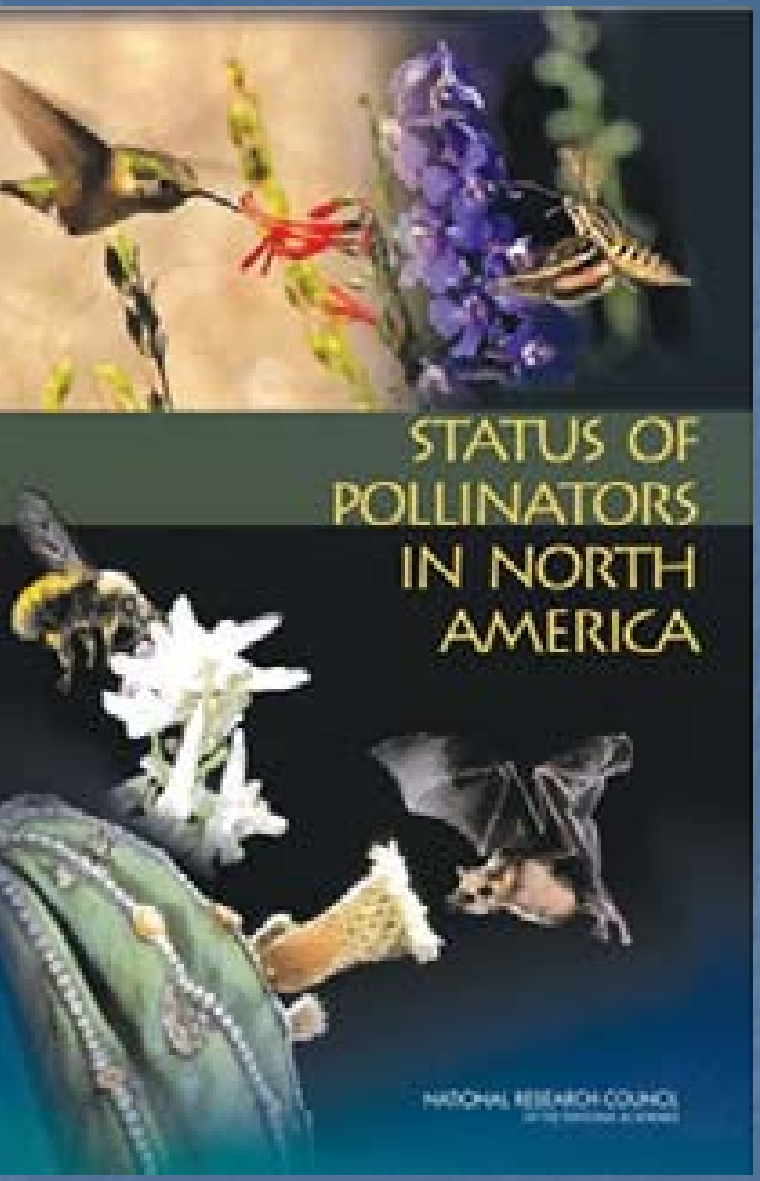
Pollinator-friendly Multi-functional Windbreak Design

Great Plains Windbreak

Renovation and Innovation Conference

International Peace Garden, MB/ND

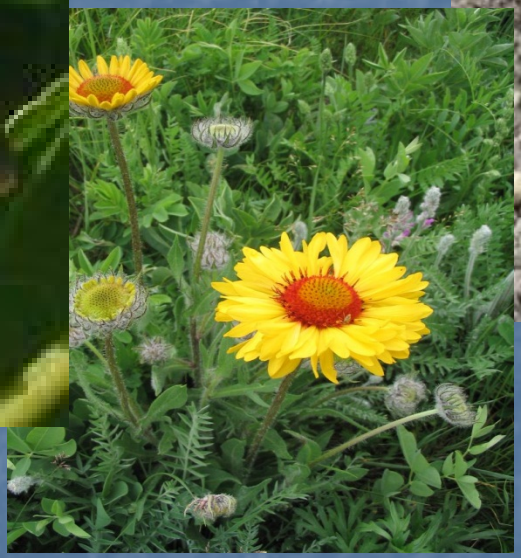
July 24-26 2012



National Academy of Sciences Report, 2006

"Effective conservation or restoration of pollinator populations requires comprehensive knowledge of their biology, which is currently insufficient to inform the design of sustainable management and maintenance programs". P. 10.

