

VEGETATION AND WATER CHEMISTRY MONITORING AND
TWENTY-YEAR FLORISTIC CHANGES AT HUFF LAKE FEN,
KANIKSU NATIONAL FOREST

by

Robert J. Bursik and Robert K. Moseley
Conservation Data Center
Idaho Department of Fish and Game

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Idaho Department of Fish and Game
600 South Walnut Street, P.O. Box 25
Boise, ID 83707
Jerry M. Conley, Director

Cooperative Challenge Cost-share Project
Idaho Panhandle National Forests
Idaho Department of Fish and Game

ABSTRACT

A vegetation and water chemistry monitoring study was initiated for Huff Lake Fen (HLF) during 1992, including placement of a permanent vegetation monitoring transect. Coverage of vascular and bryophyte species were estimated in plots placed along plot lines run perpendicular to the transect. No quantitative analysis was performed on the coverage data. These data will be used for future vegetation comparisons at HLF. Subsurface water samples were taken from three habitats in HLF along with a surface sample from the lake for chemical analysis. These data will also be used for future monitoring.

All vascular and bryophyte species encountered in 1992 were collected in order to compile a complete species list for comparison with species lists made at HLF in the early 1970's. Thirteen vascular species have apparently become extirpated at Huff Lake within the last 20 years, including three Forest Service Sensitive Species.

Photographs of HLF taken in 1973 were retaken in 1992. The major noticeable change detected from the photos was the expansion of littoral vegetation (particularly Potamogeton natans) into previously unvegetated portions of the lake.

Peatland plant species are particularly sensitive to subtle changes in water chemistry and water level. Changes in these variables may have lead to the documented floristic changes at HLF.

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INTRODUCTION

Few detailed studies exist of peatlands in the northwestern Rocky Mountains. Exceptions include a floristic and phytogeographic study of peatlands throughout this region (Bursik 1990) and a quantitative study of the plant ecology of Hager Lake Fen in northern Idaho (Rumely 1956). Bursik and Moseley (1992) reanalyzed the vegetation of Hager Lake Fen to document changes that occurred between 1952 and 1992. We found several species, including four Forest Service Sensitive and state-rare species, became extirpated from Hager Lake Fen during this period. Many species increased or decreased significantly in prominence during the 40 years, as well. Two factors, hydrological modification through ditching and prolonged drought and the oligotrophication of surface and subsurface water in the basin, appear to be responsible for these changes. The affects of logging and fire in adjacent forested stands prior to 1956 appear to be the most likely cause of lower nutrient content in waters at Hager Lake Fen (Bursik and Moseley 1992).

As was documented at Hager Lake and elsewhere in North America, many peatland taxa are sensitive to subtle changes in water table level and nutrient concentrations (Jeglum 1971; Schwintzer and Williams 1974; Vitt and Slack 1975; Slack *et al.* 1980; Glaser 1987). Peatland communities, because they are occupied by species which inhabit very specific niches within a unique habitat, are more sensitive to subtle environmental changes than are the western temperate coniferous forests at large. Biotic communities associated with peatlands can therefore provide a barometer to measure the health and stability, not only of the peatland itself, but of the ecosystem of which it is a part.

Huff Lake Fen (HLF) is an exceptional Valley Peatland system in the Priest River drainage in the Selkirk Mountains in northeastern Washington. Valley Peatlands are located throughout much of the northwestern Rocky Mountains, but are widely scattered and are rare on the landscape. The flora of Valley Peatlands is characterized by numerous boreal species whose main range is far north in central and northern Canada (Bursik 1990). Consequently, Valley Peatlands contain a disproportionately large number of rare species in Idaho and Washington (Washington Natural Heritage Program 1990; Moseley and Groves 1992).

Due to Huff Lake's location and resident population of brook trout, it has received a consistent level of trampling by fishermen during the last several decades. An unpublished report prepared for the Kaniksu National Forest (now part of the Idaho Panhandle National Forests) in 1973 outlined the botanical attributes of the "bog" communities at Huff Lake (Karg 1973). This included a checklist of vascular species along with photodocumentation of peatland communities and the impacts of fishermen on the peatland.

During cursory visits to HLF during 1991 we noticed that several species, including three regionally-designated Forest Service Sensitive Species (Carex leptalea, Nymphaea tetragona, and Scirpus subterminalis) noted by Karg (1973) and Layser (1980) were no longer present at HLF. The preexisting data for HLF (Karg 1973; Andrus and Layser 1976; and Layser 1980), though superficial and far from complete, provided the rationale to establish a long-term monitoring protocol for effects monitoring of plant communities at HLF. Floristic changes that have occurred during the last 20 years could be inferred from the vascular checklist. It was also possible to detect superficial vegetation changes by retaking the photographs of Karg (1973). This monitoring project will be used in the future to evaluate the health and stability of peatland communities and western temperate coniferous forest communities in the Priest River Valley.

Our objectives in this project were threefold: (1) given an existing vascular species list and photographs of Huff Lake, evaluate changes that have occurred at Huff Lake during the last twenty years; (2) establish a baseline qualitative and quantitative botanical and chemical inventory of Huff Lake for long-term environmental monitoring; and (3) with the help of Dr. Peter Mehringer, Washington State University, core Huff Lake peat deposits for future paleoecological study. This was a cooperative project between the U.S. Forest Service Idaho Panhandle National Forests and Intermountain Research Station, the Idaho Department of Fish and Game Conservation Data Center, and the Department of Anthropology, Washington State University.

STUDY SITE DESCRIPTION

Huff Lake is located approximately 19 km northwest of Nordman, Idaho, in Pend Oreille County, Washington, less than two km from the Idaho border (Figure 1). It occurs in a glacial kettle adjacent to Granite Creek at an elevation of 950 m above sea level. Peat cores taken at HLF in 1992 as part of a paleoecological study revealed the presence of several ash layers, including both Mazama (approximately 6700 years before present) and Glacier Peak tephras (approximately 11,700 years before present), the latter just above glacial clay and the first layers of gyttja peat (Mehringer 1992, unpublished data).

Much of the three hectares of open water consists of scattered littoral vegetation, characterized by Potamogeton natans and Nuphar polysepalum. A small band of floating mat habitat surrounds the lake on the north, south, and west sides and is characterized by Sphagnum angustifolium, S. rubellum, S. centrale, S. subsecundum, Carex aquatilis, C. limosa, C. lanuginosa and Scheuchzeria palustris. Fixed mats dominated by Carex rostrata and Spiraea douglasii surround the floating mats

Figure 1. Location of Huff Lake Fen in northeastern Washington.

in parts of the fen. Swamp and carr habitats on the north, east, and west sides of the lake are occupied by Thuja plicata, Tsuga heterophylla, Pinus contorta, and Picea engelmannii trees on high sphagnum hummocks, between which are shrub dominated areas characterized by Menziesia ferruginea, Vaccinium globulare, V. membranaceum, Rhamnus alnifolia, and Cornus stolonifera (Fig. 2). Forests surrounding Huff Lake are rather young and of mixed species composition, including Tsuga heterophylla, Thuja plicata, Pinus contorta, P. monticola, P. ponderosa, Abies grandis, and Pseudotsuga menziesii with depauperate understories.

The climate of the Priest Lake area has been described as "inland maritime" due to the prevailing westerlies, which carry maritime air masses from the northern Pacific Ocean across the northern Rocky Mountains during the winter and spring (Cooper *et al.* 1987). Mean annual precipitation for the Priest River Experimental Forest, the nearest weather station, approximately 40 km south of HLF, is 81.3 cm, most of which occurs during the winter (November through March). Snowfall accounts for more than 50 percent of the total precipitation.

METHODS

A transect was established along the west side of the lake, running 35° (generally northeast). This transect began at a large white pine snag at the southwest end of the sedge-dominated fen south of the lake (point "T"). The transect was permanently marked on either end by metal posts. One post was placed 10 m north of "T", the other post was placed 215 m north of "T", just inside the forest north of the peatland. Plot lines were run from the transect every 10 m between 10 m and 70 m north of "T". Thereafter, plot lines were located every 20 m up to and including 190 m north of "T". Plot lines were placed perpendicular to the transect on both the eastern and western sides of the transect: to the east, plot lines run at 125° up to the point of intersection with mineral soil or to the lakeward edge of littoral vegetation in open water, whichever came first; to the west, lines run at 305° if there were more than ten m between the transect and mineral soil.

A 20 cm x 50 cm plot frame was placed every meter on the plot line. Coverage of vascular and bryophyte species was read using five coverage classes (1=1-5%, 2=5-25%, 3=25-50%, 4=50-75%, 5=75-100%).

We collected voucher specimens of all vascular and bryophyte species encountered and deposited them in the University of Idaho Herbarium (ID). Voucher specimens of bryophyte species were also

deposited in the Oregon State University Cryptogam Herbarium (OSU). Taxonomy follows Hitchcock and Cronquist (1973) for vascular plants and Crum et al. (1973) for bryophytes.

Figure 2. Plant communities at Huff Lake Fen.

Karg's report (1973) included a checklist of vascular peatland species of HLF as well as vascular species of adjacent upland forests. The upland species were omitted for purposes of direct temporal comparisons of the HLF flora. Karg's checklist was far from complete. Many of the species collected by us in 1992, but not noted by Karg, were likely present in 1973. Most of the species that were present in 1973, but were absent from HLF in 1992, are distinct and unlikely to be confused with other taxa. We have assumed that Karg's identifications were correct. Although Karg (1973) did not list bryophyte species, several mosses (as well as several vascular species) were noted from HLF in other studies (Andrus and Layser 1976; Layser 1980). Layser collected extensively in northwestern Washington during the early 1970's while working on a flora of Pend Oreille County. For the purposes of this study, species noted by Layser (1980) and Andrus and Layser (1976) as being present in HLF are treated as being present in 1973.

