

Natural Resource Assessment

An in depth review of the WNRCD

WNRCD Staff and Board of Supervisors

2015

The Winooski Natural Resources Conservation District (WNRCD), created in 1940, is the largest of fourteen Conservation Districts in Vermont. It encompasses all of Chittenden and Washington County as well as parts of Orange County (Orange, Williamstown and Washington). The district relies on grants and individual donations to complete its conservation work. The WNRCD focuses its resources on completing conservation projects within the areas of agricultural assistance, forestland enhancement, urban conservation and watershed stewardship.

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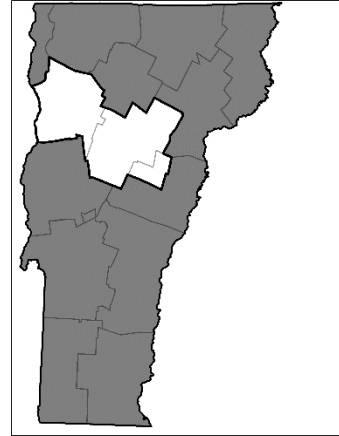
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District Social Media

Blog, Watershed Notes: <http://winooskinrcd.wix.com/watershed-notes-blog>

Facebook Page: <https://www.facebook.com/Winooski-NRCD-150801898282501/>

Twitter Page: <https://twitter.com/NRCDWinooski>

YouTube Channel: https://www.youtube.com/channel/UC_I9ldyQSO7pwKrxBD2TEg

Website: <https://www.winooskinrcd.org>

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Conservation District Overview

The Winooski Natural Resources Conservation District (WNRCD), created in 1940, is the largest of fourteen Conservation Districts in Vermont. It encompasses all of Chittenden and Washington County as well as parts of Orange County (Orange, Williamstown and Washington). The district relies on grants and individual donations to complete its conservation work. The WNRCD focuses its resources on completing conservation projects within the areas of agricultural assistance, forestland enhancement, urban conservation and watershed stewardship.

District Mission

The Winooski Natural Resources Conservation District's mission is to ensure the wise use, protection, and enhancement of Vermont's Natural Resources through the use of local initiatives, education, and partnerships; to foster public awareness and appreciation for the value and need for natural resource conservation; and to advance the understanding that we are all stewards of the living earth. The District partners with rural and urban residents, watershed organizations and government agencies to meet the shared goals of conserving protecting and enhancing the natural and cultural resources in our watersheds.

Conservation District History

The Conservation Districts were created in response to the catastrophic soil loss that occurred in the Dustbowl era. President Franklin D. Roosevelt saw a need for soil conservation and pushed congress to develop the Soil Stabilization Service. This agency became the Soil Conservation Service, and more recently, the Natural Resource Conservation Service (NRCS). To increase functionality of this new agency, Roosevelt moved for local input to become a part of the effort. Out of this, he developed the idea for locally led soil conservation boards. These boards still successfully function today as conservation district boards of supervisors.

Vermont Legislature enacted the Soil Conservation Act in 1939, which gave citizens the authority to develop Soil and Water Conservation Districts through landowner petition. Although laws have been changed and amended numerous times since it was created, the original focus to support local voluntary conservation by Vermont residents remains intact. The State Legislature has broadened the scope of the Districts, which were originally focused on resource conservation in the agricultural community to include all areas of natural resource conservation, including agriculture, forestry, watershed health and urban development.

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Winooski NRCD Geographic Overview

The Winooski Natural Resources Conservation District extends throughout the entire Winooski River Basin and beyond, spanning the counties of Chittenden and Washington and the towns of Orange, Williamstown and Washington in Orange County. Because of political lines that delineate the District, the Winooski Natural Resources Conservation District encompasses more than five different drainage basins including: the Winooski River Watershed, the Lamoille River Watershed, the White River Watershed and significant parts of the Lake Champlain Direct Drainage Basin, including Mallett's Bay, Shelburne Bay and the LaPlatte River Watershed.

The Winooski River Watershed includes 90 miles of flow, starting in Cabot and flowing into Lake Champlain in Colchester.¹ The watershed drains approximately 1,080 square miles in central Vermont, includes almost 10% of the land area in Vermont and encompasses all of Washington County, half of Chittenden County and parts of Lamoille and Orange Counties. The River has seven major tributaries: Little River, North Branch and Kingsbury Branch entering from the north and the Huntington River, Mad River, Dog River and Stevens Branch entering from the South.

The portions of the Lamoille River Watershed that are in the Winooski NRCD are the Browns River Sub-Basin and the Lamoille River Basin. The Lamoille River Watershed drains approximately 706 square miles in north-central Vermont.² The main branch of the Lamoille River Watershed originates in Glover (Orleans County) and flows over 84 miles to Lake Champlain via Malletts Bay in Milton (Chittenden County).