(Generally) Bees Require …

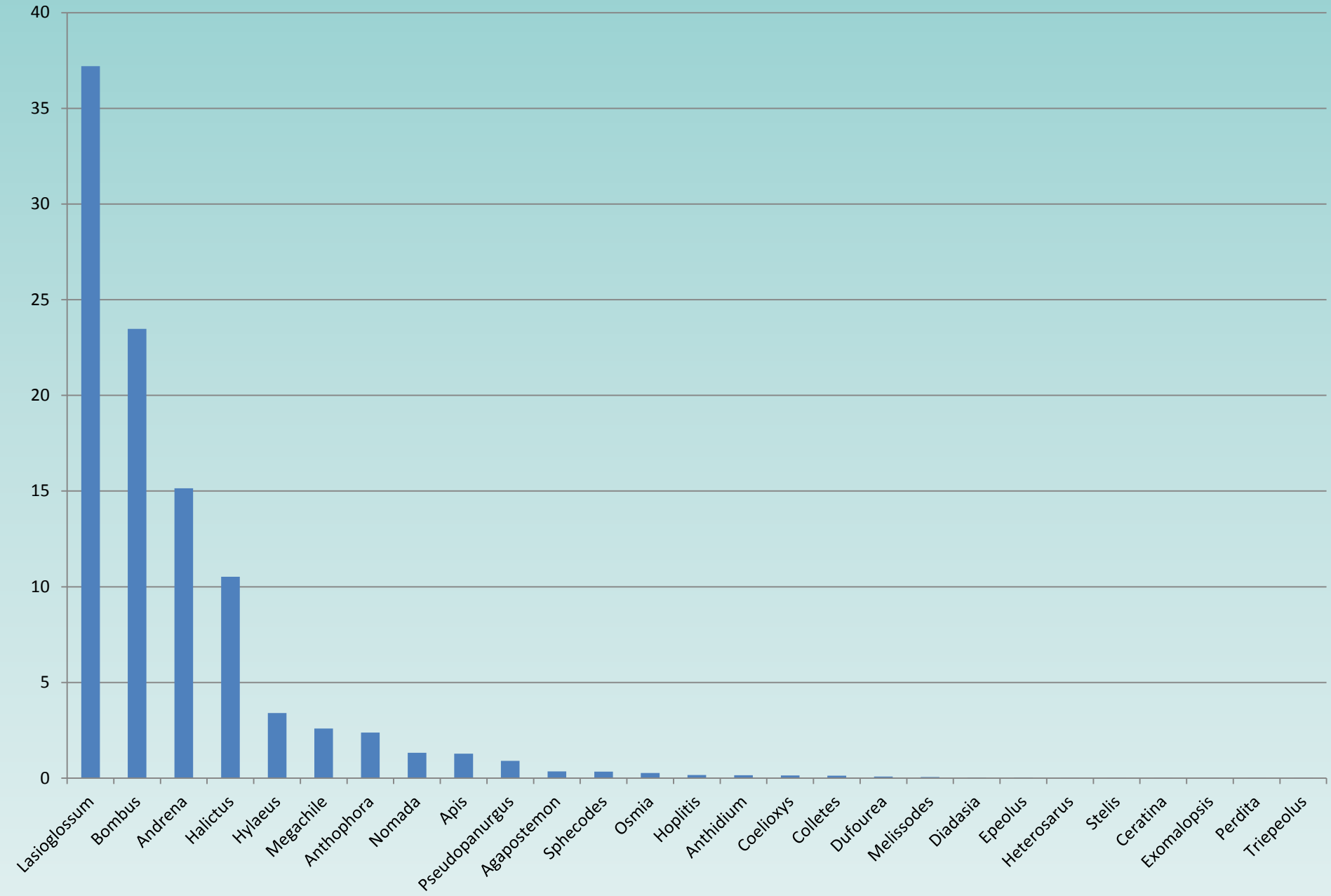


A suitable nesting substrate from which they can access adequate forage over the course of individual or colony life spans, and protection from pesticides

