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In This Issue

2015 Revision of Alberta Vascular Plant Names and Ranks.....	1
Willow Watching along Whitemud Creek, Edmonton.....	4
Paskapoo Poplar.....	5
Status of Alberta's Native Bees.....	6
Tongue-Tied in Latin: M to O	9
Some Handy Plant Lists.....	9
State of Mineral Wetlands in the Bitumen Sands of Alberta	10
News and Events.....	12

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ALBERTA
Native Plant
COUNCIL

Cover photo: Marsha Hayward;
Floating Pondweed (*Potamogeton* sp.).

2015 Revision of Alberta Vascular Plant Names and Ranks

Linda Kershaw & Lorna Allen

In the winter of 2014–2015, Environment Canada undertook a major reassessment of species' status in all of the provinces and territories. Linda Kershaw was contracted to tackle the list of vascular plants for the province of Alberta, working in co-operation with Lorna Allen of the Alberta Conservation Information Management System (ACIMS). The contract work involved two main steps: 1) generating a species list for the province following current classification and 2) assessing the status of each species on the list. A third step was added on behalf of the ANPC: 3) generating distribution maps for rare (S1 and S2) species.

1) Generating the species list

The first few weeks of work involved compiling a comprehensive species list from existing sources including the Flora of Alberta,¹ Rare Vascular Plants of Alberta,² Wild Species 2010,³ List of All Vascular Plant Taxa in the ACIMS Database,⁴ Biotics5,⁵ and Vascular Plants of Canada [VasCan].⁶ In particularly confusing cases, reference was also made to the Plants of Canada Database,⁷ the Flora of North America [FNA] website,⁸ the Grass Manual on the Web,⁹ NatureServe Explorer¹⁰

and the PLANTS Database.¹¹ This information, and data from other miscellaneous publications, resulted in a list of over 2,200 species.

Because of the many taxonomic revisions that have been implemented in recent years, the first step in refining the list was to determine the current taxonomic status of each species. Environment Canada follows the taxonomy of the VasCan,⁶ so this was used as the standard for classification. VasCan has an easily accessible and searchable online database (<http://data.canadensys.net/vascan/search>), so it was possible to sort out most cases of synonymy and/or reclassification, all the way from the level of Order down to Species. Subspecies or varieties were not assessed. Many species have recently been placed in a new genus, family and/or other taxon, and all of this information was recorded in an Excel spreadsheet, in an attempt to sort through some of the confusion between older publications (e.g., Flora of Alberta) and current taxonomy.

There are too many changes to summarize here, but a copy of the spreadsheet showing old and new names and reasons for inclusion or

See **Revision of Names & Ranks**, page 2

Revision of Names & Ranks, from page 1

exclusion in the final list is available on the ANPC website (www.anpc.ab.ca under the Publications tab). This spreadsheet will help sort through some of the puzzling changes. For example, *Solidago canadensis* is a valid species, but it does not occur in Alberta. What has been called *S. canadensis* here is either *Solidago altissima* or *Solidago lepida*.

Key to *Solidago altissima* and *S. lepida* (from Flora of North America)

Leaves moderately to densely hairy with long soft hairs or short, flat-lying hairs, especially abundant along veins on the lower/outer surface *Solidago altissima*
[*Solidago canadensis* var. *gilvocanescens*]

Leaves hairless or sometimes with a few soft, flat-lying hairs along the main vein on the upper/inner surface.....*Solidago lepida*
[*Solidago canadensis* var. *salebrosa*]



Solidago altissima [*S. canadensis* var. *gilvocanescens*]

It should be noted that only vascular plant species that grow wild in Alberta have been included in this list. This means that exotic species are only included on the list if they have been observed dispersing/reproducing in the wild (i.e., naturalized species). Some of the species listed in the *Alberta Weed Act Regulations* are not yet naturalized here, and so they are not included in the list. The presence of all species was based on published records and/or specimens collected in Alberta. Unverified reports were not included when assessing species maps and making calculations.

2) Assessing the status of each species

The status of each species was determined using the NatureServe Rank Calculator.¹² NatureServe has developed a complex protocol for determining a species' status. Two important publications addressing this process, NatureServe Conservation Status Assessments: Methodology for Assigning Ranks¹³ and NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk¹⁴ are available on the NatureServe website at <http://www.natureserve.org/conservation-tools/conservation-status-assessment>.

Many factors can be used to assess the status of a species. Factors for assessing Species Rarity include: Range/Distribution (e.g., range extent, area of occupancy within that range) and Abundance/Condition (population size, number of occurrences, number of occurrences or percent of area occupied with good viability/ecological integrity). Other considerations, in addition to Rarity, include Threats (Overall Threat Impacts, Intrinsic Vulnerability) and Trends (both Short-term and Long-term). Information about Threats and Trends for individual species is very limited for vascular plants in Alberta. Detailed information about area of occupancy, population size and percent of area with good viability/ecological

integrity is also rare to non-existent for plant species. For those few species that have had status review through COSEWIC, these data were available and were used to assess rank.

The NatureServe Rank Calculator requires at least two pieces of information relating to the abundance and distribution before it can calculate a rank. In almost all cases, the data entered for a species was Range Extent and Number of Occurrences. The source(s) of information was always recorded in a Comments section with the data.

