WAGNER NATURAL AREA NEWSLETTER
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Newsletter of the Wagner Natural Area Society, and Volunteer Stewards of Wagner Natural Area, Parkland County, Alberta

It's Spider Survey Summer in Wagner Natural Area!

Over the years, it isn't just vegetation and groundwater that have been the subjects of research in Wagner Natural Area; invertebrates too have garnered the attention of local scientists. A third major study of these small animals lacking backbones is now under way in the Natural Area, with the focus on spiders. Dr Robin Leech, arachnologist and research associate at the Royal Alberta Museum, is conducting the survey, whose goal is the collection, identification and cataloguing of as many species of spider in Wagner as possible. Leech's study follows on from a more general invertebrate survey done in 1985 and headed by Dr. Bert Finnamore of the then Provincial Museum and Archives of Alberta. Another major collection was done, this time of moths, by University of Alberta entomologists during the 1990s; most of these specimens now reside in the Strickland Museum at the U of A. Other minor studies, including those of summer students, have been done on dragonflies, butterflies and molluscs, and incidental records have been made by members of the Alberta Lepidopterists' Guild during field trips.

Leech and his colleague Don Buckle identified about 210 spider species from the 1985 collection, of which 20 species are new to science. However, only a small geographic area was sampled during that earlier study and Leech felt that by expanding it with more collecting stations, including in the parts of Wagner that have been added since 1985, he could pursue his specialty and obtain a more accurate picture of spider diversity in Wagner.

Leech has established about half a dozen pitfall traps, in different habitats and locations in the Natural Area, with each location carefully recorded using a GPS unit. Each pitfall trap consists of four small stainless steel collecting cups, sunk into the ground so that their rims are level with the surface. Each cup is filled with a mixture of water, ethylene glycol and detergent, and the quartet of cups is covered by a square aluminum sheet slightly raised off the ground. The sheet provides attractive shade and cover for insects and spiders, which tend to crawl under it. If they fall into the cups the detergent breaks the surface tension and they sink to the bottom and drown immediately. Leech has also set up one Malaise trap, a tent-like affair into which bugs fly or crawl. Moving into the roof in an attempt to escape, they fall into a collecting bottle suspended from the apex. Leech filters out the contents of the collecting vessels, puts them into vials with alcohol to preserve them and then examines them under a microscope. To advance science and to ensure that wasted deaths are kept to a minimum, Leech distributes all non-spider specimens to the appropriate invertebrate specialists for identification and curation.

The research is very demanding of time and effort; he and his wife Lorie Taylor have been checking the traps twice a week from May 1st, and will continue until the end of August. Any less frequent attention would mean deterioration of the specimens, a situation to be avoided given that tiny anatomical parts are necessary for identification!

By June, Leech's spider species count was up to 230 and he had inspected and given away a variety of interesting insects as well. Leech thinks that the explanation for the diversity of spiders in Wagner, apart from its variety of habitats, is that this area remained unglaciated, thereby allowing a wider assemblage of organisms that existed prior to glaciation to survive. To test this theory, of course, Leech needs first to know what is actually there. Then he can see how the distribution of Wagner species compares with that of the same species occurring elsewhere. For its part, Wagner Natural Area Society is happy to learn of any evidence that supports *their* theory – that Wagner is a refugium of immense biological value!

At left, Dr. Robin Leech and Lorie Taylor at working recording their collection at one of the pitfall trap locations. At right, pitfall traps with cover removed.
Photos: Edmonton Journal, Cathy Mowat

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White Spruce Planting and Monitoring in Wagner Natural Area

By J. Derek Johnson

he Junior Forest Wardens from Stony Plain have planted Twhite spruce seedlings in various parts of the Wagner Natural Area on four occasions during 2005, 2007, 2008 and 2009. In total, approximately 2000 seedlings have been planted in the area. To follow the success of some of the plantings over time, a number of the seedlings have been flagged and tagged, 150 from the 2005 planting, 26 from the 2007 planting and 10 from the 2008 planting. The seedlings will be measured for height growth every other year until they reach breast height (1.3 m), after which time they will be measured for height and breast height diameter every five years. Nothing is planned for the 2009 planting due primarily to resource restrictions.