70% of Wild bees are Ground Nesters & Mostly Solitary

30% Above Ground Nesters

Percentage Total Abundance of 28 Genera of Wild Bees in Aspen Parkland of Alberta




Lasioglossum
21 species

Bombus
18 species


Andrena
15 species

Halictus
2 species

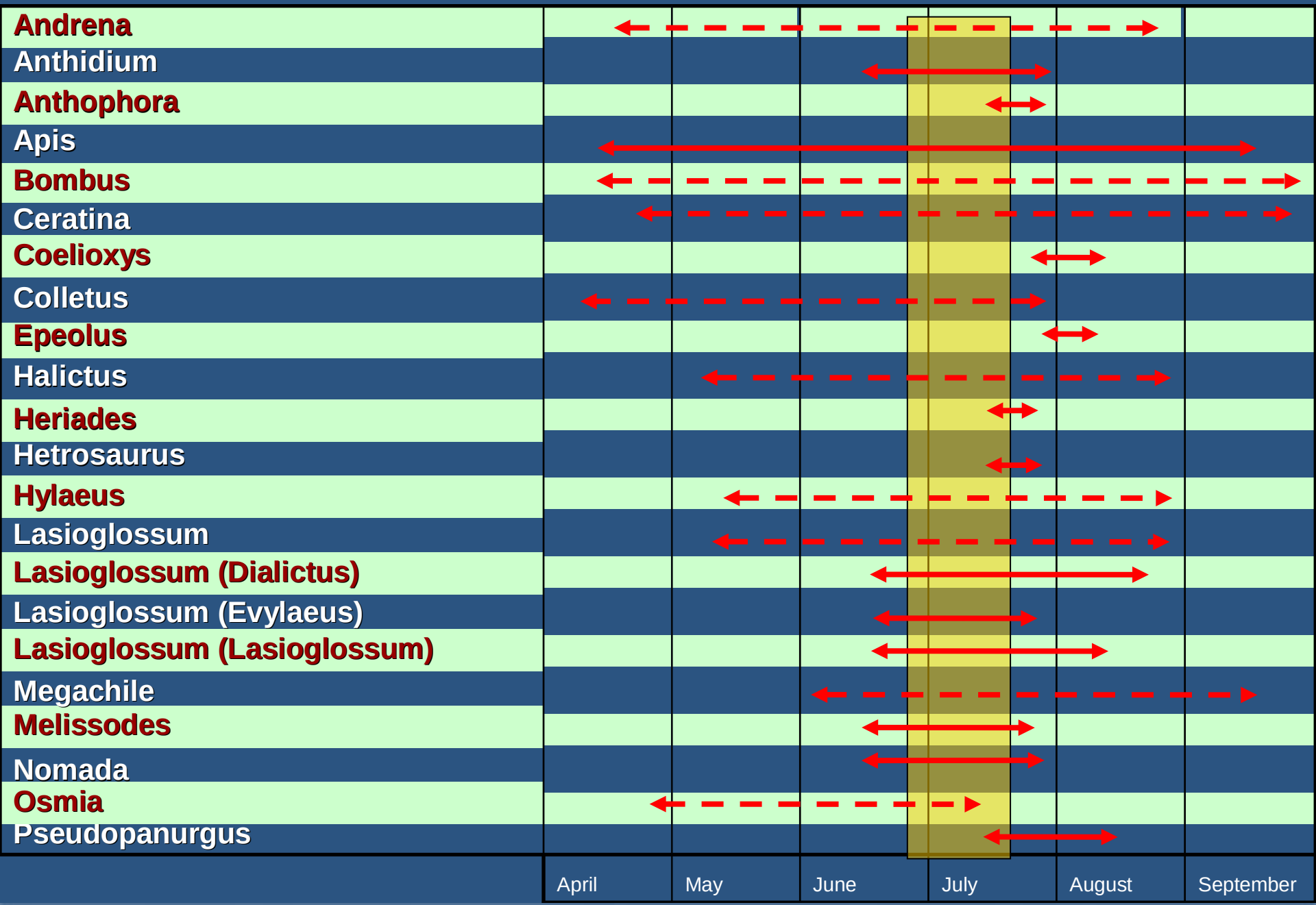
Ecobuffer Design Considerations

- Nesting resources
- Temporal and spatial distribution of pollen and nectar resources
- “Trapline” foraging and clumping
- Pesticide use

