

WAGNER NATURAL AREA NEWSLETTER

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Newsletter of the Wagner Natural Area Society, Management Committee
and Volunteer Stewards of Wagner Natural Area, Spruce Grove, Alberta



Wagner Butterflies: The Groundwork Has Been Laid

John Acorn

Butterflies are rapidly coming into their own among naturalists in Alberta. My own book, *Butterflies of Alberta*, seems partly responsible for this trend, but I can't take all the credit for a general desire among naturalists to look beyond the birds and flowers and explore their environment in greater detail.

The Wagner Natural Area is probably the best known locality in the Edmonton region for butterflies. Terry Thormin's observations, augmented by last summer's butterfly survey by Tara Normand and my own field notes (many of the photos for my book were taken at Wagner) have given us some good baseline data on the species present and their approximate adult flight periods. However, there is still much to learn.

As you wander through Wagner this summer, keep an eye out for butterflies. Record your observations, if you are so inclined. The following types of field notes could prove particularly interesting.

1. Flight periods. Simple data on species seen and the date are still needed. Flight periods shift from year to year, and the more data we have the better we will understand the fauna of the Wagner Natural Area, as well as which species are resident and which are transient visitors.



White Admiral, *Limenitis arthemis*
Courtesy of the Provincial Museum

2. Host plants. Watch for female butterflies laying eggs on plants. Then look for the eggs, and if you can identify both the plant and the butterfly you will have collected a valuable record. With all the botanical expertise in the Wagner Society, this goal should be well within reach. If you are unsure what an egg-laying butterfly looks like, or a butterfly egg for that matter, visit the Devonian Botanic Garden and ask the butterfly house staff to show you both. Unfortunately, identifying caterpillars is still a tricky business.

3. Nectar sources. Which butterflies use which flowers? These sorts of records are still rare for Alberta. Of particular interest might be the relationship between the newly-introduced European Skipper and the Lady's-slipper orchid. Apparently these butterflies are often killed while trying to pollinate the orchid elsewhere but I have yet to see it for myself. Native skippers, so they say, have no such difficulty.

continued next page

Contents

Wagner Butterflies	1
Private Conservancy	4
Upcoming Events	5
"Knee High Nature"	6
Profile, Dave Ealey	7
Wagner Grapevine	8
Beaver	9
Wildflowers (5)	12

The following is an updated checklist of the Wagner butterflies. I suspect we could still add a species or two, but in my opinion this is one of the best checklists available for a natural area in Alberta.

I hope it helps, and I hope you all have good luck with the butterflies this summer.

Wagner Butterfly List (1994)

Dreamy Dusky Wing (*Erynnis icelus*)
Arctic Skipper (*Carterocephalus palaemon*)
Garita Skipperling (*Oarisma garita*)
European Skipper (*Thymelicus lineola*)
Tawny-edged Skipper (*Polites themistocles*)
Long Dash (*Polites mystic*)
Anise Swallowtail (*Papilio zelicaon*)
Canadian Tiger Swallowtail (*Papilio canadensis*)
Western White (*Pontia occidentalis*)
Mustard White (*Pieris napi*)
Cabbage Butterfly (*Pieris rapae*)
Clouded Sulphur (*Colias philodice*)
Giant Sulphur (*Colias gigantea*)
Bronze Copper (*Lycaena hyllus*)
Dorcas Copper (*Lycaena dorcas*)
Brown Elfin (*Incisalia augustinus*)
Hoary Elfin (*Incisalia polia*)
Western Tailed Blue (*Everes amyntula*)
Spring Azure (*Celastrina argiolus*)
Silvery Blue (*Glaucopsyche lygdamus*)
Greenish Blue (*Plebejus saepiolus*)
Arctic Blue (*Agriades franklinii*)
Great Spangled Fritillary (*Speyeria cybele*)
Atlantis Fritillary (*Speyeria atlantis*)
Bog Fritillary (*Boloria eunomia*)
Silver-bordered Fritillary (*Boloria selene*)
Meadow Fritillary (*Boloria bellona*)
Frigga's Fritillary (*Boloria frigga*)
Freija Fritillary (*Boloria freija*)

Titania Fritillary (*Boloria titania*)
Northern Pearl Crescent (*Physciodes morpheus*)
Tawny Crescent (*Physciodes batesi*)
Satyr Anglewing (*Polygonia satyrus*)
Green Comma (*Polygonia faunus*)
Gray Comma (*Polygonia progne*)
Mourning Cloak (*Nymphalis antiopa*)
Compton Tortoise Shell (*Nymphalis vaualbum*)
Milbert Tortoise Shell (*Aglais milberti*)
Painted Lady (*Vanessa cardui*)
Red Admiral (*Vanessa atalanta*)
White Admiral (*Limnitis arthemis*)
Ringlet (*Coenonympha tullia*)
Common Wood Nymph (*Cercyonis pegala*)
Disa Alpine (*Erebia disa*)
Red-disked Alpine (*Erebia discoidalis*)
Common Alpine (*Erebia epipsodea*)
Jutta Arctic (*Oeneis jutta*)

