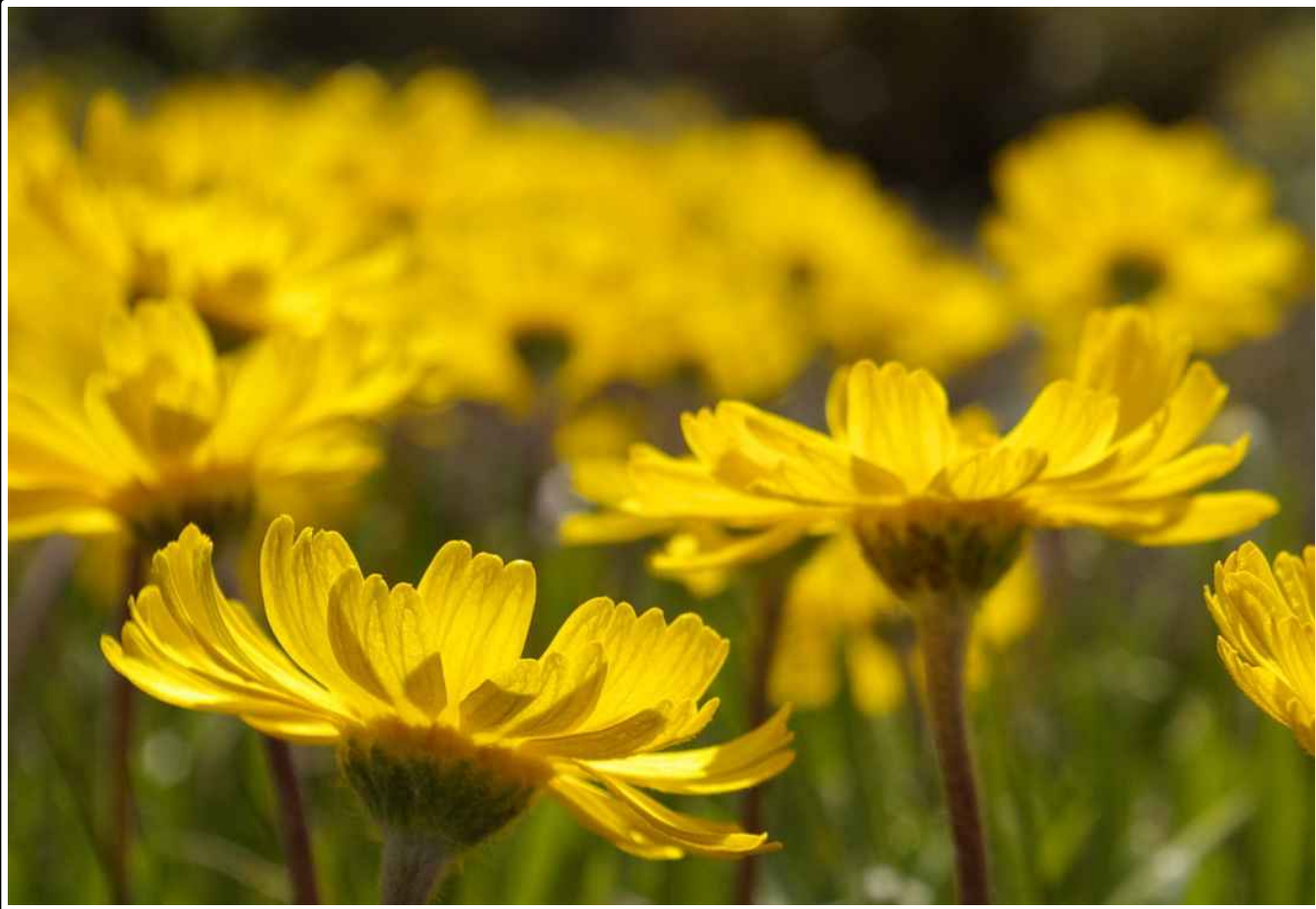


Life on the Rocks: Geology and Flowering Plants



Sprucedale & District Horticultural Society –

April 20, 2009

Dr. Andy Fyon

Ontario Geological Survey / Ontario Wildflower

Sudbury, Ontario, Canada

Not a biologist
Not an horticulturist
Am a geologist
Wildflower hobby

- **Prefer not to discuss medicinal or culinary uses of plants**



Don't have all the answers.

Lots of questions – try together.

**Geology and
Plants**



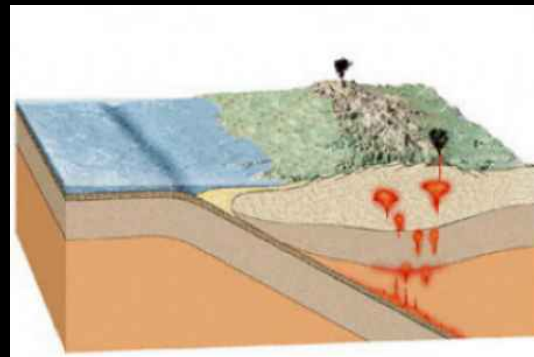
**Different
Habitats**



- Face of Earth
- Affects our lives
- Plant, animal, and human communities



**Plant
Communities**



**Geological
Processes**

Landforms



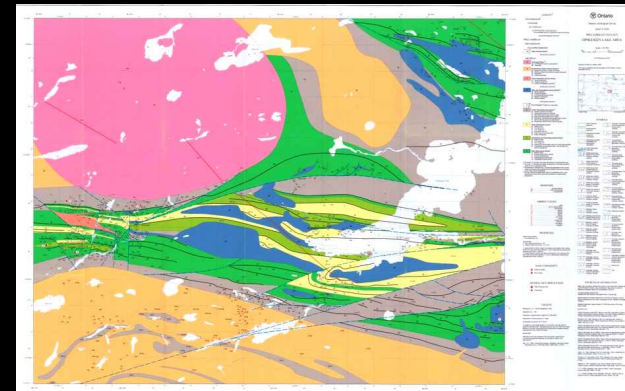
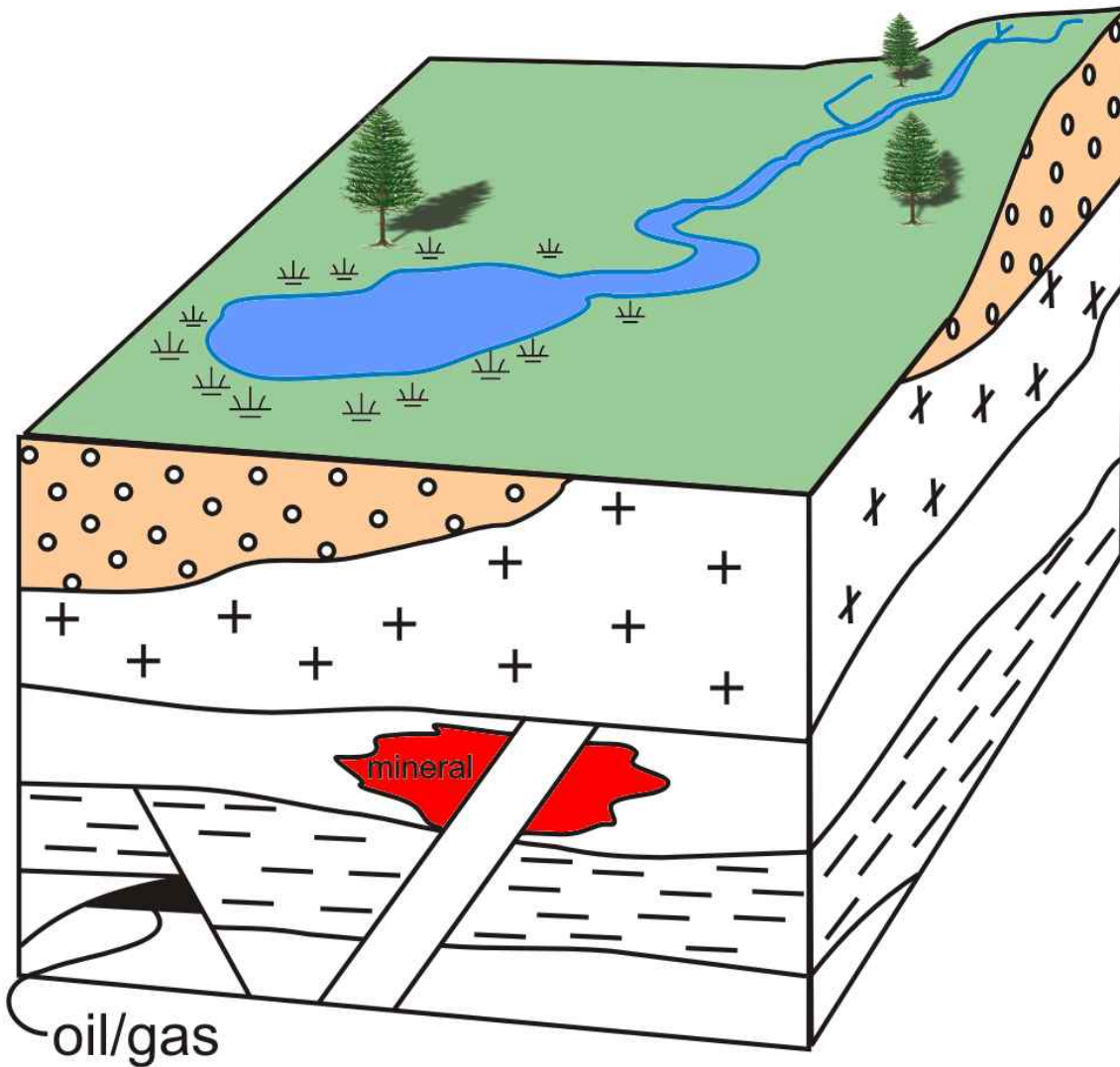
Outline

