

# WAGNER NATURAL AREA NEWSLETTER

Volume 16 Number 1 April 2002

Newsletter of the Wagner Natural Area Society, Management Committee  
and Volunteer Stewards of Wagner Natural Area, Parkland County, Alberta



## Wagner Wildlife Watch # 1: Waterbears (a.k.a. Tardigrades)

by Cliff Adams

Just a few metres from the beginning of the trail in the Wagner Natural Area and off to one side, lies a verdant mat of yellowish-green feather moss. This common feather moss, *Pleurozium schreberi* (one of three common species in the area), with a sprawling habit and a robust growth to the plant, houses a unique community of tiny animals with some of the most interesting adaptations for life we might contemplate.

Imagine an animal that can live for over 100 years in a state of suspended animation. Imagine an animal that can survive immersion in liquid air ( $-189^{\circ}\text{C}$ ) and emerge after being warmed again. Imagine an animal that might be active for perhaps 24 hours and then enter a state of suspended animation for a month or so before emerging once again for a relatively few brief moments. Imagine an animal that looks like a small bear with eight legs, a chubby barrel-like body and a tubular mouth. Imagine one of the most bumbling and stumbling gaits in the animal kingdom.

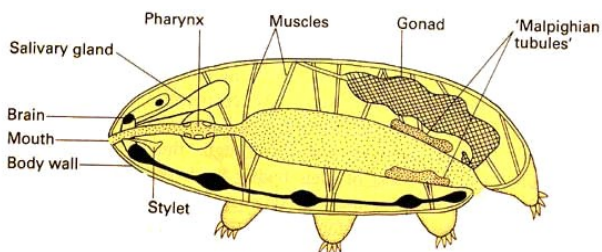
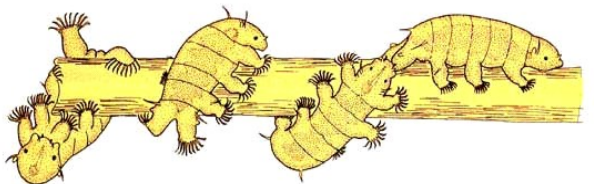


Image Source [www.unice.fr/LEML/coursJDV/images/biologie/biol26-1.jpg](http://www.unice.fr/LEML/coursJDV/images/biologie/biol26-1.jpg)

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## “Water for Life:” An Editorial

by Patsy Cotterill

As stewards of Wagner Natural Area we are fond of saying that water is the lifeblood of Wagner; it is the reason its fens, marl ponds and associated ecosystems are what they are. In consequence we have paid particular attention in recent years to studies undertaken by Parkland County to determine water quantity and flow in local watersheds. We were represented in the study for the Water Management Plan for the Upper Big Lake Basin, and we have kept track of one or two smaller studies designed to assist the County handle the current water concerns of residents and to plan for future growth. Most recently we responded to a request by the Alberta Government for public participation in a province-wide survey of water resources. The government is developing a strategy “to address pressure on the province’s water supplies”, and has invited public input by way of a questionnaire (called a work book) and various workshops held in major centres. The responses have undoubtedly been flowing in, because concern about water issues is not confined to the politicians. It is a hot topic with the grassroots these days, judging by the number of watershed protection groups that have arisen, not to mention groups fighting more local issues such as depletion of creeks and lakes, and pollution of watercourses (with various industries such as oil and gas, mining, gravel extraction and intensive agriculture being fingered as the culprits). The

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**Tardigrades**, *continued from page 1*

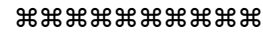
**T**ardigrades (invertebrate phylum Tardigrada, meaning “slow walkers”, related to the arthropods) are often called waterbears and live primarily on mosses, lichens and liverworts. They are nearly transparent creatures, adorable to watch under a microscope (they are generally only 400 to 500 micrometres (0.4 to 0.5 mm) long.) and fascinating creatures because of their biology. Tardigrades undergo a form of suspended animation called cryptobiosis. Since tardigrades live within the film of water on mosses, they are aquatic animals but, if the water evaporates, they simply allow themselves to dry out along with the evaporating water. They can survive in this state for many years.

