

Basin 6: Missisquoi River Basin

This basin contains the following sites:

Tillotson Mill	Lockwood Brook, Lowell
Highgate Falls	Missisquoi River, Highgate
Sheldon Falls	Black Creek, Sheldon
Pierce Mill	Missisquoi River, Troy
Big Falls	Missisquoi, Troy

The following site has not been done:

Mill Brook Falls	Mill Brook, Westfield
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See the appendix for:

Jay Branch Gorge	Jay Branch, Troy
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Basin 6 contains the Missisquoi River watershed in northwest Vermont. Most of the watershed consists of farm country with low hills and much cleared land, and we suspect that all the major waterfalls and gorges are known. The eastern edge of the watershed includes portions of Jay Peak, Hazens Notch and Belvidere Mountain. No upland waterfalls are known from these ranges but there must certainly be some that have not been reported. Limestone and serpentine outcrops occur in several places in these mountains, and it is quite possible that interesting botanical sites occur along some of the headwaters streams.

Report 15, Tillotson Mill, Lockwood Brook, Lowell, Orleans County, Vermont.

No site number; surveyed 6 October 1983 by J.C. Jenkins. Visited by accident owing to a mistake in the state waterfall map; by happenstance there was a small falls at the point where someone believed Potters Pond Falls to be but where it was not.

Small woodland cascade below an old mill site. Barely qualifies for this survey.

Atlas map 47, USGS Jay 15' quadrangle. Taking the back roads from Lowell you come to the Tillotson's Lumber Mill; the site surveyed is downhill from their barn.

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Site is 50 yards below a lumber mill, in second-growth woodlands, just downstream from the old mill pond which now is an alder swamp. Deserted part of the country, flanks of Belvidere Mountain, only one house for a mile. The sawmill used water power until the 1930's (!), then, the 19th Century having caught up with them, switched to steam. It is currently powered by gasoline, but they are considering rebuilding the dam and putting in a turbine.

Small mountain brook, averaging ten feet wide, clean water.

Currently there is a five foot beaver dam at the old mill pond. Below it are the footings for the old concrete dam, then a falls about four feet high and some sloping ledges that form a cascade about 25 feet long at high water.

The rocks are blue quartz-mica schist (Cambrian Hoosic schist). They are smoothed but not particularly sculptured.

There is no lime and the plants are unremarkable. No rarities were seen.

Other similar cascades could occur further along the brook; the Tillotsons did not know or would not admit to there being any bigger falls.

A small pleasant place but without any particularity or distinction.

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Summary: Woodland setting, poor rocks, average biology, some seclusion, no trash, no users.

Plants Seen At Tillotson Mill

Mosses and Liverworts

Climacium dendroides	Anomodon attenuatus
Brachythecium plumosum	Coniocephalum conicum
B. salebrosum	Plagiochila asplenioides
B. rivale	Rhacomitrium aciculare
Grimmia alpicola	Atrichum undulatum
Thuidium sp.	Mnium sp. (single-tooth)
Tortella tortuosa	Metzgeria conjugata
Ceratodon purpureus	Drepanocladus fluitans
Hypnum lindbergii	Campylium sp.
Amblystegium sp.	

(There are several calciphiles on this list, indicating the schist contains small amounts of lime.)

Vascular Plants

Solidago graminifolia	Solidago rugosa
Rubus flagellaris	Hypericum perforatum
Scirpus cyperinus	Carex lurida
Salix lucida	Eupatorium perfoliatum
Juncus articulatus	Apocynum cannabinum

Report 16, Highgate Falls, Missisquoi River, Highgate, Franklin County, Vermont.

Site 761, surveyed 15 July 1983 by P.F. Zika.

A wide gorge below a small dam and the remnants of a falls.

Atlas map 53, Highgate Center 7.5' quadrangle. From Highgate Center an old bridge crosses the gorge just below the falls. Further downriver a new bridge also crosses the river.

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The site is on the outskirts of the Village of Highgate Center. Houses, streetlights, powerlines, two bridges, a dam, and the intake or powerhouse are visible from various points of the gorge. The rim of the gorge is forested with second-growth woods.

