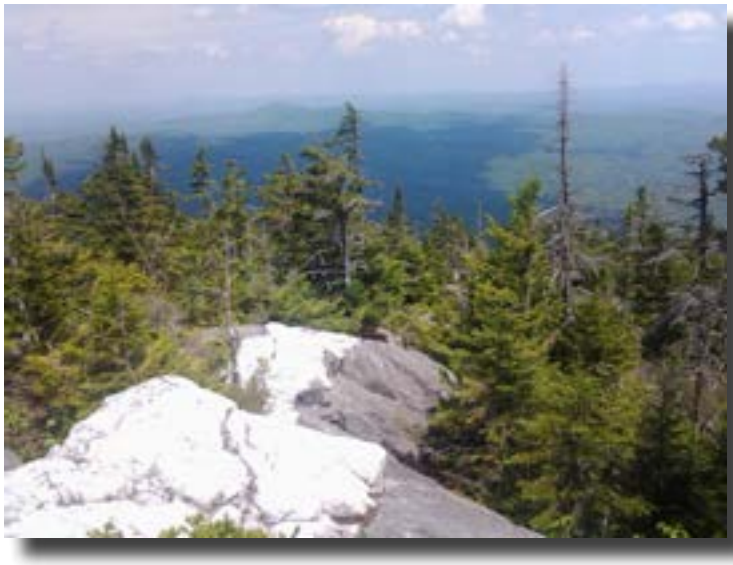


The land, or more broadly, the natural earth, is the source of all that sustains human life. This fact is sometimes easy to forget in modern America. Water pours from our taps. Food is purchased, often already prepared, under the fluorescent lights of the supermarket. Clothing hangs from a rack at the corner boutique. Shelter is erected for us out of "construction materials" on "building lots."

Yet, we remain inextricably dependent upon natural systems. Traced to their origins, all of life's necessities are products of the earth and its processes. So are we. In addition to our productive resources in our farms, forests and mineral deposits, within our Region's boundaries are many ecologically sensitive areas and resources that serve as symbols of our natural heritage and barometers of the Region's environmental health.

OVERVIEW

Water Resources

The Region's ample water resources shape the landscape, support the larger ecosystem, and influence local land use decisions. Surface waters including rivers and lakes support recreational uses such as fishing, swimming, boating, wildlife observation and hunting. Surface waters and wetlands provide numerous habitats for a variety of aquatic and riparian plant and animal communities as well as recharge groundwater aquifers. Groundwater supports public and private water supply. Wetlands store floodwaters and filter natural and man-made contaminants. The quality of such water is essential to the health of the Region's population and economy.

- The land area of the Central Vermont Region predominantly drains into the Winooski River, the largest tributary to Lake Champlain. ~~comprises the following~~ Small portions of the Region are part of six other ~~seven major~~ watersheds: ~~Winooski River,~~ Connecticut-Johns River to Waits River, Connecticut-Waits River to White River, Lamoille River, Otter Creek, Passumpsic, and the White River.

- The Winooski River has seven important tributaries, three of which enter from the north: the Little River joining below the village of Waterbury, the North Branch joining at the city of Montpelier and Kingsbury Branch joining in East Montpelier. The four branches flowing from the south are the Huntington River coming in at the village of Jonesville, the Mad River joining in Middlesex, the Dog River entering just west of the city of Montpelier and the Stevens Branch just north of Montpelier.

- The Region is home to over 65 lakes and ponds, totaling over 2,300 acres of surface water. Waterbury Reservoir in Waterbury, Berlin Pond in Berlin, East Long Pond in Woodbury and Wrightsville Reservoir spanning the Towns of Middlesex, East Montpelier and Montpelier are the Region's largest bodies of water, each over 180 acres. Woodbury (23) and Calais (14) contain the most lakes and ponds of the



Region's towns. The Town of Woodbury alone contains over 25% of the Region's lakes and ponds acreage.

- In general, groundwater sources in Central Vermont are plentiful and of good quality. Well over half of Central Vermont's residents, and many of its businesses and industries receive their water from subterranean sources. In our rural areas, this figure rises to almost 100%. See **Utilities & Facilities element**.

- Sources of groundwater contamination in Central Vermont that are of ongoing concern, however, include domestic sewage, landfills, improperly disposed of hazardous wastes, leaky underground storage tanks, pesticides and fertilizers.

- In the Central Vermont Region, the land use and land cover of the Winooski watershed are very diverse from cities such as Barre and Montpelier to the farmland of Cabot and resort and ski areas of the Mad River Valley.

- Increases in developed land cover in watersheds can result in significant changes in watershed function and water quality. These changes occur as a result of increased impervious cover (pavement, rooftops, etc.). Urbanization increases storm water runoff and increases the flow of pollutants into waterways and wetlands.

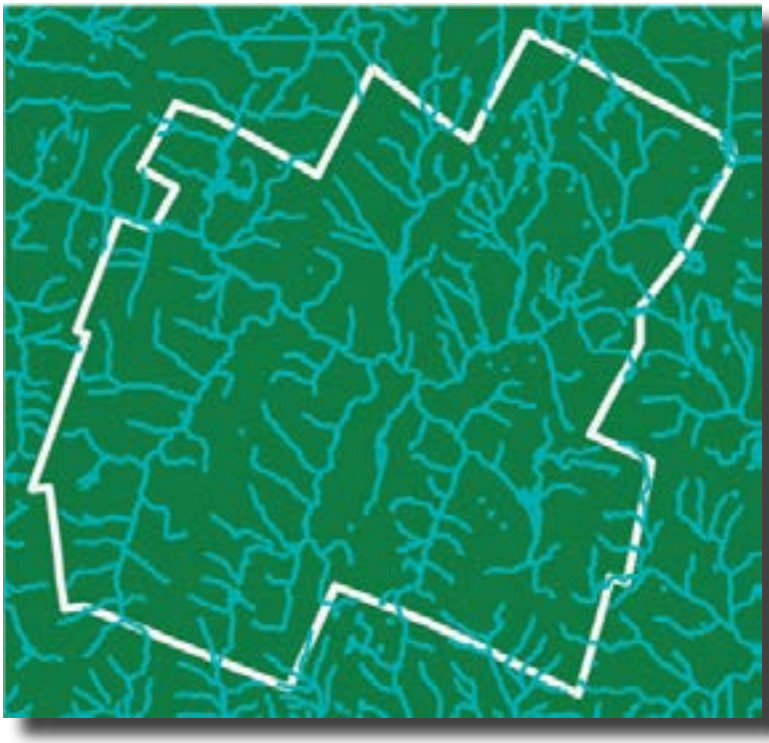
Click here to view the Water Resources Map

- The Friends of the Winooski River, Winooski Conservation District and Vermont River Conservancy in partnership with agencies, willing landowners and volunteers have headed several successful efforts to improve long term conditions of the watershed in regard to water quality and flood reduction. For example, in Marshfield, native riparian trees and shrubs were planted along 5.6 acres of riparian land over the past two years.[1] Shrubs, trees and other vegetation can protect the stream from pollutants and runoff.

- Wetlands are areas of land that are "inundated or saturated with water for varying periods of time during the growing season."[2] Wetlands help make the environment more livable. They are among our most productive and diverse biological communities. They purify surface and underground water supplies. They are natural

1 Upper Winooski River Corridor Management Plan: Plainfield to Montpelier. Prepared by Round River Design. March 2010.
2 VT Agency of Natural Resources, Department of Environmental Conservation, Vermont Wetlands Conservation Strategy.

Surface waters cross political boundaries.



Types of Flooding

Floods cause damage in two distinct, but related, ways. *Inundation* flooding occurs where water rises into low lying land. Inundation can fill structures with water for an extended period of time and cause significant property damage. It is a great concern for those living in or near flood hazard zones.

Surprisingly, however, *fluvial erosion*, including bank failure and changes in river channel courses during floods, actually causes more damage. This more common mode of damage is associated with the dynamic, and oftentimes catastrophic, physical adjustment of stream channel dimensions and lateral movement during storm events. A flash flood is a sudden local flood, often due to heavy rain. Flash floods typically lead to erosive damage and can also mobilize large amounts of debris, plugging culverts, leading to even greater damage.


Inundation


Erosion

flood storage areas during wet periods and help maintain stream flow during dry spells.

- The Vermont Wetlands Program is responsible for identifying and protecting wetlands and the functions and values they provide. There are no Class 1 wetlands identified in the Region. There are just over 9,800 acres of Class 2 wetlands, ~~Acreage is shown by town in Table 2. These wetlands~~ accounting for 1.89% of land area in the Region. There are also likely many un-mapped wetlands within the Region, many of which may still be considered significant and protected under Vermont law.

- The towns with the most significant percentage of Class 2 wetlands are Calais and Woodbury, with 4.8% and 4.5% of their land area respectively.

- Though region-specific information is not available at this time, according to Vermont Fish & Wildlife it is estimated that the current rate of regulated wetland loss in Vermont since 1995 is 20 acres per year.[3] Common threats to wetlands include draining, dredging, filling and excavation activities associated with industrial, residential and agricultural activities.

- Aquatic invasive species are another concern within the Region's surface waters. Non-native and nuisance species such as *eurasian watermilfoil* and *brittle naiad* have been located within the Region. The State's Infested Water Bodies List (2013) includes both Waterbury Reservoir and Berlin Pond. Left unchecked, these species may reach proportions of abundance that may cause economic harm or harm to human health. The State provides technical and funding assistance on aquatic invasive and nuisance species control is provided to towns, water body associations, and others.

- The Winooski River Basin Water Quality Management Plan identifies impairments and threats to water quality (see **Appendix A**) and associated uses of our surface waters. ~~, including: sedimentation, siltation, turbidity,~~

3 VT Fish & Wildlife: http://www.vtfishandwildlife.com/cwp_elem_comm_wet.cfm

~~habitat alterations, nutrients, thermal modifications, flow alterations and metals as well as physical instability and river corridor encroachment.~~

- Water quality in Lake Champlain has been of particular concern as too much pollution is reaching Lake Champlain from the streams and rivers draining into it. The primary concern is polluted runoff carrying sediments and nutrients, such as phosphorus, discharging directly into streams and rivers of the Winooski Basin, other tributaries, and the Lake itself.[4]

- As of November 2014, the State of Vermont and the U.S. Environmental Protection Agency are developing and implementing a new restoration plan for the Lake Champlain basin.

