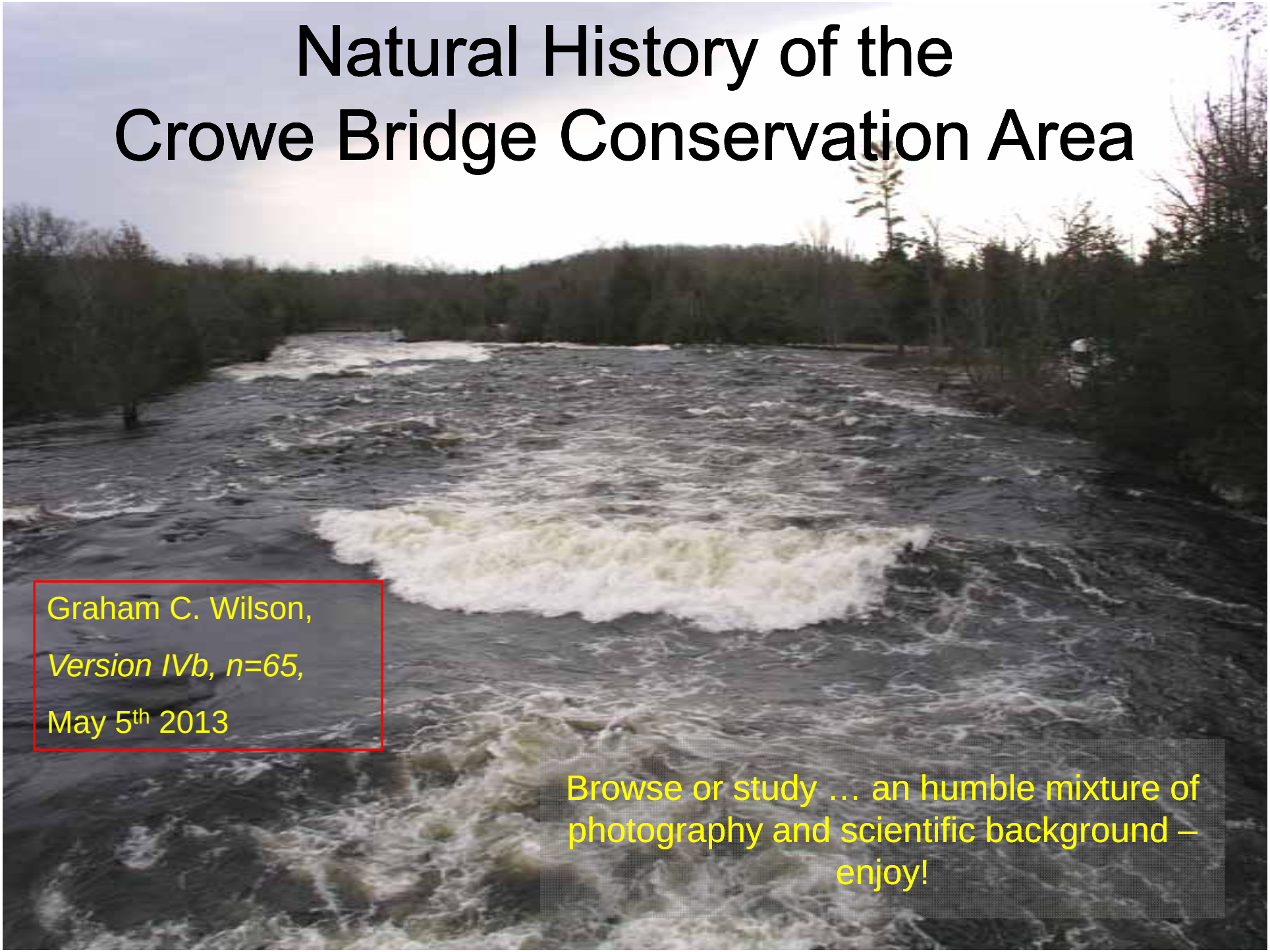
Natural History of the Crowe Bridge Conservation Area



Graham C. Wilson,

Version IVb, n=65,

May 5th 2013

Browse or study … an humble mixture of photography and scientific background – enjoy!

CBCA - snapshots 28 April 2013

CBCA – snapshot at low water, 15 Sept. 2012

Crowe Bridge Conservation Area

The CBCA is composed of predominantly wooded river-bank ecosystems, ~10 hectares (25 acres) in extent, on the left (south) bank of the Crowe River, just above the confluence with the larger Trent River, north of Campbellford in Seymour township, Northumberland county, southeast Ontario.

This presentation illustrates some of the natural attractions of the CBCA.

This 4th updated version includes a thirteen-slide appendix of photos of local flowers.

As of 05 May 2013, a total of 164 species of plants, trees, birds, animals, etc are listed for CBCA on the www.turnstone.ca web site, over 35% of the token 460 listed for the township.

The Crowe Bridge, yesterday

Detail from the "Illustrated Historical Atlas of the Counties of Northumberland and Durham, Ontario, 1878", reprinted in full with additions --- Fifth Line Press, Stirling, 2006 (p.91), publisher Peter Wilson.

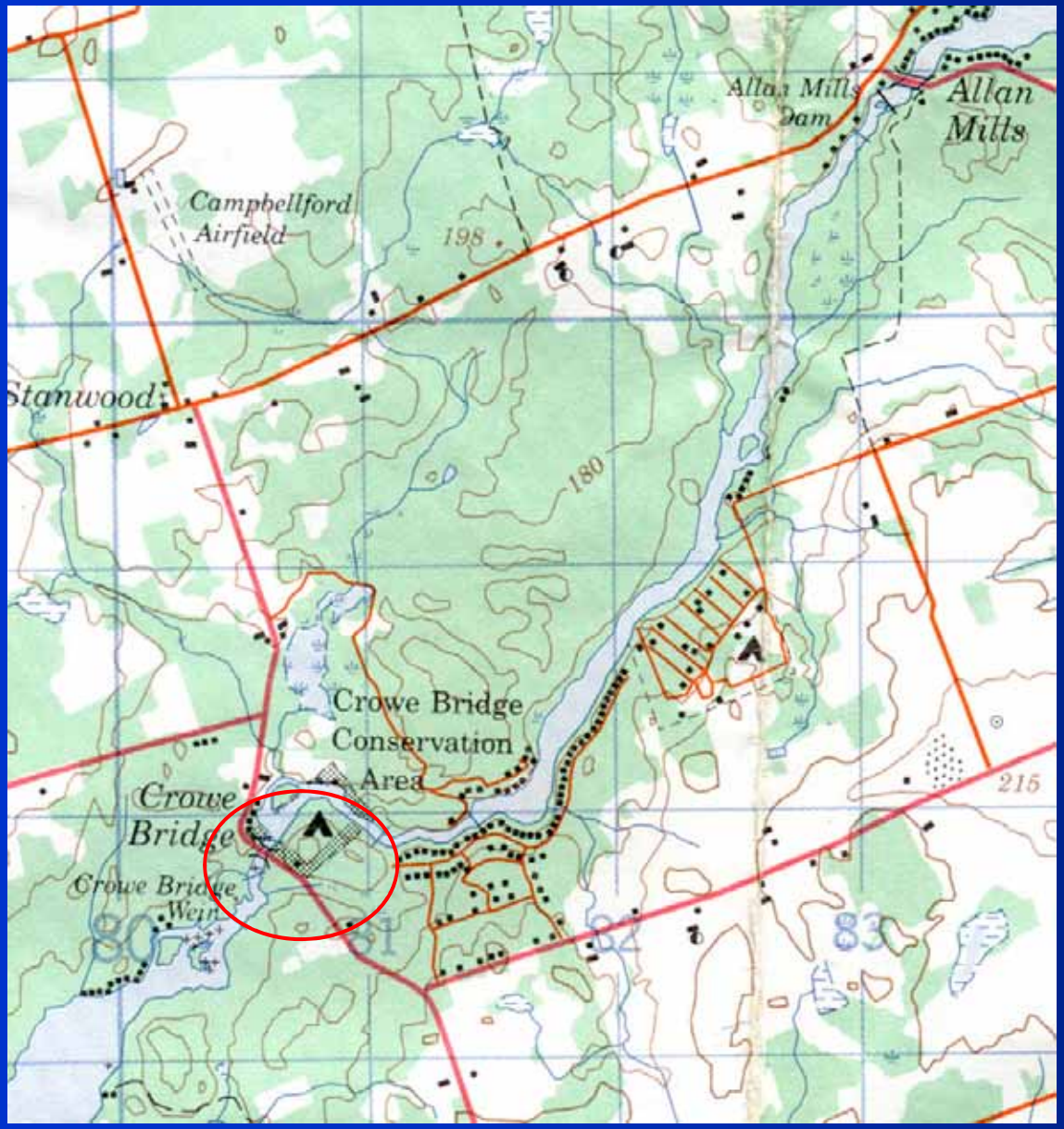
View from 8,560 feet

The CBCA lies within the red oval, around 44º22’50” N, 77º45’10” W.

The topography is hummocky, rising gently upstream, elevation ~545 to 575 feet (166 to 175 m) above mean sea level.

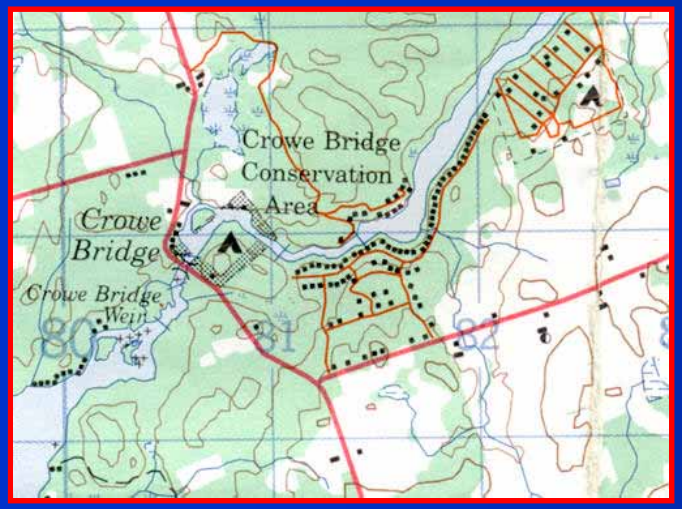
Google Earth image retrieved 01 May 2008

Topography



Detail from NTS map sheet 31 C/5 Campbellford, 6th edition, 1994.

In order to better document the natural environment of the CBCA, a modest GPS-referenced database of geological, geographic and human features was created. An initial 51 locations were documented from 25 April to 03 May 2008, and entered into a .xls spreadsheet.



Mapping project

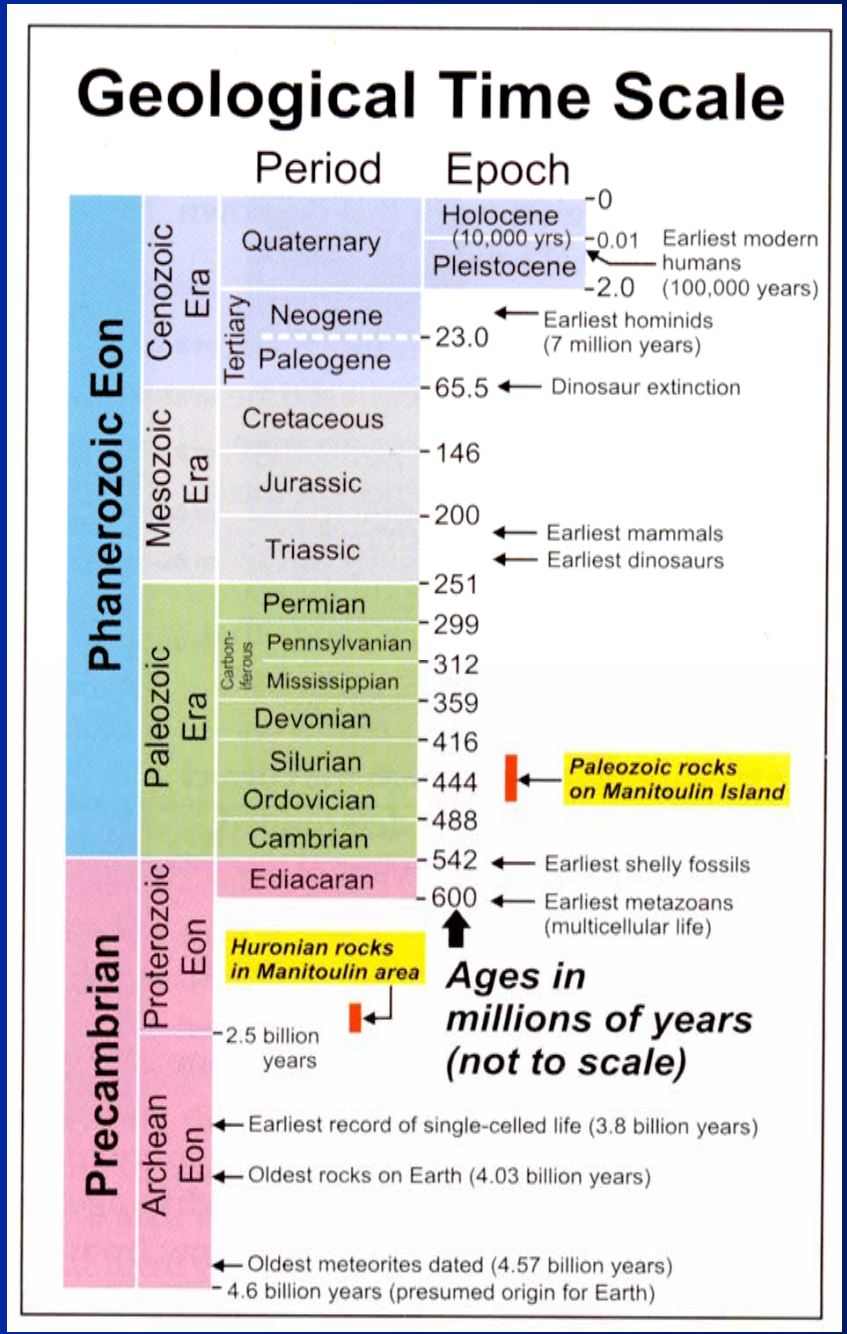
(to be continued as and when the need arises…)

The locations described so far lie within the CBCA and beside adjacent roadway to north and south. In geometric terms they lie within a 28 ha area 663 m north-south by 422 m east-west, of which the CBCA is the central 36 percent.