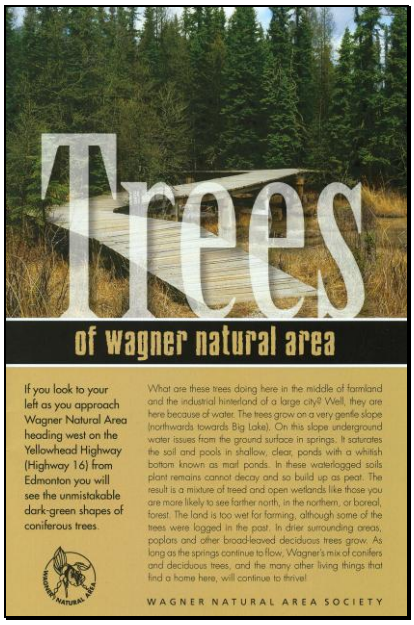
The three most important things affecting the survival of the seedlings are planting location, quality of the planting stock, and planting technique. The 2005 planting came out well on all three. The first winter survival rate of the tagged seedlings was 134 of 150 or 88%. The four-year survival rate of these seedlings was 131 of 150 or 87.3 %. Even though survival was exceptional, growth was not. The planted seedlings actually lost an average of about 0.5 cm in height over their first three years, due in some measure to the terminal leaders being bitten off by snowshoe hares. Also, seedlings typically take up to three years or more to build up their root system before they put on any appreciable height growth. In their fourth year, the seedlings from the 2005 planting put on a growth spurt, with new shoots averaging 13.2 cm in length.

The planting stock used in 2007 was older (two years) and more robust than what is usually planted and all 26 of the seedlings tagged survived their first winter. One of these seedlings now has a dead top. With this lone exception, all of the other seedlings have generally good form and have shown positive height growth in the two years following planting. In the first year height increment averaged 10.8 cm, but in the second year it declined to 4.5 cm. The greater height increment in the first year occurred because the seedlings were established under near ideal conditions in the nursery and buds were set before planting. The decline in the second year is reflective of planting stress and less than ideal site conditions.

Planting technique for some of the seedlings planted in 2008 was very poor and only two of the ten tagged seedlings survived their first winter. First-year growth in the survivors was less than 3 cm. Tags from the dead seedlings have been moved to living ones and the measurement process will start over.

Many problems befall seedlings on their way to maturity. In the case of white spruce, seedlings planted in moister sites with some shade or shelter do better than those planted in drier or more exposed situations. Some of the seedlings planted closest to the open field show definite evidence of sun scald and are a much paler green color than those in more sheltered areas. They may also be suffering from moisture and nutrient stress resulting from competition with the grasses and other plants in the open field. Many seedlings had dead brown needles after their first winter. This is a sign of winter desiccation damage. The needles start to photosynthesize on warmer winter days, but the roots are frozen and can't move any water, so the needles dry out and die. Several seedlings got smothered by snow push over the winter. This occurs when snow builds up on the surrounding vegetation and its weight pushes that vegetation down on top of the seedling, bending it over and covering it up so that it doesn't get adequate light and it dies. One seedling got uprooted by a pocket gopher. One surprise was the development of soil-covered ant runs up the sides of many seedlings. These runs may have been constructed to give the ants some cover as they went up and down the stems to "milk" the aphids which sometimes go after the sap in the young tender growth. However, aphids were not observed in any number on the seedlings compared to the number of them with ant runs. These runs were only observed on seedlings planted in 2005. The bare, loose soil around these seedlings, as a result of the planting technique used, may just have been an incentive for the ants to try and establish a colony around the seedlings, most of which failed. One seedling has been infected by the Cooley spruce gall aphid, but other than that, none of the seedlings have yet shown any clear signs of insect pests or disease.

