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The Newsletter of the Alberta Native Plant Council

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Wetlands

Taking the mystery out of these mysterious ecosystems

Markus N. Thormann and David A. Locky

It was not long ago that many people believed wetlands to be wastelands, harbours of disease, and places worthy only of draining for other land uses. Fortunately, during the last 10–20 years, public and even political opinion has turned in favour of wetlands, with an understanding of the importance of wetlands from both social and ecological perspectives. For example, wetlands play a role in transforming the landscape (removing pollution, slowing erosion), act as a source (of water, certain kinds of sediment, plants, animals, peat, and gases), and as sinks (for flood control/water augmentation, organic matter, and carbon) (Mitsch and Gosselink 2000). Many readers will know that wetlands are unique environments and often

contain the greatest comparative diversity of organisms, including plants, animals, and fungi, many of which show fidelity to only wetlands and consequently are rare.

Wetlands are found throughout Canada, covering sixteen percent of the landscape (approximately 130 million hectares), more than in any other country (National Wetlands Working Group 1988). Eighteen percent of Alberta is covered with wetlands (Vitt *et al.* 1996), including all five wetland classes found in Canada: bog, fen, swamp, marsh, and shallow water wetland. How exactly does one define a wetland and differentiate among wetland

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A brave new executive...



Some of the members of the 2001–2002 ANPC Executive at our AGM in Lethbridge. Look for a summary of the 2001 AGM in the next issue of *Iris*. L–R: Jim Posey, Ed Karpuk, Dave Downing, Ken Sanderson, Elisabeth Beaubien, Jane Lancaster, Elaine Gordon, Mryka Hall-Beyer, Linda Kershaw, and Lorna Allen.

Crested wheatgrass invasion in native prairie

Dana Bush*

AXYS Environmental Consulting Ltd.

Crested wheatgrass (*Agropyron cristatum* (L.) Gaertn.) has long been favored as a persistent, drought resistant, agronomic grass. It was instrumental in revegetating the prairies after the 1930's drought, and is still used by farmers, ranchers, transportation and city parks departments. Although not as rampantly invasive as smooth brome in the fescue prairie, crested wheatgrass has been noted to invade native prairie, and many people are questioning whether we should be using it in prairie reclamation. Unfortunately, there are few published accounts documenting crested wheatgrass invasion.

Most information about crested wheatgrass invasion in the Canadian Prairies is anecdotal. Suzanne Gill (Public Lands) states that she observed crested wheatgrass invading native prairie 15 to 20 feet (4.5–6 metres) past a fenceline on Highway 524 in southern Alberta. A. Hammermeister (Saskatchewan Native Plant Council) observed tussocks of crested wheatgrass in native prairie adjacent to pipeline rights-of-way in southern Alberta. He noted that crested wheatgrass doesn't appear to invade in waves like smooth brome does, but as individual plants. However, he also notes that he has seen a number of pastures and wellsites where invasion into the surrounding prairie was not apparent. Grassland National Park has extensive fields of crested wheatgrass planted in the 1930's and roadsides planted in the 1960's. According to Adrian Sturch of Grasslands National Park you can now find crested wheatgrass anywhere in the park, especially in the west block. He has observed clear seeding patterns where windblown seed from crested wheatgrass planted on high buttes has invaded native prairie downwind.

In an attempt to document crested wheatgrass invasion, we counted the number of crested wheatgrass plants

along the proposed AEC pipeline running along the north edge of the Suffield Military Base, during a rare plant survey conducted in July 2000. Every 500 metres, a 15 by 15 metre plot adjacent to the ditch of Kangaroo Rat Road was surveyed for crested wheatgrass. The number of tussocks were counted, and the furthest tussock was measured from the roadside. Once the survey began, it became evident that several locations had parallel pipelines adjacent to the road, or were disturbed by military activity. From then on, data sites were distinguished between unbroken native prairie and disturbed ground.

Although this was not a statistically analysable study, several observations were clear. Crested wheatgrass readily invades disturbed ground. We saw an average of 53 plants in a 15-m² area on old pipelines and disturbances and more than 100 plants were found surrounding a small rock dump. These sites did not appear to have been seeded to crested wheatgrass.

