Iris

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The Newsletter of the Alberta Native Plant Council

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Saying good-bye to Beryl Hallworth

Bonnie Smith

Beryl Hallworth, former Assistant Curator of the Herbarium, Department of Biological Sciences, University of Calgary, passed away at her residence on March 16 at the age of 89 years. Beryl was employed as Assistant Curator from 1967, shortly after her arrival in Canada from the United Kingdom, until she retired in 1978. During her tenure Dr. Charles Bird was Curator of the Herbarium. Beryl spent these years identifying plants, arranging labs, encouraging students and developing intriguing displays. She continued her association with the University and was practically synonymous with the departmental herbarium up to the time of her passing. She is fondly remembered by numerous undergraduate and graduate students, as well as fellow staff as an always enthusiastic and friendly teacher and colleague. In total, she donated over 1600 specimens to the herbarium collection, mostly from western Canada but also from locations as far afield as England and Spain.

Following her retirement she remained at the herbarium working on a project to catalogue the approximately 6000-specimen Norman Sanson plant collection from the Banff Museum. She received a monthly honorarium from the Department of Biological Sciences for this work and produced a catalogue of this collection over a period of four years. The Sanson collection was of great historical value as it had been collected during the late 1800s and early 1900s mostly from Banff National Park where Sanson worked as a park warden and meteorologist.

Still a tireless worker, Mrs. Hallworth continued working on a variety of projects involving safeguarding Nose Hill as a protected area, identifying plant specimens in the herbarium and working on histories of the expeditions of pioneer naturalists to western Canada. In 1975 she published articles on Norman Sanson, Marion Moodie and David Thompson, plus a booklet entitled 'Pioneer Naturalists of the Rocky Mountains and the Selkirks' written with Monica Jackson. During the 1990s, Mrs. Hallworth began a project to write a book on the plants of Kananaskis Country. This book was published in 1997 with Beryl Hallworth as senior author. Her publications will stand as memorials to her dedication to botany and teaching. This remarkable woman continued to work on projects right up to the last moment, most recently a continuing study of the plants associated with the University prairie located behind her residence. She was very interested in

see **Beryl**, *page 3*

Plant species at risk: COSEWIC list updated

David K. Galbraith

On May 8, 2000, COSEWIC, the Committee on the Status of Endangered Wildlife in Canada, updated its list of species at risk of extinction in Canada. The present changes to the list of species at risk in Canada are the results of the annual COSEWIC meeting, held in April. In all, the status of 141 species of plants and animals were reviewed at this year's meeting. Both the species specialist groups that review individual status reports and the actual committee itself were particularly busy this year as they have reviewed the status of many species that have been listed in the past. This activity is to ensure that the list is up-to-date when the federal *Species at Risk* legislation hopefully becomes the *Species at Risk Act* later this year. Of the 18 species that were listed for the first time by COSEWIC in 2000, six are plants:

Soapweed (*Yucca glauca*), a threatened species in Alberta.

Status: Threatened

tuberculed spike-rush	*Eleocharis tuberculosa* (NS)

Status: Special Concern

large-headed wooly yarrow	*Achillea millefolium* var. *megacephala* (SK)
Turner's willow	*Salix turnorii* (SK)
felt-leaf willow	*Salix alaxensis* (NU, SK)
sand dune short-capsuled willow	*Salix brachycarpa* (SK)
floccose tansy	*Tanacetum huronense var. floccosum (SK)*

Many plant species that have been previously listed by COSEWIC were reassessed. Most of these reassessments did not result in any change to the listed status of the species involved. The status of ten plant species was changed by the reassessment:

Uplisted to Endangered

apple moss	*Bartramia stricta* (BC)
blunt-lobed woodsia	*Woodsia obtusa* (ON, QC)
false hop sedge	*Carex lupuliformis* (ON, QC)
few-flowered club rush	*Scirpus verecundus* (ON)
goat's rue	*Tephrosia virginiana* (ON)
golden paintbrush	*Castilleja levisecta* (BC)

Uplisted to threatened

phantom orchid	*Cephalanthera austiniae* (BC)
soapweed	*Yucca glauca* (AB)
western silver-leaft aster	*Virgulus sericeus* (MB, ON)

Downlisted to Threatened

slender mouse-ear-cress	*Halimolobos virgata* (AB, SK)

The complete list of species at risk can be found on the COSEWIC web site at <www.cosewic.gc.ca>.

The function of COSEWIC in listing species at risk of extinction in Canada is evolving. Changes are taking place both because of the pending *Species at Risk Act* and also because of changes in the international community's approach to endangered species management. Recently, COSEWIC reviewed its use of extinction risk categories.

The categories presently used by COSEWIC include:

Extinct—a species that no longer exists anywhere

Extirpated—no longer exists in the wild in Canada, but still occurs elsewhere.

Endangered—in imminent risk of extinction or extirpation.

Threatened—likely to become endangered if present limiting factors are not reversed.

Special Concern—exhibits characteristics that make it particularly sensitive to human activities or natural events.