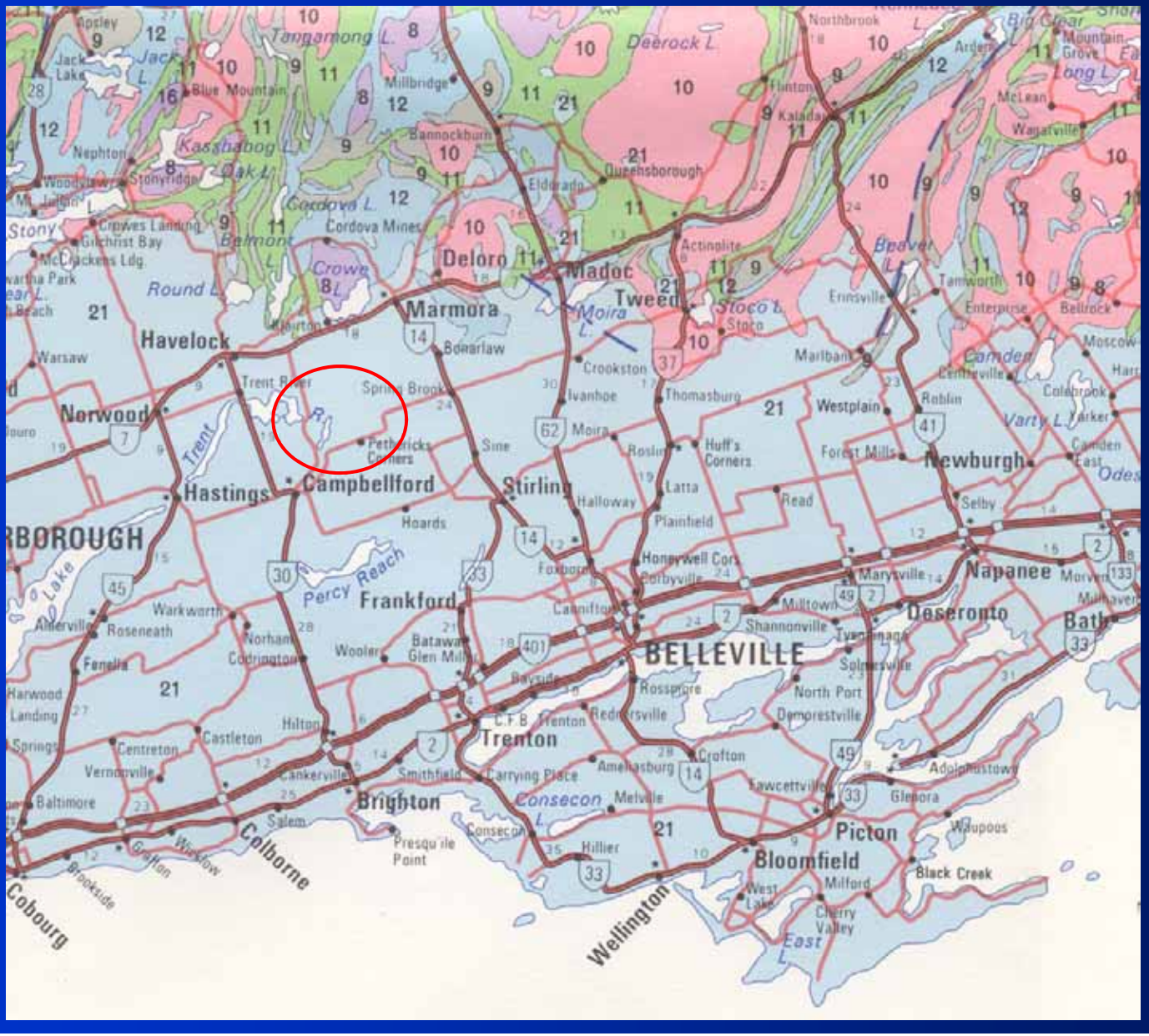
Lots of Time…

Geological Time in Southeastern Ontario

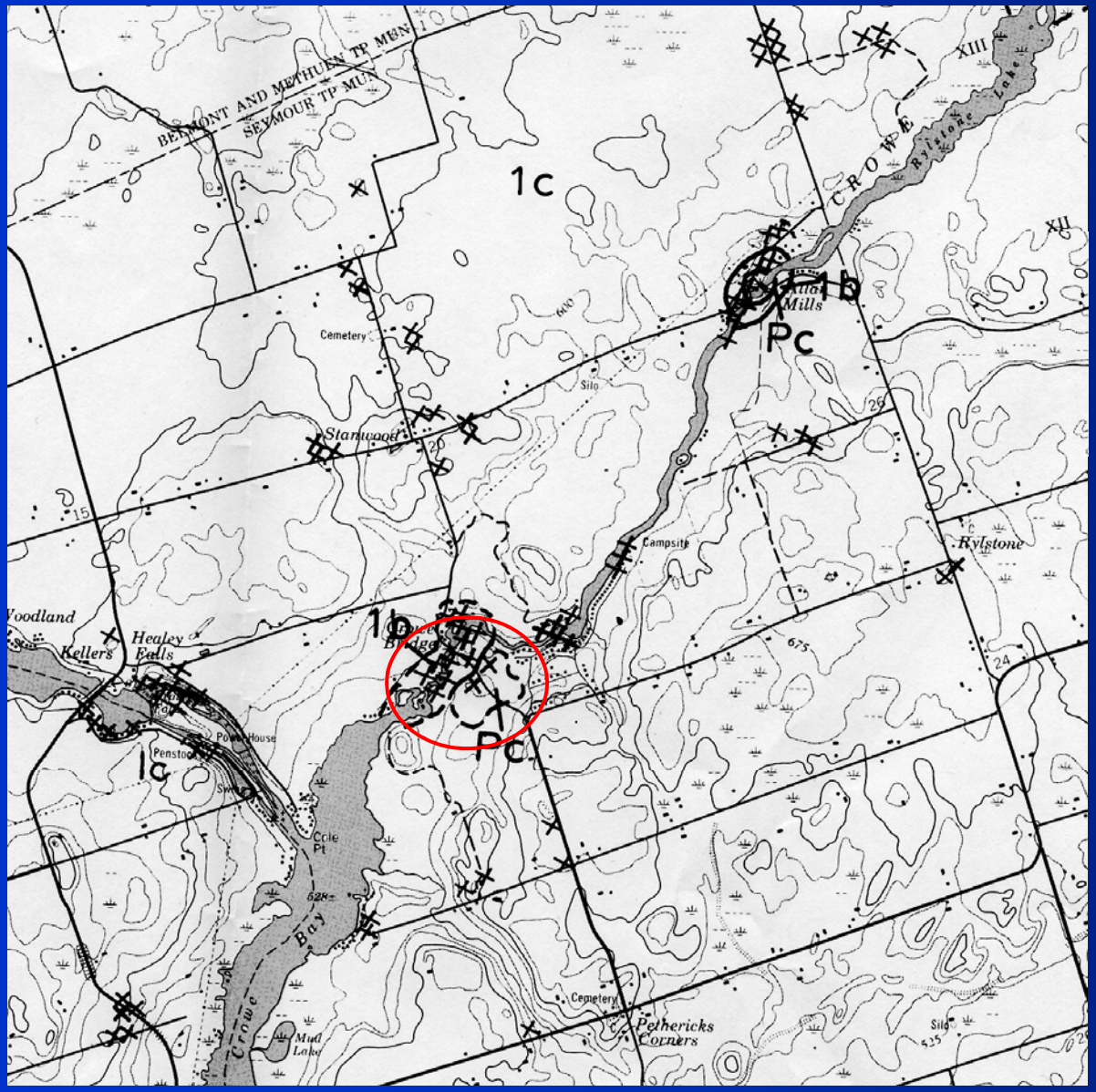
- ✓Quaternary (on top!)
- ✓Jurassic (rare)
- ✓Ordovician (the "cover rock" in the south – most of the good farm land)
- ✓Precambrian (Grenville) shield forms the "basement" under the limestone cover ("cottage country")



Geology of (part of) S.E. Ontario



Local Geology

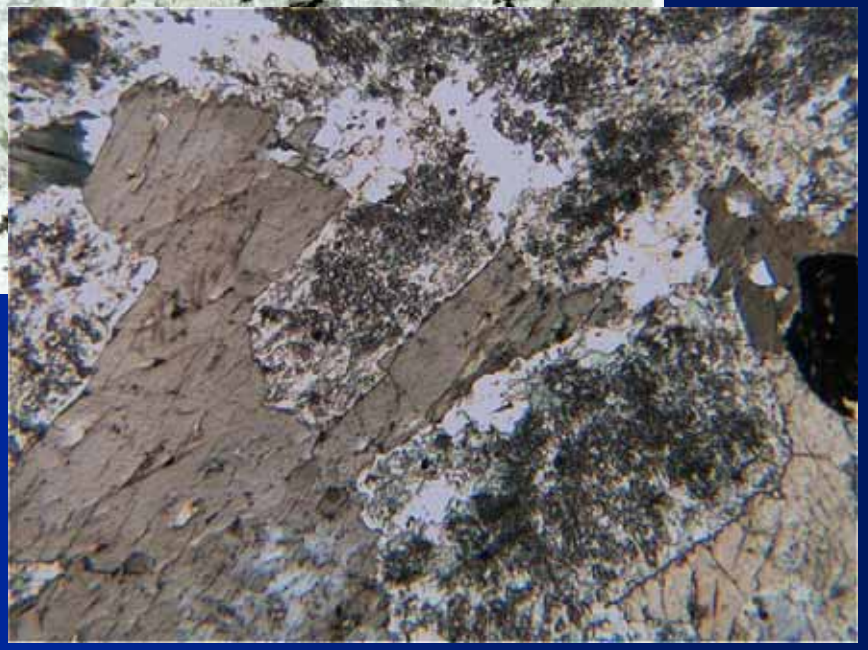


Two inliers (windows into deeper, older rock units) occur in the Crowe Valley, at CBCA and upstream at Allan Mills. In each case, small areas of Precambrian rock (Pc) and limestone of the Ordovician Gull River Formation (1b) are overlain by limestone of the Bobcaygeon Formation (1c), which persists down the Trent valley to the area of Ranney Falls, where it is succeeded in turn by the Verulam Formation (1d, not shown).

The Precambrian Shield

Apparent Precambrian outcrop beside road just south of CBCA: igneous intrusive rock, gabbro or diorite rather than granite...

Bedrock - metagabbro

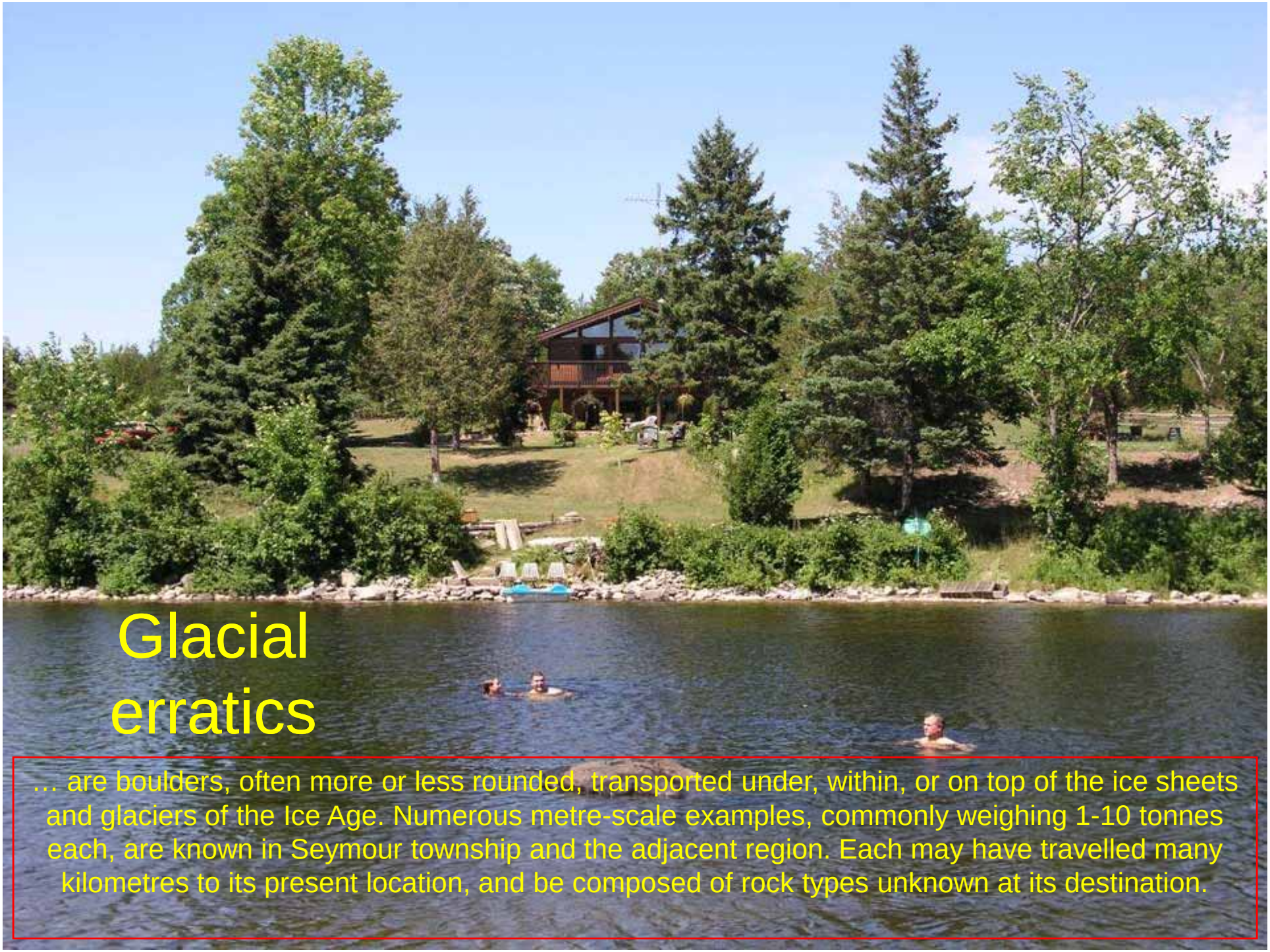


At least part of the Precambrian inlier is composed of greenschist-facies metagabbro with feldspar part-altered to zoisite, and pyroxene to actinolite. Field of view (right) 1.7 mm.