Subsurface water samples from the floating mat, fixed mat, and marginal shrub carr communities were collected for water chemistry analysis along with a surface sample from open water just off the floating mat at the south end of the lake. Conductivity was measured on site with a YSI Model S-C-T conductivity meter. Samples were collected and kept on ice for analysis at the Water Resources Lab at the University of Idaho for macronutrients, alkalinity, and pH. Aluminum, calcium, iron, magnesium, manganese, potassium, sodium, sulfur, and zinc concentrations were measured with inductively coupled atomic emissions spectroscopy. Nitrate concentrations were measured by colorometric extraction. Orthophosphates were measured by cadmium reduction. Total alkalinity was measured by titrations of 100 ml of water sample with 0.02 N sulfuric acid after adding methyl orange indicator. Measurements of pH were made with an Allied Fischer Acumet model 815MP pH meter.

Eleven photographs taken by Karg in 1973, were retaken in September 1992.

Ten-cm diameter piston cores of peat were collected in plastic core barrels from two fixed-mat locations on the south end of HLF. The plastic core barrels were sawed to the length of sediment recovery, capped, sealed, and moved to cold storage at the Department of Anthropology, Washington State University.

RESULTS

Floristic and Vegetation Analysis

Table 1 displays plant species occurring in HLF in 1973 and in 1992. Eleven moss species were collected during 1992, including eight species of Sphagnum spp., two of which were also documented by Andrus and Layser (1976). Six conifer species were collected from HLF by Karg in 1973 and ourselves in 1992. We collected 69 species of flowering plants and ferns in 1992. Karg (1973) and Layser (1980) listed 47 peatland and aquatic flowering plants and ferns, 13 of which apparently became extirpated from HLF between 1973 and 1992. Ten of these species are noteworthy, occurring in two distinct groups: aquatic species and species specifically adapted to peatland habitats. The aquatic species include Alisma plantago-aquatica, Brasenia schreberi, Potamogeton amplifolius, Scirpus acutus, and the Forest Service Sensitive Species Scirpus subterminalis and Nymphaea tetragona. The peatland species include Carex leptalea, which is also a Forest Service Sensitive Species, Eriophorum chamissonis, Hypericum anagalloides, and Pedicularis groenlandica.

Coverage data for vegetation plots is presented in Appendix 1. No quantitative analysis has been performed on these data. These data will be used primarily for future quantitative comparisons of vegetation at HLF. We also plan to use this information at the Conservation Data Center for a comprehensive peatland vegetation classification study to be carried out at a future date.

Superficial analysis of the coverage data demonstrates that an outer fixed mat zone of HLF is dominated by Sphagnum centrale, S. angustifolium, Carex aquatilis, C. canescens, C. rostrata, and Potentilla palustris (e.g., 10-40 m north of "T"). A wetter middle fixed mat zone from approximately 40 to 60 m north of "T" is dominated by Sphagnum angustifolium and Carex limosa along with S. centrale, S. subsecundum, Kalmia microphylla, Menyanthes trifoliata, and Scheuchzeria palustris. There is a relatively abrupt transition between the inner fixed mat zone and the narrow floating mat zone, which is characterized by Sphagnum angustifolium, S. centrale, Carex lanuginosa, C. aquatilis, C. limosa, and Scheuchzeria palustris (70 m north of "T"). See Figure 2 for the general distribution of these communities within HLF.

The remainder of the plot data (from 90-190 m north of "T") covered a mosaic of habitats including marginal moat areas with shallow standing water dominated by Scirpus microcarpus and Spiraea douglasii. Swamp areas are covered by high hummocks of Sphagnum centrale and S. rubellum around trees of Tsuga heterophylla and Picea engelmannii. Open mat habitats, including floating mat areas are dominated by Sphagnum centrale, S. angustifolium, Carex lanuginosa, C. limosa, C. aquatilis, C.

rostrata, and Scheuchzeria palustris.

Table 1. Vascular and bryophyte plant species occurring at Huff Lake Fen in 1973 and in 1992. Species located in 1992 but not listed by Karg (1973), Layser (1980), and Andrus and Layser (1976) are noted as "?" in 1973 and are likely to have occurred at Huff Lake then. Species noted from Huff Lake in 1973 but not in 1992 are thought extirpated and are marked "-" for 1992. Species present in either year are marked "X". Forest Service Sensitive Species are noted with an "*"

TAXON AND AUTHOR	1973	1992
BRYOPHYTA		
<u>Calliergon stramineum</u> (Brid.) Kindb.	?	X
<u>Fontinalis neo-mexicana</u> Sull. & Lesq.	?	X
<u>Polytrichum strictum</u> Brid.	?	X
<u>Sphagnum angustifolium</u> (Russ.) Tofl.	?	X
<u>Sphagnum centrale</u> C. Jens.	?	X
<u>Sphagnum fuscum</u> (Schimp.) Klinggr.	?	X
<u>Sphagnum magellanicum</u> Brid.	X	X
<u>Sphagnum rubellum</u> Wils.	?	X
<u>Sphagnum squarrosum</u> Crome	?	X
<u>Sphagnum subsecundum</u> Nees	?	X
<u>Sphagnum teres</u> (Schimp) Angstr.	X	X
CONIFEROPHYTA		
<u>Abies lasiocarpa</u> (Hook.) Nutt.	X	X
<u>Picea engelmannii</u> Parry	X	X
<u>Pinus contorta</u> Dougl.	X	X
<u>Pinus monticola</u> Dougl.	X	X
<u>Thuja plicata</u> Donn.	X	X
<u>Tsuga heterophylla</u> (Raf.) Sarg.	X	X
ANTHOPHYTA		
<u>Agrostis scabra</u> Willd.	?	X
<u>Agrostis alba</u> L.	X	X
<u>Alisma plantago-aquatica</u> L.	X	-
<u>Alnus sinuata</u> (Regel) Rydb.	?	X
<u>Amelanchier alnifolia</u> Nutt.	X	X
<u>Arnica latifolia</u> Bong.	X	X
<u>Aster modestus</u> Lindl.	?	X
<u>Athyrium felix-femina</u> (L.) Roth.	?	X
<u>Brasenia schreberi</u> Gmel.	X	-
<u>Calamagrostis canadensis</u> (Michx.) Beauv.	X	X
<u>Carex aquatilis</u> Wahl.	X	X
<u>Carex brunnescens</u> (Pers.) Poir.	?	X
<u>Carex canescens</u> L.	X	X
<u>Carex diandra</u> Schrank	?	X
<u>Carex lanuginosa</u> Michx.	?	X
<u>Carex lasiocarpa</u> Ehrh.	X	X
<u>Carex lenticularis</u> Michx.	?	X
<u>Carex leptalea</u> Wahl.*	X	-

Table 1 continued.

TAXON AND AUTHOR	1973	1992
<u>Carex limosa</u> L.	?	X
<u>Carex muricata</u> L.	X	X
<u>Carex rostrata</u> Stokes	X	X
<u>Carex scopulorum</u> Holm	?	X
<u>Cicuta douglasii</u> (DC.) Coult. & Rose	?	X
<u>Comandra livida</u> Richards.	?	X
<u>Cornus canadensis</u> L.	X	X
<u>Cornus stolonifera</u> Michx.	X	X
<u>Drosera anglica</u> Huds.	X	X
<u>Drosera rotundifolia</u> L.	X	X
<u>Eleocharis acicularis</u> (L.) R. & S.	X	-
<u>Epilobium glandulosum</u> Lehm.	?	X
<u>Equisetum fluviatile</u> L.	?	X
<u>Equisetum palustre</u> L.	?	X
<u>Eriophorum chamissonis</u> C.A. Mey.	X	-
<u>Eriophorum polystachion</u> L.	X	X
<u>Gaultheria hispidula</u> (L.) Muhl.*	X	X
<u>Gaultheria ovatifolia</u> Gray	X	X
<u>Gymnocarpium dryopteris</u> (L.) Newm.	X	X
<u>Habenaria dilitata</u> (Pursh) Hook.	X	X
<u>Hypericum anagalloides</u> C. & S.	X	-
<u>Juncus ensifolius</u> Wikst.	X	X
<u>Juncus tenuis</u> Willd.	?	X
<u>Kalmia microphylla</u> (Hook.) Heller	X	X
<u>Ligusticum canbyi</u> Coult. & Rose	?	X
<u>Linnaea borealis</u> L.	X	X
<u>Lycopodium annotinum</u> L.	?	X
<u>Lycopus uniflorus</u> Michx.	X	X
<u>Lysichitum americanum</u> Hulten and St.John	?	X
<u>Lysimachia thyrsiflora</u> L.	?	X
<u>Menyanthes trifoliata</u> L.	X	X
<u>Menziesia ferruginea</u> Smith	?	X
<u>Nuphar polysepalum</u> Engelm.	X	X
<u>Nymphaea tetragona</u> Georgi*	X	-
<u>Potamogeton amplifolius</u> Tuckerman	X	-
<u>Potamogeton berchtoldii</u> Fieb.	?	X
<u>Potamogeton epihydrus</u> Raf.	?	X
<u>Potamogeton natans</u> L.	X	X
<u>Potentilla palustris</u> (L.) Scop.	X	X
<u>Pteridium aquilinum</u> (L.) Kuhn.	X	X
<u>Rhamnus alnifolia</u> L'Her	?	X
<u>Rubus pedatus</u> J.E. Smith	?	X
<u>Salix geyeriana</u> Anderss.	X	-
<u>Salix scouleriana</u> Barratt	?	X
<u>Salix sitchensis</u> Sanson	?	X
<u>Scheuchzeria palustris</u> L.	?	X
<u>Scirpus acutus</u> Muhl.	X	-

Table 1 continued.

