

Exploring the Eastern Alpine: Botanical inventory in Uapishka (Les Monts Groulx), Quebec

2018 Les Mehrhoff Botanical Research Fund Final Report

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Introduction

Alpine ecosystems and flora have long held a particular fascination for botanists as foci of exploration and research. Consequently, the flora of many northeastern North American alpine regions has been well catalogued, yet notable exceptions remain. Uapishka or the Monts Groulx in north central Quebec spans roughly 1,200 square miles making this rolling alpine plateau the largest area of low latitude alpine ecosystem in northeastern North America (Jones & Willey, 2012), yet its flora remains incompletely known. Access to the region, which lies about 450 miles north of Quebec City, just east of the iconic Manicougan impact crater, has improved since the late 1980's with creation of the Quebec-Labrador Highway and development of a few trails from the highway through dense boreal forest to treeline. This spurred increased recreation as well as limited botanical inventory, and increasing awareness of the value of Uapishka led to improved conservation status, with about one third of the area now designated a provincial biodiversity reserve and UNESCO World Biosphere Reserve. However, increased attention also has the potential to expand impacts from recreation or other uses in this largely trail-less alpine region. Thus, the initial conservation plan for the reserve identifies further basic biological inventory as a high priority for informing management and conservation (MDDEP, 2009). To date, members of a 2009 Flora Quebeca expedition have compiled the most complete flora of the region, incorporating earlier work by Lemieux and Maldague (1964), Lavoie (1984) and Grondin and Couillard (2003), resulting in a list of 215 vascular plant species (Flora Quebeca, 2011) to which Willey and Jones (2012) report two additions, bringing the known flora to 217. Yet much of vast Uapishka remains botanically little explored, challenging to study, and unprotected.

Methods

In 2017 I conducted an exploratory trip that demonstrated the high potential for further botanical discoveries in Uapishka and in 2018 the Les Mehrhoff Botanical Research Fund generously provided support for a second botanically focused expedition to document and catalogue more of the region's flora. As a *de novo* survey effort my aim was to target under-surveyed areas and to visit the widest possible range of habitat types, especially small-scale niche habitats more likely to have less common species. Prior collections and survey accounts largely concentrated on the more accessible western summits, so our goal was to traverse toward a distant peak, Mt. Lucie, far to the east of the more frequented western summits, visiting promising sites along the way. Given the difficult traveling conditions we could not reach Mt. Lucie in the limited time we had, but this trajectory provided access to other promising sites that I remotely selected as survey targets. Targets were selected based on prior experience in the landscape combined with the limited available base data, including 1:50,000 scale topographic maps and moderate-resolution aerial imagery. Of necessity these targets were revised and augmented on the ground, based on professional judgment and trip logistics, to encompass as diverse an array of sites as possible. In the field I compiled a cumulative species list and documented most species via photography and/or collection of georeferenced specimens, particularly for new species records. Due to the frequently wet conditions and logistics of collecting while backpacking, I collected small specimens in a vasculum and later transferred them to a small field press at camp. I also recorded observations documenting typical species assemblages and distinctive sites. I determined most species in the field, but a subset of specimens required later lab work to identify or confirm, a process that is ongoing.

The Expedition

From August 1-9, 2018 I conducted a 9-day expedition to Uapishka with three able compatriots, Sacha Pealer, Bob and Kae Zaino, the former two of whom also contributed



Figure 1. The author collecting tiny *Ranunculus pygmaeus*; bug shirts are a necessity during Uapishka summer.