Unbroken prairie appears to be more resistant to crested wheatgrass invasion. Occasional tussocks (less than one per 15-m² plot) were observed in unbroken prairie. These were frequently associated with disturbances such as animal burrows, rock piles or tank tracks.

One section of the survey went through a recently burned site. The spring vegetation cover was extremely small. By summer the cover was approximately 20–30 percent. The native grasses and forbs were green but had not flowered, however, the crested wheatgrass plants were all in flower. In addition, there were numerous tank tracks throughout the area, providing good germination sites. I



suspect that a fire combined with disturbed ground and good moisture the following year could lead to a sharp increase in crested wheatgrass invasion.

Our conclusions are that native dry mixed grass prairie is relatively resistant to crested wheatgrass invasion, providing the prairie has not been disturbed. It may seed itself into animal burrows, but it is generally confined to occasional rogue plants. In disturbed prairie, however, crested wheatgrass rapidly invades. This means that new pipelines that are run parallel to older pipelines seeded with crested wheatgrass are likely to be invaded, resulting in a 60 m stretch of crested wheatgrass rather than the expected 30 metre width plus 30 metres of reclaimed native prairie. Current regulations recommend that pipelines should be placed adjacent to existing

disturbances to avoid disturbing new stretches of unbroken prairie. This policy should be carefully considered in light of new evidence about

crested wheatgrass invasion.

**With assistance from Tiffanie Billey (AXYS Environmental Consulting Ltd.) and Jane Lancaster (Kestrel Research)*

Table 1. Number of crested wheatgrass tussocks per plot on undisturbed and disturbed prairie.

	Undisturbed	Disturbed
# of tussocks	77	1178
# of plots	90	22
tussocks/plot	0.85	53

Conserving Nature in the Edmonton Region

September 21–23, Grant MacEwan Community College

Patsy Cotteril

The Edmonton Natural History Club is sponsoring a conference that aims to explore some issues surrounding conservation of natural areas in urban settings in general, and in Edmonton in particular. The conference kicks off with a keynote presentation on Friday night, September 21, given by Randall Arendt, a conservation planner from Rhode Island, USA, who will speak on *Creative Development Design as a Tool for Protecting Conservation Lands*. On Saturday, Dr. Ross Wein of the University of Alberta will speak on the importance of green corridors in forming a network of conserved areas. Calgary's Bernard Amell will discuss *Natural Processes and Urban Form: Can a Modern City Support Healthy Ecological Functions?* and, to set the scene from the natural history point of view, Derek Johnson of the Canadian Forest Service will describe ecosystems in the Edmonton region.



To examine the more political/administrative aspects of conservation, there will be presentations by City of Edmonton Planning & Development and Community Services staff, followed by a workshop and a panel discussion to discuss issues and processes in greater depth. Other presentations will include examples of successfully conserved areas and management approaches, as well as other initiatives to maintain nature in the city, such as naturalisation of schoolyards.

Naturalist/interpreter/photographer Chris Fisher will speak at the banquet supper on Saturday evening, during which a representative of the Federation of Alberta Naturalists will present the Loran L. Goulden Award. The conference will conclude on Sunday with a field trip

by bus to selected natural areas in the city.

Prior to the conference posters on natural history and conservation themes will be on display at City Hall, as well as during the conference at the main venue, Grant MacEwan Community College downtown campus.

The cost of the conference is quite modest: \$15 for the keynote presentation and \$35 for Saturday events except the banquet supper which is \$20. The field trip on Sunday is free. Registrants for the full package (\$50) will receive a \$15 discount if they register before September 1st. The registration package will include a "conservation handbook" that will indicate ways in which to participate in urban conservation initiatives. In addition, the ENHC plans to publish a proceedings of the conference by the end of the year.

To register, contact Dave Stepnisky at (780) 434-0374 or Tanya Hope at (780) 430-4218, or visit <www.enhc.com>. We look forward to seeing you there!

Wetlands, from page 1

classes?

