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VEGETATION OF THE SCHEFFERVILLE REGION, NOUVEAU-QUEBEC

by

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Abstract: The physiographic and edaphic diversity associated with the Labrador Trough contributes to an unusually rich and interesting flora near Schefferville. The correspondingly diverse vegetation falls into a range of broadly defined complexes: spruce-lichen woodland, spruce-feather moss forests, subalpine heath, alpine tundra, mire, and shoreline communities. On the basis of the sparse literature that exists and our field experience, we describe these vegetation complexes. Our emphasis is on heterogeneity within these broadly and subjectively defined complexes and the consequent need for quantitative studies of the vegetation in the central Québec-Labrador peninsula.

Résumé: La diversité physiographique et pédologique de la fosse du Labrador permet l'existence d'une flore particulièrement riche et inédite aux abords de Schefferville. Cette flore diversifiée peut être classée en quelques larges catégories: pessière à cladonies, pessière à mousses, bruyère subalpine, toundra alpine, tourbière et communautés littorales. Nous décrivons ces catégories végétales à l'aide de la maigre bibliographie existante et de notre propre expérience sur le terrain. Nous soulignons le haut degré d'hétérogénéité floristique observé dans ces vastes catégories subjectives, ainsi que la nécessité de conduire de plus amples études sur la végétation de l'intérieur de la péninsule du Québec-Labrador.

Both the vascular (Mäkinen and Kallio, 1980) and nonvascular (Bartram, 1954; S. Clayden, unpublished; Crum and Kallio, 1966; Dix, 1956; Ireland et al., 1982; Kallio and Kärenlampi, 1966) floras of the Schefferville region are unusually rich compared to other subarctic sites (Morisset et al., 1983; Hustich, 1965). Although no comprehensive and quantitative study of the vegetation in this region has been completed, it is clear even from early accounts (Dutilly and Lepage, 1962; Harper, 1964; Hustich, 1951, 1954, 1962, 1963) that the floristic diversity is reflected in a correspondingly diverse vegetation.

The floristic richness and consequent complexity of plant communities in the Schefferville region results in large part from the edaphic and physiographic diversity associated with its location in the Labrador Trough. This geologic region averages 80 km in width and cuts through the Canadian Shield in a NW/SE direction from just south of Schefferville north to Ungava Bay (Dimroth, 1972). The Labrador Trough is composed of metamorphosed sedimentary and volcanic rocks of Proterozoic age which have been faulted and folded to form a complex ridge and valley topography. In contrast to the granite gneisses of the Canadian Shield, a variety of rock types occur within the trough including quartzites, shales, slates, and dolomite as well as the iron formations which give the soils their characteristic red colour. The severe faulting and folding of the sedimentary rocks has resulted in a complex surface geology, with opportunities for ground water movement both along faults and within the more porous rocks such as the dolomite and iron formations.

The Schefferville region is believed to be near the centre of the northern Québec/Labrador ice sheet (Ives, 1960), with deglaciation occurring about 6000 yr B.P. As a result, the soils are young and usually developed on a thin layer of drift which although variable in composition often shows similarities with the underlying bedrock (Belisle and Moore, 1981; Nicholson and Moore, 1977). The soils are generally acid and of low nutrient content, the exception being in areas underlain by dolomite where the soils are much richer in calcium and magnesium. The effects of recent glaciation are also clearly seen by the large number of lakes in the region and by the development of mires in areas where drainage patterns have been disrupted by glacial processes. Schefferville's subarctic climate (Barr and Wright, 1981; Lechowicz and Adams, 1978; Petzold, 1981) with long, cold winters and cool, moist summers also contributes to the maintenance of this mire vegetation.

This paper presents a brief summary of the major vegetation complexes found in the Labrador Trough near Schefferville with the hope that this will stimulate quantitative studies of the local plant communities. This review is based on our own field observations of the vegetation in general and on more detailed studies of mires and lichen woodland in particular. We do not include a review of literature concerning similar vegetation in other subarctic regions but limit ourselves strictly to describing the native vegetation of the Schefferville region.