Watching waterbears with a microscope, one notices a kind of scrambling, almost frantic, walking motion when they have only the glass slide to walk upon. But if the tardigrade can walk over a moss leaflet, it will seem as sure-footed as any monkey or mountain goat. As we continue to watch, we might see the rapier-like stylets in the tardigrade’s mouth stab out and puncture the cellulose wall of a moss cell. The contents are then sucked out and the tardigrade moves on. Sometimes the food is not moss cell sap but, rather, a roundworm. The method of attack is the same and our waterbear moves on leaving the husk of a roundworm behind.

We might see a few round objects in the film of water. We suspect they are eggs perhaps from a rotifer or from a tardigrade. The eggs of one family of tardigrade (the Macrobiotidae) look like miniature mines, similar in appearance to the spiked mines used to sink ships. Eggs from other groups of tardigrades do not have the fancy ornamentation but they too are easy to spot as tardigrade eggs. Baby tardigrades look very much like their parents. They grow by molting. Other animals living within the water film on the moss such as the tiny eight-legged mites, the springtails (almost giants compared to the smaller animals), the roundworms and the peculiar wheel-organ animals (the rotifers) along with quite a number of species of single-celled ciliated protozoans, form a wonderful community in miniature available any time we care to soak a bit of moss in water in a petri dish or watchglass.

Tardigrades come in two major varieties: those with small hairs or spines called cirri, and those without such cirri. One group of (non-spiny) tardigrades is carnivorous. *Milnesium tardigradum* is one of the largest tardigrade species and is definitely a carnivore. If you see a tardigrade with a star-like mouth (five or six small stumps around the mouth) and four long claws on each foot, you are likely looking at a predator.

More information about tardigrades can be obtained on-line. Try the search site [www.google.ca](http://www.google.ca) and enter the key word “tardigrades.. An example of a web site is <http://www.earthlife.net/inverts/tardigrades.html>



**“Water for Life”**, *continued from page 1*  
recent trial balloon floated by the Environment Minister of a dam on the South Saskatchewan River, now mercifully shut down for the kind of reasons the government understands, economics, has contributed to the heat. Hence, debate on a comprehensive strategy emanating from Alberta Environment is welcome even if it comes by no means ahead of time.

The water we are talking about is both **surface water**, such as that in watercourses, lakes and wetlands, and subsurface water, known as **groundwater**, specifically that which is carried in aquifers and may be available for human use. (An aquifer is an underground layer of porous rock, sand or gravel containing large amounts of water.) Aquifers discharge water, naturally, as in the springs supplying Wagner’s marl ponds, or artificially, from appropriately located wells, and are recharged from rainwater or snowmelt that percolates through the ground to the aquifer. If the rate of water discharge is greater than the rate of recharge, the water level in the aquifer will fall, and its water may eventually become unavailable as a source.

The government’s booklet, *Water for life: facts and information on water in Alberta, 2002*, which accompanies the work book, provides essential background material and should be required reading for Albertans. The questionnaire, *Water for life: seeking fresh ideas*, asks readers to select options, after providing commentary, either by giving yes/no answers or rating level of agreement. With these options and commentary, the political aspects of water begin to surface. The work book starts by suggesting four objectives that need to be realized with a provincial water strategy:

- healthy, sustainable ecosystems (watersheds, streams, lakes, wetlands and groundwater)
- a safe, secure drinking water supply
- reliable, quality water supplies for a sustainable economy
- knowledge necessary to make effective water management decisions

The questions about a safe drinking water supply raise some interesting points, not the least of which is who should be responsible for such a supply, the private individual, the municipality or the province?

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**Wetland Series**

This is the second in a series of papers addressing wetlands titled *Wetlands – shedding some light into their murky water*. The first installment appeared in the October 2001 issue of the Wagner Natural Area Society Newsletter (Vol. 15, No. 2) and was titled “The importance of wetlands and their distribution”. This installment reviews the definitions of the five different wetland classes in Canada, wetland succession, and the distribution of wetlands in Alberta.

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**Part 2: What are wetlands, how do they form, and where are they in Alberta?**

by Markus N. Thormann

Definition of wetlands and the five wetland classes

Wetlands are ecosystems where the soil is saturated long enough to promote wetland or aquatic processes, typified by poorly drained soils, hydrophytic (water-loving) plants, and various biological activities that are adapted to a wet environment (National Wetlands Working Group 1997). Based on the amount of peat, or organic materials, in wetlands, there are two general categories: (1) mineral wetlands, with less than 40 cm of peat, and (2) organic wetlands, or peatlands, with at least 40 cm of peat.