- **1: Ontario Geological Survey**
- 2: Geology and You
- 3: Geology: plants
 - Forest spring ephemeral
 - Desert
 - Bog
 - Alvar
- 4: Insights



Role: Ontario Geological Survey?

- Ministry of
Northern
Development
and Mines



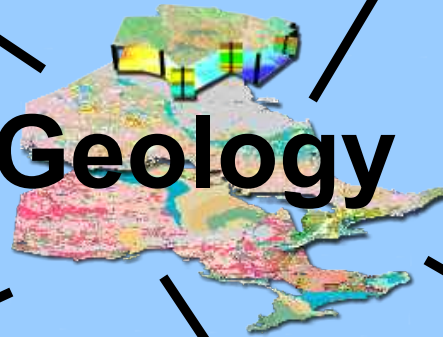


Resource development, investment attraction (mineral, energy, groundwater)

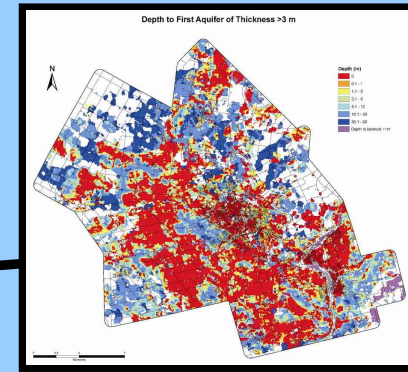


Environment, biodiversity, habitat, landforms, health

Geology



Land use Planning



Geological Hazards



Engineering Infrastructure



Global warming



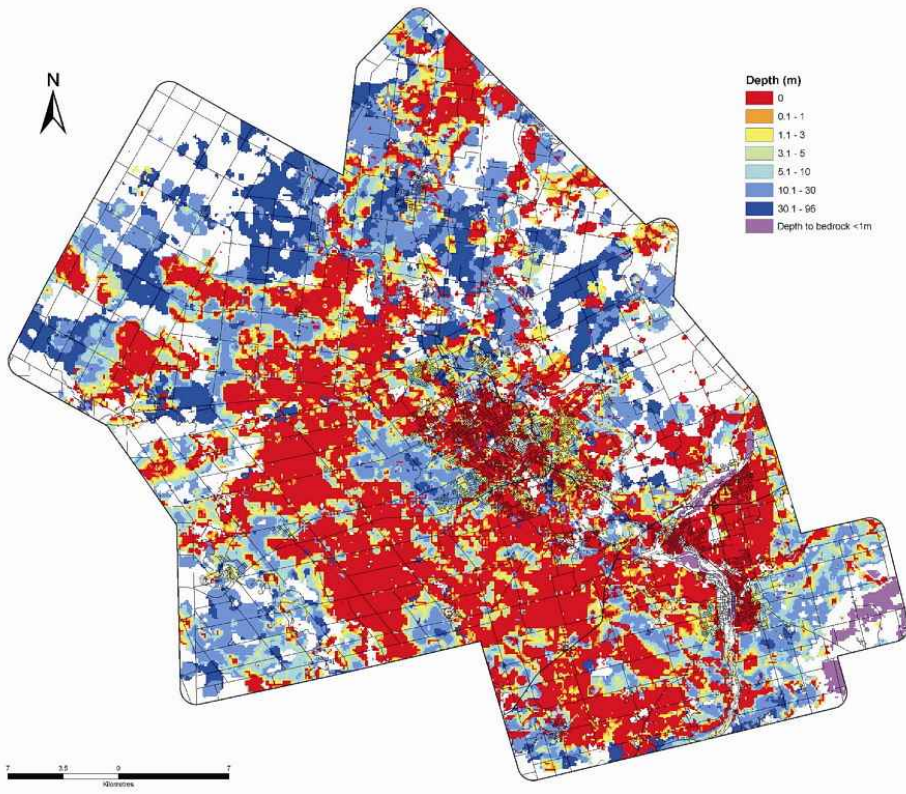
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Geology and You ! - Land-use Planning