Definition and wetland classification

According to the Canadian Wetland Classification System (National Wetlands Working Group 1988), a wetland is defined as: *land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment*. Wetlands can be divided into two general categories based on peat depth: (1) mineral wetlands, with no peat or less than 40 cm of peat, and (2) organic wetlands or peatlands, which have 40 cm or greater peat depth (Figure 1).

Peatlands can be classified into ombrotrophic bogs, minerotrophic fens and swamps. Ombrotrophic ecosystems receive water and nutrients solely from precipitation and are separated from the underlying water table, while minerotrophic ecosystems receive nutri-

ents from precipitation as well as ground and surface water flow. Fens can be subdivided into poor and rich fens, while rich fens can be further subdivided into moderate-rich and extreme-rich fens. Peatlands are distinguished from non-peat forming wetlands, such as marshes, minerogenous swamps, and shallow open waters, by the presence of a well-developed moss stratum and relatively stable water levels throughout the year in the former. In Alberta, the division between the boreal and prairie zones is generally considered to coincide with the more northern peatlands and southern mineral wetlands. The wetland classes can be described as follows (National Wetlands Working Group 1997):

Bog: A peatland receiving water exclusively from precipitation, no groundwater influence, and dominated by *Sphagnum* mosses. Although groundwater does not influence the vegetation, the water table is generally high due to the

large water-holding capacity of *Sphagnum*. Bogs can be open, open with mostly ericaceous shrubs, or treed with black spruce (*Picea mariana*).

Fen: A peatland receiving water rich in dissolved minerals and varying dominant vegetation, e.g. treed, not treed, but generally including graminoid species and mosses. Fens are the most variable wetland class and can range from sedge (*Carex*)-dominated meadows that could be confused with graminoid marshes, to *Sphagnum*-dominated systems similar to bogs. The key concept is the influence of ground and surface waters, however minimal. Fens can traverse a number of gradients, including extreme-rich to poor, treed or not treed. Fens are often associated with bogs, especially in northern Alberta where peatland complexes dominate the landscape.

Swamp: Peatland or mineral wetland,

See **Wetlands**, page 5

Book Review

Naturescape Alberta

Creating and caring for wildlife habitat at home

Myrna Pearman & Ted Pike

Published by the Red Deer River Naturalists and the Federation of Alberta Naturalists

Reviewed by Elaine Gordon

There are several hundred landscaping books on the market, a large percentage of which give excellent advice on converting personal space into works of art. I personally have a substantial investment in a number of them that are now, as we speak collecting dust on my bookshelves. Should I want to build a waterfall in my backyard, the advice to do so is as close as the nearest greenhouse or hardware super-box store, complete with workshops and how-to videos. Television programs and expert personnel bombard us with technical guidance like preachers saving sinners.

So with all the resources available, why should anyone want to include Myrna Pearman and Ted Pike's *Naturescape Alberta* in their repertoire? Well, for starters, most gardening handbooks focus on establishing landscapes that serve a human purpose or are merely pleasing to look at. In other words, they focus on practical landscapes with only humans in mind. *Naturescape Alberta*, on the other hand, focuses on establishing pleasing and practical landscapes that also serve as an oasis for wildlife with an opportunity to expand this haven to include entire neighbourhoods. In other words, how to have your barbecue pit and a hummingbird garden thrown in as well. Bonus!

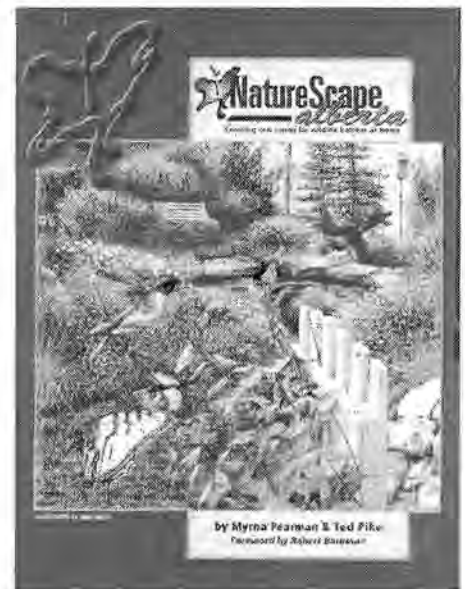
I guess I had some preconceived ideas about the plants involved, because my immediate reaction was "how can it be a "naturescape" unless native plants and only native plants are used?". Of course, I quickly realized that this approach would be really foolish. To make naturescaping successful, the choice of using cultivated plants **must** be included in the overall scheme of things. Almost everyone who does any gardening has her/his favourites and the authors thoughtfully include these in their designs. Nothing will turn off the average gardener faster than being told that they must or must not use a