References

- Acorn, John. 1993. *Butterflies of Alberta*.
Edmonton, Lone Pine Publishing.
Normand, Tara. 1993. *Butterflies of Wagner Natural Area*. Report to Wagner Natural Area Society.
Thormin, Terry. 1982. *Butterflies of the Wagner Bog*. *Edmonton Naturalist* 10 (2):37-41. □



Polyporus betulinus, Birch Polypore, fungus on dead birch adjacent to Wagner Natural Area.
Photo by P. Conerill

We are offering a mushroom field trip on July 8 this year (see Field Trips page for details), led by Sean Abbott, a mycologist working at the U of A Devonian Botanic Garden and a member of the Edmonton Mycological Club. Sean led a popular and successful mushroom trip for the Edmonton Plant Study Group in the Devonian Botanic Garden last fall. The Edmonton Mycological Club makes regular visits to Wagner to observe and record mushrooms.

Editorial

As I write, the benison of the spring season is here and, though I would hold it back, attenuate it so that I can savour every little sign and moment of it, it is rushing headlong as usual toward the bounty of full summer. Already the first flush of willows has flowered in yellow and fulgent white, and the fruiting catkins, like green-grey miniature candlesticks, point promisingly to the sky; the first flowers of Arrow-leaved Coltsfoot are sprouting in dun-coloured ditches; the Robins are warbling lustily in suburban gardens and the bumblebees bumbling crossly into people's houses, while young *Homo sapiens* stake out temporary territories in every soccer and baseball field and golf course.

In Wagner our year seems to be shaping up much as in other years, though we trust it will be anything but dull repetition. We are offering our traditional events and field trips, one in each of the major summer months and several in May (please see page 5).

Once again we have been lucky to obtain funding under the SEED (Summer Employment /Experience Development) program with which to hire a summer student. Such students work in Wagner Natural Area during May through August, assisting with site maintenance and sometimes larger projects, welcoming and interpreting for visitors, doing field work and keeping basic records. As well, the employee, a high-school student or university or college undergraduate, often undertakes a scientific project of their own. Qualifications for this job are

interests in biology and natural history, a love of the outdoors (and a comfortableness with solitary and sometimes secluded wanderings) and an ability to take initiative and work without undue supervision.

The job is not for everyone and is not easy. We usually ask the student to carry out the annual breeding bird survey in the spring, a feat which demands much early morning rising and mostly a frenetic listening-to of bird-song tapes, for recognizing the calls is a major part of bird identification. The student is not entirely on their own, however. Society executive pitch in to provide expertise, and even outside experts lend a hand (as lepidopterist John Acorn did last year). The one executive member who is most dedicated in this respect, however, is Alice Hendry, who devotes a good many hours each summer to accompanying the employee on hikes and assisting with their projects, at the same time sharing her detailed knowledge of the site and its history. Fortunately the Society's gain is reciprocated: almost every one of our students has stated that their experience in Wagner has been enlightening to them and helpful in their studies and their careers. If you come across our young summer employee while walking in Wagner this season, don't be afraid to say hi and ask a question or exchange a piece of information—hopefully you'll both benefit.

Here's hoping that you'll have many moments to savour the benisons of spring and summer in Wagner this year. And do join us on a guided field hike or two!

Patsy Cotterill

Wagner Society Executive, 1994

President, Derek Johnson	(436-8231)
Past President, Terry Thormin	(482-1389)
Vice-President, Dave Ealey	(422-0858)
Treasurer/Membership	
Janice Cantafio	(963-3938)
Secretary/Newsletter Editor,	
Patsy Cotterill	(481-1525)
Director/Public Relations	
Alice Hendry	(962-4836)
Director, Barry Jenkins	(458-1794)
Director, Edgar Jones	(436-5327)

Conference on Private Conservancy

Pat Clayton

Held January 14, 1994 at the Grant MacEwan Main Campus by the Environmental Law Centre, with a panel of speakers from the legal profession, three levels of government, and the private sector.

The aim of the conference was not so much to encourage the public to set aside land in a natural state in a conservancy but to point out that with the existing legislation, it is very difficult to do so. There is no single formula that can be applied and no simple tax advantage to be gained. Despite this gloomy generalization, it emerged during the conference that a number of dedicated people have in fact succeeded in placing caveats on land, using what legislation was available to them in various ingenious ways!

The conference began with an overview of the significance of Conservation Easement as a tool with which to set aside land for conservation, what it means in other jurisdictions, and the shortfalls in existing legislation. Various scenarios of how land is set aside or protected were then presented: by the creation of Natural Areas (provincial government); by donation (Recreation, Parks & Wildlife Foundation); by agreements (Ducks Unlimited); through municipal land use planning; and by soil conservation programs. None of these options is easy to carry out and there are good reasons for not allowing land to be covenanted. (A covenant on natural land is a legal agreement that the land will not be put to use.) We were encouraged to look at the long-term implications. The North American Waterfowl Plan, for example, was in the planning stage for 10 years. Now it is international in scope—thanks to NAFTA—and is an excellent system of management by common interest. Local interest, it appears, is the key to success. Management of

conserved areas must come from the community, and though there are regulations and laws to be complied with, persuasion and cohesive action on a local scale work better.

