

THE BRODIE CLUB



ROYAL ONTARIO
MUSEUM OF ZOOLOGY

THE 1016TH MEETING OF THE BRODIE CLUB

The 1,016th meeting of The Brodie Club was held at 7:30 p.m. on December 11, 2007 in the Ramsay Wright Laboratories of the University of Toronto.

Chairman: Paul Aird

Secretary: Oliver Bertin

There were 25 members and six guests.

- Sharon Hick, guest of Jock McAndrews
- Ricki Dunn and Jeremy Hussell, guests of David Hussell
- Brenda Gibson, guest of John Sparling
- Chris Chenier, MNR Cochrane, and Nick Jones, MNR Trent, guests of Ken Abraham

The minutes of the previous meeting were approved with one minor change. The name of the William Brodie biography is *A Pocketful of Galls*, rather than *Gulls*.

NEW BUSINESS:

- Don Baldwin, a member off the Brodie Club, died on 22 December. David Hussell sent a copy of the notice that appeared in The Globe and Mail.

DONALD HENRY BALDWIN

Passed away on Saturday, December 22, 2007 at the Norfolk General Hospital, Simcoe. Donald Baldwin of Port Rowan was in his 74th year. Beloved husband of Maureen (nee Smith) whom he married September 27, 1958. Dear father of Mark and his wife Jeannie of Toronto. He will be missed by his grandson Rhys Adam Baldwin. Also survived by his sister Margaret and husband Jack Hodges of Saltford, England. Predeceased by his son Adam

Henry Baldwin in 1981. At Don's request there will be no visitation or funeral service. Memorial donations in Don's memory can be made to Bird Studies Canada for Long Point Bird Observatory and can mailed to the Jeffrey W. Glendinning Funeral Home, 36 Front Street, Port Rowan, Ont.

Maureen's address is 10 Aspen Lane, R.R.1, Port Rowan, Ontario N0E 1M0. Telephone: 1 519-586-8801.

- Jeremy Hussell, son of member David Hussell and Ricki Dunn, has announced his desire to join the Brodie Club as a full member. His application was included in the November minutes. He has attended the requisite three meetings and has been approved by the membership committee. He will be proclaimed a member at the January meeting.
- Ann Falls forwarded Hugh Currie's nomination of Richard Joos for membership in the Brodie Club. He has attended the requisite three meetings. His application is attached below.
- Steve Varga, a member through most of the 1980s, has rejoined the Brodie Club as an active member. He now works for the Ontario Ministry of Natural Resources in Aurora.
- Robert Ritchie passed word that "Margery has been in St. Catharines General Hospital for the past 2.5 weeks, recovering from pneumonia and general state of being run down/tired as a result of being main caregiver for Bob over the past two to three years. The family is looking into alternative measures for care giving for both of them with the aim of trying to keep them in their own home as long as possible." We wish them well.
- Brodie Club members are busy, as usual. Kevin Seymour missed the November meeting (and even missed sending regrets) because he was in the wilds of northern Ecuador without email access. He missed the December meeting because he was showing off the new ROM dinosaur galleries to a group of major ROM donors. He invited members to *The Age of Dinosaurs* and *The Age of Mammals* galleries, which were both to open on Dec 15. Ellen Larsen sent regrets for the December meeting because she was in Costa Rica, while William Rapley was playing Santa Claus to the Toronto Zoo volunteer Christmas event.
- The speaker at the January meeting will be Rowland Tinline, a retired professor at Queen's University, who has been studying the occurrence of rabies over time. He has made the remarkable discovery that rabies has been in cycling in a dozen spatial cells across southern Ontario since the 1950s. That meeting will be held on January 15, at the usual time and place.
- Oliver Bertin thanked Ed Addison and Trudy Rising for handling the minutes of the previous meetings under difficult circumstances. They did a great job.

SPEAKER:

The guest speaker was Tim Johnson, a research scientist with the Aquatic Research and Development Section of the Ontario Ministry of Natural Resources.

Johnson grew up in Aurora, Ont., took a BSc in marine biology in Guelph and a Master's degree on the invasion of white perch. He took his PhD in Wisconsin, where he modeled the food web in Lake Mendota over the past 120 years. He subsequently spent 8.5 years with OMNR in Wheatley, Ont. and 1.5 years at the Glenora Fisheries Station in Picton, Ont., where he replaced Brodie member John Casselman.