TAXON AND AUTHOR	1973	1992
<u>Scirpus microcarpus</u> Presl	?	X
<u>Scirpus subterminalis</u> Torr.*	X	-
<u>Senecio hydrophilus</u> Nutt.	X	-
<u>Senecio indecorus</u> Greene	X	-
<u>Senecio triangularis</u> Hook.	?	X
<u>Smilacina stellata</u> (L.) Desf.	X	X
<u>Sparganium minimum</u> Fries	?	X
<u>Spiraea douglasii</u> Hook.	X	X
<u>Spiranthes romanzoffiana</u> Cham.	?	X
<u>Trientalis arctica</u> Fisch.*	?	X
<u>Trisetum cernuum</u> Trin.	?	X
<u>Vaccinium caespitosum</u> Michx.	X	X
<u>Vaccinium globulare</u> Rydb.	X	X
<u>Vaccinium membranaceum</u> Dougl.	X	X
<u>Vaccinium oxycoccos</u> L.*	X	X
<u>Viola glabella</u> Nutt.	X	X
<u>Viola macloskeyi</u> Lloyd	?	X

Photographs taken by Karg in 1973, along with the 1992 retake of these scenes, appear in Figures 3 through 24. Water levels appeared to be similar. Pioneer mats that formed on floating and partially submerged logs prior to 1973 were still present in 1992. There seemed to be fewer sedges and individuals of Potentilla palustris on some of these pioneer mats in 1992 (Figures 21 and 22). The major change that was discernable throughout appeared to be the expansion of the littoral zone into what were previously unvegetated portions of the lake (Figures 5 and 6; 17 and 18; 23 and 24). It is impossible to detect subtle changes in the vegetation from these photographic comparisons. Several of the photographic comparisons show that the small sphagnum-dominated pioneer mats on partially submerged logs were static or increased slightly in size during the 20 years, although they appeared to become depauperate in vascular species richness and cover (see especially Figures 7 through 10 and 19 through 24).

1973
1992

Figures 3 and 4. Photos were taken from the northwest side of the lake looking south. They demonstrate that the rate of change in a nutrient-poor fen is slow; the log in the foreground is still floating and has been colonized by mosses and sedges. The water level appears similar between 1973 and 1992.

1973
1992

Figures 5 and 6. Photos were taken from the northeast end of the lake looking south. The littoral zone apparently has expanded between 1973 and 1992, as evidenced by the presence of scattered individuals of Potamogeton natans in previously unvegetated portions of the lake.

1973
1992

Figures 7 and 8. Photos were taken of a pioneer mat growing on a partially submerged log at the northwest end of the lake. The oval mat in the center of both photos has undergone some floristic changes. In 1973 it was dominated by Calamagrostis canadensis, which is now absent, and it has increased in size. The log in the background was sparsely vegetated in 1973, and was well-vegetated with Sphagnum subsecundum and Spiraea douglasii, among other species, in 1992.

1973
1992

Figures 9 and 10. Photos were taken at the northwest end of the lake showing pioneer mats which persisted between 1973 and 1992.

1973
1992

Figures 11 and 12. Photos were taken at the south end of the fen near the pullout. They show the fixed and floating mats as well as the south end of the lake. All appears similar in this area between 1973 and 1992, although no details of the vegetation are discernable from the photos.

1973
1992

Figures 13 and 14. Photos were taken from the southwest end of the lake looking directly north along the west shore. No changes can be ascertained from these photos.

1973
1992

Figures 15 and 16. Photos are also taken from the pullout on the southwest end of the lake. The 1992 photo was taken at a different angle closer to the fen due to the regrowth of trees and shrubs between the pullout and the fen.

1973
1992

Figures 17 and 18. Photos were taken at the north end of the lake looking south. The large white pines on the southern edge of the fen, alive in 1973, were dead in 1992. Although difficult to see in the 1992 photo, scattered clumps of Potamogeton natans occur in the foreground just off the mat, an area that was unvegetated in 1973.

1973
1992

Figures 19 and 20. Photos show a pioneer mat on the west side of the lake. In 1973 the mat had been damaged by a fisherman, but by 1992 it had recovered.

1973

1992

Figures 21 and 22. Photos show the same pioneer mat as in Figures 19 and 20, however these photos were taken from the end of the log anchored to the floating mat looking directly east. Vegetation changes on this mat have occurred; there were far fewer sedges and individuals of Potentilla palustris on this mat in 1992 than in 1973. Notice also that a pioneer mat community has colonized the log in the background.

1973
1992

Figures 23 and 24. Photos were taken at the southeast end of the lake looking toward the southern pullout (in the far background). There were numerous clumps of Potamogeton natans in 1992 in the lake where there was no vegetation in 1973. Notice also the "new" or much expanded mat on the right side of the picture in the foreground.

Water Chemistry Analysis

Water chemistry data were collected from four habitats in HLF (Figure 2) and are presented in Table 2. Total alkalinity and conductivity were highest in the marginal shrub carr habitat dominated by Spiraea douglasii and Carex rostrata (22.0 mg/l and 72 mmhos, respectively). Conductivity was the lowest in open water (51 mmhos) while alkalinity was lowest in the fixed mat (7.0 ppm). Values of pH ranged from 5.8 in the fixed and floating mat habitats to 7.2 in the open water.

Two macronutrient concentrations often used to gauge trophic status to classify peatlands are calcium and magnesium. Calcium concentration was lowest in the floating mat habitat (2.0 mg/l) and was consistent (4.0 mg/l) for the other three habitats. Magnesium concentrations were below detectable limits in the floating and fixed mat habitats (0.0 mg/l), 1.3 mg/l in the open water sample, and 2.1 mg/l in the shrub carr community. Overall nutrient concentrations varied little between habitats.

Orthophosphate and nitrate levels were very low in all habitats. Given the nutrient status of the communities, the fixed and floating mats would be considered very poor fens while the shrub carr habitat is considered a poor fen. The range of water chemistry values between habitats within HLF is consistent with that described for sphagnum-dominated kettle-hole "bogs" elsewhere (Vitt and Slack 1975). Given the pH and nutrient content of surface and subsurface waters and apparent groundwater influences at HLF, it most appropriately called a fen (Jeglum 1973; Kenkel 1987; Glaser 1987), rather than a bog, which it is commonly called.

Table 2. Selected water chemistry values for four habitats in the Huff Lake Fen. Total alkalinity is measured in mg/liter as CaCO₃; conductivity is measured in micromhos, temperature is in degrees C, and all other values are expressed as mg/liter.

CHEMICAL FACTOR	OPEN WATER	FLOATING MAT	FIXED MAT	SHRUB CARR
pH	7.2	5.8	5.8	6.2
total alkalinity	11.0	11.0	7.0	22.0
conductivity	51.0	61.0	71.0	72.0
temperature	15.0	13.9	12.2	9.4
aluminum	0.0	0.1	0.2	0.4
calcium	4.0	2.0	4.0	4.0
iron	0.0	0.5	0.4	1.5
magnesium	1.3	0.0	0.0	2.1
manganese	0.0	0.0	0.0	0.1
potassium	0.7	2.0	2.0	1.3
sodium	1.3	2.0	2.0	1.6
zinc	0.0	0.1	0.0	0.0
sulfur	0.0	0.0	1.0	0.0
orthophosphates	0.0	0.1	0.1	0.1
nitrates	0.1	0.2	0.2	0.2

Coring for Paleoecological Analysis

Dr. Peter Mehringer and students from the Department of Anthropology, Washington State University, cored the fixed mat just south of the lake (Figure 2). Because the peat was coarse and fibrous they excavated two peat blocks from the upper 50 cm and began coring in the open holes. Eight drives in two cores (1.85, 2.27, 2.45, and 2.83 m long; and 1.78, 2.25, 2.73, and 2.97 m long) gave a completely overlapping sequence from 0.5 to 10.8 m depth. They recovered both Mazama and Glacier Peak tephra, and perhaps a different tawny-colored volcanic ash just 10 cm above the light-gray Glacier Peak tephra (Mehringer 1992, unpublished data).

Describing deposits of the three deepest drives revealed that some sediments in the two meters above the "tawny" tephra had been mixed and that intact beds had been tilted. The chaotic condition of these deposits could have resulted from a debris flow entering the depression in its narrow, steep-sided southern end near the coring site. Because of this disturbance, stratigraphic control has been lost in the upper parts of the cores. Coring of deposits at the widest part of the Huff Lake basin, and area of about 5.5 m of water at the north end of the lake, may be far enough away from the disturbance to yield useful cores.

Cores taken of peat deposits at Hager and Huff Lakes during 1992 will be used for future paleoecological studies of these sites. Of particular interest are an analysis of vegetation changes in situ during the last 2,000 years, the early development of the

lake/peatland complex (beginning 12,000 years before present), and the first arrival of Tsuga heterophylla and Thuja plicata, both of which are thought to have arrived approximately 2,800 years before present in the northern panhandle of Idaho (Mack et al. 1978).

DISCUSSION

Floristic changes in HLF have been substantial during the last 20 years. Thirteen species, including three regionally-designated Forest Service Sensitive Species, have become extirpated. Interestingly, several of the species that have disappeared from HLF also disappeared from Hager Lake Fen during the last forty years. These species include Alisma plantago-aquatica, Potamogeton amplifolius, Carex leptalea, and Pedicularis groenlandica (Bursik and Moseley 1992). Two other species that have disappeared from HLF decreased considerably in prominence in Hager Lake Fen (Brasenia schreberi and Scirpus acutus).

We documented changes in water chemistry at Hager Lake that included decreases in calcium, magnesium, and nitrate concentration from 1952 to 1992 (Bursik and Moseley 1992). This is likely due to the affects of forest fire and logging in the uplands surrounding the basin prior to 1956. These activities destroyed the forest vegetation and resulted in increased runoff of nutrient-rich groundwater into Hager Lake Fen. Because peatland species are adapted to very specific nutrient conditions, changes in the trophic status of fen waters would be accompanied by changes in the vegetation (Jeglum 1971; Schwintzer 1978; Wheeler et al. 1983).

Likewise, peatland species are sensitive to water levels and periodicity of flooding (Jeglum 1971; 1973). Ditching and clearing episodes have altered the hydrology of Hager Lake Fen from early in the 20th century up to the present day (the last ditching episode took place in 1988). Prolonged drought, which has affected the region for the last several years has also affected the hydrology of Hager Lake Fen. Hydrologic changes have also contributed to floristic and vegetation changes at Hager Lake Fen.

Similar changes in water chemistry and water level have likely caused the floristic changes in HLF. Through comparison of pictures we could see, for example, that water levels appeared to remain similar in Huff Lake between 1973 and 1992, yet clearly the littoral vegetation had spread to previously unvegetated portions of the lake. However, because of the paucity of pre-1992 data for HLF, the causes of documented changes are impossible to pinpoint. Future reanalysis of HLF water chemistries and vegetation will allow us to quantitatively detect changes and perhaps infer their causes. Through reanalysis we will be able to monitor the health and stability of HLF as well as the surrounding forest

communities. This will help land managers ascertain whether current management practices are compatible with the long-term survival of individual plant and animal populations, sensitive species, or even of sensitive communities, such as fens.

