CH 6: NATURAL RESOURCES

Class II Wetland in Ascutney

Background

The landscape of our Region is composed of forests, fields, surface waters, and developed lands. This rural landscape, with an abundance of natural resources, is the reason many people choose to live in or visit this region.

Changing land use patterns have resulted in ecosystem shifts and changes, affecting both wildlife and habitat. Throughout the region, the landscape has undergone shifts from an original landscape of forested land to agricultural lands in the 19th and early 20th centuries, and now back to primarily forestland. The re-establishment of forestland has significantly improved the water quality of our rivers, streams, and lakes, along with the species that depend on them. However, the loss of agricultural land has made communities within the Region less self-sufficient, requiring many food products to be imported from other regions and states.

A lack of proper planning often leads to piecemeal development that can fragment forest blocks and habitat connectors, and other wildlife habitat areas. Land use regulations that require minimum lot sizes, but do not allow for the flexibility of clustered development, may have negative impacts on ecosystems. Additionally, allowing development to encroach upon critical natural areas, such as floodplains, is not only detrimental to habitat, but also jeopardizes property, infrastructure and public safety.

Just as we plan for the connection of economic and residential centers with roads and other infrastructure, planners should provide for connectivity of wildlife habitat, in addition to protection of all critical natural resources. The following sections outline the diversity of natural resources throughout the Region, while providing policies and goals that strive to connect, integrate, and protect the landscape for balanced ecosystem sustainability.

Natural Resources Goals

Ensure the continued protection and/or restoration of the Region's significant natural resources, including forestlands, wildlife, wildlife habitat, surface water and groundwater resources, earth resources, and air quality. In order to achieve this goal, we will:

1. Promote biodiversity by minimizing development impacts on large, contiguous forest blocks and habitat connectors;

2. Protect ecosystems within which rare, threatened or endangered (RTE) species are found;

3. Promote reclassification of pristine water resources to afford further protection;

4. Protect groundwater as a public trust;

5. Maintain and improve water quality in accordance with 10 V.S.A. § 6068(a);

6. Encourage well managed extraction of mineral resources; and,

7. Ensure that drinking water supplies are safe and sufficient to meet current needs as well as the needs of future growth and development.

Agricultural Lands

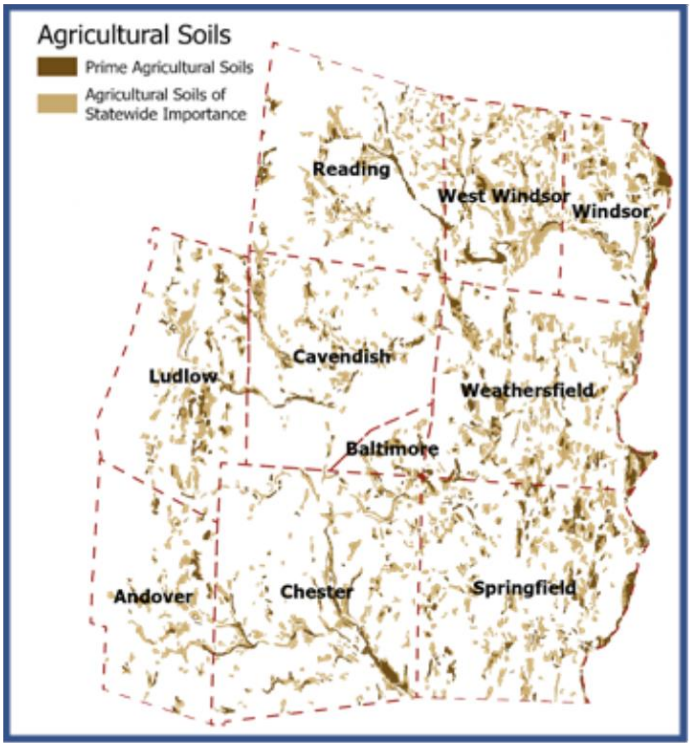
The Region and Vermont as a whole are net importers of food supplies. However, changes in the foreseeable future may require increasing local food production as transportation costs rise, the costs of petroleum and petroleum-based farm supplies increase, the western United States experiences increasingly severe water shortages, among other factors.

Some of the benefits of productive agricultural lands include:

- A more self-sufficient regional population;
- A local, stable and reliable supply of food products;
- Preservation of regional heritage and open space; and,
- Support for the tourism economy.

Prime agricultural soils should be maintained to support existing and future agricultural productivity, so as to encourage local farming and food production operations, and reduce dependency on imported food products in the Region.

Classification of Agricultural Soils



The Region has many areas identified as having prime agricultural soils (Map 7). As defined by the Natural Resource Conservation Service (NRCS), prime agricultural soils are available for use and have a combination of the best characteristics for producing food, forage, fiber, and oilseed crops. The best suited land uses for prime agricultural soils include forests, cropland, pasture, or other similar uses; but once developed, these soils lose their agricultural characteristics. Prime agricultural soils are valuable for their current and potential future farming uses. There are also many areas of agricultural soils of statewide importance throughout the Region. These soils exhibit many of the same characteristics of prime agricultural soils, but are constrained by one or more of the following: slope, erosion potential, depth to bedrock, and/or location within a mapped floodplain. Agricultural soils of statewide importance may also be valuable for their current and potential future farming uses.

Protection of Prime Agricultural Soils

Agricultural soils are a finite resource. Regenerative agricultural practices should be encouraged to the extent practicable as a means of resource preservation. Prime agricultural soil use for non-agricultural purposes is strongly discouraged. Protecting important agricultural soils, while

also encouraging smart growth, can be challenging. Many designated downtowns and village centers are located in a river valley and are surrounded by areas of prime agricultural soils and/or agricultural soils of statewide significance, which constrain future growth and development in those areas. A balance is necessary in order to protect agricultural soils, while allowing the flexibility to facilitate new growth within or adjacent to growth centers in accordance with the State Planning Goals in 24 V.S.A. §4302(c)(1).

Forest Resources

Forested land, including forest blocks and habitat connectors (Map 6), serves as a major asset to the Region. These forestlands provide a natural system of surface and groundwater filtration, stormwater retention, air purification, soil stabilization, carbon sequestration, and critical habitat for many species of native wildlife such as bobcat, bear, and deer. Vermont forests are home to a diversity of significant natural communities, Species of Greatest Conservation Need and uncommon species, along with many rare, threatened, and endangered (RTE) species. They also serve as an important economic resource for the Region. The harvest and manufacturing of forest products contributes approximately $1.4 billion to Vermont's economy annually and employs 10,555 people.[11] Forestlands form the foundation for numerous outdoor recreational activities such as walking, hiking, skiing, hunting, and camping; serve as a renewable energy resource through heat and power production; and provide the scenic qualities of an attractive natural setting for residents and visitors. Sound management of forested land takes into account all of these economically and environmentally beneficial values, and balances them for the common good.

