

Volume II

REGIONAL ANALYSIS

Chapter One: Land Use

This chapter of the Regional Plan identifies important land resources, and describes land use trends and how they relate to the economic health and quality of life in the region. This section also describes how the use of land relates to the State-wide planning goals.

Of the 55 towns in the 3 counties of the Northeastern Kingdom, 34 towns have adopted zoning regulations which provide a framework for future land use in these communities. This Regional Plan seeks to support the land use goals of the towns in the region, while recognizing potential impacts that land use in individual towns may have on regional resources, infrastructure, and economic development.

I. LAND RESOURCES

FORESTLAND

In 2014, approximately 84% of the land in the Northeast Kingdom was covered by forest (see Table 1.0). Vermont's forestland acreage had been expanding for most of the Twentieth Century, as trees grew over land once cleared for pasture and crops. However, the USDA Forest Service data indicate that forestland throughout Vermont has decreased since 1997, although in the Northeast Kingdom this decrease was nominal.

As farmland is abandoned, trees grow over what had once been pasture and crop fields. Today, local forests provide residents of the Northeast Kingdom with a variety of benefits. The largest revenue producers in the region come from the harvesting, processing, and manufacturing of forest products. In Vermont, these have existed as sources of income since the earliest European settlements. Water and air quality, and wildlife habitats are all dependent upon the vast forests. Residents enjoy a wide variety of recreational activities in the forests as well, and much of the tourism industry relies on a healthy forest to remain viable. Hunting, fishing, snowmobiling, cross-country skiing, mountain biking, and bird and wildlife viewing are all dependent on a healthy forest. Many of these activities coexist well with responsible timber harvesting. Various game and non-game species rely on a landscape that includes forest, meadow, mixed-age trees, and forest edge environments. Snowmobiling, hiking, cross country skiing, horseback riding, and mountain biking often benefit from primitive roads maintained for logging.

	Total Land (Acres)	Accessible Forests (Acres)	Percent Forested
Caledonia	416,918	345,722	83%
Essex	426,043	405,720	95%
Orleans	445,812	332,067	74%
Northeast Kingdom	1,288,773	1,083,509	84%

Source: VT Dept. of Forests, Parks and Recreation: *Wood Supply Assessment*, 4/18/2014

While most of the Northeast Kingdom's forestland is privately owned, state, federal, and local governments own nearly 130,000 acres combined in the Northeast Kingdom (private land with

conservation easements is not counted in this figure). These 130,000 acres of publicly owned land are almost entirely forested. Nearly all public lands are open for recreation, with much of the state and privately owned timber lands actively harvested. Approximately 48,000 acres of this land came into public ownership in 1999, when the Champion International Corporation conveyed its Essex County properties to the Vermont Agency of Natural Resources (nearly 23,000 acres) and the U.S. Fish & Wildlife Service (approximately 26,000 acres).

Table 1.1 shows the accessible forested acreage for the region and counties. Accessible forestland is defined by the Vermont Department of Forests, Parks and Recreation as forest land capable of producing 20 cubic feet per acre per year and not legally withdrawn from timber production.

In 2011, over 37% of the softwoods and over 17% of the hardwoods harvested in Vermont came from the Northeast Kingdom (www.vtmi.info/profile2014.pdf). Table 1.2 shows a breakdown of the 2011 harvest by county. Harvest volumes do not include firewood volumes. In 2011 there were a total of 97 sawmills in the state, 23 of which were in the Northeast Kingdom: 10 in Caledonia County, three in Essex County, and 10 in Orleans County.

	Hardwood Board Feet (thousands)	% of State	Softwoods Board Feet (thousands)	% of State
Vermont	84,446	100%	91,972	100%
Caledonia	4,969	5.9%	10,205	11.1%
Essex	3,820	4.5%	12,941	14.1%
Orleans	6,086	7.2%	11,380	12.4%
Northeast Kingdom	14,875	17.6%	34,526	37.6%

Source: VT Dept. of Labor, Economic Demographic Profile 2014, Table 37

(See the Economic Development chapter for a discussion of Silviculture.)

Sustainable Forestry

Many forestland owners and loggers point out that they have been practicing "sustainable" management for years, as is evidenced by the health of their woodlands. The argument is made that keeping forests healthy simply makes economic sense, and therefore certification is an unneeded expense. Often, from an ecological standpoint, they are correct. Many Vermont landowners already practice what is considered "sustainable" management without being certified. However, for consumers wishing to promote good environmental stewardship, certification is the only way to distinguish between wood products from an ecologically-sound forestry operation and wood from a less ecologically-sound operation. A growing number of consumers are willing to pay higher prices for certified wood from the former, and it may benefit landowners and manufacturers to be recognized for their responsible practices.

There are a number of certification programs available to landowners and forest product manufacturers. Third party certification involves an independent audit of forest management practices and certification that forestland is being managed in a sustainable fashion. Once certified, landowners can gain access to markets for sustainably produced wood products.

Certification programs are available through the Forest Stewardship Council, Vermont Family Forests, Sustainable Forestry Initiative and the Vermont Tree Farm Program. Because the cost of certification can be prohibitive for small operations, there is certification available for groups of landowners at lower costs. Certification is also available to groups of manufacturers.

The Vermont Sustainable Jobs Fund created the "Green Guide Specs," last updated in 2009, for use by architects, builders, facility managers and communities as a way to assist them in sourcing third-party-certified Vermont forest products for construction projects.

AGRICULTURAL LAND

Farming has been an integral part of the region's economy from the time of the earliest settlements. According to the US Department of Agriculture, in 2012 there were 1,291 farms in the region, and land in farms accounted for 237,764 acres in the Northeast Kingdom, over 18% of the total land area. It is the second largest land use in the region, and has provided a livelihood for generations of residents. The future of farming in the region is evolving to respond to the challenges of low commodity prices and competition from within the U.S. and abroad. The state has lost over 10,000 farms in the past forty years. However, although there was a net loss of 1,222 acres of farmland in the Northeast Kingdom between 2007 and 2012, the region saw a gain of 31 farms during that same period (see Table 1.3). In addition, the total value of agricultural products increased by 6.2% between 2007 and 2012, even when adjusting for inflation (see Figure 6.4, Economic Development).



Table 1.3 shows the breakdown of agricultural land for the three counties and the state of Vermont in 2012, and the regional comparison to 2007. In 2012 Orleans County had the most farmland, comprising 55% of all the agricultural land in the Northeast Kingdom region, while Caledonia accounted for about 34% and Essex County, about 11%.

	Table 1.3: Land in Farms 2007 and 2012					
	Vermont 2012	Caledonia 2012	Essex 2012	Orleans 2012	Northeast Kingdom 2012	Northeast Kingdom 2007
	Acres	Acres	Acres	Acres	Acres	Acres
Cropland, including pasture	488,327	29,050	8,020	52,531	89,601	97,544
Woodland, including pastured	536,075	38,269	12,003	50,935	101,207	100,504
Permanent pasture and rangeland	139,976	9,874	923	16,942	27,739	26,421
Other Land in farms	87,335	4,635	4,545	10,037	19,217	14,517
Total Land in Farms	1,251,713	81,828	25,491	130,445	237,764	238,986
Number of Farms	7,338	560	93	638	1,291	1,260

The U.S. Natural Resources Conservation Service has mapped most of the region's primary and secondary agricultural soils. These maps are available at the NVDA office in St. Johnsbury.

(See the Economic Development chapter for a discussion of agricultural trends.)

Agricultural Support

In 2009, in response to concerns that the food system in Vermont was too reliant on food grown and distributed from outside the New England region, the Farm to Plate Investment Program was initiated, and the Vermont Sustainable Jobs Fund (VSJF) was tasked with developing a 10-year *Farm to Plate Strategic Plan*. The VSJF executive director is, by statute, a member of the Vermont Working Lands Enterprise Board, and the WLEB uses the *Farm to Plate Strategic Plan* to help evaluate areas of need to grow the food system and to make funding decisions. The *Farm to Plate Strategic Plan* is housed online on the “Vermont Food System Atlas” at <http://www.vtfoodatlas.com/atlas>. The “Atlas” serves as a clearinghouse of all Vermont farm and food sector resources.

A plan commissioned in 2010 by NVDA and prepared by the Center for an Agricultural Economy focused on developing a vibrant agricultural economy and food system in the entire Northeast Kingdom. The report released in 2011, *The Regional Food System Plan for Vermont’s Northeast Kingdom*, compares consumption of the top agricultural products in the region with the amount produced locally and identifies a large potential market for local products, particularly beef, potatoes, chicken, tomatoes, pork, apples and cheese. The report provides an assessment of the Northeast Kingdom’s food system and identifies strategies to further develop it as an integral component of the region’s economic development. Development of the plan was coordinated with the Vermont *Farm to Plate Strategic Plan*, and identifies 10 broad goals to further develop the food system in the Northeast Kingdom. The goals identified in that plan, and the strategies and action items to achieve those goals, are incorporated by reference into this Regional Plan.

Support for the region’s farming community is also provided by the University of Vermont (UVM) Agricultural Extension System, which has regional offices in St. Johnsbury and Newport. The UVM Center for Sustainable Agriculture provides technical support and funding sources for farmers, and the Vermont New Farmer Project is an initiative of the UVM extension that provides support for new and aspiring farmers.

Rural Vermont, a non-profit farm advocacy organization based in Montpelier, supports family farmers and assists them in cooperative agricultural efforts.

Farmland Preservation

Despite large amounts of undeveloped land in the region, maintaining contiguous tracts of farmland for future agricultural use continues to be an issue. The same attributes which make land desirable for farming (well-drained and little slope) are the same for residential and commercial development. Agricultural fields must generally be within close proximity to other fields used by a farmer. Preserving contiguous parcels that contain primary and secondary agricultural soils that can be used by a cluster of neighboring farms is more efficient than working scattered parcels of land.

The Vermont Land Trust is one organization that conserves prime farmland through the purchase of development rights. While a permanent easement assures the preservation of farmland in perpetuity, there are limited resources available for the purchase of easements, and some landowners may be reluctant to permanently encumber their property with an easement.

The Vermont Department of Taxes’ Use Value Appraisal Program (also known as “Current Use”) is a tax program designed to support the state’s agriculture and forest products economy. It relieves the burden of property taxes on farmers by assessing taxes based on the productive agricultural value of the land rather than on the land’s potential for development for other uses. While enrollment in current use does place a lien on the property which remains in place until the Land Use Change Tax is paid, it does not place a permanent deed restriction on the property like a conservation easement would. The Land Use Change Tax is due when property is developed or withdrawn from the Current Use program, which provides a significant financial incentive to landowners to keep the land in productive farm/forestry use rather than develop it for other residential or commercial uses. The land can be developed with structures associated with the farming or forestry use of the property without penalty.

As of January 2015, a total of 3,033 parcels in the Northeast Kingdom region were enrolled in Current Use, comprising a total of 562,855 acres. The majority of the enrolled acres, 475,655 acres, were enrolled as managed forest. Only about 16% of land enrolled (87,193 acres) were for agricultural use. Twenty towns in the region each had more than 2,000 acres of agricultural lands enrolled, with the top three being the Orleans County towns of Irasburg, with 6,242 acres; Newport Town, with 5,676 acres; and Holland, with 4,397 acres.

Local land use regulations are also an effective way to protect agricultural resources, and have the flexibility to be modified over time through a public process as a town's goals and needs change. Through the use of regulatory tools such as agricultural overlay districts, low density zoning coupled with "planned unit development" or density-based zoning, towns can assure that agricultural resources are preserved while property owners can develop their property in an efficient manner for other uses, including residential or commercial developments.

Approaches towns can use to encourage commercial uses that are agriculturally-based, but which may fall outside those recognized by the Agency of Agriculture Food and Markets, are discussed in a 2012 publication entitled *Facilitating Innovative Agricultural Enterprises*. A copy of this publication can be accessed online at the NVDA website: <http://www.nvda.net/files/VT-Ag-Guide.pdf>.

RECREATION LANDS

Recreation opportunities enhance the quality of life for residents and tourists alike, provide the health benefits of exercise, and contribute significantly to the regional economy. Outdoor recreation activities, such as hunting, fishing, hiking, snowmobiling, horseback riding, cross country skiing, and mountain biking require relatively little maintenance of the open spaces where they take place. These activities often coexist easily with other land uses such as forestry and farming, and can take place on public and private lands. For example, a portion of Darling State Park has been leased to the Burke Mountain Ski area for alpine and Nordic ski trails. In northern Essex County there are vast tracts of forest land containing networks of four-season trails that are also used for forestry operations.

Private land owners have been generous in allowing recreational use of their land. Educating users about respectful and safe use is important in maintaining access to private lands in the future. However, residential development and the subdivision of land over time can reduce the amount of private lands available for recreation. This increases the pressure on public lands and those private lands that are still accessible. State-wide, the number of acres of posted property registered with town clerks was relatively constant from 2000 through 2010.

Conserved Lands for Passive Recreation

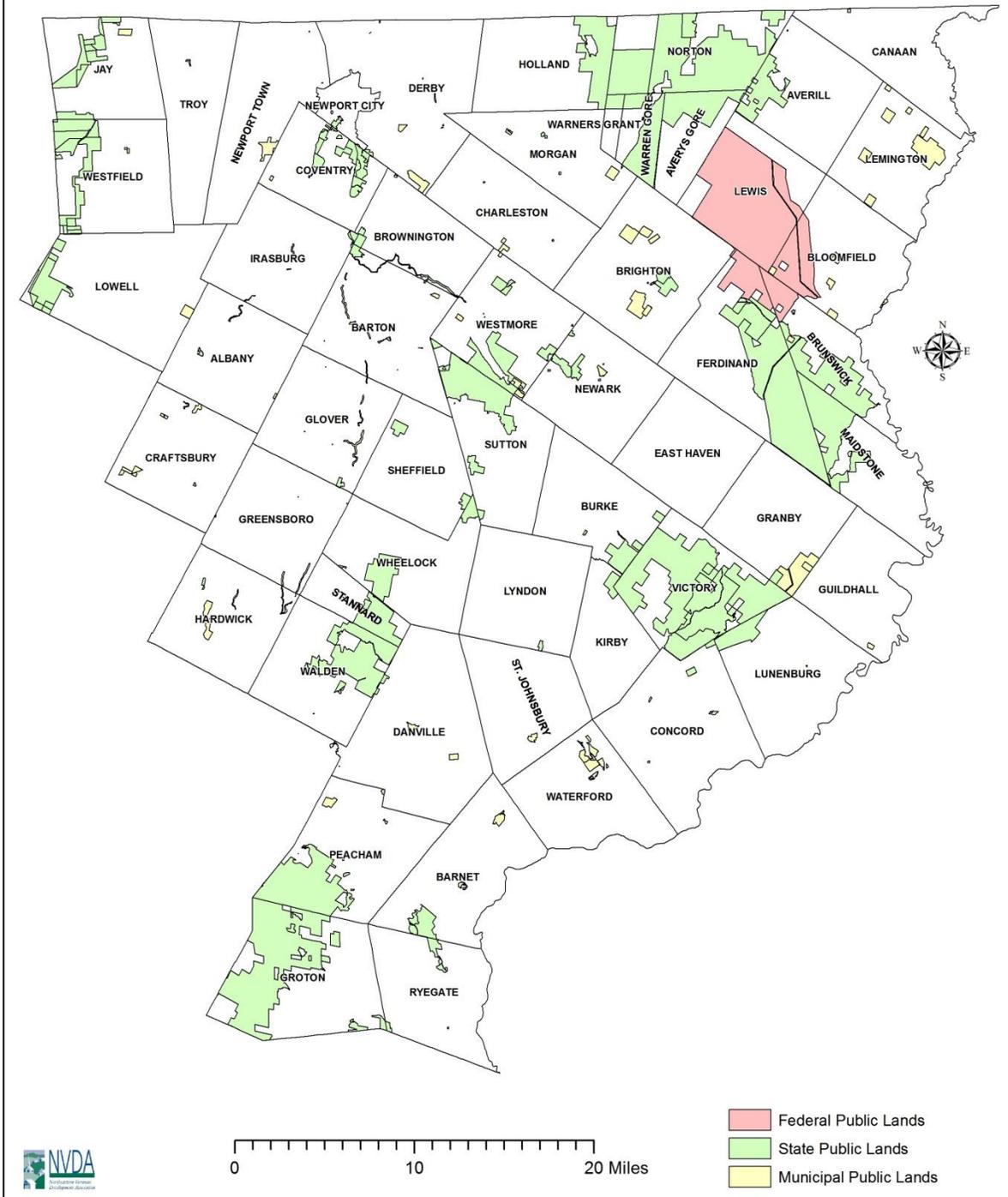
In the three counties of the Northeast Kingdom, there are 26,625 acres of federally-owned or controlled land, 137,171 acres of state-owned or controlled land, and 10,327 acres in municipal forests. This land, whether conserved by fee ownership or by an easement on privately-held land, allow for varying levels of public access and are an important passive recreational resource. Some trails and logging roads are actively maintained by the state or non-profit land conservation organizations. The Vermont Association of Snow Travelers (VAST) is one such organization that maintains trails on both private, unencumbered land and publicly held land.

Figure 1.1 "NVDA: Public Lands" shows the location of lands held or controlled by local, state and federal agencies.

NVDA: Public Lands

Figure 1.1

June 2015



Active Recreational Facilities

Sports fields, playgrounds, parks, improved trails, and lake and river-access require more maintenance and usually some form of public investment. A more detailed listing of these facilities is included in Utilities and Facilities Section of this Plan.

Considerations

Municipalities should consider their residents' current and future needs for public spaces, water body access, and recreation facilities. This can be done through the municipal plan or in a separate recreation plan or open space plan. Municipalities should work in conjunction with their neighbors in the planning and development of recreation spaces so as to complement each other's investments.

As noted above, landowners in the region are often willing to allow their land to be used for passive recreational use, particularly in the winter; however, if land is not protected through easements or regulated through zoning, the recreational potential of these lands can disappear if the landowner decides to develop the property or sell to a new owner with different interests. This can happen piecemeal over many years, as house lots are carved out of large tracts of open space. Therefore, it is important that municipalities recognize that lands held privately may not be available for recreational use in the future, and plan accordingly.

The Statewide Comprehensive Outdoor Recreation Plan (SCORP) is a plan that identifies existing outdoor recreation opportunities and issues, and sets goals and objectives for the coming years. To qualify for federal Land and Water Conservation Funds, states must revise the State Comprehensive Outdoor Recreation Plan (SCORP) every five years. These funds can be passed through to municipalities. Vermont's latest Plan, for the period 2014-2018, contains an action plan that is incorporated in this regional plan by reference. The SCORP is available online at <http://www.vtfpr.org/reclwcf/SCORP%202014-2018.pdf>.

GOALS AND STRATEGIES FOR THE PROTECTION OF LAND RESOURCES

FORESTLAND GOALS

- Sustainable forestry will remain an economically viable tool to preserve woodlands, open space for recreation, and local character.
- Mixed-use forests will allow for expanded economic benefits to forest owners while encouraging sound ecological practices and recreational access to the public.
- Value-added processing opportunities for wood resources in the region will increase.
- Residential and commercial development patterns will occur in such a way as to retain the productivity of the region's accessible forests.
- State and federally-controlled land is an important resource for passive recreation and will continue to be accessible to the public.
- Municipalities with land in municipal forests will have the capacity to manage the land for its resource value and public recreational use.

FORESTLAND STRATEGIES

- Continue to provide planning assistance to communities seeking to conserve valuable forest land. Encourage landowners to enroll productive forestland in the "current use" program. In communities that have land use regulations, encourage the use of planned unit development coupled with low density zoning to preserve larger blocks of forestland while facilitating efficient residential and commercial development.

- Connect municipalities with appropriate agencies and resources providing management assistance with municipal forests.
- Provide management, financial, and technical assistance to local forest product industries, including wood product manufacturers, sawmills, paper mills, and wood-powered electrical generators (cogeneration).
- Maintain enough forest land to support wood-related industries, retain the region’s natural beauty, protect fragile areas, encourage wildlife, promote recreational usage, and maintain a healthy, sustainable forest based economy.
- Support the development and marketing of distinctive wood products identifiable with Vermont and/or the Northeast Kingdom.
- Support owners of forestland who implement sustainable forestry practices to market their wood and wood products.
- Expand usage of existing rail infrastructure for shipping and interface with trucking. Explore the creation of forest-related industrial zones (i.e. rail sidings for sawmills)

AGRICULTURAL LAND USE GOALS

- Farming and agriculture will remain an important and viable sector of the regional economy.
- Contiguous tracts of agricultural soils will be preserved.
- Development of residential and commercial uses will not significantly reduce the amount of open and productive farm land.

AGRICULTURAL LAND USE STRATEGIES

- Continue to provide planning assistance to communities seeking to conserve productive agricultural land. Encourage the use of “planned unit development” coupled with low density zoning and other tools to preserve agricultural resources.
- Provide technical assistance to towns seeking to encourage on-farm enterprises, through the use of land use regulations or incentives.
- Provide support to farmers interested in diversification and/or product development. Assist with grants and low-interest loans for value-adding businesses and diversification.
- Identify funding sources for, and market existing and new food ventures in the region.
- Support education efforts that teach sustainable agricultural practices, and the tax benefits of enrollment in the “current use” program.

RECREATION LAND USE GOALS

- Sufficient open space will be available for current and future outdoor recreational pursuits.
- A variety of year-round and seasonal, indoor and outdoor recreation opportunities will be available for residents and visitors.
- Public access to water bodies will be protected.

RECREATION LAND USE STRATEGIES

- Assist towns to plan for future recreation needs, recognizing that privately-held land may not be available for passive recreational use in the future.
- Assist with financing to develop additional facilities such as sports fields, playgrounds, trail systems, ice rinks, skateboard parks, and recreation/bike paths, coordinating actions with the goals in the SCORP in order to access dedicated federal funds.
- Identify and protect public access to water bodies.
- Identify the recreation facilities and activities most needed by youths and seniors and help towns identify and secure funds for their development.
- Support local and regional recreation events (e.g. fairs, festivals, etc.).

II. EXISTING LAND USE & DEVELOPMENT TRENDS

Development patterns in northeastern Vermont have historically followed the valleys and waterways of the region. Early European settlers farmed the fertile soils of Orleans, Caledonia Counties and the Connecticut River valley in Essex County, using the rivers for moving logs and powering mills. Through the years, Caledonia and Orleans received the bulk of development, particularly around St. Johnsbury and Lyndon in the south, and Newport and Derby in the north. Smaller population and commercial centers also dotted the region. Development historically occurred in the form of compact village centers surrounded by a working landscape of farms and forestland. Though much of the old farmland has returned to forest, this traditional Vermont landscape has remained the dominant pattern of land use in the region. The map on the following page, “NVDA: Current Land Use,” illustrates the region’s current development patterns.

Most communities in the U.S. today have had to deal with some form of suburbanization, sprawl, loss of farmlands, and/or Brownfield issues influencing their development. To insure appropriate development for the Northeast Kingdom it is necessary to observe the development factors affecting other communities in order to direct future land uses appropriately.

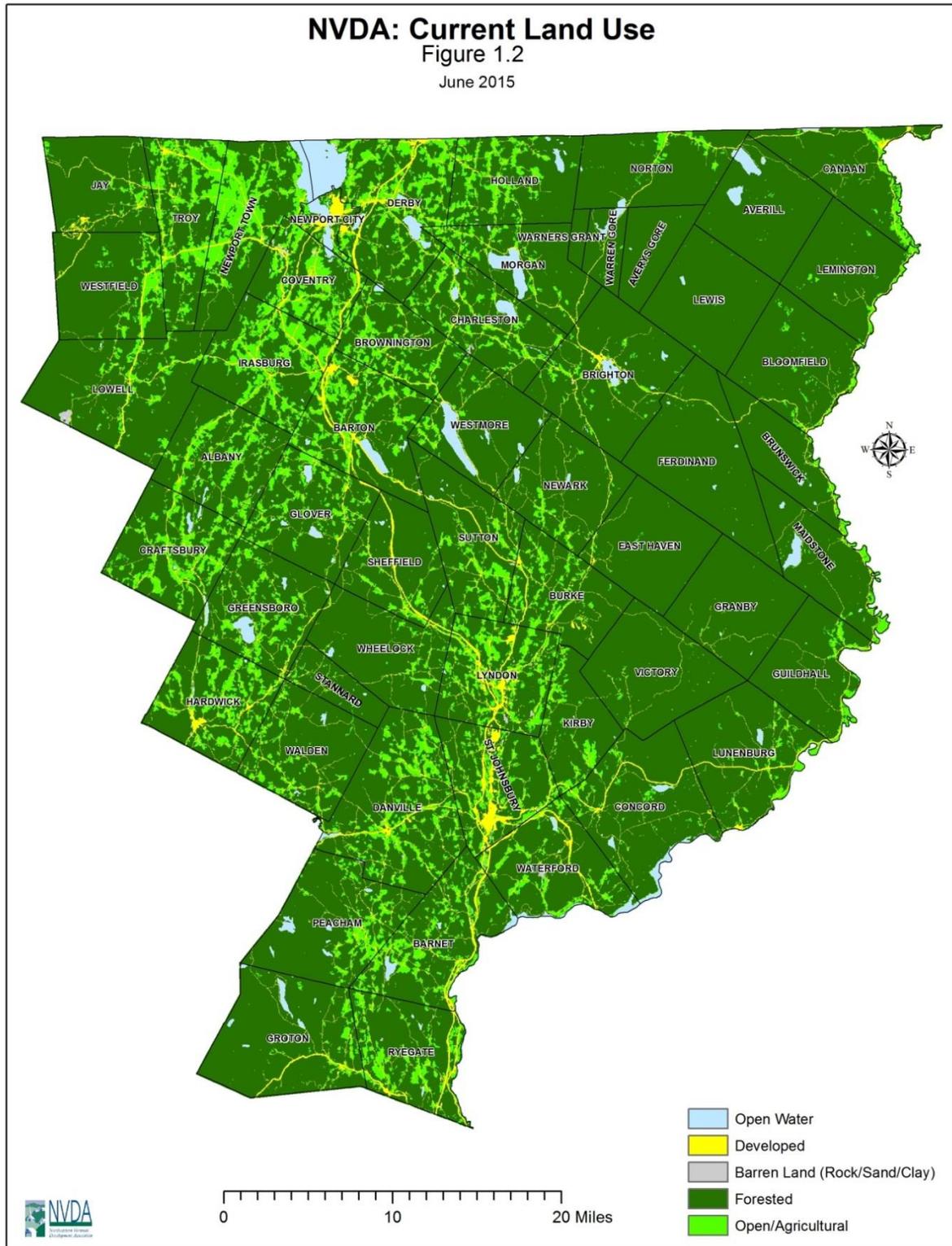
Suburbanization and Sprawl

Population and transportation changes, expanded road systems, a loss of farms, and an increase in regional tourism have all contributed to alter the patterns of settlement in Vermont. Visitors, second-home owners, and increasingly mobile residents often desire homes and services in the region’s scenic rural settings. Dispersed residential development can fragment wildlife habitats and productive forestland and agricultural land, and can result in sprawling local road networks that are difficult and expensive to maintain.

When residential development occurs in remote areas, driving becomes a requirement for most trips, increasing traffic congestion and causing greater demands on road infrastructure. The cost of associated improvement of roads, and increased demand for services including fire, ambulance and law enforcement, are often not covered by the tax revenues generated by these developments. This is particularly true when resulting disinvestment occurs in the existing town or village center, thus lowering property values and the grand list. The economic decline of established centers and the depletion of agricultural and forested land through residential subdivisions is a self-perpetuating problem that is hard to correct without intervention. Intervention can come in the form of financial incentives, local land use regulations, and transportation and housing policies that direct new development and public investment to Town centers. (See discussion of State designation programs in [Section III. Future Land Use & Development](#)).

Local land use regulations that establish low residential densities, (e.g., one residential unit per 25 acres) in agricultural areas, coupled with mandatory clustering or “planned unit development” is an effective way for Towns to protect valuable agricultural and forested land while promoting efficient, well-designed residential development. Towns may also want to promote the high value of the land for a variety of agricultural

enterprises by zoning specifically to accommodate these uses, with residences permitted only as accessory uses.



Brownfields

Brownfields are defined by the Environmental Protection Agency (EPA) as "Abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination". Though Northeastern Vermont is not typically associated with issues such as these, there are many sites throughout the region where past uses led to the contamination of soils. Questionable or contaminated sites in the region are commonly located in or near urban areas with existing industrial infrastructure. Often, the responsible parties are no longer owners of the property; others are businesses that are now defunct; and though local governments are often aware of such problems, they have no money for clean-up.

The remediation of contaminated properties faces several obstacles. The potential for hidden, open-ended costs associated with cleanup is often enough to keep developers away. Current liability issues and low prices of prime developable land ("greenfields") make the reuse of some sites unlikely without incentives. Unfortunately, what is left is frequently a vacant or abandoned eyesore and potential health hazard. Abandoned sites do not contribute significantly to the property tax base and contaminated sites lower the property values of surrounding lots.

Reasons to reuse or redevelop brownfield sites include bringing unused properties back onto the tax rolls, maintaining local property values, and alleviating the need to build new sewer, energy, and transportation infrastructure. Reuse also reinforces efforts to maintain traditional development patterns by encouraging compact development and reducing pressures on undeveloped land. Federal and state grants, revolving loan funds, tax increment financing (TIF), and liability insurance (Brownfields Reuse and Environmental Liability Limitation Act – BRELLA) are some of the tools commonly used to finance brownfield redevelopment. These are all financing methods that communities need to consider. NVDA provides assistance to Towns in securing funds to assess and remediate Brownfields.

Shoreline Development

The Northeast Kingdom possesses a majority of the state's lake and ponds, and also the majority of undeveloped shorelines. Recent increases in the development of second homes, camps, and primary residences have decreased the amount of undeveloped shoreline. Since the clearing and development of shorelines can negatively impact water quality, the State enacted the Vermont Shoreland Protection Act in 2014. The provisions of this Act require property owners to obtain a state permit for most development and clearing activities within 250 feet of the shores of lakes that are 10 acres or larger in size. In Caledonia County, all towns with the exception of Burke and St. Johnsbury have lakes that are large enough to be subject to the State Shoreland Act. In Essex County, all towns with the exception of Bloomfield, East Haven, Guildhall, Lemington, Victory and Warner's Grant have lakes subject to the State Shoreland Act; and in Orleans County all towns with the exception of Troy and Westfield have lakes subject to the provisions of the Act. Towns have the ability to seek delegation of review under the State Act, provided they have local regulations that are at least as stringent as the State's. Greensboro, in Orleans County, was the first and only town in the Northeast Kingdom region to seek delegation authority for review of permits under the State Shoreland Protection Act.

Designated Downtowns and Village Centers

The Division of Community Planning and Revitalization within Vermont's Department of Housing and Community Development oversees a State designation program that encourages communities to reinvest in their downtowns and village centers. With designation comes numerous benefits, including tax credits, loans, and grants from various state agencies. Two of the designation categories that communities in the region have applied for and received are "Village Center" designation and "Downtown" designation. Details of these programs and application requirements can be found on the website of the Agency of Commerce and Community Development at http://accd.vermont.gov/strong_communities/opportunities/revitalization.

Benefits of Village Center designation include tax credits available to the owners of income-producing properties for historic rehabilitations, façade improvements, and code improvements (including installation of elevators and sprinkler systems). Benefits also include priority consideration for Municipal Planning Grants and funding from Vermont’s Community Development Program, and priority consideration by the State Building and General Services when leasing or constructing buildings. Significant benefits of Downtown designation include all the benefits of Village Center designation, in addition to a 50% technology tax credit for data and network improvements, and access to the Downtown Transportation Fund which includes grants of up to \$100,000 for capital transportation and related capital improvements. The “Downtown” designation requires the establishment of an ongoing non-profit organization that works in partnership with public and private sectors to plan and implement a comprehensive downtown revitalization strategy.

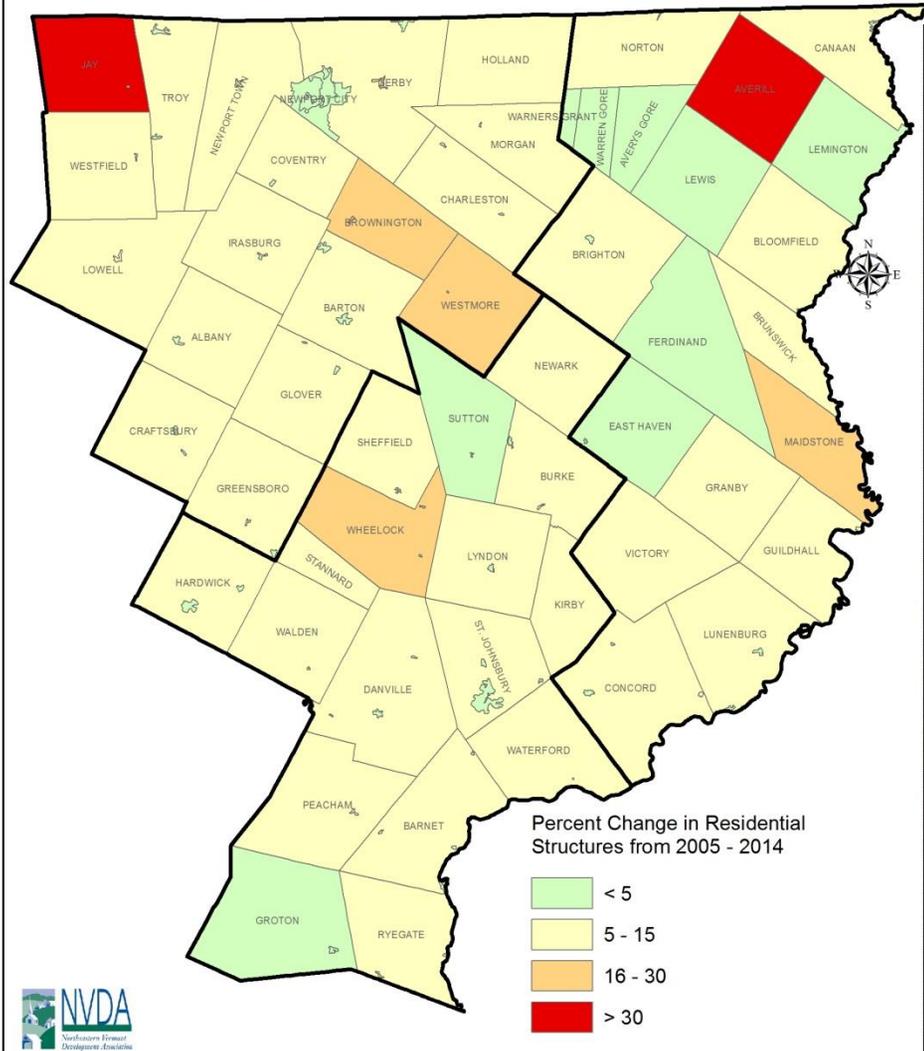
The Northeast Kingdom currently has only two designated Downtowns – St. Johnsbury and Newport City. Towns with Village Center designation in the region include Barton, Brighton (Island Pond), Burke (East Burke Village and West Burke Village), Craftsbury (Craftsbury Village and Craftsbury Common), Danville, Derby (Derby Line Village), Greensboro (Greensboro Village and Greensboro Bend), Hardwick, Lyndon, and Peacham. These areas are depicted on the “NVDA: Future Land Use” map. The Town of Hardwick is considering pursuing the Downtown designation, and the Village of Orleans in the Town of Barton is considering Village Center designation.

Assessment of Residential Growth

In 2013, the State developed a methodology for mapping “community center” areas. The goal was to assess progress towards the state’s primary land use goal of maintaining settlement patterns of compact village and urban centers separated by rural countryside. The identification of community centers was to include all state-designated centers, including new town centers, growth centers and neighborhood development areas. Recreational facilities and parks adjacent to the centers were to be included, as well as neighboring residential areas that are pedestrian-oriented or have density that is significantly greater than surrounding areas. Areas that would be defined as “strip development” were to be excluded. A total of 63 centers were identified in the region. E-911 points were used to determine how much residential development had occurred in centers, as compared to outside of centers, from 2005 to 2014. Although this analysis doesn’t account for multi-unit structures (each structure is counted as one, even if it has multiple residential units) this analysis shows that the vast majority of new residential construction since 2004 has occurred outside of centers. The results of this analysis are depicted on the map, “Residential Development from 2005-2014, NVDA Region.”

Residential Development from 2005 - 2014 NVDA Region

Figure 1.3



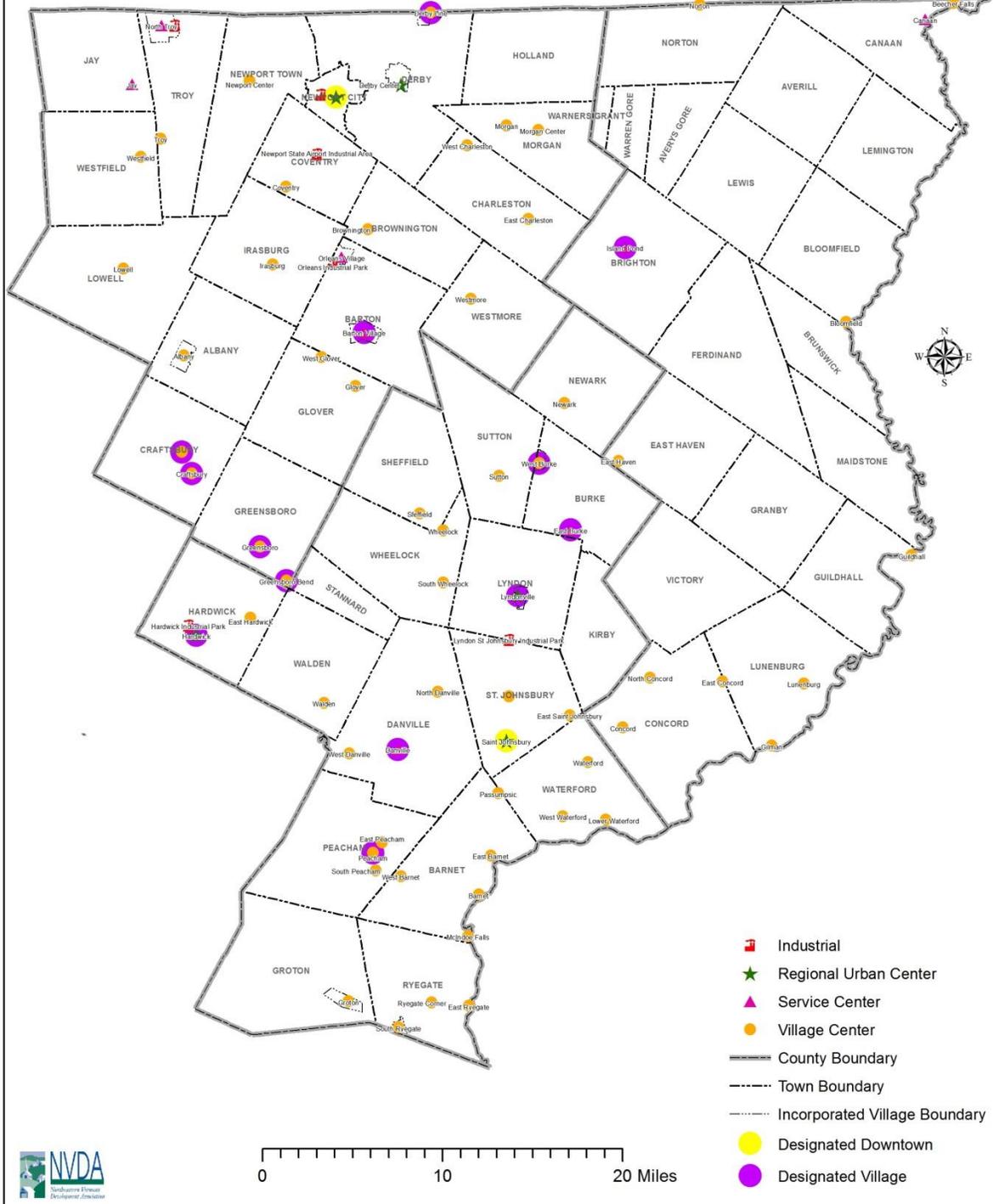
Total # of Residential Structures Added and Percent Change - 2005 to 2014

TOWN	# Structures Added		Percent Change	
	In Centers	Outside Centers	In Centers	Outside Centers
ALBANY	-4	43	-5.48%	12.29%
AVERILL	0	5	0.00%	100.00%
AVERYS GORE	0	0	0.00%	0.00%
BARNET	2	51	1.90%	7.94%
BARTON	3	41	0.82%	6.69%
BLOOMFIELD	0	12	0.00%	10.34%
BRIGHTON	0	58	0.00%	11.62%
BROWNINGTON	2	60	16.67%	16.85%
BRUNSWICK	0	6	0.00%	13.95%
BURKE	0	76	0.00%	11.59%
CANAAN	1	27	0.62%	10.42%
CHARLESTON	3	53	8.33%	11.37%
CONCORD	1	43	0.79%	10.72%
COVENTRY	1	49	2.86%	14.54%
CRAFTSBURY	0	52	0.00%	10.77%
DANVILLE	-1	88	-1.09%	10.63%
DERBY	24	119	0.00%	8.19%
EAST HAVEN	0	3	0.00%	2.65%
FERDINAND	0	0	0.00%	0.00%
GLOVER	5	46	8.33%	12.67%
GRANBY	0	5	0.00%	12.20%
GREENSBORO	0	28	0.00%	8.21%
GROTON	2	10	2.82%	3.13%
GUILDHALL	2	8	11.11%	7.14%
HARDWICK	7	62	1.75%	9.14%
HOLLAND	0	18	0.00%	6.23%
IRASBURG	-1	57	-2.33%	13.16%
JAY	0	144	0.00%	63.72%
KIRBY	0	19	0.00%	9.95%
LEMINGTON	0	1	0.00%	1.89%
LEWIS	0	0	0.00%	0.00%
LOWELL	2	44	5.26%	14.72%
LUNENBURG	2	43	1.27%	10.36%
LYNDON	1	90	1.64%	5.43%
MAIDSTONE	0	20	0.00%	28.57%
MORGAN	0	35	0.00%	9.94%
NEWARK	0	48	0.00%	15.79%
NEWPORT CITY	28	8	2.55%	4.94%
NEWPORT TOWN	2	57	2.50%	9.81%
NORTON	0	8	0.00%	8.51%
PEACHAM	3	29	9.09%	8.61%
RYEGATE	0	38	0.00%	9.41%
SHEFFIELD	-2	31	-5.88%	12.02%
ST. JOHNSBURY	3	81	0.24%	9.67%
STANNARD	0	10	0.00%	10.75%
SUTTON	0	8	0.00%	2.21%
TROY	4	66	1.16%	15.49%
VICTORY	0	4	0.00%	5.56%
WALDEN	1	50	25.00%	14.25%
WARNERS GRANT	0	0	0.00%	0.00%
WARREN GORE	0	0	0.00%	0.00%
WATERFORD	1	44	50.00%	8.87%
WESTFIELD	1	27	4.17%	14.14%
WESTMORE	0	44	0.00%	23.40%
WHELOCK	-1	49	-4.17%	16.50%

NVDA: Future Land Use 2015

Figure 1.4

June 2015



III. FUTURE LAND USE & DEVELOPMENT

Categories of Land Use

If we look at our current land use from a development standpoint, the region can basically be divided into five broad categories:

1. Regional Urban Centers
2. Service Centers
3. Village Centers
4. Rural Areas
5. Industrial/Business Areas

The Regional Urban Centers, Service Centers, Village Centers, and Industrial/Business areas are depicted on the map, “NVDA: Future Land Use 2015.” Other areas are Rural, which includes open agricultural fields and forested areas. The areas are categorized for growth based on the following development pattern descriptions. These descriptions are general in nature and can be used to guide growth in an appropriate manner, keeping in the character of the area.

The Future Land Use Map and accompanying text is intended to complement local plans and provide guidance to communities developing local plans. It is not intended, nor should it be used, to supplant any local planning effort. The identification of future land use categories in the regional plan is general in nature; locally-adopted plans are informed by locally-determined goals, and local knowledge.

Regional Urban Centers Description

Regional Urban Centers are areas with concentrated development that provide the core support services for the less developed outlying areas. Higher capacity road infrastructure, municipal sewer and water, energy infrastructure, and emergency services are in place to support heavier development in these areas.

The Northeast Kingdom has two long-established regional urban centers, one centered on the Caledonia County seat and the other on the Orleans County seat. The regional urban center in the St. Johnsbury/Lyndon area serves the southern section of the region, and Newport City/Derby regional urban center serves the northern section. Transportation infrastructure plays an important role. St. Johnsbury/Lyndon is located at the intersections of Interstates 91 and 93, Route 5, and the main east-west connector Route 2. Newport City/Derby is also on Interstate 91 and Route 5, as well as Route 105. Rail yards operate in both St. Johnsbury and Newport City. Caledonia County Airport is located in Lyndon, and the Northeast Kingdom International Airport (previously the Newport State Airport), is in a growing, aviation-related industrial area just outside of the Newport City limits in Coventry.

Over one-half of all employment in the Northeast Kingdom is located in the two urban centers. In 2012, the Northeast Kingdom had a combined 22,164 jobs; 8,263 of these were in the St. Johnsbury/Lyndon area, and 5,863 were in the Newport City/Derby area. Major sectors providing employment in the region include health care/social assistance, retail trade, manufacturing – precision metals and wood products, accommodation/food services, and construction. (VTLMI 2012). Both urban centers have industrial parks, regional hospitals, various state offices, and dense commercial development. Lyndon State College, Springfield College, Lyndon Institute, and St. Johnsbury Academy are located in St. Johnsbury/Lyndon, and the North Country Career Center is located in Newport/Derby. Branches of the Community College of Vermont, and University of Vermont Extension offices are located in both centers.

These regional centers are also home to significant cultural and recreational resources and performing arts venues. In the St. Johnsbury/Lyndon regional hub, resources include the Fairbanks Museum and Planetarium, the Athenaeum, Catamount Arts, performance venues at St. Johnsbury Academy, Lyndon Institute and the Alexander Twilight Theater at Lyndon State College; and the Caledonia County Fairgrounds in Lyndon. Resources in the Derby/Newport City hub include the historic Haskell Opera House in Derby Line Village, the Goodrich Memorial Library in Newport, North Country Union High School, which hosts an annual music festival for all high schools in the region, and attractions along the Lake Memphremagog waterfront.

Housing density is greater in the regional urban centers than other towns in the region, with a mix of single family homes and multi-unit housing serving a range of income levels. In downtowns, structures often have commercial ground floors and residential upper floors. Combined, the two urban centers contain almost one-third of the housing units in the entire region. According to the American Community Survey's 2013 estimates, St. Johnsbury/Lyndon had a total of 6,104 housing units, about one sixth of the entire Northeast Kingdom's housing stock (which is 37,201). Newport City/Derby had a total of 4,717 housing units.

Other nearby major urban centers providing employment, services, and cultural opportunities to the region are Montpelier, Littleton, NH, West Lebanon, NH, and to a lesser extent, Magoog and Sherbrooke, Quebec.

The Town of Hardwick, previously identified as a service center, is an emerging regional urban center. State highways 14 and 15 converge in the center of the downtown area, and the southern terminus of State Route 16 intersects with Route 15 in the eastern part of Town. Hardwick's Village Center designation by the State has been instrumental in encouraging investment in downtown. In addition, the industrial park adjacent to the



downtown area has supported small industrial and commercial operations important to the local and regional economy, primarily in the value-added agricultural sector. Downtown Hardwick has a variety of historically significant civic buildings important to the vitality of the downtown, among which are the Jeudevine Library and the Hardwick Town House. The Town House serves as a venue for community functions and performances and provides gallery space. The building regularly hosts the Vermont Philharmonic, the Craftsbury Chamber Players, and Vermont Vaudeville, among other groups. Due to the growth of its commercial core and the importance of its cultural resources, Hardwick is a good candidate for Downtown designation, and is considering an application.

Service Centers

Historically, a number of sub-regional service centers in the Northeast Kingdom met the everyday needs of residents, farmers and loggers in the surrounding rural areas. While the function of these service centers has changed somewhat over the years, these communities remain important centers for commerce, services, employment and community life. Barton (with its incorporated villages of Barton and Orleans) in Orleans County, and Hardwick in Caledonia County are two of the more significant service centers, providing 1,386

and 1,013 jobs in the region respectively. Other communities in this group include Orleans, Brighton-Island Pond, Canaan-Beecher Falls, North Troy, Jay, East Burke, and Danville.

The service centers are separated by distance from the two regional urban centers, and generally do not provide enough employment to be completely self-contained. As a result, many of the residents have to travel to the larger urban centers for employment. The growing availability of high speed internet in the Northeast Kingdom, residents now have more options to work from home, sometimes at great distances from their primary place of employment. In addition, many residents have found success in marketing products from their home-based business over the internet.

With some exceptions and individual variations, the service centers provide municipal water and sewer and employ municipal staffs. Other limited government functions may also be carried out in these communities. For example, Vermont Agency of Transportation has maintenance garages in Canaan, Barton and Brighton. All service centers are served by at least one state highway. Community health centers or medical clinics also exist in Barton and Island Pond and Danville.

Land use patterns in service centers have remained relatively stable over time. Change is very gradual. The cores of service centers continue to be characterized by relatively dense mixed land uses, containing civic, governmental, commercial, and mixed residential uses - not unlike times past. For the most part, the boundaries of the centers have remained unchanged over many decades.

Service centers typically have significant areas for industrial use and development. Large-scale resource-based industry in these communities was rooted in their early histories. This is exemplified by the Ethan Allen plants in Orleans and Beecher Falls. However, a reliance on a few large industries makes those communities very vulnerable to fluctuations in the national and regional economies. These service centers still have land set aside for future commercial and industrial development and would be happy to attract industry of any size. Orleans, North Troy and Hardwick all have industrial parks. Recent business development has occurred in both the Orleans and Hardwick industrial parks.

Jay and East Burke are special examples of service centers. These villages have maintained their role as service centers, primarily because they now serve the recreation needs of residents and visitors. Both have winter economies based on down-hill skiing, and to a lesser extent, cross-country skiing. Jay Peak, which recently went through a major expansion period, and along with Burke Mountain Resort with its new development projects, will both become four-season resorts. Expanded activities in recent years include mountain biking, vacation housing developments, hotel developments, and recreation facilities. Jay is the only town in the Northeast Kingdom that provides a higher number of jobs than their total population count. Based on 2012 data from the Vermont Department of Labor, there were 775 jobs in Jay, but the town's population was only 539.

Island Pond, the "Snowmobile Capital of Vermont," is a traditional industrial service center that is becoming more reliant on its recreation resources. Brighton State Park and a sizeable private campground have for many years contributed to Island Pond's summer economy. Large blocks of conserved land that are managed, through fee-ownership or easements, by the State of Vermont and the US Fish and Wildlife Service, also helps to support the tourist industry. Miles of four-season trails are used by cross country skiers, snowmobilers, hikers, and equestrians. Opportunities for bird watching, in particular, present an important draw for tourism and are dependent on the boreal forest habitat.

Village Centers

The Northeast Kingdom has retained many of its small, traditional New England villages located in rural settings. These continue to provide convenient access to basic goods and amenities for the local rural population in the form of general stores, dining, and fuel. Villages also usually have some small-lot residential housing, and such community buildings as libraries, schools, town halls, clubs, and churches. Many villages offer services for visitors from outside of the region, including inns, bed and breakfasts, dining, and access to recreational activities. Glover and Craftsbury are two examples of village centers.

Characteristics of Village Centers:

- Village/Town center with denser residential patterns than surrounding rural area.
- Appropriate businesses mainly serving the local population (small stores, dining, and some services) and visitors from outside of the region (inns, bed and breakfasts, and recreation).
- Emergency services
- Community buildings such as libraries, schools, town halls, churches, and clubs.

Rural Areas

Most of the region's land lies outside of the town and village centers. It consists mainly of the farms and forestlands of the traditional Vermont landscape. These land uses are supported by the regional urban centers, service centers, and rural villages, where most of the people and commerce are located. These rural areas should receive very little commercial or industrial development unless it occurs in an established industrial park, or in an area specifically designated in the local zoning bylaw or identified in the Town Plan as being well suited to such uses.

Industrial Parks

Some land uses, such as research and development facilities, certain manufacturing processes, warehouses, and trucking-related businesses may be more appropriately located outside of any of the above “center” areas because they 1) would be incompatible with nearby residential areas, 2) require immediate access to a major railroad or highway, or 3) need substantial amounts of land. Clustering these land uses in industrial parks can have the multiple benefits of efficient use of land and efficient provision of required infrastructure.

NVDA has helped develop four fully-serviced industrial parks along with incubator buildings in the towns of Hardwick, Lyndonville/St. Johnsbury, North Troy, and Orleans Village in the Town of Barton. In Newport City, near the border with Derby, there is an existing industrial park that will be home to the new AnC BIO VT, a biotechnology and manufacturing facility. In Coventry, the site of the Newport State Airport, recently renamed the Northeast Kingdom International Airport, is expanding its aviation infrastructure and will be adding an airplane assembly plant and a bonded warehouse facility in the near future.

Desired Future Development Patterns

Development Patterns in Centers (Village, Service and Regional Urban)

Municipalities that have been identified as Village Centers, Service Centers, and Regional Urban Centers on the Future Land Use Map can realize benefits, such as greater walkability, more efficient use of services, and stronger support for retail business uses, from denser residential development in the urban core. The appropriate residential density for a particular community will depend on existing development patterns, and accessibility to public water and sewer. Four units per acre is the typical density found in the highly walkable, pre-car-dependent residential neighborhoods adjacent to downtown business district in places like St. Johnsbury and Newport City. However, lower densities may be dictated by lack of public sewer and water infrastructure in other centers. Higher residential densities may be appropriate in areas supporting mixed uses (e.g., apartments over stores in the business district).

Ideally, development will occur within the core center area, and not expand into undeveloped areas outside the center via strip development. “Strip development” is defined by the State as “linear commercial development along a public highway that includes three or more of the following characteristics: broad road frontage, predominance of single-story buildings, limited reliance on shared highway access, lack of connection to any existing settlement except by highway, lack of connection to surrounding land uses except by highway, lack of coordination with surrounding land uses, and limited accessibility for pedestrians.” With the addition of Criterion 9L to the Act 250 permitting process, it will be more difficult for commercial and large residential developments to get state permits for developments perceived to be linear in nature.

However, it is not recommended that local zoning confine commercial or dense residential development to the boundary of any State-designated center in the municipality. The State downtown and village center designation process looks at existing commercial uses, not potential uses, because it is essentially a rehabilitation and revitalization program for areas with aging building stock. Therefore, land that is appropriate for denser development but is not yet developed as such is consequently excluded from the delineation of a State-designated “center.”

The relatively newer “Neighborhood Development Area” is a complimentary state designation program for areas adjacent to existing designated centers. This designation is intended to encourage municipalities and developers to plan for new and infill housing in the area within walking distance of its designated downtown or village center. It is recognized that the improvement and development of housing in these areas will support the commercial establishments in the designated centers. Benefits of designation include the exemption of certain mixed – income projects from Act 250 regulations; a 50% discount on Act 250 fees for projects that are not exempt; a cap on the amount of State review fees for wastewater permits that will tie into an approved municipal system; and exemption from the land gains tax.

Promoting neighborhood development areas will be a useful approach to directing new housing development to existing centers, rather than undeveloped rural areas. In order for “neighborhood development areas” to effectively provide alternatives to car-dependent residential subdivisions and combat sprawl, it must be ensured that housing products for workforce (housing available to residents making up to 120% of the area median income) and upper-income households are included in the mix of new housing that is developed. As projected commercial development in the region is expected to bring middle and upper-wage earners to the area, it will be important to provide desirable housing options in or near existing centers to combat development pressure on rural lands. It will take considerable effort and long-range strategic planning to alter the trend of new residential development occurring primarily outside of centers.

Development Patterns in Rural Areas

Just as the state designation programs mentioned above can help direct commercial and residential development to existing centers, these programs also help retain the important agricultural, forestry and recreation use of rural areas that lie outside of the commercial and residential cores.

When residential development occurs in rural areas, it should not result in the fragmentation of forestland or agricultural land such that it impedes the economic feasibility of agricultural or forest-based enterprises. Development in rural areas should also preserve, to the extent practicable, connections that facilitate the passive recreational use of land (e.g., trails).

Promoting commercial development that is tied to the agricultural use of the land, though zoning measures and/or educational outreach to residents, is one way to preserve the working landscape. Another way to achieve this desired pattern of development is to keep overall residential densities low in agricultural areas (e.g., one residential unit per 25 acres), coupled with clustering or “planned unit development” with an established maximum building envelope size.

For rural areas that are on the fringes of downtown and village centers, permitting higher residential densities and some commercial uses coupled with clear standards for pedestrian connections to the centers, is a way to accommodate growth while encouraging sustainable design.

Agricultural soils in rural areas outside centers or industrial parks should be conserved to the maximum extent practicable.

Development in Industrial/Business Parks

Industrial/business parks should be sited in locations served by major federal or state highways, airports, or railroads. Industrial/business parks are encouraged to be densely developed while allowing enough space for business expansion. Infrastructure (water, sewer, and electric power) connections designed to serve industrial parks should not contribute to strip development outside of the industrial parks.

Off-site mitigation of agricultural soils would be appropriate when new industrial/business parks are developed. However, land in the region's existing industrial/business parks should not be required to mitigate for agricultural soils when they are developed as they are all locally zoned for commercial and industrial use.

Projected Future Development in the Region

There are several projects in the works and on the horizon in the Northeast Kingdom that could spur increased development in towns throughout the region. The construction of a new, 116-unit hotel and conference center is planned for Burke Mountain, which will draw increased numbers of tourists and will employ a staff of 200. It is expected that this major expansion will spur increased commercial development catering to tourists and workers, and will place increased demands on services and facilities, including police/emergency services and child care facilities. However, although more school-aged children would be expected with this growth, most schools in the region have been experiencing declining enrollment so the growth is expected to support rather than overwhelm existing schools. Schools operating close to capacity reach economic efficiencies not possible in schools with very low enrollment.

The AnC BIO VT biotechnology facility in Newport is projected to create between 300 and 500 jobs, many of them high-wage. An \$8.8 million expansion to the Northeast Kingdom International Airport in Coventry is proposed, and associated with the airport expansion are plans to construct a 50,000 square-foot airplane assembly plant at the airport, which is also expected to bring a number of skilled jobs to the region.

Another major project is the addition of a 15,000 square-foot indoor recreation center at the Jay Peak ski resort. The Jay Peak resort has recently initiated free bus transportation to transport employees to the resort from outlying towns. Bus routes serving Barton, Orleans, Lowell, Island Pond, Newport, Newport City, and some towns from outside the region are planned.

Increased demand for housing to serve both local residents with increased spending power and vacation homeowners is expected in the region. In order to gain the maximum economic and community benefit to Northeast Kingdom communities and retain economically valuable agricultural and forestry lands, compact development should be incentivized in areas close to existing commercial and residential areas (but outside flood hazard areas). Expansion of public sewer and water facilities may be necessary to absorb new housing and commercial growth.

IV. DEVELOPMENTS OF SUBSTANTIAL REGIONAL IMPACT

For the purposes of this plan, Developments of Substantial Regional Impact are defined by the Northeastern Vermont Development Association as:

1. Projects that would have substantial and ongoing impact on two or more municipalities, including the host municipality.
2. Projects that would likely have substantial impact on a resource within the region that is widely used by people outside of the municipality in which it is located.
3. Projects that may affect development patterns to the extent that the character or identity of neighboring municipalities is significantly affected.

The projects described previously – major expansions at the Burke Mountain and Jay Peak resorts, the new biotechnology facility in Newport, and the expansion of Northeast Kingdom International Airport – would all qualify as Developments of Substantial Regional Impact. Also, qualifying as a Development of Substantial Regional Impact is the Casella Waste USA Landfill located in Coventry VT. This landfill currently accepts most of the solid waste generated in the State of Vermont. Trucks traveling to and from the facility from all parts of Vermont are a common sight.

Other developments having a substantial regional impact are the industrial-scale wind facilities located in Sheffield and Lowell. These facilities have impacted the view sheds in a number of adjoining communities.

V. ADJACENT REGIONS

The Northeast Kingdom does not exist or function independently from those regions that surround it. Therefore, it is critically important that this plan take into account the planning for these neighboring areas to insure a smooth transition between the regions. This will also reduce the adverse impacts that development in one region might have on the adjoining region.

The Northeast Kingdom is surrounded by five different planning regions in Vermont and New Hampshire and one Canadian Province. Four of these regions are located to the south and west of the Northeast Kingdom in Vermont and include the Northwest Regional Planning Commission, the Lamoille County Planning Commission, the Central Vermont Regional Planning Commission and the Two-Rivers-Ottawaquechee Regional Commission. New Hampshire's North Country Council abuts the Northeast Kingdom to the east and, finally, the Canadian Province of Quebec is to the north.

It is expected that the projected job growth in the Northeast Kingdom region will draw workers from adjacent communities, particularly those from the Northwest Regional Planning Commission and the Lamoille Country Planning Commission regions. The expected job growth in Jay and the Newport area also may spur new housing and/or commercial developments in communities from those regions – i.e. Montgomery or Morrisville. The success of value-added agricultural enterprises in Hardwick over recent years has had some effect on developments in Wolcott.

Other substantial developments in the Northeast Kingdom that have likely land use impacts on adjoining regions include: The Waste USA Landfill in Coventry (transportation and solid waste impacts); The Lamoille Valley Rail Trail (economic development and transportation impacts); And, the VAG Asbestos Mine (hazardous site in the communities of Lowell and Eden). Watershed boundaries also do not correspond to regional and municipal geopolitical boundaries, so activities affecting a waterway in one community have the potential to impact the water resource in another region.

As identified by the Vermont Department of Labor in 2015, the following Labor Market Areas (LMA) exists in the Northeast Kingdom. Only the Derby and St. Johnsbury LMAs contain only NEK communities:

- Derby LMA
- St. Johnsbury LMA
- Morristown-Waterbury LMA (partial) – Craftsbury, Greensboro, Hardwick
- Colebrook NH-VT (partial LMA) – Norton, Averill, Canaan, Lemington, Bloomfield
- Littleton NH-VT (partial LMA) – Brunswick, Maidstone, Guildhall, Lunenburg
- Newbury LMA (partial LMA) – Groton, Ryegate

From working with local communities we know that NH towns (Colebrook, Lancaster, Littleton, etc.) along the CT River attract VT residents for employment, tax-free goods, and services. We also know that communities in the outer reaches of our region find it easier to travel to communities in adjacent regions for the same things in communities like Morrisville and White River Junction. The cities of Montpelier and Burlington also draw significant numbers of travelers from the NEK to access employment, state government and agencies, larger cultural events, and expanded goods and services. Growth in any of these adjacent or nearby areas has the potential to impact the NEK.

Lastly, an analysis of the impacts of the many large developments occurring or proposed in the Northeast Kingdom is nearing completion. This was funded by a planning grant from the Vermont Agency of

Commerce, along with supplemental funds from USDA Rural Development. Drawing on data provided from several sources, including local, State and federal agencies, NVDA is examining existing conditions and assessing the potential impacts on emergency services, childcare, schools, infrastructure investments, recreational resources and housing. The conclusions and recommendations of this impact study are incorporated by reference into this Regional Plan.

GOALS AND STRATEGIES FOR FUTURE LAND USE AND DEVELOPMENT

FUTURE LAND USE & DEVELOPMENT GOALS

- Established centers will be an economically vital mix of commercial and residential uses, and will offer a variety of housing types available at different price points to support long-term sustainability.
- Towns will be supported in identifying and implementing strategies that reverses the current trend of new residential development occurring primarily outside of centers.
- Traditional development patterns will be maintained and linear “strip” development will be avoided.
- New development will be compatible with existing land uses, and consistent with local plans.
- Historic structures, community facilities, and other buildings will be preserved and adapted for re-use.
- Brownfield sites will be reclaimed.
- Significant development proposals will consider the impact on adjacent regions.

