Exploring the Cross Vermont Trail

Creation of this guide supported in part by Lake Champlain Basin Program.

Nature and History along the Cross Vermont Trail.

Look beneath the surface and see the rivers at the heart of the trail route.

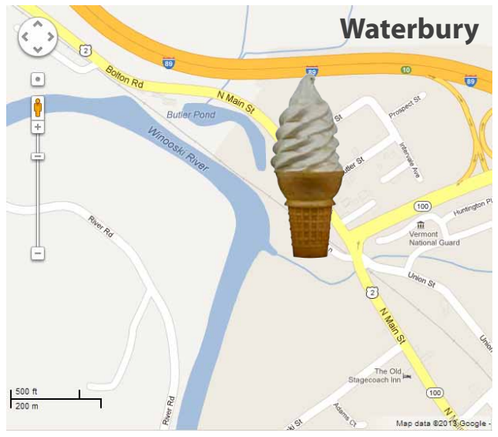
Get a feel for the shape of the land the trail passes over.

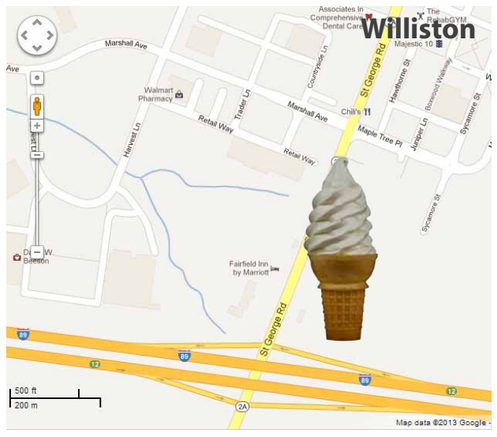
Hear the story of how connections are made via historic bridges, railroads, portages and more.

Creemee stand locations also highlighted.

version 1.0
April, 2013

Creemee Stands of the Early Holocene.





Cross Vermont Trail Association
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www.crossvermont.org

Key to guide maps.

While in the area of each MAP in the statewide Route Map Set, keep an eye out for things described in each PAGE of this Guide to Nature and History.

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Connecticut River

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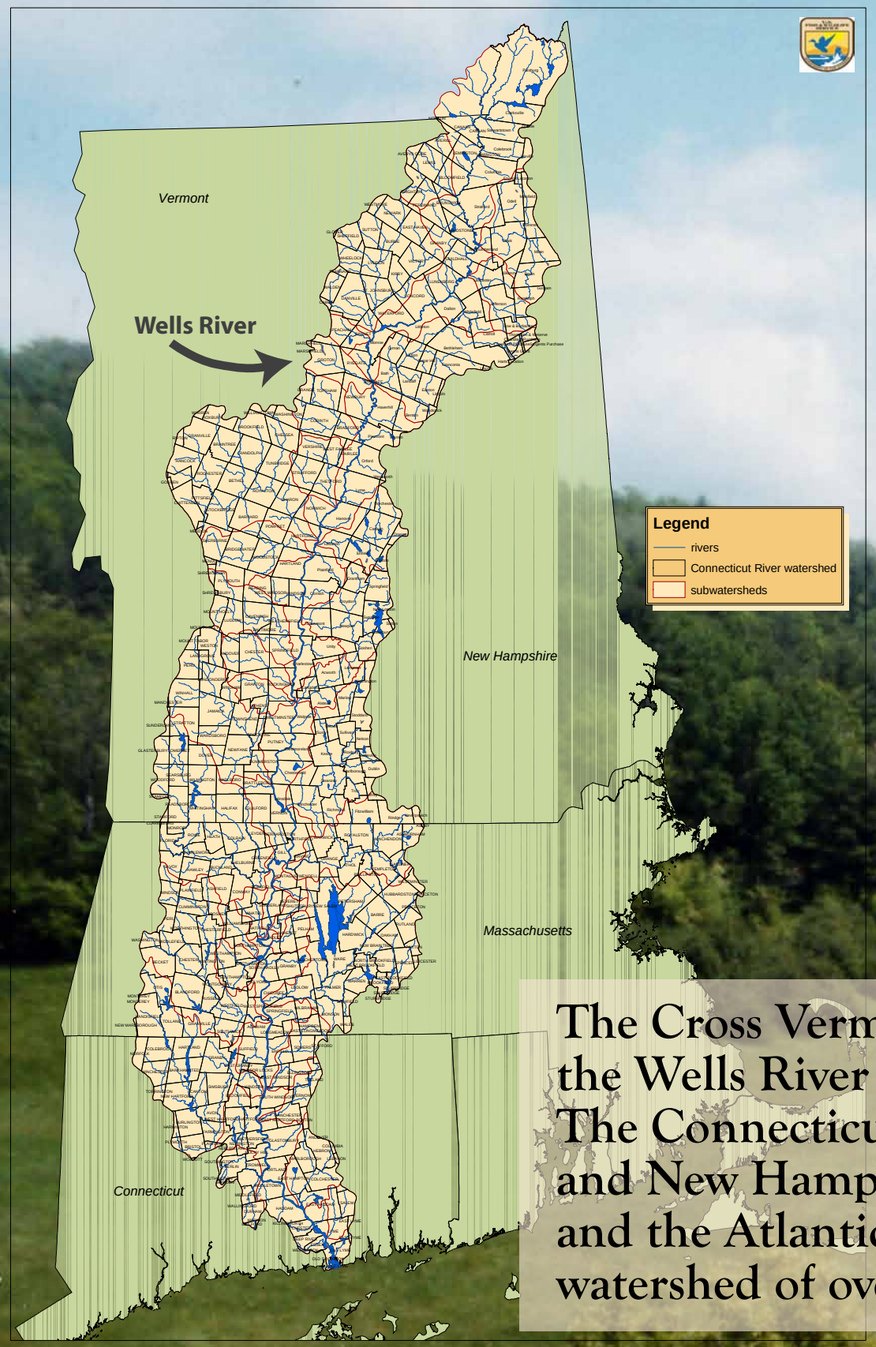
Connecticut River Watershed



"What we now call Newbury formerly comprised a portion of the Lower Cohase, and is still called that by the older people. "Cohase" has been variously held "a crooked river", "a wide valley", "a great fishing place." The longest settled, and best known parts of Newbury, are the meadows, or intervale lands, which border the Connecticut. Upper meadow, from Stair hill at Wells River to the foot of Ingall's hill; Cow meadow, from the foot of Frye Bayley's hill; then the Connecticut makes a circuit of nearly four miles, returning within a half mile of its starting point, enclosing a tract of wondrous beauty and fertility known as the Great Ox-bow.

The course of ancient river beds is to be seen in many places on the meadows. Could we know the history of these intervales, how they were formed in the course of long ages, the record would be more interesting than anything we can say about its human inhabitants. The stream has, at several points, worn away acres of land from different farms. It has, moreover, changed its channel in more than one place, and detached portions of land from one town and annexed them to the other, without consulting the authorities of either Vermont or New Hampshire, or the wishes of those who imagined themselves the owners of the soil."

- from History of Newbury, Vermont by Frederic P. Wells, 1902

The Cross Vermont Trail route starts and ends where the Wells River joins the Connecticut River, in Newbury. The Connecticut defines the boundary of Vermont and New Hampshire. It flows south to Long Island Sound and the Atlantic, running 407 miles and draining a watershed of over 11,000 square miles.

Wells River

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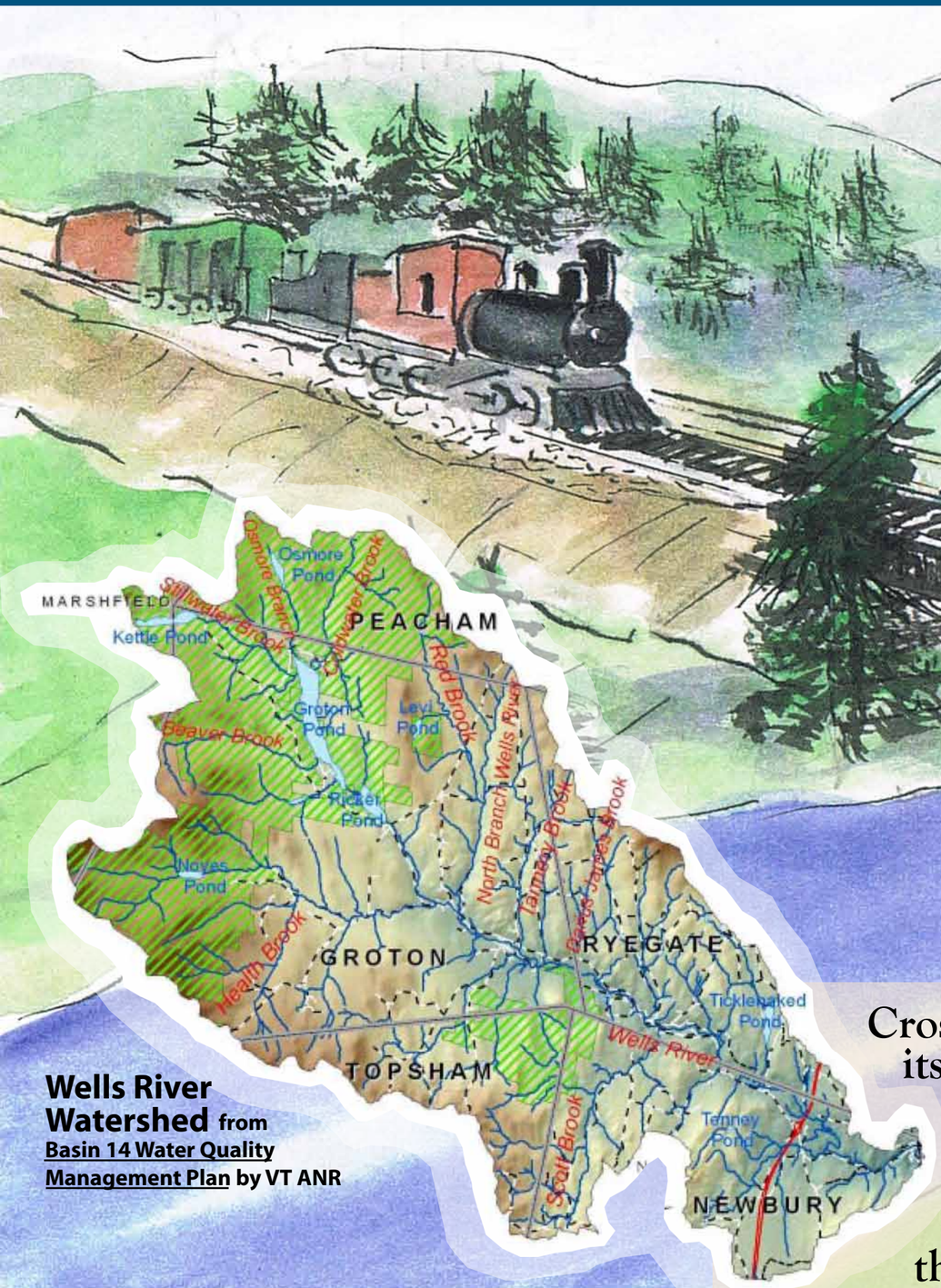

Wells River Watershed from Basin 14 Water Quality Management Plan by VT ANR

Cross Vermont Trail follows the Wells River to its source in Groton State Forest. The river runs about 20 miles, draining 100 square miles. The route of the river forms a naturally gradual grade. The 19th century builders of the Montpelier-Wells River Railroad followed the river to take advantage of this. Today, the trail follows the old railbed and the river to enjoy the same easy grade.

