

FRIENDS OF THE

Winooski

**A Paddling and Natural History Guide
to One of Vermont's Great Rivers**



www.winooskiriver.org

Friends of the Winooski River has compiled this paddling guide to help you explore the Winooski River. The guide is organized so that you can select sections and paddling distance based on skill level, habitat and location. More than just a logistics tool, the guide also includes numerous articles on the flora and fauna found throughout the Winooski Watershed. Enjoy the river and be safe.

About the River

The Winooski River begins in the town of Cabot and flows 90 miles to Lake Champlain in Colchester. The watershed drains approximately 1,080 square miles in central Vermont, encompassing all of Washington County, about half of Chittenden County, and portions of Lamoille and Orange Counties. The Winooski River is the largest tributary watershed to Lake Champlain. It includes almost 10% of the land area of Vermont.

The river and tributaries from the head to Montpelier are mostly narrow and steep with heavily timbered valleys. Below Montpelier, the river has a relatively consistent gradient with fertile open land well suited for cultivation except for a few steep gorges. The Middlesex, Bolton and Winooski gorges facilitate the harnessing of hydropower and have attracted mills and the development of towns dating to the late 1700s. The river has seven major tributaries: Little River, North Branch and Kingsbury Branch enter from the north and the Huntington River, Mad River, Dog River and Stevens Branch enter from the south.

River Winooski Trends

- Approximately 1/3 of the population of Vermont lives in the Winooski Watershed

- Over 70% of the watershed is forested, about 12% in agriculture, 9% is developed, 5% is water.
- About 11% of the watershed is publicly owned land.
- The percentage of the watershed in agriculture has dropped to its current level from 45% in 1950. This farmland has been replaced by developed land (residential and commercial) as well as reverted to forest land.
- The name Winooski is derived from the Abenaki work 'Winooskik' which means wild onion. For a period in the late 1700s to early 1800s, the river was more commonly called the Onion River.
- Approximately 90 dams dot the Winooski watershed although only a handful now function for flood control and/or power generation. Many are old mill dams.



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Winooski

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Time Travel on the Winooski

by *George Springston,*
Norwich University Department of Geology and Environmental Science

Ever wonder what the Winooski River valley looked like long ago? Today the river flows from its headwaters in Cabot south and then southwest to Montpelier and then, turning northwest, it cuts straight through the Green Mountains on a beeline for Lake Champlain. How long has the river followed this course? What came before? The geologic story of the Winooski valley is one of plate tectonics and continental glaciation, but it's also a story of streams, which over vast stretches of time can tear down even the highest mountain ranges.

If you travelled through this part of Vermont in the Cretaceous Period (144 to 65 million years ago), you might have been on a long hike across a range of hills or low mountains where the Green Mountains stand today. There may already have been a lowland in the Champlain Valley with streams flowing westward out of the hills, but the details of these ancient stream systems are unknown. These small hills were the remnants of great mountain ranges built up in the Devonian Period (417 to 354 million years ago), but the unrelenting erosive action of streams acting over millions of years had long ago worn them down. Instead of mountain-building, the Earth's crust here during the Cretaceous was being stretched and broken by the same stresses that were causing the opening of the Atlantic Ocean to the east. Away to the southeast and east, you might have seen plumes of ash

from active volcanoes at Mount Ascutney and in the White Mountains. Earthquakes may have been rather common.

An ancestral Winooski River appears to have already been flowing northwestward across central Vermont when renewed uplift of the crust took place sometime during the later parts of the Cretaceous or during the subsequent Tertiary Period (65 to 1.8 million years ago.) The uplift was a sort of gentle, regional uplift. Although the rocks of the Green Mountains were generally quite resistant to erosion, the ancient Winooski was able to keep pace by eroding downward as uplift continued, perhaps because it was already flowing in a zone of weaker (perhaps more fractured) rock. Much of this is speculation, but we do know that the Winooski and its sisters the Lamoille and Missisquoi today cut across the Greens and indeed appear to have done so since before the Pleistocene glaciation. We don't know anything about the boating conditions on this early Winooski, but fossil plants found in a lignite (brown coal) deposit at Brandon, Vermont indicate we had a warm-temperate climate about 20 million years ago. The fossils include those of hickories, chestnuts, mulberries, black gums, sycamores, and many others.

You would have been quite the adventurer to attempt to follow the route of the Winooski 25,000 years ago during the "ice ages" of the Pleistocene. An ice axe, crampons, and plenty of warm clothing

would have been very handy on such an expedition, as the Laurentide Ice Sheet was at its maximum extent, blanketing all of eastern and central North America as far south as Long Island and Martha's Vineyard under about a mile of ice. You couldn't have seen it, but the massive weight of the ice had depressed the Earth's crust by hundreds of feet. This was just the most recent of many ice sheets that came and went over the region in the last 1.8 million years or so.

About 14,000 years ago it would have been a water journey again, but with a lot of paddling, for the valley was filled with the turbid waters of glacial Lake Winooski, which extended from up in Lower Cabot all the way to Richmond, filling the main valley and all the tributary valleys to elevations of about 1,000 feet above present sea level. The clay deposits encountered at many sites in the valley were deposited in this lake. At that time, the retreating ice blocked the northern Champlain valley and the lower Winooski valley west of Richmond, and the waters of Lake Winooski spilled over the hills at the lowest point, which was Williamstown Gulf. From there, the outflow rushed down the valley of the Second Branch of the White River to an arm of the great inland lake known as glacial Lake Hitchcock, which filled the Connecticut River valley and drained south to Long Island Sound.

After the ice sheet melted back further northward, lower drainage routes for the lake opened up at Gillett Pond in Richmond and then Hollow Brook in Huntington, causing two new stages of the glacial lake in the Winooski valley (these lower stages are called glacial Lakes Mansfield I and II) and sending the waters pouring out at Hinesburg into the larger ancestor of Lake Champlain called the Coveville stage of

glacial Lake Vermont. The thick sand and gravel deposits at about 600 feet elevation at Hinesburg are remnants of a delta built out into Lake Vermont, which drained southward through the Hudson River valley (the ice sheet still blocked any drainage to the north). Finally, you could make it to the Champlain valley by boat, although there might have been some serious white water stretches to navigate as the waters rushed through the outlet stream. What would the landscape have looked like at this time? The pollen and other plant remains preserved in bogs indicate that the landscape south of the Winooski River was probably some combination of tundra and sparse boreal woodland. Spruce, birch, one of the pines (jack or red?), and poplar were early arrivals. To the north, you would have seen the great ice margin, with torrents of meltwater rushing out from under the ice on every summer day.

Coming back a few hundred years later, you'd see that even more melting of the ice sheet had opened up the lower



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Winooski valley, with the waters of the Late Pleistocene Winooski River emptying into a lower level of glacial Lake Vermont called the Fort Ann stage. The broad terraces you can see today at about 500 feet elevation in the center of Williston and north of the Winooski River in Essex Junction record this level of Lake Vermont.

Continued ice retreat led to more lowering of the water levels in Lake Vermont. Eventually (about 13,000 years ago) the ice retreated north of the St. Lawrence River, and the waters of the sea poured in to form the brackish waters of the Champlain Sea. The Burlington Airport is built on a vast delta (now about 350 feet above sea level) formed from sediments of the Winooski River that built out into the Sea. After about 3,000 to 4,000 years, rebounding of the land due to the removal of the great weight of the ice sheets cut the Champlain Sea off from the St. Lawrence estuary and led to the formation of Lake Champlain. The land was now largely forested.

If you made the trip around 8,000 to 9,000 years ago, you could certainly boat from modern-day Cabot to the shore of Lake Champlain. However, because it took

time for the river to cut down through all the lake-bottom sediments left behind by Lake Winooski, the course of the river (at least in the upper reaches) may have been some feet higher than today. Remnants of the old floodplains from this time stand as terraces many feet above the present river floodplain. Studies on the lower Missisquoi and elsewhere show that sedimentation and river channel migration in the lower reaches of the rivers were quite rapid after the end of the Champlain Sea episode as tremendous amounts of sediment were eroded off the newly exposed hillsides and excavated out of the valley bottoms in the upper reaches. However, the sedimentation rates slowed down over time, due at least partly to increasing vegetative cover and developing soils. One by one, ash, balsam fir, larch, elm, oak, maple, white pine, and hemlock joined the earlier arrivals. Plenty of changes were still to come (for example: in terms of tree species beech, hickory, and chestnut were still not present) but the broad elements of mountains, river system, and forests were finally taking on the appearance they would have up until the time of European settlement.



M

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Turtles of Central Vermont

by Mark Powell

As you travel down the Winooski river, there are three turtle species that you might encounter. The most common of these is the painted turtle, the turtle with which Vermonters are most familiar. Not only is it present in many ponds and slow moving streams throughout the Green Mountain State, it has a habit of basking out in the open, often on floating logs, where it is easily spotted by hikers and kayakers. Painted turtles are our smallest native turtle, reaching a maximum length



of seven inches. They have very dark brown, almost black, smooth shells with some red around the edges, and yellow stripes on the sides of their head and neck. Although painted turtles spend almost all of their time in or near the water, they do sometimes travel from one wet area to another, and they also wander in search of suitable nesting habitat.

Snapping turtles are also fairly common, but they are not seen as often because they spend almost all of their time in the water. Even when they want to feel the warmth of the sun, snapping turtles are more likely to find a shallow area where the water itself is able to absorb the sun's heat, with perhaps just a little bit of their back showing above the surface. Snapping turtles have large, powerful jaws, but it is

the speed with which they extend their long, snake-like necks that earns them their name and aggressive reputation. It is a myth, however, that snapping turtles will attack swimmers, biting off toes or fingers. They are usually only aggressive on land, when they are cut off from their preferred defense: slipping away to the safety of

deep water and vegetative muck. Snapping turtles are uniform in color, usually grey to brown, with prominent points on the back of the shell near their exceptionally large tails.

The rarest turtle in most of Vermont is the North American Wood Turtle, a semi-terrestrial species that spends most of the months of July and August on dry land. Wood turtles are sometimes confused with snapping turtles because of the coarse texture of their shells, but they are readily distinguished by the orange skin on their legs, head and tail. Wood turtles reach a maximum length of eight and a half inches in Vermont. They are considered to be the world's most intelligent turtle, and have an uncanny ability to blend in with the vegetation where they are basking. For this reason, people are occasionally surprised to find that they have almost stepped upon a wood turtle; they might have had no idea that a turtle was so close to them. Others might never even realize that wood turtles

are present near their homes.

Wood turtles used to be much more common, but the march of progress has not been kind to them. They were once commonly gathered for use in making turtle soup, and their reproductive pattern is such that reduced local populations can take many decades to recover, if they recover at all. Also, as a species that uses a variety of habitats throughout the year, wood turtles are more likely to cross roadways on

a frequent basis, so many wood turtles are killed by automobiles. Unfortunately, wood turtles are sometimes taken from the wild, occasionally by hikers who come across them and take them home as pets—which is illegal in Vermont—and also by poachers who then sell them on the internet.

Keep your eyes peeled for turtles as you cruise down the Winooski, both in the water and along the banks and shrubbery at the water's edge.



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Boating Safety

Before you head out on the Winooski or other rivers, please keep the following information in mind.

Know Your Limits: As the second longest river in Vermont, the Winooski offers a wide variety of paddling opportunities. The lower stretches of the river especially between Richmond and Essex and Winooski and Lake Champlain are great for beginning paddlers who are interested in trying river paddling for the first time. The upper sections of the Winooski between Marshfield and Montpelier are narrow and winding and require more advanced paddling skills.

Wear A Life Preserver: Always wear a life preserver when paddling. In high waters or white waters, a helmet is recommended.