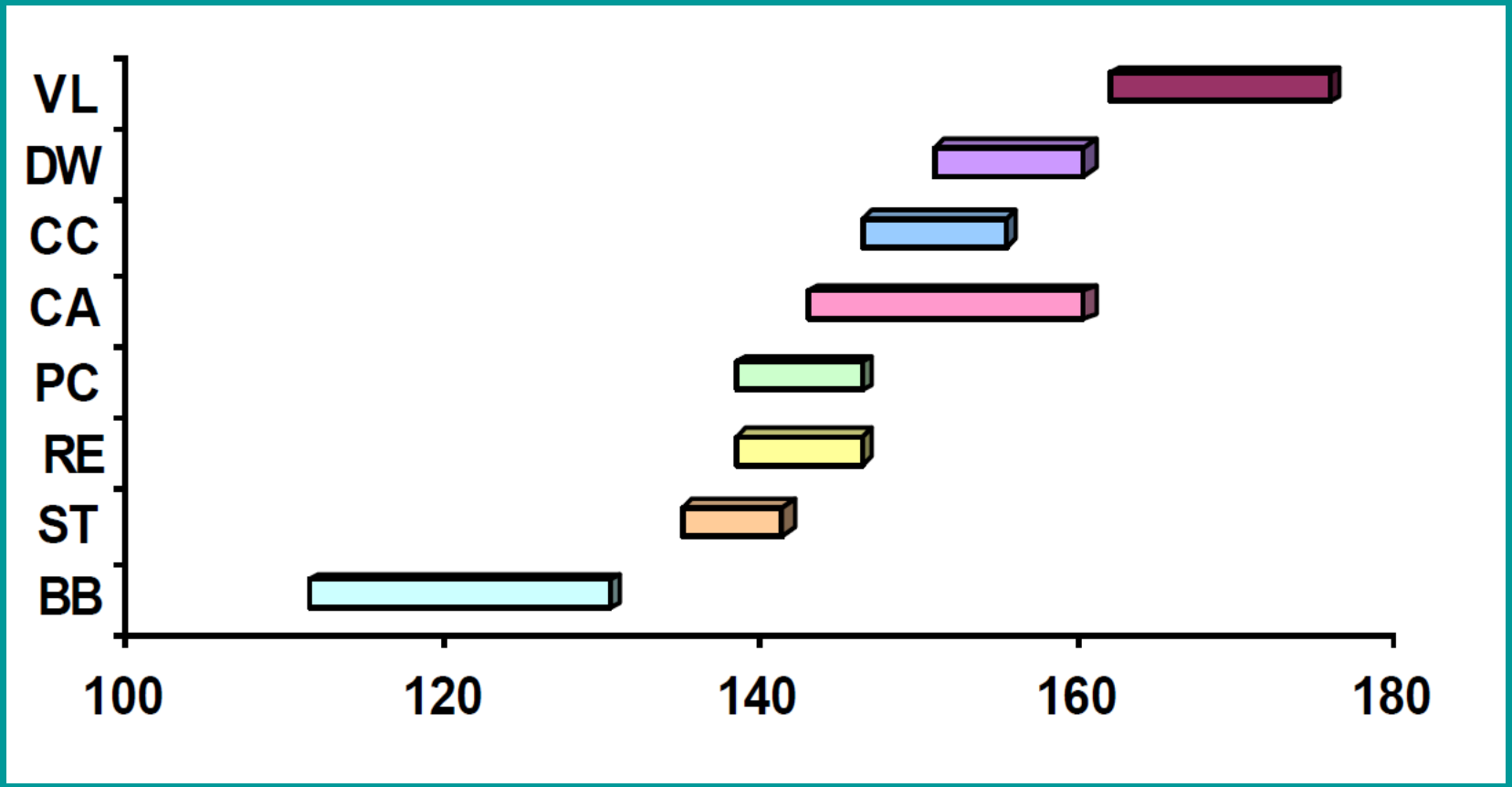
Nesting resources

- Bare soil – south and east facing
- Burrows
- Rocks, boulders
- Bunch grass, shrub tussocks
- Snags and deadfall
- Suitable leaf material (e.g., rose, pincherry/chokecherry, willow, clover, *Spirea*, aspen, poplar, fireweed)
- Nest boxes/structures/fence posts, soil boxes