This item was originally posted on e-mail Canadian Botanical Conservation Network discussion list cbcn-l, *and is reprinted with the permission of the author. For more information, visit the CBCN web page at* <www.rbg.ca/cbcn>. *David Galbraith is the Coordinator of the Canadian Botanical Conservation Network at the Royal Botanical Gardens in Burlington, Ontario.*

Alberta species on the COSEWIC list

Endangered	
tiny cryptanthe	*Cryptantha minima*
Threatened	
slender mouse-ear-cress	*Halimolobos virgata*
sand verbena	*Abronia micrantha*
western blue flag	*Iris missouriensis*
western spiderwort	*Tradescantia occidentalis*
Vulnerable	
Bolander's quillwort	*Isoëtes bolanderi*
hare-footed locoweed	*Oxytropis lagopus*
smooth goosefoot	*Chenopodium subglabrum*
soapweed	*Yucca glauca*
Indeterminate	
Kananaskis whitlow-cress	*Draba kananaskis*
little barley	*Hordeum pusillum*

Beryl, from page 1

preserving this area in a natural state for the enjoyment of all Calgarians. Beryl Hallworth's dedication to teaching botany and natural history was exemplary. She inspired many students to pursue their own interests and to continue to strive towards their goals. She was included in the Who's Who of Canadian Women in 1988.

Beryl was always busy, ever enthusiastic, and very productive yet she always had time for people, particularly students, or for that matter, anyone with a question regarding plants. Many times she could be seen talking away to a student or herbarium visitor discussing, with great enthusiasm, some interesting topic or another. She was a natural teacher with a generous spirit.

In 1972, Dr. Charlie Bird started the Calgary Natural Areas Group of the Calgary Field Naturalists' Society. Beryl was a member from the beginning. She worked for many years assembling information for 'Calgary's Natural Areas', encouraging others with her quiet enthusiasm and constancy. In years to follow; her persistence kept the natural areas' group alive and ready to tackle the political issues necessary to preserve Nose Hill Park, a beautiful hill of fescue prairie and parkland that overlooks the north side of Calgary. She made at least three submissions to city council. It took a long campaign to preserve the park and it has only been through the effort of people like Beryl that Nose Hill Park now exists. In 1988 she edited *Nose Hill: A popular guide*. She was presented with an honorary membership in the Calgary Field Naturalists' Society in 1989. In 1995, Mrs. Hallworth was presented with the Loran L. Goulden Memorial Award by the Federation of Alberta Naturalists in recognition of her outstanding contributions to natural history in Alberta. At the time of her death she was collaborating on a booklet about another natural area, the University Reserve Lands, easily accessible from her residence.

Beryl Maybury Hallworth (nee Evans) was born near Cardiff, Wales. She received her B.Sc. Hon. from University College, Cardiff, University of Wales, United Kingdom in 1932 followed by a Diploma in Education in 1933 as well as two First Class Diplomas (Royal Horticultural Society) from Usk Agricultural College, South Wales in 1934. She married Herbert Hallworth in 1942. She taught Biology in grammar schools (public and private) in the United Kingdom from 1935 to 1966. She chose to stay with her teaching position in London even in the most dangerous days of the Second World War, when bombs were falling every night on the city. She told me once that she would sit in the field with her students and hurry them to bomb shelter when they heard the air raid siren. She emigrated to Canada in 1966 with her husband Herbert who had taken a position with the University of Calgary. She taught Biology at Tweedsmuir Private School in Calgary during the 1966-67 school year. Beryl Hallworth became a Canadian citizen in 1972.

After a twenty-year association with Mrs. Hallworth I find it difficult to express my sense of personal and professional loss. She shared her knowledge, enthusiasm and good cheer with all those around her.

Bonnie Smith works at the Department of Biological Sciences at the University of Calgary.

I first met Beryl Hallworth in the fall of 1977, when I enrolled in the University of Calgary as a graduate student, studying under Dr. Bird. We kept in touch regularly after I graduated, and I was always impressed by her ever-inquiring mind and wide range of interests. Knowing Beryl has shaped my life. I regarded her as a role model and an inspiration on how to live. Thank you Beryl - the world needs more people like you. — Kathleen Wilkinson.

I first met Beryl Hallworth in 1971 when I was taking a vascular plant taxonomy course from Dr. Bob Ogilvie at the University of Calgary. I got to know Beryl really well when I started working on my Master's thesis under Dr. Bird in the fall of 1973.

Over the years I made many visits to Beryl's home, either for meetings of the [CFNS] Natural Areas committee, or just to socialize. If it was summer, and the weather was good, she frequently suggested a walk on the university grassland behind her home, which very soon became known as 'Beryl's Prairie'.

She literally knew every plant there. Beryl seemed to have an aptitude for identifying problematic weeds, particularly some of the nasty chenopods, and I made good use of her talents when I had the chance.

Beryl was a spirited woman, pleasant and articulate, but not afraid to speak her mind. I think the most agitated I ever saw her was when some graduate students made eight cups of tea from one tea bag. As far as Beryl was concerned, that was simply the most hideous thing that you could ever do to tea.