botanical expertise, and the latter of whom spearheaded trip logistics and food. Together we drove about 700 miles from central Vermont to reach the southern trailhead access into Uapishka and from there donned packs and began our trek toward the interior regions. As expected, travel was slow in the rolling, dissected, trail-less terrain, incessant biting insects, frequent rain, and uncharacteristically hot temperatures. In combination with heavy packs and the additional time needed for botanical surveying it quickly became clear we could not reach Mt. Lucie in the time we had, so we revised our destination to reach Mt. Marjolaine as our eastern-most point. Between

this expedition and the 2017 reconnaissance my surveys encompassed the summits of Mt. Provancher, Mt. Veyrier, Mt. Goeland, Mt. Oxyria, Mt. de l'Ours, Mt. Marjolaine, the shores of Lac Castor, Lac Quentin, Lac des Escapades, Lac Nomade, Lac du Leurre, Lac Magique, Lac Joyel, Lac Oxyria, and many other unnamed features in between, crisscrossing an area of approximately 20 square miles in the southwest quadrant of Uapishka.

Results

Specimen identification and compilation of prior records is ongoing, so the following results are preliminary, but fairly complete. In combination with my 2017 reconnaissance trip, this expedition resulted in documentation of 206 vascular plant species and the collection of 125 voucher specimens, representing 98 species (see Appendix 1). Based on my current understanding of the previously documented flora, this effort resulted in the addition of 38 species to the known vascular flora of Uapishka, an increase of over 17%, bringing the total known flora to about 255 species. Particularly noteworthy among these additions are a number of new, disjunct occurrences of arctic-alpine species including: *Cerastium cf. beeringianum*, *Cystopteris montana*, *Juncus castaneus*, *J. stygius* var. *americanus*, *Packera pauciflora*, *Poa arctica* ssp. *arctica*, *Ranunculus allenii* (S3), *Ranunculus pygmaeus*, and *Tofieldia pusilla*. These additions contribute to the larger understanding of the region's phytogeography and underline its importance as a priority conservation area.

While the Uapishka flora is predominantly one of relatively acidic conditions a few calcicoles have been previously noted presumably, reflecting at least locally enhanced mineral enrichment from the predominantly gabbroic bedrock. This expedition also added substantially to the list of calciphiles in the region with *Carex atratifomis*, *C. scirpoidea*, *C. vaginata*, *Cystopteris montana*, *Draba glabella*, *Pinguicula vulgaris*, *Saxifraga paniculata*, *Tofieldia*



Figure 2. A unique headwall site on Mt. Oxyria that held several new arctic-alpine species.

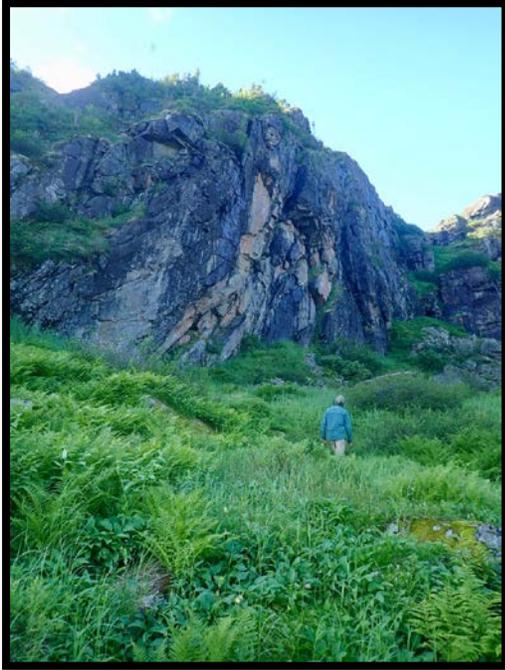


Figure 3. An apparently calcareous cliff (center section with orange *Xanthoria* lichen) that supported numerous calcicoles on Mt. Oxyria.

pusilla, and *Woodsia glabella*. Several of these occurred solely in a single, small, calcareous cliff community on Mt. Oxyria and all were locally rare.

