Waterfall Spray zones in Wells Gray Provincial Park: Biodiversity Hotspots and Potential Refugia in a Changing Climate

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Cover: Dawson Falls forms a Niagara-like curtain of water that partly plunges and partly cascades into a broad, shallow canyon. Notably, its spray zone is extended downstream for a distance of nearly 1 km by three smaller cataracts. Photo: Chance Breckenridge

Summary/Blog Post:

Wells Gray Provincial Park is sometimes referred to as “the waterfall park”. One of the major draws for tourism to the park are its waterfalls, most notably Helmcken, Dawson, Moul, and Rainbow Falls, which are visited by tens of thousands annually. But Wells Gray’s waterfalls have considerable significance beyond tourism. Here we focus on their dual function as floristic hotspots and vegetational refugia against climate change – a line of research that has received scant attention to date. We also assessed the degree to which current visitation has degraded waterfall habitats.

The vertical plunge of large waterfalls creates continuous outflow winds that carry mist and aerosolized nutrients tens or, in some cases, hundreds of meters downstream. This mist has a moderating effect on humidity and temperature, cool in summer, and warmer in winter. The net result is a unique set of ecological conditions often suited to the establishment of lichens, mosses, hepatics and plants that are otherwise regionally absent or rare. In short, waterfall spray zones are biodiversity hotspots. In principle, spray zones can also be expected to provide a degree of ecosystem resilience against deepening climate change. While other habitats seem set to become increasingly vulnerable to wildfire, drought, heat and wind, the conditions associated with spray zones are more likely to remain stable through time.

Assessment in 2023 found that floristic richness in the spray zones of Are, Dawson, Moul, and Rainbow falls was significantly higher than observed in habitats upstream. Among all spray zones, 866 species were recorded, almost twice as many species (451) as were recorded among all comparison areas. In total, 536 species of hepatics (49), lichens (304), mosses (126), and 57 vascular plants (57) occurred exclusively within spray zones, compared with 121 species that occurred only outside of spray zones, i.e., 3 hepatics, 49 lichens, 22 mosses, and 47 vascular plants. Thus, the spray zone sites collectively supported more than four times as many exclusive species. Climate monitoring at Are Falls confirmed the moderation of summer climate extremes and the longer duration of potential growth periods for cryptogamic plants.

Introduction.

The primary objective of our study is to call attention to the role of Wells Gray's waterfalls in creating and, through their status as refugia, sustaining nodes of high floristic diversity. Side benefits of our work will include: (1) baseline studies against which future floristic shifts brought about by climate change can be assessed; (2) insights useful in gaining national and international recognition for the values protected in BC's parks, here Wells Gray Park in particular; (3) an interpretive story that deepens our collective appreciation for the Clearwater Valley; and (4) guidance for managers to minimize visitor impacts on sensitive biota.

Prior to the research reported here, no comprehensive studies have been conducted on waterfall spray zone ecosystems in British Columbia. Studies from other parts of the world, however, have highlighted the importance of waterfall spray zones to regional and local ecosystems and biodiversity: Bressard 1972, Kallio 1969, Odland et al. 1991, Zilihona & Nummelin 2001, Quinn et al. 2005.

Waterfall Lichen and Plant Species Inventories (2023).

Lichen, moss, hepatic and plant species were assessed in the spray zone of three waterfalls within Wells Gray Provincial Park - Dawson Falls, Moul Falls, and Rainbow Falls - and one waterfall - Are Falls (Philip Creek) - that occurs just outside its boundaries (Figure 1).

Vegetation assessments at these four waterfalls followed methodologies outlined in the British Columbia Resource Inventory Standards Committee (RISC) Standards (RISC 2024). This methodology employs a "controlled intuitive meander" approach, in which field effort is allocated to all microhabitats present within each waterfall spray zone. Survey routes were therefore not plot- or transect-oriented, but emphasized habitats with potential for maximum species richness, consistent with the goal to compile a comprehensive species list for each waterfall spray zone.

For each of these focal microhabitats, our search effort was determined by a species-area accumulation slope, such that search effort continues only as long as it yields additional species. Once no additional species were located within a defined search area, assessment efforts were shifted to the next selected microhabitat. To compare floristic inventory results of waterfall spray ecosystems against adjacent riparian habitat (e.g. as shown in Fig. 2 for Dawson Falls), each inventory was paired with a second inventory conducted in a roughly equivalent area outside the area of waterfall influence (following the same intuitive search method as described above); where possible, this second inventory was conducted in streamside forests immediately above the waterfall (see Fig. 2).

Ideally, each upstream comparison zone would be contiguous with its corresponding spray zone. Unfortunately, this was not possible in two cases owing to the presence of additional cataracts immediately upstream, each with its own spray zone. Thus, the comparison zone for Moul Falls was positioned at some distance upstream along a low-grade span of the creek, while that for Rainbow Falls had to be situated at some distance downstream. In order to mitigate any residual

spray zone effects on this later comparison area, and because the comparison area presents only uniformly shrubby fringe habitat, we established a second comparison area along the adjacent shore of Azure Lake.

In total, our final data spreadsheet included 2295 species identifications that enabled a robust comparison of floristic richness within the four spray zones and their corresponding comparison sites. Contributing to this total were 456 specimens made in connection with our study as well as 416 photographs taken and 1,105 voice recordings. The photographs and voice recorder files will be made available upon request; specimens will be available for review once they are accessioned, databased, and filed by UBC Herbarium staff. In order to bolster our findings after the fact, we also included 318 specimens collected in previous years.

In total, we found 987 species of cryptogams and plants in the spray zones and comparison sites, i.e., including 76 hepatics, 476 lichens, 212 mosses, and 223 vascular plants (Fig. 3). Of these, 866 species occurred in waterfall spray zones, versus only 451 species in our comparison sites. Intriguingly, 536 species were recorded exclusively in spray zones, including 49 hepatics, 304 lichens, 126 mosses, and 57 vascular plant versus only 121 species in the comparison sites, i.e., including 3 hepatics, 49 lichens, 22 mosses, and 47 vascular plants. Thus not only did the spray zone sites yield nearly twice as many species as the comparison sites did, they also supported more than four times as many exclusive species.

Each of the spray zones had higher species richness than its corresponding comparison area (Fig. 3). The spray zones of Dawson, Moul, and Rainbow Falls all had more than twice the overall species richness of their corresponding comparison areas. However, vascular plants diverge from this trend compared to bryophytes and lichens: the comparison areas of Are and Dawson Falls had more vascular plants than their corresponding spray zone areas. Removing vascular plants from the species totals, the remaining cryptogam (lichens and bryophytes) floras show especially strong differences: 1.9 (Are), 4.3 (Dawson), 3.5 (Moul), and 3.7 and 2.3 (Rainbow) times higher than in their corresponding comparison areas.

Even more striking is the occurrence of rare or otherwise noteworthy species, which are many times more numerous in the spray zones than in the comparison sites (Table 1); see also Fig. 4. Among the species recorded in the project that are accorded conservation status (Blue or Red) by the British Columbia Conservation Data Centre (BC-CDC 2024), 137 occurred in sprayzones as compared with only 13 species outside the spray zones. Perhaps even more remarkable in this context is existence of 48 spray zone species for which no names could be found. Several of these species may be new to science and, though a few have been observed elsewhere (Björk, unpublished records), they appear to be rare throughout their range in BC. In marked contrast, almost all the lichens, bryophytes and vascular plants observed in the comparison sites outside of waterfall spray zones are common species with broad distributions (with the exception of five).

Environmental Monitoring

Five climate stations were installed in the vicinity of Are Falls during the summer of 2023. Three spray-zone climate stations were installed, one in the immediate spray zone beneath the waterfall (installation in fall 2023), and one in the zone of cool air drift below the waterfall at the lower edge of the spray zone (installation in spring 2023). Data from these climate stations will be contrasted with those from two comparison sites, one immediately adjacent to Are Falls on the upland bench ca. 30 m elevation above the waterfall site, and the second climate station located adjacent to a nearby wetland at Edgewood Blue, providing a comparison site with elevated humidity, but not the cool air drainage and mist associated with the spray zone.

All installations used Hobo H21-002 Microstation Dataloggers (Onset Computer, Cape Cod, MA, USA). Sensors were placed on a mast at 2 m above the ground in canopy openings adjacent to the stream or in the upland forest (see Fig. 5). The one exception was the canopy station in the immediate mist zone at Are Falls, which was installed on the bole of streamside tree due to safety and access constraints at this location.

Temperature and relative humidity (RH) were measured using a Hobo 12-bit Temperature/ Relative Humidity Smart Sensor installed in an unaspirated radiation shield. Photosynthetically active radiation (PAR) was recorded using a Hobo Photosynthetic Light (PAR) sensor and incident precipitation measured using a Hobo tipping bucket rain gauge (0.2 mm resolution), while the duration of periods of both incident and occult precipitation (condensation of mist and fog on foliage) measured using Hobo Leaf Wetness Smart Sensors installed at a 45° orientation from vertical. Measurements were taken from all sensors at 5-minute intervals. PAR and precipitation measurements were taken only at the EWB site. We did not install climate stations at the falls where tourism activity is frequent due to concerns about vandalism or tampering in these high-use visitor areas.

Preliminary results from the Are Falls climate stations indicate that the waterfall spray zone and its associated drift of cool moist air downstream has a strong moderating influence on local microclimate compared to surrounding upland forest. Stream-side forests in the extended downstream spray zone (outside of the zone of direct mist deposition - see Fig 2 for relative placement) and adjacent upland forests experienced similar nighttime temperature extremes; however, daytime temperature extremes were strongly ameliorated in the Are falls extended spray zone, with maximum daily temperatures in the upland site often 15 to 20 °C warmer on warm summer days. When combined with often greater humidity found in the streamside forest, this results in an extended duration of potential wetting episodes, as indicated by wetness sensors. This is a critical factor in facilitating the establishment and growth of non-vascular plants. Our climate station installations remain in place and will be monitored through 2024 to further document the extent/significance of spray zone influence.

Our preliminary plans for 2023 research included the examination of water chemistry in the spray zone of study sites. We have deferred this planned work until 2024 due to the greater than anticipated time and resources required to establish climate stations in 2023.

Visitor impact on the floristics of waterfall spray zones

Observation of physical habitats adjacent to Are, Dawson, Moul, and Rainbow Falls show quite different impacts of past human use, correlated with the intensity of visitor use. Are Falls was the least disturbed site, with streamside vegetation and adjacent upland forest showing little human influence. Streamside habitats at Rainbow Falls were also largely undisturbed by human impacts (Fig. 7). Dawson Falls, as a major visitor destination (see cover photograph), showed localized trampling of streamside vegetation, mainly in areas immediately adjacent (both upslope and down to the river shore) to access trails and viewing platforms. This included breakage of canopy twigs and loss of bryophyte and lichen cover in potentially species-rich streamside habitats. At Moul Falls, bryophyte cover is largely absent from areas adjacent to informal trails that lead behind the waterfall, in areas that would otherwise would likely have had continuous bryophyte cover (Fig. 8). These latter observations notwithstanding, field work in connection with the present study suggests that human disturbance does not at present threaten species richness within or adjacent to the spray zones of any of the four waterfalls examined, though some species may be threatened if they occur only adjacent to foot-traffic areas.

Wells Gray Park, our study area, falls within the traditional territory of the Simpcw (North Thompson) and Tsq'escenemc (Canim Lake) First Nations. We have discussed our proposal and preliminary research findings with members of Simpcw and have since been in conversation with Mandy Ross, Intermediate Biologist with the Simpcw Resources Group, who is leading discussions on this proposed research with the Simpcw. Our preliminary plans are to host a community workshop at Wells Gray in fall 2024 to share project findings and strategize on meeting future community needs. We anticipate that our findings will prove helpful to coming generations of Indigenous Peoples faced with managing their traditional territory in a time of deepening climate change.

2023 Project budget. The primary project expenditures from BC Parks funds were for species assessments by Curtis Björk and Trevor Goward (Enlichened Consulting, $13,125.00). The second major project expenditure was for travel and accommodation costs from Prince George to Wells Gray Park ($1,926.00) (Coxson and Ross). Remaining project expenditures were for replacement probes for the Hobo microclimate stations and related lab supplies ($2,285.00). UNBC overhead charges of $927.00 were a final expense. Another $10,500.00 was provided to Enlichened in 2023 for the waterfall project work from UNBC research funds (BC Real Estate Foundation).

Proposed 2024 Wells-Gray Fieldwork.

Our proposed research in year two would expand our focus to include two additional heavily visited waterfalls in Wells Gray Park, i.e., Helmcken and Spahats Falls (both major visitor attractions) and Sticta and Triple Decker Falls (both less often visited but with known high biodiversity). We would continue measurements of climate change refugia (microclimate) values at Are falls and would develop an occult precipitation (waterfall mist) collector to assess nutrient contributions in waterfall spray zones.

Literature.

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Figure 1. Map of study area showing location of study sites at Are Falls, Dawson Falls, Moul Falls, and Rainbow Falls within or immediately adjacent to Wells Gray Provincial Park.