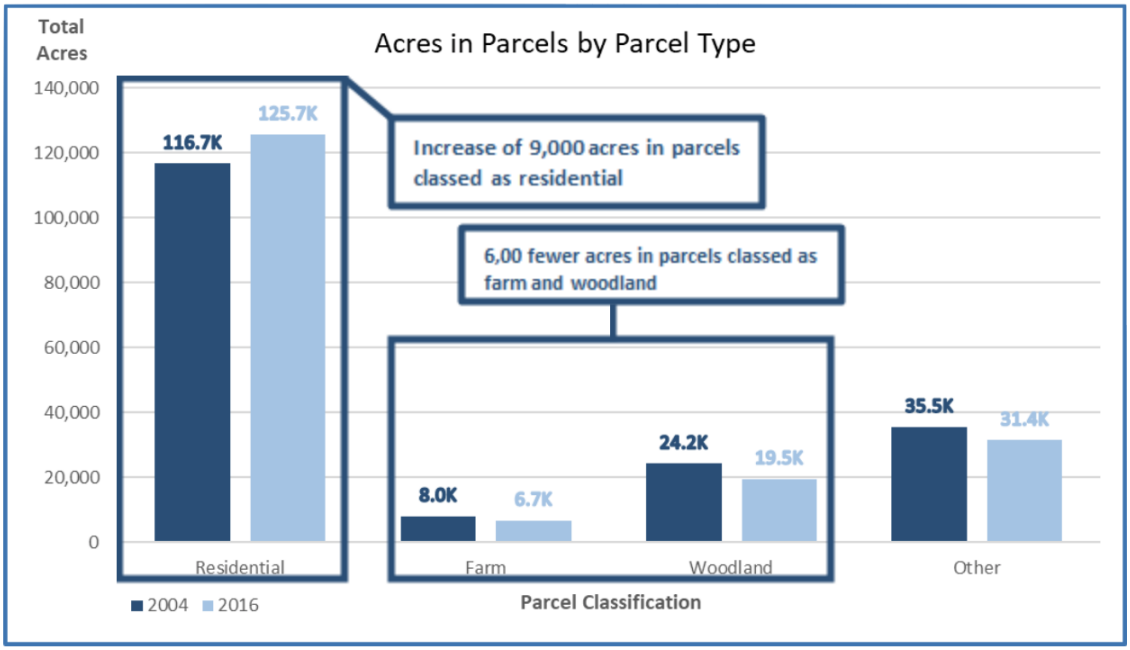
Forest Fragmentation

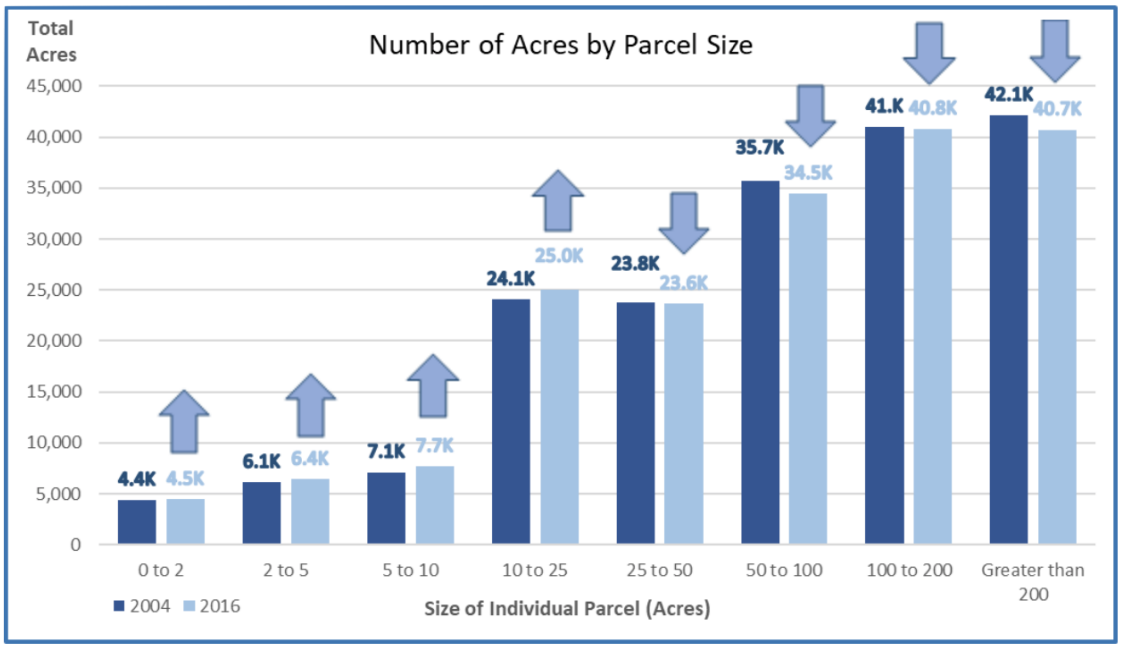
Forest fragmentation presents an increasing threat to the economic and ecological stability of forest land in the Region. As discussed in the Wildlife Section of this chapter, many of the species that drive tourism, wildlife viewing, hunting and fishing require larger, contiguous blocks of forest and a connected network of forest blocks. Even as overall forest cover remains relatively stable over time, large, contiguous forest blocks are becoming fragmented and isolated in the Region. Forest fragmentation occurs through two processes: increased residential and public infrastructure development such as roads and power lines, and parcelization. Parcelization occurs when large parcels are subdivided into smaller lots. Even if left forested, small lots in multiple ownerships can be difficult to effectively manage; recreation access can be reduced due to differing objectives of landowners; and timber production is less economically feasible. The charts below track parcelization in the Region through two metrics, parcel size and

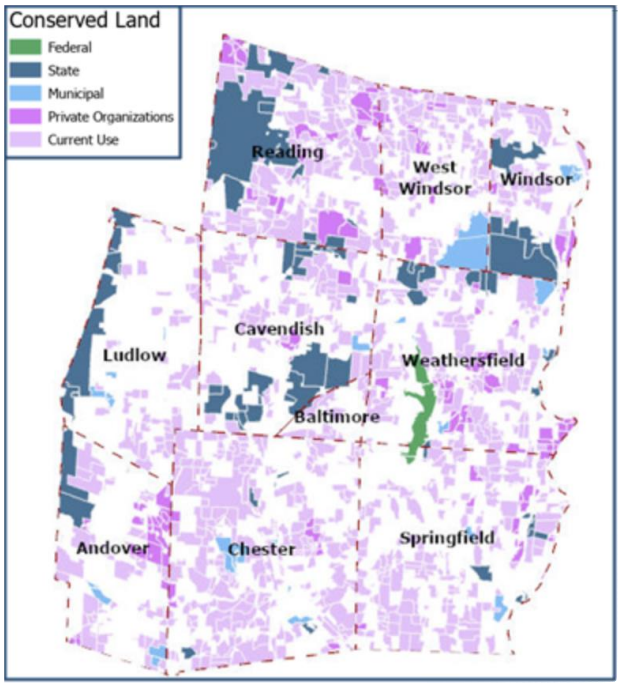
[11] Vermont Department of Forests, Parks and Recreation, *2015 Vermont Forest Fragmentation Report* (April, 2015)https://fpr.vermont.gov/sites/fpr/files/About_the_Department/News/Library/FOREST%20FRAGMENTATION_FINA L_rev06-03-15.pdf

parcel classification. Both show the same trend: fewer large parcels dedicated to forestry and farming and more, smaller residential lots.

Connectivity between forest blocks (Map 6) is also of vital importance. The ability for wildlife to readily move across the landscape preserves genetic diversity through the exchange of genes between populations, allows species to better adapt to climate change impacts, among other benefits. The Mount Ascutney corridor represents a particularly important habitat connector as one of only a handful of crossings between Vermont and New Hampshire and should therefore be a focus of conservation efforts in the Region. Other important regional corridors include the Connecticut River Corridor and another wildlife corridor which runs north to south along the central and western parts of the Region (see Map 6).







Sources: VCGI, VT Dept of Taxes

Conserved Forestland

In addition to several town forests and land owned by the U.S. Army Corps of Engineers, a large amount of forestland in the Region is owned by the State of Vermont and managed in a variety of ways. Unlike Vermont State Parks, which focus equally on recreation and conservation, Wildlife Management Areas (WMAs) are managed primarily to benefit Most of the forested land in the Region is in private ownership. Vermont's Use Value Appraisal (or Current Use) Program requires landowners to implement land management plans and has been successful in facilitating sound management of a large portion of private forest and farmland in the Region.

Exotic Invasive Species

Exotic invasive species are non-native plants and animals that invade and alter both natural and managed areas. When they are free from natural predators, exotic invasives persist and proliferate to the detriment of native plants and animals. Not all non-native plants are invasive and not all invasive plants are non-native.

Exotic invasive species have come to the Region through a variety of sources, including ornamental plant trade, conservation plantings, and agricultural operations. The threat of exotic invasive species to forest, open land, and riparian areas in the Region is ongoing.

Below is a diagram including many of the invasive species in the Region. For additional information regarding invasive species, please visit https://www.vtinvasives.org/.