Two other locally rare species, *Galium kamtschaticum* and *Pedicularis groenlandicus*, that had been historically documented in the area, but not observed more recently, were refound; the former apparently represents the northern-most station and the latter the southern-most station for the species in Quebec (Flora Quebeca, 2011). Many past survey efforts have largely focused on more exposed summit areas, so, perhaps not surprisingly, many of the new species were those of more sheltered habitats, either at lower elevations along the ascent trail, in subalpine settings within the plateau, in the most persistent snowbeds, and in aquatic habitats, which held *Callitriche heterophylla*, *Hippuris vulgaris*, *Isoetes lacustris*, *Ranunculus flammula* var. *reptans*, *Sparganium angustifolium*, and *Subularia aquatica* var. *americana*. Unfortunately, new species discoveries also included the introduced species *Poa annua* and

Festuca rubra, though these were very limited in occurrence with only a few sites at lower elevations near a cabin at the trailhead and along a lower section of trail.

A few distinctive bryophytes were also collected, adding the fen-moss *Scorpidium scorpioides* and dung-moss *Tetraplodon angustatus* to the known Uapishka bryoflora as presented by Faubert (2010). Finally, as a bonus outcome, I was able to contribute a specimen of *Diapensia lapponica* to an ongoing provenance study of *Diapensia* genetics being conducted by Sean Robinson at SUNY- Oneonta.

As noted, these are preliminary results with ongoing specimen and record compilation work. Once complete, specimens will be deposited at the Pringle Herbarium (VT), and I will finalize an annotated species list for the region and compile spatial data for the rare taxa observed. These products will be shared with the Canadian managing authority, the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), who authorized my work, in order to support their ongoing conservation and management of this amazing alpine region and Quebec's rare flora. Results of this study will also be shared in upcoming presentations, including an invited talk for the North Branch Nature Center's Naturalist Journeys series on March 8th, 2019 in Montpelier, VT.

Summary

The Uapishka region continues to yield botanical discoveries with each new survey effort. This study added to the already significant list of disjunct arctic-alpine species known from the region and substantially expanded the breadth of its sparse but present calciphilic flora. These results bolster the conservation significance of the region while also underlining the need for further inventory work to inform conservation and management decisions in light of increasing use.

References

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Appendix 1: A preliminary list of species observed in Uapishka, Quebec during 2017 and/or 2018 expeditions.

Bold text names are additions to the known flora based on comparison to Flora Quebeca (2011) and Willey and Jones (2012).

Species	Specimen Collected
<i>Abies balsamea</i>	
<i>Acer spicatum</i>	
<i>Achillea millefolium</i>	
<i>Actaea rubra</i>	x
<i>Agrostis cf. scabra</i>	
<i>Agrostis mertensii</i>	
<i>Alchemilla glomerulans</i>	
<i>Alnus viridis</i>	
<i>Amelanchier bartramiana</i>	
<i>Andromeda glaucophylla</i>	
<i>Anemone parviflora</i>	x
<i>Anthoxanthum monticola</i>	x
<i>Aralia hispida</i>	
<i>Aralia nudicaulis</i>	
<i>Arctuous alpina</i>	
<i>Athyrium alpestre</i> var. <i>americana</i>	
<i>Athyrium filix-femina</i>	
<i>Betula glandulosa</i>	
<i>Betula minor</i>	
<i>Betula papyrifera</i>	
<i>Bistorta viviparum</i>	x
<i>Bromus ciliatus</i>	x
<i>Calamagrostis canadensis</i>	x
<i>Callitriche heterophylla</i>	x
<i>Cardamine bellidifolia</i>	x
<i>Carex aquatilis</i>	x
<i>Carex atratiformis</i>	x
<i>Carex bigelowii</i>	x
<i>Carex brunnescens</i>	
<i>Carex canescens</i>	
<i>Carex debilis</i>	
<i>Carex deflexa</i>	x
<i>Carex echinata</i>	
<i>Carex foenea</i>	x