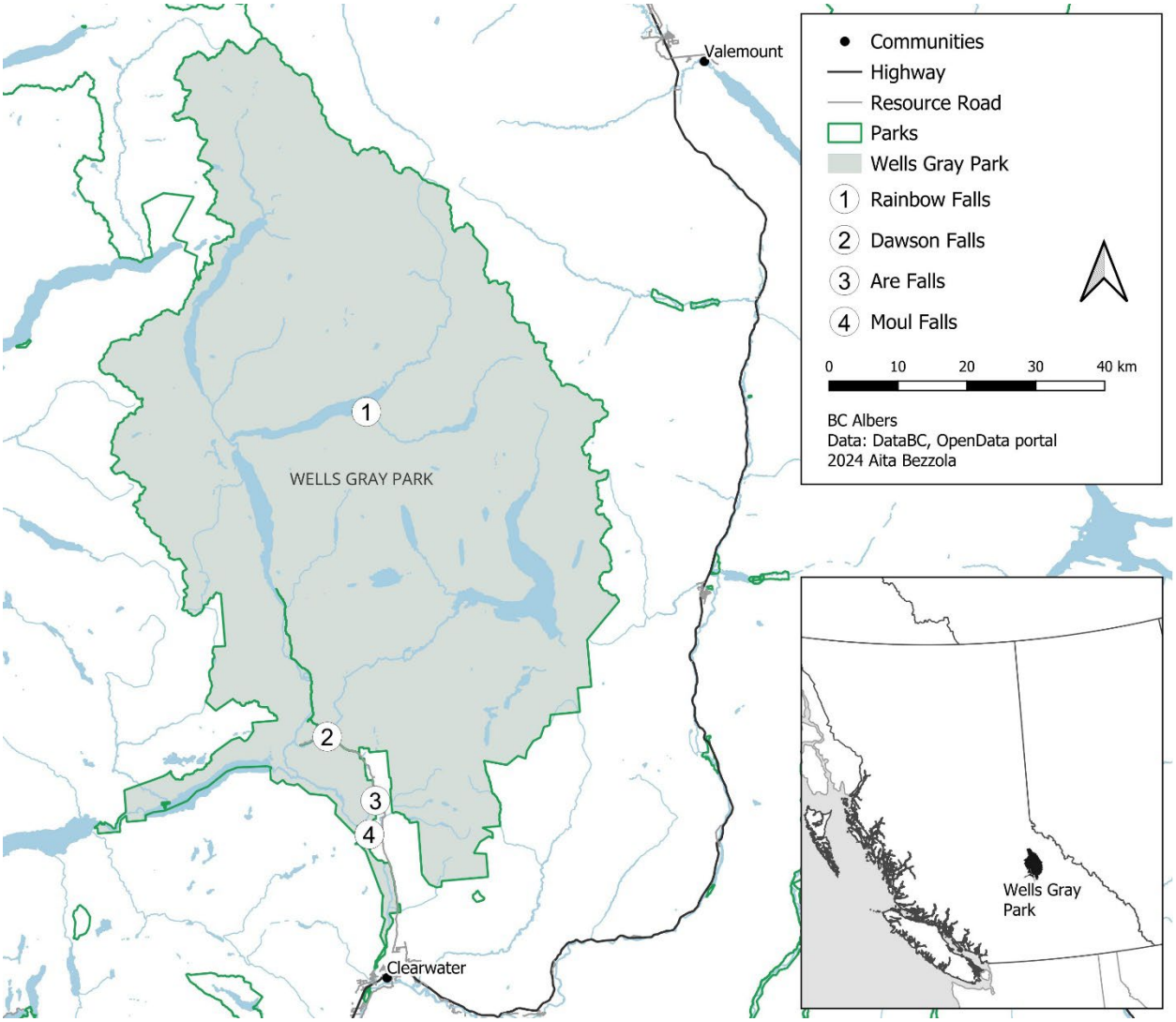

Figure 2. Potential zones of influence from a waterfall spray zone, illustrated here for Dawson Falls on the Murtle River in Wells Gray Provincial Park. These include the immediate downstream spray zone, characterized by a continued mist deposition on vegetation and exposed surfaces and a strong flow of cool moist air, the zone of extended spray zone influence, with occasional to no direct mist deposition but a strong cold air flow and elevated humidity. Adjacent upstream riverside forests provide a comparison within the landscape for evaluating spray zone influence.

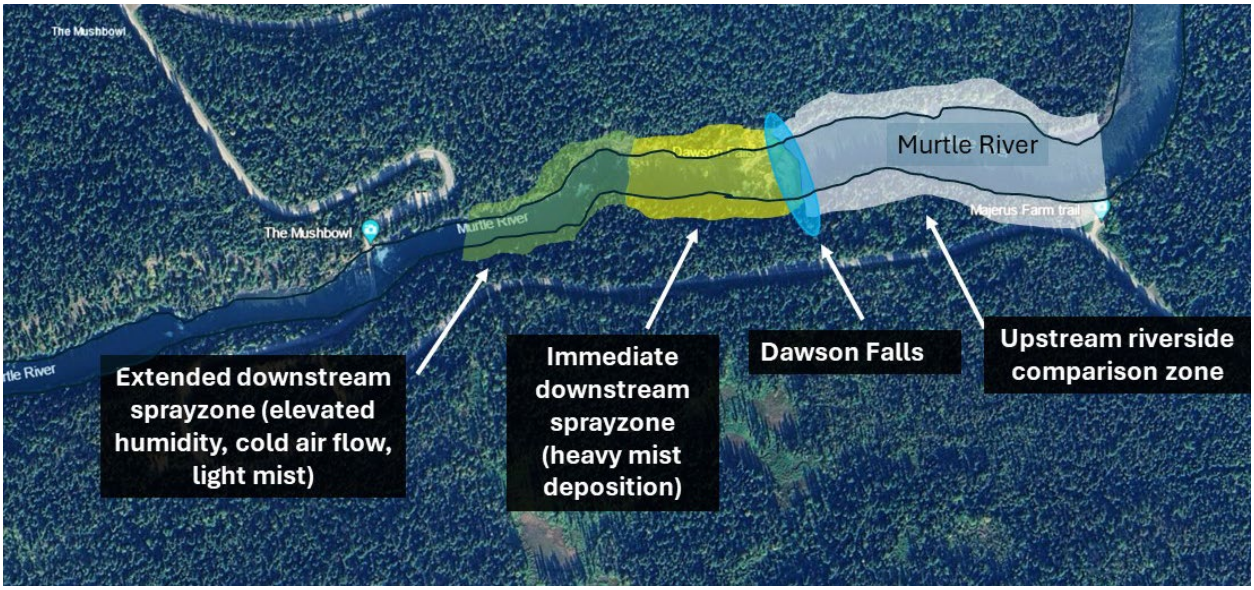

Figure 3. Species richness by group (hepatics, lichens, mosses, cryptogams, vascular plants, total) for Are, Dawson, Moul, and Rainbow Falls, comparing number of species in the riverside spray zone and in equivalent habitat exposures upstream of the falls. At Rainbow Falls the upstream comparison site was not available due to steep terrain, thus the comparison provided is on a downstream section of Angus Horne Creek, with an additional comparison on the shoreline of Azure Lake.

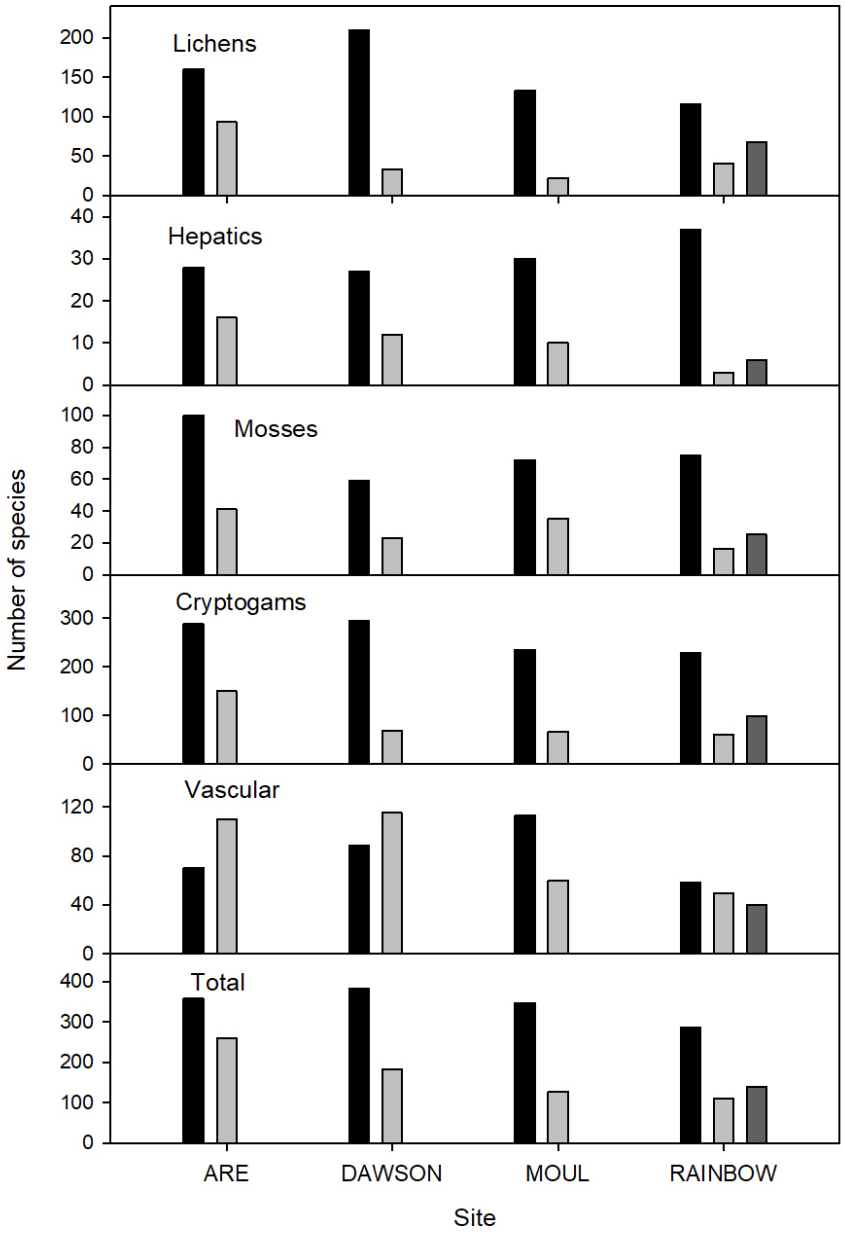

Figure 4. Examples of noteworthy species found in the spray zones: A) *Dendriscosticta oroborealis* and B) *Fissidens taxifolius*. *D. oroborealis* is known primarily from the northern Coast Mountains and wettest portion of the northern interior of British Columbia and in the Panhandle of Alaska (COSEWIC 2004, Goward & Björk unpublished data) where it is epiphytic on conifer branches in humid old-growth rainforests (Tønsberg and Goward 2001). This is a red-listed species in BC with a provincial status of S1S3 (BC CDC 2024). B) *F. taxifolius* has been reported from coastal BC historically, but its occurrence in the province is not currently accepted. Should any historical records be correctly identified as that species, then it is a new find for interior BC. Otherwise, it is entirely new find as a member of the British Columbia bryoflora.

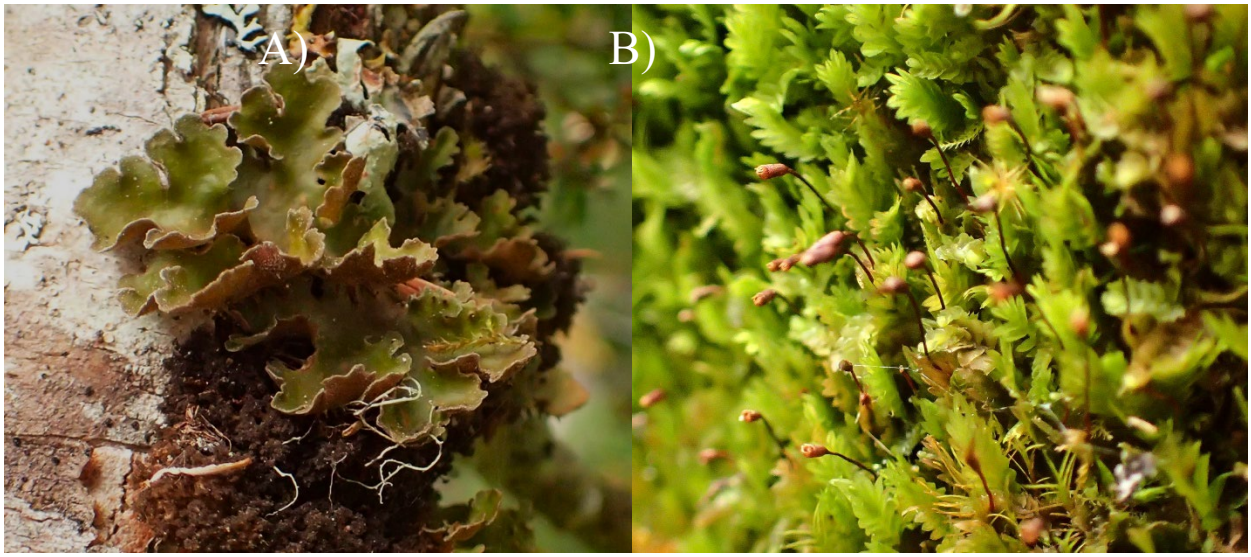

Figure 5. A) Are Falls has a steep fan-like drop of ca. 7 m over a hard basalt cap, onto more erodible pillow basalt and vesicular basalt. The climate station was placed on a streamside tree adjacent to the creek (outside of image on lower right). B) The lower Are Falls climate station was placed at the outer (lower) edge of the zone of direct spray influence, adjacent to the steep rocky cataract that characterizes downstream flow at Are fall.