The Grenville province

Local outcrop and glacial erratics, in and near CBCA, indicate that the limestone strata are a thin cover on the underlying Canadian Shield.

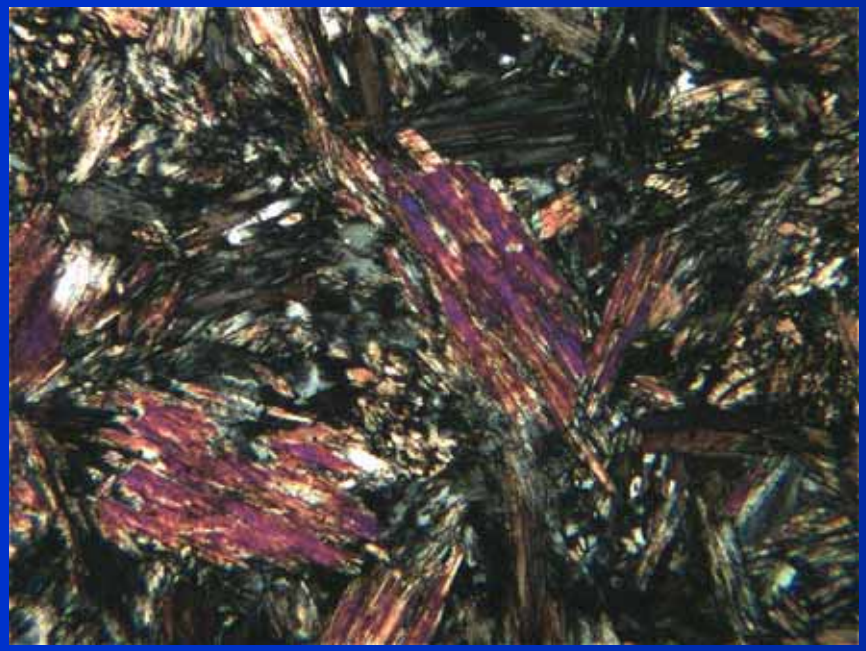
Just upstream to the northeast is Allan Mills, itself 8 km southwest of the large, rich iron deposit of the former Marmoraton mine. A sample of old drill core from Allan Mills is a biotite-magnetite diorite, a magnetic igneous rock. This rock contains some 60% feldspar, 28% pyroxenes, 7% iron-titanium oxides, 4% biotite mica, 1% apatite plus trace sulphides.

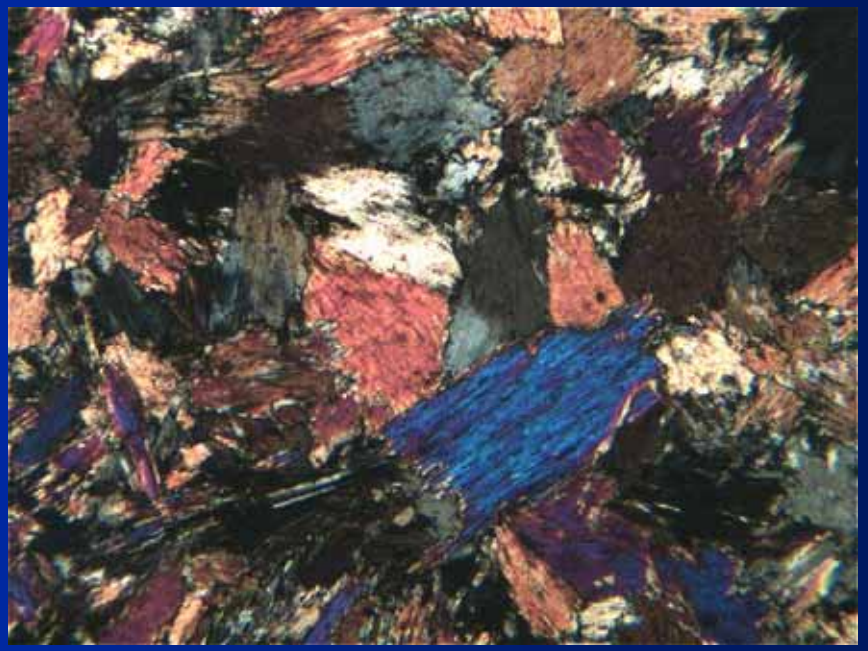


Glacial erratics

… are boulders, often more or less rounded, transported under, within, or on top of the ice sheets and glaciers of the Ice Age. Numerous metre-scale examples, commonly weighing 1-10 tonnes each, are known in Seymour township and the adjacent region. Each may have travelled many kilometres to its present location, and be composed of rock types unknown at its destination.

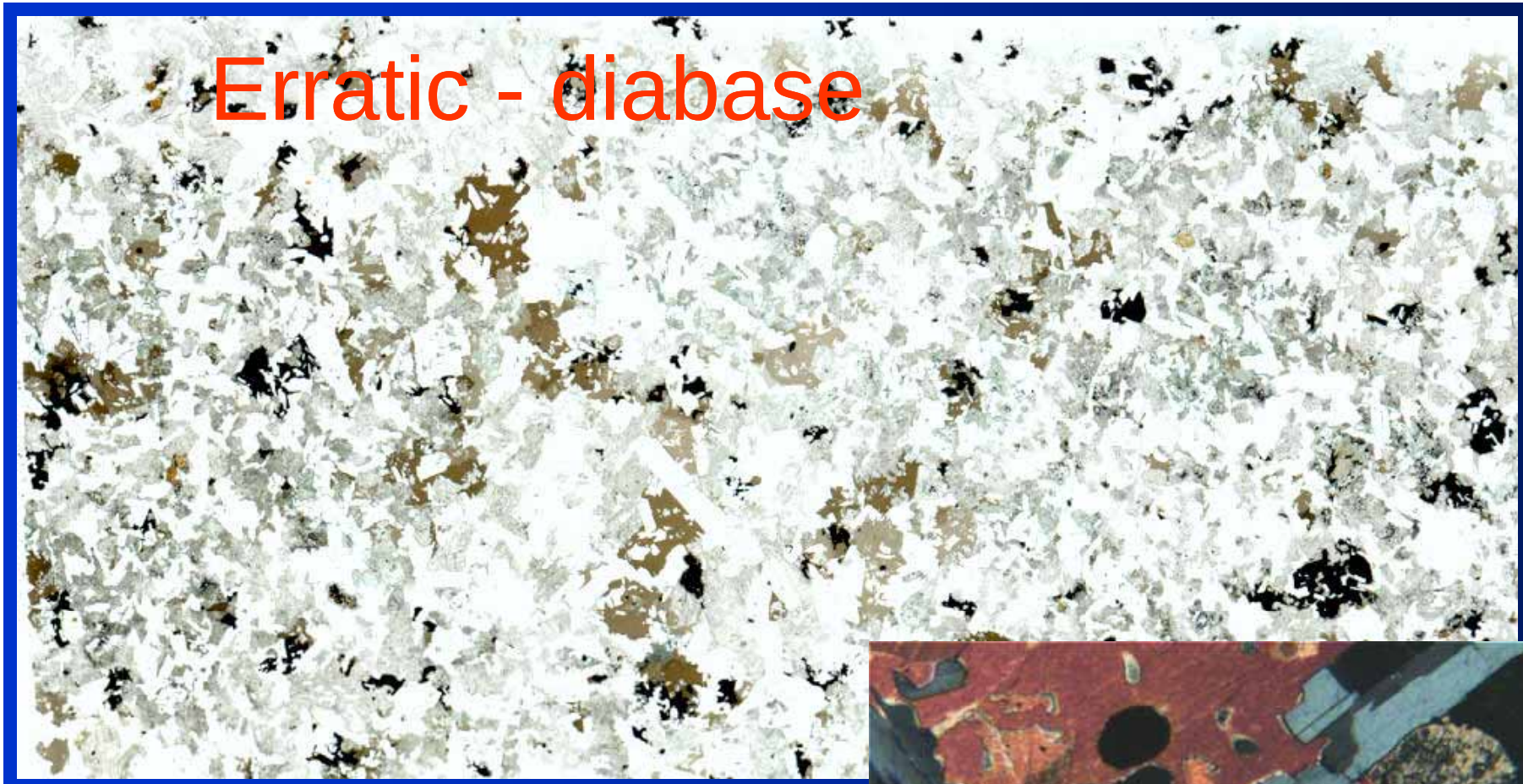
Pyroxenite boulder

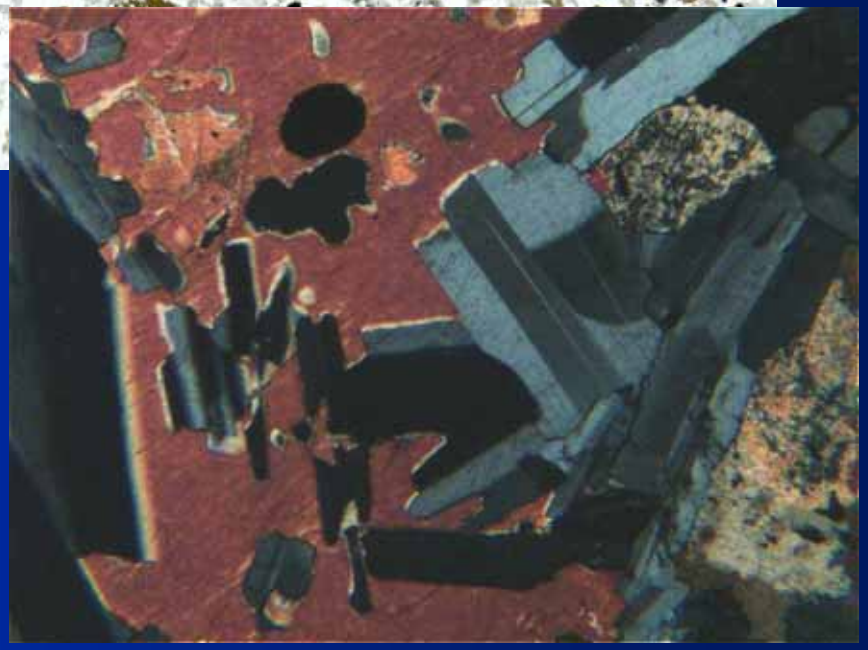




Two photomicrographs in cross-polarized transmitted light (long-axis field of view 1.7 mm) showing ragged actinolite prisms in one metamorphosed igneous rock, derived as a glacial erratic from the Grenville province, as close as Cordova Mines, or from more distant gabbroic intrusions such as the Tudor, Limerick and Thanet complexes.

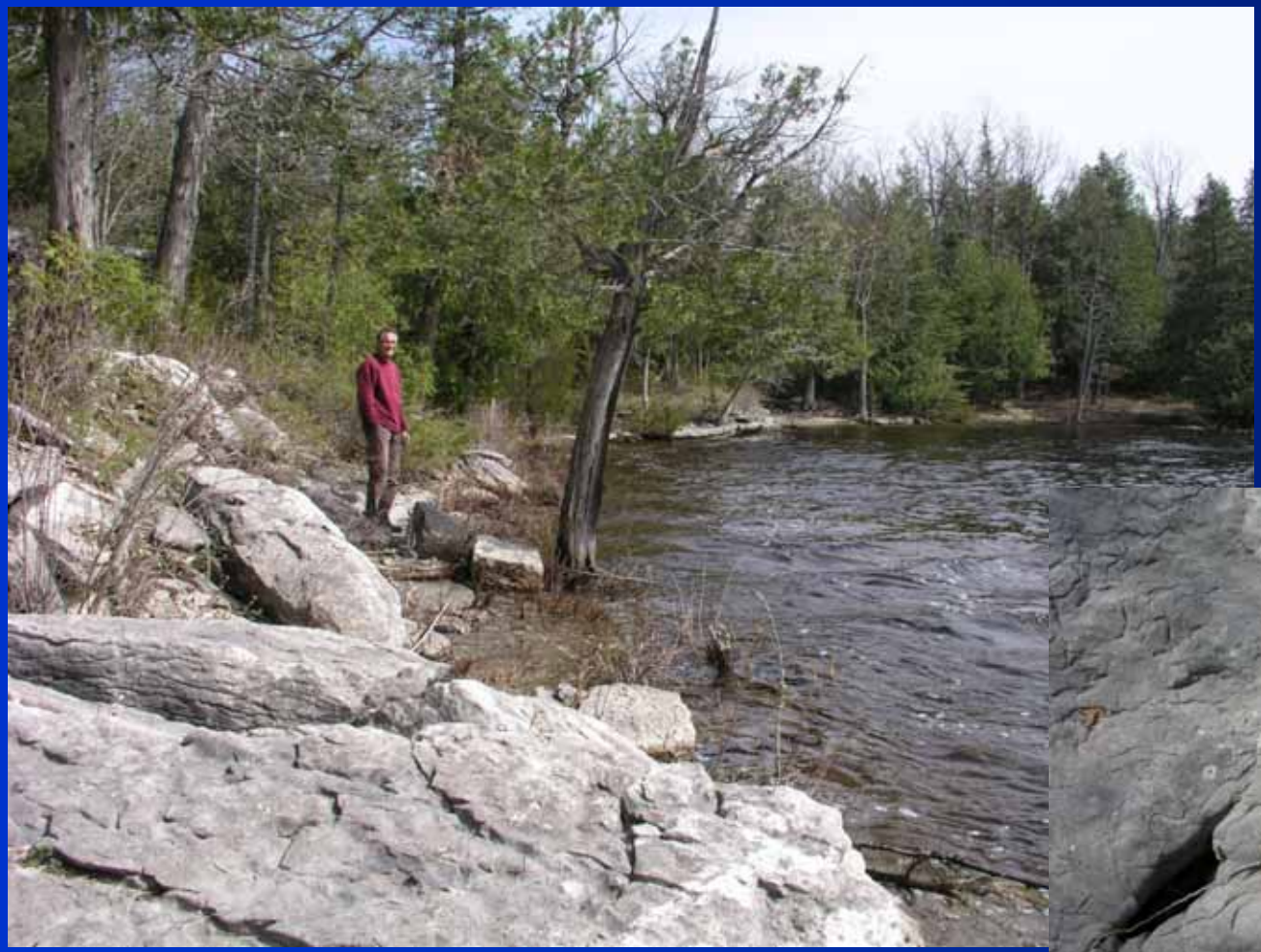
Erratic - diabase





Some erratics near the west margin of the park are metamorphosed diabase (distinctive texture, less-common, and less-altered than bedrock gabbro, and thus more magnetic). Field of view (right) 1.7 mm.

