THE BRODIE CLUB

ROYAL ONTARIO MUSEUM OF ZOOLOGY

THE 991st MEETING OF THE BRODIE CLUB

The 991st meeting of the Brodie Club was held on Feb. 15, 2005 in Room 432 of the Ramsay Wright Building of the University of Toronto.

Chairman: Alexandra Eadie
Secretary: Oliver Bertin
Attendance: 21 members and 6 guests
Guests: Ian Sturdee, guest of Mary Boswell
Rosemary Addison, Peter Addison and Melissa Rose, guests of Ed Addison
Lois and John Casselman, guests of Bertin

Minutes of the 990th meeting were approved by Bruce Falls, seconded by Addison. Falls will speak next month on his recent trip to India.

NEW BUSINESS:

The Brodie Club will celebrate its 1,000th meeting in February, 2006. All members, active or not, were invited to suggest appropriate events for the occasion and to participate in the festivities. Several members recalled the 900th anniversary when CBC luminary Lister Sinclair spoke to members over dinner in the Faculty Club.

Norm Martin enquired about the Brodie Club policy on inactive members. He said there are members who would like to remain on the books, receive the monthly minutes and attend occasional meetings. Ann Falls said members remain for life. If they wish, they can be sent email minutes free of charge and hard copies for the cost of postage, $10 a year for individuals and $15 a year for families. Bertin suggested that inactive members contact him at oliver.bertin@utoronto.ca or 416-588-8520 if they wish to receive minutes, to participate in club activities or join in the 1,000-anniversary celebrations.

Fred Bodsworth noted that Ernst Mayr, the famous Harvard evolutionist, died in February at the age of 101.

Jock McAndrews invited members to join him at Crawford Lake on Saturday February 19. He plans to take cores of the lake sediment to search for 13th-century goose pellets. He suspects that geese roosted on the lake and cast pellets after feeding on corn fields of the nearby Iroquoian villages. Some pellets dissolved to provide nutrients that led to eutrophication (guanotrophy) and meromixis.

Paul Aird wrote to say: "I have created a beautiful computer-generated poem titled BUTTERFLY BEAUTIFLY BEAUTIFUL. This has been transposed into a two-dimensional animated version that may be seen on my website www.loonsforever.com.

Click on Nature Poems. I hope someday to have a three-dimensional version with flapping wings."

Glenn Coady brought a cake to the meeting to celebrate the 50th anniversary of Fred Bodsworth's famous book, *The Last of the Curlews*.

SPEAKER:

Bertin introduced the speaker, John Casselman, a former graduate student in the UofT Department of Zoology under late Brodie Club member Ed Crossman, along with F.E.J. Fry and Harold Harvey. Casselman went on to become a senior fisheries scientist with the Ontario Ministry of Natural Resources at the Glenora Fisheries Station in Picton. He is also cross-appointed as Adjunct Professor of Biology at Queen's University in Kingston, Trent University in Peterborough and the University of Guelph where he is recognized as an authority on the impact of climate change and exotic species on fish populations. He plans to retire from his position at MNR in April and spend more time on his academic duties at Queen's.

The Effects of Climate and Climate Change on Fish and Fisheries of the Great Lakes Basin

There has been considerable interest in recent years on the impact of climatic change on the aquatic ecosystem of the Great Lakes Basin. Casselman is keen to predict the impact on fish populations.

To simplify the process, he divided Great Lakes fish into three broad categories. Warm-water fish such as small mouth bass, rock bass, blue gill and the exotic white perch, prefer water at 27 to 30C. Cool-water fish such as yellow perch, pike and walleye like water at 21 to 22C. Cold-water fish such as the salmonids and lake whitefish like 11 to 14C.

To determine the long-term trends, Casselman consulted a variety of data sets going back to the 1950s. Casselman found a good source of information on water temperature and ice cover at the Belleville pumping station on the Bay of Quinte. The data shows a dramatic rise in water temperature — three degrees — over the past 50 years with a sharp increase after the very cold winter of 1976-1977. Ice cover had been fairly stable until that winter and then started to decrease. Clearly, something major happened that year.

The 1990s were also abnormal. Casselman noted that the frequency of warm years increased through that decade with only one cold year, in 1992.

Casselman found that water temperatures in the Bay of Quinte follow trends in the South Pacific by two to eight months. The warm El Niño years were 1973, 1983, 1987, 1988 and 1995, while the cold La Niña effect came in 1976, 1985 and 1989. Water temperatures in the Bay of Quinte have also been affected by a variety of other world events, including the eruption of Mount Pinatubo in the Philippines in 1991 which led to a cold summer around the world the following year.

The fauna of Lake Ontario has changed markedly over the past century. Domestic species have waxed and waned, while exotics have often appeared, boomed and suddenly died off, often with a dramatic impact on the other species.

The zebra mussel is one exotic that has caused tremendous changes to the domestic fauna. This mussel was introduced from the Caspian and Black Seas in about 1991, and peaked in 1994 to 1996. There was a huge die-off in 2000, partly because the mussel is so voracious it ate itself out of house and home.