particular plant (unless it's invasive). Also, in established gardens, cultivated plants (other than monocultures) can and will work to attract a wide variety of wildlife and, of course, native species can be easily and successfully incorporated.

The style of writing especially sets this book apart from other gardening tomes. Clearly, the authors love their subject. So do most other gardening authors, but Pearman and Pike write with a warmth that you don't find in your average "how to" book. For example, the average gardening book usually gives tips on getting rid of Creepy Crawlies à la Malathion; Pearman and Pike inspire you to love them, welcome them, nurture and cherish them. At the same time they offer safe methods of controlling insects, algae and other critters that may tend to overdo their welcome.

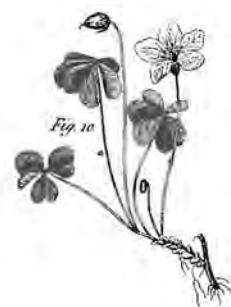
The importance of attracting a wide variety of wildlife by establishing safe places for them is emphasised throughout the book. Pearman and Pike hit the mark with the concept that dead trees, old lumber, generally, the unmanicured yards add hiding places and food sources for wildlife, and are far more interesting than a sterilized, manicured, weed-free lawns drenched in fertilizers, pesticides and other chemicals. What better environment for fertile young minds to experience, explore, look and learn to love nature first hand than living with it and in it.

The wealth of information in the Appendices alone is worth the price of the book. I was especially impressed by the Wildlife Value columns in the Plant section and, likewise the lists of butterflies and birds and the plants that attract each species. The list of resources provides avenues to follow up and enhance newly found interests. Your yard can even be certified with *Naturescape Alberta* by supplying a list of the wildlife you have successfully attracted.



While reading *Naturescape Alberta*, I was trying very hard to be critical. This was a much more difficult task than I thought, because there is really very little that I would change. Perhaps adding a few line drawings of some structures, such as sori on fern leaves might be helpful. A definition of body length in Chapter 11 might clarify whether body length includes head, thorax and abdomen, or only thorax and abdomen. On Page 48, I found the first sentence in the reference to photosynthesis a little confusing because it seems to imply that proteins are a product of photosynthesis, which is not true, although photosynthesis certainly produces the energy source for the production of proteins and other cellular requirements.

Gardening books may be sprouting everywhere, but *Naturescape Alberta* is a real gem. Myrna and Ted, thank you!! The Red Deer River Naturalists have a winner with this publication.



Wetlands, from page 3

but generally with flowing or standing mineral-rich waters for part of the year and dominated by woody and herbaceous plants. Mineral swamps in Alberta are often dominated by alder (*Alnus*) and willow (*Salix*) shrub species and are located in riparian zones, whereas peatland swamps are dominated by closely spaced *Picea mariana* and feather mosses.

Marsh: Peatland or mineral wetland that is periodically to persistently wet. The water is circumneutral to alkaline, and nutrient-rich. The dominant vegetation are graminoids, emergent plants and forbs, with some shrubs at the periphery. In Alberta, marshes are common on the prairie and they are often associated with sloughs (small bodies of water).

Shallow Water Wetland: Mineral wetlands with water up to 2 metres deep and present for most of the year. Less than 25% of the surface water area is covered by the dominant vegetation of submerged aquatic and emergent plants and some woody species. In Alberta, these wetlands are often associated with prairie marshes, but are also found in northern peatland complexes.