The portion of the White River Watershed that is encompassed within the Winooski NRCD is the First Branch of the White River. The headwaters of the First Branch originate in the hills of Washington County. Intermittent streams converge north of the Chelsea/ Washington line to form the First Branch.³ The First Branch is 24 miles long and drains from a 103 square-mile watershed. The Second Branch of the White River also originates within the WNRCD in Williamstown, with streams coming out of Staples Pond and Rood Pond, and then flows through Williamstown Gulf down a narrow valley in Brookfield. The Second Branch is approximately 20 miles long and drains from a 74 square mile watershed. The Third Branch of the White River also originates in the WNRCD at Roxbury (Washington County), where it is joined by Woodard Brook and Flint Brook. The Third Branch of the White River is 19 miles long and drains 136 square miles of the watershed. All three branches eventually drain into the White River. The White River NRCD encompasses most of the remainder of the White River Watershed except for the portions that flow into the Connecticut River in Pomfret and Hartford and parts of Norwich and Killington which are part of the Ottaquechee NRCD.

¹'Winooski Watershed'. Friends of the Winooski River. http://winooskiriver.org/Winooski_Watershed. Accessed June 11th, 2015

²'Lamoille River Basin: Water Quality Management Plan.' Vermont Watershed Management Division, State of Vermont. http://www.anr.state.vt.us/Dec/Waterq/planning/docs/pl_basin7.finalplan.pdf. Accessed June 12, 2015.

³'White River basin Plan.' Vermont Watershed Management Division, State of Vermont. http://www.watershedmanagement.vt.gov/planning/htm/pl_whiteriver. Accessed June 11, 2015.

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The portion of the Lake Champlain Direct Drainage Basin that is included in the Winooski NRCD includes Mallett's Bay and Shelburne Bay. Each make up a significant sub-watershed. Mallett's Bay received flows from portions of Milton, Essex, Westford and Colchester (Chittenden County) and Georgia (Franklin County). Four named streams flow to Malletts Bay: Indian Brook, Pond Brook, Malletts Creek and Allen Brook. Shelburne Bay received flows from South Burlington, Shelburne, Williston, Richmond, Charlotte and Hinesburg in Chittenden County. Its major tributaries are: the LaPlatte River, Munroe Brook, Bartlett Brook and Potash Brook.

Area Served by the District

The District encompasses all 17 cities and towns in Chittenden County: Bolton, Burlington, Charlotte, Colchester, Essex, Hinesburg, Huntington, Jericho, Milton, Richmond, Shelburne, South Burlington, St. George, Underhill, Westford, Williston and Winooski, including all 4 villages: Essex Junction, Jericho, Jonesville, Milton and and Buels Gore.

The District encompasses all 20 cities and towns in Washington County: Barre City, Barre Town, Berlin, Cabot, Calais, Duxbury, East Montpelier, Fayston, Marshfield, Middlesex, Montpelier, Moretown, Northfield, Plainfield, Roxbury, Waitsfield, Warren, Waterbury, Woodbury, Worcester, including three villages: Marshfield, Northfield and Waterbury and an assortment of other communities (Adamant and Tangletown).

In addition, the District also includes the Towns of Orange, Washington and Williamstown in Orange County, for a total of more than 47 communities. The District works with two Regional Planning Commissions spanning all 47 communities. In Chittenden County, the Chittenden County Regional Planning Commission oversees planning in the 21 communities, while in Washington and the towns in Orange that span the District, are planned regionally by the Central Vermont Regional Planning Commission.

Primary economic activities in the District include agriculture, resource extraction (granite), forestry, manufacturing, tourism, retail, medicine and institutions of higher education including the University of Vermont, Champlain College in Burlington, Albany College of Pharmacy and Health Sciences and Saint Michael's College in Colchester, a branch of the Community College of Vermont in Winooski and a branch of the Vermont Technical College located in Williston, Norwich University in Northfield, Goddard College in Plainfield, the Vermont College of Fine Arts in Montpelier, and NECI in Montpelier.

Chittenden County is the most populated County of Vermont (160,531 in 2014) and the most urban. Montpelier, located in Washington County, is the State Capital.

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Natural Resources Assets in the District

The Winooski NRCD boasts a variety of natural resource assets, from the very visible Lake Champlain, to the world-renown granite quarries of Barre. Other assets include valley bottoms containing prime agricultural soils, part of the Green Mountain range, including Mt. Mansfield State Forest, CC Putnam State Forest, Camels Hump State Park, and Robbins Mountain Wildlife Management Area. There are several town forests, including the Hinesburg town Forest and Barre Town Forest. In addition, the District has other recreational areas including Underhill State Park, Roxbury State Forest, and Hubbard Park in Montpelier. The District hosts sections of the Long Trail.

The Mad River Valley, Shelburne Farms and nature centers such as the Audubon in Richmond and North Branch Nature Center in Montpelier are other assets within the District. The ski areas found in Stowe and the Mad River Valley are very important cultural and economic resources within the District. The agricultural community has expanded beyond traditional dairy farming to include value-added products such as cheese, berries, local wine, and cider.