The Schefferville region can be considered to be on the border between the subarctic and hemiarctic (Rousseau, 1952) or at the southern edge of the forest tundra (Hare, 1950; Hustich, 1949). The most prominent feature of the landscape is the dominance of open lichen woodland grading into spruce-moss forest in somewhat wetter areas or into lichen heath at higher elevations. Sedge meadows and patterned fens occur frequently in poorly drained areas while alpine tundra covers the higher hilltops and ridges. In this paper we will give a brief summary of the vegetation under the following broad categories:

spruce-moss forests, lichen woodland, subalpine heath, alpine tundra, mire, and shoreline communities. The introduced species associated with human settlements and mining activity (Hustich, 1971) are not considered here.

Spruce-feather moss forests

In the Schefferville region closed-canopy forests occur only on moist and relatively nutrient-rich sites. The tree canopy consists of Picea mariana and P. glauca often mixed with some Abies balsamea. The common boreal forest feather mosses like Hylocomnium splendens, Ptilium cristacastrensis, and Pleurozium schreberi as well as Dicranum fuscescens typically carpet the shaded forest floor along with lichens like Peltigera aphthosa and Nephroma arcticum. These forests are richer in species than the spruce-lichen woodlands which replace them on poorer and drier sites. Many boreal species at their northern range limits near Schefferville occur primarily in these closed forests. These species include pteridophytes like Cystopteris montana, Gymnocarpium dryopteris, Dryopteris spinulosa, D. assimilis, Lycopodium selago var. petens, and L. annotinum. Similarly, boreal forest herbs like Linnaea borealis, Maianthemum canadense, Geum rivale, Trientalis borealis, Actaea rubra, Streptopus amplexifolius, Moneses uniflora, Mitella nuda, Habenaria dilatata, Listera cordata, and Carex vaginata, are all characteristic of the groundlayer in these closed forests. The shrub cover is sparse but includes Viburnum edule, Ribes triste, and Lonicera villosa which are most common in this habitat. Some good representatives of spruce-feather moss forests can be found just south of the Schefferville airport runway, on the Dyke Lake road not far past the Astray landing turnoff, and at the mouth of Osprey Creek. Hustich (1951, 1954, 1968) gives additional descriptions of such closed forests and compares them to the more open spruce-lichen woodlands.

Spruce-lichen woodland

Spruce-lichen woodlands are an extensive and distinctive component of the landscape as one approaches Schefferville by air. The widely spaced evergreen trees surrounded by a creamy white carpet of caribou lichens occur on most well-drained valley sites in the area. Despite the apparent physiognomic uniformity of spruce-lichen woodlands, this community shows considerable variation in species composition from site to site.

The tree layer includes Picea mariana, P. glauca, and Larix laricina but the relative abundances of these species vary from site to site. Picea mariana is usually the most abundant tree but in some woodlands like those near Greenbush Lake (Grayson, 1956), P. glauca is clearly dominant. Occasionally as in areas along the Houston Road near Dolly Lake, Larix laricina is more common than the spruces. Similar variation is apparent in the shrub layer as well. Betula glandulosa, Ledum groenlandicum,

Vaccinium vitis-idaea, V. boreale, V. uliginosum, and Ribes glandulosum occur in almost all spruce-lichen woodlands but in differing relative abundances. For example, old growth woodlands near the eastern end of the Iron Arm Road have only a sparse cover of Betula and Ledum while near Greenbush these shrubs form thickets in mature woodlands. Previous investigations on the spruce-lichen woodland (see review by Moore, this volume) have generally focused on one or a few sites; a better understanding of the pattern and control of variation in the composition of the tree and shrub layers in the spruce-lichen woodlands requires more extensive quantitative sampling.

The groundlayer in mature woodlands is species poor and less variable. In all cases the caribou lichen Cladina stellaris covers 70% or more of the surface in a dense carpet 5-10 cm deep. Scattered through this carpet, often in association with the cracks which develop in the dry lichen mat, are patches of vascular plants. These include Lycopodium sitchense and L. annotinum, the sedges Carex stylosa and C. echinata, and the grass Deschampsia flexuosa. In some of the wetter hollows another mat-forming lichen, Stereocaulon paschale, replaces C. stellaris. Other herbaceous species like Linnaea borealis and Cornus canadensis occur only as scattered individuals in the mature woodlands.