Submitted, May 25, 2009



This handy guide to Wagner's trees is now available from Wagner Society. Patsy Cotterill wrote the text and local botanical artist Rayma Peterson did the line drawings. Design is by Judy Fushtey of Broken Arrow Solutions, St. Albert. To order a copy, contact Patsy at 780-481-1525 or email: nutmeg@planet.eon.net

The Wagner Grapevine

Acheson Water Issue

In December 2009 Alberta Environment approved an application by Consor Developers, Inc. to construct two storm water management ponds in Acheson that will discharge storm water down Morgan Creek, which passes through the Natural Area on its way to Big Lake. Earlier, Wagner Natural Area Society (WNAS) had met with representatives of Consor to discuss their plans. Not satisfied with the amount of discharge proposed, and with concerns that recharge to the aquifer would be reduced, WNAS appealed the developer's permit to AB Environment. This led to a mediation process, involving Wagner executive members **Pat Clayton, Ben Rostron** and **Irl Miller**, with **Jennifer Klimek** acting as legal counsel for WNAS. The outcome after mediation sessions was that Consor agreed to reduce flow rates through Morgan Creek to 1.5 litres per second per hectare, with the proviso that larger amounts of water could be released in the event of an emergency such as a flood, and that flow could be shut off completely in the event of a chemical spill or similar emergency. Construction of the storm water management ponds is to be completed by December 2010, with Consor's permit under the *Water Act* running until December 2020. WNAS has since followed up with AB Environment regarding changes to the permit.

Following a meeting July 5 with AB Environment staff, Neil Hollands, District Manager, and Gerald Feschuk, District Compliance Manager, Pat Clayton and Alice Hendry reported the following:

"We discussed discharge from the Acheson area developments. Developments are now required to have zero discharge into the creeks and instead to have porous lined holding storage areas. Wetlands (potholes) will be retained and may be recharged from the storage areas but not used as storage themselves. Any destroyed wetlands have to be recreated. A riparian zone around the storage /retention ponds will be encouraged though not enforced. ….. Alberta Environment… is slowly turning to thinking in terms of whole ecosystems and not just individual projects." WNAS, whose main environmental challenge remains protection of the aquifer supplying the fens, feels cautious optimism with respect to this more progressive approach.

Heartland Transmission Line

Earlier this spring, WNAS became aware that as leaseholders of Crown Land we had not been notified as possibly affected landowners with respect to routes for the proposed Heartland Transmission power line. Thanks to **Pat Webb** who clarified the situation by speaking with Sam Munckhof of Heartland Transmission and ensuring that we had an opportunity for consultation input.

Apparently a route on the eastern outskirts of Edmonton is favoured and even the alternative proposed route would go west and north of Wagner Natural Area. WNAS now has to decide whether to participate in the public consultation process.

Garbage Galore!

The garbage that came to light along the roadsides (especially Highways 16 and 44) abutting Wagner when the snow retreated this spring was horrendous. Culverts in particular acted as traps for a tremendous amount of litter, including large sheets of plastic, Styrofoam and other materials as well as the usual fast-food wrappings. The explosion in dog ownership that has occurred over the last couple of decades is also making itself felt. Removing little plastic bags of dog feces, from off Wagner property and from the adjacent ditches, has now become almost routine for Wagner stewards. We struggle to understand the rationality of people who take the trouble to pick up after their pets but then leave the offending waste for others to take home. Do we need to spell out on our signs "Please pick up after your pets *and* take it home with you!"? Faced with the seemingly overwhelming task of getting on top of the litter this year, we wrote to Alberta Transportation, protesting, asking for help, and suggesting that the budget for the development of new roads include a correspondingly increased budget for litter control. We were surprised to learn that the anti-littering signs formerly deployed along the highways have been removed through lack of ability to enforce the law! We are now looking at ways of increasing our volunteer help with highway litter clean-up. Fortunately, with the exception of some cigarette butts deposited outside the picnic shelter, straightforward litter is not a problem within the Natural Area proper, although a few people find the service road to the parking lot a convenient dump site.