Camel's Hump

The Winooski River Basin has a diverse land cover; 72.4 percent of the land area is forested, 11.6 percent of the land is in agriculture, 4.4 percent is developed land, 4.7 percent is dedicated to transportation and the remaining 6.9 percent of land area is characterized as open water, wetlands and abandoned fields. There are extensive wild brook trout populations in the headwaters region of the Winooski River. Moving downstream, the wild populations of brook, brown and rainbow trout vary with habitat condition. Some locations along the main stem and its tributaries are stocked. The North Branch tributary supports wild brook trout in the upper elevations (>1000') of the watershed. Despite urbanization and associated impacts, Steven's Branch supports good levels of wild trout populations in areas and some of its tributaries are identified as important rainbow and brown trout spawning grounds. The Dog River main stem and all tributaries are managed as "wild trout waters," home to wild brook, brown and rainbow trout. The upper reach of the Mad River supports wild brook, brown and rainbow trout and is managed for wild trout. Below Warren village, increasing temperature and habitat deficiencies limit trout production to "pocket populations." On the Little River main stem, there are wild brook trout in the higher elevations and wild brown and rainbow trout below confluence with West Branch. A great deal of recreational fishing occurs on the Lower Winooski River. During the spring spawning run, people fish for walleye, Atlantic salmon and steelhead. Trout fishermen can be seen in the Winooski River all the way from Montpelier to Essex using pull-offs along Route 2 to access the river. The Bolton Falls access area is popular for fishing to the point of often

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being overcrowded. Smallmouth bass fishing occurs from Essex down to the lake along the Winooski River⁴.

The Lamoille River Watershed is covered by 71 percent forest and agriculture comprises 13 percent of the land use in the watershed. Surface waters and wetlands cover about 10 percent of the watershed area, while transportation uses and developed land occupy 4 and 2 percent respectively. The lower part of the watershed that is included in the District's territory includes cold water trout habitat and warm-water habitat for yellow perch, large-mouth bass, rock bass, white suckers and pumpkinseed sunfish.

Over 83 percent of the land area in the White River Watershed is forested. The remaining primary land covers are agriculture (9 percent) and developed land (4.6 percent). The White River is significant for being one of the last free-flowing rivers in Vermont; it is the longest undammed tributary to the Connecticut River. The White River watershed is also a designated Special Focus Area of the US Fish & Wildlife Service Silvio O. Conte National Fish & Wildlife Refuge because the watershed provides nursery and rearing habitat for juvenile Atlantic salmon and potential spawning habitat for adults. The First branch of the White River has wild brook and rainbow brook trout populations. Atlantic salmon, brook and rainbow trout are stocked annually by the Vermont Department of Fish and wildlife⁵. Along the third branch of the White River, There is a mix of wild brook, brown and rainbow trout, with Atlantic salmon stocked annually by Vermont Department of Fish and Wildlife.



Lake Champlain

Shelburne Bay and Malletts Bay are part of the Northern Lake Champlain Direct Basin, which is only approx. 37 percent forested. Thirty five percent of the land area is in agricultural use, and developed land, including transportation infrastructure comprises 13 percent of the land. The Bays comprise part of Lake Champlain's warm water fishery. Additionally, wetlands adjacent to the Lake are spawning grounds for yellow perch, brown bull head, pumpkinseed, bowfin, largemouth bass, black crappie, carp, mud minnow and longnose gar⁶.

⁴ "Basin 8 Winooski River Watershed Water Quality and Aquatic Habitat Assessment Report." Vermont Agency of Natural Resources. http://www.anr.state.vt.us/dec/waterq/mapp/docs/mp_basin8.assessment_report.pdf. Accessed September 14, 2015.

⁵ "White River Watershed Water Quality and Aquatic Habitat Assessment Report." Vermont Agency of Natural Resources. http://www.vtwaterquality.org/mapp/docs/mp_basin9.assessment_report_2012.pdf. Accessed September 14, 2015.

⁶ "Lake Champlain Direct Drainages Tactical Basin Plan." Vermont Agency of Natural Resources. http://www.watershedmanagement.vt.gov/planning/docs/mapp_2015b05tbp.pdf. Accessed September 14, 2015.

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Biological Natural Resource Assessment of District

Conservation management concerns and future actions while encompassing the needs of the Districts demographics pertaining to soil and water health and will also take into consideration the needs and concerns of the vast native biological populations. Ecosystems are connected and management concerns should not view them as separate.

The watersheds within the Winooski Natural Resources Conservation District host many interesting species of amphibians and reptiles, some of which are rare, threatened, or endangered. These animals are an important component of the ecosystem, both terrestrial and aquatic.

Interesting to note, Vermont has a native lizard, the Common Five-lined Skink. This endangered species prefers to live in deciduous forests, mines, quarries, rocky outcrops and slopes.

We are home to seven species of turtles, including the; Snapping Turtle, Musk Turtle, Wood Turtle, Northern Map Turtle, Painted Turtle, Eastern Spiny Softshell Turtle and the Spotted Turtle. Of these the Wood Turtle, Northern Map Turtle and Musk Turtle are species of concern due to their low numbers. The Spotted Turtle is endangered and prefers swamps, beaver dams, ponds and wet meadows. The Spiny Softshell Turtle, with its unique soft shell and pointed nose is threatened and can be found in Lake Champlain.