Flight Periods for Wild Bees in Central Alberta



Flowering Periods of Selected Shrubs near Indian Head, SK in 2012

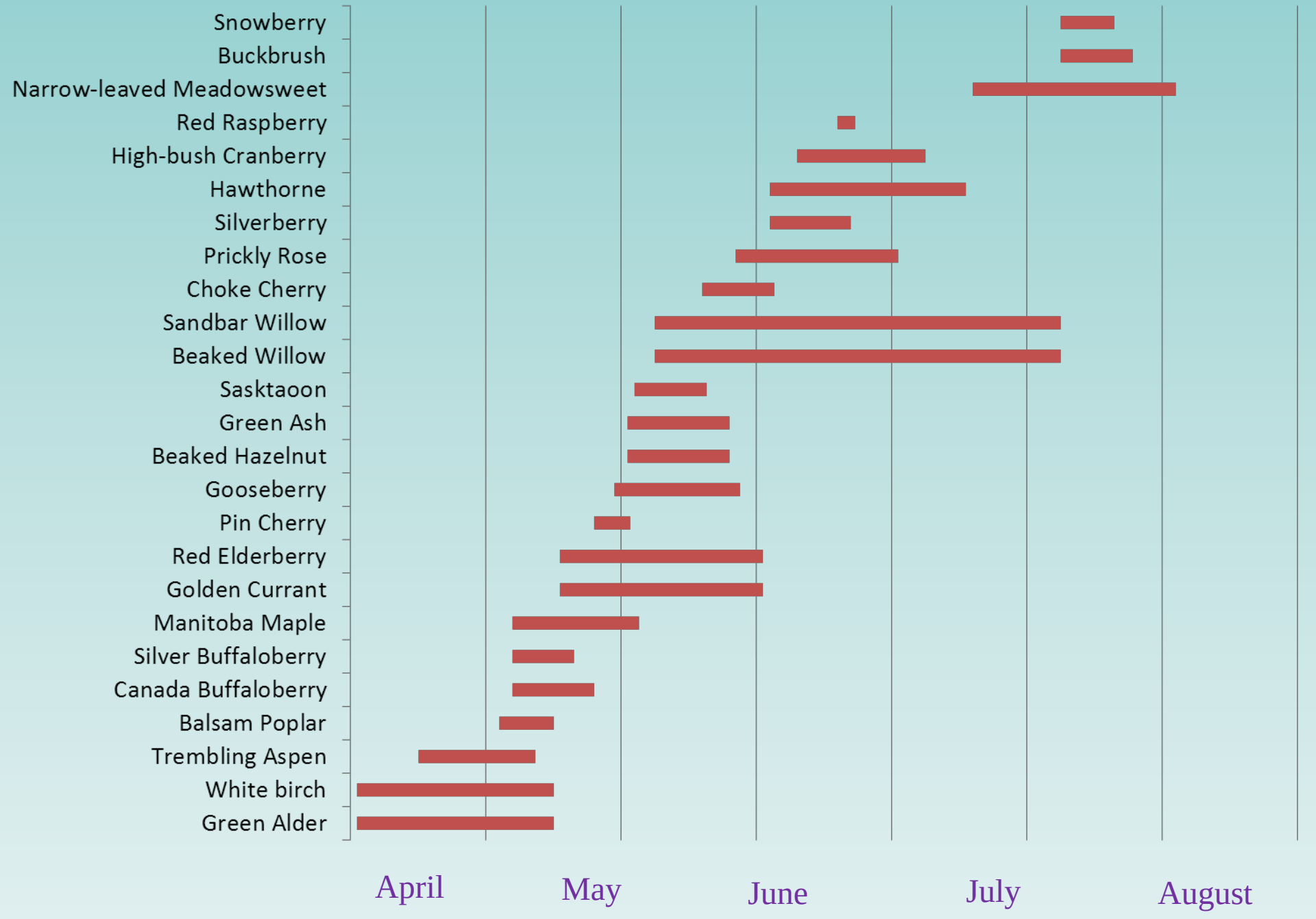


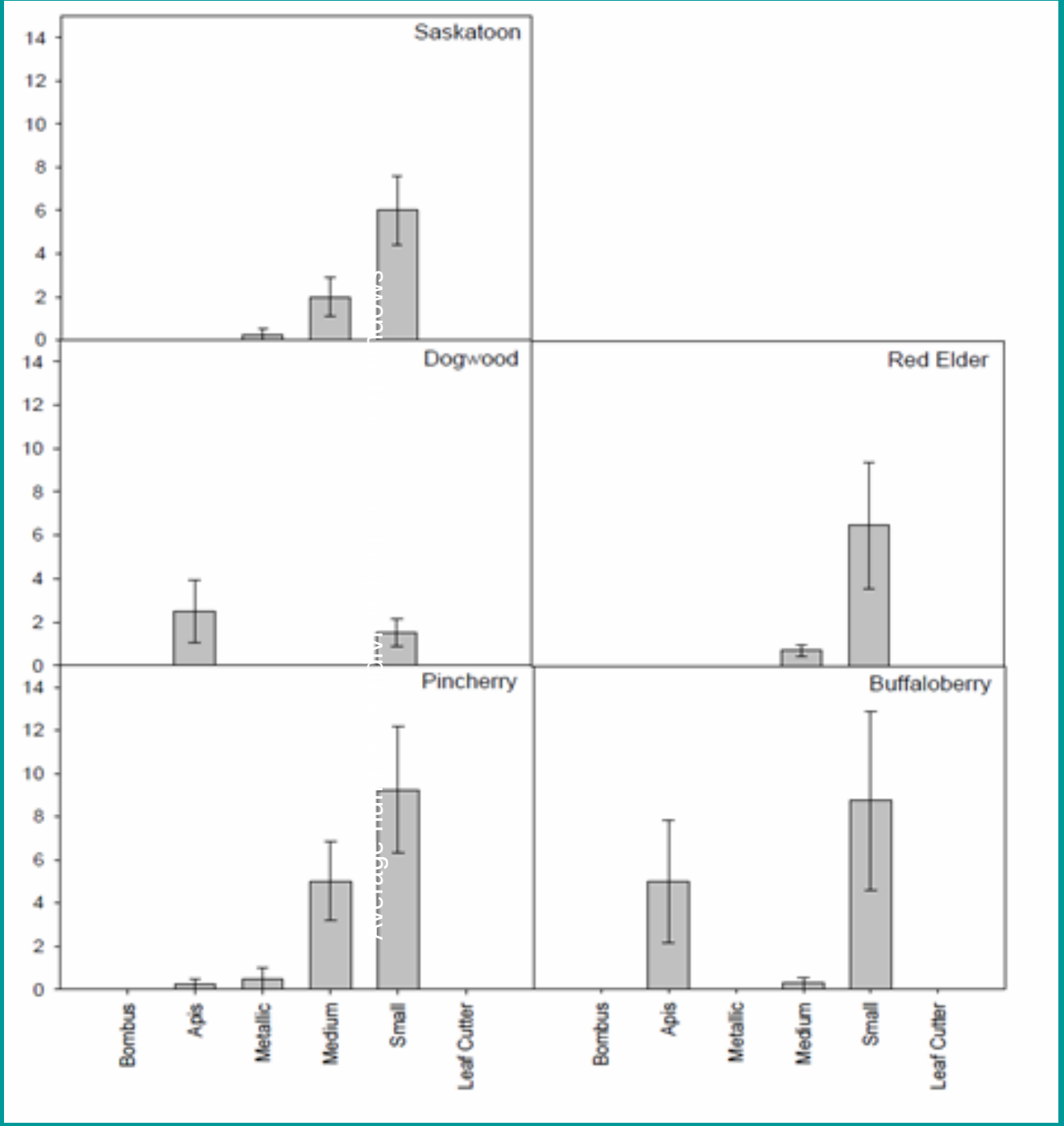
VL – Villosa lilac
DW – dogwood
CC – choke cherry
CA – caragana