Peatlands are subdivided into bogs and fens; however, marshes and swamps accumulate peat as well and should be considered peatlands in those instances. Bogs are ombrotrophic ecosystems that receive water and nutrients only from precipitation and are separated from the underlying water table. The remaining wetland classes (fens, swamps, marshes, and shallow open waters) are minerotrophic ecosystems, obtaining water and nutrients from

precipitation, ground water, and surface water flow. Fens can be subdivided into poor and rich fens and rich fens can be further broken down into moderate-rich and extreme-rich fens. This hierarchy of peatlands is shown in Figure 1. Generally, a stable water table and a well-developed moss layer characterize peatlands. In contrast, fluctuating water tables and the absence of a moss stratum characterize mineral wetlands, such as most swamps, marshes, and shallow open waters. In Alberta, peatlands are generally restricted to the boreal forest ecozone, which begins approximately 100 km north of Edmonton. Mineral wetlands can also be found in boreal Alberta; however, they tend to be the only wetlands of the parkland and prairie ecozones in Alberta. The following definitions of the five wetland classes in Canada are based on those provided by the National Wetlands Working Group (1997):

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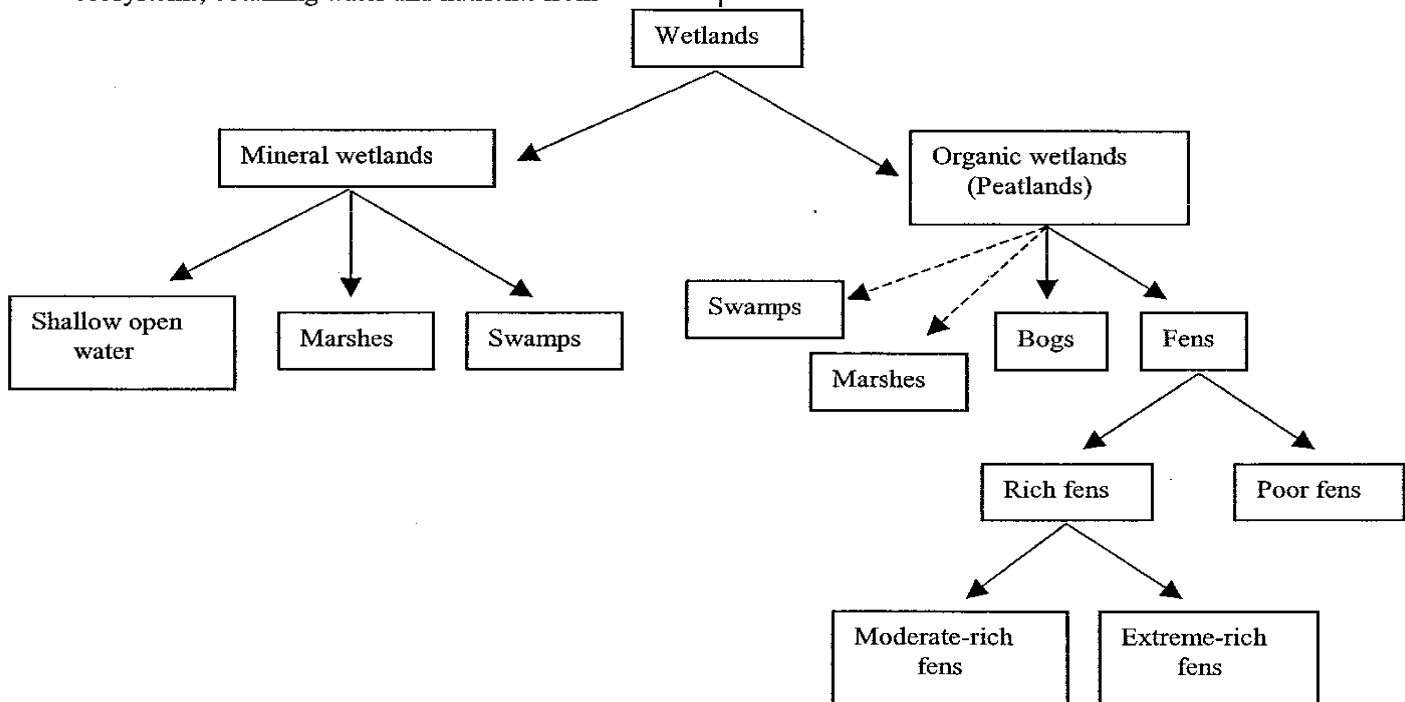


Figure 1: Wetland classes and hierarchy. Swamps and marshes can be mineral or organic wetlands.