Depth to First Aquifer of Thickness >3 m

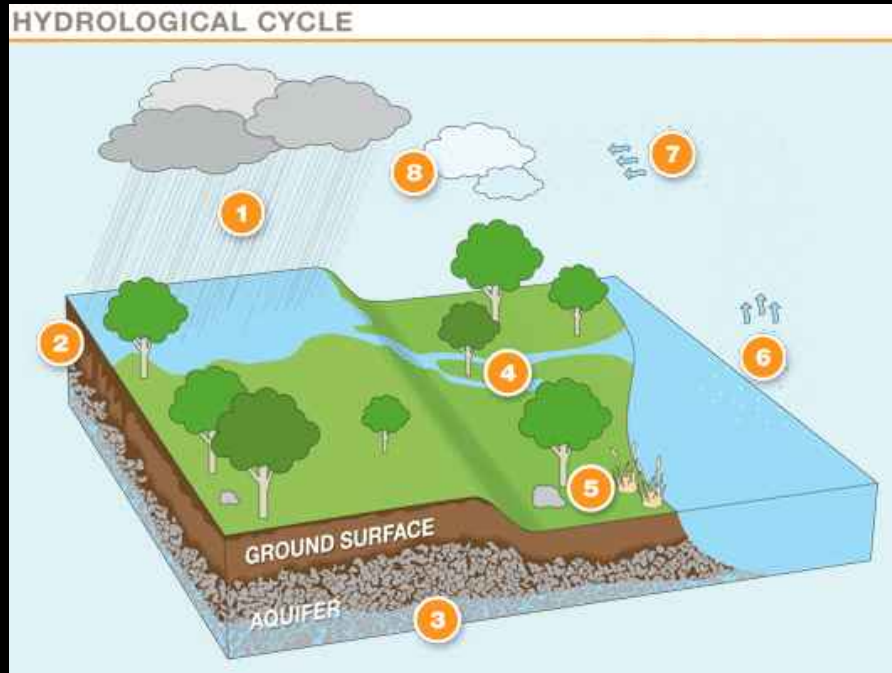


Landslide risk

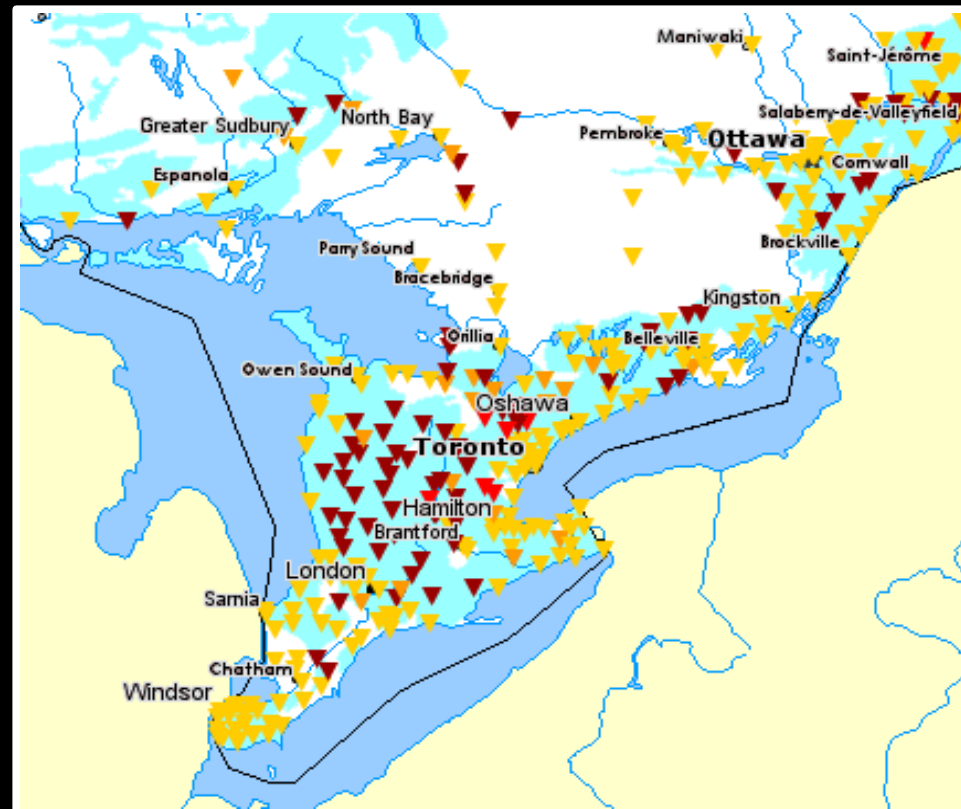
Aquifer risk – source water protection



Geology and You ! - Groundwater



chicagowildernessmag.org



NRCan

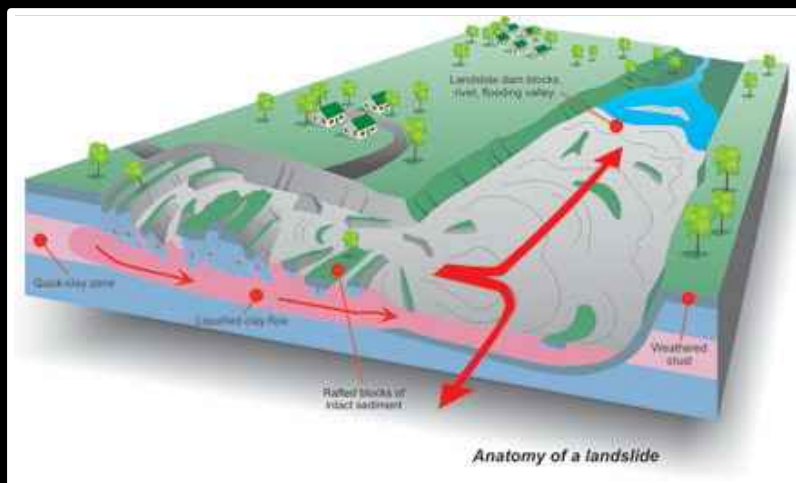
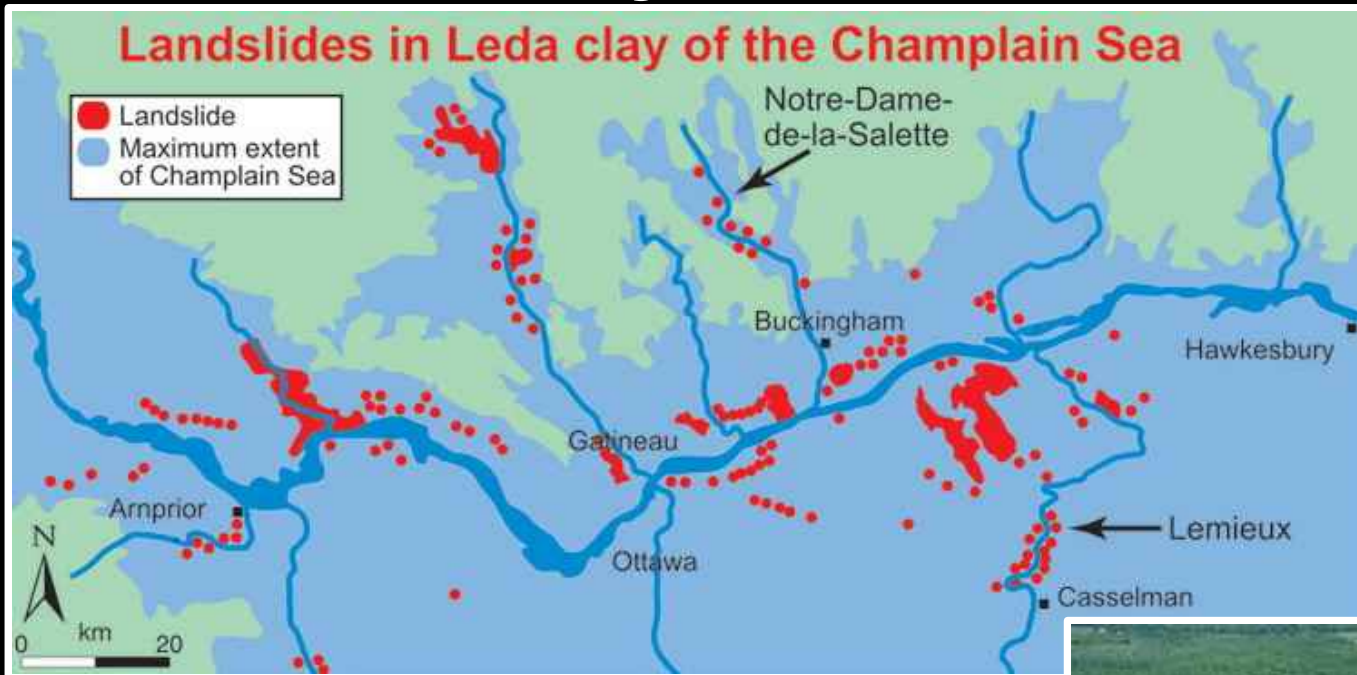
Geology and You! - Shoreline Erosion