The ground flora of successional sites is richer than that in mature woodlands. Early-successional sites often develop a fairly luxuriant growth of shrubs and groundlayer species that resprout from rhizomes or rootstocks that survived the fire (Nicholson, 1972). Resprouting Vaccinium and Lycopodium species frequently are conspicuous at this successional stage, as are Betula and Ledum. Occasionally dense mats of solitary lichens like Cladonia cornuta, C. crispata, C. cristatella, C. deformis, and C. sulphurina develop as succession proceeds and eventually give way to mat-forming species like Cladina mitis, C. arbuscula, C. rangiferina, and Cladonia uncialis at mid-successional sites. The Dyke Lake burn is an especially interesting example of the early successional stage and a number of burns along the Menihek road provide examples of mid-successional lichen mats. At these mid-successional sites, young trees are scattered throughout an often well developed shrub layer. Eventually Cladina stellaris mats develop in association with a decline in the diversity of the groundlayer vegetation. The successional sequence from burn through reestablishment of a mature woodland community is supposed to take in excess of 100 years (Nicholson, 1972), but this aspect of woodland ecology merits additional study.

Subalpine heath

At their upper altitudinal limit, the spruce-lichen woodlands grade into a scrub vegetation which has not been adequately studied. This subalpine heath is essentially transitional between the spruce-lichen woodlands and the tundra vegetation found at higher altitudes. Certain woodland species

persist in this vegetation, but the spruce trees occur only as scattered krummholz. Betula glandulosa, Ledum groenlandicum, Vaccinium uliginosum, V. vitis-idaea, and Arctostaphylos alpinum form a low, sometimes dense shrub layer. Empetrum hermaphroditon is common at some sites. In other areas, notably Irony Mountain, Alnus crispa is an important component of this subalpine zone. Cladina stellaris still occurs but does not form the luxuriant, continuous mats typical of the lichen woodland while Cladina rangiferina is more abundant than in the woodlands; tundra lichens such as Alectoria ochroleuca become frequent. These heaths are fairly widespread near tree line and can easily be seen on Houston and Irony Mountains and along parts of the Sunny Mountain road north of Greenbush Lake. This vegetation requires further investigation before it can be properly interpreted in relation to tundra and woodland communities.

Alpine tundra

Differences in bedrock, aspect, altitude, and drainage all contribute to the formation of a very rich tundra flora on the higher mountains and ridges in the Schefferville region (Hustich, 1962; Viereck, 1957; Waterway and Lei, 1982). Our limited field experience suggests that a number of plant communities can be recognized; the tundra is not the single community one might imagine from its physiognomic uniformity.

On the drier slopes and ridges, the vegetation is often sparse. Carex bigelowii, Alectoria ochroleuca and Rhacomitrium lanuginosum are all common over large areas in the tundra. Other typical tundra species such as Salix uva-ursi, Phyllodoce caerulea, Oxyria digyna, Sibbaldia procumbens, Cerastium alpinum, Loiseleuria procumbens, Veronica alpina, Poa arctica and many others occur more locally. Many dwarf shrubs like Arctostaphylos alpinum, Vaccinium uliginosum, V. vitis-idaea, and Empetrum hermaphroditum are common, especially in areas of frost-patterned ground. Dunnett (1969) has described a successional sequence in which "sorted circles" become colonized by heaths and eventually develop into hummocks of mesophytic mosses which are then colonized by Carex bigelowii and Cetraria lichens.

Late-lying snow patches are fairly common in the alpine region north of Schefferville reputed to be the centre of the former ice-sheet (Ives, 1960). Lycopodium alpinum, Salix herbacea and Cassiope hypnoides are very characteristic species found almost exclusively in the vicinity of such snowpatches.

A very diverse and relatively lush vegetation can be found in sheltered coves where there is dolomitic bedrock (e.g. Sunny Mountain). Included are the locally rare fern Polystichum lonchitis as well as other calciphilic species like Carex scirpoidea, Salix vestita, Arabis alpina, Anemone parviflora, Saxifraga aizoon, Castilleja septentrionalis, Bartsia alpina, Dryas integrifolia and Solidago multiradiata. Many species typical of the spruce-moss forests such as Gymnocarpium

dryopteris, Streptopus amplexifolius, Trientalis borealis, Viola labradorica and Viburnum edule also occur in these sheltered coves.

Small ponds and seepage areas are very common in many of the tundra areas. Several species, including Ranunculus allenii, Pedicularis flammea, P. groenlandica, Salix arctophila, Senecio pauciflorus, Tofieldia pusilla, Carex saxatilis, C. rariflora and C. vaginata, most typically are found at these wetter sites.