Water Level: In the spring and during especially rainy weeks, the river can get quite high and fast. You can contact a local outfitter for information about water levels. Unless you are a very experienced paddler, it is recommended that you do not go out on the river during high water.

Dams, Rocks and other Obstacles: The river is ever changing as trees fall, heavy rains displace sediment and rocks etc. Always be on the look-out for obstacles in the river, especially under water. In addition, there are a number of dams on the Winooski River that you will need to portage around. From spring through fall, the big ones are usually marked with ropes and buoys across the river. Get out before these ropes. Smaller dams are not

continued on page 9



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A Watershed Perspective: Conserving Headwaters and Upland Forests

By Bradley Materick

While paddling along the Winooski, the river holds your attention. Sunlight glitters on surface ripples, eddies and currents swirl and gurgle, and a shallow, cobbled riverbed gliding swiftly past your boat can be mesmerizing. Rapids especially force you to focus intently on the river itself in order to avoid collisions and capsizing. On flat water, your “duck’s eye” view from the water’s surface often prevents seeing much beyond the forests and fields right along the banks. It is compelling to think of the Winooski River as consisting solely of the water held between its banks, and perhaps a narrow strip of land on either side. This view may lead us to believe that river conservation only needs to focus on the water in the channel and whatever harmful substances might be in it. A river, however, is much more than just flowing water.

The Winooski is part of a complex system made up of the river itself plus all of the tributaries and land that drain into it. This system is called a watershed. The Winooski River watershed contains the headwaters at Coits Pond and 173 miles of major tributaries—almost twice the length of the Winooski itself—as well as many more miles of smaller streams. In total, the Winooski and its tributaries drain 1,080 square miles of land, nearly 10% of Vermont’s area. Today, this land within

Colin McCaffrey



Coits Pond, Headwaters of the Winooski

the Winooski watershed is 72% upland forests, 12% agriculture, 9% developed, and 5% water. Because a river and its watershed are intimately connected by water flowing downhill, everything that happens inside the watershed has an impact on the river to a larger or smaller degree.

Vermont’s history can teach us about the importance of adopting a watershed perspective

when thinking about the conservation of the Winooski. During the settlement of our state, from the late 1700s through the early 1900s, we did not fully appreciate the connection between a river and its watershed. In a period of about 150 years, the Winooski watershed lost nearly 80% of its upland forests as we aggressively cleared land for pasture and agriculture. Without forest cover to filter and slow the runoff of rainwater and snowmelt, water quality in the Winooski and its tributaries plummeted and massive erosion and flooding ensued, most memorably during the flood of 1927 which caused more than \$500 million of damage (in current dollars). Since that time, our forests have regenerated to nearly their pre-settlement extent. The Friends of the Winooski works to promote and implement the conservation and continued regeneration of upland forests throughout the Winooski River watershed.

Boating Safety/continued from page 7

marked by ropes or buoys. You will need to be vigilant as to changes in current (slack water often indicates a dam) and the appearance of a 'horizon line' that is often created by a dam.

Leave No Trace: Even if you are only out for the afternoon, please make sure you take everything you brought with you off the water. This includes food wrappers, clothing, water bottles etc.

Access: Public access points are included in this guide. These points vary greatly with respect to amenities and ease of access to the water. While many private land owners allow access to the river, these

are not marked in the guide. You should contact the landowners if you wish to access the river through their property.



Ryan McCall

Bolton Falls Dam on the Winooski

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Marshfield to Twinfield Union School or Martin Bridge (Plainfield)

Difficulty: Intermediate

Length: ~ 5 miles

Description: The headwaters of the Winooski River is a narrow, winding channel that traverses the rolling hills of eastern Washington county. The highlight of this section is Martin Bridge, the only "Farm Bridge" remaining in Vermont. Primarily used for agriculture, the bridge was built around 1880. Today it serves as an access point for nature trails on the south side of the river. This section of river is highly influenced by the Green Mountain Power generating station upstream of Marshfield Village. During dry periods, the river may be very low if the station is not releasing water.

Rapids/Obstacles: Paddlers may encounter downed trees blocking the river. There is a Class 2 'rock garden' rapid at the Onion River Campground. You can exit the river on the left and walk your boat rather easily around this rapid.

Put in(s):

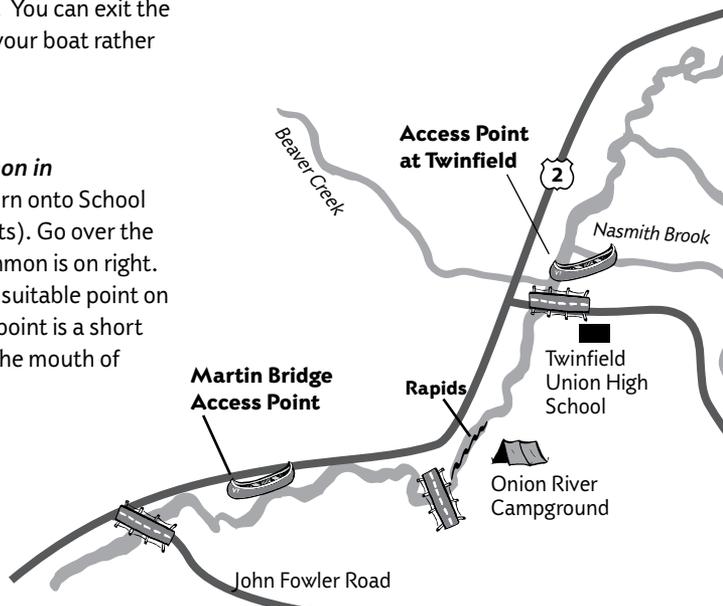
Old School House Common in Marshfield: From Rte 2 turn onto School St (next to Rainbow Sweets). Go over the bridge. School House Common is on right. Paddlers can put in at any suitable point on the property. The easiest point is a short walk past the building to the mouth of Marshfield Brook.

Take out(s):

Twinfield Union School at the mouth of Nasmith Brook: You will need to carry your boats about 100 yards to the parking area along Nasmith Brook Road. Exiting at the bridge at Nasmith Brook Road can be fairly difficult. Below Nasmith Brook, the river current gets faster and there are more rocks including the rapid at Onion River Campground.

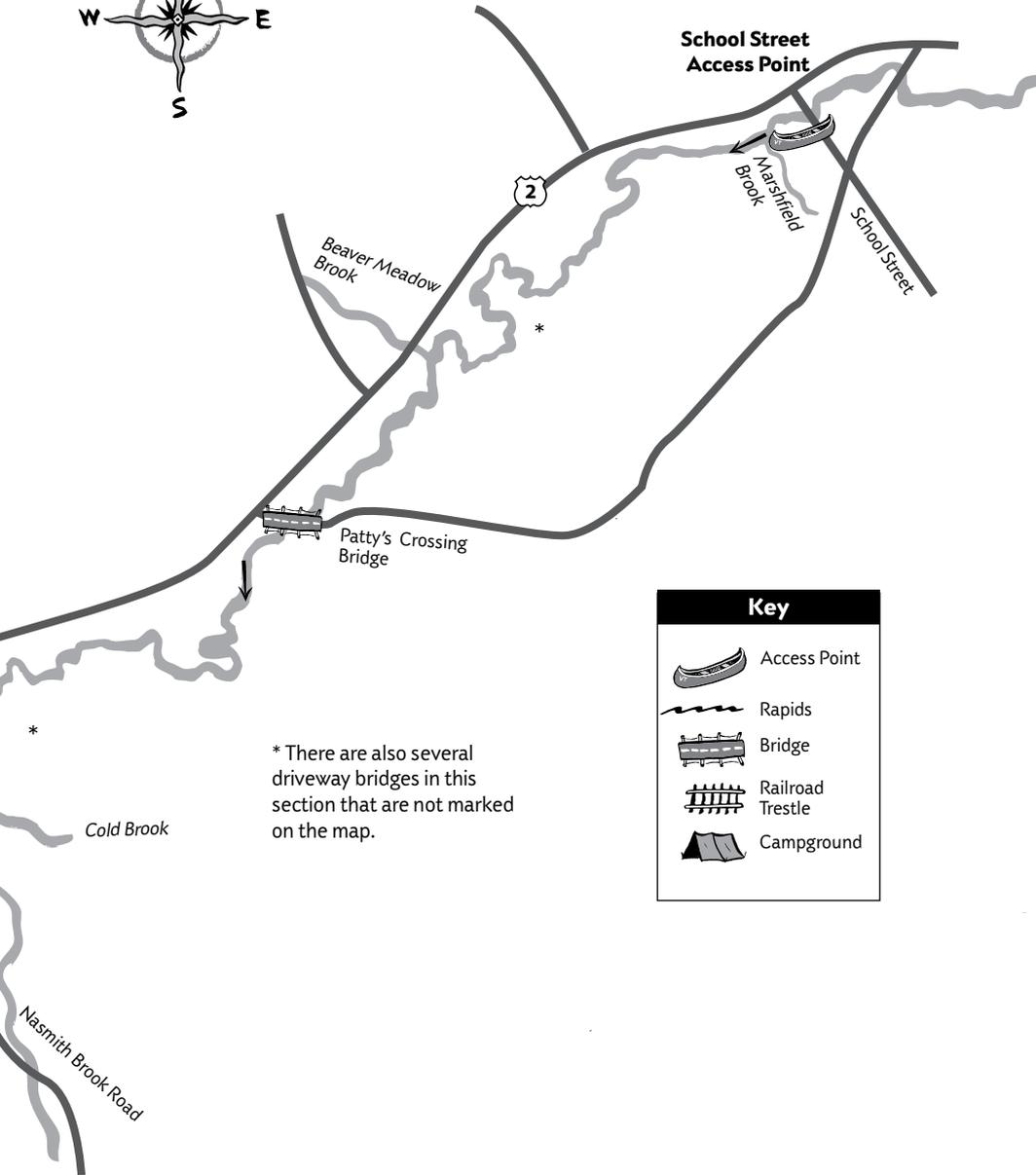
Martin Bridge: The banks are relatively steep at the Martin Bridge park so pick the take out point carefully. There is a parking area near the bridge.

Plainfield: If you plan to paddle into Plainfield, you should contact land owners before your trip to obtain permission to exit on their property. There is unmarked dam in the center of Plainfield Village.