River Corridors

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A bike trail is wider than a bike tire. Room is needed for handlebars and arms akimbo. Bike trails switchback, wind to keep an easy grade. Rivers are like that, too.

Dynamic Equilibrium

Notice, the river corridor is bigger than the river channel (where you see the water running most days.) About six times bigger, as a rule of thumb.

Why so big? 3 reasons.

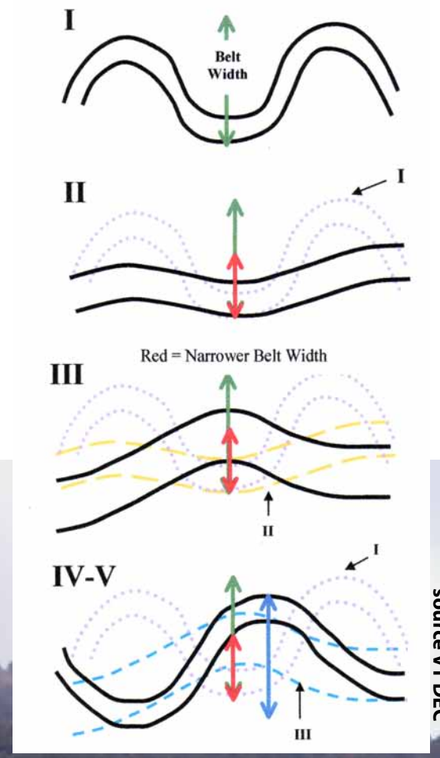
Meander belt. Not just for water, rivers are also flows of rock and dirt. Within a defined area the water winds and swirls in slow motion with the earth and stone also moving along the corridor. While this goes on in a healthy corridor the channel location may gradually change, but the channel size is stable.

Floodplain. Where high water spreads out, stored for slow release.

Streambank vegetation. A lush buffer tempers flooding and meandering, helping them to occur at moderate rates. Also, logs that fall into the stream add useful structure to the streambed, which functions best with some roughness. Unevenness baffles the water, providing an outlet for its energy. (All this makes for good wildlife habitat, too.)

On a practical note, rivers that have access to their full corridors in <u>enough</u> places inflict less damage, from flooding and erosion, on roads and buildings unavoidably in their corridors elsewhere.

Over time, flowing water changes course and reshapes the land within a defined corridor.



source VT DEC

Working Landscape

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Rickers Mill, at the outlet of Ricker Pond, was the site of a working lumber mill for nearly 200 years - from the 1780s through the 1960s. The remnants of the mill dam can still be seen. Other mills operated at the outlet of Lake Groton. Forestry and logging continue to this day along the trail route.

"To supply this thriving business at the foot of the lake the men cut trees all winter. The first sounds a camper might hear in the early spring when there was still some snow on the ground were the bells jingling and the teamsters shouting as they guided their horses slowly plodding their way along the Coldwater Brook log road or tow path. The logs were dragged to the Northeast shore and yarded at a place known as "the Log Pile." Here was a long beach with shallow sand bottom extending quite a distance out. A steamer hauled the logs from this location down to the mill twice daily. Aside from the weather this steamer and its reliable itinerary were the subjects most mentioned daily by those vacationing beside the pond."

- from Camping at the Pond by Marion Proudfoot

Geology

Along the
5 Cross Vermont Trail

Mountains and Rivers without end.

Setting the stage

Rocks. Over the life the earth, billions of years, the rocks around you were formed and journeyed through a "lavalamp" world uplifting as mountains, sinking into seas, forming continents and drifting over the face of the planet from the equator to here.

Regions. By a few hundred million years ago, the outline of the landscape was set roughly as we see it today. In eastern Vermont the "piedmont" is a plateau cut by streams into an undulating series of steep sided valleys. The spine of the state is the ridge of the Green Mountains, aligned south to north, rising steeply on either side, interrupted only with water gaps carved through by the even more ancient rivers running east to west, including the Winooski. Finally the Champlain lowlands, a trough between the Greens and the Adirondack Mountains beyond.

Glaciers

Glaciers are persistent. Bodies of ice that form where accumulation of snow each winter exceeds melting each summer. They grow year to year, eventually to cover continents, when they are called "ice sheets." In today's world, ice sheets still exist in Greenland and Antarctica. About 2 million years ago, a complex interaction of events occurred which lead to a long period of cold weather, and the beginning of the ice sheet that covered Vermont.

Glaciers flow. Once the ice becomes thick, glaciers start to move. This process begins when they are 160 feet thick. The ice that flowed over Vermont was over 5000 feet thick. It first formed in the mountains of eastern Canada, advance tendrils flowed south, tracing upstream river valleys, through mountain passes, and finally, piling up and overtopping even the summit of Mt. Mansfield. Eventually, our ice sheet made it as far south as Long Island. When the ice retreated it melted from the mountain tops first, then gradually back down the valleys to the north. Over the course of nearly 2 million years glaciers have spread south during colder periods, then partially retreated north during warmer intervals, and back again, many times. The most recent retreat was just 12,000 years ago. The action of the glaciers shaped the ancient landscape of mountains and rivers with the surface details we see today.

But, if you really want to get to know the rocks of Vermont one by one, try a trail building work party!

"I have a friend who feels sometimes that the world is hostile to human life--he says it chills us and kills us. But how could we be were it not for this planet that provided our very shape? Two conditions--gravity and a livable temperature range between freezing and boiling--have given us fluids and flesh. The trees we climb and the ground we walk on have given us five fingers and toes. The "place" (from the root plat, broad, spreading, flat) gave us far-seeing eyes, the streams and breezes gave us versatile tongues and whorly ears. The land gave us a stride, and the lake a dive. The amazement gave us our kind of mind. We should be thankful for that, and take nature's stricter lessons with some grace." - Gary Snyder

Glacial Landscape

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6 Cross Vermont Trail

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A wall of ice, a mile thick, everywhere, recently.

The land you see all around today is littered with markers left by the glaciers that covered Vermont for millions of years, and which melted just 12,000 years ago. In Groton especially look for the low hills, rounded smooth on the north and broken off on the south as the ice flowed over, plucking; the frequent small lakes, ponds and marshes gouged and dammed by sand and gravel left behind; the large boulder "erratics" scattered through the woods, garnered and slowly floated from the north.

Owls Head Mt.

Kettle Pond, from summit of Owls Head

Watershed Divide

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Smooth Transition

At Marshfield, a little past the crossing of Rte 232, the waters beside the trail flow-west, to Lake Champlain, rather than east to the Connecticut. The easy transition from the Wells River watershed to the Winooski River watershed is what makes this a natural trail route across the state, as it was for the Montpelier - Wells River rail-road, and many others before that.

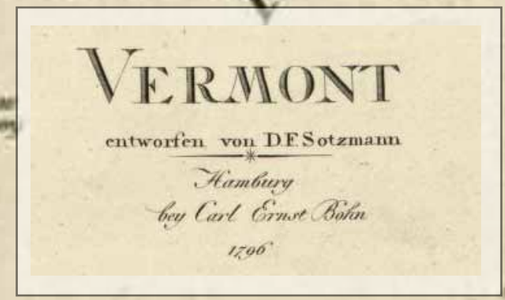
Historic Passage

"This much is certain, that in 1725, Capt. Benjamin Wright of Northampton, with a scouting party of sixty men, ascended the Connecticut to the mouth of the Wells River, which they followed, and having passed several ponds, crossed the height of land and descended Winooski River to Lake Champlain, returning by the same course. The journal of their expedition expressly mentions 'the fort at the mouth of the Wells River.' Many descendents of this Capt. Benjamin Wright are now living in Newbury. Other evidence of early visits to the Cohase country is found in the narratives of those who were taken capitve by Indians [during the war between England and France] and hurried through the wilderness. An ancient map, made about the time of the old French war, gives the correct course of both the Connecticut and Wells rivers, and says - Up both these rivers many captives have been carried to Canada."

- from A History of Newbury by Frederic P. Wells, 1902

"Joseph Paul Denis (b. 1832, d. 1928), Western Abenaki, making birchbark canoe models."

- from Handbook of North American Indians edited by William C. Sturtevant, 1978.



1796 map of VT from US Library of Congress

Railroad

First Train: 1873

The Montpelier & Wells River Rail Road was built as a cut off between two larger lines.

The Central Vt RR runs along the Winooski from Burlington to Montpelier, then turns south along the Dog River, to cross the watershed divide and follow the White River down to White River Junction.

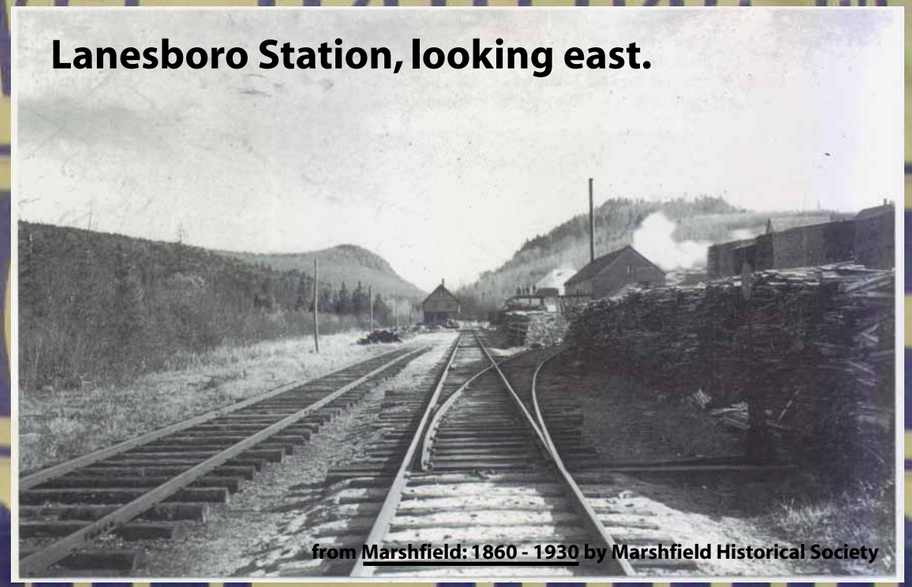
The Connecticut & Passumpsic/ Boston, Concord, & Montreal lines run up the Connecticut River valley through Wells River village.