ROUND GOBIES

Re-Engineering The Great Lakes Aquatic Ecosystem

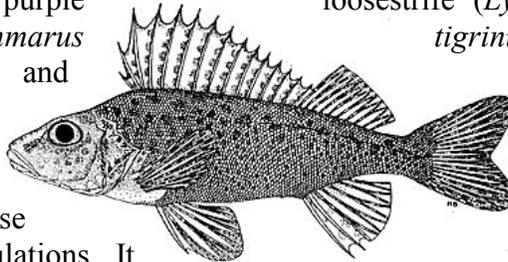
The anti-hero of Tim Johnson's talk was the Round Goby, a little-known groundfeeder that has become one of the most plentiful – and notorious – residents in the Great Lakes basin. But the Round Goby is just one of a cast of foreigners that have transformed the biology of the Great Lakes in recent years.

The Round Goby arrived from the Caspian Sea about 1990, closely following its back-home neighbour, the well-known zebra mussel. Those two species are the most common of about 182 invasive species that have appeared in the Great Lakes basin with increasing rapidity since the 1840s.

Since the 1960s, biologists have been finding 1.86 new invasives every year, a surprisingly high number but well short of the 3.75 new species found every year in such places as San Francisco Bay.

The zebra mussel is the most notorious of these species, sharing its bad reputation with such species as sea lamprey (*Petromyzon marinus*), alewife (*Alosa pseudoharengus*), and purple loosestrife (*Lythrum salicaria*). The amphipod (*Gammarus tigrinus*), the voracious shrimp (*Decapoda*), the pathogen viral hemorrhagic septicemia (VHS) are some of the most recent invaders.

VHS is a particularly virulent invader that can cause mass mortalities in wild or captive fish populations. It was first described following mass mortalities in the Bay of Quinte in 2005, and later associated with a die-off that had previously occurred in Lake St. Clair in 2003. It has no impact on human health; even infected fish are safe to eat.



More than half of the invasive species come in the ballast water or sediments of ocean-going ships. A significant number of invasives are released deliberately for a host of reasons, while others are spread around the world when sport fishermen empty their bait buckets or kids toss out their pet fish.

Ballast is a serious problem because ships often carry 40 tonnes of water and 17 tonnes of residual sediment in their holds when running empty. They typically flush the ballast out of their tanks when they arrive in the Great Lakes and pick up a load of cargo. Dumping ballast has been restricted since 1993 and banned since 2006, but it is difficult to eliminate the spread of invasives because most ships have a host of nooks and crannies in their holds and between their ribs where water and sediment collect.

Many of these foreign species will tolerate life in brackish or fresh water, but few will tolerate the extremes of fresh and salt. For that reason, federal regulations require ships to flush out their tanks with sea water in the Atlantic. Flushing kills 90 per cent of the species in the bowels of the ship if done properly, but it can be hard to make ships stop in the ocean long enough to flush their tanks, particularly in stormy weather.

The Round Goby (*Neogobius melanostomus*) is a native of the Caspian Sea. It is slate grey with black or brown spots, three to 10 inches long with a single, fused pelvic fin that lets it grip the bottom, long dorsal and anal fins, frog-like eyes and thick lips. It has no swim bladder. It usually swims or hops along the bottom of lakes, forming dense

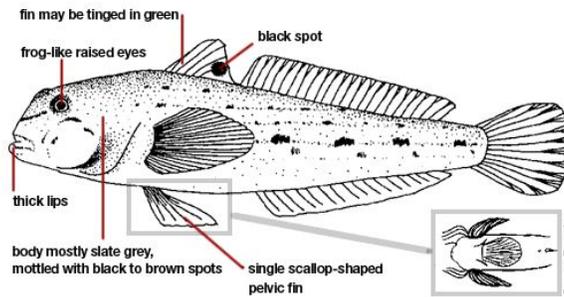
aggregations in areas of preferred habitat (rocky or structurally complex areas like ship wrecks).

It was first reported in Sarnia in 1990 and in Lake Erie in 1994. By 1999, it had spread to all of the Great Lakes and, by 2007, through large parts of the Great Lakes watershed and across Illinois, large parts of Michigan and upstate New York, into Lake Simcoe and down the St. Lawrence to Quebec City.

Round gobies are a serious threat to native species. They eat the eggs and young, compete with domestic species for food, spread botulism to waterfowl and transfer energy and contaminants from the bottom mud up the food chain.

The contaminant issue is a serious one. Zebra mussels and other bottom-dwelling organisms concentrate bottom contaminants, which are eaten by gobies and, in turn, by bass and by waterfowl or humans.

Gobies are incredibly numerous. Johnson estimated there were nearly 10 billion gobies in western Lake Erie, an area of only 3,500 square kilometers. The majority, 6.6 billion, were on mud, 1.8 billion on rock and the rest on sand. In central Lake Erie, the population peaked in 1999 before in 2002. Most were old and few live beyond three years.



billion, were on till, 1.2 billion on sand.