<i>Carex leptalea</i>	x
<i>Carex leptoneura</i>	x
<i>Carex limosa</i>	x
<i>Carex magellanica</i>	x
<i>Carex oligosperma</i>	x
<i>Carex pauciflora</i>	
<i>Carex rariflora</i>	x
<i>Carex rostrata</i>	x
<i>Carex saxatilis</i>	x
<i>Carex scirpoidea</i>	x
<i>Carex trisperma</i>	
<i>Carex vaginata</i>	x
<i>Castilleja septentrionalis</i>	
<i>Cerastium cf. beeringianum</i>	
<i>Chamaedaphne calyculata</i>	
<i>Chamerion angustifolium</i>	
<i>Cinna latifolia</i>	
<i>Clintonia borealis</i>	
<i>Coptis trifoliata</i>	
<i>Cornus canadensis</i>	
<i>Cornus sericea</i>	
<i>Cystopteris fragilis</i>	x
<i>Cystopteris montana</i>	x
<i>Danthonia intermedia</i>	x
<i>Deschampsia flexuosa</i>	
<i>Diapensia lapponica</i>	x
<i>Diphasiastrum alpinum</i>	x
<i>Diphasiastrum sitchense</i>	x
<i>Draba glabella</i>	x
<i>Drosera rotundifolia</i>	
<i>Dryopteris expansa</i>	
<i>Elymus trachycaulus</i>	x
<i>Empetrum nigrum</i>	
<i>Epilobium cf. anagallidifolium</i>	x
<i>Epilobium hornemanii</i>	x
<i>Epilobium palustre</i>	x
<i>Equisetum arvense</i>	

<i>Equisetum fluviatile</i>	x
<i>Equisetum sylvaticum</i>	
<i>Eriophorum angustifolium</i>	x
<i>Eriophorum vaginatum</i>	
<i>Eurybia radula</i>	x
<i>Festuca rubra</i>	
<i>Fragaria virginiana</i>	x
<i>Galium kamtschaticum</i>	x
<i>Galium trifidum</i>	x
<i>Galium triflorum</i>	x
<i>Gaultheria hispidula</i>	
<i>Geocaulon lividum</i>	
<i>Geum macrophyllum</i>	
<i>Geum rivale</i>	
<i>Glyceria striata</i>	x
<i>Goodyera repens</i>	
<i>Gymnocarpium dryopteris</i>	
<i>Harrimanellia hypnoides</i>	x
<i>Heracleum maximum</i>	
<i>Hippuris vulgaris</i>	x
<i>Huperzia appressa</i>	
<i>Isoetes echinospora</i>	x
<i>Isoetes lacustris</i>	x
<i>Juncus castaneus</i>	x
<i>Juncus filiformis</i>	
<i>Juncus</i> sp. (undetermined)	x
<i>Juncus stygius</i> var. <i>americanus</i>	x
<i>Juncus trifidus</i>	
<i>Juniperus communis</i> var. <i>depressa</i>	x
<i>Kalmia angustifolia</i>	
<i>Kalmia polifolia</i>	
<i>Larix laricina</i>	
<i>Ledum groenlandicum</i>	
<i>Linnaea borealis</i>	
<i>Listera cordata</i>	
<i>Lonicera villosa</i>	
<i>Luzula confusa</i>	x
<i>Luzula parviflora</i>	
<i>Lycopodiella inundata</i>	x
<i>Lycopus lagopus</i>	x
<i>Maianthemum canadense</i>	