The afternoon session dealt more strictly with legal matters. We were informed that donations of land in a natural state can qualify as charitable gifts at fair market value and of ways in which this can be determined. A gift has different tax applications depending upon whether it is from an individual or a corporation. This whole area is so complicated that anyone considering donating natural land now or upon death is well advised to consult a tax lawyer at the outset.

Part of the reason why there is resistance to making it easy to covenant land (that is, not use it) goes back to our legal system. In 1066, William the Conqueror decreed that all English land belonged to the Crown. This still holds although the Crown is now thought of as being government. Only rights are purchased: the land remains in the possession of the Crown and can thus be expropriated. The land "owner" can, however, work the land and even despoil it (though not his neighbour's land) without the government's permission. Stewardship is a relatively new concept! Thus, anyone attempting to incorporate private stewardship into our complicated legal and tax rules will have centuries of precedence to overcome. I wish good luck to all those sponsoring conferences like this one: its object is to effect change so that stewardship can become a practical reality!

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In the event of an emergency in the Wagner Natural Area, please contact Natural and Protected Areas staff, Dept. of Environmental Protection, at 427-5209.

Upcoming Events, Wagner Natural Area Society, 1994

Thursday, May 5, 6:00 p.m. at Wagner main gate

Annual Frog-and-Toad Walk led by Wayne Roberts, University of Alberta zoologist. Come out suitably dressed for standing around in the evening, watching and listening to the annual mating game of the local amphibians. If you haven't heard boreal toads calling before, you'll be amazed!

(If you arrive late, you'll find the group somewhere along the boardwalk of the Marl Pond Trail; action intensifies towards dusk and after dark.)

Thursday, May 12, 6:00 p.m. Wagner main gate

Rain-check date for the above "official" frog-and-toad walk in case the weather is inclement or the amphibians uncooperative on the 5th. If the walk on May 5th is successful, Wayne will be at the boardwalk at 8:00 p.m. to check on progress in the ponds.

Saturday, May 14, 10:00 a.m. at Wagner main gate

Annual Spring Clean-up. If you'd like to join us on this morning spruce-up of the site, we'd be glad of your help. Duties include things like picking up garbage, spring-cleaning the picnic shelter and toilets and clearing brush off the trails. Bring your favourite garden tool or cleaning materials. Be sure to wear strong gloves. Garbage bags will be provided.

Sunday, May 29, 10:00 a.m. at the main gate

Annual May Count of Plants Species in Flower. Join us for all day or part-day on our yearly scour of the site for plants in flower as our contribution to the Edmonton-area count for this province-wide event. Wear waterproof footwear as we depart from the trails and dress appropriately for bushwacking. Bring lunch. Hand lenses and floras can be useful. Call Patsy at 481-1525.

Sunday, June 12, 7:00 p.m. at the main gate

Orchid Walk. Join Wagner president and expert botanist Derek Johnson for a look at various orchid species, Wagner's most popular drawing-card, which should be at their best at this prime time. Wear appropriate footwear for possibly muddy trails. This field trip will take place even if the weather is wet, but call Derek at 436-8231 if you need further information.

Thursday, July 6, 7:00 p.m. at Wagner main gate

Mushroom Walk. University of Alberta mycologist Sean Abbott will lead this evening trip which should prove exciting whether one's interests in mushrooms are gastronomic or taxonomic or both. If conditions have been exceptionally unfavourable for mushroom growth, however, this trip may be postponed. If you are uncertain, call Sean at 987-4811 (the Devonian Botanic Garden) or Alice Hendry (962-4836) or Patsy Cotterill (481-1525) close to the date.

Saturday, August 20, 1:30 p.m. at the main gate

Bug Walk. Executive member and well-known Provincial Museum entomologist Terry Thormin will lead another walk for us this year to see what's afoot and in the air in the way of bugs. Unfortunately, this trip will have to be cancelled if the weather is inclement, when bugs stay home. Call Terry at 482-1389 if you need further information.

Thursday, October 20, 7:30 p.m. in the Provincial Museum ground floor lecture room

Annual Members' Night. We haven't decided on a title for this evening yet, but Dennis Jonker and Jan Carroll of the North of Bruderheim Natural Area Society will be taking the floor to describe their experiences as stewards of this sandhills natural area northeast of the city. Their area has presented some challenges but they are full of innovative ideas and are very active in management! As well, there'll be slides, the Wagner president's report and refreshments.

Knee High Nature: Winter

Dianne Hayley and Pat Wishart
Illustrated by Jo-El Berg
Lone Pine Publishing
169 pp. \$14.95

Book Review by Alice Hendry

This guide to nature, activities and fun is packed full of information, stories, songs, poems, and activities related to winter. The purpose of the book is "to increase awareness and appreciation of nature, to encourage adults to share their knowledge with children, and to help create opportunities for children to share their sense of wonder with adults." The guide is an excellent resource for teachers, youth group leaders, parents and children. Lone Pine has plans to publish guides for spring, summer and fall also.

Sections focus on how animals and plants cope with winter; winter birds; snow and ice; mice, voles and rats; weasels; hares and rabbits; deer family and friends; wolves, coyotes and foxes; and winter nights (astronomy). The information is well organized and easy to follow. "Neat notes" answer frequently asked questions about specific topics.