- This Plan, also known as the Lake Champlain Total Maximum Daily Load for Phosphorous, requires that Federal, State and local partners use a comprehensive approach to reducing pollution in the Lake. These efforts include increasing inspections and compliance efforts for farms and related stormwater control practices, increasing technical assistance in designing rural roads to reduce erosion and sedimentation, increasing the stability of our streambanks, and assisting municipalities in encouraging stormwater control practices in those projects that fall below the State permit threshold

Flood Resilience

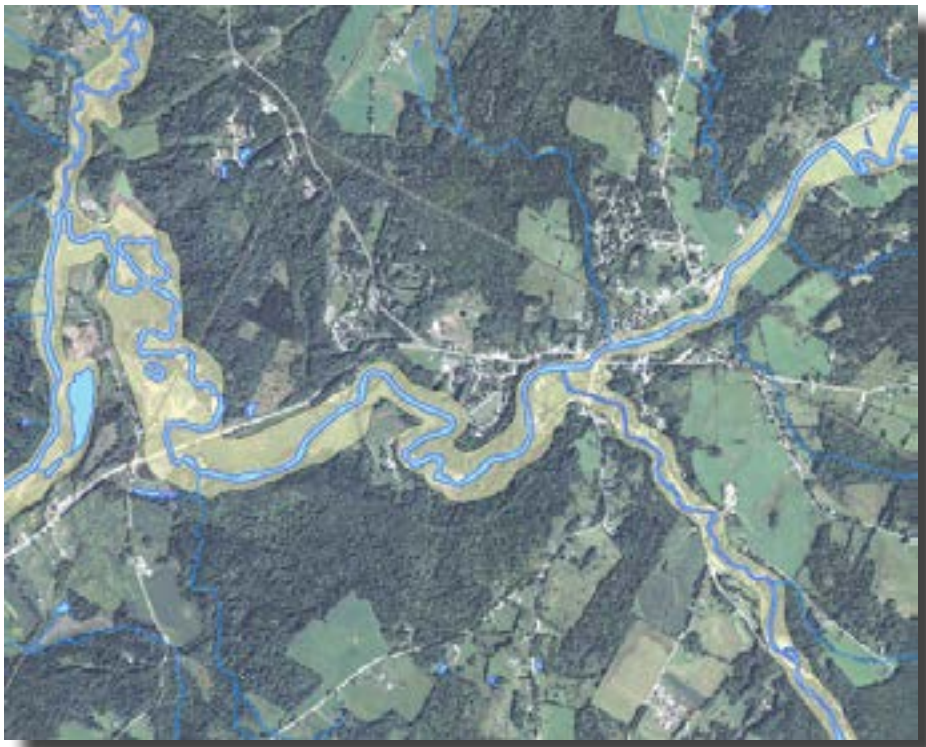
Since the industrial revolution took hold, population, commerce, and infrastructure have historically been concentrated in the river valleys in Central Vermont. The Region's downtowns and village centers are largely located along the main stem of the Winooski River and its larger tributaries. These settlement patterns have left our built environment particularly vulnerable to flooding. Strategies to floodproof and secure our existing settlements and infrastructure from future flood loss will be critical to public safety and economic vitality.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) is promoted by the Federal Emergency Management Agency (FEMA) to address inundation hazards in the Special Flood Hazard Area (SFHA). A municipality must adopt and enforce a floodplain management ordinance that must apply to at least the Special Flood Hazard Areas (SFHA) identified on the Flood Insurance Rate Map. The ordinance regulates new structures in the floodplain and places restrictions on other types of activities within the floodplain.

Areas prone to inundation by rising water during a flood with a 1% statistical probability of occurring in any given year (i.e., the "100-year Flood") are shown on the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs).

River Corridor maps released by the VT Agency of Natural Resources outline areas prone to fluvial erosion hazards.



Above: River Corridors in areas surrounding Plainfield Village.

4 VT Watershed Management Division. http://www.watershedmanagement.vt.gov/erp/champlain/

Table 1: Land Use in the Special Flood Hazard Area

Developed	13.6%
Undeveloped	84.4%
Surface Water	2.1%

Source: CVRPC

Flooding is Central Vermont's most common form of natural disaster (see **Appendix B: Past Flood Events**) and the most costly and dangerous to public health and safety. Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities.

Click here to view the Flood Resilience Map

- Most recently, in the worst flooding the State had seen since the Great Flood of 1927, the Winooski River and its smaller tributaries were cause of significant damage during May and August 2011 (Tropical Storm Irene) flood events as waterways over-topped their banks and suddenly turned violently destructive.

- Smaller scale flooding from more localized storms is more common. Impacts can be just as severe, but less widespread. Between 2011 and 2014, Central Vermont saw six Federally-declared disasters related to flooding.

- According to the Vermont Climate Assessment Report (2014), average annual precipitation in Vermont has increased 5.9 inches since 1960; almost half (48%) of this change in rainfall has occurred since 1990. The report forecasts that precipitation will continue to increase, particularly in the winter months.[5]

- The vulnerability of our Region's economic systems to increasing flood hazards became extremely evident during 2011 flood events, including Tropical Storm Irene, during which a great number of businesses and farms were directly impacted by flood damage and road closures.

- Considering all FEMA relief funding stemming from damages incurred in Tropical Storm Irene, the Region's Federal total came to a staggering $26,562,451 in damage and recovery costs.

- Region-wide, 3.13% of the land area (16,313 acres) is located within ~~a~~ the FEMA-mapped Special Flood Hazard Area (See **Appendix C: Flood Hazard Areas**).

- The Vermont Agency of Natural Resources has produced River Corridor maps that define boundaries to the area the river needs to maintain a stable stream channel. The River Corridor area boundaries also attempt to capture the lands most vulnerable to erosion hazards.

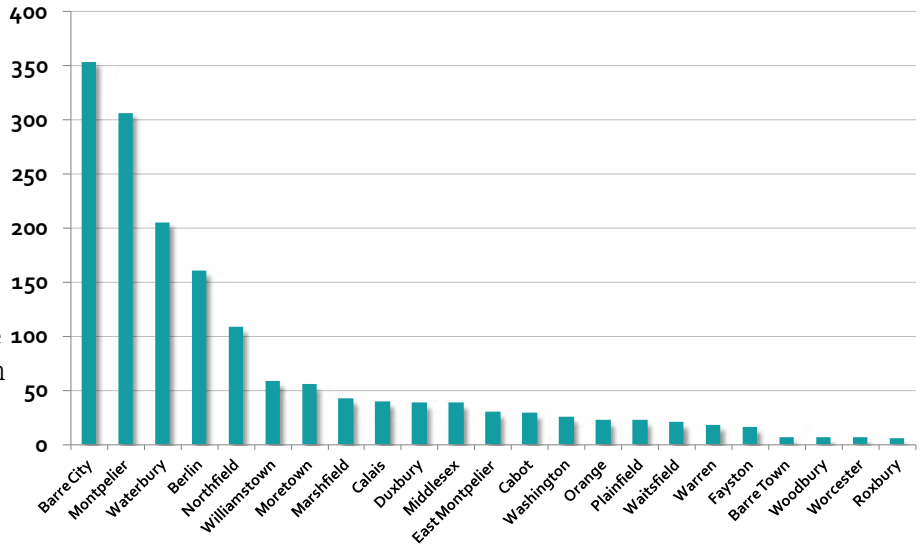
- All of Central Vermont's 23 municipalities participate in the National Flood Insurance Program and enforce flood hazard regulations, though some communities have chosen to adopt higher regulatory standards than the minimum required by FEMA in order to reduce flood risk and ensure safer development.

- A number of communities are also adopting regulations that limit development in the River Corridors, as mapped by the VT Agency of Natural Resources, in order to reduce vulnerabilities to erosion hazards and associated flash flooding.

5 Vermont Climate Assessment (2014): http://vtclimate.org/

- Preservation of open space is another important strategy for keeping the floodplain free of development and serving primary natural functions. As shown in Table 1, an analysis of existing land cover indicates that roughly 84.4% of the Special Flood Hazard Area region-wide remains undeveloped.

Figure 3: Structures in the Special Flood Hazard Area by Town



Source: e911 points and FEMA Flood Insurance Rate Maps (FIRMs)

- Communities that wish to become more resilient to future floods can also implement policies to more effectively manage stormwater throughout the entire watershed. Adopting these policies can help slow stormwater, spread it out over a larger area, and allow it to sink into the ground rather than immediately flowing into nearby streams and rivers causing them to rise more rapidly. In this vein, many municipalities in Central Vermont have adopted riparian setback and buffer ordinances that require structures to be placed a certain distance from a stream or other surface water and the protection or maintenance of vegetation.

- ~~Figure 2 portrays impervious cover as a percentage of town-wide land area for each municipality in conjunction with impervious cover as a percentage of land area within a 150 foot buffer from surface waters. The urban core of Barre City, Montpelier, and Barre Town represent the highest percentages of impervious cover town-wide, with the remainder of communities less than 10% impervious.~~

- ~~Figure 2 also shows a trend of less-developed communities tending to have higher amounts of impervious cover as a percentage of land area within 150 feet of surface waters. This percentage is likely impacted by~~

- There are numerous small and large dams constructed on streams and rivers in the Region providing various utility including flood control, power generation, and recreational opportunities. Within the Region there are 10 dams that are classified as High hazard dams by the State. Dams in the high hazard potential category will be those located where failure may cause serious damage to homes, extensive agricultural, industrial and commercial facilities, important public utilities, main highways or railroads.

- Additional dams, such as historic mill dams, located in rural hamlets and villages range from having High Hazard Potential ratings to having no hazard rating. Municipalities have recognized the need to examine local dams more closely to prevent dam failures; for example, Calais has created a task force to investigate their local dams more thoroughly. It is becoming more common to remove dams that no longer serve a useful purpose, eliminating both the hazard and an encroachment in the river corridor.