I didn't see as much of Beryl after I moved to Edmonton in 1976, but we exchanged Christmas cards every year (even if some of hers didn't arrive until Valentine's Day) and hers were always upbeat and cheerful. I think one of her happiest times in recent years was when the book on *Plants of Kananaskis Country* was finally published in 1997.

What I will remember most about Beryl is her cheerful disposition, her dedication to her family and her causes, her willingness to get involved in issues, and to help others.

— J. Derek Johnson.

Please see the article Plants of the Higher Education Reserve, *on page 5 for an example of one of Beryl's many contibutions to the knowledge of the Alberta Flora — ed.*

Weed seeds in wildflower seed mixes

Scott Meers

Gardening season has finally arrived and many homeowners find themselves with a part of their yard in which they would like to have flowers that require low (or no) maintenance. The option usually suggested to them at the garden center is to use a "Wildflower Mix". The ingredients in a wildflower mix can vary greatly and in some cases the seeds contained in the package can be outright scary.

The first concern is weeds. Depending on the species present in the mix this may or may not be a concern. One mix contained the following list on the package: Baby's Breath, Candytuft Fairy Mix, Bachelor's Buttons, Catchfly, Clarkia, Columbine, Coreopsis L.L., Coreopsis Tinot., *Cynoglossum* (forget-me-nots), Ozark Sundrop, Purple Coneflower, Shasta Daisy, Shirley Poppy, Sweet Williams Dbl, and Viola. This list of common and generic names does not give a very accurate description of the actual species. The comments below are based on what these plants are most likely to be according to the names given.

Not just another pretty daisy...

Very few if any of the plants listed in this wildflower mix are actually native to Alberta. Of the plants in this list there are some that have been shown to be a concern as weeds. Baby's breath (*Gypsophila paniculata*) and ox-eye daisy (*Chrysanthemum leucanthemum*) have become serious rangeland weeds in various locations around the province. There are patches of baby's breath throughout Alberta which in some cases have become large scale infestations often invading native rangeland. Non-invasive shasta daisy (*Chrysanthemum maximum*) and ox-eye daisy are virtually indistinguishable except by microscope. Ox-eye daisy is often passed off as shasta daisy. Ox-eye daisy is a severe problem in the foothills of Alberta where it has become a serious invasive weed in rangeland.

Catchfly and viola are a concern as weeds in cultivated areas. Catchfly could refer to a number of species, most of which are weedy. *Viola* could also refer to a number of different plant species, a few of which are good horticulture plants and a few of which can be serious weeds. There are two weedy viola species in Europe that are very difficult to control. At least one of these species (wild pansy—*Viola arvensis*) is gaining a foothold in Alberta . Weedy species of Catchfly include bladder campion (*Silene cucubalis*), night flowering catchfly (*Silene noctiflora*), white cockle (*Lychnis alba*), and cow cockle (*Vaccaria pyramidata*). Corn cockle (*Agrostemma githago*) and cone catchfly (*Silene conoidea*) are also serious weeds in the United States but are not yet established in Alberta. The catchfly listed in the aforementioned mix could be any one of the weedy species or another non-weedy one.

Yet another concern is *Cynoglossum* which is the genus name for houndstongue (*C. officinale*), a problematic rangeland plant in the foothills. Houndstongue can cause poisoning in cows and especially in horses. There is no way of knowing if the *Cynoglossum* listed in the previously described mix is houndstongue or not, but potential buyers should keep that possibility in mind.

One plant that is often found in the mixes (but not listed in the above mix) is butter and eggs, also known as yellow toadflax (*Linaria vulgaris*). Yellow toadflax is a serious and aggressive farmland and rangeland weed.

Sometimes the wildflower mixes do have a few species that are native to this area. The concern here is that the genetic source may be from outside of Alberta. This may lead to an outbreeding to local natives causing a detrimental change in the gene pool. Of even more concern to the purchaser may be that these plants are possibly preadapted to different environmental conditions and are unlikely to thrive in Alberta.

So what should a buyer do?

Avoid wildflower mixes that do not list the species it contains. Look for mixes that list the flowers by latin name as well

(they do actually exist!). As you choose plants for your garden you should know what they are and understand the impacts (as much as possible) that those plants can have on our environment. The best would be to purchase native Alberta wildflowers from a credible source. If you want true native wildflowers—check out the Alberta Native Plant Council Seed source guide at <www.anpc.ab.ca/downloads.htm>.

If you have already planted seeds and ended up with weedy or potentially weedy species then remove them immediately to avoid future problems in your garden. Control them before they escape as it is very expensive to mount province-wide cleanup programs such as the one currently underway for purple loosestrife (*Lythrum salicaria*) or the fairly successful program for spotted knapweed (*Centaurea maculosa*).

The Alberta Native Plant Council is preparing a position statement on these wildflower seed mixes. We may also prepare a resolution to send to both the Federal and Provincial governments. Right now there is a loophole in the *Canada Seeds Act* that allows the mixes to be sold without complete and clear labeling. The next time you are in a garden center please pick up the wildflower mix and write down the following information: the name of the mix, the company selling the mix, who is selling it, where it was packaged and the list of plants in the package. Also note if the package lists germination, purity, or presence/absence of noxious weeds. Please send your findings to Scott Meers <Scott.Meers@ agric.gov.ab.ca>, or by mail to the ANPC. Thanks for your assistance in this important initiative.