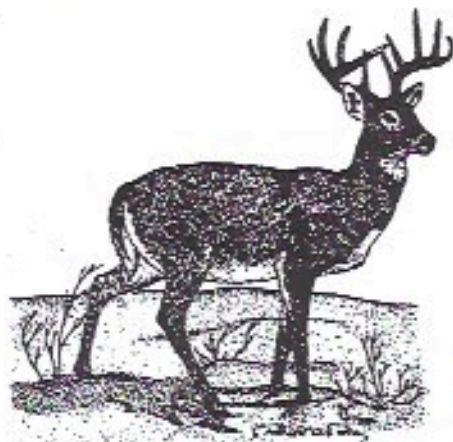
The many illustrations are not in colour but children are invited to colour the illustrations in their own copies. "Kid appeal" is added by making some of the drawings rather more fanciful than realistic.

Much of *Winter* is composed of material from an earlier series written specifically for Alberta and

published by the authors, who are both from Edmonton. Because the new *Winter* is written for a wider market, what the authors call the "North-West," most of the Alberta-specific material has been removed. Missing material includes Alberta distribution maps and the recommended reading selections found in the earlier version. The Lone Pine version has a more polished look, with graphics and shadow illustrations to fill in blank spots on the pages, and new material in the snow and ice and the winter nights (astronomy) sections. The astronomy section is excellent, but there is not enough new material in the Lone Pine edition to warrant replacing the *Winter in Alberta* version in your library.

A glossary would make a welcome addition to the *Knee High Nature* books. Some confusion in the vocabulary, probably caused by combining sections of the earlier books, could be avoided. The term "scat," for instance, is not defined when it is first introduced on page 22 but on pages 93 and 104 the reader is advised to watch for droppings (scats). Other terms, such as urinate, defecate, hierarchy, galls, bract, scales and prolific, are introduced without definition. Some vocabulary choices are curious: red markings on birds' heads are referred to as a "daub of red," female Cardinals are "quite" brown, the Clark's Nutcracker is "a bit darker grey than the gray jay," and a book that uses scientific terms such as "hibernacula" and "subliming" also refers to "bunnies" and "tummy."

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Meet our Officers. . .

Profile of Vice-President, Dave Ealey



We don't wish to boast, but some of our Wagner Society members have impressive records in natural history and biology. The fact that they are willing to channel some of their broad interests into stewardship of the Natural Area indicates, I believe, the very great esteem in which Wagner is held. In this second of our officer profiles, Dave writes of himself as follows:

"It's harder to focus on a moving target," is my motto. Whether this sentiment results from my military upbringing or from paranoia, I won't say, but my careers and my involvement in a wide variety of pastimes reflect my motto. I credit my youth as an army brat with giving me a real appreciation of a diversity of Canadian lifestyles and settings, especially in Ontario and New Brunswick. In addition, a three-year stint in London, England, had a major influence on my view of the international scene.

In my high-school yearbook I am quoted as having already planned to become a biologist. My early interests in biology were sparked by my schoolwork, including a project about birds of prey when I was 10 and living in England. (I still have my first pocket bird guide from that era.) Being a Boy Scout also influenced my outdoor interests, although largely from the perspective of outdoor recreation.

My interest in natural history really developed with my experiences in field biology for my undergraduate degree at Queen's University in

Kingston. To say my interests were eclectic is an understatement—pumpkinseed sunfish behaviour, snow goose nesting colonies, arctic vegetation transects, coral reef ecology, biospeleology (study of cave life), forest plant communities and aquatic ecology. It was difficult to narrow the focus!

Graduate studies saw me in Alberta studying spruce grouse for a summer, before I settled for the behaviour and ecology of the American Dipper as a thesis topic. Clearly, birds had won out as a passion, but my broad background did later prove invaluable to me in my career as a wildlife biologist.

After a couple of summers' working for the Canadian Wildlife Service on Pelicans and Bald Eagles in northern Alberta and Great Slave Lake, N.W.T., I began a six-year stint as a wildlife biologist with McCourt Management Ltd., doing environmental assessment work on projects in Alberta, Northwest Territories, Yukon Territory and northern B.C. Waterfowl were the most common subject of my study, but furbearers, caribou and other ungulates, wolves, songbirds and raptors were also grist to my mill, and all provided opportunities to learn about the natural history of these regions.

Along with my biological career, my interest in natural history organizations was developing. I've served as vice-president and then president of both the Edmonton Bird Club and the Federation of Alberta Naturalists (FAN). I've been on various FAN committees over the years, especially the Alberta Fish and Wildlife Advisory Council, and was assistant editor of the *Alberta Naturalist* for more years than I care to remember. I'm currently treasurer of the Edmonton Bird Club, Chairman of the Loran Goulden Award Selection Committee and Co-chair of the Edmonton Christmas Bird Count Committee, in addition to being V-P of the Wagner Society.