- Transportation infrastructure is a major source of stormwater runoff in Vermont that can alter hydrology and contribute significant quantities of pollution to surface waters. Roads, ~~and~~ driveways, and associated culverts built near waterways, which can have implications for water quality, stormwater management and flooding as it relates to infrastructure vulnerability and erosion.

- The Vermont Agency of Transportation encourages and incentivizes the municipal adoption of standards that meet or exceed the 2013 state-approved Town Road and Bridge Standards. These standards increase the likelihood that town roads and bridges will hold up during flooding or heavy rain events and also address water quality issues associated with roadway run-off.

- Based on the results of overlaying the ~~FIRM~~ FEMA floodplain maps with the location of e911 points, over 1,600 of the Region's structures (5.5%) are vulnerable to potential flooding as of 2014. Over 70% of those vulnerable structures are in regional population centers Barre City (353), Montpelier (306), Waterbury (205), Berlin (160) and Northfield (108).

Table 2: Land Cover by Type

Land Cover Type	% of Total
Deciduous Forest	38%
Mixed Forest	29%
Evergreen Forest	13%
Pasture Hay	5%
Developed, Open Space	4%
Cultivated Crops	3%
Shrub/Scrub	2%
Woody Wetlands	2%
Developed, Low Intensity	2%
Open Water	1%
Developed, Medium Intensity	1%
Grassland/Herbaceous	0.5%
Developed, High Intensity	0.2%
Barren Land	0.2%
Emergent Herbaceous Wetland	0.1%

Source: NLCD 2006

Click here to view the HABITAT BLOCKS Map

- Of the over 1,600 structures located in the regulatory floodplain, only 48% (774 structures) carry flood insurance. Issues preventing residents of Central Vermont at flood risk from obtaining insurance range from a lack of awareness regarding flood risk, rising premium costs due to recent legislative changes and the costs to obtain a surveyor-certified Elevation Certificate in order for the NFIP to rate the property.

- Many towns are still struggling with the costs of permanent repairs to infrastructure from the widespread damage. While the State of Vermont reported that between 1989 and 2003, Central Vermont received $5,119,738 in total Public Assistance allocations during Presidentially Declared Disasters, Tropical Storm Irene (2011) alone brought an allocation of $7,953,704 in Public Assistance funds to repair the publicly-owned infrastructure due to damage.[6]

- The damages from Irene adversely affected the sensitive populations of Central Vermont. Though mobile homes comprise 6% of total housing units region-wide, that number jumps to 23% when considering all residential structures located in the special flood hazard area.

- Hazard Mitigation Assistance grants have been made available from the Federal Emergency Management Agency to rebuild needed infrastructure and to replace or upgrade flood prone structures that have experienced past flood damages. These projects have typically been identified in a municipality's Local Hazard Mitigation Plan along with other non-structural flood mitigation strategies. The local documentation of past damages to a structure, road, bridge or culvert is an important factor in gaining Federal funds.

6 Central VT Pre-Disaster Mitigation Plan, 2005, and VPR's Mapping the Money: http://www.vpr.net/apps/mapping-the-money/fema

- Participation in FEMA's Community Rating System encourages a more comprehensive approach to floodplain management across a range of activities. Participating communities in this volunteer program qualify for premium reductions for its residents that hold flood insurance policies. Currently the City of Montpelier is the only participating Central Vermont community, though the Towns of Waterbury and Berlin are preparing applications to CRS as of July 2014.

- Effective public information and outreach is an important component of mitigating future flood losses as a diverse collection of community interests are involved in or affected by flood hazards within the Region. A number of communities maintain flood-related information on their municipal web sites, conduct outreach to floodplain residents and business owners, and make FEMA and State flood hazard publications available at municipal offices, libraries other public buildings.

Forest Land

Forestlands provide many benefits to Central Vermont residents. Forests contain habitat essential to a variety of wildlife species and help protect and replenish surface and groundwater supplies. They also perform an important atmospheric cleansing function protecting the quality of the air we breathe. Many recreational pursuits are dependent on, or enhanced by, forestland, as is the aesthetic quality of the Region.

- As shown in Table 2, the vast majority (approx. 80%) of the Region is forested. These forests are characterized by diverse landscapes and elevations and such diversity contributes to varied vegetative types and natural communities, including: early succession forests, northern hardwood and spruce-fir forests, sub-alpine forests, cliffs, rock outcrops and wetlands.

- There are nearly 357,000 acres of privately owned forestland in Central Vermont (86% of forested acreage) and 59,549 acres of National and State Forests, State Parks, Wildlife Management Areas and Town Forests.

- Since private landowners own a majority of the Region's productive forestland, it is important to encourage sound, long-term forest management and compatible patterns of growth and development, while respecting the rights of private property owners. Productive forestlands are defined as all large tracts which in themselves, or when combined, form a major economic unit for long-term timber production. Benefits of forest management include providing a sustainable source of forest products, increasing the diversity of habitats for wildlife, and offering scenic beauty and places for recreation.

Critical Resource Areas

For the purposes of this Plan such critical resource areas include:

- National Natural Landmarks: a designation that encourages and supports the voluntary conservation of sites that illustrate the nation's geological and biological history, and strengthens the public's appreciation of America's natural heritage;

- State-designated Natural Areas (more info >>): limited areas of land which have retained their wilderness character, although not necessarily completely natural and undisturbed, or have rare or vanishing species of plant or animal life or similar features of interest which are worthy of preservation for the use of present and future residents of the state and may include unique ecological, geological, scenic and contemplative recreational areas on state lands;

- Sites listed on the Vermont Rare, Threatened and Endangered Species, and Significant Natural Communities as designated by the Vermont Natural Heritage Inventory; and

- Elevations over 2,500 feet as shown on USGS topographic maps.

Vermont's Biofinder Tool

The BioFinder component map (see link below), included here for educational purposes, represents a compilation of available terrestrial and aquatic biological, ecological, and natural heritage data in the Region. BioFinder's Tiered Contribution to Biodiversity layer shows the relative concentrations of natural resources. For example, an area could be a Tier 1, which means that it has the highest concentration of biodiversity components, or Tier 4, which means it has a moderate concentration of biodiversity components. While not used for regulatory functions, this map can be used as a reference to give a broad, biologically inclusive, overview of an area and aid in conservation planning.

To view the map at different scales, an interactive mapping tool developed by VT Dept. of Fish & Wildlife is available at: http://biofinder.vermont.gov/.

Click here to view the BIO FINDER Map

- Non-native, invasive plants present a variety of threats to forest health in Vermont and the northeast. Invasive plants such as bush honeysuckles, buckthorn, autumn olive, and Japanese barberry crowd out native plants in upland forests, reduce habitat quality and biodiversity in forest ecosystems, are expensive and difficult to control, and can have other negative economic impacts.

- In riparian areas and along rural roads, Japanese knotweed has become a widespread invasive nuisance; typically sprouting in disturbed areas or spread via moving ice jammed up along a stream bank. In order to mitigate the impacts, eradication efforts would have to begin at the top of the watershed and work downstream.

- The Vermont Department of Forests, Park and Recreation conducts aerial and ground surveys to detect forest damage. As of 2012, nearly a quarter of the damage statewide was due to the non-native pest complex, beech bark disease. ~~Much of~~ Many the Central Vermont communities had some observances of damage.[7] ~~with East Montpelier and Orange in the 3-7 range and Calais, Marshfield, Plainfield, Middlesex, Waterbury, Berlin, Northfield, Barre Town and Williamstown in the 1-2 range~~.

- Non-native invasive insects are also on the move into Vermont forests. A few insects that are being watched for are Asian longhorn beetle, emerald ash borer, and hemlock wooly adelgid, which has already been detected in southern Vermont. These species have the potential to cause extensive mortality of some native tree species, which has wide-ranging negative implications for Vermont wildlife and forest health.[8]

Wildlife Habitats

All species of wildlife are integral to the functioning of the ecosystems upon which we all depend and two-thirds of Vermonters take part in wildlife-associated recreation. We know that viable habitat is the single most important survival need for these species; yet for many, habitat loss and fragmentation is a real and present threat. Wildlife habitat at the regional level is best supported by maintaining large contiguous blocks of forest land.

- Contiguous habitat supports native plants and animals, including species like bobcats and black bears that require large areas to survive, as well as animals with relatively small ranges such as salamanders that utilize these corridors in order to find seasonal sources of food, to breed, or to hibernate. Additionally, contiguous forest can buffer species against the negative consequences of fragmentation.

- The Central Vermont region has a significantly fragmented habitat, with some large blocks of contiguous habitat remaining in the foothills and spine of the Green

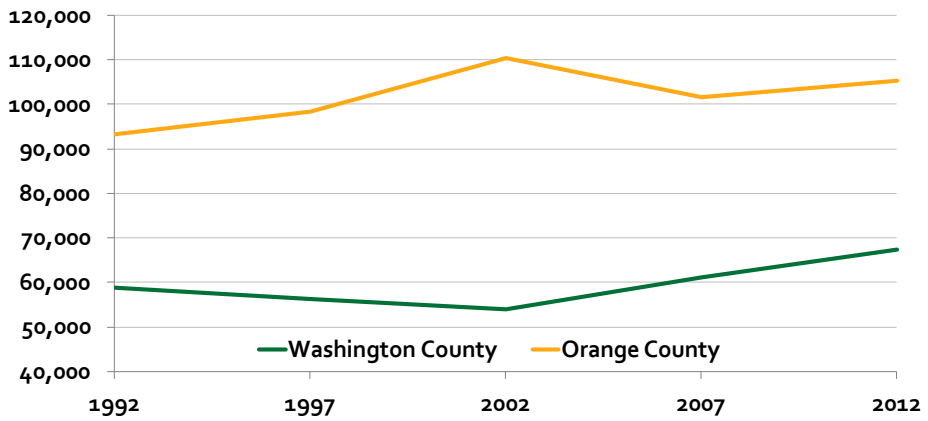
7 VT Dept. of Forest, Parks and Recreation. Forest Health: Vermont Highlights, 2012.
8 State of Vermont 2014 Invasive Forest Pest Action Plan.