Figure 6. Spray zone microclimate for Are Falls in summer 2023 showing comparisons between the lower edge of the spray zone (black line) and the adjacent upland forest (green line). Comparisons include (from top): daily mean temperatures; daily minimum temperatures, daily maximum temperatures; the daily duration of periods of high humidity; and the daily duration of wetting (when leaf wetness sensors had water sitting on their surface).

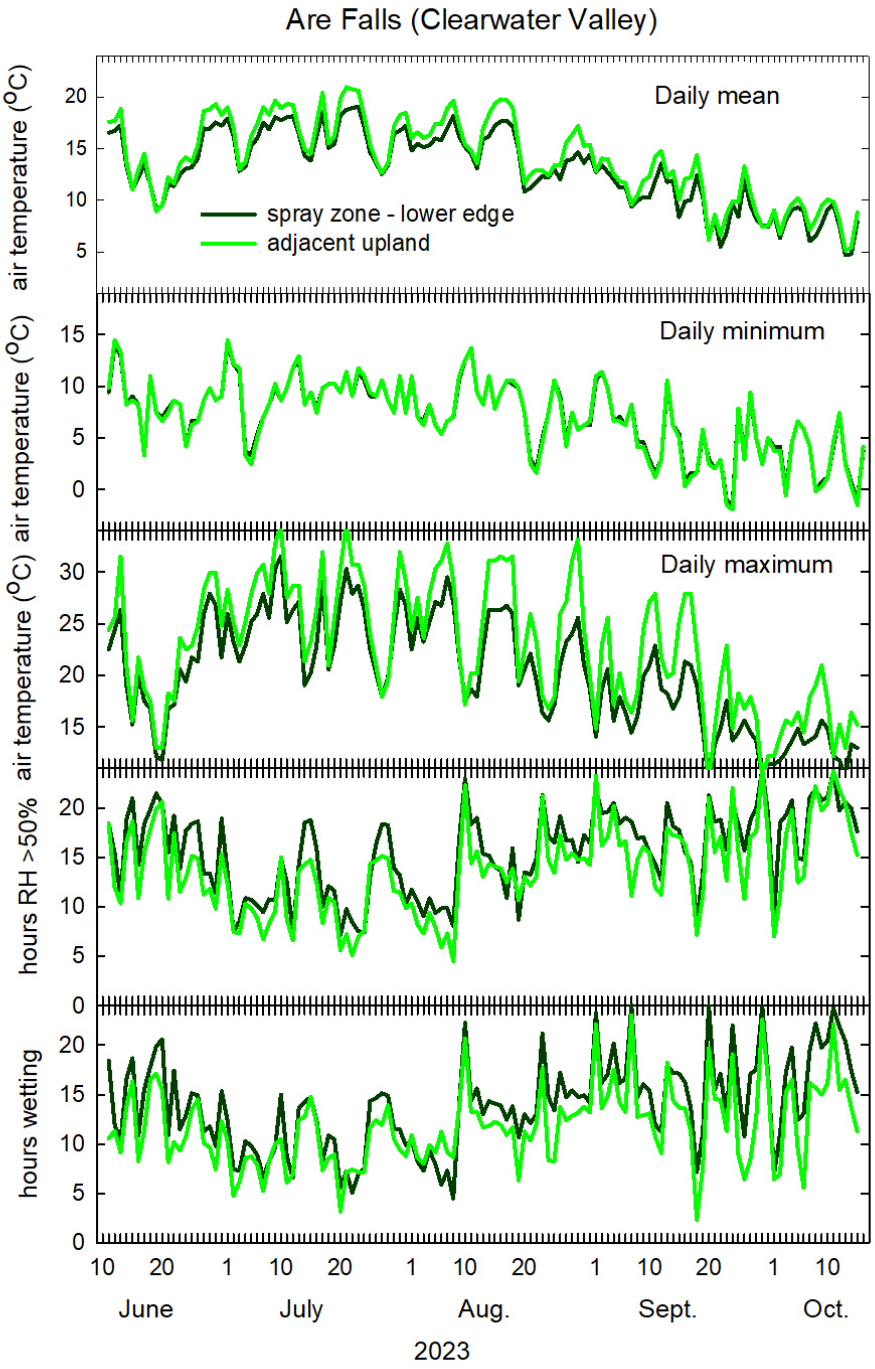

Figure 7. Waterside habitats at Rainbow Falls are largely undisturbed by human impacts, with viewing access limited to a single overlook at the terminus of a trail.

Figure 8. Visitor access in areas adjacent to trails used to access the waterfall at Moul Falls has led to the widespread loss of bryophyte cover. A) Trail approaches to Grouse Creek below falls shows extensive areas of bare substrates where vegetation communities have been lost. B) The informal trail behind Moul Falls runs through an area that would otherwise be expected to have widespread bryophyte cover.

Table 1. Distribution of observed noteworthy species. The first four rows are the spray zone sites; the last five are the corresponding comparison areas outside spray zones. Angus Horne and Azure Lake are the comparison areas corresponding to Rainbow Falls. "CDC rare" is the number of species listed under Blue or Red conservation status by the British Columbia Conservation Data Centre as of January 2024. "Other BC rare" is the number of additional species that are rare in the province. "Rare disjunct" is the number of coastal species that are rare in interior regions. "Rare novelties" is the number of species that may be undescribed species and that are rare in BC.

Site	**Total notew.**	**CDC rare**	**Other BC rare**	**Rare disjunct**	**Rare novelties**
Are Falls	19	14	16	2	7
Dawson Falls	53	11	21	3	18
Moul Falls	25	9	6	5	5
Rainbow Falls	59	18	19	7	15
Philip Creek	1	1	0	0	0
Murtle River	0	0	0	0	0
Grouse Creek	9	2	4	2	1
Angus Horne	1	0	0	0	1
Azure Lake	6	2	0	1	3

Appendix 1. see attached.

Appendix 1. List of observed species by life form (hepatics, lichens, mosses, vascular plants) in spray and non-spray zones of Are, Dawson, Grouse (Moul), and Rainbow Falls. "Rare coastal disjunct" refers to species that are rare in the interior of British Columbia but more common on the coast. "BC rare species": BC Conservation Data Centre S-ranks are shown for tracked species. "Are non-spray" is the riparian zone along Philip Creek immediately upstream from Are Falls. "Dawson non-spray" is the riparian zone along the Murtle River immediately upstream from Dawson Falls. "Moul non-spray" is the riparian zone along Grouse Creek in the nearest upstream low-grade span of the creek, separated from Moul Falls by a span of Grouse Creek where numerous smaller cataracts occur. "Angus Horne Creek" is the comparison area for Rainbow Falls, comprising the downstream portion of Angus Horne Creek from the outermost edge of the spray zone to the shore of Azure Lake. "Azure Lake" is the comparison area for Rainbow Falls, comprising the lakeshore habitats from the mouth of Angus Horne Creek to the north end of the Rainbow Falls Campground.

Taxon by Life Form	**Rare coastal disjunct**	**BC rare species**	**Rare novelties**	**Note-worthy all**	**Are spray**	**Are non-spray**	**Dawson spray**	**Dawson non-spray**	**Moul spray**	**Moul non-spray**	**Rain-bow spray**	**Angus Horne Creek**	**Azure Lake**
Hepatics													
Aneura pinguis (L.) Dumort.							+				+		
Aneura sp. nov.			+	+			+						
Barbilophozia barbata (Schmidel ex Schreb.) Loeske					+	+	+	+					
Barbilophozia hatcheri (A.Evans) Loeske					+				+				
Blasia pusilla L.									+				
Blepharostoma trichophyllum (L.) Dumort.					+	+	+	+	+	+	+		+
Calypogeia integristipula Steph.		S3		+							+		
Cephaloziella divaricata (Sm.) Schiffn.							+						+
Cephaloziella hampeana (Nees) Schiffn. ex Loeske										+			
Cephaloziella turneri (Hook.) Müll. Frib.		S3		+			+						
Chiloscyphus pallescens (Ehrh.) Dumort.						+			+				
Chiloscyphus polyanthos (L.) Corda var. *polyanthos*								+	+				
Chiloscyphus polyanthos var. *rivularis* (Schrad.) Debat									+				
Conocephalum conicum (L.) Dumort.							+				+		

Crossocalyx hellerianus (Nees ex Lindenb.) Meyl.					+			+					
Diplophyllum albicans (L.) Dumort.											+		
Diplophyllum taxifolium (Wahlenb.) Dumort.											+		
Eremonotus myriocarpus (Carrington) Lindb. & Kaal.		S3		+							+		
Frullania bolanderi Austin	+			+							+		
Frullania chilcootiensis Steph.		S3		+							+		
Fuscocephaloziopsis connivens (Dicks.) Váňa & L.Söderstr.					+		+						
Fuscocephaloziopsis lunulifolia (Dumort.) Váňa & L.Söderstr.							+		+				
Gymnomitrion corallioides Nees											+		
Harpanthus flotovianus (Nees) Nees							+						
Hygrobiella laxifolia (Hook.) Spruce	+			+							+		
Jungermannia atrovirens Dumort.					+						+		
Jungermannia oblongifolia Hook. f. & Taylor		+		+							+		
Jungermannia pumila With.							+				+		
Lepidozia reptans (L.) Dumort.					+	+	+	+	+	+	+		+
Lophocolea bidentata (L.) Dumort.							+						+
Lophocolea fragrans (Moris & DeNot.) Gottsche, Lindenb. & Nees		+		+			+						
Lophocolea heterophylla (Schrad.) Dumort.						+	+						
Lophocolea minor Nees					+	+	+			+			
Lophozia ventricosa (Dicks.) Dumort.					+	+	+	+	+	+		+	
Lophozia wenzelii (Nees) Steph.							+						
Lophoziopsis excisa (Dicks.) Konstant. & Vilnet								+			+		
Lophoziopsis longidens (Lindb.) Konstant & Vilnet					+	+	+	+	+	+	+	+	+
Marchantia polymorpha L. subsp. *polymorpha*					+						+		
Marchantia polymorpha subsp. *ruderalis* Bischl. & Boissel.-Dub.						+							
Marsupella emarginata (Ehrh.) Dumort.											+		
Mesoptychia badensis (Gottsche ex Rabenh.) L.Söderstr. & Váňa		S2S3		+	+						+		
Mesoptychia collaris (Nees) L.Söderstr. & Váňa		S3		+	+				+				
Mesoptychia heterocolpos (Thed. ex Hartm.) L.Söderstr. & Váňa											+		

Metzgeria pubescens (Schrank) Raddi									+				
Nardia geoscyphus (De Not.) Lindb.		S3		+	+				+				
Nardia insecta Lindb.		+		+							+		
Neoorthocaulis attenuatus (Mart.) L.Söderstr., De Roo & Hedd.		S2S3		+			+		+	+			
Neoorthocaulis binsteadii (Kaal.) L.Söderstr., De Roo & Hedd.		+		+					+				
Odontoschisma macounii (Austin) Underw.		S3		+							+		
Pellia neesiana (Gottsche) Limpr.					+			+	+		+		
Plagiochila porelloides (Torr. ex Nees) Lindenb.							+		+		+		
Plagiochila unknown species (small, light olive green, more laterally compressed than *P. porelloides*)					+	+		+	+				
Preissia quadrata (Scop.) Nees (broader, frilly form)			+	+			+						
Preissia quadrata (Scop.) Nees (narrower, non-frilly form)							+				+		
Ptilidium pulcherrimum (Weber) Vain.					+	+		+	+	+			+
Radula complanata (L.) Dumort.					+		+		+		+	+	
Reboulia hemisphaerica (L.) Raddi											+		
Riccardia latifrons (Lindb.) Lindb.							+		+				
Saccobasis polita (Nees) H.Buch		S2S3		+							+		
Scapania apiculata Spruce		+		+							+		
Scapania curta (Mart.) Dumort.								+	+				
Scapania mucronata H.Buch		S3		+	+								
Scapania nemorosa Dumort.		+		+					+	+			
Scapania paludosa (Müll.Frib.) Müll.Frib.					+				+		+		
Scapania subalpina (Nees ex Lindenb.) Dumort.						+							
Scapania umbrosa (Schrad.) Dumort.					+	+	+						
Scapania undulata (L.) Dumort.					+	+			+	+	+		
Schljakovianthus quadrilobus (Lindb.) Konstant. & Vilnet		S3		+	+				+				
Solenostoma gracillimum (Sm.) R.M.Schuster		+		+	+								
Solenostoma obscurum (A.Evans) R.M.Schuster		S2		+							+		
Sphenolobus minutus var. *weberi* (Mart.) Schiffn.											+		