The Missisquoi is a large river, over 50 feet wide above the dam. The dam diverts most of the flow and the river was only ten feet wide below the dam at the time of the survey. The hydroelectric project at this site is to be expanded. In permitting this expansion, the state has required that a minimum flow of 35 cubic feet per second must be maintained in the bypass at all times when water is available. This minimum flow is the flow which presently leaks through the dam. The Missisquoi receives treated sewage upstream, and was turbid and foamy and appeared messy and septic, with much algal growth in the channel below the dam.

Below the dam, there is a falls about 15 feet high and a cascade of about the same height on either side of the falls. The falls are undercut and have a cave at their base. Below the falls is a gorge about one-third mile long with walls 20-30 feet high. The floor of the gorge is largely boulder-strewn rather than carved, but there are a few potholes and some carved rock near the upper end of the gorge. At one point a 15 foot high cascade enters the gorge from the north. The gorge might be a pretty place with clean water and more of it, but in its present state is smelly, slimy, and unpleasant. The striking features of the site are the cave behind the falls and the fine exposures of bedrock along the walls of the gorge.

The geology is complex, with a number of different formations exposed. At the falls the rock is limestone of the lower Ordovician Highgate formation, and this may be the type locality for this formation. The lower gorge is a dolomitic conglomerate, the upper gorge Cambrian dolomite. The conglomerate continues down the gorge to the new bridge and there meets a dark slate, the Hungerford member of the upper Cambrian Sweetsburg formation. In one area it makes a clear contact with older rocks mapped as the Saxe Brook dolomite, and that formation is mapped as the oldest (middle Cambrian).



HIGHGATE FALLS

Hence, the gorge contains a stratigraphic section including four formations from two different periods; we think that this is one of the most complicated stratigraphies that we encountered at any gorge.

No unusual vascular plants were located, despite an intensive search along both walls of the gorge and around the falls. There is an old published record, unsupported by a collection, of Anemone multifida from this site. (Circa 1890, H.G. Jesup.) Before the dam was built the habitat at the falls would certainly have been very similar to the two sites on the Winooski River where the plant grew in the 19th century.

The area around the falls receives some local use despite the low summer flows. The gorge itself is almost dry and probably gets little use. There was a lot of trash and junk on the riverbed at the time of the visit.

The site must have been spectacular before the dam was built. Now it is very trashy and somewhat polluted. The rocks are remarkable and with more flow the gorge would be a beautiful site.

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Summary: Developed for hydroelectric generation, fine rocks, average botany, formerly a very rare plant, no seclusion or wildness, lots of junk, mild pollution, fair swimming.

Vascular Plants for Highgate Falls and Gorge

Deschampsia caespitosa	Carex vulpenoidea
Equisetum arvense ?	Cystopteris bulbifera
Salix sp.	Aquilegia canadensis
Populus deltoides	Erysimum chieranthoides
Salix rigida	Solanum dulcamara
Erigeron philadelphicus	Rorippa sylvestris
Salix interior	Rubus occidentalis
Salix rigida	Diervilla lonicera
Apocynum sibiricum	Cornus rugosa
Desmodium canadense	Rubus odoratus
Solidago juncea	Betula allegheniensis
Campanula rotundifolia	Tsuga canadensis
Festuca sp.	Acer rubrum
Toxicodendron radicans	Pinus strobus
Solidago juncea	Thuja occidentalis
Verbena hastata	Populus tremuloides
Phalaris arundinacea	Taraxacum officinale
Juncus dudleyi	Sphenopholis intermedia
Poa compressa	Onoclea sensibilis
Ulmus americana	Galium sp.
Oxalis europaea	Fragaria virginiana
Hieraceum sp.	Solidago gigantea
Hypericum perforatum	Solidago graminifolia
Antennaria sp.	Tussilago farfara
Melilotus albus	Achillea millefolium
Houstonia caerulea	Lythrum salicaria
Eleocharis tenuis	Acer saccharinum
Carex torta	Clematis virginiana
Carex crinita	Betula papyrifera
Scirpus atrocinctus	Lysimachia nummularia
Epilobium glandulosum ?	