STRATEGIES - CENTERS (Regional, Service and Village)

- Direct public investment and create financial incentives for the development of a balanced mix of low-income, work-force, and upper-income housing in and adjacent to village centers and downtowns, with the goal of allowing all communities to develop into high-opportunity areas.
- Direct public investment for new elderly and affordable housing to town and village centers in locations with access to public transportation routes. Aside from promoting traditional settlement patterns, this will put seniors closer to such amenities as shopping, and community facilities, and enable income-stressed residents to have cost-saving access to services, employment centers, and public transportation options to places of employment.
- Work with housing developers and communities to assure that all residents have the opportunity for access to high-performing schools and economically-sustainable employment.
- Assist communities applying for designation under the Vermont Downtown, Village Center, and/or Neighborhood Development Programs where appropriate to encourage mixed-use development (residential, commercial and appropriate light-industrial) in centers.
- Encourage adaptive reuse of historic structures through tax incentives, tax credits, grants, and loans, assistance in location of funding, etc.
- Encourage desired town center development through investment, maintenance, and expansion of appropriate infrastructure (sidewalks, water and sewer, parking, public spaces, etc.).
- Support beautification efforts in town centers and downtowns.
- Encourage towns to plan for community recreational and social needs.

STRATEGIES RURAL AREAS

- Avoid the development of agricultural lands with auto-dependent residential subdivisions by encouraging towns with land use regulations to lower the permitted residential density in agricultural zones, coupled with planned unit development or clustering provisions to ensure efficient and well-designed developments.
- Protect against the fragmentation of rural lands by the piecemeal development of residential lots by providing financial incentives for the development of attractive work-force and upper-income housing in and adjacent to village centers and downtowns.
- Support local conservation efforts.
- Encourage community open space plans and recreation infrastructure, recognizing that privately-held land will not be available unless protected through the purchase of conservation and access easements.

STRATEGIES INDUSTRIAL PARKS

- Assist Towns in identifying in their Town Plans appropriate areas for the development of industrial or manufacturing uses, based on the location of natural resources and existing transportation and utility infrastructure.
- Assist Towns in marketing potential locations for industry to the business community.
- Assist Towns with the assessment and remediation of Brownfields in order to revitalize and re-use existing industrial infrastructure where appropriate for future industrial uses.

Chapter Two: Energy

I. INTRODUCTION

Northeastern Vermont Development Association (NVDA) originally prepared this plan as a supplement to the *Regional Plan for the Northeast Kingdom 2006*. The *2020 Energy Plan* is an update to the *2011 Energy Plan* (and a reflection of a statutory change that extended the life of regional plans to 8 years), which outlines a regional energy strategy for Northeastern Vermont, specifically the counties of Orleans, Essex, and Caledonia. NVDA's statutory role in energy planning is outlined in V.S.A. Title 24, Chp.117 §4348a (3), which stipulates that a regional plan include:

An energy element, which may include an analysis of energy resources, needs, scarcities, costs and problems within the region, a statement of policy on the conservation of energy, and the development of renewable energy resources, and a statement of policy on patterns and densities of land use and control devices likely to result in conservation of energy.

In addition, NVDA is required to define what constitutes a 'substantial regional impact' with regards to development (24 V.S.A. Chp.117 §4345a (17)), because the definition is given due consideration in state regulatory proceedings. This definition is provided within Land Use section of the *Regional Plan for the Northeast Kingdom 2015* (Chp.1, pg. 21).

Background

Traditionally, NVDA approached energy planning from a strictly "supply-and-demand" perspective and this approach has generally supported the traditional systems that have continued to meet our regional energy needs. However, the energy trends of the last decade present NVDA with the challenge of addressing a much broader perspective, one that transcends current energy production and usage. At this time there are several factors that are creating a contentious climate for the future planning of our energy systems. Because of this, NVDA has expanded both its approach to energy planning and its role in regional energy policy.

This new role has stemmed from public response to rather swift changes now occurring in the energy industry. In the past several years, the region has had to contemplate the effect of utility-scale wind development on our mountains; how to ensure forest sustainability as wood-fuels grow in popularity; and whether or not an aging nuclear plant can be replaced with other generation resources. In addition, throughout these dynamic times affordability has become the primary concern of public and business communities. Because of our statutory responsibility, NVDA, through this document, is giving relevant information regarding various energy resources and setting our regional energy agenda for the next eight years.

NVDA Energy Committee

The 2020 update has been overseen by an Energy Committee whose members include Jim Greenwood, Marty Feltus, Robert Croteau, and John Morley. NVDA committee staff included Planning Manager, Dave Snedeker, and Senior Planner, Laurie Stillwell.

Strategy Outline

The Energy Strategy aims to guide the region's energy development for the next eight years. In order to accomplish this task, the Energy Committee has analyzed the current conditions of the region, calculated future growth, and evaluated the potential for resources to meet future needs. From the findings, the Energy Committee has developed regional portfolio recommendations, and overall energy goals and strategies. The basic components of the Energy Strategy are organized into four main sections:

Regional Overview

This section provides an evaluation of local consumption, energy sectors, electricity infrastructure and demand, and anticipated future growth in energy usage.

Resource Analysis

In this section resources are analyzed for their current and future potential as part of the overall energy portfolio. Both traditional sources are addressed, including fossil fuels, hydro-power, and nuclear power, as well as the advancing renewable sources, such as solar, methane, wind, and biomass. Efficiency/conservation is also addressed as an important piece to meeting future needs.

Northeast Kingdom Portfolio*

This section provides recommendations for each resource addressed within the Resource Analysis. It also addresses other important non-resource aspects of the portfolio, such as net-metering, and efficiency/conservation.

Regional Goals & Strategies*

This section presents the main goals for the next eight years of energy planning and identifies clear strategies to meet those goals.

* Both the Northeast Kingdom Portfolio and the Regional Goals & Strategies include the guiding language for future energy development in the region.

II. REGIONAL OVERVIEW

Current Status of the Region

The Northeast Kingdom's energy trends have mimicked those of the state, and while the state has been subjected to the same energy issues occurring nationally, Vermont still remains a national role model for energy. Throughout the U.S., energy prices are rising due to the stress on traditional resources and increasing consumption levels. To address rising energy costs, Vermonters are turning more and more towards supplemental fuels, renewables, co-generation facilities, and efficiency/conservation efforts. In 2010 Vermont ranked 51st out of the entire U.S. in total consumption of energy across all sectors and 42nd in per-capita consumption of total energy across all sectors¹.

In the past few years, the Northeast Kingdom has hosted electricity projects that have decreased transmission losses and improved reliability. The region is home to three major renewable generation facilities: the Ryegate Wood-Chip Plant, the Coventry Landfill methane-generator, and the Sheffield Wind Farm, which together produced 82% of the region's total electricity generation (2010). The Vermont State Legislature has made several changes with energy legislation as well, including policies pertaining to distributive generation (net-metering), renewable energy (portfolio goals and incentives), the creation of an efficiency utility, and alternative fuels/vehicles.

While Vermont continues to make changes in energy policy and infrastructure, there are some elements of the current energy system that negatively affect our region. The following overview proceeds to review all of the aspects of our energy system and pinpoint major elements that impact our region.

¹ U.S. Energy Information Administration: State Energy Consumption Estimates 1960-2010.
http://www.eia.gov/state/seds/sep_use/notes/use_print.pdf

Consumption

Energy consumption has grown rather steadily since the 1950s. Historically, leaps in consumption are associated with major economic growth, low energy prices, population growth, and an overall increase in the number of vehicle miles driven. Vermont has traditionally ranked one of the lowest per capita energy consumption states in the nation. Table 2.1 represents the amount of energy consumed in the state in 2009. Regional figures for energy consumption are unavailable, but the Northeast Kingdom's consumption by source is similar to the state's breakdown. Petroleum products are by far the leading source of fuel in the state, most of which is used in the transportation and residential heating sectors (Table 2.2).

Source	Trillion BTUs*
Coal	0
Natural Gas	8.7
Petroleum Products	82.2
Biomass (Wood & Ethanol)	14.3
Renewable Other**	0.3
Nuclear Electric Power	56.1
Hydro Electric Power	14.5
Net Interstate Flow of Electricity/Losses	-26.7
Net Imports of electricity	8.7
Total	158.1

*A kilowatt hour is approximately 3,412 BTUs
 **Geothermal, wind, photovoltaic, and solar thermal energy
 Source: Energy Information Administration

Type	Trillion BTUs
Motor gasoline	39.1
Heating oil and diesel fuel	30
Liquid petroleum gas	8.6
Jet Fuel	2.9
Other	1.7

Source: Energy Information Administration

Sector	1993	2001	2009
Transportation	50.7	51.9	53.5
Residential	34.6	47.8	48.3
Commercial	15.2	32.7	31.8
Industrial	14.2	31.2	24.4
Total	114.7	163.6	158.0

Source: Energy Information Administration

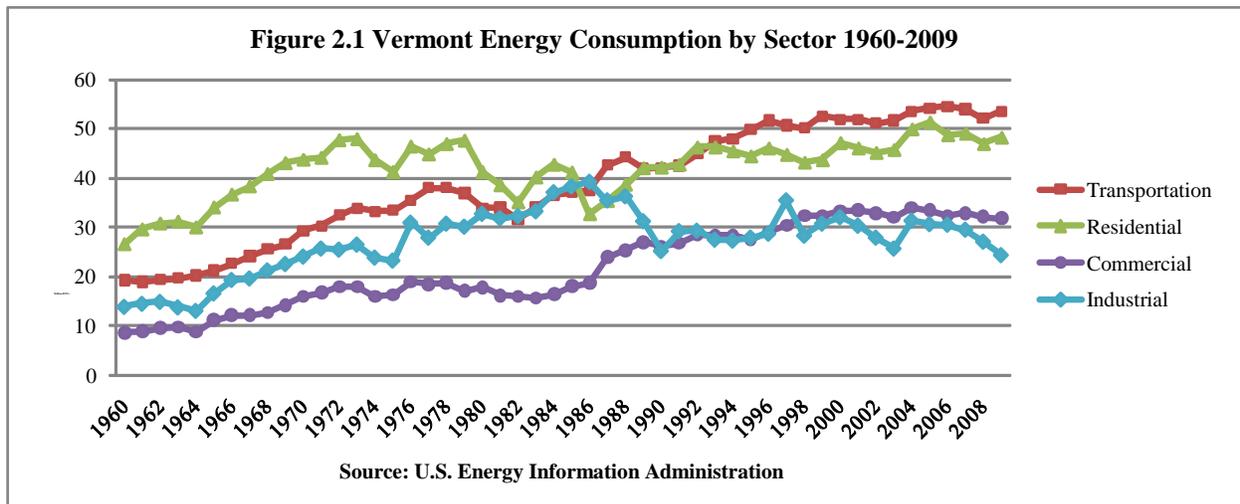
Table 2.3 outlines Vermont's energy usage by sector between 1993 and 2009. Over these years consumption has grown rather steadily, with major growth seen in particular sectors. Transportation energy usage has remained relatively steady over this period, most likely a result of an increase in fuel efficiency and conservation efforts. Residential sector consumption grew by 38.2% between 1993 and 2001. These residential fluctuations are considered to be normal - resulting from general population growth, an increase in the average house size, and additional modern conveniences. While the minuscule growth since 2001 corresponds with the recession, there is a general nation-wide "belt-tightening" initiated by rising energy prices, economic woes, conservation efforts and energy efficiency.

By far the largest growth occurred between 1993 and 2001 in the commercial and industrial sectors, which had more than doubled their energy consumption. Most of this growth can be attributed towards the advancement of computer technology and its widespread use in the workforce. The industrial sectors also saw a significant dip in consumption between 2001 and 2009; however it is unclear as to how much of this reduction is attributed to new energy efficiency measures employed by manufacturers, reduced production levels, or plant closings in Vermont. Prior to 2008, energy consumption had continued to increase every year in each of these sectors. It is expected that the pre-2008 (pre-recession) consumptions figures will easily be met again once the economy turns around.

Energy Usage by Sector

Transportation

According to the U.S. Energy Information Administration, approximately 34% of all energy used in the state is for transportation, almost entirely for cars and trucks. While the benefits of automobiles are obvious, they account for about 60% of all fossil fuels used in Vermont, 57% of carbon dioxide emissions and are the largest sources of several other pollutants. Since 1960, transportation energy use has grown at a faster pace than any other energy sector (Chart 1), especially in heavily auto dependent Vermont. However growth in transportation consumption has slowed considerably since 1993.



According to the Vermont Fuel Price Report, the average retail cost of gasoline was \$2.34 in January of 2006. In only 5 years the costs per gallon has risen 35% to \$3.17 (January, 2011). On average Americans spend 15.7 cents out of every dollar on transportation². Transportation costs now rank second only to housing costs for families throughout the country with food costs narrowing out a close third.

Energy usage in transportation is most greatly influenced by the development patterns of the region. Given that the Northeast Kingdom consists of a rural landscape with small pockets of concentrated development, there are minimal avenues in which energy consumption as part of the transportation sector can be effectively reduced. According to the *Vermont Energy Transportation Report*, the use of high fuel-efficiency and alternative fuel vehicles is one way Vermonters can reduce transportation energy use. Table 2.4 depicts the use of

Fuel/Vehicle Type	2007	2008	2009	2010	Change
Hybrids	3,651	4,565	5,473	6,335	73%
Electric	106	101	94	77	-27%
Propane	93	75	69	40	-56%
Diesel	31,648	32,140	30,724	25,025	-21%
Gasoline	583,568	578,881	528,930	514,894	-11%

Source: Vermont Energy Transportation Report

alternative-fuel vehicles in Vermont over the last few years. Hybrids seem to be the most popular type of alternative fuel vehicle. Electric and electric-hybrid vehicles have the most potential to reduce Vermont's statewide greenhouse gas emissions relative to conventional

vehicles. This is because of their overall energy efficiency and relatively low greenhouse gas emissions associated with the electricity generation resources in the state (*Vermont Energy Transportation Report 2010*). Alternative fuel vehicles still require refueling infrastructure to support their use. According to the U.S.

² U.S. Dept. of Labor, Bureau of Labor Statistics: Consumer Expenditure Survey 2009-2010.

Department of Energy's Alternative Fuels Data Center, only 1 biodiesel, 3 compressed natural gas, 7 electric, 1 ethanol, and 1 propane refueling centers exist in Vermont (amounts include public and private facilities).

Commercial shipping is one of the highest consumers of transportation fuels and another area in which the region can reduce consumption. As gas prices started to climb in the last decade area businesses looked for alternative shipping methods and inquiries into the region's rail infrastructure grew. Railroad shipping is most desirable for non-perishable commodity goods. Upon further review it was found that regional rail infrastructure has the potential for growth, with room for increased traffic and a number of underutilized sidings. The Kingdom may also be able to attract additional rail usage if rail beds are upgraded to meet the 286,000 lb. weight limit standard and bridge heights are increased. Both improvements will allow rail cars to be filled to capacity and allow for the double stacking of rail cars, which is now standard across the country. NVDA also supports the re-establishment of the Twin State Line as a means to better connect the Kingdom with greater rail markets in New England.

As already noted, regional development patterns directly impact transportation energy usage, especially in regards to individual behaviors. For example, mixed-use, higher density neighborhoods encourage more pedestrian use. The following land use principles encourage reduced transportation energy consumption³:

1. Encourage the location of new development in or near traditional village and city centers to reduce both sprawl and the number of vehicle miles driven.
2. Support transit oriented development that fosters the expansion of public transportation and rail use.
3. Encourage the construction of Park and Ride facilities to support carpooling efforts.
4. Encourage the expansion of bicycle and pedestrian facilities such as sidewalks and bike lanes.

Residential

Residential uses account for 30.5% of the energy used in Vermont (U.S. Energy Information Administration). Most of this energy is for residential heating. According to the 2005-2010 American Community Survey, heating oil is still the most common fuel source in the Northeast Kingdom, accounting for 62.5% of total home usage. Twenty-two percent of homes are heated by wood, 10.9% heated with propane gas, and 2.0% heated with electricity. All other fuels accounted for less than 1% each.

Types of Energy	November 2008				November 2011				% Change*
	BTU/Unit	Adj. Effic.	\$/Unit	\$/MMBtu	BTU/Unit	Adj. Effic.	\$/Unit	\$/MMBtu	
Fuel Oil (gallon)	138,200	80%	\$3.18	\$28.75	138,200	80%	\$3.82	\$34.58	15%
Kerosene (gallon)	136,600	80%	\$3.77	\$34.51	136,600	80%	\$4.17	\$38.16	6%
Propane (gallon)	91,600	80%	\$3.01	\$41.03	91,600	80%	\$3.16	\$43.16	1%
Natural Gas (therm)	100,000	80%	\$1.90	\$23.75	100,000	80%	\$1.67	\$20.83	-16%
Electricity (kWh)	3,412	100%	\$0.14	\$41.35	3,412	100%	\$0.15	\$43.46	1%
Wood (cord-green)	22,000,000	60%	\$190.00	\$14.39	22,000,000	60%	\$180.00	\$13.64	-9%
Pellets (ton)	16,400,000	80%	\$257.00	\$19.59	16,400,000	80%	\$247.00	\$18.83	-8%

*Adjusted for Inflation
Source: Vermont Fuel Price Report, November 2008 & November 2011, Department of Public Service

Table 2.5 demonstrates the trend of instability in heating fuel prices in the last few years. Only the least used (and priciest) heating resources, such as Kerosene, Propane, and Electricity have remained relatively steady in

³ See the Transportation, Land-Use, and Housing Sections of the *Regional Plan for the Northeast Kingdom* for additional energy-related recommendations.

price. Meanwhile fuel-oil, the number one household heating fuel in the region, has seen dramatic cost increases. Fuel oil prices may continue to rise as the U.S. economy turns around and demand for oil in growing economies, such as China and India, increases worldwide demand.

Natural gas prices show a continuation of the dramatic price reduction seen in the last several years. According to the U.S. Energy Information Administration (U.S. EIA), natural gas prices reached their lowest point in a decade this past January (2011). The dramatic drop is attributed to shale drilling (hydraulic fracturing) throughout Pennsylvania that has exploded in the last few years. Unfortunately, Northeast Kingdom residents are not able to utilize natural gas for home heating as the region lacks distribution infrastructure.

At present wood-heat is still the cheapest source of home heating in Vermont (See \$/MMBtu in Table 2.5 above). Both wood-pellets and cord wood saw decreases in price in the last few years, returning to 2007 figures. The decrease in wood-pellet pricing is attributed to an influx in pellets shipped in from British Columbia, which have kept prices down, but is not expected to last. While cord wood and wood-pellets have traditionally been used as supplemental heating fuels, the rising cost of fuel-oil has caused many home owners to swap the two, making fuel-oil a back-up to wood-pellet furnaces and out-door wood boilers. This switch was reflected in the 2005-2010 American Community Survey, showing a 6% decline in homes heated with fuel oil and a 6% increase in homes heated with wood fuels, as compared to 2000 Census figures.⁴

Electric usage is the other major energy component in the residential sector. The majority of the electricity consumed in the region is for residential purposes (Table 2.6). Since 1990 the percentage of electric usage by the residential sector has declined, while total electric

Year	Residential	%	Commercial/Industrial	%	Total
2004	197,136	46%	235,882	54%	433,018
2005	201,916	44%	255,532	56%	457,448
2006	206,629	44%	259,722	56%	466,351
2007	203,137	44%	255,207	56%	458,344
2008	202,823	47%	233,170	53%	435,993

Source: U.S. EIA

usage across all sectors has grown rather steadily. Some of this shift is a result of improved efficiency and conservation measures provided to homeowners by the state's energy efficiency utility, Efficiency Vermont. For example, Efficiency Vermont assisted in saving roughly 3,425 megawatt-hours (MWhs) through the participation of 4,295 homeowners in the Northeast Kingdom in 2009 alone. In 2007, Efficiency Vermont's programs expanded into commercial and industrial sectors when a dramatic reduction in electric consumption was seen across all sectors. Unfortunately the continued reduction in 2008 is almost entirely in the commercial and industrial sectors, indicating this reduction is not due to savings measures alone but also the economic recession.

It has already been mentioned that residential usage accounts for a significant portion of the total amount of the total energy consumed in Vermont (30.5%). Residential usage consists primarily of heating for hot water and home heating, and fossil fuels remain the most common heating resources used within the region (fuel oil accounts for 62.5% of total residential usage and propane gas accounts for another 10.9%). Given the price volatility of these resources and the constant trend upward, it makes good sense to reduce the use of these resources whenever possible. The best opportunities to reduce consumption include conservation, weatherization, and efficiency. Other fuels, such as wood, can be used as a lower cost replacement or supplement for home heating.

⁴ The American Community Survey data differs from Census data in that it utilizes annual survey figures, from a smaller cross-section of the population, across a 5-year timeframe to provide data estimates for a given year.

Commercial/Industrial

Combined, commercial and industrial activity account for the largest percentage of state-wide energy usage (35.5%). Most of the commercial/industrial energy usage can be attributed to space heating and process heating (Dept. of Public Service).

Electric costs are a major factor in attracting and retaining major commercial/industrial operations in the region. New England retains the highest electric costs in the lower 48 states for both sectors. In December 2011 the state's average electric retail price was 13.98 cents/kWh in the commercial sector and 10.05 cents/kWh in the industrial sector. Nationally, the December 2011 average electric retail prices for both the commercial and industrial sectors were 9.85 cents/kWh and 6.60 cents/kWh respectively (U.S. Energy Information Administration, Electric Power Monthly). When most large manufacturers are speaking in terms of megawatt-hours (thousands of kilowatt-hours) for power consumption, those price differences are considerable.

To combat high electric and heating costs in the region a few industrial operations have resorted to generating their own energy. RadianTec, a radiant-floor heating manufacturing company in Lyndon, Vermont utilizes solar hot water panels and passive solar design to reduce their heat loads; the former Dirigo Paper Mill utilized on-site hydro and waste steam for electrical generation, which are still in operation under an independent power producer today; the Ethan Allen plant in Beecher Falls uses scrap wood to fuel an on-site generator, and is studying the feasibility of a combined heat-and-power plant with Orleans and Barton Electric for their Orleans facility; and, Lyndon Furniture in St. Johnsbury has employed a diesel-fueled electric generator to stabilize their electric costs for several years.

The opportunities for reduced energy consumption in the commercial/industrial sector are similar to those in the residential sector but typically differ in size and scale. These again include conservation and energy efficiency (including weatherization) and should not be underestimated. Other opportunities include: Investing in renewable energy systems such as solar, small wind, or biomass as some businesses and schools in the region have already done (including net-metered systems); and, altering hours of operation to take advantage better electric rates in off-peak hours/days.

Electricity

Electric systems today are part of large regional networks that extend beyond state boundaries. Vermont belongs to a network that encompasses the six states of New England. These regional networks are responsible for the general organization and operation of the electric businesses and market territory. However, the vast diversity in state-to-state infrastructure can influence the energy climate in surrounding network states. For Vermont this translates into major effects on the affordability, cost, and reliability of electrical systems.

Regional Utilities

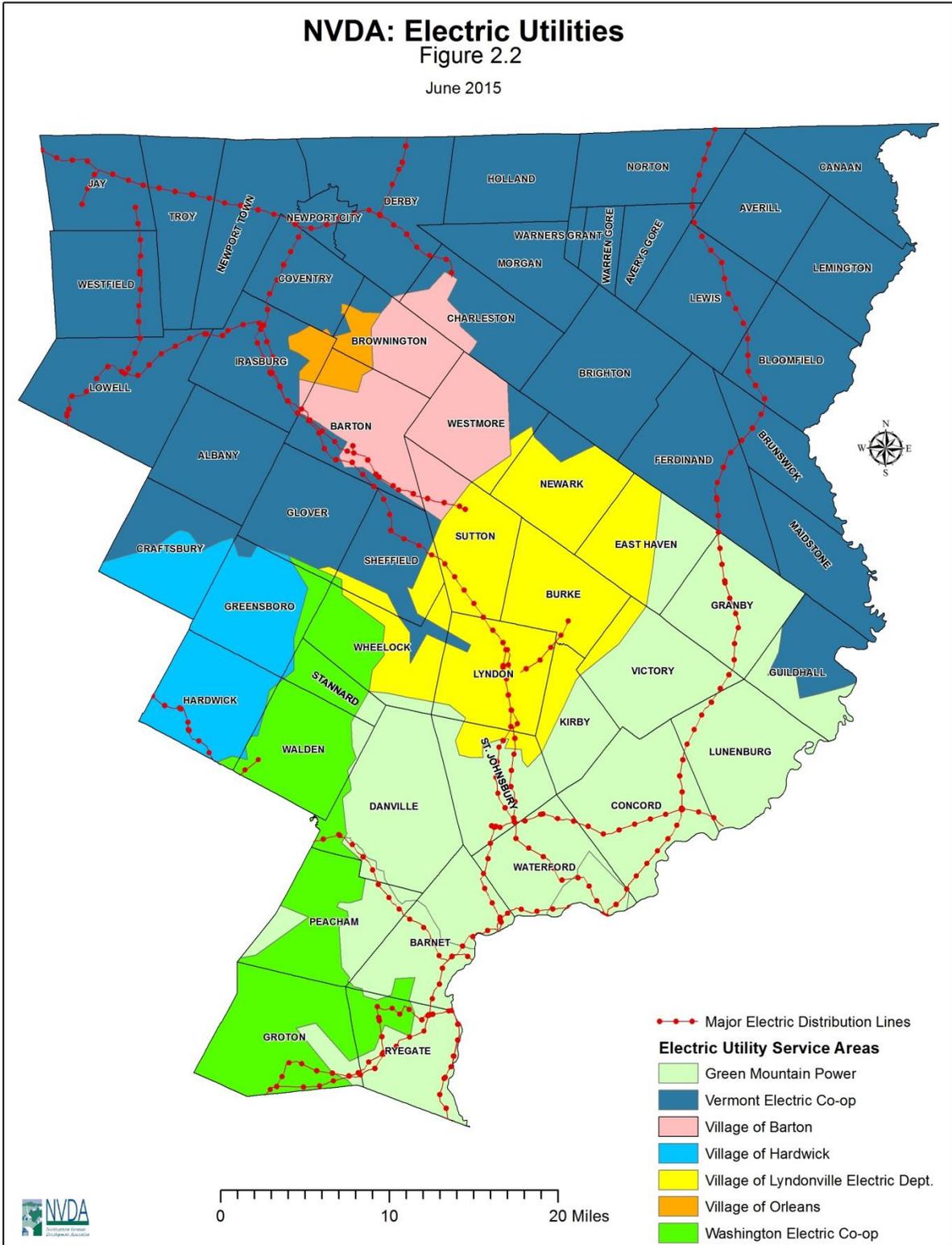
The Northeast Kingdom is served by seven electric utilities. Figure 2.2 depicts the coverage areas of the region's utilities and the major transmission lines. Vermont Electric Co-Op serves the largest area, covering over 19 towns in Northern Essex and Orleans Counties. Green Mountain Power also covers a large area in Caledonia and Southern Essex Counties, with the remainder of the region served by Washington Electric, and four municipal-owned electric companies. The NEK's municipal electric utilities include Barton Electric, Orleans Electric, Lyndonville Electric, and Hardwick Electric. Together the municipal utilities provide service to over 19 different towns and villages (see Figure 2.2 Electric Utilities Map⁵).

⁵ Latest version of mapped Utility Service Territories (VCGI ArcGIS) data available.

NVDA: Electric Utilities

Figure 2.2

June 2015



All of the smaller municipally owned utilities throughout the state are represented by the Vermont Public Power Supply Authority (VPPSA). VPPSA represents the utilities in the regional buying and selling of power and provides rate studies, central computer services, load forecasting, tax-free financing of certain capital projects, and explores new generation options. VPPSA has recently completed a 40MW peaking facility in Swanton, Vermont and in the past has negotiated agreements with other generating facilities like Hydro Quebec. Table 2.7 below documents the status of other generation resources VPPSA is presently pursuing:

Location	Project-Power Type	Ownership	Size	Status
Brockton, MA	Natural Gas Plant	Private	350 MW	Negotiating Power Purchase Agreements
Gilman, VT	Wood Biomass/Hydroelectric	Private	8-16 MW	Preliminary Negotiations
Kennebec, ME	Hydroelectric	Private	NA	Negotiating Power Purchase Agreements
Westminster, MA	Landfill Methane	Private	NA	Negotiating Power Purchase Agreements

Lyndonville Electric, Hardwick Electric, and Barton Electric’s power supply portfolios are made up of a mixture of generation resources, long-term contracts, and short-term contracts. Orleans Electric’s portfolio also includes long-term and short-term contracts; however it is without generation resources of its own. According to the 2011 Resource Reports provided by VPPSA, the municipal utilities receive power from hydro, wood, fuel-oil, natural gas, and nuclear generation facilities located throughout New England. Table 2.8 below outlines the actual power loads of the municipal utilities from 2006 through 2010 and their forecasted loads for 2011 through 2015.

Utility	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Orleans Electric	14,327	14,194	14,147	12,185	13,768	12,926	13,247	14,328	14,693	14,662
Barton Electric	17,197	17,353	17,371	17,370	17,080	17,194	17,253	17,173	17,167	17,168
Lyndonville Electric	78,246	79,050	78,017	75,957	76,462	75,520	75,890	77,342	77,817	77,776
Hardwick Electric	37,637	38,130	37,897	33,113	34,706	34,896	34,896	34,896	34,896	34,896
Total	147,407	148,727	147,432	138,625	142,016	140,536	141,285	143,739	144,573	144,501

Source: VPPSA 2011 Resource Reports

According to the chart above all of the region’s municipal utilities except Barton Electric saw a significant drop in load obligations that corresponds with the economic recession. These same utilities have forecasted that they will just begin to return to pre-recession load obligations between 2013 and 2015. This is not surprising since much of the consumption lost were from commercial/industrial operations that are hard to replace.

Regional Generation Facilities

The Northeast Kingdom has a very large share of generation resources compared to other regions of the state. Table 2.9 provides a list of the region’s generation sources. 2005 saw the first major jump in regional generation growth with the development of the Coventry Landfill methane generator, which provided another 25,000 MWhs. In 2009, regional generation made another major jump when Coventry Landfill’s generation output was doubled. Altogether, the Northeast Kingdom’s 2009 electric generation capacity grew to 284,614 MWhs.

Table 2.9 Generation Facilities in Caledonia, Essex, and Orleans Counties

Owner/Operator – Facility Name	Facility Type	2005 MWH Produced	2009 MWH Produced*	Location
Great Bay Hydro Corp. (IPP) – Newport Units 1,2,3	Hydro	15,678.22	Undisclosed	Newport
Great Bay Hydro Corp. (IPP) – Newport 4-10	Diesel	0	-	Newport
Great Bay Hydro Corp. (IPP) – West Charleston	Hydro	Undisclosed	2,070.00	Charleston
CVPS – Emerson Falls	Hydro	Undisclosed	700.00	St. Johnsbury
CVPS – Arnold Falls	Hydro	1,510.70	1,965.00	St. Johnsbury
CVPS – Gage	Hydro	2,968.00	3,582.00	St. Johnsbury
CVPS – Passumpsic	Hydro	2,158.70	2,060.00	Barnet
CVPS – East Barnet	Hydro	9,855.70	7,320.00	Barnet
Barnet (IPP)	Hydro	1,767.38	1,814.00	Barnet
Village of Barton – Diesels	Diesel	3.83	4.00	Barton
Village of Barton	Hydro	3,678.92	5,101.00	Barton
Great Bay Hydro Corp. (IPP) – North Troy	Hydro	0	-	Troy
Chaput Family Farms	Methane	0	2,490.00	Troy
Maplehurst Farm	Methane	0	723.00	Greensboro
Norton Hydro	Hydro	0	-	Norton
Lyndonville Electric – Vail & Great Falls	Hydro	4,455.91	6,205.00	Lyndonville
CVPS – Pierce Mills	Hydro	1,411.40	1,464.00	St. Johnsbury
Ampersand Gilman Hydro (IPP)	Hydro	Undisclosed	Undisclosed	Lunenburg
GMP – Joe’s Pond	Hydro	11,122.50	2,759.00	Danville
Dodge Falls (IPP)	Hydro	23,500.00	21,734.00	Ryegate
Ryegate Power Station (IPP)	Wood Chip	167,627.41	172,367.00	Ryegate
Maxwell’s Neighborhood Energy, LLC (IPP)	Methane	0	1,750.00	Coventry
WEC – Coventry Landfill	Methane	25,000.00	50,506.00	Coventry
Total		224,509.00	284,614.00	
*Figures are a mixture of actual & projected Source: VT Dept. of Public Service & IPPs				

While not reflected in this chart, the region saw more generation growth in 2010 with the addition of the largest utility-scale wind farm in Vermont, by First Wind, Inc. The First Wind facility, located in Sheffield, Vermont came online in September 2010 and contributed another 25,948 MWhs to regional generation. The wind-farm was only operating for a portion of 2010, but was expected to contribute a total 112,000 MWhs annually. Another utility-scale wind farm in the region, Kingdom Community Wind (Lowell, Vermont), was also recently approved with a Certificate of Public Good. Once built, the Kingdom Community Wind Project is expected to contribute another 185,570 MWhs annually. If producing at expected capacity⁶, both wind farms will bring the region’s electric generation capacity to approximately 580,000 MWhs.

⁶ Expected production capacity figures are provided by the Public Service Department and include discounts from actual total production capacity based on the frequency of wind generation (i.e. intermittency).

There are also three very large generation assets located on the border of the region that deserve to be mentioned. The Comerford Dam, McIndoe Falls Dam, and the Moore Dam are all located on the Connecticut River, which is owned by New Hampshire. Table 2.10 presents their generation figures. According to the Department of Public Service, they are not considered Vermont generation assets, but their mere proximity to the region may pose a future benefit to our area.

Table 2.10 State-Line Generation Facilities (Technically located in New Hampshire) in MWh/year			
TransCanada - Moore Dam*	Hydro	271,000.00	Waterford, VT & Littleton, NH
TransCanada - Comerford Dam*	Hydro	315,000.00	Barnet, VT & Monroe, NH
TransCanada - McIndoe Falls Dam*	Hydro	52,000.00	Barnet, VT & Monroe, NH
Total		638,000.00	

Electricity Consumption

With respect to simply how much electricity is generated here relative to what is consumed, the Northeast Kingdom will soon be a net exporter of electricity once the Kingdom Community Wind Project is up and running. This is a major shift from just a few years ago, when the region relied heavily on Canada, New Hampshire and the rest of Vermont to meet its electricity demand. In 2004, the total electric usage for the region was 433,019 MWhs (Table 2.11).

Between 2004 and 2005 the region saw a significant increase in consumption (5.34%), even 2006 saw another 1.93% in growth, but by 2008 consumption had returned closer to

County	2004	2005	2006	2007	2008
Caledonia	213,437	223,313	216,580	219,845	211,269
Essex	41,312	53,333	60,552	51,447	41,173
Orleans	178,270	180,802	189,221	187,054	183,553
Total	433,019	457,448	466,353	458,346	435,995
Source: VT Dept. of Public Service & Renewable Energy Atlas of Vermont					

2004 levels. Again this reduction in electric consumption is associated with the start of the recession, increasing fuel costs and improved efficiency measures. If more recent consumption figures (2009-2011) were available on the county level it is expected they would follow the trend reflected in the municipal utilities' load obligation data (Table 2.8), essentially showing a continued decline in 2009-2010 with a recovery to pre-recession consumption levels by 2015. From this assumption, current regional electric consumption should be close to the 2004 figures, around 433,000 MWhs. With the recent addition of significant generation assets, such Kingdom Community Wind Farm, the Northeast Kingdom will produce approximately 580,000 MWhs of electricity, which is 150,000 MWhs more than it consumes.

Purchase & Distribution

The state of Vermont belongs to the ISO-New England Regional Transmission Organization (RTO). The ISO-New England RTO operates all of New England's bulk electric power system and works in coordination with the New England Power Pool (NEPOOL). NEPOOL is Vermont's regional representative of the electric power businesses, including utilities, independent power producers (IPP), suppliers, end-users, and transmission providers. In 1997, the RTO was developed as a means to create competitive wholesale electricity markets. Their responsibilities include developing, overseeing and operating the New England wholesale electric market, as well as managing and planning for regional electric needs.

At this time the RTO wholesale electric market operates on a per-hour bid system that incorporates some short-term and long-term contracts. The bid system requires generation units to bid into the system based on what it costs them to produce for that hour. The hourly price is then set based on the most expensive facility

needed to meet demand. As demand increases, the higher-priced facilities are pulled online to meet the increasing load. In Vermont, many of the “peaking” plants utilize diesel fuel. New England is also heavily dependent on natural gas generation facilities, which set the hourly price 85% of the time. Even though natural gas prices have dropped recently, New England households retain the highest electric costs in the country (Table 2.12). As part of the RTO, Vermont is subject to these higher electric costs, even though there is only one natural gas generation facility in the state. According to the Public Service Department, the higher pricing is caused by existing long-term contracts and restrictive pipeline infrastructure.

In other words New England is still paying natural gas pricing that was set in a 30-year contract, plus its limited pipeline capacity means it cannot access additional volumes of natural gas outside of those contracts. Massachusetts is currently pursuing the expansion of a major pipeline to be able to utilize larger volumes of natural gas.

Transmission

A majority of Vermont’s electric transmission system is operated by the Vermont Electric Power Company (VELCO). VELCO is responsible for bulk transmission lines with a voltage rating of 115kV and above. Lines with a rating of 34.5kV, 44kV, and 69kV are considered sub-transmission lines. The Northeast Kingdom has roughly 325 miles of transmission and sub-transmission lines (Figure 2.2) and serves as an important gateway for electricity coming from both Canada and New Hampshire.

At this time, Vermont is considered a constrained zone due to transmission grid congestion. Constrained states have a limited transmission network and transport electricity over long distances, creating congestion on the lines and restricting the ability to receive additional electricity from outside the state during increasing demand. The majority of the constraint has been caused by the considerable growth in the Northwest region of the state. The increasing demand has congested the Northeast Kingdom’s transmission network – limiting the capacity to receive additional electricity from out of state when needed. Constraint issues usually result in increased electricity costs. Because of transmission line congestion in-state facilities must be brought online (started up) in order to meet the new demand, even though less expensive generation facilities might be available out of state.

VELCO’s recently completed Northern Loop Project has alleviated much of the congestion of the Northern transmission grid. In our region, the project installed new lines between Irasburg and Newport; upgraded the St. Johnsbury substation; upgraded the Irasburg substation; and reconfigured the Hydro Quebec interconnection at Highgate – resulting in a significant amount of new transmission capacity on existing lines. The Northern Loop Project increased the reliability throughout Northern Vermont and should provide the transmission capacity needed to meet the Northeast Kingdom’s electrical growth for the next several years. An upgrade of the Hill Street substation in Lyndonville is also underway to provide a secondary connection between Lyndonville Electric’s grid and the larger VELCO transmission lines. The project is expected to ensure adequate future demand is met and improve overall reliability in Caledonia and Essex Counties. Other similar upgrades are being made throughout the region.

VELCO’s implementation of Smart Grid technology is also expected to improve transmission reliability. With the help of a \$69M grant from the American Recovery and Reinvestment Act, the technology will be installed throughout the state in the next several years. A “Smart Grid” is named for the improvements made to existing transmission networks that convert existing one-way transmission system into a two-way system. The new fiber-optic system will be able to relay real-time data on electric usage, voltage, existing or potential outages, and generation facility performance allowing utilities to resolve problems quickly and assess customers’ electric usage patterns. The Smart Grid technology also improves the incorporation of more and

State	Cents/kWh
Connecticut	15.91
Maine	12.68
Massachusetts	14.05
New Hampshire	14.48
Rhode Island	13.57
Vermont	14.21
National Average	9.65
Source: Electric Power Monthly, EIA	

more distributed generation systems into the current electrical grid. According to VELCO the Smart Grid, “has the potential to increase energy efficiency and thereby reduce environmental impacts and energy consumption, and empower customers to manage their energy choices”.

Net-Metering

Another means of alleviating transmission congestion is to reduce the need for transmission altogether, which is something that net-metering can help provide. Net-metering requires electric utilities to permit customers to interconnect on-site renewable electricity systems with the grid (e.g. a photovoltaic system with proper DC-AC conversion equipment) and to be billed only for the net amount of power they consume. This effectively creates an incentive equal to the customer’s electric rate for the kWh’s of renewable electricity that they create. In 1998 the Vermont State legislature passed a bill allowing the practice of net-metering. Approved net-metering systems include photovoltaic, small wind, fuel cell, farm methane, and bio-gasification facilities. Several revisions to the net-metering law over the last several years, including expanding production limits, simplifying permitting, and increasing peak load capacity, have made it easier to establish individual and group run net-metered systems.

The current law allows for net-metered systems of up to 500 kW with a capacity limit of 4% of a utility’s 1996 system peak or previous year’s peak, whichever is higher. Farm methane systems are now exempt from the capacity limit and solar net-metered systems have an added financial incentive called the “Solar Adder”, which increases the average value of solar net-metered payback to \$0.20/kWh. According to Vermont’s *2011 Comprehensive Energy Plan*, there are currently 1,319 permitted systems that have a peak production capacity of 10,923 kW, the majority of which are residential. Net-metered renewable systems have multiple benefits. Besides producing green power and providing monthly electric bill credits, the systems reduce the capacity pressure on local transmission systems during peak demand times.

Other Energy Facilities

The electricity system is the major energy network in the region. However, it is important to mention the Northeast Kingdom’s other major energy infrastructure. The Portland Pipeline is a major crude oil pipeline that stretches from Portland, Maine into Canada. In our region the pipeline runs from Guildhall northwest to Jay before crossing into Canada. While Vermont doesn’t tap into the pipeline, its existence in our region as major transporter of oil is important for potential future use.

The Portland Natural Gas Transmission system also just touches the region. The transmission line also runs from Portland, Maine into Canada and is owned by TransCanada, a major Canadian energy supplier. The line just barely passes through the state in Canaan, Vermont before reaching Canada. A spur has recently been created from this line, but only serves the Ethan Allen Manufacturing Plant in Beecher Falls. Future potential to expand this transmission system into the region remains possible.

Anticipated Future Growth

According to the *2005 Vermont Electric Plan*, energy consumption will increase in coordination with economic growth and population growth. According to the 2000 and 2010 Census, the region has grown by roughly 3.7% in the last decade, down from a 4.2% population growth between 1990 and 2000. If the region continues this slower than average growth rate, as it is expected, the Kingdom will see 0.3 – 0.4% population increase each year for the next decade.

Economically, Vermont is expected to return to its pre-recession levels by 2015, and grow mildly through 2020 as compared to the rest of New England. According to the *New England Economic Partnership (NEEP)*, New England’s economic base will grow by just under 1% per year up to 2013. Unfortunately, this figure is said to be barely strong enough to overcome unemployment growth as the overall employment base is expected to grow as well, creating a rather stagnant economy. Vermont, however seems to be faring slightly better than the rest of New England, with lower unemployment, limited housing value decline, and growth in real personal income in 2011; pre-recession growth levels of 1% per year are predicted to be reached for

Vermont prior to 2015, putting the state at a slight advantage. Although this figure represents the State's growth, the Northeast Kingdom should plan to incorporate a small percentage of this growth into the region approximately 0.2 - 0.3% between 2013 and 2020.

We project the future growth in energy demand for the Northeast Kingdom to be between 0.5 – 0.7% a year for the next eight years. This is very similar to the compound annual growth rate of between 0.4 - 0.7% (forecast to 2030) predicted for the Vermont as a whole by the Department of Public Service.

Using the conservative projection (0.5% per year), the Northeast Kingdom's electricity consumption will reach approximately 462,886 MWH by 2020, which is still below the regional consumption peak of 466,353 in 2006 (Table 2.10). This is certainly a possibility, since 2006 peak demand was reached prior to the implementation of extensive conservation and efficiency programs. The more realistic projection is 0.7% per year in electric consumption growth, as it reflects the 2015 rebound amount of 457,812 MWH, nearly matching the pre-recession consumption figures of 2007 that account for conservation and efficiency measures. Following the more realistic figure, we project that the Northeast Kingdom will consume an additional 40,000 MWH of power by 2020.

Transportation sector energy consumption is projected to have a much more conservative growth rate, which is most often tied to Vehicle Miles Traveled (VMT) data. According to the *Vermont Transportation Energy Report*, the amount of VMT has been decreasing statewide between 2006 and 2009 (reduced by 1.75% annually). This decline is attributed to the economic recession and growing fuel costs over this period, but it is unclear as to whether higher fuel prices will have a more lasting effect on the amount people are driving even after the economy turns around. Because of this, we project that the number of Vehicle Miles Traveled to grow rather conservatively for the Northeast Kingdom following the projected 2015 economic turnaround, translating to an additional 3,800,000 VMT from 2015 and 2020.

According to *Vermont's 2011 Comprehensive Energy Plan*, thermal energy consumption has changed little in the last 20 years. Petroleum fuel consumption for heating purposes only grew at an average annual rate of 0.8% between 1990 and 2009. Increases in costs for heating fuels mostly result in fuel substitutions and investments in efficiency and weatherization. At the same time, new residential development and population growth has balanced out any decline in consumption that might be seen in the region so far. Therefore, we project thermal energy consumption in the NEK to remain relatively stable to 2020, with decline only expected if efficiency and weatherization activities increase.

III. RESOURCE ANALYSIS

Traditional Resources

Fossil Fuels

Fossil fuels account for over 60% of Vermont's energy consumption. Transportation and household heating are the two leading uses of fossil fuels. Fossil fuels include: natural gas, propane, heating oil/diesel fuel, gasoline, coal, and kerosene. As mentioned previously, the Northeast Kingdom is not served by natural gas; instead heating oil and propane are major resources. There are also no crude oil processing facilities in the state, the nearest facility is located in Quebec and is served by the Portland Pipeline, which runs through the region. Coal and kerosene are also used, though minimally.

One area in which Vermont is seeing growth in fossil fuel usage is via compressed natural gas. With a reduction in natural gas prices, compressed natural gas is now economical for large industrial applications (utilize over 150,000 gallons fuel oil annually) and as a transportation fuel. Both the Burlington Department of Public Works and Vermont Gas maintain vehicle fleets fueled with compressed natural gas. According to *Vermont Transportation Energy Report*, a total of 2.6 million cubic feet of CNG was sold at the two compressed natural gas filling stations in Vermont, the equivalent of over 20,000 gallons of gasoline or 19,500 gallons of diesel.

In the past, the abundance of cheap fossil fuels has influenced the development of our energy systems. Their current price volatility has dramatically affected the economy and the cost of living. In order to stabilize the country's energy structure, many states are encouraging diversification of energy portfolios through renewable resources. In the last few years, fossil fuel costs have risen to the point where renewable and alternative fuels are becoming more attractive within the energy market.

Nuclear

In 2009, nuclear power constituted roughly 38% of Vermont's electric needs. Vermont only has one nuclear facility located in Vernon, Vermont and owned by Entergy. Nuclear energy is produced using an atomic reaction and the process needed for this type of generation produces a lot of radioactive waste and environment temperature increases. Because of these outputs, there is a lot of apprehension towards this type of energy production. Public concern over facility safety has been another major concern for nuclear, particularly with the Vernon facility and the recent natural disasters in Japan (earthquake and flooding).

Green Mountain Power (and its acquisition, Central Vermont Public Service) held the largest share of power purchase agreements with Vermont Yankee, which shut down on December 29, 2014. A large share of this replacement power is expected to come from Hydro Quebec and other facilities in the regional market. According to Vermont's 2011 *Comprehensive Energy Plan*, "even with new Hydro Quebec and other contracts being offered to replace power previously supplied by Vermont Yankee, a gap between contracted supply and expected demand still exists".

Renewable Resources

In response to issues with conventional energy sources, Vermont is exploring newly emerging technologies and renewable energy sources, in particular, to meet future needs. Renewable resources generally include solar, wind, methane, hydro, and biomass energy. In June 2005, Vermont enacted the Sustainably Priced Energy Enterprise Development (SPEED) Program and Renewable Portfolio Goal. The SPEED Program provides financial incentives for the development of new renewable generation facilities under 2.2 MW. The program encourages development by providing feed-in tariffs, which pay a set incentive rate/kWh above current market retail prices for power that meets program criteria and agrees to long-term contracts. Specific types of renewable generation were initially assigned different tariff amounts (Table 2.13) and a total cap of 50 MW was established for the program. To date the 50 MW cap has been met, with 15 projects in operation (7.58 MW) and another 43 projects (42.37 MW) in various stages of development (*Public Service Department*).

Renewable Energy Technology	Current Tariff Rates*
Landfill Methane	\$0.09
Farm Methane	\$0.141
Wind (small)	\$0.214
Wind (large)	\$0.118
Solar PV	\$0.24
Hydroelectric	\$0.12
Biomass	\$0.13
*As amended in 2010 Source: Public Service Department	

In the 2012 latest legislative session, the cap was increased to a total of 127.5MW that will be rolled out in set allotments each year to limit the impact on rate payers. The first allotment will be 5MW/year for the first three years, then it will increase to 7.5MW/year for the next three years, after which it will increase to 10MW/year for each remaining years until the 127.5MW capacity is met by 2022. Changes to the program also address how tariff rates are established, with the legislature promoting a reverse auction process to ensure competitive rates. Northeast Kingdom renewable energy development projects enrolled in the SPEED Program include First Wind, Coventry Landfill, Maxwell's Neighborhood Energy, Chaput Family Farms, Great Bay Hydro - West Charleston, and Kingdom Community Wind.

Vermont's Renewable Portfolio Goal calls for utilities to meet growth in electricity demand by using energy efficiency and new renewable generation sources. This law encourages each retail electricity provider to supply an amount of new renewable energy equal to its total incremental energy growth between 2005 and 2012, with a minimum requirement of 5% (2008 amendment). If this goal is not achieved by 2012 the policy will become a mandatory Renewable Portfolio Standard in 2013. According to the 2011 *Comprehensive Energy*

Plan the 5% minimum was met in 2011, and there is a new goal established by the Legislature of 75% minimum by 2032. Presently, Vermont utilities are on track to provide 17% of the state's total electric portfolio from new renewable resources by 2013.

Hydro

Hydro-power is second leading generation resource in the Northeast Kingdom. Fifteen of the 22 generation facilities in the region are hydro. The largest electric producers include Green Mountain Power's facility on Joe's Pond, Lyndonville Electric's Vail & Great Falls facilities, Central Vermont Power Service's East Barnet Dam, and Great Bay Hydro's facilities in Newport (Table 2.8). The three Connecticut River Dams, though not considered part of our regional generation, are three of the largest hydro facilities in the Northeastern U.S. Together the Moore, Comerford, and McIndoe Falls Dams produce roughly 638,000 MWH of electricity annually (double what the region consumes). Altogether, the Northeast Kingdom can produce roughly 78,000 MWhs of hydro-electric power. A hydro-power resource map developed by NVDA (provided on the following page) identifies where the potential for new hydro facility siting may exist in the region.

Hydro facilities can be a good source of base-load power when regular rainfall is received. For river-run facilities, power generation is dependent upon continuous levels of rainfall and must run when the flow is at optimum levels. This can mean producing electricity when it might not be needed. Dams, on the other hand, have the advantage of storing their resource for later use. Unfortunately, drought can severely limit the production capacity of dams as well. Hydro power facilities can also alter the ecosystem of a waterway. Both reservoir and river-run systems can increase water temperature, decrease water speed, limit oxygen and increase nitrogen levels, and alter riparian areas. These changes to the ecosystem cause stress to fish populations and riparian-habitat wildlife⁷. Today, new hydro facility design and upgrades are engineered to mitigate or lessen negative impacts on the ecosystem.

Overall hydro-power is considered a long-term resource and is relatively secure and stable. Generation costs for hydropower vary considerably between facilities. Many of the facilities in the region were built in the early 1900's and have needed significant upgrades over the years. Upgrading existing hydro and permitting new hydro can prove to be very costly and consequently raises the production costs for the facility. To alleviate some of the permitting costs new legislation was recently passed to help expedite permitting for new small-scale hydro projects in the state.

Solar

Overall solar resources in Vermont are quite good, and solar energy can be harnessed effectively for primary and secondary energy needs. The two main types of solar energy systems are photovoltaic (PV), which generates electricity, and solar thermal, which generates hot air or hot water for water and/or space heating. For some homeowners in our region, solar electricity systems have proven more cost effective than extending power lines to the home. A typical off-grid system consists of photovoltaic (PV) modules that convert solar energy to electricity, batteries that store the electricity (if off-grid), and an inverter that converts DC power to AC for use in conventional electric appliances. As a rough rule of thumb, a 1 kilowatt photovoltaic system can be expected to produce 3-3.5 kWh/day on average in Vermont.

Solar water heating systems typically utilize collectors to capture the sun's energy, a pump to circulate a solution through the collectors to extract heat energy, and a well-insulated storage tank to hold the heated water for use as needed (this can be integrated with an existing water-heating system). An appropriate size solar water-heating system can provide one-half to two-thirds of a household's annual hot water needs – typically 100% in summer, but as little as 25% in winter. In Vermont, these types of systems tend to pay themselves off in less than two decades.

Solar energy can also be harnessed through passive solar design (day-lighting and space heating) with Green Building Design. This includes orienting buildings close to true south, as well as using appropriate windows

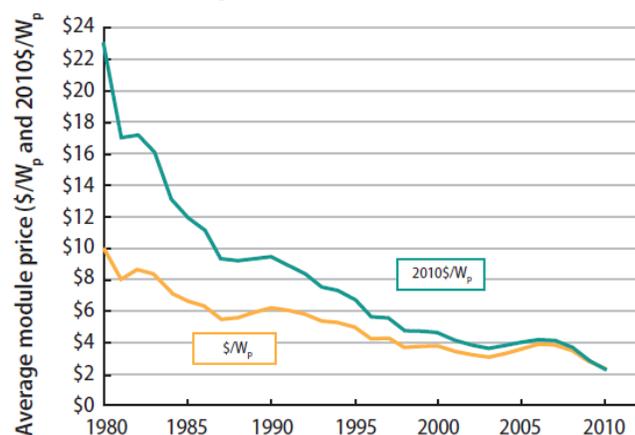
⁷ Foundation for Water and Energy Education.

on the south wall, installing thermal mass (brick, concrete, or water) to store the sun’s energy, and using appropriate levels of insulation. Through these designs, as much as 60% of a building’s space heat can be derived from the sun. This type of heating is termed “passive solar” because no moving parts are needed, the collection and storage system is built into the structure. Green Building Design principles also attempt to maximize the amount of natural light a building receives, in order to reduce the energy costs associated with daytime lighting.

Active and passive solar systems are custom built based on the building site, building and purpose of the solar system. There are many factors that bear on siting solar systems. Many homes and businesses have good rooftop sites, or good sites nearby for ground mounted systems. Unfortunately some do not, such as properties where there is limited southern exposure, possibly blocked by other development or trees. This is common for more urbanized areas. One way to address this situation is through the development of “community-sized” PV projects or co-operative systems on the order of a few hundred kilowatts up to a few megawatts. Utility-scale PV developments are also becoming popular in other areas of the U.S. Often referred to as solar parks, farms, or ranches, these utility-scale PV installations are designed for the sale of merchant power (MWh) into the electric grid and can utilize several acres of land. Public concerns surrounding solar installations of this size usually focus on aesthetics and transmission line development.

Improving technology, in cost and output, also suggests that Vermont’s solar energy potential will continue to grow. Vermont is already one of the top 10 states for PV on a per capita basis (Vermont’s 2011 *Comprehensive Energy Plan*). Today, smaller net-metered (or “grid-tied”) PV systems tend to produce power with a long-term levelized cost of about \$.20/kWh (with the 30% Federal Tax Credit included). Figure 2.3 shows the dropping price of photovoltaic modules from the Department of Energy’s Solar Technologies Market Report⁸. There is also a wide range of photovoltaic technologies now under development, including various thin film technologies, which may further advance the use of solar systems in Vermont.

Figure 2.3 Global Average PV Module Prices, all PV technologies 1984-2010 (Mints 2011)



Methane

Methane, a common gas found in the environment, can be burned to produce electricity.

Large amounts of methane are produced through the anaerobic digestion of manure, agricultural wastes, and other organic wastes. Both large farms and landfills offer the best potential to utilize this resource. In agricultural practices, manure is collected in various containment systems, where it can be heated up for methane gas production and collection. The remaining manure by-product can be spread on fields as fertilizer, and the dry solids can be used for animal bedding.

In agricultural practices, the procedure also destroys harmful pathogens, reduces water quality impacts, reduces manure odors, and provides a new source of income to local farmers. The Blue Spruce Farm in Bridgeport, Vermont was the first farm in the state to develop a manure-methane generation system. The farm began producing in January of 2005 and estimates production at 1.7 million kWh annually. The project is supported through the Central Vermont Public Service’s (CVPS) Cow Power Program, which grants financial assistance for the development of methane generation systems. Through this program, farmers receive 95 percent of the market price for the electricity produced plus the additional fees (4 cents/kWh)

⁸ <http://www.nrel.gov/docs/fy12osti/51847.pdf>

from participating rate payers. In the Northeast Kingdom the Maplehurst Farm, Maxwell Farm, and Chaput Family Farms have installed anaerobic digester systems and collectively produce approximately 4.9MW of electricity. According to the *Renewable Energy Atlas of Vermont*, there are another 31 dairy farms in the Northeast Kingdom that have the potential to support anaerobic digesters.

With landfills, facilities are capped and have special extraction systems to remove the methane for generation. If not utilized, methane - which is 20 times more potent as a greenhouse gas than carbon dioxide - escapes into the atmosphere. In late 2005, the Coventry Landfill began producing electricity from the facility. According to the Washington Electric Cooperative, this facility currently provides two-thirds of the Co-op's power demand. There are a number of smaller landfills in the region that may have the potential to produce electricity depending upon the content of the landfills and their age.

Wind

Wind energy has recently been on the forefront of the renewable energy movement. The U.S. Department of Energy has announced a goal of obtaining 5% of U.S. electricity from wind by 2020, a goal consistent with the current rate of growth of wind energy nationwide. Vermont is currently ranked 34th out of the lower 48 states for wind energy potential.

At this time, our region harnesses wind energy through small-scale individual systems and one utility-scale wind farm (First Wind) located in Sheffield, VT. The First Wind facility, which consists of 16 turbines over 400' tall, was the first large utility-scale wind farm permitted in Vermont following the experimental and much smaller Searsburg facility. The Kingdom Community Wind project, located in Lowell, is the NEK's second and Vermont's largest utility-scale wind farm, utilizing 3 miles of ridgeline, and 21 turbines over 400' tall, and is predicted to produce approximately 185,570 MWhs annually. There are several more utility-scale wind projects in the works at various stages of planning and development in the state, as outlined in Table 2.14, some of which are within the Northeast Kingdom.

Project Name	Size (MW)	Location	Status
Deerfield Wind	30 (15 towers)	Reedsboro (Searsburg Expansion)	Certificate of Public Good Permitted (Lawsuit pending)
Georgia Mountain	7.5-12 (3-5 towers)	Milton	Certificate of Public Good Permitted (operational Nov. 2012)
Grandpa's Knob	50 (20 towers)	W. Rutland, Castleton, Hubbardton, Pittsford	Permit Application expected in 2012
Seneca Mountain Wind	91.5* (12-25 towers)	Ferdinand, Newark, Brighton	Planning stage (measurement towers application submitted Apr. 2012)
Grandview Farm	2-2.3 (1 tower)	Derby	Certificate of Public Good Permit Application submitted Dec. 2011
Smugglers Hill Farm	2-2.3 (1 tower)	Holland	Certificate of Public Good Permit Application submitted Dec. 2011
*Based on NEEPOOL Interconnection application Source: VT Department of Public Service, www.aweo.org			

The siting of wind turbines has raised concerns about aesthetic impacts, erosion, water quality impacts, noise, land scarring, and effects on wildlife, property values, public health, and local economic drivers, such as tourism. Because of our region's mountainous terrain, the ideal location for utility-scale wind turbines is on North-South oriented ridgelines with elevations between 2000 and 3500 feet above sea level. Each utility-scale tower can range in height from 135 feet to 500 feet tall, requiring specified FAA lighting for towers over 200 feet. For purposes of this plan, smaller non-utility scale wind systems are defined as turbines under 200 feet in height, including the length of the blades. A wind resource map is provided at the end of this chapter that outlines potential siting locations that are suitable for small-scale wind towers. Larger (utility-scale)

ridgeline generation facilities may contain as few as 1 to as many as 40 or more turbines. All grid-connected wind turbines are subjected to review and approval by the Public Service Board (30 VSA Section 248). Because of the variations in wind speed, the output of a wind facility is considered intermittent power, and the energy generated is generally 20-30% of what a conventional power generation facility of the same rated peak capacity would produce. Wind speeds need to be within an optimum range specific to the tower technology. If any wind speeds or gusts are registered over the optimum range the wind tower is usually shut down for safety purposes.

Geothermal

Geothermal, or “ground source heat pump systems”, extract natural low-temperature thermal energy from the ground during colder months for heating, and transfer thermal energy from the building to the ground in warm months for cooling. A geothermal system in Vermont can save roughly \$1,000 to \$2,000 annually in heating costs and have a “simple payback time” of between 10-20 years. This technology operates much like a refrigerator, utilizing a heat pump, heat exchanger and refrigerant. While geothermal systems do require electricity to operate the pumps, the systems generally deliver between 3 to 5 times more heat than the electrical energy they consume (depending on the type of system). Geothermal systems are also more efficient than heat pumps that just utilize outside air because the ground/well source systems can take advantage of relatively constant temperatures below the frost line (45-60 Fahrenheit).⁹

There are two main types of geothermal systems, open-loop and closed-loop. Open-loop systems utilize a deep rock well or pond to draw water to the heat exchanger where heat flows from the water into cold refrigerant. The refrigerant is then compressed, which greatly raises its temperature and converts it to vapor. Refrigerant vapors then transfers heat to water in a second heat exchanger that is then circulated to heat the building. The process operates in reverse for cooling. Closed-loop systems are slightly different in that they utilize piping in the ground or a pond that can be placed closer to the surface, but then require refrigerant or water with antifreeze to circulate in the piping.

Open-loop systems are more efficient than closed-loop systems, and are often cheaper to install because they require less excavation. Open-loop systems are also a good fit for Vermont, since standing column wells can be constructed virtually everywhere. While existing well systems can have geothermal systems installed, installation of this technology is often cheapest during construction of a new building and development of a new well site. A geothermal well resource map is provided at the end of the chapter and identifies existing wells with a high potential for geothermal heating and cooling applications.

Biomass

Biomass is organic material that is burned to generate energy. The most common forms of biomass are wood, solid waste (biogas), and biofuels such as ethanol and biodiesel. Wood is already an abundant renewable resource in the region and commonly comes in the form of cordwood, wood chips, and wood pellets. Appropriate biomass applications include use as fuels for heating, electric generation, combined heat-and-power (CHP), and transportation.

Wood chips and wood-pellets have become increasingly popular as a heating resource in the region. Wood chips - either bole chips or whole tree chips - are well suited for combustion to supply heat, hot water, or steam in institutional, commercial, and industrial settings. While wood-pellets can be used in these same applications, they have proven to be most popular in residential applications due to the increased efficiency and ease of existing operating systems. According to the Pellet Fuels Institute, sales of pellet-burning stoves and furnaces grew from 55,000 in 2007 to 141,208 in 2008.

For institutional applications the Vermont Fuels for Schools Program has been extremely successful, installing 43 schools with heating systems that burn small-diameter waste wood. Several Vermont colleges

⁹ Source: *Heating Your Home or Business in Vermont with a Geothermal System* (a NVDA Publication).

now also have campus-wide district heating systems supported by wood-waste. Middlebury College, for example utilizes a 21,000 ton/year wood-chip fueled combined heat-and-power (CHP) system.

Industrial and commercial enterprises in the state are also moving towards wood based heating systems, and in some cases co-generation. In the Northeast Kingdom the North Country Hospital, Ethan Allen Plant (Canaan), and Lyndon Furniture utilize wood-chip CHP systems to meet partial heat and power needs. The Vermont Department of Buildings and General Services operate a large number of facilities on wood-chips including the Montpelier Capital Complex, the Middlebury State Office Complex, the Emory Hebard State Office Building, and several state prisons. According to the Vermont State Agency Energy Plan (July 2005) wood resources account for only 2% of energy expenditures for state buildings, but yields 20% of the energy required.

The region already supports a large scale wood-chip fueled electric generation facility. The Ryegate Power Station is the second largest electric generation facility in the region. Capable of generating 172,367 MWh annually; the plant operated at 100% capacity in 2009, but was idle in the spring of 2012. New power purchase agreements have been drafted and the plant resumed production in June 2012. The plant remained shut down for a while because its retail price/kWh cannot compete on the electric spot market. Plant modifications underway will enable it to receive Renewable Energy Credits, effectively subsidizing its production costs to make its retail price more competitive. Ryegate Power Station is a good example of the difficulties in making an electric-only wood generation plant profitable and competitive. Overall, the ease of handling, local availability, low emissions, and general low-costs of wood resources will allow the region an opportunity to expand this resource if fossil fuel prices climb.