Marshfield to Plainfield: ~ 5 miles

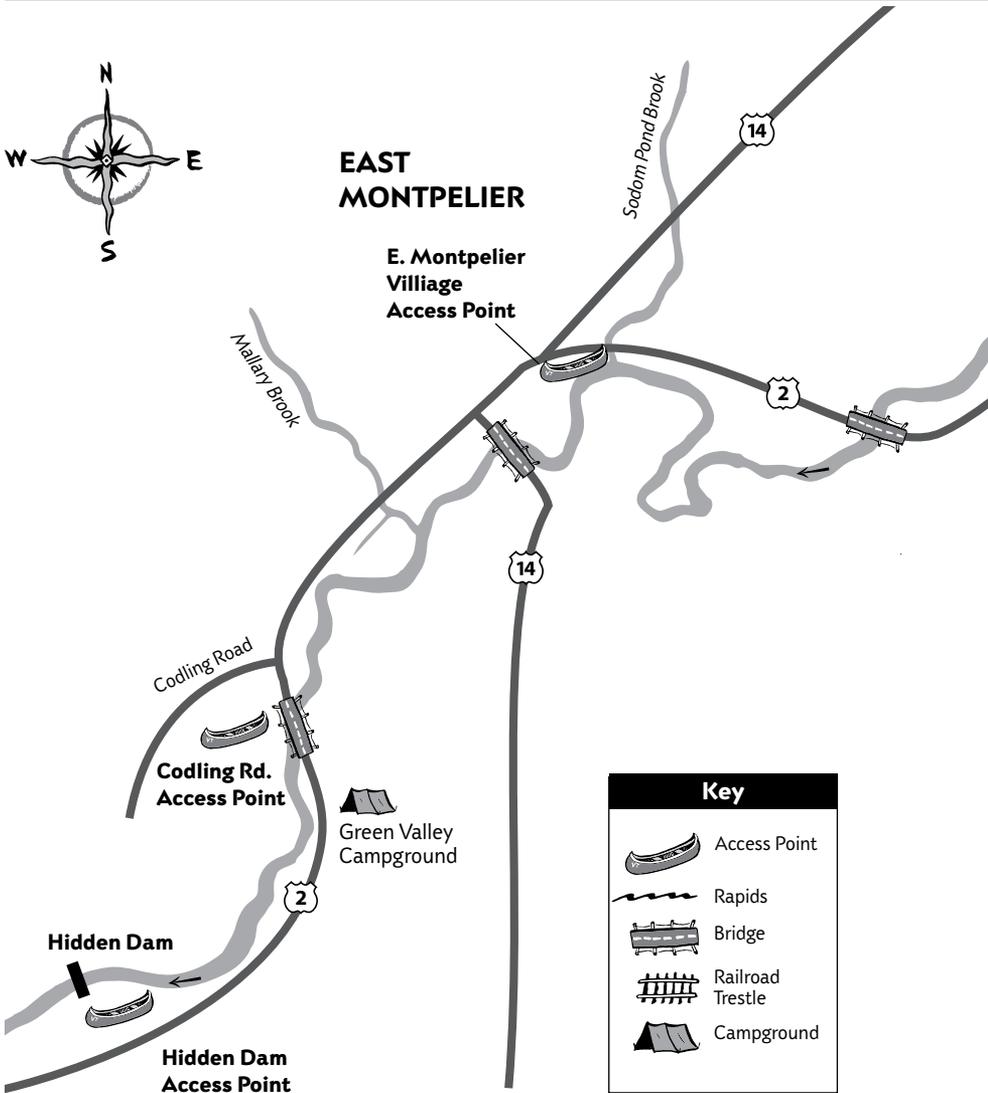
MARSHFIELD

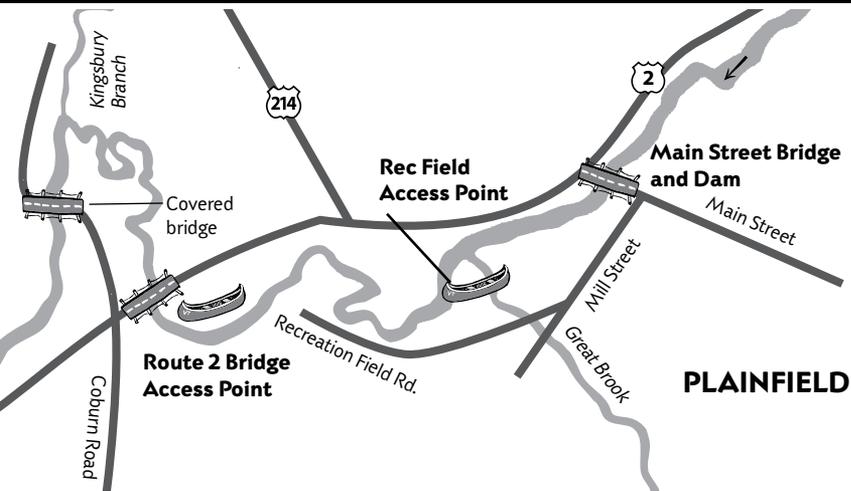


* There are also several driveway bridges in this section that are not marked on the map.

Key	
	Access Point
	Rapids
	Bridge
	Railroad Trestle
	Campground

Plainfield to East Montpelier: ~ 12-13 miles





Plainfield to E. Montpelier

Difficulty: Intermediate

Length: ~12 to 13 miles

Description: This stretch of the river passes by several picturesque Vermont farms and under a covered bridge. The Winooski widens a bit after Plainfield, particularly after the Kingsbury Branch enters from the right.

Rapids/Obstacles: This section features two relatively long rocky sections. The first is immediately below the Plainfield Recreation Field put in. The other is on the stretch through East Montpelier village.

Put in(s):

Plainfield Recreation Fields: From Main Street, take Mill Street to the first right, Recreation Field Road. The put in is located at the mouth of Great Brook.

Route 2 Bridge (downstream of Plainfield): Less experienced paddlers (or if there is low water) may want to put in

here. Parking is along the wide shoulder of Rt. 2. It is an easy walk on a well trod trail to the river.

Take Out (s):

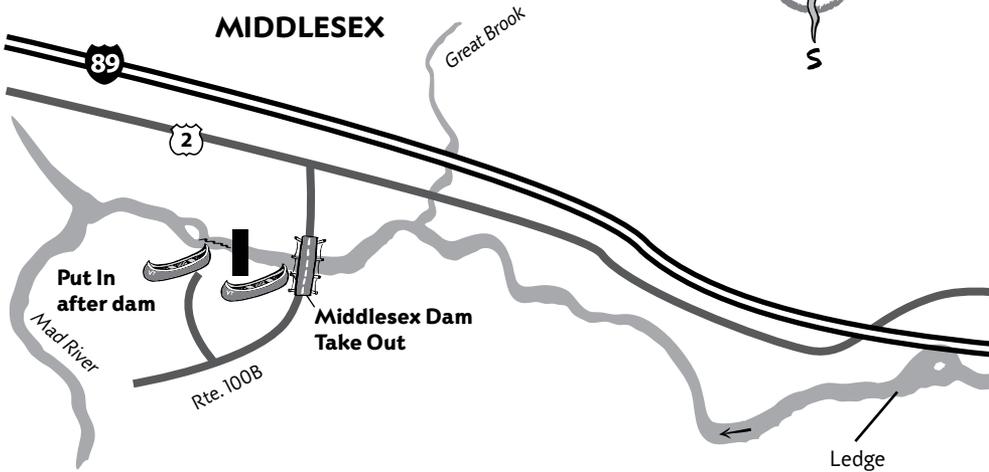
East Montpelier Village: There is a takeout on the upstream edge of the Village. Look for a small muddy beach area just as the river bends to the left, away from Rt 2. It is a short but steep climb.

Codling Road Access Point (just upstream of Green Valley Campground):

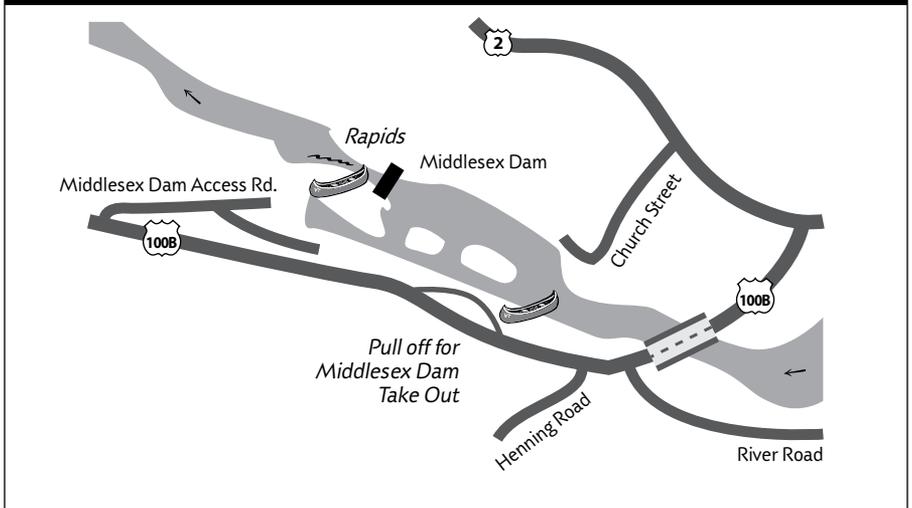
You can take out either upstream (on left) or downstream (on right) of the bridge. You can park along Codling Road or in small pull off upstream side of the bridge.

Hidden Dam: About a mile beyond the Rt 2 take out is a 'hidden dam'. Parking for this take out is on a wide shoulder of Rt 2. Recognizing this take out from the road and the river (it is not marked with ropes) is difficult unless you are familiar with the area. The banks are steep with poison ivy.

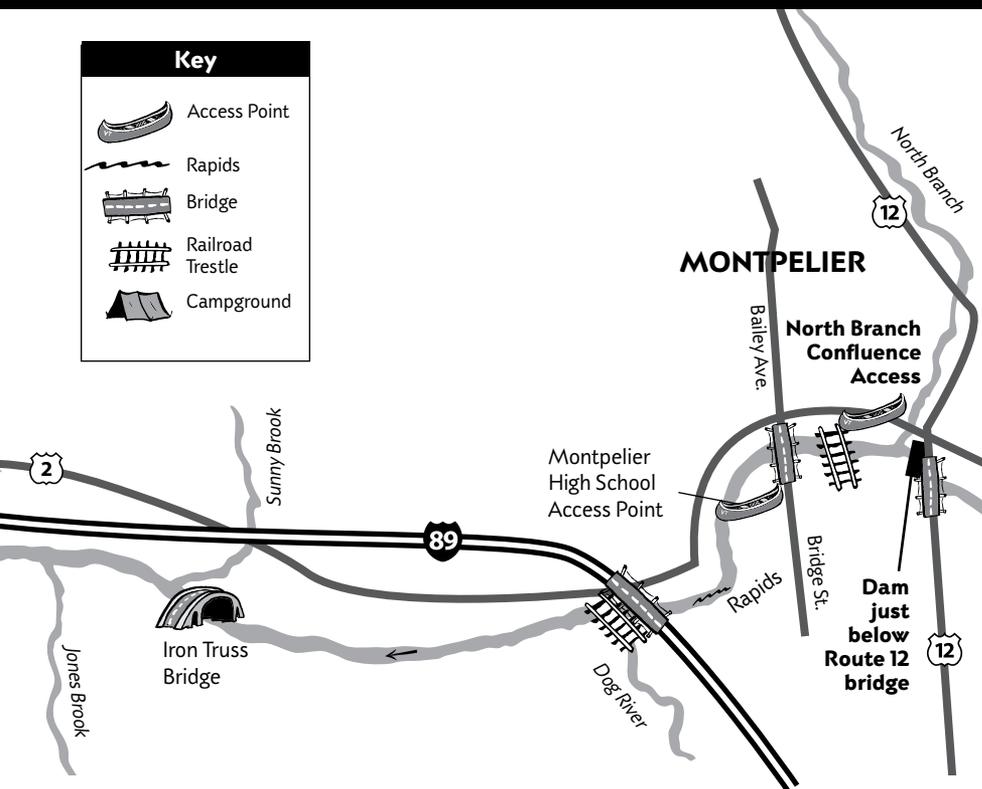
Montpelier to Middlesex: ~ 5 miles



Middlesex Dam Portage Detail



Key	
	Access Point
	Rapids
	Bridge
	Railroad Trestle
	Campground



Montpelier to Middlesex

Difficulty: Intermediate

Length: ~ 5 miles

Description: The Winooski is wide in this section with a number of fairly straight stretches. In August and September, the river can be quite shallow requiring skill in seeking good travel channels.

Rapids/Obstacles: Occasional boulders and underwater rocks require paddlers to stay alert. In addition, two short ledges require basic skill to navigate. The first is at Cemetery Corner, shortly after the High School put in. In the summer, start left and move right to avoid the ledge. The other is just below Jones Brook entrance on the

left. The ledge is most passable on the far right, but can have a steep drop. It is easily portaged on the left side.