Understanding peatlands

A more thorough understanding of peatlands can be obtained by examining the original defining criteria of these ecosystems. Originally, Tuomikoski (1942) and DuRietz (1949) classified peatlands according to the number of moss "indicator species". These are species that can be found consistently in the same type of peatland. They determined that bogs and poor fens have a low number, while rich fens have a larger number of characteristic bryophyte species. Bogs and poor fens are dominated by species of *Sphagnum* (peat mosses of the class Sphagnopsida), while rich fens are dominated by "brown mosses" (true mosses of the class Bryopsida), such as *Drepanocladus*, *Scorpidium*, and *Tomenthypnum*. Table 1 summarizes some of the more common vascular and non-vascular plant species of western continental wetlands, keeping in mind that there are many more plant species common to wetlands in this

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If you have an announcement, article or other items, you are invited to submit it to the editor for publication. Items concerning native plants will be given the highest priority.

The editors reserve the right to edit submissions, but will review changes with the authors whenever possible. Disputes will be resolved in favour of the audience.

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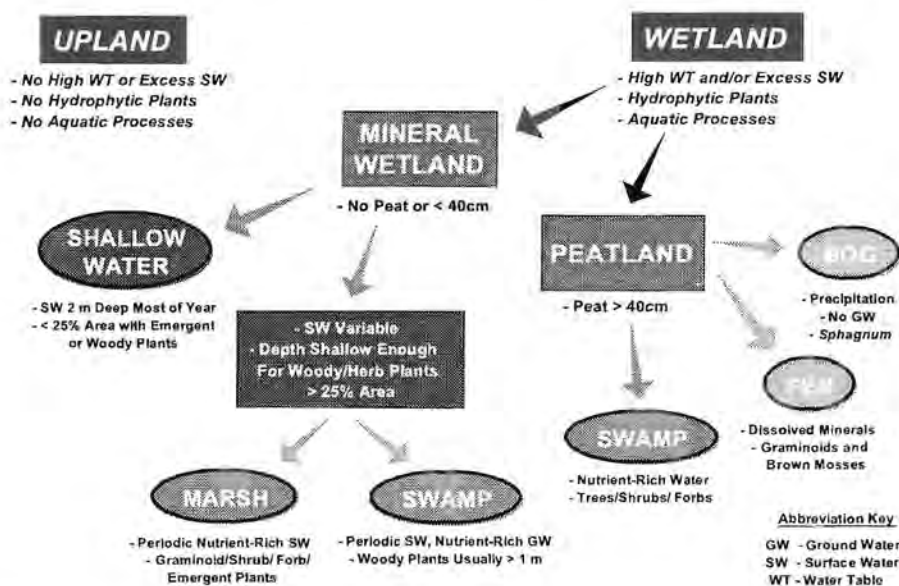


Figure 1. Generalized Canadian classification key to the five wetland classes. Based on hydrology, peat occurrence and depth, and vegetation. Swamp and marsh wetland class can be mineral wetland or peatland. Adapted from National Wetlands Working Group (1997).

region and that wetlands in other regions, e.g. in eastern Canada or Europe, have substantially different plant communities.

Sjörs (1950, 1952) overlaid a chemical gradient onto the vegetation gradient, focussing on pH and conductivity of the surface water. Therefore, along this vegetation-chemical gradient, bogs are highly acidic and are dominated by oligotrophic species of *Sphagnum*, poor fens are less acidic and are dominated by mesotrophic species of *Sphagnum*, and rich fens are slightly acidic to alkaline and are dominated largely by brown mosses (Table 1). Over the years, this increasing gradient of pH and conductivity along the bog-poor fen-rich fen gradient has been erroneously applied to include other surface water nutrients, such as nitrate, ammonium, and phosphorus, when indeed all peatlands have similar concentrations of these nutrients in their surface water (Vitt 1994).