Range Extent was entered as one of the following nine fields: A=<100 km²; B=100–250 km²; C=250–1,000 km²; D=1,000–5,000 km²; E=5,000–20,000 km²; F=20,000–200,000 km²; G=200,000–2,500,000 km²; H=>2,500,000 km²; Z=Zero (no occurrences believed extant; presumed extinct). The area of a species' range was often calculated using the online Area Calculator at <http://www.freemaptools.com/area-calculator.htm>. Based on distribution maps, polygons were delineated with the map tool, and the area of the range was generated. For widespread species, an estimate of total area was often enough to determine the Range Extent field. For example, Alberta covers about 662,000 km², so no species would be ranked as H, but if a species' range covered more than a third of the province, its Range Extent would be G. The Area Calculator was used to measure the size of smaller ranges (differences between fields become smaller with smaller ranges) and to distinguish between fields when Range Extent fell close to the mid-point between two fields.

Number of Occurrences was entered as one of the following six fields: A=1–5; B=6–20; C=21–80; D=81–300; E=>300; Z=Zero (species presumed extinct). The information used to assign a field for Number of Occurrences was usually based on dots on published distribution maps (e.g., in the Flora of Alberta¹) and/or records in databases (e.g., the Database of Vascular Plants of Canada⁶). The University of Alberta

See **Revision of Names & Ranks**, page 3

Revision of Names & Ranks, from page 2

Vascular Plant Herbarium [ALTA] Website¹⁵ was especially helpful for assessing Number of Occurrences. Unfortunately, not all of the specimens in ALTA have been entered into the database (all of the monocots and most small dicot families have been completed), but the information that was available was invaluable. The Grass Manual on the Web⁹ and Ecological Sites Information System¹⁶ were also very helpful.

Rare species were easy to assess, because their populations have been recorded and mapped by ACIMS, and all of this information was available on Biotics5.⁵ However, for the more common species, detailed information regarding number of occurrences was often lacking. When detailed dot maps and/or site records were not available, the person entering the field value had the authority to adjust the entry, based on her/his field experience. For example, there are few Alberta distribution maps with >300 dots recorded, but many of our common species are known to have >300 occurrences in the province. In these cases, the Number of Occurrences was entered as E=>300 with the Comment "widespread and common." In some cases, the distinction between two fields was unclear based on personal experience (e.g., a species is common in some areas and has 23 dots on the map in the Flora of Alberta,¹ but should its Number of Occurrences be C=21–80 or D=81–300?). Unless the expert felt certain that the species was more common than its map(s) suggested, the number entered was based on the published data (e.g., C=21–80). Ranks are not static, and as more occurrences are recorded, ranks can be adjusted in the future.

3) Generating distribution maps for rare (S1 and S2) species

Maps of rare (S1, S1/S2, S2, S2/S3) species were generated by overlaying points from the ACIMS database on the base map used in the Rare Vascular Plants of Alberta.² Many thanks to

Duke Hunter, who made this possible. A total of 444 maps were completed. These included maps for 276 species that are now classified as rare and 168 species that were considered rare in 2001 but have since been reclassified. Maps for an additional 80 species were not generated, because revisions to the database were still underway when the status report was completed.

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Welcome to our newest volunteers! Many thanks for joining us.



Kim MacKenzie will be our Nature Alberta Director.

Cam Johnson is leading ANPC's new social media committee.

Joelyn Kozar has taken on stewardship of Clyde Fen Natural Area.

Kim Rondreau, Kim Gould, and Andrea Dechene will be compiling ANPC field trip data to submit to Alberta Conservation Information Management System (ACIMS) and Parks Canada.

Willow Watching Along Whitemud Creek, North Saskatchewan River Valley, Edmonton

Patsy Cotterill & Elisabeth Beaubien

In 2014 phenologist Elisabeth Beaubien and I tagged a number of willows growing in a small area of Whitemud Creek Park, Edmonton. The following year Varina Crisfield joined our willow-watching team. The idea was to record the significant events in the lives of these local willows and better acquaint ourselves with these harbingers of spring. By late spring 2015, we had tagged and made preliminary observations on 11 species: *Salix arbusculoides*, *S. bebbiana*, *S. candida*, *S. discolor*, *S. famelica*, *S. interior*, *S. lasiandra* var. *lasiandra*, *S. petiolaris*, *S. planifolia*, *S. pseudomyrsinites*, and *S. pseudomonticola*. Habitats varied from creek embankments and floodplains (e.g., *S. arbusculoides*, *S. famelica*, *S. interior*, *S. discolor*) to a marly plateau influenced by calcareous seepage (*S. candida*, *S. pseudomonticola*) and a mulch bed planted with native willows (*S. discolor* (one specimen), *S. petiolaris*, *S. lasiandra*). (The mulch bed was created and planted with locally salvaged native willows to serve as a barrier to Parks staff whose mowing of a calcareous meadow at the base of a hill threatened a population of saline shooting-stars and orchids.)