Ordovician Limestones

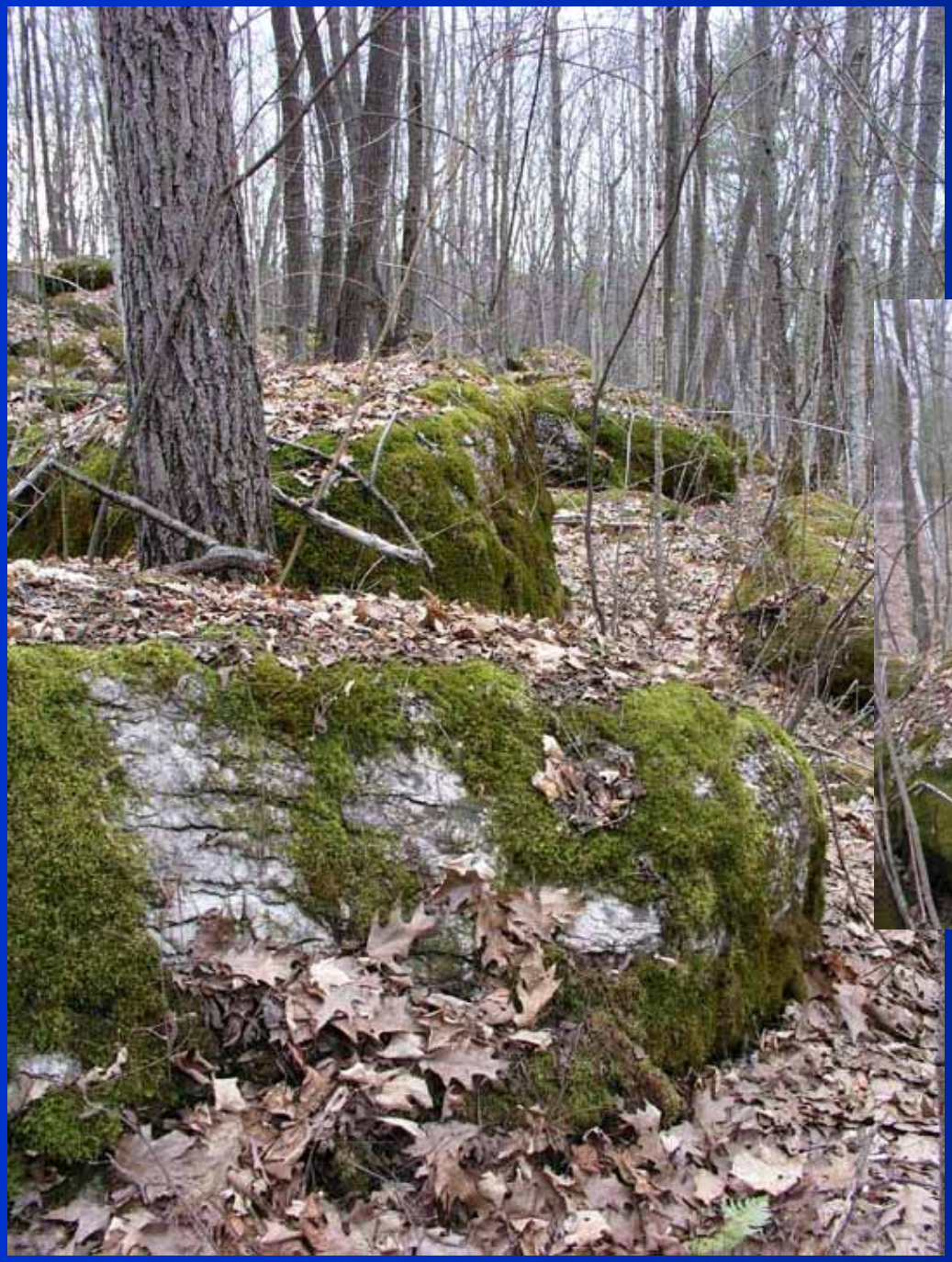


Limestone downstream of the bridge. Right: incipient solution cavities on vertical joints, forming upstanding “clints” separated by trench-like “grikes” (or maybe “grykes” - seen also in marble at Petroglyphs Park).

Ordovician Limestones

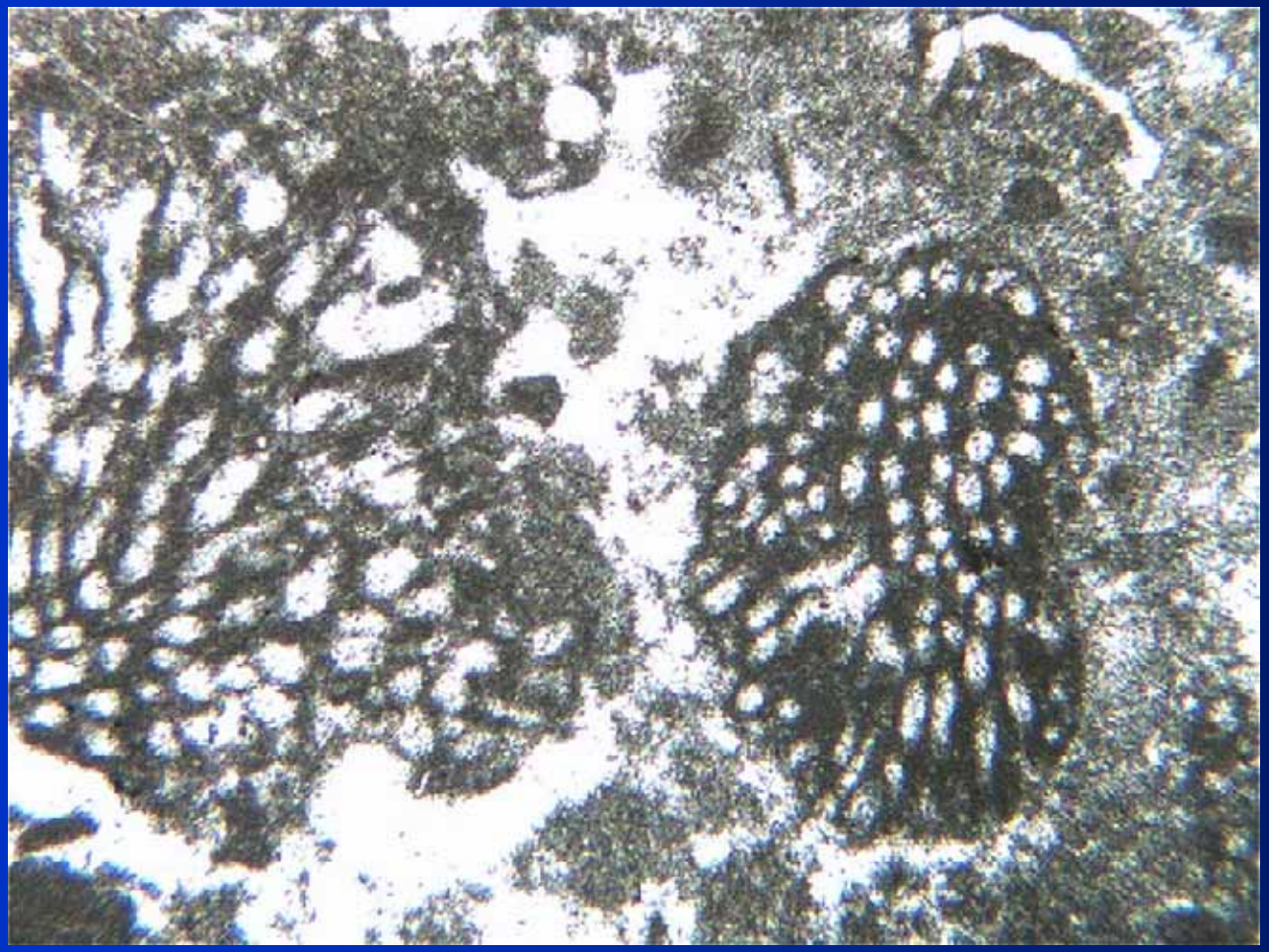
A 50-cm-long fossil orthoceratid (a cephalopod, part of the class which includes squid and octopus, nautiloid and ammonite). Possibly Actinoceras. Such fossils are well-known elsewhere, e.g., Anticosti Island.

Limestone ecosystems



Some mosses, wild flowers and even trees can grow and thrive on limestone blocks, and the thin calcareous soil that forms on the rock slabs.

Bioclasts



Photomicrograph, 1.7 mm in diameter, showing fossil fragments in limestone. Colonial organisms, probably bryozoans.

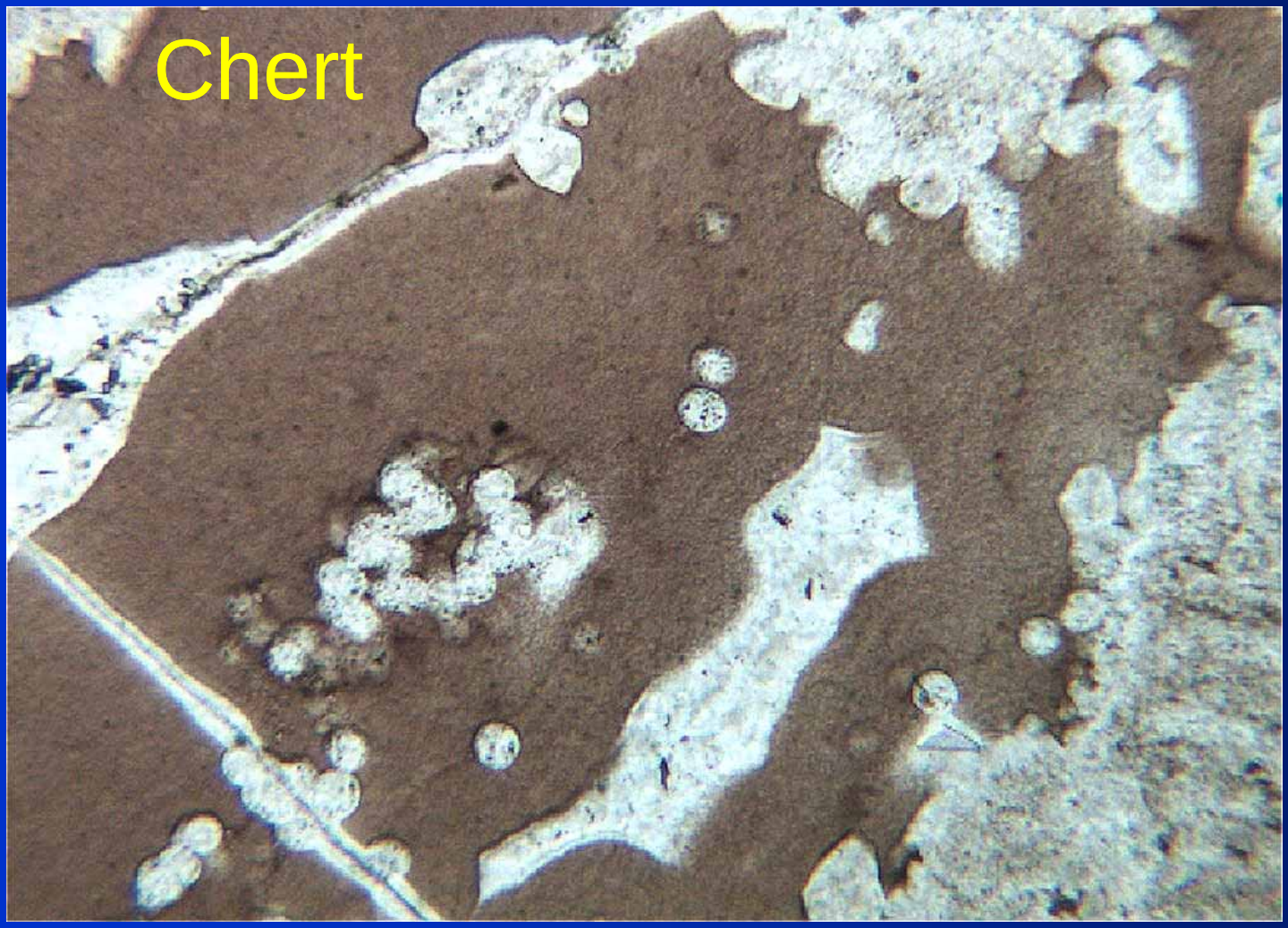
Bedded chert nodules – arsenal for ancient artisans?