Bryophytes (in part)

Amblystegium riparium	Amblystegium serpens
unknowns from Pottiaceae	Coniocephalum conicum
Plagiochila asplenioides	Brachythecium plumosum
Fissadens cristatus	

Report 17, Sheldon Falls, Missisquoi River, Sheldon, Franklin County, Vermont.

Site 0, surveyed 15 July 1983 by P.F. Zika.

A dammed and destroyed waterfall at the head of a small gorge.

Atlas map 53, Enosburg Falls 15-minute quadrangle. The road connecting Sheldon Springs and Shawville crosses the Missisquoi River just above the dam. Access is probably easiest from the north side of the river, west of the dam, but is tricky anywhere.

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The site is in the Missisquoi River floodplain, and much of the land upstream from the site is agricultural. There is a large dam above the gorge (which destroyed the actual Sheldon Falls). Houses are visible above the site, while the shores in the gorge itself are wooded with young hardwoods and pine.

The dam diverts most of the water to a mill belonging to the Missisquoi Specialty Board Company, formerly Missisquoi Paper and Pulp. They return it to the river below the gorge, about one-half mile downstream.

The Missisquoi is a large alluvial river, with a channel averaging 30-50 feet wide below the site. The shores are mostly cobble. The water had a slight smell of sewage, and there was some algae on the rocks in the channel. We understand that process effluent from the pulp mill and some treated municipal wastes are discharged below the mill. The flow through the gorge is minute at low water, and there are many algae-filled pools.

The waterfall is completely obliterated by the dam.

Below the dam there is a short gorge about 100 feet long with rock walls about 25-35 feet high. After this, the river widens and there are ledges and carved rocks and chutes in the channel, making an impressive stretch of whitewater. The run is fairly short, approximately one-half to three-quarters of a mile, but very difficult and demanding, probably Class IV or higher depending on the water level. Several canoe organizations are trying to arrange some scheduled water releases here. If they are successful, the gorge will become an important recreational area, particularly for closed boats and competitions.

Below the walls, the south bank of the river is lined with rusty scrap metal and tangles of rusty wire, looking something like the reject pile of a bed spring factory. There are amazing amounts of this stuff: we judge it the most extensive industrial-fluvial deposit in the state.



SHELDON FALLS

The site is on or near a thrust fault, mapped as the contact between quartzites and dolomites of the Cheshire formation slate, and conglomerates of the Bridgeman Hill formation, both of Cambrian age. The ledges are limy, especially on the south shore of the river. The rocks of the Bridgeman Hill formation have a few potholes and are slightly carved in one place.

About 30 plants of Hypericum pyramidatum, a rare St. Johnswort currently known only from two other sites in Vermont, were found on the ledges north of the river, just below the dam. The rest of the plants are common species of cobble shores and limy woods.

The falls and gorge receive no use from swimmers because of the lack of water. There is a bass fishery in some of the pools in the gorge. The metal garbage below the gorge is also unpleasant, and, with all respect to the industrial base of our economy, the mill is not very scenic either.

Editor's Note: It should be pointed out that the project is being redeveloped. The Department of Water Resources and Environmental Engineering has issued a 401 water quality certificate which now contains a minimum flow requirement of 7Q10 through the bypass. Prior to this 401 certificate there had been no minimum flow requirement.

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Summary: Industrial setting, developed for hydroelectric generation, nice rocks by the island, one rare plant species, no seclusion or wildness, mild pollution, no swimming, not used for picnics or hiking, receives some use by boaters in the spring.