Eleven species of snakes can be found with the district, including the; Northern Watersnake, DeKay's Brownsnake, Redbelly Snake, Garter Snake, Ribbonsnake, Ring-neck Snake, Racer, Smooth Greensnake, Eastern Ratsnake, Milksnake, and the Timber Rattlesnake. Of these the Ribbonsnake is a species of concern due to its low numbers. The Racer is a threatened species and prefers to live in wet meadows, abandoned fields, mines and quarries. The Ratsnake is also threatened and prefers to live in deciduous forests, abandoned fields, rocky outcrops and slopes. The Timber Rattlesnake is the only endangered snake within the district and prefers to live in deciduous forests and rocky outcrops and slopes.

The district is home to ten species of salamanders, including the; Northern Two-lined Salamander, Blue Spotted Salamander, Mudpuppy, Jefferson Salamander, Red-spotted Salamander, Dusky Salamander, Redback Salamander, Four-toed Salamander, and the Spring Salamander. Of these the Jefferson Salamander, Blue-spotted Salamander, Four-toed Salamander and the Mudpuppy are species of concern.

Eleven species of frogs and toads can be found within the district, including the; Fowler's Toad, American Toad, Gray Treefrog, Spring Peeper, Bullfrog, Green Frog, Mink Frog, Wood Frog, Northern Leopard Frog, Pickerel Frog and the Chorus Frog. Of these the Fowler's Toad is endangered, preferring to live in beaver ponds, marshes, pine barrens, deciduous forests and even some suburban areas. The Chorus Frog is also classified as endangered and prefers to live in wet meadows and abandoned fields.

The District contains over 183 species of birds that have been documented. Some species are rare or of concern.

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Description of Natural Resource Concerns in the District

The following are concerns of the WNRCD Board of Supervisors:

Overall Objectives: Minimize anthropogenic nutrient and organic pollution, reduce TMDL of phosphorus from roads, agricultural practices, shoreline erosion, and land application; Protect/restore, aquatic and riparian habitat, Repair flood and erosion hazards, Minimize toxic and pathogenic pollution and chemicals of emerging concern, Educating landowners, and user groups to concerns, mitigation methods and best management practices.

- Bacterial TMDL for the Huntington and Mad Rivers and Allen Brook
- Phosphorus TMDL for the Winooski Watershed
- Finding ways for the District to support the Natural Resources Conservation Service's Water Quality improvement efforts
- Streambank restoration
- Identifying areas of runoff and assisting property owners with mitigation
- Identification and repair/ retrofit culvert replacement projects
- Outreach to farmers to help with nutrient management planning and soil sampling
- Forest fragmentation – education about it, maintenance of riparian plantings
- Connectivity of habitat; continuing with aquatic organism passage/culvert retrofit projects
- Invasive species control when working on riparian plantings
- Small farm initiatives – installation of agricultural BMPs, soil conservation and fertility, helping small farmers 'survive'
- Invasive Species identification, and removal
- Assist communities in efforts to restore and maintain natural landscapes including town forests
- Encourage green infrastructure practices as a method of stormwater management
- Support projects that demonstrate green lawn care practices that further stormwater infiltration
- Increase awareness of horse manure composting, and facilitate incorporation of best management practices with equine owners
- Help property owners understand the need for increased buffers on agricultural lands along surface waterways and wetlands, assist with instillation and outreach on maintenance
- Outreach to municipalities, schools and property owners with over 3 acres of impervious surfaces on best management practices for maintenance of invasive species, road salt application and stormwater retrofit instillation.
- Expand Trees for Streams to include lakes and pond shoreline protection

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The Winooski Watershed

Many areas in the Winooski River watershed were highly altered during Tropical Storm Irene in 2011. Sedimentation and erosion altered many locations in the watershed and impacted trout habitat, private property and agricultural activities. Some of the hardest hit areas in the Winooski Watershed were in the Dog River Subwatershed. It is predicted that large, intense flood events may occur with greater frequency in the future. Limited biological sampling of rivers in mostly forested watersheds in the basin has identified sites with notably very high water quality, including Stevenson and Ranch Brook in Stowe, Dowsville Brook in Duxbury, the Shepard Brook in Fayston and the Sunny Brook in Northfield. Miles of streams, especially in the upper Winooski, support healthy trout populations, indicating a healthy ecosystem over much of the basin. However, outside of these higher elevation, heavily forested areas, water quality declines. Based on river miles, sediment and nutrients are the most prevalent pollutants in streams and rivers, except at high elevations. Physical alterations are also a problem throughout the lower reaches of the watershed, including habitat alteration, general stream channel instability and encroachment into the flood hazard zone. The Winooski River Basin includes a number of hazardous waste sites and old landfills that release heavy metals and other toxic compounds. More isolated problems specific to particular reaches include, thermal modification, acidity, pathogens and flow alteration. The main human activities that contribute to the natural resources concerns in the Winooski River Watershed and across the entire District are land conversion, stormwater runoff from development and agricultural activities⁷.

While lakes and ponds in this watershed are in good to excellent condition, there are several water quality issues affecting lakes, including eutrophication, exotic species, water level management, cumulative lakeshore development, and atmospheric deposition.