The main business was hauling granite out from Barre; but much else was carried, too.

Daily Passenger Trains:
- 6 per day in 1894
- 8 per day in 1916
- 4 per day in 1922
- 2 per day in 1933

Last Train: November 15, 1956

- from Rail Lines of Northern New England by Robert M. Lindsell



Lanesboro Station, looking east.

from Marshfield: 1860 - 1930 by Marshfield Historical Society

Granite milemarker "Wells River 29 miles".

image Vermont Historic Society

River Continuum

Along the
9 Cross Vermont Trail

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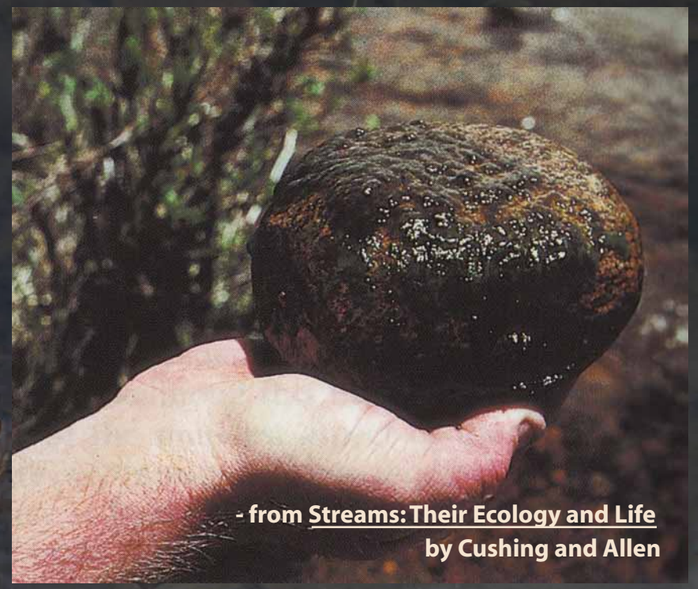
Scientists who study the ecology of flowing waters classify each river as having three parts, which flow one to the next, in continuum. Because they are describing the web of life, the divisions are keyed to major changes in the base of the food chain. As you travel the length of the river, look for these three regions.

Headwaters. Narrow, fast water, fully shaded by forest, rocky bed. Base of the food chain is land plants that fall to the water. For example, a tree leaf in a stream is quickly colonized by bacteria and fungi who convert the non-nutritious leaf matrix into a rich mass, palatable to aquatic animals - "like making peanut butter from a cracker."



- from Streams: Their Ecology and Life
by Cushing and Allen

Mid-reaches. Stream is wider, bottom is well lit, temperature warms, nutrients from upstream concentrate. All of this leads to the growth of a (tiny) jungle of plants, bacteria, and fungi bound together in a matrix inhabited by protozoans and micrometazoans. This BIOFILM coats rocks in the streambed (that's what makes them slippery!) Insects graze the biofilm and fish hunt the insects. The mid-reach is the most productive part of the river; many of the most famous trout fishing areas are in the mid-reaches.

Lower reaches. Large rivers, deep waters, slow flowing. Light does not reach the bed, which is clogged with silt. So the biofilm jungle does not grow here. Most animals live by collecting food that floats in from upstream.

Lake Winooski

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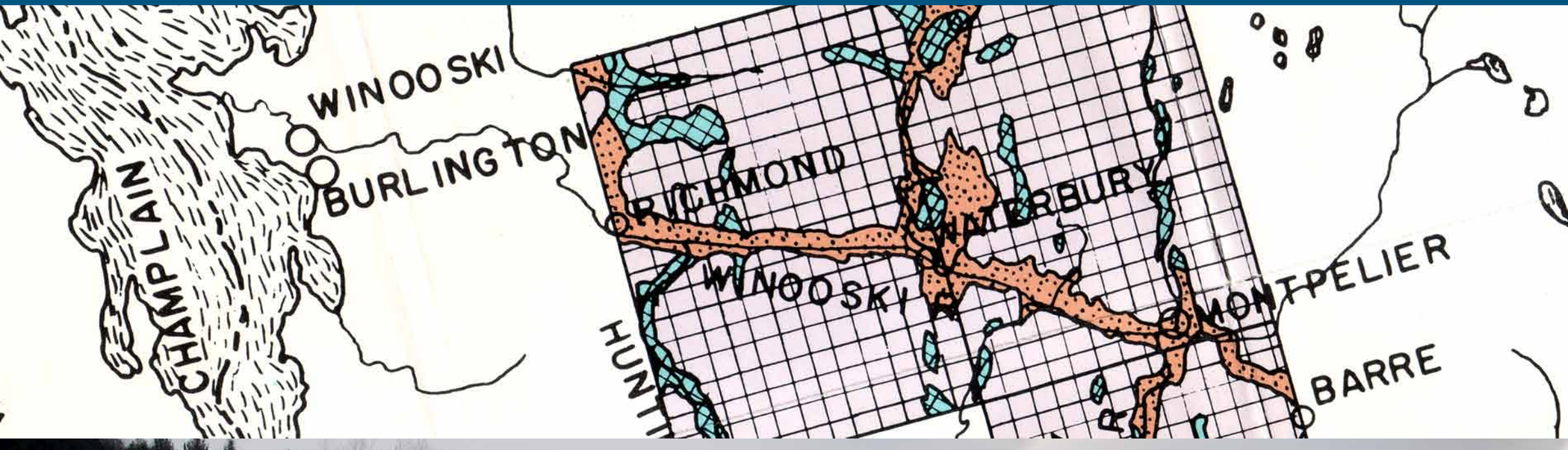

GENERALIZED CLASSIFICATION AND DISTRIBUTION OF THE SURFACE MATERIALS MAPPED 1956 – 1959.

LEGEND

- TILL – GENERALLY THIN OVER BEDROCK
- LACUSTRINE DEPOSITS
- GLACIOFLUVIAL DEPOSITS MOSTLY KAMES AND KAME TERRACES

GEOLOGY BY DAVID P. STEWART 1960

- from Bulletin No. 19 by Vt Geological Survey

10,000 BC - 9,000 BC
Climbing the hill from Martin Covered Bridge takes you to the shoreline of glacial Lake Winooski.

Lacustrine means lake. Geologists mapping the soils of Vermont years ago noticed the soil in the river valley is like the soil at the bottoms of modern lakes. The map of these "lacustrine deposits" must show the location of a lake that drained away long ago. At the end of the Ice Age, stagnant glaciers lingered in the valleys. The melting started at the headwaters and worked down stream. The retreating glacier was a dam; a cold muddy reservoir pooled up behind it. As the whole system moved down stream the name geologists use for the resulting lake changes from Lake Winooski, to Lake Mansfield, to Lake Vermont in the Champlain Valley. The pooled lakes followed after the retreating ice for about 1,000 years. In the end, the glacier melted so much the dam broke. The entire lake drained in one torrential day.

Marshfield Mussels

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A season of excitement and travel; then a long, settled life at home.

Mussels live upstream of the Martin Covered Bridge. “Looking up" at you today are some who would have also seen the horse drawn wagons hauling hay across this same bridge. Individuals can live over 100 years, encased in their hard shell, anchored with a muscular foot.

Improbably, these "stuck in the mud" creatures spend their first year of life as tiny hitch hikers inside the gills of brook trout, soaring. When mothers have a large batch of babies, they lure trout close, and cast their young up, who then spend months travelling with the fish. Once the juveniles are grown sufficiently, they drop off and set up permanent homes of their own on the river bottom. This relationship does not harm the fish, and it helps the young mussels find "fresh pastures" away from their parents.

Despite their individual adventuresomeness and fortitude, as a species they are threatened. In truth, they are not major players in the ecosystem of flowing waters here. If they finally disappear, it's likely most people would not notice. However, their presence indicates a robust habitat, with clean water, unclogged streambed, and healthy trout.
Protecting the mussel protects in turn a whole natural system.


photo I. Boldie

- from Brehm's Life of Animals

Do Not Disturb!
Collecting or bothering native mussels is illegal in Vermont.

Watershed Snapshot

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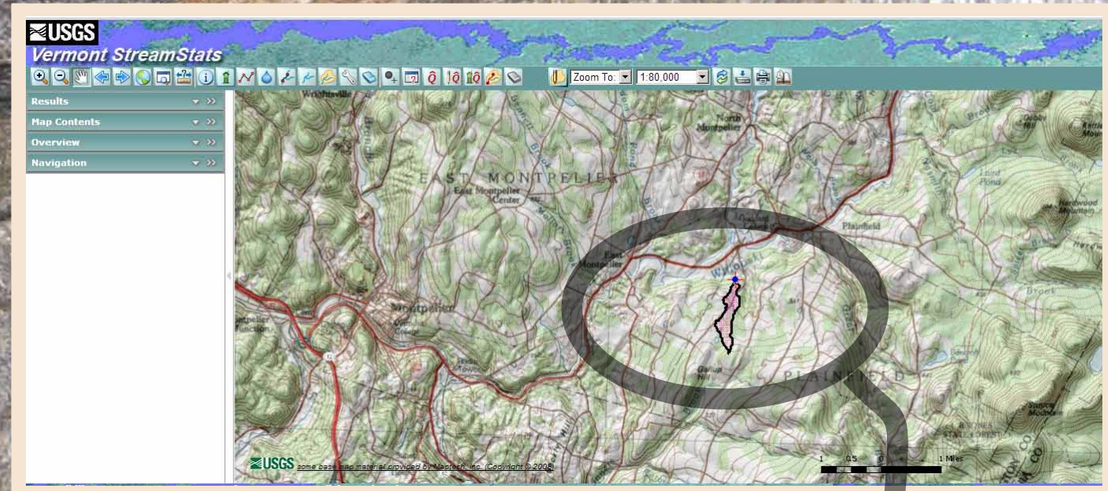
Hills and Mountains sloping to water.
What I call a valley some call a funnel.
More precisely, watershed.
More prosaically drainage basin.