In contrast, non-peat forming wetlands are eutrophic, that is, they have higher surface water concentrations of nitrate, ammonium, and phosphorus than oligotrophic and mesotrophic bogs and fens. Furthermore, their water levels

fluctuate significantly throughout the year, hindering the establishment of a well-defined bryophyte stratum and favouring the establishment of emergent plants, such as species of sedge (*Carex*), cat-tail (*Typha*), rush (*Scirpus*), and canary grass (*Phragmites*) (Table 1). Although

generally considered non-peat forming wetlands (National Wetlands Working Group 1997), some marshes do form peat; however, their peat consists of vascular plant remains, in contrast to bryophyte-derived peat in bogs and most fens, and is not evenly distributed throughout the wetland. For example, the Florida Everglades is a large expanse of swamps and marshes often with significant peat deposits. Similarly, many marshes in central Alberta contain significant peat deposits and should be considered peatlands (Thormann and Bayley 1997). However, further research is required to determine the extent of peat in marshes elsewhere.

Wetland classification is by no means a clearly defined process and indeed still a contentious issue (see Bridgman et al. 1996). While technical by necessity, this classification system has provided a common language for our wetlands that is usable by all. For example, Wagner Bog (now Wagner Natural Area, west of Edmonton) is not really a bog but a peatland complex consisting of small extreme-rich fens (characterized by mud ponds) and bogs. There are countless other examples of this mislabelling or uncertainty regarding differentiation among wetlands, for example, the term "muskeg" appears on many labels of plant

Wetlands to See in Alberta

Edmonton's unique location in the transition zone between the northern prairie and southern boreal regions makes it an ideal centre from which to visit examples of all five wetland classes in Alberta. The shallow water wetlands and marshes of the prairies give way to the peatlands of the boreal region, although you can certainly find mineral wetlands north and isolated peatlands in the south. Some sites to explore:

Bleak Lake peatland complex, approximately 17 kilometres southwest of Athabasca. This is a good place to see bogs, moderate-rich fens and rich fens. Take the first eastbound road north of Perryvale (approximately 100 kilometres north of Edmonton on Highway 2). The wetlands are found 5–15 kilometres north and south along Perryvale Road.

Wagner Natural Area, west of Edmonton, 1 kilometre south of Calahoo. This is a good place to see extreme-rich fens

Swamps: common in riparian areas throughout Alberta.

Marshes and shallow water wetlands: Found around sloughs in southern Alberta and in association with other wetland classes in northern Alberta.

specimens in many herbaria, because the collector was unable to classify the type of wetland from which a particular plant was collected.

From a botanist's perspective, learning more about wetland identification can be very beneficial. For example, peatlands, particularly fens, are probably the best areas to look for orchids in Alberta.

Markus Thormann recently completed his Ph. D. in Ecology and Environmental Sciences at the University of Alberta. His field of research is wetland plant ecology with emphasis on decomposition dynamics, nutrient cycling, and microfungus communities.

David Locky is a Ph. D. candidate in Ecology and Environmental Sciences at the University of Alberta. His field of research is wetland ecology with emphasis

on wetland delineation, effects of disturbance, and plant and avian communities.

Literature cited

- Bridgman, S. D., Pastor, J., Janssens, J. A., Chapin, C., and Malterer, T. J. 1996. Multiple limiting gradients in peatlands: a call for a new paradigm. *Wetlands* 16: 45-65.
- DuRietz, G. E. 1949. Huvidenheter och huvidgräns I Svensk myrvegetation. Summary: Main units and main limits in Swedish mire vegetation. *Svensk Botanisk Tidskrift* 43: 274-309.
- Mitsch, W. J., and Gosselink, J. G. 2000. *Wetlands*, 3rd edition. John Wiley & Sons, Inc., New York, NY.
- National Wetlands Working Group. 1997. The Canadian Wetland Classification System, 2nd edition. Warner, B. G. and C. D. A. Rubec (eds.). Wetlands Research Centre, University of Waterloo, Waterloo, Ont.