Sunny Mountain and Irony Mountain are the best places to observe tundra vegetation near Schefferville. More detailed study of these and other sites will be necessary before tundra plant communities in the Labrador Hills can be adequately classified.

Mires

Poorly drained areas with surfaces underlain by peat are frequent in the Schefferville area and are difficult to classify as distinct types on the basis of currently available information. Patterned mires are the most prominent, varying from minerotrophically rich fens in areas influenced by runoff from dolomitic substrates to poor fens at other locations. The origin and development of patterned mires in Labrador is dealt with elsewhere (Foster, this volume), but have not been investigated in the Schefferville area. Small sedge meadows, essentially without pattern, are also common and seem to originate from filled-in lake basins which do not develop string and flark topography.

The minerotrophically rich patterned fens present an open aspect with the strings dominated by small larch and black spruce, dwarf birch and ericaceous shrubs, while the flarks are dominated by sedges and brown mosses. These rich and intermediate fens vary in pH from 5.4 to 7.2, in conductivity from 20 to 258 μScm^{-1}, in Ca from 0.9 to 17.0 ppm, and in Mg from 0.5 to 13.7 ppm (Moore, unpublished). Species richness is high (60+ vascular plant species and 30+ bryophytes) and species assemblages change over short distances with changes in water depth and water chemistry. Width of both strings and flarks and the regularity of their pattern is extremely variable both within and between fens. In some cases poor and intermediate fen vegetation grades gradually into rich fen vegetation within a single mire with increases in pH and conductivity downslope.

Bryophytes commonly associated with the more acidic parts of these mires are Sphagnum angustifolium, S. balticum, S. lindbergii, S. jensenii, S. pulchrum, Scapania spp., and Drepanocladus exannulatus, while Sphagnum warnstorffi, Scorpidium scorpioides, Tomenthypnum nitens and Drepanocladus revolvens are more characteristic of minerotrophic areas. Sphagnum russowii, Aulacomnium palustre and several species of Calliergon occur over a wide range of conditions.

About one third of the vascular plant species in these patterned mires belong to the Cyperaceae. Carex rostrata and C. oligosperma dominate the wetter areas under somewhat acidic conditions while C. aquatilis, C. livida, C. chordorhiza and C. rariflora are typical of richer sites. The rarer Carex exilis and C. diandra are indicators of calcareous conditions. Carex limosa is ubiquitous, but is especially common in the flarks. Both Scirpus cespitosus and S. hudsonianus are common, especially at the mire margins with the latter found under slightly more minerotrophic conditions. The most common shrubs are Betula pumila, B. glandulosa, Kalmia polifolia, Andromeda glaucophylla, Ledum groenlandicum, Chamaedaphne calyculata, Vaccinium uliginosum, Salix pedicellaris, S. arctophila, Myrica gale, Lonicera villosa and Potentilla fruticosa. The last two species are found only in the richer areas. The diversity of herbaceous plants found on the strings increases with increasingly minerotrophic conditions, some of the more characteristic species being Solidago purshii, Aster puniceus, Habenaria dilatata, H. hyperborea, Smilacina trifolia, Tofieldia glutinosa, Triglochin maritima, Selaginella selaginoides. Menyanthes trifoliata is common in flarks under all conditions and is joined by Drosera anglica, D. rotundifolia, and Utricularia intermedia in richer sites.

Good examples of minerotrophically rich fens can be found near Greenbush Lake, near Annabel Lake, north of Astray Lake, and just west of Iron Arm of Attikanagen Lake (see appendix). Detailed studies of the relationships between the mire vegetation and water chemistry are in progress at those sites (Moore and Waterway, in preparation).

A fen just east of Goodream Lake is unusual in the Schefferville area because of the large palsa mound found at its northern end. The palsa, underlain by ice, is surrounded by fairly deep water with a thin floating mat of peat on which Carex aquatilis and Carex rostrata are codominants. The mound itself is dominated by ericaceous shrubs and a rich bryophyte and lichen flora. The bryophytes have not been studied but lichen species found here include Alectoria nigricans, A. ochroleuca, Omphalina hudsoniana, 9 species of Cetraria, 10 species of Cladonia, 3 species of Bryoria and 2 species of Parmeliopsis (S. Clayden, unpublished). The southern end of this fen is typical of rich fens with irregular string and flark topography. A few plants more typical of open tundra sites, Carex stylosa, C. nigritella, C. rariflora, and Salix herbacea are also found in this part of the fen.