Scarborough
Bluffs
(N. Eyles)

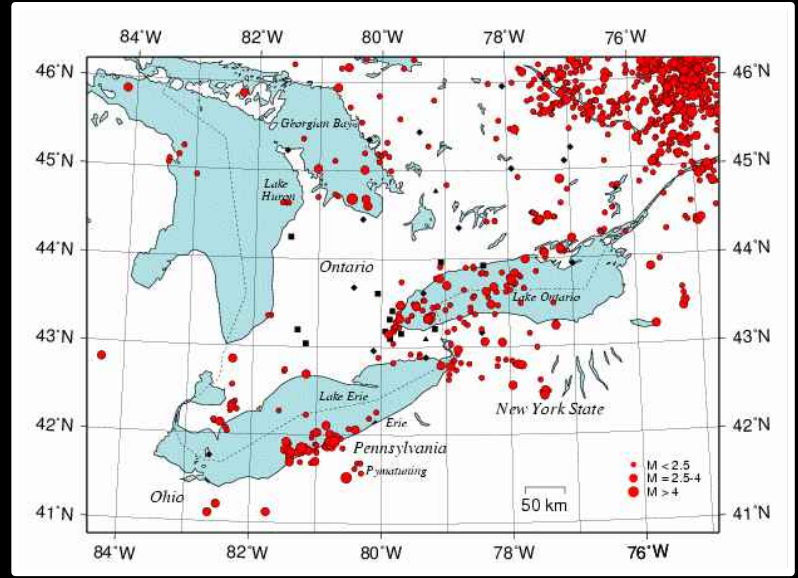
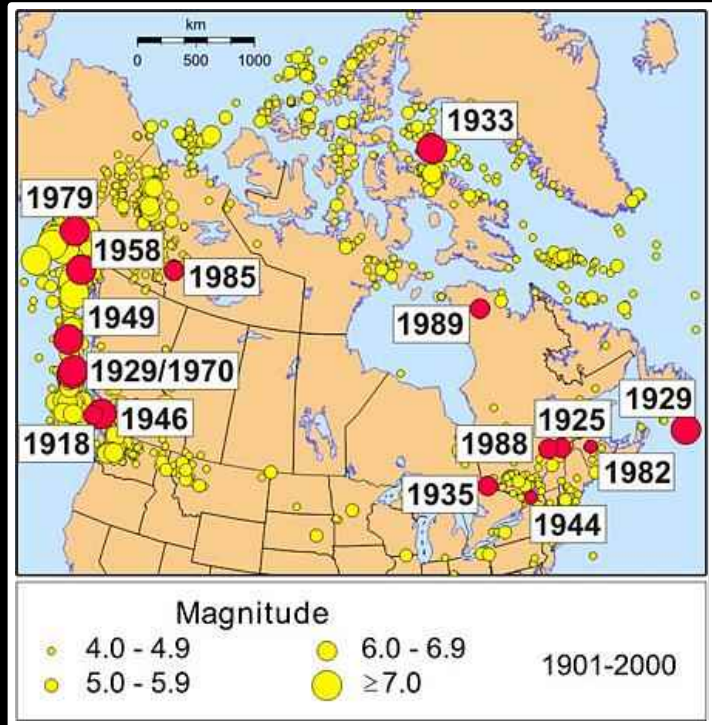
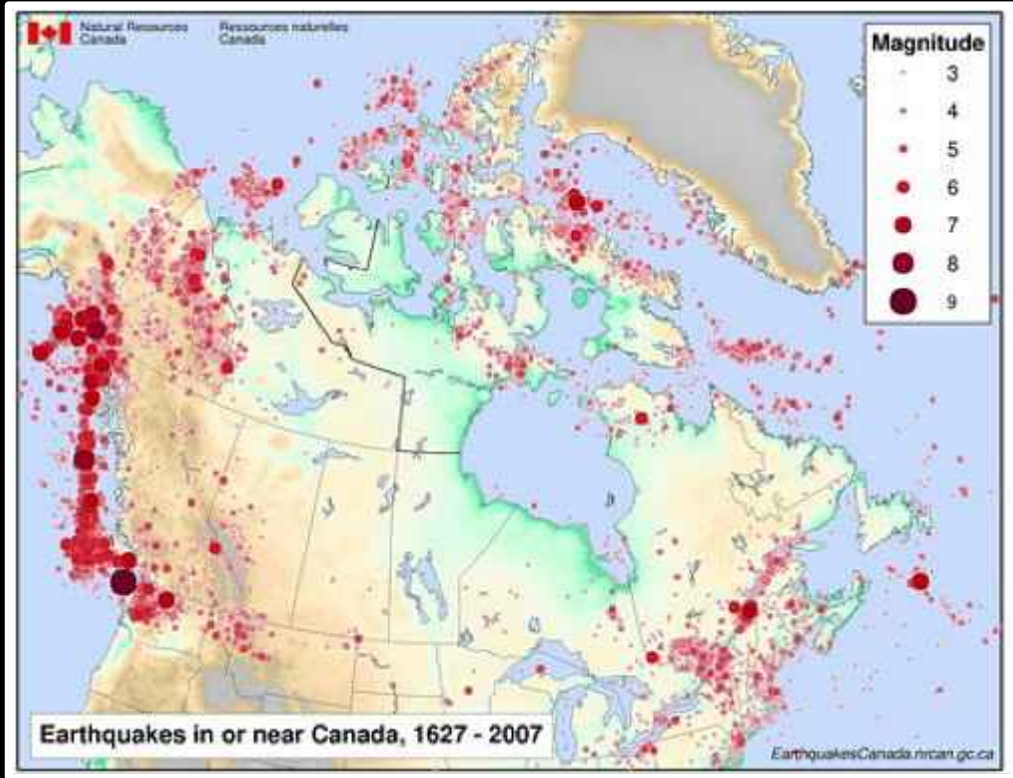
Geology and You !

Leda Clay – Lemieux Slide 1993

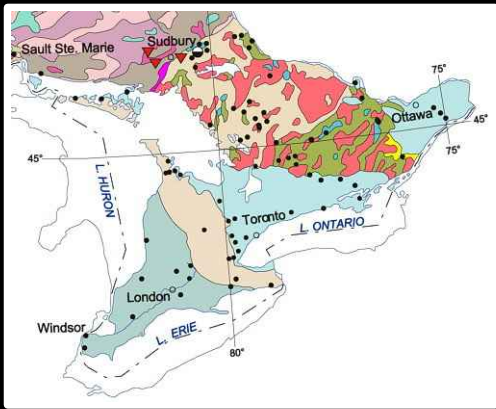


Geology and You!