All except two species have representatives of both sexes, and because we began tagging in April 2014 without knowing the identity of all specimens, *S. discolor* and *S. famelica* were over-represented. Going into 2016 we still have some labelling work, including finding and tagging missing genders for some willows. One plant was partly cut down by Parks staff because it was overhanging a bridge, but has re-sprouted sufficiently for us to retain it in the inventory. Another apparently died of an infestation of willow and poplar borer larvae (*Cryptorhynchus lapathi*), which have attacked several willows in the mulch bed but fortunately have not spread to plants in more natural habitats.



Patsy Cotterill

Brilliant red stigmas contrast with white-hairy capsules in this female hoary willow, *Salix candida*.



Patsy Cotterill

Salix discolor, pussy willow, showing early stages of seed dispersal and young, tender leaves. Pussy willow is precocious, flowering early and producing catkins on naked stems prior to leaf development.

Results so far indicate what we already knew: that there is a definite, if overlapping, sequence of flowering among the willows. Elisabeth used the phenology codes of Helmut Dierschke

(1972): e.g., R4 = first bloom stage, R7 = full bloom = pollen-shed finishing, to record phenology stages, both vegetative and reproductive. She found, however, that they did not adequately capture the nuances of willow development, so she will try to modify them. **If readers have ideas on this, please contact us!**

Studying individual plants provides insights into their growth, development, morbidity and mortality that cannot be gained from merely surveying the species as a whole. I was particularly intrigued to note how the delicate young leaves on new shoots (particularly prone to insect attack) became cuticularized (or “hardened” as I called it) and were then less sensitive. The timing when new shoot growth ceases may be another parameter worth recording.

Tagging Willows

Patsy, Elisabeth and Varina tagged 28 specimens in the first two years. Each specimen was labelled with a number, scientific name, and sex (male or female). They used multiple methods to label each specimen:

- Plastic label (an old Dymo labeller) on a metal forestry label (or inscribed directly into the metal)
- Flagging tape
- GPS points
- Google Maps
- Written location description and phenology

Several years' worth of data should reveal how flowering times and fruiting success are affected by weather and climate. Studies over a wider geographic area using other observers should indicate whether the sequence of flowering and fruiting shown by the species remains consistent for these

See **Willow Watching**, page 5

Willow Watching, from page 4

species elsewhere. On a practical note, having all the species within a restricted area allows us to survey all specimens in a single visit, a great advantage when schedules are busy. Finding optimal weather-proof labels, however, remains a quest!



Patsy Cotterill

Catkins and leaves develop at the same time in sandbar willow, *Salix interior*, which forms extensive colonies along shores and floodplains. This is a staminate plant.



Patsy Cotterill

Catkins and leaves also develop simultaneously in shining willow, *Salix lasiandra* var. *lasiandra*, another later-flowering species. Note the bottle-brush appearance of these male catkins, with 4-5 stamens per flower. ♦

Paskapoo Poplar

Ken Wright

Reprinted with permission from *Calgary Gardening*, the newsletter of the Calgary Horticultural Society

The Paskapoo Poplar (*Populus balsamifera* 'Paskapoo') is unique among the genus of poplars, not only for its perfect shape, but it also resolves many of the poplar issues, of which there are many, including short-lived, disruptive root systems, and fragile branches in heavy winds, rain or snow.

Paskapoo is a genetic dwarf, which resolves the issue of overgrowing a site and becoming a hazard. The dwarf characteristics of the tree give it a small stature with a much lower canopy. The mature height is 7 – 8 m tall and almost as wide. It is a perfect specimen tree; the shape art students draw even if they don't know trees.

The Paskapoo Poplar is a native balsam poplar selection from a tree growing on the Paskapoo slope on the west side of Calgary. The original tree is growing on a high windy section of the slopes, giving it extreme weather/ climate resistance. Paskapoo is very drought tolerant, to the point of being dependent on dry conditions. It is perfectly happy in a mulched bed without irrigation.

The root system, because of the native toughness of the balsam poplar, is not as disruptive as the hybrid poplars, which are just rebelling against Southern Alberta. The root system of the Paskapoo, small to match the dwarf nature of the top, drop down instead of spreading just under the surface of the soil. Paskapoo will not sucker unless the



Ken Wright

roots are disturbed. The suckering event can be triggered by tilling, digging, or in my case cultivating too close to the tree. As a defense mechanism, the main tree will send up suckers if the main root system is damaged.

The winter form of the tree, with the strong right angle attachment of the branches, not only give a very pleasing form, but also give superior strength to the limbs. It is very resistant to late winter (early spring) storms. It can carry very heavy snow loads without damage.

The winter form is so interesting, I am always a little disappointed when the leaves do break bud in the spring. Although, I do find the balsam smell of the leaves very fragrant, and it reminds me of walking along the river in the shade of the poplars on a hot summer day.

The genetics of our native balsam poplars add to the longevity of Paskapoo. Expectations are to have a tree that will live a hundred years. ♦

The wonderful articles by Al Fedkenhauer and Ken Wright, on using native plants in gardens, are coming to an end — there is only one more to go. I have enjoyed every one of them, and I thank the authors for letting us reprint them. We now have a gap in *Iris*, so if any of you budding writers want to submit articles on gardening with native plants, please contact me.

Dana Bush Bush.eco@telus.net

Status of Alberta's Native Bees: Understanding Diversity and Abundance of These Important Pollinators

Donna Fleury, M.Sc. P.Ag.

