



Unique Wetland Report
Roy Mountain Cedar Swamp

Barnet, VT

This large example of a cedar swamp supplies clean water and flood resilience to Harvey Lake and provides habitat for a rare sedge species. It also includes exceptional examples of Beaver Wetland, Sweet Gale Shoreline Swamp, and Alder Swamp.



May 2, 2024

SITE NAME: Roy Mountain Cedar Swamp

LOCATION: In Roy Mountain Wildlife Management Area (WMA), south of Harvey Lake and west of Roy Mountain, in Barnet, Vermont.

SITE DESCRIPTION: The majority of this wetland consists of Northern White Cedar Swamp, including several variants of cedar swamps and natural blowdowns. Beaver Wetland, Boreal Floodplain Forest, Sweet Gale Shoreline Swamp, Alder Swamp, and Intermediate Fen occur along Jewett Brook as well. Beyond the wetland is Harvey Lake and its associated development to the north, steep forested mountains to the east and south, and a mix of cleared fields and forest to the west.

EXISTING LAND USE TYPE(S): Residential (single family), Undeveloped, Agriculture, Forestry, Parks/Rec/Trail

MAP:

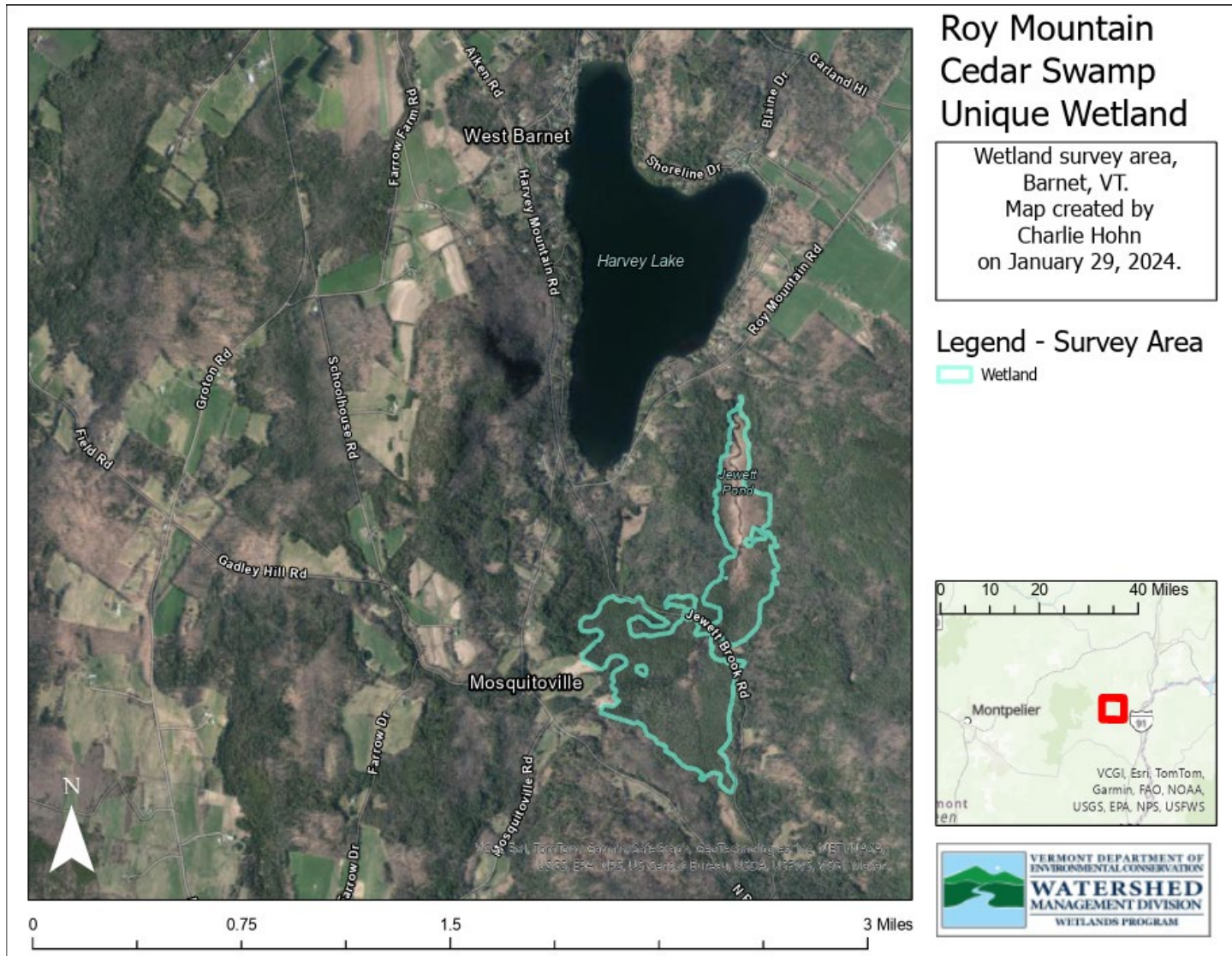


Figure 1: The main plot is at 44.274334, -72.13473. The mapped area is the Unique Wetland survey area.