Earthquakes - "The Day the Earth Moved"



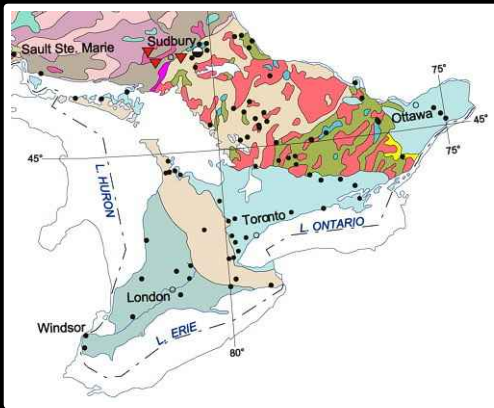
Geology and You ! Horticultural Limestone



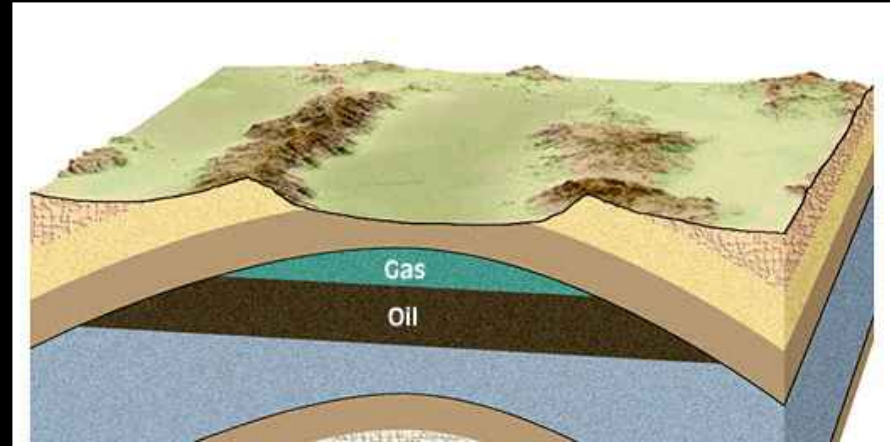
- Adjust soil pH



Geology and You ! Ornamental / Crushed Limestone

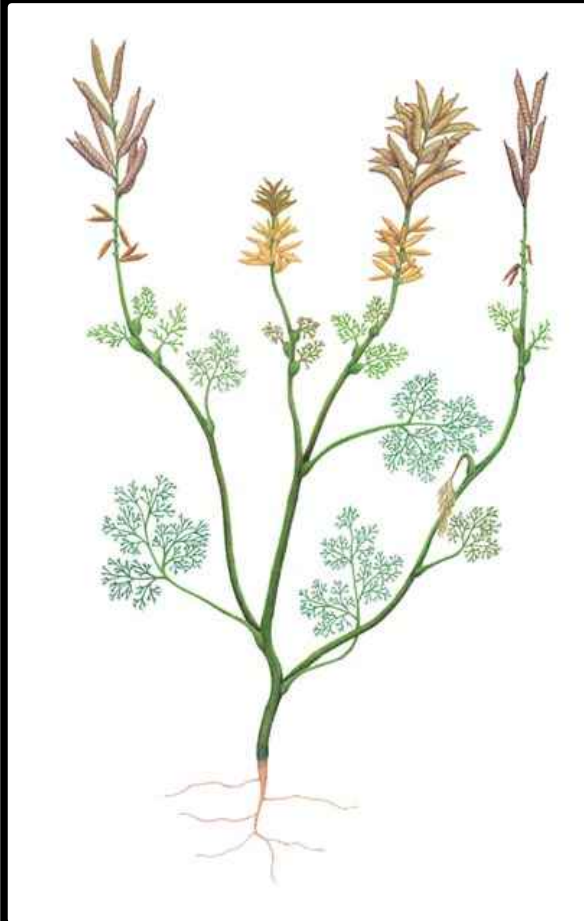


Geology and You !



Geology and Plants

Fossil Plant – *Archaeofructus sinensis* (China) 125 million years old



- Liaoning Province
- Aquatic
- no petals
- closed fruits
protected seeds
- evolutionary leap
- separated
flowering plants
from other plants

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Hardwood Forest - Geology



- Soil
- Moisture quality and content
- Slope

- Warm
- Early growth pre-leafing

Hardwood Forest - Spring ephemerals



- Short bloom and growth
- Ground thawed
- Sunlight pre-leaf out
- Early pollinators
- Seed + disappear before leaf out

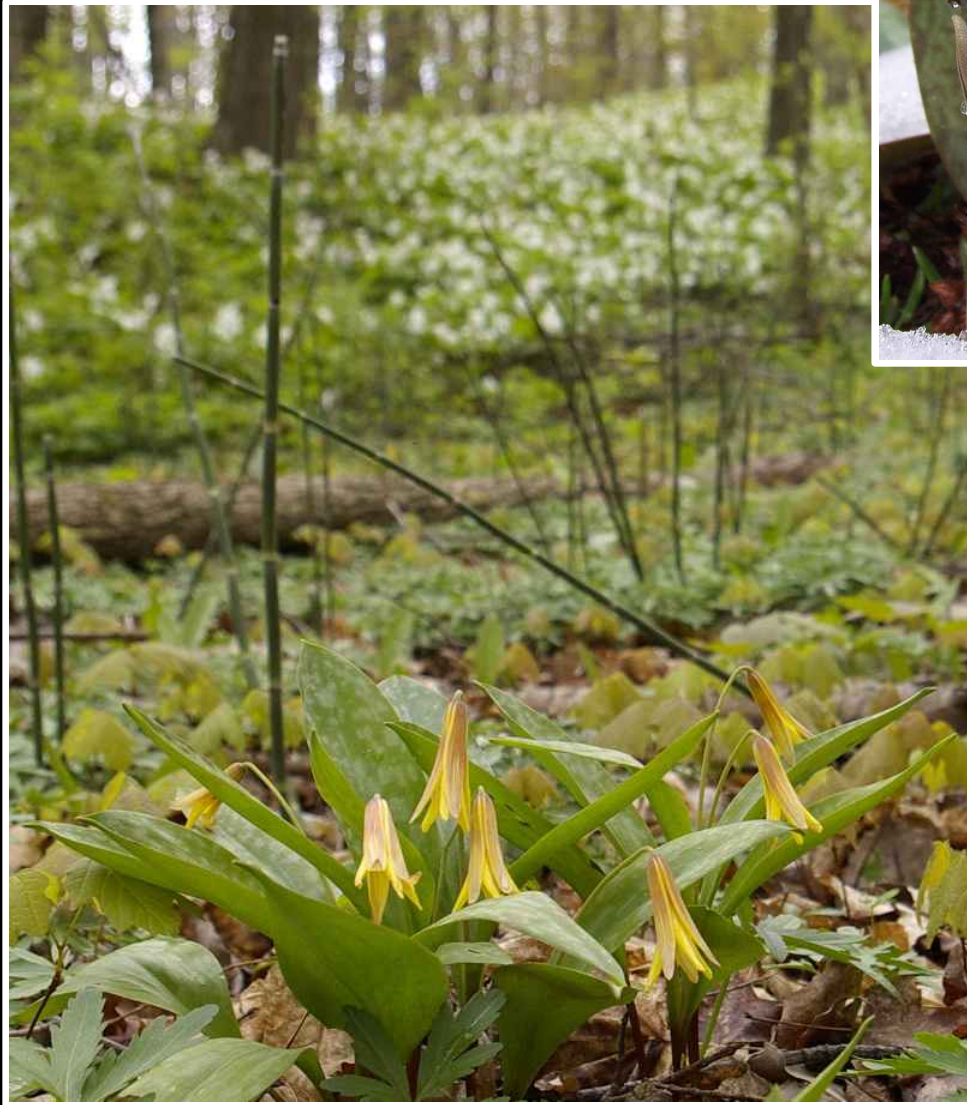
Large-flowered Trillium

Spring Ephemeral Large-flowered Trillium



- Community
- Dies if picked
- 5 to 7 years seed to bloom
- Myrmecochorous - ant seed dispersal