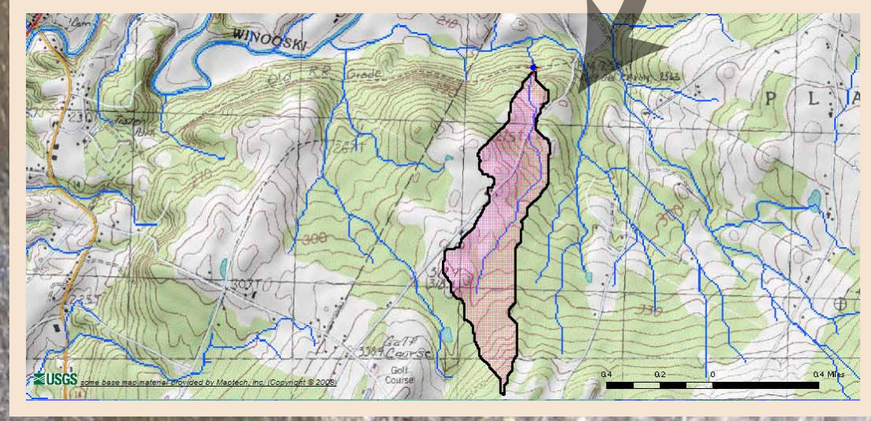
"Shed." An old english word meaning something like "organize". Maybe not best for some modern uses. But a good word to sort and delineate "the whole gathering ground of a river system."

- adapted from In the Land of the Wild Onion by Charles Fish

The US Geological Service has an online tool, "Streamstats", that allows anyone to take a snap shot of the watershed upstream from any point.

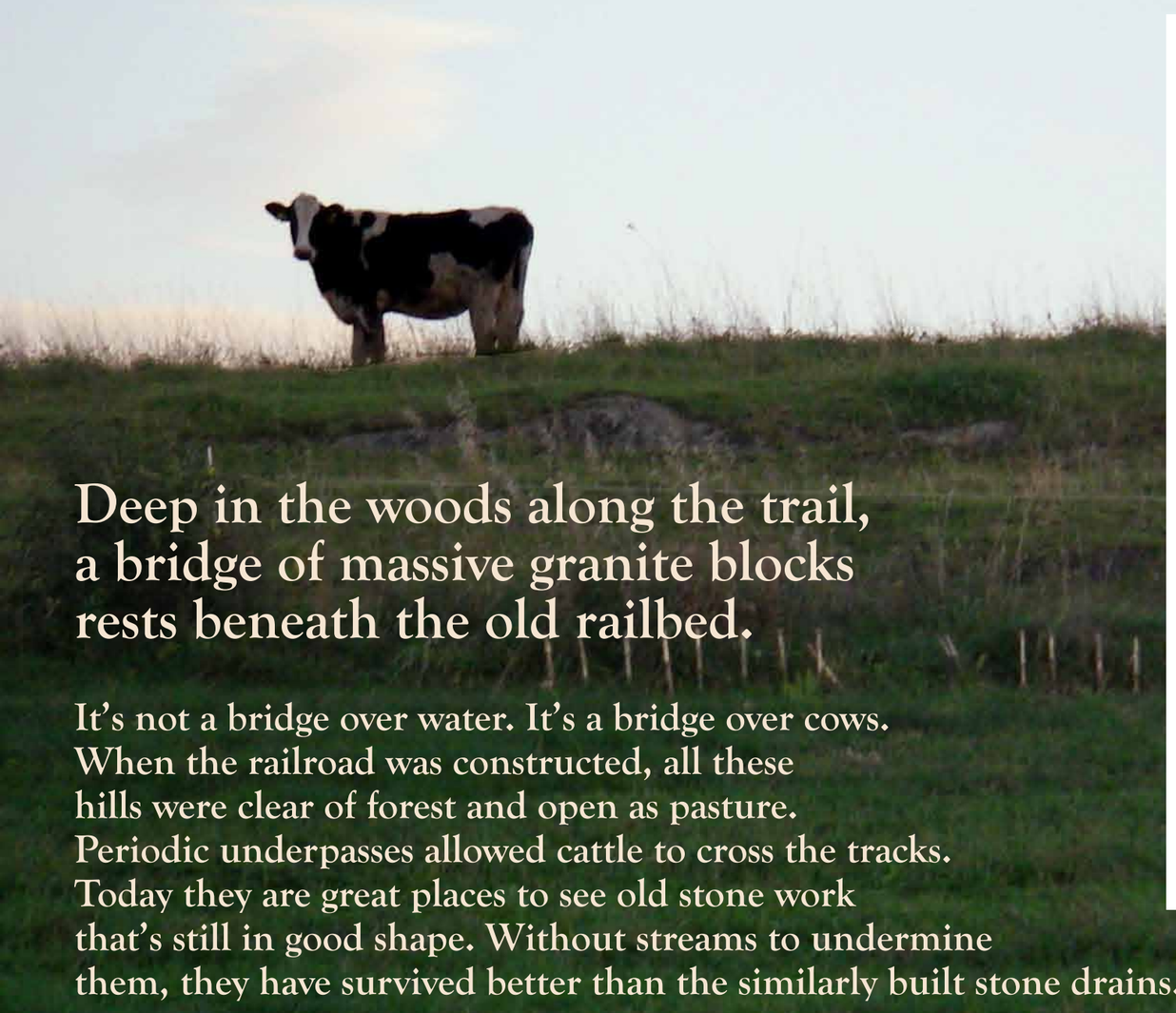
Beneath the trail, a few minutes west of Country Club Rd in Plainfield, a small stream shuffles through an old railroad culvert. Turns out this unassuming creek drains 135 acres, and starts more than a mile uphill.





Pasture Legacy

Along the
13 Cross Vermont Trail



Deep in the woods along the trail, a bridge of massive granite blocks rests beneath the old railbed.

It's not a bridge over water. It's a bridge over cows. When the railroad was constructed, all these hills were clear of forest and open as pasture. Periodic underpasses allowed cattle to cross the tracks. Today they are great places to see old stone work that's still in good shape. Without streams to undermine them, they have survived better than the similarly built stone drains.

Historically, a massive amount of sediment washed off Vermont hills during the clearings of the 19th century. By some estimates, the valley floors were raised several feet with this fill material! Some, piled in the ancient flood plains, plagues the rivers below to this day. Denied full use of their flood plains, they are now more destructive elsewhere during storms. In some ways, the 19th century settlers of Vermont were like human glaciers; working landscape changes that are taking centuries to settle out. Also, they dropped these Barre granite blocks, erratically, though neatly, here in the midst of an East Montpelier hillside.

Chemistry

Looking for what you can't see.

Some things are easy to see. Geology is - the banks, boulders, rushing water. Wildlife is - the hovering dragon fly, the Beaver's tail slap. Between these there is a category of things you have to look harder to see, which are just as big in the story of the river.

Oxygen in the water. Warm water has less, cold more. Water with high levels of organics, like manure, has more bacteria, but less oxygen.

Acidity. Wildlife prefers less, which is why acid rain is a problem.

"Fertilizing" nutrients, like nitrogen and phosphorus.

A River Ethic.

Many volunteer and student groups make special trips to monitor these invisible aspects of the river. It helps keep tabs on the water health, it builds a "land ethic" in the community, and it's interesting.

Local students monitor this stretch of river, downhill from their school. They drive by this site daily, but many have never before gone down to the water and taken a hard look. Some comments sprinkled in their lab reports:

"I was surprised." *"We were shocked."* *"I had no idea."*

"Some feelings our group received from our site were not good including that fact that we could see noticeable debris in the water such as a bed spring and multiple tires."

photos Brian Slope

Just what is Phosphorus, anyhow?

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Phosphorus is food for plants.

A nutrient which occurs in nature from many sources. It's also sometimes included in commercial fertilizer. On a bag of fertilizer, it's the middle number. Since it's in most soil already, naturally, bagged fertilizer often has a zero amount. But, this also means that excessive soil erosion is sort of like dumping a bag of fertilizer in the river.

When all this extra fertilizer accumulates at the bottom of the watershed, in the lake, it fuels "blooms" - thick and gooey - of algae and aquatic weeds. Some are toxic to humans, all spoil habitat for wildlife.

Political Watershed

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The Winoskik Abenaki Band who lived in this valley for thousands of years thought of the Winooski watershed as being their home in explicit terms. It was their "country", not just a geographic notion.

In the same way the Kowasek Band lived in the Connecticut River watershed, and the Mazipskoik in the Missisquoi.

A tradition that worked. For hundreds of generations, they moved house over the course of each year through all corners of the watershed. Taking advantage of seasonal bounties - they came together at communal villages along the river to fish in warm weather, spread out to family camps in the hills to hunt in cold weather, other camps to gather syrup in the spring, and so on around

- adapted from The Original Vermonters by Haviland and Power

The Vermont History Center on Main Street in Montpelier displays a re-imagined Abenaki Village (and much else).

MONTPELIER, and the North Branch

Stream Gage

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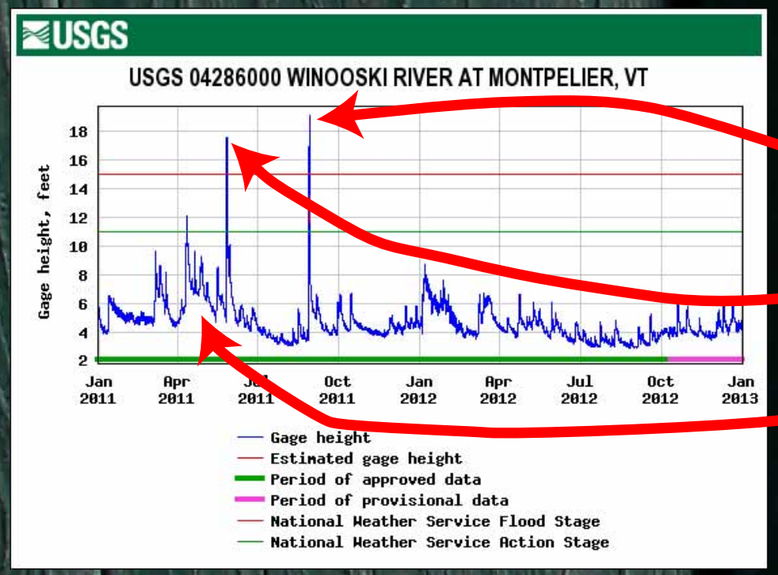
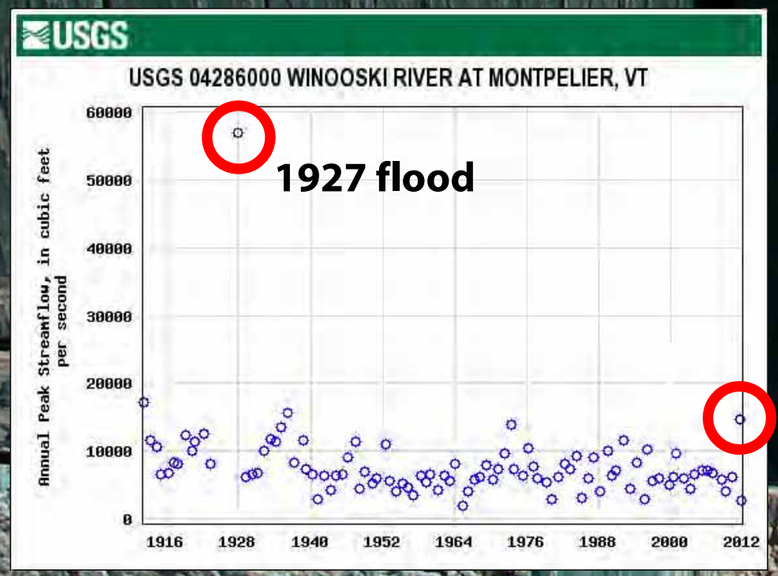


High water logged for 2011 and 2012.