After six years with McCourt Management Ltd. and five years as an independent wildlife biologist with my own company, in 1989 I became a technical editor with the departments of Alberta Energy/Forestry, Lands and Wildlife. I am now, with the recent reorganization of the provincial government, an editor in the Communications

Branch of Alberta Environmental Protection. I have been involved with the Wagner Natural Area since 1982 when I wrote on behalf of the Edmonton Bird Club to urge for protection of the area. Although I have only recently joined the Society's executive, I have long maintained an interest in Wagner's special features and I enjoy hikes on the site, especially the frog-and-toad walks.



The Wagner Grapevine



Bouquets to Pat Clayton and husband Dick for their conscientious monthly monitoring and maintenance of the site over the last few months. They have installed new trail guide boxes, replaced the cover of the donation box and rehabilitated the bird boxes as well as doing more routine tasks such as checking the biffies and cleaning out the remains of fires in the picnic shelter. Despite being very busy in numerous naturalist organizations, Pat and Dick always seem to have time to bestow a bit of t-l-c on Wagner!

Brickbats to the young people—perhaps we are prejudiced but we assume they are young—who keep having parties, complete with campfires, inside the picnic shelter. I suppose we are lucky that they haven't yet burned the house down, but that's a distinct risk they are taking, as well as a risk of even worse scenarios. Before we erected the picnic shelter we debated whether to include a fireplace, but quickly decided against it because providing firewood was beyond our means. We reasoned that if we had a fireplace and didn't provide wood we might encourage people to cut down nearby trees. Besides, we argued, Wagner is for walking and nature observation, it isn't a day—or night—use area! (For rather similar reasons we didn't include a garbage can; we wanted to encourage people to pack out what little garbage they could be assumed to have.) While we admit that the picnic shelter may be an ideal place for cozy evening socializing, we simply must deter such activities. If anyone can give us information leading us to apprehend the culprits and explain to them the error of their ways, please give any member of the executive or Natural and Protected Areas a call at 427-5209.

As well, I enjoy cross-country skiing in the Canadian Birkebeiner, singing in the chorus of the Cosmopolitan Music Society, being a Volunteer Steward for the Edgar T. Jones Natural Area, and conducting breeding bird surveys. I live in south Edmonton with my wife Joan who, I freely admit, is exceptionally tolerant of my varied pursuits. □

Wagner is in Pictures!

We—and particularly Eddie Jones—always knew that Wagner was photogenic, but the word seems to have got out across the province and the country, as every year brings a fresh crop of film-makers wanting to shoot footage in Wagner. The site (including president Derek Johnson and some members of the Calgary Field Naturalists' Society who were serendipitously taking part in a field trip when the cameras were rolling) appears in a video called "A New Leaf" distributed by the Western Canada Wilderness Committee (497-7616) and in "The Great Northern Forest" by Karvonen Films (467-7167). (Derek comments on the latter that the cinematography is great but the script can be a little misleading, even inaccurate, at times.) As well, Len Gilday, of the CBC's "The Nature of Things," has expressed interest in filming in Wagner for the program this summer. Apparently he would like to include people taking part in nature recreation, so if you're hanging out in Wagner at the right time you might be lucky enough to feature as an extra!

Wagner Natural Area Society

Wagner Society is a non-profit organization registered under the Societies Act with the purpose of preserving the Natural Area and keeping it available for nature-oriented education, recreation and research. The Area is Crown land but the Society has a 21-year lease to it (half over) and is able to direct its management. As well the Society is a Volunteer Steward of the site under the Volunteer Steward Program of Natural and Protected Areas, Dept. of Environmental Protection. Joining our Society helps support our endeavours both politically and financially. Donations are very welcome and are tax-deductible. All members are volunteers.

Subscription rates are \$12 per family, \$10 per individual, \$8 per student and \$12 per senior. Mail your cheque to Wagner Natural Area Society, c/o Janice Cantafio, Treasurer, Box 842, Stony Plain, AB T0E 2G0. □

As Canadian as Beaver: A Look at The Big Rodent We Love-Hate

Part I. Body Structure and Lifestyle

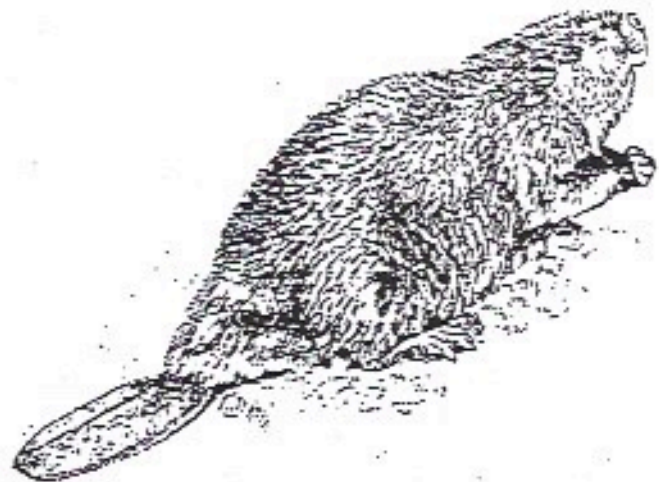
Beaver, not surprisingly, are more or less permanent residents of the Wagner Natural Area and its surroundings. However, because conifers are not to their taste and presumably also because the fen watercourses and marl ponds are unsuitable water bodies, they are confined to streams and poplar forests on its periphery. Despite their rather marginal occupancy, we stewards regard Wagner beaver with mixed feelings. We are glad that the area is large and wild enough to provide a home to the larger mammals, and fascinated by some of the changes in landscape and vegetation the beaver have brought about. At the same time they have got us into trouble with our farm neighbours and we have watched with dismay as our once full-bodied stand of aspen and balsam poplar close to Atim Road has been thinned to a mere skeleton of its former self. Dedicated as we are to the preservation of Wagner's peatlands, we absolutely draw the line at beaver-induced flooding that extends to muskeg and fens. Nevertheless, our management philosophy is one of coexistence with beavers where at all possible. Over the last few years the staff of Natural Areas in the Environmental Protection have employed various means to reduce the nuisance quotient of beavers while recognizing the naturalness of their presence and their need to make a living.