Lake Erie, the at about four billion falling to 1.7 billion less than one year

Young gobies eat large numbers of dreissenid mussels, as well as zooplankton, chironomids and *Hexagenia* shrimp, depending on the season. Adults mainly eat mussels and shrimp, thereby competing with native species.

There is an upside to the equation. Many native species eat the gobies that are eating their spawn. Smallmouth bass, pickerel, burbot and yellow perch have been voracious goby eaters in recent years – up to 80 per cent of the bass or burbot diet can be goby.

Johnson has published numerous papers on the energy balance of the western basin. He estimates that 143,000 tonnes of prey are consumed in a year, mostly from June to November, most of it chironomids by fish in their first few months of life.

One indirect conclusion of the study is that production of these food types far exceeds consumption. Johnson estimated that 13.5 grams of dreissenids are consumed per square meter per year in the western basin of Lake Erie, far less than the 3 kg. of production. About one-quarter of zooplankton are consumed every year, and about 1.5 per cent of other benthic production. However, impacts can be far more severe in localized areas.

The mobilization of benthic contaminants is a more subtle, but still worrying factor. Johnson estimated that western Lake Erie gobies mobilize 1.5 kg of mercury and 2.5 to 3.6 kg. of PCBs annually. Much of it comes from dreissenids – 28 per cent of the mercury and 45 per cent of the PCBs. Of that amount, between one-fifth and two-thirds is retained in goby tissue. This sounds like a tremendous amount until put into perspective. Gobies mobilize only 0.03 per cent of the 12,379 kg of PCBs in the western

basin, and 0.003 per cent of the 45,510 kg of mercury. In total, this accounts for less than one per cent of the annual load.

While round gobies may be a new pathway for contaminants to move up the food chain, Johnson provided data to suggest there is no significant change in accumulation for important sport fish like bass and pickerel after considering other ecological effects. Round gobies are relatively energy rich relative to native prey and reach high densities making them more available to native predators. These two factors, among others, allow predators to grow more quickly and in essence self-dilute any added contaminant burden.

It is too late to eradicate gobies from the Great Lakes. Instead, Johnson prefers to remove gobies from sensitive areas at critical times of the year, particularly when native species are spawning.

One promising strategy is to use fish pheromones to entice female gobies into traps. The idea has considerable merit. Female gobies have sensitive olfactory glands, and a series of very interesting experiments have shown they are attracted to the steroids of their male counterparts.

Johnson and his colleagues have taken the idea several steps forward. They are planning to manufacture and use slow-release pheromone tablets to entice female gobies out of harm's way in an efficient and cost-effective manner.

But that is a subject for another Brodie Club talk a few months or years down the road.

QUESTIONS:

- Johnson said the pheromone steroids they are contemplating are species specific, both in type and concentration. They do not appear to attract other fish species.
- Gobies do not appear to have invaded Lake Nipigon yet, but that seems to be purely a matter of time. They have travelled up the St. Louis River at the extreme west end of Lake Superior, and right across Michigan from Lake Huron to Lake Michigan.
- Some fishermen use gobies as bait to attract smallmouth bass. That practice has now been outlawed in many jurisdictions, but the smell of a goby has proved to be a very efficient attractant.
- Gobies have no obvious commercial value. Commercial fishermen find them uneconomic to catch because they prefer rocky habitats, and they are hard to sell because they do not suit the North American palate.
- Gobies could be used to feed pets or mink, but there are already abundant sources of food for these purposes.
- Gobies may well have come to the Great Lakes before 1990.
- Invasive species have become so common around the world in recent years partly because shipping routes have changed. The goby and zebra mussel have come from the Caspian Sea, while North American species have spread to Europe via similar vectors.
- Johnson suggested this could be a good time to buy a fishing tug. The Lake Erie ports of Stanley, Wheatley and Dover all have large and sustainable fisheries that are worth about \$30 million a year in direct benefits and five times that in economic benefits.

- Young gobies typically live on zooplankton, a food type that is not common in rivers. But that has not prevented their spread upstream into small rivers because gobies have proven to be highly opportunistic feeders.
- There is little doubt that gobies have helped spread botulism toxins to cormorants, loons and other waterfowl. But there appears to be little direct danger to humans because gobies and other vertebrates are affected very quickly by the botulism toxin. It is, of course, unwise to eat a dead or dying fish or bird.
- Botulism appears to be a natural byproduct of the anaerobic decomposition of algae in deep water. The difference these days is that zebra mussels are picking up the toxin, spreading it to gobies, bass and birds. Most gobies sink to the bottom after death because they have no swim bladder, but some are picked up by cormorants and other diving birds or washed ashore where they are picked up by gulls. That accounts, in part, for the sharp increase in bird deaths in recent years.