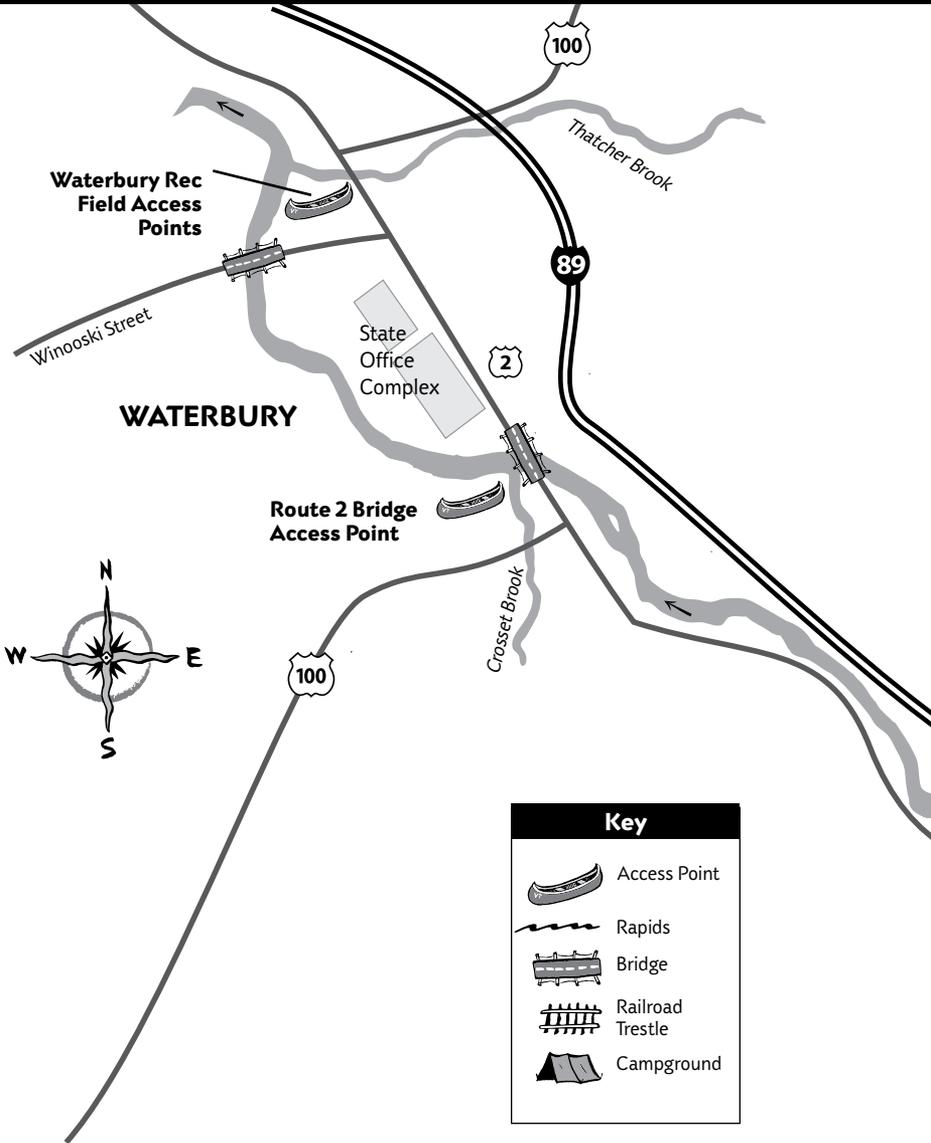
Put In:

Montpelier High School: The put in is about 100 yards below the Bailey Avenue bridge. There is short easy path off the bike/pedestrian path.

Take Out:

Just above Middlesex Dam: The take out is on the left just beyond the Rte 100B bridge. The bank is steep and can be muddy. The dam is marked by barrels across the water during summer months. You must exit here. You can portage the dam to continue.

Middlesex to Waterbury: ~ 5 miles



Middlesex to Waterbury

Difficulty: Intermediate

Length: ~ 5 miles

Description: This section of the Winooski features a variety of landscapes including the Middlesex Gorge, woodlands and rock escapements. The Mad River meets up with the Winooski shortly after the put in at the Middlesex Dam.

Rapids/Obstacles: Shortly after the put in is the Hugo Rapid, which is caused by a rock constricting the channel. In high water, it is a very large wave. About ½ mile after the Mad River enters from the left, paddlers will encounter Junkyard Rapids. When approaching Junkyard Rapids hug the left shore and scout the rapid to determine your course. There is a relatively short portage over the rocks on the left.

Put In: At the Middlesex Dam Powerhouse on Rte 100B on the south side of the river. Follow the portage signs to parking and then the trail down to the river.

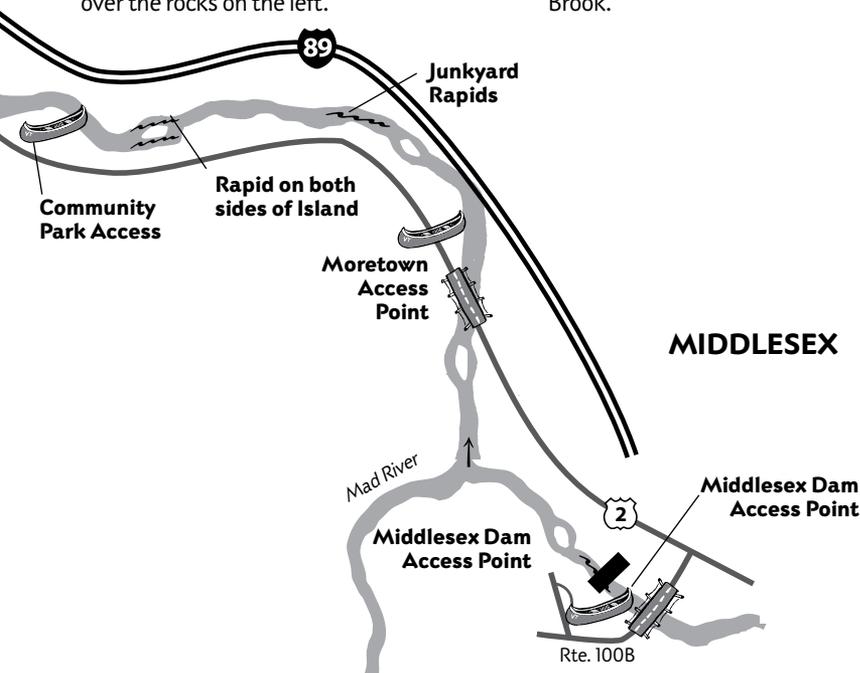
Community Park Access: This small park is located close to Majestic Auto. The trail to the river is very steep.

Moretown Access: The access is shortly past the confluence with the Mad River.

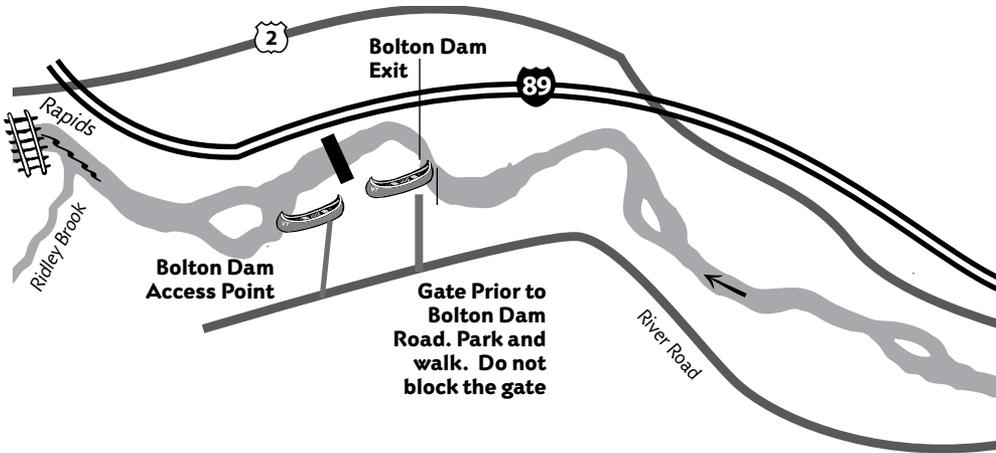
Take Out(s):

Rt 2 Bridge as you enter Waterbury: On the left just after you pass under the bridge.

Waterbury Recreation Fields: Take out is on the right, near the mouth of Thatcher Brook.



Waterbury to Bolton: ~ 5 miles



Waterbury to Bolton

Difficulty: Easy

Length: ~5 miles

Description: A steady current flows through this section of the river, which is mostly flat. Shortly after Waterbury you will pass the Little River as it enters the Winooski. This stretch of the river passes through the Green Mountains, offering breathtaking views of both the Green Mountain Range and the Worcester Range. Camel's Hump will be visible on the left.

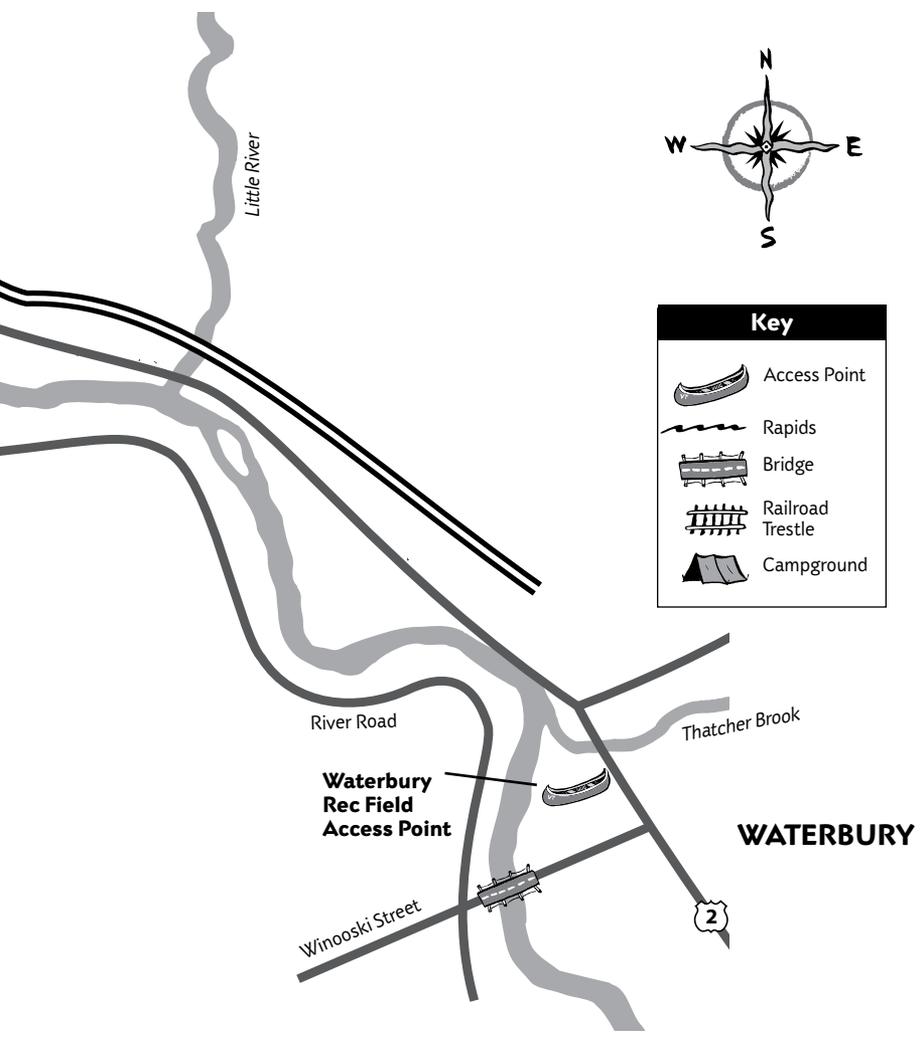
Rapids/Obstacles: None although paddlers should always watch for barely submerged rocks and woody debris.