Syzygiella autumnalis (DC.) K.Feldberg, Váňa, Hentschel & Heinrichs					+	+			+				
Trilophozia quinquedentata (Huds.) Bakalin									+				
Tritomaria exsecta (Schmidel) Schiffn. & Loeske		S3		+	+						+		
Tritomaria exsectiformis (Breidl.) Schiffn. ex Loeske		S3		+	+	+	+		+		+		
Tritomaria scitula (Taylor) Jørg.		S2S3		+	+				+		+		
Lichens													
Acarospora fuscata (Nyl.) Th.Fr.					+	+	+						
Acarospora heppii (Nägeli ex Hepp) Nägeli											+		
Acarospora smaragdula (Wahlenb.) A.Massal.					+								
Acarospora unknown species (bullate)					+								
Agonimia tristicula (Nyl.) Zahlbr.					+								
Agonimia tristicula (Nyl.) Zahlbr. aff. (brown spores and pyriform perithecia)			+	+			+						
Agyrium rufum (Pers.) Fr.						+							
Alectoria sarmentosa (Ach.) Ach.					+	+	+	+	+	+	+	+	+
Amygdalaria panaeola (Ach.) Hertel & Brodo									+				
Arthonia apatetica (A.Massal.) Th.Fr.					+						+		
Arthonia arthonioides (Ach.) A.L.Sm.											+		
Arthonia didyma Körb.		+		+			+						
Arthonia dispuncta Nyl.		+		+			+						
Arthonia edgewoodensis Björk ined.						+							
Arthonia lapidicola (Taylor) Branth & Rostr.							+						
Arthonia lignariella Coppins					+								
Arthonia lignariella Coppins aff.			+	+							+		
Arthonia mediella Nyl.					+								
Arthonia muscigena Th.Fr.											+		
Arthonia patellulata Nyl.							+						

Arthonia radiata (Pers.) Ach.						+						+	
Arthonia selkirkensis Björk ined.			+	+			+						
Arthonia spadicea Leight. cfr. (small apothecia)			+	+			+						
Arthonia vinosa Leight.							+						
Arthopyrenia analepta (Ach.) A.Massal. cfr.							+						
Arthopyrenia antecellans (Nyl.) Arnold							+						
Arthopyrenia cinereopruinosa (Schaer.) A.Massal. cfr.							+						
Arthopyrenia sp. nov. +			+	+								+	
Arthopyrenia sp. nov. 2			+	+							+		
Arthopyrenia sp. nov.?			+	+			+						
Aspicilia aquatica Körb.							+		+				
Aspicilia cinerea (L.) Körb.						+			+				
Aspicilia contorta (Hoffm.) Körb.									+				
Aspicilia laxula (H.Magn.) Brodo							+						
Aspicilia mutabilis (Ach.) Körb.					+								
Aspicilia unknown (appearance like Lecanora)			+	+			+						
Bacidia (unknown species)			+	+							+		
Bacidia arceutina (Ach.) Rehm & Arnold	+			+			+				+		
Bacidia auerswaldii (Hepp ex Stizenb.) Mig.		+		+			+						
Bacidia circumspecta (Norrl. & Nyl.) Malme					+								
Bacidia friesiana (Hepp) Körb.							+						
Bacidia idahoensis H.Magn.													+
Bacidia laurocerasi (Del. ex Duby) Vain. s. str.													+
Bacidina delicata (Larbal. ex Leight.) V.Wirth & Vězda							+						
Bacidina inundata (Fr.) Vězda						+	+						
Bacidina ramea S.Ekman					+		+				+		
Bactrospora brodoi Egea & Torrente		+		+			+						
Bactrospora cascadensis Ponzetti & McCune											+		
Baeomyces rufus (Huds.) Rebent.					+	+			+				

Bellemerea cinereorufescens (Ach.) Clauzade & Cl.Roux						+							
Bellemerea diamarta (Ach.) Hafellner & Cl.Roux							+				+		
Biatora aureolepra T.Sprib. & Tønsberg							+				+		
Biatora beckhausii (Körb.) Tuck.							+		+				
Biatora chrysantha (Zahlbr.) Printzen							+						
Biatora efflorescens (Hedl.) Räsänen							+						
Biatora nobilis Printzen & Tønsberg cfr. (but spores mostly 0-+ septate)			+	+									+
Biatora rufidula (Graewe) S.Ekman & Printzen									+		+		+
Bilimbia accedens Arnold					+		+						
Bilimbia microcarpa (Th.Fr.) Th.Fr.							+						
Bilimbia sabuletorum (Schreb.) Arnold					+								
Botryolepraria lesdainii (Hue) Canals									+				
Brigantiaea praetermissa Hafellner & St.Clair								+					
Bryobilimbia ahlesii (Hepp) Fryday, Printzen & S.Ekman		+		+			+						
Bryobilimbia hypnorum (Lib.) Fryday, Printzen & S.Ekman						+	+				+		+
Bryoria fremontii (Tuck.) Brodo & D.Hawksw.					+								+
Bryoria fuscescens (Gyeln.) Brodo & D.Hawksw.					+	+	+	+	+	+			+
Bryoria glabra (Motyka) Brodo & D.Hawksw.					+			+	+				
Bryoria implexa (Hoffm.) Brodo & D.Hawksw. aggr.							+						
Bryoria pikei Brodo & D.Hawksw.									+				+
Bryoria simplicior (Vain.) Brodo & D.Hawksw.					+								
Buellia (unknown species with septal thickenings but hymenium not inspersed)			+	+									+
Buellia arborea Coppins & Tønsberg					+								
Buellia chloroleuca Körb.							+						
Buellia erubescens Arnold											+		
Buellia griseovirens (Turner & Borrer ex Sm.) Almb.											+		
Buellia polyspora (Willey) Vain.					+								
Calicium adaequatum Nyl.											+	+	

Calicium glaucellum Ach.					+								
Calicium viride Pers.					+	+			+				+
Caloplaca ahtii Søchting					+								
Caloplaca arenaria (Pers.) Müll. Arg.					+	+							
Caloplaca atrosanguinea (G.Merr.) I.M.Lamb						+			+				+
Caloplaca cerina (Hedw.) Th.Fr.							+		+				
Caloplaca cerinelloides (Erichsen) Poelt cfr.							+						
Caloplaca chrysodeta (Vain.) Dombr.					+								
Caloplaca citrina (Hoffm.) Th.Fr.					+		+		+				
Caloplaca ferruginea (Huds.) Th.Fr.							+		+				
Caloplaca flavorubescens (Huds.) J.R.Laundon							+				+		
Caloplaca holocarpa (Hoffm.) A.E.Wade					+								
Caloplaca jungermanniae (Vahl) Th.Fr.							+						
Caloplaca oleicola (J.Steiner) van den Boom & Breuss		+		+			+		+				
Caloplaca pyracea (Ach.) Th.Fr.					+						+		
Caloplaca pyracea (Ach.) Th.Fr. aggr.							+		+				
Caloplaca saxicola (Hoffm.) Nordin							+						
Caloplaca scotoplaca (Nyl.) H.Magn.		+		+			+						
Caloplaca sorocarpa (Vain.) Zahlbr.											+	+	
Caloplaca suspiciosa (Nyl.) H.Magn.		+		+			+						
Caloplaca ulcerosa Coppins & P.James													+
Caloplaca xanthostigmoidea (Räsänen) Zahlbr.					+		+		+		+		
Candelariella efflorescens R.C.Harris & W.R.Buck					+								+
Candelariella vitellina (Ehrh.) Müll.Arg.					+	+			+				
Carbonicola anthracophila (Nyl.) Bendiksby & Timdal							+						
Carbonicola myrmecina (Ach.) Bendiksby & Timdal					+								
Catillaria lignicola Björk ined. cfr.			+	+					+				
Catinaria atropurpurea (Schaer.) Vězda & Poelt							+						
Chaenotheca cinerea (Pers.) Tibell							+						

Chaenotheca furfuracea (L.) Tibell					+		+						
Chaenotheca gracilenta (Ach.) Mattsson & Middelb.					+		+						
Chaenotheca nitidula TIbell							+						
Chaenotheca stemonea (Ach.) Müll. Arg.					+		+		+		+		
Chaenotheca subroscida (Eitner) Zahlbr.							+				+		
Chaenotheca trichialis (Ach.) Th.Fr.					+								
Chaenotheca xyloxena Nádv.							+		+				
Chaenothecopsis nana Tibell							+	+			+		
Chaenothecopsis nigra Tibell		+		+							+		
Chaenothecopsis retinens (Nyl.) Tibell (one ascomatum, sacraficed for microscopy)		+		+							+		
Chaenothecopsis tasmanica Tibell							+				+		
Chaenothecopsis unknown (growing on Bactrospora apothecia, similar to C. vainioana, but spores smaller			+	+							+		
Chaenothecopsis viridireagens (Nádv.) A.F.W. Schmidt							+						
Cheiromycina flabelliformis B.Sutton							+						
Chromatochlamys muscorum (Th.Fr.) H.Mayrhofer & Poelt var. *muscorum*					+								
Chrysothrix candelaris (L.) J.R.Laundon s. lat. (patchy form)									+				
Chrysothrix candelaris (L.) J.R.Laundon s. str.					+	+			+				
Cladonia acuminata (Ach.) Norrl.	+			+	+		+		+	+			
Cladonia arbuscula (Wallr.) Flot.									+				
Cladonia cariosa (Ach.) Spreng. cfr.							+						
Cladonia carneola (Fr.) Fr.					+				+			+	
Cladonia cenotea (Ach.) Schaer.					+				+				+
Cladonia chlorophaea (Flörke ex Sommerf.) Spreng. aggr.					+	+	+		+		+		
Cladonia coccifera (L.) Willd.					+								
Cladonia coniocraea (Flörke) Spreng.									+			+	+
Cladonia cornuta (L.) Hoffm. ssp. *cornuta*					+	+			+				+
Cladonia crispata (Ach.) Flotow subsp. *crispata*					+		+						

Cladonia fimbriata (L.) Fr.					+	+		+				+	
Cladonia gracilis subsp. *turbinata* (Ach.) Ahti					+				+				
Cladonia metacorallifera Asahina					+								
Cladonia multiformis G.Merr.					+				+				
Cladonia novochlorophaea (Simpan) Brodo & Ahti cfr.							+						
Cladonia ochrochlora Flörke							+		+				
Cladonia phyllophora Ehrh. ex Hoffm.					+		+		+	+			
Cladonia pleurota (Flörke) Schaer.					+								
Cladonia pocillum (Ach.) O.J.Rich.					+								+
Cladonia pyxidata (L.) Hoffm.					+	+	+		+				
Cladonia rangiferina (L.) Weber ex F.H. Wigg.									+				
Cladonia scabriuscula (Delise) Leight.							+						
Cladonia squamosa (Scop.) Hoffm.					+								
Cladonia stricta (Nyl.) Nyl.					+								
Cladonia subulata (L.) Weber ex F.H.Wigg.					+	+							
Cladonia sulphurina (Michx.) Fr.									+				
Cladonia symphycarpa (Flörke) Fr.					+				+				
Cladonia verruculosa (Vain.) Ahti					+								
Cladonia verticillata (Hoffm.) Schaer.									+				
Cliostomum griffithii (Sm.) Coppins									+				
Cliostomum spribillei Goward & Tønsberg							+		+				
Cliostomum vitellinum Gowan aff.							+	+					
Coenogonium pineti (Ach.) Lücking & Lumbsch							+						
Collema auriforme (With.) Coppins & J.R.Laundon cfr.		+		+			+						
Collema coniophilum Goward		S2, T		+			+				+		
Collema furfuraceum Du Rietz											+		
Collema latzelii Zahlbr.		+		+					+				
Collema occultatum Bagl.							+				+		+
Collema polycarpon Hoffm.							+						