**Wetlands, continued from page 3**

**Bogs:** Bogs are ombrotrophic peatlands (they receive water and nutrients solely from precipitation). Bogs are separated from the influence of the underlying ground water with its dissolved nutrients. Although separated from the ground water, the water table in bogs can be high due to the large water-holding capacity of *Sphagnum* mosses. Frequently, water may pool in small depressions (hollows), and bogs in eastern Canada often have large pools of water located near their centres. Bogs are typically dominated by *Sphagnum* spp. at the ground layer, members of the Ericaceae at the shrub layer, and *Picea mariana* (black spruce) at the tree layer.

**Fens:** Fens are minerotrophic peatlands (they receive water and nutrients from precipitation, surface water, and ground water flow). This is the most variable class of wetlands, with some fens being dominated by sedges (*Carex* spp.) and lacking mosses, shrubs, and trees. Thus, these fens may appear similar to marshes (however, marshes are generally richer in nutrients and have fluctuating water levels – see below). In contrast, other fens may be dominated by shrubs, trees, and mosses. Fens can traverse a number of hydrological and vegetation gradients, ranging from marl pond-dominated extreme-rich fens (for example, those found at Wagner Natural Area) to bog-associated poor fens frequently found in northern Alberta.

**Swamps:** These can be mineral or organic wetlands, depending on whether peat has accumulated to more than 40 cm or not. Swamps are characterized by flowing or standing nutrient-rich waters, which persist for most of the year. They support a tree or shrub-dominated vegetation composition. These wetlands often occur in riparian zones bordering streams, rivers, and some lakes. Alder (*Alnus* spp.) and willows (*Salix* spp.) are frequently encountered in mineral swamps, while black spruce (*P. mariana*) and feather mosses dominate organic swamps in boreal Alberta.

**Marshes:** Marshes can also be mineral or organic wetlands. However, marshes generally do not accumulate peat, especially in those areas where they are the dominant wetland class, such as the prairies. They are characterized by nutrient-rich surface waters and are usually open and dominated by herbaceous, emergent vegetation, such as cattails (*Typha* spp.), rushes (*Juncus* spp.), and reeds (*Phragmites* spp.). Although marshes can be found throughout Alberta, they tend to be much more common in southern regions, where they provide valuable waterfowl habitat.

**Shallow open waters:** These mineral wetlands are characterized by water that is up to 2 m deep and persists for most of the year. Less than 25% of the surface water is covered with vegetation, which is predominantly emergent macrophytes, and some shrubs. However, up to 100% of a shallow open water wetland can be “covered” by submerged aquatic vegetation. Shallow open water wetlands are frequently associated with marshes in the

prairie region of Alberta and are also significant waterfowl habitat.

Wetland succession

In the traditional view of succession, wetlands are considered transient stages in the “hydrarch” development of a forested peatland community from a shallow lake. Over time, the lake fills in with organic material from dying plants and minerals carried into the lake from the adjacent upland. At first, changes occur slowly, because the only source of organic matter is phytoplankton. Once submerged aquatic vegetation and emergent macrophytes become established, the deposition of dead organic matter increases substantially. With time, a peat mat forms that stabilizes water level fluctuations at the mat surface and facilitates the establishment first of herbaceous plants and then woody plants. Trees and shrubs contribute to the accumulation of organic matter, while concomitantly drying the organic matter due to increased rates of evapotranspiration. Eventually, a forested peatland community dominates the site where once a lake existed. This formation of peatland formation from an infilling lake is called “terrestrialization.” On the other hand, “paludification” occurs when such a peatland begins to encroach and blanket adjacent ecosystems. Figure 2 shows the classical hydrarch succession at the edge of a pond.

Wetland succession patterns have been shown many times (Nicholson 1994, 1990); however, it remains unclear whether wetland succession is exclusively driven by plant-mediated internal forces or if it is a combination of internal (or “autogenic”) and external (or “allogenic”) influences. Several studies have shown that wetland succession is driven by a combination of autogenic and allogenic factors.