Irene

May, 2011 storm

April, 2011 flooding



Annual peak flow records at this site go back to 1907.

2011 floods

You see along the river banks occasional concrete pillboxes, with antennas.

They are stream gages; constantly measuring the amount of water flowing by. (The data is posted live at usgs.gov.)

Gages are built to keep working in even the worst storms. During floods, the real time data is vital to emergency managers and people living down stream.

But they need to keep working all other days, too, to be useful during storms. Storm forecasting formulas are based on accurate knowledge of the river characteristics. Since river channels are dynamic, and always changing, the formulas are regularly updated with new information about what is "normal".

The resulting historic record is a treasure trove for scientists trying to understand the river.

The traditional spelling is gage (not “gauge”.)

Crossings

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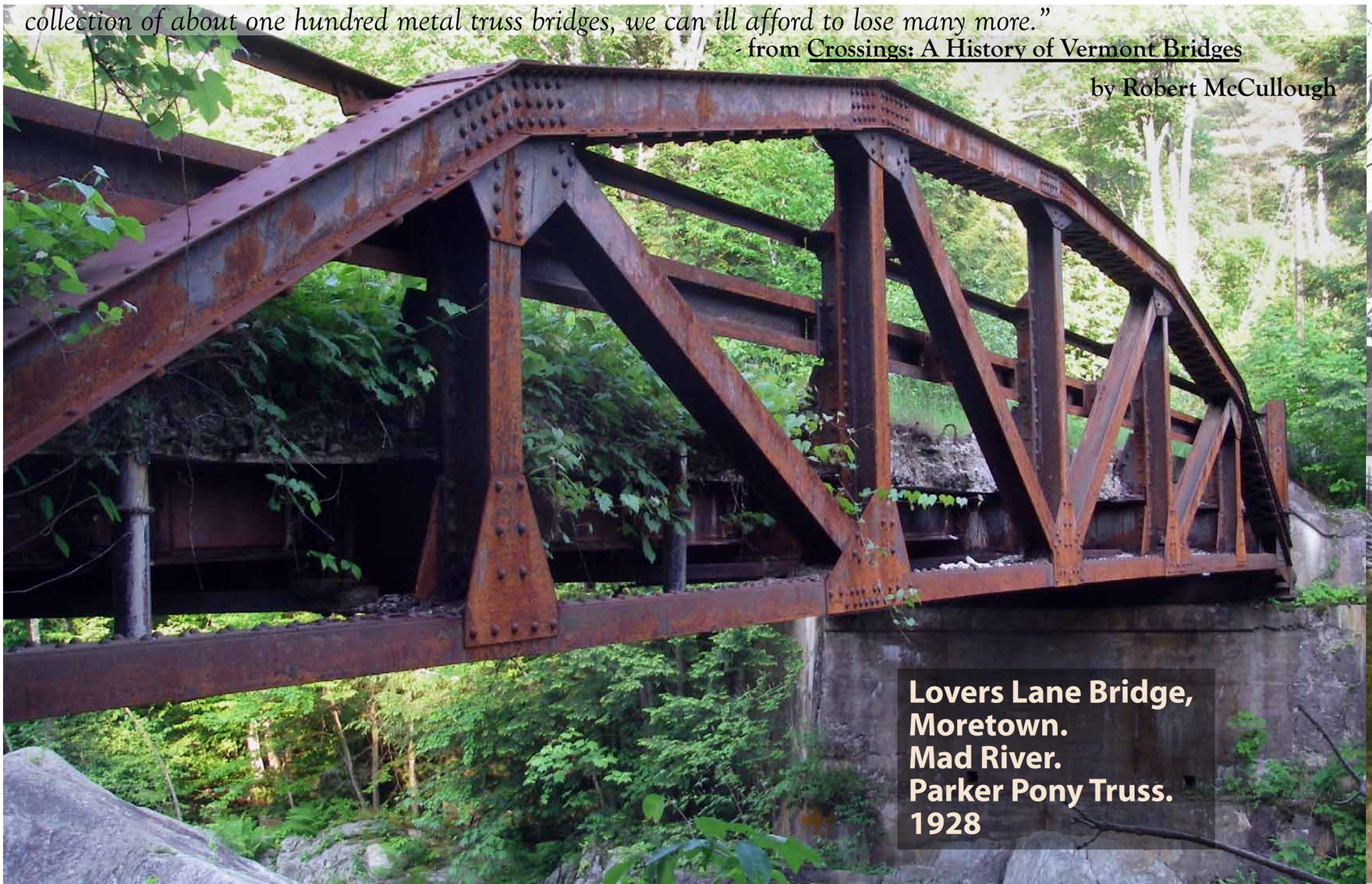
Bridges work best when unnoticed by traveler and river alike. Unimpeded. And yet, even then we may choose to slow and look; at them for their own sake.

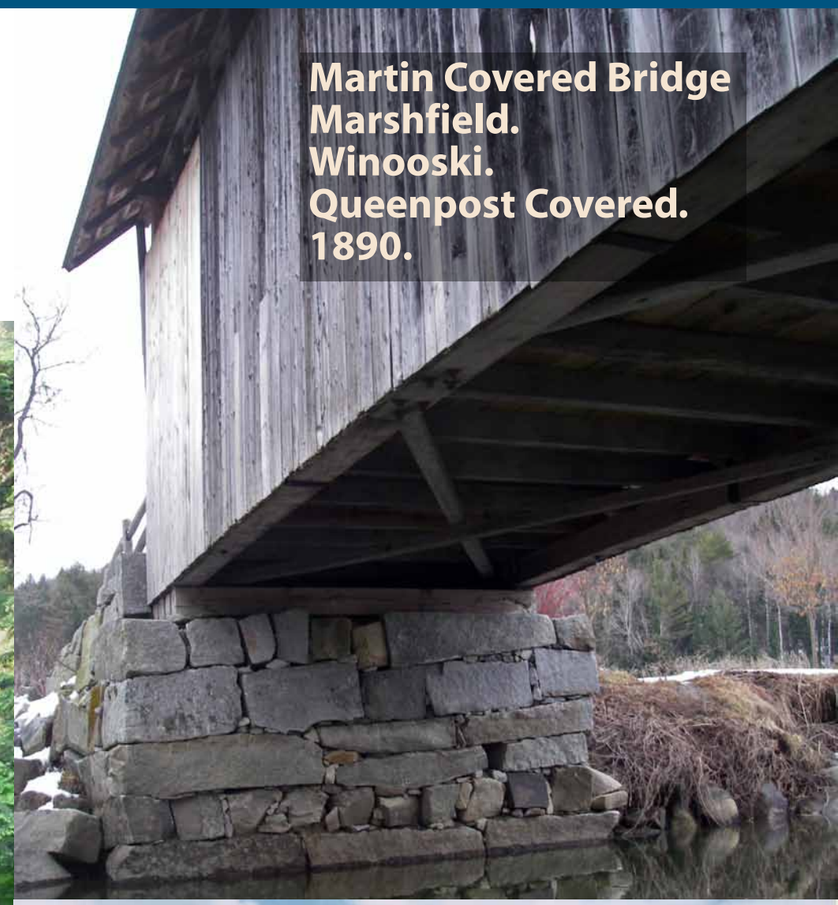
"Metal truss crossings would benefit from several points of comparison with the timber framed covered bridges. Covered bridges were often portrayed in disparaging terms during the push to modernize highways eighty years ago [and were] considered ordinary in design. Remarkably, there were four or five hundred covered bridges in Vermont in the 1920s, more than four times the [number] that stand today. Considering Vermont's comparatively small collection of about one hundred metal truss bridges, we can ill afford to lose many more."

- from Crossings: A History of Vermont Bridges

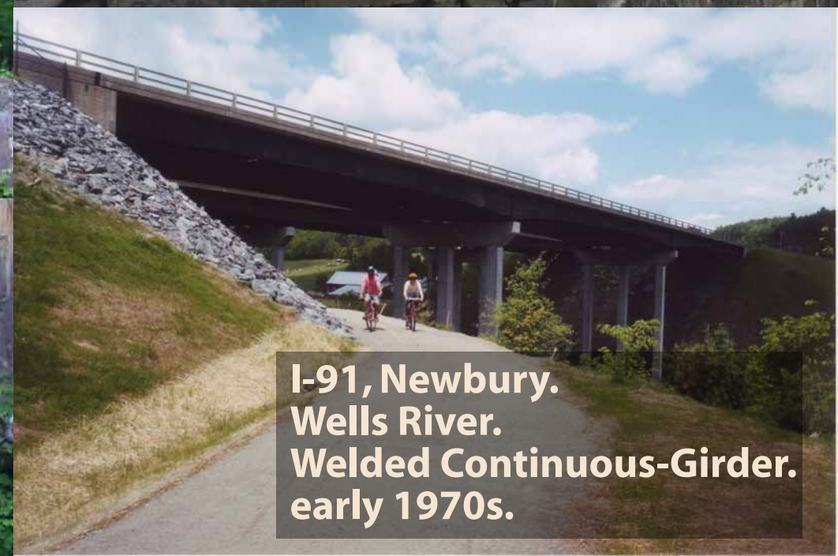
by Robert McCullough



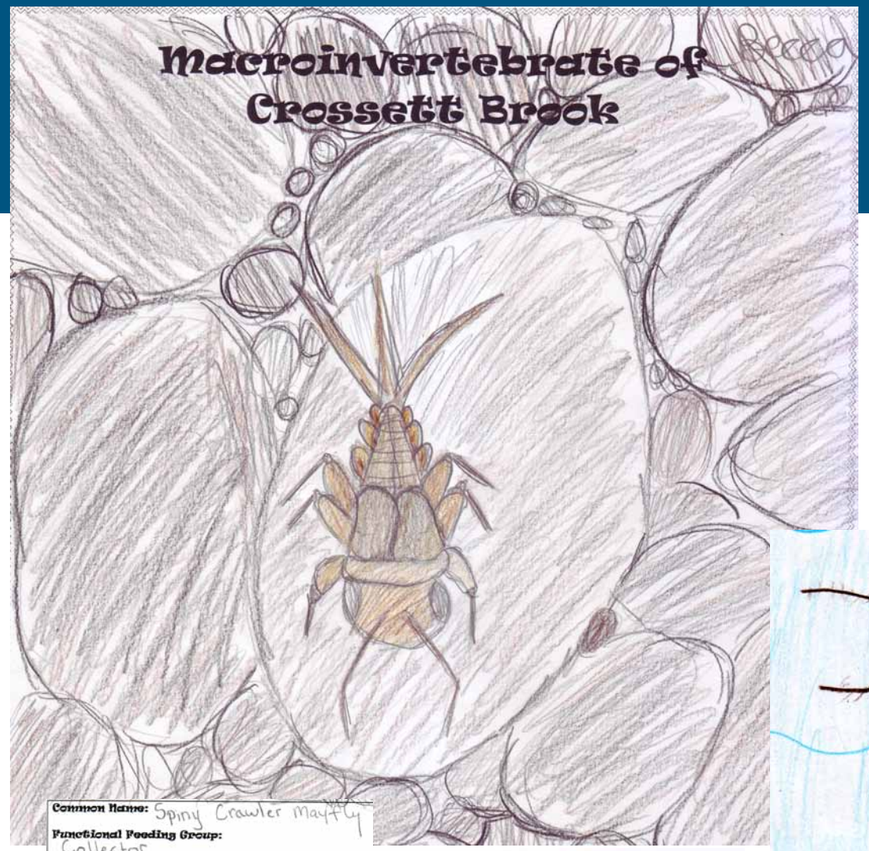
Lovers Lane Bridge,
Moretown.
Mad River.
Parker Pony Truss.
1928



Martin Covered Bridge
Marshfield.
Winooski.
Queenpost Covered.
1890.