Vascular Plants of Sheldon Falls

Phalaris arundinacea	Calamagrostis canadensis
Deschampsia cespitosa	Apios americana
Trisetum spicatum	Apocynum sibiricum
Amelanchier sp.	Panicum clandestinum
Spartina pectinata	Phleum pratense
Pinus strobus	Lilium canadense
Populus tremuloides	Veratrum viride
Vaccinium sp.	Alnus rugosa
Solidago juncea	Lysimachia ciliata
Antennaria sp.	Salix rigida
Festuca sp.	Equisetum arvense
Cystopteris bulbifera	Osmunda claytoniana
Cryptogramma stelleri	Prunus virginiana
Erigeron sp.	Desmodium canadense
Dryopteris marginalis	Vitis riparia
Sphenopholis intermedia	Clematis virginiana
Saxifraga virginiana	Galium sp.
Aquilegia canadensis	Campanula aparinoides
Cystopteris fragilis	Campanula rotundifolia
Tsuga canadensis	Achillea millefolium
Tilia americana	Onoclea sensibilis
Ulmus americana	Rorripa sylvestris
Acer saccharinum	Thalictrum polygamum
Oxalis europaea	Smilax herbacea
Athyrium filix-femina	Toxicodendron radicans
Hypericum pyramidatum	Populus deltoides
Carex sp. (ovales)	Cornum rugosa ?
Spiraea alba	

Report 18, Bakers Falls, Missisquoi River, Troy, Orleans County, Vermont.

Site M, surveyed 7 August 1983 by P.F. Zika.

A dried up cascade below a dam.

Atlas map 55, Irasburg 15-minute quadrangle. From the center of Troy drive east on Vermont Route 100 (about 0.4 miles) and take the first left (north) turn. Follow that road north about one mile to the bridge over the pond formed by the dam. Access to the rocks below the dam is from the road to the powerhouse west of the river.

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The site is in the broad floodplain of the Missisquoi River. Much of the surrounding land is cultivated. The site is quite flat and the dam is the most prominent single feature.

The Missisquoi is a large stream and averages about 40 feet wide above the dam and 25 feet wide below it. There are discharges in Troy and the water in the impoundment and in the pools below the dam was very smelly. The dam releases very little water in the summer. Algae are common and form great slimy masses in some of the pools. Small oil seeps were seen. No aquatic insects were seen, and we suspect that the water may be very poorly oxygenated.

Below the dam there is a cascade about 25 feet high, and below this two small cascades about ten feet high. None of them were very impressive because of the smell of the site and the lack of flow.

The rock was schist and phyllite from the Ordovician Stowe formation, a very common rock in this part of the state. There are no potholes or sculptured rocks. The damp ledges on the shaded north-facing bank of the river at the lower end of the cascades had traces of lime.

Two uncommon plants were found at the edge of the channel near the bottom of the cascades. The first was Aster tradescanti, a species restricted to rocky shores in Vermont, and is known from about ten contemporary stations. The second is Vaccinium caespitosum, the dwarf bilberry, which is known from about seven stations in Vermont and is restricted to alpine tundra and river gorges. A single small colony of about 20 stems was found here. Both of these species occur in larger populations elsewhere along the Missisquoi.

It is an ugly, smelly place, without recreational value, and with only a remnant of the original falls. Swimming is not recommended because the water is designated Class C. The two

small colonies of rare plants are the only important things there.

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Summary: Developed for hydroelectric generation, average rocks, two rare plants, no privacy, some trash, disgusting water, no swimming, an unpleasant place to visit.

WE RECOMMEND THAT THERE BE A MINIMUM FLOW RELEASE TO PROTECT PLANTS, IMPROVE WATER QUALITY AND AESTHETICS.

Plants From Bakers Falls

Agrostis sp.	Solidago gigantea
Ulmus americana	Calamagrostis canadensis
Achillea millefolium	Sagina procumbens
Antennaria sp.	Phleum pratense
Populus tremuloides	Rumex obtusifolius
Pinus strobus	Verbena hastata
Aster umbellatus	Carex torta
Thuja occidentalis	Myosotis scorpioides
Tsuga canadensis	Bidens sp.
Trisetum ?	Laportea canadensis
Betula populifolia	Elymus riparius
Danthonia spicata	Salix nigra
Hypericum perforatum	Polygonum sp.
Salix rigida	Viola sp.
Erigeron annuus	Vaccinium caespitosum
Alnus rugosa	Campanula rotundifolia
Houstonia caerulea	Thalictrum polygamum
Juncus tenuis	Spiraea alba
Thelypteris phegopteris	Aster puniceus
Aster tradescanti	Ranunculus acris
Rubus pebescens	Potamogeton epihydrus
Acer spicatum	Lindernia dubia
Betula alleghaniensis	Galium sp.
Mimulus ringens	Lycopus uniflorus
Phalaris arundinacea	Hydrocotyle americana
Eupatorium maculatum	Cardamine pensylvanica

Report 19, Big Falls of the Missisquoi River, Troy, Orleans County, Vermont.