Upper Winooski River Subwatershed—The major areas of concern in this section are flow alteration due to hydroelectric power, obstruction to fish passage from dams, sedimentation, aquatic habitat destruction, eroding banks, and frequent flooding. This area is characterized as stressed due to lack of riparian vegetation, channel straightening, nutrient enrichment and agricultural activities.

Stevens Branch Subwatershed—This area is impaired by siltation and semi-volatile and volatile organic compounds. Sections of the subwatershed experience altered habitat, undersized culverts and poorly planned development that has caused washouts and erosion. This area is stressed from urban runoff, turbidity, sedimentation, nutrient enrichment, and a lack of forested riparian buffers

⁷ "Winooski River Basin Water Quality Management Plan." Vermont Agency of Natural Resources.
http://www.watershedmanagement.vt.gov/mapp/docs/mp_basin8final.pdf. Accessed September 14, 2015.

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North Branch Subwatershed—This area is impaired due to increased water temperature, turbidity, and pathogens. Loss of riparian vegetation and urban runoff are other stressors in the area. Acid precipitation is a concern along Minister Brook

Dog River Subwatershed—Much of the Dog River is doing well, but there are many instances of Japanese knotweed invasion. Stream geomorphic assessments phase 1 and 2 show an overall fair to good condition throughout the watershed. However, problems such as obstructed aquatic organism passages, sedimentation, scouring from old bridges, dams and abutments exist. Roads run close to the channel limiting ability for the establishment of riparian buffers⁸ and increasing the potential for road salts to enter waterways. Significant impacts from Tropical Storm Irene remain an issue.

Mad River Subwatershed—This area is impaired due to sedimentation, iron deposits from construction, parking lot runoff from ski area, habitat alteration from ski area, sedimentation due to heavy logging in the area, pathogens due to failing septic systems. The watershed also experiences altered flow regimes from water withdrawal for snow-making operations. The subwatershed has a loss of riparian vegetation, Japanese knotweed invasions and significant streambank erosion.

Little River Subwatershed—The aquatic habitat is impaired for iron from development, sedimentation from land development, runoff from development. Additionally, the aquatic habitat is impaired due to low dissolved oxygen from Green Mountain Power operations. Aquatic habitat has been altered due to channel modification and loss of riparian vegetation. Runoff from developed lands, altered flow from water withdrawal for snow-making operations and poor erosion controls further stress the water quality and aquatic habitat.

Huntington River Subwatershed—This area is impaired in some locations and stressed in others for e. coli contamination due to failed septic systems and perhaps domestic animals. Aquatic habitat is stressed due to habitat alterations from the loss of riparian vegetation, and channel straightening

Middle Winooski Subwatershed—This section is impaired in Middlesex above the dam due to low dissolved oxygen content. It is also impaired below Montpelier for pathogens, nutrients, turbidity, streambank erosion, urban stormwater runoff. Additional stresses on this section include: sedimentation, flow alteration due to development and stormwater inputs, and confinement of the channel from roads.

Lower Winooski Subwatershed—This area impaired for fish consumption due to mercury deposition and for e. coli due to stormwater runoff. Sedimentation occurs in this area due to lack of streambank vegetation. Stormwater runoff is contributing to nutrient enrichment and additional sedimentation. Arsenic and iron impairments are also documented in this area due to landfill runoff.

⁸ “Dog River Corridor Plan.” Bear Creek Environmental. <http://www.berlinvt.org/wp-content/uploads/2014/09/Dog-River-Corridor-Plan.pdf>. Accessed September 14, 2015.

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The Lamoille Watershed

Impairments are attributed to various land uses including hydroelectric facility drawdowns, agricultural runoff, residential and urban runoff (stormwater) as well as atmospheric deposition from mid-western power plants. The major pollutants include excessive nutrients such as phosphorus and nitrogen, manure, pesticides, fertilizers, heavy metals, oil, gas, and sediments. Low levels of dissolved oxygen in the water at certain locations cause additional water quality problems. The major impacts to the Lamoille River and its tributaries involve sedimentation, habitat alteration, and channel instability. Nutrients and thermal modifications also impact a number of river miles. Riparian vegetation removal, streambank erosion, floodplain encroachments, floods, and agricultural land uses are the five top sources that impact the water quality and aquatic habitat of the Lamoille River

Lower Lamoille Subwatersheds—Phosphorus inputs are a major concern in this area; agricultural activities, new construction and road system management are major areas of concern. Old stormwater management systems in need of retrofitting and streambank restoration are needed throughout this subwatershed.

Browns River Subwatershed—Phase one and two stream geomorphic assessments find that there are many undersized culverts leading to fish passage issues and stream bank erosion⁹. Lack of riparian buffer, impacts from gravel mining also contribute to watershed health issues in the subwatershed area. The watershed has largely been transformed into a sediment and nutrient source and transport zone where floodplain access is limited and sediment and nutrients are funneled through the system to downstream receiving waters. This has caused downcutting in the channel, disconnecting the river from its floodplain in some areas¹⁰.