Nodules of massive silica (known as chert or flint) in bedded limestone. Chert is the raw material for countless ancient arrowheads. Coin is 26 mm wide.

Chert nodules in limestone at CBCA

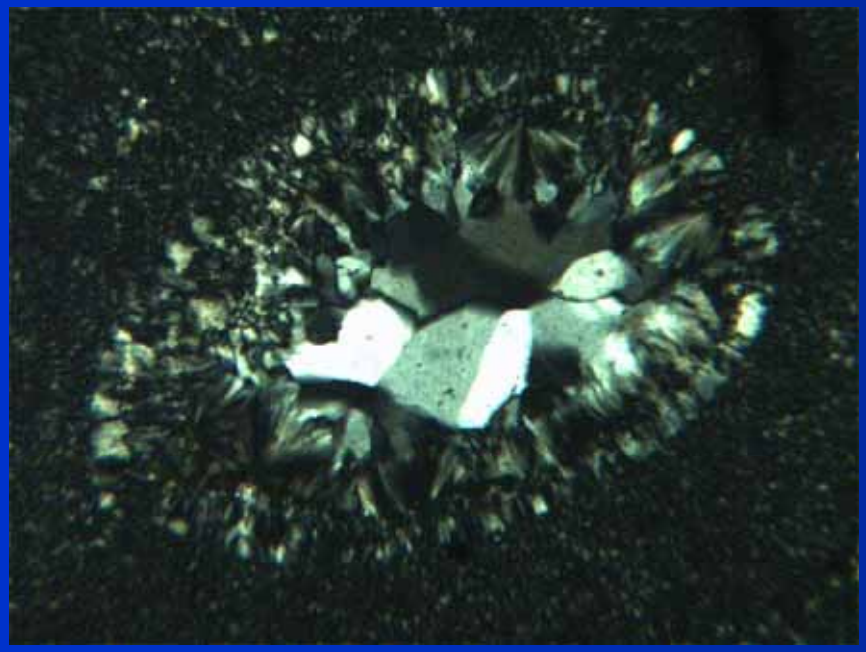
T&G Humphries photo

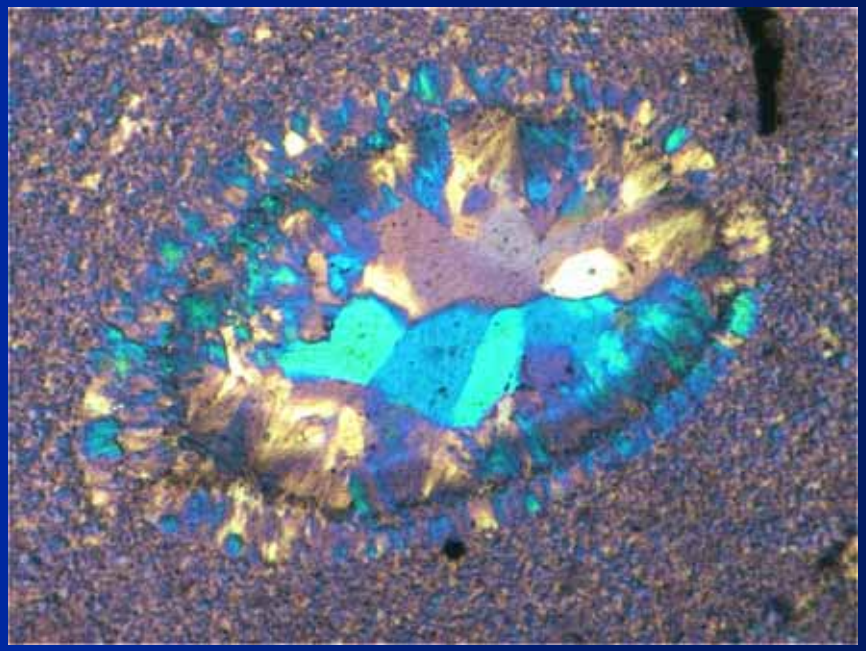
Chert



Collophane, a brown phosphate, infilling voids in silicified limestone. The limestone, originally mostly carbonate, is now 71% silica, 20% relict carbonate, 7% bioclasts (bryozoans, brachiopods), 2% phosphate and a trace of pyrite. View 0.9 mm in diameter.

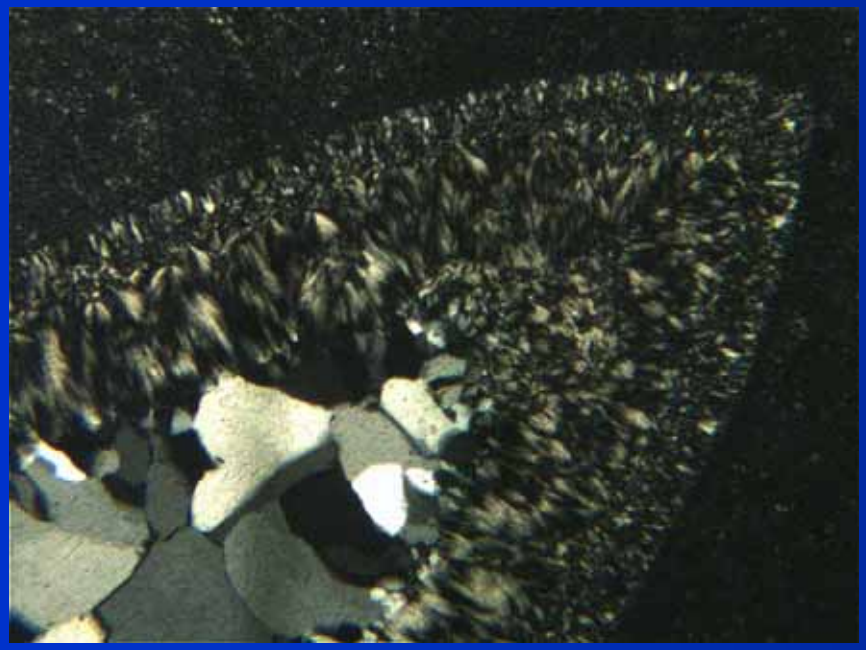
Chert

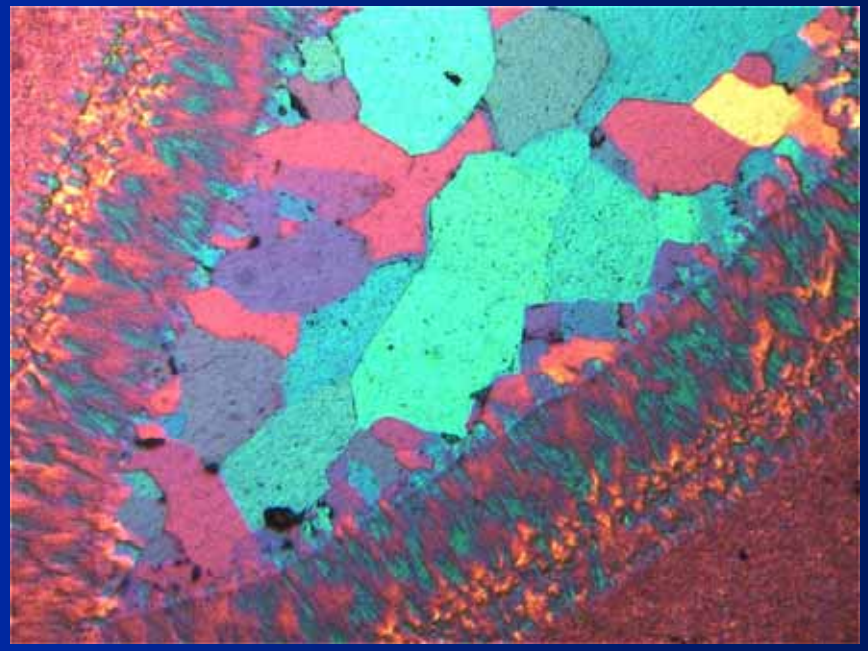




Two views of a void or fossil test (shell) rimmed by chalcedony and infilled by coarser quartz crystals. Views 0.9 mm in diameter.

Chert





Two views of an (?) algal bioclast in chert, replaced by chalcedony and infilled by coarser quartz crystals. Views 1.7 mm in diameter.

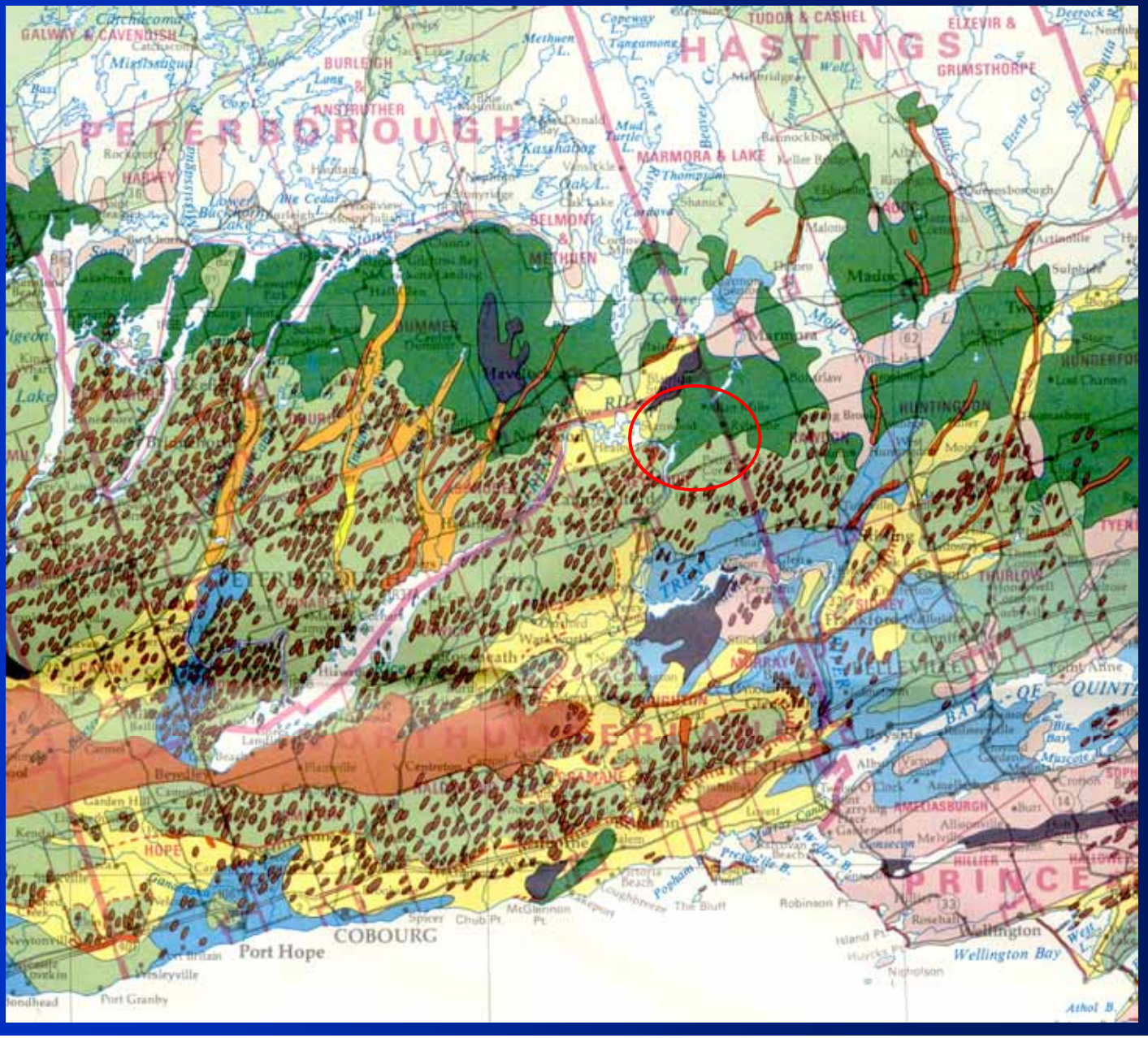
Typical small fossils at CBCA

Bryozoan, coral and orthoceratite fossils in outcrops at CBCA. Coin diameter = 18 mm.