<i>Maianthemum trifoliata</i>	
<i>Melampyrum lineare</i>	
<i>Menyanthes trifoliata</i>	
<i>Minuartia groenlandica</i>	
<i>Mitella nuda</i>	
<i>Moneses uniflora</i>	
<i>Monotropa uniflora</i>	
<i>Muhlenbergia uniflora</i>	x
<i>Omalothea norwegica</i>	
<i>Omalothea supina</i>	x
<i>Orthelia secunda</i>	
<i>Osmunda claytoniana</i>	
<i>Oxyria digyna</i>	x
<i>Packera</i> cf. <i>aurea</i>	x
<i>Packera pauciflora</i>	x
<i>Pedicularis groenlandica</i>	x
<i>Petasites frigidus</i> var. <i>palmatus</i>	
<i>Phegopteris connectilis</i>	
<i>Phleum alpinum</i>	x
<i>Phyllodoce caerulea</i>	x
<i>Picea glauca</i>	
<i>Picea mariana</i>	
<i>Pinguicula vulgaris</i>	x
<i>Piptatherum canadense</i>	x
<i>Platanthera dilatata</i>	
<i>Platanthera obtusata</i>	
<i>Poa annua</i>	x
<i>Poa arctica</i> ssp. <i>arctica</i>	x
<i>Poa glauca</i>	x
<i>Populus balsamifera</i>	
<i>Pyrola asarifolia</i> ssp. <i>asarifolia</i>	x
<i>Pyrola grandiflora</i>	x
<i>Pyrola minor</i>	x
<i>Ranunculus allenii</i>	x
<i>Ranunculus flammula</i> var. <i>reptans</i>	x
<i>Ranunculus pygmaeus</i>	x
<i>Rhinanthus minor</i> ssp. <i>groenlandicus</i>	x
<i>Rhododendrom lapponicum</i>	x
<i>Ribes glandulosum</i>	
<i>Ribes lacustre</i>	

<i>Ribes triste</i>	
<i>Rubus arcticus</i>	
<i>Rubus chamaemorus</i>	
<i>Rubus idaeus</i>	
<i>Salix arctophila</i>	x
<i>Salix argyrocarpa</i>	x
<i>Salix herbacea</i>	x
<i>Salix humilis</i>	
<i>Salix pedicellaris</i>	x
<i>Salix planifolia</i>	x
<i>Salix pyrifolia</i>	
<i>Salix</i> sp. (undetermined)	x
<i>Salix uva-ursi</i>	
<i>Sambucus racemosus</i>	
<i>Saxifraga paniculata</i>	x
<i>Scheuchzeria palustris</i>	x
<i>Schizachne purpurescens</i>	x
<i>Scirpus atrocinctus</i>	
<i>Selaginella selaginoides</i>	x
<i>Sibbaldia procumbens</i>	x
<i>Sibbaldiopsis tridentata</i>	
<i>Solidago macrophylla</i>	
<i>Solidago uliginosa</i>	x
<i>Sorbus decora</i>	
<i>Sparganium angustifolium</i>	x
<i>Sparganium hyperboreum</i>	x
<i>Spinulum annotinum</i>	
<i>Spinulum canadense</i>	

<i>Spiranthes</i> sp. (undetermined)	
<i>Stellaria borealis</i>	x
<i>Streptopus amplexifolius</i>	
<i>Streptopus lanceolatus</i>	
<i>Subularia aquatilis</i> var. <i>americana</i>	x
<i>Symphyotrichum puniceum</i>	
<i>Taraxacum lapponicum</i>	x
<i>Tofieldia pusilla</i>	x
<i>Trichophorum alpinum</i>	x
<i>Trichophorum cespitosum</i>	
<i>Trientalis borealis</i>	
<i>Vaccinium angustifolium</i>	
<i>Vaccinium boreale</i>	
<i>Vaccinium cespitosum</i>	
<i>Vaccinium ovalifolium</i>	
<i>Vaccinium oxycoccus</i>	
<i>Vaccinium uliginosum</i>	
<i>Vaccinium vitis-idaea</i>	
<i>Vahlodea atropurpurea</i>	x
<i>Veronica serpyllifolia</i>	
<i>Viburnum edule</i>	
<i>Viola palustris</i>	x
<i>Viola selkirkii</i>	
<i>Viola</i> sp. (undetermined)	x
<i>Woodsia glabella</i>	x
<i>Woodsia ilvensis</i>	x