LITERATURE CITED

- Andrus, R.E., and E.F. Layser. 1976. Sphagnum in the northern Rocky Mountains of the United States. *Bryologist* 79(4):508-511.
- Bursik, R.J. 1990. Floristic and phytogeographic analysis of northwestern Rocky Mountain peatlands, U.S.A. Unpublished M.S. Thesis, University of Idaho, Moscow, ID. 37 pp.
- Bursik R.J., and R.K. Moseley. 1992. Forty-year floristic and vegetation changes at Hager Lake Fen, northern Idaho. Unpublished report to the Idaho Panhandle National Forest on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 32 pp.
- Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1987. Forest habitat types of northern Idaho: a second approximation. General Technical Report INT-236. Ogden UT: USDA Forest Service, Intermountain Research Station. 135 pp.
- Crum, H.A., W.C. Steere, and L. Anderson. 1973. A new list of mosses for North America, north of Mexico. *Bryologist* 76:85-130.
- Glaser, P.H. 1987. The ecology of patterned boreal peatlands of northern Minnesota: a community profile. Report 85 (7.14). U.S. Fish and Wildlife Service. 98 pp.
- Hitchcock, C.L., and A. Cronquist. 1973. *Flora of the Pacific Northwest*. University of Washington Press, Seattle. 730 pp.
- Jeglum, J.K. 1971. Plant indicators of pH and water levels in peatlands at Candle Lake, Saskatchewan. *Canadian Journal of Botany* 49:1661-1676.
- Jeglum, J.K. 1973. Boreal forest wetlands near Candle Lake, central Saskatchewan. II. Relationships of vegetation variation to major environmental gradients. *Musk-Ox* 12:32-48.
- Karg, K. 1973. Huff Lake Bog. Unpublished report prepared for the Kaniksu National Forest on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise. 27 pp.

- Kenkel, N.C. 1987. Trends and interrelationships in boreal wetland vegetation. *Canadian Journal of Botany* 65:12-22.
- Layser, E.F. 1980. Flora of Pend Oreille County, Washington. Washington State University Cooperative Extension, Pullman, WA. 146 pp.
- Mack, R.N., N.W. Ruetter, V.M. Bryant Jr, and S. Valastro. 1978. Reexamination of postglacial vegetation history in northern Idaho: Hager Pond, Bonner Co. *Quaternary Research* 10:241-255.
- Mehring, P. 1992. Unpublished data. Department of Anthropology, Washington State University, Pullman, WA.
- Moseley, R.K., and C.R. Groves. 1992. Rare, threatened and endangered plants and animals of Idaho. Second Edition. Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 38 pp.
- Rumely, J.H. 1956. Plant ecology of a bog in northern Idaho. Unpublished Ph.D. Dissertation, Washington State University, Pullman, WA. 84 pp.
- Schwintzer, C.R. 1978. Vegetation and nutrient status of northern Michigan fens. *Canadian Journal of Botany* 56:3044-3051.
- Schwintzer, C.R., and G. Williams. 1974. Vegetation changes in a small Michigan bog from 1917 to 1972. *American Midland Naturalist* 92:447-459.
- Slack, N.G., D.H. Vitt, and D. Horton. 1980. Vegetation gradients of minerotrophically rich fens in western Alberta. *Canadian Journal of Botany* 58:330-350.
- Vitt, D.H., and N.G. Slack. 1975. An analysis of the vegetation of Sphagnum-dominated kettle-hole bogs in relation to environmental gradients. *Canadian Journal of Botany* 53:332-359.
- Washington Natural Heritage Program. 1990. Endangered, threatened, and sensitive vascular plants in Washington. Washington State Department of Natural Resources, Olympia, WA.

Wheeler, G.A., P. Glaser, E. Gorham, C. Wetmore, F. Bowers, and
J. Janssens. 1983. Contribution to the flora of the Red
Lake Peatland, northern Minnesota, with special attention to
Carex. American Midland Naturalist 110:62-92.

APPENDIX 1

Coverage values for vascular and bryophyte species in plots along the permanent transect through Huff Lake Fen.

Cover Classes: 1 = 1 - 5%
 2 = 5 - 25%
 3 = 25 - 50%
 4 = 50 - 75%
 5 = 75 - 100%

"Plot Line" identifies the distance that that plot line was established along the transect north of point "T." Orientation of the plot line east or west of the transect is also noted.

"Distance of transect from upland" is a reference point to aid in relocating the transect, and refers to the position of the transect in relation to the peat-mineral soil interface.

Transect Through Huff Lake Peatland

Plot Line: 20 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)							
	16	17	18	19	20	21	22	
<i>Sphagnum centrale</i>	3	-	-	5	2	-	-	
<i>Sphagnum angustifoli.</i>	-	2	-	-	-	-	-	
<i>Calliergon stramineum</i>	3	1	2	1	-	1	1	
branched feather moss	-	-	-	2	-	-	-	
other moss spp.	-	-	-	2	-	-	-	
<i>Calamagrostis canade.</i>	-	2	-	2	2	1	-	
<i>Carex aquatilis</i>	-	-	-	-	-	2	-	
<i>Carex canescens</i>	2	2	2	1	1	-	3	
<i>Carex rostrata</i>	2	3	3	1	2	3	3	
<i>Gaultheria hispidula</i>	4	1	-	-	-	-	-	
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	
<i>Menyanthes trifoliat.</i>	-	1	1	2	-	-	-	
<i>Menziesia ferruginea</i>	2	-	-	-	-	-	-	
<i>Potentilla palustris</i>	1	-	-	-	-	-	-	
<i>Rubus pedatus</i>	2	1	-	1	-	-	-	
<i>Spiraea douglasii</i>	3	-	-	-	-	-	-	
<i>Vaccinium membranace.</i>	2	-	-	1	-	-	-	
<i>Viola glabella</i>	-	-	-	-	2	1	-	
<i>Abies lasiocarpa</i>	-	-	-	4	-	-	-	
<i>Picea engelmannii</i>	-	-	-	-	-	-	2	
<i>Tsuga heterophylla</i>	-	-	-	-	-	2	5	

Notes: Plots 16-20 are partially on a log.

Transect Through Huff Lake Peatland

Plot Line: 30 m east

Distance of transect from upland: 7.5 m east

Date: 20 July 1992

TAXON	DISTANCE FROM TRANSECT (m)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Sphagnum centrale</i>	4	3	3	-	-	5	2	-	-	-	-	-	-	2	2
<i>Sphagnum angustifoli.</i>	3	3	3	-	-	2	2	-	-	4	1	2	-	4	3
<i>Sphagnum rubellum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Sphagnum subsecundum</i>	-	-	-	2	2	-	1	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	1	1	1	-	-	1	2	-	1	1	-	1	-	1	-
<i>Fontinalis neo-mexic.</i>	-	-	-	1	1	-	1	3	-	-	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
<i>Agrostis scabra</i>	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-
<i>Calamagrostis canade.</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2
<i>Carex aquatilis</i>	-	1	1	-	-	-	-	-	2	-	-	-	-	1	1
<i>Carex canescens</i>	1	2	1	-	-	5	2	-	-	2	-	2	1	5	1
<i>Carex limosa</i>	-	-	1	-	2	-	3	3	3	3	1	-	-	-	-
<i>Carex rostrata</i>	-	1	2	2	2	1	3	3	3	3	2	3	1	2	2
<i>Equisetum fluviatile</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-
<i>Gaultheria hispidula</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
<i>Kalmia microphylla</i>	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
<i>Menyanthes trifoliat.</i>	2	2	-	1	-	-	-	1	-	-	-	-	-	2	-
<i>Potentilla palustris</i>	1	2	1	1	-	1	1	-	-	1	1	2	-	1	2
<i>Rubus pedatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Spiraea douglasii</i>	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Vaccinium membranac.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Picea engelmannii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pinus monticola</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Plots 11,13, and 15 are partly on moss-covered logs.

Transect Through Huff Lake Peatland

Plot Line: 30 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)													
	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Sphagnum centrale</i>	1	3	2	3	2	-	-	-	-	-	-	-	-	4
<i>Sphagnum angustifoli.</i>	5	4	5	4	4	1	-	5	-	1	3	2	4	3
<i>Sphagnum rubellum</i>	-	-	-	-	-	-	-	-	-	3	-	-	-	-
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	1	-	1	1	1	-	1	-	2	1	1	-	-	-
<i>Fontinalis neo-mexic.</i>	-	-	-	-	1	3	3	-	-	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	-	-	-	2	-	2	-	-
<i>Agrostis scabra</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	1	3	3	2	1	-	-	2	1	2	-	2	-	-
<i>Carex aquatilis</i>	2	-	2	2	1	1	1	2	1	4	3	-	1	3
<i>Carex canescens</i>	-	2	3	2	2	2	2	3	1	-	-	-	1	-
<i>Carex limosa</i>	-	-	-	2	1	-	2	-	-	-	-	-	-	-
<i>Carex rostrata</i>	1	1	-	-	-	-	-	-	-	-	-	4	3	-
<i>Equisetum fluviatile</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	-	-	2	4	2	-	-	-	-	-	-
<i>Gaultheria hispidula</i>	1	-	-	-	-	-	-	-	1	-	-	1	-	-
<i>Kalmia microphylla</i>	2	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	-	1	1	1	-	-	-	-	-	-	1	-	-	-
<i>Potentilla palustris</i>	2	2	2	2	2	1	2	1	2	-	1	1	2	1
<i>Rubus pedatus</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	1
<i>Spiraea douglasii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	1	-	-	-	-	-	-	-	1	-	-	-	-	-
<i>Vaccinium membranace.</i>	-	-	-	-	-	-	-	-	-	-	-	2	-	-
<i>Picea engelmannii</i>	-	4	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pinus monticola</i>	-	-	-	-	-	-	-	-	3	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	-	-	-	-	-	-	2	5	5	-	-

Transect Through Huff Lake Peatland

Plot Line: 40 m east

Distance of transect from upland: 5 m east

Date: 20 July 1992

TAXON	DISTANCE FROM TRANSECT (m)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Sphagnum centrale</i>	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
<i>Sphagnum angustifoli.</i>	1	1	2	1	3	2	1	-	-	-	3	5	5	4	4
<i>Sphagnum rubellum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
<i>Calliergon stramineum</i>	1	2	-	1	1	2	-	2	-	-	-	-	-	-	-
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Athyrium felix-femin.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex aquatilis</i>	-	1	-	1	-	-	-	3	2	-	-	-	-	-	-
<i>Carex canescens</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex limosa</i>	-	-	2	2	4	3	3	4	4	4	5	4	4	4	5
<i>Carex rostrata</i>	3	3	3	4	2	3	3	-	1	1	2	2	3	3	3
<i>Eriophorum polystach.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gaultheria hispidula</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	-	-	-	-	-	-	2	1	-	-	-	1	1	-	1
<i>Potentilla palustris</i>	1	2	4	4	3	3	2	-	-	-	1	1	1	2	-
<i>Rubus pedatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Scheuchzeria palust.</i>	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-
<i>Spiraea douglasii</i>	1	3	-	1	1	2	-	2	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Viola glabella</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Picea engelmannii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Thuja plicata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: plots 5 and 6 are on a vegetated log.