One of the most efficient uses for wood-fuels is co-generation, the simultaneous production of both heat and power, such as the system in North Country Regional Hospital that generates a third of its electric needs and heats the entire hospital. Recent studies looking at co-generation opportunities in the region indicate that it works best when there is an equal need for heat and power¹⁰. Balanced heat and power loads are easier to provide for on the small scale, such as for an individual business but larger plants are more desirable, since they can secure more renewable energy incentives and the capital cost/kWh improves. Large co-gen applications (10+MW) may make sense if an equally large heat user can be found, such as a manufacturer that requires tremendous heat loads. Some engineers propose developing district heating systems along with co-gen plants in areas where a considerable industrial heat user is not available. District heating systems are utilized throughout Europe and one will soon come on-line in Montpelier. Unfortunately most of Vermont's communities do not have the density to support nor afford the \$400/linear foot installation cost district heating requires for distribution. In addition, the average connection cost for district heating is around \$5,000 per homeowner. In other words, district heating is not an easy sell to tax payers.

Siting wood-generation and co-generation facilities are not always easy either. Noise, emissions, truck traffic, and unsightly smoke stacks are concerns when siting facilities near residential neighborhoods and since these facilities use a renewable fuel that grows at a specific rate, overharvesting of the regional woodshed is also a concern.

By diversifying transportation fuels with ethanol or biodiesel, the region would be able to reduce a significant portion of our fossil fuel consumption and stabilize transportation costs. Ethanol based fuels such as E85 are a combination of ethanol and gasoline. Corn is the most common element used to produce ethanol, even though it can be produced from a variety of elements, including wood. Ethanol burns cleaner than gasoline and is very effective in lowering fuel emissions. Unfortunately, the fuel also has significant problems in cold-weather, which make it less useful for Vermont's climate. Biomass fuels are also vulnerable to natural disasters, such as drought and wildfires.

¹⁰ *Town of Sutton - Burke Lumber Site Redevelopment: Wood Supply Assessment & Wood Pellet Manufacturing Facility Feasibility Study/Business Plan* (June 2009, Innovative Natural Resource Solutions for NVDA), *St. Johnsbury-Lyndon Industrial Park Energy Study* (2007).

Biodiesel is a better fit as a biofuel in the state of Vermont, as it can easily be supported in the existing infrastructure of the region. Existing diesel engines and heating oil furnaces do not need to be altered in any way to use biodiesel. Both systems can use pure biodiesel, but combination fuels have been developed for maximum output, such as B10 and B20. Biodiesel is commonly made from soybeans, rapeseed (canola), and sunflowers; all of which can be grown in Vermont. Currently the Vermont Biodiesel Project is working to expand the usage of biofuels for heating and transportation in the state.

Energy Generation Facility Permitting Process

As with the development of any energy generation facility, a Certificate of Public Good must first be issued by the Public Service Board. Prior to issuance, the Board takes into account the environmental, economic, and social impacts of a proposed facility (see Appendix A at the end of the chapter for specifics).

Municipalities and other groups are allowed to participate in the Section 248 review process, but many find doing so to be difficult and expensive. At this time towns may only regulate the development of individual owner-consumption electric generation facilities that are not connected to the transmission grid. Moreover, under Section 248 the Public Service Board must consider, but is not bound by, environmental criteria and may approve a project simply on the basis that they deem the project to be in the “public good”.

Incentives and Subsidies

There are considerable federal incentives that support the market for renewable energy development in Vermont. Without the tax credits and Renewable Energy Credits (RECs), some renewable technologies, such as utility-scale wind, would not be an economically viable resource. There are currently three major federal tax credits supporting the development of renewable energy facilities. The extension of some subsidies by the Federal government is now currently in question, and as a result, the industry is presently unstable. Table 2.15 below lists the current federal subsidies and their eligible renewable technologies:

Program Name	Applicable Technology
Business Investment Tax Credit (ITC)	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Wind, Biomass, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Solar Hybrid Lighting, Fuel Cells using Renewable Fuels, Microturbines, Geothermal Direct-Use
Modified Accelerated Cost-Recovery System (MACRS)	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, Municipal Solid Waste, CHP/Cogeneration, Solar Hybrid Lighting, Anaerobic Digestion, Fuel Cells using Renewable Fuels, Microturbines, Geothermal Direct-Use
Renewable Energy Production Tax Credit (PTC)	Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Hydrokinetic Power (i.e., Flowing Water), Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal

Business Investment Tax Credits are a major contributor to the renewable energy market at this time. Investors receive deductions from 10-30% of the cost of investing, purchasing, or construction depending on the type of renewable technology. Vermont provides a corporate state-tax credit that investors can claim in addition to the federal credit. The federal Production Tax Credit (PTC) provides residential and business generators of renewable power a tax credit of up to 2.2 cents/kWh for 10 years depending on the type of renewable technology. In order to claim the Production Tax Credit eligible facilities must be in-service before a set date. Wind technologies will be the first to expire from the Production Tax Credit, unless the in-service deadline of December 31, 2012 is extended. All other eligible PTC technologies have an in-service deadline of December 31, 2013. At this time it is unclear if the Production Tax Credit will be extended by Congress for wind facilities. Modified Accelerated Cost Recovery System (MACRS) is another extremely important

subsidy, especially to wind farms at this time, due to the short life-span of wind turbines. The system provides specific tax depreciation deductions for a variety of technologies based on pre-determined life-spans.

Renewable Energy Credits (RECs) are also a major supporting factor in the development of renewable energy. RECs are derived from the Renewable Portfolio Standards (RPS) laws mandatory in Massachusetts, Connecticut, Rhode Island, Maine, and New York. Although similar to Vermont's Renewable Portfolio Goals, the standards require utilities to have a certain percentage of renewable power in their mix. Commonly the RPS starts at 1-5% in the first year and increases to as much as 20% in ten years. Most RPS policies involve a credit trading mechanism, so that companies with extra renewable power can sell the extra "renewable-credits" to utilities who haven't met their RPS requirement. Vermont currently allows the sale of renewable credits in other New England states, since Vermont's goals are not mandatory. Essentially as Vermont utilities build additional renewable generation, the RECs can be sold separately from the electricity to other states' utilities, where they have a higher value, thereby subsidizing the development of the new renewable generation in Vermont. Unfortunately, the separate sale of RECs also has provided for a kind of a 'double counting' of renewable generation. For example, a Vermont utility can currently claim to provide renewable power to its ratepayers (possibly as part of the Vermont SPEED Program), while at the same time sell the RECs from the same power to Massachusetts ratepayers. Overall, this is clearly an issue which deserves further consideration and refinement by the Legislature.

Property-Assessed Clean Energy (PACE) Districts are a relatively new method to encourage property owners to install renewable energy systems and make energy efficiency improvements. PACE programs allow property owners to borrow money to pay for such things as energy efficient water heaters, lighting, furnaces, boilers, windows, programmable thermostats, and insulation, as well as solar heating, PV, wind and biomass systems. The amount borrowed is typically repaid via a special assessment on the property over a period of up to 20 years. In Vermont, local governments are authorized to create PACE Districts to provide financing. Participating property owners must agree to a special assessment and lien on the property and pay a one-time, non-refundable fee to support the reserve fund created to cover losses in the event of foreclosure of participating properties. The district may release a lien on a property once the property owner has met the terms of the loan. At this time only a few local towns are considering implementing PACE Districts.

Efficiency & Conservation

Energy efficiency is a very significant part of any long-term energy strategy, yet it is often overlooked when adopting an energy plan. Conservation involves reducing or eliminating unnecessary energy use and waste (e.g. lowering thermostats, limiting hours of operation, etc.). Efficiency also involves reducing the total amount of energy consumed, but the reduction comes from improving equipment or operating processes that use energy. Efficiency can be improved in any number of ways (e.g. switching to efficient fluorescent light bulbs, insulating an attic, driving a more fuel efficient vehicle, or replacing older equipment with new technologies that consume less energy). The net result is that less energy is used, while the overall costs needed for energy are reduced. Energy efficiency improvements typically have a cost, but the payback periods will vary depending upon the cost of the improvement and the amount of energy that is saved.

Weatherization improvements are energy efficiency measures and include such things as insulating walls and ceilings, installing programmable thermostats, and replacing inefficient machinery. There are energy efficiency and weatherization programs in Vermont available to businesses and homeowners and these do change over time. Efficiency Vermont is a good starting place to find out what is available.

Efficiency Vermont

In 1999, the Vermont Public Service Board created an energy efficiency utility for the state, called Efficiency Vermont. The utility is funded by an energy efficiency charge on consumer electric bills, similar to a system benefits charge. Efficiency Vermont offers energy and money-saving programs to consumers that allow them to install and use energy-efficient construction designs, products and equipment. They also offer low-income energy assistance programs.

Over the last ten years, Efficiency Vermont has had a strong impact on reducing energy consumption. According to *Efficiency Vermont's 2011 Annual Report*, the savings from their programs have met 11% of Vermont's 2011 total electrical energy needs. In 2011 alone, they were responsible for saving 108,000 MWhs of electricity, 66,762 MMBTUs, and 790,000 tons of cumulative CO2 emissions state-wide. In the Northeast Kingdom, their programs accounted for 5,609 MW hours of electricity savings, a net -462 MMBTU of fuel savings, and 27,300 CCF of water savings in 2011 (*Efficiency Vermont Year 2011 Annual Report*).

In 2009, Vermont Energy Investment Corporation signed a new three-year contract with the Public Service Board to provide services through Efficiency Vermont that will raise the annual energy savings goal to 360,000 MWhs from 204,000 MWhs (2005-2008) and provided a \$100 million dollar budget to do so. The economic benefit goal for the current contract term aims to provide \$85 million in total resource (lifetime) benefits to the Vermont economy. This translates to a benefit cost ratio of 1.2 (Highlights of Efficiency Vermont's Plans for 2009-2011). As of Efficiency Vermont's 2009 Annual Report, 95% of the Caledonia County and 85% of Orleans/Essex Counties total resource benefit goals had been met, accounting for a total of \$6.4 Million in savings.

IV. NEK PORTFOLIO

Portfolio Recommendations

As we look at meeting the energy needs for the Northeast Kingdom it is important to remember that there are several distribution companies that supply the region with power and each will need to focus on their individual future needs. All distribution companies are planning for greater diversity in their resources as well as evaluating fuel sources, contract lengths, and contract terms.

The following recommendations express how each resource should fit into the regional energy portfolio for the next eight years:

Fossil Fuels

Base-load Power, Standard Heating & Transportation Fuel Resource

Determining the future extent to which fossil fuels can remain a part of the region's energy mix is difficult. For years, experts have been trying to determine the time frame in which world oil production will peak and just how long worldwide supplies will be able to keep up with demand. At the time of this writing, world oil production is growing more slowly than demand, causing a major increase in fuel prices. The trend of rising fossil fuel prices over the long-term is expected to continue although downward fluctuations do occur. Natural gas has been a relatively recent exception to this trend for fossil fuels. Expanding production capacity can be developed, but this only translates into a short-term fix. For the next eight years fossil fuels, with the exception of natural gas, should play a reduced role in the region's energy mix.

Hydro

Base-load & Intermittent Power Resource

While this energy source is renewable, the ability to create new hydro-power generation is limited. Some of the best hydro resources in the region are already generating, while permitting new facilities has been a long and difficult process. At this point the focus for hydro-power should be focused on maintaining facilities with renewed permits, upgrades to aging infrastructure, and improved safety standards. The development of new facilities should be pursued where practical, and may now be easier under new state law.

Nuclear

Base-load Power Resource

Nuclear power is a reasonable priced base-load resource. The Vermont Yankee plant provided a significant portion of the state's electricity and its power has been replaced by utilities with other base-load resources, primarily from Hydro Quebec. Nuclear energy should remain an option for the region's energy portfolio, either through Vermont Yankee (if it's relicensed), or through other nuclear facilities in New England.

Solar

Intermittent Power & Supplemental Heating Resource

Solar power (photovoltaic) has an ability to meet some of our future energy needs, by successful implementation as a supplemental resource. The recent decrease in cost of PV and technology advances suggests that prospects for this resource will continue to improve. A gradual, sustainable increase in the use of solar power should be encouraged, especially in residential applications. Solar hot water heating is already a proven cost reducer and/or stabilizer. This technology should be considered where applicable. Green Building Design principles, including passive solar design, are also a very cost-effective way to help reduce energy consumption and should be encouraged in renovations or new buildings.

Methane

Base-load Power Resource

Methane proves to be a significant resource to meet our short-term energy growth and also support agricultural practices in the region. The only large-scale landfill in the region is already being utilized for methane generation, but there are at least 31 dairy farms with enough capacity to sustain a manure-methane generation facility (Renewable Energy Atlas of Vermont). Farms with over 200 cows can produce a favorable amount of generation, potentially over 1,000 MWhs/year. The development of such systems can be costly however. If state and federal grants, tax credits, and incentives remain in place to combat the high start-up costs, manure-methane generation should be expanded in the region's energy mix.

Wind

Intermittent Power Resource

The Northeast Kingdom, the region that the NVDA serves, has considerable experience with industrial wind turbines. Caledonia County is home to First Wind's Sheffield turbines. Green Mountain Power's Kingdom Community Wind turbines are located in Lowell (Orleans County). Three additional projects were proposed, but not carried out: the East Haven Wind Farm (Essex County), Seneca Mountain Wind (Caledonia and Essex Counties), the Encore Redevelopment project in Derby (Orleans County). It follows that the NVDA's Board of Directors has become quite familiar with arguments both for and against industrial wind complexes.

The NVDA's 2005 regional plan stated, "As a statement of policy, NVDA supports the construction of wind towers." The plan also said, "Wind Towers should be seen as beneficial to the region."

The NVDA has first-hand experience with the divisiveness that accompanies wind projects and the damage that the projects visit upon communities. This experience resulted in a re-evaluation of the NVDA's 2005 position on wind energy. In 2012, the NVDA Board of Directors voted 39 to 3 in favor of a resolution calling for a suspension of development of new industrial wind projects in the region. The Board called for the formation of a committee to study industrial wind energy in the region and develop findings and recommendations. The committee's findings and recommendations would be reviewed by the NVDA's Executive Committee and then by the full Board of Directors.

As a result of this effort, the NVDA has developed the following position on industrial wind energy:

"The NVDA sees one clear benefit to industrial wind energy, one clear problem, and a host of troubling questions. The clear benefit is the tax relief that industrial-scale wind turbines bring to their host towns. The clear problem is the bitter divisions that wind brings to our communities. The troubling questions involve the unreliability of wind energy, the amount of energy produced versus the social and environmental disruption, the costliness of the electricity, and the dubiousness of the claims of environmental benefit. We are even more troubled by the potential impacts on human health, essential wildlife habitat, water quality, aesthetics, property values, and our tourism industry. We are also troubled by the state's energy policies, the state's permitting process, and the ease with which the public good as expressed in our municipal and regional plans can be overridden by people who may never have even visited our region.

It is the position of the NVDA that no further development of industrial-scale wind turbines should take place in the Northeast Kingdom.

Geothermal

Supplemental Heating Resource

Geothermal has great potential for expansion in the Northeast Kingdom, with the most promising systems being open-loop well systems. This technology is also one of few renewable resources that can directly reduce fuel oil consumption used for space heating and should be encouraged in both existing and new construction in the region.

Biomass

Base-load Power, Standard/Supplemental Heating & Transportation Fuel Resource

Biomass has significant potential to reduce the region's fossil fuel consumption. The majority of our fossil fuel consumption is for transportation and home heating uses, only a small portion of fossil fuels are used in electricity generation for the region. Wood chips, wood pellets, and biodiesel hold the greatest potential for Vermont to transition these uses towards renewable energy. The expansion of these resources will also offer strong support for our traditional economy (forestry and agriculture) and stabilize regional fuel costs. In the next few years, biomass usage should be promoted and expanded as a significant resource to diversify the region's energy portfolio and meet future energy needs.

Energy Efficiency & Conservation

The Northeast Kingdom expects energy efficiency improvements and weatherization could meet a significant portion of growth in energy demand. Through efficiency programs and weatherization, such as the ones offered by Efficiency Vermont, energy efficiency and weatherization efforts should be promoted and utilized as much as possible at the local and regional level. All municipalities should lead by example and conduct energy efficiency audits of public buildings and make efficiency and weatherization improvements to reduce energy consumption and save local taxpayer dollars.

REGIONAL GOALS & STRATEGIES

Policy Statement

This region has a responsibility to plan for adequate supply of energy to meet local energy demand. Planning activities may include the production, storage, siting, and distribution of energy. Individuals, businesses, organizations, and communities are encouraged to explore emerging energy supply, efficiency, and net-metering opportunities that meet accepted environmental standards in order to satisfy their power demand.

New industrial/utility energy development shall meet the highest standards required by law. Permitting authorities shall first consider current and historical land use and the culture of the region, community opinion, economic benefit, as well as the land owner's rights. Any development shall to the extent possible be done so as to mitigate adverse impacts to the region. Any utility-scale energy generation project deemed acceptable by the Public Service Board shall include a plan for distributing benefits to the towns in the region proportional to the adverse effects experienced by that town. Long term maintenance, safety issues, decommissioning, and land reclamation procedures required at the end of the energy project's life must also be included in the project plan.

This plan aims to balance environmental quality and important natural resources with energy production. Significant local and regional support and clearly demonstrated benefits should exist in any energy proposal.

REGIONAL ENERGY GOALS & STRATEGIES

1. An adequate, reliable, diverse, and secure energy supply will benefit the region.

- Support the upgrade of regional transmission systems to continue to reduce constraints.
- Support the maintenance and upgrade of existing energy generation facilities and related infrastructure.
- Promote a diversified energy portfolio for the region.
- Encourage local responders to plan for emergency energy resources (VEM Emergency Generator Grant Program generators).

2. Affordable energy alternatives will be available for the region's users.

- Assist in the development of businesses that support alternative energy use.
 - Support the development of small-scale renewable resources, such as wind and solar, and the use of supplemental sources (wood) to stabilize energy costs.
 - Promote and support rail infrastructure as a cost-effective transportation resource for the energy industry.
- 3. Net-metering capacity in the region will be maximized.**
- Encourage municipalities to become “clean energy districts” and participate in the PACE program (Property Assessed Clean Energy). This would provide consumers with options to more affordably implement grid tied renewable energy systems.
- 4. Energy generation that provides the best cost-benefit to the region will be promoted.**
- Promote wood-based energy generation to support the region’s forest industry.
 - Encourage the development of energy facilities and resources that help sustain local agriculture and forestry (i.e. grass/wood-pellets, small-wind, solar, farm-methane, wood-chip, biodiesel).
- 5. Environmental and aesthetic impacts of energy generation and usage will be considered.**
- 6. Energy efficiency and weatherization will be an integral part of the energy portfolio.**
- Encourage municipalities to reduce their energy costs through conservation and efficiency, and weatherization programs
 - Support Local Energy Committee/Coordinator efforts to reduce energy consumption, improve efficiency and weatherization, and develop new generation resources.
 - Encourage municipalities to conduct energy audits and weatherization programs.
 - Encourage businesses to make energy efficiency investments and develop energy efficient production methods.
 - Promote energy efficient building design and construction methods (Green Building Design & LEED certification).
- 7. There will be broad public participation in the decision-making process.**
- Encourage the Vermont Legislature to develop policies that support the development of solar, small-wind, hydro-electric, farm methane and biomass generation facilities, while respecting current local land use and the culture of the region.
 - Encourage the PSB to examine the long-term sustainability of proposed facilities.
 - Ensure that developments subject to Act 250 consider new energy requirements.
 - Support the NVDA Board of Directors resolution for a three-year suspension of utility-scale wind development in the Northeast Kingdom until a study is completed.
- 8. Assessment of local needs and values on new energy development will be encouraged.**
- Encourage towns to address energy development in town planning and zoning.
 - Provide assistance to businesses/municipalities to develop cogeneration and other alternative energy strategies.

APPENDIX A - Title 30: Public Service Board, Chapter 5, Section 248(b): Before the public service board issues a certificate of public good as required under subsection (a) of this section, it shall find that the purchase, investment or construction:

(1) with respect to an in-state facility, will not unduly interfere with the orderly development of the region with due consideration having been given to the recommendations of the municipal and regional planning commissions, the recommendations of the municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality. However, with respect to a natural gas transmission line subject to board review, the line shall be in conformance with any applicable provisions concerning such lines contained in the duly adopted regional plan; and, in addition, upon application of any party, the board shall condition any certificate of public good for a natural gas transmission line issued under this section so as to prohibit service connections that would not be in conformance with the adopted municipal plan in any municipality in which the line is located;

(2) is required to meet the need for present and future demand for service which could not otherwise be provided in a more cost effective manner through energy conservation programs and measures and energy-efficiency and load management measures, including but not limited to those developed pursuant to the provisions of subsection 209(d), section 218c, and subsection 218(b) of this title. In determining whether this criterion is met, the board shall assess the environmental and economic costs of the purchase, investment, or construction in the manner set out under subdivision 218c(a)(1)(least cost integrated plan) of this title and, as to a generation facility, shall consider whether the facility will avoid, reduce, or defer transmission or distribution system investments;

(3) will not adversely affect system stability and reliability;

(4) will result in an economic benefit to the state and its residents;

(5) with respect to an in-state facility, will not have an undue adverse effect on esthetics, historic sites, air and water purity, the natural environment, the use of natural resources, and the public health and safety, with due consideration having been given to the criteria specified in 10 V.S.A. §§ 1424a(d) and 6086(a)(1) through (8) and (9)(K) and greenhouse gas impacts;

(6) with respect to purchases, investments, or construction by a company, is consistent with the principles for resource selection expressed in that company's approved least cost integrated plan;

(7) except as to a natural gas facility that is not part of or incidental to an electric generating facility, is in compliance with the electric energy plan approved by the department under section 202 of this title, or that there exists good cause to permit the proposed action;

(8) does not involve a facility affecting or located on any segment of the waters of the state that has been designated as outstanding resource waters by the secretary of natural resources, except that with respect to a natural gas or electric transmission facility, the facility does not have an undue adverse effect on those outstanding resource waters;

(9) with respect to a waste to energy facility, is included in a solid waste management plan adopted pursuant to 24 V.S.A. § 2202a, which is consistent with the state solid waste management plan;

(10) except as to a natural gas facility that is not part of or incidental to an electric generating facility, can be served economically by existing or planned transmission facilities without undue adverse effect on Vermont utilities or customers;

(11) with respect to an in-state generation facility that produces electric energy using woody biomass, will:

(A) comply with the applicable air pollution control requirements under the federal Clean Air Act, 42 U.S.C. § 7401 et seq.;

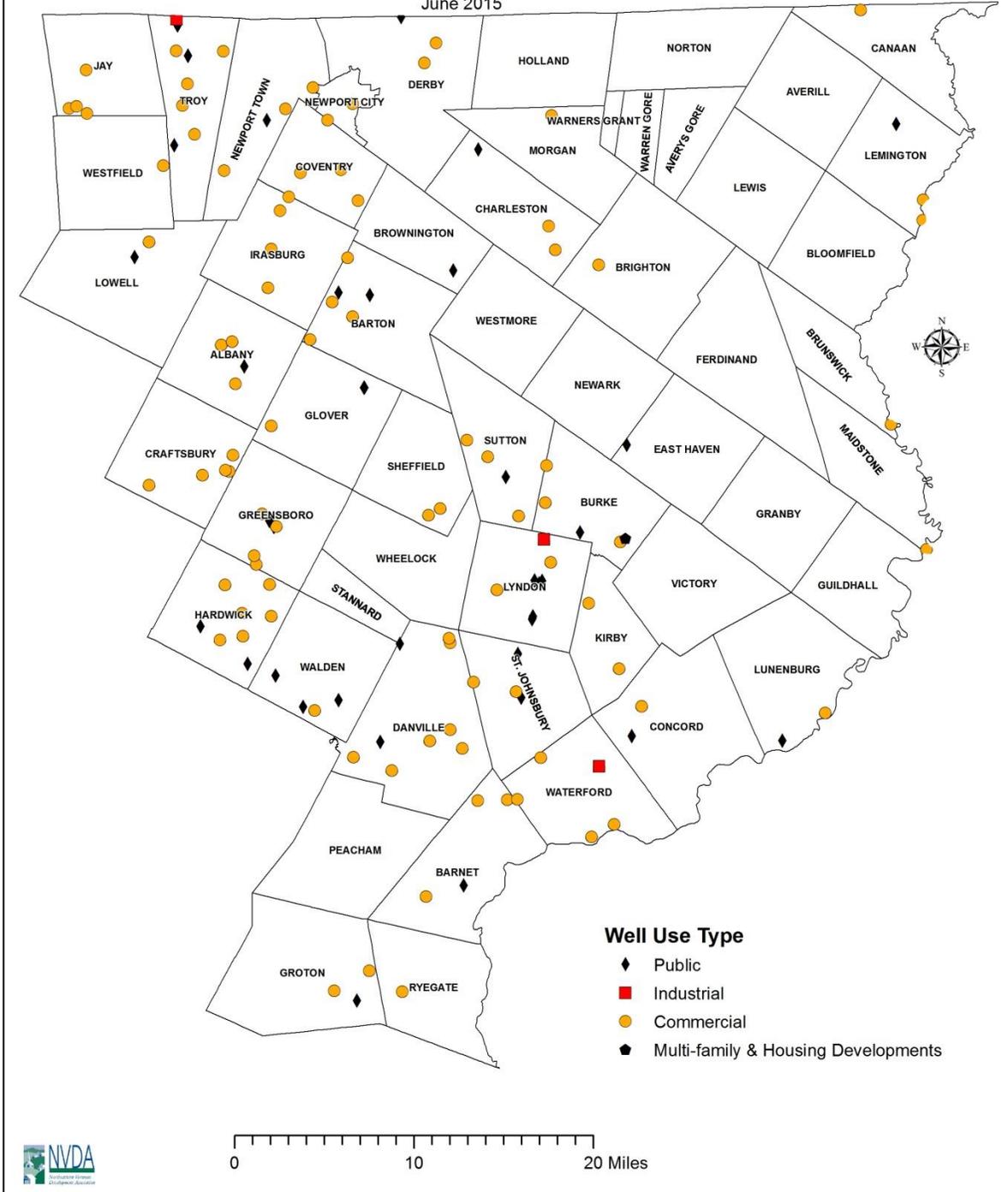
(B) incorporate commercially available and feasible designs to achieve a reasonable design system efficiency for the type and design of the proposed facility; and

(C) comply with harvesting guidelines and procurement standards that are consistent with the guidelines and standards developed by the secretary of natural resources pursuant to 10 V.S.A. § 2750 (harvesting guidelines and procurement standards).

Geothermal Heating & Cooling High Potential Wells in the Northeast Kingdom

Figure 2.4

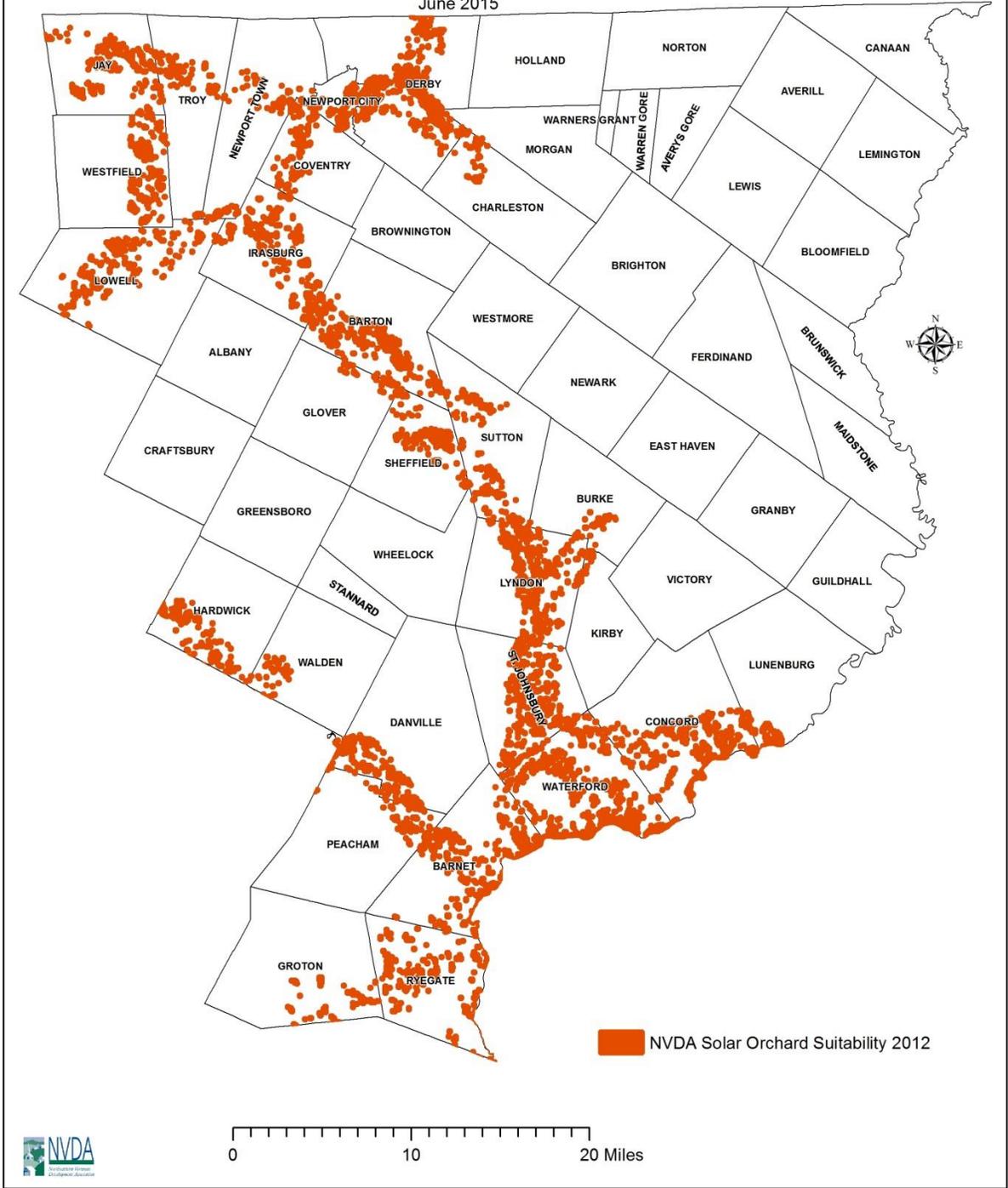
June 2015



Solar Orchard Site Suitability in the NEK

Figure 2.5

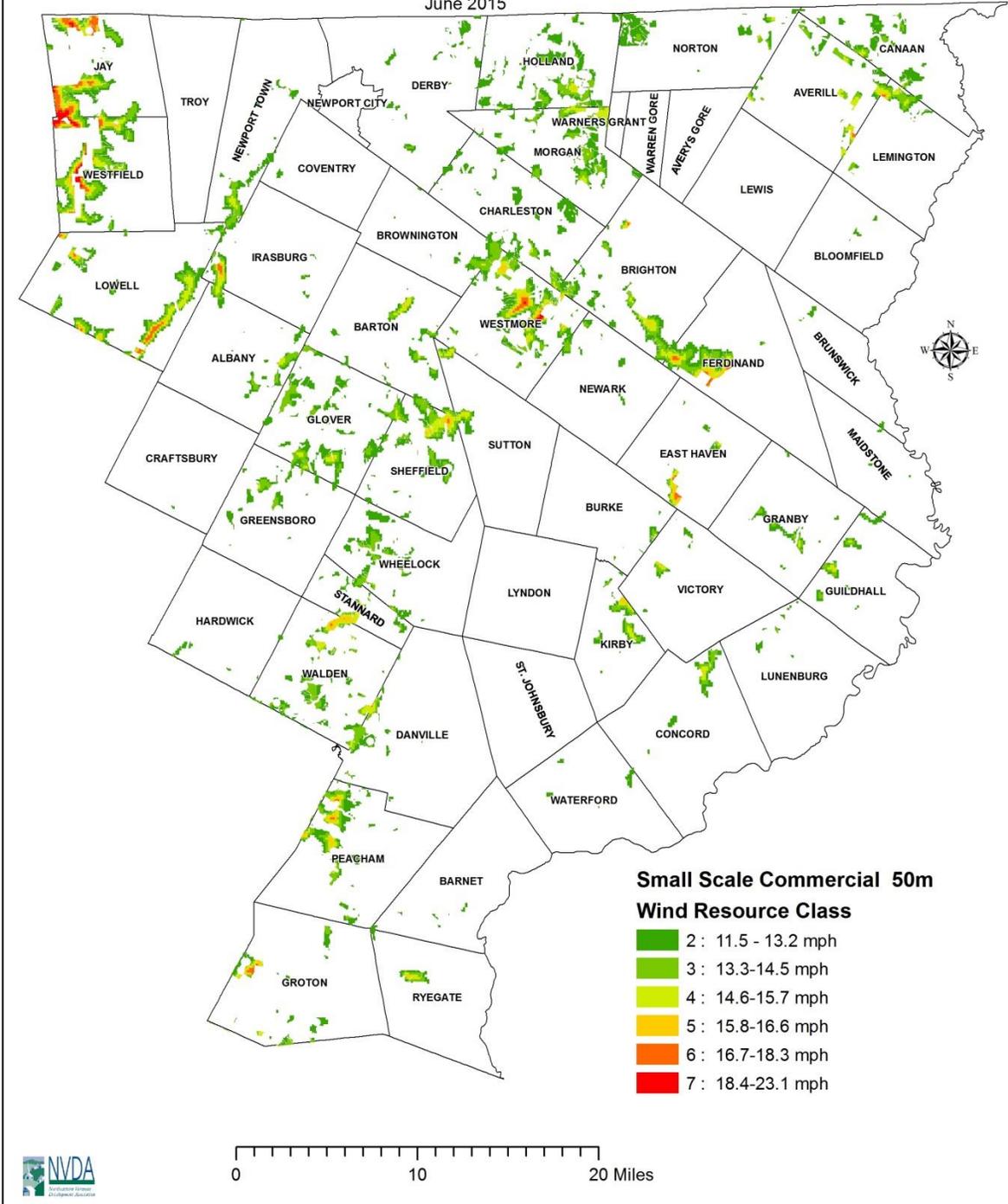
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Northeast Kingdom Small Scale Commercial Wind Resources

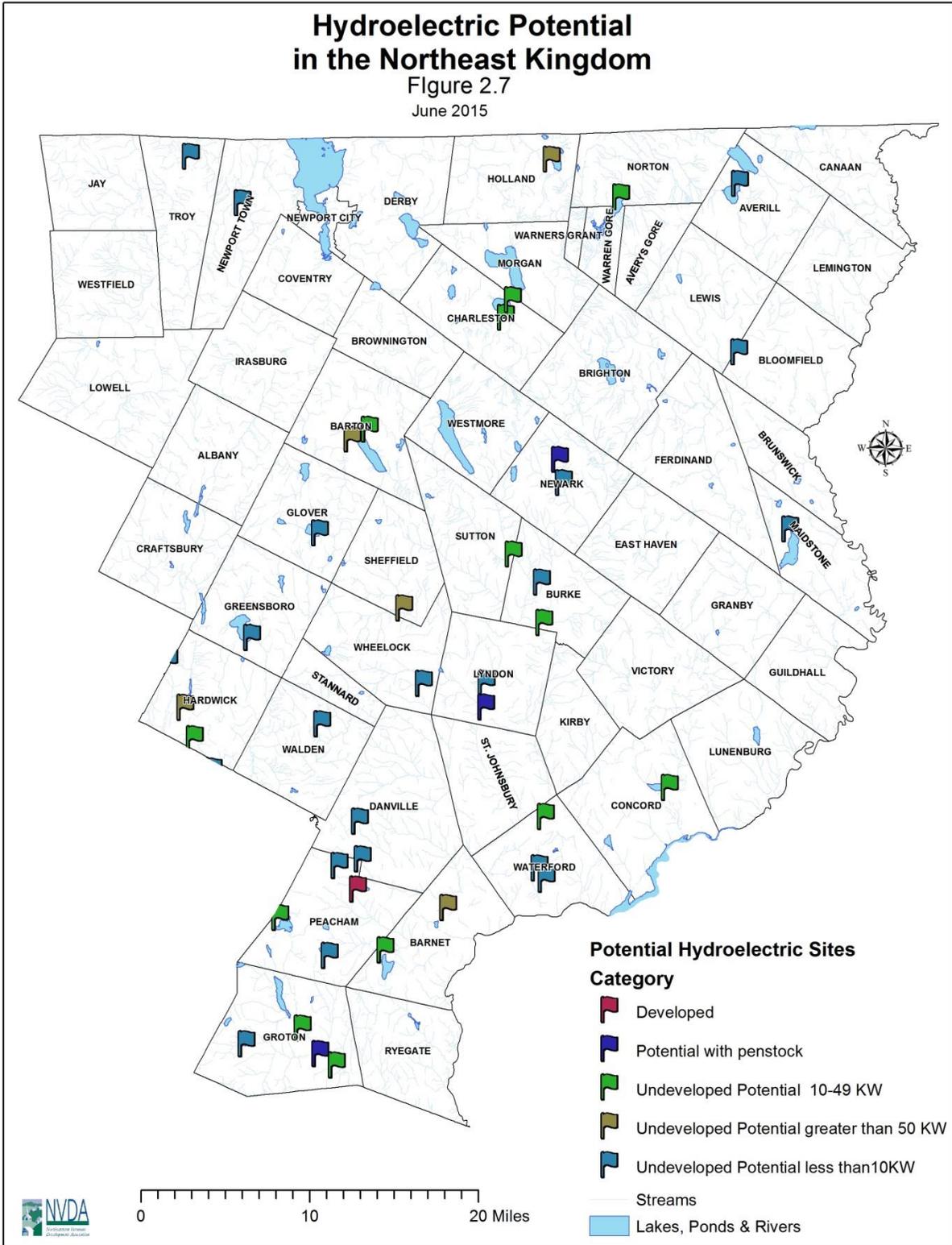
Figure 2.6

June 2015



Hydroelectric Potential in the Northeast Kingdom

Figure 2.7
June 2015



Chapter Three: Utilities & Facilities

INTRODUCTION

This chapter of the regional plan identifies existing educational, recreational, and public facilities, and utilities including power generating plants, transmission lines, telecommunications facilities, public water supply, and sewage disposal systems.

The economic stability and orderly land use development of communities largely depends on the capacity of local and regional utilities and facilities. This chapter identifies areas where facilities need to be expanded in order to accommodate the growth that communities desire and/or that will result from pending significant development projects in the region. Goals, and strategies to achieve them, are contained at the end of each subsection in this chapter.

I. EDUCATIONAL FACILITIES

Overview

The Northeast Kingdom currently has 40 public schools, and 9 publicly-funded independent schools serving the 55 towns and gores in the region. Additionally, there are 6 independent schools that are approved or recognized by the Vermont Department of Education, but which are not eligible for publicly-funded tuition payments due to a religious affiliation. Of these 55 schools, 11 serve the secondary grades only (grades 7th or 9th through 12th), including two career/technical centers. Four public schools and two independent schools in the region provide education for primary and secondary grades in one school. (see Table 3.2)

Independent schools having boarding or home-stay programs add greatly to the cultural diversity of the community and act as a generator for the local economy. Three schools in the region have boarding programs: Burke Mountain Academy, Lyndon Institute, and St. Johnsbury Academy.

Fifteen towns in the region, including the six Essex County towns of the Unified Towns and Gores (UTG), do not operate schools and instead pay tuition for all students in grades K-12 to attend other schools. Another 16 towns operate an elementary school or belong to a union elementary district, but tuition all students in the secondary grades. Two towns tuition students in the 7th and 8th grades only, and two towns tuition just the elementary grades. (See Figure 3.1)

Both public and approved independent schools accept students from “school choice” towns (as schools that tuition some or all grades are known) and are eligible to receive payment via the tuition voucher system unless the school is religiously affiliated. Some of the independent schools offer specialized education to serve particular educational needs. In order to be approved by the State of Vermont, independent schools are required to provide a minimum level of curriculum and instruction.

School Choice towns generally allow families to send students to the school of their choice, usually provided the tuition cost does not exceed an amount pre-set by the sending school district. Transportation to school in these towns is generally left to the students’ families.

Average Daily membership is a count of resident and state-placed students who receive an elementary or secondary education at public expense. Average daily membership of elementary students includes those in Early Education, PreKindergarten, Kindergarten, and 1st through 6th grades. Average daily membership of secondary students includes those in grades 7-12.

Table 3.1 gives an indication of the number of students sent to independent and public schools in other districts from school choice towns in the 2013-2014 school year.

Every year the State Department of Education publishes the “Average Announced Tuition” for public and approved independent schools in Vermont. It is noted that tuition rates do not necessarily correspond to per-pupil spending – rather, it is the amount that is paid by the sending district (usually one that does not operate a school) to the receiving school district. The tuition rates of private schools in the region are generally competitive with tuition rates at the region’s public schools. Schools in New Hampshire are also a desirable option for students in Vermont school choice towns, particularly in the eastern Essex County towns along the Connecticut River.

Table 3.1 Northeast Kingdom School Choice Towns Average Daily Membership by District 2013-2014				
School District	County	Grades Tuitioned	ADM 2013-2014*	
			Elem.	Second.
Barnet	Caledonia	9-12	NA	116
Burke	Caledonia	9-12	NA	122
Kirby	Caledonia	K-12	48	42
Lyndon	Caledonia	9-12	NA	342
Newark	Caledonia	9-12	NA	31
Peacham	Caledonia	7-12	NA	43
Sheffield	Caledonia	9-12	NA	51
St. Johnsbury	Caledonia	9-12	NA	469
Stannard	Caledonia	7-12	NA	24
Sutton	Caledonia	9-12	NA	62
Walden	Caledonia	9-12	NA	80
Waterford	Caledonia	9-12	NA	129
Wheelock	Caledonia	9-12	NA	40
Bloomfield	Essex	K-12	8	20
Brunswick	Essex	K-12	5	6
East Haven	Essex	K-12	17	19
Ferdinand	Essex	K-12	NA	NA
Granby	Essex	K-12	6	3
Guildhall	Essex	7-12	NA	15
Lemington	Essex	K-12	9	3
Lunenburg	Essex	9-12	NA	81
Maidstone	Essex	K-12	5	9
Norton	Essex	K-12	9	3
Victory	Essex	K-12	5	8
Coventry	Orleans	9-12	NA	73
Morgan	Orleans	K-6	37	NA
Newport Town	Orleans	7-8	NA	107
Westfield	Orleans	7-8	NA	27
Westmore	Orleans	K-8	19	NA

Source: Vermont Department of Education, average Daily Membership report for the 2013-2104 school year

Figure 3.1
School Choice Towns in the NVDA Region

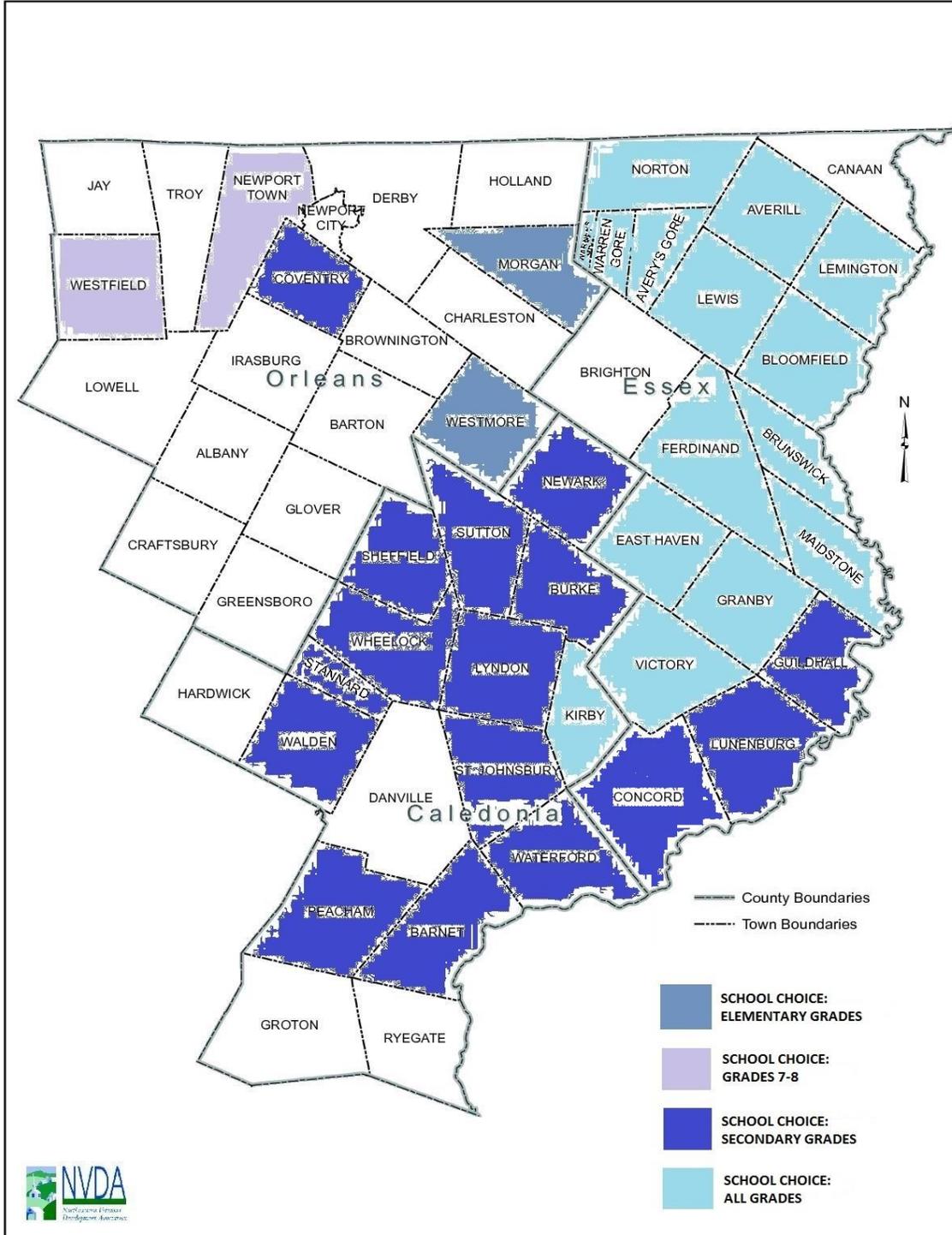


Table 3.2 Schools in the Northeast Kingdom											
School Name	Town	County	Type	Description	Grades served	Average enroll. 2008-2012	Enrollment School year ending ...			Fiscal Year 2015 Announced Tuition	
							2013	2014	2015	Elem.	Second.
CALEDONIA COUNTY											
Barnet Elementary School	Barnet	Caledonia	Public	Day School	PK-8	182	219	217	213	\$13,500	\$11,500
Burke Mountain Academy	East Burke	Caledonia	Approved Independent	Boarding School with skiing program	8-12	NA	54	59	63	NA	NA
Burke Town School	Burke	Caledonia	Public	Day School	PK-8	185	201	204	217	\$12,095	\$12,095
Caledonia School	St. Johnsbury	Caledonia	Approved Independent	Special Education Day School	9-12	NA	26	19	20	NA	NA
Cornerstone School	St. Johnsbury	Caledonia	Approved Independent	Special Education day School	4-12	NA	21	24	27	NA	NA
Danville School	Danville	Caledonia	Public	Day School	PK-12	384	374	356	346	\$13,750	\$13,750
East Burke School	East Burke	Caledonia	Approved Independent	Day School	8-12	NA	8	11	13	NA	NA
Green Mountain Technology and Career Center	Hardwick	Caledonia	Public	Career/Technical Center and adult education	7-12	NA	NA	NA	NA	NA	\$15,295
Hardwick Elementary	Hardwick	Caledonia	Public	Day School	PK-6	258	276	275	277	\$10,500	NA
Hazen UHSD #26	Hardwick	Caledonia	Public	Day School	7-12	370		368	347	NA	\$13,300
Lyndon Educational Alternative Resources Network, Inc.(LEARN)	Lyndonville	Caledonia	Approved Independent	General and Special Education Day School	7-12	NA	22	23	17	NA	NA
Lyndon Institute	Lyndon Center	Caledonia	Approved Independent	Day and Boarding School, offers some special education	9-12	601	574	542	549	NA	\$15,993

Lyndon Town School	Lyndon	Caledonia	Public	Day School	PK-8	483	484	518	492	\$12,095	\$12,095
Millers Run School USD #37	Sheffield	Caledonia	Public	Day School	PK-8	157	130	126	116	\$12,095	\$12,095
Newark School	Newark	Caledonia	Public	Day School	PK-8	50	67	57	59	\$12,095	\$12,095
Peacham Elementary School	Peacham	Caledonia	Public	Day School	PK-6	39	50	49	48	\$17,400	NA
Riverside School	Lyndonville	Caledonia	Approved Independent	Day School	K-8	NA	71	81	72	NA	NA
St. Johnsbury Academy	St. Johnsbury	Caledonia	Approved Independent	Day and Boarding School, offers Special Education	9-12	961	914	984	949	NA	\$15,750
St. Johnsbury Schools	St. Johnsbury	Caledonia	Public	Day School	PK-8	684	658	690	685	\$10,175	\$10,175
Sutton School	Sutton	Caledonia	Public	Day School	PK-8	96	108	107	110	\$12,095	\$12,095
Thaddeus Stevens School	Lyndon Center	Caledonia	Approved Independent	Day School	1-8	NA	60	72	76		
Walden School	Walden	Caledonia	Public	Day School	PK-8	101	108	101	93	\$12,100	\$10,200
Waterford Elementary School	Waterford	Caledonia	Public	Day School	PK-8	177	174	151	152	\$9,800	\$9,800
ESSEX COUNTY											
Brighton Elementary School	Brighton	Essex	Public	Day School	PK-8	109	88	91	93	\$13,972	\$13,972
Canaan Schools	Canaan	Essex	Public	Day School	PK-12	212	202	184	193	\$13,000	\$16,000
Concord School	Concord	Essex	Public	Day School	PK-12*	219	208	218	212	\$14,251	\$14,360
Guildhall Elementary	Guildhall	Essex	Public	Day School	K-6	21	19	19	20	\$9,500	NA
Lunenburg Schools	Lunenburg	Essex	Public	Day School (separate elem. & middle schools)	PK-8	130	114	110	120	\$12,763	\$12,502
ORLEANS COUNTY											
Albany Community School	Albany	Orleans	Public	Day School	PK-8	90	95	95	94	\$9,550	\$9,550

Barton Graded School	Barton	Orleans	Public	Day School	PK-8	156	197	181	193	\$9,550	\$9,550
Brownington Central School	Brownington	Orleans	Public	Day School	PK-8	83	110	116	106	\$9,550	\$9,550
Charleston Elementary	Charleston	Orleans	Public	Day School	PK-8	108	113	130	122	\$8,500	\$8,500
Coventry Village School	Coventry	Orleans	Public	Day School	K-8	95	108	102	105	\$13,300	\$13,300
Craftsbury Schools	Craftsbury	Orleans	Public	Day School	PK-12	162	160	168	179	\$11,400	\$16,000
Derby Elementary School	Derby Line	Orleans	Public	Day School	PK-6	363	395	384	385	\$10,697	NA
Glover Community School	Glover	Orleans	Public	Day School	PK-8	130	136	135	134	\$9,550	\$9,550
Holland Elementary School	Holland	Orleans	Public	Day School	PK-6	74	68	67	52	\$11,230	NA
Irasburg Village School	Irasburg	Orleans	Public	Day School	PK-8	130	136	148	140	\$9,550	\$9,550
Jay/Westfield Joint Elementary	Jay	Orleans	Public	Day School	PK-6	85	97	86	86	\$13,266	NA
Job's Mountain Academy	Glover	Orleans	Approved Independent	Special Education school for students with traumatic brain injury	7-12	NA	2	0	0	NA	NA
Lake Region UHSD #24	Barton	Orleans	Public	Day School	9-12	381	361	346	352	NA	\$12,900
Lakeview USD #43	Greensboro	Orleans	Public	Day School	PK-6	72	78	83	90	\$12,078	NA
Lowell Graded School	Lowell	Orleans	Public	Day School	PK-8	121	112	118	115	\$10,616	\$10,616
Newport City Elementary	Newport City	Orleans	Public	Day School	PK-6	302	345	343	335	\$11,160	NA
Newport Town School	Newport	Orleans	Public	Day School	PK-6	106	100	105	89	\$15,000	NA

North Country Career Center	Newport City/ Derby	Orleans	Public	Career/Tech. Center & adult education	7-12	NA	NA	NA	0	NA	\$13,164
North Country Junior UHSD# 22	Derby Center	Orleans	Public	Day School	7-8	308	272	257	270	NA	\$14,554
North Country Senior UHSD #22	Newport City	Orleans	Public	Day School	9-12	919	850	836	796	NA	\$13,600
Orleans Elementary School	Barton	Orleans	Public	Day School	PK-8	118		114	115	\$9,550	\$9,550
Troy School	Troy	Orleans	Public	Day School	K-8	167	158	199	184	\$9,600	\$9,600
Turning Points School	Newport City	Orleans	Approved Independent	Special education school	1-12	NA	NA	NA	27	NA	NA

*Residents in 2015 voted to close grades 9-12 at the Concord School.

Independent Schools in Northeast Kingdom Not Eligible for Publicly-Funded Tuition Payments

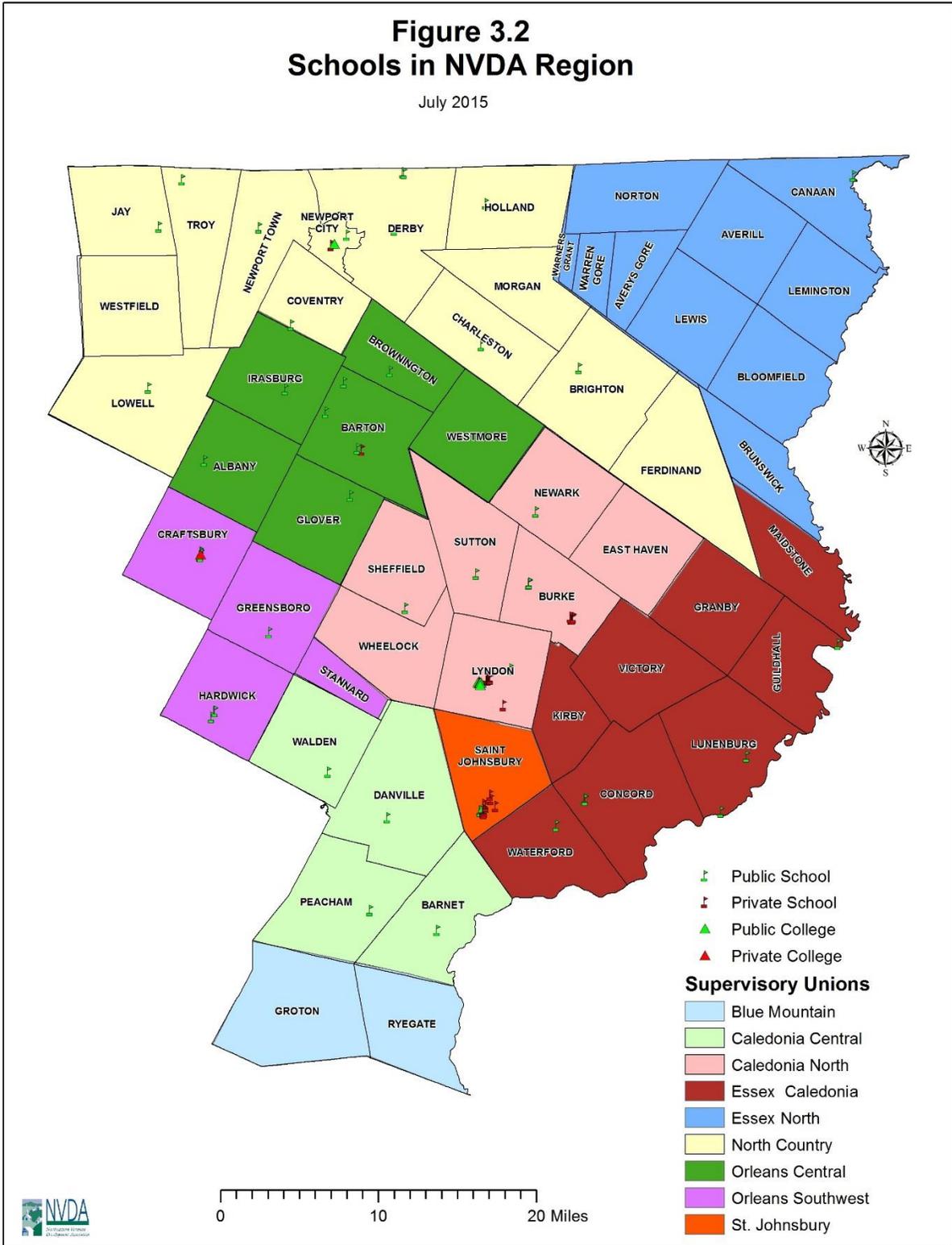
School Name	Town	County	Type	Description	Grades served	Enrollment Year ending...		
						2013	2014	2015
Caledonia Christian School	St. Johnsbury	Caledonia	Approved Independent	Seventh Day Adventist Day School	1-8	9	8	14
Cornerstone Christian School (the Fold, Inc.)	Lyndonville	Caledonia	Recognized Independent		6-12	5	11	6
Good Shepherd Catholic School	St. Johnsbury	Caledonia	Approved Independent	Roman Catholic Day School	PreK-8	156	138	104
St. Paul's Elementary	Barton	Orleans	Approved Independent	Roman Catholic Day School	K-8	95	76	69
United Christian Academy	Newport City	Orleans	Independent, Recognized	Christian Day School	K-12	82	87	103
Twelve Tribes Community Church School	Island Pond (Brighton)	Essex	Recognized Independent		Ages 6 -16	NA	1	6



Schools that experienced increased enrollment 2012-2015

Figure 3.2 Schools in NVDA Region

July 2015



School size, distance from home, student diversity, physical facilities, academic programs offered including availability of Advanced Placement courses, and sports and extracurricular offerings are among the many factors considered by families in school choice towns when choosing a school.

Figure 3.1 depicts School Choice towns in the region, by grade levels tuitioned. Benefits of school choice include more flexibility for families and no school buildings to maintain. Some drawbacks are long travel times and high transportation expenses for families (or towns that provide school bus transportation.) In addition, due to state formulas, a town tuitioning a handful of students may actually have a *higher* education tax rate than a town that maintains a school with hundreds of students.

Home Study & Home School

Some families opt for "Home Study" programs to educate their children. The child is still taught a minimum course of study according to 16 V.S.A. Section 906, with an evaluation at the end of each school year by a qualified teacher, a standardized achievement test, or a portfolio. The number of home-schooled students increased in Caledonia County over the past six years, while the number decreased in Essex and Orleans Counties. (See Table 3.3). Data specifying the grade level was not available, and numbers tend to vary throughout the school year. Some students are home-schooled in some subjects, and attend school for other subjects or extracurricular activities.

In total, homeschoolers in the 2014-2015 school year accounted for 3.5 percent of the student population in the region.

County	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Caledonia	162	171	193	210	215	216
Essex	30	26	24	23	23	15
Orleans	135	144	139	139	134	126
Total NEK Region	327	341	356	372	372	357

Source: Vermont Agency of Education, response to data request, 2014-2015

Supplemental Educational Programs

Another important educational resource in the region is educational/non-profit organizations which run programs for youth that lie outside traditional academic subjects. For example, the University of Vermont Cooperative Extension coordinates a variety of 4-H programs based in locations throughout the region, in subjects such as arts and crafts, cooking, agriculture and livestock, natural resources, energy, and teen leadership.

In 2012, Catamount Arts and the St. Johnsbury Athenaeum initiated an arts education program geared towards pre-k through 8th grade students. Daytime and afterschool programs have served elementary students in St. Johnsbury and neighboring towns in Caledonia County, and have included classes in music, dance, and studio art.

Other examples of non-profit organizations that provide arts-based education and enrichment programs include the Greensboro Arts Alliance and Residency (GAAR), based in Greensboro, Orleans County, that serves residents of all ages; and Vermont Children's Theater, based in Lyndon, Caledonia County, that provides a summer theater program for students in the elementary and high school grades.

Secondary Education

Table 3.4 shows the 2013-2014 data on dropout rates of the publicly-funded secondary schools in the three counties of the Northeast Kingdom. Since some secondary schools begin at grade 7 and some at grade 9,

both drop-out rates are shown. When students fail to graduate from a secondary level institution (or levels beyond), their opportunities for gainful employment in the future are greatly diminished. It is important that schools and communities strive to help students complete their education.

County	School	Dropout rate Grades 7-12	Dropout rate Grades 9-12
Caledonia	LYNDON INSTITUTE	--	1.5%
Caledonia	ST JOHNSBURY ACADEMY	--	1.1%
Caledonia	DANVILLE	0	0
Caledonia	HAZEN UHS #26	2.2%	3.3%
Essex	CANAAN SCHOOLS	1.1%	1.5%
Essex	CONCORD SCHOOL	1.0%	1.5%
Orleans	CRAFTSBURY SCHOOLS	1.0%	1.5%
Orleans	LAKE REGION UHS #24	--	3.8%
Orleans	NORTH COUNTRY UHS #22A	--	5.4%
Vermont	STATEWIDE TOTAL	1.7%	2.5%

Source: VT Agency of Education, 2013-2014 Dropout & High School Completion Report

Table 3.5 depicts education levels of residents of the Northeast Kingdom as compared to the State. Region-wide, Caledonia County has the population with the highest education levels of the three counties, although it still lags behind the State. 89.8 percent of the adult population in Caledonia County has a high school education, compared to 91.6% of the State's population. 26.3% have a Bachelor's degree or higher in Caledonia, as compared to 35.7% of State's residents.

2013	Caledonia	Essex	Orleans	Vermont
Population 25 years and older	21,631	4,690	19,509	435,144
Less than 9 th Grade	3.3%	7.6%	5.6%	2.9%
9 th to 12 th Grade, no diploma	7.0%	9.1%	8.7%	5.4%
High School Graduate (includes equivalency)	35.7%	43.1%	39.7%	30.3%
Some college, no degree	18.4%	17.0%	17.5%	17.0%
Associate's Degree	9.4%	8.5%	6.7%	8.6%
Bachelor's Degree	15.8%	10.5%	14.6%	21.7%
Graduate or Professional Degree	10.5%	4.2%	7.3%	14.0%
High School Graduate or Higher	89.8%	83.3%	85.8%	91.6%
Bachelor's Degree or Higher	26.3%	14.7%	21.9%	35.7%
2000				
Population 25 years and older	19,596	4,384	17,814	404,718
High School Graduate or Higher	82.6%	75%	78.2%	86.4%
Bachelor's Degree or higher	22.5%	10.8%	16.1%	29.4%

Source: U.S. Census Bureau, Census 2000, American Community Survey 2013

Residents of Essex County have the lowest level of educational attainment of the three counties, with just 83.3% having a High School diploma. However, when comparing the education levels of the region's 25 and older population to what it was in 2000, there has been a marked improvement.

Higher education enables residents to be more competitive in the higher-wage job market. An educated population is something that businesses will look at when making a decision to locate in an area, so a highly-educated population in the Northeast Kingdom is important to the future economic outlook of the region.

Post-Secondary and Adult Education

At the post-secondary level, the region is home to four colleges: Sterling College in Craftsbury, two branches of the Community College of Vermont in Newport and St. Johnsbury, Springfield College in St. Johnsbury (School of Human Services), and Lyndon State College in Lyndon.

Lyndon State College has signature programs that draw students from outside the State. The college has been recognized nationally for its Meteorology program, and is currently the only higher-education institution in Vermont that offers a degree program in this subject. In 2015, the College was also recognized nationally for its Electronic Journalism program.

Colleges and educational facilities are often viewed as "clean industries" and communities vie to have them. Expanding education institutions within the region is encouraged.

Vermont's adult education and literacy programs are offered through 10 full-service centers and several satellite centers across the state. Full-service centers provide a full range of services, from beginning to advanced literacy in math, reading, writing, interpersonal skills, workplace skills, General Educational Development (GED), Adult Diploma Program (ADP), English to Speakers of other Language (ESOL), High School Completion Program (HSCP) and basic computer instruction. Service centers in the Northeast Kingdom are located in Canaan, Newport, St. Johnsbury and Hardwick and are operated by Northeast Kingdom Learning Services (neklsvt.org).