ASH YELLOWS
Candidatus Phytoplasma fraxini
BALSAM WOOLLY ADELGID
Adelges piceae
BEECH LEAF DISEASE
Litylenchus crenatae mccannii
BUTTERNUT CANKER
Sirococcus clavigignenti-juglandacearum
FOREST PESTS
ASIAN LONG-HORNED BEETLE
Anoplophora glabripennis
BEECH BARK DISEASE
Cryptococcus fagisuga and Neonectria spp.
EMERALD ASH BORER
Agrilus planipennis
DUTCH ELM DISEASE
Ophiostoma novo-ulmi
The Asian Long-Horned Beetle threatens hardwood trees. This poses a threat to recreation and forest resources (like maple syrup production).
Beech Trees are an important part of the Northern Hardwood Forest. Forest animals rely on beech nuts as a vital food source.
Ash trees infested with emerald ash borer will die. This poses a threat to Vermont;s economy and ecology, as 5% of Vermont's trees are Ash.
Most American Elm trees have been eradicated because of Dutch Elm Disease. Trees can still be found in forests, but often succumb to the disease after producing seeds.
CHESTNUT BLIGHT
Cryphonectria parasitica
ELONGATE HEMLOCK SCALE
Fiorinia externa Ferris
GYPSY MOTH
Lymantria dispar
HEMLOCK WOOLY ADELGID
Adelges tsugae
OAK WILT
Bretziella fagacearum
JUMPING WORMS
Pheretimoids
PEAR THRIPS
Taeniothrips inconsequens
SPOTTED LANTERN FLY
Lycorma delicatula
RED PINE SCALE
Matsucoccus matsumurae
Jumping Worms alter the soil of the forest floor leading to a reduction of organic matter, and some seed banks. Their presence may also alter the spread of other invasive species.
SIREX WOOD WASP
Sirex noctilio
Spotted Lantern Flies remove sap which reduces photosynthesis, weakening the plant. Adult flies secrete honeydew which allows the growth of fungus on the leaves, stems, and fruit.
THOUSAND CANKER DISEASE
Geosmithia morbida sp. nov
WHITE PINE BLISTER RUST
Cronartium ribicola
WINTER MOTH
Operophtera brumata


AMUR MAPLE
Acer ginnala
AUTUMN OLIVE
Elaeagnus umbellata
JAPANESE BARBERRY
Berberis thunbergii
ASIATIC BITTERSWEET
Celastrus orbiculatus
BLACK LOCUST
Robinia pseudoacacia
COMMON BARBERRY
Berberis vulgaris
Barberry displaces native plants and reduced wildlife habitat and forage. Barberry is a host to deer ticks, which can transmit Lyme disease. The plant can also alter soil pH.
COMMON REED
Phragmites australis
Common Reed replaces native flora. It does not provide a quality habitat for insects, birds of amphibians. The root systems are tired to the death of nearby native root systems.
BORDER PRIVET
Ligustrum obtusifolium
GIANT HOGSWEED
Heracleum mantegazzianum
Giant Hogsweed grows rapidly and displaces native plants. The plant leaves the ground bare in winter, making it open to erosion. The sap is dangerous to human skin.
COMMON BUCKTHORN
Rhamnus cathartica
GLOSSY BUCKTHRON
Frangula alnus
BURNING BUSH
Euonymus alatus
BUTTERBURS SWEET COLTSFOOT
Petasites hybridus
CYPRUS SPURGE
Euphorbia cyparissias
DAME'S ROCKET
Hesperis matronalis
EUROPEAN ALDER
Alnus glutinosa
EUROPEAN SPINDLE-TREE
Euonymus europaeus
FALSE INDIGO
Amorpha fruticosa
FALSE SPIRAEA
Sorbaria sorbifolia
GARLIC MUSTARD
Alliaria petiolata
GOUTWEED
Aegopodium podagraria
TERRESTRIAL PLANTS
JAPANESE KNOTWEED
Fallopia japonica
Knotweeds form thick dense stands and can crowd out native vegetation. The masses can clog waterways and increase erosion, lovering habitat for wildlife. They are difficult to eradicate.
MULTIFLORA ROSE
Rosa multiflora
Multiflora Rose forms dense thickets that crowds out native plant species. Spread through a variety of methods, this plant can grow in many types of conditions.
HIMALAYAN BALSAM
Impatiens glandulifera
VINE HONEYSUCKLE
Lonicera japonica
DWARF SHRUB HONEYSUCKLE
Lonicera xylosteum
JAPANESE HOPS
Humulus japonicus
JAPANESE STILTGRASS
Microstegium vimineum
GIANT KNOTWEED
Fallopia sachalinensis
MILE-A MINUTE VINE
Persicaria perfoliata
NARROW- LEAVED BITTER-CRESS
Cardamine impatiens
NORWAY MAPLE
Acer platanoides
PORCELAINBERRY
Ampelopsis brevipedunculata
PRINCESS TREE
Paulownia tomentosa
TREE OF HEAVEN
Ailanthus altissima
Tree of Heaven forms dense thickets that crowd out native species. They are extremely tolerant of harsh conditions, and can easily invade forests and cause habitat change.
REED CANARY GRASS
Phalaris arundinacea
REED MANNA GRASS
Glyceria maxima
RUSSIAN OLIVE
Elaeagnus angustifolia
SPOTTED KNAPWEED
Centaurea stoebe
BLACK SWALLOWWORT
Cynanchum louiseae
PALE SWALLOWWORT
Cynanchum rossicum
WALL-LETTUCE
Mycelis muralis
WHITE POPLAR
Populus alba
WILD PARSNIP
Pastinaca sativa
YELLOW FLAG IRIS
Iris pseudacorus

Wildlife Resources

The landscape of the Region includes a variety of natural resources such as rivers, lakes, forests, and wetlands that provide habitat for numerous wildlife species. Planning for the preservation of wildlife habitat is critically important for the continued survival of wildlife species in the Region. In addition to providing habitat and creating economic opportunities, lands that are left undeveloped contribute to the rural character of the Region.

Habitat

A diversity of habitat types is necessary for the continued existence of the various fish and wildlife species that inhabit the Region. A major detriment to wildlife survival rates and proliferation is the impact of human development on the natural environment. Although most development in the Region is done on a relatively small scale, it can have a significant cumulative impact on wildlife habitat. As people move to the Region, development of new single-family housing outside of growth centers is increasing. This growth pressure in rural areas is having a detrimental impact on large, contiguous blocks of wildlife habitat, including forest and connectivity blocks, fields and other open spaces. Scattered, small-scale development causes fragmentation of these habitat areas, potentially degrading or eliminating the land needed to support certain species. A diversity of healthy populations can only be achieved through maintaining variety in the types of wildlife habitat available. Conservation of a diverse mix of natural areas and attention to connections between large tracts of wildlife habitat is necessary for a diverse and healthy wildlife population to survive and flourish. The following sections describe some important habitat types that may be found in the Region.

Large mammals such as moose, bear, deer, bobcat, and a variety of other species, such as wild turkeys and grouse, rely on large contiguous areas of forests, fields and other undeveloped lands for food, shelter, breeding grounds and migratory stop-overs. Fragmentation of such land can result in decreases in the number of species, as well as population sizes. A variety of songbirds reside in wooded areas that are characterized by less intense human use.

Mast

Mast is high-energy food, including seeds, nuts, and berries, produced by certain trees and shrubs, such as beech and oak. Mast production areas provide critical fall feeding areas for a number of wildlife species, such as bear, deer and grouse. Mature oak and beech stands are the most important mast production areas for wildlife and shall be preserved whenever possible.

Deer Wintering Areas

During winter months, deer tend to congregate in coniferous forests along westerly and southernly slopes where they are protected from wind and cold temperatures. The greatest limitation to the size of the deer herd in the state is the quality and availability of wintering habitat. Identified deer wintering areas should be afforded protection to the extent feasible.

Aquatic Habitat

A variety of aquatic habitats are necessary to sustain different aquatic species. Many fish species in Vermont have lost habitat due to increased development along rivers, streams and lakes. One of the greatest threats to fish habitat is nonpoint source sediment pollution, caused by channel/bank erosion and mismanaged highway runoff, among other sources. Riparian buffers of natural vegetation along waterways, green stormwater infrastructure/low impact development practices, and proper highway maintenance (such as armoring drainage ditches and proper highway crowning) can help mitigate some of these impacts.