A complex of poor fens and marshy lake shores occurs in the area to the east of Dolly Ridge. Patterned fens with mature spruce trees on the strings and flarks dominated by Carex oligosperma can be found here. These areas are more acidic and much poorer in vascular plant species (about 20-25 species) than the fens described above. Bryophytes have not been studied in this area. Allington's study of bogs in the Schefferville region (1961) was done in this mire complex; on the basis of

physiography only, she classified the mire types in this region into string bogs, closed strings, sedge meadows, spruce muskeg, and tamarack swamp forest. This area certainly merits further study; a quantitative study of species' compositions in this complex wetland would contribute to our understanding of this vegetation mosaic.

The vascular flora of the more uniform sedge meadows includes many of the same species as are found in the patterned fens. Willows, especially Salix pedicellaris and S. arctophila are more common than in the fens. Common in the sedge meadows are Carex aquatilis, C. pauciflora, C. paupercula, C. gynocrates, C. leptalea, C. trisperma, and C. rariflora, most of which are more characteristic of spruce-moss forests than of the patterned fens. Bryophytes form a continuous ground layer in this community but the floristic composition has not been studied.

Shorelines

Shoreline vegetation occurs along the larger rivers in the region and along lake shores. Wassen (1969) provides a good description of vegetation zonation around selected lakeshores; our own observations are limited to the Howell's River and a very few lakes in the area. Carex rostrata, C. aquatilis and C. vesicaria are the common emergent macrophytes. Hippurus vulgaris, Sparganium hyperboreum and Nuphar variegatum occur in some lakes. Isoetes echinospora occurs at its northern limit in the very nutrient poor Dolly Lake where it grows to a depth of about 4 m. Along the Howell's River shore, willows are very common, especially Salix planifolia, S. argyrocarpa and S. arctophila. Myrica gale and Alnus crispa also occur in the study zone near the shoreline. Herbaceous species occurring along shorelines include Carex aquatilis, Phleum alpinum, Juncus castaneus, Parnassia palustris var neogaea, P. kotzebuei, Pinguicula vulgaris, Triglochin palustris, Pedicularis groenlandica, Barbarea onthoceras, Geum rivale, Astragalus alpinus, Rhinanthus borealis, Alchemilla filicaulis, Primula laurentiana, Epilobium palustre, Cardamine pratensis and Polygonum viviparum.

CONCLUSION

The preliminary nature of these and earlier published narrative descriptions must be emphasized. Given the present dearth of quantitative vegetation studies at Schefferville, it is impossible to assign a particular site to anything but a very general category of vegetation. We suggest that anyone studying a particular plant or vegetation type initially spend some time exploring the area around Schefferville to define the variation in the local vegetation in which their work will be based. It will often be misleading to select a "representative" study site without preliminary surveys - the vegetation of the Schefferville region is sufficiently heterogeneous and poorly enough understood

to assure that haphazardly chosen study sites will often turn out to be unusual or unrepresentative in some way that may compromise the intended work. We have therefore provided an appendix of readily accessible sites that will serve to familiarize the investigator with the major vegetation types near Schefferville. Hopefully, increased awareness of the complexity of the local vegetation will stimulate a comprehensive analysis of the plant communities in the Schefferville region in the near future.

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APPENDIX 1

Some selected sites near Schefferville representing the major vegetation complexes

By visiting these sites an investigator can fairly quickly familiarize himself with the local vegetation. With appropriate floras in hand and the preceding descriptions, even those with limited botanic training can better appreciate the diversity of the local vegetation. Many of the sites listed are or have been study areas - please be considerate of marked plots or equipment that you may find. Both the military grid reference and the latitude and longitude are given for each site, but access roads are sometimes difficult to follow. The station manager should be consulted for advice on how to actually reach the sites and also in regard to ongoing research.