Collema pseudosaturninum Goward ined.			+	+	+								
Collema subflaccidum Degel.							+				+		
Collema suboceanica Goward ined.			+	+							+		
Collema undulatum var. *granulosum* Degel.					+								
Crust with black apothecia and "halos" of round flat grey areoles (can't collect it)						+							
Cyanolichen, lichinoid? Minute, pulvinate.			+	+			+						
Cyphelium inquinans (Sm.) Trevis.					+				+				+
Dendriscosticta oroborealis (Goward & Tønsberg) Moncada & Lücking chloromorph		S+S3		+							+		
Dermatocarpon bachmannii Anders							+						
Dermatocarpon meiophyllizum Vain.							+						
Dermatocarpon miniatum (L.) W.Mann							+		+				
Diploschistes scruposus (Schreb.) Norman					+				+				
Eopyrenula sp. nov.			+	+			+						
Ephebe hispidula (Ach.) Horw.					+								
Evernia mesomorpha Nyl.						+							
Frutidella pullata (Norman) Schmull					+	+							
Fuscidea gothoburgensis (H.Magn.) V.Wirth & Vězda					+		+						
Fuscopannaria cheiroloba (Müll. Arg.) P.M. Jørg.							+						
Fuscopannaria confusa (P.M. Jørg.) P.M. Jørg.					+		+				+		
Fuscopannaria mediterranea (Tav.) P.M. Jørg.					+		+						
Fuscopannaria praetermissa (Nyl.) P.M. Jørg.					+		+						
Fuscopannaria sp. nov. (isidiate, otherwise similar to F. confusa)			+	+							+		
Gyalecta geoica (Wahlenb. ex Ach.) Ach.		+		+			+						
Gyalecta jenensis (Batsch) Zahlbr.		+		+							+		
Gyalecta russula (Körb. ex Nyl.) Baloch, Lumbsch & Wedin		+		+			+				+		
Haematomma ochroleucum (Neck.) J.R.Laundon					+		+				+		
Hypocenomyce scalaris (Ach. ex Lilj.) M.Choisy									+				
Hypogymnia enteromorpha (Ach.) Nyl.					+	+						+	+

Hypogymnia hultenii (Degel.) Krog												+	
Hypogymnia occidentalis L.H.Pike						+	+	+		+			+
Hypogymnia physodes (L.) Nyl.					+	+	+	+	+	+		+	+
Hypogymnia protea Goward, T.Sprib. & Ahti							+						+
Hypogymnia rugosa (G.Merr.) L.H.Pike							+						
Hypogymnia tubulosa (Schaer.) Hav.					+	+	+	+	+	+		+	+
Icmadophila ericetorum (L.) Zahlbr.									+		+		
Imshaugia aleurites (Ach.) S.L.F.Mey.						+							
Jamesiella anastomosans (P.James & Vězda) Lücking, Sérus. & Vězda	+			+									+
Japewia tornoensis (Nyl.) Tønsberg											+		
Koerberiella wimmeriana (Körb.) Stein.							+				+	+	
Lambiella caeca (J. Lowe) Resl & T. Sprib.												+	
Lecanactis latebrarum (Ach.) Arnold		+		+			+		+		+		
Lecania cyrtellina (Nyl.) Sandst.							+						
Lecania dubitans (Nyl.) A.L.Sm.							+		+				
Lecania fuscella (Schaer.) A.Massal.									+				
Lecania madida Reese Næsborg & Björk					+								
Lecania prasinoides Elenkin													+
Lecanora achariana A.L.Sm.							+						
Lecanora campestris (Schaer.) Hue ssp. *campestris* cfr.						+							
Lecanora chlarotera Nyl.						+						+	
Lecanora detrusa (Th.Fr.) Vain. cfr.							+						
Lecanora dispersa (Pers.) Röhl.									+				
Lecanora farinaria Borrer						+			+				
Lecanora hagenii (Ach.) Ach.									+				
Lecanora hybocarpa (Tuck.) Brodo					+								
Lecanora hypopta (Ach.) Vain.					+								
Lecanora impudens Degel.									+				

Lecanora laatokkaensis (Räsänen) Poelt									+				
Lecanora muralis (Schreb.) Rabenh. aggr. (short lobes)					+								
Lecanora pannonica Szatala							+						
Lecanora polytropa (Ehrh.) Rabenh.						+							
Lecanora pulicaris (Pers.) Ach.												+	
Lecanora reagens Norman							+						
Lecanora sambuci (Pers.) Nyl.												+	
Lecanora subrugosa Nyl.											+		
Lecanora symmicta (Ach.) Ach.						+							
Lecidea albohyalina (Nyl.) Th.Fr.					+		+						
Lecidea auriculata Th.Fr. cfr.							+						
Lecidea betulicola (Kullh.) H.Magn.						+	+						
Lecidea erythrophaea Flörke ex Sommerf.					+	+			+				
Lecidea homosema Nyl.							+						
Lecidea latypizodes Nyl.							+						
Lecidea leprarioides Tønsberg					+				+				+
Lecidea nylanderi (Anzi) Th.Fr.					+	+	+		+				
Lecidea plebeja Nyl.						+							
Lecidea thujae Björk ined.			+	+			+						
Lecidella euphorea (Flörke) Hertel									+				
Lecidella stigmatea (Ach.) Hertel & Leuckert						+	+						
Lecidella unknown species (small apothecia, K- thallus, upper hymenium dull purple)			+	+					+		+		
Leciophysma saximontanum (T.Sprib, P.M.Jørg & M.Schultz) P.M.Jørg., Wedin & S.Ekman		S3		+	+		+						
Lempholemma cladodes (Tuck.) Zahlbr.									+				
Lempholemma radiatum (Sommerf.) Henssen		+		+							+		
Lepraria brodoi Lendemer & Tønsberg					+								
Lepraria diffusa (J.R.Laundon) Kukwa											+		
Lepraria eburnea J.R.Laundon					+								

Lepraria elobata Tønsberg											+		
Lepraria jackii Tønsberg							+						
Lepraria nivalis J.R.Laund.					+								
Lepraria unknown (coralloid)			+	+							+		
Lepraria unknown species (bluish, firly granular, large diffuse patches on boulders)										+			
Lepraria vouauxii (Hue) R.C.Harris					+		+	+			+		
Leptogium cellulosum P.M. Jørg. & Tønsberg							+				+		
Leptogium compactum D.F.Stone, F.L.Anderson & J.W.Hinds					+		+				+		
Leptogium cookii D.F.Stone & Lendemer		S2S3		+							+		+
Leptogium intermedium (Arnold) Arnold						+	+						
Leptogium nanum Herre		+		+			+						
Leptogium plicatile (Ach.) Leight.							+				+		
Leptogium pulvinatum (Hoffm.) Cromb.							+						
Leptogium saturninum (Dicks.) Nyl.					+				+		+	+	
Leptogium subtile (Schrad.) Torss.							+						
Leptogium tenuissimum (Hoffm.) Körb.							+						
Leptogium teretiusculum (Flörke) Arnold							+						
Leptorhaphis epidermidis (Ach.) Th.Fr.					+	+		+	+	+			
Letharia lupina Altermann, Goward & Leavitt													+
Lichenomphalia umbellifera (L.) Redhead, Lutzoni, Moncalvo & Vilgalys					+			+	+				
Lichinella nigritella (Lettau) P.P.Moreno & Egea		S3		+			+						
Lobaria hallii (Tuck.) Zahlbr.					+		+						+
Lobaria linita var. *tenuior* (Hue) Asahina											+		
Lobaria pulmonaria (L.) Hoffm.					+	+	+	+	+	+	+	+	+
Lobaria scrobiculata (Scop.) P.Gaertn.					+		+		+			+	+
Lopadium disciforme (Flot.) Kullh.											+		+
Loxospora elatina (Ach.) A.Massal.	+			+							+		
Loxosporopsis corallifera Brodo, Henssen & Imshaug	+			+							+		

Massalongia carnosa (Dicks.) Körb.					+				+				
Melanelixia glabratula (Lamy) Sandler & Arup					+	+					+		
Melanelixia subaurifera (Nyl.) O.Blanco, A.Crespo, Divakar, Essl., D.Hawksw. & Lumbsch					+								
Melanohalea exasperatula (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch											+		
Melanohalea multispora (A. Schneid.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch						+			+		+		
Melanohalea subelegantula (Essl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch											+		
Melanohalea subolivacea (Nyl. ex Hasse) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch									+				
Melaspilea proximella (Nyl.) Nyl. aff.			+	+			+		+				+
Micarea aeruginosa Björk ined.					+								
Micarea globulosella (Nyl.) Coppins							+						
Micarea melaena (Nyl.) Hedl.							+						
Micarea peliocarpa (Anzi) Coppins					+								
Micarea prasina Fr. aggr.					+	+	+						
Micarea prasinella (Jatta) I.M.Lamb											+	+	
Micarea unknown (spores 3 septate, thallus yellowish and C+ Y, hymenium blue-gray)			+	+			+						
Microcalicium ahlneri Tibell											+		
Microcalicium disseminatum (Ach.) Vain.							+					+	
Miriquidica leucophaea (Flörke ex Rabenh.) Hertel & Rambold							+						
Mniaecia nivea (P.Crouan & H.Crouan) Boud.							+						
Montanelia sorediata (Ach.) Divakar, A.Crespo, Wedin & Essl.					+	+			+				
Mycobilimbia carneoalbida (Müll. Arg.) Vitik., Ahti, Kuusinen, Lommi & T. Ulvinen						+	+						
Mycobilimbia epixanthoides (Nyl.) Vitik., Ahti, Kuusinen, Lommi & T. Ulvinen						+	+						
Mycobilimbia pilularis (Hepp ex Körb.) Hafellner & Türk									+				+
Mycobilimbia vermiformis Björk ined.			+	+	+								
Mycoblastus affinis (Schaer.) T.Schauer													+

Mycoblastus sanguinarius (L.) Norman						+		+	+	+	+		
Mycocalicium subtile (Pers.) Szatala									+				
Nephroma arcticum (L.) Torss.					+								
Nephroma bellum (Spreng.) Tuck.						+			+				
Nephroma helveticum Ach.		S3		+			+						
Nephroma isidiosum (Nyl.) Gyeln.		S3		+									+
Nephroma parile (Ach.) Ach.						+			+		+	+	
Nephroma resupinatum (L.) Ach.					+							+	+
Nephroma sipeanum Gyeln.					+	+	+	+	+	+			+
Nodobryoria oregana (Tuck. ex Nyl.) Common & Brodo							+						
Ochrolechia androgyna (Hoffm.) Arnold													+
Ochrolechia gowardii Brodo							+						
Ochrolechia oregonensis H.Magn.													+
Ochrolechia szatalaensis Verseghy							+		+				+
Opegrapha zonata Körb.	+			+			+						
Ophioparma rubricosa (Müll. Arg.) S.Ekman								+	+				
Parmelia hygrophila Goward & Ahti											+		+
Parmelia saxatilis (L.) Ach.									+				
Parmelia sulcata Taylor					+	+	+	+	+	+		+	+
Parmelia sulymae Goward, Divakar, M.C.Molina & A.Crespo						+						+	
Parmeliella parvula P.M.Jørg.					+		+						
Parmeliella triptophylla (Ach.) Müll. Arg.							+		+		+		+
Parmeliopsis ambigua (Wulfen) Nyl.					+	+	+	+	+	+		+	+
Parmeliopsis hyperopta (Ach.) Vain.					+	+	+	+	+	+		+	+
Peltigera aphthosa (L.) Willd.					+		+		+		+	+	
Peltigera britannica (Gyeln.) Holt.-Hartw. & Tønsberg									+				
Peltigera canina (L.) Willd. cfr.							+	+					
Peltigera collina (Ach.) Schrad.					+		+	+	+			+	
Peltigera didactyla (With.) J.R.Laundon					+								

Peltigera elisabethae Gyeln.					+			+					
Peltigera extenuata (Nyl.) Vain.					+	+	+						
Peltigera hairy above veins moderately raised, beige coloured, slow to darken, rhizines not very distinct from each other												+	
Peltigera horizontalis (Huds.) Baumg.					+						+		
Peltigera kristinssonii Vitik.								+					
Peltigera lepidophora (Vain.) Bitter					+								
Peltigera leucophlebia (Nyl.) Gyeln.					+				+		+		
Peltigera membranacea (Ach.) Nyl.					+	+	+		+		+		
Peltigera praetextata (Flörke ex Sommerf.) Zopf							+						
Peltigera rufescens (Weiss) Humb.							+						
Peltigera scabrosa Th.Fr.											+		
Peltigera sp. nov. 52692			+	+			+						
Peltigera venosa (L.) Hoffm.					+	+	+					+	+
Pertusaria alpina Hepp ex Ahles cfr.							+						
Pertusaria amara (Ach.) Nyl.							+		+		+	+	
Pertusaria carneopallida (Nyl.) Anzi ex Nyl.											+		
Pertusaria multipuncta (Turner) Nyl.							+						
Pertusaria ophthalmiza (Nyl.) Nyl. aggr.							+						
Pertusaria peculiaris Björk ined.							+						
Pertusaria pupillaris (Nyl.) Th.Fr.					+		+						
Pertusaria sommerfeltii (Sommerf.) Flörke							+		+		+	+	
Pertusaria sp. 6											+		
Pertusaria subambigens Dibben									+		+		+
Phaeocalicium betulinum (Nyl.) Tibell						+							
Phaeocalicium compressulum (Nyl. ex Vain.) A.F.W. Schmidt											+		
Phaeocalicium populneum (Brond. ex Duby) A.F.W.Schmidt						+	+	+	+	+			+
Phaeophyscia decolor (Kashiw.) Essl.					+	+	+						
Phaeophyscia kairamoi (Vain.) Moberg							+		+		+		+