Spring Ephemeral Trout Lily



Community

1 leaf = young + no
flower; 2 leaves = older
+ 1 flower

Up to 7 years to bloom

Myrmecochorous - ant seed
dispersal

Spring Ephemeral Carolina Spring Beauty



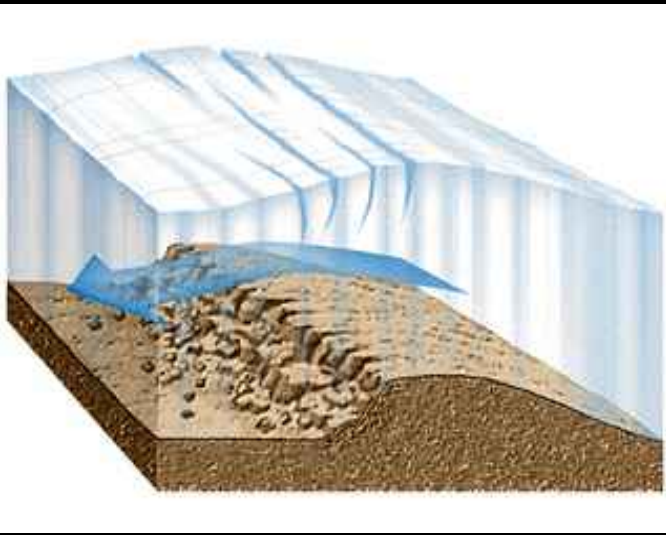
- Flowers close at night, overcast and rainy days when insects don't fly to preserve pollen
- Stripes on petals guide insects

Spring Ephemeral Plant Summary

- Grow early, fast
- Tolerate cold weather
- Early pollinators
- Many myrmecochorous



Geological “Desert”



Glaciation – Erosion - Wind
Physical conditions
Nutrients

Rock Desert - Pearly Everlasting

Silver-coloured
leaves



Rock Desert – Sedum

Succulent

Photosynthesis



Rock Desert – Wintergreen



Communal root system
Methyl salicylate
(salicylic acid methyl ester)



“Desert” Plant Summary

- Leaf design
- Community roots
- Photosynthesis



Bog Geology and Plants



Physical / chemical
Nutrients
Plants



Bog Geology

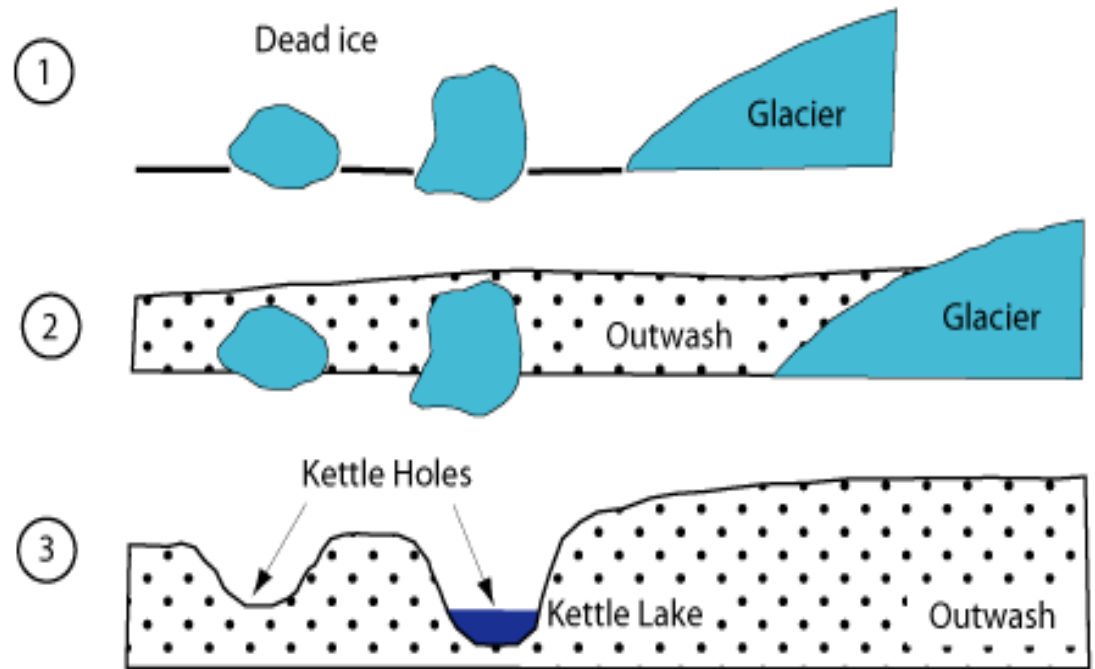
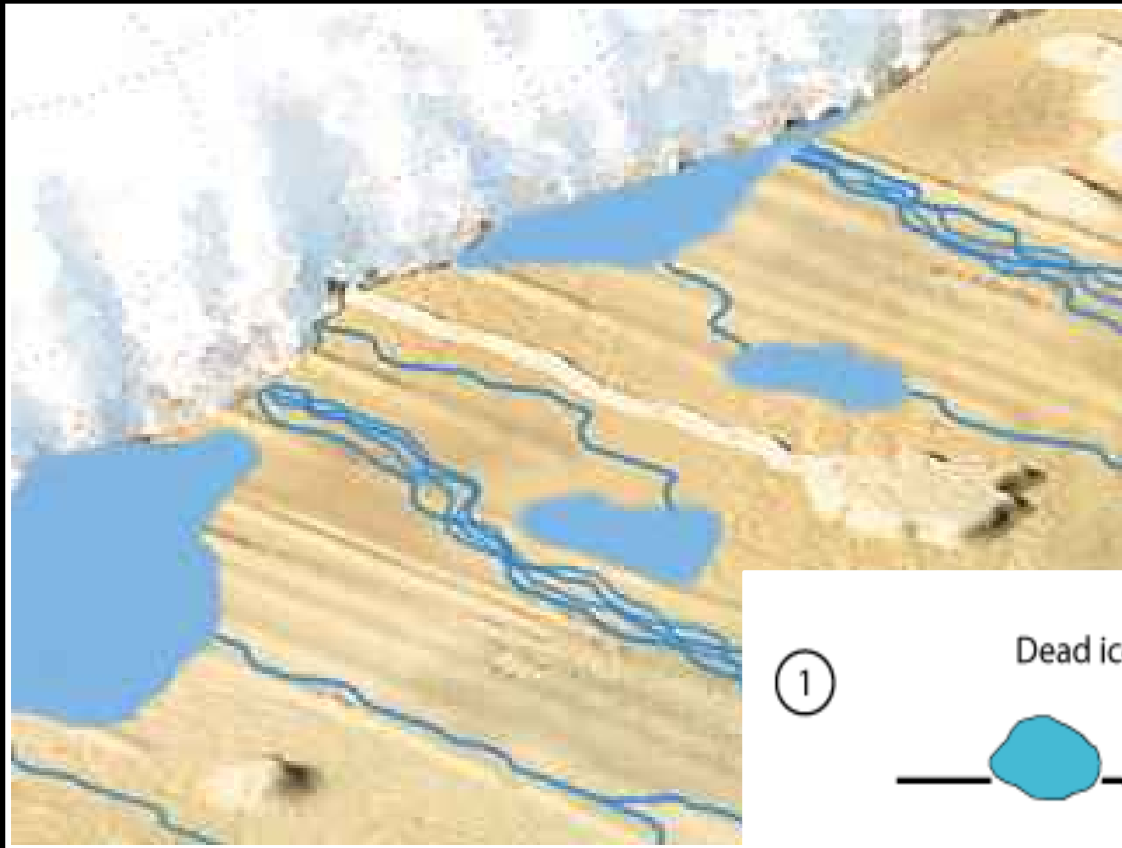
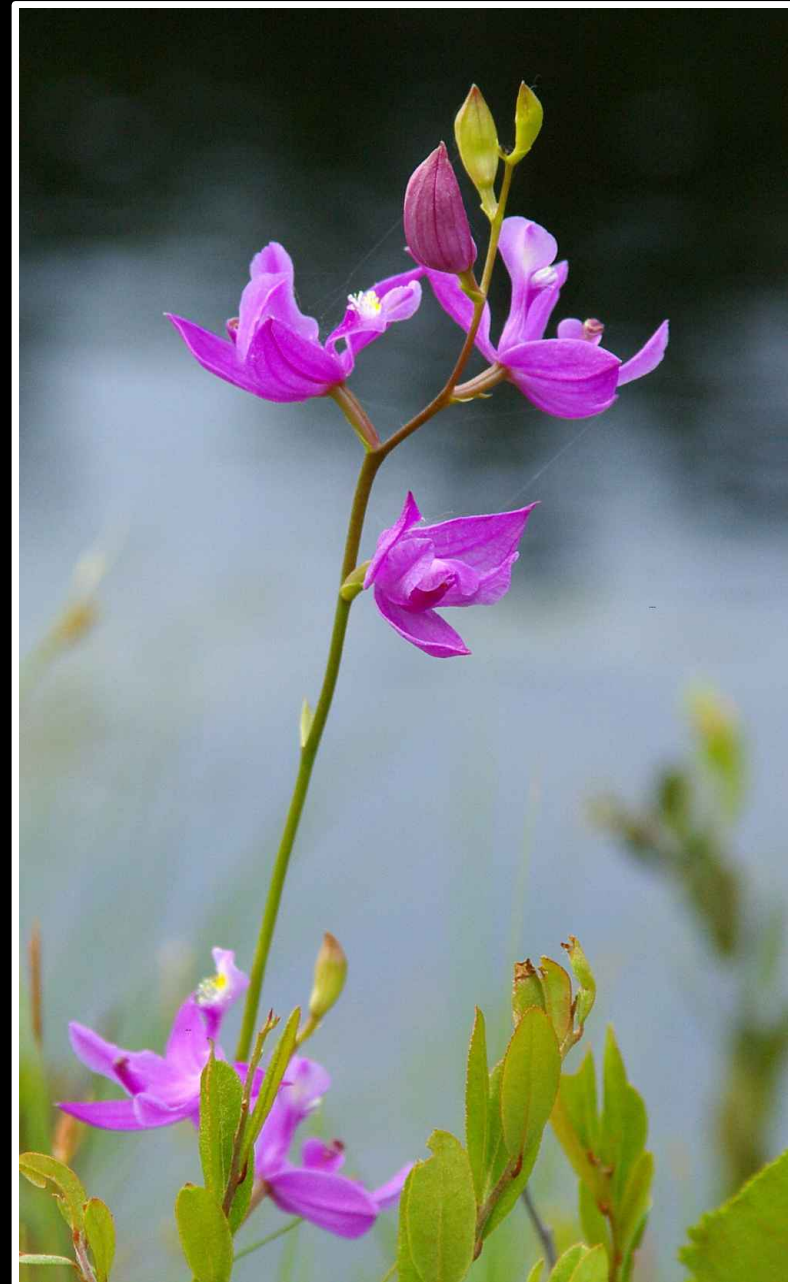