An important autogenic factor that drives peatland development and succession is the presence of *Sphagnum* spp., which acidify the environment and decrease decomposition rates of organic matter, thus facilitating the accumulation of peat. The peat mass may ultimately be raised above the surrounding landscape and become separated from the underlying ground water, leading to the formation of a bog from a fen. Similarly, the establishment of trees and shrubs results in increased evapotranspiration rates and a lowered water table in the peatland. This further enhances the establishment of other woody plant species and facilitates the succession of a fen into a bog.

Allogenic factors influencing peatland development and succession include precipitation, temperature, fire, salinity, and beaver activity (see Vitt et al. 1996). These factors determine whether a peatland can form within the landscape, as well as the direction and speed of peatland succession. For example, beavers may flood a peatland and potentially reverse the direction of succession, leading to the formation of a marsh or shallow open water wetland where once a fen or bog was located. Similarly,

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## The Wagner Grapevine



### F.A.N. Awards

Congratulations to **Eddie Jones**, who was awarded an Honorary Lifetime Membership in the Federation of Alberta Naturalists (F.A.N.) at a volunteer recognition and appreciation banquet and awards night held April 13<sup>th</sup> at the Provincial Museum. This honour is bestowed for long and distinguished service in the cause of natural history, and is shared with such illustrious predecessors as Ray Salt, Dewey Soper and Kerry Wood. Congratulations also to **Derek Johnson**, who received a Volunteer Award for service to F.A.N. Two other Alberta naturalists were honoured with the lifetime membership award: Dorothy Dickson and Lloyd Lohr.

### Volunteer Stewards' Conference at Cypress Hills, April 26-28

Staff of the Alberta Government's Volunteer Stewards Program are once again preparing to celebrate the services of volunteer stewards (campground hosts and natural area stewards) with a conference, this time in the far southeast corner of the province, in Cypress Hills Interprovincial

Park. **Pat and Dick Clayton** and **Irl Miller** will be representing Wagner at the conference.

### Big Lake Natural Area and B.L.E.S.S.

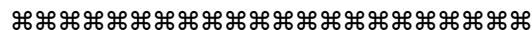
Congratulations to the Big Lake Environmental Support Society (B.L.E.S.S.) who, logically enough, have become stewards of the Big Lake Natural Area, on which the government has commissioned a study. We are pleased to have a natural area and a new steward on our doorstep!

### Wells in Wagner

N.A.I.T. students continued their hydrogeology studies in Wagner this winter by drilling another five wells, two of which were suitable for the installation of piezometers to monitor water levels. All wells are being monitored and limited testing of water quality is being undertaken.

### Orchid Poster for Sale

Our full-colour poster of orchids in Wagner, painted by botanical artist **Rayma Peterson**, is currently available for sale at \$10 each. **Information on how to order is provided on page 9 of this newsletter.** A number of posters have been distributed free to schools, appropriate authorities and our grant-funding agencies.



## Field Trips, 2002

(All trips are free.)

### Frog-and-Toad Walk, May 2

Join University of Alberta herpetologist **Wayne Roberts** for our annual trip to watch frogs and toads in reproductive mode. Join Wayne at the main gate at 6:30 p.m. or if you arrive later (the trip will continue at least until dusk) follow the Marl Pond Trail from the north end until you find the spectators on the boardwalk. Dress appropriately for evening temperatures.

### May Count of Plants in Flower, May 26

Another annual ritual! Join **Patsy Cotterill** and our faithful band of Wagner plant-watchers at the main gate at 10 a.m. The idea is to count the number of species that are in flower and submit the data to the province-wide count. Bring lunch if you intend to stay for the whole day and remember we shall be crossing wetlands! Phone 481-1525 for further information.

### Orchid Walk, June 16

And yet another annual event! Various members of the Wagner Committee will lead guided tours to our orchid hot spots from 2 p.m. onwards. This is also a good opportunity to get to know our early summer flora in general. Meet at the main gate.

And another couple of events you might be interested in...

**Dandelion Festival** at the John Janzen Nature Centre in Edmonton, **May 11**, 11 a.m. to 4 p.m. A family event, sponsored by the Alberta Native Plant Council. Displays, talks, food, drink, crafts and competitions, featuring our familiar weed!

### Coyote Lake Field Trip, June 8

The Stewards of Alberta's Protected Areas Association is organizing this trip, to be hosted by **Doris and Eric Hopkins**, to the Greater Coyote Lake Conservation Area, a beautiful spot southwest of Edmonton. Call **John Woitenko** at (780) 459-0475 or e-mail [jwoitenko@compusmart.ab.ca](mailto:jwoitenko@compusmart.ab.ca) for more information.