Technical and Alternative Education

Technical education has become an important and viable part of our educational system, allowing individuals to specialize in work areas typically not addressed by more traditional secondary school programs, and to earn industry-recognized credentials. These programs serve both high school-aged students and adult learners.

Technical education centers in the Northeast Kingdom include: The Canaan Career Center, Lyndon Institute Technical Center, St. Johnsbury Academy Applied Technologies Center, the North Country Career Center (NCCC), and the Green Mountain Technology and Career Center (GMTCC). The school districts of Ryegate and Groton in southern Caledonia County are served by the River Bend Career and Technical Center in Bradford.

The Canaan Career Center at Canaan School in Essex County offers technical education programs with courses of study in business administration and technology, building trades and restoration carpentry, diversified agriculture, fire and emergency services, and health services. The building trades program makes student labor available to nonprofit organizations seeking carpentry work, and students develop advanced skills in building conservation and historic preservation, gaining a sense of pride and ownership in the community.

The St. Johnsbury Academy program offers course in the career clusters of Agriculture, Food, & Natural Resources; Arts and Communication; Architecture and Construction; Business; Hospitality and Tourism; Human Services; Information Technology; Transportation; and Distribution and Logistics.

Lyndon Institute offers career sciences programs in Automotive Technology, leading to NATEF certification; Human Services with an emphasis on Early Childhood Education; Allied Health, leading to LNA certification; Precision Machining; Welding, leading to AWS certification; Innovation/Engineering Career Academy; and Environmental Stewardship.

The NCCC is based in Newport and serves high school students and adults with programs in Agriculture and Natural Resources, Arts and Communications, Engineering and Technical Systems, Business Systems, and

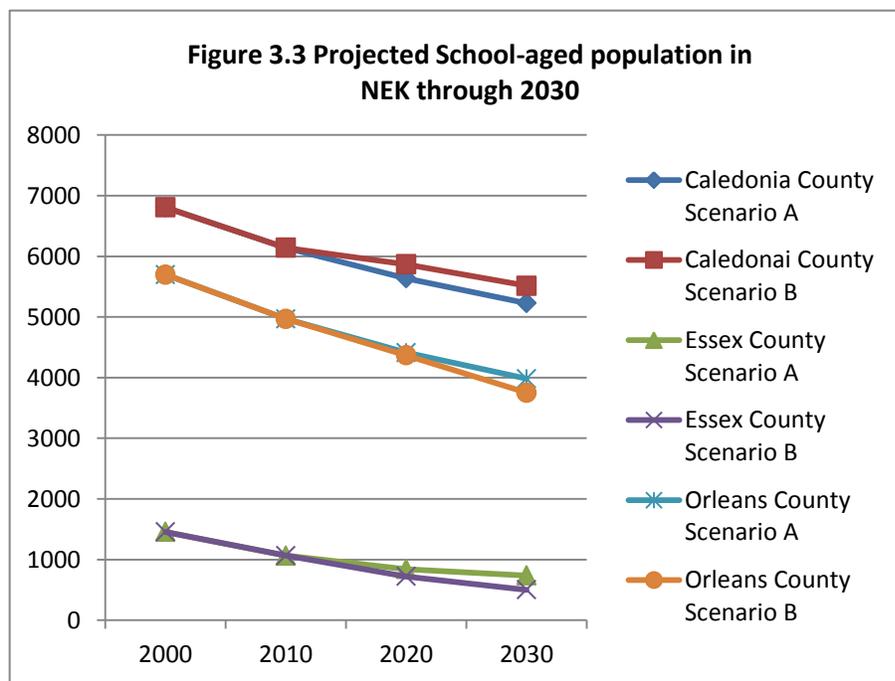
Health and Human Services. The Harold J. Haynes Memorial Land Lab of NCCC is located on 60 acres on Lower Quarry Road in Derby. Students in the Natural Resources, Building Trades, Heavy Equipment and Protective Services Programs participate in classroom activities as well as hands on land management, vehicle repair, construction and fire & emergency response safety training at this facility. In 2014 NCCC added a program in hospitality and tourism, and in 2015 a program in mechatronics and robotics was introduced. NCCC also provides a smaller selection of satellite programs and technical training at Lake Region High School in Barton.

GMTCC, based in Lamoille County, serves students at Hazen Union and Craftsbury schools. A satellite program in Hardwick located in a building behind the Hazen Union School campus offers a program in Forestry and Land Management Technology. This program provides students with introductory and basic training in areas of forest products, natural resource management, wood production, value added wood products, and the technologies associated with these applications. Student field experiences are conducted with forest land at Hazen, Lamoille Union, and at wood manufacturing facilities. Traditional sugaring operations are conducted in Hardwick with field experiences at advanced commercial operations.

Issues and Concerns

The condition of the physical plant (buildings and grounds), the ability of school buildings to accommodate the student population, student to teacher ratios, and the academic strength of the school (measured largely by standardized test scores) are all items that provide an indication of the ability of a school to provide a good education to all students. Schools, in turn, are often a good indicator of the stability and economic health of the larger community.

The capacity of the physical plant of public schools in the Northeast Kingdom is expected to be sufficient for the foreseeable future. Based on population projections prepared by the State in 2013, the school-aged population is projected to decrease in all three counties of the Northeast Kingdom through 2030 (see Figure 3.3).



The State provided projections under two different scenarios: “A” based on the healthy growth experienced in the 1990s, and scenario “B”, based on the slower growth rates of the 2000s.

On table 3.2, some schools show an increase in enrollment in recent years, although it is noted that the average enrollment for years 2008-2012 reflects years when Pre-K was not included in the enrollment numbers for many elementary schools. Although a number of elementary schools show an increase in enrollment in

2013, this is due in part to the counting of preschool students beginning that year. It is also noted that two elementary schools in the region – in the towns of East Haven and Morgan -- closed in the 2012/2013 school

year, so those students were absorbed into other area schools after 2012. Seventeen of the schools in the region experienced some growth from 2012 to 2015.

A more pressing issue than capacity of the region's schools is the rising per-pupil cost of education. As populations shrink and pupil count goes down, per pupil cost can rise in towns that operate their own schools, resulting in a higher homestead education tax rate. It is important to note that because of the way in which education funding is structured, growth in a community that leads to more school-aged children does not necessarily result in an increase in the education tax rate in that town, even if the overall school budget increases. Vermont's state-funded education system links property tax rates to per-pupil spending rather than the overall school budget, so districts that have schools with high enrollment or that belong to a union school district typically tend to see lower education tax rates because of the economy of scale.

School choice Towns do not deal with physical plants of schools, and the budget of school districts in these towns are largely dependent on decisions made by neighboring school districts. For school choice towns, education costs are dependent on tuition rates at the schools which students attend and vary widely (see table 3.2). In fiscal year 2014, both the highest and lowest spending school districts in Essex County were in towns that tuitioned all grades: Victory had the highest per-pupil spending in the County at \$18,098, and Brunswick had the lowest spending at \$8,733.70 (these figures represent spending "per equalized pupil" which assigns a weight to students based on grade level and other special education needs.) In Caledonia County, both the highest- and lowest-spending districts in 2014 were towns had a designated elementary school but tuitioned its high school grades: Stannard, which belongs to Lakeview Union Elementary District and tuitions grades 7-12, spent \$16,984.09 per equalized pupil while St. Johnsbury, which maintains an elementary school but tuitions grade 9-12, was the lowest-spending district in Caledonia County with per-pupil spending of \$11,547.69. There are many expenses and funding sources that contribute to the determination of per-pupil spending, but in general, low-per pupil spending is easier to accomplish in schools with high enrollment. It is noted that the St. Johnsbury Elementary School has the largest enrollment of any elementary school in the Northeast Kingdom. In addition, the location of the school in the center of a densely developed residential area allows many of the students to walk to school, alleviating some of the school transportation costs.

School Consolidation

In recent years State legislation has been introduced to address the issue of high education costs, including legislation designed to encourage, or even mandate, school consolidation.

In the Northeast Kingdom, several schools have closed in the last 10 years. Most recently, the Concord School eliminated the high school grades, and will tuition those students to other schools. The benefits of further school consolidation to increase efficiencies and reduce per pupil spending are limited in the region, in part due to the long distances between schools and the cost of student transportation. (See Figure 3.2)

Although many communities in the Northeast Kingdom are opposed to dissolution of local school boards and the forced closure of local schools, Supervisory Unions in the region are looking at ways to reduce costs by sharing items such as financial accounting systems and maintenance services.

Academic Achievement

Because of the nature of the state-funded education system in Vermont, the ability of a town to provide adequate educational facilities is not based on the wealth of local residents and grand list values. This has enabled higher-poverty school districts (defined here as schools with at least 50% of students eligible for free or reduced price lunch) to provide high-quality educational facilities without raising local tax rates to unsustainable levels. Vermont's school funding system has alleviated many of the funding problems associated with low-income school districts, ensures equal access to education for all the state's students, and is recognized as one of the most equitable school-funding systems in the nation. However, the system is not able to address other socioeconomic factors that are linked to student achievement. In general, statistics show

that students in high-poverty school districts tend to perform more poorly than students in “middle class” districts (defined as districts where the proportion of students on free or reduced lunch is less than 50%).

According to an article by Richard D. Kahlenberg in *American Educator*, (Winter 2012-2013), boosting academic achievement in schools is dependent on economic integration. The article cites research that shows that the performance of low-income students improve when they attend schools serving students in the middle and upper-middle income brackets, and this improvement is independent of any benefits resulting from better-funded schools. The article identifies middle-class schools as those where less than 50 percent of students are eligible for free or reduced-priced lunch, and high poverty schools as those where at least 50 percent of students are eligible for free or reduced-price lunch. Link to the complete article: <http://www.aft.org/pdfs/americaneducator/winter1213/Kahlenberg.pdf>

Because of the significant effect that socioeconomic factors have on student performance, communities that support a balance of income levels through new housing development and job creation can better help assure that residents of all economic backgrounds have access to good schools, functional government and economic opportunity.

GOALS AND STRATEGIES FOR EDUCATIONAL FACILITIES

EDUCATIONAL FACILITY GOALS

- School districts will seek to maximize educational opportunities for students, including extracurricular offering, and increase economic efficiency by sharing services with neighboring school districts when feasible.
- To provide the most favorable outcomes for students, school districts should be economically integrated.
- Adult literacy resources will continue to be available to residents of the Northeast Kingdom to increase the percentage of residents that have earned a high school diploma.
- Post-secondary institutions in the region are vital to the economic development potential of the region and will be supported.
- Post-secondary schools will be closely integrated with the local communities they serve, including the business community, and should have a mutually beneficial relationship.
- Affordable educational and training opportunities should exist for all persons within the region.

EDUCATIONAL FACILITY STRATEGIES

- Investigate opportunities for shared facilities between municipalities and institutions.
- Provide opportunities for the involvement of school officials in the local planning process.
- Promote the development of economically integrated school districts through policies and programs that promote a range of housing options for all income levels within each school district.
- Promote cooperation between institutions of higher learning and local businesses to support quality training and employment opportunities for local residents.
- Support the expansion of post-secondary institutions in the region, to continue to build a highly-educated workforce.
- Support local and regional efforts for workforce development and adult education.

- Support the efforts of local and regional libraries to provide quality facilities and materials for independent learning and education.

II. RECREATION FACILITIES & PROGRAMS

The Northeast Kingdom is home to numerous State Parks, Wildlife Management Areas and Natural Areas that provide passive and active recreational opportunities. In addition, many towns in the region offer public recreation facilities in some form, including town parks or commons, town forests, tennis and basketball courts, ball fields, ice rinks, and public beaches. There are also school recreation facilities, and municipal buildings hosting local recreation programs.

The two major commercial recreational facilities in the region are Burke Mountain Resort, and Jay Peak Resort.

Burke Mountain has Nordic ski trails, Alpine ski trails served by four ski lifts and a J-bar, a full-service restaurant, and a hotel and conference center currently under construction. In the summer, the Burke ski trails are used for mountain biking.

Jay Peak, located in the town of Jay, also hosts a large hotel and conference center, with adjacent golf course. There are a number of alpine ski trails served by nine lifts that can reportedly service 12,820 people per hour. The Pump House Indoor Waterpark is attached to the hotel and is a major draw for tourists year-round. The Ice Haus Arena at Jay Peak offers ice skating lessons and public skating sessions for a reduced rate to Vermont residents.

Municipalities, especially the more rural ones, tend to rely to an extent on private property to meet residents' recreation needs. The Vermont Association of Snow Travelers (VAST) is an organization that relies in part on agreements with private property owners to allow winter access for recreational snow travel. However, unless there are permanent access easements on these properties, property owners can decide to exclude public access at any time.

Towns with higher populations, including St. Johnsbury, Lyndon, Newport City, and Derby, have an array of community recreational facilities and programs. In recent years St. Johnsbury closed its municipal recreation center located in the old armory building and partnered with St. Johnsbury Academy to provide the capacity and staff for its municipal recreation program, which continues to operate year-round and provide a variety of sports teams and activities. Catamount Arts, which is a non-profit arts organizations based in St. Johnsbury, also plays an important role in providing recreational and cultural programs for children year round. It also serves as a "regional box office" for events as diverse and geographically far-ranging as musical theater productions at the Haskell Opera House in Derby Line, to water skiing camps on Harvey's Lake in Barnet.

Parks or "greens" in the center of town are important for passive recreational opportunities. For example, Danville, St. Johnsbury, Newport and Lyndonville all host free outdoor summer concert series in centrally located public spaces.

Table 3.6 is a list of facilities available for use by the general public either free of charge or for a modest fee, organized by county and town. The facilities are generally operated by a municipality, state agency, or a non-profit. The list is not exhaustive, and does not include small pocket parks, school recreational facilities or other passive recreational facilities that may be highly valued by individual communities.

County	Town	Facility/Program	Owner/management organization
Caledonia	Barnet	Harvey's Lake/swimming beach, swim lessons, beach house, picnic areas, boating, water skiing	Town of Barnet, Harvey's Lake Beach Committee

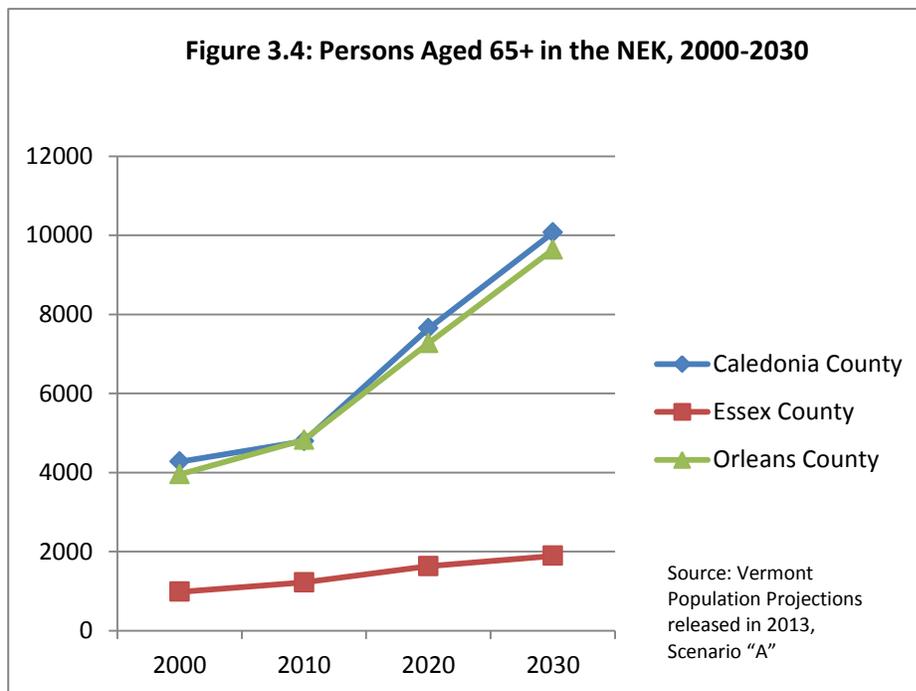
Caledonia	Burke and Kirby	Darling State Park/primitive camping, hang gliding launch sites, observation/fire tower, rustic pavilion (portions leased to Burke Mountain ski area)	Vermont Department of Forests Parks and Recreation
Caledonia	Groton	Seyon Lodge State Park (in Groton State Forest)/lodge and conference center, fly fishing, boat rental, cross-country ski trails	Vermont Department of Forests Parks and Recreation
Caledonia	Groton	Ricker Pond State Park (in Groton State Forest)/campsites, lean-tos, cabins, swimming beach, boat launch, hiking trails	Vermont Department of Forests Parks and Recreation
Caledonia	Groton	Big Deer Sate Park (In Groton State Forest)/campsites, lean-tos, nature trails	Vermont Department of Forests Parks and Recreation
Caledonia	Groton	Stillwater State Park (In Groton State Forest)/ camp sites and lean-tos, swimming beach, boat launch	Vermont Department of Forests Parks and Recreation
Caledonia	Groton	Boulder Beach State Park (in Groton State Forest)/day use picnic areas, swimming beach, boat launch, boat rental, play area	Vermont Department of Forests Parks and Recreation
Caledonia	Lyndon/Burke	Cross Country ski/bike trails	Kingdom Trails
Caledonia	Lyndonville	Powers Park/outdoor swimming pool, tennis courts, swim lessons, arts and crafts program	Village Improvement Society/Powers Park Board
Caledonia	Lyndonville	Fenton Chester Arena (indoor ice rink/indoor field sports)	Lyndon Area Sports Association
Caledonia	Lyndonville	Community ski hill, rope tow, T bar	Lyndon Outing Club
Caledonia	Peacham	New Discovery State Park (in Groton State Forest)/ camp sites, lean-tos, seven horse camping sites, pond for fishing, trails	Vermont Department of Forests Parks and Recreation
Caledonia	Sheffield	Perry Holbrook State Park/ hiking trails, two ponds for fishing and picnicking. Dispersed recreation, including hunting and trapping.	Vermont Department of Forests Parks and Recreation
Caledonia	St. Johnsbury	Public outdoor swimming pool/free swim lessons	Kiwanis Club
Caledonia	St. Johnsbury	Playground, outdoor ice rinks(2), playing fields, tennis courts	Town of St. Johnsbury, Kiwanis Club, American Legion
Caledonia	St. Johnsbury	Town Forest hiking trails	Town of St. Johnsbury
Caledonia	St. Johnsbury	Fred Mold Park/picnic area and fishing pier at confluence of Moose and Passumpsic Rivers	Town of St. Johnsbury
Caledonia	St. Johnsbury	St. Johnsbury Country Club Golf Course/day rates available to the public	St. Johnsbury Country Club
Caledonia	St. Johnsbury (eastern terminus of LVRT)	Three Rivers Recreation Trail to Lamoille Valley Rail Trail/ four seasons transportation trail	Town of St. Johnsbury/VAST
Caledonia and Essex	Averill, Avery's Gore, Bloomfield, Brighton, Brunswick, Burke, East	Kingdom Heritage Lands (West Mountain Wildlife Management Area, the Silvio Conte National Wildlife Refuge- Nulhegan Basin Division, and the Plum Creek private timberlands) / hiking trails, snowmobile trails, equestrian trails	Green Mountain Club/Vermont Agency of Natural Resources/VAST/ Vermont Horse Council

	Haven, Ferdinand, Granby, Lemington, Lewis, Maidstone, Morgan, Victory		
Essex	Canaan	Canaan Recreation Park/ Adjacent to Library and Historic Society Museum, playground, golf range, softball fields, camp sites, picnic pavilion	Town of Canaan Recreation Committee/Canaan Historical Society
Essex	Concord, Granby, Lunenburg, and Victory	Victory State Forest/ primitive camping, hiking, hunting, trapping, wildlife viewing, snowmobiling, snowshoeing, and horseback riding	Vermont Department of Forests Parks and Recreation/Vermont Horse Council
Essex	Maidstone	Maidstone State Park/campsites, lean-tos, swimming beaches, playground, hiking trails, pavilion with picnic tables	Vermont Department of Forests Parks and Recreation
Essex	Norton	Black Turn Brook State Forest/ hiking, cross country skiing, snowshoeing, hunting, and fishing, primitive camping	Vermont Department of Forests Parks and Recreation
Orleans	Barton	Crystal Lake State Park/ Swimming beach, bathhouse, picnic area	Vermont Department of Forests Parks and Recreation
Orleans	Brighton (Island Pond)	Brighton State Park/Spectacle Pond public beach and bathhouse, campsites, lean-tos, cabins, boat rental, nature museum, amphitheater, hiking trails	Vermont Department of Forests Parks and Recreation
Orleans	Charleston	Northwoods Stewardship Center/ mapped trails, day camps, expeditions, science programs	Northwoods Stewardship Center
Orleans	Craftsbury	Hosmer Point, camp programs, sailing on Hosmer Pond	Hosmer Point
Orleans	Craftsbury/ Albany	Craftsbury Outdoor Center/Nordic ski trails, rowing center (sculling)	Craftsbury Outdoor Center (non-profit)
Orleans	Derby	Bike Path along Lake Memphremagog from Canadian Border to Newport City	Town of Derby
Orleans	Derby	Baxter Park/ Playground, Baseball Fields, Tennis Courts, Basketball Court	Town of Derby
Orleans	Derby	Lake Salem Beach House/ Beach House, Sand Beach, Volleyball Court, Horse Shoe Pits	Town of Derby
Orleans	Derby	Petsafe Kingdom Dog Park/off leash dog park	Town of Derby/Dog Park Committee
Orleans	Derby	Clyde River Park/picnic areas, passive recreation	Town of Derby
Orleans	Derby	Derby skating rink w/ warming shack at North Country Union Jr. High	Town of Derby
Orleans	Greensboro	Caspian Lake/ swimming beach, boat launch, picnic areas, natural areas	Greensboro/Hardwick Electric
Orleans	Newport	Prouty Beach and Campground	City of Newport
Orleans	Newport	Gardner Memorial Park: playground, basketball, picnic areas, Clyde River access, Lake	City of Newport

		Memphremagog access, fishing dock, playing fields, skatepark, ice rinks	
Orleans	Newport	Newport Recreation Path/non-motorized recreational uses. Joins the Beebe Spur Rail Trail in Canada	City of Newport
Orleans	Newport	Newport City Dock/ marina, boardwalk, lake cruises	City of Newport
Orleans	Newport	Gateway Center/ event space on Lake Memphremagog	City of Newport
Orleans	Troy	Big Falls of the Missisquoi Natural Area/ swimming, fishing	Vermont Department of Forests Parks and Recreation
Orleans	Westfield	Hazen's Notch Natural Area, Hazen's Notch State Park/ hiking trails, rare plants and peregrine falcon viewing, intersects Long Trail	Vermont Department of Forests Parks and Recreation
Orleans	Westmore	Willoughby Cliffs Natural Area/Lake Willoughby (in Willoughby State Forest) fishing, hiking trails, swimming. Boat launch on north end of lake	Vermont Department of Forests Parks and Recreation
Orleans	Westmore	Sentinel Rock State Park/hiking, ADA- accessible interpretive center	Vermont Department of Forests Parks and Recreation

Planning Considerations

Communities should plan for adequate facilities to meet residents’ needs, and financial sustainability is a key consideration. Towns should research funding options before undertaking a project, as certain loan programs offer loan forgiveness in communities that are financially stressed.



Programs for seniors are an important part of the region’s recreational programs, particularly since population projections predict that seniors over age 65 will continue to make up a greater percentage of the population in the Northeast Kingdom. By 2030, people aged 65 and older are expected to represent 32% of the region’s population.

Some senior programs are organized by local non-profit community groups and receive support by the municipality through an annual appropriation.

For example, “Wonder and Wisdom” receives an annual appropriation from the town of Greensboro to

provide programs for local seniors that are designed to enable them to maintain social contact, and make new friends through outings, cultural activities, and age-appropriate exercise classes.

The Northeast Kingdom Council on Aging, which is supported by the Vermont Agency of Human Services, offers fitness classes at locations throughout the NEK region especially designed for seniors, such as “Growing Stronger” and “Tai Chi for Arthritis.”

Providing an adequate number of recreational programs and facilities adds to the residents’ overall well-being and the community’s quality of life, and thus are important for any town. Publicizing these recreational facilities to town residents and visitors is just as important as developing and maintaining them in the first place.

GOALS AND STRATEGIES FOR RECREATIONAL FACILITIES

RECREATIONAL FACILITIES GOALS

- Towns in the region will provide recreational facilities according to the population’s particular needs.
- State-managed lands in the region will continue to be accessible to the residents of the region, and improvements will be made as appropriate to serve the identified needs of the population, as articulated in municipal plans (e.g., blaze new trails, maintain parking areas and points of entry into state-controlled lands used for passive recreation, create improved access to waterbodies)

RECREATIONAL FACILITIES STRATEGIES

- NVDA will assist municipalities in identifying recreational needs and securing appropriate funding sources to develop new facilities.
- NVDA will direct municipalities to appropriate resources (e.g., Northeast Kingdom Travel and Tourism Association) to develop strategies to increase visibility of existing recreational resources to residents and potential visitors.

(Note: For discussion of goals related to recreational use of land, see Chapter One: Land Use Section V. Recreation Land Use Goals.)

III. CHILD CARE

Safe, reliable and affordable childcare is a resource that is important to the economic and social well-being of Northeast Kingdom communities. It should be a consideration in any development that is designed to house families, particularly affordable housing developments as defined in state statute. It is also important to have childcare facilities near places of employment. The lack of sufficient childcare facilities poses a particular hardship to single parents struggling to find employment and care for a child.

The regional child care system is diverse, and includes independent day care homes, relative care, and center based group care.

The Vermont Department for Children and Families (DCF) operates the Bright Futures Child Care Information System, which is a database of child care providers searchable by town. The site also provides information on how to become a licensed childcare provider. A link to the database can be reached through the DCF website: <http://www.brightfutures.dcf.state.vt.us>

Regional agencies and organizations that offer child care programs or provide referrals to programs include Northeast Kingdom Community Action, Inc. (NEKCA), which oversees the Headstart and Early Headstart programs in the region; and Umbrella, Inc., which operates the Kingdom Childcare program.

GOALS AND STRATEGIES FOR CHILD CARE

CHILD CARE GOALS

- Child care entrepreneurs and child/family service centers should be supported.
- Additional site-based or community child care centers that offer high quality, affordable care should be developed in employment centers and as a component of affordable housing developments.
- The efficiency and effectiveness of existing child care, early education, and family service programs should be improved.
- Child care issues will be integrated into the planning process.

CHILD CARE STRATEGIES

- Provide assistance to municipalities and non-profits seeking to develop child care facilities and/or programs.
- Assist municipalities in assessing the future local need for and supply of childcare services, and whether local barriers exist for the provision of needed services, and assist in developing an action plan.
- Municipalities periodically should review land-use and development regulations to identify needed amendments to authorize quality child-care services in appropriate locations convenient to households, including as home occupations.
- Employers, schools, and community organizations should collaborate to ensure that affordable, quality child-care services are available to meet the different needs of households.
- Municipalities should encourage the inclusion of childcare facilities in the plans for any multi-family housing development that will accommodate families with children, and any large commercial development, to provide more options for employees.

IV. TELECOMMUNICATIONS

The region can gain many economic, social, safety and cultural benefits with a strong telecommunication infrastructure.

The 2014 Vermont Telecommunications Plan issued by the State of Vermont Department of Public Service sets forth ambitious goals that, if realized, will help close the gaps in broadband and cell coverage experienced in many locations in the Northeast Kingdom.

Among the goals of the Plan:

1. **Broadband Speed.** Every E-911 residential and business locations in Vermont should have available broadband Internet access with the minimum technical requirements of 4 megabits per second (Mbps) download and 1 Mbps upload. By year end 2020, a majority of addresses in Vermont should have access to the Internet at speeds of at least 100 Mbps symmetrical, and every address should have access at speeds of at least 10 Mbps download. **By 2024, every address should have broadband speeds of 100 Mbps symmetrical.**
2. **Broadband Deployment.** Every address in Vermont should have access to wired and wireless broadband Internet access service.

3. Affordability. Broadband service should be affordable to all members of every customer class.
4. Local Public Generated Content. The state should promote locally generated content that is used and useful to the community.
5. Adoption and Usage. Vermont should support the universal adoption and use of broadband service at home and at work.
6. Mobile Service. Vermont should have universal availability of mobile service along roadways and near universal availability statewide.
7. Basic Service. Vermont should have reliable, economical telephone service in all areas of the state, including rural areas. All residents, regardless of income or location, should have access to basic telephone service.
8. Enhanced 911. Vermont should have available the best possible E-911 service. The State should endeavor to find greater efficiencies within the E-911 system without sacrificing public safety.
9. Competition. Vermont's telecommunications marketplace should be competitive and all Vermonters should reap the benefits of competition.
10. Regulatory Fairness. Like services should be regulated alike, regardless of the platform or technology used to provide the service.

For an in-depth description of Vermont's telecommunication goals refer to the Vermont Telecommunications Plan at:

http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Telecom_Plan/VT%20Telecom%20Plan%202014.pdf

According to the Vermont Public Service Department, Essex County is one of the most underserved counties in the State, with DSL, cable and fixed wireless broadband services available to less than half of the population. The Public Service Department provides information on wireless and broadband coverage on its website: http://publicservice.vermont.gov/topics/telecom/maps#broadband_map

Geographic distance to markets traditionally posed a barrier for rural businesses. With the development of e-commerce and secure online transactions, rural businesses and residents can join in an expanded modern economy. Tourism information and marketing of local products is available to customers anywhere at any time on the Internet. A strong telecommunications infrastructure serves to improve quality of life, supports businesses, and provides information to residents and tourists about the region.

As telecommuting becomes more popular, settlement patterns may change as more people work in "cyber-jobs" or further away from their employment locations. Video conferencing and teleconferencing allow people to work while away from their offices, reduce some time and expense of transportation to meetings and relieve the burden to drive in hazardous winter conditions. Although the availability of these systems has increased significantly in the last decade, there are still some gaps in coverage in the Northeast Kingdom region, as noted above.

In the Northeast Kingdom, an initiative of the Vermont Telecommunications Authority was the Northeast Kingdom Fiber Network. A fiber optic network benefits cell service and broadband internet expansion in the following way, as noted by the VTA:

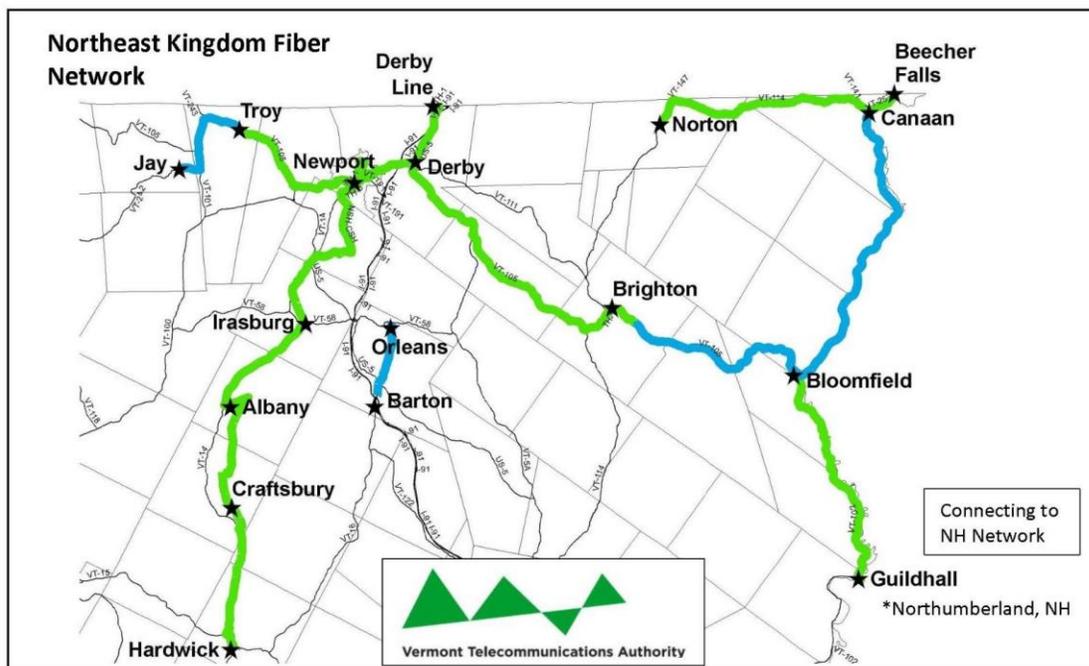
- Cellular towers and other cellular infrastructure need fiber optic routes for "backhaul," the means of transmitting signals from the wireless antennae to carriers' nationwide and global networks.
- For broadband Internet, getting fiber optic cable closer to end users makes faster Internet access possible even when the final leg of service to homes and businesses is a copper telephone line, coaxial cable TV lines or wireless signal.

The network includes the following connections:

- Derby Line to Derby, Route 5
- Derby to Brighton, Route 105
- Brighton to Bloomfield, Route 105
- Newport to Jay, Routes 105, 101 & 242
- Newport to Irasburg, Routes 5 and 14
- Irasburg to Albany, Route 14
- Albany to Craftsbury, Craftsbury Road
- Craftsbury to Hardwick, Route 14
- Orleans to Barton, Telfer and Baird Roads
- Guildhall to Beecher Falls, Route 102
- Beecher Falls to Norton, Route 114

The route connects from Guildhall across to Northumberland, NH to a 744-mile New Hampshire fiber optic network (see Figure 3.5)

Figure 3.5



In 2015, the activities of the Vermont Telecommunications Authority were absorbed by the Connectivity Division in the Vermont Department of Public Service.

Regulations of Wireless Telecommunication Facilities

In 2007, the Vermont Legislature created 30 V.S.A. § 248a. Section 248a provided telecommunications carriers seeking to construct telecommunications facilities the option of obtaining a "Certificate of Public

Good” from the Public Service Board (PSB) as an alternative to local zoning and Act 250 environmental review. Although municipalities may still adopt local ordinances pertaining to telecommunications towers, carriers typically choose to have projects reviewed by the PSB.

New legislation enacted in 2014 sought to clarify the role of the municipal and regional plan in Act 248a proceedings. Act 190 amendments to Section 248a directed the Public Service Board to describe how it interprets the terms “substantial deference” and “good cause” as used in the statute. These terms were intended to provide direction to the PSB as to how to weigh recommendations of municipalities with regard to their town plans and conservation measures.

The Public Service Board adopted the following definitions:

“Good cause” means a showing that deferring to the land conservation measures in the plans of the affected municipalities and the recommendations of the municipal legislative bodies and the municipal and regional planning commissions regarding the municipal and regional plans, respectively, would be detrimental to the public good or the State’s interests articulated in 30 V.S.A. § 202c.

“Substantial deference” means to give significant and meaningful weight to the land conservation measures in the plans of the affected municipalities and the recommendations of the municipal legislative bodies and the municipal and regional planning commissions regarding the municipal and regional plans, respectively.

It is important that municipalities clearly describe their visions for telecommunication planning within their town plans, since the plans are consulted by both the Act 250 commission and the Public Service Board when reviewing projects.

NVDA encourages towns to prepare the most appropriate plans and regulation for their individual needs.

GOALS AND STRATEGIES FOR TELECOMMUNICATIONS

TELECOMMUNICATIONS GOALS

- Northeast Kingdom residents, business, organizations and public entities will be served by an up-to-date telecommunications infrastructure.
- Affordable fixed and wireless communications systems, as well as high-speed Internet broadband, will be available throughout the region.
- Land conservation measures and protection of scenic resources identified in local and regional plans will be give substantial deference when telecommunications projects are under review.

TELECOMMUNICATIONS STRATEGIES

- Solicit input from towns in the region to determine where gaps in broadband and cell coverage may still exist.
- Encourage communities to set up wi-fi zones in public areas (libraries, municipal buildings, etc.) that are available free of charge to residents.
- Support development efforts that reduce the cost of high-speed telecommunications throughout Vermont and the Northeast Kingdom.
- Continue to work with state and regional agencies, as well as the private sector, to attain the coverage goals as set forth in the State Telecommunications Plan.

V. SECURITY & EMERGENCY SERVICES

Enhanced 9-1-1

Since 1998, enhanced 9-1-1 dispatch service has reduced the response time of emergency services for Northeast Kingdom towns. A person dialing 9-1-1 is automatically routed to the appropriate Public Safety Answering Point (PSAP), regardless of telephone exchange boundaries. The Derby State Police Barracks has been the regional PSAP, however due to state budget cuts the Vermont Department of Public Safety is consolidating from four PSAP's to two. Dispatching that is now done out of the Derby PSAP will be done out of Williston. This should not diminish the service provided or response times for first responders, however there has been some concern from citizens, first responder agencies, and local legislators. This change will take place as of September 30, 2015. The PSAP call taker has the caller's phone number, locatable address from a Geographic Information System (GIS), and contact information for the nearest emergency services (police, fire, ambulance, EMS). This enhanced service has shortened response time in the dispatch of appropriate local emergency services and finding the location of the caller without having the caller provide that information.

The Orleans County Sheriff's Department has researched the costs and logistics involved to keep dispatching local. There has been some interest from first responder agencies that now use the Derby PSAP to join this dispatch system, if it occurs; however this new dispatch system managed by and located at the Orleans County Sheriff's Department would not occur until sometime in 2016.

Fire Protection

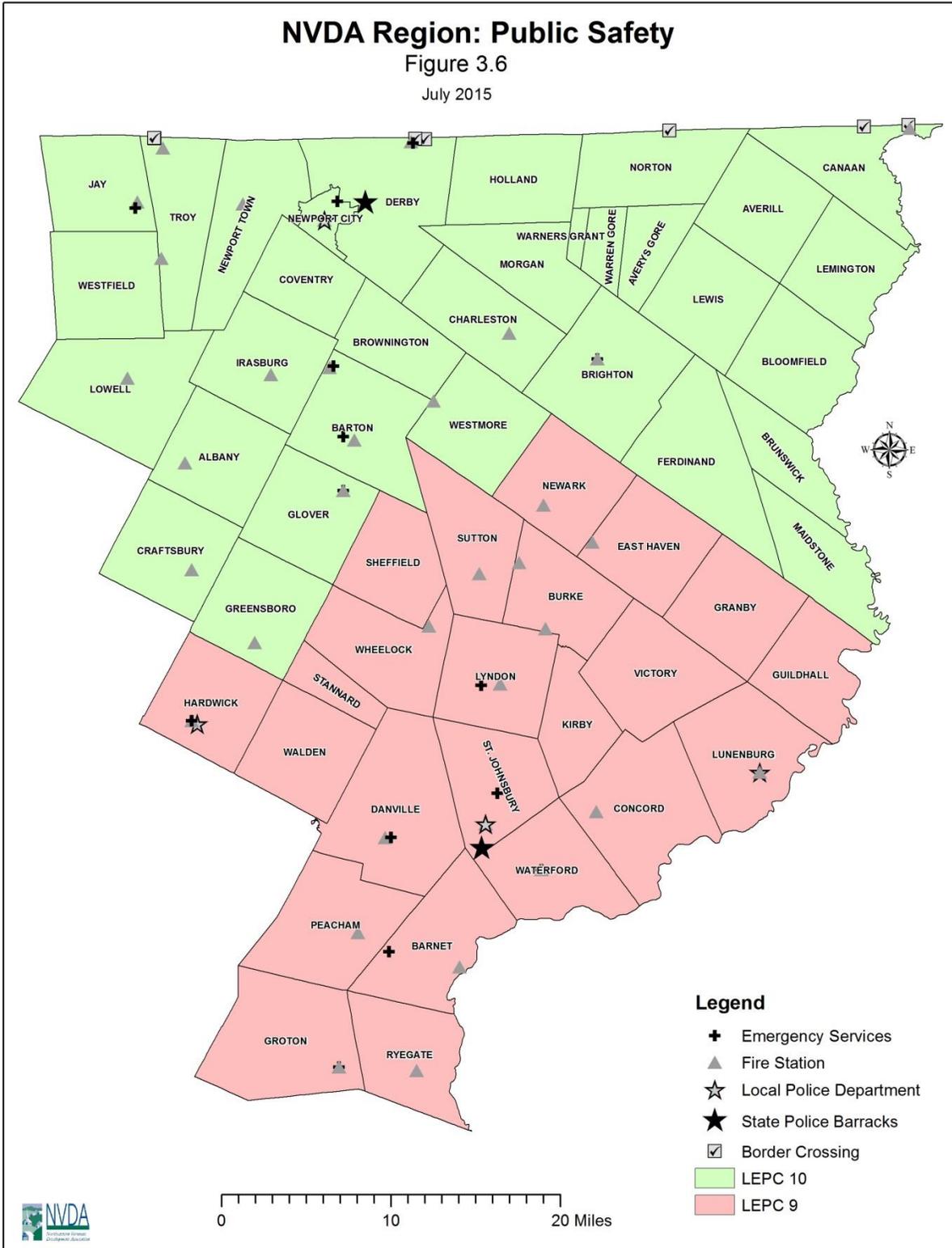
The region is served by a variety of local fire departments. The majority of incorporated towns have their own fire protection. Other communities do not have a fire department and rely on neighboring towns to provide their protection. The types of departments vary from combination full/part-time to paid on-call, to all volunteer. The responsibilities of each department vary according to the population they serve. Major responsibilities of fire departments continue to be fire suppression, prevention and education. The majority of housing in the region (older, wood buildings) was constructed without modern building or fire code standards, making fire prevention a challenge in buildings with outdated wiring or heating. Fire departments also respond to calls for auto accidents, hazardous materials spills, Emergency Medical Services (EMS), and natural and man-made disasters. The capability of these departments to handle such incidents ranges from very good to very poor. If a technical response is needed that a department is not suited to handle, such as rope rescue or hazardous materials mitigation (Haz-Mat), the services will come from the nearest available department or the State Hazardous Materials Response Team. All towns have a fire warden.

Within the three counties there are mutual aid organizations which enable the departments to work collaboratively to mitigate problems in each other's communities. Some departments may travel as much as 40 to 50 miles if needed. One of the major hindrances for small towns is the lack of local firefighters to respond to incidents. Many communities are without immediate fire response because their staff/volunteers work outside the town and will not be able to respond quickly. In addition, departments face challenges to recruit new members due to the high level of training required and responsibilities within fire departments. It is necessary to maintain the proper level of skill and knowledge to respond to the wide range of complex emergencies in our communities. Our communities have had fire departments made up of a large number of dedicated individuals who were called upon frequently to perform in emergencies. The number of volunteers has decreased over the past ten years. Increased funding for equipment and training would assist our fire departments with keeping up with the demand for their services.

NVDA Region: Public Safety

Figure 3.6

July 2015



Ambulance Service

The towns of the Northeast Kingdom belong to one of three State Ambulance Districts. Within the districts there are several ambulance services. Parts of the region are served by ambulance services based in New Hampshire. Ambulance services provide medical first aid, CPR training, non-emergency medical transportation, and back up service to neighboring ambulance coverage areas. The chart below is a summary of the statistics and level of service provided by emergency medical teams operating in the region. Many of the trained first aid responders are volunteers. The "level of service" ranges from low to high service for technical certification and training. The towns listed in table 3.7 include the base locations for ambulance service. The level of service definitions are as follows:

FR-B First Responder EMT Basic Service

FR-I First Responder EMT Intermediate Service

FR-P First Responder EMT Paramedic Service

EMC-B Emergency Medical Certification Basic Ambulance Service

EMC-I Emergency Medical Certification Intermediate Ambulance Service

EMC-P Emergency Medical Certification Paramedic Ambulance Service

Base Town	District #	Level of Service	Base Town	District #	Level of Service
Barnet	5	FR-I	Newport	2	EMC-P
Barton	2	EMC-I	Orleans	2	EMC-I
Brighton	2	EMC-I	St. Johnsbury CALEX	5	EMC-P
Concord	5	FR-I	St. Johnsbury Fire Dept.	5	FR-B
Danville	5	EMC-I	Walden FAST Squad	5	FR-B
Derby Line	2	EMC-I	Waterford Fire Dept.	5	FR-B
Gilman-Lunenburg	5	FR-B	Colebrook, NH	2	EMC-B
Glover	2	EMC-I	Groveton, NH	5	EMC-B
Groton-Ryegate FAST Squad	5	FR-B	Lancaster, NH	5	EMC-I
Hardwick	4	EMC-I	Pittsburg, NH	2	EMC-B
Jay Peak FAST Squad/Ski Patrol	2	FR-I	Stratford, NH	5	EMC-B
Lyndon	5	EMC-I	Woodsville, NH	5	EMC-P
Missisquoi (Troy)	2	EMC-I			

Source: NVDA 2003

Medical Services

The region is fortunate to have two full-service health care centers available, the North Country Hospital (www.nchsi.org) in Newport, and the Northeastern Vermont Regional Hospital (www.nvrh.org) in St. Johnsbury. The Northeastern Vermont Regional Hospital is a member of the larger, regional Dartmouth-Hitchcock Alliance. Other hospitals near the region include the Copley Hospital in Morrisville, the Littleton (NH) Regional Hospital, the Cottage Hospital in Woodsville (NH), and the Weeks Medical Center in Lancaster (NH). Fletcher Allen Health Care, located in Burlington, is available for many specialized medical services.

Emergency mental health services, substance abuse counseling, and crisis support is provided by Northeast Kingdom Human Services on a twenty-four hour basis. The region's towns and villages also contain small medical clinics or physician offices, providing a greater level of access for local residents. Similarly, veterinarian services are available in a number of towns for pet and livestock care.

Border Protection

The Border and Transportation Security Division, under the Department of Homeland Security, patrols the Northeast Kingdom portion of the Canadian border. The Division has six border crossings on the Canadian border in the region. The main border crossing facility is at Derby Line on I-91 and provides monitoring services of the movement of people and goods and processes immigration and emigration. The amount of security and level of surveillance at border crossings has been dramatically increased over the past few years.

Police Protection

Municipal police departments are located in Hardwick, Lyndon, St. Johnsbury and Newport City. The towns of Brighton and Canaan use the same Officer for their Police coverage and when he is off-duty, that area is serviced by the Essex County Sheriff's Department or the Vermont State Police-Derby. County Sheriff's Departments are located in the towns of St. Johnsbury (Caledonia County), Newport (Orleans County), and Lunenburg (Essex County).

The Vermont State Police have barracks in St. Johnsbury (Caledonia County) and Derby (Orleans County). The St. Johnsbury State Police barracks covers 21 towns in Caledonia and southern Essex counties. The Derby barracks serves 32 towns in Orleans and Northern Essex. Trooper activities include patrolling rural roads, responding to auto accidents, and reducing the number of speeding and intoxicated vehicle operators. Troopers investigate domestic assaults, burglaries, child abuse, and arson.

The St. Johnsbury barracks provides dispatch service for Enhanced 9-1-1 service including four ambulance squads (Lyndon Rescue, Calex Rescue in St. Johnsbury, Danville Ambulance, Concord FAST Squad), Hardwick Police, Department of Fish and Game, Sheriff's Department (Caledonia, Essex, and Orange counties), and Bradford State Police. The Derby barracks provides dispatch service for State Police as well as Newport Police, Orleans County Sheriff's Office, Brighton Constable, as well as sixteen fire departments and seven ambulance squads. The Derby Marine Patrol covers Lake Memphremagog, an international waterway with Canada as well as many other lakes. Snowmobile patrolling is also a big part of police activity in the winter months, with the Orleans/Northern Essex County area having the most extensive trail system in the state (Source Vermont State Police, Derby, <http://www.dps.state.vt.us>). Crime statistics are also available at the Department of Public Safety website.

Facilities, Prisons, and Courts

Correctional facilities are located in St. Johnsbury and Newport. St. Johnsbury hosts the Caledonia Community Work Camp, the Northeast Regional Correctional Facility, The St. Johnsbury Community Correction Center, and the St. Johnsbury Court and Reparative Services. Newport hosts the Northern State Correctional Facility, the Newport Court and Reparative Services, and the Vermont Correctional Industries. Courts in the region are located in each of the three counties (Caledonia, Orleans, and Essex) and serve as district, family, probate, small claims and superior courts.

Disaster Planning and Services

The key to responding to disasters is to have sound emergency planning in place. Many services and grants at the federal, state and local levels support such planning efforts. The Directorate of Emergency Preparedness and Response, a division under the Department of Homeland Security, has designated mitigation as the cornerstone of emergency management. Mitigation begins with local communities assessing risks and repetitive problems and making a plan for creating solutions to these problems.

The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 requires each state government to establish a State Emergency Response Commission (SERC). The SERC is charged with developing integrated plans for responding to chemical emergencies and making chemical information available to the public. The SERC appoints Local Emergency Planning Committees (LEPC) to prepare for

and respond to emergencies at the local level. Two LEPC's work in this region: one, serving Orleans County, and the other serving Caledonia and Essex counties.

NVDA, working as a liaison with the LEPC's, assists all towns in the region to keep the Local Emergency Operations Plans updated.. These are efficient guides for use in the early stages of disaster response. The plans give contact information for the organizations and people responsible in an emergency including: emergency medical services (EMS), fire chief, hospital, select board chair, road foremen, law enforcement, town clerk, state contacts, and other resources. The plan describes the method for alerting and evacuating the population if necessary, the site of an alternate "emergency operations center", and locations of local emergency shelters. Other towns have Hazard Mitigation Plans which aim to prevent damage from natural hazards and outline improvements to structures and facilities in the event of damage.

Committees and partnerships aid in the ability to respond to disasters. For example, most of the states and territories have adopted a legal mechanism called the Emergency Management Assistance Compact, which allows states to assist one another during emergencies, but does not force a state to help if that state is unable. Vermont has recently become a partner in this mutually beneficial compact. Other local organizations like the Connecticut River Watershed Council have joined in cooperation with state and local emergency management and planning organizations to create plans for preventing disasters within the Connecticut River Watershed.

Disasters such as severe winter storms, droughts, floods, wildfires, high winds, earthquakes, and tornados have all been known to affect our region. The Vermont Emergency Management agency focuses on preparing and responding to these emergencies. In light of the past few years of drought throughout the state which has left groundwater and surface water reservoirs at very low levels, the Vermont Drought Task Force recommends that every town have an emergency plan to deal with drought preparedness.

The National Flood Insurance Program encourages each town to plan for flood hazards by designating flood prone areas in the town and restricting construction and development in these areas. Most of the towns in our region have adopted Flood Hazard Regulations to limit development in flood hazard areas.

Other aid agencies are designed to provide services in the event of disasters. The Northern Vermont Chapter of the American Red Cross offers service to the three counties of the region including training (First Aid, CPR, AED), HIV/AIDS education, disaster relief, armed forces emergency services, international tracing and communication services, language bank and youth services. In the event of a disaster, the American Red Cross provides shelter, food, health and mental health services to address basic human needs.

GOALS AND STRATEGIES FOR SECURITY & EMERGENCY SERVICE

SECURITY & EMERGENCY SERVICE GOALS

- Emergency services should be provided to all residents of the Northeast Kingdom through Enhanced 9-1-1, local departments, and mutual aid districts.
- Towns should have up-to-date Local Emergency Operations Plans.
- All buildings should meet current state fire code and safety standards.
- Emergency services training should be available to keep all emergency service providers current with regard to service provision and certification.

SECURITY & EMERGENCY SERVICE STRATEGIES

- Support regional approaches to disaster planning and mitigation, including partnerships between neighboring communities and states and Canada.
- Support local efforts for disaster planning, response, recovery and mitigation.

- Assist communities to apply for safety and emergency equipment grants by disseminating information on available funding programs.
- Assist interested municipalities with the adoption of building and fire codes for non-public buildings and rental properties.
- Ensure that adequate emergency services (personnel, facilities, and equipment) are available for new developments prior to placing additional demands on existing services.
- Assist Local Emergency Planning Committees (LEPCs) and Towns to identify gaps in disaster planning, such as increased flood and drought protection, and work to eliminate gaps through an interagency, inter-jurisdictional approach.
- Encourage all communities to participate in the National Flood Insurance Program (NFIP) and to adopt the Vermont Transportation Highway Codes and Standards.
- Discourage development in identified or known flood prone areas to avoid costly potential damage to life and property.

VI. WATER SUPPLY

The Northeast Kingdom region has a number of lakes, ponds, rivers, streams, and springs providing fresh water for our residents. The water supply in the region is used for a multitude of residential, agricultural, industrial, and commercial purposes. Thus, it is important that we work to ensure an adequate supply of usable water to meet the needs of all the region's residents and businesses. Generally, the water quality throughout the area is considered excellent. The majority of the region's water supply comes from groundwater, and the majority of water supply systems are privately-owned, on-site wells.

Results of regular testing by municipal water systems seems to indicate Vermont's water quality is generally good, but that contamination can and does occur. Common threats to our water supply systems come from agricultural runoff, salt storage areas, road salt, contaminated runoff from paved surfaces, and failing septic systems. Occasional contamination is a primary reason the state requires many public water systems to have source protection plans, well-head protection areas, test regularly for contaminants, and report those results to water customers.

Public Water Supply

The *Vermont Water Supply Rule* is applicable to all Vermont water systems, including public and non-public water supply systems, privately owned water sources, and bottled drinking water facilities (only portions of the rule apply to each type of system). Its primary purpose is to regulate water systems in the state for the provision of clean and safe drinking water for Vermont's citizens, regardless of the type or size of system involved. The Vermont Water Supply Rule is administered by the Department of Environmental Conservation, Drinking Water and Groundwater Protection Division. The last Rule was adopted in 2010, a revision of the Water Supply Rule is currently underway.

All water systems are initially classified as Public or Non-public. Classification as a Public water system depends on the number of service connections (15 or more) or people served (25 or more) by the system.

Public water systems are further divided into Public Community water systems (serving residents on a year-round basis) and Public Non-Community water systems (serving non-residential groups of people such as schools, restaurants, etc.). These Public Non-Community water systems are subdivided into Non-Transient, Non-Community (NTNC) systems whose non-residential users don't change over time (i.e. schools and offices), and Transient Non-Community (TNC) systems whose non-residential users do change over time (i.e. restaurants and motels). Each type of public system requires a different level of chemical monitoring with Transient, Non-Community systems requiring the least.

The NVDA Region: Sewer & Water Map (Figure 3.6) shows the municipalities with public community water supply facilities.

Source Protection

Public Community and Non Transient, Non-Community systems (such as systems serving schools) are required by the state to develop Source Protection areas (SPAs) and have Source Protection Plans. Included in most SPAs are three zones: 1, 2 and 3. The SPAs for groundwater sources are configured differently from surface water sources, but both establish Zone 1 as the immediate area of 200 feet around the water source or intake. This is the area where impacts from contamination are likely to be immediate and certain. The water system does not have authority to control land uses on any land within the SPA unless they own the land or have specific legal agreements with the landowner. However, Towns have the ability to enforce local ordinances with overlay districts that correspond with the SPAs for public water supply sources.



All public water systems are subject to regulation under the federal Safe Drinking Water Act. These federal regulations are administered by Vermont's Department of

Environmental Conservation (DEC). Permits are administered by the Drinking Water and Groundwater Protection Division of the DEC. All public water systems are required to have a Permit to Operate. The Permit to Operate includes a description of the water system, findings from the most recent sanitary survey, conditions, requirements, violations and a compliance schedule to correct significant deficiencies. Operating permits do not expire and are non-transferable when ownership changes. The Drinking Water and Groundwater Protection Division conducts sanitary surveys at every three years for community water systems and in-state bottled/bulk water facilities, and every five years for non-community water systems.

In Vermont, public water supply systems may be owned and operated by municipalities or privately-owned (either individually or cooperatively). Municipally-owned water systems may be managed by the town or a fire district. Public drinking water systems are required to have an Operator certified by the Drinking Water and Groundwater Protection Division. The class of Operator Certification is based on the source water type, treatment, and population of a water system. Jurisdiction over protection of public water supply sources rests with the Drinking Water and Groundwater Protection Division and the District Environmental Commission (through the Act 250 review process). Local zoning decisions made by municipalities can also affect public water supplies.

Public water system violations are published in an annual report made available to the public by the Department of Environmental Conservation. "*Consumer Confidence Reports*" are made available by public water suppliers for public community residential systems on an annual basis.

In addition to providing adequate water supply systems to meet the demands for domestic, commercial and industrial uses, there must be a level of flow necessary for fire protection. This depends, in part, on the amount of water stored or available, the size of the water mains and the level of pressure needed.

The active public community water systems in the Northeast Kingdom, along with the number of people they serve, are shown in Table 3.8 below.

Figure 3.7 depicts Towns that have public community water systems, although most of these systems serve a very limited geographic area within the town. It does, however, indicate the potential for more compact development in these towns.

**Table 3.8:
Public Community Water Systems – Caledonia, Essex, & Orleans Counties**

Caledonia County					
Water System Name	System Type	Primary Source	Owner Type	Town	Pop
BARNET WATER SYSTEM INC	C	GW	P	BARNET	205
PASSUMPSIC FIRE DISTRICT 1	C	SWP	L	BARNET	140
MCINDOE FALLS FIRE DISTRICT 3	C	SW	L	BARNET	176
KARME CHOLING	C	GW	P	BARNET	140
WEST BURKE HOUSING	C	GW	P	BURKE	40
BURKE FIRE DISTRICT 1	C	GW	L	BURKE	142
BURKE MOUNTAIN WATER SYSTEM	C	GW	P	BURKE	1058
DANVILLE FIRE DISTRICT 1	C	GW	L	DANVILLE	450
EAST HARDWICK FIRE DISTRICT 1	C	GW	L	HARDWICK	350
HARDWICK TOWN WATER SYSTEM	C	GW	L	HARDWICK	1900
LYNDONVILLE WATER SYSTEM	C	GW	L	LYNDON	4500
LYN HAVEN FIRE DISTRICT 1	C	GW	L	LYNDON	100
NORTHEAST KINGDOM MHP	C	GWP	P	LYNDON	156
PEACHAM FIRE DISTRICT 1	C	GW	L	PEACHAM	150
RYEGATE FIRE DISTRICT 2	C	GW	L	RYEGATE	131
SHEFFIELD FIRE DISTRICT 1	C	GW	L	SHEFFIELD	50
ST JOHNSBURY WATER SYSTEM	C	SW	L	ST. JOHNSBURY	5000
ST JOHNSBURY CENTER F D 1	C	SWP	L	ST. JOHNSBURY	370
GREEN LANTERN MHP	C	SWP	P	ST. JOHNSBURY	144
SUTTON WATER SYSTEM	C	GW	L	SUTTON	190
WHEELLOCK FIRE DISTRICT 1	C	GW	L	WHEELLOCK	50
Essex County					
BLOOMFIELD	C	GW	L	BLOOMFIELD	50
BRIGHTON WATER SYSTEM	C	SW	L	BRIGHTON	1782
CANAAN FD #2	C	GW	L	CANAAN	350
CANAAN FIRE DISTRICT 1	C	GW	L	CANAAN	970
SORRELL MHP	C	GW	P	CONCORD	112
AQUA HAVEN	C	GW	L	EAST HAVEN	150
GUILDHALL WATER SYSTEM	C	GWP	L	GUILDHALL	136
LUNENBURG FIRE DISTRICT 2	C	GW	L	LUNENBURG	400
LUNENBURG FIRE DISTRICT 1	C	GW	L	LUNENBURG	250
Orleans County					
ALBANY WATER SYSTEM	C	GW	L	ALBANY	200
BARTON WATER SYSTEM	C	SW	L	BARTON	950
ORLEANS WATER SYSTEM	C	GW	L	BARTON	846
MAPLE LANE NURSING HOME	C	GW	P	BARTON	181
COVENTRY FIRE DISTRICT 1	C	GW	L	COVENTRY	251
CRAFTSBURY FIRE DISTRICT 2	C	GW	L	CRAFTSBURY	420
BEEBE PLAIN WATER SYSTEM	C	GW	P	DERBY	142
DERBY LINE VILLAGE WATER DISTRICT	C	GW	L	DERBY	1630
DERBY CENTER WATER SYSTEM	C	SW	L	DERBY	1100
SHATTUCK HILL MHP	C	SWP	P	DERBY	129

DERBY MHP	C	SWP	S	DERBY	265
UNION HOUSE NURSING HOME	C	GW	P	GLOVER	56
GREENSBORO FIRE DISTRICT 1	C	GW	L	GREENSBORO	551
GREENSBORO BEND FIRE DISTRICT #2	C	GW	P	GREENSBORO	71
IRASBURG FD #1	C	GW	L	IRASBURG	200
JAY PEAK SUBDIVISION II	C	GW	P	JAY	66
JAY PEAK WATER SYSTEM	C	GW	P	JAY	6740
TRILLIUM WOODS WATER SYSTEM	C	GW	P	JAY	27
NEWPORT CITY WATER SYSTEM	C	GW	L	NEWPORT CITY	4766
NEWPORT CENTER WATER SYSTEM	C	GW	L	NEWPORT TOWN	330
HOLBROOK BAY COMMONS	C	GW	P	NEWPORT TOWN	95
NORTH TROY WATER SYSTEM	C	GW	L	TROY	860
TROY WATER SYSTEM	C	GW	L	TROY	315
WESTFIELD FIRE DISTRICT 1	C	GW	L	WESTFIELD	120
ALPINE HAVEN	C	GW	P	WESTFIELD	250
C= Community, GW= Groundwater, SW= Surface Water, GWP= Groundwater purchased, SWP= Surface water purchased, L= Local Government, P= Private, S= State Source: ANR Water Supply Division, 2014					

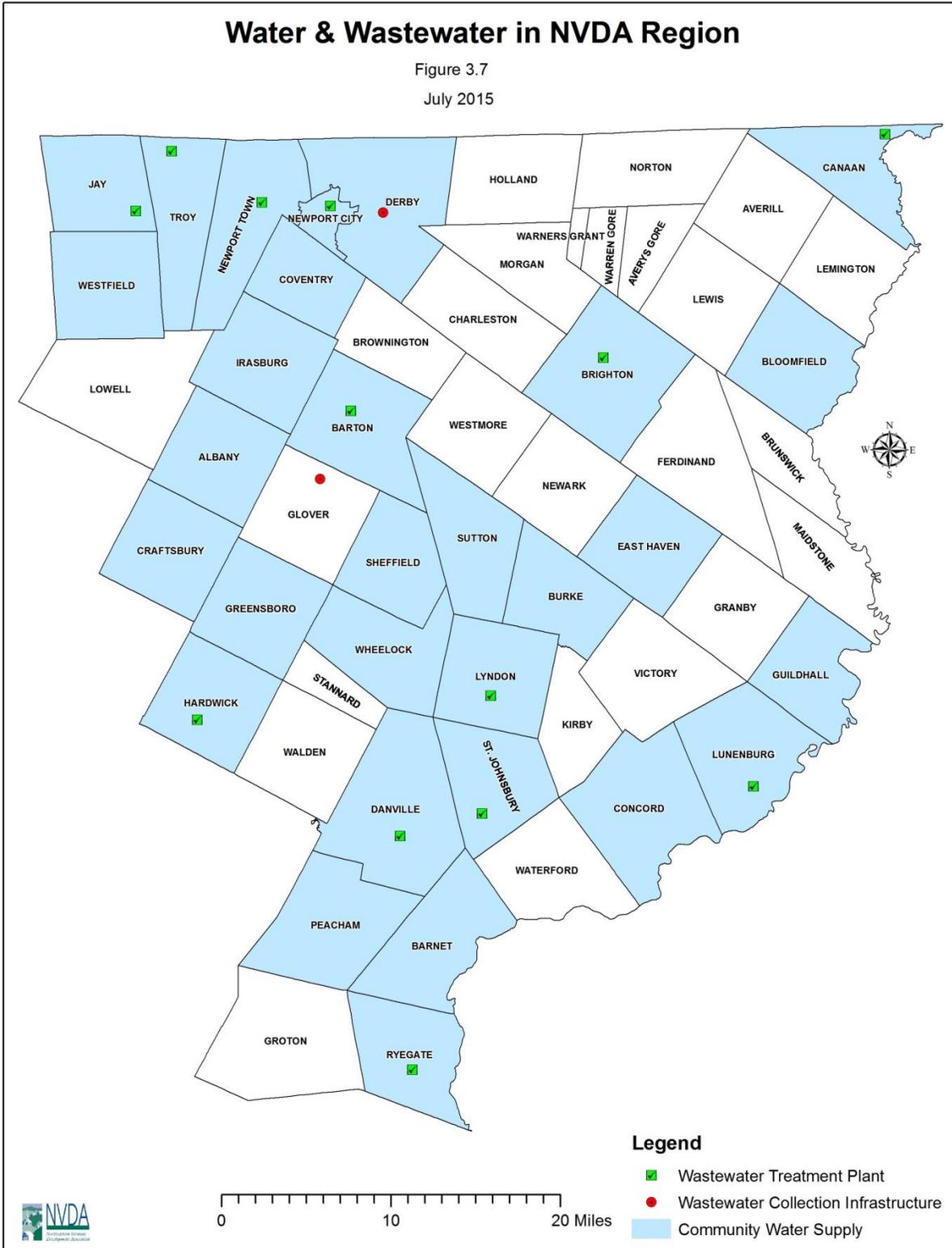
Public Water Issues

Many public water systems in the Northeast Kingdom do not have metering, and that is an issue that communities are beginning to address. The Towns of Hardwick's water system serves a population of 1,900 including residential and commercial customers. In 2014 the Town updated its water ordinance to address issues such as customer responsibility for preventing water loss through leakage of corroding pipes. By updating water ordinances and installing metering, issues of water loss through leakage or irresponsible usage can be curtailed, and water system managers have a better understanding of water use by different types of commercial operations.