Bees are well recognized for their importance in pollinating crops, gardens and native plants; however, their abundance and diversity is less well understood. Although there are estimates of over 320 different kinds of bees in Alberta alone, available data is limited and historical records are few and far between. What is well known is that pollinators around the world are increasingly at risk and some populations are quickly decreasing in abundance and diversity. Threats such as habitat loss, climate change, pathogens and pesticides are impacting native bees as well as honey bees and other important pollinators.

Recognizing the important role of bees as crop pollinators, the Alberta Biodiversity Monitoring Institute (ABMI) added pollinator services to their Ecosystem Services Assessments Project. In partnership with Dr. Jessamyn Manson at the University of Alberta, a two-year project was initiated in 2014 to fill in the gaps in information on native bees in Alberta. Manson is also collaborating with Dr. Cameron Carlyle, Rangeland Ecologist at the University of Alberta.

"We are assessing the diversity and abundance of species in rangelands and canola fields to determine how bee communities vary across space, time and habitat type," explains Manson. "We know that native pollinators are essential for maintaining healthy and diverse natural ecosystems, but they also play an important role in the success of many agricultural crops by increasing yield. However, the contribution of native pollinators to crop production has rarely been quantified; moreover, in Alberta we know very little about the native pollinators that provide this important

ecosystem service." This study is a key step towards understanding relationships between native bees and the productivity of our agroecosystems, helping us to develop strategies to support both economically and ecologically sustainable agriculture in Alberta.



Donna Fleury

From Onefour near the Alberta-Montana border to Grande Prairie, Manson's graduate students have conducted extensive surveys of pollinator communities in canola and rangeland sites twice per season over the past two years. Using pit fall traps and systematic sweeps along transect lines, over 15,000 specimens have been collected. The preliminary analyses of the first round of visits have yielded 23 genera and over 85 species. Manson expects those numbers to increase once the 2015 collections have been analyzed. Data on native and other forage plants favoured by native bees is also being recorded to look at relationships between flowering plant abundance, species richness and bee community traits.

"We are really in very preliminary stages of the study and analysis, but not surprisingly we have confirmed there is a significant variation in communities across space," says Manson. "For example, certain genera are more frequently found in the parkland than in the boreal area, which is usually

related to habitat and resource needs. There are also differences in the abundance of certain groups, such as the solitary bee species *Lasioglossum*, which is extremely common, while others are very rare. Ultimately we are hoping our data will be able to help group native bee communities into functional units that serve to support ecosystem services in each type of community including natural and agricultural. We also need to understand how climate change and other factors are impacting native bee ranges and populations."

Native bees are primary pollinators of some specific crops such as alfalfa, tomatoes, blueberries and cranberries. Alfalfa leaf cutter bees (*Megachile*), a native to North America, evolved with alfalfa and are now managed in crops to increase yield. In backyard gardens and in commercial greenhouses, tomatoes, cucumbers and peppers are pollinated by native bumble bees, which are buzz pollinators. Populations of native western bumble bees (*Bombus occidentalis*) started to decline in the last few decades. Commercial greenhouse operators had domesticated western bumble bees and used them in commercial production until about 15 years ago when managed populations crashed due to disease. Today the eastern bumble bee (*Bombus impatiens*) is imported from Ontario into Alberta,



Donna Fleury

See **Status of Native Bees**, page 7

Status of Native Bees, from page 6

Saskatchewan and British Columbia for greenhouse production as a replacement. A few have escaped to the outdoors; however, it is unknown how their presence will impact other local native bees.



Donna Fleury

"Our project will provide the baseline data we are missing around native bees in Alberta and hopefully will become the foundation of a long-term monitoring program," says Manson. "The data collection is a very expensive and time consuming process, so we plan to work with ABMI and other partners to figure out a long-term sustainable strategy and continue pollinator assessments in an ecologically and economically friendly way. One of the biggest gaps in our knowledge is around nesting habitats and specific requirements. Fortunately the wild bee and bumble bee research community is very small across Canada and North America, and we work closely together on trying to keep on top of pollinator populations and ultimately develop implementation strategies to improve bee abundance and diversity. The general agreement is we are in a perfect storm of a lot of issues such as climate change, habitat and biodiversity loss, pathogens and pesticides, all affecting native bees and other pollinators."

In Alberta and elsewhere, several other native bee research projects have been completed or are underway, emphasizing their impact on food security and economic benefits. Published in 2013 (Science 339: 1608–11), an international research team of 50 researchers, including University of Calgary's Dr. Lawrence Harder, analyzed data from 41 crop systems

in 20 countries around the world. This study found that wild insects pollinated crops more effectively than honey bees, and that honey bees supplemented rather than substituted for pollination by wild insects. They showed an increased visitation by wild insects is twice as likely to result in fruit set compared to an equivalent increase in honey bee visits. Another recent study published in 2015 (Science 349: 177–180), led by Dr. Jeremy Kerr from the University of Ottawa, and a member of ABMI's International Science Advisory Team, identified the negative impacts of climate change on bumble bees in both North America and Europe. As climate changes, bumble bees are finding it difficult to expand their range further north and move to more suitable locations, meaning many may just disappear.