Put In(s):

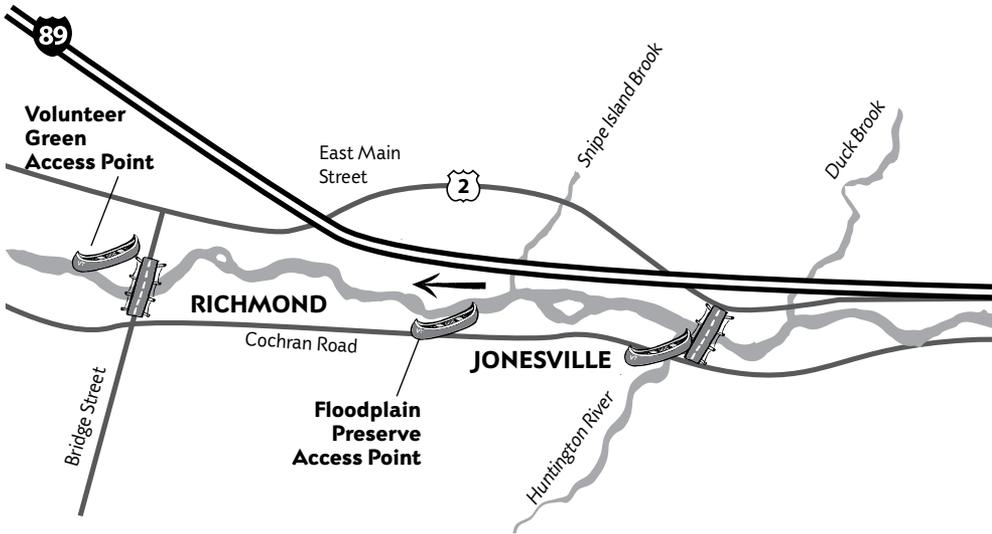
Waterbury Recreation Fields: access point is on the right, near the mouth of Thatcher Brook.

Take Out:

Bolton Dam Take Out is located on the left side of the river. It is marked by a small sign. It is a steep and sometimes muddy bank. The river is fairly wide and flat before it takes a turn to the left into the narrow Bolton Gorge. Be on the alert for the take out. Ropes and buoys, if present at all, will only be in the river during warmer months. You will need to carry your boat about 2000 feet. You can carry around the dam on a wide, well maintained, but relatively steep trail to the picnic area below the dam. Or you can park at a gate on River Road (do not block the gate) and carry your boat out along the access road.



Bolton to Richmond : ~ 10.5 miles



Bolton to Richmond

Difficulty: Intermediate (if putting in at Bolton Dam); Easy (if you put in further downstream)

Length: ~10.5 miles

This stretch of river continues to pass through the Green Mountains. There are a number of spots to take a break for a swim or to fish. About 1 mile upstream of Richmond, you will pass the a rare intact floodplain forest owned by the Richmond Land Trust.

Rapids/Obstacles: About $\frac{3}{4}$ of a mile downstream from Bolton Dam is a rapid that ends just past the railroad trestle. This rapid can be difficult especially in high water. You can pull over on the left bank above the rapid to scout it. If you choose not to paddle it, you can carry your boat about 1500 feet to below the trestle. There is a foot path.

Put In(s):

Bolton Dam: There is parking at the picnic area below the dam. The access road is marked by a sign on River Road.

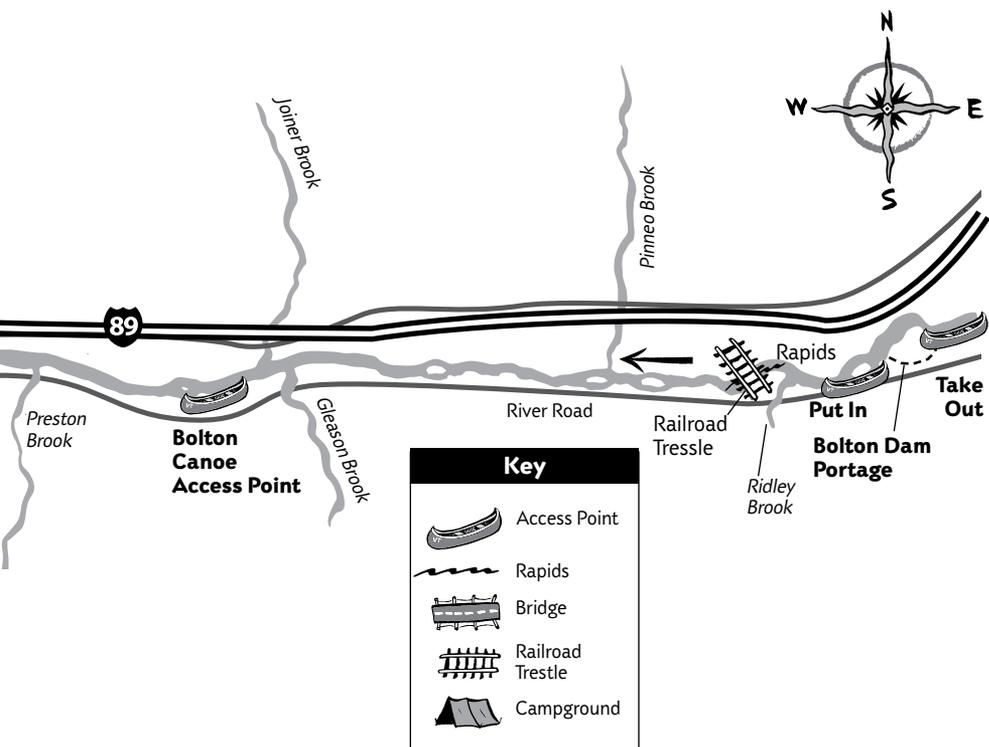
Bolton Canoe Access Area: This area with ample parking is about four miles west on River Road from the Bolton Dam access.

Take out(s):

Jonesville: Just after you pass under the Cochran Road Bridge, the take out is on the left. Unload on road shoulder but parking is on the opposite side of the bridge.

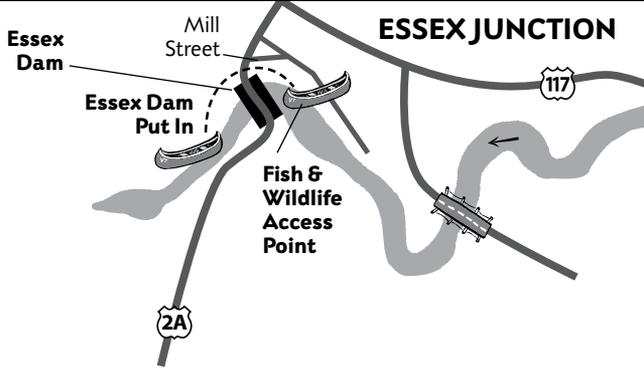
Floodplain Preserve: Take out on the sandy bar on the left side of the river about 1.5 miles below the Jonesville bridge. There is no sign marking the Preserve. It is short carry to the parking area.

Volunteer Green Richmond: Heading into Richmond you will pass under the Bridge St. bridge and head to the right bank.



Charles Fish

Richmond to Essex: ~ 11.5 miles



Richmond to Essex

Difficulty: Easy
Length: ~ 11.5 miles

Description: Winding through wetlands, farmland and woodlands, this is a tranquil section of the river perfect for family and beginning paddlers. This stretch of the river also begins to pass through suburban development. Note how the river changes as the landscape changes in this section.

Put In(s):

Richmond Volunteer Green: From Rt 2 in Richmond, turn south on to Bridge Street. The park is on your right just before you cross the Winooski. The canoe launch is in the upstream corner of the park.

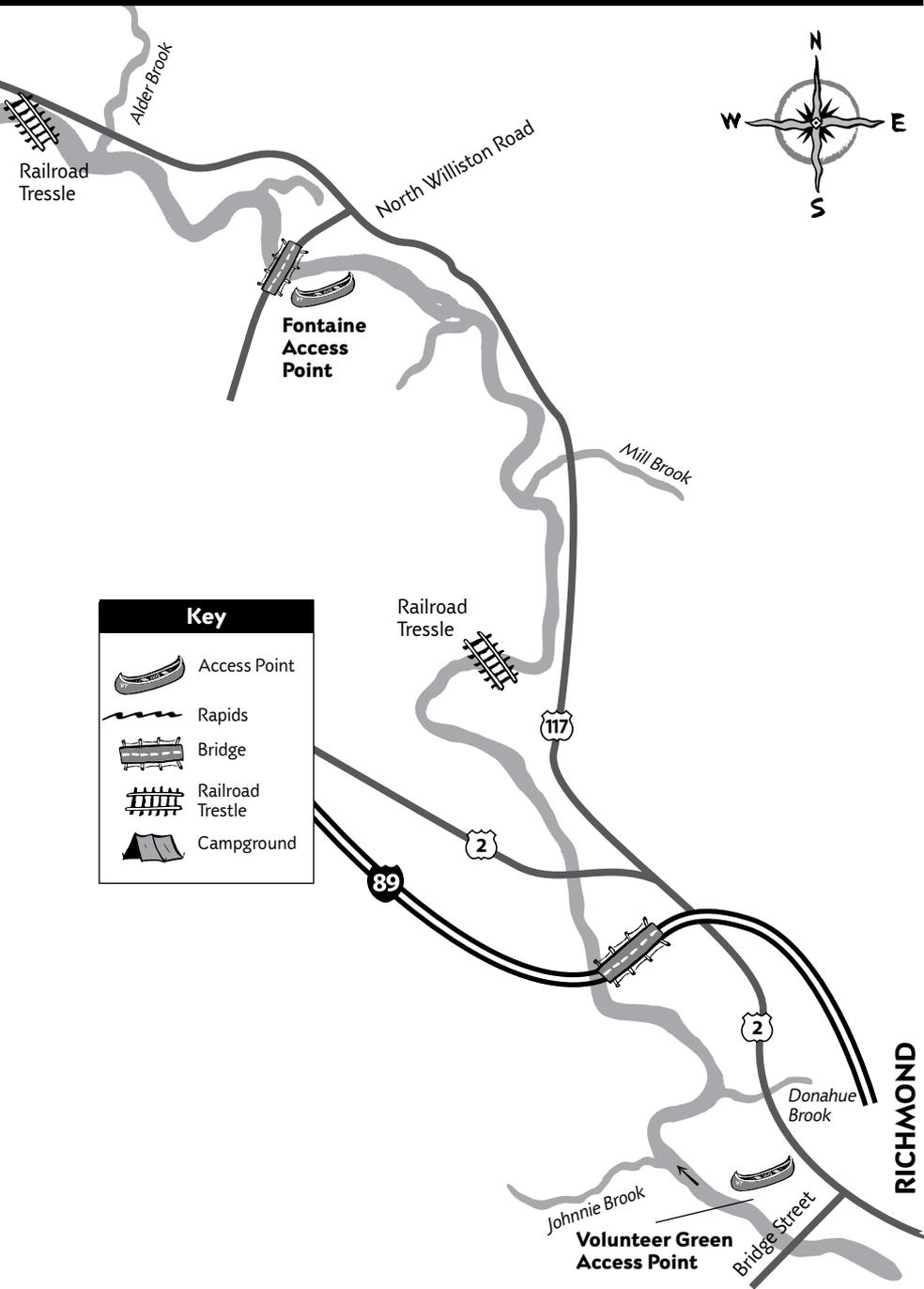
Take outs:

Fontaine Canoe Access: The take out is on your left, just before the North Williston Road Bridge. From Rt 117, turn on to North Williston Road and turn left into the small parking area just after you cross over the Winooski.