Another issue that Towns can address through a water/sewer ordinance is allocations. For example, the Town of Derby has an ordinance that levies a fee for holding a water and or sewer allocation, discouraging property developers from holding on to allocations without using them for extended periods of time.

Water & Wastewater in NVDA Region

Figure 3.7
July 2015



Capacity

The permitted maximum daily demand of a public water system is noted on the operating permit issued by the State Drinking Water and Groundwater Protection Division. The aspects of a system that determine the permitted maximum daily demand include well yield, treatment capacity, and storage capacity.

While the maximum permitted demand as a measure of gallons per day is established by the state-issued operating permit, the determination of reserve capacity of a system is not as easily established, particularly for older water systems. While actual gallon-per-day water usage can be compared to maximum permitted demand, this does not necessarily determine reserve capacity of a system, since actual usage from all connections may be below potential usage based on allocation. The Vermont Water Supply Rule is in the process of being revised to provide a more accurate means of determining the reserve capacity of a water system.

The current water supply rule specifies that public community water systems be designed to meet a projected future demand, and requires that when a water system, expecting future growth, reaches 90% of capacity of a treatment or pumping system it begin planning for additional capacity.

The Capacity Development Program in the Drinking Water and Groundwater Protection Division of the State DEC deals with long range plans for water systems, asset management plans, water audits and reviews of budgets and user rates. The “Capacity” of a water system is measured not only by well yield, storage capacity and treatment capacity (which would be the technical capabilities of a water system) but also managerial and financial capabilities. The State's strategy to ensure water quality and supply is to provide resources and education to water system owners/operators so that their systems will be able to comply with all state and federal rules.

For public water systems that have reached or may be nearing their system's physical capacity, strategies can be implemented to reduce water consumption. Some of these are billing customers based on metered water use; repairing leaks in the system; and structuring billing rate schedules so that heavier users pay more. The creation of individual community water systems for residential subdivisions has drawbacks because of ongoing management issues. The consolidation of the management of water systems is encouraged. Even if geographically separate, systems can share billing or management to increase efficiency. This also enables a more efficient and cost-effective process system monitoring, to ensure water quality is maintained.

System funding and Development: The most common problem facing towns or communities having, or seeking, a public water supply system is obtaining the funds to acquire or upgrade facilities. Problems that have occurred in community water systems in the Northeast Kingdom include lack of reserve capacity, aging equipment, and contamination of water supplies due to inadequate control over development within the source protection area.

It is important to note that centralized water systems allow more residents to share the high costs of acquisition and maintenance. Public water supply systems are also generally easier to maintain and protect than individual supplies in more densely populated areas. Extensions to existing, public community water systems greatly affect the location, density, type, and future pattern of development within a community. Therefore, considerable public discussion should occur regarding proposals for water main extensions. The state has a revolving loan program that provides assistance to communities seeking to develop capacity in their water system.

Vermont Act 250

Criteria 2 and 3 of Vermont Act 250 deal with the issue of permitting for water supplies:

(a) Before granting a permit, the board or district commission shall find that the subdivision or development...

(2) Does have sufficient water available for the reasonably foreseeable needs of the subdivision or development.

(3) Will not cause an unreasonable burden on an existing water supply, if one is to be utilized. [10 V.S.A. Section 6086 (a)(2) and (3)]

GOALS AND STRATEGIES FOR WATER SUPPLY

WATER SUPPLY GOALS

- Water supplies and water systems will not be contaminated, depleted, or degraded
- There will be sufficient quantities of water to meet existing and future residential, agricultural, commercial, industrial and recreational needs.
- Public investments will be made in utility facilities, services, and lands to support existing and future development within town centers, villages, or other designated and planned growth areas. Expansion of systems will not facilitate sprawl or strip development.
- Effective, efficient, and accessible public services will be promoted.

WATER SUPPLY STRATEGIES

- Support local proposals to upgrade existing water supply systems.
- Support water conservation measures to reduce the demand for water and protect water supplies.
- Discourage development in Source Protection Areas, identified groundwater recharge areas, or other areas where water supplies are likely to be adversely impacted.
- Assist interested communities to identify, map, and plan for the protection of surface and groundwater resources.
- Assist towns and communities with the preparation of capital improvement plans and budgets to complement local plans and this plan.
- Assist municipalities seeking to share services and infrastructure with neighboring municipalities in order to reduce costs and increase efficiency

VII. WASTEWATER, SEWAGE & STORMWATER MANAGEMENT

The treatment of wastewater is necessary to remove solids, destroy pathogens, and remove pollutants. Municipal sewage, domestic sewage, and industrial wastewater are the types of wastewater typically treated. Wastewater is either treated centrally by a municipal wastewater treatment facility, or by a decentralized "on-site" system, typically a septic tank with leach field.

Public Wastewater Facilities

Wastewater Treatment Facilities are regulated by the State Agency of Natural Resources, Department of Environmental Conservation, Watershed Management Division. Such facilities are required to be operated by certified individuals that meet particular requirements for experience and knowledge, as outlined in the Wastewater Treatment Facility Operator Certification Rule. The Rule was updated and became effective September 25, 2014, replacing the October 1985 version.

Domestic wastewater treatment facilities have five classification levels. Class 1 facilities have simplified treatment processes (i.e. pH adjustment only) with low design flows. Class 5 facilities are more complex and

have design flows of greater than 5.0 MGD. Most of the Wastewater Treatment Facilities in the Northeast Kingdom are Class 1 or Class 2. The three largest systems -- in St. Johnsbury, Newport City, and Lyndonville -- are Class 3.

Industrial treatment facilities are classified in four categories; dairy, metal, paper and industrial. There are also three levels to each classification. Each level of classification is based on treatment process and design flow.

Table 3.9 Wastewater Treatment Facilities			
Municipal Wastewater Facilities:	Capacity in Million Gallons per Day (MGD)	Avg. Annual Flow (MGD)*	Percent of capacity used
Caledonia County			
Danville	0.06	0.0319	53%
Hardwick	0.371	0.1844	50%
Lyndonville	0.75	0.1572	21%
Ryegate (Town)	0.006	0.0040	67%
Ryegate Fire District #2	.0103	0.0039	38%
St. Johnsbury	1.6	0.7526	47%
Essex County			
Brighton (Island Pond)	0.15	0.0701	41%
Canaan	0.185	0.0943	51%
Lunenburg Fire District #2	0.076	0.0648	85%
Orleans County			
Barton	0.265	0.1590	60%
Newport (City)	1.3	0.6915	53%
Derby Center	0.15	Not provided	NA
Newport Town	0.0415	0.0179	43%
North Troy	0.11	0.0665	61%
Orleans	0.19	0.0561	30%
Troy / Jay	0.2	0.0758	38%
* June 1, 2014 – May 31, 2015 Notes: Ryegate F.D. #2 average flow does not include May 2015; St. Johnsbury does not include April 2015 in average; Derby Center Village has an allocation from the Newport City WWTF. Source: WWTF List dated July 2, 2015; data request, July 2015, VT Watershed Management Division, Wastewater Section			

Table 3.9 shows the municipal wastewater treatment facilities in the Northeast Kingdom region. It is noted that the Village of Derby Center and the Town of Glover both have allocations in systems maintained by other towns. Glover has sewer capacity in the Barton system, and Derby Center has an allocation in Newport City's system. The percentage of capacity that the annual average flow represents shows how much of the system's capacity is currently being used, but it does not reflect committed capacity. Therefore, a system that is only using 50% of its design capacity does not necessarily have 50% of its capacity available for new development. The

municipality that manages the system may have committed sewer capacity to an entity that is not fully using the allocation – for example, a residential developer may have secured an allocation for connections for a 10 lot subdivision, but the subdivision has not yet been built out. However, the annual average flow data does show which systems are using a high percentage of total capacity.

Funding

In the 1960s-1970s, federal funding typically paid up to 90% of the cost for public sewage treatment plants. Today, it is exceedingly difficult for small towns to finance new facilities due to the high per user cost associated with central sewage treatment projects, and reductions in federal funding. While centralized, municipal treatment facilities may be the preferred types of systems, the rural nature of our region makes it difficult and expensive to provide such facilities for towns without a sufficient population density. While there are funding programs through USDA Rural Development, the ongoing maintenance cost to the municipality also needs to be considered. Municipalities that encourage and plan for denser development would benefit by being able to share the costs of providing centralized wastewater facilities due to a higher number of residents being served by the system.

On-Site Wastewater Systems

For our region, on-site systems (i.e. traditional septic systems) are by far the most common for wastewater treatment. Poor siting, installation, or maintenance of on-site systems often contributes to their failure and can result in human health risks through the contamination of public surface or ground water supplies. Maintaining and repairing on-site systems is important to prevent the deterioration of ground and surface water quality, and has associated costs far lower than those for purifying contaminated water supplies.

The Agency of Natural Resources, Department of Conservation *Wastewater System and Potable Water Supply Rules* were last updated in 2007. The rules "apply to the subdivision of land, the construction, modification, or change in use of a building or structure, the creation or modification of a campground, and the construction, modification, replacement and operation of their associated potable water supplies and wastewater disposal systems." The rules regulate soil-based disposal systems with design flows of less than 6,500 gallons per day, and sewerage connections of any size. They also regulate potable water supplies that are not subject to regulation under the Vermont Water Supply Rule as public water supplies.

The Rules primary purposes are:

1. To protect human health and the environment;
2. To prevent the creation of health hazards or unsanitary conditions;
3. To ensure the availability of an adequate supply of potable water;
4. To ensure that there is adequate effluent dispersal and drainage for the proper functioning of wastewater systems.

Sludge and Effluent Disposal

After wastewater is treated, there is the issue of sludge and effluent disposal. Sludge in the Northeast Kingdom is typically disposed of by land application, or it is de-watered and sent to a landfill. Shipping sludge to a landfill takes up valuable space. Incineration is not permitted in Vermont, but a few small communities may transport their sludge out of state for incineration. Effluent is what remains after solids have been removed from wastewater. Once wastewater has been treated, effluents are usually discharged to ground or surface waters. However, there are regulatory requirements that include testing for pH, residual chlorine, dissolved oxygen, suspended solids, bacteria, various metals, and organic compounds before discharge can occur. In communities with small wastewater systems, effluents may be discharged in a leach-field type of system similar to those used for on-site septic systems. Whether an on-site system or municipal wastewater treatment plant is used, the sludge and effluent are treated similarly. In our region, private haulers currently manage the septage generated by septic tanks from on-site facilities in municipalities without wastewater treatment facilities. Although septage and biosolids are byproducts of wastewater treatment, these wastes are categorized as "Solid Wastes" in Vermont, and are regulated by the Vermont Solid Waste Management Rules: (<http://www.anr.state.vt.us/dec/wastediv/solid/documents/SWRule.final.pdf>)

Stormwater

An important issue related to water supply and wastewater is storm water. When it rains, or snow melts, the resulting "stormwater" is absorbed into the ground or it becomes "runoff" and flows over the land to a nearby lake, stream, or estuary. Stormwater runoff from vegetated land is typically low, since most rain or snow filters into the ground or is lost to evaporation. Stormwater runoff increases as the percentage of impervious surface cover increases (e.g., paved streets, parking lots, and rooftops), since the land's ability to absorb water is restricted. In addition to washing pollutants into our surface waters, improperly managed stormwater runoff can result in soil erosion and flooding. Stormwater recharges the groundwater supply, and proper management helps to reduce flooding and surface water contamination.

The Vermont Agency of Natural Resources, Department of Environmental Conservation, Watershed Management Division, provides information on permits needed for stormwater discharges at certain thresholds. Detailed information on stormwater permit applications and fees can be found on the Watershed Management Division's website at http://www.watershedmanagement.vt.gov/stormwater/htm/sw_permits.htm.

An alternative to traditional stormwater infrastructure systems is known as "Green Stormwater Infrastructure" (GSI), which is defined as "systems and practices that restore and maintain natural hydrologic processes in order to reduce the volume and water quality impacts of the built environment while providing multiple societal benefits."

More information about GSI can be found on the aforementioned website of the Watershed Management Division.

GOALS AND STRATEGIES FOR WASTEWATER, SEWAGE & STORMWATER MANAGEMENT

WASTEWATER, SEWAGE & STORMWATER MANAGEMENT GOALS

- The region's towns will have adequate wastewater treatment facilities with sufficient capacity to meet current needs and projected future development.
- Public investments in new or expanded facilities and services shall be in agreement with local plans, shall be directed toward town centers, villages, or other designated and planned growth areas, and shall support the revitalization of established centers.
- Municipalities will incorporate Green Stormwater Infrastructure in planning improvements to local road infrastructure and public facilities; and will incorporate them into land use regulations, as appropriate.

WASTEWATER, SEWAGE & STORMWATER MANAGEMENT STRATEGIES

- Support proposals to upgrade and improve existing wastewater treatment facilities.
- Encourage the proper disposal of hazardous materials, particularly household hazardous materials that are difficult to treat in secondary systems.
- Provide advice and technical assistance to communities and groups interested in developing community wastewater systems.
- Assist communities to interpret and abide by changes to state and federal laws regarding municipal and on-site wastewater systems and stormwater regulations.
- Conduct educational outreach to municipalities regarding the benefits of Green Stormwater Infrastructure.
- Assist communities with advanced planning activities for future upgrades and financing of local systems.
- Assist municipalities seeking to share services and infrastructure with neighboring municipalities in order to reduce costs and increase efficiency

VIII. SOLID WASTE MANAGEMENT

Municipal Solid Waste

Vermont statute [24 V.S.A. subsection 2202(a)] requires that all municipalities, either individually, or through a solid waste management district or inter-municipal association, adopt a Solid Waste Implementation Plan (SWIP). The SWIPs need to conform with the State Materials Management Plan (MMP), which came into effect in June of 2014.

The State-wide goal articulated in the Plan is for Vermont to “...reduce the disposal rate of municipal solid waste (MSW) by 25% from 413,517 tons to approximately 306,772 tons by end of the Plan term. The per capita disposal rate of MSW will be reduced from the current 3.62 lbs. per person per day to 2.69 lbs. per person per day. This will be achieved through implementation of the Universal Recycling law and a variety of new and existing efforts designed to educate and to offer services to Vermont citizens and organizations in the proper management of materials.”

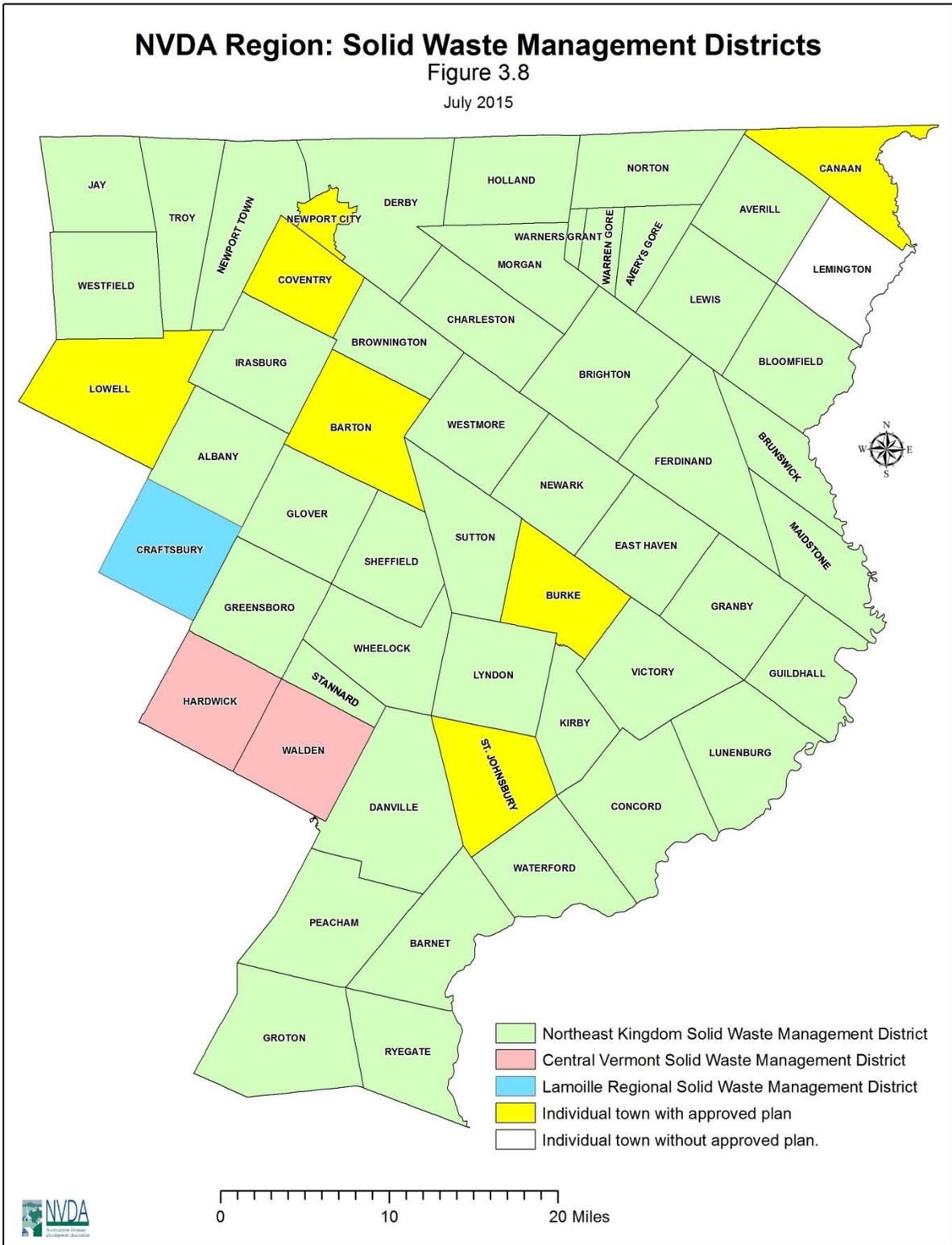
Recent changes to State law regarding solid waste management were established by Act 148, known as the “Universal Recycling Law.” The Act 148 Implementation Timeline is as follows:

Date	Implementation Measure
July 1, 2014	<ul style="list-style-type: none">• Transfer stations/Drop-off Facilities must accept residential recyclables at no separate charge• Food scrap generators of 104 tons/year (2 tons/week) must divert material to any certified facility within 20 miles
July 1, 2015	<ul style="list-style-type: none">• Statewide unit based pricing takes effect, requiring residential trash• charges be based on volume or weight• Recyclables are banned from the landfill• Transfer stations/Drop-off Facilities must accept leaf and yard debris• Haulers must offer residential recycling collection at no separate charge• Public buildings must provide recycling containers alongside all trash• containers in public spaces (exception for restrooms)• Food scrap generators of 52 tons/year (1 ton/week) must divert material• to any certified facility within 20 miles
July 1, 2016	<ul style="list-style-type: none">• Leaf, yard, and clean wood debris are banned from the landfill• Haulers must offer leaf and yard debris collection• Food scrap generators of 26 tons/year (1/2 ton/week) must divert material to any certified facility within 20 miles
July 1, 2017	<ul style="list-style-type: none">• Transfer stations/Drop-off Facilities must accept food scraps• Haulers must offer food scrap collection• Food scrap generators of 18 tons/year (1/3 ton/week) must divert material to any certified facility within 20 miles
July 1, 2020	<ul style="list-style-type: none">• Food scraps are banned from the landfill

NVDA Region: Solid Waste Management Districts

Figure 3.8

July 2015



Solid Waste Management Districts

Solid waste services are provided for 44 towns in the NVDA region by the Northeast Kingdom Waste Management District (NEKWMD). Walden and Hardwick are part of the Central Vermont Solid Waste Management District, while Craftsbury is a member of the Lamoille Regional Solid Waste Management District. The remaining towns have approved their own individual plans for solid waste, and are not members of a Waste Management District (See Figure 3.8).

Landfills

The Coventry Landfill is the only permitted landfill in the region. This is a lined facility, privately owned and operated by New England Waste Services of Vermont. In 2014, the landfill was approved for expansion.

Act 78 of 1987 resulted in the closure of a number of older, unlined landfills. The Solid Waste Management Rules, effective March 15, 2012, contains post-closure monitoring requirements for landfills. The Vermont Natural Resources Atlas (<http://anrmaps.vermont.gov/websites/anra/>) provides data on the locations of closed landfills and their status, under the “Waste Management” layer.

Hazardous Wastes

Household Hazardous Wastes (HHW) are the most prevalent of all hazardous wastes generated within the region. Despite their availability and relative ease-of-use for residential and commercial sources, the toxins in many of these products can pose serious health and environmental hazards (oil, batteries, cleaning solvents, insecticides, fluorescent bulbs, etc.). Therefore, the proper disposal of wastes, empty containers, and the unused portions of products is essential. Towns and solid waste districts hold hazardous waste collection events every year, two per year at minimum (spring and fall) and many common household hazardous wastes can be disposed of at these events.

In 2014 a bill was passed that requires primary (single-use) battery manufacturers to fund and manage a take-back and recycling program on behalf of consumers. The law requires battery manufacturers to submit a plan to the state by July 2015 outlining how they will implement a convenient collection program. The program will provide convenient battery drop-off locations for consumers at retail and municipal sites.

(See the Land Use chapter of this Plan for a discussion of Brownfields)

Permitted Solid Waste Facilities

Solid waste facilities, including transfer stations, recycling centers, composting facilities and dates for collection of household hazardous waste are listed on the webpages of each waste management district serving towns in the Northeast Kingdom region: <http://www.nekwmd.org/>, <http://www.cvswwmd.org/>, and <http://www.lrswwmd.org/>.

Towns that are not part of a solid waste management district and handle their own waste include the towns of St. Johnsbury and Burke in Caledonia County; Barton, Coventry, Lowell and Newport City in Orleans County; and Canaan in Essex County. Table 3.10 includes a list of Agency of Natural Resources-permitted facilities in towns that are not part of a waste management district.

Town	County	Facility Name
Burke	Caledonia	Wise Worm Compost
Burke	Caledonia	AOT, District #7 Stump Dump
Burke	Caledonia	Burke Recycling Center
St. Johnsbury	Caledonia	St. Johnsbury Transfer Station, Inc.

Canaan	Essex	Canaan Transfer Station
Canaan	Essex	Canaan Stump Dump
Barton	Orleans	AOT District 9 Disposal Facility
Barton	Orleans	Barton Recycling Center
Coventry	Orleans	Waste U.S.A. Landfill
Newport City	Orleans	City of Newport Recycling Facility

Other Solid Waste Management Procedures

The Vermont Agency of Natural Resources, Waste Management Division currently has twenty one procedures in effect which address various aspects of solid waste management, from the disposal of dead animals to the disposal of clogged septic stone. These procedures can be found at:

<http://www.anr.state.vt.us/dec/wastediv/solid/procedures.htm>

GOALS AND STRATEGIES FOR SOLID WASTE MANAGEMENT

SOLID WASTE MANAGEMENT GOALS

- Municipal and regional solid waste disposal systems shall be cost-effective, environmentally sound, and promote reduction, reuse, and recycling, and will support the State-wide goal of reducing the disposal rate of Municipal Solid Waste
- Hazardous wastes shall be disposed of facilities permitted by the Agency of Natural Resources to ensure proper handling.

SOLID WASTE MANAGEMENT STRATEGIES

- Support public education to promote proper waste disposal efforts.
- Assist municipalities to adopt illegal dumping and burning ordinances.
- Encourage communities to meet the waste management and recycling goals established by the Northeast Kingdom Waste Management District and municipal waste management plans.
- Encourage communities to create or expand local recycling facilities.
- Assist communities in eliminating illegal dump sites and Brownfields in the region.

Chapter Four: Historic, Cultural & Scenic Resources

I. HISTORIC & SCENIC RESOURCES

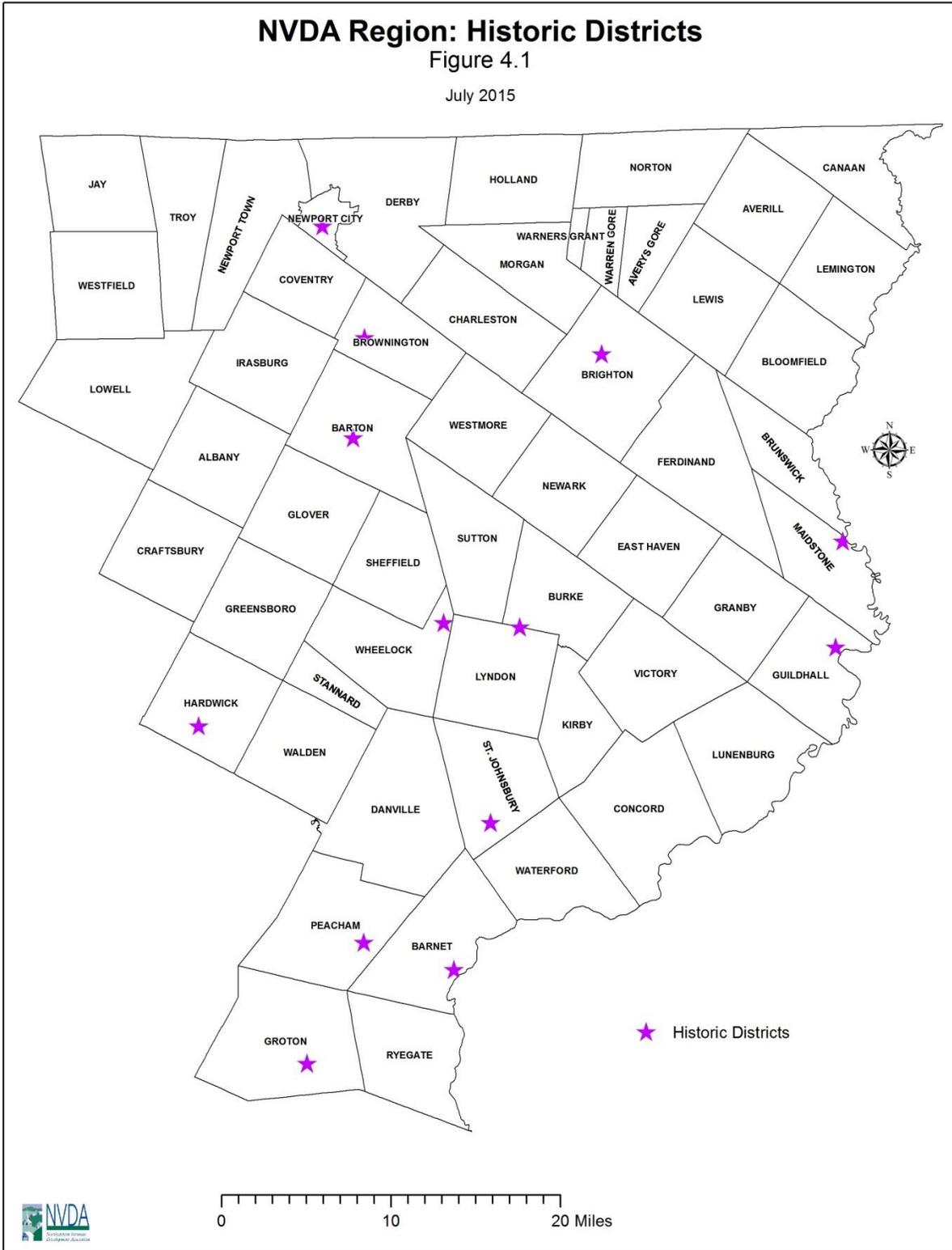
Preserving historic, archeological, and scenic resources enables communities to retain links to their past, maintain their traditions (including quality of life), and can bring economic benefits through increased property values and tourism. Indeed, there are federal and state programs to assist communities with preservation. Tourism has been increasingly beneficial for much of the New England region, and particularly for Vermont due to its abundance of scenic resources. The Northeast Kingdom is fortunate to have communities that have already identified some of their assets and protected a significant number of historic resources. These include historic districts, a large number of historic buildings, archeological sites, covered bridges, barns, and areas of natural or scenic beauty. Despite the work that has already been done, there are many historic, community buildings and meeting houses still in need of restoration and preservation. Table 4.1 gives some representation of the existing historic and cultural resources within the region. For more information on individual properties listed on the state and national registers, go to <http://orc.vermont.gov/Resource/Show-Resource-Table.aspx>

Table 4.1: Northeast Kingdom Historic Districts and State Parks Listed on the National Register of Historic Places	
Caledonia County:	Date
Barnet Center Historic District	07-12-1984
Darling Estate Historic District, Burke and Lyndon	08-23-2011
Downtown Hardwick Village Historic District	09-30-1982 Boundary increased 03-10-2004
Hardwick Street Historic District, Hardwick	06-22-1979
Maple St./Clarks Ave. Historic District, St. Johnsbury	04-05-1994
Peacham Corner Historic District, Peacham	12-18-2003
Railroad Avenue Historic District, St. Johnsbury	06-25-1974
Ricker Pond State Park, Groton	03-29-2002
St. Johnsbury Historic District (extension of Railroad Street district to include Eastern Avenue and connect with Main Street)	04-28-1980
St. Johnsbury Main Street Historic District (along Main Street, Eastern and Western Avenues, Park and Belvidere Streets, and Summer Street Common)	05-28-1975
Stillwater State Park, Groton	02-29-2002
Wheelock Common Historic District, Wheelock	08-30-2007
Essex County:	
Guildhall Village Historic District	09-27-1980
Maidstone State Park	11-29-2001
Island Pond Historic District, Brighton	01-31-1979
Orleans County:	
Brownington Village Historic District	05-09-1973
Crystal Lake Falls Historic District, Barton	07-07-1994
Crystal Lake State Park, Barton	08-30-2005
Newport Downtown Historic District, Newport City (Main, Coventry, Central, Second Summer, Third, School, Bayview, Eastern, Field, Seymour, Fyfe)	09-28-2006
Source: National Park Service	

NVDA Region: Historic Districts

Figure 4.1

July 2015



Each historic district also contains a number of properties listed on, or eligible for the National Register.

Historic Preservation Programs and Assistance

Criterion 8 of Act 250 protects scenic and aesthetic resources, historic sites, and rare or irreplaceable natural areas. A historic site is defined as "any site, structure, district or archeological landmark which has been officially included in the National Register of Historic Places and/or the state register of historic places or which is established by the Vermont Advisory Council on Historic Preservation as being historically significant." [10 V.S.A Section 6001 (9)]. If a site has been nominated, then designated as historic, the state provides a number of programs for communities and groups to help achieve their preservation goals.

The State of Vermont Division for Historic Preservation has a number of resources on its Web page explaining the programs available for historic and cultural preservation efforts, information, and technical assistance. http://accd.vermont.gov/strong_communities/preservation These programs are available to communities, neighborhoods, individuals, and businesses and provide many benefits.

Other Regional Resources

Local area Chambers of Commerce can provide much of the information on business & industry, schools, housing, local attractions, and services available in or near a municipality. Table 4.2, below, is included as a resource for additional information.

Barton Area Chamber of Commerce, Barton	http://centerofthekingdom.com/
Burke Area Chamber of Commerce, East Burke	www.burkevermont.com
Danville Chamber of Commerce, Danville	http://www.danvillevtchamber.org/
Hardwick Area Chamber of Commerce, Hardwick	http://www.heartofvt.com/
Island Pond Chamber of Commerce, Island Pond	http://islandpondchamber.org/
Jay Peak Area Association, Troy	http://topofvt.com/
Lyndon Area Chamber of Commerce, Lyndon	http://www.lyndonvermont.com/
Northeast Kingdom Chamber of Commerce, St. Johnsbury	http://nekchamber.com/
St. Johnsbury Chamber of Commerce, St. Johnsbury (also a Designated Downtown organization)	http://discoverstjohnsbury.com/
Vermont's North Country Chamber of Commerce, Newport	http://www.vtnorthcountry.org/

Northeast Kingdom Travel and Tourism Association (NEKTTA), the regional marketing organization for the Northeast Kingdom partners with NVDA in many efforts. NEKTTA is also involved in assisting individual businesses and the local chambers of commerce shown above with their marketing efforts. More about the NEKTTA organization can be found at their Web site <http://www.travelthekingdom.com/>.

II. CULTURAL RESOURCES

Public Libraries

The Northeast Kingdom is fortunate to have many library resources as centers of learning (many of which are architecturally significant) to complement the region's educational systems. It is important to keep all of these facilities updated to meet the informational and technological needs of area residents.

Table 4.3: Public Libraries in the Northeast Kingdom			
Municipality	Library and Address	Phone	Web site
Albany	Albany Public, 530 Main St.	(802) 755-6107	http://localpubliclibrary.com/AlbanyVermontpubliclibrary
Barnet	Barnet Public, 147 Church Street	(802) 633-4436	
Barnet	Macindoe Falls Academy, 37 Academy Lane	(802) 802-633-4472	
Barton	Barton Public, 100 Church Street	(802) 525-6524	http://barton-public-library.org/
Barton	Jones Memorial Library, 1 Water Street, Orleans Village	(802) 754-6660	http://centerofthekingdom.com/services/jones-memorial-library
Brighton	Island Pond Public Library, 49 Mill Street Ext	(802) 723-6134	https://islandpondpubliclibrary.wordpress.com/
Burke	East Burke Community Library,	(802) 626-9823	http://www.burkevermont.org/library-east-burke.php
	West Burke Public Library, 135 Main Street, West Burke	(802) 467-3717	http://www.burkevermont.org/library-west-burke.php
Canaan	Alice M. Ward Memorial, 27 Park Street	(802) 266-7135	http://www.aliceward.org/
Concord	Concord Public, 360 Main Street	(802) 695-2220	http://www.concordvt.us/
Craftsbury	Craftsbury Public, 12 Church Street, Craftsbury Common	802 586-9683	http://www.craftsburypubliclibrary.org/
	John W. Simpson Memorial Library, 1972 E Craftsbury Rd East Craftsbury	(802) 586-9692	
Danville	Pope Memorial Library, 121 Park Street	(802) 684-2256	http://popememoriallibrary.org/
	Brainerd Memorial Library, 4215 Bruce Badger Memorial Hwy, North Danville	(802) 424-1403	http://www.brainerdmemoriallibraryvt.org/
Derby	Dailey Memorial Library, 101 Junior High Drive	(802) 766-5063	http://daileymemoriallibrary.org/
Derby Line	Haskell Free Library and Opera House, 93 Caswell Avenue	(802) 873-3022	http://haskellopera.com/library/
Glover	Glover Public Library, 51 Bean Hill Road	(802) 525-4365	http://gloverlibrary.org/
Greensboro	Greensboro Free Library, 53 Wilson Street	(802) 533-2531	http://www.greensborofreelibrary.org/
Groton	Groton Free Public Library, 1304 Scott Hwy	(802) 584-3358	http://grotonlibraryvt.org/
Guildhall	Guildhall Public Library, 7218 Vt. Route 102	(802) 676-3054	
Hardwick	Jeudevine Memorial Library, 93 North Main Street	(802) 472-5948	http://www.jeudevinememoriallibrary.org/
Irasburg	Leach Public Library, 130 Park Avenue	(802) 754-2526	
Lowell	Lowell Community Library, 100	(802) 744-2447	

	Ranch Road		
Lunenburg	Gilman Public Library	(802) 892-5969	
	Alden Balch Memorial Library, 24 E. Main St.	(802) 892-5365	https://aldenbalchlibrary.wordpress.com/
Lyndon	Cobleigh Public Library, 14 Depot Street, Lyndonville	(802) 626-5475	http://cobleighlibrary.org/main/
Newport	Goodrich Memorial Library, 202 Main Street	(802) 334-7902	http://www.goodrichlibrary.org/
Peacham	Peacham Library, 656 Bayley Hazen Rd	(802) 592-3216	http://peachamlibrary.org/
Ryegate	South Ryegate Public Library, 140 Church Street, South Ryegate		
St. Johnsbury	St. Johnsbury Athenaeum, 1171 Main Street	(802) 748-8291	http://www.stjathenaeum.org/
Troy	William & Lucy Rand Memorial Library, 160 Railroad Street, North Troy	(802) 988-4741	http://randmemoriallibrary.my-free.website/
Walden	Walden Community Library, 135 Cahoon Farm Road, West Danville	(802) 563-3000	
Waterford	Davies Memorial Library, 532 Maple Street, Lower Waterford	(802) 748-4609	http://daviesmemoriallibrary.org
Westfield	Hitchcock Museum, 1252 Rte. 100	(802) 744-8258	http://hitchcocklibrary.blogspot.com/
Source: NVDA 2015			

In addition to public library resources in the region, Table 4.4 shows a number of alternative public and private learning institutions possessing cultural and informational resources worthy of mention. Internet addresses have been provided as well.

Table 4.4: Public and Private Learning Institutions		
School	Location	Website
Community College of VT	St. Johnsbury/Newport	www.ccv.vsc.edu
Lyndon Institute	Lyndon Center	www.lyndoninstitute.org
Springfield College	St. Johnsbury	www.spfldcol.edu
Sterling College	Craftsbury	www.sterlingcollege.edu
Lyndon State College	Lyndonville	www.lsc.vsc.edu
North Country Career Center	Newport	http://nc3.ncsvt.org/
Burke Mountain Academy	East Burke	www.burkemtnacademy.org
Northwoods Stewardship Center	East Charleston	www.northwoodscenter.org
St. Johnsbury Academy	St. Johnsbury	www.stjohnsburyacademy.org
Source: NVDA 2015		

Museums

Museums are another excellent cultural and informational resource, as well as a link to the distant and recent past. There are many museums in the Northeast Kingdom worth visiting and popular ones include the Old Stone House Museum in Brownington; the offbeat Bread & Puppet Museum in Glover; and the Athenaeum,

Fairbanks, and Maple museums in St. Johnsbury. Each of these has a wide array of exhibits and programs for all ages. Table 4.5 lists the region's resources for historic information and museum collections.

Table 4.5: Historical and Museum Collections in the Northeast Kingdom	
	Location
Barnet Historical Society – Goodwillie House	Barnet
Crystal Lake Falls Historical Society - Pierce House	Barton
Old Stone House Museum / Orleans County Historical Society	Brownington
Alice Ward Library	Canaan
Concord Historical Society (http://www.concordvthistorical.noconek.com/)	Concord
Craftsbury Public Library	Craftsbury
Derby Historical Society	Derby
Hardwick Historical Society (Memorial Bldg.)	Hardwick
Haskell Library and Opera House	Derby Line
White School Museum	East Burke
Bread and Puppet Museum	Glover
Greensboro Historical Society	Greensboro
Holland Historical Society	Holland
Island Pond Historical Society	Island Pond
Shores Memorial Museum	Lyndon Center
Goodrich Memorial Library	Newport
Missisquoi Valley Historical Society	North Troy
Peacham Historical Society	Peacham
Maple Grove Museum and Factory	St. Johnsbury
St. Johnsbury Athenaeum	St. Johnsbury
St. Johnsbury History & Heritage Center	St. Johnsbury
Fairbanks Museum and Planetarium	St. Johnsbury
Stannard Historical Society	Stannard
Hitchcock Memorial Library and Museum	Westfield
Source: NVDA 2015	

GOALS AND STRATEGIES FOR HISTORIC, CULTURAL & SCENIC RESOURCES

HISTORIC, CULTURAL & SCENIC RESOURCE GOALS

- Future development should follow traditional development patterns, while providing for economic development opportunities and livable communities.
- Significant historic, cultural, and scenic resources within the region should be identified and preserved.

HISTORIC, CULTURAL & SCENIC RESOURCE STRATEGIES

- Promote local and regional tourism, since it an important part of our economic base.
- Assist communities to preserve and maintain historic downtowns, village centers, buildings, and rural and scenic landscapes.

- Rehabilitate and re-use significant cultural, architectural, and historic sites, and community facilities, whenever feasible.
- Promote local traditions, skills, crafts, and the performing arts within the region.
- Utilize federal, state, and local programs for developing or preserving local cultural and historic assets.
- Disseminate information about historic tax credits to businesses and property owners.
- Assist communities to designate downtowns and village centers under the Vermont Downtown Program.
- Support local cultural resource initiatives to revitalize communities and downtowns.
- Assist municipalities with securing funding and technical assistance to conduct a comprehensive survey of local historic resources.

Chapter Five: Housing

I. HOUSING OVERVIEW

According to the 2010 Census, there are 37,123 housing units in the Northeast Kingdom, an increase of 9.4% from 33,939 units in the previous decade. The Census defines a “housing unit” as a house, apartment, mobile home, group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. According to the U.S. Census Bureau, the Northeast Kingdom’s population in 2010 was 64,692, which represents a modest increase of 3.6% from the 2000 Census, far slower rate of growth than the region has seen in prior decades. The increase in housing units significantly outpaced the rate of population change, even in Essex County, which saw a net loss in population. (Figure 5.1)

Municipalities throughout the Northeast Kingdom that lost population still saw an increase in housing units: Bloomfield, Brighton, Danville, East Haven, Hardwick, Guildhall, Lemington, Lunenburg, Sheffield, and Victory. The exceptions to the rule were Canaan, Greensboro, Norton, and Newport City.

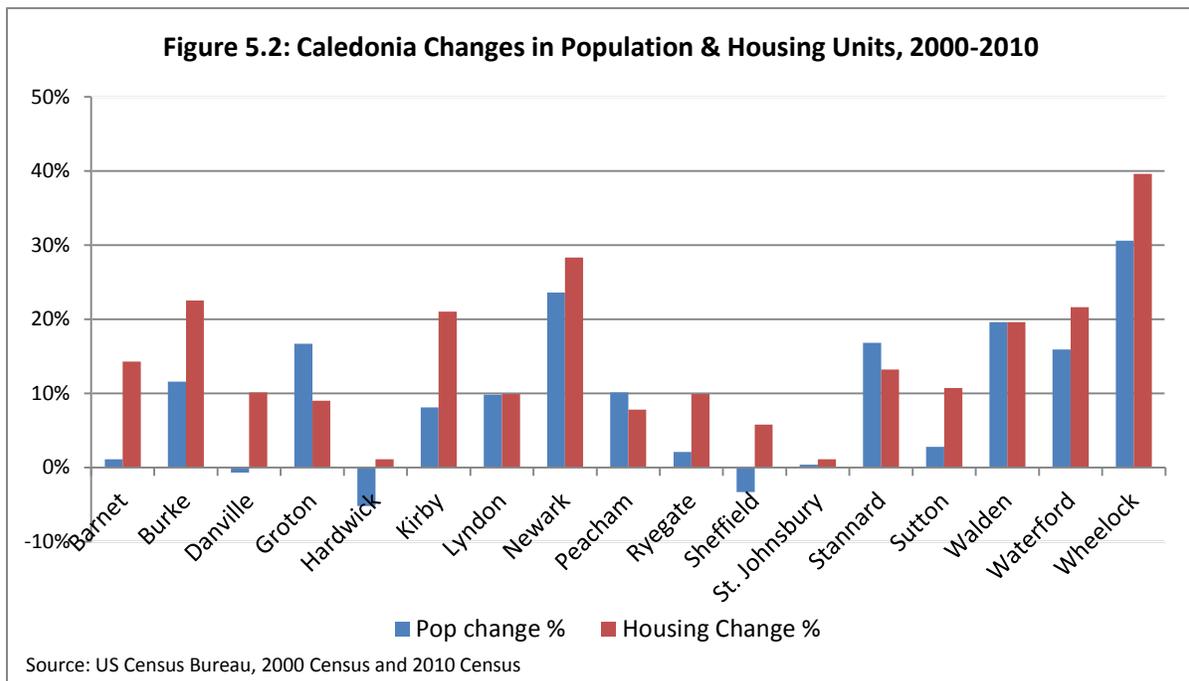
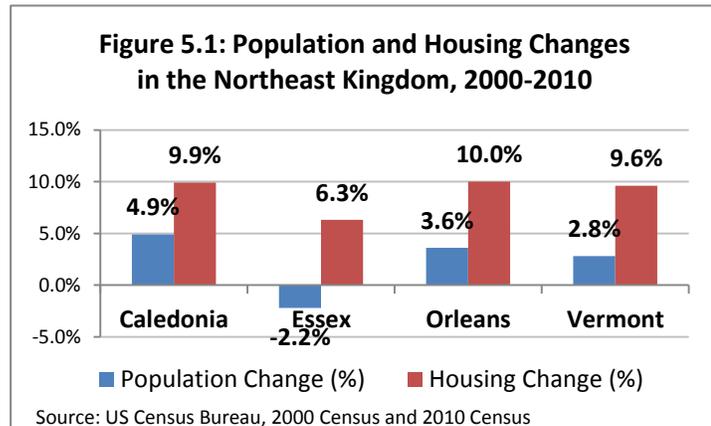
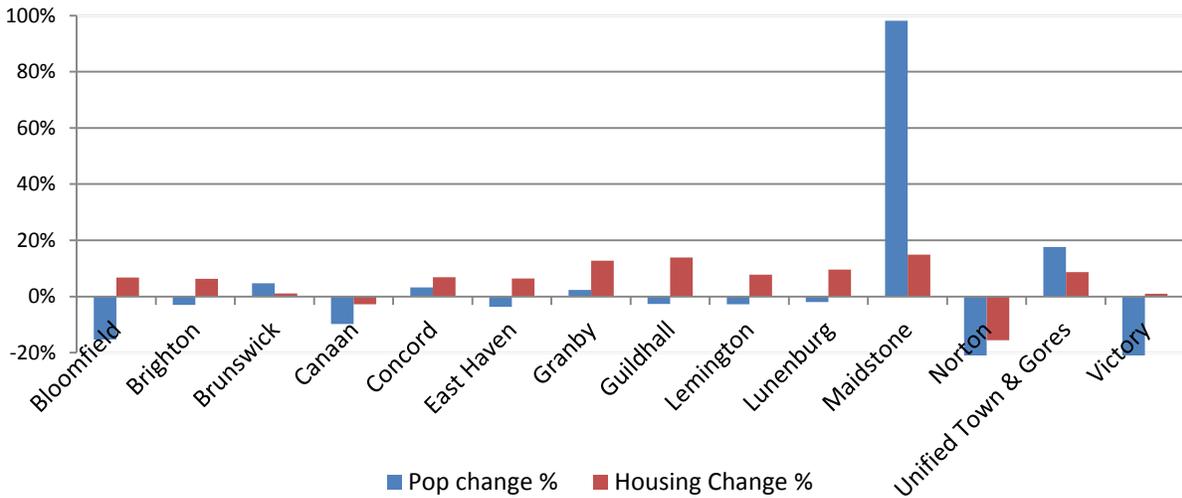
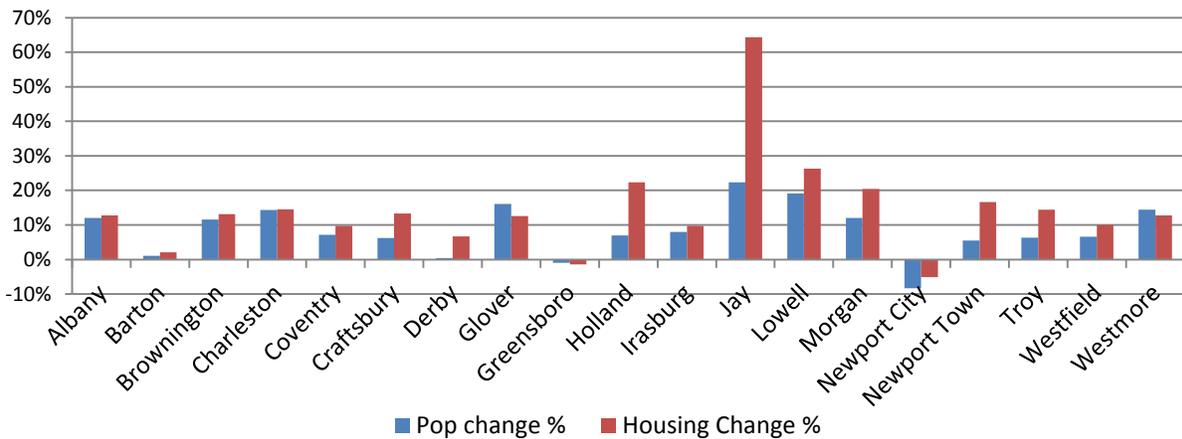


Figure 5.3: Essex Changes in Population & Housing Units, 2000-2010



Source: US Census Bureau, 2000 Census and 2010 Census

Figure 5.4: Orleans Changes in Population & Housing Units, 2000-2010

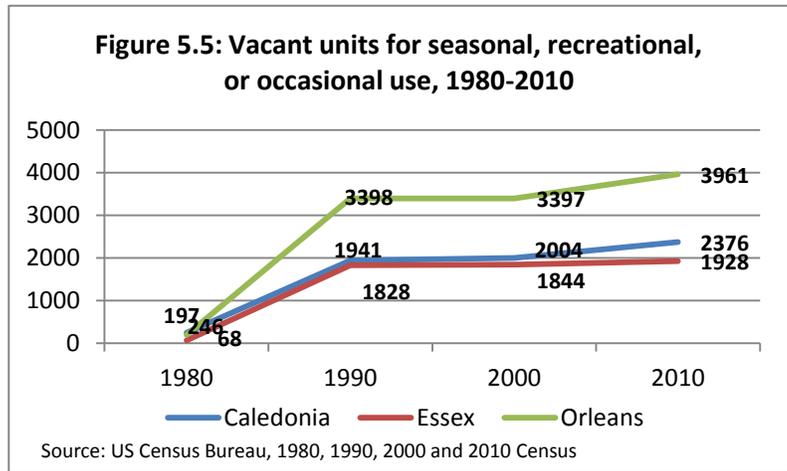


Source: US Census Bureau, 2000 Census and 2010 Census

Seasonal Housing

A partial explanation for the discrepancy between population growth rates and housing units is the disproportionate share of seasonal and vacation housing. The Northeast Kingdom has traditionally had some of the highest percentages of seasonal and vacation housing stock in the state. According to the 2010 Census, more than one out of every five housing units in the Northeast Kingdom is a vacant housing unit intended for “seasonal, recreational, or occasional use.” By comparison, the statewide percentage of vacant seasonal housing stock is only 15.6%. Like the rest of Vermont, the Northeast Kingdom saw significant growth in seasonal housing units from 1980 to 1990. Growth slowed in the following decade, but appears to have picked up slightly from 2000 to 2010. (Figure 5.5)

In Orleans County, seasonal housing accounts for more than half of the housing stock in Greensboro (53.3%), Jay (63.4%), Morgan (58.0%) and Westmore (67.9%). In Essex, seasonal units account for more than half the housing stock in Brunswick (50.0%), Maidstone (69.7%), Norton (58.2%), and the Unified Towns and Gores (90.6%). Granby’s seasonal stock is at 44.3%. Historically, Caledonia has had a smaller share of seasonal housing stock (currently only 14.9% of all housing units), but seasonal units account for close to half of all units in Newark (49.3%) and Peacham (40.2%).



The high proportion of seasonal and vacation housing creates complicating factors in the region’s housing scenario. Seasonal homes consistently command higher prices on the real estate market (Table 5.1). Also, as Vermont becomes a more attractive destination for retirees, long-time seasonal residents may be more likely to become full-time residents. This appears to be the case in Maidstone, where the population practically doubled over the past decade, the community’s share of owner-occupied housing *increased* by more than 13% and the share of seasonal *decreased* by more than 13%. Growth in seasonal units over the past decade was largely concentrated in Barnet, Burke, and Jay (a net of 81, 97, and 200 units respectively).

Table 5.1: Average and Median Real Estate Values in the Northeast Kingdom and Surrounding Counties

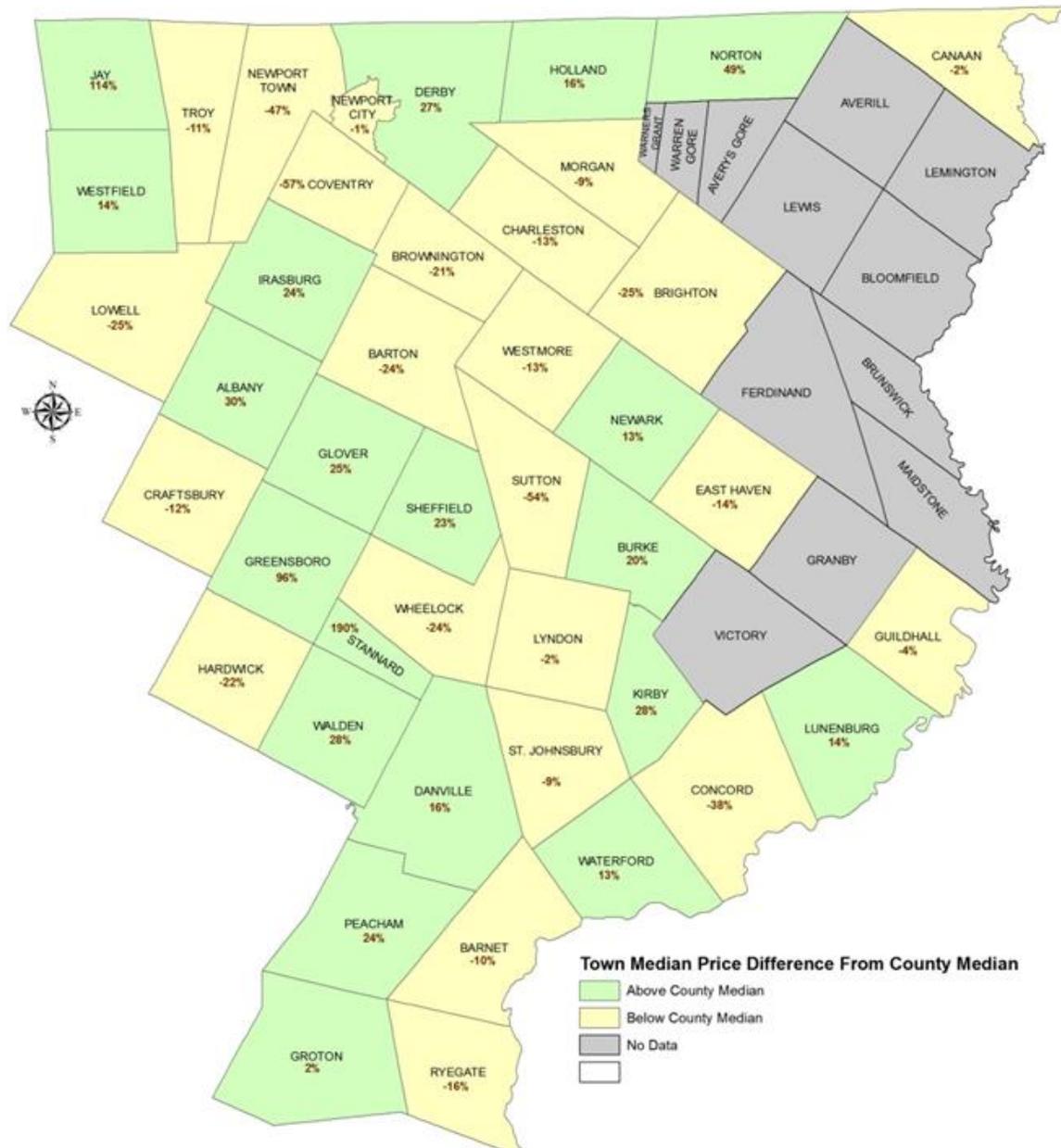
	Primary Residences Sold		Vacation Residences Sold	
	Average	Median	Average	Median
Caledonia	\$144,047	\$130,000	\$217,986	\$178,000
Essex	\$100,615	\$89,250	\$147,238	\$120,000
Orleans	\$142,371	\$119,000	\$200,212	\$162,500
Franklin	\$190,051	\$183,000	\$155,824	\$135,000
Lamoille	\$286,820	\$200,000	\$447,374	\$299,900
Washington	\$208,795	\$178,000	\$284,332	\$231,000
Orange	\$172,608	\$150,000	\$214,007	\$140,000
Vermont	\$227,635	\$200,000	\$303,720	\$220,000

Source: Vermont Department of Taxes, accessed from Housingdata.org. Median figures include single family residences, mobile homes with land and condominiums sold in 2013.

The relatively lower cost of vacation homes in the Northeast Kingdom in comparison with the rest of the state is likely an ongoing attraction to potential seasonal home buyers. In all cases the median – the “middle” selling price of all residences when prices are sorted in ascending order – is lower than the average. This indicates that outliers -- sales of extremely high-priced homes -- are skewing averages upward.

The following figure shows the median price of single family home primary residences sold in 2013 in each municipality in the region.

Figure 5.6: Median Single-Family Home (Primary Residences)* Prices by Municipality, 2013



Source: Vermont Department of Taxes. *Sales of mobile homes with land and condominiums can skew median figures at the town level, so they were omitted from this analysis.

Even though the average and median prices of primary residences in the Northeast Kingdom may be lower than statewide, real estate is not necessarily a bargain for those who live and work here, because median and mean (average) household and family incomes are lower than statewide incomes (Table 5.2).

	Household Income		Family Income	
	Median	Mean	Median	Mean
Caledonia	\$45,395	\$57,426	\$54,941	\$68,228
Essex	\$37,679	\$46,190	\$45,500	\$54,463
Orleans	\$41,953	\$52,730	\$52,235	\$63,174
Franklin	\$56,240	\$69,784	\$68,408	\$81,089
Lamoille	\$52,686	\$65,629	\$64,500	\$75,640
Washington	\$57,281	\$70,028	\$74,640	\$84,083
Orange	\$52,480	\$65,350	\$63,253	\$75,798
Vermont	\$54,267	\$69,716	\$68,111	\$83,752

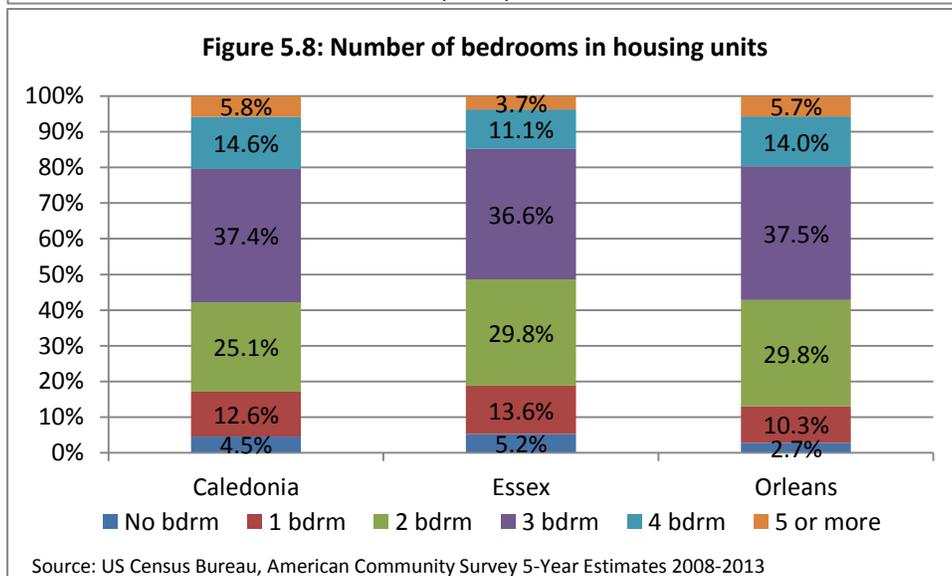
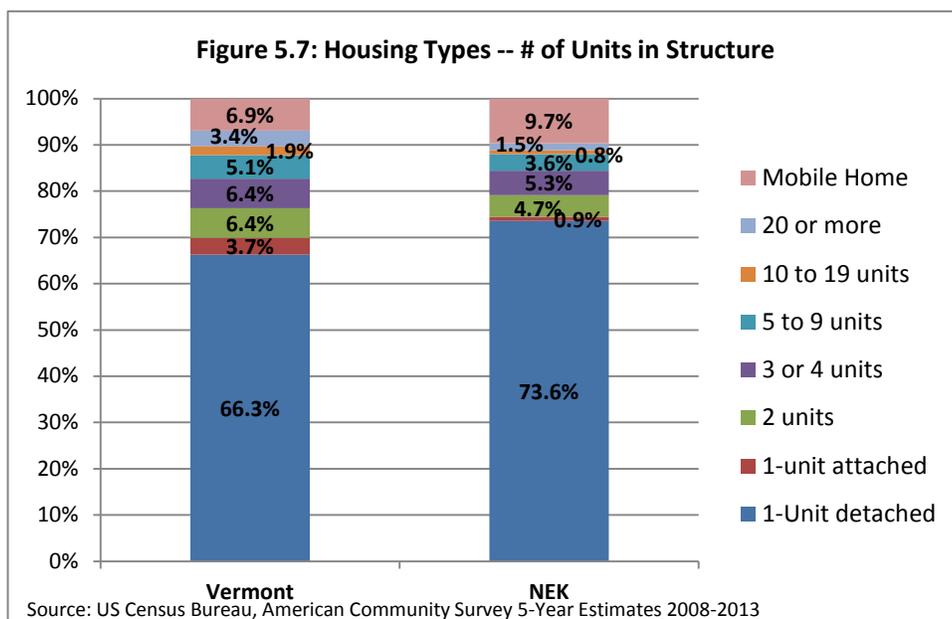
Source: US Census Bureau- American Community Survey 5 Year Averages, 2008-2013

Housing Supply

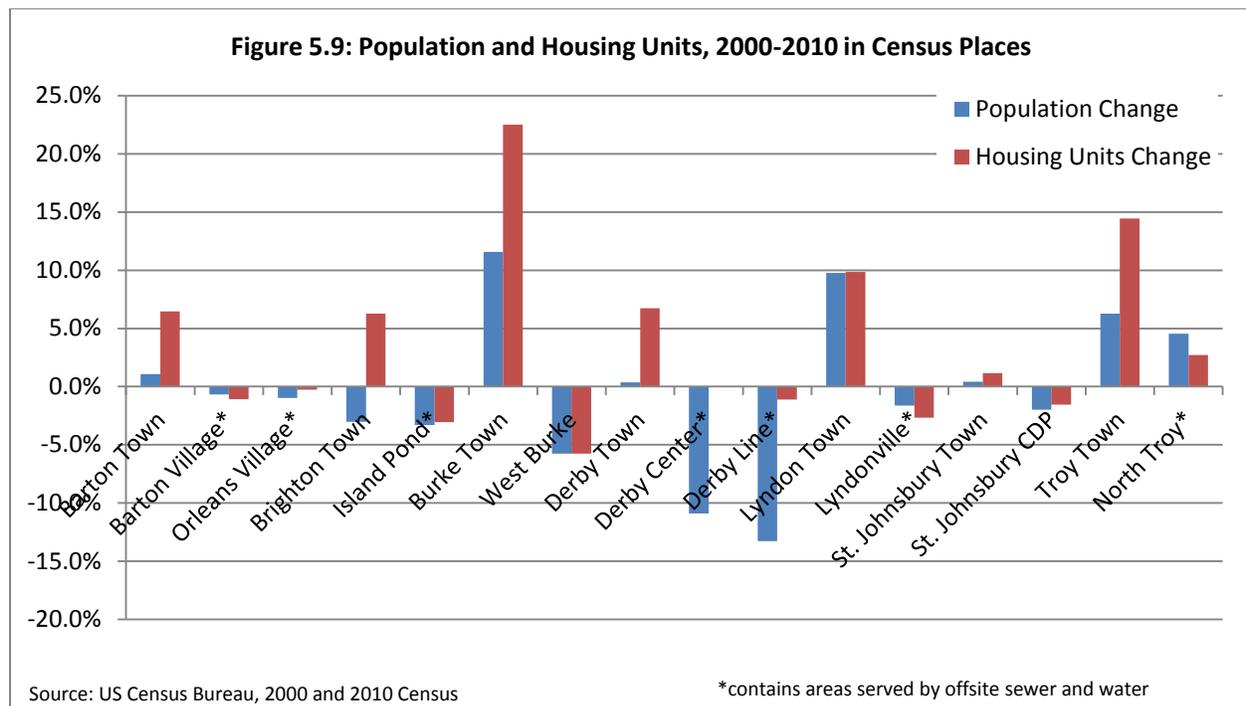
The Northeast Kingdom’s supply of housing primarily consists of single family dwellings (1-unit unattached). Compared with statewide figures, single family homes and mobile homes account for a greater share of the overall housing stock. Multiunit dwellings and attached 1-unit dwellings (such as accessory dwelling units and apartments over a commercial use) account for a smaller share. (Figure 5.7) More than half of the

region’s housing units have three or more bedrooms. (Figure 5.8).