Mountains, the Worcester Range, Groton State Forest and the Northfield Range.

- The National Audubon Society (Audubon Vermont) has identified three priority forest bird blocks within the county, denoting its significance to bird conservation within the State. These include the Northern Green Mountains Important Bird Area (IBA), an IBA encompassing the spine of the Green Mountains north of the Winooski River and the Worcester Range within the Region. This forest block supports breeding populations of Bicknell's Thrush, a species of global conservation concern.

- Riparian areas serve important habitat functions and provide connecting corridors for wildlife movement. Riparian areas are ecosystems comprised of streams, rivers, lakes, wetlands, and floodplains that form a complex and interrelated hydrological system. These ecosystems extend up and down streams and along lakeshores, and include all land that is directly affected by surface water.

Figure 4: Agricultural Acreage, 1992-2012



Source: US Agricultural Census

View of a dairy farm in the Town of Washington.

- The more developed areas of the region, which tend to be located in river valleys, exhibit increasing amounts of habitat fragmentation.

- According to a recent state-wide study, the number of parcels containing more than fifty acres of woodland (undeveloped land with relatively intact forest) has decreased in Vermont by four percent (4%) betweem 2003 and 2009. This is in step with the character of incremental growth and development in Central Vermont.[9]

- Within our Region's boundaries are many ecologically sensitive areas and resources that serve as symbols of our natural heritage and barometers of the Region's environmental health. These environmentally sensitive lands have great value for education and research and for the understanding and appreciation of natural systems and

Click here to view the AGRICULTURAL LANDS AND MINERAL RESOURCES Map

9 Informing Land Use Planning and Forestland Conservation through Subdivision and Parcelization Trend Information. VNRC & Vermont Family Forests, 2010.

processes. They perform critical ecological functions, enhancing the stability and diversity of ecosystems. For the purposes of this Plan, special considerations are made for *Critical Resource Areas*.

- Camel's Hump Natural Area was designated a National Natural Landmark in 1968 and is also a State-designated Natural Area.

- In addition to Camel's Hump, other State-designated Natural Areas include the portions of Mount Mansfield Natural Area in the Town of Waterbury, which encompasses an extensive and unbroken subalpine heath krummolz community and a subalpine spruce-fir forest, and Worcester Range Natural Area spanning the Towns of Middlesex, Waterbury and Worcester.

Agricultural Lands and Soil

Farming helps to define the Region's cultural identity and provides Central Vermont residents with open space, recreational opportunities, aesthetic pleasure, and a sense of place. More importantly, farms and farm soils, if protected now, can assure us of some degree of Regional self-sufficiency in the event that outside food supplies dwindle, are cut off, or become prohibitively expensive. While such scenarios may seem farfetched for the short term, a number of circumstances already in motion could make them a reality within our lifetime. Among such circumstances are: global climate change, dwindling and expensive energy reserves, disease susceptible mono-culture farming in major production areas, soil salinization and water shortages in these same locations, trade fluctuations, and worldwide population increases.

The limited supply of primary agricultural soils, their general suitability for septic systems, combined with agriculture's increasing dependence on higher quality land make it crucial that land use decisions display foresight and recognize the importance of these soils to future generations.

- As of 2012, over 67,000 acres in Washington County and over 105,000 acres in Orange County were open and agriculturally managed lands. This accounts for just over 15% of all land within Washington County and nearly 24% in Orange County.

- Total acreage of farms in both counties increased between 2007 and 2012, with an overall slight increase over the past two decades[10].

- Primary agricultural lands are a finite resource, and preventing conversion of these critical soils to other uses should be a priority in our efforts to maintain a viable agricultural base.

- A number of Central Vermont communities have put protection for prime agricultural soils into their zoning and subdivision regulations requiring or encouraging the siting or clustering of development at the edges of open spaces and agricultural lands in a way that leaves land open for farming or recreational use.

- Accommodating diversified agricultural enterprises and reducing barriers or added permitting to these types of uses can also serve as a barrier to the viability of prime agricultural land. Conditional uses listed in zoning districts targeted for agricultural such as "small-scale processing of farm and forest products" or "special events"

10 USDA Agricultural Census.

are a few examples employed by the Town of Waitsfield.

Mineral Resources/Earth Extraction

The mineral deposits of Central Vermont are recognized as an important, yet finite, resource. The presently known mineral resources of the Region include granite, talc, asbestos, chromite, verde antique, sand, and gravel. The granite quarries of Barre Town and granite industries of Barre City, Berlin, Calais and Montpelier are contributors to our economy and living monuments to a colorful part of our Regional heritage. While sand and gravel deposits are less renowned, they play an important part in local and personal economies and are relied upon by municipalities for road building and maintenance materials. The products of earth resource operations are important and we must accommodate them even as we guard against their more harmful aspects.

- According to the U.S. Geological Survey's Mineral Resources Data System, there are at least 17 actively producing mines in the Region and over 50 formerly operating sites. Open pit mining is the most common method employed.

- Towns that wish to encourage sand and gravel operations in specific locations should make sure that their conditional use standards are clearly written, administered fairly, and that they balance the interests of the town, the facility owner/operator and the neighboring landowners.

Renewable Energy Resources

The Region's natural resources are also potential sources for renewable energy generation as we strive to reduce fossil fuel consumption and dependence. Opportunities for hydro-power, biomass, biofuels, methane, wind and solar energy generation should all be considered in resource conservation policies and strategies. There can be significant natural resource impacts associated with energy development and resource extraction. Proposed energy developments should consider the costs related to impacts on the resource in tandem with the value of the energy produced. For additional information and analysis, see the Energy element of this Plan.

Air Quality

Overall within the Region, given the lack of industrial development, local air quality concerns are limited mainly to emissions from traffic, heating systems and some

Statewide Outdoor Recreation Trends

The 2014-2018 Vermont State Comprehensive Outdoor Recreation Plan (SCORP) highlighted a number of statewide trends that may have implications for recreation within the Region. These include:

- An increase in membership in all trail-based organizations.
- An increase in mountain bike trails, particularly trails managed by the Vermont Mountain Bike Association and Green Mountain National Forest,
- An increase in established ATV trails on private lands, and VASA's membership has almost doubled since 2003.
- A decrease in VAST membership over the past 10 years, though more than 10% of Vermonters participate in snowmobiling.

agricultural practices. There are currently no air quality monitoring stations located in the Region, though various stationary sources of emissions within the Region are registered and regulated by EPA, state, and local air pollution agencies.

- Neighboring Chittenden County is currently at risk for non-attainment status due to the amount of particulate matter and ground level ozone.[11] There are no available data that identify how much ozone and particulate pollution is generated locally, compared to the amount that blows into our area from areas upwind of Vermont. The only pollution sources that we can directly affect are local sources. The cumulative effect of these sources may increase with additional growth and may have greater impact on local air quality.

- On a local level, most Central Vermont communities have chosen to include some type of performance standards in their zoning regulations that address objectionable elements that may degrade air quality in the surrounding areas.

Natural Scenic Areas

Central Vermont is a place of celebrated natural beauty. Its scenic landscapes not only enrich lives and spirits and attract new businesses and residents, they also provide the basic ingredient for one of the Region's most important industries – tourism. Each year thousands of visitors travel here to see the mountain vistas, pastoral scenes, fertile valleys, historic villages, Interstate 89 corridor (which has received awards for its scenery), remote back roads, and woodlands ablaze with autumn color. Thus, it is in our best interest, both psychologically and economically, to preserve the best of Central Vermont's visual splendor.

- Landscape diversity is also an important consideration in addition to individual scenic elements. Areas immediately adjacent to scenic corridors, such as open agricultural lands or a wetland, can be equally important to the scenic qualities as the prominent ridgelines or large body of water that frame the vista.
- There are two Federally- and State-designated Scenic Byways in the Region. Scenic byways are designated for their intrinsic archaeological, cultural, historic, scenic, natural and recreational values and the Green Mountain Byway and Mad River Byway both boast unique landscape elements and viewscapes that are highly valued for scenic qualities and for contributing to quality of place and tourism.
- Broader development patterns and types occurring in the Region and other factors that impact scenic resources include scattered residential development and forest fragmentation, climate change and impacts on forests (including foliage impacts),

11 Keeping Our Air Clean: Local and Regional Strategies to Improve Air Quality in Chittenden County. Chittenden County Regional Planning Commission, 2010.

proliferation of telecommunication towers on hilltops and ridgelines, utility line corridors, and development of commercial-scale solar arrays or wind farms.

Outdoor Recreation[12]

One of Central Vermont's greatest recreational "facilities" is its landscape. Besides being the home to one of Vermont's last undeveloped mountain ranges (the Worcester Range), only undeveloped alpine area (Camel's Hump), a bounty of mountains, rivers, lakes, forest and fields, it provides a virtual playground for residents, neighboring regions, and out-of-state visitors alike. The Region boasts some 59,549 acres of public outdoor recreational lands. These include a National Forest, seven State forests, four State parks, five wildlife management areas, and municipal forests in almost all of the towns in Central Vermont. In addition, there are public parks and playgrounds, as well as State surface water access points.

Barre Town Forest

The most recent addition occurred in April of 2013 with the creation of the Barre Town Forest. Protection of this 355-acre forest near the villages of Graniteville and Websterville was an effort involving local officials and non-profits, the Trust for Public Land and the USDA Forest Service. Barre Town Forest is actively managed for timber, has a disc golf course, and provides a variety of popular trails used for hiking, mountain biking, snowmobiling and cross-country skiing.

While these publicly-protected lands contain some of Central Vermont's finest scenery, natural resources, and recreational opportunities, such values are abundantly represented in many of the Region's private holdings, as well. Accordingly, un-posted private lands are an important piece of Central Vermont's recreational tapestry.

- Forested lands support a variety of outdoor recreational activities as well as the tourism industry. The Green Mountain National Forest (GMNF) encompasses more than 400,000 acres in southeastern Addison County and Central Vermont in the Green Mountain Biophysical Region, forming the largest contiguous public land area in the State.