CURRENT CLASSIFICATION:

This wetland is currently classified as Class II as it meets several presumptions; the wetland is identified on the Vermont Significant Wetlands Inventory (VSWI) map; contains dense, persistent, non-woody vegetation or woody vegetation adjacent to a stream; is over 2,500 sq ft in size; and contains a species in the Natural Heritage database as rare, threatened, or endangered, and portions are mapped as state significant by the Vermont Natural Heritage Inventory.

DESCRIPTION:

This large wetland complex includes around 135 acres within the survey area, with possible additional wetland to the south. The majority of the wetland is the Northern White Cedar Swamp natural community, which supports a canopy consisting of dense northern white cedar (*Thuja occidentalis*), with lower cover of species such as balsam fir (*Abies balsamea*), black ash (*Fraxinus nigra*), and red maple (*Acer rubrum*) (1). The shrub swamps primarily support speckled alder (*Alnus incana*), sweet gale (*Myrica gale*), and leatherleaf (*Chamaedaphne calyculata*), with woolly-fruited sedge (*Carex lasiocarpa*) abundant in fenny stream sides, and bluejoint (*Calamagrostis canadensis*) among the species in the beaver wetlands (1). In the floodplain forest area, wood nettle (*Laportea canadensis*) and ostrich fern (*Matteuccia struthiopteris*) are among the understory plants (1). Bryophytes are very abundant and diverse especially in the cedar swamp, with high fungal diversity observed as well (1). The wetland occurs in a basin between three mountains, with a lake to the north. The basin has accumulated deep peat and muck soils (1).

Table 1: Estimated cover of natural communities and other important cover types in the wetland.

Natural Community/ Vegetation Cover Type	Acres	Percent
Northern White Cedar Swamp	159.6	75.6%
Sweet Gale Shoreline Swamp	21.2	10.1%
Beaver Wetland	8.1	3.9%
Other Shrub Swamps	6.7	3.2%
Alluvial Shrub Swamp	5.1	2.4%
Open Water and Aquatic Bed	3.3	1.6%
Boreal Floodplain Forest	3.1	1.5%
Alder Swamp	1.7	0.8%
Sedge Meadow	1.1	0.5%
Intermediate Fen	1.0	0.5%

HYDROLOGY:

This wetland is set between several large mountains, including 2364-foot Blue Mountain, 2119-foot Roy Mountain, 1789-foot Harvey Mountain, and Gibson Hill and the Witherspoon Hills, which also reach over

1500 feet. Jewett Brook joins with several tributaries in the wetland, where it is also fed by high-pH groundwater. Jewett Brook flows into Harvey Lake, not far from its outlet from the wetland. Harvey Lake drains into South Peacham Brook before entering the Stevens River, then the Connecticut River and ultimately Long Island Sound. Large portions of the cedar swamp receive floodwater, as was evident during site visits (1), and most of the wetland is likely to be saturated most of the time when not flooded.

SURROUNDING LAND USE:

The land use surrounding the wetland includes undeveloped and residential (single-family).

RELATION OF WETLAND TO OTHER NEARBY WETLANDS:

There are several other nearby wetlands that may cumulatively contribute to the overall function of this wetland. The wetlands around Lower Symes/McLam Pond include a state significant Poor Fen natural community (2) as well as extensive beaver wetland. They are adjacent to the Roy Mountain wetland via a low saddle. There is also a smaller cedar swamp part way up Roy Mountain, as well as beaver wetlands and seeps in the area. To the north of Harvey Lake at its outlet is a disturbed shrub swamp. These wetlands are in close enough proximity that wildlife, plant seeds, and pollen are likely to travel readily between them.

CUMULATIVE IMPACTS TO THE WETLAND:

This wetland is in excellent condition, but not free of impacts. Most notably, some of the streams have areas of scattered invasive plants, especially in areas where flooding and runoff has disturbed the soil or deposited sediment (1). Some of the inlet streams drain farm fields and roads, which could cause degradation of water quality due to extra nutrients or road salt. Jewett Brook Road - a dirt access road - does have areas of fill and one stream crossing which affect hydrology at a low level. Past logging has also occurred in the cedar swamp, though it now consists of mature forest with natural clearings.

There are no wetland projects or permits recorded in the Unique Wetland area or buffer.