Residential development trends have favored large lot rural residential in recent years. According to the 2013 Grand List, there are 21,563 residential properties in the Northeast Kingdom (i.e. not seasonal or mobile homes). More than a third of residential properties (37.2%) are on lots that are larger than six acres. (Vermont Department of Taxes).



A key planning statewide planning goal is to plan development in order to maintain historic settlement patterns of compact villages and urban centers separated by rural countryside. (24 V.S.A. 4302(1)). Residential development in the Northeast Kingdom does not appear to be furthering this goal. A recent NVDA GIS analysis shows that over the past decade, more than 95% of residential development in the Northeast Kingdom has occurred outside of development centers (areas characterized by compact settlement patterns and clusters of mixed uses). Furthermore, a review of Census data from 2000 to 2010 shows a loss of population and housing units in “Census places,” concentrated settled areas that are not necessarily incorporated. In Vermont, Census places often are traditional village settlement areas with the capacity to support additional housing opportunities with off-site water and sewer and provide convenient access to civic, cultural, and commercial amenities. Boundaries of Census places can change from one decennial Census to the next, so only the Census “places” with unchanged boundaries are evaluated here. Every Census place in the Northeast Kingdom with comparable historic data shows a loss of both population and housing units, with the exceptions of Derby Center (no net change in housing units) and North Troy.



Real estate markets in St. Johnsbury and Newport City – both of which contain the Northeast Kingdom’s regional urban centers – are underperforming against the rest of their respective counties. Single family homes in both markets tend to take a little longer to sell and command a lower sales price. This is significant because according to the Vermont Realtors Association Market Report, St. Johnsbury accounts for about 20% of all available single-family inventory in Caledonia and Newport City 18%.

	Days on Market Until Sale	Median Price	Average Price	% of Original Asking Price
St. Johnsbury	169	\$119,750	\$134,145	88.0
Caledonia County	168	\$143,000	\$166,342	88.2
Newport City	186	\$128,500	\$162,794	87.9
Orleans County	176	\$136,000	\$171,925	88.6

Source: Vermont Association of Realtors, YTD through 12-2014

The Northeast Kingdom's housing stock is relatively old. With a few exceptions (Beecher Falls, Danville CDP, Derby Center, Barton Village, and Greensboro Bend) the majority of units built before 1939 are concentrated in the Census Designated Places. The deferred maintenance and energy inefficiency of these aging structures are likely to make them less attractive to potential homebuyers.

Table 5.4 Percentage of Housing Stock Built Before 1939 in Municipalities with CDPs			
Town/CDP	% of Stock Pre 1939	Town/CDP	% of Stock Pre 1939
Albany Town	35.7%	Albany Village	56.5%
Barnet Town	38.5%	Barnet CDP	60.0%
Barton Town	42.9%	Barton Village	48.2%
		Orleans Village	72.9%
Brighton Town	36.3%	Island Pond CDP	47.7%
Burke Town	27.0%	East Burke CDP	70.4%
		West Burke Village	65.5%
Canaan Town	33.1%	Beecher Falls CDP	25.6%
		Canaan CDP	54.9%
Concord Town	21.8%	Concord CDP	59.3%
Coventry Town	21.8%	Coventry CDP	51.9%
Danville Town	30.6%	Danville CDP	31.0%
Derby Town	26.4%	Derby Center Village	28.7%
		Derby Line Village	52.0%
Glover Town	29.7%	Glover CDP	39.6%
Greensboro Town	45.3%	Greensboro CDP	62.0%
		Greensboro Bend CDP	25.0%
Groton Town	32.1%	Groton CDP	56.9%
Hardwick Town	51.5%	Hardwick CDP	63.7%
Irasburg Town	21.1%	Irasburg CDP	52.0%
Lyndon Town	33.4%	Lyndonville Village	70.6%
Newport City*	54.0%		
St. Johnsbury Town	50.1%	St. Johnsbury CDP	54.6%
Troy Town	44.2%	North Troy Village	70.6%
		Troy CDP	63.4%

Source: U.S. Census Bureau – American Community Survey 5-Year Averages, 2009-2013
 * Newport City is a Census Designated Place and a County Subdivision.

Auto Dependence

Auto dependence (particularly work-related) maybe reinforcing scattered rural residential development patterns. Jobs are relatively scarce in this region, and residents are used to traveling far and wide to work. Essex, Orleans and Caledonia Counties have the state’s highest percentages of residents who travel to work at least 25 miles or more in one direction. (Figure 5.10)

Home Ownership

According to the U.S. Census Bureau 2010 Census, of the 26,691 occupied housing units in the Northeast Kingdom, 20,046 (75.1% are owner-occupied). Of these owner-occupied units, 61.6% have a mortgage or loan, and 38.4% are owned free and clear. The Northeast Kingdom continues to have high percentages of owner-occupied housing units. However, higher owner occupancy rates are often typical of a rural area and are not necessarily an indicator of economic well-being or affordability. Rather, it may be a reflection of the relative lack of alternatives to home ownership, such as apartments and home shares. For example Essex County, which has the lowest median household income in the state, also has the second highest rate of owner occupancy in the state of just over 80%. By contrast, Chittenden County, which has the highest median household income, has the lowest rate of owner-occupancy in the state of just over 65%.

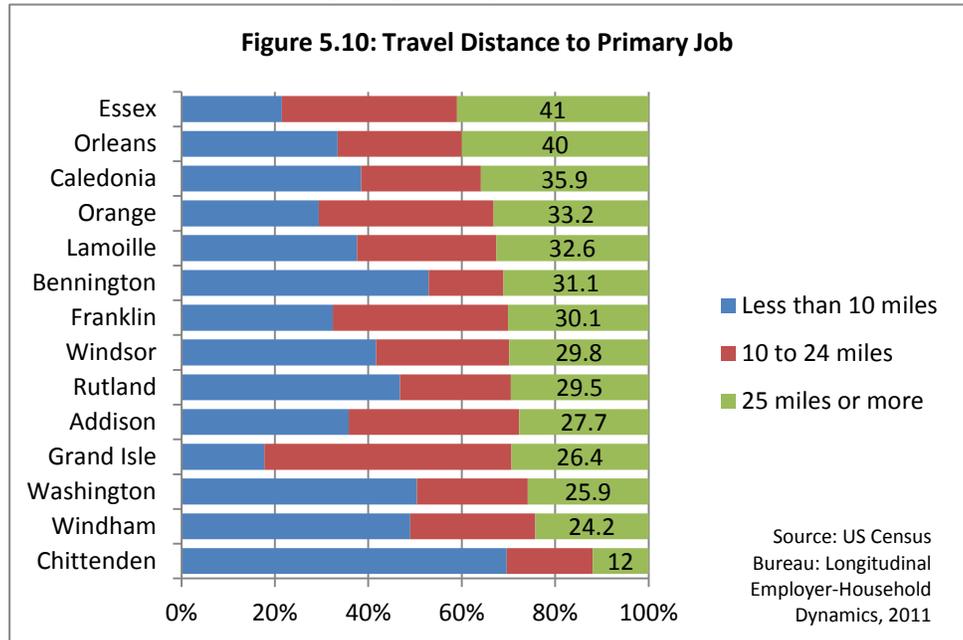


Table 5.5 Owner-Occupied Housing Units in the Northeast Kingdom, 2000-2010

	Occupied Housing Unit Change (Absolute)	Rate (%) of change	Owner Occupied Change (Absolute)	Rate (%) of change	% of occupied units that are owner occupied, 2000	% of occupied units that are owner occupied, 2010
Caledonia	890	7.6	734	8.6	72.9	73.6
Essex	216	8.3	188	9.1	79.6	80.2
Orleans	874	8.4	816	10.5	74.1	75.6

Source: US Census Bureau, 2000 and 2010 Census

Owner-occupancy rates are lowest in the region’s urban centers, where more rental housing is likely to be found: St. Johnsbury is 56.5%, Lyndon 68%, and Newport City 54.6%. It should be noted, however, that Newport City saw a net loss of 231 occupied units over the past decade. Despite modest gains in regional owner-occupancy rates from the previous decade, many communities experienced a decrease. In Caledonia County, only Burke, Danville, Hardwick, Peacham, Sheffield, St. Johnsbury, and Sutton saw modest increase in owner-occupancy rates from the previous decade. In Orleans County, eight communities saw a drop in owner-occupancy rates: Albany, Craftsbury, Derby, Glover, Jay, Lowell, Newport Town, and Westfield.

Household and Family Characteristics

As is with the rest of Vermont, there has been significant shift in the makeup of the region’s households that may have a profound impact on the region’s housing supply and demand. The US Census Bureau defines a “household” as all the people who occupy a housing unit as their usual place of residence. A “family” is a group of two or more people who reside together and who are related by birth, marriage, or adoption. Both household sizes and family sizes are shrinking in the Northeast Kingdom (Figure 5.11)

There are three drivers behind this trend: 1) a smaller percentage of family households from the previous decade, 2) a net loss of families with children under the age of 18 from the previous decade, and 3) an increase in the share of non-family households (Table 5.6).

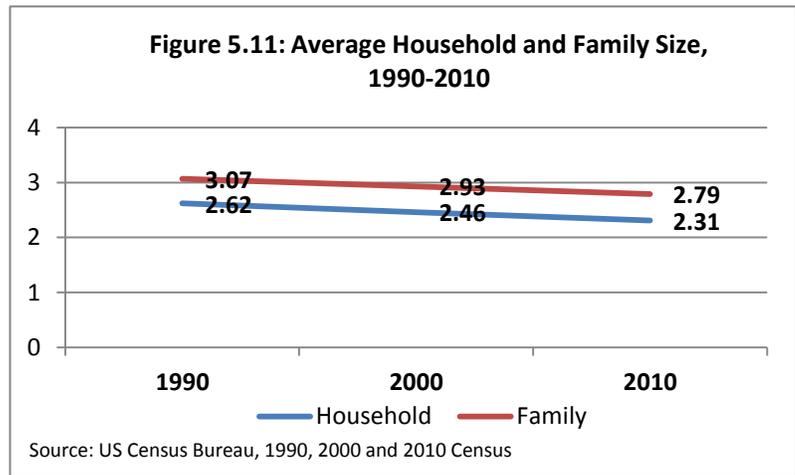


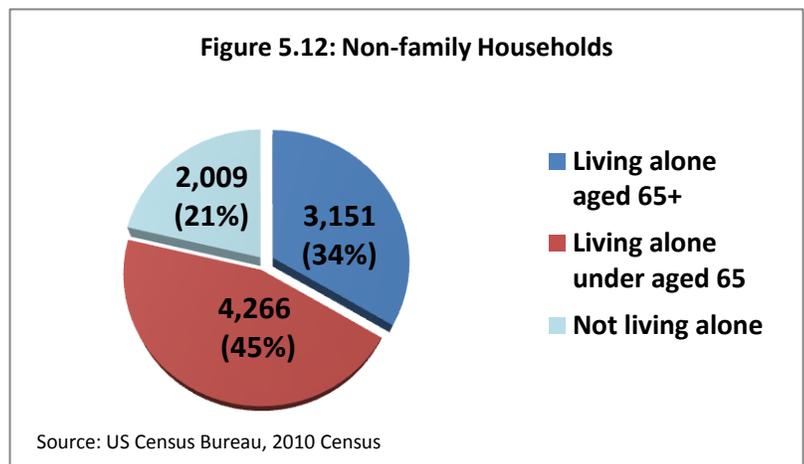
Table 5.6: Households and Families in the Northeast Kingdom, 2000-2010

	Total Households	Families	% of Households	Families with Children < Age 18	Non-Family Households	Householder Living Alone
2000	24,711	16,861	68.2%	7,962	7,850	6,248
2010	26,691	17,265	64.7%	6,898	9,426	7,417

Source: US Census Bureau, 2000 and 2010 Census

Studies show that married couple households tends to have higher rates of home ownership due to a number of factors, such as dual incomes, better access to credit, and cost-efficiencies from sharing resources. According to the 2010 Census there are the 13,389 married couple households in the Northeast Kingdom – the same number as in the previous decade – yet they now account for less than 50% of all households.

Non-family households now account for more than 35% of all households in the Northeast Kingdom, up from just under 28% in 1990. The overwhelming majority of non-family households are individuals who live alone. More than a third of those who live alone are 65 years or older. (Figure 5.12). This sector of the region’s population grew by more than 15% over the previous decade.



Aging Population

According to the 2010 Census, about just under a quarter of the Northeast Kingdom’s population is aged 65 and older. By 2030 this age group could account for nearly 40% of the population. In 2013, the State of Vermont released two sets of population projections:

A) Based on more robust growth and migration rates seen in the 1990s, and

B) Based on slower migration rates seen in the 2000s.

Both sets of projections show a decrease in every age group under 60 and an increase in every age group over 60. This demographic shift could have a dramatic impact on future housing demands, such as smaller, lower maintenance homes that are located closer to goods and services.

Successful aging in place requires “liveable communities,” ones that are

characterized by safe, appropriate, accessible and affordable housing located in walkable neighborhoods with convenient access to goods and services. Newport City has taken on this challenge by receiving Vermont’s first “Age-Friendly Community” designation from AARP. An advisory council has recently completed an exhaustive survey of the residents in Newport City and Orleans County age 45 and up. Among their findings:

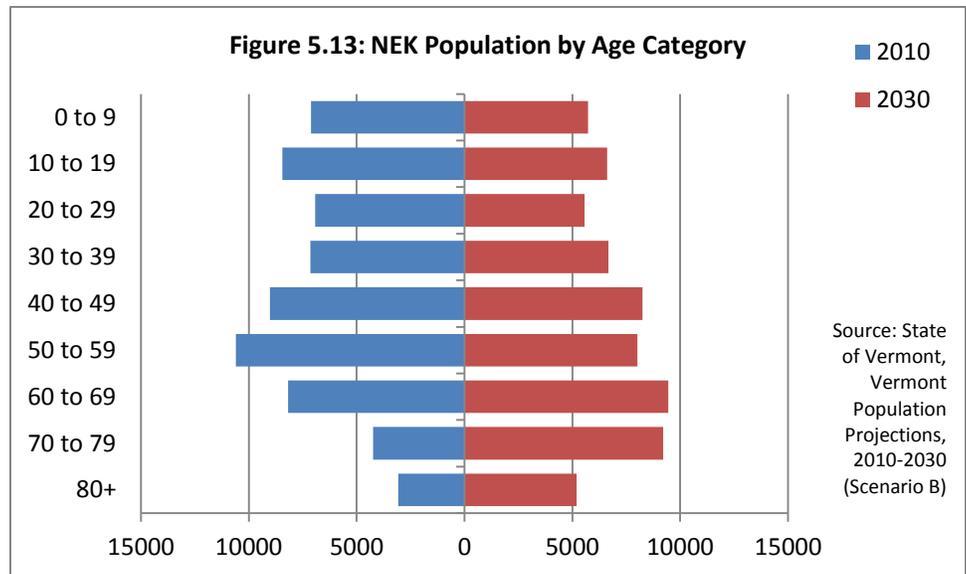
Orleans county residents have lived in Orleans County and their town for a long time and are likely to remain there as they get older. 53% have lived in Orleans County for at least 45 years *and* 53% have lived in their current town for at least 25 years. More than a third said it was extremely or very important to stay in their town as they aged, and 71% said they are not very or not at all likely to move outside of Orleans County after retirement.¹¹

Existing housing supply in the region is not likely to meet the needs of an aging population. According to the AARP Liveability Index, less than 3% of housing units nationwide provide “basic passage,” which is determined by doorways and hallways that are at least 36” wide, floors with no steps between rooms, and at least one entry level bedroom and bathroom. NVDA encourages municipalities to inventory existing housing stock at the town level.

Safety of Housing Stock

Fire poses the greatest safety risk to the region’s housing supply. According to the 2014 Annual Report of the State Fire Marshal, first responders were called to 317 structure fires in the Northeast Kingdom in the past year. According to statewide data, about 80% of structure fires involve residences. The region’s senior population is particularly vulnerable. Over the past four years 68% of fire deaths in Vermont have involved individuals over the age of 60. There a number of factors that exacerbate the risk of fire in the Northeast Kingdom:

- **Age of housing stock:** The region’s housing stock is relatively old and more likely to be noncompliant with fire and safety codes. About 36% of the region’s housing stock was built before 1950, compared to just under 31% statewide. (American Community Survey 5 Year Estimates) Additionally, Vermont Housing Conservation Board reports that more than a fifth of the state’s mobile homes were built before 1976, predating federal safety standards, such as prohibiting louvered windows that obstruct escape from fire.



¹¹ AARP Research, “Successful Aging in Orleans County: The 2014 Survey of Community Residents Age 45+ in Orleans County, Vermont,” April 2015

- **Scattered rural development:** Rural low-density development is likely to lead to greater response times.
- **Long cold winters:** The State Fire Marshal reports that 43% of residential structure fires in 2014 were caused by heating appliances. Rising heating costs may force lower income individuals to turn to unsafe or improperly installed heating alternatives.

Towns do have the authority to address unsafe housing conditions by enforcing rental housing codes. Typically enforced by a town health officer or fire chief, local codes may address fire safety hazards, in addition to lead, mold, sewer, and water. Lyndon and St. Johnsbury have local rental housing codes.

Junky yards, accumulation of household debris, and hoarding create nuisances and reduce property values, but they also pose public health hazards and threaten drinking water supplies. NVDA regularly receives requests from municipalities for assistance with enforcement, which can require a degree of tenacity and perseverance. In 2009 the regulation of salvage yards – the outdoor storage of junk, motor vehicles, metal scrap, appliances, etc. – was delegated to the Agency of Natural Resources. ANR’s criteria for jurisdiction is *any* place or outdoor storage or junk, regardless of whether the activity is connected with a business.

Municipalities may adopt salvage or junk ordinances that meet or exceed ANR standards. They may also request enforcement assistance from ANR’s Dept. of Environmental Conservation Salvage Yard Program. ANR will evaluate and prioritize requests based on a number of factors, including whether of the municipality has a duly adopted salvage yard ordinance in place. To date only a handful of communities have such ordinances: Concord, Ryegate, Barton, and Burke.

Flooding and flood-related losses can be financially ruinous for any homeowner, but the region’s lower income populations may be most vulnerable. Older housing, which is often located in traditional centers of development, may be more likely to be located near rivers. To date, NVDA has assisted two communities with FEMA buyouts of two repetitive loss properties. Mobile home dwellers are also more prone to flood-related losses. Statewide, about 15% of all properties affected by Tropical Storm Irene were mobile homes. Two mobile home parks in the region –in Lyndon and Concord – have lots that are either located in mapped inundation areas or in areas close to rivers and streams prone to fluvial erosion. Most of the region’s flood maps are paper, which makes it difficult to quantify the extent of risk to residential properties. NVDA is likely to develop better data as individual communities develop Local Hazard Mitigation Plans. (See Flood Resilience Chapter.)

EB-5 Investments and Potential Impact on Housing Demand

In the fall of 2012 an infusion of funds from the federal EB-5 Visa program created the potential for significant economic growth in the Northeast Kingdom. Current project include:

- **AnC BIO Vermont:** An 84,000 square foot biotech manufacturing facility located on a 40 acre research campus in Newport City is currently under construction. At full capacity, the employer is expected to about 500 people, of which 150 will earn salaries of \$75,000 and up.
- **Expansion to the Newport State Airport in Coventry.** Associated with the airport expansion are plans to construct warehousing facilities, as well as a 50,000 square-foot airplane assembly plant at the airport, which is expected to bring a number of skilled jobs to the region.
- **Resort development in Jay and in Burke.** A 116-unit hotel and conference center is planned for Burke Mountain, which will draw increased numbers of tourists. Similarly in Jay, new ski amenities, as well as a 100 new housing units and an 84-unit hotel, will draw more visitors to the region.
- **Renaissance Block:** An entire city block in Newport City was recently demolished. In its place will be a four-story mixed-use development with anchor businesses on the first two floors and short- and long-term residential suites on the upper two.

While these developments will invariably bring more people to the region, it is difficult to accurately predict the total expected in-migration and resulting demand on housing. Early estimates for total direct, indirect, and induced job creation indicated about 2,000 direct jobs, 3,000 total jobs (which includes indirect and induced jobs), and a net migration to the region as high as 4,500. A workforce development study released in July 2013 attributed about 1,100 new hospitality and tourism jobs related to ongoing resort development and the Renaissance block. The majority of these jobs would be hourly, pay less than \$20.00 an hour, and require minimal post-secondary education.

The Vermont Agency of Commerce and Community Development studied the impacts of Jay Peak investments from 2008 to 2013 (a value of about \$250 million). The study did not find evidence of net migration (in fact current population estimates indicate a net loss). However, there were indicators that more wage income was coming from Orleans County¹². The next level of development, however, involves the creation of skilled manufacturing and technology jobs, which may lead to net migration. Where newcomers might choose to live remains unclear, but the region will see an increased demand for housing at all income levels, more visitors, and increased spending power. So far the region has not experienced an increase in annual housing starts based permitting figures on privately owned residential housing units from the U.S. Census Bureau, those figures are highly unreliable because of inconsistent reporting from towns. A review of recent Act 250 permitting activity related to housing shows that as many as 409 new housing units have either recently been created or may be established in the next 10 years in Orleans County. The majority of these units created are market rate, with about 20 identified as affordable. Much of the development involves the creation of single-family units with some major exceptions:

- Newport City: Renovation of a 1920 hospital structure into 23 units.
- Newport City/Derby: 126 townhomes and 123 single family homes.
- Derby: 44 senior housing units in 8 buildings on a 12.2 acre tract off Route 5.
- Derby: Five multi-family residential buildings with four units each.

II. AFFORDABLE HOUSING IN THE NORTHEAST KINGDOM

A household's total housing costs should be 30% or less of the household income in order to be considered affordable. While the 30% rule applies to housing costs for all income brackets, Vermont statute defines **affordable housing** as households with an income below 80% of their county median household income who pay no more than 30% of their income on total housing costs. By statutory definition, housing costs for home owners include principal, interest, taxes, insurance, and association fees. For renters, costs include rent, utilities, and association fees. For a housing development to be considered affordable, at least 20 percent of all the units or five units (whichever is greater) have to be considered affordable and must be subject to covenants or restrictions to keep the units affordable for at least 15 years.

In the Northeast Kingdom, traditional forms of affordable housing are mobile homes, multi- units dwellings (three units or more), and accessory unit dwellings.

¹² Impacts of Growth on the Northeast Kingdom, October 3, 2014

Mobile homes and Mobile Home Parks

Mobile homes are the more prevalent form of affordable housing in the Northeast Kingdom. Overall they comprise roughly 10% of the region’s housing stock (compared to 7% statewide), but even higher concentrations can be found in the most rural communities with very small or no centers of development.

Caledonia County		Essex County		Orleans County	
Municipality	%	Municipality	%	Municipality	%
Stannard	28%	East Haven	23%	Coventry	34%
Sutton	23%	Lunenburg	20%	Brownington	23%
Sheffield	20%				

Source: US Census Bureau, American Community Survey

Although mobile homes are a significant source of affordable housing in our region, the lower price tag may come at the expense of energy efficiency: Vermont Energy Efficiency Investment Corporation estimates that mobile home owners spend about 66% more of their income on energy costs than owners of stick-built properties. The Vermont Housing & Conservation Board (VHCB) recently concluded a pilot project to site Vermont high-performance single-wide mobile homes. When equipped with a solar panel, these energy efficient homes are nearly net-zero. To date there are two Vermont homes in the Evergreen Manor Mobile Home Park in Hardwick.

Vermont statute defines a **mobile home park** as a parcel (or contiguous lots) of land that contains three or more mobile homes. Subdivided lots with more than two mobile homes are also a mobile home park when the lots are owned or controlled by the same person even if there are only one or two mobile homes on each lot. There are 22 mobile home parks in the region. All lot rents run well below the statewide median of \$310 (Caledonia \$255, Essex, \$200, and Orleans \$225), and vacancy rates run above the statewide average of just under 5% (Caledonia is 7.5%, Essex 7.1%, and Orleans 7.8%) When a park is slated for closure, Vermont law requires the owner to give sufficient notice to residents so that a purchase of the park – coordinated among the residents or with a non-profit housing provider – may be established in order to keep the park open. There are four such parks in the region now operated by non-profits.

Table 5.8: Mobile Home Parks in the Northeast Kingdom

County	Town	Ownership	Lots	Vacant Lots	MHs Owned by MHP	MHs Owned by Leaseholder
Caledonia	Burke (Glenwood)	For-profit	33	3	0	6
Caledonia	Hardwick (BCP MHP)	For-profit	7	0	0	6
Caledonia	Hardwick (Evergreen Manor)	Non-profit (Lamoille Housing Partnership)	32	3	2	20
Caledonia	Hardwick (Strong's MHP)	For-profit	3	0	1	2
Caledonia	Lyndon (Maple Ridge MHP)	Non-profit (Rural Edge)	41	0	0	41
Caledonia	Lyndon (Northern Hill Estates)	For-profit	29	0	1	28
Caledonia	Lyndon (Riverview Estates)	For-profit	33	1	5	28
Caledonia	Lyndon (Woodland Heights)	For-profit	34	0	1	33
Caledonia	St. Johnsbury (Green Lantern MHP)	For-profit	51	14	0	35
Caledonia	St. Johnsbury (McGill Avenue MHP)	For-profit	10	2	6	2
Caledonia	St. Johnsbury (Mt. Pleasant MHP)	For-profit	92	0	31	61
Caledonia	St. Johnsbury (Oak Street MHP)	For-profit	8	5	0	2
Essex	Canaan (Canaan MHP)	For-profit	18	0	0	18
Essex	Concord (North Concord Trailer Park)	For-profit	24	3	2	19
Orleans	Barton (Fairview Estates)	For-profit	32	4	4	26
Orleans	Coventry (Nadeau MHP)	For-profit	16	9	0	7
Orleans	Coventry (Nadeau MHP)	For-profit	8	2	1	5
Orleans	Derby (Derby Center Mobile Court)	For-profit	11	0	11	0
Orleans	Derby (Derby MHP)	Non-profit (Housing Foundation)	96	1	0	95
Orleans	Derby (Shattuck Hill MHP)	Non-profit (Rural Edge)	47	1	0	48
Orleans	Derby (Tetrault MHP)	For-profit	2	0	0	2
Orleans	Irasburg (Piette's MHP)	For-profit	6	0	1	5
		Total	633	48	66	489

Source: Vt. Dept. of Housing and Community Development: Vermont Mobile Home Program 2013 Registry and Mobile Home Parks Report (Published January 2014)

Multi-unit housing

According to latest American Community Survey 5-year estimates, multi-unit housing stock is largely concentrated in the Northeast Kingdom's population centers. Jay and Burke also have a high concentration of multi-unit dwellings, but these are generally associated with resort populations. Multi-unit dwellings are relatively scarce in remaining municipalities, and many have none at all.

Caledonia County		Essex County		Orleans County	
Municipality	%	Municipality	%	Municipality	%
St. Johnsbury	34%	Brighton	13%	Jay*	34%
Lyndon	21%	Canaan	10%	Newport City	23%
Burke*	19%				
Hardwick	10%				

Source: US Census Bureau, American Community Survey *Likely associated with resort populations.

Accessory dwelling units

Accessory dwelling units (also called “mother-in-law suites”) are dispersed throughout the region. In 2004 a change in statute required accessory unit dwellings to be treated as a permitted use of an owner-occupied single family dwelling. However, not all towns in the region have zoning, and these developments may be inconsistently tracked and reported in lister data. Most recent American Community Survey five-year estimates indicate that the majority of “1-unit attached” dwellings are located in Caledonia and Orleans County (132 and 109 respectively) and that there are only 10 such units in Essex County.

Subsidized housing

The term **subsidized housing** refers to government-sponsored economic assistance to help alleviate the cost of housing (usually rental) for people with low to moderate incomes. Funding typically originates from the U.S. Department of Housing and Urban Development and follows one of two models:

1. **Project-based assistance:** Where the subsidy is assigned to a specific housing unit built, developed, and/or managed specifically for the purpose of accepting low-income tenants.
2. **Tenant-based assistance:** Where the recipient receives financial assistance (usually called a **voucher**) to help cover the costs of any qualified housing unit. The housing unit may be privately developed and it does not have to have been specifically developed for housing low-income tenants. Because vouchers provide low-income recipients with a range of housing choices, they may, in theory, support efforts to integrate disadvantaged families into mixed-income communities. This mobility may help to break the cycle of poverty for future generations. A recent study has indicated that young children (about 8 years old) whose families had been given housing vouchers increased the child’s total lifetime earnings by about \$302,000.¹³ Private landlords may refuse to accept vouchers, but landlords who have received low-income housing tax credits (see below) are required to accept them. How tax credits are allocated may ultimately determine (or restrict) housing choices for voucher recipients.

¹³ Chetty, Hendren, and Katz: “The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment,” Harvard University, May 2015

Caledonia County			Essex County				Orleans County				
	Family	Senior only	Vouchers*		Family	Senior Only	Vouchers*		Family	Senior Only	Vouchers*
Barnet	0	0	1	Brighton	23	32	19	Albany	0	0	1
Burke	0	15	3	Canaan	0	12	1	Barton	24	52	12
Danville	0	12	4	Concord	0	10	2	Coventry	0	7	0
Groton	18	9	2	East Haven	0	0	1	Craftsbury	0	24	1
Hardwick	29	30	20	Guildhall	0	0	1	Derby	23	11	29
Lyndon	41	61	19					Glover	0	12	2
Newark	0	0	1					Greensboro	0	10	1
Peacham	0	6	2					Irasburg	0	10	0
Ryegate	7	0	2					Newport City	55	76	61
St. Johnsbury	195	114	134					Newport Town	0	0	2
Waterford	0	1	0					Troy	0	14	7
TOTAL	290	248	188	TOTAL	23	54	77	TOTAL	102	216	116

Source: Vermont Housing Data (www.housingdata.org), accessed May 2015; *Vermont State Housing Authority, April 2015

Workforce Housing

Workforce housing is a term that has been used increasingly by planners, governments, and organizations that advocate for housing policy. It is typically used to describe housing for those who are gainfully employed in occupations that are essential to a community, such as teachers, healthcare workers, first responders, as well as occupations that may pay relatively lower incomes, such as food services, retail, hospitality and tourism. Workforce housing typically does NOT include age-restricted developments. Rather, it is:

- affordable to the local workforce (with or without a subsidy);
- sited in or reasonably near the place of employment; and
- usually available to households that earn up to 120 percent of the area median income.

Most HUD programs are limited to low-income recipients (up to 80% of the area median income), which precludes opportunities for funding workforce housing.

Affordable Housing Partners

The Northeast Kingdom is served by two non-profit housing development corporations. Rural Edge (formerly known as Gilman Housing) serves all three counties and currently manages about 500 flat rate and income-based housing units throughout the region. Its Homebuyer Education Program provides financial literacy counseling to about 200 individuals a year. Lamoille Housing Partnership also develops and rehabilitates properties for rent or purchase by low- to moderate-income residents. Based in Morrisville they also serve Hardwick. Both non-profits manage mobile home parks in the region.

Additionally, Northeast Kingdom Community Action (NEKCA) provides assistance with locating emergency housing, electrical disconnect, and crisis fuel assistance throughout the NEK in Newport, St. Johnsbury, Canaan, and Island Pond.

Housing Tax Credits

Housing Tax Credits (also known as federal Low Income Housing Tax Credits (LIHTC) have produced most of Vermont's affordable rental housing developed since the program's inception in 1987. Credits reduce federal tax liability for a 10-year period. Qualified recipients must agree to certain operating restrictions and reporting and monitoring requirements for at least 15 years. Vermont's allocation of federal credit is capped at \$2.68 million. Vermont also has state affordable housing tax credits, and \$400,000 is available annually for affordable rental housing projects. Both federal and state tax credits can be sold in order to create equity. Tax credits are awarded through a highly competitive process administered by the Vermont Housing Finance Authority. Funding rounds are consistently oversubscribed. Allocation is based on the annual Qualified Allocation Plan, which establishes priorities for awarding credits. Since 2004 nearly \$1.5 million in tax credits have been awarded to projects in the Northeast Kingdom to acquire, develop, or rehabilitate 187 housing units, in St. Johnsbury, Hardwick, Newport, Glover, and Groton. Local partners and sponsors have been Rural Edge, Lamoille Housing Partnership, and Housing Vermont.

Table 5.11: Housing Tax Credits in the Northeast Kingdom, 2004 to Present

Year	Project	Local Partner/Sponsor	Location	Type	Credits	Amount	# Units
2004	Moose River Housing	Gilman Housing Trust*/Housing Vermont	St. Johnsbury	Acquisition, Rehabilitation	28	\$163,594	28
2006	Groton Redevelopment	Gilman Housing Trust*/Housing Vermont	Groton	Rehabilitation	18	\$44,000	18
2007	Passumpsic North & South	Housing Vermont	St. Johnsbury	Acquisition, Rehabilitation	28	\$95,000	28
2007	Hardwick Family Housing	Lamoille Housing Partnership/Housing Vermont	Hardwick	Rehabilitation	8	\$39,065	8
2007	Bemis Block	Lamoille Housing Partnership/Housing Vermont	Hardwick	Rehabilitation	14	\$98,000	14
2007	Glover Senior Housing	Gilman Housing Trust*	Glover	New Construction, Rehabilitation	12	\$75,755	12
2009	Newport Senior Housing	Gilman Housing Trust*	Newport	Acquisition, Rehabilitation	13	\$95,655	13
2011	Newport Family Housing	Gilman Housing Trust*/Housing Vermont	Newport	New Construction, Acquisition, Rehabilitation	21	\$390,000	21
2012	St. Johnsbury Historic Green Rehab	Gilman Housing Trust*/Housing Vermont	St. Johnsbury	Rehabilitation	29	\$350,000	29
2013	Maple Street Senior Apartments	Housing Vermont	Hardwick	Acquisition, Rehabilitation	16	\$54,200	16
2014	Maple Street Senior Apartments	Housing Vermont	Hardwick	Acquisition, Rehabilitation	16	\$61,199	16
2014	Maple Street Senior Apartments	Housing Vermont	Hardwick	Acquisition, Rehabilitation	16	\$25,000	16

Source: Vermont Housing Finance Authority. (*Now called Rural Edge)

Applications for credits are evaluated according to a two-tiered weighting process. Top-tier priorities are rehabilitation or infill new construction where vacancy rates are 3.5% or less; family housing, location in a designated downtown or village center; and removal of blight. Mixed-income housing development is considered a second-tier priority.

III. CHALLENGES TO AFFORDABILITY

Affordability in the region is measured through American Community Survey, and through housing wages determined by the National Low-Income Housing Coalition. HUD also provides a methodology that factors in the cost of commuting. By any measure, the region’s supply of affordable and workforce housing is inadequate to meet the needs of the region. Lagging incomes, scarcity of jobs, and aging housing stock are contributing factors. Additional challenges are identified below.

According to most recent American Community Survey 5-Year Estimates, more than a third of homeowners in the Northeast Kingdom pay more than 30% of their income on costs for properties with a mortgage, and at least 20% pay more than 30% on a properties that are owned free and clear. More than half of renters in the region pay more than 30% of income on housing. Compared to statewide averages, housing in Orleans County is more likely to be unaffordable, and rental housing throughout the region is more likely to be unaffordable.

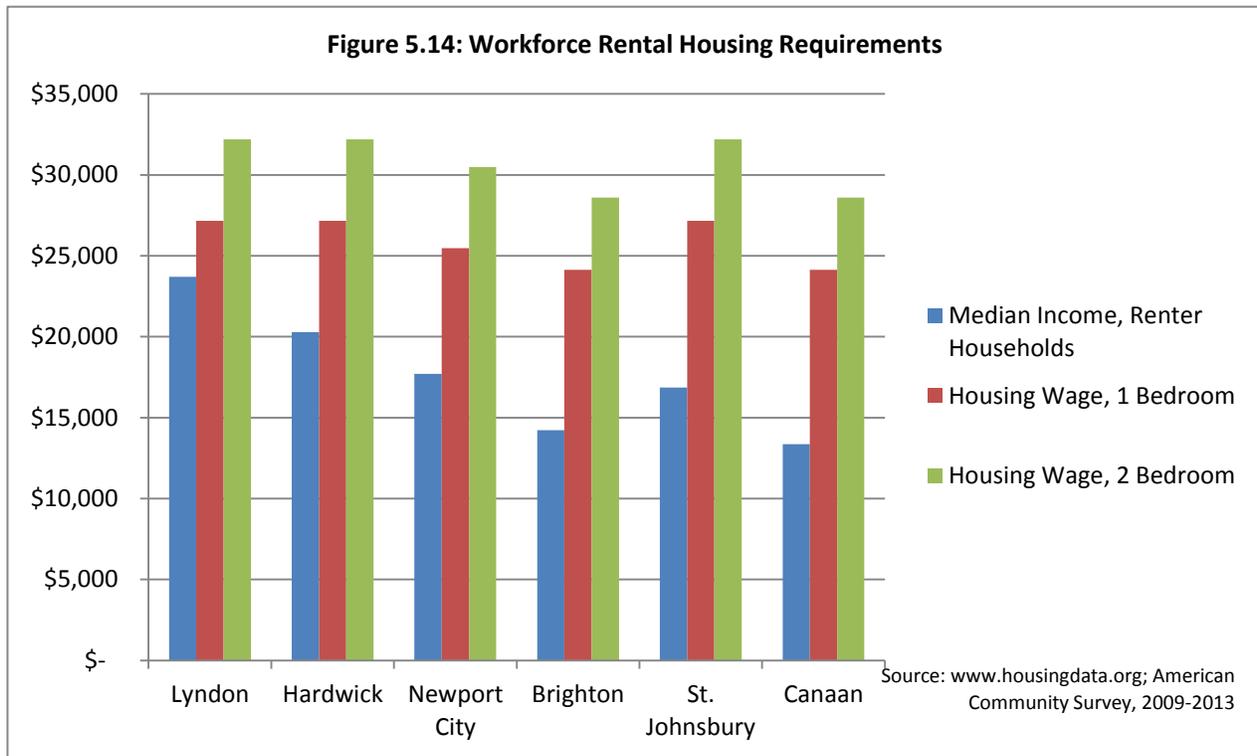
	Selected Monthly Owner Costs* as a % of Household Income		Gross Rent**
	Housing Units w/ Mortgage	Housing Units w/o Mortgage	Occupied Units Paying Rent
Caledonia	34.6%	20.1%	60.2%
Essex	37.4%	21.1%	59.6%
Orleans	40.3%	27.6%	54.9%
Vermont	37.0%	22.9%	52.4%

Source: US Census Bureau: American Community Survey 5-Year Averages, 2009-2013

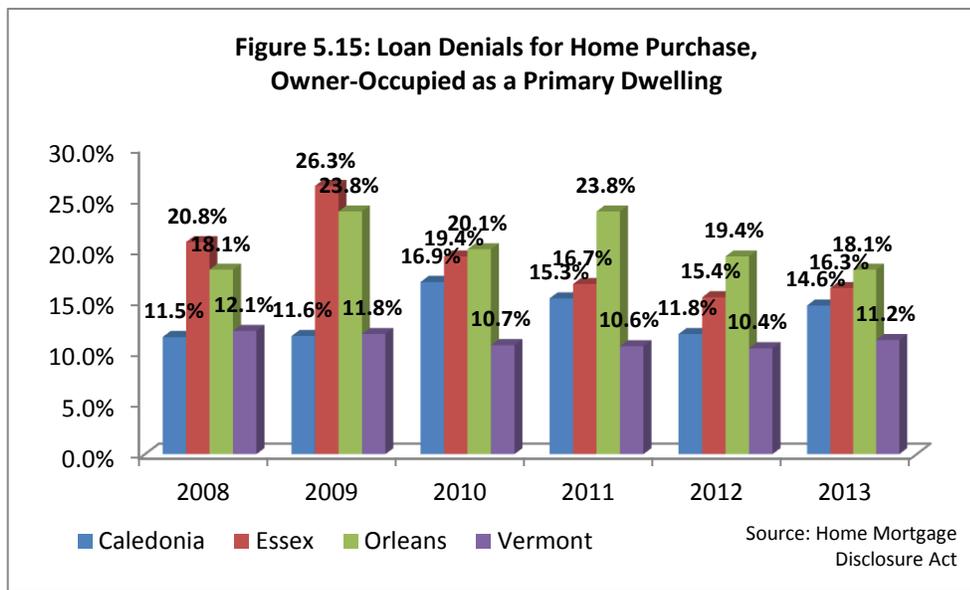
* Selected monthly owner costs are the sum of payments for mortgages, deeds, contracts to purchase, or similar debts on the property. It also include property taxes, insurance, utilities, fuels, and where appropriate condominium and association fees or mobile home costs.

** Gross rent includes the estimated average monthly cost of utilities and fuel.

Median household incomes for renters fall short of housing wages, the income needed to afford an apartment at HUD's Fair Market Rate (FMR). HUD's FMRs are published annually by bedroom size and are for a modest apartment, costing about 10% less than the area median rents. Note: Figure 5.14 includes only communities where multi-unit structures account for at least 10% of housing stock and excludes Jay and Burke, where multi-unit housing is more likely to be related to resort development.



Credit Access: Homebuyers – particularly first-time ones – may face considerable barriers to get out of the rental cycle. To afford a home costing \$130,000, the average homebuyer would need a household income of \$38,470 and \$11,279 cash on hand at closing.¹⁴ Lending programs vary, but in general, a 20% down payment is required to avoid private mortgage insurance, and debt-to-income ratios are capped at 43%. Manufactured housing can be harder to finance because they depreciate faster. Loan terms for a used manufactured unit, for example, will be limited to 10 to 15 years. According to five years of data from the Home Mortgage Disclosure Act, prospective home buyers in the Northeast Kingdom are more likely to be denied a mortgage. The most cited reason was debt-to-income ratio.



¹⁴ Home Mortgage Calculator, www.housingdata.org.

The Hidden Cost of Rural Living: Travel is another cost driver for housing in the Northeast Kingdom. Travel from households to destinations (like work) varies on the location of the home, and is considered affordable when it accounts for 15% of household income or less. Combined, housing and transportation costs are considered unaffordable when they account for more than 45% of household income. According to the HUD Location Affordability Index, transportation accounts for about a third of household income in the region. Even in St. Johnsbury/Lyndon and Newport City – the regional urban center – transportation accounts for 28% and 32% of household income respectively.

Table 5.13: HUD Location Affordability by County (for Renters and Owners)

County	Annual Income for Median-Income Family (4 people, 2 commuters)	Average Cost of Housing as a % of Income	Avg. Cost of Transportation as a % of Income	Location Affordability
Caledonia	\$44,435	26% -- \$11,553	32% -- \$14,219	58% -- \$25,772
Essex	\$40,842	25% -- \$10,214	37% -- \$15,116	62% -- \$25,330
Orleans	\$41,618	26% -- \$10,821	35% -- \$14,566	61% -- \$25,387

Source: HUD Location Affordability Portal, Version 2 (<http://locationaffordability.info/>)

Mismatched housing supply: The region’s housing stock is mainly single-family with 3 bedrooms or more, with more than a third sited on large lots. It falls short of the needs of financially strained first-time buyers and aging baby boomers, who may be looking for smaller homes located near jobs, services, and amenities. The region’s downtowns and village centers could provide opportunities for more dense development and lower land costs, but most of the region’s village centers lack off-site water and sewer to support dense development.

Perceptions about affordable housing: One of the most common objections to affordable housing development is that it will decrease values of surrounding properties. For the most part these concerns are unfounded. The Center for Housing Policy has reviewed numerous studies on the impact of affordable housing on property values. Developments that are well managed and maintained and attractively designed to blend with surrounding neighborhood properties are more likely to have no effect or even a positive effect on nearby properties. Rehabilitation of distressed properties for affordable housing may positively impact property values as well. However, large concentrations of affordable housing should be avoided. Several researchers have found that concentrated affordable housing developments were more likely to have a negative impact on neighboring properties. *As long as it is not overly concentrated*, siting affordable housing developments in strong neighborhoods with high home values and low poverty rates is unlikely to have adverse effects on neighboring property values.

These findings affirm the trend toward mixed income housing and communities.¹⁵ Mixed-income housing is central to any smart growth strategy because it can support a more diverse population and achieve a more equitable distribution of households of all income levels.¹⁶

NVDA supports the development of affordable housing that is well managed and maintained and is context-sensitive to existing concentrations of poverty and surrounding property values. Mixed-income housing offers numerous social and economic benefits to a community by preventing residential segregation and promoting vitality of urban and village centers. The vast majority of residential development in the Northeast Kingdom has occurred outside of established development centers over the past decade, running counter to the long-

¹⁵ The Center for Housing Policy. “Don’t Put it Here!” Does Affordable Housing Cause Nearby Property Values to Decline? Insights from Housing Policy Research (Policy Brief Series published between 2008 and 2011.)

¹⁶ Smart Growth Online (<http://smartgrowth.org/smart-growth-principles/>)

range planning goal of maintaining the historic settlement pattern of compact village and urban centers separated by rural countryside. Reversing this trend will require a sustained effort that supports a range of attractive housing opportunities and choices – for all income levels and age groups -- both in and immediately adjacent to our region’s downtowns and village centers. NVDA supports housing policies and programs that incentivize mixed-income housing development, avoids concentrations of poverty, and supports vibrant and livable neighborhoods that are near existing services, amenities and employment opportunities.

IV. TAKING ACTION: TOOLS FOR MUNICIPALITIES TO PROMOTE AFFORDABLE AND WORKFORCE HOUSING

Affirmatively furthering fair housing: The federal Fair Housing Act prohibits discrimination based on race, color, religion, gender, family status, or disability in the sale, rental, or advertisement of housing. Vermont statute extends this prohibition to include discrimination based on age, marital status, sexual orientation, or reception of public assistance. 24 V.S.A., Chapter 117, the statute that regulates planning and zoning, contains requirements and provisions to protect and promote affordable housing. For example:

- Single- and two-family homes cannot be subjected to site plan review.
- It is illegal to prohibit mobile homes or mobile home parks from a municipality.
- Municipalities must designate appropriate districts for multi-unit and multi-family dwellings.
- Residential care and group homes serving up to eight individuals must be considered a single-family residential use of property unless it is located within 1,000 feet of another such home.
- Accessory dwelling units (one-bedroom apartments or efficiencies) subordinate to a single-family dwelling must be considered a permitted use.
- Duly adopted municipal plans must include recommendations for addressing the housing needs of low- and moderate-income individuals and should account for accessory dwelling units as a form of affordable housing.

Promoting density: Enabling dense, compact development near downtowns and village centers may reduce land costs for new housing. Although density may be limited by lack of off-site water and sewer, municipalities with zoning should not require minimum lot sizes larger than what is necessary to accommodate on-site water and septic systems in areas in village centers. Traditional opposition to dense residential development is often based on preconceived notions of crowded, monotonous development with little or no privacy. These objections can be overcome with attractive, context sensitive site designs that fit with a rural setting. Design charrettes and buildout analyses might help residents better visualize appropriate housing development.

Regulatory incentives and inclusionary zoning: Planned unit development is authorized in Vermont statute to provide for compact, pedestrian-oriented development especially in and adjacent to downtowns and village centers. It is also a popular regulatory tool for promoting affordable housing. Provisions for planned unit development may include “density bonuses” to encourage affordable and mixed-income projects. Municipalities also may provide bonuses to homes with smaller footprints (e.g. 1,500 feet or less) or universal access design. A number of communities in the region provide for planned unit development or some form of residential clustering with density incentives. There is no statutory limit to density bonuses, but experience has shown that a minimum of at least 50% density bonus may be needed to incentivize developers. Other zoning incentives may include waiver of parking requirements and permitting fees. Unlike density bonuses, **inclusionary zoning** is mandatory, and developers are required to build a percentage of affordable units in developments of a certain scale. As with impact fees, inclusionary zoning should be based on clearly stated local housing policies and well documented housing needs.

Vermont Community Development Program Grants: Municipalities with duly adopted plans may apply for Vermont Community Development Program (VCDP) grants to support affordable housing, which is one of the program’s top priorities for funding. Because municipalities in the Northeast Kingdom lack the administrative and fiscal resources to develop and affordable housing, they often subgrant to qualified housing partners to develop and rehabilitate affordable housing stock. Municipalities that receive VCDP grants must complete fair housing trainings that are offered throughout the year. Recent VCDP recipients include the Town of Hardwick (Maple Street Senior Apartments, 16 units) and the Town of Lyndon (Northeast Kingdom Revolving Loan Fund, 38 units).

Local incentives: In addition to low-interest loans (such as a revolving loan fund capitalized by the VCDP grant), municipalities may be able to encourage housing investments through tax stabilization or abatement programs (e.g. hold the tax rate for a rehabilitated property to its pre-construction value for five years or more).

Downtown and Village Center Designation: Qualifying municipalities may pursue downtown or village center designation. Once conferred, the designation is valid for five years. The primary benefit of the program is eligibility for state tax credits for historic rehabilitations, façade improvements, and code improvements (including installation of elevators and sprinkler systems). Income-producing properties (including mixed-use and multi-family structures) can be eligible. Unlike federal tax credits, state tax credits are relatively accessible to private property owners because they are easy to administer and sell. To date, the Northeast Kingdom has received nearly \$3.1 million in tax credits for 16 projects that included some form of housing, including market-rate housing units. Although tax credits are awarded annually, the Northeast Kingdom has been under-represented in some funding rounds. It is possible that property owners are still not aware of the benefits of Downtown and Village Center designation. Additional benefits of designation include priority consideration for grant program (such as VCDP funds) and Low-Income Housing Tax Credits. (For a map of existing designated Downtowns and Village Centers, see Future Land Use in the Land Use Section.)

Sales Tax Reallocation: Municipalities and developers of qualified projects in designated downtowns may jointly apply for a reallocation of sales taxes on construction materials. If awarded, reallocated funds must be used by the municipality to support the project (e.g. sidewalks, stormwater management, streetscape improvements, etc).

Neighborhood Development Area Designation: This adjunct to the Downtown and Village Center designation encourages municipalities and developers to plan for new infill housing in pedestrian-oriented neighborhoods within walking distance from the designation areas (1/2 mile from downtown and ¼ mile from village center). Incentives and benefits include exemption from Act 250 for qualified “mixed-income” projects, and for projects that don’t qualify for a full exemption, a 50% discount on application fees. Waste water review from the Agency of Natural Resources can be capped at \$50.00, and projects can be exempt from land gains tax. “Mixed-income” housing is defined as:

- **Owner-occupied:** At least 15% of the housing units have an initial price that is equal to or less than the Vermont Housing Finance Authority price limit (\$300,000 for a one-unit property, \$350,000 for a two-unit), OR at least 20% of the housing units have an initial price that is equal to or less than the VFHA limit.
- **Rental Housing:** At least 20% of the units are affordable (i.e. not costing for than 30% of gross household annual income) to households not earning more than 80% of the county median income. Affordability is secured for at least 20 years.

To qualify for a neighborhood development area designation, the municipality has to incorporate pedestrian design into local planning and zoning (i.e. “complete streets”) and allow for a density of at least four detached single family dwelling units per acre. Newport and St. Johnsbury officials have explored the feasibility of new neighborhood designation. NVDA supports further exploration of this program in order to incent the

establishment of pedestrian-oriented neighborhoods that offer a full array of housing choices – affordable, workforce, and market rate.

Reducing local permitting restrictions: Revisiting zoning regulations and waiving restrictions such as parking requirements and height of structures may be an inexpensive way for a community to encourage housing in appropriate areas. Permit fees may be reduced or eliminated in some cases. In some communities, where zoning permit fees are not very expensive, eliminating permitting requirements for single- or two-family homes may be appropriate for areas where dense development is encouraged.

Housing Studies: Municipalities with duly adopted plans are required to include a “recommended program for addressing low and moderate income persons' housing needs as identified by the regional planning commission.” Local planning commissions can gain greater insight into housing needs through studies that quantify local housing needs, determine capacities for greater densities (through GIS-based buildouts) and examine potential impacts of housing policies on property values. Studies may also identify appropriate areas for rehabilitation and new infill housing development, such as brownfields or abandoned, derelict, or underutilized properties.

Local Housing Commissions: Municipalities are authorized by statute to create advisory commissions composed of individuals with expertise or interest in specific areas such as historic preservation, design, and housing. Such commissions can assist and advise the planning commission and other officials on housing studies, as well as policies and programs to further affordable housing and improve housing stock.

Local Rental Codes and Local Enforcement: State rental housing codes help to promote safe and healthy living conditions. Communities may take this further by enacting local codes and create local registries, or they may enforce state codes locally.

Derelict/Abandoned Buildings Ordinances: Local enforcement can help to protect neighborhoods from blight. Some communities have established regulations requiring owners of vacant properties to register them. (http://www.dekalbcountyga.gov/vacant_property_registry/index.html). Springfield, Vermont recently passed an ordinance that establishes a fund and allows the municipality to tear down properties that are either abandoned or deteriorated if the property owners has failed to take action.

Charrettes/Master Planning: Downtown master plans (like in Barre and St. Albans) may help to inspire and attract private investors to new housing opportunities. Newport City's Regional/Urban Design Assistance Team set off an intense two-day envisioning process that ultimately led to the implementation of form-based codes and removed barriers to vertical and infill development. Although planning at this level can be expensive, grant programs are available to cover the cost. (See below.)

USDA Loans and Grants: US Department of Agriculture offers home purchase and repair assistance. Individuals who earn up to \$32,500 a year (or for a family of four, up to \$52,700) may be eligible for the USDA Direct Home Ownership program. Loan terms can be as long as 33 years, and interest rates vary from 1 percent to 3.65 percent. No down payment is required. A family of four making up to \$77,200 a year may qualify for a USDA guarantee on a bank loan, which enables a prospective homeowner to purchase a home at a low interest with no money down. USDA also offers home repair loans to make homes safer and more accessible (e.g. wiring, roof, energy efficiency, ramps and other accessibility modifications). Home repair loans are only 1 percent with a 20 year term. Seniors and very low-income individuals may even qualify a direct grant of up to \$7,500 to improve livability. USDA grants and loans are made directly to qualifying individuals; however, municipalities, local planning commissions, local housing commissions, and NVDA can help to raise awareness of this underutilized resource.

Other Grant Programs: Municipal Planning Grants are available annually to communities with a confirmed planning process. Eligible activities include zoning bylaw updates, planning for downtown and village center revitalization and redevelopment. (A Municipal Planning Grant helped to cover the cost of the Newport R/UDAT.) VTrans also offers grant opportunities (Strong Communities Better Connection) to help communities integrate transportation with land use to create safe, convenient and more walkable

communities. Downtown Transportation Fund provides grant funds for public capital improvements in Designated Downtowns, including sidewalks and streetscape improvements.

GOALS AND STRATEGIES FOR HOUSING

HOUSING GOALS

- An adequate supply of safe, attractive, and energy-efficient housing will be available to the region's residents in a proportionate balance of affordable, workforce, and market rate housing.
- Existing housing stock – particularly that located in downtowns, village centers, and older neighborhoods in existing centers of development – will be preserved.
- Overall quality, safety, and energy efficiency of existing housing stock in the region will improve.
- Housing will be available in a variety of types that meet the needs of all income groups and ages, and will be located near employment, services, commercial, civic, and recreational uses.
- Partnerships with regional housing and human service providers will be strengthened, allowing for more effective service provision.
- New housing development in downtowns and villages will conform to existing traditional patterns.
- Municipalities will be supported in determining local housing needs.

HOUSING POLICIES

- Support the efforts of local and regional housing providers and organizations, government agencies, private lenders, and developers in identifying and meeting housing needs of the region.
- Encourage innovative strategies that reverse the long-term trend of disinvestment in established development centers. Development resources should be strengthened and directed toward existing neighborhoods.
- Community revitalization and economic development plans should include the needs of all age and income groups.
- Ensure that existing housing programs and incentives promote a proportionate balance of affordable, workforce, and market-rate housing.
- Encourage the development of rental housing on a scale and design compatible with existing neighborhoods.
- Support and sustain livable communities that offer comprehensive mobility options (including alternatives to driving).
- Promote and support zoning that allows for greater densities for the purpose of providing a full range of housing choices (affordable, workforce, market-rate) in a manner that preserves the character of older neighborhoods in downtowns, village center, and other established centers of development.
- Locate affordable and special needs housing in areas with access to appropriate services.
- Support home ownership and property upkeep efforts of citizens and municipalities.

HOUSING STRATEGIES

- Work with regional housing and human service providers, including Rural Edge, NEK Enterprise Collaborative, Lamoille Housing Partnership and NEK Community Action to identify housing needs and support economically integrated communities.
- Review and comment on proposed plans and policies that will impact future affordable housing development (e.g. downtown designation, Qualified Allocation Plan).
- Assist towns to create housing policies that address the affordable housing needs of low-income residents.
- Identify incentives for the development and rehabilitation of work-force and market-rate housing in established centers.
- Assist communities interested in adopting local building codes.
- Assist communities interested in adopting and enforcing “junkyard ordinances.”
- Assist communities applying for designation under the Vermont Downtown Program, Village Center Designation Program, and where appropriate, the New Neighborhood Designation Program.
- Provide outreach and education to property owners of old or substandard housing units in Designated Downtowns and Village Centers.
- Encourage the use of innovative incentives, including density bonuses or tax stabilization for mixed-income developments, universal access design, and small footprint housing.
- Help communities evaluate needs through housing studies and build-out analyses.
- Provide outreach and education on housing programs that improve housing stock and promote home ownership.
- Facilitate fair housing trainings for municipal officials and other interested groups.
- Ensure that NVDA member communities remain eligible for VCDP funds and Municipal Planning Grants

Chapter Six: Economic Development

Note: In 2011 NVDA commissioned Economic & Policy Resources, Inc. to complete a study of the region's economic performance over the most recent business cycle (2001-2009). The report, "NVDA-Strategic Industries in the Northeast Kingdom," focused on employment trends, regional industries of economic significance, as well as a detailed analysis of key strategic industries using a cluster analysis. This section of NVDA's Regional Plan cites heavily from this study and provides updated data whenever available. The complete report is available on NVDA's Web site.

http://www.nvda.net/files/NVDA-StrategicIndustries_Report_June_2011_WOR.pdf

I. OVERVIEW

Employment Characteristics

According to the Vermont Department of Labor, the three counties of the Northeast Kingdom had an estimated labor force of 33,750, which accounts for 9.6% of the state workforce. The region's covered employment, which includes all private and public ownerships but doesn't count all farm employment or self-employment, totals 22,164 and accounts for 7.4% of the statewide covered employment.¹⁷

The Northeast Kingdom's labor market is undergoing fundamental changes. Although employment in the region increased by one-sixth between 1990 and 2010, employment growth was flat during the latter half of the 2000s. Employment in goods-producing sectors of agriculture, forestry, mining, construction, and manufacturing fell. Services, trade, transportation, and finance and insurance employed about three in every four workers in the region by the end of the period.¹⁸

		Northeast Kingdom				Vermont	US
		Employment				% Change	
NAIC	Title	2001	2006	2009	% Change	% Change	
--	Total – all ownerships	22,900	23,330	22,136	-3.3%	-1.9%	-0.8%
--	Private ownership	18,771	18,757	17,499	-6.8%	-4.1%	-2.2%
--	Goods Producing	6,485	5,635	4,694	-27.6%	-24.7%	-21.4%
11	Agriculture, forestry, fish & hunt	400	321	424	6.0%	11.3%	-2.4%
111	Crop production	175	65	122	-30.3%	-6.0%	-5.8%
112	Animal production	151	179	202	33.8%	24.0%	11.6%
21	Mining	21	19	15	-28.6%	-30.3%	19.8%
23	Construction	1,316	1,447	1,253	-4.8%	-9.7%	-12.2%
31-33	Manufacturing	4,748	3,847	3,003	-36.8%	-31.4%	-27.9%
--	Durable Goods	3,636	2,986	2,380	-34.5%	-33.5%	-29.5%
321	Wood product mfg	520	418	307	-41.0%	-37.2%	-37.1%
327	Nonmetallic mineral	141	60	57	-59.6%	-23.9%	-28.2%
332	Fabricated metal	581	666	337	-42.0%	-25.9%	-36.2%
333	Machinery mfg	615	569	494	-19.7%	-30.6%	-21.7%
339	Misc. mfg	132	159	176	33.3%	8.6%	-40.4%

¹⁷ Vermont Department of Labor: An Economic-Demographic Profile of Vermont 2014

<http://www.vtlni.info/profile2014.pdf>

¹⁸ Economic & Policy Resources, Inc. (EPR): NVDA-Strategic Industries in the Northeast Kingdom, June 2011.

--	Non-Durable Goods	1,112	861	623	-44.0%	-25.6%	-18.7%
311	Food mfg	132	211	177	34.1%	-3.8%	-25.3%
--	Service Providing	12,286	13,122	12,805	4.2%	2.9%	3.5%
42	Wholesale trade	455	586	481	5.7%	-3.8%	-2.9%
44-45	Retail trade	3,049	3,137	3,094	1.5%	-4.4%	-3.7%
48-49	Transportation & warehousing	599	616	554	-7.5%	-4.4%	-6.5%
22	Utilities	98	65	59	-39.8%	6.2%	-21.8%
51	Information	390	402	324	-16.9%	-17.8%	-1.2%
52-53	Financial Activities	669	768	703	5.1%	-6.1%	-0.4%
52	Finance and Insurance	571	600	547	-4.2%	-7.9%	-3.2%
53	Real Estate & rental/leasing	97	167	156	60.8%	-0.4%	1.0%
54-56	Professional & business services	680	904	1,036	52.4%	5.5%	23.4%
61-62	Education & Health Services	3,669	3,955	4,110	12.0%	26.1%	28.4%
62	Health care & social assist.	3,093	3,280	3,350	8.3%	30.9%	22.6%
71-72	Leisure and Hospitality	1,944	2,024	1,869	-3.9%	-3.8%	9.4%
71	Arts, entertain & recreation	130	300	309	137.7%	10.6%	7.7%
72	Accommodation & food	1,814	1,714	1,559	-14.1%	-5.5%	9.7%
81	Other services (ex. Public admin)	733	655	576	-21.4%	-16.3%	3.9%
--	Government, total	4,129	4,573	4,636	12.3%	9.5%	6.5%
	Federal government	368	447	493	34.0%	13.4%	2.7%
	State government	939	1,118	1,084	15.4%	6.5%	4.2%
	Local government	2,822	3,008	3,059	8.4%	10.3%	8.1%

Source: Vermont Department of Labor Prepared by Economic & Policy Resources, Inc.

While Vermont has seen a significant shift from a “goods-producing” to a “service-producing” economy, this trend is still not as pronounced in the Northeast Kingdom. (The goods-producing industries include natural resource sectors of agriculture, forestry, and mining, as well as construction and manufacturing. Services-producing sectors include transportation and warehousing, utilities and information; finance and insurance; real estate and rental; educational services; health care and social assistance; professional and technical services; management of companies, administrative and waste services; arts, entertainment, and recreation; accommodation and food services; wholesale and retail trade; and government.) Statewide, the ratio of services-producing jobs for each goods-producing job increased from 2.0 in 2001 to 4.0 in 2009. By contrast, the Northeast Kingdom ratio increased from 1.9 to 2.7 during the same period, so more people are still working in goods-producing jobs in this region.¹⁹

The state economy gained 6,444 jobs (2.2%) between 2010 and 2012. However, this gain was not evenly distributed among the counties. Caledonia County experienced a net job loss of 0.9%, and Essex County experienced a 13.5% loss – by far the steepest loss in the state. By contrast, Orleans County saw the greatest gain in the state (6.2%).²⁰ The largest gains in covered employment in Orleans County came from accommodation and food services (26.9%) and it is possible that this growth could be attributed to the EB-5 investments in the region.

¹⁹ EPR

²⁰ Vermont Dept. of Labor

Self-Employment

Self-employment in the Northeast Kingdom represents a significant share of total employment, compared to the rest of Vermont. In 2008, self-employed workers represented about 17.1 percent of the regional workforce, compared to 14.1 percent of the state workforce.²¹

The U.S. Census Bureau reports on *nonemployers* using tax return information from the Internal Revenue Service. These are largely self-employed individuals operating unincorporated businesses (known as sole proprietorships), which may or may not be the owner's principal source of income. The data consist of the number of businesses and total receipts by industry. More than half of these non-employers are engaged in construction; retail trade; professional and technical services; forestry, fishing, and agricultural support services; healthcare and social assistance, and other services.