On the subject of water supply for a sustainable provincial economy, the questions become even more interesting—and more controversial. We on the Wagner executive had trouble answering some of them, partly because of their ambiguous or conflicting implications. Projecting a scenario in which the river basins have become fully allocated for water use (meaning there are competing demands for scarce resources), the public is asked about changes to current water allocation methods (e.g., the first in time, first in right rule) To promote more efficient use of water such Albertans look at a pricing system to encourage economy, and storing water, both on a small-scale (tanks and small reservoirs) and a large-scale (dams). Perhaps most controversial of all, the issues of closed-basin and open-basin transfer of water, with all their potential environmental consequences, are broached.

The section in the work book that deals with water conservation measures asks whether individuals and companies should pay for the water they use (as opposed to just for its treatment and delivery by a municipality). This opens up the problem of water becoming a commodity, to be bought and sold through trading agreements, possibly even becoming a scarce commodity to those who cannot afford to pay.

Interestingly, the section on maintaining healthy ecosystems, despite being placed as the first objective, falls last in the work book. Most of the options presented we agreed with, but one, “determine the balance between the amount of water needed for the aquatic environment and the amount needed for economic growth within a water basin?” gave us pause for thought. Long experience has taught us that the word “balance” is government or corporate shorthand signalling an intention to create an imbalance that favours development over environmental protection. To the final question, “maintain an amount of water in aquatic environments that will protect ecosystems even though it may limit human use?” we answered a resounding “yes,” ignoring the work book’s warning that “economic development opportunities may be lost”. As a steward group whose mandate is to protect a publicly-owned wetland it would be surprising if we answered this question in any other way. But while we are grateful for being asked, we remain deeply sceptical as to the weight our answer will carry. The Special Places process and program is still fresh in our minds, along with its end-result after months of public consultation in which people earnestly put forward their wish-list for protected areas: a blueprint for hassle-free economic development first, environmental protection second. The work book commentary admits “ It is difficult to accurately quantify and protect ‘natural demand.’” To what extent will the government be willing to spend money even to attempt this? It is easy for a company to calculate how much water it needs for a given processing operation, but very difficult to determine how much water must issue from the springs in Wagner Natural Area before they lose significant biodiversity or dry up altogether. The question

that made us the most uneasy, however, was whether the government should investigate its groundwater resources, about which it knows relatively little. It is hardly likely that the government will fund such studies without expecting a payoff in terms of increased human consumption and/or economic benefit. And who knows what will happen if significant amounts of groundwater are withdrawn for human use? Terrestrial as well as aquatic ecosystems may suffer. What will happen to our Wagner springs and fens if someone taps into the aquifer that sustains them?

Another good question, which the work book seeks somewhat deviously to probe, is how serious are we in Alberta about protecting our natural environment? Perhaps there is some reason for optimism. Our moderator in the Edmonton “water for life” workshop observed that even in the irrigation districts of the southern part of the province, people expressed interest in putting environmental protection ahead of increased human use. We believe it is important for everyone who feels this way to convey their message clearly to the government. It is also important to stay informed and be vigilant for opportunities to preserve wetlands and watercourses. We continue to look out for Wagner’s life-water.

For more information on “Water for life: Alberta’s strategy for sustainability” call Alberta Connects toll free 310-4455 or visit [www.waterforlife.gov.ab.ca](http://www.waterforlife.gov.ab.ca)

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Derek Johnson and his field assistant Erin Flynn take a forensic profile of this dead or dying spruce tree in Wagner. See the next issue for more information on the “**Mystery of the Murdered Spruce.**”