BUFFER ZONE:

The 50 and 160 foot buffers for this wetland is almost entirely intact, with mostly softwood forest. A small woods road intersects the buffer through much of its north and east sides, with apparently minimal impact. There may be small areas of buffer disturbance such as logging or clearing in the southwest end. There are many soil types mapped in the buffer, mostly silt loams and fine sandy loams. These include Monadnock fine sandy loam, Tunbridge-Monadnock complex, and Cabot silt loam (8).

FUNCTIONS AND VALUES PRESENT:

WATER STORAGE FOR FLOOD WATER AND STORM RUNOFF

Wetlands provide storage for floodwater and stormwater runoff; and can make significant contributions to reducing risks of public safety, reducing damage to public and/or private property, reducing downstream erosion, and/or enhancing the stability of habitat for aquatic life.

This wetland includes several sinuous streams, abundant woody vegetation, lots of physical space for flooding, and visible evidence of flooding and deposition near some of the streams. The wetland is large and densely vegetated, and the outlet stream flows near structures before flowing into Harvey Lake.

SURFACE AND GROUND WATER PROTECTION

Wetlands can make a significant contribution to the protection or enhancement of the quality of surface or of groundwater.

This wetland supports large areas where water can pass slowly through dense, persistent vegetation amongst high amounts of microtopography. Much of the wetland is permanently flooded or saturated. Areas of deposition are present. Seeps and springs are abundant here and are protected by the vegetation from impact; the deep wet organic soils amidst sand and silt also provide groundwater recharge.

FISH HABITAT

Wetlands can make a significant contribution to the protection or enhancement of the quality of surface or of groundwater.

This wetland includes areas where woody vegetation overhangs streams. It also includes deep and shallow marsh habitat and associated beaver ponds. Jewett Brook, a sizable stream, passes through much of the wetland. The outlet brook drains directly into Harvey Lake, supplying clean and cold water to the lake. The subwatershed is noted as having brook trout by the Eastern Brook Trout Joint Venture (9)

WILDLIFE HABITAT

Wetlands may provide significant habitat to one or more of the different wildlife guilds, including waterfowl, songbirds, shorebirds, reptiles, amphibians, water-dependent mammals, and large mammals. In addition, the physiognomic structure of a wetland can also be used as an indicator for the diversity of wildlife habitat present.

This wetland provides a number of wildlife functions, including habitat for waterfowl migration in an open-water beaver flowage; marsh and shrub habitat along the flowage that provides duck breeding habitat; sedge meadow habitat for migratory birds such as marsh wrens and bitterns; excellent wintering habitat for deer in the cedar swamp; feeding habitat for bear, bobcat, and moose in the seeps, cedar swamp, and open wetland; and habitat for beaver, muskrat, otter and mink along the streams and beaver wetlands. Uncommon amphibian and reptile species may use the fen and flowage areas. The wetland meets several

criteria for overall wildlife habitat diversity including multiple vegetation classes; abundance of forested swamp; direct adjacency to stream and location near large lake; and proximity and connectivity to other wetland and upland forest habitats. Most of the wetland complex is owned by the Vermont Department of Fish and Wildlife and managed as a Wildlife Management Area. The wetland is large and contributes to habitat connectivity.

EXEMPLARY NATURAL COMMUNITIES

Wetlands identified as high quality or rare examples of one of Vermont’s recognized natural community types make an important contribution to Vermont’s natural heritage.

The Northern White Cedar Swamp is recognized by Vermont Natural Heritage Inventory (NHI) as an A-ranked example of a state significant cedar swamp (3, 11), notable for its large size. In 1992, it was noted to be young and recently logged, but since that time it has grown into a mature forest with very large cedar trees (3). Cedar swamps are ranked as S3 (uncommon) natural community types (see figure 1). The Sweet Gale Shoreline Swamp and Intermediate Fen may also qualify as state significant but have not yet been evaluated by NHI. The wetland has deep peat accumulation, and the forested wetland is beginning to approach old growth characteristics in some areas.

State Rank: these ranks indicate the relative rarity of natural community types and are assigned by the Vermont Nongame and Natural Heritage Program
S1: very rare in the state, generally with fewer than five high quality occurrences
S2: rare in the state, occurring at a small number of sites or occupying a small total area in the state
S3: high quality examples are uncommon in the state, but not rare; the community is restricted in distribution for reasons of climate, geology, soils, or other physical factors, or many examples have been severely altered
S4: widespread in the state, but the number of high quality examples is low or the total acreage occupied by the community type is relatively small
S5: common and widespread in the state, with high quality examples easily found

Figure 2: Description of state ranking system (10).

RARE, THREATENED, OR ENDANGERED SPECIES

Wetlands that contain rare, threatened, or endangered species of plants or animals are significant wetlands.