- Sjörs, H. 1950. Regional studies in north Swedish mire vegetation. *Botaniska Notiser* 1950: 174-221.
- Sjörs, H. 1952. On the relation between vegetation and electrolytes in north Swedish mire waters. *Oikos* 2(1950): 242-258.
- Szumigalski, A. R., and Bayley, S. E. 1997. Net aboveground primary production along a peatland gradient in central Alberta in relation to environmental factors. *Écoscience* 4: 385-393.
- Thormann, M. N., and Bayley, S. E. 1997. Aboveground plant production and nutrient content of the vegetation in six peatlands in Alberta, Canada. *Plant Ecology* 131: 1-16.
- Tuomikoski, R. 1942. Untersuchungen über die Untervegetation der Bruchmoore in Ostfinland. I. Zur Methodik der pflanzensoziologischen Systematik. *Annales Botanici Societatis Zoologicae Botanicae Fennicae 'Vanamo'* 17: 1-203.
- Vitt, D. H. 1994. An overview of factors that influence the development of Canadian peatlands. *Memoirs of the Entomological Society of Canada* 169: 7-20.
- Vitt, D. H., and Chee, W.-L. 1990. The relationship of vegetation to surface water chemistry and peat chemistry in fens of Alberta, Canada. *Vegetatio* 89: 87-106.
- Vitt, D. H., Halsey, L. A., Thormann M. N., and Martin, T. 1996. *Peatland Inventory of Alberta Phase 1: Overview of Peatland Resources in the Natural Regions and Subregions of the Province*. Alberta Peatland Resource Centre, Edmonton, Alta. Publication 96-1.

Table 1. Some typical bryophyte indicator species and vascular plants of western continental wetlands in Alberta

Wetland class	Mosses	Vascular plants
Bogs	<i>Sphagnum angustifolium</i> <i>S. cuspidatum</i> <i>S. magellanicum</i> <i>S. nemoreum</i> <i>S. fuscum</i>	<i>Andromeda polifolia</i> <i>Chamaedaphne calyculata</i> <i>Picea mariana</i> <i>Rhododendron groenlandicum</i> <i>Vaccinium vitis-idaea</i>
Poor fens	<i>Aulacomnium palustre</i> <i>S. exannulatus</i> <i>S. jensenii</i> <i>S. papillosum</i> <i>S. riparium</i>	<i>Andromeda polifolia</i> <i>Betula pumila</i> <i>Carex</i> spp. <i>Menyanthes trifoliata</i> <i>Salix</i> spp.
Moderate-rich fens	<i>Brachythecium mildeanum</i> <i>Calliergonella cuspidata</i> <i>Drepanocladus aduncus</i> <i>D. vernicosus</i> <i>Tomenthypnum nitens</i>	<i>Betula pumila</i> <i>Carex</i> spp. <i>Larix laricina</i> <i>Menyanthes trifoliata</i> <i>Salix</i> spp.
Extreme-rich fens	<i>Scorpidium scorpioides</i> <i>D. revolvens</i> <i>T. nitens</i> <i>Campylopus stellatus</i> <i>Sphagnum warnstorffii</i>	<i>Betula</i> spp. <i>Carex</i> spp. <i>Muhlenbergia glomerata</i> <i>Salix</i> spp. <i>Triglochin</i> spp.
Mineral swamps	<i>Climacium dendroides</i> <i>Plagiomnium cuspidatum</i> <i>P. ellipticum</i>	<i>Alnus</i> spp. <i>Betula</i> spp. <i>Calamagrostis</i> spp. <i>Carex</i> spp. <i>Salix</i> spp.
Peatland swamps	<i>Hylocomnium splendens</i> <i>Pleurozium schreberi</i> <i>Ptilium crista-castrensis</i> <i>S. warnstorffii</i>	<i>Alnus</i> spp. <i>Betula</i> spp. <i>Calamagrostis</i> spp. <i>Carex</i> spp. <i>Salix</i> spp.
Marshes	absent	<i>Carex</i> spp. <i>Lemna</i> spp. <i>Phragmites</i> spp. <i>Scirpus</i> spp. <i>Typha latifolia</i>
Shallow open water	absent	<i>Ceratophyllum</i> spp. <i>Myriophyllum</i> spp. <i>Nuphar</i> spp. <i>Polygonum</i> spp. <i>Potamogeton</i> spp.

AGM 2002

Plans are already afoot for next year's Annual General Meeting and Workshop. Next year's workshop will be held in Red Deer and co-sponsored by the Red Deer River Naturalists.