To manage an animal one must first understand how it lives. Most of us know something about beaver and admire it as an industrious engineer, one of the few animals like ourselves that can conspicuously alter the environment to further its own ends. Most of us respect the role that beaver, albeit unwillingly, have played in the history and development of this country. Yet even a little delving into the literature reveals the beaver to be a more interesting creature than most of us realize. This first of a two-part article on beaver reviews information on its biology and habits, compiled mainly from the references indicated below.

Beavers have been around since at least the Pleistocene period starting about one million years ago. At this time, when modern man himself was also evolving, beavers in North America (classed as the genus *Castoroides*) were giant creatures, 2.7 metres (9') long and about 360 kg (800 lbs) in weight. They became smaller as they evolved

so that the modern American beaver (*Castor canadensis*) now measures a more modest 1 to 1.2 m (3 to 4') in length (including the tail) and weighs in at an average of 18 to 27 kg (40 to 60 lbs). Even so, it is North America's largest rodent and the largest rodent in the world after the capybara of South America.

Beaver occur throughout much of North America from the Mexican border to the treeline. They cannot survive in arctic tundra and are likewise scarce elsewhere where the habitat is unsuitable, e.g., in treeless prairie. Beavers were once entirely terrestrial mammals but gradually became adapted to a semi-aquatic way of life, coming to spend much of their time in the water of slow-moving streams, ponds and lakes as they do today. Their body shape and features show many adaptations to this way of life.



Perfectly Suited to a Watery Life

The caricature of the beaver in human portrayals is of a chunky brown animal with a flat, scaly paddle-shaped tail and big buck teeth (incisors)—a caricature that nonetheless provides valuable clues as to the beaver's lifestyle. The beaver uses its tail, which is about 30 cm (1 foot) long and half as wide, as a rudder and for propulsion when it is swimming, as well as a means of communication—it slaps it hard against the water surface to warn other beaver of danger, usually before diving. On land it uses its tail as a brace when cutting trees and for balance when holding or carrying material with its front feet.

Its large hind feet are fully webbed, giving good propulsion during swimming and support on soft muddy surfaces. One toe is furnished with a split nail which is thought to help in grooming the fur. The front feet are much smaller than the hind but are dexterous, useful for digging and manipulating material for feeding and building. The beaver's eyes are set high on its head allowing it to see when all but the top of its head is submerged, and it has good eyesight even under water. Both the ears and nostrils have valves that close under water and the senses of hearing and smell are well developed.

The beaver is famous for its two pairs of large, orangey-brown incisors in the upper and lower jaws. Their front surfaces are protected by hard enamel which wears down more slowly than on the softer inner portions of the teeth, with the result that the incisors become extremely sharp and chisel-like. They grow continuously throughout life (which may be as long as 10 years) and must be as continuously honed and worn down by use. The molar teeth, used for chewing, do not grow continuously but have a sort of rippled surface covered in enamel that ensures they last for the animal's lifetime. The teeth are set in a skull that is rugged enough to withstand the beaver's constant gnawing. The well-furred lips close behind the incisors, allowing the animal to gnaw underwater without taking in water and to gnaw on land without ingesting wood chips. Beavers are pretty well waterproofed by their pelage: a soft dense undercoat of dull brown fur protected by an outer coat of long brown guard hairs. To assist the waterproofing (that is, keep the skin surface dry), they groom their fur with oil produced from a pair of anal glands. Close to the oil glands is a pair of scent glands, castor sacs or castors, which produce (together with urine which enters the castors) a yellow odiferous liquid called castoreum. Both male and female beavers deposit castoreum on small mounds of mud called scent mounds, presumably to mark territory. Both oil and castoreum reach the exterior by way of the cloaca, a single ventral opening located between tail and the hind legs that also serves the intestinal, urinary and reproductive tracts. There are no external differences by which humans can distinguish male and female beaver except during late gestation and lactation when four teats are visible on the female between her front legs. When teats are absent, workers needing to sex beavers for study purposes or population control may palpate (feel) for the penis bone; when present the animal is a male.