This wetland supports a population of an S1 very rare plant species (3) and an S2S3 uncommon to rare plant species (4). The site has the potential to support additional rare species as it is very large, diverse, and mostly undisturbed. Specific species identification is not listed here for the protection of these species. For a full list of rare, threatened, and endangered species, consult the Natural Heritage Inventory database and the ANR Natural Resource Atlas, as well as references 3 and 4 below.

EDUCATION AND RESEARCH IN NATURAL SCIENCES

Wetlands can provide valuable resources for education or scientific research.

This site is known by NHI and other entities to be a diverse and important wetland. The majority of the wetland is on public land. 498 iNaturalist observations of 232 species have been recorded in the site (6), and 13 eBird lists totaling 49 bird species have also been recorded (7).

RECREATIONAL VALUE AND ECONOMIC BENEFITS

Wetlands can provide substantial recreational values or economic benefits.

This wetland is largely on public land, and is managed for wildlife habitat, hunting, trapping, and wildlife observation. Deer hunting and nature observation in the cedar swamp are two uses known to occur here. The wetland is visible from the access road allowing nature observation for those with reduced mobility.

OPEN SPACE AND AESTHETICS

Wetlands can significantly contribute to the open-space and aesthetic character of the landscape.

The cedar swamp, with its tilted, shaggy trees, high understory plant diversity, and very mossy understory, is a very aesthetically desirable landscape. The stream visible from the road is also very aesthetically pleasant. The large wetland can be visited easily and provides open space.

EROSION CONTROL THROUGH BINDING AND STABILIZING SOIL

Wetlands located where erosive forces are present – typically along a stream, river, pond, or lake shorelines – can provide significant erosion control.

The wetland contains sinuous streams and dense persistent vegetation growing along much of the stream bank including large cedar trees and dense mats of sweet gale and leatherleaf. Persistent emergent vegetation such as bulrushes and sedges are also common.

OTHER WETLAND QUALITIES

REPRESENTATIVE EXAMPLE

The cedar swamp is very large, and while it is not old growth, it has matured to the point where it has very large trees, snags, and areas of blowdown creating a very diverse landscape. The cedar swamp well represents the variability of this natural community type with areas of moss understory; areas influenced by meandering streams; areas of bare understory but high fungus diversity; more acidic areas with black spruce in the canopy with the cedar; areas of higher tamarack cover; and areas of very abundant coarse woody debris and successional vegetation after a severe windstorm created a blowdown. NHI classified it as a cedar swamp but with recent logging in 1982 and noted in 2012 it was more like a forested bog than a cedar swamp (3) The Sweet Gale Shoreline Swamp, Alder Swamp, Boreal Floodplain Forest, and Intermediate Fen are less developed as habitat, but are important as they are often associated with cedar swamps and add to the diversity of the site.

RARE COMMUNITY TYPE

The cedar swamp is an uncommon (S3) natural community. It is well within the range of this natural community type but is a particularly large example. See Significant Natural Community section above for further information. A smaller Sweet Gale Shoreline Swamp is also present – this is also an S3 natural community type. The Boreal Floodplain Forest and Intermediate Fen are small, but with their rare (S2) status they also contribute to the diversity of the site.

COMMUNITY ASSEMBLAGE/WETLAND COMPLEX

This wetland has at least six natural communities in an interconnected ecosystem. This includes the very varied cedar swamp as well as Sweet Gale Shoreline Swamp, Boreal Floodplain Forest, Intermediate Fen, Alder Swamp, and a large beaver flowage. See Exemplary Natural Communities section above for more information.

LANDSCAPE ASSOCIATION

This wetland occurs in a classic Northern Piedmont landscape amidst mountains with dense forest and a few scattered roads and farm fields. The wetland itself is also very large.

Most of the land to the east and south of the wetland is forested, with steep slopes and both conifer and hardwood forest present. Some of the upland forests on Roy Mountain, such as a Red Pine Forest, are also considered exemplary natural communities. Much of this is conserved land. There are also shrubby and emergent wetlands in the area, as well as two smaller ponds to the southeast. To the west there is an approximately even split of cleared fields such as hayfields and forested land. Scattered rural residences and farms are present here along with a few natural emergent wetlands and constructed farm ponds. There is some habitat connectivity in the forest connecting with the large, conserved area of land around Groton State Forest. Harvey Lake to the north is mostly surrounded by homes and camps, with a recreational beach and a disturbed shrub swamp complex at the north end where the lake outlet is. The Connecticut River valley to the east supports small villages and more extensive farmland in a narrow band, and Interstate 91, a major travel corridor, passes through this area as well. The Connecticut River is influenced by multiple dams in this region and does not have natural flow patterns.

RARE, THREATENED, OR ENDANGERED SPECIES HABITAT

This wetland is known to support an S1 plant species (3) and a S2S3 plant species (4). Specific species are not listed for protection purposes. See also Rare, Threatened, or Endangered Species section above.