The organising committee is looking for suggestions for a theme as well as presentation topics and speakers. If you have any ideas or would like to contribute in any way, please drop a note to Ed Karpuk <ed.karpuk@gov.ab.ca>, or call him at (403) 347-5723.

News and notes

Compiled by Don Gordon

New Books

The Botrychiaceae of Alberta. 2001.

Patrick Williston.

Available from Patrick at
pwilliston@bulkey.net

Includes keys, drawings, maps, and color plates.

Price: \$20

Co-management of Natural Resources: Organizing, Negotiating and Learning-by-Doing

Grazia Borrini-Feyerabend, M. Taghi Farvar, Jean Claude Nguingiri, Vincent Awa Ndangang.

This book is available free on-line at:
<nrm.massey.ac.nz/changelinks/cmmr.html>

Ecology and Design: Frameworks for Learning

Edited by: Bart Johnson, Kristina Hill
Island Press

ISBN: 1-55963-813-3

Price: \$32.00

For more information visit Island Press web page, <www.islandpress.com>

Conserving Earth's Biodiversity

A CD-ROM by Edward O. Wilson and Dan L. Perlman

Island Press

Price: \$39.95

For more information visit Island Press web page, <www.islandpress.com>

The Cactus Family

Edward F. Anderson

Forward by Wilhelm Barthlott and a chapter on cactus cultivation by Roger Brown.

Island Press

Price: US\$99.95

For more information visit Timber Press web page, <www.timberpress.com>

Meetings

Conserving nature in the Edmonton Region: A vision for the future

September 21-23

The Edmonton Natural History Club is

organising a conference on the conservation of natural areas in Edmonton and the region.

11th International Conference on Aquatic Invasive Species

October 1-4, 2001

Hilton Alexandria Mark Center, Alexandria, Virginia.

To register or for more information visit the conference web page

<<http://www.aquatic-invasive-species-conference.org>>

Restoration across borders

Society for Ecological Restoration

October 4-6, 2001, Niagara Falls, Ontario

For more information contact

<ser2001@niagarac.on.ca> or visit the SER website <www.ser.org>

28th Annual Natural Areas Conference

A spatial odyssey, searching for a natural balance

October 3-6, 2001

Cape Canaveral, Florida

<www.natareas.org> for information

Old growth forests in Canada: a science perspective

October 15-19, 2001, Sault Ste. Marie, Ontario.

For more information visit the conference website <www.ulern.on.ca/oldgrowthforest>.

Native Plants: Our Culture, Heritage and Future

Native Plant Society of Saskatchewan, Annual Meeting and workshop

February 22-24, 2002

Hawood Inn, Waskesiu Lake, Prince Albert National Park

This will be a celebration of the role that native plants play in our lives ranging from traditional uses to their future potential.

Please contact the Native Plant Society of Saskatchewan at info@npss.sk.ca or (306) 668-3940 for more information or if you are interested in presenting or exhibiting at this event.

Courses and Workshops



Prairie and Northern Plant Diversity Centre

The Devonian Botanic Garden has launched a plant diversity centre for the prairie provinces and northern Canada. The PNPDC offers a number of courses and workshops. For more information visit the their website

<www.devonian.ualberta.ca/devonian/pnpdc.html> or contact Alina C. Fischer (780) 987-3054 afischer@ualberta.ca

Old Growth Lichens

Clearwater, British Columbia Sept 1-3, 2001.

Friends of Yoho National Park summer Institute.

The Summer Institute offers a number of nature-oriented courses. For details contact Kathryn Cameron (250) 343-6065.

Autumn Glory - Secrets of the Alpine Larch

Sept 23 with Nadine Fletcher
Tuition \$70

Northwest Field School 2001.

Continuing Education opportunities for technical and professional development, or interested amateur naturalists. The following are courses in the Northwest Field School 2001 located in Smithers, British Columbia. For more information contact Northwest Community College (250) 847-4461 or smithersinfor@nwcc.bc.ca

Introduction to Forest Mushrooms

September 15 & 16 with Marty Kranabetter
Tuition \$100