Zebra mussels were so numerous at one point that they, in effect, vacuum-cleaned the waters in Lake Ontario, achieving a clarity that has been compared to the Caribbean. The subsequent die-off left huge numbers of mussel shells, enough to create beaches of dead shells and to fill in the interstices between rocks on the bottom of the lake. This severely reduced the habitat available to other species, particularly for shelter and for spawning.

Casselman showed that domestic fish populations have also changed through the years. Lake trout, a cold water fish, were a major commercial fish in Lake Ontario in the late 19th and early 20th century. The population peaked in 1925 and declined sharply through the 1930s before going extinct in about 1955, probably due to predation by lampreys, sedimentation of the spawning beds and over-fishing. The numbers have come back in recent years, mainly due to the stocking of millions of young fish. They peaked in about 1990 but have since declined sharply, probably due to over-stocking, a shortage of prey and climatic effects. The population is particularly sensitive to temperature during the spawning season.

Lake whitefish, another cold-water species, also boomed following the cold 1976-77 winter and in the early 1990s, following the eruption of Mt. Pinatubo. But the species fell back in the late 1990s, perhaps because water temperatures were rising and the zebra mussel was affecting its food supply.

The impact of temperature can be profound. In some fish species, a three-degree change in temperature can lead to a 20-fold increase in recruitment that year. That affects the size of the year-class for the fish's lifetime.

The cool-water walleye has also been affected by the climatic changes. Walleye populations boomed in the 1920s, 1950s and late 1970s, years when there were cold La Niña effects in the Pacific and cold winters in Canada. Pike is another cool water fish that is very sensitive to temperature. A slight change in temperature can have a major effect on the year-class strength.

Warm-water species have clearly benefited from the rise in water temperature. The population of small mouth bass, large mouth bass and rock bass have soared in the Bay of Quinte since the mid-1990s, replacing cold water fish which have dwindled.

Growth rates have also been affected. Casselman showed two photographs of similar 60-pound muskellunge taken 15 years apart. One fish was 30 years old when it was caught in 1989. The other was only 18 years old in 2000. The photographs indicate that musky are now growing twice as fast as they used to.

Temperature fluctuations have also affected several exotic species, complicating the broader picture. Alewives and white perch suffered big die-offs during the cold winter of 1976-77 even though both were established, thriving species. Alwives appeared in the Great Lakes as early as the late 1800s while white perch first appeared in the 1950s.

The die off of these two exotics had a profound effect on native species because they are important predators, prey and competitors. The disappearance of alewives, for instance, led to a big increase in the population of two native species, yellow perch and

walleye. Walleye, in particular, blossomed after the alewife die off, reaching record levels in about 1985. The numbers have now fallen back to traditional levels.

Casselman was able to conclude that global warming has had a profound effect on Lake Ontario fish, causing a big decrease in cold-water fish, a big increase in warm-water species and a middling impact on cool-water species.

Casselman went on to talk about the American eel, a species which faces extinction in North America. These fish have been common in Lake Ontario and the St. Lawrence River for hundreds of years, They were as important to the eastern Iroquoian tribes as salmon were to the B.C. native peoples. They were easily caught in weirs and their high-fat content made them an excellent winter food until the Iroquois acquired muskets in the 17th century and turned to hunting instead of fishing.

The eel population peaked in the mid-1970s but has dropped precipitously since the early 1990s. About 30,000 eels a day used to climb the 80-foot fish ladder beside the Moses-Saunders dam. Last year, there were only 25 to 50 eels a day. They may already be extinct in Lake Ontario.

These fish have a complex, little-understood life cycle that goes back about 500 million years. They spawn in the Sargasso Sea and the young elvers drift north with the Gulf Stream. The young eels swim up freshwater rivers along the Atlantic Seaboard and into Lake Ontario, where they live for about 20 years. They swim downstream, follow the ocean currents past Europe and Spain back to the Sargasso Sea where they spawn.

The American eel is similar in appearance to the European and Pacific eels but is a different species. All three species are showing a similar decline. The Dutch eel fishery has already crashed and experts believe that North America could well be next.

One factor in the eels' decline in the St. Lawrence River may be the two dams that were built in the 1960s. The dam turbines apparently kill about 40 per cent of the eel population as the adults head downriver.

Other factors include loss of habitat, changes in oceanic conditions (a deeper Gulfstream and a colder Labrador current), exploitation of eels at every stage of their life cycle, changes in the food web, parasites, the harvesting of the Sargasso weeds and toxins.

QUESTIONS:

- Many fish species are highly mobile. Why don't they move to cooler waters? They do but it still affects their productivity.
- Many cities, including Toronto, are sucking up cold lake water for use in air conditioning systems. Does this affect the fish population? One can assume these intake pipes are affecting the cold-water species, but the impact has not been measured.
- The temperature of the North Atlantic seems to follow the same cycle as the El Niño/La Niña cycles in the South Pacific.
- Species dynamics are changing in Lake Ontario, but the total biomass remains about the same. The dynamics can be predicted, allowing authorities to manage the fishery.
- Nobody knows where the Sargasso eels spawn. In the Pacific, they appear to spawn in mid-ocean above submerged mountain peaks. There are similar submerged peaks under the Sargasso Sea.