UNDISTURBED CONDITION

This wetland is in very good ecological condition. This wetland has been assessed several times using the Vermont Rapid Assessment Method (VRAM). VRAM assigns a score to a wetland ranging from 1 to 100 with 100 being pristine condition and very high function (12). A 2022 VRAM conducted of the entire wetland received a score of 97 indicating very high function and very good condition. Other VRAMs of subsections of the wetland have received slightly lower scores of 89, 88, and 80, due mostly to lower levels of function when looking only at a subset of the wetland (1). For context, only two VRAM assessments out of 1104 have ever scored higher than 97. However this wetland did not score a 100% for condition metrics due to some disturbance in the broader landscape, a few invasive species being present, and the small logging road within the wetland. The Coefficient of Conservation (CoC) is a metric that uses the presence and abundance of plant species to evaluate wetland status (13). CoC scores generated from vegetation plots and species lists collected here in 2022 ranged from 3.9 to 4.5 indicating some level of disturbance, but much of this was natural disturbance associated with floodplain and blowdown processes(1).

ATTACHMENTS:

2022 Roy Mountain Cedar Swamp Site Report. Vermont Wetlands Program.

References

- (1) Vermont Wetlands Program. 2022 Roy Mountain Site Report. June 30, 2022. Internal Report. Accessed 1/10/2024.
- (2) [Vermont Heritage Inventory Element Occurrence 1535](#). Accessed 1/10/2024.
- (3) [Vermont Heritage Inventory Element Occurrence 4087](#). Accessed 1/10/2024.
- (4) [Vermont Heritage Inventory Element Occurrence 3928](#). Accessed 1/10/2024.
- (5) [Vermont Heritage Inventory Element Occurrence 34683](#). Accessed 1/10/2024.
- (6) [iNaturalist – Roy Mountain WMA](#). Accessed 1/10/2024.
- (7) [eBird – Roy Mountain WMA](#). Accessed 1/10/2024.
- (8) Natural Resources Conservation Service. [Web Soil Survey](#). Accessed 1/10/2024.
- (9) [Eastern Brook Trout Joint Venture – Native Eastern Brook Trout Population Status, September 2015](#). Accessed 1/24/2024.
- (10) [NatureServe Biotics Help Page](#). Accessed 1/24/2024.
- (11) [Vermont Fish and Wildlife Department, Natural Heritage Inventory. Synonymy of Vermont Natural Community Types with National Vegetation Classification Associations](#). Accessed 1/24/2014/
- (12) [Vermont Rapid Assessment Method for Wetlands v 2.1 User’s Manual and Scoring Form](#). Accessed 2/5/2024.
- (13) New England Interstate Water Pollution Control Commission. [Enhanced Northeast Wetland Monitoring & Assessment with Ecoregional FQA Metrics](#). Published 9/29/2022. Accessed 1/25/2024.

SITE NAME: Roy Mountain Cedar Swamp

LOCATION: A large complex of wetlands along Jewet Brook Rd in Roy Mountain WMA east of Mosquitoville. 44.274334, -72.13473

SURVEY DATE: 6/20/22

OVERVIEW:

The Roy Mountain cedar swamp is a large wetland south of Harvey Lake that consists primarily of cedar swamp with open wetland also present. The wetland is very diverse, with over 222 species having been reported from the area including nearly 200 plants. Fungi were also abundant and not all identified, indicating further biodiversity. The majority of the site is Northern White Cedar Swamp, but the swamp varies internally with areas of dense cedar and mossy understory; areas of smaller cedar with little in the way of understory; more acidic areas with black ash; younger areas with more balsam-fir and tamarack; blowdown areas perhaps caused by a small tornado; and areas along the brook that contain cedar but function as Boreal Floodplain Forest. Alder Swamp, Sweet Gale Shoreline Swamp, Sedge Meadow, and Beaver Wetland were also observed, with Woodland Seeps on the slopes above. The broader landscape includes Roy Mountain to the east, Harvey Lake to the north, the Symes Pond wetland system to the southeast, and to the west scattered homes and fields with the Groton habitat block beyond them.

SPECIES DIVERSITY:

A 20 by 20 meter plot was conducted in the **cedar swamp** in the same location as a 2017 plot. Species diversity was very high at this site with 70 species in this plot! The overstory supports dense cedar (*Thuja occidentalis*) with lesser amounts of Balsam-fir (*Abies balsamea*) and tamarack (*Larix laricina*). Shrubs primarily consist of tree saplings plus some speckled alder (*Alnus incana*) and alder-leaved buckthorn (*Rhamnus alnifolia*). The herb layer was very diverse with many species at low cover, the most abundant species were sensitive fern (*Onoclea sensibilis*), brome-like sedge (*Carex bromoides*), and dwarf raspberry (*Rubus pubescens*). Bryophytes were also abundant.

