

THE
BRODIE
CLUB



ROYAL ONTARIO
MUSEUM OF ZOOLOGY

THE 1,021st MEETING OF THE BRODIE CLUB

The 1,021st Meeting of the Brodie Club was held at 7:30 pm on May 6, 2008 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chairman: Jean Iron

Secretary: Oliver Bertin

There were 21 members and three guests, including:

Dorothy Andrews, guest of Fred Bodsworth

Bill Allison, guest of Ellie Larsen

Sharon Hick, guest of Jock McAndrews

The members in attendance included Bev Scott, former Curator of Ichthyology at the Royal Ontario Museum, who now lives in Kingston.

The minutes of the previous meeting were approved with several changes requested by Bruce Falls.

NEW BUSINESS:

The annual field trip will be held on Sunday, June 8 at the home of member John Riley in the Highlands of Dufferin County, aka the Hockley Valley, just north of Orangeville.

Members have been invited to gather at Riley's farm at either 8 am or 10 am for a morning bird walk, and meet there again at lunch. In the meantime, Riley will lead tours to Mono Cliffs Provincial Park, the Hockley Valley Nature Reserve, the Niagara Escarpment with its cliff-edge ferns, McCarston Lake, Scotts Falls and the cave where Howard Savage found some very exciting pleistocene mammals.

The farm is at 874523 Fifth Line Mono Twp.

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- Go to the corner of Highway 9 and Airport Road, just east of Orangeville.
- Head north on Airport Road to Hockley Valley Rd.
- Continue north four concessions to Mono Centre Road (County Road 8).
- Turn left on Mono Centre Road and drive west for one line.
- Turn left on Fifth Line Mono Twp.
- John Riley's farm will be a short distance south on the east side. (See attached map and PDF).

David Tomlinson offered members a copy of his 1974 Master Plan for Mono Cliffs Provincial Park.

Ed Addison (Aurora: 905 727-4476), Oliver Bertin (downtown: 416 588-8520) and others offered rides to those who would like to car pool.

Trudy Rising mentioned two groups associated with Toronto Zoo. Ontario Road Ecology Group is comprised of government and non-government scientists, educators and transportation planners who are trying to raise awareness about the threat of roads to the biodiversity of Ontario, and to find and apply solutions. A related group – www.crayfishontario.ca – is concerned with Ontario crayfish. They can both be reached through www.torontozoo.com.

This was Bertin's 10th anniversary as secretary. He offered the mantle of power and prestige that comes with the position to any and all aspiring members (for the tenth annual time!)

SPEAKER:

Bertin introduced John Casselman, a Brodie Club member and former graduate student and lab-mate of Bertin's in the Department of Zoology. He went on to become a senior scientist with the Ontario Ministry of Natural Resources at the Glenora Fisheries Research Station in Picton, Ont. responsible for studying fish populations, fish production and climate change. He retired for the first time in 2004 and assumed a second career, as adjunct professor of fish ecology and environmental physiology at Queen's University in Kingston. He has travelled widely, including Canada's Arctic, Ethiopia and Tibet, at the invitation of the Chinese Academy of Sciences.

EELS AT THE EDGE

An ancient and valued species and resource
in unprecedented decline

Eels have been around for upwards of 500 million years, and a valuable food resource across eastern North America since at least the Ice Age. But the North American population crashed in the late 1990s and very few eels now come up the St. Lawrence River into Lake Ontario. The decline is unambiguous. But the cause of the decline – or even the life history of the fish – is poorly understood.

There are three species of eel in the world, which appear to be part of the same breeding stock with complete genetic mixing. The largest population is the European eel. It spawns in the Sargasso Sea and drifts with the Gulf Stream to Europe where it is found in England, continental Europe and the Mediterranean. North American eels (*Anguilla rostrata*) form a mid-sized group that also spawns in the Sargasso Sea. They drift up the Atlantic coast of North America, then metamorphose and swim up freshwater rivers along the Eastern Seaboard. One group drifts as far as Newfoundland and then heads up the St. Lawrence River into Lake Ontario and even Lake Erie, the extreme end of its range. Others head into the Caribbean, and up the Mississippi and rivers in Mexico, Yucatan and Central America. The smallest eel species are Japanese, a little known group that breeds in Oceania and swims to Japan and the Far East.

Little is known about the life cycle of the North American eel, except that it appears to spawn somewhere in the Sargasso Sea, possibly above underwater peaks. The early stage, the Leptocephalus, drifts to Newfoundland, where it metamorphoses into a glass eel, so called because it has no pigment. Males appear to stay in brackish water, but the female eel grows into a pencil-sized elvar and swims up the St. Lawrence where it becomes a yellow eel at between five and eight years of age. When 20 years old and

three feet long, the mature silver eel heads downriver, into salt water and along the Gulf Stream to Europe, Africa and back to the Sargasso Sea to spawn.