Beavers as Engineers

The beaver's lifestyle revolves around the presence of water deep enough to allow it to carry out its daily business safe from predators. Because beavers are active during winter, in northern regions they must ensure the water is deep enough (usually 3 m (10') to allow them access to their winter food supply below the ice. Where the depth of water is sufficient naturally beavers do not build dams, but this is rarely the case and, over the course of evolution, they have learned to impound water to create and maintain the depths they need. They also dig channels to allow them to transport tree limbs with greater ease and safety. They build their dams of boughs, sticks, stones and mud, embedding the initial barricade of sticks and saplings in the stream bottom against the flow of the current. Secondary dams may be built to supplement the main one if the current is strong or to provide additional safe travel conduits. Beavers also use sticks and mud to build their home bases, large dome-shaped lodges 2 to 3 m (6 to 9 feet) high and 3 to 6.5 m (10 to 21 feet) wide, either with one side against the stream bank or completely surrounded by water. Inside, they hollow out a chamber, often 1 m (3 feet) high and more than a couple of metres wide, which is above the water line and usually consists of a dry sleeping quarter and a lower eating area around a plunge hole. Several underwater channels provide access to the chamber and the main entrance is usually at least 37 cm (15 inches) in diameter allowing food to be brought into the lodge.

The beaver's legendary industry derives from its strong, probably instinctive compulsion to keep its dams and lodges in good repair. Beaver activity is further increased in the late summer when they prepare their food pile or cache ready for the winter, anchoring green tree trunks and limbs in the mud at the bottom of the pond within reach of the lodge.

Beavers as Foresters

The inner bark (cambium) of aspen is the beaver's preferred food but it also eats this tissue in willows, white birch, balsam poplar and a variety of other trees. Its summer diet includes much aquatic vegetation such as water lilies, cattails, pondweeds and duckweeds. To fell a tree—and beavers can fell aspen up to 37 cm (15") in diameter—the animal cuts two horizontal grooves about 7 cm (3") apart with its incisors, and then, working to right and left, chips out the wood between them. It moves to the other side of the tree to complete the cut. Beavers never cut

directly through the tree but always leave a narrow central connection. This, however, usually means that the tree soon topples under its own weight or in the next strong wind. They chew off the branches from the downed tree and drag them to the water's edge for use or consumption in the pond or lodge.

Beavers As Social Animals

A territory, which usually includes a section of watercourse and often more than one pond, with several bank burrows and lodges, is occupied by a single colony, the social unit of the beaver. A colony is typically a family unit of parents, young of the current year (kits) and the previous season's litter (yearlings), though it may vary considerably in size (average 3 to 8 animals) and composition. Beavers are usually monogamous, sticking to their mate for life unless he or she dies. In northern climes, a couple will produce one litter per year of an average 3 to 4 kits, with females in their prime (4 to 6 years old) and living in good habitat producing the largest litters (up to 9). Postmortems have shown, however, that litter size is influenced by absorption or resorption of embryos, which may reach almost one-third. Beavers clearly have no objection to love in a cold climate, for mating occurs during January to March, under water. The kits are born in May through July, weigh about 0.5 kg (1.1 lbs), and are well developed and capable of eating solid food within a month. The young ones begin to assist with tree cutting and dam repairing in their second season. They usually leave the home colony before the new kits arrive in the spring or summer of their second year. In dispersing to find territories and mates and found colonies of their own, two-year-olds have been recorded as travelling up to 240 km

(150 miles), though a distance of 8 to 10 km (5 to 6 miles) is average. When food supplies are abundant, however, the young may not disperse, resulting in larger colonies. However, in such instances they do not seem to become sexually mature; only the dominant female of the colony comes into estrus and breeds.

It has been estimated that one beaver can cut 216 trees in a year or that 0.4 hectares (one acre) of aspen will support one beaver for one year. Is this a sustainable way to live? Beavers, vulnerable through trapping for their valuable fur, were brought to near-extinction by the turn of the century but have since made a come-back. What controls their populations now? Can beaver and man live in harmony? What happens locally? I don't promise to have the answers but these are the topics I'll try to explore in part II on beavers in the fall issue of the newsletter. Stay tuned.

*Compiled mostly from the literature cited below by
Patsy Cotterill*

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Mosses in Wagner

In this issue of the Wildflowers of Wagner series (#5) (next page), we break with tradition because we feature a moss, a plant that is not a wildflower. It is not even a tracheophyte, with specialized tissues for conducting water and food to its extremities, as are most of our larger and more conspicuous plants. Mosses, in a group of plants known as bryophytes, lack well developed conducting tissues and are therefore usually small, low, ground-hugging plants that often also favour moist habitats. However, when mosses do dry out they do not die but simply become

dormant. Once re-wetted they can photosynthesize immediately and resume growth.

Wagner contains many moss species, among the most interesting being those of the fens called brown mosses. All three species of feathermosses described by Dale Vitt occur in the tall spruce forest at the end of the Marl Pond Trail. For further help in recognizing them, consult the book by Dr. Vitt et al. cited overleaf, as well as the Guide to the Marl Pond Trail available at the site or from executive. We'll be looking for those capsules on Big Red Stem, too!

Wildflowers of Wagner (5)
Class Bryopsida True Mosses
Big Red Stem *Pleurozium schreberi* (Brid.) Mitt.