Flowering date phenology of some common plants at the University of Calgary's Higher Education Reserve—1974 to 1999

Don Stiles

The Higher Education Reserve ('University Prairie'), looking east from the Paskapoo Slopes. The University campus and Nose Hill are in the background.

The Higher Education Reserve (also called the University Prairie) is a large natural area immediately west of the University of Calgary campus. From 1974-1995, Beryl Hallworth visited the reserve regularly, noting the flowering dates of plants and other natural history highlights.

Beryl visited the prairie an average of nearly two times per week, adding up to a total of 800 visits over 21 years. Even when you consider that she and her husband took yearly summer holidays, Beryl amassed a tremendous record of the phenology of this area. In 1991, Ann Brebner began to compile her own observations from nearly daily walks with her dog. This information has been included in Beryl's data. As a result we have a wonderful source of flowering dates for many plants on the reserve.

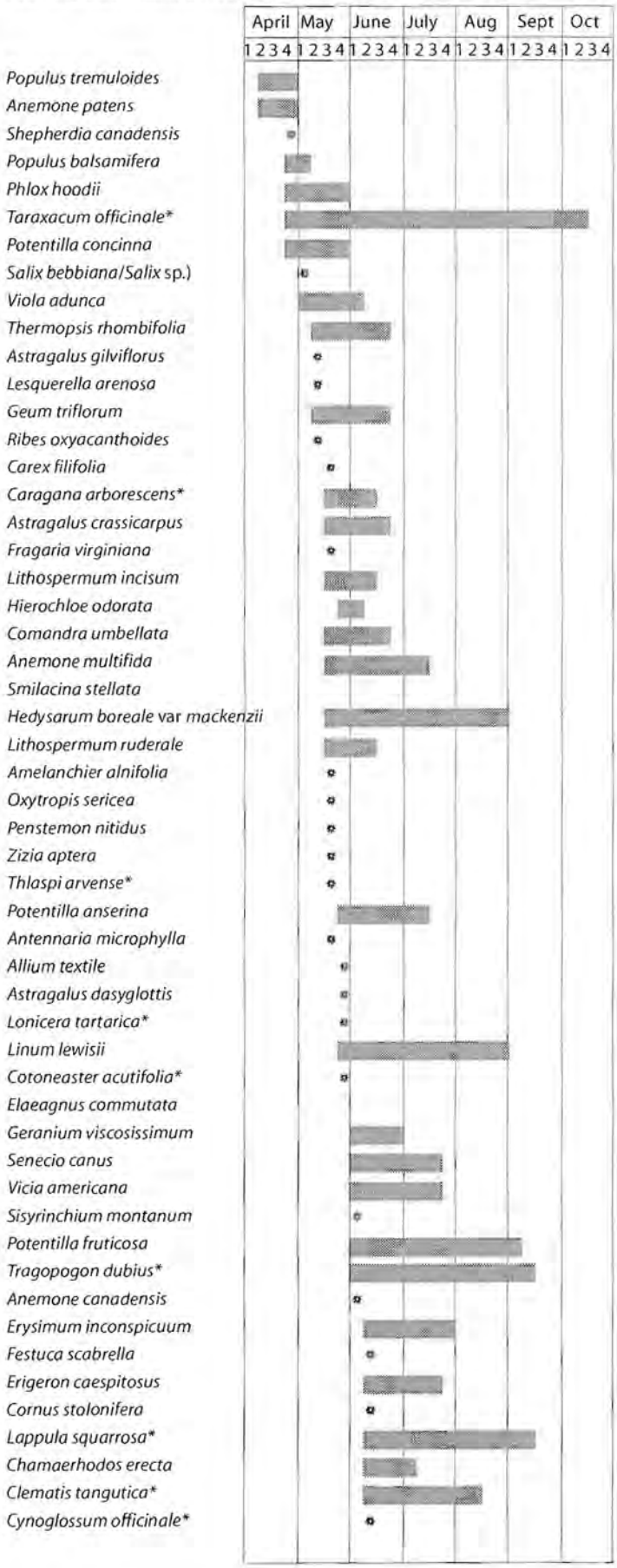
First and last flowering dates for each year were taken out from Beryl and Ann's records of 79 common plants by members of the Natural Areas Group of the Calgary Field Naturalists' Society. Data for another 28 slightly less-common plants were added later, for total of 107 species. Median first and last flowering dates were determined for each species; those with more than 8 years of data are presented in Table 1. Choosing a median rather than an average date minimised the effect of any extremes in the database.