Development sometimes results in loss of buffer vegetation, which can facilitate thermal stress (increased water temperatures), among other issues. Certain fish species, such as trout and salmon, require cold-water habitat, and share the need for well oxygenated, free-flowing water with few blockages, as well as gravel streambeds for spawning. Small, cold headwater streams serve as the most productive habitat for wild trout. These streams remain cool throughout the summer season, and generally have been minimally altered by land and water development activities. Headwater streams throughout the Region should be considered for reclassification to Class A(1) where supporting data exists in order to afford them further protection.

Hydroelectric facilities (hydro-dams) inhibit aquatic organism passage (AOP), and often restrict migratory fish species from accessing critical spawning habitat. Mitigation measures often include installation of fish ladders or elevators to allow upstream passage to spawning habitat. Provision and maintenance of this passage infrastructure is generally a condition of the facilities' operating license.

Smaller barriers to AOP are far more common. Stream crossing culverts often outlet above the water surface elevation at the downstream end, preventing upstream passage for some or all species and life-stages. Replacing these culverts with structures of adequate size and appropriate grade allow aquatic species to access the upstream portion of the habitat. In addition, removing small, dated dams that serve no functional purpose along smaller rivers and streams is a common and effective means to restore aquatic passage, and should be encouraged when feasible.

Rare, Threatened and Endangered Species; and Significant Communities

Rare, threatened, and endangered (RTE) plant and animal species and significant communities are identified throughout the Region. The Vermont Department of Fish and Wildlife's Nongame and Natural Heritage Program has identified and mapped RTE species, and significant natural communities throughout the State. These habitat areas/natural communities have been identified by points on the map, but do not reveal which species reside there (as a protective measure) (**Appendix A – Map___)**. Development should not negatively impact these areas. The Vermont Department of Fish and Wildlife should be consulted to determine if these areas have

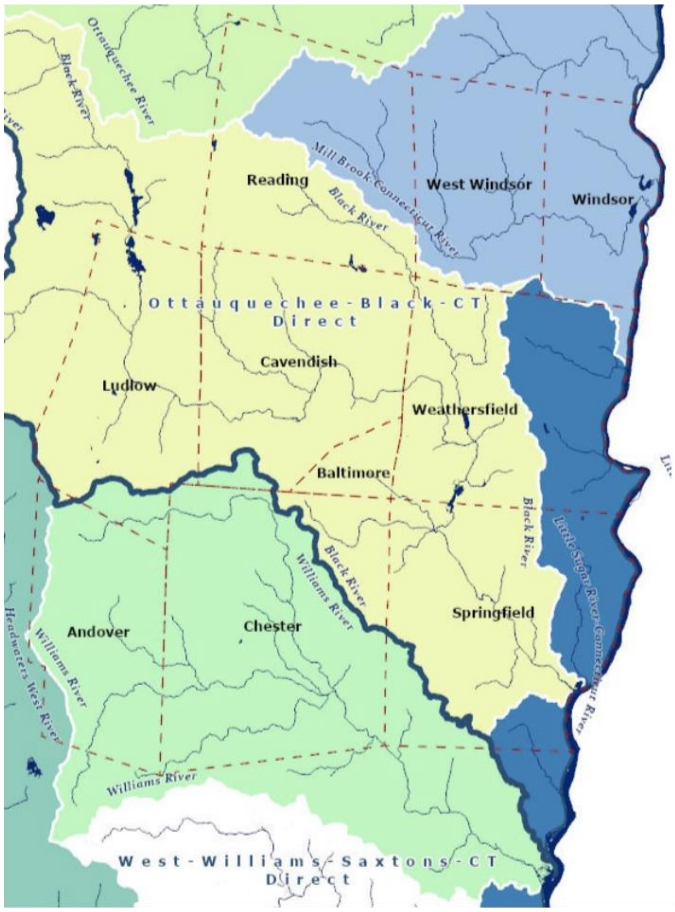
practical conservation value for the community based on potential, continued or historical presence and/or regular recurrence at a given location.

Water Resources

Lakes, ponds, rivers, streams, wetlands, and clean drinking water sources are all important elements of a healthy ecosystem. Surface waters provide habitat for fish and other aquatic species and are recreational resources for swimming, paddling sports, and fishing. Naturally vegetated buffers along rivers provide natural greenway corridors that connect networks of wildlife across the Region. Wetlands are important for habitat, natural water pollution abatement, flood control, and recharge of surface and ground water.

Groundwater is the primary source for most residential and municipal water supply systems in the Region, and has many points of exchange both to and from surface waters. Water resources can easily be degraded if not properly managed. Development and other human activity can adversely affect surface water, groundwater, and wetlands through direct and indirect pollution discharges caused by a variety of land use activities. Many of the Region's larger rivers serve as mixing zones for dilution of treated wastewater effluent.

Basins, Watersheds and Tactical Basin Planning



The Region is situated within the Connecticut River watershed, and sits within three basins, as defined by the State: The Black River (Basin 10), the Williams River (Basin 11), and the Lower Connecticut River (Basin 13). Each of the three major drainage basins in the Region are depicted in the map to the left. Basins also include a number of sub-basins (i.e., Mill Brook within Basin 10). Tactical Basin Plans must be developed by the Vermont Department of Environmental Conservation for each basin and must be updated every five years, pursuant to 10 V.S.A. § 1253. Basin Plans provide an overall view of the health of the waters in the Basin and define ongoing and future actions to address high-priority stressors. The Department also prepares biological assessment reports for each basin roughly every five years. These assessment reports summarize chemical, physical and biological monitoring data and help inform the development of Basin Plans.

In June 2018, the Basin 10 Plan was adopted by ANR and remains in effect until 2023. The Basin 11/13 Plan was adopted in January 2015, and is set to expire in 2021. The new plan is under development as of the adoption date of this Regional Plan.

Regional Planning Commissions, Natural Resources Conservation Districts, and local watershed groups assist in the development of Basin Plans. Regional Planning Commissions are responsible for ensuring conformance between Basin Plans and Regional Plans.

Surface Waters and Water Quality

The Region's surface water resources consist of ponds, lakes, rivers, streams and wetlands which offer a variety of uses, such as recreation; wildlife habitat; food supply; commercial, industrial, and domestic use; and public drinking water supply. The major lakes and ponds in the Region include Lake Rescue, Stoughton Pond, Mill Pond, Knapp Pond, North Springfield Reservoir, and Lake Runnemede. The largest rivers in the Region include the Connecticut (serving as the border

between New Hampshire and Vermont), Black, and Williams Rivers. Major streams in the Region include Mill Brook, Twentymile Stream, Jewell Brook, and Tracer Brook.

The State is required to list impaired waters on the 303(d) List of Impaired Waters. Impairment is defined by the Vermont Water Quality Standards (VWQS). The State is required to address impaired waters through issuance of a Total Maximum Daily Load (TMDL) plan, which specifies the maximum allowable daily amount of a given pollutant the impaired water can receive to achieve compliance with the VWQS. As of the adoption date of this Regional Plan, there are no stream segments within the Region included on the 303(d) List. However, the Connecticut (CT) River, which flows north to south along the eastern border of the Region, is listed as impaired by the State of Vermont due to flow alteration as a result of hydroelectric facility operations. The CT River is also listed as impaired by the State of New Hampshire due to high pH levels resulting in low dissolved oxygen concentrations in the Long Island Sound.

Most point-source discharge pollution problems in the state have been addressed through the construction of municipally owned and operated wastewater treatment facilities, as well as regulation of industrial discharges. However, non-point source pollution continues to be an issue throughout the Region and State. The most common sources of non-point source pollution include agricultural runoff, channel and streambank erosion, removal of riparian vegetation, flow modification, developed land runoff, and highway runoff. These various stressors result in thermal modification, organic enrichment or low dissolved oxygen concentrations, and excess sediment and nutrient loading.