We recommend the use of the following floras to those beginning to learn the local plants: Porsild and Cody's (1980) Flora of the Northwest Territories, Porsild's (1957) Flora of the Canadian Arctic Archipelago, Britton and Brown's Illustrated Flora of the Northeastern United States and Adjacent Canada (Gleason, 1968), and Gray's Manual (Fernald, 1950). Scoggan's (1978) Flora of Canada, although mostly unillustrated, may be a useful adjunct to these manuals. Hultén's (1968) Flora of Alaska is illustrated and includes polar projection range maps that can be useful when deciding if a species is to be expected in Nouveau-Québec. Rousseau (1974) also provides range maps and detailed habitat descriptions. It is important to realize that no single volume treats plant identification in subarctic Québec, although a flora of Nouveau-Québec is presently in preparation at Laval University. For the moment one must carefully work back and forth between arctic and temperate floras to learn the vascular species of the Schefferville region.

Unfortunately, only very technical and fragmentary keys are available for the lichen and bryophyte species of this region. The beginner is advised to seek expert help on all but the few most common taxa. Jahn's (1983) beautifully illustrated guide to northern European cryptogams can be used with caution as a primer for many of the more common lichen and bryophyte genera.

Spruce-feather moss forests

1) Runway Woods: South of the Schefferville airport runway, east of the end of the cleared flight path line. 423733; 54°46'N, 66°46'W.

2) Old Cabin Woods: On the old road to Dyke Lake (Houston road) south of the Astray Landing junction. This forest is at the point where a small stream draining Leo fen crosses the road. 536607; 54°39'N, 66°33'W.

3) Osprey Creek Woods: Osprey Creek crosses the Houston road just at the bottom of the north slope ascending to the top of Houston Mountain. Follow the creek downstream to its mouth. 476683; 54°45'N, 66°41'W.

Spruce-lichen woodland - mature sites

1) Iron Arm Woodlands: The Iron Arm road in the last few kilometers before its terminus at Iron Arm Lake passes through some fine, old-growth woodlands. 508834; 54°52'N, 66°38'W.

2) Annabel Woodland: An island of mature woodland remains amid an extensive burn about 25 km north on the Annabel road from Schefferville. 264895; 54°55'N; 67°01'W.

3) Greenbush Woodland: Very fine white spruce woodlands occur just north of Greenbush exploration camp on the road to Sunny Mountain. 143945; 54°59'N, 67°12'W.

Spruce-lichen woodlands - successional sites

1) Astray Landing burn: A fire in 1972 burnt a lichen woodland on the west side of the Houston Mountain road just before the turnoff to Astray Landing. 531614; 54°40'N, 66°35'W.

2) Dyke Lake burn: On the Dyke Lake road south of Astray Landing, an older (1965?) burn has been recolonized extensively by early-successional lichens. 543605; 54°41'N, 66°34'W.

3) Silver Yards burn: Off the Menihek road just before it crosses the railroad tracks at the Silver Yard a mid-successional burn of unknown age can be found on the side road to the Old Astray Landing. 457633; 54°43'N, 66°43'W.

Subalpine heath

1) Houston Mountain: Take Houston Mountain road to the summit and then walk downslope to the west. 484669; 54°45'N, 66°40'W.

2) Geren Mountain: The road to Sunny Mountain past Greenbush and before Geren Mountain runs at tree line for some distance through an area of heath. 105985; 55°10'N, 67°15'W.

Alpine tundra

1) Irony Mountain: The road to the Howell's River ford skirts the base of Irony Mountain. One can hike to the peak through a series of tundra communities. 181852; 54°53'N, 67°09'W.

2) Sunny Mountain: The Sunny Mountain road traverses large expanses of alpine tundra including many distinct but unstudied plant communities. 123033; 55°04'N, 67°14'W.

Mires

1) Iron Arm Mire: The Iron Arm road passes through a large mire complex, including some strongly patterned fens. 578847; 54°53'N, 66°37'W.

2) Aries Fen: Due south of the Schefferville airport runway is a small fen within a few kilometers of the McGill Station. 423728; 54°46'N, 66°46'W.

3) Leo Fen: Along the Dyke Lake road not far from the Astray Lake Landing. Follow stream which crosses the road upstream to the fen. 590606; 54°39'N, 66°30'W.

4) Goodream Palsa: Just northwest of the junction of the Irony Mountain and Sunny Mountain Roads; immediately east of Goodream Lake. 203884; 54°56'N, 66°06'W.

5) Greenbush Fen: North along the stream system running through the Greenbush Exploration Camp; west of the road not far north of the camp entrance. 135948; 55°00'N; 67°13'W.

6) Annabel Fen: Out the Annabel Road; go east at the T-junction and continue north just past the Annabel Woodland study site. 265905; 54°57'N, 67°00'W.