Wetlands, conclusion, continued from page 7

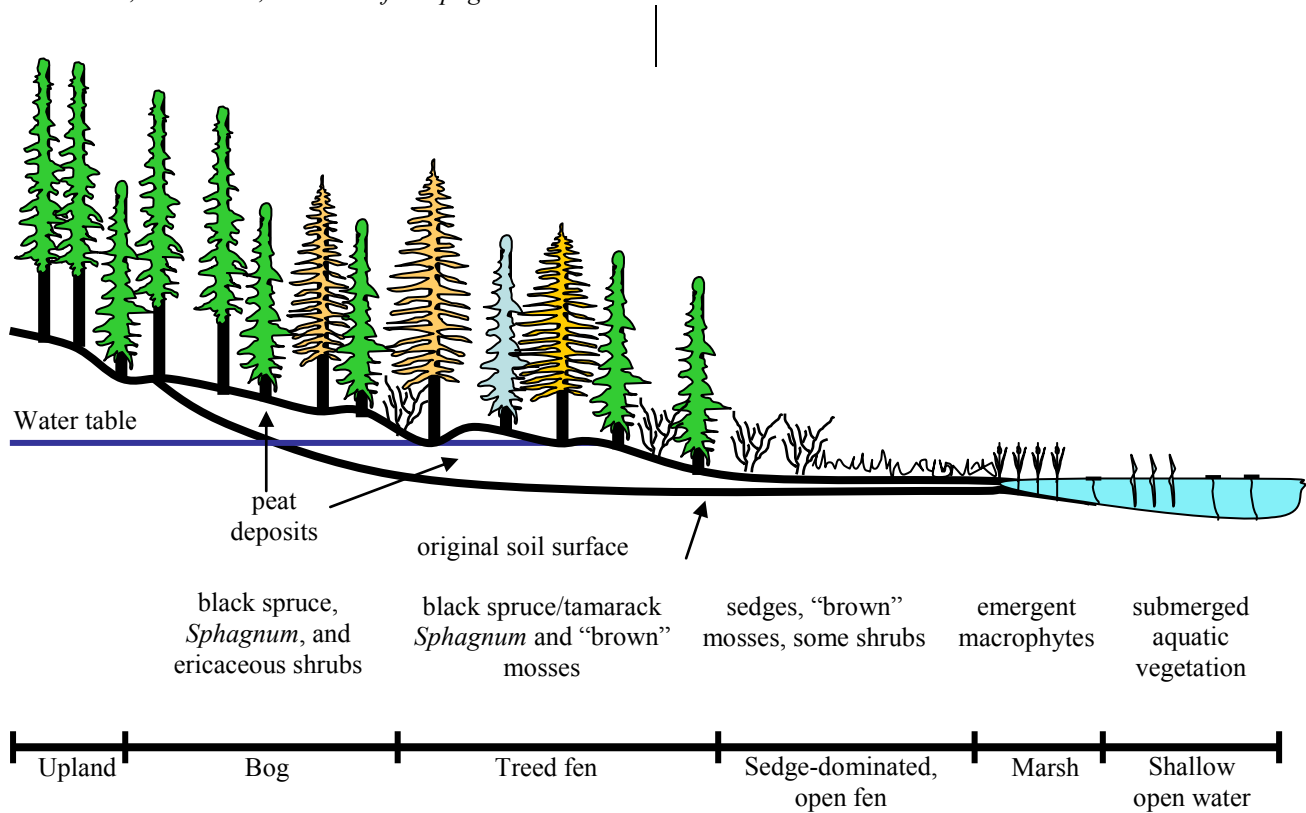
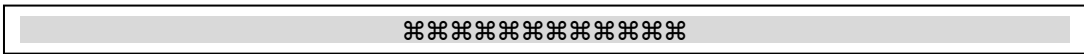


Figure 2: Toposequence from shallow water wetland to bog-fen complex, indicative of a typical wetland succession. The most mature wetland type is the bog-fen complex. Original artwork by Dave Locky.



**Wagner Natural Area Society**

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\*Visit our website at <http://www.wagner.fanweb.ca>

**Executive 2001**

President	Irl Miller (455-3866)
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Vice-President	Alice Hendry (962-4836)
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	Beth Jenkins (458-1794); Mike Jenkins (481-8695);
	Derek Johnson (436-8231); Edgar Jones (436-5327);
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Poster/video order form overleaf