Town highway runoff is a significant contributor to water quality impacts throughout the Region. If proper highway maintenance practices are not in place, stormwater runoff can erode the road surface and drainage network, particularly along gravel roads, which can lead to sediment and nutrient pollution. This scenario also contributes to road failure events and increased highway maintenance costs. In an effort to address town highway runoff impacts on water quality, the Vermont Department of Environmental Conservation issued the Municipal Roads General Permit (MRGP) as an element of the 2015 passage of Act 64 (Vermont Clean Water Act). The MRGP regulates stormwater discharges from town highways to surface waters. For a more in-depth discussion of the MRGP and its associated requirements, please see the Regional Transportation Plan.

Wastewater treatment facilities can also degrade water quality if effluent treatment is insufficient, or if adequate infrastructure is not in place to treat certain nutrients, such as phosphorus. The ability of rivers and streams to dilute effluent from treatment facilities is predicated on in-stream flow and depth. For this and many other reasons, water withdrawal from rivers and streams can have a negative impact on water quality and associated habitat, and must be evaluated before a withdrawal permit can be issued.

Pollutants can also be carried into rivers and streams via precipitation. For years, there have been statewide fish consumption advisories for mercury content as a result of atmospheric

deposition.[12] The advisory guidelines are more stringent for the consumption of lake trout and walleye, especially for women of childbearing age, but suggest limits on consumption of all fish for all segments of the population. Atmospheric deposition cannot be effectively controlled at the local, regional, or state level.

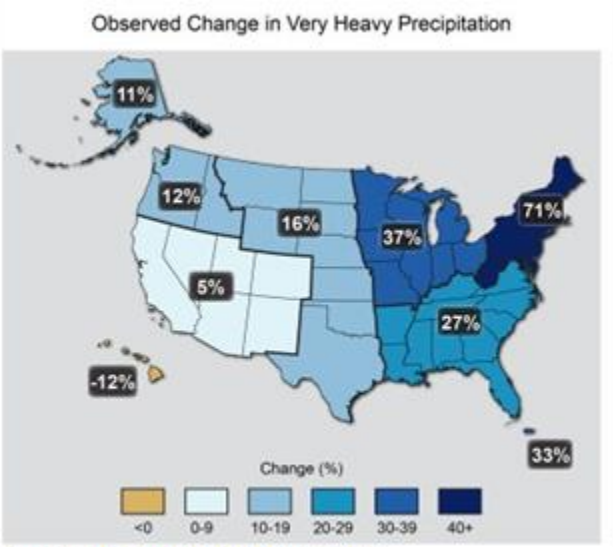
Surface water quality is also significantly impacted by flooding events. Flood waters often carry large woody and solid debris, soil and farm runoff, and other pollutants. A lack of floodplain access as a result of berms and incised channels is a major catalyst for fluvial erosion and associated sediment and nutrient pollution. Please see the Flood Resilience Section below for a more in-depth discussion of flooding and its impacts.

[12] Atmospheric deposition is the process, long recognized by scientists, whereby precipitation (rain, snow, fog), particles, aerosols, and gases move from the atmosphere to the earth's surface. Source: Atmospheric Deposition (maryland.gov)

Flood Resilience

The purpose of this section is to further the State Planning Goal of encouraging flood resilient communities and to address the requirements of 24 V.S.A. §4348a(a)(11). Flood and fluvial erosion hazard areas, as described in this section, are shown on Map 1. Water Resources.

Increased Risk of Flooding:



Source: globalexchange.gov, 2014

Flooding is one of the primary natural disasters in Vermont. Accordingly, flooding is identified as one of the most significant natural hazard events in all ten of the MARC member towns' *Local Hazard Mitigation Plans*. In addition, weather patterns are changing and predicted future climate conditions include increasing average temperatures, an overall increase in precipitation, less snowpack and shorter/more intense rainfall events. As a result, it is imperative that communities evaluate their flood resilience as a significant amount of the built environment is within or near flood or fluvial erosion hazard areas, and municipal culvert and stormwater networks may not be adequately sized for these future conditions. The legislature recognized this fact and acted upon it by passing Act 16 in 2013.

Types of Flooding:


River Corridor. Source: floodready.vermont.gov.

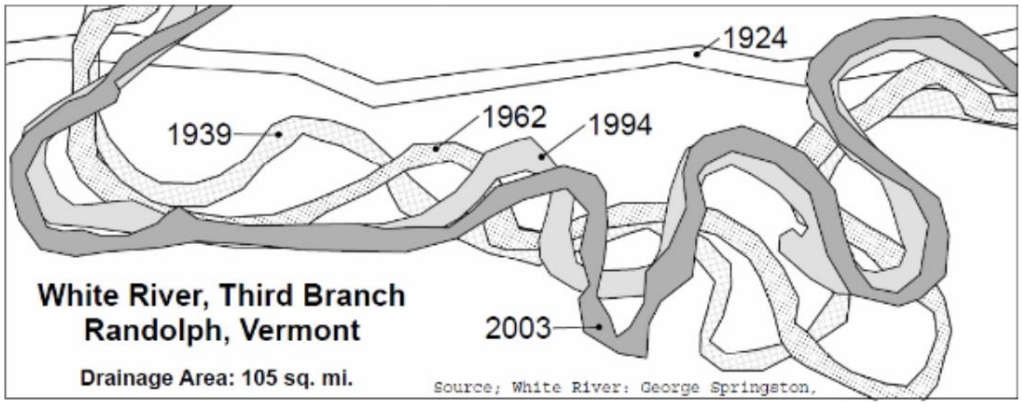
Inundation Flooding, or overbank flooding, occurs when a stream channel or waterbody receives a significant amount of rain or snow melt from its watershed, or when the stream channel is blocked by a debris or ice jam. The excess water spills out onto or inundates the floodplain. This type of flooding can occur slowly or in a short duration; flood waters can cover a small area or a large area.

Fluvial Erosion is when a river, stream, or brook shifts laterally during a high flow event by eroding its banks. This type of flood hazard is not recognized on the FEMA maps discussed below. The region experienced significant, widespread damage from Tropical Storm Irene (2011). The majority of the damage was a result of fluvial erosion rather than inundation flooding. As a result, the State established statewide "River Corridors," which include the anticipated meander belt of a river and a fifty-foot buffer as shown in the graphic above. River Corridor is defined in Vermont statute as follows:

> "River Corridor" means the land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition, as that term is defined in section 1422 of this title, and for minimization of fluvial erosion hazards, as delineated by the Agency of Natural Resources in accordance with river corridor protection procedures. 10 V.S.A. Chapter 32 § 752.

In Vermont, most flood-related damage occurs outside the Special Flood Hazard Areas. Much of the damage is due to the erosive power of water causing damage to critical public infrastructure such as roads and stream-crossings. Homes, businesses, and community buildings have also been damaged by fluvial erosion. Where stream meanders are confined by human activity, streams fall out of an equilibrium condition and become steepened, straighter and more erosive. The more powerful the stream-flow, the higher the risk for damage.

Today, most streams in Vermont are not in an equilibrium condition, because riparian development, channelization practices, and other historic land uses have prevented the river from assuming its most stable natural shape (meander pattern, slope, channel width and depth, sediment bars, etc.). Vermont communities can choose to limit additional encroachment within the mapped River Corridor. Doing so can help streams dissipate erosive energy in undeveloped areas and help prevent flood damage to existing riparian development from progressing. On the other hand, it is important to note that while the River Corridor protects the stream's ability to establish and maintain equilibrium, the boundaries of the River Corridor do not predict where the stream will actually go. The River Corridor is not a predictive model, and in response to existing encroachments and recent channelization practices, most streams in Vermont are not in a dynamic equilibrium condition.



Source: Flood Ready VT

The river corridor includes both the channel and the adjacent land. The purpose of the zone is to identify the space a river needs to re-establish and maintain stable "equilibrium" conditions. In other words, if the river has access to floodplain and meander area within this corridor, the dangers of fluvial erosion can be reduced over time. River corridor maps are delineated based on scientific, location-specific assessment of the geomorphic (or physical) condition of a river.