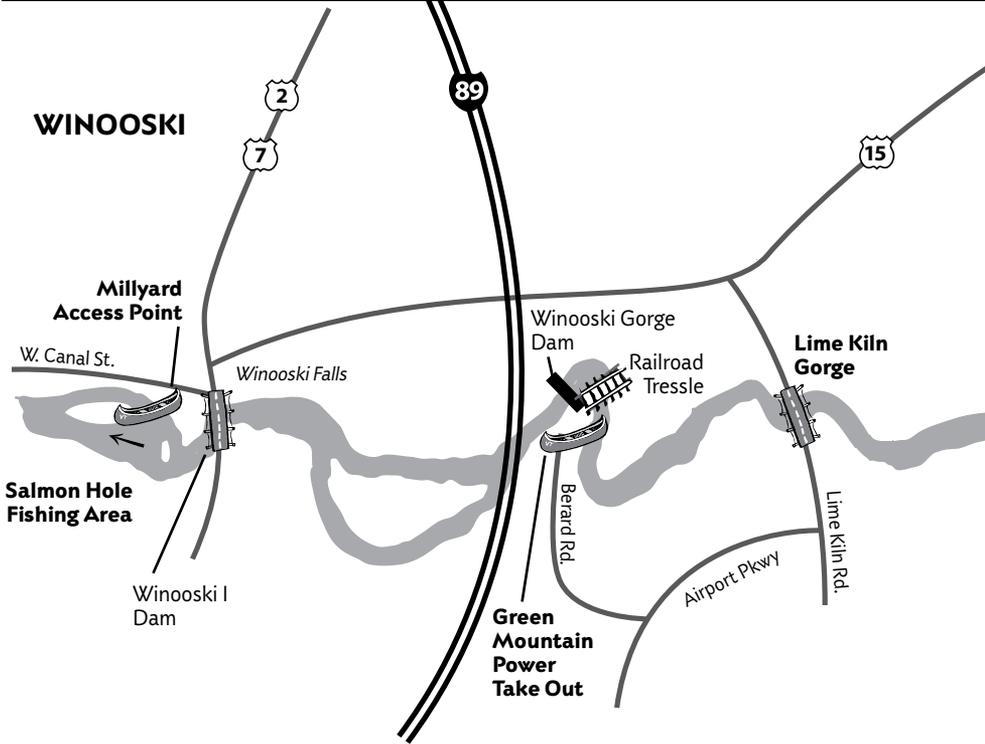
Fish and Wildlife Access off the IBM

access road: The take out is on the right at a small landing spot among the trees. It is not marked from the water. From the Five Corners (intersection of Rt 15, 117 and 2A) head south on 2A, turn left onto the Mill St. just before crossing the Winooski. The canoe access with small parking area will be on your right.

Dam Portage: If you plan to portage the dam and continue on, you will exit the river at a set of stairs on the right below the Fish and Wildlife access. There is a foot path that will take you under Rt 2A to the power station. Go around the power station to the put in below.



Essex to Winooski: ~ 7 miles



Essex to Winooski

Difficulty: Intermediate

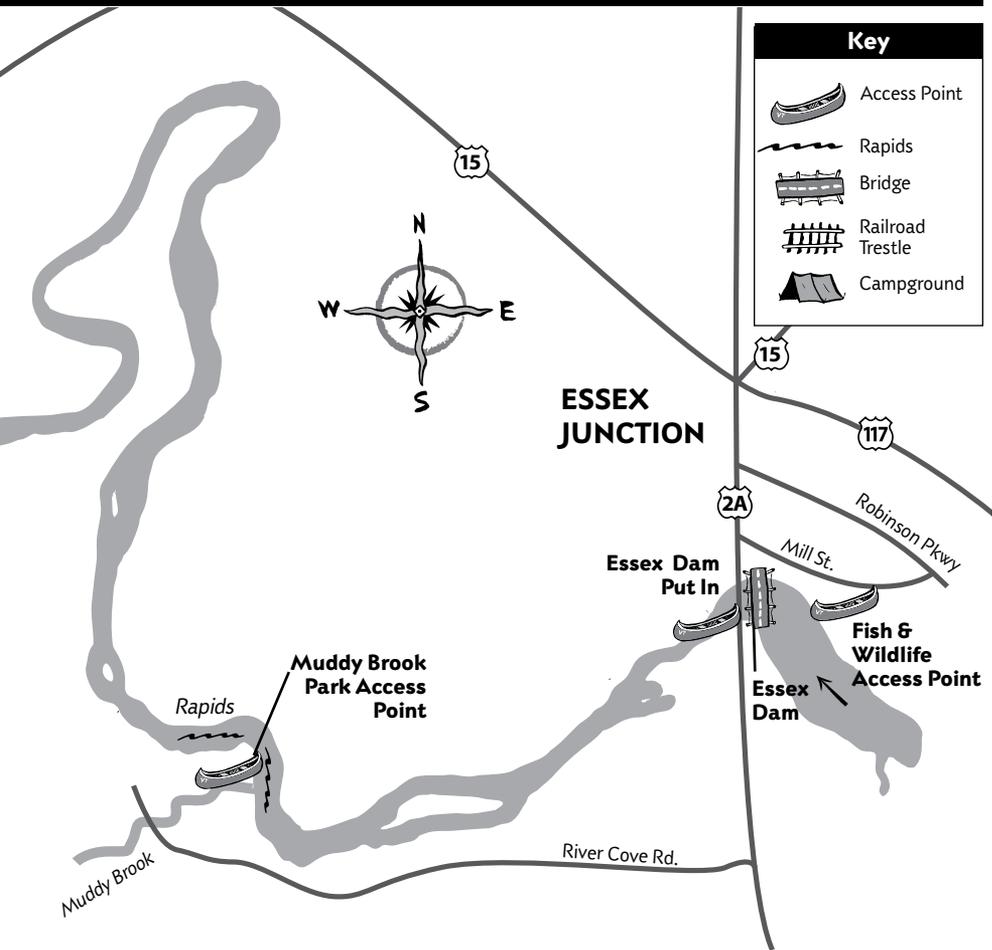
Length: ~ 7 miles

Description: The Winooski begins passing through urban and suburban areas in this section of the river. However, there are great picnicking and natural areas to stop at along the way including the Muddy Brook Natural area and canoe access located about a mile downstream from the Essex Dam on the left. There is also Woodside Park, operated by the Winooski Valley Park District, about four miles below the Essex Dam. This stretch passes through the only un-dammed gorge, the Lime Kiln Gorge, on the Winooski.

Rapids/Obstacles: There is a short rapid visible from the put in below the Essex Dam. A bit further downstream, the river will split around an island. The best channel is along the right side of the island. Just beyond the confluence with Muddy Brook, there is a long rocky stretch.

Put in(s):

Below Essex Dam: Pull into the Green Mountain Power Station off 2A. The put in is below the power generating station. If the gate is unlocked, you can drop your boat off in the station parking lot but you cannot park there. Park at Overlook Park, across the 2A bridge, and walk back.



Muddy Brook Park: If you want to avoid the rapid below the power station, put in about a mile downstream at Muddy Brook Park. You continue south on Rt 2A to River Cove Road and turn right. The Park will be on your right.

Take Out (s)

Winooski Gorge Dam: Shortly after passing through the Lime Kiln Gorge, the river makes a right hand turn. The take out is on the left before the river narrows into the gorge. Barrels may be in place across the river in warmer months. From Rt 15, take Lime Kiln Road south crossing over the river, turn right on to Berard Drive (another ½ mile or so) and follow it to the end.

Winooski to Lake Champlain : ~ 10 miles

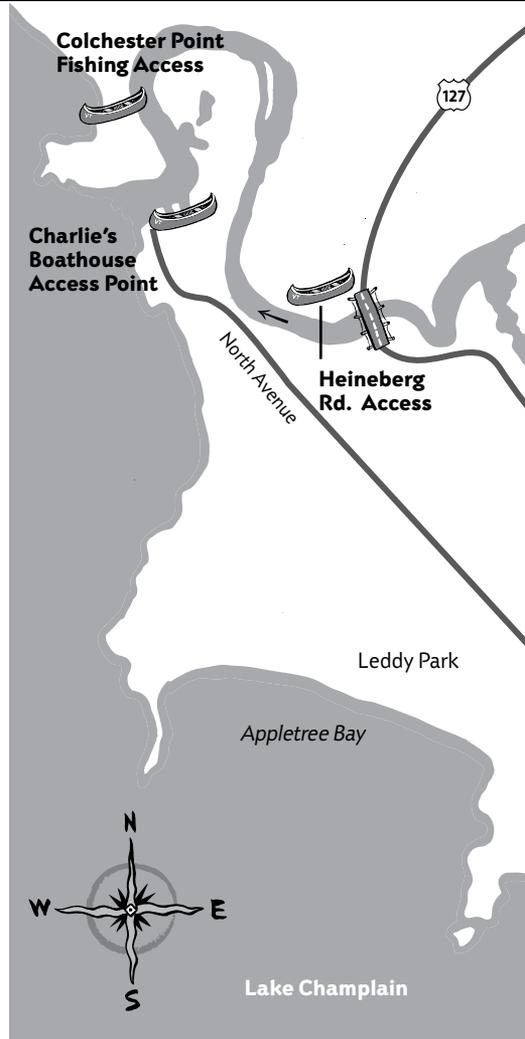
Winooski to Lake Champlain

Difficulty: Easy
Length: ~ 10 miles

Description: The river is wide and slow moving from Winooski to the lake. Although this part of the Winooski flows through the most urbanized area of the state, it hardly feels that way. The river meanders through farmlands, wetlands and forests on its last leg to Lake Champlain. One of the most popular fishing and picnic spots on the lower Winooski is located across from the Millyard Access Point at Salmon Hole, known for its walleyed pike, steelhead trout and landlocked salmon. Near the railroad bridge just downstream from the Millyard Access Point is the site of the first European settlement on the Winooski in 1773. Recent archaeological finds have revealed that Native Americans had settled the area almost 300 years before the arrival of Ethan Allen. Three miles downstream on the left is the Ethan Allen Homestead. The Winooski travels through some unique ecological habitats including the McCrea Farm, Derway Island and Half Moon Cove. At the mouth of Lake Champlain 55-acre Delta Park is home to rare plants and animals.