- There is little doubt that eels are decimated by hydro-electric turbines. Casselman was due to attend a world conference on this problem following his Brodie Club talk.
- The eel may be seen as a rare and endangered species in the United States and Canada. That would allow authorities to manage the harvest.

The speaker was thanked by Addison.

NOTES AND OBSERVATIONS:

- Bertin found an adult Gobi fish about 10 inches long washed up on the beach on the south coast of England. This species is an exotic from the Caspian Sea that has become numerous in the English Channel as well as in Lake Ontario.
- Bertin also reported seeing two wild horses in the Italian Alps at about the 7,000-foot mark. These horses were approximately 32 inches at the withers — the size of a large dog. According to one source, they go back to Roman times.

Bertin meets wild Roman horse

- Bodsworth reported seeing large numbers of Great Gray Owls this winter. "They are all over the place, easy to find and easy to see."
- Ron Pittaway has heard reports of melanistic Great Gray Owls in Minnesota and elsewhere. Some are darker than usual, but some are almost black. He suggested that the owl is so large it could be susceptible to extinction.
- Kevin Seymour noted that larger animals have been more susceptible to extinction than normal species. But the Great Gray Owl is not a great deal larger than the Barred Owl once stripped of its feathers.
- Addison recently saw dozens of Wild Turkeys in the Beaver Valley, north of Toronto. He saw 50 in one orchard, and flocks of 25 to 30 at a time in farmers' fields. They are extremely abundant.

- Harry Lumsden said excavations at Ste-Marie-Among-the-Hurons in Midland, Ont. turned up large numbers of Trumpeter Swan bones but few Wild Turkeys.
- John Speakman has seen "an unbelievable abundance" of deer — 20, 30 or 40 at a time. They are having a devastating impact on farm crops, yet the Ontario Ministry of Natural Resources apparently doesn't want to cull.
- Sandra Eadie said a friend reported seeing what may have been a Long-horned Beetle in a house near High Park in Toronto. Falls said it could have been a native species.

The meeting adjourned at 9:40 pm.

NEXT MEETING:

The next meeting will be held at 7:30 pm on March 15, 2005 in Room 432 of the Ramsay Wright Zoological Laboratories at the University of Toronto. Bruce Falls will speak on his recent trip, "The Brodie Club goes to India," illustrated by a one-hour video.

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Active Pass

from our Western Correspondent
Yorke Edwards

Through the winter of 1963-1964, I travelled weekly from Victoria to Vancouver, going to the Univ. of B.C. in Vancouver to teach Zoology to first year students. The usual teacher was away for a year. At about 8 a.m. every Wednesday morning, I was 25 times on a large boat filled with cars and people, and I always stood on the boat's prow as it sailed through a narrow pass between two islands, Galiano and Mayne. In those 25 times, I saw the largest numbers of birds I have ever seen before or since. Beyond both ends of the Pass, there were always a few birds as well. I counted birds, or tried to, but they were too numerous to count as the boat plowed through, passing them in hundreds, sometimes even in thousands. Most birds could be seen only in short looks.

In the many pairs of numbers below are first, the largest number seen through the 25 days, and the other is the number of days any were seen. Example: Loon's biggest number seen: 4; and number of days the species was seen: 3.

Common Loon 4-3; Pacific Loon 1,500-18; Gray Grebe 2-1; Western Grebe 1,000-21; Red-breasted Grebe 5-1; Double-crested Cormorant 2-7; Brandt's Cormorant 3,000-24; Pelagic Cormorant 4-5; Great Blue Heron 1-1; White-winged Scoter 3-7; Surf Scoter 90-11; Red-breasted Merganser 1-1; Harlequin Duck 2-2; Common Goldeneye 1-1; Sooty Shearwater 1-1; Heermann's Gull 8-3; Mew Gull 500-18; California Gull 50-8; Sabine's Gull 1-1; Glaucous-winged Gull 1,000-25; Herring Gull 50-15; Bonaparte's Gull 4,000-15; Western Gull 100-25; Cassin's Auklet 1-1; Long-tailed Jaeger 8-4; Band-tailed Pigeon 4-3; Pipit 3-7; Pigeon Hawk 1-1; Northwestern Crow 4-5.

Clearly, the Pass had a lot of food attracting many birds. The foods for them are unusually abundant, but why is it there? Well, the Pass is part of the ocean so it is alive with ocean animals, some very large to many too small for our very poor eyes. Recently 2,000 new species of tiny animals were discovered in ocean depths, and there will be more. Below our windows, we watch a sandy seashore, endlessly widened, then narrowed, as the sea rises then lowers. Winds make waves high, and in the waters are many animals, some large many small.

Active Pass has water rushing through, back and forth like ups and downs on our beach. Through the channel its rocky bottom rises and falls, and its waters keep going through with ocean animals in them rising to the top. At least, it probably is that way. . .

Farther north there are two other such channels attracting birds, but only small boats go through them.....Y

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