The Vermont Rivers Program has designed protocols to evaluate river conditions all over the state. The resulting data are used to map meander belt widths. One can think of this belt width as the particular "wiggle room" a river needs to find its most stable path down the valley, while efficiently moving and storing its sediment load. The shape and width of the meander belt varies with valley shape, surficial geology (e.g., bedrock, glacial lake sand), and the natural channel length, slope, and width. The lower the slope and the broader the valley, the more sinuous a river will likely be, in a natural setting. Rivers that have been historically straightened or encroached upon lose their natural stability when they lose their meanders and floodplain access. Given an appropriate amount of lateral space, an unstable river can eventually develop a stable meander pattern. Meanders may shift within the corridor over time, but the river will be less susceptible to dramatic channel adjustments and accelerated erosion.

Ice jams are common in the Region, and occur during winter and spring months when river ice begins to break up and flow downstream. Ice flows can build up against bridge abutments or other obstructions and create a temporary dam impounding large volumes of water which have the potential to flood the surrounding areas and damage infrastructure. The most devastating winter floods have been associated with a combination of heavy rainfall, warming temperatures, rapid snowmelt, and the resulting ice jams. Winter weather with less than average snowfall can result in greater ice build-up on streams and rivers, potentially resulting in greater ice jam damage. Ice jams threaten many of the same properties as inundation flooding and the damage can be expected to be similar.

Flash flooding events are rapid onset events which, according to Vermont State Climatologist Lesley-Ann Dupigny-Giroux "often result from stagnant or slow-moving thunderstorms as well as from the passage of a series of thunderstorms over the same geographic area. Such high intensity and often long duration events produce large amounts of precipitation in a short period of time. These precipitation amounts can quickly exceed bank-full widths along rivers and streams, trigger mass movements (such as landslides and mudslides), sweep away unattached structures (e.g., mobile homes), and carve new river channels into unstable riverbanks." High intensity rain events that result in flood and erosion damages are becoming much more common with changing climate patterns.

Hazard Areas and Areas to be Protected:

Areas in the region that are particularly at risk of flooding and fluvial erosion are discussed below and are shown on the accompanying Water Resources Map. These hazard areas are based on mapping data from FEMA and the Vermont Agency of Natural Resources.

Flood Hazard Areas are the areas in the region that are at higher risk of inundation flooding (i.e., Special Flood Hazard Areas) and are shown on FEMA's Flood Insurance Rate Map (FIRM), as most recently amended. The maps are available through FEMA's online Flood Map Service Center. Digital Flood Insurance Rate Map data can also be accessed through the Natural Resource Atlas or the Flood Ready Vermont website.

The Flood Hazard Map depicts the Special Flood Hazard Areas (SFHA). The Special Flood Hazard Area depicted is based on the digital Flood Insurance Rate Maps.

Table 6.1 below summarizes the land areas that are within these identified flood hazard areas. Note that "floodway fringe" is also known as the "floodplain."

TABLE 6.1 FLOOD HAZARD ZONES BY LAND AREA

Hazard Zone	Area in Region	
	Acres	%
Floodway	9,017	4%
Floodway Fringe (Floodplain)	21,667	9%
Total Land Area	220,132	100%

Note that the figures presented in Table 6.1 are based on GIS calculations of land area or building points, which may vary slightly from data presented by the U.S. Census Bureau or other sources. While other portions of the region may be at risk of flooding, they are not mapped at this time. Flooding from ice jams and flash flooding are also concerns.

River Corridors (RC) include both the channel and the adjacent land. Rivers are dynamic and, as a result, development that is located too close to river/stream banks is at risk of potential bank erosion and/or planform adjustment (channel migration). The River Corridor, which is shown on the River Corridor Map, depicts the portions of the region that are at risk of this type of fluvial erosion damage. This mapping data can also be found on the ANR Atlas and Flood Ready Vermont websites referenced above.

Tables 6.1 below summarizes the land areas that are within these identified river corridors:

TABLE 6.2 RIVER CORRIDOR BY LAND AREA

HAZARD ZONE	AREA IN REGION	
	ACRES	%
River Corridor	6,818	3%

The river corridor within the region encompasses significant portions of land that are critically important for our economic development efforts, including within many of the region's Designated Downtowns and Village Centers and along important local infrastructure corridors. The potential economic development impacts associated with adoption of river corridor bylaws should be carefully considered by each community prior to adoption.

In an effort to incentivize municipal adoption of river corridor protections, Vermont established the Emergency Relief and Assistance Fund (ERAF). ERAF provides state funding to match Federal Public Assistance following federally-declared disasters. In other words, participation in ERAF results in a lower local cost-share for disaster recovery efforts. In order to receive the maximum state cost-share of 17.5%, communities must protect river corridors from new encroachment, or protect flood hazard areas from new encroachment and participate in the FEMA Community Rating System.

Additional Emergency Relief and Assistance Fund requirements include participation in the National Flood Insurance Program (NFIP), as well as municipal adoption of:

1. VTrans Town Highway Road and Bridge Standards
2. Local Emergency Management Plan
3. FEMA approved Local Hazard Mitigation Plan

For additional information regarding Emergency Relief and Assistance Fund requirements and benefits, please visit the Flood Ready VT website.

Wetlands fulfill a variety of functions, including flood storage, erosion control, removal of pollutants, and wildlife habitat. The State recognizes the importance of these functions in 10 V.S.A. §905. In January 2020, ANR issued the amended Vermont Wetlands Rules, which classify wetlands according to their functions (i.e., Class 1, 2 or 3).

The major functional values of wetlands are:

- Storage of flood water and stormwater runoff;
- Protection of surface and groundwater through filtration of pollutants;
- Habitat for fish, wildlife, migratory birds, hydrophytic vegetation, and RTE species;
- Specialized, seasonal breeding habitat (such as vernal pools);
- Natural science education and research;
- Recreational value; open space; aesthetics; and
- Erosion control through binding and stabilizing of the soil.

Development activity in or near a Class 1 or 2 wetland requires a Conditional Use Determination from the Agency of Natural Resources to ensure no undue adverse impact on its protected functions. Zoning administrators in municipalities that have zoning regulations are required to notify the Wetlands Program of activities proposed within wetlands prior to the issuance of a local zoning permit. The Wetlands Program has 30 days to provide comments on the project to

the zoning administrator. This review mechanism protects zoning administrators from issuing local permits that might violate state and/or federal regulations.

Vermont wetlands are also protected under Act 250. Federal protection is afforded by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency through administration of Section 404 of the Clean Water Act. Section 404 regulates the dredging or placement of fill in waters of the United States, including wetlands. The Clean Water Act also requires regulated activities to be certified as compliant with applicable Vermont Water Quality Standards.

Communities in the Region should consider adoption of local zoning bylaws to afford further protection to wetlands that provide critical flood water and stormwater runoff storage, erosion control, and wildlife habitat benefit.

Upland forests are defined as those areas of the landscape that have moist to well drained soils or exposed bedrock and that support plants adapted to growing in moist to well drained soils. Adequate vegetative cover in rural upland areas and steep slope areas helps to maximize infiltration of water into the soil, and minimize or slow down stormwater runoff in ways that mitigate water quality impacts, erosion and flooding hazards to downstream locations. Efforts to minimize heavy cutting in forestry activities, limiting the extent and densities of developments, and properly managing stormwater in these upland areas will help contribute toward flood resilience.

Riparian buffers and other land areas adjacent to waters provide a variety of flood control functions. Riparian buffers help facilitate a resilient river corridor by attenuating flood waters, providing streambank stability, reducing flood and ice damage, and helping slow and infiltrate stormwater runoff.

Vernal Pools

Vernal pools are temporary bodies of water which usually occur in woodland depressions, meadows, sand flats, or floodplains and serve as critical breeding habitat for a variety of amphibian and insect populations as well as rare, threatened and endangered species. Most vernal pools in Vermont are filled by spring rains and snowmelt. They typically dry up during summer months. Vernal pools are shallow and may range in size from a few feet to 150 feet in width. Vernal pools are protected as Class II wetlands under the 2020 Vermont Wetland Rules.