Pleurozium schreberi, probably the dominant moss in spruce-covered areas of Wagner, is one of three mosses collectively called "feather mosses." All three feather moss species are common at Wagner.

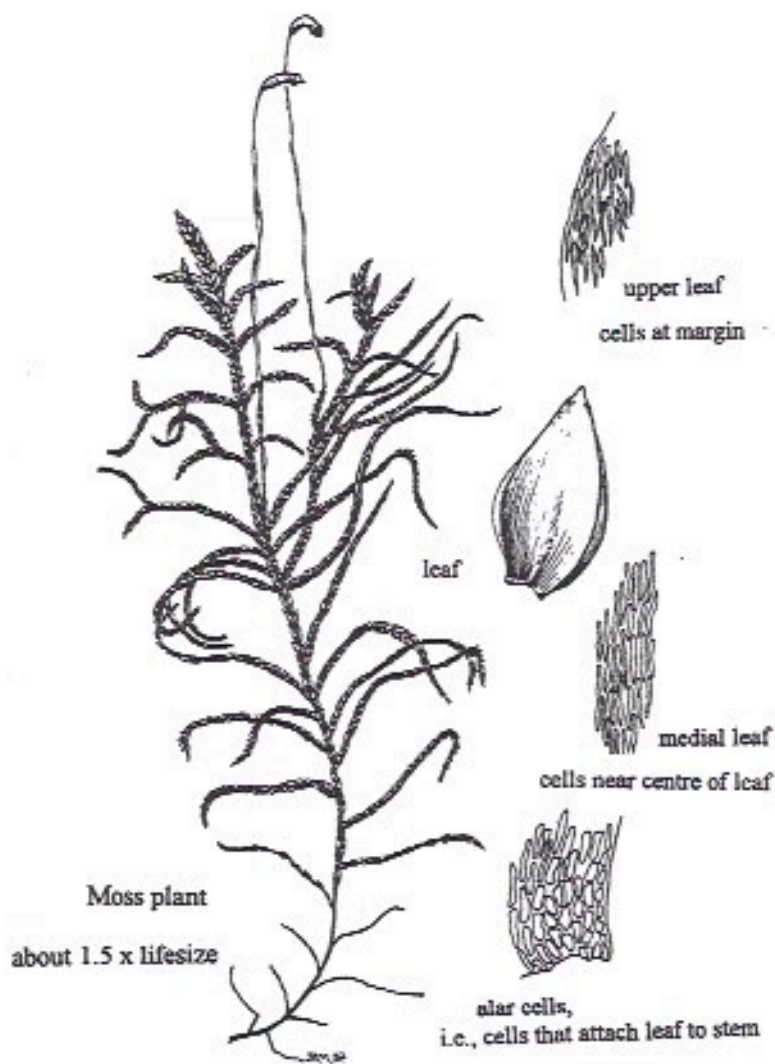
Hylocomium splendens or stair-step moss is easily told by the fact that it has annual (growth) increments in the form of stair steps. The plants are bipinnately branched. *Ptilium crista-castrensis* or knight's plume is smaller, more densely singly pinnate,* and has all its leaves curved like a sickle. It truly looks like the plume of feathers as worn by the Knights of the Round Table. Big red stem is also singly pinnately branched, but in this species the branches are widely spaced and the leaves are imbricate (overlapping), straight and rather blunt. The stems lack any additional covering of fuzz and are translucent red, which is easily seen in the field.

Under a microscope the leaves are seen to be composed of very elongate cells that have no bumps or projections on them. This gives the plants a very shiny appearance. The plants are about 4 to 10 centimetres tall and form loose mats (officially, *wests*) under coniferous trees. In Wagner, mats are developed into undulating hummocks. The species never occurs in the open rich fens like so many other interesting mosses at Wagner. Big red stem has unisexual plants and because of this does not often produce capsules (which contain spores). However, capsules do occur at Wagner and are always interesting to find.

Big red stem is common across the boreal region of North America, Europe and Asia. It is less common north of the treeline and is very rare in temperate deciduous forests.

Ecologically, the three feather mosses often cover 100 percent of the forest floor in upland boreal forest of pine and spruce. They have been shown to actively sequester (take out of circulation) nutrients and because of their large biomass tie up a large component of the nutrient pool of the forest. These nutrients are in turn only slowly released to the larger vascular plants by decay processes. Thus these feather mosses actually play an active role in dictating the flow of nutrients in these forests and act to slow down tree growth as the forest becomes older. They are a good indicator of older forests.

Next time you are at Wagner see if you can find the three feather mosses under coniferous trees. Of the three, knight's plume is by far the least common.



* pinnate means having branches on either side of the main axis and thus resembling a feather (pinna = Latin for feather). In bipinnate branching, the branches themselves are pinnately branched.

by Dale H. Vitt, Ph.D.

Dr. Vitt is a Professor in bryology at the University of Alberta and Director of the U of A Devonian Botanic Garden. The drawings are by John Maywood and have been reproduced with permission from *Mosses, Lichens and Ferns of Northwest North America* by Dale H. Vitt, Janet E. Marsh and Robin B. Bovey, 1988. Edmonton, Lone Pine Publishing.