

THE BRODIE CLUB



Established 1921

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

THE 1,131st MEETING OF THE BRODIE CLUB

The 1,131st meeting of the Brodie Club was held on Tuesday, 17 January 2023 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Gavin Miller
Secretary: Ed Addison.

The meeting was called to order at 7:32 pm and was attended by 18; 17 members and 1 guest.

Roll Call:

Present: E. Addison, R. Addison, Bacher, Beadle, Bell, Bertin, DeMarco, N. Dengler, R. Dengler, Dunn, Eckenwalder, Hussell, Kortright, Lindsay, Miller, Moldowan, Thomas

Guests: Mary-Lou Jorgensen-Bacher (guest of Bacher).

Regrets: Abraham, Crins, Currie, Dunlop, Falls, Martyn, McAndrews, Obbard, Pittaway, Rising, Stones, Sutherland, Xamin

Minutes: Minutes of the December 2022 meeting were approved.

Committee Reports:

Katie Thomas reported on future meetings. Speaker at our next meeting, 21 February, will be Daniel Chevalier, the arborist at the Mount Pleasant Cemetery, on the topic "Arboretum Management Concerns and Considerations." On 21 March 2023, Dr. Nick Eyles will present on the contributions of J. Tuzo Wilson to our understanding of global geography as affected by continental drift.

New Business:

Ricky Dunn reviewed the proposal sent earlier to all members about honoraria and travel expenses for guest speakers to the Club. The motion presented by Ricky Dunn and seconded by Rose Addison was that all speakers continue to be invited to a pre-talk meal at the Faculty Club at our expense (no change from past) and will be offered a \$50 honorarium. Recognizing that this is just a token and that out-of-town speakers have travel expenses, non-local speakers will be offered an extra \$50 toward expenses. The motion was passed.

Announcements:

Oliver Bertin introduced a new book "Tuzo" about J. Tuzo Wilson, his life and discoveries regarding plate tectonics. The book is written by Nick Eyles who has spoken to the Brodie Club on

a number of occasions and who will address the club about Wilson at our March 2023 meeting. The ISBN of this book is 978-1-4875-2457-9 (paperback) or 978-1-4875-6360-8 (hard bound).

John Bacher introduced a book “Awful Splendour, a fire history of Canada”. It is written by Stephen J. Pyne. The ISBN of the book is 978-0-7748-1392-1 (paperback) or 978-0-7748-1391-4 (hard bound).

SPEAKER: Patrick Moldowan was introduced by Oliver Bertin. Patrick is a Brodie Club member who will be defending his Ph.D. dissertation this month at the University of Toronto, and who has already published 32 papers. Patrick has previously spoken to the Club about his research on spotted salamander biology and endangered species work in Mauritius.



**“ Hyperpredation of tortoises and freshwater turtles by subsidized corvids:
From global case studies to a conservation conundrum”**

“Subsidized predators” are predatory animals whose population levels rise—and remain— above previous levels as a result of increases both in the quantity and temporal predictability of resources provided by humans. These resources could be food, nesting sites or artificial shelters that lead to increased survival, along with elimination of higher-level predators. Common examples of subsidized predators include some raptors, dogs, cats, fox, raccoons, and skunks. Subsidized predation may be confined to population increase at a localized source of specific subsidies, but nonetheless result in increased predatory activity far into surrounding areas.

Corvus spp. are often subsidized predators. Patrick focused on ravens (approximately 47 species), which are known to predate turtles and tortoises (chelonians). Corvids share the characteristics of being mobile, social and intelligent. They are dietary generalists, anthrophilic, long-lived and somewhat unique in their transmission of cultural information among peers and even intergenerationally. In contrast, chelonians are long-lived, grow slowly, mature late, have long generation times, high adult survivorship and low recruitment. A result of these characteristics is that seemingly small increases in adult mortality have a big impact and can lead to precipitous population declines from which it is difficult to recover.

Patrick conducted a literature search and corresponded with other scientists with several objectives in mind: 1) review the available literature describing ravens as predators of chelonians, 2) examine population levels of ravens on a regional scale, 3) assess ravens as threats to chelonians, and 4) examine the global breadth of potential raven-chelonian interactions.

He reviewed case studies with data addressing these topics from around the world. Within North America, cases of Northern Ravens (*Corvus corax*) predated chelonians came from northwestern Ontario (Kenora-Rainy River areas), east shores of Georgian Bay and east through the Algonquin area, eastern Canada and the Mojave and Sonoran deserts of the southwest United States. Victims reported included painted turtles (*Chrysemys picta belli*) in northwestern Ontario and in central Ontario; a variety of chelonian species in eastern Canada and the New England States including wood turtles (*Glyptemys insculpta*) on military bases in New Brunswick; and the desert tortoise (*Gopherus agassizii*) in the deserts of the southwest U.S. Also found were cases from Morocco, Egypt/Israel, South Africa and Australia that involved other species of corvids and chelonid, especially tortoises.