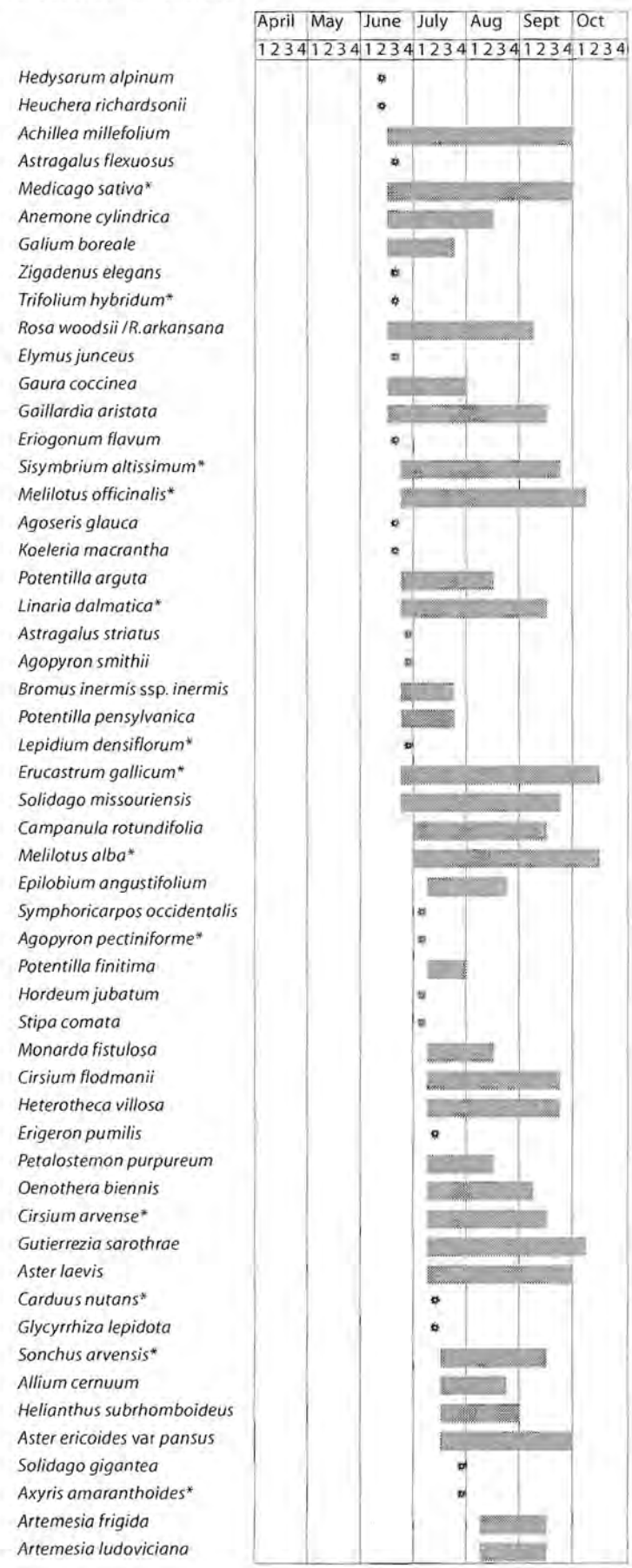
First dates appear to be more consistent than last dates. This may partly be due to the observers being more keen at the beginning of the flowering season, but also because Beryl was the only one of the two observers that noted last flowering dates.

Don Stiles is an amateur naturalist with an interest in birds and plants. He is the University Prairie representative for the Calgary Field Naturalists' Society. He knew Beryl for 15 years.

The phenology data were compiled by the Natural Areas Study Group of the Calgary Field Naturalists' Club. If you would like more information on the dataset, please contact Don Stiles of the CFNS at 403-271-4689.

Table 1. Median first and last flowering dates of plant species. Shaded bar indicates week in which the species is flowering. A '✿' is shown when the median last flowering date is not known. Species are arranged in order of first flowering date. * denotes a non-native species.





When is a rare plant report not acceptable?

Joyce Gould

Pedicularis capitata (large-flowered lousewort), an S2-ranked species in Alberta

When is a rare plant report not acceptable? Recently, some problems have arisen regarding the accuracy and acceptability of some rare plant reports. This note describes why we must use a high standard for identification of rare plants and how we apply it.

The Alberta Natural Heritage Information Centre (affectionately known as ANHIC) compiles information on taxa and communities, primarily those that are "rare". Data such as location, observer, date of observation, population size, and threats are entered into the databases for all taxa and communities (elements) on various provincial tracking lists (plants, lichens, plant communities, odonates and vertebrates). The data in ANHIC are used for many purposes such as land use planning (for example, facility placement or routing) and assessment of species status. Consequently, data quality is of paramount importance to ensure that the information used in these processes is credible and accurate.

Data are checked during data entry to capture mistakes in transcription and spelling. However, of fundamental importance is whether the plant has been identified accurately. We evaluate this through codes for identification of a particular record. For example, if a plant is reported in the literature and we subsequently get information that this is an erroneous report or if the identification is changed, we use the code "no". If a plant is reported without documentation (specimen or photograph of diagnostic characteristics) for a location that is an unlikely habitat or considerably out of range we use the code "?".