Image: Fettes
College

Bog – Plant Survival Tactics

- Carnivorous
- Non-carnivorous, soil fungi (mycorrhizal association)

Grass-pink orchid



Bog – Carnivorous Bladderwort



- Leaf traps



Carnivorous Plant - Pitcher Plant



Carnivorous Plant - Pitcher Plant

Leaf “soup”

Hairs

Insects

Nutrients

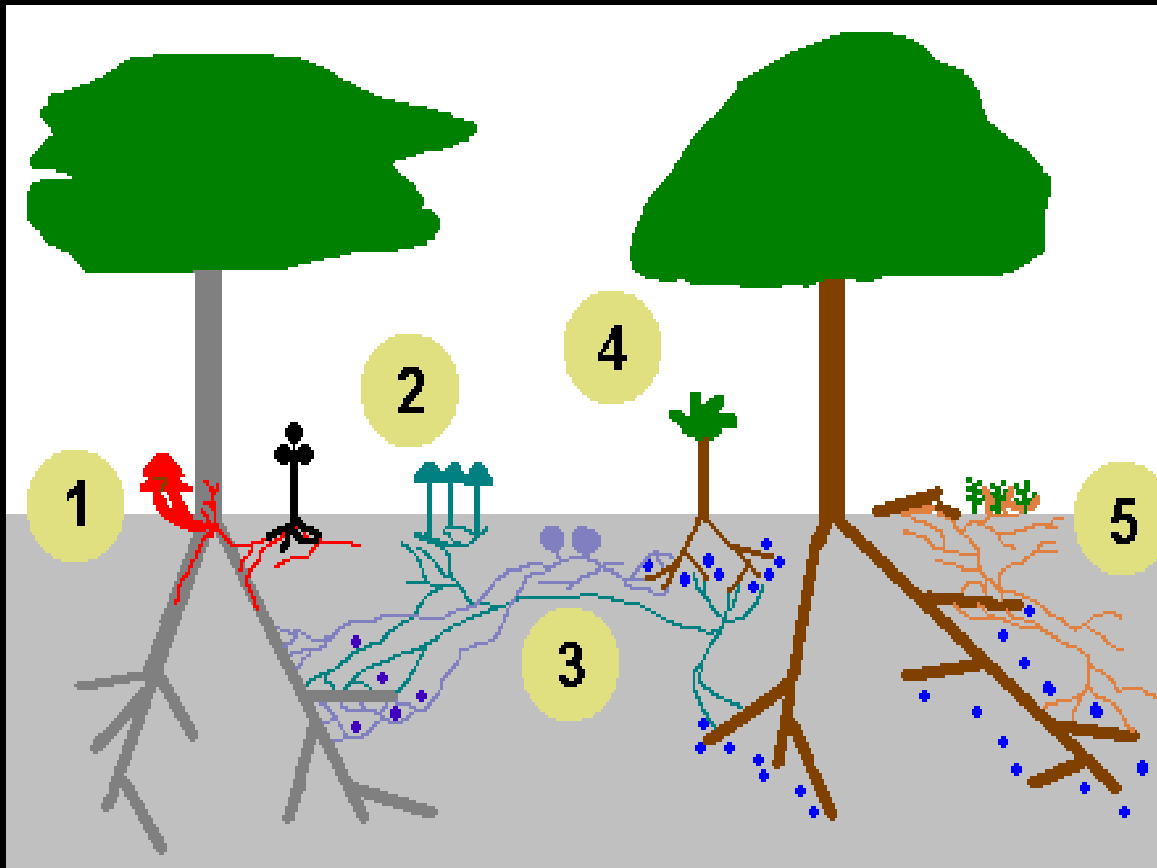


Carnivorous Plant - Sundew



Secretions
Insects
Nutrients

Mycorrhizal (Fungi) Association



Chanterelle



Truffle

Australian National Botanic Gardens Fungi Web Site

Plant: Sugars to fungi

Fungi: Nutrients to plant + no metal poisons

Non-carnivorous - Labrador Tea Mycorrhizal Fungi



Bog Summary

Geology

Physical conditions

Nutrients

Plant adaptation

Carnivorous

Mycorrhizal



Limestone Plains - Alvar



Alvar Rock Geology

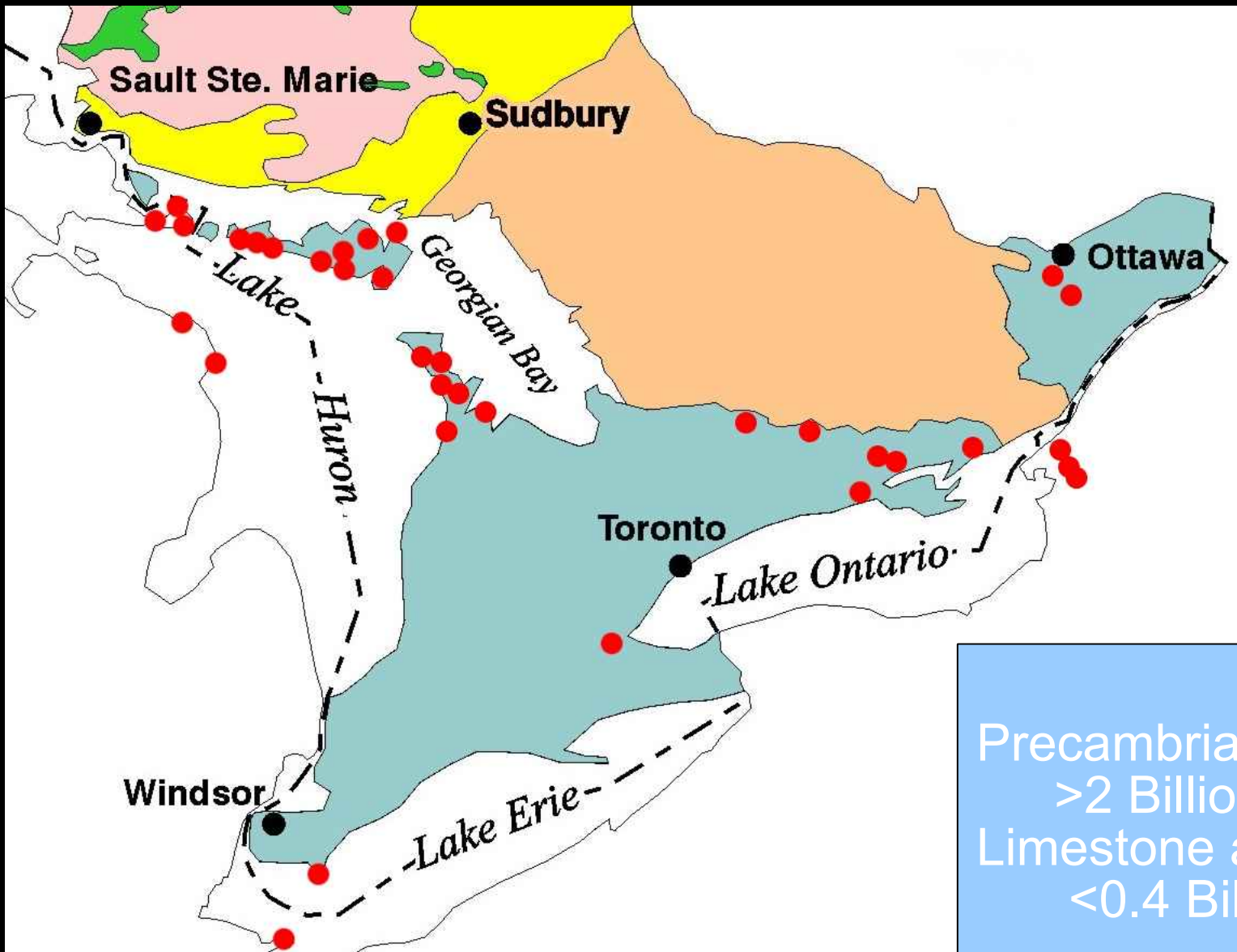


Tropical ocean - 0.45
billion years ago.

Limestone rocks



Ontario Alvars



Precambrian Shield:
>2 Billion years old
Limestone alvar:
<0.4 Billion year old

Alvar – Calciphile - Shrubby Cinquefoil