Transect Through Huff Lake Peatland

Plot Line: 40 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
<i>Sphagnum centrale</i>	1	-	-	-	-	-	-	-	5	4	-	4	3	-	3
<i>Sphagnum angustifoli.</i>	4	3	4	5	5	4	3	4	2	2	-	2	2	-	4
<i>Sphagnum rubellum</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Athyrium felix-femin.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	-	-	-	-	-	-	-	-	-	-	-	2	1	-	2
<i>Carex aquatilis</i>	1	-	-	-	-	-	-	3	-	2	4	-	2	-	3
<i>Carex canescens</i>	-	-	-	-	-	-	-	-	-	2	-	-	2	-	1
<i>Carex limosa</i>	5	4	4	3	5	4	4	2	1	2	2	1	1	-	-
<i>Carex rostrata</i>	2	3	3	-	1	2	-	2	-	-	1	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	3	2	1	2	-	2	2	-	2	1	-	2
<i>Gaultheria hispidula</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	-	2	-	-	-	2	-	-
<i>Menyanthes trifoliat.</i>	-	1	1	-	-	1	2	1	1	1	1	2	-	-	-
<i>Potentilla palustris</i>	2	1	-	1	1	2	1	3	2	2	1	2	-	-	-
<i>Rubus pedatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Scheuchzeria palust.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Spiraea douglasii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
<i>Viola glabella</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Picea engelmannii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Thuja plicata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: plots 28-30 are partly on a log.

Transect Through Huff Lake Peatland

Plot Line: 40 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)								
	31	32	33	34	35	36	37	38	39
<i>Sphagnum centrale</i>	2	-	3	1	3	-	-	-	-
<i>Sphagnum angustifoli.</i>	2	1	4	4	3	3	-	-	-
<i>Sphagnum rubellum</i>	4	-	1	-	-	2	-	-	-
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	-	-	-	-	-	-	1	2	2
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	-	-	-
<i>Athyrium felix-femin.</i>	-	-	-	-	-	-	-	3	-
<i>Calamagrostis canade.</i>	2	-	2	1	-	2	-	2	-
<i>Carex aquatilis</i>	2	3	1	4	2	4	4	4	4
<i>Carex canescens</i>	-	1	2	1	3	-	-	-	-
<i>Carex limosa</i>	-	-	-	-	-	-	-	-	-
<i>Carex rostrata</i>	-	3	2	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	2	-	-	-	-	-	-	-	-
<i>Gaultheria hispidula</i>	1	-	-	-	-	1	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	-	2	1	-	-	-	-	-	-
<i>Potentilla palustris</i>	-	1	2	2	-	-	-	-	-
<i>Rubus pedatus</i>	-	-	-	-	-	1	-	-	-
<i>Scheuchzeria palust.</i>	-	-	-	-	-	-	-	-	-
<i>Spiraea douglasii</i>	2	-	-	2	-	-	-	-	-
<i>Trientalis arctica</i>	1	-	-	1	1	2	-	-	-
<i>Viola glabella</i>	-	-	-	-	-	-	2	3	-
<i>Picea engelmannii</i>	-	-	-	-	-	-	-	-	3
<i>Thuja plicata</i>	-	-	-	-	-	-	1	-	4

Transect Through Huff Lake Peatland

Plot Line: 50 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)														
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
<i>Sphagnum centrale</i>	3	-	2	4	-	-	-	2	-	-	-	-	-	-	2
<i>Sphagnum angustifoli.</i>	4	5	5	3	5	1	-	-	1	-	4	3	-	-	4
<i>Sphagnum rubellum</i>	-	-	-	-	-	-	-	-	-	-	2	-	5	5	-
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-
<i>Calliergon stramineum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Agrostis scabra</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
<i>Carex aquatilis</i>	-	2	1	-	-	-	2	2	1	1	-	-	-	-	-
<i>Carex canescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex limosa</i>	4	3	3	2	4	4	3	3	4	2	1	-	-	-	-
<i>Carex rostrata</i>	-	-	3	2	1	-	-	-	-	-	2	-	-	-	-
<i>Carex scopulorum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum fluviatile</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	1	1	1	1	-	-	-	-	-	-	1	3	1	1	1
<i>Gaultheria hispidula</i>	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-
<i>Gaultheria ovatifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	1	3	2	1	1	-	1	-	1	2	1	2	1	2
<i>Linnaea borealis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Lycopodium annotinum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Lycopus uniflorus</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Menyanthes trifoliat.</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
<i>Menziesii ferruginea</i>	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-
<i>Potentilla palustris</i>	1	1	2	1	1	1	-	-	-	-	-	-	-	-	-
<i>Rubus pedatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Scheuchzeria palust.</i>	1	1	-	2	2	3	2	2	3	3	1	1	-	-	-
<i>Spiraea douglasii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	1	-	-	-	-	-	-	-	1	-	1	-	-
<i>Vaccinium globulare</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Vaccinium membranace.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
<i>Abies lasiocarpa</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Picea engelmannii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pinus monticola</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3

Notes: plot 43 is on a mossy log

Transect Through Huff Lake Peatland

Plot Line: 50 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)															
	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	
<i>Sphagnum centrale</i>	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	
<i>Sphagnum angustifoli.</i>	1	-	-	-	-	-	-	-	-	3	-	-	-	-	-	
<i>Sphagnum rubellum</i>	3	-	-	-	5	3	-	3	-	-	-	-	-	-	-	
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Calliergon stramineum</i>	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	
<i>Fontinalis neo-mexic.</i>	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	
other moss spp.	-	-	-	-	-	-	-	-	3	-	-	1	-	-	-	
<i>Agrostis scabra</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Calamagrostis canade.</i>	-	-	-	2	1	1	-	-	1	-	-	-	-	-	-	
<i>Carex aquatilis</i>	1	1	1	2	-	2	4	-	-	2	-	-	-	-	-	
<i>Carex canescens</i>	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	
<i>Carex limosa</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Carex rostrata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Carex scopulorum</i>	-	-	-	-	-	-	-	3	4	3	2	5	5	5	5	
<i>Equisetum fluviatile</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
<i>Eriophorum polystach.</i>	1	1	3	1	-	-	-	-	-	-	-	-	-	-	-	
<i>Gaultheria hispidula</i>	1	-	-	-	3	1	-	1	-	1	-	-	-	-	-	
<i>Gaultheria ovatifol.</i>	-	-	-	-	2	2	-	1	-	-	-	-	-	-	-	
<i>Kalmia microphylla</i>	-	1	-	1	2	-	-	-	-	-	-	-	-	-	-	
<i>Linnaea borealis</i>	-	-	-	-	-	-	-	1	1	-	-	2	-	-	-	
<i>Lycopodium annotinum</i>	-	-	-	-	-	1	-	2	1	2	-	1	-	-	-	
<i>Lycopus uniflorus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Menyanthes trifoliat.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Menziesii ferruginea</i>	-	-	-	-	2	2	-	3	-	-	-	-	-	-	-	
<i>Potentilla palustris</i>	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	
<i>Rubus pedatus</i>	-	-	-	-	-	-	2	2	1	-	-	3	-	-	-	
<i>Scheuchzeria palust.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Spiraea douglasii</i>	-	-	-	-	-	-	-	-	-	1	-	-	3	-	-	
<i>Trientalis arctica</i>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	
<i>Vaccinium globulare</i>	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	
<i>Vaccinium membranace.</i>	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	
<i>Abies lasiocarpa</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
<i>Picea engelmannii</i>	-	-	-	-	-	2	-	-	2	-	-	-	-	-	-	
<i>Pinus monticola</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Tsuga heterophylla</i>	-	-	-	-	3	4	1	5	-	2	4	2	-	-	-	

Notes: Plot 46 is partly on a log.

Transect Through Huff Lake Peatland

Plot Line: 60 m east

Distance of transect from upland: 5 m east

Date: 21 July 1992

TAXON	DISTANCE FROM TRANSECT (m)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Sphagnum centrale</i>	-	2	4	-	4	-	-	-	-	-	-	2	-	-	-
<i>Sphagnum angustifoli.</i>	3	3	2	-	-	-	3	3	-	-	-	2	-	1	-
<i>Sphagnum rubellum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Sphagnum subsecundum</i>	-	-	-	2	-	-	3	3	4	5	5	2	5	5	5
<i>Calliergon stramineum</i>	-	1	-	1	-	-	1	-	-	-	1	-	1	-	1
other moss spp.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
<i>Calamagrostis canade.</i>	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-
<i>Carex aquatilis</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Carex canescens</i>	-	1	2	3	-	1	-	-	-	-	-	-	-	1	-
<i>Carex limosa</i>	-	-	-	1	-	1	4	3	3	3	3	2	2	2	3
<i>Carex rostrata</i>	2	3	2	2	3	3	2	2	3	2	2	4	2	-	2
<i>Cicuta douglasii</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum fluviatile</i>	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-
<i>Equisetum palustre</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	2	3	-	1	-	-	-	2	3	1	2
<i>Lycopus uniflorus</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	2	2
<i>Menyanthes trifoliat.</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
<i>Nuphar polysepalum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potamogeton natans</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potentilla palustris</i>	2	-	2	2	3	3	2	2	4	4	4	3	3	3	2
<i>Scheuchzeria palust.</i>	-	-	-	-	-	-	-	-	-	1	1	-	2	3	2
<i>Spiraea douglasii</i>	4	1	2	1	3	-	-	-	1	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Viola macloskeyi</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Plots 5 and 12 are located on mossy logs.