Put In(s):

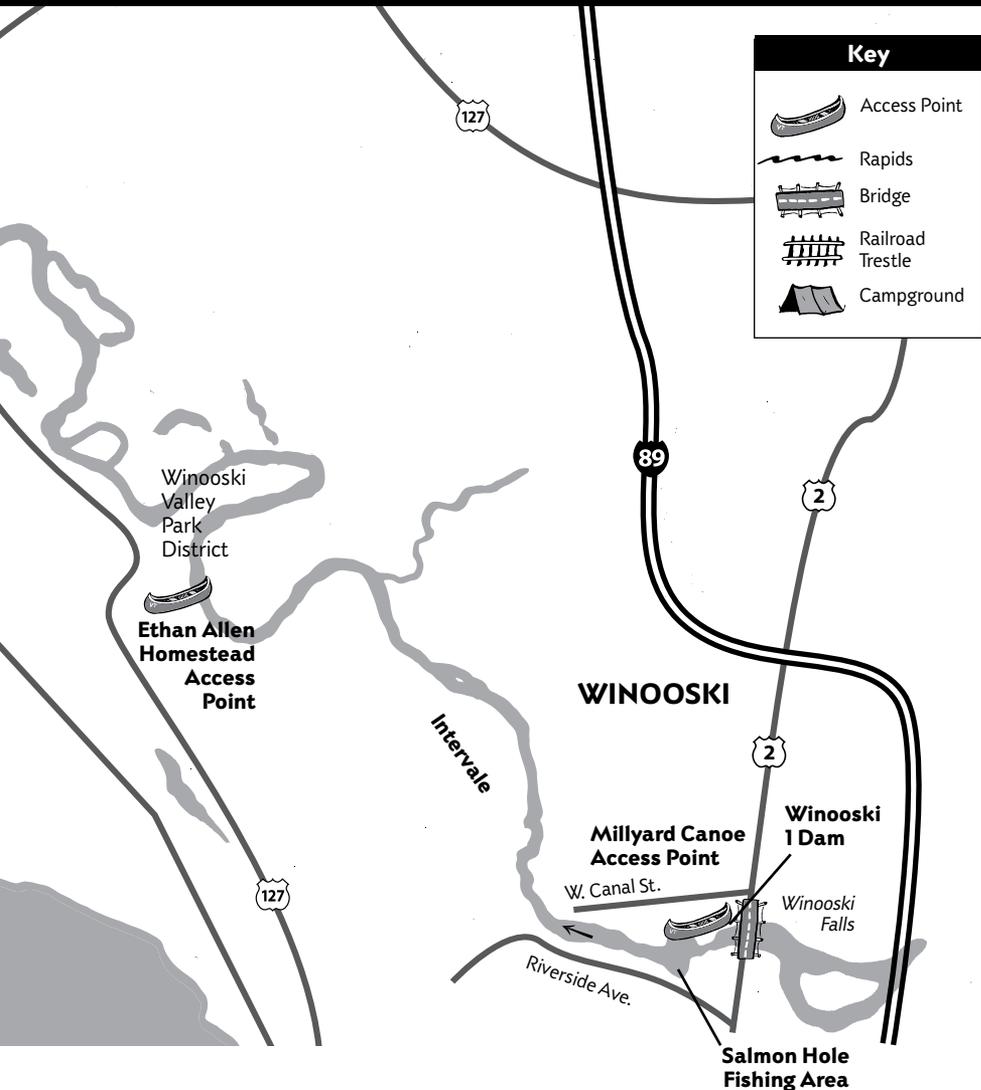
Millyard Canoe Access in Winooski: Take Rt 2/Rt 7 or Rt 15 into the center of Winooski. Exit the traffic circle on to Canal Street on the south west corner. Travel about 1/5 mile and make a left hand turn on the access road to the canoe access.



Ethan Allen Homestead: The Homestead is on Rt 127, which runs from Burlington to Colchester. From the water, the access is on the left marked by a sign and stairs.

Take out(s):

Rt 127/Heineburg Road Boat Access: There is a boat access on the north west corner of the Rt 127.



Colchester Point Fishing Access: The boat access is off of Windemere Way in a residential section of Colchester. Visit the VT Fish and Wildlife Department website for a map and detailed directions.

Charles Boat House on Lake Champlain: Paddlers can reach Charlie's by heading left at the mouth of the river. To arrive at this access point by car, take North Avenue from Burlington until it dead ends.

Charles Fish



View from above Bolton Dam.

Charles Fish



The historic Plainfield Mill dam.



Middlesex bedrock folds

Charles Fish



"Hugo" Rapid below Middlesex Dam

Barbara Borowski

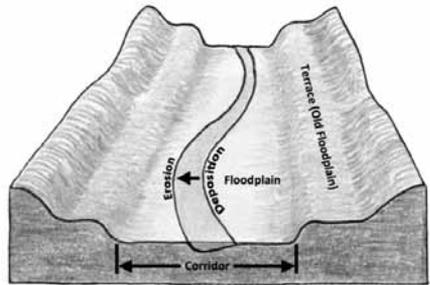
Geomorphology: The Shape of a River Corridor

By Bradley Materick

River geomorphology is the study of the shape of rivers and the surrounding land with which they interact (their corridors). When planning human development and activities within a river corridor, from flood control to the construction of roads and buildings, it is essential to understand a river's shape and how it changes over time.

On a seasonal timescale, we know that the Winooski River is very dynamic. With spring rains and snowmelt, water levels rise and currents accelerate. Eventually, water overtops the banks and floods the flat land bordering the river (its floodplain). Through the summer, water levels drop steadily, changing the character of rapids and exposing new obstacles with each passing day. In winter, the river could be a flat sheet of ice or a shifting jumble of icebergs.

On a timescale of decades, the Winooski is perhaps even more dynamic, completely changing its shape and radically altering the land through which it flows. The two most important processes that cause these changes are lateral meandering and downward erosion. A meander is simply a bend in the river. Water flows fastest and deepest towards the outside of a bend, steadily eroding the bank and causing the bend to migrate in this direction (see *diagram*). At the same time, slower water flowing around the inside of a bend deposits sediment, steadily building up a point bar. If the water level in Lake



Champlain were to drop, the Winooski would also begin to erode downwards, abandoning its current floodplain and creating a new, lower floodplain. Terraces along the Winooski are actually old abandoned floodplains, evidence that Lake Champlain was once much deeper than it is now.

These processes can pose a threat to human structures and activities. In the short term, annual flooding can damage crops and structures. In the longer term, migrating meanders can erode away a significant amount of land, threatening buildings and roads and reducing agricultural acreage. In response, we have tried to control or even halt these processes with flood control dams, bank hardening with riprap, and other methods. However, these methods create serious ecological problems of their own. Future planning for human activities in the Winooski's corridor should respect the dynamic nature of the river and plan development accordingly.

Birds of the Winooski: A Responsibility to Conserve

By Bradley Materick

You do not need to be an expert birder to notice and appreciate the diversity and abundance of birdsong along the Winooski River. To help novice birders gain a better understanding of our state's birdlife, the Vermont chapter of the National Audubon Society created the Birder's Dozen, a suite of twelve species that are relatively easy to identify by sight and/or song. These birds are considered Responsibility Species because the bulk of their breeding habitat is located in New England and it is therefore our responsibility to conserve this habitat. Audubon believes that conserving habitat for these particular birds will simultaneously benefit many other species of plants and animals that depend on the same habitat. Below are four species from the Birder's Dozen that are commonly seen and heard along the length of the Winooski.

Chestnut-sided Warbler

This is a distinctive bird, averaging 5 inches from beak to tail, with a bright yellow crown, black "moustache" stripes, and streaks of chestnut-red along its sides. Birders say its song sounds like Pleased, pleased, pleased to MEET YOU!



Eastern Wood-Pewee

This is a slender bird, averaging 6.5 inches from beak to tail. Its back is olive-gray and its chest and wing bars are dusky white. When aroused, its head feathers come to a distinct point. Its song sounds much like its name, a plaintive, high-pitched PEEawee.



White-throated Sparrow

This is a sparrow-sized bird, averaging 6.75 inches from beak to tail, with a bright white throat patch, black and white stripes on its head, and yellow patches in front of its eyes. Its song, birders say, sounds like Old Sam Peabody, Peabody, Peabody.



Veery

This is a plain-looking, robin-sized bird with a magical song. Averaging 7 inches from beak to tail, it is reddish-brown above and bright white below with a weakly spotted chest. Its song is an ethereal, descending spiral of flute-like notes.



Furtive Fauna: Reptiles and Amphibians of the Winooski River

By Bradley Materick

You are not likely to see many reptiles or amphibians in the main channel of the Winooski. Out in the open water they are dangerously exposed to predatory fish, birds, and mammals such as mink and river otters. An exception would be the well-armored turtles, which you may see nonchalantly basking on logs and rocks in the river. You will need to explore the river's edges, as well as habitats bordering the river, in order to find most cold-blooded critters. Where water is shallow and stagnant, allowing marsh plants to become established, you may find frogs and salamanders hiding. In the dense underbrush along the river, snakes hunt those same frogs and salamanders, as well as small mammals, insects, and even bird eggs. Wetlands associated with the Winooski River, such as oxbow lakes and floodplain forest, are also havens for reptiles and amphibians, and are especially important during the spring breeding season. Below are four species you may find with some careful searching.

Garter Snake

A beautiful snake, growing up to 30 inches long, the garter is common throughout Vermont. It has three stripes down its length that vary in color from yellow to tan to greenish. Its body is black,



brown, or dark green, often with a checkered pattern.

Eastern Painted Turtle

This species is common to rivers, lakes, and ponds and can reach 6 inches in length. The carapace (top shell) is smooth black or dark olive with bright red markings along the edges where it meets the plastron (bottom shell). Red and yellow stripes on the head, neck and front legs aid in identification.



Northern Leopard Frog

This attractive frog can grow up to 5 inches long and has irregular, dark spots on a background of green or brown. Each spot is outlined with a light ring. Two prominent ridges (dorsolateral ridges) run down its



back. It can be confused with the pickerel frog which has rectangular spots and bright yellow inner thighs.

Northern Spring Salamander

This large species grows up to 8 inches long and is pink to reddish with black mottling. It prefers clear, cold, well-oxygenated streams that flow into the Winooski.



More Than a River: The Winooski Wetlands Complex

By Bradley Materick

The Winooski River is embedded within a diverse complex of interconnected aquatic and wetland natural communities that work together to maintain the health and stability of the entire river corridor and its inhabitants.

The Diversity of Wetlands

Within the confines of the riverbanks, several distinct wetland communities can be found. Exposed sand, gravel, and mud bars represent ephemeral wetlands hosting unique plant species that are able to cope with their substrate being washed away every year during spring runoff. In shallow, stagnant backwaters and bays along the river, marsh vegetation including reeds, sedges, cattails, pickerelweed, and arrowhead are able to take root. The native floodplain forest growing along the river is inundated every spring and during major rain events, and a new layer of fine sediment is deposited, building the soil's fertility. Only certain plants can tolerate this annual flooding, including silver maple and ostrich fern. As the Winooski meanders over the years, it creates new channels and abandons old channels. These old channels, being lower than the surrounding floodplain, are typically wetter and will host marshes, sedge meadows, or shrub swamps. Where a meander forms a complete loop, the river will eventually break through the narrow strip of land where the channel almost meets itself, flowing straight again and leaving behind a crescent-shaped pond, an oxbow, that provides yet more wetland habitat.

The Function of Wetlands

Wetlands in the Winooski River corridor perform several important ecological functions. They absorb rain and snowmelt and release it slowly into streams and rivers, reducing flood flows in the Winooski and preventing damage from erosion. Some absorbed water also percolates deep into the earth, recharging groundwater supplies. Wetlands capture sediment, nutrients, and pollutants before they reach the river, protecting water quality in the Winooski. Marsh habitats along the river serve as breeding areas for several species of fish and amphibians, as well as sheltered nurseries for their young. Flooded forests and even agricultural fields attract other breeding amphibians such as wood frogs and spring peepers. Numerous reptiles, birds, and mammals also depend on wetlands for all or part of their life cycles. Although wetlands comprise less than 10% of Vermont's land area, they host 35% of our threatened and endangered plant species, and 21% of our threatened and endangered animals.

The Winooski's wetlands face a variety of threats. They are often cleared for agriculture due to their desirably flat topography and fertile soils. They are being invaded by several species of non-native plants that outcompete and replace native vegetation. Dams along the Winooski have flooded upstream wetland communities, and they trap sediments and change annual flooding patterns downstream, radically altering the very processes that create and maintain the wetlands that make the Winooski River corridor what it is.