Site 348, surveyed 7 August 1983 by P.F. Zika.

A gorge and large high-angle cascade. No dam.

Atlas map 55, Irasburg 15' quadrangle. From North Troy take Route 105 east for one mile, turn south, go about 1.5 miles to a pulloff on the right which is the parking for the falls. There is a smaller gorge one-tenth of a mile above the falls. It can be reached from the same road.

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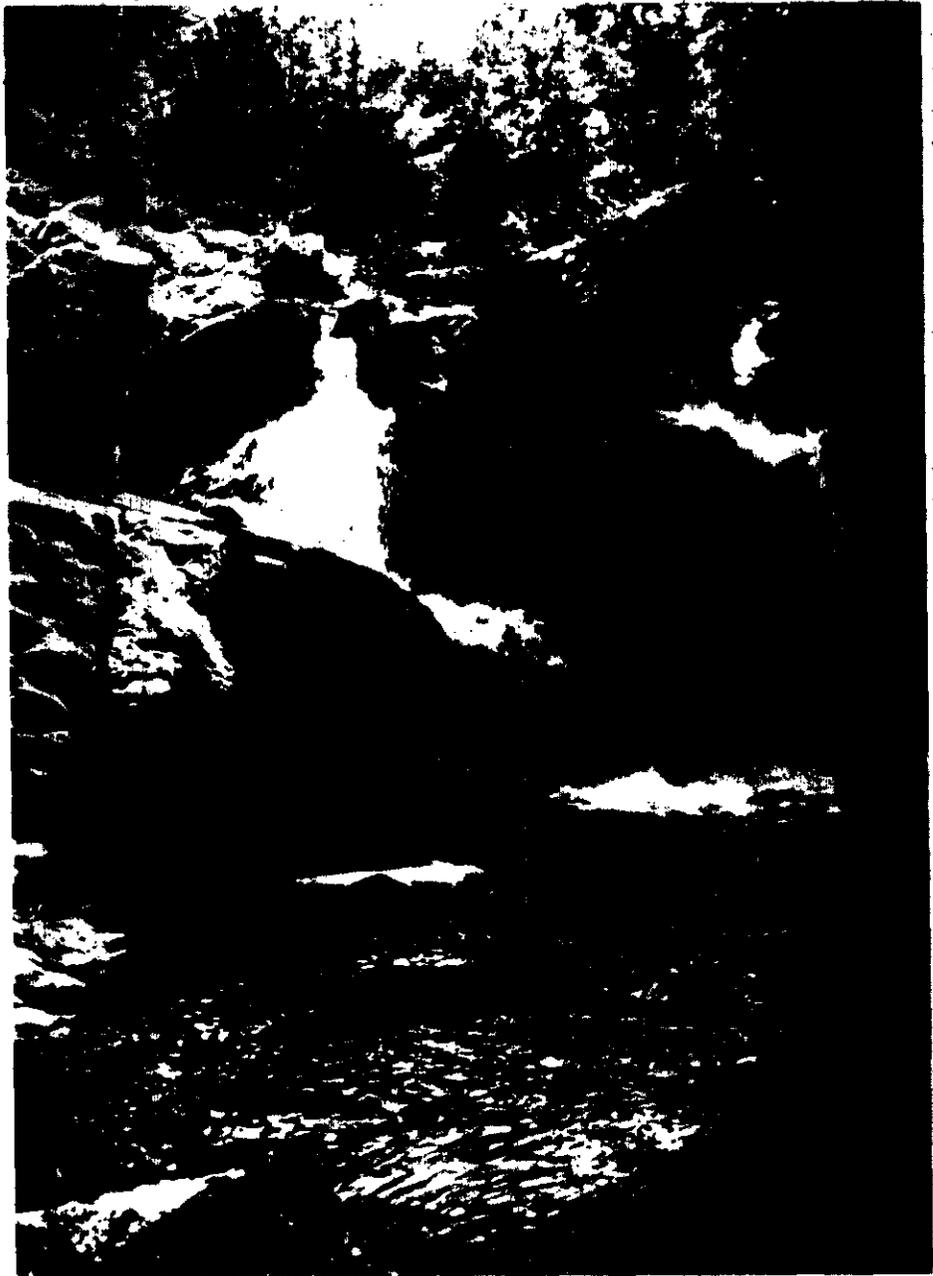
The site is in the floodplain of the Missisquoi River and is forested with hemlock, pine, and hardwoods. No houses are visible. Route 105 parallels the river but is not obtrusive, and the sound of the falls drowns any noise from traffic. An abandoned sandpit is visible below the falls; otherwise the surroundings are undisturbed. The upper gorge is secluded.