The speaker was thanked by George Bryant.

NOTES & OBSERVATIONS:

- Jock McAndrews has studied the bones and tusks of three late-Pleistocene mastodon/mammoths in the ROM collection. He found magnetite crystal embedded in the tusk of the Thamesville mastodon and traces of magnetite in all of them. This adds to the evidence that a comet may have led to the extinction of the mastodons and mammoths about 12,900 years ago. (See Jock's observations in the November minutes.)
- John Speakman has seen a Red-bellied Woodpecker near his daughter's place in Sutton, Ont. They are the most common woodpecker in the U.S. southeast, but are seen only sporadically in southern Ontario. Fred Bodsworth mentioned one record for Algonquin Park.
- Hugh Currie has seen three Northern Hawk Owls this winter. This species is usually found in boreal forests.
- Jean Iron offered the club a photograph of an Owen Staples painting of William Brodie. There are two paintings by Staples. One is hanging in the ROM ornithology department; the other was hanging in the UofT Faculty of Dentistry until it was stolen in 2001. That incident was described in a recent copy of the minutes.
- David Hussell is collecting T-shirts that were given to donors by Bird Studies Canada. The association is missing several of the T-shirts from the early 1990s.

The meeting adjourned for Christmas cheer at 9:10 pm.

NEXT MEETING:

The speaker at the January meeting will be Rowland Tinline, a retired professor at Queen's University, who has been studying the occurrence of rabies over time. He has made the remarkable discovery that rabies has been in cycling in a dozen spatial cells across southern Ontario since the 1950s. That meeting will be held on January 15, 2008 at 7:30 pm in Rm. 432 of the Ramsay Wright Zoological Laboratories.

Application for Membership:

Richard Joos

Hugh Currie writes:

I have known Richard and birded with him often over the past 15 years.

Although he is a biologist today, Richard originally graduated from prestigious M.I.T. in architecture. There he won a Fulbright scholarship to study in Italy for two years. More recently, after becoming by choice a Canadian, he obtained a Master's degree in Landscape Architecture at Guelph.

He is currently pursuing a PhD in Avian Ecology, focusing mainly on Yellow Warbler and Little Gull. He is President of the Toronto Bird Observatory and is licensed to band in two provinces. However he has also

banded in three U.S. states and Costa Rica. He has numerous publications to his credit, many of which relate to the Little Gull. He has given talks to the AOU and other organizations. He is author of the Black-throated Blue Warbler in the upcoming 2001-2005 Ontario atlas book.

His memberships include the Toronto Ornithological Club and the Colonial Waterbird Society.

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Bears

By Yorke Edwards

Our Western Correspondent

On the northwest side of B.C.'s mainland, near the Queen Charlotte Islands, there is a large area covered by a huge, evergreen, rain forest. In it are rivers, big and small, all running to the sea. Each year, thousands of salmon go up those rivers to drop their eggs onto small pebbles in the shallow water. Then, both males and females die and are often carried away by black bears that come to eat the dead fish. After catching a fish, the bears eat the fish under a favorite tree, where they often eat the soft parts – sometimes just the brains of the fish or the eggs within the females – and leave the rest behind. Such trees are used for many years, leaving many bits of fish under a tree that grows larger every year.

Through the mainland's northern forest, there are many rivers and streams with salmon that go far up to drop their eggs in the shallow gravel places. Bears go there too, of course. There are many rivers going through that huge forest in northwest British Columbia, and most have lots of salmon for the bears.

In the mainland forest, there are many grizzly bears, but none are on Vancouver Island. The best place to see them is far up the British Columbia sea shore, close to Alaska. Boats take people to see the grizzlies, often on a large and treeless area by the sea where they come to eat beside the Northwest B.C. forest.

Now that forest is beginning to disappear as its trees become logs and are carried away, mainly going to the United States. In Queen Charlotte's

forest, most trees will soon disappear too.

Recently, black bears seem to be wandering closer to populated places, and they can sometimes be dangerous. But almost always, the bears run away from people, or just wander across farms and other treeless areas. They eat in fields and gardens, but soon wander away. Bears are much less dangerous than our cars and trucks.

Most of the bears are black, some are brown, and a few are white all over. The

white bears are not easily found, but are sometimes seen by lucky people. Perhaps the best place to see one is at the forest edge of Princess Royal Island. They are usually deep in the large forests by the sea, but are rarely seen wandering by a shore or by a river.

Recently in a government speech, it was suggested that a white bear should be the mascot for B.C.'s 2010 Olympic Games. A big one in a cage is not much to show, but maybe a young one would be suitable. Y

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