PC – pincherry
RE – red elder
ST – saskatoon
BB – buffaloberry

From Kort and Strekies 2010

Flowering Periods of Selected Deciduous Shrubs and Trees in Central Alberta





Number of Bees Observed on Different Shrub Species

From Kort and Strekies 2010

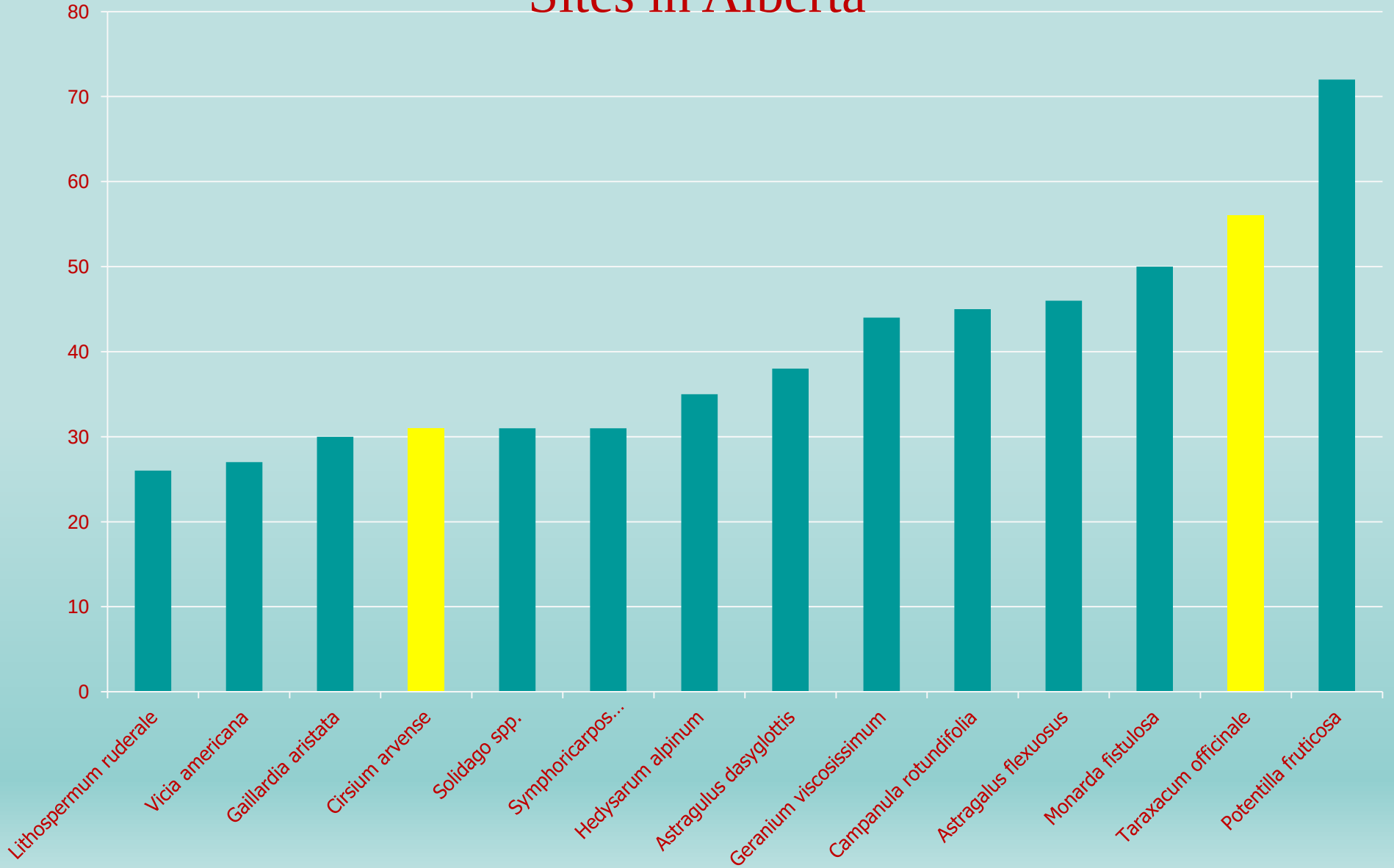
Relative Nectar and Pollen Resource Ranking for Selected Species