Fossils

Mid- to upper Ordovician fossils from S.E. Ontario, beautifully prepared for display. Clockwise from top left: trilobite (Isotelus), brachiopods (Dalmanella), trilobites (Isotelus), and crinoid (Porocrinus) with calyx. Photos and sample prep. courtesy of Bill Hessin of Fossil Hut, http://www.fossilhut.com/

Quaternary Geology

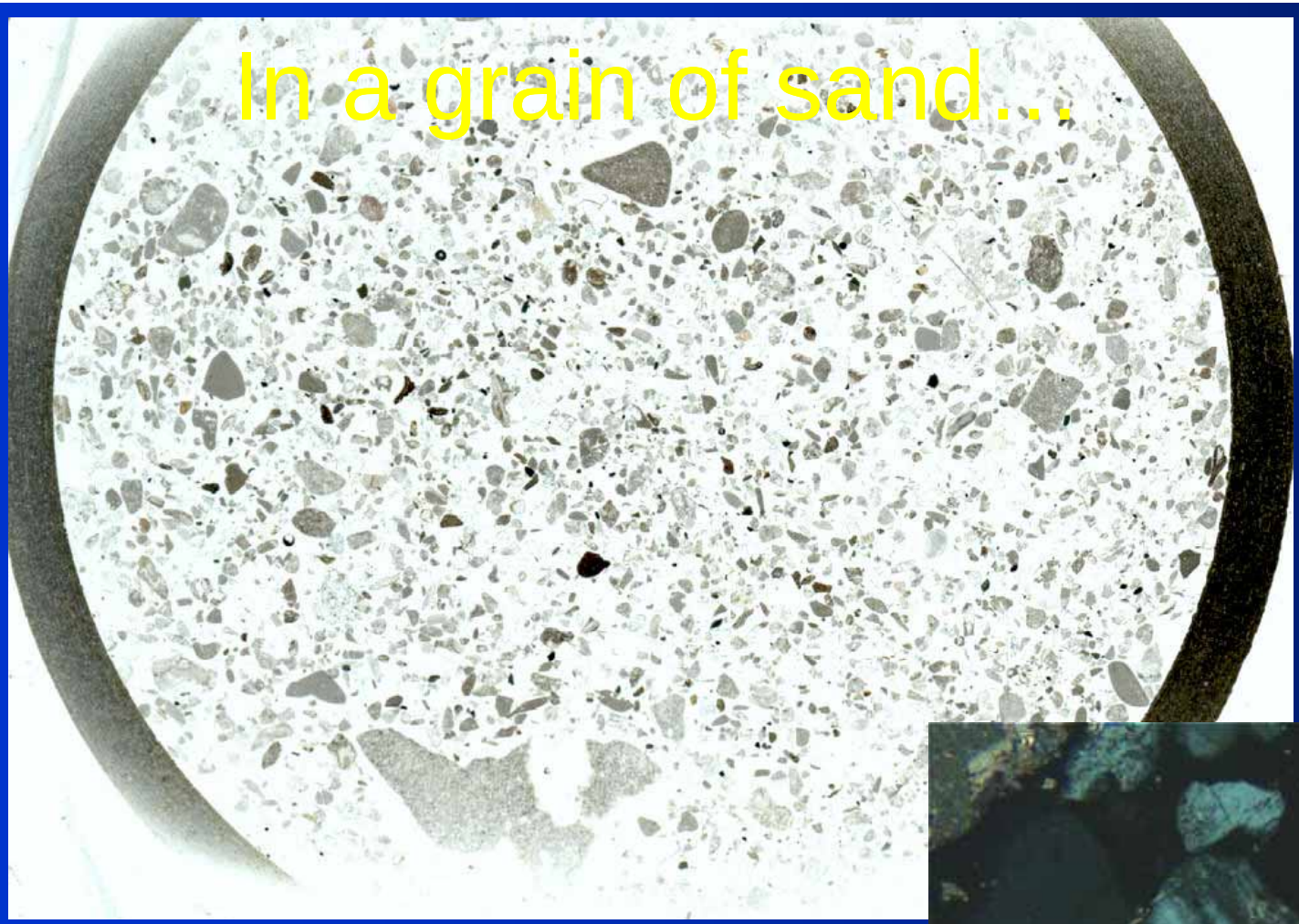


Moraines,
Drumlins,
Eskers…

Sand

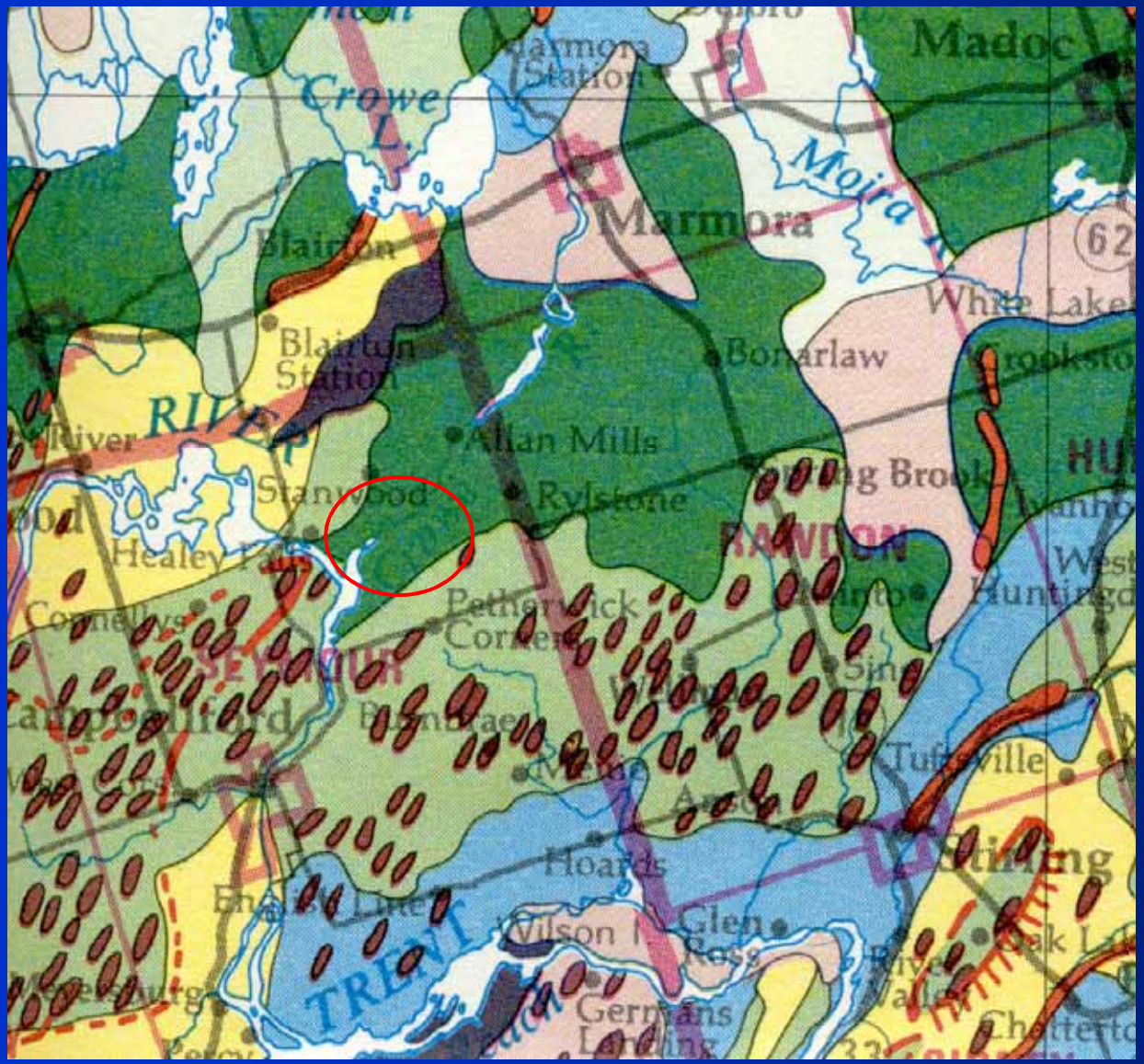
Sand from the Thompson pit just south of CBCA, bagged for flood defence at the Davidson yard in April 2008. The Thompson pit is some 1,500 m S.S.E. (N158ºE) of CBCA. Under the microscope, local sand contains both fragments of coral limestone and mineral grains from the Canadian Shield.

In a grain of sand...



A 25-mm-wide polished grain mount contains 70% limestone fragments, some with coarse calcite, and 30% minerals from Shield granites, such as feldspar and quartz (right: field of view 1.7 mm).

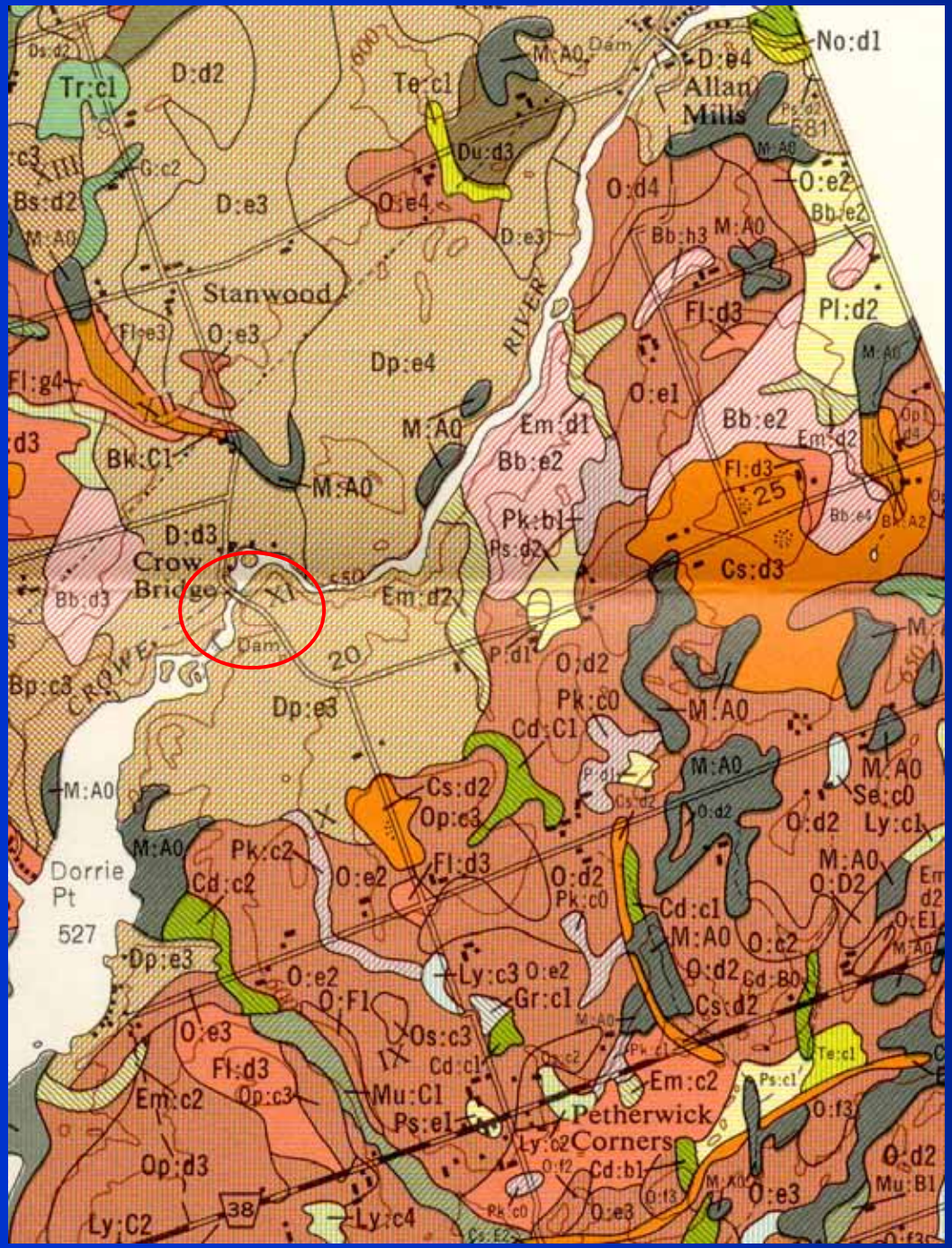
Surficial features



The lower Crowe valley is largely till moraine, a hummocky sheet of boulder-strewn glacial debris (dark green). To the south is a till plain with whaleback drumlins, their long axes oriented within the ice-flow direction (pale green; brown spots). There are also sand, clay and limestone plains (yellow, blue and pink, respectively).

Evidence of minor deformation

The left bank of the river, immediately upstream of the bridge, displays a gentle dome-like structure, which appears as arcuate traces of limestone beds. This is identified as a “pop-up”. Such *neotectonic* features are geologically youthful structures: a good local example occurs at King’s Mill conservation area in Rawdon Twp. These photos from August 2007 give some indication of the pop-up, which is tens of metres wide.