The Missisquoi is a large river, about 60-75 feet wide above the site with clear but fertile water. There are moderate amounts of algae in the channel but no foam or scum, and small fish are plentiful and the water looks and smells clean.

The site is about one-half mile long. Above the falls there are rapids, braiding channels, low cliffs ten to 35 feet high, and many small islands. Immediately before the falls is a large pool about 100 feet wide. The falls themselves (actually steep cascades) consist of three channels and drop about 25 feet. The middle channel is beautiful and spectacular and very noisy. Below the falls there is a gorge about 75 yards long with walls about 60 feet high. The east walls are vertical, the west walls sloping. At the bottom of the gorge there is deeper water which makes good swimming, and several sandy beaches.

The falls are at the contact between the Ordovician Stowe formation and the Cambrian Ottauquechee formation. Schist, phyllite and greywacke all occur. Parts of the rock are limy and in places there are pretty bands of quartz. The upper gorge has rippled rocks and potholes. The lower gorge has smoothed rocks but no potholes or sculpture.

The gorge has a diverse group of vascular plants, including several species that are otherwise unknown in the Missisquoi basin and rare or uncommon in the state as a whole. The most notable were Erigeron hyssopifolius, Vaccinium caespitosum, Solidago squarrosa, Aster tradescanti, and Trisetum spicatum. The first two are known in Vermont only from two mountaintops and several gorges. Large populations of each were found on both shores of the river. The total number of species is impressive



BIG FALLS OF THE MISSISSQUOI RIVER

and this together with the five uncommon species makes this an important botanical site.

Bryophytes were common and diverse; they need more study.

The falls are a popular tourist attraction (marked on free-bee chamber of commerce maps), and the deeper water below the falls is good for swimming and fishing. Only small amounts of litter were found, primarily below the falls.

The site is the only undammed large cascade and large gorge remaining on a major Vermont river.

The site is threatened by a proposal to dam it and divert water for hydropower. Since it is a major area for rare plants and the only large falls on a major river without a dam, we feel very strongly that it deserves protection, and urge that no development at all occur.

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Summary: Woodland setting, nice rocks, exemplary biology with five unusual species, moderately wild, some trash; mild pollution, good swimming and fishing, a popular tourist attraction with a nice view of the falls, popular for picnics.

HIGH IMPORTANCE: Major recreational area, major botanical site, largest undammed falls in the state.