Stacey Cedergren

Bumble bee nest**Status of Native Bees in Canada**

In Canada, COSEWIC and SARA list two native bees as endangered: the rusty-patched bumble bee (*Bombus affinis*) in Ontario and Quebec, and the gypsy cuckoo bumble bee (*Bombus bohemicus*) that was once widespread across Canada. The western bumble bee (*Bombus occidentalis occidentalis*), found in southern areas of British Columbia, Alberta and Saskatchewan, was listed as threatened by COSEWIC in 2014 and the yellow-banded bumble bee

See **Status of Native Bees**, page 8

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And many volunteer writers ...

Status of Native Bees, from page 7

(*Bombus terricola*), once widespread across Canada, was designated special concern in 2015. SARA currently has no status indicated for these two species. As more information becomes available, other species may be listed in the future.



Stacey Cedergren

Take Action to Help Native Bees in Backyards and Communities

Finding a way to help native bees in your backyard or your community may be easier than you think. One example is the Calgary organization, Apiaries and Bees for Communities, who has recently expanded their honey bee education and pollinator stewardship outreach to include native bees.

“This spring we expanded our program to include native bees, including the reinstatement of our ‘bumble bee rescue program’, which ran as a pilot a few years ago in conjunction with a Mount Royal University research project,” explains Stacey Cedergren. “We receive about 100 calls every year about bumble bee nests and removal, but find that in most cases with education we can usually encourage people to leave the nests. In rare cases, bees find their way into walls of houses or other problem areas, and we will then remove and relocate the nests to

other locations. We are working on trying to set up partnerships with community gardens and native plant park spaces for relocation spots in the future.”

To support their work, Cedergren and her colleagues have published three easy-to-use guidebooks to introduce people to different kinds of native bees, to provide information on how to create supportive habitats, and to provide gardening information to support bees. The easiest thing people can do is to plant flowers; providing more forage and nesting sites for native bees and other pollinators is also important. Native plants have co-evolved alongside native bees, so trying to have blooming plants available from early spring through to late summer and fall improves the success and resiliency of native bees. Bees also need nesting sites, so leave an area of your yard untidy (sticks, old sod, leaves, other yard debris, logs with holes drilled in) away from high traffic areas to provide a safe place for bees and other beneficial insects to nest and/or hibernate.

Although many plants are suitable for native bees, Cedergren has developed a list of 10 top plants (<http://www.backyardbees.ca/nativebees/gardening>) to consider as a start for native plantings:

Spring blooming: Prairie crocus (*Anemone patens*), milkvetch (*Astragalus* sp.), smooth blue beardtongue (*Penstemon nitidus*)

Summer blooming: Wild bergamot (*Monarda fistulosa*), alpine hedysarum (*Hedysarum alpinum*), fleabane (*Erigeron* sp.), lupine (*Lupinus* sp.)

Early fall blooming: Goldenrod (*Solidago* sp.), asters (*Symphyotrichum* sp.), purple cone flower (*Dalea purpurea*)

In the future, opportunities may become available for ANPC members and others to become involved in pollinator ‘citizen science’ projects. Flowering plant surveys would be a good place to consider adding pollinator surveys to help with long-term monitoring and assessment of native bees and other species. For example, the Xeres Society has a Bumble Bee Watch program that provides opportunities for citizens and school groups to get involved with tracking bumble bees across North America, and has published a “Guide to Bumble Bees of the Western United States” that could be used in Southern Alberta. Everyone can do their part to help improve the success and resiliency of native bees and other pollinators.



Donna Fleury

Some websites of interest:

http://www.biology.ualberta.ca/manson_lab
<http://blog.abmi.ca/2015/02/04/the-latest-buzz-on-albertas-wild-bees/> - .VgmKchaHbKc
<http://ecosystems-services.abmi.ca/applications/esa-models/pollination/>
<http://www.backyardbees.ca/nativebees>
<http://www.inspirationgreen.com/insect-habitats.html>
http://www.reginahortsociety.com/images/Sheffield,_Frier_and_Dumesh_2014_The_bees_of_the_Prairies_Ecozone_with_comparisons_to_other_grasslands_of_Canada.pdf
http://publications.gc.ca/collections/collection_2014/aac-aafc/A59-12-2014-eng.pdf
http://www.cosewic.gc.ca/eng/sct7/sct7_3_23_e.cfm
http://cjai.biologicalsurvey.ca/srpg_18/srpg_18.pdf
<http://wildlifepreservation.ca/insect-pollinators/>

See **Status of Native Bees**, page 12

Tongue-tied in Latin: M to O

C. Dana Bush

Here are the pronunciation guides for M to O. This time it is the accents that are confusing. Words of two syllables are stressed on the first syllable (*Mentha* = *men-tha*). Words of more than two syllables are stressed on the next to last syllable if the vowel is followed by two or more consonants (*Myriophyllum* = *mi-ree-ō-fil-lum*), or if the vowel is long (*Oenothera* = *oy-nō-thee-ra*). Otherwise, they are stressed on the third to last syllable (*Mahonia* = *ma-hon-ee-a*).

If this is too confusing, just remember that “Botanical Latin is essentially a written language How they are pronounced really matters little provided they sound pleasant and are understood by all concerned...” W.T. Stearn (as quoted on Dave’s Garden).