Lake Champlain Direct Watershed

Phosphorus pollution is the greatest threat to clean water in Lake Champlain. Shoreline development is another major threat to water quality. Several of the smaller drainages that flow into Inner Mallet's Bay are impaired for e. coli. caused by failing septic systems and urban runoff from developed lands¹¹. Malletts Bay and Shelburne Bay suffer from stormwater runoff and nutrient inputs from agricultural runoff. Shelburne Bay has also had high e.coli contamination and many documented invasive aquatic species. Streams feeding into these bays have undergone alteration and waters are stressed from thermal changes, turbidity and sediment¹². Malletts Bay and Shelburne Bay are a part of the regulated MS4 communities in

⁹ "Browns River Phase 1 and Phase 2 Assessment Report." Winooski Natural Resources Conservation District. <https://anrweb.vt.gov/DEC/SGA/finalReports.aspx> Accessed September 15, 2015.

¹⁰ "Browns River Corridor Plan." Arrowwood Environmental. <https://anrweb.vt.gov/DEC/SGA/finalReports.aspx>. Accessed September 15, 2015.

¹¹ "Basin 5 Mallets Bay Streams." Vermont Agency of Natural Resources. http://www.vtwaterquality.org/mapp/docs/mp_MallettsBayStreams.pdf Accessed September 15, 2015.

¹² "Shelburne Bay Watershed." Vermont Agency of Natural Resources. http://www.vtwaterquality.org/mapp/docs/mp_ShelburneBayStreams.pdf. Accessed September 15, 2015.

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Chittenden County with specific phosphorus limits. Both bays are urban stormwater impaired. There are also major concerns about hazardous algal blooms occurring in Lake Champlain due to nutrient inputs into the Lake.

Malletts bay:

- Indian Brook—impaired for stormwater and treated for milfoil invasions¹³
- Pond Brook—impaired for bacteria, part of a TMDL with Lewis Creek¹⁴
- Mallett's Creek—generally in good condition, it flows through an important wetland complex
- Allen Brook—impaired for bacteria, this subwatershed has a TMDL for bacteria and incorporates stormwater runoff through hydrologic alteration¹⁵

Shelburne Bay:

- LaPlatte River—main stressors in this watershed are due to channel straightening, stormwater runoff from developed lands and nutrient inputs from loss of riparian vegetation¹⁶.
- Munroe Brook—this river is impaired due to stormwater runoff. This river travels through highly developed areas¹⁷
- Bartlett Brook—impaired due to stormwater runoff in a highly developed area¹⁸
- Potash Brook—impaired for bacteria and for stormwater runoff in a highly developed area¹⁹

White River Watershed

First Branch Subwatershed- Issues in this subwatershed stem from more recent landuse change and channel modifications. The dense road networks amplify the issues. This area has

¹³ Indian Brook management Plan Website. http://www.essex.org/index.asp?Type=B_BASIC&SEC={A4F6FA8A-E06A-4102-BAC0-C8413FA56CCF} Accessed September 14, 2015.

¹⁴ "Lewis Creek and Pond Brook" Vermont Agency of Natural Resources http://www.watershedmanagement.vt.gov/mapp/docs/mp_5lewisecreekpondbrook.pdf Accessed September 14, 2015.

¹⁵ "Allen Brook" Vermont Agency of Natural Resources. http://www.watershedmanagement.vt.gov/mapp/docs/mp_12allenbrook.pdf. Accessed September 14, 2015.

¹⁶ "LaPlatte River Corridor Plan." Lewis Creek Association. <https://anrweb.vt.gov/DEC/SGA/finalReports.aspx>. Accessed September 14, 2015.

¹⁷ TMDL to Address Biological Impairment on Munroe Brook." Environmental Protection Agency. http://www.epa.gov/waters/tmdl/docs/35084_Munroe%20Brook%20VT%20TMDL.pdf Accessed September 14, 2015.

¹⁸ TMDL to Address Biological Impairment on Bartlett Brook." Environmental Protection Agency. http://www.vtwaterquality.org/stormwater/docs/sw_bar_tmdl_approved.pdf. Accessed September 14, 2015.

¹⁹ "Potash Brook." Vermont Agency of Agriculture. http://www.vtwaterquality.org/mapp/docs/mp_10potashbrook.pdf. Accessed September 15, 2015.

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been identified as in great need of floodplain protection. In this area, there are many incised streams and a lack of vegetated buffer²⁰.

Third Branch Subwatershed—the major natural resources concerns along the Third Branch are e. coli contamination and sedimentation. This area is in need of floodplain protection and riparian restoration.

District Goals and Programs to address Natural Resource Concerns

The following are the WNRCD's Board of Supervisors' vision of the current and future actions that will address the concerns noted above:

- Small woodland owners, those who own less than 25 acres, with current use designation don't receive much assistance from the state, the District could assist this demographic
- Working with landowners to manage woodlands to promote good wildlife habitat
- Assisting small farmers with conservation BMP's and with meeting water quality goals
- Environmental education for residents, students and special groups including farmers, homebuilders, municipalities and special interest groups.