Reports for plants within the known range and appropriate habitat, **and** that have been identified using sources such as *Flora of Alberta, Flora of North America* or other taxonomic publications are coded with "blank". The code "yes" is used only for records in which either a specimen or photograph of diagnostic characteristics has been taken, **and** the material has been checked against specimens in a well-maintained herbarium *or* the plant has been identified by an expert for that particular taxon. A voucher specimen also needs to be deposited in a publicly accessible herbarium.

Because status determination is often based on number of locations or small population size, we need to ensure that we count only those records for which we are confident of the identification. Therefore, only records with the qualifier "yes" or "blank" are used in this process. The same applies to land use planning. We do not consider records with questionable or incorrect identification. We encourage contributors to ANHIC to contact us for assistance with identifications whether it is to review difficult specimens against material at a herbarium or to provide a contact for expert determination.

So, when is a rare plant report not acceptable? For ANHIC, it is when the report is not supported by sufficient information, confirmed voucher specimen or photograph, to confirm the identification.

Joyce Gould is a botanist with the Alberta Natural Heritage Information Centre

Attendees of this year's ANPC AGM in Calgary on their way back from a field trip to look for signs of spring on Nose Hill Park.
The theme of this year's AGM was Restoration and Naturalisation inAlberta. Sessions covered naturalisation projects that ranged in scope from schoolyard garden projects to large-scale restoration of pipeline rights-of-way. More than 140 people attended, making this year's AGM an outstanding success.

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Iris is published three times a year by the Alberta Native Plant Council. The Council's aim is to increase knowledge of Alberta's wild flora and to preserve this diverse resource for the enjoyment of present and future generations. A subscription to *Iris* is included with membership in the ANPC.

Membership fees are:

$15 Individual
$25 Family
$10 Student/Retired
$50 Corporate
$500 Lifetime

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

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

Deadlines for upcoming issues:

Fall	**Oct 15, 2000**
Winter	Jan 15, 2001
Spring	May 15, 2001

printed on recycled paper

Book Review:

Wildflowers of Alberta

A guide to common wildflowers and other herbaceous plants

Kathleen Wilkinson
University of Alberta Press and Lone Pine Press, Edmonton.
$26.95

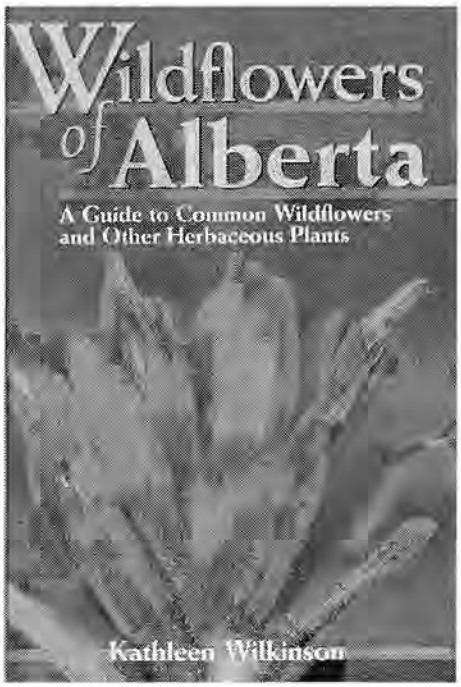
Reviewed by Lorna Allen

With over 1700 plant species known to occur in Alberta, a book with pictures of the full flora would be large and unwieldy. Kathleen Wilkinson's latest book, "Wildflowers of Alberta" is a good compromise. With 246 species from 66 families described in detail, she has done a fine job of choosing the common flowering plants that people are most likely to notice. The reader is provided with clear descriptions, plus discussions on other similar species and interesting information on uses. In addition, Ms. Wilkinson has accessed the collections of 20 photographers to provide generally high quality photos for most species.

The book begins with a concise review of Alberta's natural regions, illustrated with some lovely photographs. The author then moves into species descriptions. Species are grouped by family, with discussion of the characteristics of many of the plant families. I appreciated the inclusion of some of the plants that people may have noticed and been curious about, such as club-moss (*Lycopodium*), dwarf club-moss (*Selaginella*) and horsetails (*Equisetum*). Too often, these curiosities are left out of such books, in favor of showier, but often better-known species.

The species descriptions include a discussion on habitat and range, flowers (or, in the case of the above genera, reproductive structures), leaves and growth habit. I particularly like the bolded text emphasizing those features that are of the most help in identifying the species. The description is followed by a sometimes-lengthy section on the meaning of the genus and species name, uses and often a discussion on other species in the genera. Photos illustrate the main species.

The line drawings by Joan Williams are a fine addition to the book. Often a distinguishing feature, such as "lower



internode longer than corresponding stem sheath" that separates the common horsetail (*Equisetum arvense*) from the very similar-looking meadow horsetail (*E. pratense*), is made clear through the use of a drawing (see pg. 4). I also found the drawings distinguishing the lip shapes of the various twayblade orchids (*Listera* species) to be very helpful.

Although the author has avoided using technical terms, there are some cases where a simple term can replace a long phrase. Going back to the earlier example, she uses "internode" instead of "the point between where leaves or branches attach". Then provides a glossary, again with line drawings to illustrate some of the points.