Vowels

ă = cat	e = let
a = apart, canal	i = in
o = hot	ie = kite
ō = note	u = full
oi = usually as oy	ū = tub
in boy but classically as o-i	

Consonants

c = always hard as in cat
g = always hard as in gate
s = as in this, not as in those

M

Mahonia	ma-hon-ee-a
Maianthemum	mah-uānth-e-mum
Mammillaria	mām-i-lah-ree-a
Matteucia	ma-too-kee-a
Mentha	men-tha
Mentzelia	ment-zel-ee-a
Menyanthes	may-nee-ānth-eez
Menziesia	men-zeez-ee-a
Mertensia	mer-tenz-ee-a
Mimulus	mee-mew-lus
Minuartia	min-wah-tee-a
Mirabilis	mee-rah-bi-lis
Mitella	mi-tel-la
Monarda	mo-nar-da
Montia	mon-tee-a

Myosotis

Myosotis	mee-os-ō-tis
Myrica	mi-ree-ka
Myriophyllum	mi-ree-ō-fil-lum

N

Nemophila	ne-mo-fi-la
Nepeta	ne-pe-ta
Nuphar	new-far
Nymphaea	nimf-ie-a

O

Oenothera	oy-nō-thee-ra
Opuntia	o-pun-tee-a
Orchis	or-kis
Oxalis	oks-ah-lis
Oxycoccus	oks-ee-kok-us

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Dave’s Garden. n.d. Welcome to Botanary, the Botanical Dictionary. Available at: <http://davesgarden.com/guides/botanary/#ixzz3pvX4JbFF>.

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Monarda fistulosa – wild bergamot



Nuphar variegata – yellow pondlily

Some Handy Lists

C. Dana Bush

Forbs with Opposite Leaves

Apocynaceae (*Apocynum*)
 Asclepiadaceae (*Asclepias*)
 Asteraceae (*Arnica*, *Monarda*,
Helianthus, *Iva*, and others)
 Boraginaceae (*Plagiobothrys* – bottom
 leaves only)
 Callitrichaceae (*Callitriche*)
 Caryophyllaceae (*Stellaria*, *Cerastium*,
Spergularia, *Moerhingeria*, *Arenaria*,
 and others)
 Elatinaceae (*Elatine*)
 Gentianaceae (*Gentiana*, *Gentianella*,
Halenia, *Lomatogonium*)
 Geraniaceae (*Geranium* and *Erodium*)
 Hypericaceae (*Hypericum*)
 Labiatae (*Mentha*, *Galeopsis*, *Stachys*,
Dracocephalum, *Lycopus*, and others)
 Lythraceae (*Lythrum*)
 Onagraceae (*Circeae*, some *Epilobium*,
 but not *Oenothera*)
 Primulaceae (*Lysimachia*)
 Scrophulariaceae (*Euphrasia*, *Gratiola*,
Mimulus, ~*Pedicularis*, *Penstemon*,
Rhinanthus, *Veronica*, but not
Castilleja and others)
 Urticaceae (*Urtica*)
 Valerianaceae (*Valeriana*)
 Verbenaceae (*Verbena*)

Shrubs with Opposite Leaves

Caprifoliaceae (*Linnaea*, *Lonicera*,
Sambucus, *Symphoricarpos*,
Viburnum)
 Celastraceae (*Pachistima*)
 Cornaceae (*Cornus*)
 Elaeagnaceae (*Shepherdia* but not
Elaeagnus)

Plants with Whorled Leaves

Chimaphila
Collinsia
Cornus
Galium
Glaux
Oxytropis
Trientalis

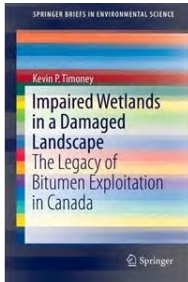
Plants with Milky Sap

Asclepiadaceae (*Asclepias*)
 Asteraceae (*Crepis*, *Lactuca*, *Hieracium*
 and others)

See **Some Handy Lists**, page 12

The State of Mineral Wetlands in the Bitumen Sands of Alberta, Present and Future

Kevin Timoney



Timoney, Kevin. 2015. *Impaired Wetlands in a Damaged Landscape: The Legacy of Bitumen Exploitation in Canada*. Springer Briefs in Environmental Science. New York: Springer.

The ecological, climate change, treaty infringement, and pollution impacts of bitumen exploitation in northeastern Alberta have created international concern. With a present bitumen industry landscape footprint of 150,000 ha in the region, bitumen exploitation is on track to destroy or degrade 480,000 ha of natural ecosystems, about 186,000 ha of which are wetlands. *Impaired Wetlands in a Damaged Landscape: The Legacy of Bitumen Exploitation in Canada* (Springer, New York) focuses on those wetlands.

The book begins with an introduction to wetland ecology, and describes the study region, bitumen exploitation, present and projected habitat loss, and Alberta government reclamation policy. It then describes the data and the methods used to compare and contrast natural and industrially-affected wetlands through a first-ever meta-analysis of data from 417 wetland study plots. The book classifies the vegetation of natural and industrially-affected wetlands, then describes their physical, chemical, structural, and landscape attributes. Botanists and ecologists may wish to read *Impaired Wetlands* for the details.