We are not sure why the Atlantic eel swims as far as Mexico and Lake Erie, but this habit appears to be related to the density of the Atlantic population. Now that ocean populations have declined, eels are no longer pressured to swim as far afield.

Lake Ontario eels tend to be older, longer and more prolific than those found on the Eastern seaboard. A typical U.S. eel could have two to five million eggs; while an Ontario specimen might have 15 to 30 million. That makes the Ontario group a vital force in the renewal of the species.



Eels were a vital food resource for Aboriginal peoples and the early European settlers because their high protein and fat levels make them highly nutritious. They contain six times the caloric value of normal fish and can be smoked for use through the winter.

“They were as important to Ontario Indians as salmon were to West coast Indians,” Casselman said. “They were the single most important fish species for the Iroquois.”

They were the only fish species to be honoured by the Iroquois with a clan status.

“Eel fishing is highly productive, and enables people to live when all else fails,” according to the Jesuit Relations, which contains a wealth of natural history from the 17th century. These missionary dairies tell how the local Aboriginals caught thousands of eels in elaborate fish weirs, smoked them and used them for so-called travelling food. We can confirm this because eel remains are scarce in Indian villages, but are common in smaller hunting camps.

The Iroquois lived on eels as early as 1100 and as far inland as the Finger Lakes, while the Illinois Nation caught Caribbean eels that had swum up the Mississippi River. Jacques Cartier described eels, in 1535, as a “large and valuable fishery” in the Lower St. Lawrence, while Samuel de Champlain, in 1603, mentioned eating smoked eels that were caught in fish weirs. The Jesuits reported that 500 to 600 eels could be caught in one night in a fish weir, while the Montagnais/Onondaga People would hang a torch from their canoe and spear 1,000 eels in one night.

Indian spears were often shaped like a letter "W", with two side pieces that directed the eels onto a central spike.

Eels were easy to catch in large numbers because they tend to ball up in the mud, much like a group of hibernating garter snakes. An experienced native would look for a patch of grey slime on the surface of the river mud, mark the spot and go back after freeze-up, when he would cut a hole in the ice and spear the entire mass of 500 to 600 eels. Eels also drift downstream in huge intertwined balls three feet across. Casselman once watched a commercial fisherman net a mass of 14 mature eels in the St. Lawrence.

Eels are still caught in fish weirs in the Tadoussac region of the Lower St. Lawrence, while fishermen reported catching 100 tonnes annually in Lake Oneida as late as 1916. That population has apparently been extirpated by dams upstream from Lake Ontario.

Eels were an important commercial fishery in Canada, peaking at 1,200 tonnes in 1980 with a value of 20 cents a kilogram in 1980 dollars. That would be equivalent to about \$1 million today. Smoked eels are particularly valuable. In the Tadoussac region, they currently fetch \$45 a kilogram.

The decline in the eel population was fast and dramatic. The population started to fall in the southern U.S. seaboard in 1980, by 1992 in the Central U.S. states and Gulf of Mexico, 1998 in Newfoundland and 2000 in the Bay of Fundy. Mexico has seen the same trend. The commercial catch in that country has declined to one tonne a year, from 45 tonnes, with similar declines in Europe and Japan.

The Lake Ontario population has been monitored through commercial fish catch statistics since 1880 and, in more recent years, at a fish ladder beside the Moses Saunders Dam, which straddles the St. Lawrence River in Cornwall. The commercial catch shows that the lake population peaked in 1970 and 1980, but started to fall in 1995, leading to the close of the commercial fishery in 2004. This trend is corroborated by observations at the dam. About 7,500 eels swam upstream every day of the month-long migration period in 1975, with 30,000 a day in 1983, equivalent to one million eels a season. But by 1995, only 40 or 50 were passing by daily.

Catch statistics from the Bay of Quinte back up these numbers. Commercial fishermen used to catch one or two eels per mile of trawling; now there are none. It's the same story off Main Duck Island, near Kingston. Fishermen used to catch 60 to 100 eels an hour in the 1980s using electro-fishing gear, but only 10 eels per hour in 1995, and none in 2002.