NAICS	Description	2008		2013		% change Non-employers
		Non-employers	Receipts* (\$000)	Non-employers	Receipts (\$000)	
11	Agriculture, forestry, fish & hunt	628	\$34,266	540	\$25,282	-14.0%
21	Mining	12	\$456	n/a	n/a	n/a
22	Utilities	9	\$258	n/a	n/a	n/a
23	Construction	1,262	\$59,592	1,037	\$48,719	-17.8%
31-33	Manufacturing	208	\$4,898	259	\$6,753	24.5%
42	Wholesale Trade	92	\$5,973	97	\$10,226	5.4%
44-45	Retail Trade	546	\$23,089	536	\$20,810	-1.8%
48-49	Transportation & Warehousing	231	\$23,126	193	\$17,644	-16.5%
51	Information	59	\$821	49	\$1,714	-16.9%
52	Finance & Insurance	72	\$2,176	80	\$3,706	11.1%
53	Real estate & rental/leasing	359	\$16,849	383	\$22,437	6.7%
54	Professional, scientific & technical svc	563	\$17,466	547	\$15,810	-2.8%
56	Admin & Support and waste mgt.	469	\$9,200	484	\$9,096	3.2%
61	Educational services	130	\$1,343	135	\$1,867	3.8%
62	Healthcare and social assistance	607	\$12,448	523	\$12,683	-13.8%
71	Arts, entertainment & recreation	270	\$3,590	270	\$4,695	--
72	Accommodation & food services	115	\$3,230	118	\$5,005	2.6%
81	Other services (ex. Public admin)	759	\$23,980	767	\$13,472	1.1%
	TOTAL	6,391	\$242,761	6,045	\$231,263	-5.4%

Source: US Census Bureau
n/a is due to data suppression

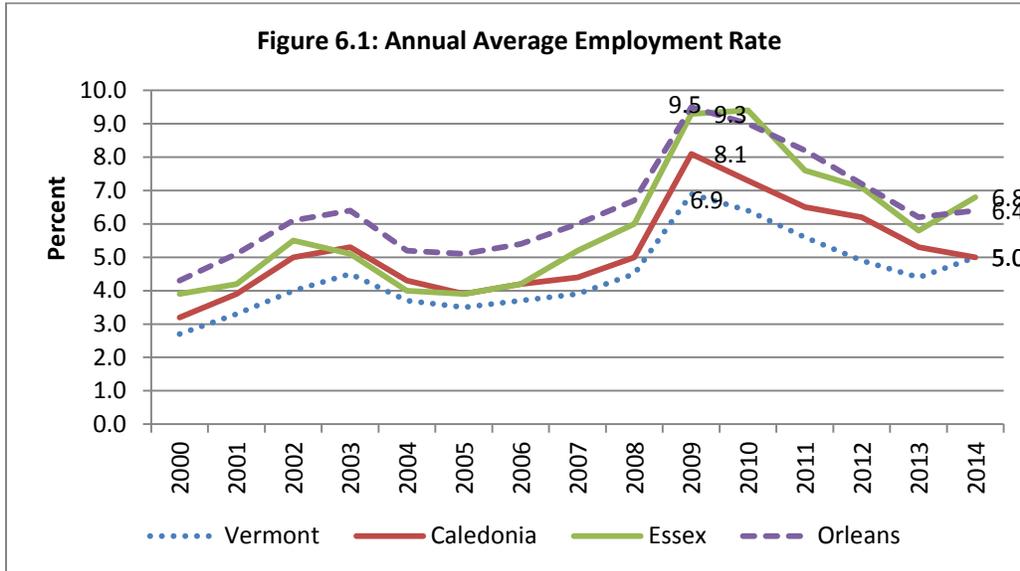
2008 data prepared by Economic & Policy Resources, Inc.
*2008 receipts are not adjusted for inflation

The Northeast Kingdom and Vermont saw a decrease in non-employers over the past five years (-5.4% and -1.7% respectively.) In the region, the biggest losses came from construction, transportation and warehousing, and information sectors. These losses were partially offset by significant gains in manufacturing. Much of this growth came from nondurable goods manufacturing, and specifically, food manufacturing. As of 2013 the region had 85 nonemployers in food manufacturing, representing \$1.65 million in receipts. Essex County data for 2008 is suppressed, but the number of nonemployer food manufacturers in Caledonia County and Orleans County more than doubled over that period.

²¹ EPR

Unemployment

Regional unemployment has dropped from the peak of the “Great Recession” in 2009, when the unemployment rates in Orleans and Essex Counties peaked at 9.5 and 9.3 respectively. Unemployment rates in the Northeast Kingdom have traditionally outpaced the Vermont rate, with Orleans and Essex counties leading the state. Caledonia County has fared somewhat better, and its current unemployment rate is equal to the state unemployment rate. The county averages conceal the fact that a few communities in the region have much higher concentrations of unemployment, such as Barton (9.6%) and Newport City (11.5%).



Source: Vermont Department of Labor

Leading Northeast Kingdom Employers

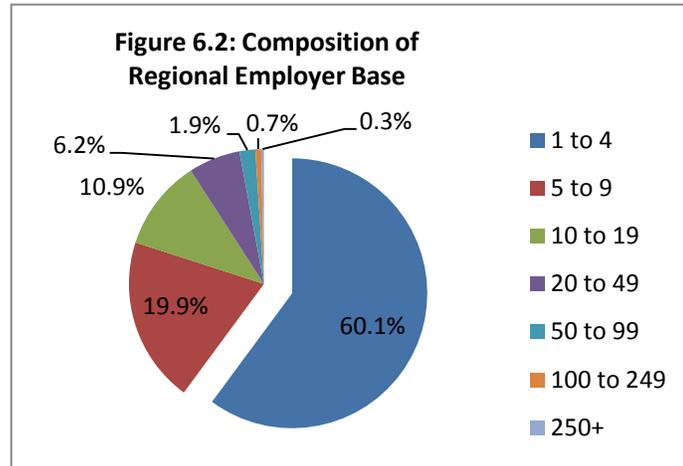
The U.S. Census Bureau County Business Patterns provides annual statistics for businesses with paid employees. The series excludes data on self-employed individuals (such the nonemployers in Table 6.2), employees of private households, railroad employees, agricultural production employees, and most government employees. In 2013, there were 768 establishments in Vermont with 50 or more paid employees – 299 (or 39%) were in Chittenden County. Only 54 of these were located in the Northeast Kingdom (26 in Caledonia County, 27 in Orleans County, and one in Essex County).

Table 6.3: Northeast Kingdom Employers by Size

County	Total	Number of establishments by employment size class						
		1-4	5 - 9	10 -19	20 - 49	50 - 99	100 - 249	250+
Vermont	21,119	12,051	4,141	2,605	1,554	457	225	86
Caledonia	944	555	194	102	67	14	9	3
Essex	116	85	21	7	2	1	-	-
Orleans	793	474	153	93	46	20	4	3

Source: US Census Bureau, County Business Patterns 2013

Of the 1,853 establishments in the Northeast Kingdom, the smallest firms with four employees or fewer account for more than 60% of all establishments. (Figure 6.2)



II. REGIONAL ECONOMIC SECTORS

Manufacturing

The companies listed below provide a representation of the region’s traditional manufacturing and natural resource base. These are also some of the region’s largest employers.

- Ethan Allen, Essex and Orleans Counties
- EHV Weidman Industries, Caledonia County
- Columbia Forest Products, Orleans County
- NSA Industries, Caledonia County
- North East Precision, Caledonia County
- Fairbanks Scales, Caledonia County
- Tivoly USA, Orleans County
- Lyndon Woodworking, Caledonia County
- Vermont Aerospace, Caledonia County

Precision metal fabrication is deeply rooted in the region’s history. Fairbanks Scales, for example, has manufactured platform scales in St. Johnsbury since the mid-1800’s. There are numerous other precision metal industries in the Northeast Kingdom, among them NSA Industries in Lyndonville, Vermont Aerospace in St. Johnsbury, and Trivoly USA and North Country Engineering in Derby. EHV Weidmann, in St. Johnsbury, manufactures industrial insulators.

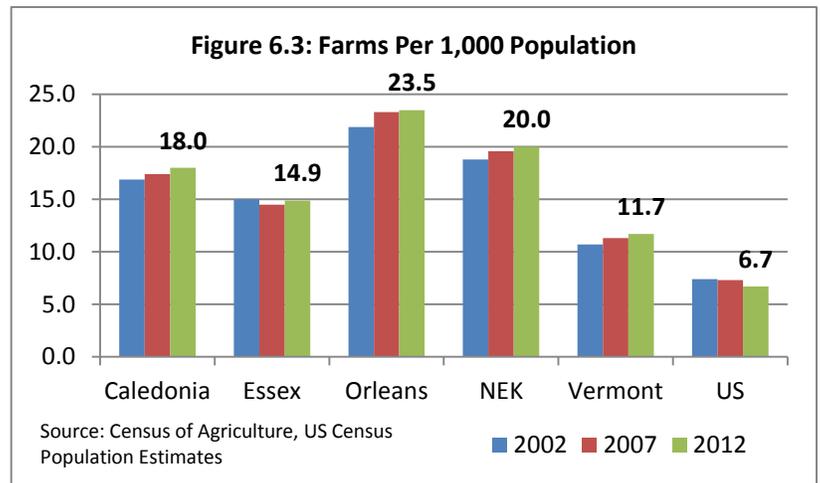
Recent manufacturing industry growth for the region includes:

- In North Troy, Appalachian Flooring continues to see business growth.
- Revision Military, a helmet and eyewear company with headquarters in Quebec and a facility in Burlington, continues to grow. With government contracts for military and police helmets, the company has plans to expand its workforce by another 50-60 persons.
- Kimtek Corporation, formerly located in Westmore, has moved into the Orleans Industrial Park where there is room for the company to grow. Vermont Custom Gage, a subsidiary of VT Precision Tool, has set up operations in a former NSA building in the St. Johnsbury – Lyndon Industrial Park.

Agriculture

According to the Vermont Department of Labor, the land-based economy – agriculture, forestry, fishing and hunting – accounted for only 1.7% of covered employment in the Northeast Kingdom in 2012. Nevertheless, the land-based economy is a critical part of the Northeast Kingdom’s traditional landscape that preserves open spaces and enhances the region’s scenic beauty.

Approximately 18% of Vermont’s farmland is located within the Northeast Kingdom. According to the 2012 Census of Agriculture, there are 1,291 farms in the Northeast Kingdom, which represents an 8.9% increase from 2002. The region has more farms per population than statewide. (Figure 6.3)



Agricultural Trends

The total market value of all Northeast Kingdom agricultural products (crops and livestock) grew to \$148,204,000 in 2012, an increase of 6.2% since 2007. While the value of livestock sales in the Northeast Kingdom dropped by 4.6% from 2007 to 2012, it still accounted for the majority (83%) of the value of all agricultural sales in the region. Livestock sales include all animals and their products (meat, eggs, milk, etc.). Dairy remains a top commodity in the Northeast Kingdom. The top two livestock products by value of sales in the region according to the 2012 census were “milk from cows,” and “cattle and calves,” which together accounted for about 98% of all livestock product sales. The third top livestock product in terms of sales varied among the three counties: the third-place holder in Caledonia County was “horses, ponies, mules, burros and donkeys” (bringing in \$968,000 in sales); “sheep, goats, mohair and milk” in Orleans County (accounting for \$816,000 in sales); and “poultry and eggs” in Essex County (bringing in \$29,000 in sales).

Table 6.4 Market Value of Agricultural Products Sold 2012, 2007*

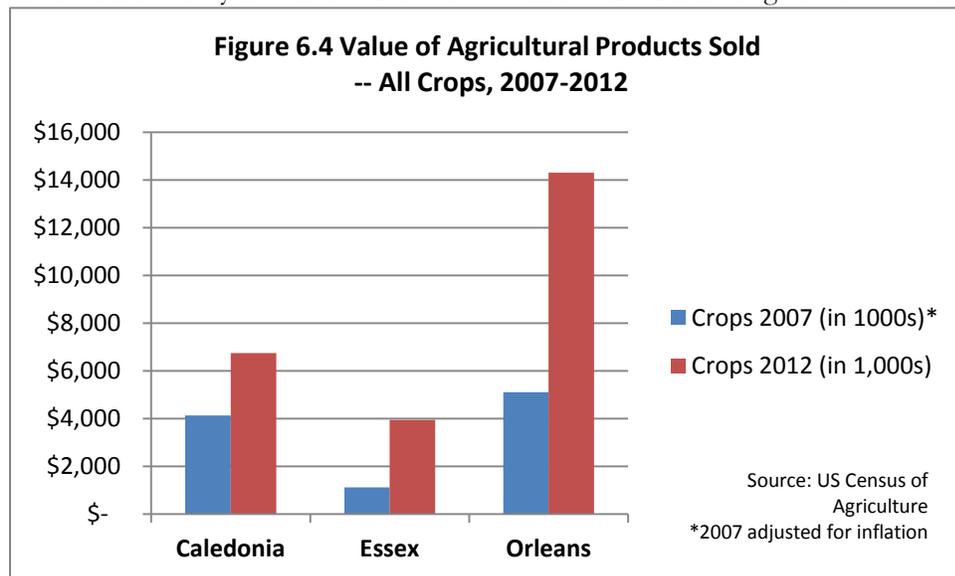
	Vermont		Caledonia		Essex		Orleans		Northeast Kingdom	
	2012	2007	2012	2007	2012	2007	2012	2007	2012	2007
Crops (\$1,000)	177,726	109,915	6,748	4,134	3,945	1,123	14,305	5,116	24,998	10,373
Livestock (\$1,000)	598,379	636,101	30,498	30,793	7,706	12,328	85,003	86,070	123,207	129,191
All Agricultural Sales (\$1,000)	776,105	746,016	37,245	34,927	11,651	13,451	99,308	91,186	148,204	139,564

Source: 2012 Census of Agriculture, USDA
*Adjusted to 2012 dollars using Bureau of Labor CPI Inflation Calculator

Orleans leads in agricultural sales in the Northeast Kingdom, as shown on Table 6.4. Although there was no increase in the number of cattle and calves from 2007 to 2012, these animals still far outnumber other livestock in the Northeast Kingdom. However, sharp increases between 2007 and 2012 in the goat and sheep inventories in Orleans County, with a more modest rise in Caledonia County, indicates that livestock is beginning to diversify, and other animal products may account for a larger share of total livestock sales in future years.

The value of crop sales in the Northeast Kingdom saw a dramatic increase of 140% from 2007 to 2012. While crop sales only accounted for 7.4% of Northeast Kingdom total agricultural sales in 2007, it represented 17% in 2012. Crops include nursery and greenhouse crops. This may signal a trend in more local production of food.

Dairy farming is still the main agricultural driver in Orleans County. The county has more than 21,000 dairy cows – second only to Addison and Franklin Counties – accounting for 15.7% of all dairy cows statewide and



\$77.5 million in milk sales. The impact of dairy activity, however, goes well beyond milk sales. A conservative estimate on its direct and induced impacts statewide is about \$2.2 billion per year.²²

Silviculture

The forest industry is an intricate part of the region's economic and social identity. Columbia Forest Products and Ethan

Allen are key manufacturers using the region's abundant forest resources.

Forest products industries are still very prominent in the regional manufacturing economy. Essex County's large percentage of goods-producing industries is largely due to the presence of the Ethan Allen Furniture processing plant in Beecher Falls. Ethan Allen has its primary production facility in the village of Orleans. The company has remained stable over recent years as it transitioned to special order manufacturing.

Lyndon Woodworking, Appalachian Flooring, and Newport Furniture Parts are other wood manufacturers located in the Northeast Kingdom. In addition, Columbia Forest Products manufactures plywood in the City of Newport. There has traditionally been little farming in Essex County due to poor agricultural soils and rugged terrain, but a large amount of the county's land area is covered by spruce-fir forest that is harvested commercially. While a significant amount of forested lands have been converted into conservation uses, some large parcels have been developed for increased maple production. The Sweet Tree 1 project includes a maple processing facility in Island Pond (in the former Ethan Allen plant), a large commercial sugar house in Avery's Gore, and thousands of acres of sugarbush in northern Essex County. The company presently employs 50 persons. Similarly, the Island Pond Maple Factory, a bulk maple processing company located in the former Island Pond Woodworkers facility has adaptively re-used an existing building and employs local residents. Logging, however, continues to be a locally important economic activity.

Statewide, approximately 6,636 workers are employed in forest-based jobs. These include jobs in logging and trucking, wood products and furniture manufacturing, paper manufacturing, wood energy, maple syrup and Christmas trees. When including jobs in forest-based recreation, and using a multiplier that takes into account the "rippling" effect the industry has on other sectors, the total estimated number of jobs is 20,605, with a

²² Vermont Dairy Promotion Council, Vermont Agency of Commerce and Community Development, Vermont Agency of Agriculture, Food and Markets: Milk Matters: The Role of Dairy in Vermont, December 2014

total economic output estimated at \$3.4 billion (Northeast State Foresters Association, The Economic Importance of Vermont's Forest-based Economy, 2013, Table 1).

In 2012, Act 142 created the Working Lands Enterprise Fund and the Working Lands Enterprise Board (WLEB). The WLEB is made up State agencies and private sector members in the supply chains of agriculture and forestry. The forestry subcommittee of the WLEB is currently developing an "asset map" that will include information on the location and scale of facilities and businesses within the primary and secondary forestry industry, and has chosen consultant Yellow Wood Associates to assist in a Forest Industry Systems analysis. This work will culminate in a State-wide summit in 2015 to review strategies to strengthen the forestry and wood products industry.

Other industry support groups and programs include the Vermont Wood Manufacturer's Association, Vermont Technical College, the Vermont Community College System, the University of Vermont's Forestry Department, and the Small Business Development Center Program.

Health Care & Education

The healthcare and education service industries have become significant employers for the region. The Northeastern Vermont Regional Hospital in St. Johnsbury and the North Country Hospital in Newport are among the largest employers the Northeast Kingdom. In 2009, healthcare and education services accounted for 4,110 of the region's jobs. In many of the region's towns, it is likely that the local school is one of the largest employers in the town (Note: some education professionals are employed within the government sector).

Retail

Retail trade remains a challenge for many Northeast Kingdom communities. Taking into account the region's low population densities, it has proven difficult to attract large retailers, although some have opened in neighboring New Hampshire where there is a smaller tax burden and a less stringent permitting process. There has been some retail growth through the 'dollar store' chains in a number of communities – Island Pond, North Troy, Hardwick, and Orleans. Other retail businesses that have located or remained in the region have often found the best strategy is to identify and concentrate on "niche" markets for specialty goods and services. These are areas where large retailers typically cannot compete efficiently or effectively. With a new Wal-Mart Supercenter coming to Derby, this strategy may make sense. Local merchants have been able to fill some retail needs in most communities, but some local officials continue to seek large retailers for area residents.

The Town of St. Johnsbury continues working to revitalize its Railroad Street retail district. Several long-time retailers remain in downtown St. Johnsbury, and may attract other businesses. Rather than compete with Littleton for the same retail customer base, St. Johnsbury looks to develop its own niche in the retail sector, with a collection of unique destination shops and restaurants. St. Johnsbury's many cultural and historic assets provide a good basis for current economic recovery efforts.

Newport City is revitalizing its downtown retail sector through a comprehensive community development strategy. The development of the downtown, lakefront, rehabilitation of community facilities, streetscape beautification, and the relocation of state and federal government offices to the downtown, have aided the transformation of Newport's downtown central business district into an economically viable commercial area and place of employment. The planned Renaissance Block project on Newport's Main Street will significantly alter the look, feel, and the retail offerings in the city.

Recent commercial growth in the region has been greatest in the following three areas:

1. U.S. Route 5 corridor between Derby and Newport City.
2. U.S. Route 5 in Lyndonville between the Interstate 91 and the village center.

3. U.S. Route 5 in St. Johnsbury, near the Interstate 91 exit (Exit 22) north of the city.

Leisure & Hospitality

The leisure and hospitality services (e.g. hotel, restaurant, and tourism related businesses) industries account for about 1,869 jobs (NAICS data, 2009). Tourism has been an important factor in keeping the retail trade and leisure and hospitality industries strong in the Northeast Kingdom. A number of high-quality, commercial recreation facilities and tourist attractions have been the reason for much of the increased tourism. In FY2013, the region's taxable rooms and meals receipts totaled \$99,752,799. Retail and use taxes receipts were \$307,156,451 over the same period.

Among the leading leisure and hospitality industries in the area, the Jay Peak Resort continues its expansion with the addition of new facilities, equipment and new ski runs. From the continuing development of seasonal homes, hotels, condominiums, recreational facilities, an 18-hole golf course, Jay Peak Resort plans to expand to a four season vacation resort. To provide some perspective on Jay's contribution to the regional economy, rooms tax receipts in Jay (town wide) account for more than 83% of all room tax receipts in the Essex/Orleans area. Q Burke Mountain Resort has expansion plans underway, as well, including a 100+ unit hotel, and recreation facilities.

Tourism

The regional tourism industry also incorporates activities such as: biking, snowmobiling, hunting, cross-country skiing, and hiking to attract numerous visitors to the Northeast Kingdom. Along with the Jay Peak Resort and Q Burke Mountain Resort, the four-season destinations mentioned above, there are numerous cross-country ski and cycling centers in the region. Kingdom Trails, the Craftsbury Outdoor Center, the Northwoods Stewardship Center, Lyndon Outing Club, and Jay Peak include a thorough network of cross-country ski and cycling trails. The Vermont Association of Snow Travelers (VAST) has an extensive system of trails throughout the region for snowmobiles. As the Lamoille Valley Rail Trail continues to develop, this will bring additional visitors to the NEK region.

Fishing and boating are popular activities on the region's many lakes and streams. Recognized water trails located within the Northeast Kingdom include the Passumpsic Valley Riverway, a 20-mile water trail from East Burke to Barnet; the Northern Forest Canoe Trail, a 723-mile historic trail, follows a route used by native Americans to move from Lake Champlain to the Connecticut River Watershed; and the recently designated Connecticut River Water Trail are all popular canoeing waters. In the northwest part of the region, the Missisquoi River was recently designated as Wild & Scenic River by the federal government.

Fall foliage and scenic landscapes continue to be popular attractions. The Northeast Kingdom has developed a reputation as one of the best places to bicycle in the country. Many cyclists come during the foliage season or during the summer months, and most tour along the state highways. NVDA, with Agency of Transportation financing assistance, has identified a network of on and off road bicycle touring routes throughout the Northeast Kingdom, consisting of a 'loop and link' system, with courses ranging from 10 miles to 80 miles. Kingdom Trails, in East Burke, has an extensive all season trail network, which is nationally popular with mountain bike enthusiasts (60,000+ visitors annually) and cross-country skiers. Other bicycle path projects are still in the planning stages including paths in St. Johnsbury and Newport.

"Agri-tourism", which includes farm stays and tours, and direct marketing of local agricultural products is a growing trend within the region, as is "eco-tourism". Green Mountain Farm to School, in conjunction with USDA Rural Development and the Northeast Kingdom Travel and Tourism Association, recently released "Flavors of the Kingdom," a tour map of farms and food producers in the region.

Government

Government, or public-sector, employment includes local, state, and federal employment opportunities. Educational institutions are typically large employers within the state and local government sectors. In 2009,

approximately 4,636 persons were employed by local, state, or federal governments, representing a little more than one-fifth of all covered employment in the region.

III. INDUSTRY CLUSTERS

The 2011 Economic & Policy Resources study identified and analyzed key industry clusters for the Northeast Kingdom using an iterative analysis of sector data, including employment concentration, wage performance and stability, growth and change, and supply chain interrelationships. Clusters were ranked as *mature, challenge, opportunity, or star*.

Mature: Traditional mainstay companies having a large number of employees, a high level of concentration (as measured by employment specialization ratio), but in recent years their collective performance is one of stagnation or decline

Challenge: Lacking key industries or be dominated by a small number of firms. Collectively, this cluster has two characteristics that evoke the moniker of “challenging;” namely, a lower level of concentration and an eroding base of employment.

Opportunity: Potential or emerging, with strong growth in both firms and employment in a number of segments, but overall lack the critical mass or collective concentration. For instance, if a cluster is composed of about 10 interrelated industries, an opportunity or emerging cluster would show firms and employment in only about half to two-thirds of these industries.

Star: These clusters are identified as stars given both their high level of concentration and their solid recent performance. Given the recent “great recession” in the United States, there are few star clusters that have retained their economic luster in any particular geographic region.

Regional industry clusters were selected based on the analysis of various screening criteria of growth and expansion, competitiveness, linkage strength, and overall position (and subsequent label).

Agribusiness, food processing & technology: One of the “stars” of the Northeast Kingdom, this cluster is made up of twelve production, processing and distribution segments. With a 2009 critical mass of 75 establishments, employing 654 workers with average wages of \$33,270; this cluster has exhibited strong growth over the business cycle period of 2001-2009. Its measure of economic specialization (called location quotient) has increased over time; meaning its export orientation continues to strengthen. Overall, the Northeast Kingdom’s agribusiness cluster has outperformed its national counterpart over the study period. Finally, this regional cluster has not gone unnoticed—growth and developments in the Northeast Kingdom agribusiness cluster has been cited in national studies and the popular press.

Biomedical/biotechnical (life sciences): One of the “opportunity” clusters in the Northeast Kingdom, this cluster is made up of biomedical-oriented manufacturing sectors, equipment and supplies wholesalers, health and personal care stores, and ambulatory health care services. Overall, this cluster experienced modest employment growth with some erosion of export orientation. Although it includes the relatively recent (and potential) “stars” of biotech/biomedical manufacturers, there remain some questions about composition and related performance. In particular, there appear to be strong interconnections between the existing biomedical/biotechnical segments with area hospitals. Hospitals and other ambulatory health care services are directly tied to the significant and growing medical payment transfer receipts within the region.

Education and knowledge creation: Composed of education services (private), publishers and other information services, the education and knowledge creation cluster is in its incipient stage, with limited interconnections with other sectors in the region. This cluster showcases a number of nationally (and internationally renowned) educational institutions such as the St. Johnsbury Academy, Burke Mountain Academy, and Sterling College.

Fabricated metals and machinery manufacturing: A “mature” cluster, fabricated metals and machinery manufacturing is diversified. The combined industry is in the midst of a recovery after the debilitating Great Recession. Several fabricated metals segments were hollowed out by the recession. Given the significant

orientation toward national and international markets, many firms within this cluster are once again showing signs of life and beginning to hire-back laid off workers and expand production. Workforce training issues are paramount within this cluster.

Forest and wood products: Overall, a cluster composed of several “mature” sectors including wood products manufacturing, paper manufacturing, and furniture products manufacturing. Though showing significant signs of decline (employment base of 2,500 workers in 2001 to 1,450 workers in 2009), the churning has spawned a number of developments in niche markets. As in the agribusiness and food processing cluster, forest and wood products is part of the traditional economic base of the Northeast Kingdom and as such have many opportunities for convergence and intersection with other economic activities, including visitor and tourism.

Visitor and tourism: Another “star” cluster for the Northeast Kingdom with solid growth during the study period of 2001-2009. Significant investments will help make the region a year-round destination. Though these developments will continue to add jobs to its solid base of nearly 1,000 workers; wages remain relatively low within this industry, due largely to continued seasonality and part-time opportunities.

IV. EB-5 DEVELOPMENT AND POTENTIAL IMPACTS

In the fall of 2012 an infusion of funds from the federal EB-5 Visa programs created the potential for significant economic growth in the Northeast Kingdom. Current project include:

- AnC BIO Vermont: An 84,000 square foot biotech manufacturing facility located on a 40 acre research campus in Newport City is currently under construction. At full capacity, the employer is expected to about 500 people, of which 150 will earn salaries of \$75,000 and up.
- Expansion to the Newport State Airport in Coventry. Associated with the airport expansion are plans to construct warehousing facilities, as well as a 50,000 square-foot airplane assembly plant at the airport, which is expected to bring a number of skilled jobs to the region.
- Resort development in Jay and in Burke. A 116-unit hotel and conference center is planned for Burke Mountain, which will draw increased numbers of tourists. Similarly in Jay, new ski amenities, as well as a 100 new housing units and an 84-unit hotel, will draw more visitors to the region.
- Renaissance Block: An entire city block in Newport City was recently demolished. In its place will be a four-story mixed-use development with anchor businesses on the first two floors and short- and long-term residential suites on the upper two.

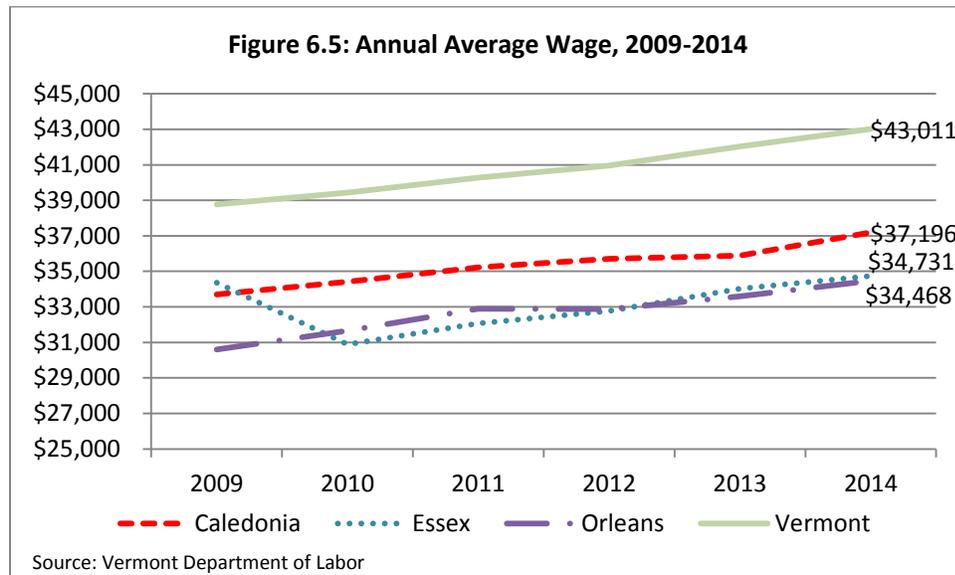
While these developments will invariably bring more people to the region, it is difficult to accurately predict the total expected in-migration and resulting demand on housing. Early estimates for total direct, indirect, and induced job creation indicated about 2,000 direct jobs, 3,000 total jobs (which includes indirect and induced jobs), and a net migration to the region as high as 4,500. A workforce development study released in July 2013 attributed about 1,100 new hospitality and tourism jobs related to ongoing resort development and the Renaissance block. The majority of these jobs would be hourly, pay less than \$20.00 an hour, and require minimal post-secondary education.

V. FOREIGN TRADE ZONE

In 2013, NVDA received a grant of designation from the U.S. Department of Commerce to operate a Foreign Trade Zone (FTZ) for the three-county region. Lamoille County was added to NVDA’s FTZ #286 in 2015. The FTZ program primarily provides benefits to companies that import foreign materials, components, or goods for their processing or distribution. A number of existing manufacturers in the four-county region have been provided information on the FTZ program and it is likely that a few will sign up for participation in the near future.

VI. WAGES

Wages in the Northeast Kingdom have only seen modest overall gains from 2009-2014, during the Great Recession. The region's wage earners substantially lagged behind the statewide averages for the same period (Figure 6.5). In 2014, Orleans County had the second lowest annual average wage in the state. (The lowest was Grand Isle at \$31,111.) Average annual wage is based on the geography of the job and not the residents in the area. It is also important to note that a high concentration of seasonal or part-time jobs significantly lowers the average wage.



VII. REAP ZONE AND COLLABORATIVE

Since 2000, the Northeast Kingdom region has been designated as a Rural Economic Area Partnership (REAP) Zone by USDA Rural Development. One of only four such areas in the U.S., the zone was established in part to help address longstanding issues of poverty, low incomes, and lack of opportunity. Special set-aside funds are made available for REAP areas by USDA Rural Development. Since its inception, the REAP Zone has attracted hundreds of millions of dollars in investments for housing, community facilities, public infrastructure, and business development.

The Northeast Kingdom Collaborative is the organization that maintains the Strategic Plan for the REAP Zone. The Collaborative is a body comprised of representatives from the many regional organizations that serve the three-county area. Projects that seek REAP set-aside funds should address specific priorities within the Strategic Plan. The Strategic Plan was last completed in the fall of 2011. The Collaborative is currently in the process of holding public forums around the region to gather input for an update of the Strategic Plan.

VIII. COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY (CEDs)

Another economic region of importance to the Northeast Kingdom and northern Vermont is the region's local Economic Development District (EDD) – a district approved by the federal Economic Development Administration (EDA). Currently being reorganized and governed by the regional planning and development organizations serving the same geographic area, the Economic Development District of Northern Vermont covers the six counties of Caledonia, Essex, Orleans, Lamoille, Franklin, and Grand Isle.

The governing board has just started the process of updating the Comprehensive Economic Development Strategy (CEDS) for region. With an updated strategy document, communities and organizations within the district will be able to apply for EDA funds for infrastructure upgrades, community facilities, and business development.

The Economic Development District for Northern Vermont service area is geographically aligned with Vermont’s portion of the Northern Border Regional Commission – another entity that annually makes funds available for the same types of projects funded by the EDA.

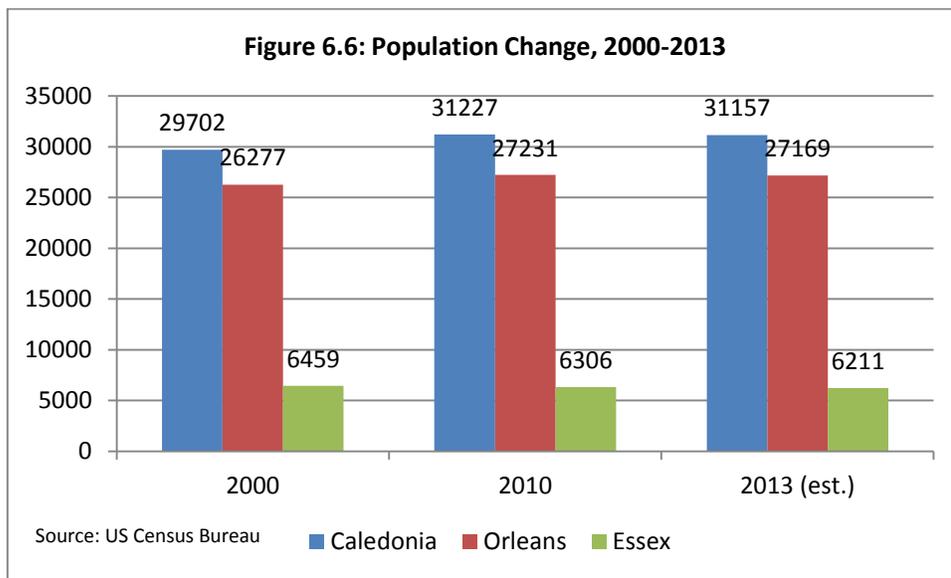
IX. OTHER ECONOMIC INDICATORS

Housing

The federal government typically uses new housing starts as an indicator of economic activity. These numbers are not presented in this report. Communities can track local building permits to estimate activity in their areas. Additional housing information can be found in Chapter 5 of this document.

Population

The Northeast Kingdom is the most sparsely populated region in Vermont. The most recent decade – one marked by economic turbulence – has reversed the growth trends of previous years. The region accounts for 21% of the land area in Vermont, with each county having roughly the same total land area. However the region contains only about 10% of the state's population. As Table 6.6 shows, the region has lost population since 2000, and most recent population estimates show further losses. A perceived lack of attractive employment opportunities likely contributes to the out-migration of younger workers from the area.

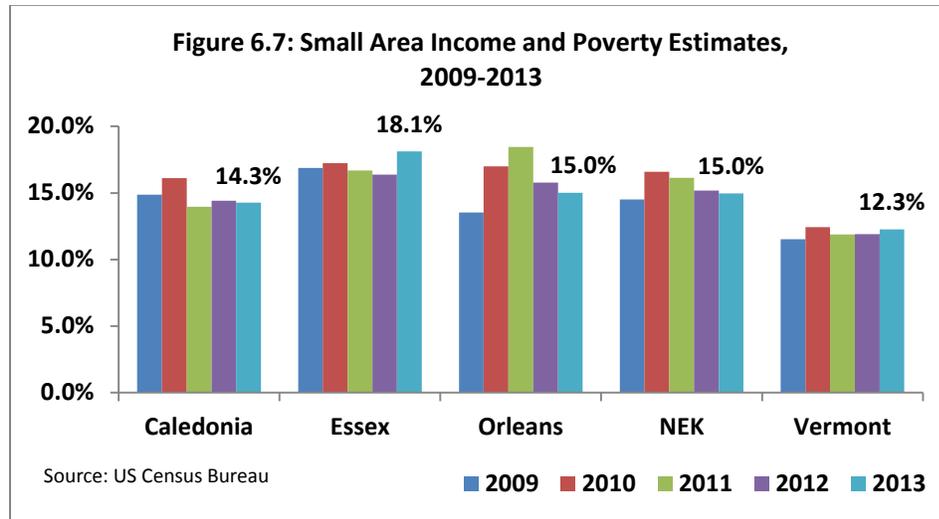


Rural Poverty

The lack of adequate personal income is a critical issue in the Region and was identified by 92% of the population in a 2001 survey of Northeast Kingdom residents conducted by the Northeast Kingdom Collaborative as part of the process for the Rural Economic Area Partnership (REAP). The Peace and Justice Center conducted a groundbreaking study on the livable wage issue in Vermont and Justice. The study’s findings include:

- The federal poverty measure severely underestimates the cost of meeting a family’s basic needs.
- Depending on family size, a livable wage is between 52% and 197% greater than the minimum wage.
- A significant percentage of working families do not earn enough to meet their basic needs.
- The inflation-adjusted median wage had not grown in ten years; while aggregate income has increased, the top 40 % of families experienced all of the growth.

Collectively, the counties of the Northeast Kingdom continue to outpace poverty levels in the state (Figure 6.7).



External Trends and Forces

People may be concerned about future growth in the Northeast Kingdom, fearing that it will lead to unattractive commercial development and loss of the traditional Vermont landscape. Business interests view this concern as a potential threat to economic development. Everyone agrees that efforts to revitalize downtowns can have economic and cultural benefits, but many people oppose limiting growth to existing growth centers and downtowns. Also, attempts to create a “livable wage” continue to raise concerns over retaining and attracting new businesses, but it is extremely difficult for someone earning minimum wage to improve their standard of living.

Adequate, affordable childcare remains a challenge for many in the workforce and for those moving from welfare to work. The need for affordable childcare was identified by 85 % of the respondents in the Northeast Kingdom survey conducted by the Rural Economic Area Partnership. A lack of public transportation is another limiting factor for many low-income workers in rural communities where local employment opportunities are limited or nonexistent.

Property tax reform continues to be an issue for too many residents and businesses in the region. Education in Vermont is primarily funded by property taxes which have steadily risen despite declining numbers of students in local schools.

Neighboring regions to the south and in New Hampshire seemingly put the Northeast Kingdom at competitive disadvantage in recruiting and retaining businesses. New Hampshire has no state sales or income tax and offers very low worker’s compensation rates. Other Vermont regions are nearer large population centers and have access to a wider variety of goods and services. In addition, the nearest commercial airports (Burlington VT, Montreal QC, and Manchester NH) are two or more hours away from most Northeast

Kingdom locations. However, expansions to the Northeast Kingdom International Airport will certainly boost economic activity in the region.

Due to the rural character of the Northeast Kingdom, telecommunications companies have been slow developing high-speed telecommunications systems throughout much of the region, thereby frustrating the growth of e-commerce and those wishing to "telecommute" from home. Slow systems development can be attributed in part to a widely scattered population (customer) base and less to environmental sensitivities regarding the location of new of telecommunication facilities.

BUSINESS ASSISTANCE & FINANCING

There are many opportunities for business and financial assistance in the region. Several organizations provide a variety of services to help expand businesses and employment within the region. These organizations include:

- Northeastern Vermont Development Association (NVDA), with offices in St. Johnsbury and Newport, is a primary contact for Northeast Kingdom businesses. NVDA contacts and prospects for in-state and out-of-state clients that will fit the region, including participating in recruitment efforts in the province of Quebec. NVDA provides technical assistance for reviewing business plans, and connects with the appropriate state agencies for marketing assistance, workforce training funds, and growth incentive funds. NVDA submits grant proposals for community and economic development projects to a number of funding agencies. NVDA has a Rural Development Intermediary Re-lending Program, which provides loans up to \$100,000, and also maintains a Non-profit Community Development loan fund, which is being recapitalized with loan repayments from Vermont Community Development Program grants. These loan funds are used to provide financial assistance for business start-ups, expansions, or relocations to the region.
- Northern Community Investment Corporation (NCIC) offers Small Business Administration (SBA) loans, lines of credit, direct loans up to \$100,000; loan guarantees; an equipment-leasing program; equity investments; arranges bank loans, and SBA 504 Fixed Asset Financing.
- Small Business Development Center (SBDC), a program of the U.S. Small Business Administration, maintains offices in St. Johnsbury and Newport, providing assistance to for-profit businesses to develop business plans for internal use or for loan proposals. The SBDC also offers management, marketing, financial, and production support to fledgling businesses.
- Northeast Kingdom Community Action (NEKCA) Micro-Business Development Program provides information on how to start a business, creating marketing and financial plans, as well as general trouble shooting for micro-businesses.
- Vermont Economic Development Authority (VEDA) serves the entire state and offers a variety of business incentive programs.

Local Revolving Loan Funds

The towns of St. Johnsbury, Lyndon, Barton, Hardwick, Brighton, Newport, Albany, Jay, and Canaan all have revolving loan funds capitalized in a variety of ways. Some of these are used solely for business development; others are broader in scope and are used for various community development projects.

Workforce Education and Training

Workforce development continues to be one of the keys to economic development in the region. The need for more vocational/technical education programs and a need for more adult literacy programs were identified by 85 % of the respondents in a Northeast Kingdom survey. A need for training at both the entry level and management level is a need commonly expressed by businesses.

Importantly, the Regional Technical Centers in Newport, Lyndonville, and St. Johnsbury, the Northeast Kingdom Collaborative, and area businesses agree that a lack of employees with specific skills is the greatest barrier to attracting new businesses and expanding existing businesses. Fifty-six percent of Northeast Kingdom businesses, responding to a survey, said that an available, trained workforce was the biggest challenge facing their business.

X. CONCLUSION

Workforce training for new and existing workers will be one of the region's priorities in order to meet the needs of area businesses and increase workers' salaries. New and innovative infrastructure improvements must occur for information technology to grow and thrive. Quality employment opportunities will be identified and promoted to allow residents, especially young adults, to find jobs closer to home. Business and industry clusters can be developed to increase productivity, broaden the access to markets, and reduce the waste of time and resources. The growth in the small business sectors, e.g. telecommuting, specialty foods, value-added businesses, arts and crafts and e-commerce, will flourish. It is expected that manufacturing will strengthen, become more flexible, and make important gains, particularly in the forest products and industrial machinery sectors. It is hoped there will be increased research and start-up funds to aid value-added processing and to diversify the economy, especially for the region's farmers. Tourism will continue to grow in the Northeast Kingdom. Eco-based businesses will become a part of the region's landscape, and steps will be taken to mitigate the negative effects that some older businesses have had on the environment.

GOALS AND STRATEGIES FOR ECONOMIC DEVELOPMENT

ECONOMIC DEVELOPMENT GOALS

- The region's unemployment rate should be reduced.
- The training/skills of the workforce should be improved.
- Higher-wage jobs should be created.
- Coordinate economic development functions in the Northeast Kingdom.
- Towns should receive assistance in their economic development efforts.
- The region's agricultural output should increase and diversify. Value should be added to local staple products and raw materials.
- The economic infrastructure capacity in the Northeast Kingdom should be improved to meet current and future needs.
- The region's telecommunications infrastructure should modernize and expand.
- Downtowns and village centers in the Northeast Kingdom should be maintained and revitalized.
- Quality, affordable child care should be available to workers with children in the Northeast Kingdom.

ECONOMIC DEVELOPMENT STRATEGIES

- Provide technical assistance for new and expanding businesses, and recruit new businesses.
- Market the resources of NVDA.

- Assist existing manufacturing companies to grow by identifying new markets, products, and technology.
- Assess opportunities for coordination of economic development organizations.
- Provide greater access to revolving loan funds.
- Develop an annual forum for regional partners to participate in the economic development strategy for the Northeast Kingdom.
- Develop and implement a comprehensive workforce development strategy for the region.
- Develop and implement strategies to revitalize distressed areas and specific employment sectors within the Northeast Kingdom.
- When possible, provide grant and technical assistance and project management to towns, organizations, and businesses throughout the Northeast Kingdom.
- Assist local planning commissions and development organizations in the Northeast Kingdom with economic development planning.
- Host economic development planning seminars in cooperation with SBDC and USDA Rural Development and other partners.
- Host business financing panels or workshops so that businesses are aware of capital resources available.
- Support and promote the specialty food industry.
- Index and promote the traditional foods products of Vermont's small family farmers.
- Plan for and support the development and maintenance of local physical infrastructure projects such as water, sewer, industrial sites, and transportation projects.
- Consider administering public works grants for towns in the region that lack professional capacity.
- Encourage entrepreneurialism and engage new startups with proven business strategies and tools.
- Identify, prioritize and implement Brownfield mitigation projects within the region.
- Develop a region-wide plan for water and sewer facilities.
- Support telecommunications infrastructure and knowledge capabilities by creating effective partnerships, and by advocating for increased infrastructure.
- Promote and advocate for economic development projects in downtown areas.
- Support Micro-enterprise programs for new business identification.
- Work through regional and community partnerships to expand training assistance and other support for childcare providers, and develop additional site-based child care centers.
- Work with local businesses, schools, and community partnerships to assess childcare needs throughout the region.

Chapter Seven: Natural Resources

I. OVERVIEW

The Northeast Kingdom is recognized for its diverse wildlife, large undeveloped areas, and vast woodlands. The region's natural resources (depicted in Figure 7.1 on the following page) provide residents and others a variety of benefits. The largest source of revenue in the region is from the harvesting, processing, and manufacturing of forest products; a wide variety of recreational activities are available in the forests and on lakes; and much of the tourism industry relies on the healthy and scenic environment to remain viable. Therefore, the natural resources in the Northeast Kingdom have intrinsic scenic and economic values that require careful consideration when making planning decisions. The overarching goal for the region is to balance local economic needs with the protection of the resources that so many of region's residents enjoy and depend upon.

The Northeast Kingdom lies mostly within three physiographic regions:

- *The Northeast Highlands*, an extension of New Hampshire's White Mountains, make up most of Essex County and northern Caledonia County. On average, this area is cooler than the rest of the state. The growing season here averages less than 90 days and snowfall accumulation frequently exceeds 36 inches.
- In much of Orleans County and parts of Caledonian County the topography is primarily *rolling hills* interspersed with occasional plains of fertile agricultural soils. Both of these physiographic regions have extensive glacial deposits.
- The third region is the *Connecticut River Valley*, which extends the length of the region along its eastern border. Level topography and rich alluvial soils well suited for agriculture characterize this physiographic region.

The forests are mainly northern hardwoods with large stands of red spruce and balsam fir. Black spruce and succession species such as white pine and aspen fill recent clearings. The region contains some of the State's largest bog and wetlands complexes, with fabulous stands of red pine, black spruce, hemlock and hardwoods dispersed throughout. Essex County has more wetlands than any other county in Vermont.

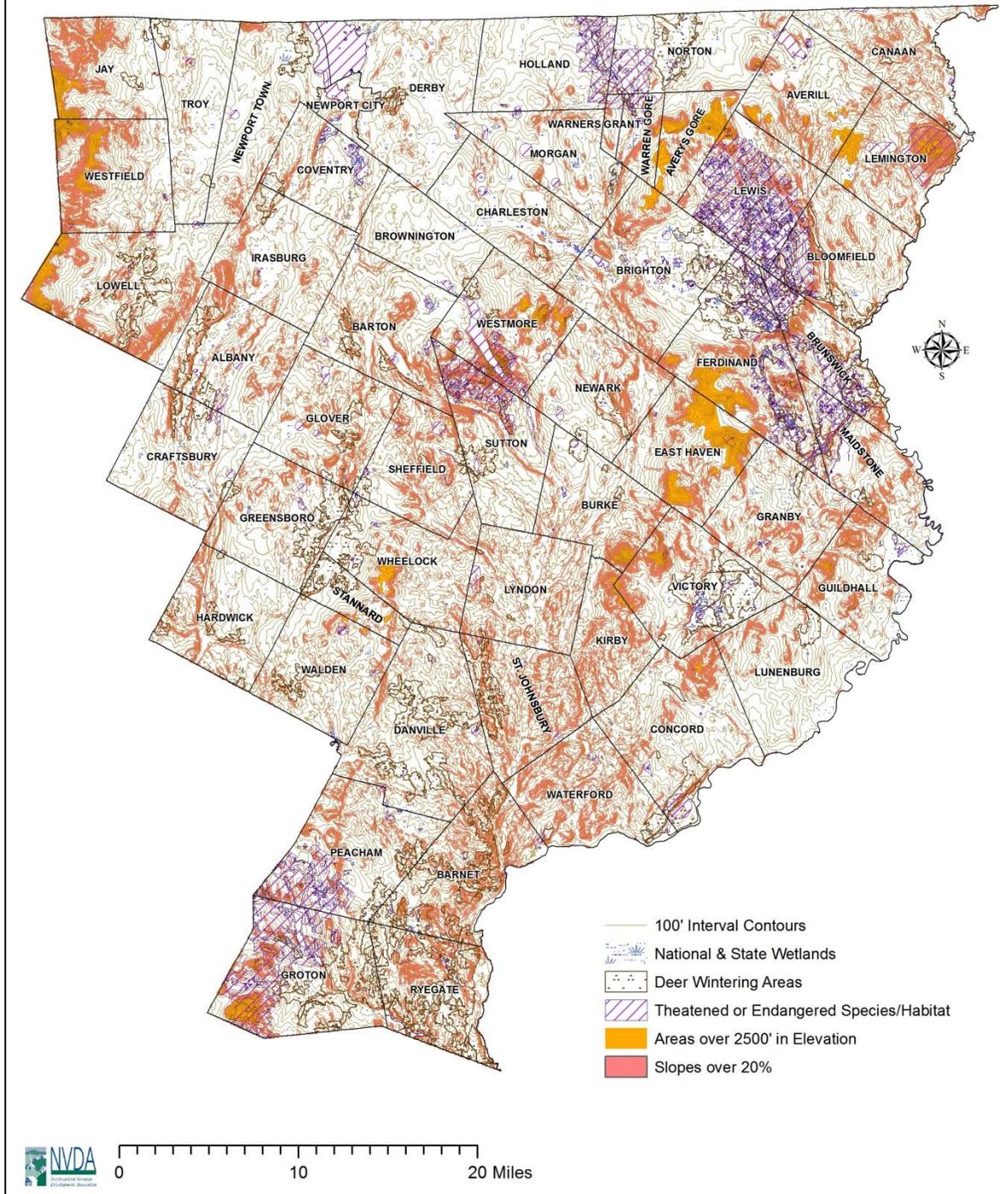
The majority of the region's water drains either north to Quebec as part of the St. Francois River watershed or east and south as part of the Connecticut River watershed. Much of the region's western edge drains north and west as part of the vast Lake Champlain basin. The region's lakes and rivers are famous for the excellent and diverse fishing opportunities they offer. The more than 130 lakes and ponds found concentrated in the region represent a disproportionately high share of the State's total. This region is home to most of Vermont's larger, deeper lakes and the legendary 20-30 pound trout that have inhabited them since the last ice age.

This combination of forest and water resources creates prime habitat for many wildlife species, and draws many to the Northeast Kingdom.

NVDA Region: Natural Resources

Figure 7.1

June 2015



II. WATER RESOURCES

Water Quality

According to the Water Quality Division of the Department of Environmental Conservation, the water quality of all rivers, streams, lakes, and ponds in Vermont is considered good. When mercury contamination in fish is added to the equation, the rating is fair. No comprehensive studies have been completed on the quality of Vermont's groundwater, yet based on the small number of public water supplies throughout the state that have detected any contamination, the Water Quality Department describes Vermont's groundwater as "excellent."

Vermont's classification system for surface water establishes management goals and practical uses. The Water Resources Board classifies all surface waters in Vermont as either Class A or Class B. The October 30, 2014 Water Quality Standards recognize two categories of Class A waters. Class A(1) waters are ecological waters, which are managed to maintain waters in a natural condition. All of the waters above 2,500 feet in elevation are classified A(1). Class A(2) waters are managed as public water supplies and therefore allow moderate water level fluctuation. Class B waters are designated as being either Water Management Type 1, 2, or 3 depending upon their protection and management. An overlay of both Class A and Class B waters is an Outstanding Resource Water (ORW). These waters are designated by the Water Resources Board as having exceptional natural, recreational, cultural, or scenic value. Most waters in the Northeast Kingdom, like in the rest of Vermont, are Class B, which is consistent with State policy to achieve and maintain Class B waters with suitability for swimming, boating, and drinking with treatment as well as for irrigation and livestock watering.

The Water Quality Division maintains a river and lake assessment database listing impaired surface waters. This database is updated every two years with the most recent information and data from a variety of sources. Table 7.1 displays the impaired lakes and rivers within the Northeast Kingdom from this database. Threats listed are addressed at the local, regional, state or federal levels. For instance, agricultural runoff is a local and regional issue, whereas sewage overflows and mercury issues should be addressed across the entire range of management levels.

Water Body	Threat or Impairment
Burgess Brook	Sediment: Asbestos mine tailings erosion/ asbestos fibers
Coburn Brook -- Newport	Agricultural activity and runoff
Mud Creek, from Vt./Que border	Agricultural runoff/nutrients enrichment
Passumpsic River Tremont St. Downstream – 5 miles through St. Johnsbury	E Coli: St. Johnsbury WWTF passes combined sewer overflows
Lower Sleepers River – St. Johnsbury	E Coli: St. Johnsbury WWTF passes combined sewer overflows
Lake Memphremagog – Newport	Phosphorous: Excessive algae growth; nutrient enrichment
Stearns Brook & Tributary – Holland	Nutrients: Agricultural runoff
Source: State of Vermont 303(d) List of Impaired Waters, September 2014	

Watersheds

A watershed is a geographic area in which all water flows into a single river. Boundaries of watersheds are therefore the highest points of elevation surrounding the water body. Watersheds can be small and localized, or large enough to incorporate many drainage areas flowing into a vast water body. Vermont is divided into 17 major watersheds. The three counties of our region contain waters that flow within the St. Francois or

Lake Memphremagog; Passumpsic; Upper Connecticut; Lamoille; Missisquoi; Stevens, Wells, Waits, Ompompanoosuc or “Basin 14”; and Winooski watersheds.

The Agency of Natural Resources has a watershed basin planning process for all 17 major watersheds. Basin Plans pertaining to the Northeast Kingdom are addressed in the Flood Resilience Chapter of this plan. In 2015, Vermont statute was amended to add specific language to statewide planning goals pertaining to the policies and actions contained in the basin plans. Since municipal plans must be deemed consistent with statewide planning goals (in 24 V.S.A. 4302), NVDA staff will work closely with its member municipalities to ensure that duly adopted plans further the relevant policies and actions of their respective basin plans.

Joint working groups were formed to address agricultural issues and lake/river water quality monitoring and objectives. The Lake Memphremagog Quebec/Vermont Working Group, established by the governments of Quebec and Vermont in 1989, completed their *Final Report on Managing Lake Memphremagog and its Environment* in 1993. Recommendations were made to reduce point and non-point sources of pollution, and a Vermont Memphremagog Steering Committee was formed in the spring of 1995 to work with its Quebec counterpart to implement priority recommendations.

The Connecticut River Joint Commissions were established by the legislatures of New Hampshire and Vermont and directed to serve in an advisory capacity, promoting public involvement in decisions affecting the Connecticut River and its watershed. Five local river subcommittees operate along the river in Vermont and New Hampshire. The two subcommittees in our region are the Headwaters and the Riverbend. The Connecticut River Watershed Council is another citizen-based advocate for the environmental well-being of the Connecticut River. This Council, founded in 1952, includes representatives from the four states where the river flows: Vermont, New Hampshire, Massachusetts and Connecticut. This organization conducts research, produces publications, awards small project grants, and initiates programs to generate local activism in the River watershed.

There are also several local Lake Associations involved in watershed activities throughout our region. One example is the Lake Parker Association in West Glover, which has done work with watershed assessment, road erosion control, shoreland vegetation enhancement, lay monitoring and invasive aquatic species prevention. These lake associations have created a network for local citizens to help restore the health of their water systems.

NVDA Region: Watersheds

Figure 7.2

July 2015

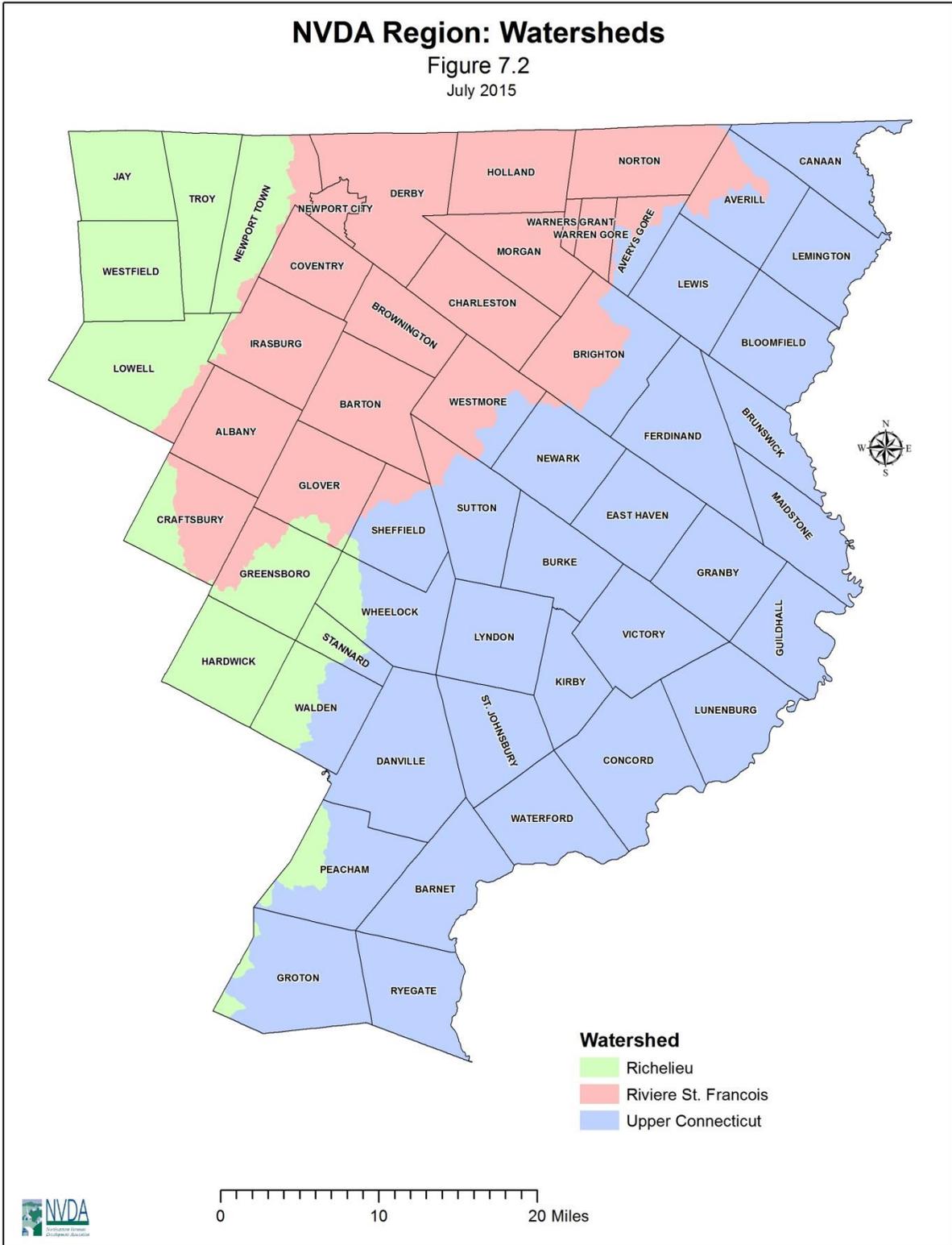


Table 7.2: Local Lake Associations		
Local Associations Involved in Watershed Activities:	Programs Conducted by Local Lake Associations:	
Lake Memphremagog Watershed	<input type="checkbox"/> Bacteria Monitoring <input type="checkbox"/> Exotic Species Spread Prevention <input type="checkbox"/> Lake Assessment <input type="checkbox"/> Lake Protection Through Town Zoning <input type="checkbox"/> Land Conservation <input type="checkbox"/> Landowner Education <input type="checkbox"/> Lay Monitoring Program <input type="checkbox"/> Local Advocacy <input type="checkbox"/> Road Erosion Control <input type="checkbox"/> Runoff Diversion <input type="checkbox"/> Shoreland Vegetation Enhancement <input type="checkbox"/> Testing of Shoreline Septic Systems <input type="checkbox"/> Watershed Assessment	
Averill Lakes Assoc. (Great and Little Averill, Forest Lake)		
Crystal Lake Reservation Assoc.		
Daniel's Pond Assoc.		
Echo Lake Assoc.		
Elligo Lake Assoc.		
Friends of Little Hosmer		
Island Pond Assoc.		
Lake Parker Assoc.		
Memphremagog Conservation, Inc.		
Salem Lake Assoc.	<input type="checkbox"/> Watershed Management Committee	
Seymour Lake Assoc.		
Shadow Lake Assoc.		
Westmore Assoc. (Lake Willoughby, Long Pond, Bald Hill Pond)		
Lamoille River Watershed		
Greensboro Assoc. (Caspian Lake)		
Passumpsic River Watershed		Basin 14: SEWER Save Everyone's Wells River Passumpsic River Network Passumpsic Valley Land Trust CT River Watershed Advisory Commission Barton River CPP Program Lamoille River Anglers Association Missisquoi River Basin Association
Cole's Pond Assoc.		
Joe's Pond Assoc.		
Lyford Pond Assoc.		
South End Newark Pond Assoc.		
Stevens River Watershed		
Harvey's Lake Assoc.		
Upper Connecticut River Watershed		
Maidstone Lake Assoc.		
Miles Pond Assoc.		
Neal Pond Assoc.		
Source: VT Agency of Natural Resources, Water Quality Division, Pamphlet: "Watershed and Lake Associations of Vermont", October 2003		

Surface Waters

The Northeast Kingdom has the largest amount of surface water of any region in Vermont, excluding Lake Champlain. The region is famous for its pristine trout and salmon lakes. Lakes such as Willoughby, Seymour, and Caspian offer high quality trout fishing, while Lake Memphremagog and the Moore Reservoir are known for small-mouth bass. The Clyde, Black, Barton and Willoughby Rivers, primary tributaries to Lake Memphremagog, draw anglers from all over the Northeast for the large leaping rainbow trout and landlocked Atlantic salmon that migrate upstream from the big lake. Efforts to restore Atlantic salmon are taking place in the upper Connecticut River basin waters, such as the Passumpsic, Moose, Stevens and Wells Rivers. The region's lakes and rivers serve as significant sources of recreation for residents and visitors, as well as being the source of drinking water for some communities.

Ground Water

Ground water is a critical resource for the rural areas of Vermont. Approximately 60 percent of Vermont's citizens depend upon ground water for drinking and general uses. According to the state Water Quality Division, in many rural communities nearly 100 percent of the public and private drinking water sources are from ground water. Ground water occurs in two general hydrogeologic settings, bedrock and unconsolidated aquifers. Igneous and metamorphic crystalline bedrock along with carbonate bedrock form the bedrock

aquifers within the state. Unconsolidated deposits are comprised of glacial till, which is basically sand and gravel.

As ground water moves through these materials, the organic and mineral substances that are dissolved or picked up dictate the quality of water. These water sources often tend to be better quality than surface water because of the leaching process. However, toxic substances can stay with ground water for very long distances. Although groundwater quality is generally good, the resource is nonetheless fragile. Contaminated wells destroy property value. The cost of developing and installing new groundwater sources for public water supply is estimated between \$500,000 and \$1,000,000 (Water Quality Division, 2000). This cost is prohibitive for many towns in the Northeast Kingdom, making prevention and education critical management tools. One way to avoid costly groundwater contamination cleanup is to begin a Well Head Protection Program (WHPP). This is addressed in the Water Supply section of the Utilities and Facilities chapter of this document.