- An impressive network of trails traverses the Region including approx. 23 miles of the Long Trail, the oldest long distance hiking trail in America. Multiple opportunities for loop-hikes or end-to-end hikes create attractive options for day-hikers and backpackers.

- Other popular hiking trails include those of the Worcester Range that traverse the exposed summits of Mount Hunger and Mount Worcester. Various trails exist in the vicinity of Groton State Forest, including the popular Spruce Mountain hike, and in the vicinity of Paine Mountain in Northfield.

- Multi-use trails under continued development and expansion within the Region include the Cross Vermont Trail and the Mad River Path. The Cross Vermont Trail, a designated National Recreation Trail since 2003, will eventually bisect Vermont through the Wells River and Winooski River Valleys, connecting Newbury on the Connecticut River with Burlington on Lake Champlain. Currently 30 of the 90 miles of Cross Vermont Trail have been

Click here to view the RECREATIONAL RESOURCES Map

12 Unless otherwise indicated, data from this section is derived from the 2014-2018 Vermont State Comprehensive Outdoor Recreation Plan.

Table 3: Select Trail Resources by County

County	Municipal Hiking Trails (miles)	Municipal Bike/ Pedestrian Trails (miles)	*VAST Trails (miles groomed)*
Chittenden	83	99	*146*
Washington	58	13	*476*
Orange	36	22	*505*
Windsor	36	19	*463*
Rutland	28	16	*471*
Bennington	24	5	*198*
Addison	22	14	*234*
Windham	19	8	*283*
Orleans	15	1	*405*
Franklin	11	3	*276*
Lamoille	10	10	*244*
Caledonia	8	9	*504*
Grand Isle	3	5	*33*

Source: State Comprehensive Outdoor Rec. Plan 2014-2018, VAST

completed and are open for use.

- Mountain biking has seen increased participation over the past decade. New and expanded trail systems at Shaw Outdoor Center (Norwich University), in the Mad River Valley and at Millstone Trails in Barre Town have fueled the sport's popularity and tourism potential within the Region

- Orange County has the most miles of groomed snowmobile trails of all the counties in Vermont at 505 miles. Washington County towns in the Upper Winooski River corridor have a large concentration of groomed snowmobile trails, with fewer trails in the more mountainous, ecologically sensitive areas. There are also a variety of trails for all-terrain vehicles (ATVs) in the Region, many of which are on private lands.

- The Central Vermont Region is home to one of Vermont's largest alpine ski resorts, Sugarbush Resort, one of its most iconic, Mad River Glen, and is within a half hour drive of several others. Sugarbush and Mad River Glen generate approximately 385,000 skier-visits on an annual basis and during the 2012-2013 season at Sugarbush, skier visits were up 44% over the previous season.[13]

- The ski industry continues to be a major draw for the Region's tourism economy; however, as economic pressures and warming winters have impacted the industry, the ski resorts have begun to shift toward more four season activities.

- The popularity of back-country skiing in Vermont has continued to increase and the opportunities and issues this activity poses are also on the rise. This use is increasing rapidly at developed ski areas.

- Nordic skiing is also a popular pursuit in Central Vermont, and Orange and Washington Counties together boast 89 miles of nordic skiing/snowshoe trails (ranking second and third statewide to Chittenden County's first, respectively). A section of the Catamount Trail, a 300 mile Nordic ski trail that spans the State north to south, traverses the Towns of Warren and Fayston. Various commercial nordic ski areas also serve the Region.

- Central Vermont offers a variety of warm-water and cold-water fishing opportunities. Sections of two of Vermont's largest and most productive trout streams, the Lamoille and Winooski rivers, as well as the Waterbury Reservoir, are accessible to the Region's residents. It is also home to the Dog River, one of

13 Mad River Valley Data Report, 2013: http://www.mrvpd.org/MRVDataReport.php

Vermont's top wild trout streams, and the Woodbury-Calais Lakes region which offers good to excellent fishing for trout, bass, and panfish.

- Over a quarter of Vermonters participated in hunting-related activities in the past year. Big game hunting, which for most Vermonters means deer hunting, was the most popular form of hunting in the State. Other popular game include black bears, wild turkey, moose, duck, goose, rabbit, partridge and coyote. Central Vermont is home to numerous Wildlife Management Areas and allows hunting in designated areas of State Forests and State Parks within the Region.

- The sale of hunting licenses in Vermont has declined over the past 10 years, but fishing license sales and participation are holding steady.

- Water-based recreational opportunities are also abundant in the Region in the warmer months. The Winooski River Paddlers' Trail is an 80-mile trail from Cabot to Lake Champlain on the Colchester/ Burlington border.

- The Mad River, Dog River, Wrightsville Beach Recreation Area and various ponds throughout the Region are also popular paddling spots. There are numerous public access points for motorized boating and fishing in the Region's ponds, as well.

- Disc golf, also known as Frisbee golf, is a relatively new sport that is gaining popularity in the Region with residents and visitors. There are at least 5 public courses, including Wrightsville Beach, Millstone Trails, Sugarbush Resort (2 courses), and Waterbury Center, as well as a few private courses.

Click here to view the CONSERVED LANDS Map

- With increased demand for more diversified facilities like multi-use trails that support a variety of activities, public land managers are faced with the challenge of maintaining recreational trails and structures in light of the increased and diversified use.

- Recreational access to private land remains an ongoing discussion and point of debate among certain recreational user groups and property rights advocates. Though statewide data on acres of posted land shows that the amount of land posted remained relatively constant from 2000 through 2010, not all posted land is registered with town clerks.

- With the vast amount of developed and yet un-tapped recreational resources, much of which are tucked away in the Region's more rural communities, there is opportunity for both a more coordinated approach to recreation planning that could increase connections between the various trails, recreation areas and communities and for more coordinated marketing of these assets to support awareness among both visitors and residents.

Conserved Lands

Vermont residents and visitors benefit from the natural assets supplied by permanently protected parcels, whether the land is conserved and maintained by private landowners, held as a preserve by a nonprofit land trust, or managed as a park, refuge or multiuse

area by a government entity. The majority of the larger blocks of conserved lands in the Central Vermont Region can be found along the spine of both the Green and the Worcester Mountains as well as adjacent to Groton State Forest.

Many smaller private properties have been conserved with the assistance of land trusts such as the Duxbury Land Trust and the Vermont Land Trust (See **Appendix D: Conservation Organizations**). In addition, properties that are 25 acres or more are eligible for enrollment in the State of Vermont's Current Use program.

- Almost half of all Vermont towns own a community forest. In the Central Vermont Region, there are town and/or school forests in Barre Town, Berlin, Cabot, Calais, Duxbury, East Montpelier, Fayston, Marshfield, Middlesex, Moretown, Northfield, Orange, Plainfield, Roxbury, Waitsfield, Warren, Washington, Waterbury, Williamstown, Woodbury and Worcester.

- Forty-two percent (42%) of the land in the Region is enrolled in the Current Use program. Towns with the largest percentages of their land in Current Use include Moretown (60.5%), Washington (55.6%), Northfield (55.2%), Cabot (55.1%) and Woodbury (53.8%).

- Over a ten year period, the number of acres in the Region enrolled in the Current Use program grew from 187,835 in 2003 to 222,640 acres in 2013. Towns enrolling the largest number of acres over the ten year period included Northfield (4,890), Fayston (3,560), Orange (3,523) and Warren (2,069), together accounting for over 40% of the Region's new enrolled acres since 2003.[14]

- Municipal conservation commissions play an important role in maintaining and enhancing natural resources in the Central Vermont Region. Towns with established commissions include: Berlin, Cabot, Calais, Fayston, Marshfield, Middlesex, Montpelier, Northfield, Plainfield, Waitsfield, Warren, Waterbury and Worcester.

- Some conservation commissions are also involved in local planning efforts, particularly in the review of the 'Natural Resources' section of a town plan and comment on local permit applications that might have an adverse environmental impact if approved.

Climate Change

From the Lake Champlain shore to the Connecticut River Valley, the climate of Vermont is changing. Records show that spring is arriving earlier, summers are growing hotter, and winters are becoming warmer and less snowy. These changes are consistent with climate change, an increasingly urgent phenomenon driven by heat-trapping emissions from human activities.

Research shows that if greenhouse gas emissions continue to grow unabated, Vermont can expect dramatic changes in climate over the course of this century with substantial impacts on vital aspects of the State's economy and character. If the rate of emissions is lowered; however, projections show that many of the changes will be far less dramatic.

- Global climate change is having regional impacts on Vermont forests and birds.

14 VT Dept. of Taxes, 2014.

Table 4: Identified Climate Change Trends

Climate changes in Vermont	Impacts on Forests
Longer growing seasons.	Changes in forest type and plant species distribution. Spruce fir forests are being replaced by hardwoods at high elevations. At lower elevations, oak-pine forests will likely replace forests dominated by sugar maple and other northern hardwoods.
More frequent winter thaws and earlier springs.	
Less winter precipitation falling as snow and more as rain.	
Increased heavy downpours.	Increased spread of forest pests, such as hemlock wooly adelgid, that can survive milder winters and take advantage of stressed trees. Non-native invasive plants may also spread. Hardwoods may be more susceptible to leaf diseases such as anthracnose.
Earlier spring snowmelt resulting in earlier peak river flows.	
More frequent short-term droughts in late summer and fall.	Forest based economy will be impacted by changes in timing and extent of peak fall foliage, shortened winter logging season stresses on maple in sugarbushes and reduced snowfall for winter recreation.
More frequent hot (over 90° F), humid days.	

Source: Climate Change and Vermont's Forests, Vermont Agency of Natural Resources Climate Change Adaptation White Paper Series (2011).

Though implications for individual species can appear benign, potential disruptions of complex ecosystem connections and process are far-reaching and serious for forests, birds, other wildlife and people. Particular identified trends are outlined in Table 4.

- The Northeast is projected to see a 10% increase (about four inches per year) in annual precipitation by the end of the century. Winter precipitation is expected to increase by 20% to 30%, but because of a prediction in temperatures, more and more of this precipitation is going to fall as rain.