I-91, Newbury.
Wells River.
Welded Continuous-Girder.
early 1970s.

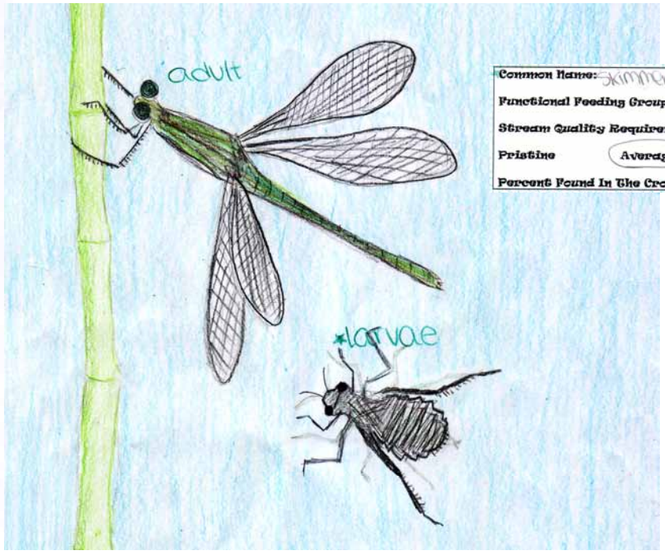


"Macro" because they are too large to fit through a 0.5 mm sieve.
Insects, snails, crawfish.
The second level of the river's food chain, gathering debris that falls in the water; grazing the periphyton (the tiny biofilm jungle on the stream bed.) Fishermen "tie flies" to mimic the macroinvertebrates.

Common Name: Little Stream Crawler Stage #4
Functional Feeding Group: Collecters
Stream Quality Requirement:
Pristine Average Poor
Percent Found In The Crossett Brook 14.8%

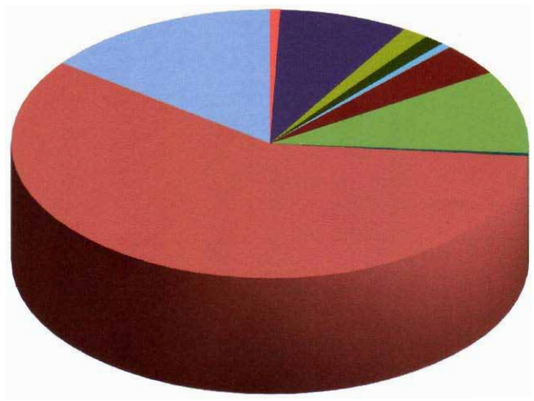
Common Name: Spiny Crawler Mayfly
Functional Feeding Group: Collector
Stream Quality Requirement:
Pristine Average Poor
Percent Found In The Crossett Brook 53.5%

Common Name: Humpless Casemaker Caddisfly
Functional Feeding Group: Shredder
Stream Quality Requirement:
Pristine Average Poor
Percent Found In The Crossett Brook 10%



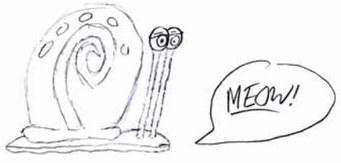
Common Name: Skimmer dragonfly nymph
Functional Feeding Group: Predator
Stream Quality Requirement:
Pristine Average Poor
Percent Found In The Crossett Brook

Macroinvertebrates Found In The Crossett Brook, June 2012



According to our macroinvertebrate data and the gross stream quality assessment, we can conclude that the Crossett Brook water quality is good. The requirements to be a good river is that you can find one organism or greater per square foot. We found about 20. Also 30% or greater of the organisms found have to be Mayflys, Stoneflys, and Caddisflys. 83.5% of the Crossett Brook organisms are those. To be a healthy river there has to be six different organisms found; We found eleven. You also have to see fish during a 100 foot walk along the river. We found many fish as we walked the river. The Crossett Brook River was always meeting or exceeding the standards to be classified as a good quality river. I think we can safely conclude that the Crossett Brook water quality is good.

art and science by
Crossett Brook Middle School students



Floodplain Forest

Along the
20 Cross Vermont Trail

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"It must have been spectacular." *Continuous bands of forest extended for miles along all our major rivers, prior to European settlement. Entering a mature Floodplain Forest, with towering Silver Maples, pillar trunks, arching crowns, open airy and fern filled, could create the impression of a cathedral interior.*

- from Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont
by Elizabeth Thompson and Eric Sorenson.

Disturbance

Floods make the Floodplain Forest, of course. Here the river is always moving, back and forth, shaping and reshaping the land. Plants that need unchanging ground do not last. Those few that can "go with the flow" get to thrive in the rich soil given by the river. For example, few shrubs survive, freeing ferns to grown luxuriantly, head high. The trees that dominate grow tall quickly during quiet times – and quickly regroup and regrow after storms – bowed but unbroken.

Calm

The ever changing land makes this forest. But once made, the forest works to slow changes caused by the river. During floods, trees act like a filter, slowing water, screening out floating debris, reducing the water's power to scour and erode. In addition, many people find the flood plain forest has a calming effect on sunny days too!

First cut, last recovered.

Floodplain Forests were quickly cut down by pioneer families to get at the rich, stone free soil, deposited by annual floods. Food grown here helped them survive. Later, as the population grew, all types of forests were cleared. Today, most have regrown and the view of tree covered hills stretching into the distance is again normal. Down in the floodplain, though, forest remains uncommon. The reason is simple. We still value this land along rivers for agriculture and settlement. The forest on the trail ahead of you is young, but protected and growing - imagine what it will look like in time!

Along the Winooski c. 1910.
Photo by Homer Locke, courtesy Town of Bolton.

Hope Cemetery

Along the
21 Cross Vermont Trail

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Rivers and villages interwined.

"The first settler of Waterbury was James Marsh . . .. [He] had been a soldier in the French War. In the early part of the Revolutionary War . . . he was drafted . . .. Having a large family of small children . . . he hired a young man as a substitute, paying him $100. To pay this sum . . . he sold his place in [Connecticut] and bought a right of land in . . . Waterbury. . . . In the spring of 1783, he came on, selected his right, . . . cleared a small piece of land between the Grave Yard and the river, and . . . planted it to corn.

During the first summer, this family with eight children, lived many weeks on wild onions, cooked in the milk of their one cow . . . That summer Mr. Marsh built his log-house on his clearing, a little to the west of the Grave Yard hill, and moved into it. His crop of corn raised near the river, was fine - but after he had secured some twenty bushels of it, a flood came and destroyed the remainder. So that for nearly two years they lived much of the time, on the flesh of the moose, deer and bear."

- from: The Early History of Waterbury, A Discourse. Delivered Feb 10, 1867 by Rev. C. C. Parker, Pastor of Congregational Church.

**Here on "Grave Yard hill"
is a glimpse into the origin of a centuries old landscape
- rivers and villages in close relationship - which you see all along the Cross Vt Trail.**

How old? What's the earliest headstone you can find? These two get close, but are not the oldest!

"Sacred to the memory of Seth Chandler who was killed instantly by the fall of a tree 31st March 1806 in the 39th year of his age."

"Amos Demmon died Sept 23 1801 in his 47th year. Enlisted under Capt. Hayward May 10, 1775. Later joined 2nd Mass Regt. Discharged June 10 1783."

Dams

Along the
22 Cross Vermont Trail

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19th century Vermonters were dam people. They built dams everywhere, hundreds up and down the Winooski and its tributaries. They built castle like edifices across the valleys and then their villages around them; they built log and boulder crib dams high in the hills and then released them to drive logs to mills, and they built every size and shape dam in between.

But that's the not the story here.

The story now is that we are still in the age of dams. It's not history. Currently the Winooski and the Wells River both are being utilized at near capacity for commercial hydroelectric production. Major new dam projects have been finished on the Winooski as recently as the 1990s.

The Cross Vermont Trail route passes by 8 working dams (out of a total of 15 between the Winooski and Wells River basins). They are a sight to behold.

Life in the Current

Along the
23 Cross Vermont Trail

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"There's a good run,"

Lawrence said, pointing to an island with a current on either side and at the lower end a pool 10 or 12 feet deep where the currents converged. Trout will wait in a pool or behind a rock where the water is fairly quiet and wait for the riffle to bring them food and oxygenated water. They also will stay close to the bottom except when they rise to feed, for friction with the river bottom slows the current there. If they expend more energy than they take in, they are doomed.

We parked about half mile below Bolton Dam and followed a cold mountain stream (63 degrees - Lawrence carried a thermometer) under the railroad tracks to its delta at the Winooski. We came to a long, sweeping riffle that is one of Lawrence's favorite stretches of water.

"Perhaps not the best" he said.