Current WNRCD Programs Include:

1. Equipment Rental:

- a. Aerator, 11 ¼ foot Gen-Till Model 1200s
- b. Portable Skidder Bridges (3) heavy duty bridges located at three different mills throughout the District
 - i. Fontaine's Saw Mill, East Montpelier
 - ii. Lamell Lumber, Essex Junction
 - iii. Cyr Lumber, Milton

2. Chittenden County Stream Team (CCST):

WNRCD runs the CCST on behalf of eight towns in Chittenden County to implement projects to reduce non-point source pollution and stormwater volume at the local level. The project utilizes social networking tools to form a cadre of concerned citizens and professionals interested in hands-on activities to reduce the harmful effects of stormwater. The eight communities are subject to the Municipal Separate Storm Sewer Systems (MS4) permit under Phase 2 of the Clean Water Act. Some of the activities we oversee include:

- a. Rain Garden Adoption
- b. Water Quality Monitoring
- c. Build-your-own Rain Barrel Workshops

²⁰ "First Branch White River Watershed: Stream Geomorphic Assessment and River Corridor Plan." <https://anrweb.vt.gov/DEC/SGA/finalReports.aspx>. Accessed September 15, 2015.

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- d. Stream Clean-Ups
 - e. Public Outreach through Tabling at Events
 - f. Connecting the Drops Outreach Campaign (a collaborative public art display of rain barrels with Let it Rain)
3. **Trees for Streams:** WNRCD is active in securing funding yearly for our 'Trees for Streams' program. WNRCD works with private landowners to install forested riparian buffers to reduce sedimentation, bank failure and erosion and to enhance fish and wildlife habitat. WNRCD also works under the Vermont-wide VACD-funded Trees for Streams program when funding is available.
4. **Let it Rain:** The Let it Rain program provides stormwater education and assistance for landowners. Let it Rain provides technical assistance to private landowners who wish to install low impact development (LID) or green stormwater infrastructure (GSI) on their properties to help mitigate the effects of stormwater. When funding is available, WNRCD helps provide a cost share for the landowners to offset the cost of a practice. Let it Rain is managed jointly with UVM Sea Grant.
5. **Let it Rain: *Soak it for Schools!*** is a compilation of materials about stormwater relevant to school-aged children throughout the District (and especially, Lake Champlain) and beyond. WNRCD is available to facilitate lessons or help teachers identify future action steps to become stormwater champions.
6. **Stormwater Planning and Mitigation Projects**, including:
- a. Rumney Memorial School, Middlesex
 - b. Colchester High School, Colchester
 - c. (as a consulting partner) Harwood High School, Duxbury
7. **Best Management Practices within the Agricultural community:**
- a. Horse Manure Composting: working with horse owners to build and install compost bins for manure on their land to help avoid runoff from horse manure into local waterbodies
 - b. Edge-of-Field monitoring of runoff from fields being aerated to study the benefits of aeration on runoff
8. **Aquatic Organism Passage (AOP):** working with partners, WNRCD identifies areas where passage for fish may be hindered and works with towns and road crews to make necessary changes to the offending structure. WNRCD then works with engineers to obtain designs and then secures funding to do a replacement or retrofit. Current projects include:
- a. Crossett Brook at Hayes Road, Duxbury
 - b. Dole Hill Road, Northfield
9. **Caring for the Urban Canopy in Winooski**
- WNRCD has worked with Winooski's Department of Public Works and the Vermont Monitoring Cooperative to complete an ecosystem services inventory of their urban forest. The data will be used to create a Tree Management Plan for the City and to support the formation of a Winooski Tree Board.

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10. Habitat Restoration in the Mad and Dog River Watersheds

This multi-year project assessed small streams in the Mad and Dog River Watersheds to identify restoration priorities to improve fish habitat across the two watersheds. Restoration strategies were implemented including dam removal and riparian buffer planting. Additionally, educational workshops were held for the public.

11. Agricultural Outreach and Assistance

- a. Regional Conservation Partnership Program (RCP): assist small farmers in signing up for NRCS program, enrolling them in nutrient management planning classes and conducting soil sampling on their fields.
- b. “Kitchen Table Talks”: Meet with small farmers to discuss new water quality regulations and create outreach materials

12. Winooski Headwaters Community Partnership is a locally-led effort to restore and protect the upper portion of the Winooski watershed. Its work is directed by the Conservation Commissions of Cabot, Marshfield, and Plainfield. The Friends of the Winooski River and the Winooski Natural Resources Conservation District provide facilitation and staff support. Other partners include local and state government, local businesses, non-profit organizations, and citizens. The partners have emphasized education, cooperation, and community involvement in all their projects.

13. Public Outreach and Demonstrations are provided across the District as grants allow and as requested. These events most frequently concern watershed health, stormwater and water quality.

14. District Capacity Building

- a. NRCC funds have provided us with opportunities to improve upon District administration and personal development.
- b. LCBP grant funds allow WNRCD to promote and develop its brand and increase its presence in the community.
- c.