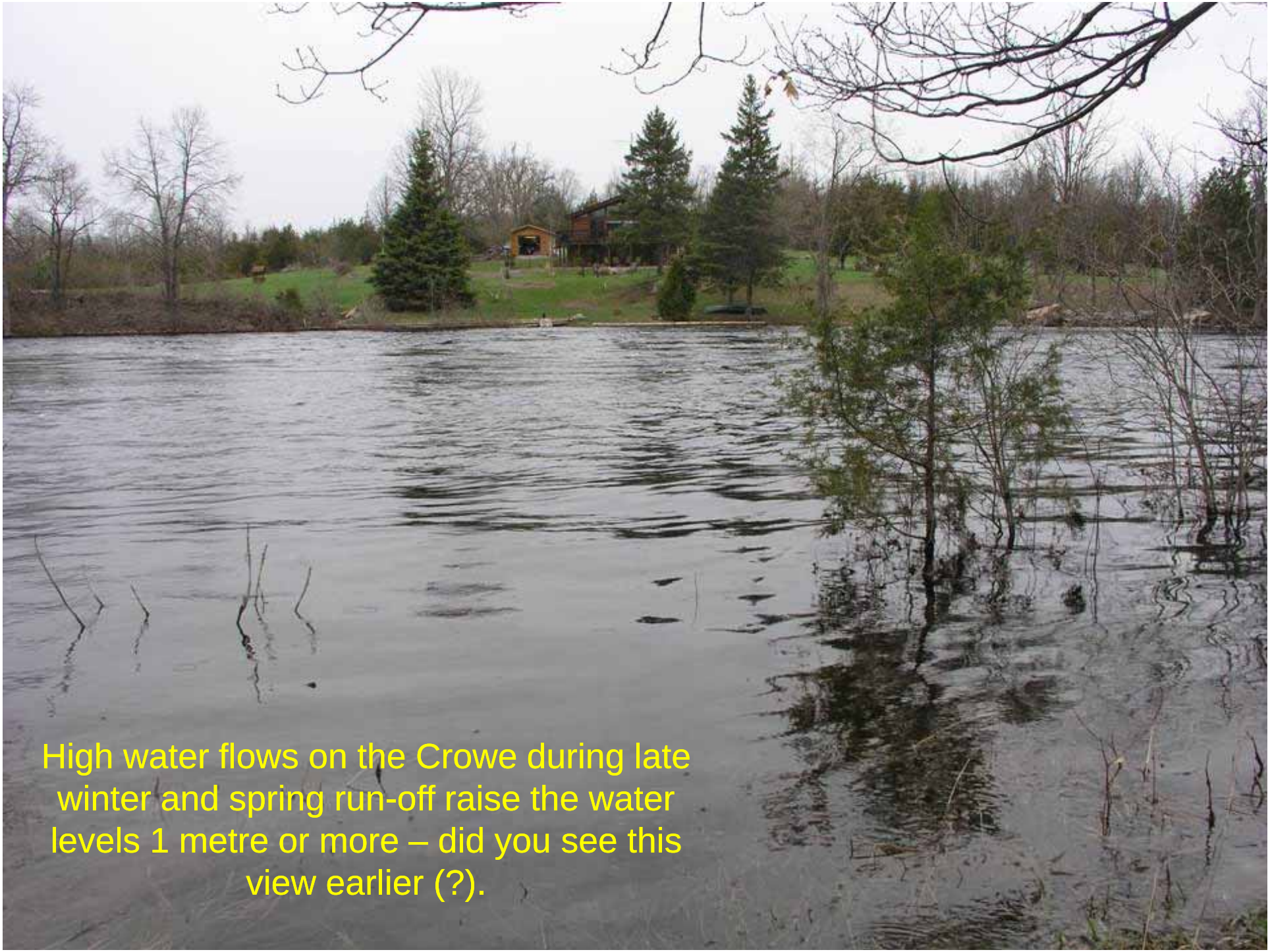


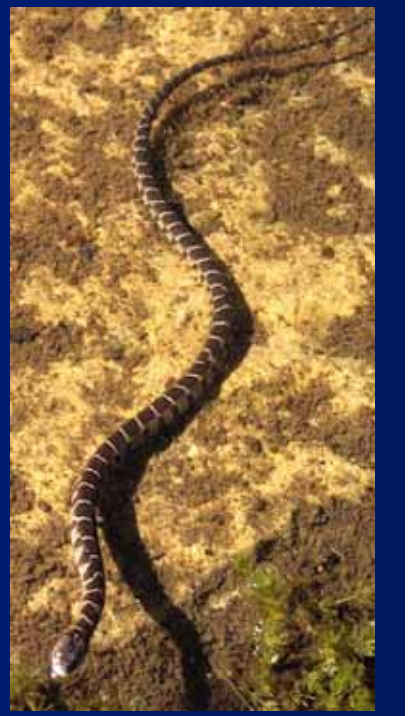
Soil Types

The CBCA is underlain by “Dp:e3”, the shallow phase of the soil type known as the Dummer loam. Topography is irregular, 10-15º, and the soil is very stony. For these reasons, this soil (generally formed on limestone till, and so calcareous) is not ideal for agriculture. In contrast, the soils to the south near Pethericks Corners are generally better. An example is labelled “Os:c3”, Otonabee sandy loam: the land is very gently sloping, 2-5º, the soil also very stony.

Seasonal flooding of Crowe River

April 2008


High water flows on the Crowe during late winter and spring run-off raise the water levels 1 metre or more – did you see this view earlier (?).



Fauna

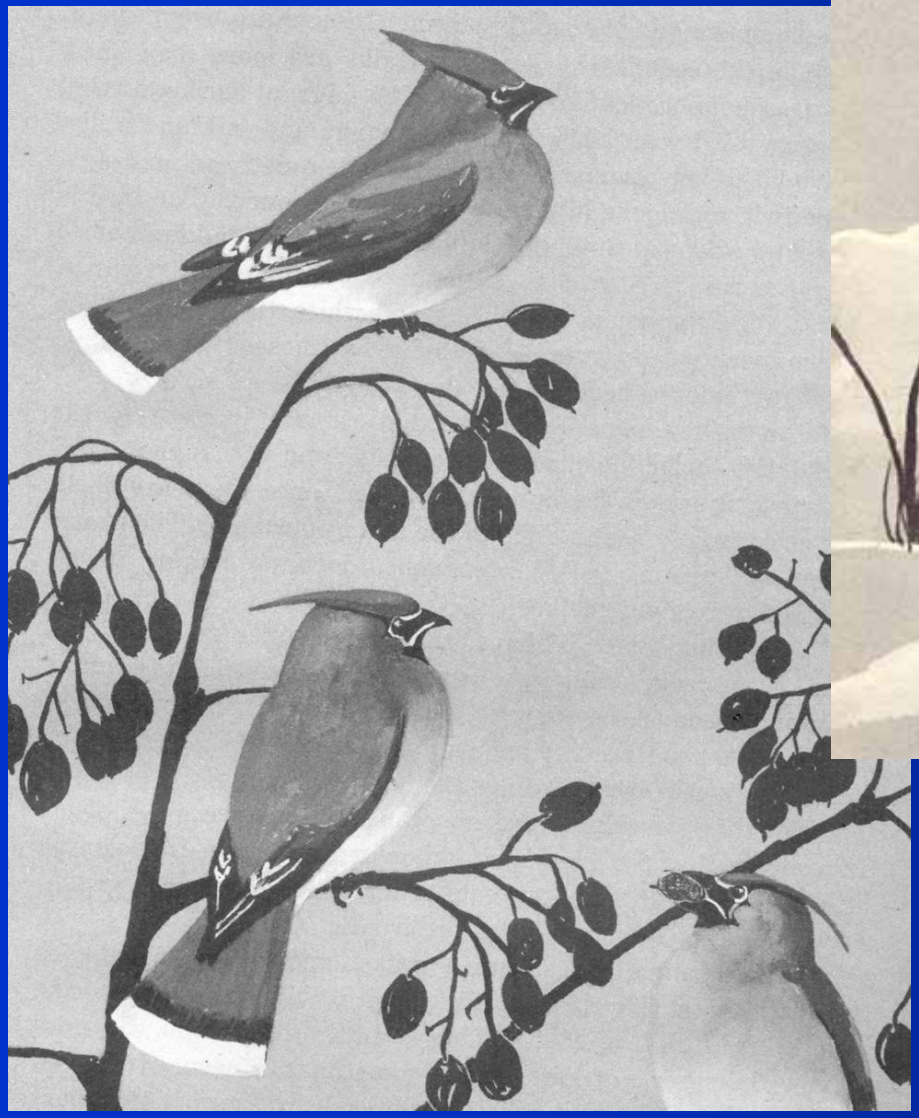
--- from bats to beavers, including this little juvenile northern water snake, Nerodia sipedon sipedon.

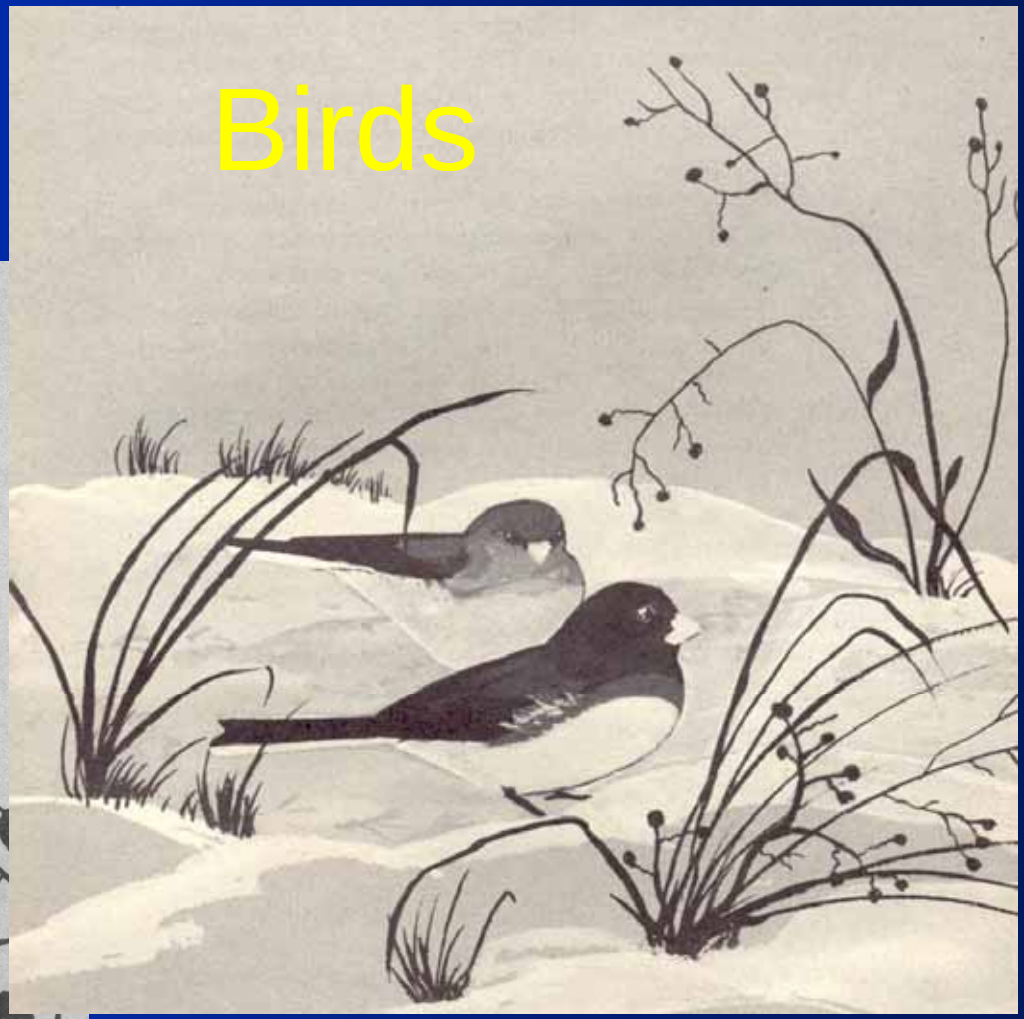
Blue-spotted salamander

T&G Humphries photo

Birds

Cedar waxwings and slate-coloured juncos are winter visitors to the area.





Species lists (birds, trees, plants, animals, butterflies, etc) for CBCA are available: see Appendix, p.1

Wild Flowers

Snow trillium (Trillium grandiflorum, above) and cardinal flower (Lobelia cardinalis).

Wild Flowers, II

Two examples of bottle gentian (closed gentian, Gentiana andrewsii).

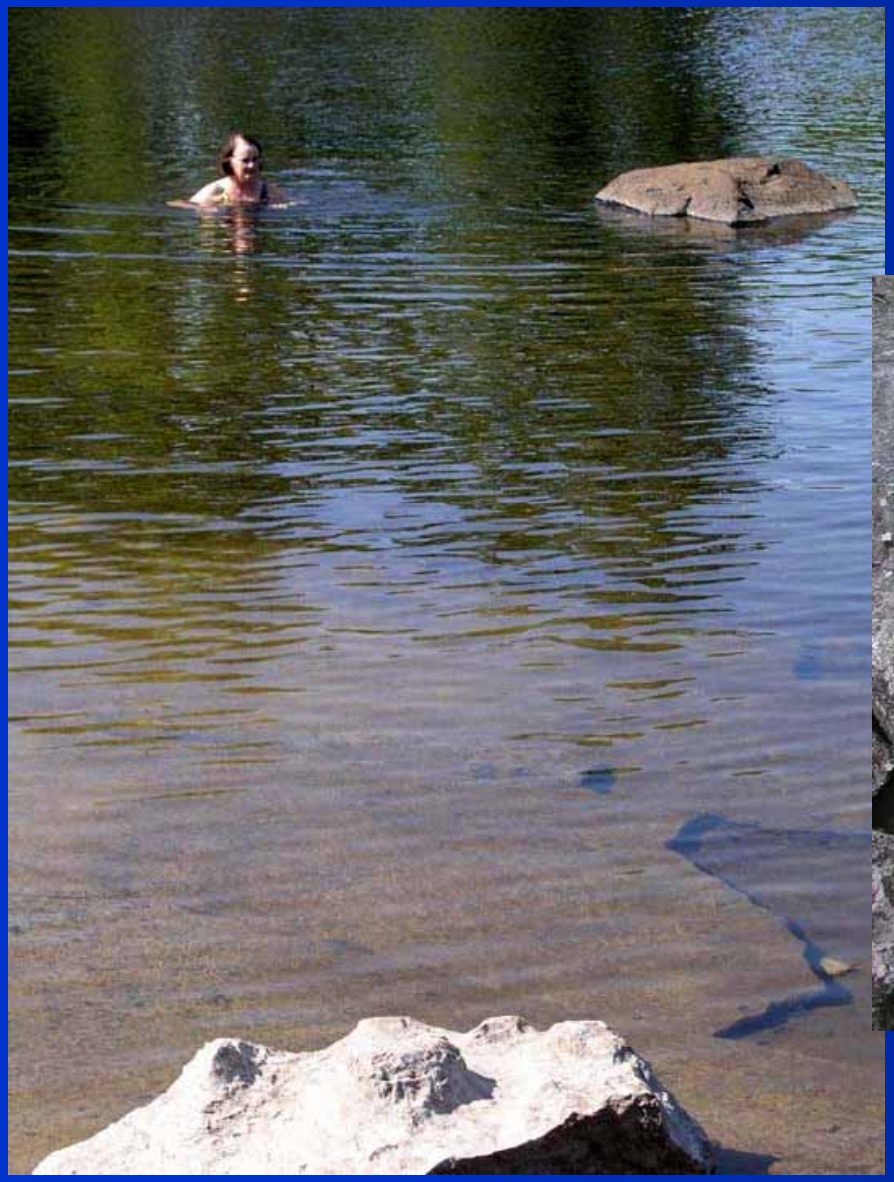
Wild Flowers, III

Year-1 of a biennial plant, the great mullein (above) and swamp sunflower (common sneezeweed).