Riparian Buffers

A riparian buffer is a strip of vegetation located adjacent to a body of water. Maintaining vegetative buffers of native trees and shrubs is among the easiest and most cost-effective ways to improve and protect water quality in streams, rivers, lakes, ponds and wetlands. Buffers filter runoff from roads, lawns, farms, developed land and construction operations that may carry fine sediment, nutrients, oils, fertilizers or other pollutants. The roots of buffers systems help stabilize stream banks to prevent erosion and associated pollution. Buffers also help facilitate soil infiltration, and therefore reduce stormwater runoff volumes. In addition, riparian buffers help

shade the stream channel, reducing thermal stress. This improves aquatic habitat for cold-water fish species such as eastern brook trout.

Riparian buffers offer clear-cut habitat, water quality, and flood/fluvial erosion hazard mitigation benefit. However, some flexibility in buffer type and width should be considered for projects that provide significant public benefit (such as bike paths, parks, and other recreational uses) within designated Downtowns and Village Centers.

Stormwater

Significant changes have been made in recent years to federal and state stormwater regulations. In 2017, the Agency of Natural Resources adopted new stormwater regulations via the 2017 Vermont Stormwater Management Manual (VSMM) Rule. These regulations were updated in response to recent significant advances in the design and range of best management practices (BMPs) and site design approaches available to meet Vermont's water quality goals.

A major change associated with adoption of the 2017 VSMM is the regulation of all existing parcels containing three or more acres of impervious surface. These parcels will be regulated under the Developed Lands General Permit (commonly referred to as the "3-acre rule"). The permit is currently in effect in the Lake Champlain and Memphremagog watersheds, as well as stormwater impaired watersheds state-wide. The permit is not expected to take broad jurisdiction in the Connecticut River watershed for a number of years. The 2017 VSMM serves as the design standard for the General Permit. The 2017 VSMM also serves as the design standard for the operational stormwater permit program.

Under the VSMM Rule, permittees are required to provide site/development plans that have been stamped and certified by a licensed professional engineer (PE) as compliant with the VSMM standards. Communities may also elect to adopt local zoning bylaws or subdivision regulations in an effort to regulate development which is not otherwise jurisdictional under Act 250 or the 2017 VSMM.

The VSMM standards often feature low impact development and green stormwater infrastructure practices, which are techniques used to control stormwater runoff from developed lands. Techniques can range from utilization of constructed wetlands and subsurface stormwater infiltration, to collection of rooftop runoff for domestic reuse. The goal of green stormwater infrastructure and low impact development is to mimic pre-development hydrologic conditions through use of practices that infiltrate and/or detain runoff.

In addition, the Agency of Natural Resources established a town highway stormwater permitting authority by way of the Municipal Roads General Permit (MRGP) in 2015. The MRGP regulates stormwater discharges from "hydrologically connected" town highways, and mandates a suite of drainage standards along those portions of town highway in an effort to mitigate erosion and associated sediment and nutrient pollution. For a more in-depth discussion of the MRGP and its associated requirements, please see the Regional Transportation Plan.

The *Vermont Standards and Specifications for Erosion Prevention and Sediment Control (2019)* and the *Low-Risk Site Handbook for Erosion Prevention and Sediment Control* provide guidelines for sediment control and erosion prevention during construction. Many of the guidelines and standards outlined in these resources apply under the Construction General Permit (CGP), which regulates construction activities that disturb greater than one acre of soil. It is anticipated that the CGP may regulate construction activities that disturb as little as half an acre of soil in the future.

Several measures can be taken to mitigate stormwater impacts on water quality during construction, including:

- Laying gravel on the construction entrance to prevent soil from being transported from the site onto the pavement;
- Properly installing and maintaining silt fencing;
- Diverting and slowing the rate at which stormwater runoff from any surrounding hillsides passes through the site; and/or,
- Exposing only the soil on the area which will be worked on and then stabilizing the soil when finished with approved methods.

Groundwater

Groundwater is the Region's primary source of drinking water. Groundwater migrates through aquifers, which are water-bearing strata of permeable rock, sand, or gravel. Potential groundwater pollutants include septage from improperly designed or malfunctioning septic tanks and leach fields, leakage from underground storage tanks, improperly discarded chemical or radioactive material and leaching animal waste from pasturing farm animals. Groundwater contamination/pollution abatement is difficult and costly. Therefore, pollution prevention through proper regulation of source protection areas (SPAs) is key to maintaining clean and safe groundwater supplies.

The Vermont Drinking Water and Groundwater Protection Division has developed a groundwater protection strategy, including the identification and mapping of source protection areas for all communities in the Region. Vermont's Water Supply Rule (*Environmental Protection Rule, Chapter 21; revised March 17, 2020*) defines a Source Protection Area/Public Water Source Protection Area as:

> "…a surface and subsurface area from or through which contaminants are reasonably likely to reach a Public water system source."

Source protection areas must be delineated to support installation of new public water supply systems, or for increases in approved yield of an existing source. Groundwater sources require delineation of Wellhead Protection Areas, which are delineated using geologic, hydrogeologic, and pumping test data.

Soils

Soil is composed of disintegrated rock, water, air, decaying organic matter, and microorganisms. Soils vary greatly in composition, and play an important role in water impoundment locations, vegetation species and density, and development suitability. Common soil uses in the Region include agriculture, forestry, earth resource and mineral extraction, and recreational and building site development.

TABLE 6.3 SLOPE CLASSIFICATIONS	
% Slope	**Classification**
0-3%	Generally suitable for most types of development, may require drainage
3-8%	Most desirable for development, having least restrictions
11-15%	Suitable for low density development with particular attention given to erosion control, runoff, and septic design
15-25%	Unsuitable for most types of development and septic systems, construction costly, erosion and runoff problems likely
>25%	All types of construction should be avoided, careful land management for other uses needed

Source: Natural Resources Conservation Service

Erosion poses a threat to soil. Soil erosion is a naturally occurring process, but can be accelerated by development activities. Soil is often protected from wind and stormwater runoff by vegetation in undeveloped settings. When vegetation is removed, fertile topsoil often quickly erodes. Topsoil generally has more capacity than the subsoil to hold moisture, supply nutrients, and allow plants to establish root systems. Erosion, development, mining, logging, and other activities can destroy protective vegetation.

Soil slope is one of a few important factors in determining development suitability. **Table 6.3** above identifies Natural Resource Conservation Service slope classifications and associated development constraints. Map 3. Topographic Constraints shows slopes over 25 percent.

In Vermont, land in excess of 2,500 feet in elevation is considered fragile environment and development should be strongly discouraged. Land at these elevations tend to be predominantly steep with an extremely shallow soil depth to bedrock, and a high susceptibility to erosion. These highland areas are largely forested and facilitate infiltration of stormwater runoff and groundwater recharge.

Ski areas may require development in areas greater than 2,500 feet in elevation, and with slopes greater than 25%. However, careful consideration must be given to any negative impact development may have on the environment, such as degradation of water quality, erosion of topsoil, and encroachment on wildlife habitat.

Mineral Resources

Mineral resources such as sand, gravel, crushed rock and stone, talc, soapstone, granite and marble, are necessary resources for road improvement, building construction, drainage, septic systems, and for exportation. Sand and gravel for domestic use, and talc for exportation are the predominant mineral resources extracted from the Region today. Sand and gravel deposits occur in abundance along the Connecticut River and its tributaries. However, many town-owned pits are experiencing diminished sand and gravel supplies for town highway maintenance use. Talc is currently mined and processed in Ludlow. That mine is expected to remain stable well into the future.

Excessive resource extraction can permanently damage natural and aesthetic resources with broad implications for water quality and availability, as well as the potential for destruction of archaeological sites. Sand and gravel deposits serve as areas for aquifer recharge and filtration, vital for high quality sources of drinking water. Disturbance of these areas can reduce stormwater infiltration, resulting in degraded water quality. Maintenance of wide buffers of native vegetation around extraction pits is strongly encouraged. On-site storage and disposal of materials at extraction sites can contaminate groundwater through leaching of hazardous materials. On-site material storage and disposal shall not be permitted.