Vascular Plants of The Big Falls of The Missisquoi River

<i>Acer rubrum</i>	<i>Taraxacum officinale</i>
<i>Betula alleghaniensis</i>	<i>Oxalis europaea</i>
<i>Tsuga canadensis</i>	<i>Phalaris arundinacea</i>
<i>Ulmus americana</i>	<i>Mimulus ringens</i>
<i>Amelanchier</i> sp.	<i>Onoclea sensibilis</i>
<i>Corylus cornuta</i>	<i>Calamagrostis canadensis</i>
<i>Solidago gigantea</i>	<i>Sium suave</i>
<i>Spiraea alba</i>	<i>Carex</i> sp. (ovales)
<i>Acer saccharum</i>	<i>Cornus stolonifera</i>
<i>Populus grandidentata</i>	<i>Scirpus atrocinctus</i>
<i>Solidago rugosa</i>	<i>Betula populifolia</i>
<i>Prunella vulgaris</i>	<i>Salix nigra</i>
<i>Achillea millefolium</i>	<i>Lotus corniculatus</i>
<i>Agrostis perennans</i>	<i>Verbena hastata</i>
<i>Aster umbellatus</i>	<i>Clematis virginiana</i>
<i>Houstonia caerulea</i>	<i>Prunus virginiana</i>
<i>Aster tradescanti</i>	<i>Matteuccia struthiopteris</i>
<i>Deschampsia caespitosa</i>	<i>Vicia cracca</i>
<i>Salix rigida</i>	<i>Chelone glabra</i>
<i>Fragaria virginiana</i>	<i>Thelypteris phegopteris</i>
<i>Erigeron annuus</i>	<i>Lysimachia ciliata</i>
<i>Festuca</i> spp.	<i>Cardamine pensylvanica</i>
<i>Sagina procumbens</i>	<i>Brachyeletrum erectum</i>
<i>Carex torta</i>	<i>Hieracium</i> sp.
<i>Carex</i> spp.	<i>Campanula rotundifolia</i>
<i>Phleum pratense</i>	<i>Bromus latiglumis</i>
<i>Campanula rotundifolia</i>	<i>Populus tremuloides</i>
<i>Trisetum spicatum</i>	<i>Eleocharis obtusa</i>
<i>Penthorum sedoides</i>	<i>Pinus strobus</i>
<i>Lindernia dubia</i>	<i>Apios americana</i>
<i>Salix interior</i>	<i>Salix lucida</i>
<i>Solidago squarrosa</i>	<i>Elymus riparia</i>
<i>Erigeron hyssopifolius</i>	<i>Campanula aparinoides</i>
<i>Chimaphila umbellata</i>	<i>Galium asprellum</i>
<i>Trisetum spicatum</i>	<i>Veratrum viride</i>
<i>Vaccinium caespitosum</i>	<i>Lythrum salicaria</i>
<i>Bidens</i> sp.	<i>Lycopus uniflorus</i>
<i>Polygonum pensylvanicum</i>	<i>Glyceria grandis</i>
<i>Viola</i> spp.	<i>Cicuta bulbifera</i>
<i>Leersia oryzoides</i>	<i>Aster puniceus</i>
<i>Galium mollugo</i>	<i>Alnus rugosa</i>
<i>Solidago graminifolia</i>	<i>Mentha arvensis</i>
<i>Athyrium filix-femina</i>	<i>Trifolium repens</i>
<i>Tilia americana</i>	<i>Glyceria striata</i>
<i>Cerastium vulgatum</i>	<i>Aralia nudicaulis</i>
<i>Thalictrum polygamum</i>	<i>Clintonia borealis</i>
<i>Thuja occidentalis</i>	<i>Impatiens capensis</i>
<i>Poa compressa</i>	<i>Salix discolor</i>
<i>Antennaria neglecta</i>	<i>Trifolium agrarium</i>
<i>Hypericum perforatum</i>	<i>Polygonum sagittatum</i>
<i>Bidens cernua</i>	<i>Epilobium glandulosum</i>
<i>Eupatorium maculatum</i>	<i>Silene cucubalis</i>

Leontodon autumnalis	Luzula multiflora
Polygonum sp.	Panicum clandestinum
Chrysanthemum leucanthemum	Agrostis hyemalis
Asclepias syriaca	Hypericum ellipticum
Solidago hispida	Pteridium aquilinum
Vaccinium myrtilloides	Trilium undulatum
Juncus tenuis	Lycopodium annotinum
Agrostis sp.	Asplenium trichomanes
Plantago major	Polygonum cilinode
Scutellaria lateriflora	

Byrophytes of Big Falls (partial list)

Pleurozium schreberi	Campylium sp.
Bartramia pomiformis	Plagiothecium ? denticulatum
Hylocomnium splendens	Amblystegium sp.
Anomodon attenuatus	Ceratodon purpureus
Polytrichum sp.	? Brotherella recurvans
? from Pottiaceae	Thuidium sp.
Campylium chrysophyllum	Scapania nemorosa
Climacium dendroides	Pohlia wahlenbergii