Restoration Fields

The Milestone herbicide that **Parkland County** applied last year to beat back a Canada thistle problem in the southeast fields certainly did the trick; the thistle population is much reduced this year. However, surprise, surprise, the native seed mix we sowed in a year of near-absolute drought came up almost pure timothy – origin not quite clear! We also began planting small islands of native, mostly shrubby, vegetation in the westernmost field in the hope that these will serve as nuclei for successional spread. This is a multi-year project, and we will likely need to be patient. Right now I think we are following where nature leads!

Reviewing the Past, Envisioning the Future

After spending the morning of May 22 doing our annual spring clean-up of the site (thanks to everyone who helped out), we repaired to Alice Hendry's home in the afternoon for the more sedentary occupation of navel-gazing – or rather crystal-ball gazing. Under the able leadership of moderator **Beth Jenkins** we reviewed our major achievements (agreeing unanimously that having facilitated the doubling in size of Wagner Natural Area from its original half-section to more than 650 acres over the past 25 years has been cause for greatest satisfaction). Our other favourite successes were interventions that prevented development that likely or potentially could affect the integrity of Wagner. We also identified our major challenges, past and present, then focused on our wishes and hopes for the future.

Continued on page 4

The Wagner Grapevine (continued)

One of these was an end to problems arising from development in the surrounding area and total protection of our recharge area; another was what we have dubbed the "succession issue", i.e., finding volunteers who will take over the functions of our aging executive. Other ideas included developing partnerships with local businesses in Acheson to assist in management, developing a successful strategy for restoration of formerly cultivated fields in the south-east of the property, and working with Parkland County to develop a "conservation overlay" that would extend to wildlife corridors.

Wagner in the Public Eye

On June 14th Wagner became a field trip venue for the Native Orchid Conference, of which Ben Rostron was a lead organizer this year. Groups of people visited four stations set up in Wagner representing prime opportunities for viewing orchids, and several WNAS committee members assisted with interpretation.

Wagner Natural Area has received considerable media publicity this year too. Dr. **Robin Leech**'s spider research has garnered a lot of attention with articles in the *Edmonton Journal* and the *St. Albert Gazette*, and Wagner was considered an appropriate setting for an article celebrating the International Year of Biodiversity (again in the *St. Albert Gazette*), with **Leech, Ben Rostron** and **Patsy Cotterill** all providing interviews.

Bouquets

Welcome to **Heike Kohl** and **Holly Duvall**, our new volunteers who will be helping with monthly monitoring duties. Both work for the Wildlife Rehabilitation Society and are in interested in protecting the environment. Heike is also a Nature Conservancy volunteer who has helped with fence removal. Last year she was one of the intrepid pair who scaled trees in order to remove old hunting platforms; this year she proved equally adept at rolling rusty old barbed wire into neat coils for removal from the bush.

A big thank-you to the **Nature Conservancy of Canada** for organizing for the second year running a volunteer day to remove old fence wire (potentially hazardous to wildlife). **Kate Nesbitt**, in charge of volunteers for NCC, organized the event on June 27th in conjunction with **Irl Miller** of Wagner, with the assistance of **Amber Briggs**, NCC Monitoring Intern for Northern Alberta, and **Per Andersen**, Manager of Conservation Operations, who kicked off the event. Fourteen volunteers took part in the day dubbed "Wire, Bog, Orchid," as our eager young helpers were later given a tour of the Marl Pond Trail in appreciation of their efforts.

Bouquet to **Pat Clayton** for taking the lead in an enormous amount of political/advocacy work this year.

Many thanks to **Dick Clayton** who again looked after our tree swallow bird boxes and provided a report on the status of breeding (see page 5). Dick in turn would like to thank **Bob Danner** who assisted him with banding again this year. Dick notes the difficulty in finding the right date to be able to band the maximum number of young.

Congratulations to our hardworking spider scientists, **Robin Leech** and **Lorie Taylor**, who got married in Edmonton June 14th.