- from In the Land of the Wild Onion by Charles Fish

photo USFWS

Return of the Eagle

Along the
24 Cross Vermont Trail

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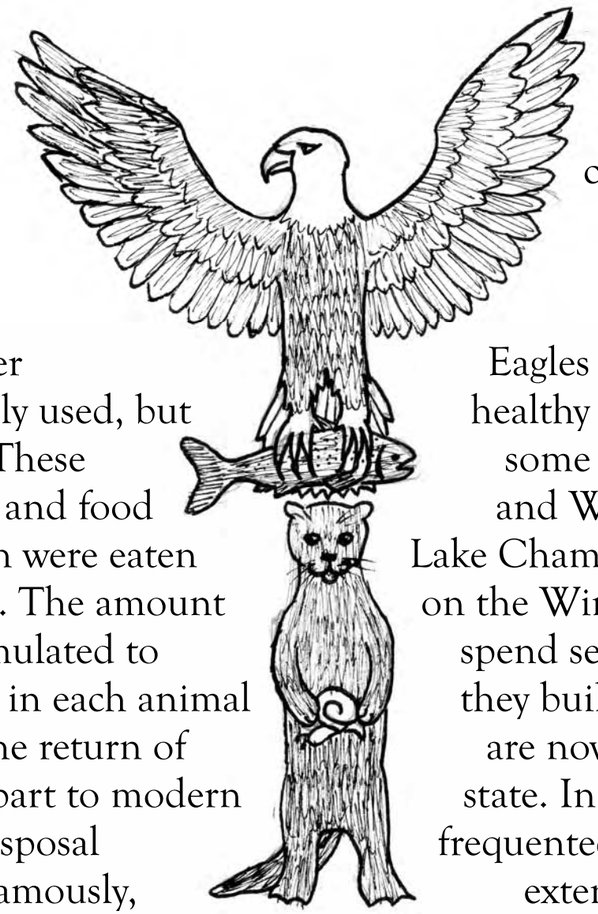
Eagles in Vt again; nationwide comeback passes milestone.

Like a national symbol ought to be, eagles are widespread throughout the USA.
However, in the early 1970s their numbers plummeted.
They were extinct in Vermont, and endangered elsewhere.



Eagles sit at the top of the food chain. They are "top of the totem pole." This was not a good place to be in the 1950s and 1960s when pesticides and other chemicals were first widely used, but still poorly understood. These toxins got into the water and food of smaller animals, which were eaten by larger animals in turn. The amount of toxins gradually accumulated to greater and greater levels in each animal on up the food chain. The return of the eagle is due in large part to modern control of the use and disposal of chemicals - starting, famously, with the pesticide DDT.

In order to finish their come back, eagles needed more than clean water and poison free food.

They needed habitat.

Eagles live at large rivers and lakes with healthy fish, lined with forests including some very large trees. Vt Dept of Fish and Wildlife calculates the Intervale at Lake Champlain is the only nesting habitat on the Winooski. However, juvenile eagles spend several years ranging widely before they build their first nest. Eagle sightings are now reported from throughout the state. In at least one recent year, an eagle frequented the Johnnie Brook area for an extended period. Keep your eyes out!

art Amber Nuite

400 Generations

Along the
25 Cross Vermont Trail

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photos UVM CAP Report #204

photo Burlington Free Press 7/9/2001

10,000 years ago a group of 25 - 40 people arrived at a hill overlooking Allen Brook, above the Cross Vermont Trail route, and established a base camp. In a sense, they never left. Their drills, knives, hammers, and spear heads made of stone were still here, ready to tell their story, when archeologists from UVM came looking in advance of a planned highway. Archeologists found one of the largest Paleoindian sites known in the northeast, among the oldest in Vermont. With their careful excavation, it has told us the story of that band of settlers, exploring a new land.

People who study the Vermont archeological record see evidence of an unbroken line from those first Paleoindian pioneers to the Abenaki who live in Vermont today. Pretty deep family roots! Here, members of the Missisquoi Band meet with Governor Salmon in 1976.

Champlain Sea

Along the
26 Cross Vermont Trail

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9000 BC to 6000 BC

The first Vermonters arrived in Williston and set up camp on an ocean beach, ringed by a tundra dotted with pioneer trees. Beluga whales swam in the shallows, and Woolly Mammoths grazed the hills. Fossil remains of both these animals have been found nearby and are on display at UVM's Perkins Museum. The beluga whale (named Charlotte) is Vermont's "State Fossil."

Glaciers sat on Vermont like a fat man on a pool float.

Just like a pool float sinks into water, the crust of the earth here was pushed down into the magma, molten rock deep in the earth below. After the weight of the glaciers melted away, it took thousands of years for the magma to ooze back into place, "popping" the surface up again.

Williston was pushed down to about sea level, and Burlington was lower. When the glaciers finally retreated north of the St. Lawrence, the Atlantic came pouring in.

As the crust of the earth rebounded, the salt water eventually drained back out, creating the lake we see today.

Wildlife Corridor

Along the
27 Cross Vermont Trail

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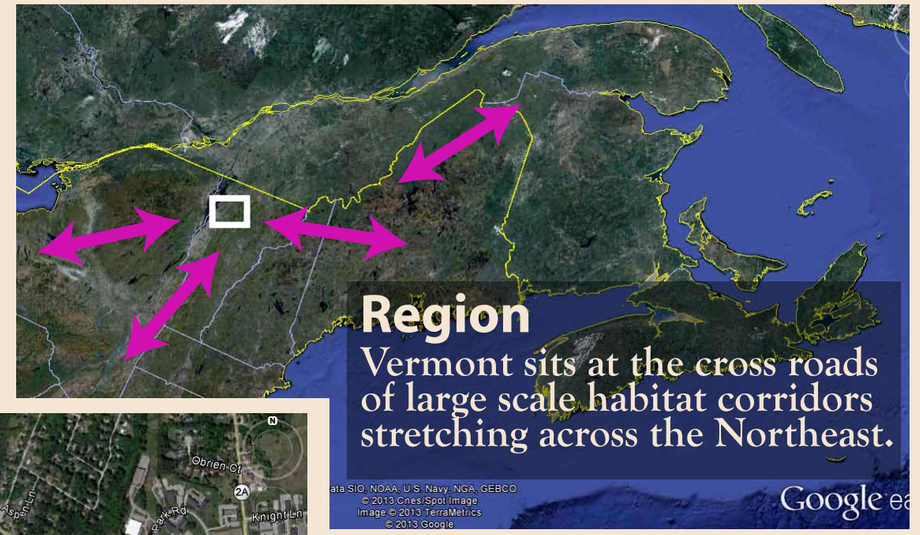
Muddy Brooks and Green Ways.

Neighborhood

A simple 100 ft wide swath of trees gives animals the cover needed to travel easily between two protected wetland areas where they live and feed.

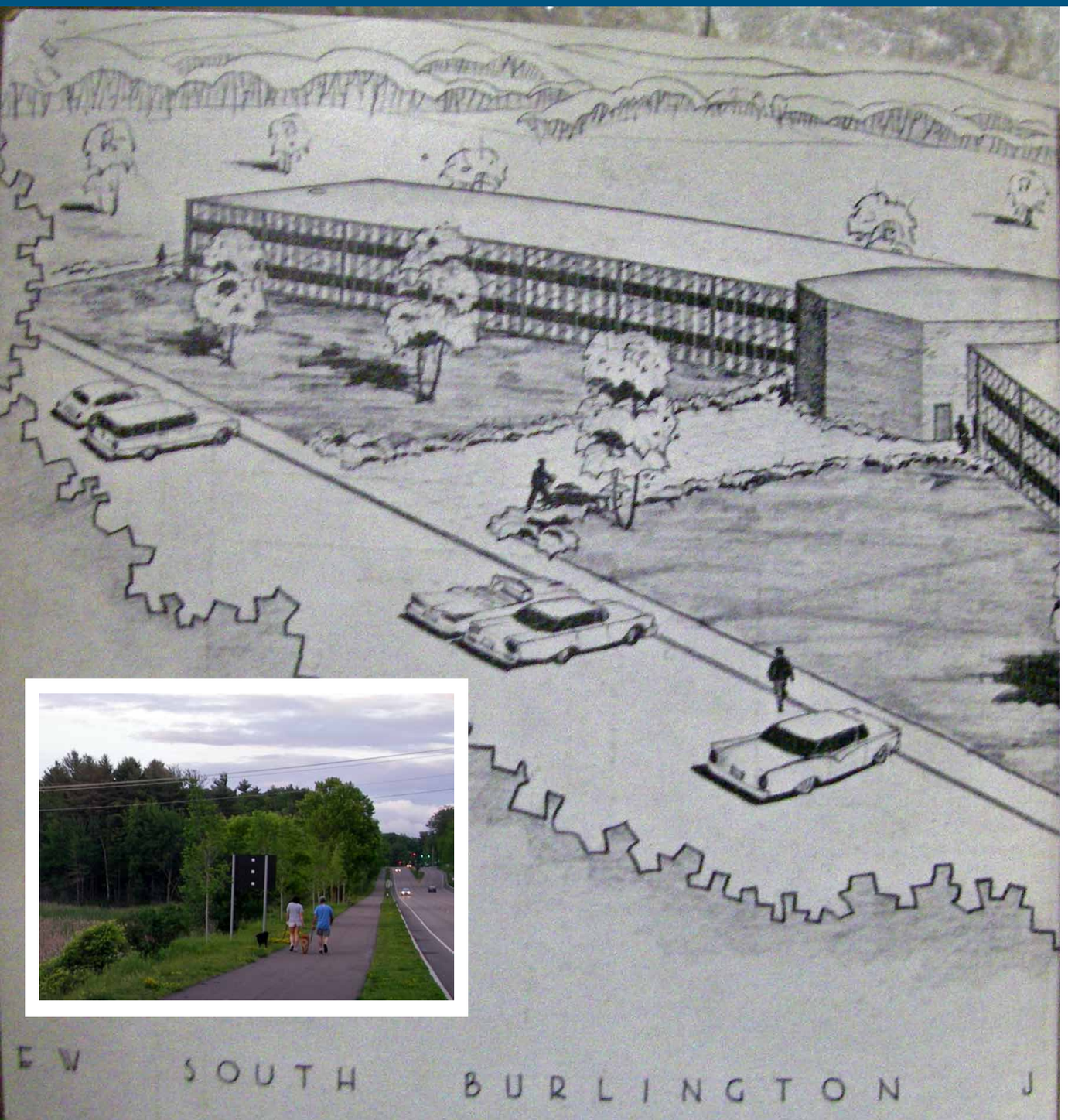


Town

The mostly forested banks of Muddy Brook run the length of Willison. Uniting into one habitat a series of wetlands from Shelburn Pond to the Winooski River. There are numerous beaver lodges, including, at times, here in the developed part of town.

Kennedy Drive

Along the
28 Cross Vermont Trail



New Frontier

Fifty years ago, the people of South Burlington were on the leading edge. The population of Vermont had been static from the late 19th century to the mid twentieth. Then it doubled. It happened here first. Through out the mid-twentieth century the census count for South Burlington grew at a rate of 100%, decade after decade. They went from wood stove heated, one room school houses in 1940 - spread out each within walking distance of the children for each rural neighborhood - to having a centralized school that was the largest in the state by 1960.