Comparing the 2022 plot with the 2017 plot there were some changes. However, the plot may not have been aligned the exact same way, so these changes offer hints, not certainty. It was notable that there was less sedge cover in 2022, and the sedges were predominantly brome-like sedge rather than interior sedge (*Carex interior*) noted in 2017. Marsh bedstraw (*Galium palustre*), tamarack (*Larix laricina*), and sensitive fern were more abundant in 2022. Conversely, cedar and interior sedge covers declined in 2022 compared with 2017. Also, two invasive species, water forget-me-not (*Myosotis scorpioides*) and bittersweet nightshade (*Solanum dulcemara*) were observed in 2022 but not 2017. These changes may come down to differences in plot alignment; or in the case of the less sedge cover, a possible error in assigning cover to tussocks based on limited reproductive material; but changes may also represent changes in the ecosystem. A revisit in 5 more years would be helpful to see if any of these trends continue. Species data was also collected from the **blowdown**. This blowdown was observed but not monitored further in 2017. A review of air photos and NOAA data suggests that the blowdown could have originated from a severe thunderstorm that affected this immediate area on July 4,

2012 as described [here](#). No tornado was reported during that event, but given the mixed nature of the blowdown - as opposed to trees pointed outward or in one direction from a microburst - plus the remote nature of the site, it is possible a small unconfirmed tornado touched down here. In any event, the blowdown was dramatic with essentially all trees flattened in one area and left in a pile of logs. The area subsequently grew in with very dense mountain maple (*Acer spicatum*) which is interesting because the species is only present at very low cover elsewhere in the cedar swamp. It is unclear whether this represents a 'lucky' seed drop during or after the storm event or if mountain maple is common in these types of blowdowns. Amidst the mountain maple, saplings of cedar, Balsam-fir, black ash (*Fraxinus nigra*) and hemlock (*Tsuga canadensis*) were growing, as well as other shrubs at lower cover including mountain holly (*Ilex mucronata*). The herb layer included dwarf raspberry, jewelweed (*Impatiens capensis*), heartleaf foamflower (*Tiarella cordifolia*), and three seeded sedge (*Carex trisperma*). 34 plant species were observed in total.

A species list was also collected for a conifer-dominated **floodplain forest** along Jewett Brook east of the access road. Here Balsam-fir is more abundant than cedar, and the canopy is more open than the cedar swamp. Black ash was also present including one enormous example. Herb species present included wood nettle (*Laportea canadensis*), reed canary grass (*Phalaris arundinacea*), ostrich fern (*Matteuccia struthiopteris*), and tall meadow rue (*Thalictrum pubescens*). Coarse woody debris was abundant along and in the stream.

A full species list was not collected in the open wetland to the north but species in this area included sweet gale (*Myrica gale*), leatherleaf (*Chamaedaphne calyculata*), woolly-fruited sedge (*Carex lasiocarpa*), *Sphagnum* mosses, speckled alder, bluejoint (*Calamagrostis canadensis*), three-way sedge (*Dulichium arundinaceum*), and woolgrass (*Scirpus cyperinus*).

SOILS:

The soils in the **cedar swamp** within the plot were an interesting mix of mineral and organic soils. The soil was muck to 10 inches deep, then silt loam to 14 inches and loamy sand to 24 inches. This plot was bisected by a small stream, so the soils here are a mix of the typical organic cedar swamp soils and alluvial soils from flood events associated with the bisecting stream. It is likely that other areas of the cedar swamp have deep peat and muck soils, whereas the floodplain along the larger stream has primarily sandy and/or silty mineral soils.

WATER QUALITY and HYDROLOGY:

Water samples were collected from the stream passing through the **cedar swamp** at the location of the plot. The water had a pH of 7.8 and conductivity of 244, indicating calcium-enriched waters which is typical for cedar swamps. Calcium levels were also rather high at 42.6 mg/l with alkalinity also high. Total nitrogen was somewhat elevated as well at .24 mg/l; other substances were mostly at low levels including sodium and chloride further indicating the conductivity is elevated due to mineral groundwater not road salt. Looking at changes from 2017, most measurements were similar, but the iron, digested phosphorus, and turbidity levels were lower while nitrate and total suspended solids levels were higher. pH and conductivity were both higher in 2022 perhaps due to a drier year and with more groundwater influence as opposed to rainwater.

The hydrology of the site is fed by multiple sources – several perennial and intermittent streams enter the wetland. Given all the groundwater indicator species and water chemistry metrics, seeps likely discharge directly into the wetland as well. Precipitation is likely important in isolated areas where perched water tables are less influenced by groundwater, such as the places where black spruce or leatherleaf were found. A large stream exits the site and flows into Harvey Lake to the north. This stream is also affected by beaver activity.