Thanks also to **James Glasier**, MSc student in conservation biology at the U of A, who in May identified 10 species of ants occurring in Wagner. More information in a later newsletter.

Many thanks to **Irl Miller** who organized a dinner for Wagner executive at the Faculty Club, University of Alberta, on May 18, to celebrate our **250th management meeting** in April. Guests included **Jennifer Klimek**, the lawyer who recently acted on our behalf, and new volunteers **Heike** and **Holly**. As usual, the food was sumptuous and the company terrific!

Breeding Bird Survey in Wagner Natural Area, 2009

For the second year running ornithologist **Loney Dickson** has conducted a Breeding Bird Survey (BBS) in Wagner Natural Area. Last year Dickson resumed the Survey, which was previously done in 1994 (by summer student Sandra Tober) and in 1995 (by summer student Natasha Klingsh).

The BBS as its name suggests aims to determine which bird species are breeding in a given area and because it is standardized it allows some comparison to be made of the status of breeding between years or over a period of time.

The BBS survey period runs from May 28 to July 7, although participants often go out earlier to record early breeders such as owls and chickadees. Recording begins optimally about a half-hour before sunrise and should not extend much beyond 11 a.m. Points are set up at various locations and they should be surveyed as often as possible during the breeding period, but at least three replicates should be recorded for each point. All points do not need to be surveyed on a given day; different starting points should be chosen so that the same points are not surveyed at the same time of day during the recording period.

Nineteen point count locations were set up in 1994. Dickson has retained 18 of these original points and added a further 48 locations, selected to represent different habitats and to obtain an even sampling throughout the Natural Area, including the more recently added lands.

At each point, breeding evidence is assessed over a 3-minute period. Breeding evidence is classified as "possible" (species observed or breeding calls heard in suitable nesting habitat); "probable" (evidence such as a pair of birds seen in suitable nesting habitat, territorial behavior, courtship, visiting of a probable nest site and nest building); "confirmed" (nest building, distraction display, used nest or eggshell, recently fledged young, occupied nest, carrying food, nest with eggs and nest with young). Weather data are also recorded for the survey days. Windy days (measured as greater than 4 on the Beaufort scale) are best avoided for conducting the surveys.

Dickson reports that in 2009 a total of 74 bird species were observed in Wagner Natural Area (64 species in 1995), with 59 species (57 in 1995) showing some evidence of breeding. Of these, 17 species showed evidence of probable breeding and four had confirmed breeding. These were tree swallow, white-throated sparrow, American robin and black-capped chickadee. Survey dates were the 17th and 29th April (outside the breeding period proper), 16th May, 2nd and 4th of June, and 4th July.

Dickson also recorded numbers of individuals of species seen incidentally. He observed over 20 individuals on a given date during the survey period of the following species: black-capped chickadee, American robin; house wren; least flycatcher; pine siskin, ruby-crowned kinglet, red-eyed vireo, Tennessee warbler, yellow warbler, song sparrow, white-throated sparrow and clay-coloured sparrow. Among the more noteworthy species he observed were olive-sided and yellow-bellied flycatchers, and Cape May, blackpoll, black-throated green and black-throated blue warblers, this last being an eastern species and very rare for Alberta. He noted the following species commonly occurring in the fen habitats, which altogether yielded 27 species: ruby-crowned kinglet (in 87.5% of fen locations), Tennessee and yellow-rumped warblers (37.5% each), and American robin and dark-eyed junco (31.5% each). Herring gulls and Franklin's gulls were also seen.

Dickson provides the following useful references:

Dickson, H. L., 2010. Report of the 2009 Breeding Bird Survey of the Wagner Natural Area, Alberta. (Report provided to the Wagner Natural Area Society)

Federation of Alberta Naturalists, 1992. The Atlas of Breeding Birds of Alberta. Edited by Glen Semenchuk. Federation of Alberta Naturalists, Edmonton, Alberta.

Klingsh, N., 1995. Breeding Bird Survey for the Wagner Natural Area. June 14-30, 1995.