## Wildflowers of Wagner No. 20

*Salix candida* Fluegge ex Willdenow  
Salicaceae

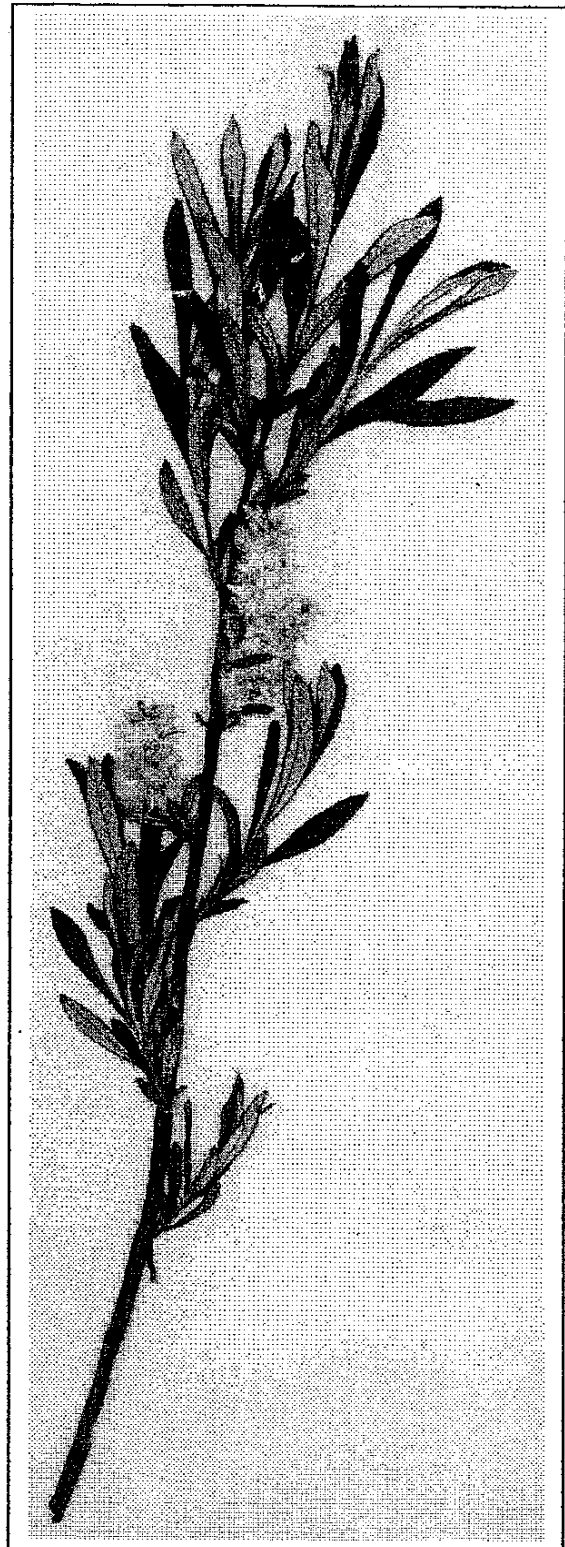
Hoary Willow  
Willow Family

The presence of hoary willow is usually a sign of calcareous or saline water. This low-growing shrub (to 1.5 m high) occurs abundantly in Wagner Natural Area around the edges of marl ponds and in the somewhat drier ridges of vegetation (strings) in the fens. It may also be found where mineral-rich water seeps out of rock, e.g., in river valley escarpments or along lakeshores.

*S. candida* is readily distinguishable from other willows and its common name is descriptive: it has a whitish or hoary look overall because of the white felt of hairs on the undersides of the leaves and on the young twigs, and when the plant has flowering or fruiting catkins, on the ovaries and developing capsules. In Wagner, hoary willow is one of only two low-growing willows in the fens. The other is Athabasca willow, *Salix athabascensis*, which has ovate or elliptical leaves that are glossy-green on top. Hoary willow leaves, in contrast, are longer and narrower, dark green and furrowed on top, although often with some loose tufts of white hairs; beneath, they are densely white-felted and have a prominent mid-vein. The leaf margins lack teeth and are slightly turned under (revolute).

Like all willows, the male and female flowers are borne on separate plants and form spikes (catkins or aments), of small, simple flowers, which appear in May at the same time as the leaves. Each male flower consists of two stamens borne in the angle (axil) of a hairy brown bract; their anthers (pollen-sacs) are characteristically dark red when fresh. The female flower consists of a single pistil in the axil of a bract. The ovary is covered with a felt of matted white hairs, above which the dark red style and branched stigmas contrast attractively. The ovary develops into a capsule from 3.5–7 mm long, which splits into two halves when ripe to release the numerous seeds, each with its own "parachute" (or coma) of white hairs, to aid dispersal by wind. Both male and female flowers also bear a small nectary gland at their base. Willows are pollinated both by wind and by insects, and because they produce profuse flowers in early spring when few other plants are in bloom, are an extremely important source of pollen and nectar for insects.

Hoary willows occur in suitable habitat throughout Alberta and indeed are widely distributed throughout northern North America.



Photocopy of an actual specimen  
collected in Wagner Natural Area