FUNCTIONS AND VALUES PRESENT:

- | | |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Water Storage for Flood Water and Storm Runoff | <input checked="" type="checkbox"/> Rare, Threatened or Endangered Species |
| <input checked="" type="checkbox"/> Surface and Ground Water Protection | <input checked="" type="checkbox"/> Recreational |
| <input checked="" type="checkbox"/> Fish Habitat | <input checked="" type="checkbox"/> Education |
| <input checked="" type="checkbox"/> Wildlife Habitat | <input checked="" type="checkbox"/> Open Space |
| <input checked="" type="checkbox"/> Exemplary Natural Communities | <input checked="" type="checkbox"/> Erosion Control through Binding and Stabilizing the Soil |

ANTHROPOGENIC DISTURBANCE:

This wetland is in excellent to reference condition. The few stressors noted include low levels of invasive species (which were a bit more abundant in a few areas of open canopy) and hydrologic disturbance caused by the dirt road accessing the site. Logging has occurred in the past and an older Natural Heritage Inventory record indicated logging disturbance. However, the site has regrown well with little current impact from any past logging. Some areas have very large trees indicating no logging has happened in those areas for quite some time.

BIOCRITERIA ANALYSIS:

VRAM, the Vermont Rapid Assessment Method, is a method of rapidly assessing both condition and function of a wetland. A VRAM was conducted for the entire wetland complex including the **cedar swamp, blowdown, and floodplain forest**, with two other VRAMs conducted for nearby wetlands. Not surprisingly, the large wetland complex scored very high with a total score of 97. Condition scored at 89% with a few points lost to the minor impacts from the access road and surrounding low level development, and low levels of invasive species. The function score, 87, is currently the highest function score any wetland has achieved! This is thanks to a wide range of habitat types, Natural Heritage Inventory (NHI)-tracked exemplary natural communities and rare species, and a copious supply of different habitat features. A smaller **beaver wetland** that is disjunct from the main wetland was also assessed and received a significantly lower score of 72. The condition score was not much different at 81 but the function score was much lower at 45 due to a much smaller range of habitat features, less varied hydrology, and no NHI-tracked features. An interesting **roadside rich fen** in nearby Mosquitoville was also assessed. This scored lower at 55 total score, 55% condition, and just 38 points for function due to roadside and habitat effects. It is still an interesting landscape feature and example of a rich fen albeit small and somewhat disturbed.

The Coefficient of Conservation (CoC) is a metric that uses the presence and abundance of plant species to evaluate wetland status. The main **cedar swamp** plot received a score of 4.5 which is a somewhat lower score than average for cedar swamps. This is perhaps due to natural disturbance from the dynamic stream passing through the site, or else from the few invasive species, or maybe even disturbance from the storm that caused the blowdown nearby. When weighted by relative species cover the score was even lower at 3.98. Interestingly, the CoC in 2017 was a higher 4.71 with a much higher cover weighted CoC of 4.6. These data points are not sufficient to indicate a problem in the wetland, but it is recommended the site is visited again in 5 years to note if the trend has continued or reversed. Other biocriteria for the site suggest the site is wetter, more calcium enriched, and has more mineral soil and less peat than average for cedar swamps. The latter was verified by soil sampling and is a local effect due to the stream and likely not true for the wetland as a whole.

The **blowdown**, interestingly, scored higher in CoC than the intact cedar swamp at 4.9! Cover weighted CoC was also higher at 4.3. This is despite what obviously amounted to tremendous disturbance. The score was only marginally lower than the average score for an intact swamp. This seems to indicate that the site is regrowing in a natural manner, which is to be expected due to the good condition of the landscape in and around the blowdown. Blowdowns like this are a natural part of the ecology of a cedar swamp and add habitat and landscape diversity to the wetland. The jumble of large logs likely provides habitat for species like bobcat while also discouraging deer browse on the regrowing cedars. Other biocriteria indicate this site is less enriched and drier than the other plot, with more average soil conditions for a cedar swamp (the actual soil was unsampled as it was buried under piles of logs).

The **floodplain forest** scored lower than either of the cedar swamp plots at 3.93. It is difficult to compare this score to other floodplain forests of its type as they are uncommon and poorly sampled, but this score is probably near average for this wetland type, thanks to constant natural disturbance and vulnerability to invasive species invasion.