Ms. Wilkinson has chosen to order species by family. Once plant family characteristics can be recognized, I think naturalists find a plant book ordered by family, such as this one, handier than one ordered by color. But beginners may find themselves flipping through the entire book, trying to identify the species of interest. The author has tried to remedy this by providing a species list ordered by colour. The intermediate naturalist will find the keys included after the species write-ups to be helpful in identifying those pesky unknowns. Two sets of keys are provided, first to the main families, then to species within each of the families.

Overall, this is a fine book, and would prove a useful addition to any plant enthusiast library.

Rare plant communities of Alberta no. 3

Limber pine

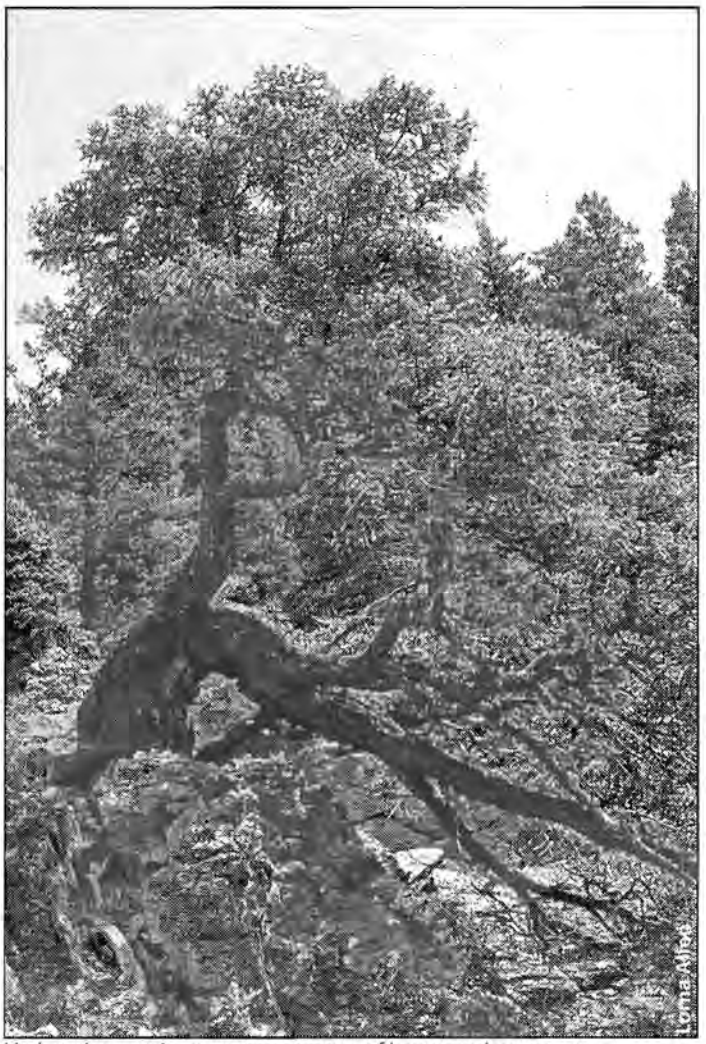
Lorna Allen

Gnarled, wind-twisted limber pine (*Pinus flexilis*) cling to barren, rocky outcrops in a windy landscape. How can they survive? Surprisingly, rocky soils have greater moisture than finer textured soils at the same elevation, resulting in more water available for tree growth. The rocks that look so dry channel water into deep cracks, allowing moisture to infiltrate deeply and reducing evaporation. Although there is likely only limited, poor soil in the cracks in the rocks, in semi-arid climates, moisture, not soil fertility, tends to be the factor that limits tree growth (Knight 1999).

Limber pine is an amazing, long-lived tree, with some individuals documented to be over 1500 years old. The species has the broadest elevational span among conifers in North America, growing from 870 m in Wyoming to 3810 m in Colorado (Knight 1999). In Alberta, it grows at elevations from 980 m to 1900 m (Timoney 1999). Sometimes a component of subalpine forests, it becomes dominant on rocky outcrops.

There are likely several different limber pine woodland community types in Alberta, but their structure and composition has not been well documented. Timoney (1999) has tentatively divided them into the following community types:

- A mixed Douglas fir, limber pine open woodland with ground juniper and mountain rough fescue (*Pseudotsuga menziesii—Pinus flexilis/Juniperus communis/Festuca campestris*). It is found at upper slopes and crests, but on sites with enough soil development to support the grassy understory.
- An open limber pine woodland of rocky outcrops with a dwarf shrub understory of common bearberry and ground juniper (*Pinus flexilis/Arctostaphylos uva-ursi—Juniperus horizontalis*). June grass (*Koeleria macrantha*) and shrubby cinquefoil (*Potentilla fruticosa*) are other species commonly found in this community.
- A mixed, more closed community type with subalpine fir, limber pine and aspen trees (*Abies lasiocarpa—Pinus flexilis—Populus tremuloides/Thalictrum venulosum*) that may be transitional to an Engelmann spruce–subalpine fir forest. More information is needed to verify this type.