They took seriously the challenge to build an ideal new town. One chance to do so arrived with construction of the interstate in the early 1960s. Kennedy Drive was built at the same time as I-89, meant to go along with it. A brand new section of town, with a wide, modern boulevard giving easy access to carefully planned campuses of residential and commercial development. A "Brasilia on the Potash".

from South Burlington Town Reports:

1960: One of the most difficult and, we feel, beneficial accomplishments during the past year has been the completion of negotiations for our primary needs in connection with the Interstate Highway through our Town. The present Chairman of our Board, alone, has made more than one dozen trips to Montpelier at his own expense in an effort to complete these negotiations with the Highway Department. The limited access portion of the Interstate from Shelburne Road to Dorset Street cannot be used for development; but that portion of the road between Dorset Street and Williston Road will be available. Its general route will proceed East along the southern side of the Town lot (site of the new Junior-Senior High School now under construction) and in general follow Potash Brook.

1965: During each of the past few reports from your board, we have mentioned with pride the rate of growth of our Town which continues to be more rapid than that of any other in the state.
1965 was again a banner year. Uppermost in [our] objectives is the continued assurance of maintaining a healthy free from care community where each citizen may find an ideal place to live, work and play.
A professional planning consultant has been picked to do the ... work and it is planned for completion in less than eighteen months.

Retrofit

At that time, they thought the growth would continue for ever. The town government spoke of needing to plan for a population of 40,000 by 2010. In fact the population of South Burlington in the 2010 census was less than half that, and not too much more than preceding decades (though a world of difference from the size a century before). In 2012, Vermont as a whole was estimated to have actually lost population. However, the effect of all the development from the years of growth are still working their way through the natural systems around us.
Potash Brook, along Kennedy Drive, is classified as "impaired". All the water that now runs off new roads, parking lots, and buildings flushes the toxins of the modern world into the brook where it is concentrated into amounts of heavy metals measured pounds at a time.
Even the simple rush of the water that arrives in the stream all at once, where before it would have soaked into the ground and been stored to recharge the brook gradually over time, erodes tons of soil unnecessarily. To bring things back into balance, the City recently reconstructed all along the road, creating retention pools that capture runoff, filter it, and release it slowly to the stream, mimicking natural function. Look for these along side the bike path. Kennedy Drive was meant to be the picture of the future. Now, it is a little more so!

Winooski River

Along the
29 Cross Vermont Trail

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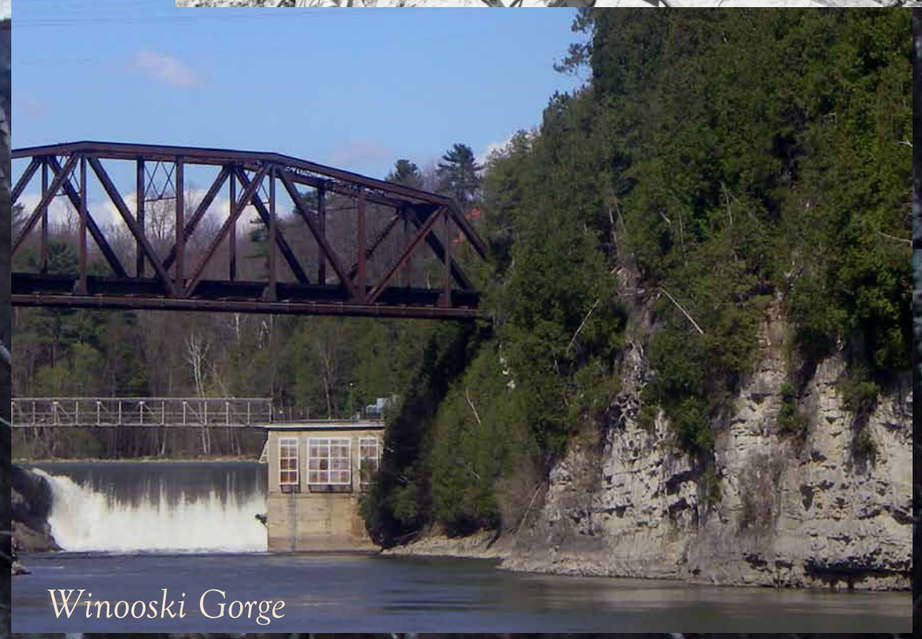
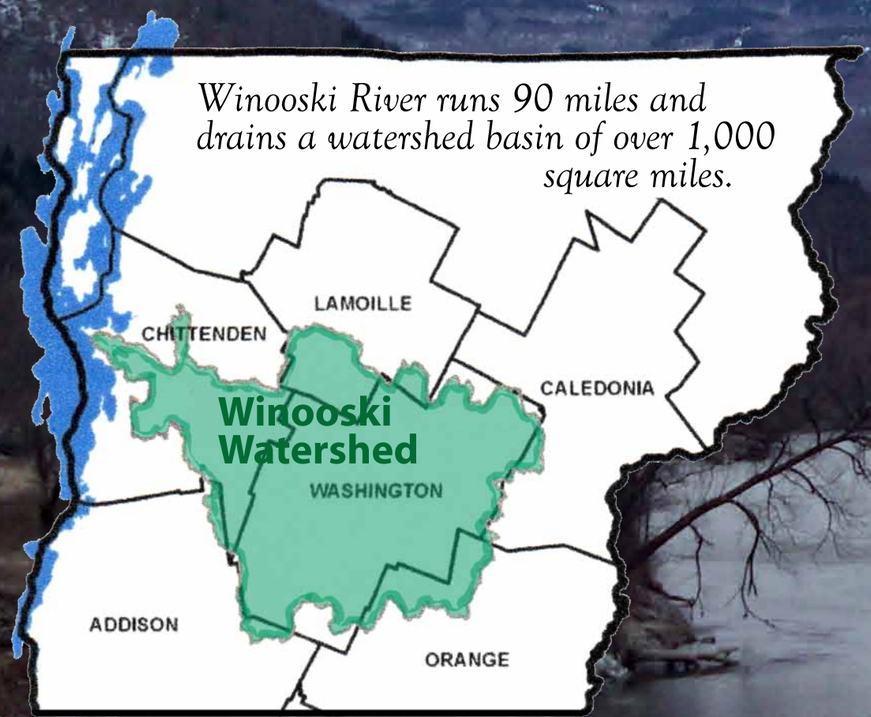
A mighty water gap through the mountains.

The Cross Vermont Trail, together with I-89, Rte 2, and the Central Vt Railroad, takes advantage of a natural water gap through the Green Mountains carved out over hundreds of millions of years by the Winooski River. The elevation at the river is but a few hundred feet above sea level where Camels Hump and Mt. Mansfield each rise to over 4,000 feet on either side. All the blasting of rock for the highway pales next to this feat of the Winooski. And the labor proceeds. New, steep sided canyons have been cut from bed rock in recent millennia along the route by the river still seeking the optimal way to the lake.

Cartier Construction drills ledge for I-89
photo: Vt State Archives



Winooski Gorge



Lake Champlain

Along the
30 Cross Vermont Trail

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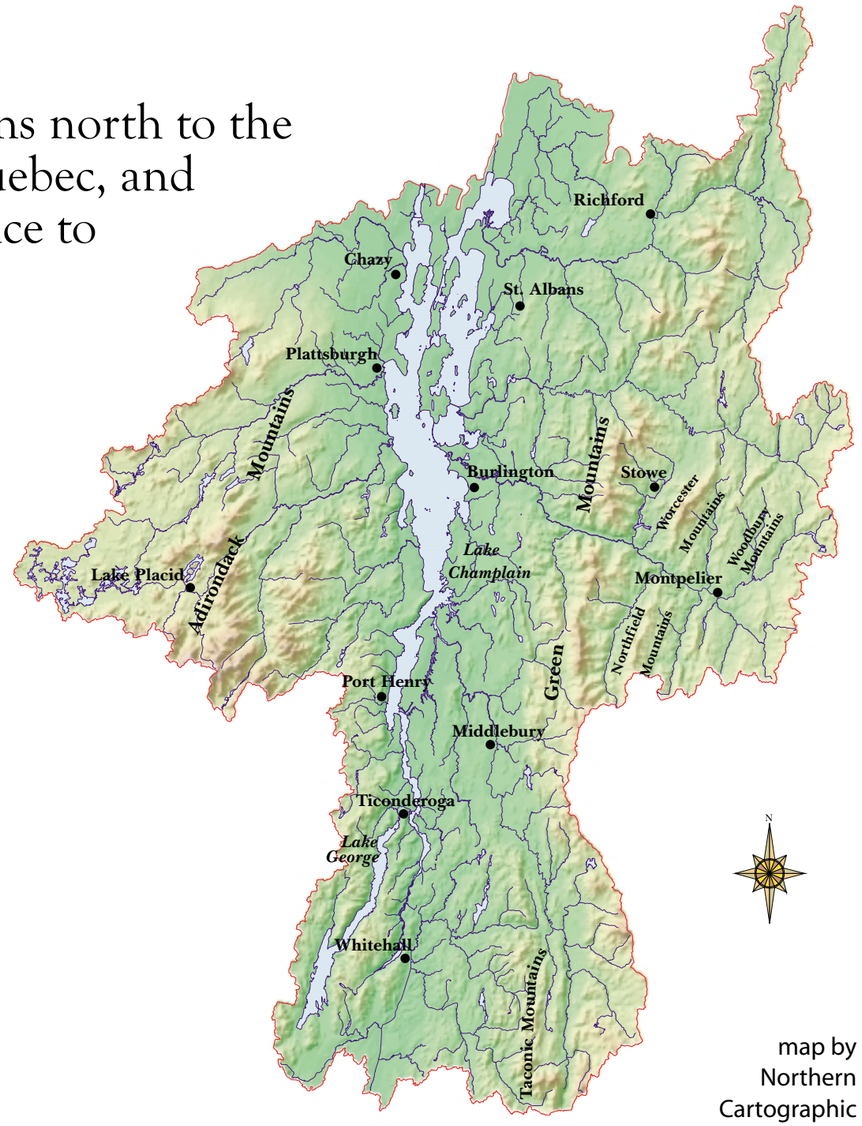
Lake Champlain drains north to the Richelieu River in Quebec, and on out the St. Lawrence to the Atlantic Ocean.

120 miles long, it drains a watershed of over 8,200 square miles.



map by Northern Cartographic

The Cross Vermont Trail route starts and ends on the shores of Lake Champlain, in Burlington. The lake forms the border of Vermont and New York.

look closer

Along the
Cross Vermont Trail

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photos Zyla Nuite

What do you see?

This is a living document. We want it to grow. What do you say?

Hey teachers, and students - want to do a school project improving or expanding a page from this guide? Give us a call! (We may have some money to reimburse your expenses for supplies or for field trips.)