- Rainfall is expected to be more intense and heavy rainfall is expected to be more frequent, resulting in adverse effects to water quality and outbreaks of waterborne disease, replenishment of groundwater supplies, soil erosion and flood risks both in urban areas and agricultural fields in the Northeast.[15]

15 Northeast Climate Impacts Assessment, Confronting Climate Change in the U.S. Northeast, 2007.

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KEY CHALLENGES AND TRENDS

Water Resources

Polluted Stormwater Runoff. Pollutants ending up in our waterways via stormwater runoff are an issue that not only affects local environmental and economic health, but also has federal implications in the Winooski River basin related to the Clean Water Act due to pollutant levels in Lake Champlain. The Lake Champlain Phosphorus Total Maximum Daily Load (TMDL) requires that Federal, State and local partners use a comprehensive approach to reducing pollution in the Lake. Strategies that incorporate public education and outreach and require collaboration across public and private sectors will be critical in addressing these issues. These efforts include increasing inspections and compliance efforts for farms and related stormwater control practices, increasing technical assistance in designing rural roads to reduce erosion and sedimentation, increasing the stability of our streambanks, and assisting municipalities in encouraging stormwater control practices in those projects that fall below the State permit threshold. Adopting local stormwater policies also relates to flood resilience as it can help to slow stormwater runoff, spread it out over a larger area, and allow it to sink into the ground rather than immediately flowing into nearby streams and rivers, causing them to rise more rapidly.

Wastewater Treatment. Though we do not have a Region-wide assessment, localized studies point to findings of pollutant sources related to public and individual wastewater treatment systems that continue to impair surface and ground water quality. Water quality reports cite failing or inefficient septic systems that have infiltrated stormwater systems or discharged into nearby waterways. Development of small-scale community septic systems may be a solution to replace failing systems in the long term. ~~Combined sewers, in which domestic sewage and stormwater are transported via the same pipe system to a waste water treatment plant, are another factor as they were designed with overflow points that keep the treatment plant from becoming overloaded during heavy rain storms. Combined sewer overflow remains an issue in some of the Region's larger communities, while some smaller communities are also having issues with storm water infiltrating wastewater systems during large rain events and discharging into local waterways.~~

Flood Resilience & Climate Change

Floodplain and River Corridor Encroachment. Historic settlement patterns near waterways have placed many of the Region's residences, businesses and valuable pieces of public infrastructure in areas prone to flood hazards. Some of the Region's communities have taken steps to place limits on investment in flood prone areas that exceed the National Flood Insurance Program minimum requirements. Development continues to occur in these areas in other communities, however, as access to main transportation corridors or the presence of downtowns, village centers or previously built-up areas make these floodplains and river corridors desirable for continued development despite the risks.

It will be important to mitigate flood risk through both prohibition of new structures and other significant investment, where feasible, or through more stringent requirements for site and building design that will not increase flood hazards where development must occur. Setting conservation priorities to permanently protect undeveloped areas that provide key flood storage functions

will also be important in planning for flood resilience.

River and Stream Barriers. Undersized and poorly designed culverts and bridges, particularly smaller pipe culverts, cause streams to dam and hold back sediment. This sediment can lead to clogging of culverts, sending water over the top of the road during a large rain event. There are also many older dams that no longer serve a useful purpose and are falling into disrepair. These dams disrupt river and stream equilibrium, create safety hazards and raise the potential for downstream ecological impacts in the event of failure. Inventories of these structures do exist, but more work is needed. Removal of barriers or mitigation of their impacts will be key in addressing the problem.

Outreach and Education. Planning and implementation to improve the Region's resilience to future flood events is a process that must involve a diverse range of public and private stakeholders as well as community leaders and engaged residents. Local government, State agencies, property owners, business owners, residents, builders, real estate agents, surveyors, etc. all have a role to play in advancing goals of reducing future flood losses. Outreach and education will need to be a key component in order to engage these populations, to seek input on areas or populations prone to flood hazards, and in raising awareness of flood risks and available resources and strategies to reduce risks.

Improved Documentation of Flood Extent and Damages. Damages can and do occur beyond mapped flood hazard areas and steps taken following a disaster to document the flood extent, eroded areas and resulting damages can be vital in mapping and mitigating potential future hazards. Federal grant programs that dedicate funds to local projects that will reduce damage and loss of property from flood events in the long term require that past damages be documented and quantified. In order continue to access funding for these types of projects, such as an up-sized culvert to accommodate larger storms or efforts to floodproof a business, it will be important to set up systems that facilitate the collection and documentation of this information, particularly for smaller-scale flood events whose damages aren't documented via FEMA assessment.

Climate Change Impacts on Natural Resources and Tourism. The Vermont Climate Assessment (2014) predicts that springs will continue to arrive earlier, summers will continue to grow hotter, and winters will become warmer. While winter storms are predicted to be fewer, they are slated to be more powerful as warmer air moving into the northeast from other regions can hold more moisture. Projected vulnerabilities within the Vermont landscape to these changes include a decrease in water and air quality as forests are impacted, an increase in precipitation and flood events, and a decrease in tourism due to impacts on fall foliage and winter recreation. It will be important to both take action to adapt to its potential impacts in order to maintain environmental health and community and economic vitality and to reduce the emissions serving as contributors to climate change.

Forests, Agricultural Lands & Wildlife Habitat

Maintaining Connectivity and Viable Working Landscapes. Inventories, mapping, prioritization and conservation strategies will be vital to reducing fragmentation, maintaining ecological linkages and maintaining healthy ecosystems and wildlife habitat. Similar strategies support important efforts to protect working forests and to keep productive land in agriculture. It will be important to work with state agencies and conservation organizations conducting inventories and mapping and with willing landowners interested in conserving their properties and preserving fragile and unique habitats. Equally important will be continuing to support municipalities in developing habitat, forest and agricultural-based protection priorities and in identifying regulatory and non-regulatory actions to make progress towards these goals. Maintaining habitat connectivity and large forest blocks is also a climate change adaptation strategy in allowing fish and wildlife to move, and can serve as the Region's best "insurance policy" in mitigating its impacts on environmental health.

Environmental Education. There is a need for continued and enhanced environmental education offered in the Region to strive for a broader public understanding. A more comprehensive understanding of complex environmental issues and the connections between economic prosperity, community vitality, and environmental health will benefit greatly future land use planning and decision-making. State-wide, community and school-based learning opportunities, such as using the forest as a classroom, are all vital to this effort.

Outdoor Recreation & Scenic Resources

Increase in Trail Usage The 2014-2018 State Comprehensive Outdoor Recreation Plan made note of an increase in membership in almost all trail-based organizations in the State, many of which are based here in Central Vermont. Increases in mountain biking and ATV riding organization membership were specifically highlighted. According to data presented, demand for outdoor recreation in Vermont is highest for road and trail-based activities (walking, skiing/backcountry skiing, sightseeing/driving for pleasure, hiking, snowshoeing, and bicycling). This increase in uses may underscore the need for continued and expanded educational efforts on low-impact recreation principles (i.e. Leave No Trace), respecting public and private property and trail etiquette.

Coordinated Outdoor Recreation Planning and Promotion. Central Vermont has a wealth of both commercial and public outdoor recreation assets including hiking, mountain biking, road cycling, hunting, fishing, skiing, boating and disc golf scattered throughout the Region. There is opportunity for both a more coordinated approach to recreation planning that could increase connections between the various trails, recreational areas and communities and for more coordinated marketing of these assets that provides a one-stop web resource with accompanying publications and makes Regional information more readily available to visitors and residents.

Conflicting Uses for Public Lands. Public recreational areas and trails are under increasing pressure to serve more needs and uses as preferences shift or certain types of recreation gain new popularity. A few examples include simultaneous use of a trail by hikers and mountain-bikers which can create certain safety hazards or that some uses may require higher levels of ongoing trail maintenance than others. For those visitors or residents who take to trails seeking remoteness in nature or solitude, encounters with motorized uses may

degrade the quality of the user experience. Limited budgets, limited amounts of land and the growing number of users present challenges in satisfying all user groups. However, these increases in demand present a need for increased involvement of more user groups in the long-range planning processes for these public land units to balance environmental, economic and social considerations and for additional management strategies to mitigate conflicts.

Incremental Rural Development and Infrastructure Siting. Broader development patterns and types occurring in the Region and other factors that are impacting scenic resources and aesthetic values include: scattered rural residential development, climate change, and related impacts on forests (including foliage impacts). Maintenance of designated scenic viewing areas is another consideration as vegetation in the foreground can overgrow designated vistas and mask panoramic views. The proliferation of telecommunication towers on hilltops and ridgelines underscores the need to balance broadband expansion with scenic preservation goals. Development of commercial-scale solar arrays or wind farms bring similar considerations. Implementation of siting and design guidelines for this infrastructure, as well as discussions regarding what significant local resources deserve extra protection or aesthetic consideration are both important next steps in addressing these issues.

Goal 1: Conservation and protection of surface and groundwater resources.

1. Encourage the improved identification and mapping of surface and groundwater resources.

    a. Work with State and Federal partners, such as U.S. Geological Survey, VT Geological Survey, and the Agency of Natural Resources in delineating groundwater supply, aquifers, and groundwater protection areas.

    b. Support towns in identifying wetlands and vernal pools that are not already mapped by the State of Vermont.