Limber pine—an important component of barren, rocky outcrops

The Clark's nutcracker is an important dispersal agent for limber pine

Found from California, Arizona and New Mexico north, limber pine reaches the northern limit of its distribution in Alberta. Some of the most northerly limber pine woodlands are found on the south-facing ridges of Windy Point, in the Kootenay Plains Ecological Reserve, and west in Jasper National Park. These woodlands have been described as open limber pine with some Douglas fir, and an understory dominated by junipers and bearberry (*Pinus flexilis—Pseudotsuga menziesii/Juniperus communis—J. scopulorum/Arctostaphylos uva-ursi*) (Achuff *et al.* 1986). Table 1 lists the species that have been documented in these woodlands.

The establishment of limber pine woodlands shows the fine interdependence of species. Limber pine has large seeds that can supplement a bear's fall diet. The seeds are also an extremely important food source for birds such as Clark's nutcrackers (*Nucifraga columbiana*) and Steller's jay (*Cyanocitta stelleri*). The birds collect seeds, then fly off in search of places where they may be able to retrieve the seeds in winter. These include south-facing slopes or windswept

ridges, which are coincidentally just the types of places where a limber pine woodland might be able to survive. The birds hide 1 to 5 seeds at a time, poking them 2 to 3 cm deep into cracks. Clark's nutcrackers have been observed to carry limber pine seeds up to 23 km (Knight 1999). Red squirrels will also help plant the seeds, but do not do as good a job at dispersing them long distances.

Limber pine woodlands are often small in size, but their distinctive character and the importance of their seeds as a food source make them significant. Clark's nutcrackers in particular depend on limber and whitebark pine seeds as a primary food source. The interdependence of these species may mean that if the population of one drops, the decline of other's will follow. An introduced disease, white pine blister rust (*Cronartium ribicola*), may threaten five-needle pines (in Alberta, mainly limber and whitebark pine, *Pinus albicaulis*). A die-off of pines in Glacier National Park, Montana has already been reported, and stands of limber pine in Waterton Lakes National Park, Alberta, typically contain many dead trees (Achuff *et al.* 1997).

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Table 1 Limber pine - Douglas fir / juniper species – bearberry woodland species list (*Pinus flexilis - Pseudotsuga menziesii / Juniperus communis – J. scopulorum / Arctostaphylos uva-ursi*) From Holland and Coen 1983

Tree Layer	
Pinus flexilis	limber pine
Pseudotsuga menziesii	Douglas fir
Picea glauca	white spruce
Shrub layer	
Amelanchier alnifolia	saskatoon
Juniperus communis	ground juniper
Juniperus scopulorum	Rocky Mountain juniper
Pinus flexilis	limber pine
Potentilla fruticosa	shrubby cinquefoil
Rosa acicularis	prickly rose
Shepherdia canadensis	Canada buffaloberry
Herb—Dwarf shrub layer	
Allium cernuum	nodding onion
Anemone multifida	cut-leaved anemone
Anemone patens	prairie crocus
Antennaria parvifolia	small-leaved everlasting
Arctostaphylos uva-ursi	bearberry
Artemisia campestris	plains wormwood
Artemisia frigida	pasture sagewort
Aster ciliolatus	Lindley's aster
Aster sibiricus	Arctic aster
Astragalus spp.	milk vetch species
Bromus ciliatus	fringed bromte
Carex filifolia	thread-leaved sedge
Erigeron caespitosus	tufted fleabane
Festuca scabrella	rough fescue
Galium boreale	northern bedstraw
Hedysarum boreale	northern hedysarum
Koeleria macrantha	June grass
Linum lewisii	wild blue flax
Oxytropis sericea	early yellow locoweed
Rosa acicularis	prickly rose
Senecio canus	prairie groundsel
Trisetum spicatum	spike trisetum
Bryoid Layer	
Barbula icmadophila	screw moss
Eucalypta rhaptocarpa	striate-fruited extinguisher moss
Pylaisiella polyantha	
Tortula ruralis	twisted moss
Xanthoria elegans	
Epiphytes	
Letharia vulpina	*wolf lichen*
Parmelia infumata	
Parmelia subolivacea	
Usnea hirta	old man's beard

Alberta's limber pine woodland communities are all considered plant communities of conservation concern and are on the Preliminary Plant Community Tracking List. You can get a copy of the list at the ANHIC website <www.gov.ab.ca/env/parks/anhic/anhic.html>, or writing to:

Lorna Allen
Alberta Natural Heritage Information Centre
Parks and Protected Areas
2nd. Fl., 9820 - 106 St.
Edmonton, Alberta Canada T5K 2J6
tel.: 780 427-6621
fax: 780 427-5980
Email; <lorna.allen@gov.ab.ca>

Or check it out on the website at <www.gov.ab.ca/env/parks/anhic/anhic.html>

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Available from: CAFF National Representative for the United States, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503 USA

Flora of North America. 4. Alismatidae, Arecidae, Commelinidae (in part) and Zingiberidae.
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