Phaeophyscia sciastra (Ach.) Moberg					+		+						
Phlyctis argena (Ach.) Flot.									+				+
Physcia adscendens H.Olivier						+			+				
Physcia alnophila (Vain.) Loht., Moberg, Myllys & Tehler					+				+		+		+
Physcia caesia (Hoffm.) Hampe ex Fürnr.						+							
Physcia dubia (Hoffm.) Lettau								+					
Physcia occidentalis Essl. ined.					+								
Physcia phaea (Tuck.) J.W.Thomson					+								
Physconia muscigena (Ach.) Poelt							+						
Physconia perisidiosa (Erichsen) Moberg						+		+					
Physconia sp. nov.			+	+							+		
Piccolia ochrophora (Nyl.) Hafellner		+		+			+						
Pilophorus cereolus (Ach.) Th.Fr.					+	+							
Placopsis fusciduloides D.J.Galloway					+		+		+				
Placynthiella dasaea (Stirt.) Tønsberg					+								
Placynthiella icmalea (Ach.) Coppins & P.James							+				+		
Placynthiella uliginosa (Schrad.) Coppins & P.James cfr.							+						
Placynthium flabellosum (Tuck.) Zahlbr.		+		+			+						
Placynthium nigrum (Huds.) Gray					+								
Placynthium pannariellum (Nyl.) H.Magn.		+		+	+		+						
Platismatia glauca (L.) W.L.Culb. & C.F.Culb.					+	+	+	+	+	+	+	+	+
Platismatia norvegica (Lynge) W.L.Culb. & C.F.Culb.											+		
Polyblastia sp.											+		
Polychidium muscicola (Sw.) Gray					+				+				
Porpidia cinereoatra (Ach.) Hertel & Knoph		+		+	+								
Porpidia contraponenda (Arnold) Knoph & Hertel					+	+	+		+				
Porpidia crustulata (Ach.) Hertel & Knoph					+		+		+				
Porpidia melinodes (Körb.) Gowan & Ahti		+		+							+		
Porpidia ochrolemma (Vain.) Brodo & R.Sant.						+	+						

Porpidia soredizodes (Lamy) J.R.Laundon					+				+				
Porpidia tuberculosa (Sm.) Hertel & Knoph					+								
Protopannaria pezizoides (Weber ex F.H.Wigg.) P.M.Jørg. & S.Ekman					+	+	+	+	+				
Protoparmelia oleagina (Harm.) Coppins cfr.		+		+							+		
Protothelenella petri H.Mayrhofer & Poelt		+		+	+								
Pseudocyphellaria anomala Brodo & Ahti											+	+	+
Pseudocyphellaria citrina (Gyeln.) Lücking, Moncada & S. Stenroos	+			+							+		
Psilolechia clavulifera (Nyl.) Coppins		+		+							+		
Psilolechia lucida (Ach.) M.Choisy					+				+		+		
Pycnora sorophora (Vain.) Hafellner					+								
Racodium rupestre Pers.		+		+							+		
Ramalina dilacerata (Hoffm.) Hoffm.						+			+				+
Ramalina farinacea (L.) Ach.							+		+				
Ramalina obtusata (Arnold) Bitter						+	+		+				
Ramalina thrausta (Ach.) Nyl.						+	+	+	+	+		+	+
Ramboldia cinnabarina (Sommerf.) Kalb, Lumbsch & Elix					+	+	+	+	+	+			+
Ramboldia subcinnabarina (Tønsberg) Kalb, Lumbsch & Elix							+						
Rhizocarpon geminatum Körb.					+	+			+				
Rhizocarpon geographicum (L.) DC.							+						
Rinodina albertana Sheard					+								
Rinodina archaea (Ach.) Arnold									+		+		
Rinodina capensis Hampe					+	+			+		+		+
Rinodina efflorescens Malme						+					+		
Rinodina flavosoralifera Tønsberg					+				+				
Rinodina freyi H.Magn.									+				
Rinodina griseosoralifera Coppins						+							
Rinodina metaboliza Vain.							+				+		

Rinodina orculata (Poelt) Steiner						+	+		+				+
Rinodina pyrina (Ach.) Arnold						+						+	
Rinodina sheardii Tønsberg							+						
Rinodina subparieta (Nyl.) Zahlbr.						+							+
Rinodina trevisanii (Hepp) Körb.						+	+						
Schaereria corticola Muhr & Tønsberg													+
Schismatomma cretaceum (Hue) J.R.Laundon		+		+							+		
Schismatomma decolorans (Turner & Borrer ex Sm.) Clauzade & Vězda		+		+							+		
Scoliciosporum umbrinum (Ach.) Arnold							+						
sorediate crust unknown										+			
Sphaerophorus tuckermanii Räsänen											+		
Spilonema revertens Nyl.							+						
Staurothele areolata (Ach.) Lettau					+								
Steinia geophana (Nyl.) Stein					+								
Stenocybe pullatula (Ach.) Stein					+	+						+	
Stenocybe sp. nov. (short stalks, large capitula, unbranched)			+	+							+		
Stereocaulon intermedium (Savicz) H.Magn.					+				+				
Sticta fasciculata Goward & Di Meglio ined.											+	+	
Strangospora pinicola (A.Massal.) Körb.							+						
Thelidium fontigenum A.Massal. aff.			+	+			+						
Thelotrema lepadinum (Ach.) Ach	+										+		
Thermutis velutina (Ach.) Flot.		+		+			+						
Tingiopsidium sp. nov.			+	+			+						
Toensbergia leucococca (R.Sant.) Bendiksby & Timdal						+							
Toninia sp. nov. (crustose, with scattered granules, apothecia with a black disc and strongly pruinose margin)			+	+			+						
Trapelia coarctata (Turner ex Sm.) M. Choisy											+		
Trapelia corticola Coppins & P.James					+								

Trapelia obtegens (Th.Fr.) Hertel					+								
Trapelia placodioides Coppins & P.James						+			+				
Trapeliopsis flexuosa (Fr.) Coppins & P.James											+		
Trapeliopsis granulosa (Hoffm.) Lumbsch							+						+
Trapeliopsis viridescens (Schrad.) Coppins & P.James					+								
Tuckermannopsis chlorophylla (Willd.) Hale					+	+	+	+	+	+		+	+
Umbilicaria hyperborea (Ach.) Hoffm.						+							
Umbilicaria polyphylla (L.) Baumg.									+	+			
Usnea barbata f. *scabrata* comb. ined.									+				
Usnea hirta (L.) Weber ex F.H.Wigg.						+							
Usnea perplexans Stirt.						+			+				
Usnea substerilis Motyka						+			+				
Verrucaria aethiobola Wahlenb.						+					+		
Verrucaria aethiobola Wahlenb. aff. (crust immersed)												+	
Verrucaria cernohorskyi Servít cfr.							+						
Verrucaria cinereoatra Hoffm.							+						
Verrucaria csernaensis Zsch.							+						
Verrucaria fusconigrescens Nyl.													+
Verrucaria hemisphaerica (Flörke) I. Schmitt & Lumbsch											+		
Verrucaria litorea (Hepp) Zschacke							+						+
Verrucaria margacea (Wahlenb.) Wahlenb.					+		+				+		+
Verrucaria muralis Ach. aff. (smaller perithecia, siliceous rock)									+		+		
Verrucaria nigrescens Pers.									+		+		
Verrucaria pachyderma Arnold						+					+		
Verrucaria praetermissa (Trevis.) Anzi (sensu Clauzade & Roux), plus *Verrucaria* unknown species (immersed thallus)						+							
Verrucaria unknown epiphyte with perithecia ca. 0.+ mm wide, spores ca. 20 microns long			+	+							+		
Vulpicida canadensis (Räsänen) J.-E. Mattsson & M.J. Lai									+				
Xanthomendoza mendozae (Räsänen) S.Y. Kondr. & Kärnefelt					+			+					

Xanthoria candelaria (L.) Th.Fr. var. *candelaria*					+							
Xanthoria elegans (Link) Th.Fr.					+							
Xylographa hians Tuck.					+							
Xylographa paralella (Ach.) Fr.					+		+		+			
Xylographa septentrionalis T. Sprib.		+		+	+							
Xylographa soralifera Holien & Tønsberg									+			
Xylographa trunciseda (Th.Fr.) Minks ex Redinger cfr.					+		+					
Xylographa vitiligo (Ach.) J.R.Laundon							+					
Xyloschistes platytropa (Nyl.) Vain.		+		+			+					
Mosses												
Amphidium mougeotii (Bruch & Schimp.) Schimp.							+				+	
Anoectangium aestivum (Hedw.) Spruce											+	
Anomobryum concinnatum (Spruce) Lindb.		+		+	+							
Anomobryum julaceum (Schrad. ex G.Gaertn., B.Mey. & Scherb.) Schimp.		+		+					+			
Antitrichia curtipendula (Hedw.) Brid.											+	+
Atractylocarpus alpinus (Schimp. ex Milde) Lindb. cfr.		+		+	+							
Atrichum selwynii Austin									+			
Aulacomnium androgynum (Hedw.) Schwägr.					+	+			+		+	
Aulacomnium palustre (Hedw.) Schwägr.					+						+	
Barbula unguiculata Hedw. cfr.							+					
Bartramia ithyphylla Brid.											+	
Bartramia pomiformis Hedw.									+		+	
Blindia acuta (Hedw.) Bruch & Schimp.					+					+	+	
Brachytheciastrum collinum (Schleich. ex Müll.Hal.) Ignatov & Huttunen												+
Brachytheciastrum velutinum (Hedw.) Ignatov & Huttunen					+							
Brachythecium acuminatum (Hedw.) Austin cfr.		+		+	+							

Brachythecium acutum (Mitt.) Sull. ex Austin					+	+							
Brachythecium asperrimum (Mitt. ex Müll.Hal.) Sull.						+							
Brachythecium frigidum (Müll.Hal.) Besch.						+							
Brachythecium rivulare Schimp.						+	+		+	+	+		
Brachythecium rotaeanum De Not.							+						
Brachythecium salebrosum (Hoffm. ex F.Weber & D.Mohr) Schimp.					+		+						
Brideliella wahlenbergii (Brid.) Fedosov, M.Stech & Ignatov					+		+		+		+	+	
Bryum argenteum Hedw.											+		+
Bryum lanatum (P.Beauv.) Brid.					+						+		
Bucklandiella heterosticha (Hedw.) Bedn.-Ochyra & Ochyra						+			+				
Bucklandiella microcarpa (Hedw.) Bedn.-Ochyra & Ochyra											+		
Calliergon cordifolium (Hedw.) Kindb.								+					
Campylium chrysophyllum (Brid.) Lange							+						
Campylium protensum (Brid.) Kindb.											+		+
Campylium stellatum (Hedw.) C.E.O.Jensen					+								
Campylopus atrovirens De Not.	+			+	+				+				
Campylopus flexuosus (Hedw.) Brid.	+			+					+				
Ceratodon purpureus (Hedw.) Brid.					+				+		+	+	
Chionoloma tenuirostre (Hook. & Taylor) Lindb.					+								
Claopodium bolanderi Best									+				
Climacium dendroides (Hedw.) F.Weber & D.Mohr					+	+	+	+	+	+	+	+	+
Codriophorus acicularis (Hedw.) P.Beauv.					+				+		+	+	
Codriophorus mollis (Cardot) Bedn.-Ochyra & Ochyra											+		
Conardia compacta (Müll. Hal.) H. Rob.					+	+							
Cratoneuron filicinum (Hedw.) Spruce							+		+				
Ctenidium sp. +						+							
Ctenidium sp. 2			+	+	+								
Dichodontium pellucidum (Hedw.) Schimp.					+	+			+		+		+