Wetland plots were arranged along a complex three-dimensional chemical gradient: eigenvector 1 was dominated by attributes of industrial activity (high

conductivity, total dissolved solids, etc.); eigenvector 2 was dominated by macronutrients and primary productivity; and eigenvector 3 was dominated by major cations and anions. Impairment of industrial wetlands was evident in their shifted species assemblages; reduced species and vegetation richness; dominance of disturbance-adapted generalists, salt-tolerant species, and exotics; absence of expected wetland species and vegetation types; reduced biomass, plant cover, height, density, and growth; elevated concentrations in water and sediments of conductivity, salts, naphthenic acids, and other chemical indicators of industrial activity; reduced concentrations of plant nutrients and organic matter; compacted sediments; hydraulic isolation; and reduced wetland size.

Through an analysis of reclaimed wetlands of known age, the data demonstrate that ecological impairment is persisting over time. No evidence was found to support the view that reclaimed wetlands are converging towards healthy natural wetlands.

Other study findings: (1) natural saline marshes exhibit a great diversity of vegetation types and species that are absent from industrial saline marshes (Figure 1); (2) identification of a new type of Alberta wetland, the floating marsh (Figure 2); (3) analyses of independent datasets produced corroborative results; (4) mineral wetland species assemblages can be extremely dynamic or exhibit multidecadal stability; (5) Alberta Biodiversity Monitoring Institute (ABMI) wetland data proved to be unreliable and unable to detect change; and (6) Alberta Conservation Information Management System (ACIMS) data demonstrated that extirpation of rare elements is taking place.

The monograph documents the ecological consequences of unbridled bitumen exploitation upon the mineral wetlands of northeastern Alberta; it demonstrates how dysfunctional management disconnected from scientific evidence, and overly influenced by a powerful oil industry, has damaged landscapes with long-term ecological consequences. Examination of government regulations and policy revealed that wetland reclamation guidelines are inchoate and that the certification process used for wetland reclamation is based upon regulatory criteria that do not exist. Regulatory approvals do not provide specific guidance or define the ecological conditions that would certify a wetland as reclaimed. Given the absence of a science-based wetland reclamation certification system, regulatory approvals as they pertain to wetland reclamation are unenforceable.

After documenting how industrial wetlands are impaired, the book demonstrates that impairment extends beyond the wetlands to the greater ecosystem, and that monitoring is inadequate. Due to the combined effects of inadequate monitoring and habitat loss, vegetation and floristic biodiversity are being lost before they are being documented. A host of ecological, hydrological, and physico-chemical factors make it unlikely that the impairment of industrial wetlands and the greater ecosystem will ameliorate in the near future. A damaged and contaminated landscape, a national sacrifice zone, is being created. Without major and rapid changes in policy and management, large-scale and persistent environmental degradation is inevitable.

The book concludes: "There are those who believe that the creation of a national sacrifice zone is a small price to pay for the benefits of bitumen.

See *Mineral Wetlands*, page 11

Mineral Wetlands, from page 10

The inequitable apportionment of the impacts, costs, and benefits is, however, one of the more troubling aspects of bitumen exploitation. Future generations, who will have to live with the legacy of bitumen exploitation, will be the ultimate arbiters."

Is there a bright future for the flora, vegetation, and landscape of northeastern Alberta? Despite pronouncements of new programs and initiatives, recalcitrant facts remain. (1) Bitumen exploitation damages landscapes, destroys habitat, consumes or degrades surface water and groundwater, and poses inescapable dangers to wildlife. (2) Processes and pathways that operate outside of management control, such as groundwater flow, atmospheric circulation and precipitation, Athabasca River flow, and animal movements, link contaminated areas to the greater ecosystem. (3) Regulatory and monitoring entities (for example, AESRD, AEMERA, AER, ABMI, CEMA, RAMP) remain overly influenced by the energy industry and either have no vegetation or floristic monitoring capacity or have poor track records in regard to monitoring, study design and sampling protocols, and data integrity and retrieval. None are currently capable of producing reliable vegetation or floristic data. One bright exception is ACIMS. Despite understaffing and underfunding, ACIMS continues to provide reliable, accurate information on the occurrence of species and vegetation elements.

Because bitumen exploitation causes inescapable ecological damage and, as of fall 2015, no credible vegetation or wetland monitoring exists for northeastern Alberta, the most likely future is a continuation of the past: one of reduced native floristic and vegetation diversity, increased occurrence of exotic flora, continued extirpation of rare element occurrences, declining water availability and water quality, and habitat and wetland loss. Climate-driven desiccation is an overarching stressor.

Continued inadequate monitoring means that society will remain unaware of the extent of vegetation and floristic changes in northeastern Alberta, or will be made aware when it is too late. I wish that I could be more sanguine, but my view is constrained by available data and observable reality.



Figure 1. Example of natural saline marsh vegetation diversity. Strings in this rare patterned saline marsh near the eastern border of Wood Buffalo National Park are dominated by *Atriplex subspicata*, *Puccinellia nuttalliana*, *Plantago maritima*, and *Triglochin palustris*; the ponds (flarks) are dominated by a cyanobacteria and diatom community with *Triglochin palustris*; the red areas are mudflats (community rank S1S3). There are no bryophytes due to the high salt content. 10 August 2001. Reproduced from *Impaired Wetlands*.