Transect Through Huff Lake Peatland

Plot Line: 70 m east

Distance of transect from upland: 2 m east

Date: 21 July 1992

TAXON	DISTANCE FROM TRANSECT (m)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Sphagnum centrale</i>	-	4	5	4	5	5	-	5	-	5	-	-	-	-	3
<i>Sphagnum angustifoli.</i>	-	-	-	2	-	-	-	2	-	-	-	-	-	3	2
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	2	-	3	-	2	3	2	3	2
<i>Calliergon stramineum</i>	-	-	-	-	-	-	-	1	-	1	-	-	-	-	1
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
<i>Calamagrostis canade.</i>	-	2	3	2	-	-	-	-	-	-	-	-	-	-	-
<i>Carex aquatilis</i>	4	-	-	1	1	-	-	-	-	-	-	-	-	-	-
<i>Carex canescens</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex lanuginosa</i>	-	-	-	-	-	-	3	3	4	3	3	3	2	3	2
<i>Carex limosa</i>	-	-	-	-	-	-	-	-	1	-	-	-	3	2	3
<i>Carex rostrata</i>	-	-	-	1	2	3	2	2	-	-	-	-	-	-	-
<i>Drosera anglica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
<i>Equisetum fluviatile</i>	1	2	4	2	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum palustre</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	2	3	3
<i>Lycopus uniflorus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
<i>Menyanthes trifoliat.</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
<i>Nuphar polysepalum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potamogeton berchtol.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potamogeton epihydrus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potentilla palustris</i>	-	-	1	1	-	2	1	1	-	-	1	-	-	1	1
<i>Scheuchzeria palust.</i>	-	-	-	-	-	-	-	-	-	-	2	3	2	-	1
<i>Spiraea douglasii</i>	-	1	2	4	2	2	2	-	1	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
<i>Viola glabella</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-

Notes: Plot 2 is partially on a log; plots 4-6 were trampled during coring.

Transect Through Huff Lake Peatland

Plot Line: 70 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
<i>Sphagnum centrale</i>	-	-	-	-	5	3	3	5	5	5	4	5	5	4	2
<i>Sphagnum angustifoli.</i>	5	5	2	4	2	4	4	2	2	2	3	2	2	3	2
<i>Sphagnum subsecundum</i>	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
other moss spp.	2	2	1	1	1	-	-	-	-	-	1	-	-	-	-
<i>Calamagrostis canade.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex aquatilis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex canescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex lanuginosa</i>	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex limosa</i>	2	3	4	4	2	2	2	2	2	2	3	3	2	2	2
<i>Carex rostrata</i>	-	-	-	2	1	1	-	-	-	1	-	-	-	-	-
<i>Drosera anglica</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum fluviatile</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum palustre</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	3	3	2	1	2	3	2	3	2	-	-	-	-	-	-
<i>Lycopus uniflorus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	3	3	3	-	1	2	3	1	-	1	-	1	1	-	-
<i>Nuphar polysepalum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potamogeton berchtol.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potamogeton epihydrus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potentilla palustris</i>	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Scheuchzeria palust.</i>	1	1	1	2	2	2	3	1	2	2	2	3	3	2	2
<i>Spiraea douglasii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-
<i>Viola glabella</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Plots 26-30 were trampled during coring activities.

Transect Through Huff Lake Peatland

Plot Line: 70 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)														
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
<i>Sphagnum centrale</i>	4	3	2	5	3	3	2	3	4	2	4	4	3	4	4
<i>Sphagnum angustifoli.</i>	3	4	5	2	4	4	5	4	3	4	3	2	4	3	3
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	1	1	1	-	-	-	-	-	-	1	-	-	-	-	-
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
other moss spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	-	-	2	1	1	-	-	-	-	-	-	-	-	-	2
<i>Carex aquatilis</i>	-	3	3	2	2	3	1	-	2	1	3	2	2	2	2
<i>Carex canescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex lanuginosa</i>	-	-	-	-	-	-	2	2	-	1	-	-	-	1	-
<i>Carex limosa</i>	3	2	-	-	-	2	2	2	3	2	2	2	2	3	1
<i>Carex rostrata</i>	-	1	-	-	-	-	-	2	-	-	-	1	1	-	-
<i>Drosera anglica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum fluviatile</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum palustre</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Lycopus uniflorus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	-	-	-	1	1	-	-	-	1	1	1	1	-	-	1
<i>Nuphar polysepalum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potamogeton berchtol.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potamogeton epihydrus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Potentilla palustris</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Scheuchzeria palust.</i>	3	1	2	2	2	3	2	2	3	2	2	2	2	3	2
<i>Spiraea douglasii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	1	1	1	1	1	1	1	1	1	-	1	1	-	1	1
<i>Viola glabella</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Plots 31-33 were trampled during coring activities.

Transect Through Huff Lake Peatland

Plot Line: 70 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)													
	46	47	48	49	50	51	52	53	54	55	56	57	58	59
<i>Sphagnum centrale</i>	2	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Sphagnum angustifoli.</i>	4	5	5	-	-	-	-	-	-	-	-	-	-	-
<i>Sphagnum subsecundum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Fontinalis neo-mexic.</i>	-	-	-	-	-	-	-	-	-	-	-	-	2	4
other moss spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex aquatilis</i>	2	4	1	-	-	-	-	1	-	-	-	-	1	4
<i>Carex canescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex lanuginosa</i>	-	-	4	-	-	-	-	-	-	-	-	-	-	-
<i>Carex limosa</i>	2	3	1	-	-	1	1	-	-	-	-	-	-	-
<i>Carex rostrata</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera anglica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum fluviatile</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Equisetum palustre</i>	-	-	-	-	-	-	-	-	-	-	1	1	1	2
<i>Eriophorum polystach.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Lycopus uniflorus</i>	1	2	1	-	-	-	1	-	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	1	1	1	-	-	-	-	-	-	-	-	-	-	-
<i>Nuphar polysepalum</i>	-	-	-	3	4	4	4	3	3	4	3	-	-	-
<i>Potamogeton berchtol.</i>	-	-	-	-	-	-	-	-	-	2	-	-	-	-
<i>Potamogeton epihydrus</i>	-	-	-	4	3	3	3	-	-	-	-	-	-	-
<i>Potentilla palustris</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Scheuchzeria palust.</i>	2	2	2	-	-	-	-	-	-	-	-	-	-	-
<i>Spiraea douglasii</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Viola glabella</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Plots 49-59 are in the lake littoral zone (0.5 m deep) while plot 48 occurs partially on a semi-sunken, moss-covered log.

Transect Through Huff Lake Peatland

Plot Line: 90 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)													
	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Sphagnum centrale	4	4	3	3	1	3	4	3	-	2	-	2	2	-
Sphagnum angustifoli.	3	3	4	4	4	4	3	4	5	4	5	4	2	-
Sphagnum subsecundum	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calliergon stramineum	-	-	-	-	-	-	1	-	1	1	1	1	-	-
Calamagrostis canade.	-	-	-	-	-	1	1	2	1	2	-	-	-	-
Carex aquatilis	-	-	-	-	3	2	2	-	3	-	-	-	-	-
Carex brunnescens	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carex diandra	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Carex lanuginosa	-	-	1	4	3	2	-	2	3	2	3	3	2	1
Carex limosa	2	2	4	2	2	3	2	2	1	2	4	2	2	2
Carex rostrata	1	1	1	1	-	1	1	1	-	2	1	-	-	-
Cornus canadensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drosera rotundifolia	-	-	-	-	-	-	-	-	-	1	1	1	1	-
Equisetum fluviatile	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eriophorum polystach.	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Kalmia microphylla	2	2	2	1	-	-	-	-	-	-	-	-	-	-
Lycopus uniflorus	-	1	-	1	2	-	1	1	1	4	2	2	1	-
Lysimachia thyrsiflo.	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Menyanthes trifoliat.	1	1	1	2	1	-	-	1	1	2	2	1	2	1
Potentilla palustris	-	-	-	1	1	1	-	1	1	-	-	-	-	1
Scheuchzeria palust.	1	1	2	2	-	3	2	2	2	2	1	1	2	-
Spiraea douglasii	-	-	-	2	1	-	-	-	-	-	-	-	-	-
Trientalis arctica	-	-	-	-	-	1	-	-	1	-	-	-	-	-
Picea engelmannii	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tsuga heterophylla	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: The littoral zone adjacent to the mat contains a few basal rosettes of Nuphar polysepalum in ca. 2.0 m of water; plots 28 and 29 are in shallow water on the edge of the mat.