District Sources of Income

The Winooski Natural Resources Conservation District receives base- funding from the Vermont Agency of Agriculture equalling less than 2% our annual budget. The WNRCD manages funding from public and private sources to implement vital conservation programs throughout the District. WNRCD raises funds throughout the year to support ongoing conservation programs, public education and targeted workshops to communities across the District. Our largest fundraising activity each year is our Annual Tree Sale, which provides important unallocated funds for on-going projects and staff time to apply for grant funding in addition to the funding received from the State through the Agency of Agriculture and to the Vermont Natural Resources Conservation Council (NRCC) .

The majority of project pass-through funds are allocated to projects that WNRCD helps to identify and coordinate. District staff work throughout the year to actively search and apply for available grants to fund specific projects that fulfill WNRCD conservation goals. The category listed as “other” in the

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funding sources pie chart includes miscellaneous sources of income including rental fees from our skidder bridges and conservation tillage aerator.

District Implementation and Funding Partners

1. Natural Resources Conservation Service (NRCS): We work together on farms, often working with small farms and demographics that they cannot easily cover. We also refer farmers to their programs. Additionally, NRCS provides the District with office space and access to office equipment and supplies.
2. US Fish and Wildlife Service (USFWS): WNRCD works with USFWS on a variety of projects and programs including AOP and Trees for Streams.
3. Lake Champlain Basin Program: We have several grants with this organization, they are very supportive of our work. We are working with their Resource Room staff at ECHO Aquarium and Science Center to provide educational material for the public.
4. Vermont Department of Environmental Conservation (DEC): We frequently receive Ecosystem Restoration Program (ERP) funds through the DEC. We work closely with our basin planner Karen Bates, river scientists Gretchen Alexander Staci Pomeroy, and Rick Hopkins who coordinates ERP agricultural projects and several people from the stormwater division.
5. Schools: We work with schools all across our district in many capacities. We are working with several schools now to design stormwater mitigation implementation; we are also developing stormwater curricula to be used in the classroom. We frequently provide educational and hands-on activities in the schools across our District.
6. Lake Champlain Sea Grant: we have a memorandum of understanding with LCSG to manage the Let it Rain program jointly.
7. Chittenden County Regional Planning Commission: We work with them to manage the Chittenden County Stream Team and are in communications to expand our partnership efforts to include other areas.
8. Local Towns: They provide us with annual funding. We also work with individual towns through CCST to implement stormwater reduction projects and provide education and outreach. We are also currently working with the town of Winooski to inventory their urban canopy.
9. Vermont Department of Forest, Parks and Recreation: We are working on a grant with them to inventory Winooski's urban canopy and assist in developing a Tree Board. We also receive assistance from DFPR for technical assistance with our skidder bridge program.
10. Stone Environmental: We work with Stone Environmental on a variety of projects, frequently for stormwater design. We are also contributing funds to help with their AGO grant to measure phosphorus runoff from agricultural fields under different management scenarios.
11. Friends of the Winooski River: We partner with FWR on many projects. They assist us in our water quality monitoring for CCST and we work together on managing the Winooski Headwaters Community Partnership.

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12. Friends of the Mad River: We are currently working with Friends of the Mad River to assist them in developing a stormwater plan for a school in Harwood.
13. Vermont Monitoring Cooperative: We are working together with VMC on the Canopy inventory in Winooski; they have provided inventory equipment, data management and assistance with the analysis.
14. Central Vermont Regional Planning Commission has long partnered with the District and helped to disseminate information about our projects.
15. Watersheds United Vermont: we work with WUV to promote projects and participate in events. They provide us with assistance and volunteers when needed.
16. Other Conservation Districts, Vermont Association of Conservation Districts We work with other conservation districts to participate in statewide grants including Trees for Streams, the Regional Conservation Partnership Program and the Skidder Bridge Rental Program.
17. Arcana Nursery: we partner with Arcana to purchase native rain garden plants for our projects and to offer at our Annual Tree Sale.
18. Local landscaper, Ann Pearce: Ann donates rain garden plants for our public rain gardens.
19. University of Vermont: We work with multiple professors within the Rubenstein School of the Environment and Natural Resources. We worked with multiple student volunteers and hosted interns.
20. Local Public Works Departments: We work with the public works departments in Chittenden County to help them meet outreach goals in their MS4 permits. We also work with them to hold stormwater workshops in their towns.
21. Vermont River Conservancy: We work with the VRC to assist with the Vermont Watershed United initiative and are currently assisting in the selection process of the new Director.
22. LEAHY Center, ECHO Science Center and Aquarium: We are currently in discussion with staff and the Executive Director on future exhibits and collaborative projects to further both our missions.
23. VTRANS: Discussions are underway on partnering with VTRANS on public and municipal outreach efforts focused on road maintenance and road salt application.

Links Highlighting Specific Projects

Chittenden County Stream Team <http://ccstreamteam.org/>

- Water quality monitoring <http://ccstreamteam.org/index.php/stream-monitoring>
- Events and Workshops <http://ccstreamteam.org/index.php/events>

Caring for Winooski's Urban Canopy Outreach Documents:

<http://winooskinrcd.org/work/forestry/#canopy>

Let it Rain Webpage <http://letitrainvt.org/>

- Connecting the Drops <http://letitrainvt.org/connecting-the-drops/>
- Soak it for Schools <http://letitrainvt.org/soak-it-for-schools/>