In all the case studies, dead chelonians were found lying on their backs with visceral removed via portals beneath the shell in the rear leg pocket and/or anal/inguinal areas. In smaller specimens holes were made in the dorsal surface of the shell, which is softer in juveniles than in adults. Once a hole is made, only entrails and eggs may be eaten, and in some desert areas the aim is to drink blood.



Painted turtle predated by Northern Raven, showing typical access through rear leg pocket (Photo by M. Marchand, New Hampshire Fish and Game)

Ravens have increased over time, according to the Breeding Bird Survey and provincial breeding bird atlases, and increases in raven numbers in each case study area coincided with increases in subsidized resources: physical structures such as hydro poles or large billboard signs for nest sites, artificially increased availability of water of arid areas (e.g. golf courses), and food (e.g. garbage dumps, dumpsters at short order food locations).



Shells of juvenile Angulate Tortoises at a single Pied Crow nest in South Africa (Photo by N. Lambrechts)

Reports of chelonian predation by ravens often showed high mortality at very local scales. In the U.S. southwest more than 300 juvenile tortoise shells were recovered under one raven nest. In the Egypt/Israel case study area, 40 tortoise shells were recovered under a tree occupied by a pair of brown-necked raven (*Corvus ruficollis*). In a Moroccan cork oak forest, 51 % of juvenile *Testudo graeca* tortoises were found dead, with ravens being the main cause of mortality. In South Africa, one pair of pied crows (*Corvus alba*) killed more than 160 and 315 Angulate tortoises (*Chersina angulata*) in 2012 and 2013, respectively.

As the city of Perth, Australia has grown, so has the population of the Australian raven, which now poses a threat to two nearby reserves where rare chelonian species still persist. In addition to urban subsidies, the Australian raven scavenges sheep afterbirths at local farms.

In summary, hyper-predation by ravens is widespread, spatially patchy, of low frequency at the landscape scale, especially focused around corvid nesting sites, facilitated by linear human constructed corridors, promoted by human subsidies and correlated with increases in raven populations. Patrick emphasized that correlation is not causation. The methods for monitoring regional bird population changes were not standardized, and counts are quite variable over time and location. Nonetheless, it is clear that where ravens are subsidized, predation pressure on chelonians increases, and given the life history of chelonians, it is quite likely that even localized increases in predation may be enough to trigger decline of an entire chelonian population.

Management at local scales has been attempted in some locations, such as 1) reducing access of corvids to subsidies, especially sources of food waste; 2) interrupting reproductive success (e.g.

addling or oiling eggs); 3) aversion training using 3-D printed shells with noxious (but not lethal) contents; and 4) lethal control. Few of these suggestions are very practical. What is really needed are changes in human behavior, which we all know is very hard to do.

Questions following the presentation:

Gavin Miller noted that wildlife tunnels intended to facilitate movement of amphibians across roads may lead to crows crowding the entrances of the tunnels. Patrick replied that such structures are known as attractants for quite a few kinds of predators.

John Bacher: West Nile Virus (WNV) resulted in decline of some species of birds including corvids. Perhaps some mortality factors such as that might limit corvid impacts on chelonians? Patrick agreed that WNV may have had an impact, but the techniques used to collect data on corvid population change at a regional scale cannot be used to detect and quantify fine scale changes.

Oliver Bertin: Do turtles have other predators besides corvids? Patrick confirmed that there are many species of predators, including mink, raccoons, and others. There was a short period of years during the study of snapping turtle (*Chelydra serpentina*) in Algonquin Park when otters preyed heavily upon overwintering turtles.

Ed Addison: It seems that there are a lot of value laden perspectives that we apply. Garbage dumps are 'bad' because they subsidize ravens but they were likely considered 'good' when our depleted bald eagle populations in northern Ontario were being subsidized at garbage dumps. Patrick agreed that many conservation priorities are based on value judgements.

Jeremy Hussell: You noted that only about 30% of raven nests in one of the big studies had evidence of chelonian predation. Does this indicate that specific nesting pairs specialize in a specific type of prey, different from other nesting pairs? Patrick commented that the patchiness and sample size in these case studies make interpretation of corvid-chelonian relationships in human-affected vs. pristine habitats difficult.

Nancy Dengler thanked the speaker.

OBSERVATIONS

Ricky Dunn: During the 2-3 day high winds and snow at Christmas, Sandhill Cranes in the Long Point area seemed to do fine. In contrast, feeders were caked with snow and ice, and the local house sparrow population crashed. Once Project FeederWatch data are compiled it will be interesting to see if this was widespread.

Motion to adjourn: John Bacher, seconded by Oliver Bertin and passed at 9:05 PM.