Transect Through Huff Lake Peatland

Plot Line: 110 m east

Distance of transect from upland: 1 m east

Date: 27 July 1992

TAXON	DISTANCE FROM TRANSECT (m)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Sphagnum centrale</i>	5	-	-	-	-	5	4	-	2	4	5	4	4	3	4
<i>Sphagnum angustifoli.</i>	-	2	-	-	1	-	3	5	5	2	2	2	2	2	3
<i>Calliergon stramineum</i>	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	2	4	2	2	2	1	1	2	-	-	-	-	-	-	-
<i>Carex aquatilis</i>	1	2	2	2	2	2	2	1	1	-	1	-	-	-	-
<i>Carex canescens</i>	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-
<i>Carex lanuginosa</i>	-	-	-	-	-	-	-	2	3	2	2	3	1	2	1
<i>Carex limosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex rostrata</i>	-	-	-	-	2	2	2	2	1	1	-	1	-	1	-
<i>Cicuta douglasii</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1
<i>Equisetum fluviatile</i>	1	1	-	-	1	1	1	1	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	-	-	-	-	-	-	-	-	1	2	-	1
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	-	-	1	3	3	1	-	2
<i>Lycopus uniflorus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Lysimachia thyrsiflo.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
<i>Potentilla palustris</i>	1	1	1	2	2	1	1	1	1	-	-	-	-	-	-
<i>Scheuchzeria palust.</i>	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2
<i>Scirpus microcarpus</i>	4	2	2	2	2	-	-	-	-	-	-	-	-	-	-
<i>Spiraea douglasii</i>	-	2	4	2	3	1	4	2	1	2	-	1	-	-	-
<i>Trientalis arctica</i>	2	1	1	-	1	1	1	1	1	3	2	1	-	-	1
<i>Vaccinium oxycoccus</i>	-	-	-	-	-	-	-	-	-	-	1	2	2	1	2
<i>Viola glabella</i>	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
<i>Viola macloskeyi</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Picea engelmannii</i>	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: The littoral zone off the mat is > 2.0 m deep and contains scattered individuals of Nuphar polysepalum and Potamogeton natans, however, none occur in plots.

Transect Through Huff Lake Peatland

Plot Line: 130 m east

Distance of transect from upland: 9.5 m east

Date: 27 July 1992

TAXON	DISTANCE FROM TRANSECT (m)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Sphagnum centrale</i>	5	5	5	4	5	4	5	5	3	3	2	-	-	-	-
<i>Sphagnum angustifoli.</i>	-	-	-	-	-	2	-	-	-	1	1	1	-	-	-
<i>Calliergon stramineum</i>	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-
<i>Agrostis scabra</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
<i>Athyrium felix-femin.</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	3	2	1	2	3	2	2	2	1	2	2	-	-	-	-
<i>Carex aquatilis</i>	3	1	1	-	1	2	-	-	1	2	2	-	-	-	-
<i>Carex brunnescens</i>	-	-	-	2	2	2	2	1	-	-	-	-	-	-	-
<i>Carex canescens</i>	-	1	-	1	-	-	-	-	-	-	2	-	-	-	-
<i>Carex limosa</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
<i>Carex muricata</i>	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-
<i>Carex rostrata</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
<i>Cornus canadensis</i>	-	-	-	1	1	-	-	1	2	-	-	-	-	-	-
<i>Cornus stolonifera</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
<i>Equisetum fluviatile</i>	1	1	2	1	1	1	1	1	1	1	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
<i>Gaultheria hispidula</i>	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	-	-	-	2	2	2	1	2	-	-	-
<i>Ligusticum canbyi</i>	-	-	3	-	-	1	2	1	-	-	-	-	-	-	-
<i>Linnaea borealis</i>	-	-	-	-	-	-	1	1	3	-	-	-	-	-	-
<i>Lycopodium annotinum</i>	-	-	-	3	-	-	-	-	1	-	-	-	-	-	-
<i>Menyanthes trifoliat.</i>	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-
<i>Menziesia ferruginea</i>	-	-	-	3	1	-	-	2	-	-	-	-	-	-	-
<i>Nuphar polysepalum</i>	-	-	-	-	-	-	-	-	-	-	-	-	3	4	2
<i>Potamogeton berchtold.</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
<i>Potamogeton natans</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2
<i>Potentilla palustris</i>	2	1	1	-	-	-	-	-	2	1	1	1	-	-	-
<i>Rubus pedatus</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
<i>Smilacina stellata</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Spiraea douglasii</i>	2	3	2	1	3	3	4	1	3	4	1	1	-	-	-
<i>Trientalis arctica</i>	1	1	1	1	1	-	1	2	-	-	-	-	-	-	-
<i>Vaccinium caespitosum</i>	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
<i>Picea engelmannii</i>	-	-	-	3	-	1	-	3	-	-	-	-	-	-	-
<i>Thuja plicata</i>	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tsuga heterophylla</i>	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-

Notes: plot 9 is on a log; plots 13-15 are in the lake littoral zone.

Transect Through Huff Lake Peatland

Plot Line: 130 m east (continued)

TAXON	DISTANCE FROM TRANSECT (m)										
	16	17	18	19	20	21	22	23	24	25	26
Sphagnum centrale	-	-	-	-	-	-	-	-	-	-	-
Sphagnum angustifoli.	-	-	-	-	-	-	-	-	-	-	-
Calliergon stramineum	-	-	-	-	-	-	-	-	-	-	-
Agrostis scabra	-	-	-	-	-	-	-	-	-	-	-
Athyrium felix-femin.	-	-	-	-	-	-	-	-	-	-	-
Calamagrostis canade.	-	-	-	-	-	-	-	-	-	-	-
Carex aquatilis	-	-	-	-	-	-	-	-	-	-	-
Carex brunnescens	-	-	-	-	-	-	-	-	-	-	-
Carex canescens	-	-	-	-	-	-	-	-	-	-	-
Carex limosa	-	-	-	-	-	-	-	-	-	-	-
Carex muricata	-	-	-	-	-	-	-	-	-	-	-
Carex rostrata	-	-	-	-	-	-	-	-	-	-	-
Cornus canadensis	-	-	-	-	-	-	-	-	-	-	-
Cornus stolonifera	-	-	-	-	-	-	-	-	-	-	-
Drosera rotundifolia	-	-	-	-	-	-	-	-	-	-	-
Equisetum fluviatile	-	-	-	-	-	-	-	-	-	-	-
Eriophorum polystach.	-	-	-	-	-	-	-	-	-	-	-
Gaultheria hispidula	-	-	-	-	-	-	-	-	-	-	-
Kalmia microphylla	-	-	-	-	-	-	-	-	-	-	-
Ligusticum canbyi	-	-	-	-	-	-	-	-	-	-	-
Linnaea borealis	-	-	-	-	-	-	-	-	-	-	-
Lycopodium annotinum	-	-	-	-	-	-	-	-	-	-	-
Menyanthes trifoliat.	-	-	-	-	-	-	-	-	-	-	-
Menziesia ferruginea	-	-	-	-	-	-	-	-	-	-	-
Nuphar polysepalum	3	-	-	-	-	-	-	-	-	-	-
Potamogeton berchtold.	-	-	-	-	-	-	-	-	-	-	-
Potamogeton natans	-	1	-	-	-	-	-	-	-	-	-
Potentilla palustris	-	-	-	-	-	-	-	-	-	-	-
Rubus pedatus	-	-	-	-	-	-	-	-	-	-	-
Smilacina stellata	-	-	-	-	-	-	-	-	-	-	-
Spiraea douglasii	-	-	-	-	-	-	-	-	-	-	-
Trientalis arctica	-	-	-	-	-	-	-	-	-	-	-
Vaccinium caespitosum	-	-	-	-	-	-	-	-	-	-	-
Picea engelmannii	-	-	-	-	-	-	-	-	-	-	-
Thuja plicata	-	-	-	-	-	-	-	-	-	-	-
Tsuga heterophylla	-	-	-	-	-	-	-	-	-	-	-

Notes: The littoral zone extends to 26 m east of the transect and has a few, scattered individuals of *P. natans* growing in over 2 m of water.

Transect Through Huff Lake Peatland

Plot Line: 150 m west (continued)

Date: 27 July 1992

TAXON	DISTANCE FROM TRANSECT (m)		
	16	17	18
<i>Sphagnum centrale</i>	-	-	-
<i>Sphagnum angustifoli.</i>	-	-	-
<i>Sphagnum subsecundum</i>	-	-	-
<i>Calliergon stramineum</i>	-	-	1
other moss spp.	-	-	-
<i>Agrostis scabra</i>	-	-	-
<i>Agrostis stolonifera</i>	-	-	-
<i>Athyrium felix-femin.</i>	-	-	-
<i>Calamagrostis canade.</i>	3	2	1
<i>Carex aquatilis</i>	3	3	3
<i>Carex canescens</i>	1	1	-
<i>Carex rostrata</i>	-	-	-
<i>Cornus canadensis</i>	-	-	-
<i>Drosera rotundifolia</i>	-	-	-
<i>Equisetum fluviatile</i>	1	2	1
<i>Gaultheria hispidula</i>	-	-	-
<i>Kalmia microphylla</i>	-	-	-
<i>Ligusticum canbyi</i>	-	-	-
<i>Lycopus uniflorus</i>	1	-	-
<i>Lysichitum americanum</i>	-	2	-
<i>Menziesia ferruginea</i>	-	-	-
<i>Potentilla palustris</i>	4	3	3
<i>Rubus pedatus</i>	-	-	-
<i>Scirpus microcarpus</i>	-	2	-
<i>Spiraea douglasii</i>	2	2	2
<i>Trientalis arctica</i>	-	-	-
<i>Trisetum cernuum</i>	-	-	-
<i>Vaccinium globulare</i>	-	-	-
<i>Viola macloskeyi</i>	-	-	-
<i>Thuja plicata</i>	-	-	2
<i>Tsuga heterophylla</i>	-	-	2