Fairy butter (a *jelly fungus*)


Trees
Hardy cedars growing along the river banks are some of the most memorable trees in the CBCA.

CBCA – a place worth exploring



Conclusions

The CBCA is special in scientific terms, in addition to its local, cultural and social importance. Confirmed or suspected features of CBCA include:

- Inlier of Canadian Shield and unconformably overlying Gull River Formation, with
- Bedded chert at or near the transition to the younger Bobcaygeon Formation
- Fossils in the mid-Ordovician limestones, including fine orthoceratite cephalopods
- Weathering of limestone forming “clints and grykes”
- Small-scale limestone-based ecosystems with distinctive flora and fauna in thin soil, fractured rocks and cavities
- Glacial till, drumlins, and erratics from the Shield
- A neotectonic “pop-up” feature in the Crowe River.

CBCA – early summer flowers, 18 June 2011

- Blue flag iris and (right)
- Hairy beard-tongue

Resources

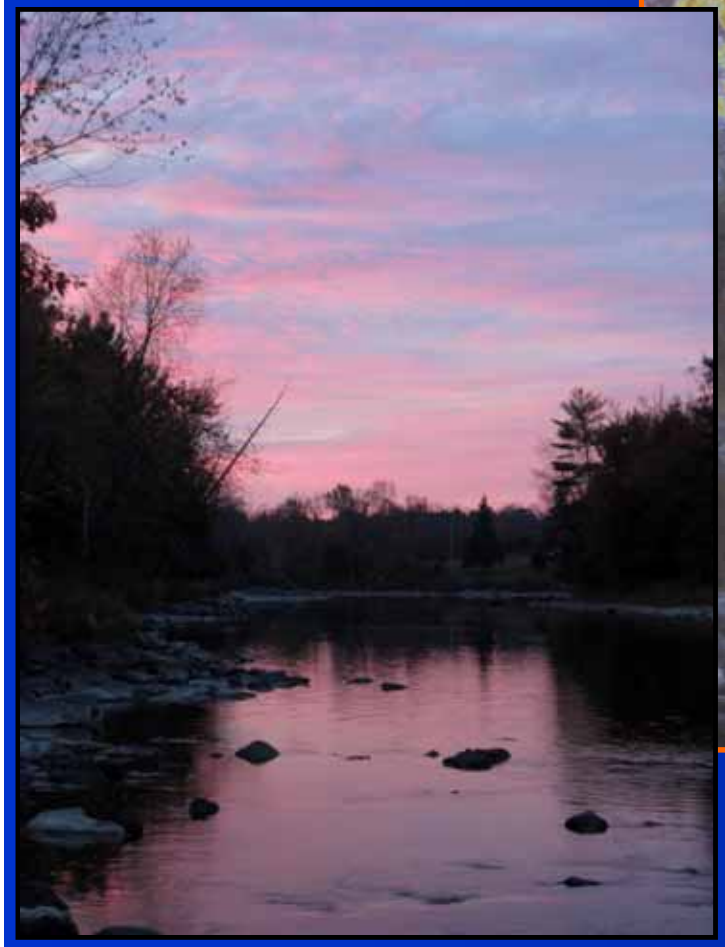
On-line references:

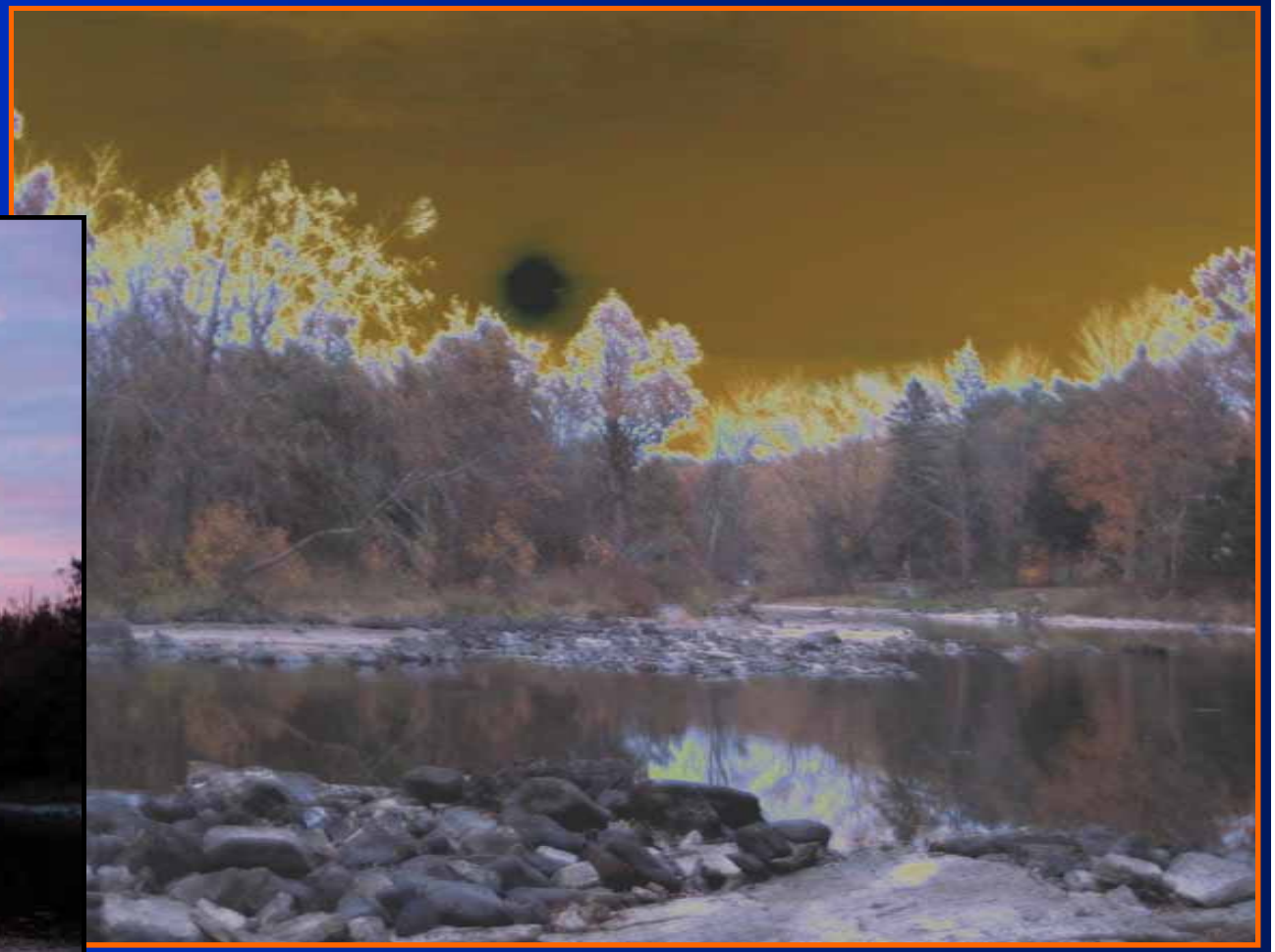
Turnstone web site --- Seymour bird list and related data, summary of local geology, and bibliography:
http://www.turnstone.ca/local.htm

Local rocks on the site include chert:
www.turnstone.ca/rom76ch.htm

and another local erratic:
http://www.turnstone.ca/gabbro.htm

CBCA – sunset, moonlight, Oct. 2011





Resources

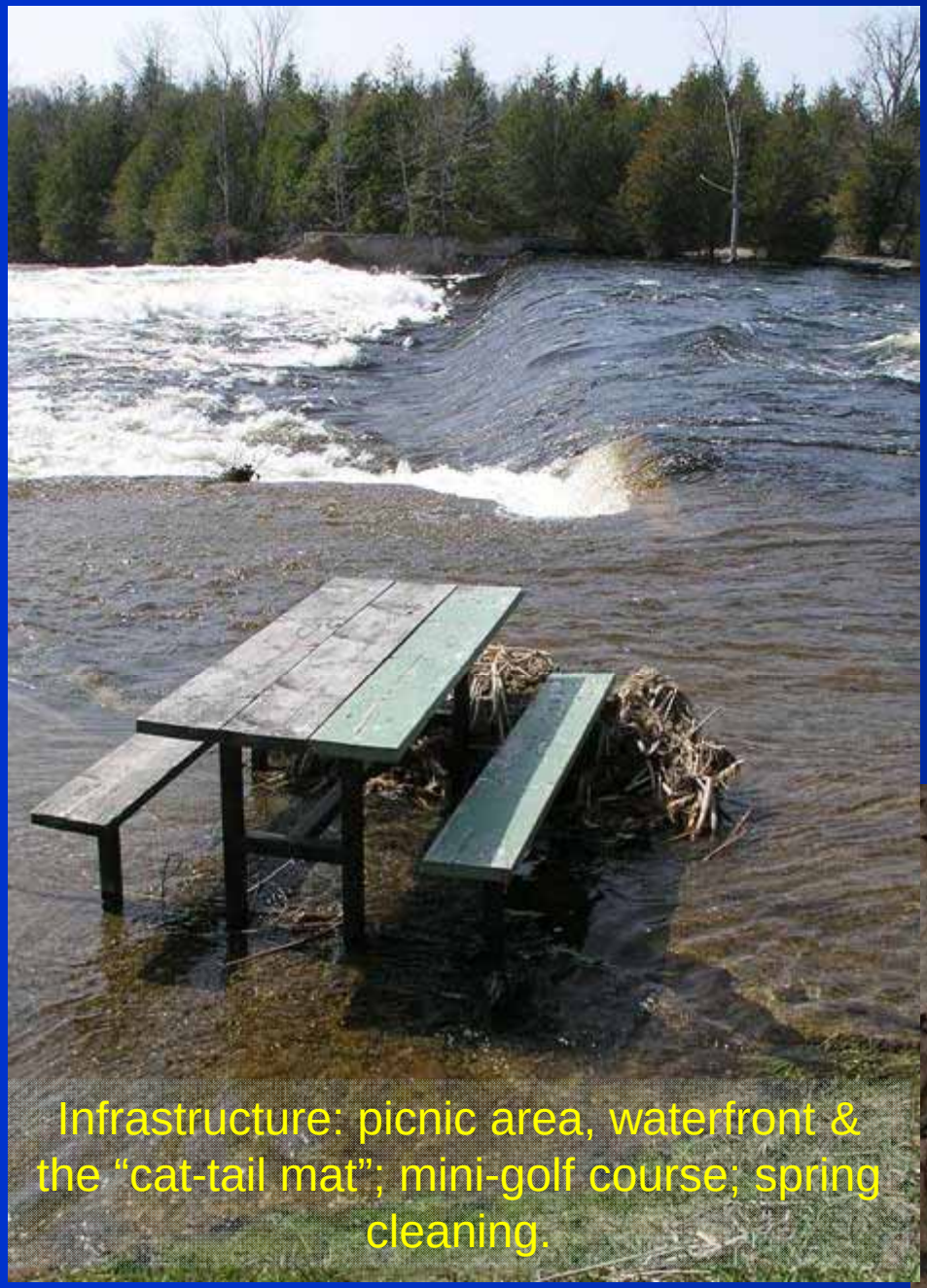
References:

Carson, D.M. (1980) "Paleozoic Geology of the Bannockburn- Campbellford area", OGS map P2374, 1:50,000 scale.

Chapman, L.J. and Putnam, D.F. (1984) "The Physiography of Southern Ontario", OGS Spec.Vol. 2, 270pp., plus map P2715, in colour, 1:600,000 scale.

Hoffman, D.W. and Acton, C.J. (1974) "The Soils of Northumberland County", Ontario Soil Survey Report 42, 117pp. Plus 1:63,360 scale map.

Care & maintenance



Infrastructure: picnic area, waterfront & the “cat-tail mat”; mini-golf course; spring cleaning.

Acknowledgements

- Original impetus: The "Save The Crowe" campaign

- Bird illustrations by: Virginia S. Eifert, "Birds in Your Backyard", 2nd edition, 1945 (pp.148-149, 198-199).
- Fossils by: Bill Hessin

- Chert and salamander photos: G&T Humphries
- Drill-core sample: R Brett
- Copying: L Winegarden
- Inspiration: Church Key

Appendix:
Crowe Bridge Conservation Area

Selected flowers,

15th August, 2nd October, 2010

Appendix, 13 slides. See also the detailed species lists at:
http://www.turnstone.ca/birdetc.htm
and the bird list at:
http://www.turnstone.ca/birdlist.htm
Flower I.D. with help from Andy Fyon of
http://ontariowildflower.com

Two August staples – common sneezeweed (swamp sunflower) and (right) cardinal flower

I thought this was white baneberry (doll's-eyes) but Andy Fyon makes a strong case for an alternative, red osier dogwood. The leaves are diagnostic of the dogwood, though the doll's-eyes plant occurs in Ferris park.

Flowering segment of the
red osier dogwood.

False Solomon's seal (false spikenard), low to ground, showing pale early-stage berries. One berry had turned red 4 days later.

Boneset (above) and square-stemmed monkey flower (photo is rather pale).

Grass-leaved goldenrod (right) and, for comparison, another species (also at CBCA; this example is from the esker [Monaghan] spring in the Trout Creek drainage), identified in both localities as rough-stemmed goldenrod.

Mint and (at right) the invasive purple loosestrife, which seems more abundant in Seymour township in 2010, but is still of patchy distribution.

Pale smartweed with grass-like tufts of mm-size flowers on long stems.

American elder

More rough woodland sunflower and unknown “grass” (see on)

Thimbleweed with distinctive puffy heads and sharply indented basal leaves, and (above) rough woodland sunflower.

An old favourite from CBCA, the bottle gentian (closed gentian).

The end, for now