Dicranella subulata (Hedw.) Schimp.							+						
Dicranodontium denudatum (Brid.) E.Britton	+			+							+		
Dicranoweisia cirrata (Hedw.) Lindb. ex Milde								+			+		
Dicranum acutifolium (Lindb. & Arnell) C.E.O.Jensen					+								
Dicranum fuscescens Turner					+								
Dicranum polysetum Sw.						+	+	+	+	+			+
Dicranum scoparium Hedw.					+	+	+	+	+	+	+		+
Dicranum unknown species (brood bodies with cirrate leaves)			+	+			+		+				
Didymodon nigrescens (Mitt.) K.Saito					+								
Didymodon unknown (terminal portion of leaf thickened and pinched off or broken as a propagulum)			+	+	+		+						
Didymodon unknown species (Rainbow Falls)			+	+							+		
Dilutineuron fasciculare (Schrad. ex Hedw.) Bedn.-Ochyra, Sawicki, Ochyra, Szczecińska & Plášek							+						
Distichium capillaceum (Hedw.) Bruch & Schimp.					+				+		+		
Drepanium fastigiatum (Brid.) Lange & C.E.O.Jenssen					+								
Drepanocladus arcticus (R.S.Willams) Hedenäs cfr.		+		+						+	+		
Encalypta brevicolla (Bruch & Schimp.) Ångstr.		S3		+	+								
Encalypta ciliata Hedw.					+					+			
Encalypta longicollis Bruch		S3		+			+				+		
Encalypta procera Bruch									+				
Encalypta rhaptocarpa Schwägr.							+		+				
Eurhynchiastrum pulchellum (Hedw.) Ignatov & Huttunen					+		+		+		+		+
Fissidens adianthoides Hedw.					+				+		+	+	+
Fissidens arcticus Bryhn		+		+	+						+		
Fissidens osmundioides Hedw.									+				
Fissidens taxifolius Hedw.		+		+	+						+		
Flexitrichum flexicaule (Schwägr.) Ignatov & Fedosov					+				+				
Flexitrichum gracile (Mitt.) Ignatov & Fedosov					+			+	+		+		
Fontinalis antipyretica Hedw.							+						

Fontinalis neomexicana Sull. & Lesq.								+					
Funaria hygrometrica Hedw. (odd form)							+						
Geheebia fallax (Hedw.) R.H.Zander					+						+		
Gemmabryum dichotomum (Hedw.) J.R.Spence & H.P.Ramsay							+						
Grimmia muehlenbeckii Schimp. aff.			+	+	+								
Grimmia torquata Drumm.								+					
Gymnostomum aeruginosum Sm.									+				
Hamatocaulis vernicosus (Mitt.) Hedenäs											+		
Hedwigia ciliata (Hedw.) Boucher					+	+			+				
Homalia trichomanoides (Hedw.) Brid.					+				+				
Homalotheciella subcapillata (Hedw.) Broth. cfr.			+	+							+		
Homalothecium aeneum (Mitt.) E.Lawton					+				+				
Homalothecium unknown species			+	+							+		
Hygrohypnella bestii (Renauld & Bryhn) Ignatov & Ignatova						+			+	+			
Hygrohypnella ochracea (Turner ex Wilson) Ignatov & Ignatova										+			
Hygrohypnum luridum (Hedw.) Jenn.					+	+					+		+
Hygrohypnum styriacum (Limpr.) Broth.					+						+		
Hylocomiadelphus triquetrus (Hedw.) Ochyra & Stebel					+	+	+	+	+	+	+		+
Hylocomiastrum pyrenaicum (Spruce) M.Fleisch. ex Broth.					+								
Hylocomium splendens (Hedw.) Schimp.					+	+	+	+	+	+	+	+	+
Hymenoloma crispulum (Hedw.) Ochyra						+	+						
Hymenostylium recurvirostrum (Hedw.) Dixon								+			+		
Isopterygiella pulchella (Hedw.) Ignatov & Ignatova					+								
Isopterygiopsis alpicola (Lindb.) Hedenäs		+		+	+								
Kiaeria falcata (Hedw.) I.Hagen							+						
Kindbergia praelonga (Hedw.) Ochyra												+	
Leptobryum pyriforme (Hedw.) Wilson										+			
Lescuraea baileyi (Best & Grout) E.Lawton											+	+	
Lewinskya affinis (Brid.) F.Lara, Garilleti & Goffinet		+		+	+								

Lewinskya rupestris (Schleich. ex Schwägr.) F.Lara, Garilleti & Goffinet					+								
Lewinskya sordida (Sull. & Lesq.) F.Lara, Garilleti & Goffinet		+		+	+						+		
Lewinskya speciosa (Nees) F.Lara, Garilleti & Goffinet					+	+		+	+				
Meesia uliginosa Hedw.							+						
Mielichhoferia unknown species (leaves narrower than M. mielichhoferiana, and leaves at apex with strong, more or less recurved teeth)			+	+							+		
Mnium blyttii Bruch & Schimp.							+		+				
Mnium lycopodioides Schwägr.							+		+				
Mnium spinulosum Bruch & Schimp.											+		
Mnium thomsonii Schimp.									+		+		
Molendoa sendtneriana (Bruch & Schimp.) Limpr.		S2S3		+							+		
Myurella julacea (Schwägr.) Schimp.								+					
Myurella tenerrima (Brid.) Lindb.											+		
Neckera menziesii Drumm..					+				+				
Niphotrichum canescens (Hedw.) Bedn.-Ochyra & Ochyra ssp. *canescens*					+							+	
Niphotrichum canescens ssp. *latifolium* (C.E.O.Jensen) Bedn.-Ochyra & Ochyra													+
Niphotrichum muticum (Kindb.) Bedn.-Ochyra & Ochyra					+								
Nyholmiella obtusifolia (Brid.) Homen & E.Warnecke						+		+	+	+			+
Oligotrichum parallelum (Mitt.) Kindb.							+						
Oncophorus virens (Hedw.) Brid.					+		+		+	+	+		
Orthodicranum flagellare (Hedw.) Loeske					+					+			
Orthodicranum montanum (Hedw.) Loeske					+								
Orthodicranum tauricum (Sapjegin) Smirnova					+	+		+	+	+	+		+
Orthomnion cuspidatum (Hedw.) T.J.Kop. & Yu Sun					+	+	+	+	+	+			
Orthomnion medium (Bruch & Schimp.) T.J.Kop. & Yu Sun					+	+							
Orthothecium chryseum (Schwägr.) Schimp.											+		
Orthotrichum anomalum Hedw.							+						

Orthotrichum pallens Bruch ex Brid.		+		+	+								
Palustriella falcata (Brid.) Hedenäs							+				+		
Philonotis fontana (Hedw.) Brid.						+				+	+		
Philonotis marchica (Hedw.) Brid.		S2S3		+	+		+						
Philonotis tomentella Molendo							+				+		
Plagiopus oederianus (Sw.) H.A.Crum & L.E.Anderson							+		+		+		
Plagiothecium cavifolium (Brid.) Z.Iwats.										+			
Platydictya confervoides (Brid.) H.A.Crum cfr.		+		+	+								
Platydictya jungermannioides (Brid.) H.A.Crum					+	+			+				
Platydictya minutissima (Sull. & Lesq.) H.A.Crum cfr. (but leaves falcate)		+		+			+						
Platyhypnum alpestre (Hedw.) Ochyra		S3		+			+				+		
Platyhypnum alpinum (Lindb.) Loeske		S3		+						+	+		
Platyhypnum duriusculum (De Not.) Ochyra						+				+			
Platyhypnum norvegicum (Schimp.) Ochyra		S2		+							+		
Platyhypnum smithii (Sw.) Ochyra							+						
Pleurozium schreberi (Willd. ex Brid.) Mitt.					+	+	+	+	+	+		+	+
Pogonatum dentatum (Menzies ex Brid.) Brid.					+								
Pogonatum urnigerum (Hedw.) P.Beauv.						+					+		
Pohlia andalusica (Höhn.) Broth.		S2		+					+				
Pohlia annotina (Hedw.) Lindb.					+	+			+				
Pohlia cruda (Hedw.) Lindb.					+	+	+		+	+			
Pohlia drummondii (Müll.Hal.) A.L.Andrews						+							
Pohlia longibracteata Broth.	+			+					+	+			
Pohlia nutans (Hedw.) Lindb.					+	+			+				
Pohlia proligera (Kindb. ex Breidl.) Lindb. ex Arnell						+							
Polytrichum hyperboreum R.Br.		S+S3		+	+		+						
Polytrichum juniperinum Hedw.									+			+	
Pseudisothecium stoloniferum (Brid.) Grout											+	+	

Pseudohygrohypnum eugyrium (Schimp.) Kanda					+								+
Pseudohygrohypnum subeugyrium (Renauld & Cardot) Ignatov & Ignatova		+		+						+			
Pseudoleskeella nervosa (Brid.) Nyholm					+		+						+
Pterigynandrum filiforme Hedw.					+				+		+		+
Ptilium crista-castrensis (Hedw.) De Not.					+	+		+	+	+	+		
Ptychostomum bimum (Schreb.) J.R.Spence		+		+			+						
Ptychostomum imbricatulum (Müll.Hal.) Holyoak & N.Pedersen								+			+		
Ptychostomum pallescens (Schleich. ex Schwägr.) J.R.Spence										+			+
Ptychostomum pseudotriquetrum (Hedw.) J.R.Spence & H.P. Ramsay					+	+	+		+		+		
Ptychostomum subneodamense (Kindb.) J.R.Spence		+		+						+			
Ptychostomum turbinatum (Hedw.) J.R.Spence											+		
Ptychostomum unknown, section Cladodium, gemmiferous			+	+						+			
Pylaisia intricata (Hedw.) Schimp.		+		+	+								
Pylaisia polyantha (Hedw.) Schimp.						+	+	+	+	+			+
Rectithecium piliferum (Sw.) Hedenäs & Huttunen										+			
Rhizomnium pseudopunctatum (Bruch & Schimp.) T.J.Kop.					+	+					+		
Rhizomnium punctatum (Hedw.) T.J.Kop.					+				+				
Rhytidiadelphus loreus (Hedw.) Warnst.							+						
Rhytidiadelphus subpinnatus (Lindb.) T.J.Kop.									+		+	+	
Roaldia revoluta (Mitt.) P.E.A.S.Câmera, Carv.-Silva & M.Stech var. *revoluta*							+						
Rosulabryum capillare (Hedw.) J.R.Spence					+								
Saelania glaucescens (Hedw.) Broth.					+				+	+			
Sanionia nivalis (Hedw.) Loeske cfr.					+								
Sanionia uncinata (Hedw.) Loeske					+	+		+	+	+		+	+
Schistidium agassizii Sull. & Lesq.					+								
Schistidium confertum (Funck) Bruch & Schimp.		S+		+					+				
Schistidium dupretii (Thér.) W.A.Weber					+								

Schistidium papillosum Culm.					+	+		+	+	+			
Schistidium pulchrum H.H.Blom		S3		+	+								
Schistidium rivulare (Brid.) Podp.									+				
Schistidium subjulaceum H.H.Blom						+							
Schistidium trichodon (Brid.) Poelt		S3		+					+				
Schistidium unknown species (tiny capsules, red operculum)			+	+	+				+				
Sciurohypnum latifolium (Kindb.) Ignatov & Huttunen							+						
Sciurohypnum plumosum (Hedw.) Ignatov & Huttunen					+				+				
Scleropodium obtusifolium (Mitt.) Kindb.							+						
Scouleria aquatica Hook.					+	+	+	+	+	+		+	
Sphagnum capillifolium (Ehrh.) Hedw.											+		
Sphagnum girgensohnii Russow											+		
Sphagnum warnstorfii Russow											+		
Streblotrichum convolutum (Hedw.) P.Beauv							+						
Syntrichia norvegica F.Weber aff.			+	+	+								
Syntrichia ruralis (Hedw.) F.Weber & D.Mohr					+		+						
Tetraphis geniculata Girg. ex Milde							+		+				
Tetraphis pellucida Hedw.							+						
Thamnobryum neckeroides (Hook.) E.Lawton					+		+		+				
Thuidium recognitum (Hedw.) Lindb.					+				+		+		
Timmia austriaca Hedw.					+		+						
Timmia megapolitana Hedw. ssp. *megapolitana*					+								
Tortella fragilis (Hook. & Wilson) Limpr.									+				
Tortella nitida var. *fragilifolia* (Jur.) Köckinger & Hedenäs											+		
Tortella tortuosa (Schrad. ex Hedw.) Limpr.					+		+		+		+		+
Tortula mucronifolia Schwägr.					+								
Trematodon sp.?											+		
Trichostomum tenuirostre (Hook. & Taylor) Lindb.					+		+				+		
Trochophyllohypnum circinale (Hook.) Jan Kučera & Ignatov					+				+		+		+

Vinealobryum nicholsonii (Crum) R.H.Zander		S+		+	+								
Vascular Plants													
Abies lasiocarpa subsp. *bifolia* (A.Murray) Silba					+	+	+	+		+	+	+	+
Acer glabrum var. *douglasii* (Hook.) Dippel						+	+	+	+	+			
Achillea sp.					+					+			
Agrostis capillaris L.						+							
Agrostis exarata Trin.						+							
Agrostis gigantea Roth					+	+	+		+	+			
Agrostis scabra Willd.					+	+	+	+	+	+	+		
Alnus alnobetula var. *fruticosa* (Rupr.) H.Winkl.					+	+		+		+	+	+	+
Alnus incana (L.) Moench					+	+	+	+	+	+	+	+	+
Amelanchier florida Lindl.								+	+				
Anaphalis margaritacea (L.) Benth. & Hook.f.						+	+		+		+		
Anemone parviflora Michx.											+		
Angelica genuflexa Nutt.					+	+			+		+		
Antennaria howellii Greene									+				
Antennaria rosea Greene								+					
Apocynum androsaemifolium L.						+							
Aquilegia formosa Fisch. ex DC.						+		+	+			+	
Arabidopsis lyrata ssp. *kamchatica* (Fisch. ex DC.) O'Kane & Al-Shehbaz					+	+			+				
Aralia nudicaulis L.						+	+	+					
Arctostaphylos uva-ursi (L.) Spreng.								+	+				
Arnica amplexicaulis Nutt. var. *amplexicaulis*							+	+			+		
Asplenium viride Huds.											+		
Athyrium filix-femina (L.) Roth					+	+	+	+	+	+	+	+	+
Berberis aquifolium var. *nutkana* (DC.) Marroq. & Laferr.					+	+	+	+	+	+			
Betula papyrifera Marshall					+	+	+	+	+	+	+	+	+