Transect Through Huff Lake Peatland

Plot Line: 150 m east

Distance of transect from upland: 18 m east

Date: 27 July 1992

TAXON	DISTANCE FROM TRANSECT (m)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Sphagnum centrale</i>	2	-	2	1	4	5	5	-	1	-	2	2	1	1
<i>Sphagnum angustifoli.</i>	3	-	-	2	2	2	2	4	4	5	4	3	3	1
<i>Sphagnum rubellum</i>	1	-	4	-	-	-	-	2	-	-	-	-	-	-
<i>Calliergon stramineum</i>	1	-	1	4	-	-	1	2	2	2	2	2	3	-
<i>Agrostis scabra</i>	-	-	-	3	-	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	1	-	1	1	-	-	-	-	-	-	-	-	-	1
<i>Carex aquatilis</i>	2	2	2	-	-	-	-	-	-	-	3	4	-	-
<i>Carex canescens</i>	1	2	1	1	-	-	-	-	1	-	-	-	-	-
<i>Carex lanuginosa</i>	-	-	-	-	-	-	-	-	2	1	-	1	4	1
<i>Carex limosa</i>	-	-	-	-	-	-	-	-	2	2	2	1	2	2
<i>Carex muricata</i>	2	1	-	-	-	-	1	2	-	-	-	-	-	-
<i>Comandra livida</i>	-	-	-	-	2	1	-	-	-	-	-	-	-	-
<i>Cornus canadensis</i>	-	-	-	-	1	1	1	-	-	-	-	-	-	-
<i>Drosera anglica</i>	-	-	-	-	-	-	-	1	1	-	-	-	-	-
<i>Drosera rotundifolia</i>	-	-	1	-	-	-	1	1	1	1	-	-	1	-
<i>Equisetum fluviatile</i>	-	-	2	-	-	-	-	-	-	-	-	-	-	-
<i>Eriophorum polystach.</i>	-	-	1	2	2	2	3	1	2	-	-	-	-	-
<i>Gaultheria hispidula</i>	-	-	1	-	-	2	-	-	-	-	-	-	-	-
<i>Gaultheria ovatifolia</i>	-	-	3	-	-	-	-	-	-	-	-	-	-	-
<i>Kalmia microphylla</i>	-	-	-	-	3	1	4	1	1	2	1	-	-	-
<i>Lycopus uniflorus</i>	-	1	-	2	-	-	-	-	1	1	2	3	4	1
<i>Lysimachia thyrsiflo.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Menyanthes trifoliata</i>	-	-	-	3	-	1	1	2	-	2	3	2	2	1
<i>Menziesia ferruginea</i>	-	-	-	-	1	-	-	-	-	-	-	-	-	-
<i>Potentilla palustris</i>	1	2	2	2	-	-	1	-	1	1	-	-	-	-
<i>Scheuchzeria palustr.</i>	-	-	-	-	-	-	2	2	2	2	1	-	-	-
<i>Spiraea douglasii</i>	3	1	2	-	-	-	-	-	1	-	-	-	-	-
<i>Trientalis arctica</i>	1	-	1	-	-	-	-	-	1	-	-	-	-	-
<i>Viola macloskeyi</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	-
<i>Vaccinium oxycoccos</i>	-	-	-	-	1	2	1	-	-	-	-	-	-	-
<i>Abies lasiocarpa</i>	-	-	-	-	-	2	-	-	-	-	-	-	-	-
<i>Pinus monticola</i>	-	-	-	-	5	2	-	-	-	-	-	-	-	-

Notes: Plot 14 is at the edge of the mat; littoral zone off of mat is 2.5 m deep with scattered individuals of *Nuphar polysepalum* and *Potamogeton natans*.

Transect Through Huff Lake Peatland

Plot Line: 170 m west

Distance of transect from upland: 12 m east

Date: 27 July 1992

TAXON	DISTANCE FROM TRANSECT (m)											
	1	2	3	4	5	6	7	8	9	10	11	12
<i>Sphagnum angustifoli.</i>	2	-	-	-	-	-	-	-	-	-	-	-
<i>Sphagnum squarrosum</i>	5	2	-	-	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	-	-	2	2	1	-	2	2	-	-	2	-
<i>Agrostis scabra</i>	-	-	-	-	-	1	-	-	-	-	-	-
<i>Arnica latifolia</i>	-	-	1	-	-	-	-	-	-	-	-	-
<i>Aster modestus</i>	2	1	-	-	-	-	-	-	-	-	-	-
<i>Athyrium felix-femin.</i>	-	1	1	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	3	3	3	4	4	2	3	3	4	2	2	2
<i>Carex aquatilis</i>	2	1	1	1	-	-	2	2	1	-	-	-
<i>Carex canescens</i>	-	-	-	-	2	2	1	1	-	1	-	-
<i>Carex lanuginosa</i>	-	-	-	-	-	-	-	-	2	1	-	1
<i>Carex lenticularis</i>	-	-	-	-	2	4	-	-	-	-	-	-
<i>Carex muricata</i>	1	-	-	-	-	-	-	-	-	-	-	-
<i>Cicuta douglasii</i>	-	-	-	-	1	1	-	-	-	-	-	-
<i>Equisetum fluviatile</i>	1	1	1	1	1	1	2	2	1	2	2	3
<i>Lycopus uniflorus</i>	2	1	-	1	-	1	-	-	-	-	-	-
<i>Potentilla palustris</i>	1	-	-	-	-	-	-	-	-	-	-	-
<i>Salix scouleriana</i>	-	2	2	-	-	-	-	-	-	-	-	-
<i>Scirpus microcarpus</i>	3	3	2	2	1	3	2	2	3	2	-	-
<i>Sparganium minimum</i>	-	-	-	-	-	-	-	-	-	2	2	-
<i>Spiraea douglasii</i>	2	2	1	3	1	-	1	1	2	2	4	5
<i>Trientalis arctica</i>	1	1	1	1	1	-	-	-	-	-	-	-
<i>Viola glabella</i>	-	-	-	-	-	1	-	-	-	-	-	-

Transect Through Huff Lake Peatland

Plot Line: 170 m east

Distance of transect from upland: 12 m east

Date: 27 July 1992

TAXON	DISTANCE FROM TRANSECT										
	1	2	3	4	5	6	7	8	9	10	11
<i>Sphagnum centrale</i>	-	1	-	-	-	-	-	-	-	3	1
<i>Sphagnum angustifoli.</i>	-	-	-	-	-	-	-	-	-	4	3
<i>Calliergon stramineum</i>	1	1	-	-	-	-	-	-	-	1	1
<i>Agrostis scabra</i>	1	1	-	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	-	2	-	-	-	-	-	-	-	1	-
<i>Carex canescens</i>	1	2	-	-	-	-	-	-	-	-	-
<i>Carex diandra</i>	-	-	2	-	-	-	-	-	-	-	-
<i>Carex limosa</i>	-	-	-	-	-	-	-	-	-	1	2
<i>Cicuta douglasii</i>	-	2	-	-	-	-	-	-	-	-	-
<i>Drosera anglica</i>	-	-	-	-	-	-	-	-	-	1	-
<i>Equisetum palustre</i>	-	-	1	-	-	-	-	-	-	-	-
<i>Lycopus uniflorus</i>	1	-	-	-	-	-	-	-	-	1	2
<i>Lysimachia thyrsiflo.</i>	-	-	-	-	-	-	-	-	-	1	2
<i>Menyanthes trifoliata</i>	-	-	-	-	-	-	-	-	-	2	-
<i>Nuphar polysepalum</i>	-	-	-	3	2	2	3	-	-	-	-
<i>Potamogeton berchtol.</i>	-	-	1	-	-	-	-	-	-	-	-
<i>Potentilla palustris</i>	-	2	1	-	-	-	-	-	-	1	2
<i>Scirpus microcarpus</i>	2	2	-	-	-	-	-	-	-	-	-
<i>Viola macloskeyi</i>	-	-	-	-	-	-	-	-	-	-	1

Notes: Plot 3 partially in littoral zone; no plants occur in plots 8 and 9, littoral zone continues past plot 11 in ca. 2.5 m of water with scattered individuals of *Nuphar polysepalum* and *Potamogeton natans*; plots 10 and 11 are on a small island of moss growing on a partially submerged log.

Transect Through Huff Lake Peatland

Plot Line: 190 m east

Distance of transect from upland: 8.5 m east

Date: 27 July 1992

TAXON	DISTANCE FROM TRANSECT (m)											
	1	2	3	4	5	6	7	8	9	10	11	12
<i>Sphagnum centrale</i>	-	-	-	-	-	-	3	-	-	-	-	1
<i>Sphagnum angustifoli.</i>	-	-	-	-	1	-	-	-	-	-	-	2
<i>Sphagnum squarrosum</i>	-	-	-	4	-	-	-	-	-	-	-	-
<i>Calliergon stramineum</i>	2	3	-	-	-	-	-	-	-	-	-	-
<i>Agrostis scabra</i>	-	1	-	-	-	-	-	-	-	-	-	-
<i>Agrostis stolonifera</i>	-	-	-	1	-	-	-	-	-	-	-	-
<i>Calamagrostis canade.</i>	2	2	1	2	-	-	-	-	-	-	-	-
<i>Carex aquatilis</i>	2	-	-	-	2	-	-	-	-	-	-	-
<i>Carex canescens</i>	-	-	-	-	-	1	-	-	-	-	-	-
<i>Carex lasiocarpa</i>	-	-	-	-	-	-	-	-	-	-	-	2
<i>Carex limosa</i>	-	-	-	-	1	-	-	-	-	-	-	2
<i>Carex muricata</i>	-	-	-	-	1	-	-	-	-	-	-	-
<i>Equisetum palustre</i>	2	2	2	-	-	1	1	1	-	-	-	-
<i>Gymnocarpium dryopte.</i>	-	-	1	-	-	-	-	-	-	-	-	-
<i>Lycopus uniflorus</i>	1	-	-	2	-	-	2	-	-	-	-	-
<i>Lysichitum americanu.</i>	-	1	-	-	-	-	-	-	-	-	-	-
<i>Lysimachia thyrsiflo.</i>	-	-	-	-	-	-	-	-	-	-	-	1
<i>Menyanthes trifoliata</i>	-	-	-	-	1	-	-	-	-	-	-	-
<i>Menziesia ferruginea</i>	-	-	2	-	-	-	-	-	-	-	-	-
<i>Nuphar polysepalum</i>	-	-	-	-	-	-	3	3	2	-	-	-
<i>Potentilla palustris</i>	1	2	3	3	2	-	-	-	-	-	-	1
<i>Scirpus microcarpus</i>	3	2	3	4	2	-	-	-	-	-	-	-
<i>Senecio triangularis</i>	-	2	-	-	-	-	-	-	-	-	-	-
<i>Smilacina stellata</i>	1	1	1	1	-	-	-	-	-	-	-	-
<i>Spiraea douglasii</i>	2	3	4	-	1	-	-	-	-	-	-	-
<i>Trientalis arctica</i>	1	1	-	-	-	-	-	-	-	-	-	-
<i>Viola macloskeyi</i>	-	-	-	-	-	-	1	-	-	-	-	-

Notes: Plots 10 and 11 are in an unvegetated portion of the littoral zone; plot 12 is on an island of moss growing on a partially submerged log; beyond plot 12 the littoral zone continues with few, scattered individuals of *Nuphar polysepalum* and *Potamogeton natans*.