Species	Common Name	Nectar	Pollen
Alnus spp.	Alder species	0.125	0.500
Amelanchier spp.	Serviceberry species	0.500	0.400
Aster puniceus	Purple-stemmed aster	0.625	0.500
Betula papyrifera	Paper birch	0.000	0.500
Epilobium angustifolium	Fireweed	0.625	0.500
Fragaria virginiana	Strawberry	0.500	0.500
Melilotus alba	White sweetclover	0.700	0.700
Mentha arvensis	Wild mint	0.835	0.500
Pinus spp.	Pine species	0.000	0.500
Populus sp.	Poplar species	0.000	0.625
Prunus pensylvanica	Pin cherry	0.750	0.750
Quercus macrocarpa	Bur oak	0.000	0.700
Rubus sp.	Rubus species	0.700	0.600
Salix sp.	Willow species	0.800	0.900
Sambucus pubens	Red elderberry	0.335	0.665
Solidago spp.	Goldenrod species	0.750	0.750
Spiraea latifolia	Meadowsweet	0.500	0.500
Taraxacum spp.	Dandelion species	0.900	0.800
Trifolium repens	White clover	0.900	0.800
Vaccinium spp.	Vaccinium species	0.500	0.500
Viburnum spp.	Virburnum species	0.500	0.500
Vicia spp.	Vetch species	0.625	0.500

0=no pollen/nectar source, 1=major pollen/nectar source

Adapted from Loose et al 2005

Bee Visits on Selected Flowers in Fescue Grassland Study Sites in Alberta



From Evans 2012 (unpublished data)

Spatial Distribution/Configuration

- Most bees fly less than 200 m from their nests
- Javorek 2012 found that forage resources >300 m did not significantly affect bee abundances
- Connectivity and landscape heterogeneity?
- Core habitat size and population stability?
- Clumping

ITD	Bee Size	Foraging Range (m)	Genera
< 1.5	Very Small (VS)	50	*Lasioglossum* (Subgenera *Dialictus* and *Evylaeus*)
1.5 – 2.0	Small (S)	300	*Lasioglossum* (Subgenera *Lasioglossum*), *Andrena*
>2.0 – 2.7	Medium (M)	700	*Andrena, Halictus, Osmia*
>2.7 – 3.3	Large (L)	1100	*Andrena, Colletes*
>3.3	Very Large (VL)	2500	*Bombus*

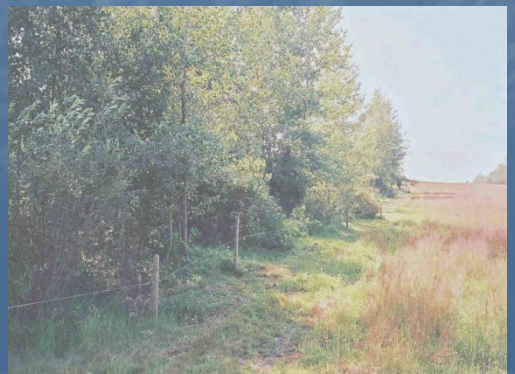
Table from Javorek 2012

Pesticide Use

- Employ conservation biological control, with pesticides as last resort
- Use least toxic pesticides
- Minimize pesticide drift off crop
- Create a 5 m no-spray buffer zone around ecobuffer habitat

Summary

- Nesting resources (bare soil, burrows, snags, logs/boulders)
- Forage – plant species attractive to bees (or with high pollen/nectar scores) that overlap in flowering coverage from April-September – use diversity to build in redundancy
- Strive for 300 m between ecobuffers
- Clump flowering plants
- Consider connectivity and block plantings
- Use pesticides as last resort and then with caution



Questions?

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