Calamagrostis canadensis (Michx.) P.Beauv.					+	+	+	+	+	+	+	+	+
Calamagrostis rubescens Buckley									+				
Canadanthus modestus (Lindl.) G.L.Nesom					+	+	+	+	+	+	+	+	+
Cardamine oligosperma Nutt.						+			+				
Cardamine pensylvanica Muhl. ex Willd.					+	+			+				
Carex arcta Boott								+					
Carex brunnescens (Pers.) Poir.						+							
Carex capillaris L.											+		
Carex deflexa Hornem.									+				
Carex disperma Dewey								+					
Carex kelloggii W.Boott						+	+	+					+
Carex leptalea Wahlenb.							+						
Carex mertensii J.D.Prescott ex Bong.						+					+		
Carex pedunculata Muhl. ex Willd.					+	+							
Carex rossii Boott							+						
Carex sitchensis J.D.Prescott ex Bong.								+					+
Carex vaginata Tausch								+			+		
Carex viridula Michx.								+				+	+
Castilleja purpurascens Greenm.								+					
Cerastium fontanum Baumg.						+			+				
Chimaphila umbellata (L.) Nutt.									+		+		
Cicuta virosa L.					+	+							
Cinna latifolia (Trevir. ex Göpp.) Griseb.					+	+	+	+	+	+			
Circaea alpina L. ssp. *alpina*					+	+	+	+	+	+	+	+	
Cirsium vulgare (Savi) Ten.									+				
Clintonia uniflora (Menzies ex Schult. & Schult. f.) Kunth						+	+	+		+	+		
Conyza canadensis (L.) Cronq.									+				
Cornus stolonifera Michx.					+	+	+	+	+	+	+	+	+
Cornus unalaschkensis Ledeb.						+	+	+			+	+	

Corylus cornuta Marshall var. *cornuta*					+				+				
Cryptogramma stelleri (S.G.Gmel.) Prantl											+		
Cystopteris fragilis (L.) Bernh.					+			+	+		+		
Danthonia spicata (L.) P.Beauv. ex Roem. & Schult.									+				+
Deschampsia caespitosa (L.) P.Beauv. ssp. *caespitosa*							+	+					
Deschampsia elongata (Hook.) Munro							+						
Deschampsia sukatschewii (Popl.) Roshev.												+	+
Diphasiastrum complanatum (L.) Holub						+		+	+	+			
Dryopteris carthusiana (Vill.) H.P.Fuchs					+				+				
Dryopteris expansa (C.Presl) Fraser-Jenk. & Jermy					+	+	+	+	+	+	+	+	+
Dryopteris filix-mas (L.) Schott									+				
Elymus glaucus Buckley ssp. *glaucus*						+		+	+	+	+	+	
Elymus trachycaulus (Link) Gould ssp. *trachycaulus*						+		+				+	
Elymus trachycaulus ssp. *subsecundus* (Link) Á.Löve & D.Löve								+					
Epilobium angustifolium L.					+	+	+	+	+	+		+	+
Epilobium ciliatum Raf.						+	+	+		+			
Epilobium glandulosum Lehm.						+				+			
Epilobium latifolium L.												+	
Epilobium leptocarpum Hausskn.					+			+			+		
Equisetum arvense L.						+	+	+				+	
Equisetum sylvaticum L.						+	+	+		+			+
Equisetum variegatum ssp. *alaskanum* (A.A.Eaton) Hultén							+	+				+	
Erigeron philadelphicus L. var. *philadelphicus*									+				
Erythranthe guttata (DC.) G.L.Nesom						+							
Eurybia conspicua (Lindl.) G.L.Nesom						+			+				
Festuca occidentalis Hook.								+					
Fragaria vesca L.					+	+	+	+	+				
Fragaria virginiana Mill.								+	+				
Galium trifidum L.					+			+			+	+	

Galium triflorum Michx.					+	+	+	+	+	+			
Geum macrophyllum Willd.					+	+	+	+	+	+			
Geum perincisum Rydb.									+				
Glyceria borealis (Nash) Batch.										+			
Glyceria elata (Nash) M.E.Jones					+	+		+	+				
Glyceria striata (Lam.) Hitchc.						+	+	+	+			+	
Goodyera oblongifolia Raf.							+						
Goodyera repens (L.) R.Br.							+						
Gymnocarpium disjunctum (Rupr.) Ching					+		+	+	+		+	+	
Gymnocarpium dryopteris (L.) Newman						+	+				+		
Heracleum lanatum Michx.									+				
Heuchera glabra Willd. ex Roem. & Schult.					+	+	+	+	+		+		
Hieracium albiflorum Hook.					+		+		+				
Hieracium caespitosum Dumort.						+							
Hieracium piloselloides Vill.						+						+	
Hierochloe odorata (L.) P.Beauv.							+						
Hippuris vulgaris L.								+					
Impatiens aurella Rydb.									+				
Juncus alpinoarticulatus Vill.												+	
Juncus ensifolius Wikstr.						+	+	+				+	
Juncus filiformis L.							+	+					
Juncus mertensianus Bong.												+	+
Juncus tenuis Willd.						+							
Lathyrus ochroleucus Hook.									+				
Leucanthemum vulgare (Vaill.) Lam.						+			+				
Lilium columbianum Leichtlin							+						
Linnaea borealis var. *americana* (J.Forbes) Hultén					+	+	+	+	+	+	+	+	+
Lonicera involucrata (Richardson) Banks ex Spreng.					+	+	+	+	+	+			
Lonicera tatarica L.					+								

Luzula fastigiata E.Mey.							+				+		
Lycopus uniflorus Michx.					+			+					
Lysichiton americanus Hultén & H.St.John						+	+	+	+	+			
Maianthemum racemosum (L.) Link						+		+	+	+			
Melampyrum lineare Desr.									+				
Mentha canadensis L.						+	+	+	+				
Micranthes occidentalis (S.Watson) Small							+						
Mitella nuda L.					+	+	+	+	+	+		+	
Monotropa uniflora L.								+					
Mycelis muralis (L.) Dumort.						+							
Oplopanax horridus (Sm.) Miq.					+	+	+	+	+	+	+	+	
Orthilia secunda (L.) House						+	+	+		+			
Oryzopsis asperifolia Michx.						+		+	+	+			
Osmorhiza berteroi DC.						+		+	+	+			
Packera indecora (Greene) Á.Löve & D.Löve					+				+		+		
Packera paupercula (Michx.) Á.Löve & D.Löve								+			+		
Parnassia fimbriata K.D.Koenig							+	+			+		+
Paxistima myrsinites (Pursh) Raf.					+	+	+	+	+				
Petasites palmatus (Aiton) A.Gray						+			+				
Petasites x *vitifolius* Greene									+				
Phalaris arundinacea L.					+	+	+	+	+	+			
Phegopteris connectilis (Michx.) Watt					+			+	+		+		
Picea engelmannii Engelm.						+	+		+				
Picea glauca (Moench) Voss						+	+	+	+		+	+	+
Picea x *darwyniana* Björk & Goward					+	+	+	+					
Pinus contorta var. *latifolia* Engelm.					+	+		+	+	+			
Piptatheropsis pungens (Torr. ex Spreng.) Romasch., P.M.Peterson & Soreng								+					
Plantago major L.									+				

Platanthera dilatata (Pursh) Lindl. ex L.C.Beck var. *dilatata*								+					
Poa annua L.						+			+				
Poa arctica R.Br.											+		
Poa nemoralis L.						+							
Poa palustris L.									+				
Poa pratensis L.									+				
Polystichum braunii (Spenn.) Fée	+				+					+			
Polystichum lonchitis (L.) Roth					+								
Populus tremuloides Michx.						+			+	+			
Populus trichocarpa Torr. & A.Gray					+	+	+	+	+	+	+	+	+
Potentilla norvegica L.					+	+							
Prunella vulgaris var. *lanceolata* (W.P.C.Barton) Hultén					+	+	+	+	+	+	+	+	+
Pseudotsuga menziesii (Mirb.) Franco					+	+	+	+	+	+			
Pteridium aquilinum ssp. *lanuginosum* (Bong.) Fernald											+		
Pyrola asarifolia Michx.					+	+	+	+	+	+		+	+
Pyrola chlorantha Sw.						+	+						
Ranunculus acris L.						+							
Ranunculus flammula L. aggr.								+					+
Ranunculus pensylvanicus L.f.							+						
Ranunculus uncinatus D.Don					+				+				
Rhododendron menziesii Craven					+	+	+	+		+	+	+	+
Ribes lacustre (Pers.) Poir.					+	+	+	+	+	+	+	+	+
Ribes oxyacanthoides L. ssp. *oxyacanthoides*						+							
Rorippa sp. (leaves only)									+				
Rosa acicularis Lindl.							+	+	+	+			+
Rosa gymnocarpa Nutt.									+				
Rosa x engelmannii nothosubsp. *britannicae-columbiae* W.H.Lewis						+	+	+	+				
Rubus idaeus L.					+		+	+	+	+		+	
Rubus parviflorus Nutt. nom. cons. prop.					+	+	+	+	+	+	+	+	+

Rubus pedatus Sm.											+	+	+
Rubus pubescens Raf.						+	+	+		+		+	
Sagina procumbens L.						+							
Salix alaxensis ssp. *longistylis* (Rydb.) Hultén								+				+	
Salix bebbiana Sarg.								+					
Salix commutata Bebb													+
Salix lasiandra Benth.							+	+					
Salix melanopsis Nutt.							+	+				+	+
Salix scouleriana Barratt ex Hook.					+			+	+				
Salix sitchensis Sanson ex Bong.					+	+		+	+			+	
Sambucus callicarpa Greene						+		+	+	+	+		
Schizachne purpurascens (Torr.) Swallen								+					
Scirpus microcarpus J.Presl & C.Presl						+		+					
Scutellaria galericulata L.					+								
Senecio triangularis Hook.							+	+					
Shepherdia canadensis (L.) Nutt.					+	+	+	+	+	+			
Sium suave Walter							+	+					
Solidago lepida var. *salebrosa* (Piper) Semple						+							
Sorbus scopulina Greene						+			+		+	+	+
Sparganium emersum Rehmann								+					
Spinulum annotinum (L.) A.Haines						+	+	+		+	+		
Spinulum canadense (Nessel) A.Haines									+				+
Spiraea douglasii ssp. *menziesii* (Hook.) Calder & RoyL.Taylor						+	+	+	+	+			
Spiraea lucida Douglas ex Hook.						+		+	+		+		
Spiraea x *pyramidata* Greene								+					
Stellaria calycantha (Ledeb.) Bong.					+				+				
Stellaria crispa Cham. & Schltdl.									+				
Streptopus amplexifolius (L.) DC.						+	+	+		+	+		
Symphoricarpos albus var. *laevigatus* (Fernald) S.F.Blake									+				

Symphyotrichum ciliolatum (Lindl.) Á. Löve & D. Löve					+	+		+	+	+			
Symphyotrichum eatonii (A.Gray) G.L.Nesom													+
Symphyotrichum foliaceum (Lindl. ex DC.) G.L.Nesom							+				+		
Symphyotrichum maccallae (Rydb.) comb. ined.								+					
Taraxacum sp. (exotic)					+			+	+				
Taxus brevifolia var. *reptaneta* Spjut											+		
Thuja plicata Donn ex. D.Don					+	+	+	+	+	+	+	+	+
Tiarella trifoliata var. *unifoliata* (Hook.) Kurtz					+	+	+	+	+	+	+	+	+
Torreyochloa pauciflora (J.Presl) G.L.Church						+							
Trifolium aureum Pollich									+				
Trifolium hybridum L.						+							
Tsuga heterophylla (Raf.) Sarg.					+	+	+	+	+	+	+	+	+
Vaccinium cespitosum Michx.									+				
Vaccinium membranaceum Douglas ex Torr.						+	+	+	+	+		+	+
Vaccinium myrtilloides Michx.									+				
Vaccinium ovalifolium Sm.							+				+		+
rbascum thapsus L.									+				
Veronica americana Schwein. ex Benth.					+	+	+	+	+	+			
Veronica serpyllifolia L.						+							
Viburnum edule Raf.						+	+	+	+	+		+	
Viola adunca Sm.					+				+				
Viola epipsila Ledeb.													+
Viola incognita Brainerd cfr.					+								
Viola palustris L.							+						
Woodsia scopulina D.C.Eaton					+						+		