2. Support the betterment of surface water quality in the Region

    a. Assist and conduct outreach to municipalities and partner with state agencies in implementation of proposed actions to reduce pollutants outlined in the Lake Champlain Total Maximum Daily Load for phosphorous, including those regarding: agricultural practices, transportation infrastructure, river corridor protection, and efforts to limit stormwater runoff in developed areas.

    b. Native vegetated buffer strips in riparian zones and shoreland areas should be protected or maintained according to Best Management Practices outlined in the Vermont *Handbook for Shoreland Development* and *VT ANR Guidance Regarding Riparian Buffers* to protect functional habitat and improve water quality.

    c. Encourage towns to collaborate with organizations such as the Friends of the Winooski River to engage volunteers in watershed protection and restoration efforts, including various types of water quality monitoring.

    d. Encourage towns to support the work of Natural Resource Conservation Districts by encouraging their constituents' voluntary participation in conservation programs and helping to identify resource priorities in Central Vermont on a yearly basis.

    e. Encourage and assist with the acquisition of conservation easements along waterways according to priorities identified in River Corridor Plans

f. Disseminate information regarding guidelines for failed septic systems put forth by the Vermont Agency of Natural Resources and financial resources for repair or replacement.

g. Encourage application and implementation of wastewater treatment technologies that will help protect and improve water quality.

h. Support efforts to educate about invasive species. Support efforts to contain and mitigate the spread of riparian and aquatic invasive species. Assist towns in applying for grants, such as the Vermont Aquatic Nuisance Species Grant-in-Aid program, to combat aquatic invasive species.

i. Encourage the preservation of wetlands so as to protect their function and productivity. Efforts (including consideration of site design options) should be made to mitigate against the possible adverse impacts of development on the Region's wetlands.

j. ~~Encourage and support the redevelopment of brownfields by continuing to pursue funding to facilitate assessment and clean-up of contaminated properties and redesign as appropriate.~~

k. Assist with and support efforts to remove dams that are not serving a useful purpose and other artificial barriers from rivers and streams. Help identify dams that are ~~no longer useful or safe~~not serving a useful purpose and that should be listed for removal in conformance with state and federal rules and regulations.

3. Protect ground water quality and ensure adequate, safe drinking water supply.

a. Through participation in state permitting processes, require hazardous waste to be disposed of properly (in accordance with State and Federal regulations, etc.) to prevent any degradation of groundwater.

b. Encourage and support all towns to maintain or create regulations to ensure that land use near ground water sources will not contaminate public water supplies or wells.

c. Support towns in applying for funding sources to better their groundwater quality, such as VT Ecosystem Restoration Grants.

4. Encourage watershed based cooperation of towns and organizations representing people that live, work, and recreate in the watershed. Partner with and assist towns and organizations in implementing the Winooski River Basin Water Quality Management Plan and in keeping it current by helping to identify issues and high

Commented [KM1]: There is no reference to Brownfields in narrative of the Env. & Natural Resources element. It was recommended we strike from this section and leave the strategies related to Brownfields to the economic and land use elements.

Commented [KM2]: Revised per comment that the strategy reads as though we should assist with and support efforts to remove ALL dams.

priority projects.

a. Convene a mini-conference of town officials, government agencies and non-profit organizations that looks specifically at ways the towns could cooperate and coordinate to improve water quality and contribute to the Lake Champlain Total Maximum Daily Load for phosphorous goals.

5. Encourage enhanced educational opportunities on watershed functions, protection and restoration, particularly those targeted to youth.

a. Develop a clearinghouse of resources that could be used by teachers and other groups working with youth to provide education on these topics

Goal 2: Mitigation of, and adaptation to flooding in the Region.

6. Avoid or limit development and investment in identified flood hazard areas, where feasible.

a. Continue to conduct outreach to municipalities regarding the most recent state River Corridor maps as delineated by the VT Agency of Natural Resources and their implications.

b. Encourage and provide technical assistance to municipalities in enhancing the regulatory standards in their municipal flood hazard regulations, including the incorporation of River Corridor regulations.

c. New buildings within mapped floodways as identified on FEMA Flood Insurance Rate Maps shall be prohibited, except where a substantial public benefit is provided.

d. Wetlands that provide a flood storage function as determined by the VT Wetlands Program should be left undisturbed or development should be required to provide compensatory storage or restoration on-site or in the immediate vicinity, if disturbed.

e. Assist municipalities in identifying and limiting development on lands adjacent to waterways that provide flood storage or other beneficial function through acquisition, easement, deed restriction or zoning that encourages cluster design, particularly for those upstream floodplains that provide flood protection functions for the Region's downtowns and village centers.

Commented [KM3]: Added per recommendation received from VNRC on 2/26.

7. Support stream bank and shoreland restoration and stabilization efforts.

    a. Assist landowners in identifying funding opportunities to support buffer plantings on their properties that would support stream bank and shoreland restoration.

8. Continue assessment and encourage replacement, removal or repair of dams and culverts, bridges, or other transportation infrastructure that may contribute to destabilization of the waterway. Ensure that consideration is given to impacts on downstream structures and properties.

9. Promote better stormwater management throughout the Region's watersheds.

    a. Municipal regulations should include requirements to preserve existing vegetated areas, increase canopy cover and limit clearing in the development process through regulatory techniques, such as use of building envelopes to preserve vegetation or setting aside a percentage of open space.

    b. Structural best management practices (BMP's) should be used, as appropriate, to control stormwater on new development sites before, during and after construction, including plans for long term maintenance and operations. Objectives and applications include:

        - Stormwater retention: wet ponds, artificial wetlands;
        - Stormwater detention: dry basins;
        - Stormwater filtering: bio-retention, sand filters, compost filters;
        - Stormwater velocity control: filter strips, grassed swales, rock swales;
        - Erosion control: construction schedule, seeding/mulching, check dams, runoff diversions;
        - Sediment control: sediment basins/traps, filter fabric/silt fences, hay bales, inlet protection; and
        - Infiltration: infiltration basins, trenches, dry well, leaching catch basins, infiltration islands, pervious surfaces.

    c. Municipalities should consider adopting policies and practices to reduce the volume and impacts of stormwater runoff, including:

        - Adhering to standards set forth in the updated Vermont Stormwater Manual with regards to development and redevelopment.
        - Encouraging stormwater management through the use of BMP's (as outlined in strategy b) in local plans, zoning bylaws, and building permits;
        - Minimizing zoning setbacks to allow for shorter driveways, shared driveways, and access management;

- Instituting maximum, as well as minimum, parking ratio requirements in local bylaws to prevent "overbuilt" parking lots;
- Allowing for shared parking facilities in local bylaws;
- Minimizing development impacts in high elevation and steep slope areas via local bylaws;
- Properly sizing, setting and maintaining culverts;
- Properly maintaining ditches on dirt roads to slow runoff and filter sediments as per the "Road Design and Maintenance Handbook" published by the Vermont Local Roads Program;
- Separating combined stormwater/sewer systems (CSO's) which can discharge raw sewage to surface waters during high runoff events; and
- Consulting and implementing Best Management Practices recommended in the "Erosion Control Prevention Manual" published by the Vermont Geological Survey.

d. Assist municipalities in applying for funding sources for the preparation of stormwater mapping and stormwater master plans and creation of stormwater utilities. Educate on the impacts and considerations of stormwater management.

10. Protect and reduce flood risk in vulnerable settlements.

a. Assist municipalities and property owners in pursuing funds for relocations, home elevations or floodproofing measures.

b. ~~Explore opportunities and partnerships for local educational campaigns and public voucher programs to encourage measures such as fuel-tank tie-downs and vent extensions and sewer line valve installations in areas prone to inundation flooding.~~

c. Redevelopment or rebuilding in flood-prone locations should add additional flood storage capacity such as new parks and open space.

d. Assist municipalities in efforts to protect or relocate critical facilities and infrastructure in vulnerable areas.

e. ~~Assist municipalities in identifying agricultural lands vulnerable to flooding and possible mitigation solutions, including encouraging buffer plantings.~~

f. Encourage, facilitate and educate on the need to document flood extents and costs of past damages in order to improve access to FEMA mitigation grant funding.

11. Identify "safer areas" for future development, where appropriate.

Commented [KM4]: Deleted per comment to trim down Flood Resilience-related strategies. Very specific or not a top priority.

Commented [KM5]: Deleted per comment to trim down Flood Resilience-related strategies. Very specific or not a top priority.

a. Encourage municipalities with downtowns, village centers or commercial districts at flood risk to identify safer growth areas in municipal plans and local hazard mitigation plans.

b. Assist municipalities with ordinance revisions and capital improvement planning to support development in preferred safer growth areas.

12. Encourage the continued assessment and monitoring of dams that may pose a threat to human safety by Federal and State agencies, municipal partners and private owners.

a. Work with partners to ensure that Emergency Action Plans are up to date for High Hazard Potential Dams as designated by the State.

b. Encourage State agencies and municipalities to consider potential impacts of dam release or dam failure to infrastructure in hazard mitigation planning.

c. Encourage formation of dam committees to address issues related to local dams of concern.

13. Improve flood resilience planning, education and outreach activities to create a citizenry aware of flood risks, potential costs, and actions that can serve to reduce risk and future property loss.

a. Continue to assist municipalities in developing local hazard mitigation plans and flood resilience elements as part of municipal plans.

b. Promote participation in FEMA's Community Rating System, where appropriate; Assist un-enrolled towns in applying for the Community Ratings System and assist towns already involved in the Community Ratings System in improving their rating.

c. ~~Publicize and share the results of the Vermont Economic Resiliency Initiative (VERI) study in Barre City and Barre Town with all municipalities in the Region to help promote flood resilience.~~

Commented [KM6]: Deleted per comment to trim down Flood Resilience-related strategies. Very specific or not a top priority.

d. Consider coordination of a multi-jurisdictional Program for Public Information, an ongoing effort to prepare, implement, and monitor a range of public information activities.

e. If requested, perform an audit of municipal web sites and communication methods and recommend additional information and communication methods that will increase local awareness of flood risks, municipal flood

resilience planning, and actions property owners and residents can take.

f. Partner with the Vermont Agency of Natural Resources to coordinate Region-wide flood resilience-related trainings targeted to real estate agents, developers, business owners and other stakeholders with interest in floodplain management.

14. Implement the goals and policies presented in the Land Use, Energy, Transportation, and Community Resources elements of this Plan that reduce the Region's contribution to the drivers of Climate Change.

Goal 3: Conservation and management of diverse natural areas and wildlife habitats.

15. Enhance mapping and identification of the location and extent of critical resource areas, contiguous wildlife habitat and corridors, and vulnerabilities of these resources.

    a. Work closely with partners such as The Nature Conservancy, the Staying Connected Initiative and Vermont Fish and Wildlife to identify areas within the Region that are sensitive to development, which contains the most recorded species, the most diverse communities, etc., and have this data for available incorporation in member town plans.

    b. Encourage the inclusion of critical resource areas information and mapping in local plans. (Municipalities should not be limited by the definitions and designations included here, as it is recognized that this Plan may not include all locally significant sites.)