Tober, S., 1994. Birds of the Wagner Natural Area, Alberta: Breeding Bird Survey June 18-30, 1994.

Wagner, G., 2000. Atlas of Breeding Birds of Alberta: Update Project, Atlasser's Handbook, Federation of Alberta Naturalists.

Editor's Comments:

Wagner Society is very grateful to Loney Dickson for re-instating the Breeding Bird Survey after a 14-year interval. Covering 66 points with at least three replicates in a limited time period sounds like an onerous undertaking and we appreciate his dedication. We were under the impression that bird numbers and diversity had declined owing to the noise from the road and general disturbance in the area – and indeed this may be true for some species such as owls that require quietness for successful predation. But it's good to know that Wagner still is a sanctuary for bird life.

Loney notes with a hint of disappointment that no other incidental bird records were provided to him during the year, from Society members or anyone else. Clearly we shall have to pull our socks up! And to see even the commonest birds he recorded, there is just as clearly no substitute for getting up very early in the morning and getting out there, with field guide and possibly tape recorder in hand. I suspect we would see an entirely different side of Wagner than the one we see in the middle of the day!

We look forward to the 2010 BBS report!

Dick Clayton's Tree Swallow Banding Report, 2010

Dick reports as follows: Total young 119; 114 fledged, 5 late young (no wrens fledged this year)

Total swallows banded 64, not banded (too large, too small, etc. 55) for a total of 119 young in 30 boxes. (Bob Danner helped with banding, which was done on July 2nd.) Dick notes that the number of swallows fledged is down 48 from last year's 167, which was a record for Wagner. Other statistics: 5 empty boxes, 13 sterile eggs; 2 wren nests but no eggs; 4 tree swallows dead in two boxes; 1 mouse nest.

Wagner Natural Area Safety Checklist for Monitors and Stewards

The assembled safety kit
Photo by Cathy Mowat

It fits inside this handy bag.
Photo by Cathy Mowat

***Cathy Mowat** prepared the following list, which stewards of other natural areas might also find useful. She also put together a monitor's day pack of safety items, which is to be passed from monitor to monitor (usually a monitor checks the site during one month only before handing over to another monitor). Cathy admonishes: think ahead, act safely, and have a good time!*

Monitor "MUSTS" (i.e., must do before each monitoring trip):
ALWAYS - Think in advance about what could go wrong and be prepared to take care of yourself in the event of an emergency.
ALWAYS - Have some emergency contacts and backup plans in place so that you can get assistance if you need it.
ALWAYS - Be aware of the weather and be prepared for the weather to change.
ALWAYS - Take your cell phone with you if you have one*.

THE BIG 3 QUESTIONS:
1. Have you told someone where you are going and when you'll be back?
2. Do you have the Monitor Day Pack with you and does this backpack have all its supplies?
3. Do you have everything else that you feel you will personally need to take with you from a medical safety and physical safety point of view ?

Checklist for Monitor Day Pack (to check before each monitoring trip):
• extra large bright-orange trash bags (2)
• candles (3-4) & waterproof matches – in plastic bag
• pocket knife
• standard St. John's Ambulance first aid kit
• flashlight & 2 extra batteries
• safety whistle
• space (emergency thermal) blanket
• cord
• plastic sheet
• compass
• field maps/air photos kit
• "major access points & road directions" sheet - to be used in the event you need to direct emergency personnel to the major road access point closest to your location.

Monitors must also take (each trip, from their own personal supplies):
• rain gear - or suitably warm winter outer clothing (appropriate to season)
• hat & gloves - all seasons
• 1 extra (warm) jacket or sweater & 1 pair of extra socks - all seasons
• sturdy closed-toed footwear appropriate for bush conditions - all seasons
• water - a minimum of 1 litre (1000 ml *or* 4 cups) of water - all seasons
• food - high energy snacks - all seasons
• sun screen - all seasons
• insect repellant - spring, summer and fall

*Call 911 for all medical and crime emergencies. Call Public Lands at 780-464-7955 or a member of the Wagner Board (see page 4) to report damage to the Natural Area.