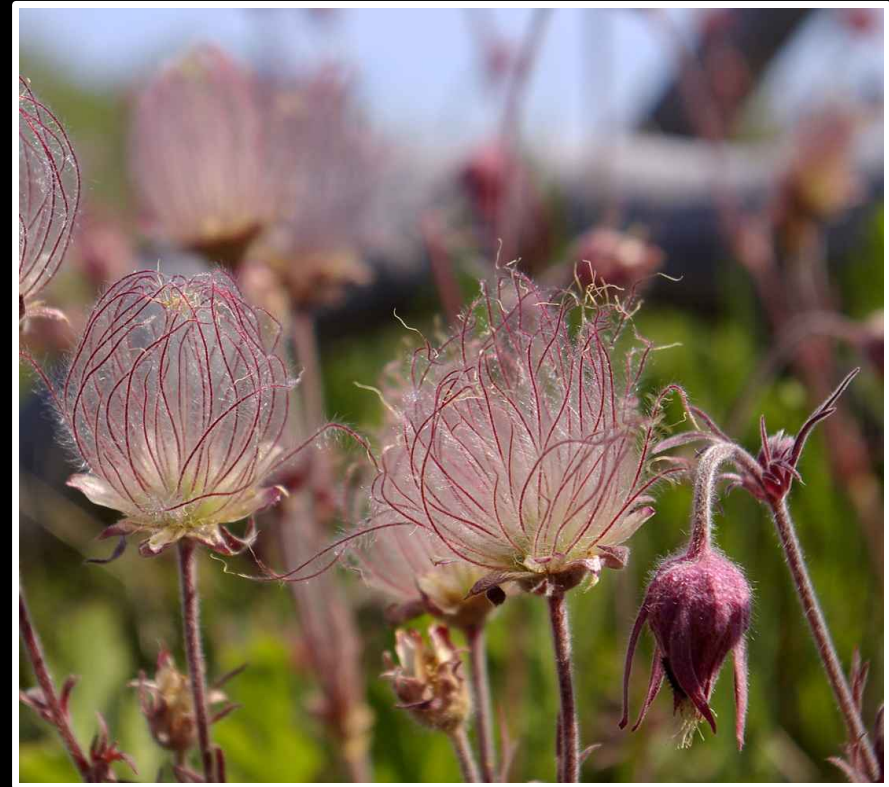


Alvar Calciphile - Wild Paintbrush

Semi-parasitic
Flowers vs bracts



Alvar Calciphile – Prairie Smoke



- Alvar + tallgrass prairie
- Name = seed head in wind
- Dry, well drained, full sun

Alvar Calciphile - Lakeside Daisy



- Great Lakes
- Rare
- Manitoulin Gold
- Thick, rubbery leaves store water to withstand dry spells.

Misery Bay



Alvar - Geological Influence

Calciphile Plants

- Alvar geological history
- Chemical conditions
- Calcium- and magnesium-tolerant plants



Lakeside Daisy +
Columbine



Low Calamint

**Geology and
Plants**



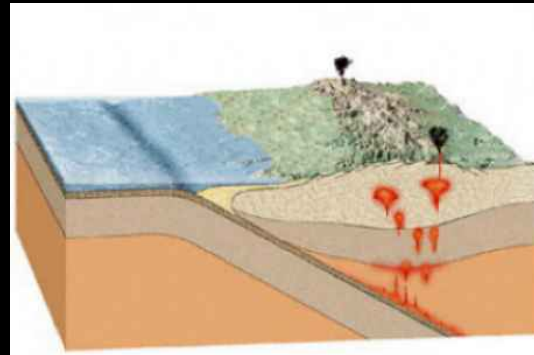
**Different
Habitats**



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- Plant and human communities



**Plant
Communities**



**Geological
Processes**

Landforms



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(Geology Hat)

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or**

(Wildflower Hat)

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