16. Continue and enhance environmental and outdoor educational offerings, particularly those targeted to youth, via community and school-based learning opportunities to strive for broader public understanding of complex environmental issues and for the health and well-being of residents.

17. Protect critical resource areas. *Note: Critical resource areas include: rare, threatened and endangered species, significant natural communities, National Natural Landmarks, State-designated Natural Areas, and areas above 2,500 ft in elevation.*

    a. Promote protection of critical resource areas by educating towns and the public on their importance. Preserve critical resource areas by identifying key sites and by assisting towns in incorporating provisions in their town plans and land use regulations to protect them (and, as appropriate, restore them).

18. Protect wildlife corridors and contiguous habitat, including but not limited to deer winter habitat, wetlands, habitat for rare, threatened or endangered species and feeding and denning areas for black bears.

    a. Encourage local programs for the purchase of development rights, conservation easements or fee simple acquisition to protect contiguous areas of active~~, successional~~ or potential wildlife habitat.

    b. Development and associated infrastructure (roads, driveways, utilities, etc.) should be designed and sited in a manner to preserve contiguous areas of active~~, successional~~ or potential wildlife habitat.

    ~~b.~~c. Encourage use of use of mandatory clustering, planned unit development, variable lot sizing and/or conservation subdivision design to conserve identified wildlife corridors.

    ~~c.~~d. Support communities in working with interested landowners to foster participation in State and Federal programs such as Forest Legacy, Land and Water Conservation Fund, and the Wildlife Habitat Incentive Program.

19. Prevent the spread of terrestrial invasive species and forest pests.

    a. Work with partners to implement coordinated invasive species and forest pest education, detection, prevention and control measures.

    b. Encourage landscaping with native species over the use of non-native species, particularly in non-urban environments. Work with UVM Extension Master Gardeners on educating homeowners on the use of native trees and plants.

Goal 4: Sustainably managed natural resources and supported industries.

20. Support and encourage the protection and continued productivity of viable agricultural and forestry soils.

    a. Encourage the protection of prime and statewide agricultural soils.

    b. Assist municipalities in identifying locally significant agricultural and forest parcels and/or districts through locally and consensually developed processes, including land evaluation and site assessment programs (e.g. LESA and FLESA). Such identification can assist in establishing protection

priorities and programs.

c. Encourage use of mandatory clustering, planned unit development, or conservation subdivision design to conserve the best farmland and productive forest blocks.

d. Assist local farms in identifying options for keeping farm parcels intact and viable.

~~d.~~e. Assist forest landowners in connecting with organizations such as USDA Natural Resources Conservation Service to help them determine and meet their management objectives and improve overall forest management.

Commented [KM7]: Added per comment received at 2/10 Commission meeting.

~~e.~~f. Public improvements are considered a significant reason for farmland's metamorphosis into prime developable land. The installation of sewer or water lines, and roads across or into the immediate vicinity of agricultural parcels or primary agricultural soils can encourage the development of farmland. For this reason they require careful review. Such improvements will be discouraged unless:

- such a position would conflict with the local plan;
- the improvements are required to implement the settlement pattern goals set forth in this Plan or in that of a Central Vermont municipality;
- there is an overriding public need being served;
- adequate permanent protection is inherent in the development proposal; or
- parcels or soils affected are determined to be "not viable" for reasons of size, topography, surrounding land use, or potential productivity.

21. CVRPC recommends continuation of, and participation in, the Use Value Appraisal Program as a means to promote continuing sound management of resource lands by taxing them fairly and according to their current use.

22. Encourage and assist towns in setting up local tax stabilization programs for forestland protection.

23. Municipalities are encouraged to map the important, accessible mineral sources.

24. The extraction of sand and gravel should not be unduly detrimental to surrounding land uses or the environmental quality of the area. A reclamation plan should be included as part of any extraction proposal. Possible alternative uses should be identified in town plans.

25. Occupants of new development that encroach upon those lands identified or designated as important sources of mineral resources are encouraged to respect the rights of resource land owners to continue existing operations, and undertake appropriate expansions, according to Best Management Practices promoted by the Vermont Dept. of Environmental Conservation.

26. Implement the goals and policies presented in the Strong and Diverse Economy element of this Plan that support the entire value-chain of agriculture and forest-based industries.

27. Implement the goals and policies presented in the Energy element of this Plan that facilitate the sustainable utilization of our natural resources for renewable energy production to decrease dependence on fossil fuels.

Goal 5: Air quality that maintains attainment of the National Ambient Air Quality Standards.

28. ~~Work with~~Support State and ~~regional~~ Federal entities ~~to~~ in identifying and monitoring localized air quality impacts.

29. ~~Encourage the use of best-available technology for tracking and monitoring all emission sources within the airshed, including residential emission sources.~~

~~29.~~30. Consider the air quality impacts of any proposed development, and require air quality controls for any project that would have a substantial negative impact on regional air quality.

Goal 6: Accessible outdoor recreational opportunities and scenic resources that meet the needs of residents and visitors and respect the natural environment.

~~30.~~31. Develop public process to identify, map and monitor impacts to significant scenic resources.

~~31.~~32. Encourage siting and design of development that minimizes impacts on scenic resources.

a. Municipalities and developers are encouraged, through design and siting of structures, to make a concerted effort to preserve access to and enjoyment of scenic views for the public.

b. Unless effectively screened or clearly in the best interest of the general public, ridge line development or conspicuous development on locally

prominent landscape features is discouraged.

c. The scale and siting of new structures should be in keeping with the surrounding landscape and architecture.

d. Utility infrastructure and corridors shall be sited so as to minimize aesthetic impacts, particularly in areas of local and regional scenic importance. Wherever ~~feasible~~practicable, utility lines will be installed underground or behind structures in downtowns and village centers.~~.~~

e. Where possible, parking lots and storage areas should be well landscaped and/or otherwise located or screened out of view from transportation corridors.

f. The location of telecommunication towers is a significant aesthetic issue within the Region. Policies intended to minimize negative impact are presented in the Utilties & Facilties element of this Plan.

g. Outdoor lighting should be shielded and limited to minimum levels necessary to ensure safety and security of persons and property. Due consideration should be given to the guidelines set forth in the "Outdoor Lighting Manual for Vermont Municipalities."

h. Light sources shall be shielded and not directly visible from transportation corridors or adjacent residences. Due consideration should be given to the guidelines set forth in the "Outdoor Lighting Manual for Vermont Municipalities."

~~32.~~33. Encourage the State and municipalities to maintain existing roadside views by means of vegetation clearing, where appropriate.

~~33.~~34. Any new development should make all reasonable attempts to minimize noise pollution and shall not exceed accepted standards in residential areas.

~~34.~~35. Assess and anticipate recreational needs and identify recreational access issues specific to resources or user groups.

a. Encourage and foster the provision of diverse outdoor recreational opportunities with consideration given to the needs of the elderly, youth, disabled, and economically disadvantaged.

b. Public access to rivers, streams, lakes, ponds and recreational lands is a need in the Region. Municipalities, the State, and private groups, such as land trusts, should coordinate efforts to provide for improved recreational access to the Region's surface waters. At the same time, significant water

related natural areas should be maintained and protected, as appropriate.

c. Participate in Act 250, Section 248 and State rulemaking processes related to use of public waters within the Region to implement policies and strategies in this Plan related to water resources and recreational use.

d. New development proposals are encouraged, through design, to make an effort to preserve access to recreational areas for the general public.

e. Landowners are encouraged to voluntarily keep their lands open for public recreation and enjoyment where possible, so as to maintain the State's tradition of informal, resource based recreation on private lands.

f. Encourage participation of recreational user groups in municipal planning and long-range planning for public land units to enhance management and mitigate conflicts.

g. Participate in long-range planning for regionally significant public lands.

h. Municipalities should develop and implement strategies to protect important recreational lands.

~~35.~~36. Encourage recreational activities that focus on respect, enhancement, and education of the natural environment. Recreation and related facilities should minimize impacts on natural resources.

~~36.~~37. Support and encourage the creation and existence of intermunicipal recreation districts. (Inter-municipal districts are legal arrangements whereby a governmental entity joins with another to provide recreational facilities or services. Through these arrangements, increased opportunities may exist for municipalities to acquire or develop land, provide services, or manage an area.) Accordingly, CVRPC will continue to provide administrative and technical assistance to the Wrightsville Beach Recreation District.

~~37.~~38. Work towards and support the maintenance and development of trail and greenway networks to provide for recreational diversity, tourist amenity, habitat linkage, and low impact transportation choices.

a. Work with individual municipalities, at their request, to help plan local trails and greenways;

b. Work with groups of municipalities and/or citizens to promote the concept and development of a Regional trail, greenway, and recreation plan that connects and builds upon local initiatives;

c. Encourage the development of multi-purpose trail corridors along ~~abandoned~~ former rail beds;

Commented [KM8]: Revised per comment that there are very few "abandoned" rail beds left in the Region.

d. Encourage municipalities to maintain public access on Class IV roads and public trails for public recreational use.

e. Encourage formation and sustained efforts of local trail committees and volunteer groups to support expansion of local trail networks.

~~38.~~39. Enhance awareness and promotion of recreational resources to residents and visitors.

a. Update and distribute a Region-wide recreation map.

b. Engage with tourism promotion organizations and business groups to incorporate recreational resources into tourism promotion efforts.

~~39.~~40. Enhance the viability of existing nordic and alpine ski areas and foster their development in a manner which will enable them to remain competitive while ensuring that they will protect and co-exist with the natural, physical, and socio-economic environment.

a. Encourage equitable means of sharing external costs between ski areas and their host towns where such costs cannot be avoided.

b. Any expansion or redevelopment should be conducted in a planned, orderly manner that reflects and addresses the relationship between recreation and facility development, natural and scenic resources and historic village and settlement patterns.

c. Any expansion or redevelopment should follow appropriate trail-building techniques and practices.