Wagner in Pictures, 2009

Pat Clayton carries the torch for Wagner! Pat and friend at Parkland County Office, Stony Plain, in February.

Wagner "roadside pond" at the beginning of June. Fortunately a normal amount of rainfall this year has put some water in our ponds.

Photo: Patsy Cotterill

Robin Leech's malaise trap (spider survey)

Photo: Robin Leech

Wire, Bog, Orchid volunteers with their catch of old fence.

Photo: Kate Nesbitt

Kate Nesbitt of the Nature Conservancy with giant puffball, June 27th

Photo: Patsy Cotterill

Round-leaved bog orchid, *Platanthera orbiculata*, obligingly appeared along the Marl Pond Trail in July for the second year running, for all our visitors to see.

Photos: Patsy Cotterill

Plants of Wagner No. 33

Betula pumila
(Family Betulaceae)

Dwarf Birch
(Birch Family)

Dwarf birch is a common shrub of fens in central and northern Alberta. In rich calcareous fens like those of Wagner it usually grows in islands or strings where the water table is somewhat lower than in the adjacent depressions (or flarks) and marl ponds, along with two dwarf willow species and stunted spruce and tamarack.

Its several dark, erect stems can vary from 1 to 3 m in height; the twigs have a grey coating and are covered in pale, raised dots that are resin glands. The stalked leaves are egg-shaped with the broader end towards the top (obovate), 1-3.5 cm long and usually more or less wedge-shaped at the base. They are prominently toothed, with 10 or more teeth on each side of the leaf and 3-5 lateral veins on either side of the midvein. The leaves are tough in texture and rather shiny.

Like all members of the birch family, dwarf birch bears its flowers in separate male and female catkins (or aments) on the same plant. The catkins emerge singly from buds formed towards the top of twigs during the previous year and expand as flowering approaches (middle to the end of May in the Edmonton area). The male catkins reach about 12 mm, are yellowish to reddish-brown, and curve downwards as they expand. The females are slightly shorter at less than 10 mm and appear green, with tiny bright crimson forked stigmas protruding at flowering.

Each ament consists of a stalk or axis bearing numerous small flowers, each attached to or in the angle of a protective structure called a bract. The pollen-bearing flowers consist of stalked clusters of stamens attached to the inner side of the bract (that is, towards the axis), each bract being distinctly reddish on the outside and minutely fringed. The female flower consists of a naked green ovary with two thread-like stigma arms. It sits inside a protected, somewhat woody, three-pronged bract whose side arms are slightly upraised, saguaro style. The fruit is an oval to somewhat squarish soft nutlet that is bordered on both sides by a membranous wing. The fruits turn brown as they ripen, imparting this colour to the fruiting ament which also becomes wider. Sometimes the fruiting aments stay on the shrub until the following spring, but usually they disintegrate during fall and winter, the fruits and bracts falling together. Dispersal is by wind, but birds may also be instrumental in distributing the seed as well as using it as source of food.

Betula pumila has a close relative, *Betula glandulosa*, also known as dwarf birch or bog birch. Unlike *B. pumila*, however, which is a lowland species of boreal habitats, *B. glandulosa* is usually found in subalpine and alpine areas, including tundra and open subalpine forest which are drier. Apart from geographic distribution and habitat, the two differ in leaf characters, the leaves of *B. glandulosa* being smaller and more rounded, with fewer than 10 teeth on either side of the leaf. Its broad nutlets also have narrower wings than the fruits of *B. pumila*. *B. glandulosa*, as its name implies, is more heavily invested with glandular resin dots. Nevertheless, plants that have intermediate characters do occur, and can be hard to identify.

From top left; dwarf birch shrub showing male catkins at flowering time; right, fruiting catkins that have overwintered.

From bottom left: fully grown leaves of dwarf birch (*Betula pumila*); twig of *Betula glandulosa* (slightly smaller than life size) showing different leaf shape and number of teeth.

Photos: Patsy Cotterill