Site	VRAM Score	CoC
Cedar swamp	97	4.5
Blowdown	97	4.9
Floodplain Forest	97	3.9
Beaver Wetland	72	n/a
Roadside rich fen	55	n/a

MANAGEMENT RECOMMENDATIONS:

This wetland complex is in excellent condition, and does not face significant threats in the near future. The presence of the access road does cause some impacts but given these are long-standing and the wetland has grown around the road, removing it would not be high priority. However, the culvert should be monitored to make sure beavers are not using it to anchor a

dam causing more inundation than they naturally could. This could cause unnatural mortality of cedar trees. No evidence of such beaver activity was seen at any of the visits to the site. Emerald ash borer will likely result in death of many of the black ash trees in the wetland. This is a loss ecologically, but since black ash is a relatively minor canopy component of this particular wetland, effects will be less impactful than many other forested wetlands. Most important perhaps is to have ecologists or land managers visit the wetland and walk around looking for any obvious new impacts, such as erosion associated with the road, clogs to culverts, or new spread of invasive species. And it is recommended that the plot is surveyed again in 5 more years (2027).

Photos:

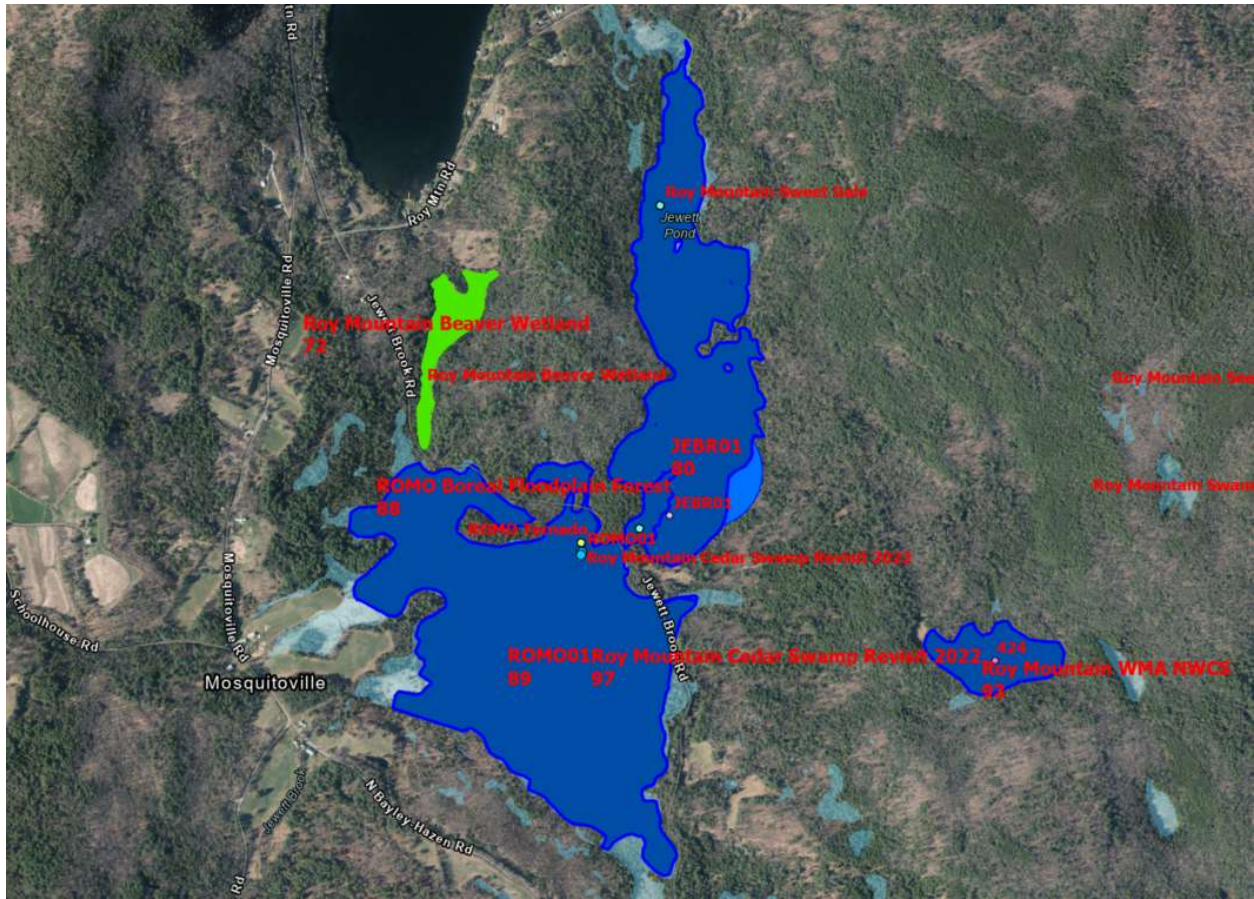


Figure 1: plot location in cedar swamp



Figure 2: leaning trees on the edge of the blowdown.

MAP – note this area has been well studied.



Appendix A: Soil Data
Soil Table -
Cedar swamp

Depth to Lower Boundary (<i>in</i>)	Texture	Notes
10	Muck	Lots of woody material
14	Silt Loam	
24	Loamy Sand	