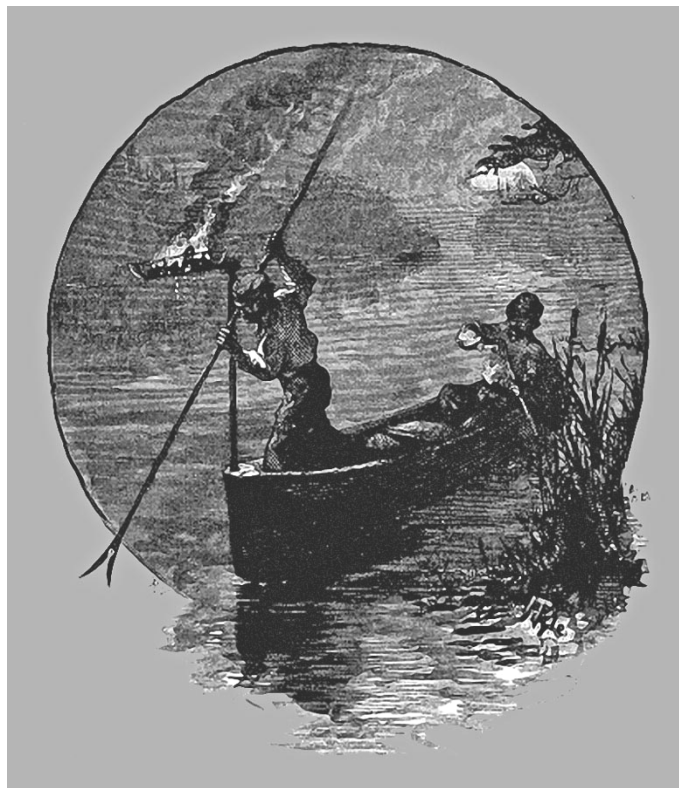
Eel models place the Canadian eel population at between 25 to 50 million eels in the 1600s, five million in 1990 and approximately zero in 2000. Put another way, the Ontario population plummeted by 92 per cent between 1950 and 2007.

There are many possible reasons for the decline, but none are well understood. The list of reasons includes:

- Habitat loss: An estimated 84 per cent of historical habitat in the Great Lakes has been lost, largely through dam construction.
- Barriers to migration, including dams such as the ones that have cut off the traditional fishing grounds in Lake Oneida.
- Changes in ocean conditions: The Labrador Current has increased because of melting glaciers, while the temperature of the Gulf Stream has dropped by three or four degrees.
- Toxic contaminants: Eels are lipophilic. They store lots of noxious substances.

- Hydroelectric turbines: The St. Lawrence River was blocked from 1959 to 1974, when authorities built a fish ladder beside the Moses Saunders dam. Eels were able to swim upstream, but the electric turbines decimate fish going downstream.
- Parasites, particularly bladderworm, could present a serious problem in the future.
- The Sargasso weed harvest, which may have affected the spawning habitat.
- Fishing and possibly over-fishing of several life stages, particularly in the 1978 to 1981 period in Lake Ontario.
- Changes in the food web and loss of prey, particularly alewives in Lake Ontario, compounded by the influx of clams, which have increased the transparency of the water and affected the habitat of this light-sensitive species.
- Reproduction: North American and European eels may be interbreeding, affecting recruitment of the Ontario stock. Moreover, the decline in Ontario has affected the entire population. Fecund Ontario eels used to account for 30 to 50 per cent of the entire North Atlantic stock.

The future of the Ontario eel population is in considerable doubt. There has been talk of restoring the population by buying young eels and restocking Lake Ontario, but Casselman said any action must be taken soon to avoid losing the entire population.



QUESTIONS:

- Eels are clearly endangered in Lake Ontario, but COSEWIC would rate eels of special concern at best.
- An English fisherman told Bertin in January that "a strange disease in the Sargasso Sea was killing the eels." Casselman confirmed that Viral Haemorrhagic Septicemia (VHS) is indeed a concern. While there is little proof so far, he suspects VHS is transferred from European to North American eels in the Sargasso Sea. The disease is found in European fish and on the east and west coasts of North America. It apparently killed 200 to 300 tonnes of Freshwater Drum in the Bay of Quinte a few years ago, and may have caused the death of two to three million eels in Lake Ontario in 1986-1987.
- Bertin noted that his mother drank Guinness beer and ate jellied eels – a typical diet for pregnant English women in the late 1940s. That may no longer be wise, given the eels' high concentration of organochlorides.
- The re-stocking of eels presents several problems. The European Community has cut production of glass eels, forcing the price up to excessive levels. Moreover, glass eels take 20 years to mature, a long time to wait. Bladderworm could also be a problem because Ontario would want to restock with worm-free fish.
- Denmark has been researching the eel population in the Sargasso Sea. Canada managed to get a trawler for 40 days, but the research was cut short when a whale swam into the nets and ruined them.
- Hydro-electric turbines limit the usefulness of stocking programs. Eels can handle fish ladders when they head upstream, but they risk being shredded by the turbine blades when they go back down.
- Eels have also declined in the Caribbean. Smaller, riverine eels have been seen in a sinkhole in Jamaica, one kilometre inland. Nobody is sure how they got there.
- The 1975 year class was gigantic in Lake Ontario, as was the echo class in 1982.
- Casselman has otoliths going back to the 1940s that tell a lot about recruitment over the past 65 years. These ear bones have "tree rings," which allow the researcher to age the fish and judge its annual growth.
- Heavy flood years appear to increase the number of eels, for no obvious reason.
- Eels, with their heavy fat content, have high levels of organochlorides. "It is a big, big problem," Casselman said.