Air Quality

Residents of the Region are fortunate to live in an area that has relatively clean air. However, threats to air quality do exist and may either be locally generated or transported from outside the State's borders. Local air quality problems may be generated through auto emissions, especially in congested areas; local industrial and manufacturing facilities, including mineral extraction; trash incineration; smoke from wood stoves; and illegal burning of garbage. Transported air pollution comes across state lines or from other regions of the country, as evidenced by acid rain and reduced visibility in the summer.

Air quality standards are established at the federal level through the EPA. The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) (40 C.F.R. part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act also established two types of national air quality standards: Primary standards (to protect public health) and Secondary standards (to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.) The EPA Office of Air Quality and Standards set NAAQS standards for six principal or "criteria" pollutants: particulates, sulfur dioxide, carbon monoxide, nitrogen dioxide, lead, and ozone. Currently, Vermont is compliant with all standards set under NAAQS, however it is bordered by other states that are non-compliant for some pollutants. It is important that development of new industrial or manufacturing facilities include approved emission control

systems to stay in attainment with standards. In addition, dust from mining operations and construction can cause local air quality problems if not properly controlled.

For additional discussion on air quality issues and climate change, please refer to the Regional Enhanced Energy Plan.

Natural Resources Policies

Development Definition**:** For the purposes of this Chapter, the term "development" is defined as any development activity that requires approval through either Act 250 or Section 248 review procedures.

1. Where an alternative exists, development is prohibited in large tracts of Prime Agricultural Soils located outside of designated downtowns, villages, and other locally designated growth areas.
2. Development within downtowns, villages, and other locally designated growth areas should be allowed on areas of Primary and/or Secondary Agricultural Soils, if supported in the town plan, but shall use innovative site designs such as clustered development on the periphery (for examples, see *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks* (1996) by Randall Arendt) to minimize negative impacts and prevent fragmentation. Additionally, such developments shall be required to maintain a small tract for future small-scale agricultural use or community garden.
3. Agricultural and forestry activities shall minimize point and non-point source pollution through use of the Vermont Required Agricultural Practices (RAPs) and Acceptable Management Practices (AMPs) for forestry activities.
4. Invasive species that threaten forestry, agriculture and aquatic resources and habitat should be closely monitored by state and federal governments, and education and prevention methods shared with landowners.
5. All developments must show the following information on site plans, based on the most currently available data through the Vermont Center for Geographic Information, the Vermont Fish and Wildlife Department's Biofinder, the Vermont Agency of Natural Resource's Natural Resource Atlas, local natural resources inventories, or detailed site review:
    a) Rare, threatened and endangered species (see Map 6);
    b) Priority forest blocks and habitat connectors (see Map 6);
    c) Areas over 2,500 feet in elevation;
    d) Cliff areas or rock outcroppings identified as habitat for peregrine falcons, bobcats, or other wildlife;[13]

[13] Not currently available through online resources. This data would have to come from a local natural resource inventory or detailed site review.

e) Other identified significant wildlife habitat areas available through other sources, such as local natural resource inventories.

6. Development must avoid negative impacts to the following critical wildlife habitats as identified by the Vermont Fish and Wildlife Department:
    a) Rare, threatened and endangered species;
    b) Cliff areas or rock outcroppings identified as habitat for peregrine falcons, bobcats or other wildlife.
7. Development must minimize negative impacts to and fragmentation of the following critical resources as identified by the Agency of Natural Resources to maintain their important ecological and economic functions. Such development must be designed and sited in a manner to minimize encroachments to and preserve continuous priority forest blocks and habitat connectors by locating structures and roads to the periphery of these areas:
    a) Priority forest blocks and habitat connectors (see Map 6);
    b) Other identified significant wildlife habitat areas available through other sources, such as local natural resource inventories.
8. Maintain undisturbed buffers of vegetation along watercourses, lakes, ponds and wetlands in order to protect shorelines, provide shading to prevent undue increase in stream temperatures, minimize effects of erosion, sedimentation and other sources of pollution, and maintain scenic, recreational, and habitat values in accordance with *ANR Riparian Buffer and Corridor Technical Guidance (2005)*. In order to further development goals of this plan, reduced buffer width requirements should be considered to accommodate the development of public recreation paths, sidewalks, and utility or road crossings, within designated Downtowns and Village Centers, but efforts shall be made to minimize undue adverse impacts.
9. Headwater streams[14], gorges, waterfalls, and cascades and the land around these important resources must be protected. Outstanding Resource Water (ORW) designations for these areas should be considered where deemed appropriate.
10. Development must not result in undue degradation of any surface water resource.
11. It is state policy to achieve no net loss of significant wetlands as defined in the *Vermont Wetland Rules*. In order to achieve this:
    a) Destruction of wetlands and construction in wetlands will be avoided when any reasonable alternative exists.
    b) Development will minimize negative impacts to significant wetlands and their associated values and functionality.
12. Groundwater withdrawals must not adversely impact the quality or quantity of groundwater or surface water resources, such as municipal water sources, adjacent wells, wetlands, streams, rivers and lakes.
13. Minimize areas of earth disturbance, grading and vegetation clearing on slopes over 15%.

[14] A stream that has few or no tributaries, and typically has a steep, incised channel that is often associated with active erosion, seeps, or springs. Headwater streams are referred to as first order streams.

14. In working land and conservation future land use areas, development on slopes between 15-24% must be designed to minimize adverse stormwater and erosion impacts by incorporating low impact development and green stormwater infrastructure principles, including:
    a) Development of a lot or site shall require the least amount of site disturbance and reduce the lot coverage and building footprints as much as possible in order to maintain the natural hydrologic processes and reduce the volume and water quality impacts of the proposed development.
    b) Roads, driveways, buildings and utilities must be located on the flattest portions of the site.
    c) Minimize crossing steep slopes with roads and driveways and lay them out to follow topographic contours in order to minimize soil and vegetation disturbance.
    d) Minimize the length of driveways.
    e) Reduce the total length of residential streets by examining alternative street layouts to determine the best option for increasing the number of homes per unit length.
    f) The scale of development will not exceed the development capacity of the site.
15. Development is prohibited in areas predominated by slopes exceeding 25% or above 2,500 feet in elevation (other than appropriately designed recreational trails, ski lifts, zip lines, lookouts, and other similar recreational uses). Appropriately designed recreational uses above 2,500 feet in elevation are those that do not result in undue adverse impacts on the environment and are consistent with the future land use goals in this Regional Plan.
16. When any alternative exists, developments shall not be sited on soils that are:
    a) Susceptible to flooding;
    b) Located in identified river corridor areas; and
    c) Not suited for foundations and/or septic systems.
17. Development proposals for shallow soils shall provide and conform to an erosion control plan for construction activities and a site drainage plan.
18. Support mineral resource extraction as an important component of the working landscape economy, provided that such operations minimize impacts to the environment and neighboring properties.
19. Mineral extraction activity that is determined to have undue adverse impacts on neighboring properties is prohibited.
20. Mineral extraction activity that may destroy or significantly imperil wildlife habitat or other critical natural resources is prohibited.
21. Where mineral extraction is determined to be appropriate, adequate measures to minimize adverse effects (e.g., visual, noise, groundwater, surface water, and air pollution) on the environment and its wildlife shall be taken.
22. Effective site reclamation and re-vegetation plans shall be provided and implemented.
23. Mineral extraction and processing facilities must be planned, constructed, and managed:
    a) to provide direct access to Class III or better highways;
    b) to not interfere with the function and safety of existing road systems serving the project site. Factors to be considered in determining impacts include, but are not limited to:

(i) Extent of increase in heavy vehicular traffic;
(ii) Effects of weight loads on roadbeds and bridges;
(iii) Conflicts with pedestrians or bike users; and,
(iv) Numbers and frequency of heavy vehicles traveling through dense residential areas.

24. Prohibit development or activities that significantly degrade air quality.
25. Support efforts to reduce locally and regionally generated air pollutants by encouraging the use of energy conservation guidelines as developed by the Vermont Department of Public Service.

APPENDIX A – MAPS

See Regional Plan Maps online at marcvt.org/2022-Regional-Plan/