Wetlands

Vermont's wetlands are defined as those areas of the state that are inundated by surface or ground water with a frequency sufficient to support plants and animals that depend on saturated or seasonally saturated soil conditions for growth and reproduction. These areas are commonly known as ponds, bogs, fens, marshes, wet meadows, shrub swamps, and wooded swamps. Wetlands often occur in association with lakes, ponds, rivers, and streams, creating transitional areas between dry land and open water. However, wetlands can also be isolated from any obvious connection to surface water. In order to be classified as a wetland under Vermont law, an area must have wetland soils and wetland plants, in addition to at least seasonal water. Wetland soils are often anaerobic and the plants have adapted to growing in such waterlogged conditions.

Every town in the region contains wetlands that have been designated by the state as significant. The Vermont Wetland Rules classify all wetlands into one of three classes. Classes One and Two are considered "significant" and protected under the Vermont Wetland Rules. All three wetland types are protected by Vermont's Act 250. The online Vermont Natural Resources Atlas contains an atlas layer that depicts the three classes of wetlands designated by the State. The information is found on the Watershed Protection layer of the Atlas, under the sublayer "Outstanding Water Resources" and "Wetlands." The Vermont Natural Resources can be viewed here: <http://anrmaps.vermont.gov/websites/anra/>

Wetlands provide important ecological functions, including flood and erosion control, and providing habitat for fish and wildlife. They aid in the maintenance of water supplies by trapping nutrients and sediments and recharging groundwater, and they provide recreational and educational opportunities.

Wetlands were once considered wastelands and were thought to be "improved" by draining and filling. As a result, nearly half of Vermont's original wetland resources have been lost, and hundreds of acres are lost annually. Human activities and development continue to encroach upon this finite resource. Agriculture and forestry activities as well as residential, commercial and industrial development all result in wetland alteration. Replacing new wetlands is costly and often impractical, so wetlands preservation is important.

Floodplains

Floodplain maps identify flood hazard areas, defined as those areas that are inundated by the waters of the 100-year flood. Limiting extensive development in flood-prone areas is the best way to prevent flood damage while allowing the floodplain to function as it should. Overdevelopment in flood hazard areas increases risks to human life, property damage, and leads to habitat loss for wildlife species. Preventative measures, such as flood hazard regulations, can reduce these risks. Flood hazard regulations enable property owners to obtain both flood insurance and mortgage loans for property in flood hazard areas. Overdevelopment in floodplains can lead to an increase in intensity and frequency of flooding. This is especially true in areas that are losing wetlands due to development. Wetlands act like sponges-soaking up excess water-and when these are filled in or altered, there is an increased potential for flooding along other parts of the stream banks.

Prevention is the best strategy for reducing environmental and human impacts from flooding. Preventative strategies include various planning and zoning tools, open space preservation, and watershed management.

Pollution

The Connecticut River Joint Commissions' *The Watershed Guide* indicates that most aquifer contamination comes from “non-point” sources. This means that contaminants can come from drainage areas some distance away from the point of contamination. Contamination sources include “point” sources such as leaking gasoline storage tanks, failing septic systems, salt storage piles, landfills, storage tanks, or “non-point” sources such as urban and agricultural runoff, and mining operations. Cleanup of bedrock aquifers is costly and often ineffective.

Many farmers use Best Management Practices (BMPs) to reduce the amount of pollution entering waterways. Millions of dollars in state funds have been committed to help farms implement Best Management Practices. These practices are also useful for landowners and towns to avoid polluting waterways. There are BMPs for timber harvesting, construction and development, septic system care, road construction, road salting and dumping, golf courses, site excavation, sand and gravel operations, urban runoff, chemical and petroleum products, land application of bio-solids, and docks, moorings, and marinas. Education and voluntary compliance are essential to mitigating the production of non-point source pollution.

Erosion and Sedimentation

Erosion and discharge of sediment into rivers, lakes, and streams can cause significant damage to aquatic communities. Sediments suspended in the water or deposited on bottoms can adversely affect the growth, feeding, and reproduction of many organisms. Other impacts include loss of topsoil, contamination of water by heavy metals, increased flooding potentials and high municipal costs for ditch, culvert, and drain cleanup. The rate of erosion is influenced by the type of soil, vegetative cover, topography, and climate.

Vermont's extensive networks of dirt roads are a major cause of erosion and sedimentation when improperly built and maintained. It is important that the state, towns, and landowners cooperate in efforts to maintain these roads with better practices to protect water quality and save funds over the long term. The Better Backroads Program, established by the Agency of Natural Resources, is a popular program for education on appropriate road maintenance.

Failing Septic Systems

Failing septic systems can be a major source of pollution. Septic systems fail due to inadequate soils, poor design or construction, inadequate maintenance, or increased use from seasonal to year-round use. Failing septic systems can result in either effluent surfacing on the ground or contamination of ground water. Both situations contaminate water supplies and are hazardous to human health.

Water Quality

As development around the region's lakes has increased, so has the use of these lakes and the amount of pollution entering the water. A lake can naturally treat a certain amount of pollution but if the amount surpasses the lake's natural ability to treat the waste, it starts to accumulate in the sediments and water column. The Northeast Kingdom's lakes are cold water lakes which have a much harder time breaking down pollutants. Once a particular concentration of nutrient pollution is reached, there may be a decrease in the amount of oxygen available for fish along with an increase in lake temperatures. Sediment build-up and algae growth are natural processes in the life cycle of a lake. However, when phosphorous and sediments enter a lake through erosion, agricultural run-off, or failed septic systems, this process is accelerated dramatically, hastening the lake's decline.

A decline in water quality may affect the real estate value of lakefront properties. Vermont has no statewide shoreline zoning laws, and much of the shoreline development currently taking place receives little or no review. Water quality protection is dependent on municipalities enacting and enforcing good resource protection measures.

III. MINERAL RESOURCES

Soils

In general, soils can be classified as clay, silt or sand. Combinations of one or more of these can create many variations of soil. Soil is influenced by the organic matter that is deposited on the surface and by the organisms that exist within it, in combination with parent materials. Within soils, organisms and fungi provide food for animals and create organic matter for more efficient vegetative production. This vegetative layer, in turn, helps to purify surface water.

The availability of soils suitable for cultivation plays a crucial role in agricultural productivity. Out of the 257,000 acres of potentially primary agricultural soils in the Northeast Kingdom, 133,565 acres were in production in 1992 as compared to 142,832 acres in 1987. It should be noted that less than 8% of these acres are found in Essex County, where most of the terrain and soil composition is better suited for the forestry industry. Despite this fact, there are still important agricultural soils in Essex County along the Connecticut River.

Sand and Gravel

The primary sources of sand and gravel follow streams and waterways or are adjacent to water bodies. During the ice age streams tunneled through ice sheets. These streams allowed deposits of sand and gravel and other debris to build up, creating deposits called eskers. Water flow is easier through these deposits, forming rivers and streams. The Passumpsic River in Caledonia County is one of the largest, continuous eskers in the region, approximately 24 miles in length. Clear, clay-free materials of eskers are excellent for concrete and asphalt aggregates, roadbeds and other construction uses.

Sand and gravel deposition also happened when large glacial ice remnants melted. Much of the remaining sand and gravel was deposited in the valleys along waterways. One of the largest areas of sand and gravel deposits in the region extends from west of Island Pond to the eastern border of the Nulhegan Basin.

Sand and gravel deposits often serve as important areas for groundwater aquifer recharge and filtration. Disturbance of these areas can result in a reduction of their natural ability to retain and filter groundwater. As minerals are extracted, deposits become shallower and less able to filter contaminants from the water. Because of these infiltration concerns, the distances from gravel pits to surface and ground water supplies should be examined.

The prospects for sand and gravel extraction are difficult to measure. While the 1990 Census identified only three sources of sand and gravel extraction activity, the District 7 Act 250 Office has issued over 50 permits in the Northeast Kingdom counties for extraction of sand and gravel. In addition to these, there are small pits like many town sources for local road maintenance not subject to Act 250 standards. The contribution of mineral extraction to the local economy is difficult to ascertain because most extraction is done as part of some other business or is additional income for entrepreneurs. There are active granite quarries in Sheffield, Ryegate and South Ryegate.

Earth resources such as sand and gravel are commonly utilized by local and state road departments, railroads, and commercial paving operations. Other mineral resources like granite, talc, and soapstone have been important for communities in the past, and along with other mineral resources may become useful again. From a regional perspective, it is good to have mineral resources available locally as transportation costs are reduced and the extraction process may create local employment. For local planning efforts, NVDA encourages towns to identify important mineral resource deposits and develop policies that would minimize potential conflicts between land uses should the extraction of sand, gravel, or other mineral resources become feasible. A site reclamation or rehabilitation plan shall be developed for any earth extraction activity

that requires an Act 250 permit or meets the definition of “substantial regional impact” as defined in this plan.

As mineral resource extractions and their transport have the potential to be damaging to the environment and public infrastructure if carried out improperly, NVDA recommends that mitigation policies consider negative impacts such as:

1. Excessive dust and noise which may result in unreasonable nuisance to neighboring properties and create air quality issues,
2. Improper site management which may lead to excessive soil erosion, soil compaction, water quality impacts, or inadequate site restoration,
3. Site degradation which may result in aesthetically unpleasing conditions in the immediate vicinity of the project and/or the community, and
4. Deterioration of town and state highways or other public infrastructure due to frequent truck traffic.

Many local zoning bylaws contain special provisions designed to minimize the environmental impacts of earth resources extraction, and to assure reclamation or restoration of the site once work is completed. This is desirable. However, there are large sand and gravel pits and former mined sites that pre-date local and state regulations that require rehabilitation. Towns should consider connecting the owners of these pits and the Natural Resource Conservation Service (or other state agencies or organizations) to develop reclamation or rehabilitation plans that will stabilize the sites and minimize impacts. Towns should also identify and consider possible new uses for these old sites in their local plans. Solar facilities and outdoor recreational uses have taken advantage of former pit sites in some communities.

Soil Compaction

Compacted soil, which occurs naturally, as well as through land development and industrial processes, makes it more difficult for water to be absorbed. This creates two changes to the soil formation process. First, water cannot flow through the soils in order to leach contaminated particles. Second, it creates erosion and carries away soil. As discussed under water resources, erosion contributes to flooding, removal of productive topsoil, distribution of chemicals on the soil, and sedimentation of surface water.

IV. AIR QUALITY

The air we breathe is less tangible than other resources, but equally important. Air quality is adversely affected by industrial, residential, and transportation emissions. The cyclical patterns of air are intricately connected with all other biological systems where change in one affects the others. Although the Northeast Kingdom is the antithesis of cityscapes where industrial pollution may be visible on a daily basis, there are still sources of air pollution that persist.

Industrial Emissions

Toxins such as sulfur dioxide and nitrogen oxide, emitted into the atmosphere when fossil fuels are burned, contribute to the acidification of our surface waters. The sulfates and nitrates remain in the atmosphere until rain transports them to the earth's surface where they increase the acidity of the soil and water. A study conducted for the Vermont Department of Environmental Conservation's Air Pollution Control Division concluded that 99.9 percent of the pollutants responsible for wet sulfate deposition in Vermont originate from out-of-state industrial sources.

Residential Emissions

The number one generator of air pollution in Vermont is the automobile, and its use continues to grow. Issues related to automobiles are addressed in the Transportation section of this regional plan. Household emissions include heating systems using wood and fossil fuel, and trash burning. Although municipalities no longer burn trash, there are many households that continue to burn residential wastes. The dioxins, hydrochlorides, carbon monoxide and various carcinogens released into the atmosphere pose risks to our health, the health of the surrounding ecosystems and create obnoxious odors for numerous neighbors.

Light Pollution

As development increases, outdoor lighting may become an issue for some residents. Neighbors of new developments with significant outdoor lighting can be particularly sensitive this. Directing outdoor lighting in new developments to reduce excessive light reduces complaints and allows people to enjoy the night sky.

V. WILDLIFE HABITATS

All wildlife species have three basic needs for survival: food, water and cover. The spatial relationship of these factors and their availability comprise the habitat of a given species. To promote a diversity of wildlife species, it is important to conserve various habitat types as well as critical areas that support basic needs for some species. For example, white-tailed deer live in a variety of forested and non-forested areas, but specific softwood wintering areas are critical for their survival. The deer have adapted to this habitat for their survival and without it they would not survive the harsh winters in Vermont.

Almost every kind of human development results in the loss of some wildlife habitat. Single developments, even at a large-scale, do not usually destroy a wildlife population. It is the cumulative impact of developments that gradually diminish wildlife habitats. It is difficult to plan for the protection of wildlife habitat because their ranges tend to cross human defined political boundaries. This may require municipalities to work together on habitat protection issues.

The region's large tracts of undeveloped land provide excellent habitat for a variety of species. Both residents and visitors enjoy the variety of wildlife present. A 1996 survey by the Vermont Department of Fish and Wildlife revealed that 242,000 Vermont residents 16 years and older engaged in fishing, hunting, or wildlife-watching activities. In the same year, both resident and nonresidents spent \$341 million on wildlife-associated recreation in Vermont. This is a significant portion of our economic base and warrants attention.

Deer Wintering Areas

One of the most prized game species; the Northern White-tailed deer is very adaptable and thrives in this area due to the diversity of landscapes. The home range of white-tailed deer includes many habitats such as edges between fields and forests, wetlands, and broadleaf and needle-leaf forests. During the winter, it is critical for deer to stay in forested areas sheltered by needle-leaf softwoods such as balsam fir, cedar, spruce and white pine. These evergreens intercept the snow and create a refuge for the deer. Such a canopy offers thermal protection and greater mobility on the ground in deep winter. Although these "wintering areas" may only be a fraction (10%) of their yearly range, they are the single most important factor in determining the carrying capacity of the land. Without such habitat, the deer population would virtually die off.

Black Bear Habitat

Unlike deer wintering habitat, the Department of Fish and Wildlife has not completely mapped the critical black bear habitat in Vermont. Bear require large uninterrupted tracts of forestland that often contain American beech stands, wetlands and high elevations. In other areas, black bear populations have dwindled due to habitat loss resulting from highway and urban development. Unlike the wild turkey, black bear in Vermont were able to escape to high elevations during the 1800s when forested land was scarce. Habitat

changes returned the black bear population, some say, to where it was before European settlers arrived. The black bear population in Vermont is now estimated at 3000. Public support, increased awareness of construction impacts on habitat, and private responsibility are necessary to protect the remote and extensive forestland necessary for the bear's survival.

River and Riparian Habitat

Vermont's river corridors provide critical habitat for endangered or threatened plants and animals. Along the rivers of the state, there are 27 species included on the Federal Endangered Species List. River and riparian habitats serve important functions for many plants and animals.

A riparian buffer is a unique ecosystem. It provides food and shelter for everything from caddis flies to brook trout to food for mammals and birds such as the river otter and kingfisher. The mink, bald eagle, Louisiana water thrush, dusky salamander, black bear and wood turtle all require streamside woods. These areas provide vital food supplies and safe corridors for game species as well. Much of the river's natural riparian forest in Vermont is gone, removed for farming, development, or landowner access to the river.

Maintaining and repairing riparian buffers is inexpensive and can provide many economic benefits. A municipality will spend more money on bank stabilization, stormwater control and water quality improvements than it would by leaving or replanting riparian vegetation. Riparian buffers, which can eliminate the need for costly riprap, are an effective tool to avoid the costs of bridge collapse, and washed out roads. Farmers sometimes lose land when they clear riparian vegetation to grow crops because unstable banks can create a situation during floods when the river jumps its channel and cuts a new one into the cropland.

Travel Corridors and Contiguous Forestland

Many species, such as bobcat and black bear, use different areas dependent upon the season and they need ways to travel between habitats. Wildlife corridors enable their movement and hence their survival. Black bear require contiguous remote forestlands to survive. Black bear and bobcat are also considered "umbrella" species. This means that if migration corridors are effectively maintained to support these species, many other species with smaller home ranges will also benefit.

The division of habitat into smaller and smaller areas due to human settlement is termed "fragmentation." The transformation results in the direct loss of important habitat by the creation of gaps or barriers between isolated habitat blocks, rendering the habitat unusable for some animal species. The smaller the habitat block, the fewer the number of species can survive there and the less species diversity. Many species of wildlife rely on natural connections (corridors) between habitats to allow safe access within their habitat range.

Threatened and Endangered Species

The Endangered Species Listing by the U.S. Fish and Wildlife Service shows that there are six animal species and two plant species in our region whose survival is in question. Threatened species include the Bald Eagle, Canada Lynx, and Puritan Tiger Beetle. Endangered species include the Indiana Bat, Eastern Puma, Dwarf Wedge Mussel, Jesup's Milk-Vetch and the Northeastern Bulrush.

Often the preservation of these threatened and endangered species has more to do with habitat protection than any other factor. A species is considered endangered if it normally occurs in the state, and its continued existence appears to be in jeopardy. A species is threatened if its numbers are significantly declining due to loss of habitat or human disturbance. Habitat loss and degradation is the principle cause of the decline in biological diversity and is the number one factor relating to species endangerment. Human development is the primary cause of habitat loss and degradation.

Non-native Invasive Species

Many non-native species introduced to this region intentionally or otherwise are creating significant problems in both terrestrial and aquatic ecosystems. Because they have been imported here from outside the region, there are no natural predators to control the spread of these non-native species. They often take over an area by out-competing the existing flora or fauna, choking out native species.

Purple Loosestrife and Eurasian Water milfoil are two invasive aquatic plants that currently infest a number of lakes and wetlands in our region. Purple Loosestrife is a wetland perennial that has infested thousands of acres in Vermont and can be found in almost every town in our region. It chokes out the native vegetation and can decrease the food and shelter for native wildlife species. Eurasian Water milfoil has also taken hold in several lakes of our region, including Brownington and Clyde Ponds and Lakes Elligo, Salem, Crystal, Willoughby, and Memphremagog. This freshwater seaweed creates a dense, impenetrable canopy of stems and leaves that consumes large quantities of oxygen, suffocating fish and other creatures. Preventing its expansion to other water bodies through education and controlling it within each lake's boundaries is currently the most effective way to manage it.

Open Space

The Northeast Kingdom is composed of rolling hills, farmlands, lakes and rivers, forests, country roads, and compact village centers. These areas combined create an open, picturesque landscape unlike any other. Open space provides not only scenic beauty and wildlife habitat, but is necessary for the numerous outdoor activities enjoyed by the region's residents and visitors, and is key to the agricultural and forestry traditions of the region. The region contains more than 1,300,000 acres of land. Almost 200,000 acres are either publicly owned or have public recreation/access easements. Many recreational activities rely on private landowners allowing access to their properties, so it is the responsibility of users to respect the landowner and their land. Vermont landowner liability law (12 V.S.A. 5793) maintains "an owner shall not be liable for property damage or personal injury sustained by a person who, without consideration, enters or goes upon the owner's land for a recreational use unless the damage or injury is the result of the willful or wanton misconduct of the owner." Still, according to the Vermont Department of Forests, Parks & Recreation, posting of private land in the state doubled in the last decade from approximately 100,000 acres in 1988 to approximately 250,000 acres in 1997.

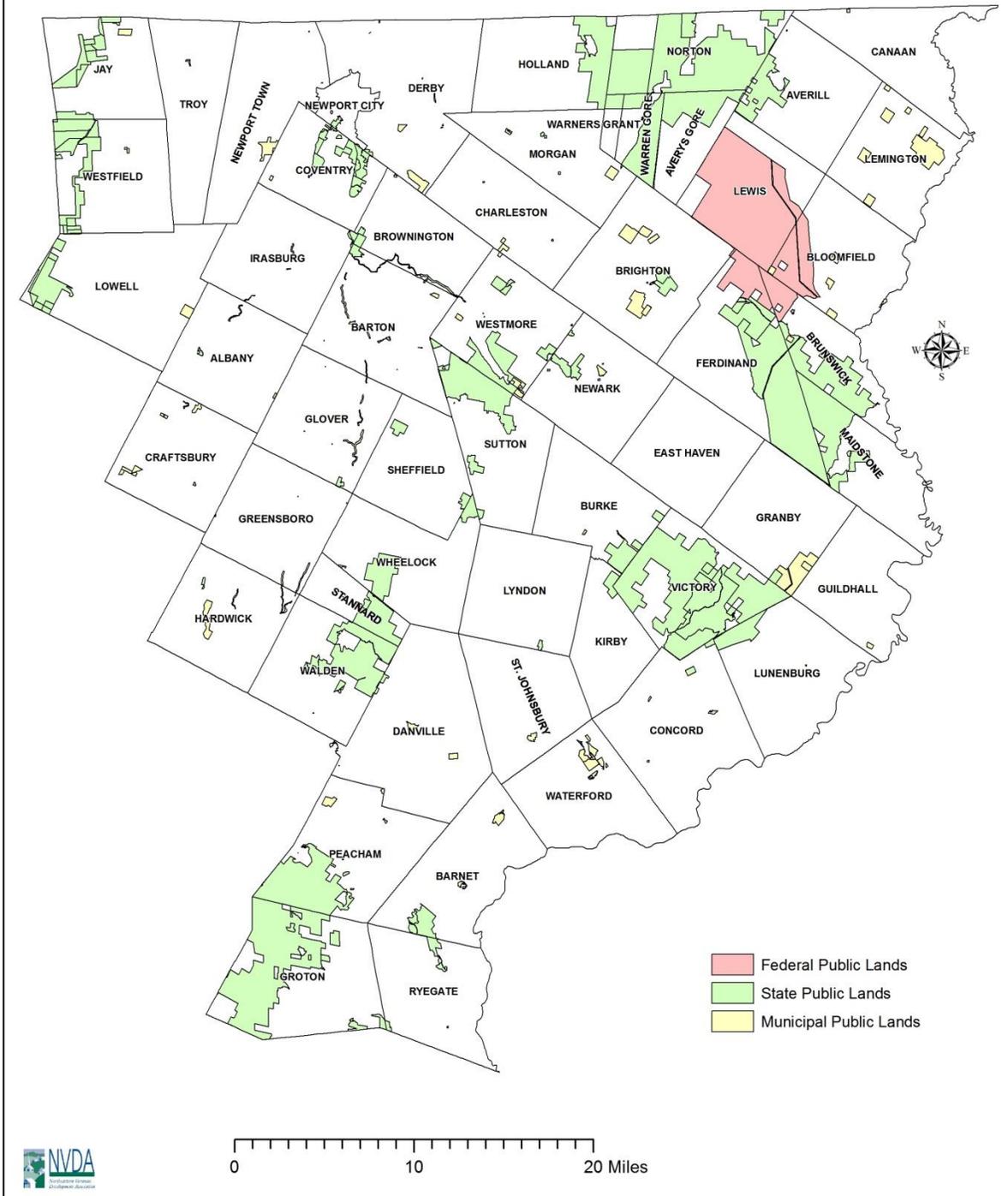
Public Lands

The region contains many conserved public lands. Recently, more than 132,000 acres of remote forestland, primarily in Essex County, was conserved by Vermont's largest land conservation project. Of this, 84,000 acres was resold to Essex Timber Co. LLC, with easements to ensure that these lands are conserved as a working forest for the sustainable production of wood products as well as to maintain public access. In the same transaction, U.S. Fish and Wildlife Service formed the Silvio O. Conte National Wildlife Refuge in the towns of Lewis, Ferdinand, Bloomfield and Brunswick totaling nearly 28,000 acres. The 23,000 acre West Mountain Wildlife Management Area was created in this land transfer, as well. The goals of this purchase were to protect public access to the land; conserve and protect biological diversity, wildlife habitat and natural communities; and conduct sustainable management and utilization of forest products.

NVDA Region: Public Lands

Figure 7.3

June 2015



Prior to this extensive investment, in 1997 the State of Vermont purchased easements on 31,450 acres in another major land deal with the former John Hancock Insurance properties creating Legacy Forests. While

the easements limit future subdivision, they protect public access and recreation opportunities. These new lands and previously state owned lands provide the Northeast Kingdom with some of the finest, most remote, and diverse outdoor recreation opportunities in New England.

Town	Parcel Name	Acres
Averill	Averill Mountain WMA	510
Newark	Bald Hill Wildlife Management Area	932
Troy	Big Falls SP	16
Holland	Bill Sladyk WMA	9,496
Norton	Black Turn Brook SF	593
Brighton	Brighton SP	152
Sutton	Calendar Brook WMA	340
Barton	Crystal Lake SP	16
Burke	Darling State Park	1,997
Groton, Peacham	Groton SF	23,706
Burke	Hazens Notch SP	307
Sheffield	Holbrook SP	202
Jay	Jay SF	3,877
Peacham	Levi Pond WMA	260
Jay	Long Trail SF	2,774
Lyndon	Lyndon State Forest	72
Maidstone	Maidstone SF	475
Wheelock, Sheffield	Mathewson SF	795
Ryegate, Barnet	Roy Mountain WMA	1,590
Westmore	Sentinel Rock SP	330
Irasburg	South Bay WMA	1,515
Walden, Stannard, Wheelock	Steam Mill Brook	10,421
Victory	Victory Basin WMA	4,970
Victory, Lunenburg	Victory SF	15,997
Barton	Wenlock WMA	1,994
Brunswick, Ferdinand, Maidstone	West Mountain WMA	22,738
Barton	Willoughby Falls WMA	130
Westmore, Sutton	Willoughby SF	7,300
Source: NVDA, 2002		

GOALS AND STRATEGIES FOR NATURAL RESOURCES

NATURAL RESOURCE GOALS

- The overarching goal for the region is to balance local economic needs with the protection of the natural resource that so many of the region’s residents enjoy and depend upon.
- The quality and quantity of the region’s surface waters should be protected, maintained, and restored.
- The quality and quantity of existing and potential groundwater resources should be protected and improved.
- Significant wetlands within the region should be protected.

- The region's mineral and soil resources should be used in a manner that will support the sustainable growth and development of the region.
- A consistently high level of air quality should be maintained for the health, safety, and enjoyment of the region's residents and visitors.
- Adequate resource information for the region should be maintained to improve the region's ability to plan for protection of wildlife resources in the area.
- Critical wildlife habitat should be protected.
- The native biodiversity of the region should be maintained, and restored when appropriate.
- Private, public and community interests should be considered in matters affecting local recreation and open space.

NATURAL RESOURCE STRATEGIES

- Provide public education on state and local water quality issues as they relate to local planning and development.
- Discourage inappropriate development in flood hazard areas and floodplains. Support compatible land uses in flood areas, such as agriculture and passive recreation.
- Support the efforts of watershed organizations working in the region.
- Coordinate the region's basin planning efforts with local plans and related activities.
- Encourage and assist communities to identify and protect community water supplies. Education on water conservation and resource protection should accompany these efforts.
- Prevent the degradation of significant wetlands through public education.
- Minimize the negative impacts of mineral and earth resource extraction and processing facilities.
- Support development of new markets and uses for local mineral resources. Encourage the use of locally obtained minerals for building construction and highway construction and maintenance.
- Support efforts to reduce air pollutants generated in the region from the residential, commercial, industrial, and transportation sectors.
- Support broader state and regional efforts to minimize pollutants entering the region from out of state.
- Support local and state efforts that inventory, delineate and map important habitats and wetlands.
- Support local efforts to protect critical wildlife habitat and maintain habitat connectivity.
- Assist interested towns with planning and mapping for the protection of habitats and natural resources.
- Support state and local efforts to mitigate the impacts of the non-native species through ecologically sound methods (e.g. insect control, etc.).
- Support the protection of endangered and threatened native species.
- Maintain and improve the resource stewardship in the area by supporting and advocating for recreation and environmental education opportunities.

- Support the protection and the acquisition of unique and irreplaceable recreational spaces open for the public to enjoy.
- Encourage the growth of businesses focused on recreational activities. Support ecotourism in the region that will increase visits to the region and minimize the disturbance of important habitats.

Chapter Eight: Flood Resilience

I. INTRODUCTION

This chapter of the regional plan describes the hydrological setting of the region, identifies general areas subject to flooding and fluvial erosion and factors that can exacerbate flood damage; identifies data sources that municipalities can use in the preparation of local flood resilience plans; and provides recommendations on strategies to mitigate the risks to public safety, critical infrastructure, historic structures and public investments.

In general, any new development should occur outside of identified flood hazard, and fluvial erosion hazard areas. If new development is built in such areas, it should be done in such a way as to not exacerbate flooding and fluvial erosion. In addition to avoiding development in flood hazard areas, attention should be given to the protection and restoration of floodplains and upland forested areas that attenuate and moderate flooding and fluvial erosion. Finally, emergency preparedness and response planning will save lives and promote resilience in the face of flood events.

II. EXISTING CONDITIONS:

Watershed

A watershed is a geographic area in which all water flows into a single river. There are seven large watersheds (basins) that extend across the region. The delineation of watersheds follows the topography, so does not respect political boundaries. The Northeast Kingdom region shares watersheds with counties in Vermont to the south and west, with Canada to the north and New Hampshire to the east.

The seven drainage basins in the region are: Basin 6, the Missisquoi; Basin 7, the Lamoille; Basin 8, the Winooski; Basin 14, which includes the Stevens, Wells, Waits and Ompompanoosuc subwatersheds; Basin 15, the Passumpsic; Basin 16, which includes the Upper Connecticut, Nulhagan, Willard Stream, and Paul Stream subwatersheds; and Basin 17, which includes the Lake Memphremagog, Coaticook & Tomifobia subwatersheds. (see Figure 8.1)

Topography, soils and wetlands

Topography and soils factor into how susceptible an area is to erosion hazards. Areas of steep slopes with shallow soils are susceptible to erosion, particularly if cleared of natural vegetation.

Figures 8.2 through 8.4 depict the distribution of soils classified by different degrees of erodibility throughout the region. The soil erodibility classification system was developed by the Natural Resources Conservation Service (NRCS). In general, soils with greater permeability, higher levels of organic matter and improved soil structure have a greater resistance to erosion. Soils that contain silt, very fine sand and expansive clays (having a high shrink-swell capacity) tend to have increased susceptibility to erosion.

Wetlands have the capacity to store stormwater during high runoff events. When located in a floodplain, wetlands can store flood waters that overflow riverbanks. As flood waters recede, the water is released slowly from the wetland soils. By slowing the rate that water re-enters the stream channel, wetlands can reduce the severity of downstream flooding and erosion. The Vermont Watershed Management Division reports that in watersheds where wetlands have been lost, flood peaks may increase by as much as 80 percent.

Vegetated wetlands along river and streambanks can protect against erosion caused by fast-moving waters during floods and storms. Wetland plants serve to absorb the energy of the current and bind soil and deposited sediments in their dense root systems.

Additional values of wetlands, including their role in providing plant and wildlife habitat and maintaining water quality, are discussed in the Natural Resources section of this plan.

Identified Flood Hazard Areas

In Vermont, there are two primary means of identifying areas subject to flood hazard: the areas mapped by the Federal Emergency Management Agency (FEMA) as areas of special flood hazard; and areas mapped by the State of Vermont Department of Environmental Conservation known as the State-wide River Corridors. The FEMA maps primarily identify areas of inundation (rising floodwaters), while the River Corridors identify areas subject to fluvial erosion hazards (when fast moving water in a river or stream erodes the streambank and adjacent land). The State-Wide River Corridors in Caledonia, Essex and Orleans counties are depicted on figures 8.2 through 8.4

The FEMA maps are known as the Flood Insurance Rate Maps (FIRM) because of their use in the National Flood Insurance Program (NFIP). The flood hazard and risk information presented on the FIRMs is the result of engineering studies that are approved by FEMA. The Special Flood Hazard Area shown on a FIRM is the area that has a 1-percent or greater chance of flooding in any given year; this area is also referred to as the 1-percent-annual-chance floodplain, base floodplain or the 100-year floodplain.

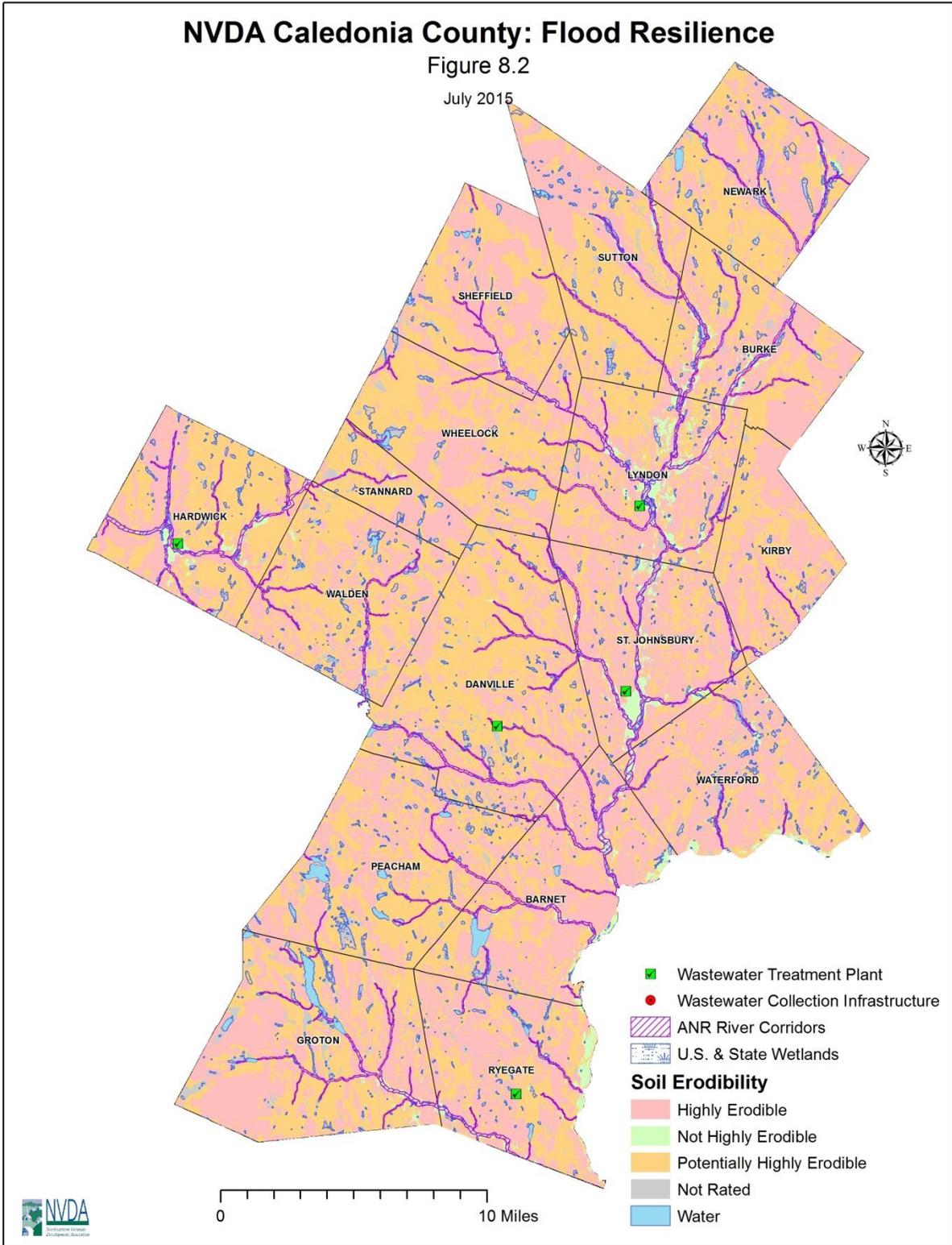
In the Northeast Kingdom region, most of the FIRM maps are over 30 years old. Only two municipalities in the region currently have up-to-date, FEMA maps: Jay and Hardwick. These digitized maps (known as D-FIRMs) have a much higher level of accuracy than the older maps because the flood hazard information is in a GIS format that can be easily integrated with other local GIS data layers. This allows more clear identification of land areas and existing development that is within the flood hazard area. Although the older FIRM maps lack this level of accuracy, they have been scanned and are available for viewing online at the FEMA map Center site: <https://msc.fema.gov/portal>.

Because of errors on the FIRMs that are due to scale or inaccuracies on the source maps, FEMA has an administrative procedure to change the designation of properties on the FIRM. These

NVDA Caledonia County: Flood Resilience

Figure 8.2

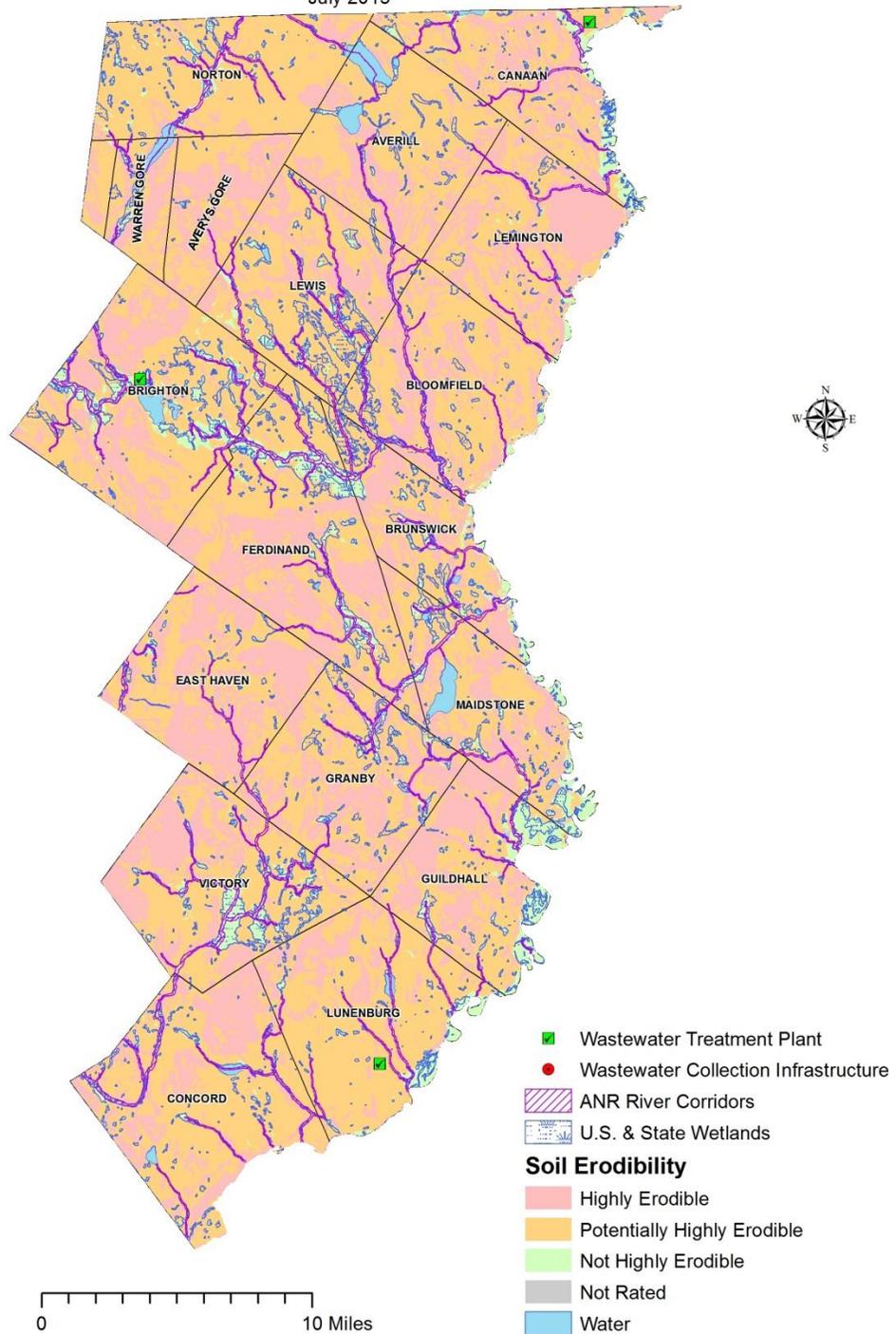
July 2015



NVDA Essex County: Flood Resilience

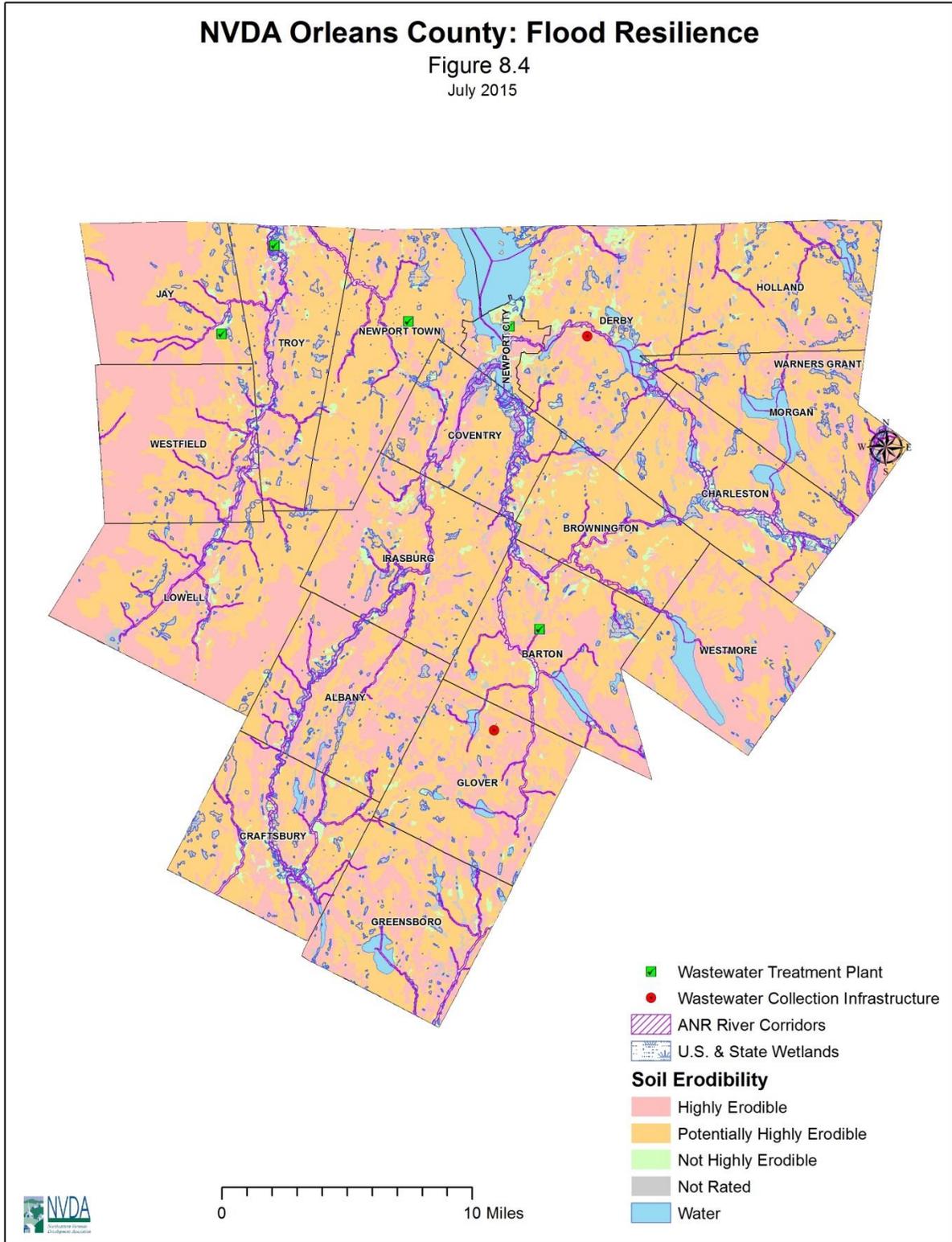
Figure 8.3

July 2015



NVDA Orleans County: Flood Resilience

Figure 8.4
July 2015



processes are referred to as the Letter of Map Amendment (LOMA) process, and the Letter of Map Revision Based on Fill (LOMR-F) process. Through these processes, an individual who owns, rents or leases property

may submit mapping and survey information to FEMA and request that FEMA issue a document that officially removes a property and/or structure from the Special Flood Hazard Area. In most cases, the applicant will need to hire a licensed land surveyor or Professional Engineer to prepare an “Elevation Certificate” for the property.

Membership in the NFIP is done at the municipal level. Membership allows residents of the town to secure flood insurance if they are within the FEMA-mapped flood hazard area, and affords residents outside the mapped flood hazard area a better rate on flood insurance. If a Town wishes to be a member of the NFIP, the town must agree to regulate the development of land within the areas of special flood hazard, as shown on the FIRM, to minimum standards established by FEMA.

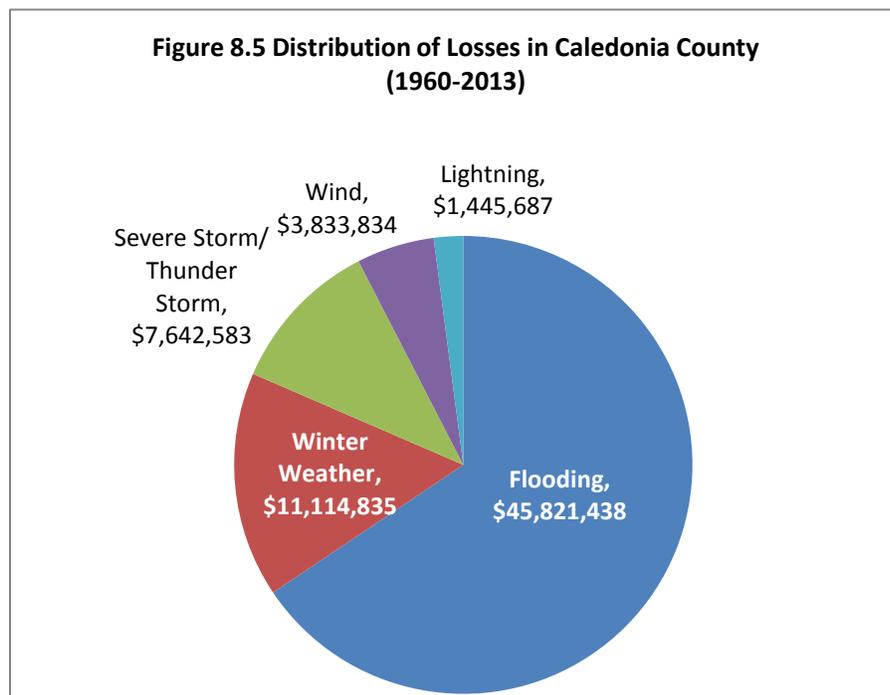
It is noted that not every town in the region has FIRMs, even if they are susceptible to flooding. This is true for some towns that have had historically low populations and structures in areas prone to flooding. However, this does not mean that those communities are not subject to flood hazards.

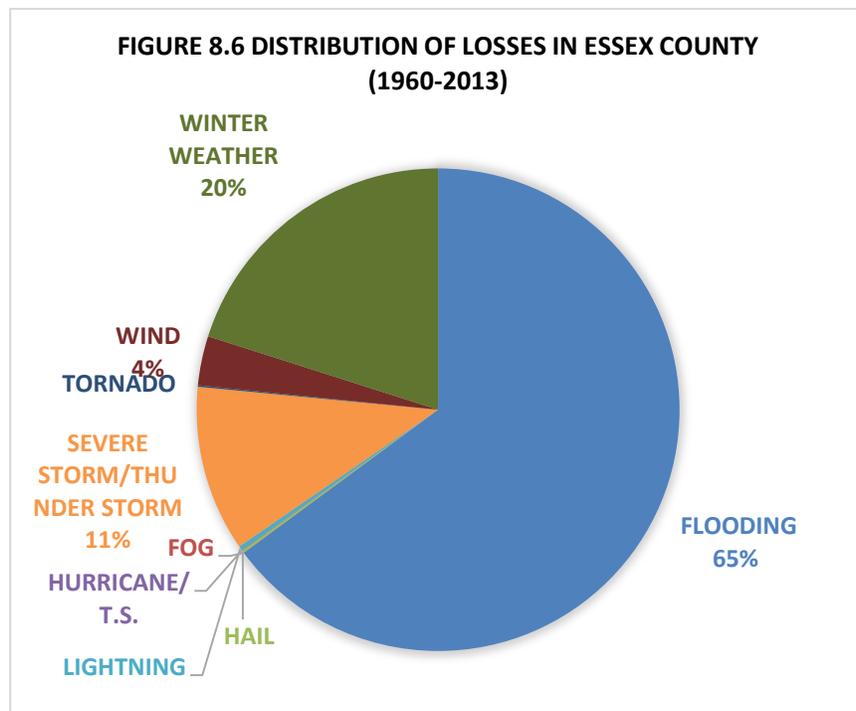
Structures in Flood Hazard Areas

For the reasons noted above, getting an accurate count of structures within the FEMA-mapped flood hazard area is difficult. Moreover, such a count does not necessarily predict the risk of flood damage within a community, since FEMA’s mapping is elevation-based and does not consider fluvial erosion factors. A structure on a highly elevated river bank could get washed away due to erosive action of the stream course,

but not be identified as at-risk under FEMA’s methodology.

For this reason, towns are advised to identify structures both in the FEMA-mapped flood hazard area and the mapped State-wide River Corridors when preparing a local flood resilience plan. Also, since the State-wide River Corridors are provided in standard GIS format, they have a much higher level of accuracy than the older FIRMS.





Trends in Flood Damage.

FEMA provides data on the number of projects and cost for repairing damage due to a variety of disaster events.

A database known as SHELDUS (Spatial Hazard Events and Losses Database for the US) provides data on disaster events by county. In the Northeast Kingdom region (as in the rest of the State) damage due to flooding has been the most costly.

RESOURCES

There are a number of reports and sites that provide detailed information on the conditions within the region's watersheds, and provide guidance on specific projects that can serve to mitigate future damage due to flooding and fluvial erosion.

Tactical Basin Plans

The Watershed Management Division of the Department of Environmental Conservation (DEC) within the Vermont Agency of Natural Resources (ANR) undertakes assessments and provides guidance on issues related to both water quality and flood resilience. Flooding and fluvial erosion not only cause damage to buildings and road infrastructure, but can adversely affect water quality. Likewise, mitigation measures that are undertaken to improve water quality can also serve to mitigate flood hazards.

The Watershed Management Division produces Tactical Basin Plans to manage surface waters in each of the State's 17 basins (see Figure 8.1). The tactical plans include monitoring and assessment data, and the protection and restoration tools pertaining to rivers, lakes, wetlands and stormwater. Each plan prioritizes projects for funding within the watershed, and integrates priority items from complementary plans, including River Corridor Plans, Stormwater Master Plans, Backroads Inventories, and Agricultural Environmental Assessments.

Although the main focus of the Tactical Basin Plans is water quality, these plans are a good place to start when a municipality begins to develop a flood resilience section as part of their Town Plan, since they incorporate a host of studies pertaining to surface water management. Tactical Basin plans can be found on the Watershed Management Division site here: <http://www.watershedmanagement.vt.gov/planning.htm>.

As previously noted, the basins follow hydrological boundaries rather than political boundaries, so each Tactical Basin Plan produced by the Watershed Management Division covers a number of municipalities that may lie in different counties. Basin Plans pertaining to the Northeast Kingdom region are as follows:

- **Missisquoi Bay Basin Water Quality Management Plan, (Basin 6)** Approved March 2013. Covering the towns of Jay, Westfield, Troy and portions of Irasburg, Newport Town, and Lowell.

- *Lamoille River Basin Water Quality Management Plan, (Basin 7)* Draft, February 2009. Covering the town of Hardwick and portions of the towns of Craftsbury, Glover, Greensboro, Stannard, Walden and Wheelock.
- *Winooski River Basin Water Quality Management Plan, (Basin 8)* Approved May 2012. Covering portions of Groton, Peacham and Walden.
- *Basin 14 Tactical Basin Plan-2015, including the Stevens River, Wells River, Waits River, Ompompanoosuc River, and Mid-Connecticut River Direct Tributaries Watersheds,* Draft, June 2015. Covering the town of Ryegate and portions of Barnet, Danville, Groton, and Peacham.
- *Passumpsic and Upper Connecticut River Tactical Basin Plan, (Basin 15 and Basin 16)* Approved June 2014. Covering the towns of Bloomfield, Brunswick, Burke, Canaan, Concord, East Haven, Ferdinand, Granby, Guildhall, Kirby, Lemington, Lunenburg, Lyndon, Maidstone, St. Johnsbury, Victory, and Waterford; and portions of Averill, Avery's Gore, Barnet, Brighton, Danville, Peacham, Newark, Norton, Sheffield, Stannard, Sutton, Westmore, Wheelock, and Walden.
- *Basin 17 Water Quality Management Plan,* Approved January 2012. Covering the towns of Albany, Barton, Brownington, Charleston, Coventry, Derby, Holland, Morgan, Newport City, Warners Grant; and portions of Averill, Avery's Gore, Brighton, Craftsbury, Greensboro, Glover, Irasburg, Newport Town, Newark, Norton, Sheffield, Sutton, Westmore, and Warren Gore.

River Corridor Plans

River Corridor Plans are more detailed studies of streams and rivers within the subwatersheds of the larger basins. These plans include an assessment of the natural tendencies of a stream, its current condition, and what changes may be anticipated in the future (also known as “stream geomorphic assessments”). The River Corridor plans use the results of the assessments to provide both general and site-specific guidance on ways to alleviate flood hazards and improve water quality within those areas. Recommended projects can range from enlarging culverts to alleviate channel constriction, reducing erosion potential along stream banks by revegetation, to reconnecting floodplains to the adjacent river in order to reduce flood risk downstream. River Corridor Plans can be found on the Watershed Management Division's site, here

<https://anrweb.vt.gov/DEC/SGA/finalReports.aspx>

Natural Resources Atlas

The Natural Resources Atlas at <http://anrmaps.vermont.gov/websites/anra/> contains a “road erosion risk” layer, which ranks the erosion risk of unpaved Class 2, 3 and 4 Town roads as well as driveways longer than 1,000 feet. Features considered in assessing risk include undersized culverts, elevation and slopes, soil types, and proximity to rivers, lakes, and wetlands. The result is an identification of road segments that have a “low”, “moderate” or “high” erosion risk. This is a useful tool for communities to identify potential road hazards during storm events.

Flood Ready Website

The State of Vermont maintains a “Flood Ready” website that acts as a clearinghouse of all information related to flood resilience planning. The site contains good examples of local flood resilience plans, mitigation measures, identifies funding sources, and provides an overview of the Emergency Relief Assistance Fund (ERAF) rules, identifying the measures needed by municipalities to qualify for the highest level of funding under this program.

PLANNING CONSIDERATIONS

Guiding new development to areas that are not within flood and fluvial erosion hazard areas is first on the list for mitigating future flood loss. Preserving floodplain wetlands to provide area for floodwater storage, and in

some cases taking action to reconnect stream course to these floodplains is also a key step that can alleviate future flood damage. As noted previously, loss of wetlands has been shown to substantially increase flood risk.

For structures that are already within flood hazard areas, there are steps that can be taken to mitigate against future flood risk. FEMA has published a guide entitled “Protecting Your Home and Property From Flood Damage, Mitigation Ideas for Reducing Flood Loss.”(October 2010) The guide begins with guidance on how to go about repairing a flood damaged house, from getting back in safely to selecting a contractor and water-resistance building materials. The guide also provides a list of mitigation strategies when rebuilding after a flood, including relocating or elevating the structure, installing floodwalls and foundation drainage systems.

Local Land Use Regulations

One of the requirements of membership in the NFIP is that the Town administer flood hazard regulations. While these regulations address the flood hazard areas identified by FEMA, they do not necessarily address fluvial erosion hazard areas associated with the movement of rivers and streams. It is recommended that Towns also consider including the state-mapped river corridors in the areas to be regulated by flood hazard regulations. Although this is not intended to affect flood insurance requirements of properties with the designated river corridor, it is a way for towns to better mitigate future flood risk. The Watershed Management Division of the DEC has prepared model flood hazard regulations that include regulation of land in river corridors.

The provision for Planned Unit Developments in local land use regulations is another way to facilitate development that reduces the risk of floods. They allow more flexible requirements for developments that achieve environmental benefits, such as preservation of open space, and minimization of impervious surfaces.

Towns may also wish to establish limits on impervious coverage, clearing on areas of steep slopes, and disturbance to steep slopes as part of their land use regulations. Such measures will mitigate against damage caused by erosion of steep slopes and excessive stormwater runoff, which can overwhelm drainage infrastructure during storm events.

Of the 33 towns in the Northeast Kingdom region with land use regulations, 19 include a provision for Planned Unit Developments, 6 include limits on impervious surfaces, and 8 limit disturbance to steep slopes.

Infrastructure planning

Planned improvements to road and stormwater infrastructure, including road culverts and bridges, should take into consideration the priorities and site specific projects identified in the tactical basin plans, and river corridor plans for the region.

New roads to serve residential or commercial development should not occur within flood hazard areas identified by FEMA, or within fluvial erosion hazard areas as depicted on the State-wide River Corridors, or as identified in a stream geomorphic assessment report.

The State Road and Bridge Standards are based on best management practices to guard against damage to road infrastructure from erosion and flood damage. Although implementation of the standards on all roadways in a municipality may have high up-front costs, the long range savings in maintenance and repair to roadways can result in long-term savings to municipalities.

Historic Structures and Critical Facilities

Identification of historic properties and other critical infrastructure, such as public buildings used for shelters, emergency services buildings, and water and wastewater treatment facilities, will help communities better plan for emergencies. Such an inventory will help municipalities be in a better position when requesting funding for mitigation actions, such as flood-proofing or moving a structure to higher ground or outside of a fluvial erosion zone. (See the historic resources section of this plan for a discussion of resources in the region.) Because critical facilities are defined by their ability to quickly and efficiently respond to and recover from floods, critical facilities should never be flooded, and their critical actions should never be conducted in

floodplains if at all avoidable. The Association of State Floodplain Managers recommends that where critical facilities are located adjacent to special flood hazard areas, their flood protection elevation should be two feet above the elevation with a 0.2% chance of flooding (the 500 year floodplain).

ERAF

The Emergency Relief Assistance Fund (ERAF) provides Public Assistance grants through FEMA to help Vermont municipalities repair damaged infrastructure after a presidentially-declared disaster. In past years, ERAF funding typically covered half the required 25% non-federal match for approved projects (i.e., the State would provide 12.5% and the municipality 12.5%, with FEMA covering 75% of the total project costs).

Effective October 23, 2014 Towns must have adopted four flood hazard mitigation measures in order to maintain the same level of state funding in the event of such a disaster: 1) Flood Hazard Regulations that meet minimum standards for enrollment in the National Flood Insurance Program; 2) the most recent Agency of Transportation Road and Bridge Standards; 3) a Local Emergency Operations Plan (LEOP); and 4) a Local Hazard Mitigation Plan and submit to FEMA for approval.

Local Flood Hazard Regulations that include protection of State River Corridors are afforded a greater share of State matching funds – the State’s portion of the match is increased to 17.5%.

Table 8.1 below shows the “ERAF status” of Towns as of July 2015.

Table 8.1						
ERAF Status of Northeast Kingdom Towns as of July 2015						
Towns	ERAF Rate (%)	NFIP	Road and Bridge Stand.	LHMP	LEOP	R.C. Bylaw
Albany	7.5	No	Yes	No	Yes	
Barnet	7.5	Yes	No	No	No	
Barton Town	Pending	Yes	Yes	Yes	Pending	
Barton Village	12.5	Yes	Yes	Yes	Yes	
Bloomfield	7.5	Yes	Yes	No	No	
Brighton	7.5	Yes	Yes	Plan in progress	Yes	
Brownington	7.5	No	Yes	No	Yes	
Brunswick	7.5	Yes	Yes	No	No	
Burke	7.5	Yes	Yes	No	No	
Canaan	12.5	Yes	Yes	Yes	Yes	
Charleston	7.5	No	Yes	Yes	No	
Concord	7.5	Yes	Yes	No	Yes	
Coventry	7.5	Yes	Yes	No	Yes	
Craftsbury	7.5	Yes	Yes	No	No	
Danville	7.5	Yes	No	No	Yes	
Derby	7.5	Yes	Yes	No	No	
East Haven	7.5	No	Yes	No	Yes	
Glover	12.5	Yes	Yes	Yes	Yes	
Granby	7.5	Yes	Yes	No	No	Interim
Greensboro	7.5	Yes	Yes	No	Yes	

**Table 8.1
ERAF Status of Northeast Kingdom Towns as of July 2015**

Towns	ERAF Rate (%)	NFIP	Road and Bridge Stand.	LHMP	LEOP	R.C. Bylaw
Groton	7.5	Yes	Yes	No	Yes	
Groton Village	7.5	Yes	Yes	No	Yes	
Guildhall	17.5	Yes	Yes	Yes	Yes	Interim
Hardwick	7.5	Yes	Yes	Yes	No	
Holland	7.5	No	Yes	No	Yes	
Irasburg	7.5	No	Yes	No	Yes	
Jay	7.5	Yes	Yes	No	Yes	
Kirby	7.5	Yes	Yes	No	Yes	Interim
Lemington	7.5	Yes	Yes	No	No	
Lowell	7.5	Yes	Yes	No	Yes	
Lunenburg	7.5	No	Yes	No	No	
Lyndon	7.5	Yes	Yes	Plan in Progress	No	
Lyndonville Vill.	7.5	Yes	Yes	Plan in Progress	No	
Maidstone	7.5	No	No	No	No	
Morgan	7.5	No	Yes	No	Yes	
Newark	7.5	No	No	No	No	
Newport Town	7.5	Yes	Yes	No	No	
Newport City	7.5	Yes	Yes	Plan in Progress	Yes	
North Troy Village	7.5	Yes	No	No	Yes	
Norton	7.5	Yes	Yes	No	Yes	Yes
Peacham	7.5	Yes	No	No	Yes	Interim
Ryegate	12.5	Yes	Yes	Yes	Yes	
Sheffield	7.5	No	No	No	Yes	
South Ryegate Vill.	7.5	Yes	Yes	Yes	No	
St. Johnsbury	12.5	Yes	Yes	Yes.	Yes	
Stannard	7.5	Yes	No	No	No	
Sutton	7.5	No	Yes	No	No	
Troy	7.5	Yes	Yes	No	Yes	Interim
UTG	7.5	Yes	Yes	Plan in Progress	Yes	Yes
Victory	7.5	No	Yes	No	No	
Walden	7.5	No	No	No	Yes	
Waterford	7.5	Yes	Yes	Plan in Progress	Yes	
Westfield	7.5	Yes	Yes	No	Yes	
Westmore	7.5	No	Yes	No	No	
Wheelock	7.5	No	No	No	Yes	

It is noted that besides the funding benefits under ERAF, each of the four required elements are beneficial on their own. As previously noted, membership in the NFIP enables residents to secure flood insurance, which is required if a federally-backed mortgage is sought for the property. It also lowers rates for all flood insurance policy holders in Town. It is noted that some Towns may wish to join the National Flood Insurance Program for the benefits available to residents, but do not have FEMA Flood Insurance Rate Maps (FIRMs) on which to base local flood hazard regulations. In this case, other data may be developed to establish the area that would be subject to local flood hazard regulations. Peacham is one such town in the region that never had FIRMs, but was able to join the NFIP through the use of data established by stream geomorphic assessment reports.

GOALS AND STRATEGIES FOR FLOOD RESILIENCE

FLOOD RESILIENCE GOALS

- Increase awareness of the most effective means of reducing future flood damage, as identified in Tactical Basin Plans and Stream Geomorphic Assessments (River Corridor Plans)
- Protect areas identified and designated as flood plains, river corridors and land adjacent to streams
- Mitigate risks to public safety, critical infrastructure, historic structures, and municipal investments.

FLOOD RESILIENCE STRATEGIES

- Coordinate with the County Conservation Districts in hosting flood mitigation workshops for residential landowners and business owners, to educate them on measures to reduce flood risk and damage.
- Encourage Towns to include restriction of development within River Corridors, as mapped by the Vermont Agency of Natural Resources.
- Encourage Towns to amend zoning and subdivision regulations to include limits on clearing and impervious coverage, and that avoids impacts to wetlands and steep slopes (slopes greater than 20%).
- Encourage Towns to incorporate Planned Unit Development provisions in their bylaws as a means to minimize impervious coverage and clearing.
- Encourage towns to engage in a working partnership with adjacent communities to address control of stormwater runoff and actions that will allow rivers and streams to regain access to floodplains.
- Assist Towns in seeking funding to implement hazard mitigation projects identified in plans.