THE BRODIE CLUB

Established 1921

Website: http://thebrodieclub.eeb.utoronto.ca

THE 1,082nd MEETING OF THE BRODIE CLUB

The 1,082nd meeting of the Brodie Club was held on Tuesday, 17 March, 2015 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Jean Iron
Secretary: Kevin Seymour

The meeting was called to order at 7:37 pm and was attended by 27; 24 members and 3 guests.

Roll Call:

Present: Abraham, E. Addison, R. Addison, Carley, Coady, Crins, Daniels, Dunn, Eadie, A. Falls, B. Falls, D. Hussell, J. Hussell, Iron, A. Juhola, H. Juhola, Machin, McAndrews, Obbard, Pittaway, J. Rising, T. Rising, Seymour, Speakman,

Guests: Peter Addison (guest of E. and R. Addison), Sharon Hick (McAndrews) and Njal Rollinson (guest of the speaker).

Regrets: Bertin, Bousfield, Bryant, Curry, Dunham, Larsen, Martyn, Slessor, Sutherland, Zoladeski

Minutes: of the previous meeting were approved, with small edits made by Ricky Dunn for the official record. Moved: Helen Juhola, seconded Jim Rising.

Committee Reports:

B. Falls announced upcoming meetings:

21 April: Todd Morris on Freshwater Mussels
5 May: Shannon McCauley on Dragonfly Communities

Note the earlier than normal date for the May meeting.

No report from the Field Trip Committee, although apparently it has met. Bruce Falls said that Happy Valley is being considered as a destination.

Announcements:

Jim Woodford, known to many Brodie members, died 14 March at age 84**.** Jim was a life-long naturalist and environmentalist author ("The Violated Vision: the rape of Canada's North," McClelland and Stewart 1972), and an early Executive Director of the Federation of Ontario Naturalists.

SPEAKER:

The speaker was introduced by Bruce Falls. **Dr. Don Jackson** is the Chair of the EEB department at the University of Toronto. In addition working on fish and benthic invertebrates, he is an expert on statistics and system modelling.

What is happening to (and in) Ontario lakes?

Don gave an overview of what is happening in smaller Ontario lakes (he did not talk about the Great Lakes as they are so complex). He started with an historical perspective, showing that postglacial drainage of the southern Ontario lakes through the Mississippi allowed primarily cool-water fish species to migrate into Ontario from refugia further south. When the drainage changed to go through the St. Lawrence system shortly thereafter, many warm-water species never made it back into Ontario from the southern refugia, leaving Ontario fish communities lacking in these species.

Acid precipitation from smelters on the Canadian Shield was studied in the 1970s by Harold Harvey and Dave Schindler among others. Policy changes starting about 1980 meant a reduction in emissions, so that in the last 30 years the acid loading has decreased significantly, and both terrestrial and aquatic communities are recovering. Despite this improvement, Ontario lakes continue to suffer long-term after effects of acidification, and those were the topic of most of Jackson's presentation.

Daphnia sp.

Calcium cycling that is present in the southern ecosystems tends to be lacking on the shield, as calcium in the water is not quickly renewed from shield rocks. Calcium is important for forest growth, with between 20% and 80% of the system's calcium being tied up in trees. Therefore logging is removing another source of calcium, and can quickly have a deleterious effect on the overall system, especially on the shield. About 80% of the lakes in Muskoka are low in calcium, which affects some zooplankton (e.g. *Daphnia*) that need calcium to grow their carapaces. The result has been the "jellification" of lakes, because zooplankton species that do not need much calcium use jelly instead as an external protective system (e.g. *Holopedium* sp.), and these species end up dominating in calcium poor lakes. These are not the preferred prey of larger organisms, hence they tend to become abundant. *Daphnia*, which needs more calcium and is a major prey species, has become less abundant, affecting the entire food chain.

Jelly-like *Holopedium* sp.

Surveys of native crayfish species have shown enormous declines (up to 95%) in most species in the last 15 years. Both the number of species as well as the number of individuals has declined. Some have blamed the introduced Rusty Crayfish (*Oronectes rusticus*) for this decline, but this species is not present in shield lakes and so it is probably not much of a contributing factor. Although crayfish that are lab-raised in low calcium water show a high mortality of juveniles, even in high calcium lakes there has still been a decrease in the numbers of crayfish species. Perhaps introduced Smallmouth and Rock Basses are a contributing factor in this crayfish decline? Crayfish raised in low calcium water show a greater aversion to predator risk, thus decreasing their survival, growth and fecundity.