Quiet Invasion: Managing Non-native Plants Along the Winooski River

By Bradley Materick

As you paddle peacefully along the Winooski, it might be hard to believe that an invasion is happening all around you. It is a silent invasion of non-native plants that are slowly but steadily outcompeting and replacing native vegetation in the unique natural communities that cloak the riverbanks. The Town of Richmond is an example of a community that has come together with a deliberate plan to manage invasive species along its segment of the river.

The Floodplain Forest

Richmond contains large remnants of what is now a very rare natural community, the Silver Maple-Ostrich Fern Floodplain Forest. This type of forest once lined most of the major rivers in Vermont, but it has been largely cleared for agriculture, its rich soils and flat topography being highly desirable. As its name implies, Silver maple is the dominant tree in this community, but it is also home to American and slippery elm, cottonwood, hackberry, and box elder. Ostrich fern, with fronds resembling the large feathers of an ostrich, often forms an unbroken groundcover and wood nettles are abundant in patches. Fiddleheads, a northeastern spring delicacy, are actually the newly emerging and still coiled fronds



of ostrich fern. The town of Richmond, the Richmond Land Trust, and the Nature Conservancy manage significant parcels of floodplain forest along this section of the Winooski.

Invasives in the Floodplain

Invasive exotic plants are those non-native plants with an ability to significantly disrupt native habitats. These plants often have no native predators and their growth habits allow them to outcompete native plants for space, sunlight and/or nutrients. In Richmond's floodplain forest, invasives include Japanese knotweed, garlic mustard, goutweed, dame's rocket, common reed, honeysuckle, barberry, multiflora rose, Oriental bittersweet, and moneywort. Working together with the Nature Conservancy's Wise On Weeds! Program, the town of Richmond and the Richmond Land Trust have developed a Weed Management Plan with the goal of preserving the integrity of the floodplain forest through management of the invasive plants listed above. In some cases, there is hope that a particular invasive species can be eradicated in time. In other cases,



continued on page 38

Hidden World: Aquatic Life in the Winooski River

By Bradley Materick

This section of the Winooski is a fitting place to consider the creatures that thrive below the river's surface and the complex relationships they have formed with humans. Each fall, for example, landlocked salmon and steelhead rainbow trout enter the mouth of the Winooski from Lake Champlain and swim upstream towards their ancestral spawning grounds. However, they are thwarted early in their journey by the Winooski Dam One, located in downtown Winooski. Since 1993, in an effort to mitigate this situation, a fish lift service has captured salmon and trout below Winooski Dam One and trucked them upriver as far as Bolton Falls Dam, which is the endpoint of this section.

Aquatic Macroinvertebrates

Macroinvertebrates are animals with no backbone that are large enough to see with the naked eye. Although these creatures may escape our notice, there are well over 1000 species of macroinvertebrates living below the surface of the Winooski and forming the essential base of a food web that sustains all animal life along the river. The majority of these species are the larvae of insects such as dragonflies, damselflies, stoneflies, caddisflies, mayflies, beetles, water bugs, and true flies. Other invertebrate groups include worms, leeches, sowbugs, isopods, snails,



finger nail clams, and mussels. Several species of endangered mussels make their home in the Lower Winooski below Salmon Hole, including fragile papershell, pink heelsplitter, pocketbook, and fluted shell. In the colder upper reaches of the river, endangered eastern pearlshell mussels make their home, with some individuals living up to 75 years!

Fish

Anglers call this section of the Winooski the "Waterbury Zoo," due to the abundance and trophy sizes of fish living here. Non-native rainbow and brown trout, introduced in the 1800s, have established wild populations in the main channel and larger tributaries. Our only native stream trout, the brook trout, prefers cool, shaded mountain streams throughout the Winooski watershed. Other well-loved game fish include perch, walleye, large- and smallmouth bass, and landlocked Atlantic salmon.

Among the threats to aquatic life in the Winooski, dams were mentioned above. In addition to blocking fish migration, dams flood upstream spawning grounds and may bury downstream spawning grounds

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Muddy Footprints: Mammal Tracking Along the Winooski

By Bradley Materick

As water levels in the Winooski River fall through the paddling season, extensive mud flats are revealed, especially along lower sections of the river. Mud flats may seem like a terrible inconvenience when you step out of your canoe and sink to your knees in sticky silt and clay sediments that threaten to confiscate your footwear. To a tracker, however, mud flats are a gold mine! While we rarely see the shy and elusive mammals that inhabit the Winooski River corridor, mud flats can present us with a record of their passage in the form of tracks and other signs. Soft silt and clay with the right amount of moisture can preserve a set of tracks perfectly, often showing fine details such as claw marks, fur impressions, webbing between toes, and even finger-prints! It can be a rewarding experience to stop and explore the Winooski's mud flats during your paddling journey. Just be sure your shoelaces are tightly tied!

American Beaver

Beavers are the world's second largest rodents and their tracks are correspondingly large: the rear track ranges from 5-7 inches long and 3-5 inches wide. Webbing is often visible between the five toes of the rear track. Also look for worn troughs in the riverbank where beavers enter and exit the water. Although beavers do not build dams across the Winooski, they do live and forage here.

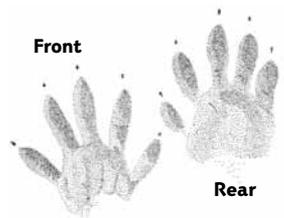


Northern Raccoon

Raccoons and their distinctive tracks—like tiny human hands—are abundant along the Winooski.

Front tracks are 2-3 inches long and 1.5-3 inches wide with five claw-tipped toes.

Rear tracks, also five-toed, show a longer heel pad and range from 2-4 inches long and 1.5-2.5 inches wide.



Northern River Otter

Otters are the largest members of the weasel family in Vermont.

Tracks have five toes, the front being

2-3 inches in width and length. A small heel pad may show in the front track. Rear tracks show an arched palm pad and are 2-4 inches in length and width. Webbing may show between the toes in deeper mud.



You may also see the tracks of white-tailed deer, coyote, red fox, striped skunk, mink, and short- and long-tailed weasels. The tracks shown above were taken from *Mammal Tracks and Sign: A Guide to North American Species*, by Mark Elbroch, an excellent resource for novice and experienced trackers alike.

Bobcat Betrothals

by Susan C. Morse

Yesterday a warm mid-March sun shone upon a few inches of fresh snow. By nightfall, it was cold again and starry clear – perfect for bobcat courtship.

Evidence of last night's wildcatting activities were all about. Over the years, I've gotten to know a certain tom-bobcat's tracks, and whenever I encounter them, I'll poke along for a spell to see what he's been up to. I always backtrack him – out of respect for his privacy and his absolute need not to be harassed, frightened, or forced to expend precious energy, especially during late winter's season of potential food shortage and deep snow.

The tom's tracks led me back towards his refugia among high cliffs and talus. I purposefully did not intrude there.

Instead, I circled around to the other side of the bony ridge to pick up his trail. I've encountered this pattern hundreds of times all over Vermont. Bedsites, called "lays," are safely sequestered atop ledges or precarious talus jumbles facing the south/southwest, where the winter sun provides much-appreciated warmth.

Times are good for bobcats, especially in valley and foothill habitats – much better than earlier in the twentieth century, when over-hunting, destruction of habitat, and a paucity of prey severely limited their numbers. In addition to stricter game laws, bobcats now benefit from access to lower-elevation habitats, thanks to the re-growth and re-connection of countless thousands of acres of forest cover. Such habitats are often more supportive than



Photo © Susan C. Morse

Bobcat resting on a remote Winooski Valley cliff.



higher elevation sites are, offering bobcats easier living in the winter and a greater abundance and diversity of prey. People mistakenly believe that bobcats feast primarily on snowshoe hare; they actually are predator generalists, and the overall diversity and abundance of their prey species have increased in recent decades. Typical bobcat prey includes small rodents, gray squirrels, turkeys, ruffed grouse, porcupines, cottontail rabbits, beavers, and occasionally deer. The recovery of beavers and their associated wetland habitats throughout the Winooski River watershed have been a boon to bobcats.

This is not to say that the bobcats are completely in the clear. While our forest cover in Massachusetts and throughout New England has expanded greatly during the past century, that increase has come to an end. New housing and busier roads are encroaching on our forestlands, whittling away at prime lowland bobcat habitat and threatening the corridors that link these habitats together.

The tom's tracks showed that, at sundown, the napping cat had abandoned his bed and headed out for a date and possibly a nice meal in the forest and wetlands below. Along the way, the sometimes-hurrying tom's tracks frequently stopped, backed up, or paused beside rotten stumps or the undersurfaces of logs or conifer boughs. If you kneel down at such places and sniff the surface facing the hindfoot tracks, you'll detect the distinctive pungent odor of cat urine. "Elixir de kitty!"

Three hours and nearly four miles later, I decided to backtrack an older set of female bobcat tracks, hoping they would lead me back to where I started. Her smaller feet, shorter strides, and relatively infrequent scent-marking activities provided clues regarding her gender, but her behaviors

were the most revealing. She was more focused on hunting than reproduction, slinking from patch of cover to patch of cover, tree to stump to rock.

She'd flatten herself behind a log and position herself to peer around looking for prey from a concealed place. In contrast to the tom's destination-driven, swaggering trail, with sex messages liberally sprayed all over the place, the female was cryptic and careful.

Her "modus operandi" in deep snow is to get above it all and carefully conserve her energy by walking along fallen logs and even skinny branches, which she negotiated with feline grace and balance.

The bobcat is special – quintessentially wild yet wonderfully near us. No different than the leopard or the lion, the wide-ranging bobcat walks, naps, hunts, and finds a mate in a vast matrix of habitats that must be conserved if this and so many other species are to survive. Walk along a bobcat's backtrail for the day, and you'll get the picture – it's the big picture.

Portions of this article first appeared in Vermont's *Rutland Herald* and *The Times Argus*, made possible by the Wellborn Ecology Fund.

Founder and Director of KEEPING TRACK®, Susan C. Morse, is a nationally recognized wildlife ecologist and tracker. KEEPING TRACK® (www.keepingtrack.org) offers field workshops for citizen science volunteers, biologists, land managers, transportation agency personnel, and land trust leaders. Our workshops provide hands-on experience with science-based tracking and wildlife monitoring techniques which yield information critical to successful conservation planning and preservation of wildlife habitat.

Non-native Plants

continued from page 33

the best approach is to focus on keeping a particular invasive from spreading more than it already has. The Land Trust and the Conservancy have worked creatively

with local businesses and non-profits to engage scores of volunteers in the difficult work of cutting and pulling weeds. During one event, the local bakery and cafe On the Rise used garlic mustard pulled by volunteers to make a tasty pesto sauce!

Aquatic Life

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with pulses of released sediment. Water temperature regimes upstream and downstream can also be radically altered.

Poor water quality and invasive species such as *Didymo* (also called "rock snot") and the parasitic sea lamprey are additional ongoing concerns. Finally, there is continuing debate about the effects of fish stocking on the genetics of wild fish populations.



Andrew Nemethy

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Brad Howe



The Friends of the Winooski River are committed to the restoration and protection of the Winooski River and its watershed. To that end, the Friends implement many types of projects including riparian and stream bank restoration, water quality monitoring, rain water harvesting projects, and landowner stewardship including the facilitation of conservation easements and planning. We work in partnership with a wide range of organizations from local volunteer groups, businesses and town leaders to state and federal agencies in order to leverage resources and expertise. Since most people relate to the river on a scale smaller than the Winooski as a whole, we work on a tributary basis to maximize local input and involvement. The vision and energy of the local community are critical factors to any watershed protection effort.

If you are interested in finding out more about the Winooski River or getting involved with the Friends, please visit us at www.winooskiriver.org, email info@winooskiriver.org or call 802-882-8276.



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