The speaker was thanked by Jim Rising.

NOTES & OBSERVATIONS:

Jock McAndrews continues to investigate the theory that a comet struck the earth 13,000 years ago and is looking for a fast and economical way of checking the levels of magnetite levels embedded in mastodon tusks. He has tried a compass, and a battery-powered stud finder, which works well. He is now looking for a hand-held magnetometer or something similar.

Helen Juhola saw three Chipping Sparrows in Queen's Park when walking over the day of the meeting. These are the first she has seen this year.

David Hussell reported a Tree Swallow egg was laid on May 1, the first of the year and the earliest egg-laying date in his 32-year study at Long Point Bird Observatory in Port Rowan. No other bird has yet laid an egg in any of the other 160 nest boxes. A Little Blue Heron has been seen at the Bird Studies Canada pond for the past few days, he said.

Trudy Rising has just returned from Dauphin Island, a sandbar off Mobile, Alabama, where migrating birds often land after their flight from Yucatan. They arrive in Canada about two weeks later.

Jean Iron and Ron Pittaway have just returned from Minesing Swamp, a huge wetland west of Barrie. A large collection of shorebirds and waterfowl were visiting a local road that was flooded, including a red and black morph Ruffs and a rare Long-billed Dowitcher. Ducks Unlimited has bought a farm in the area, joining The Nature Conservancy of Canada that has purchased about 8,000 acres over the past 30 years.

The meeting adjourned at 9:36 pm.

FIELD TRIP

This was the last regular meeting of the season. The next event is the field trip on Sunday, June 8 at the home of John Riley in the Hockley Valley (see above). We hope to see you all there and again at the members' meeting in September.

In Several Forests

By Yorke Edwards

Our Western Correspondent

A short distance north of Victoria, there is a small provincial park with a river running through an old forest by the sea. I have been there many times, mostly in the spring, early in the morning, and I often went through that forest hearing the songs of many birds. In summer, many salmon go up the river to drop their eggs. Then the adults die and the water takes their bodies to the sea. Many Bald Eagles wait at the mouth of the river for their annual feast of dead salmon. I have been in many B.C. parks, but this is the one that I visited the most.

I have been to many parks, working, often going northeast into the big Wells Gray Park, not far from the Rocky Mountains. I have seen many birds there, including Bald Eagles, Pileated Woodpeckers, Great Gray Owls, Willow Ptarmigans, Sharp-tailed Grouse, Barrow's Goldeneye and many others. Large mammals are there too, moose in some hundreds, many white-tailed deer, but also mountain caribou, black and grizzly bears, beavers, coyotes, wolverines, martens, minks and many other mammals. Once, on a high flat edge on a mountain just above the trees, I slept well under some evergreen bushes. Early in the morning, I put my head out and found myself face-to-face with a wolf. It ran away, and fast.

One day in Manning Park, which is along the U.S. border in a mountainous area, I was going down a mountain through a steep forest, swinging from tree to tree, when I came to a small pond with a hole in the ground beside it, about seven inches wide, made by a mammal. I watched there for some time, and saw a mammal come out that looked a bit like a muskrat, but wasn't.

It was not bothered by me as it went away at a slow run. I was amazed because I had never seen one before. Later, I got my mammal book out and found that it was a mountain beaver, a species that is not at all like a real beaver. They live in a very small area in Canada's southwestern corner and in the United States in a small area about half of Washington and Oregon, beside the sea.

In the mountains of Manning Park, there are many hoary marmots that make very loud whistles, calling in the mornings from near the treeless mountain tops. They live in a small northern area of Washington, Idaho and Montana, and in large parts of British Columbia, north to Yukon and onto Alaska's flatland, well north of the treeline.

On Vancouver Island, there is another kind of marmot that had been reduced to very small numbers with few homes in the ground. But then a local helper collected a few and took them to Alberta where they were kept alive in tin boxes. After a few years, there were enough of them to restock their home in the flatlands of Vancouver Island, above the forest. They are now rather numerous, and living where they were before.

Almost every time I drive high up the highway near Manning Park, I look up to the top of a high rocky cliff with trees on its top, and there I usually see five or six white mountain goats looking down at me, always standing still, in line together at the edge. That is how they live most of the time, only leaving their cliff faces to find water and shrubs and smaller plants to eat. They seem to do nothing but look for food and water, while looking down.