Rusty Crayfish

Average lake temperatures have increased by 2 to 3 degrees in the south but by as much as 8 degrees in the north. This has led to a longer ice-free season, a longer growing season and more marked thermal lake stratification. With a consequent increase in the amount of dissolved organic matter, the colour of the waters has darkened -- which has led to a decrease in the amount of photosynthesis. With the increase in temperature there has also been an increase in the survival of larger predatory fish species (and a subsequent expansion of their ranges), impacting the smaller prey species, especially at their range edges.

Environmental contaminants also have played a role in the last 30 years. An increase in phosphorus has led to algal increases and eutrophication in two lakes in Algonquin Park in 2014. Off the shield there has also been an increase in the number of introduced, invasive species such as the Spiny Water Flea, Zebra and Quagga Mussels (only in high calcium areas) and the Round Goby.

Questions

Q. (B. Falls): Will lakes eventually recharge with calcium from natural processes?
A. Yes, but long after our lifetimes.

Q. (E. Addison): Is the decrease in calcium in some lakes a latent effect from acid rain?
A. Yes, as the calcium was effectively stripped out, and now it can't be replaced quickly enough from the shield rocks. Also tree removal has had an additional effect.

Q. (E. Addison): Is adding calcium to lakes a possible solution?
A. No, it is very expensive at the watershed level.

Q. (E. Addison): Fish species came from two separate refugia to south and NW Ontario, and both those regions are part of the Eastern Mixed Forest. Is that chance, or are there common factors keeping both fish and forest from expanding further north?
A. Could be both. Both benthic invertebrate and fish communities show an abrupt change at the shield boundary, so shield waters may have characteristics that limit their expansion. Whether such characteristics are the main drivers of forest type seems less likely.

Q. (Dunn): What is the status of the Experimental Lakes Project?
A. The Federal Department of Fisheries and Oceans no longer manages it. It has been taken over by the International Institute for Sustainable Development. Both the provinces of Ontario and Manitoba are also supporting it, but it remains to be seen if they can all raise the money over the next 5 years to keep this project going.

Q. (Eadie): Has anyone tried multivariate modelling of these complicated systems to predict which species will do well and which will not?
A. Yes and no. Mostly the models that have been built are between pairs of interacting species. Modelling the bigger system is much more difficult.

Q. (E. Addison): I have heard that some Lake Trout are piscivorous and some are herbivorous. Is this true and if so why?
A. Not really true: in those lakes with limited prey species, some trout seem to survive to some extent on plankton but they are probably also eating smaller fishes or even small individuals of their own species.

The speaker was thanked by guest Peter Addison.

OBSERVATIONS

Jean Iron presented her first book, a photographic guide for field use, "Shorebirds of Ontario," featuring photos of 39 species in various plumages. She will have some copies for sale at the next meeting ($15). Profits go to the Matt Holder Environmental Education Fund, as will those from others in a series. (Upcoming titles on bats and sphinx moths.) Published by Hawk Owl.

Ed Addison recommends the book "The Future Eaters: an ecological history of the Australasian Lands and People" (2002 paperback), by paleontologist Tim Flannery, which describes the ecology and early interactions of humans as they expanded around the globe.

Signs of spring: Dunn observed a Northern Cardinal carrying nest material this week. Rose Addison observed a Turkey Vulture in Aurora on March 13. Helen Juhola had the first Common Grackle today; Kevin Seymour had his first in his yard on Sunday. Snowdrops are blooming. Jeremy Hussell announced that the first Tundra Swans are arriving at Long Point today but the bay and Lake Erie are still almost completely frozen.

Despite the signs of spring, the Peterborough contingent could only report that "the snow is melting." Coady reported a Red-throated Loon on a roadway during the recent period of maximum ice, presumably having mistaken it for open water.

Obbard noted that bears had not yet left their dens. He carried on with explanation that hibernating bears accumulate feces in a plug that is not expelled until spring departure, or in the case of females, when they give birth. You therefore have to be cautious when investigating bear dens to avoid crawling over fecal plugs. One den recently examined had a fecal plug in the entrance but no cubs, and Obbard suggested the female might have given birth but then eaten the young.

The meeting was adjourned at 9:20 and refreshments were enjoyed by all.

NEXT MEETING

The next meeting will be 'Freshwater Mussels,' given by Dr. Todd Morris of Department of Fisheries and Oceans.

CORRESPONDENCE

Twenty-five years ago: In March 1990, member David Hussell spoke on "The influence of food abundance on clutch size and brood provisioning behavior of Tree Swallows at Long Point."

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