Figure 2. A floating marsh, previously undescribed in Canada, fills an unnamed basin south of Galoot Lake in the Athabasca River Delta. Plants were rooted in an organic mat floating in 20 to 42 cm of water. Dominants at the observation location in this mixed marsh were *Carex atherodes*, *Calamagrostis canadensis*, and *Phragmites australis*, none of which tolerate prolonged flooding. Other floating marsh types are present in the basin. Airphoto observations confirm that the floating marsh has been present for at least 60 years. August 2006. Figure modified from *Impaired Wetlands*. ♦

Status of Native Bees, from page 8

<http://www.xerces.org/pollinator-redlist/>
<http://www.xerces.org/pollinators-mountain-region/>
http://www.xerces.org/wp-content/uploads/2012/06/conserving_bb.pdf
http://plants.usda.gov/pollinators/Montana_Native_Plants_for_Pollinator-Friendly_Plantings.pdf
[http://www.mgabc.org/sites/gardenfiles/Gardening for Pollinators Colour_1_0.pdf](http://www.mgabc.org/sites/gardenfiles/Gardening_for_Pollinators_Colour_1_0.pdf) ♦

Some Handy Lists, from page 9

Wetland minimas

Glaux maritima	Naverettia
Myosorus ssp.	Plegiobothrys
Anagalis	Cerastium
Limosella	Gnaphalium
Callitriche	Psilocarphus ♦
Elatine	
Veronica	
Lilaea	
Elodea	
Marsilea	
Spergularia	
Euphorbia	

Iris is published three times a year by ANPC. The Council aims to increase knowledge of Alberta's wild flora and to preserve this diverse resource for the enjoyment of present and future generations.

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

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

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Submission deadline for the next issue:
November 15, 2015

A subscription to *Iris* is included with membership in the ANPC. To join, contact the secretary, or check our website, www.anpc.ab.ca.

News and Events

Want more News and Events?

Sign up for the ANPC Info-Email, by emailing Sandy McAndrews at s.mcandrews@shaw.ca.

**Native Bees & Pollinators
December 4, 2015**

Presentation on bees, neonics, pollinators, etc. with Drs. Morrissey and Manson, Friday, December 4, 2015, at 7:00 p.m. at the University of Alberta in Lecture Theatre 2-215 in the Physical Education and Recreation Building. Details will be posted at <https://crookedcreekconservancy.wordpress.com/> as they develop.

**Prairie Conservation Action
Committee (PCAP) Conference**

ANPC's affiliate, PCAP is hosting its annual Prairie Conservation and Endangered Species Conference on February 16, 17 & 18, 2016, in Saskatoon, SK. Details at <http://www.pcsc.ca/>.

**Alberta Wetland Rapid Evaluation
Tool-Actual Guide (ABWRET-A)**

Most of you who are interested will know that the long-awaited wetland evaluation guide has been published by Alberta Environment and Parks (June 2015) and is available at <http://www.waterforlife.alberta.ca/documents/RapidEvaluationTool-Jun01-2015.pdf>.

What you may not know is that Appendix 3 is titled Plant Species Considered Invasive by the Alberta Native Plant Council or Alberta Weed Act. Thanks to all the ANPC members whose fees and efforts supported this work, and especially to the volunteer efforts of the late Jim Posey.

Interactive Salix Key

An interactive key of new world *Salix* species developed by Dr. George W. Argus, Curator Emeritus, Canadian Museum of Nature, Ottawa, Canada is now available on the Alberta Conservation Management Information System (ACIMS) website: <http://www.albertaparks.ca/albertaparksca/science-research/interactive-salix-key.aspx>.

Rare Plant Study Groups

There are four rare plant ecology study groups associated with ANPC. Three meet throughout the year, indoors through the fall and winter and outdoors through the spring and summer. Beginning in October or November and running through until April, the following groups generally meet monthly. Group participants nurture their interest in and expand their knowledge of Alberta's native plants and communities and local ecology. **Please contact facilitators for details and to confirm attendance.**

**Central Alberta Rare Plant Study
Group (Edmonton)**

Location: University of Alberta Herbarium, B-613 (botany wing), Biological Sciences Building (east end), Saskatchewan Drive, Edmonton. Date: Last Wednesday of the month; October to April inclusive. Time: 6:30 to 8:30 p.m. Facilitator: Varina Crisfield (vcrisfield@gmail.com).

**Southern Alberta Rare Plant Study
Group (Calgary)**

Location: University of Calgary Herbarium, Biological Sciences Basement. Date: First Saturday of the month; October to April inclusive. Time: noon to 4:00 p.m. Facilitator: Leslie Monteleone (lesliemonteleone@hotmail.com).

**Medicine Hat Rare Plant Study
Group**

Location: Medicine Hat College Herbarium (L155). Date: Fourth Saturday of the month (except December & February) from noon to 3:00 p.m. Facilitator: Cathy Linowski (clinowski@memlane.com).

**Northern Plant and Ecology Study
Group (NPESG)**

This is a field-based study group, active through the growing season and into early autumn. Contact Marsha Hayward for more information (wildloonart@telus.net).



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