BRODIE CLUB

ROYAL ONTARIO MUSEUM OF ZOOLOGY

THE 966th MEETING OF THE BRODIE CLUB

The 966th meeting of the Brodie Club was held on April 16, 2002 in Room 432 of the Ramsay Wright Zoological Laboratories of the University of Toronto.

Chairman:	Bill Carrick
Secretary:	Oliver Bertin
Attendance:	18 members and three guests
Guests:	Isabel Boardman, guest of Claire Muller
	Rosemary Addison, guest of Ed Addison
	Ron Pittaway, guest of Jean Iron

The minutes of the 96Sth meeting were approved with no changes.
Two members have changed their e-mail addresses.

Jennifer Young can be reached at jryoun@sympatico.ca, with no 'g'
Hugh Currie can be reached at hcurrie@ca.inter.net

Ann and Bruce Falls said they will participate in the Baillie Birdathon at Long Point Bird Observatory on May 22 and 23. Members were invited to donate to the cause, which helps fund Bird Studies Canada and the Long Point Bird Observatory.

Toronto Western Hospital has named the RR Tasker Chair in Stereotactic and Functional Neurosurgery in honour of member Ron Tasker. This is the first chair of its kind in the world. The hospital said: "The chair honours Dr. Ron Tasker, a pioneer and world leader in neurosurgery. He has a legacy of creative approaches to understanding the complexities of the brain and its disorders."

Boardman brought a late 19th century microscope to the meeting and demonstrated a collection of teaching slides dating from the 1890s.

SPEAKER:

Falls introduced the speaker, Mart Gross, a professor of conservation biology at Uoff's zoology department. Gross did his undergraduate studies at Queen's University in Kingston, Ont., graduate work in Utah and post-graduate studies in Washington state. He started his career at Simon Fraser University in Vancouver, where he worked on the reproductive biology of the salmon. He was attracted to Uoff in 1987, where he has been active on several conservation boards. He has been "a powerhouse since he came here," Falls said.

Aquaculture: Boon or Bane

In his talk, Gross discussed the impact that fish farming is having on the population of wild salmon, mainly on the B.C. coast but also in the Maritimes and other areas of the world.

In their natural environment, wild salmon typically breed in freshwater streams, lay their eggs in gravel and then protect the site for a few weeks before they die. The eggs incubate for several months before hatching. The smolt descend to the Pacific Ocean where they remain for three or four years before returning to the river they were hatched in. They spawn, guard their nests for a few weeks and die.

In recent years, the number of Sockeye Salmon has decreased sharply. Commercial fishermen caught about 40 million in 1991 but only 10 million in 1998, a reduction of75 per cent.

The number of pacific salmon have been reduced to such low levels that Gross plans to recommend that the Coho Salmon be declared a threatened species.

The fish are dying out as a result of two threats to their survival, the destruction of their spawning habitats and overfishing. The logging of the B.c. Interior has led to warmer streams with more silt, and commercial fishermen are taking 85 to 90 per cent of the fish that return to spawn. But Gross believes the greatest threat to their survival is the growth of the aquaculture industry.

In one form of aquaculture, ranching, salmon eggs are fertilized artificially. The fish are held for one or two years, being fed trout pellets. They are released into the wild on the assumption that they will return to the hatchery three years later to be caught. Some advocates of this practice believe it is good for the wild population because it supplements the population and the commercial fishery in the area.

With fish farming, as opposed to ranching, the fish are spawned in huge hatcheries and raised in floating nets that dot the coast of Oregon, Washington, British Columbia, the Maritimes and Norway. These fish are fed artificially and doctored with massive amounts of antibiotics and other medicines to prevent epidemics from destroying the population. They are raised to adulthood in these nets and then harvested.

Gross estimated that 400 hatcheries on the West Coast released five billion smolt in 1998. Millions more fish are raised to maturity in the floating farms. He estimated that about 56 per cent of salmon are raised in farms, while 44 per cent are caught in the wild, mostly from ranched fish. Atlantic Salmon, originally from Norway, account for about 80 per cent of all the fish farmed in B.c. "We can't get wild Atlantic Salmon (in the supermarkets) any longer because there is no commercial fishery. They are all farmed," Gross said.

Hundreds of thousands of domesticated fish have escaped from fish farms, and sometimes interbreed with wild animals to create hybrids.

He was particularly upset by school programs in which 30,000 young children in Washington state breed salmon in their classrooms and release them into the wild. "This is the worst possible thing they can do to salmon. They are no longer wild, natural salmon."

Gross also has serious concerns about the breeding techniques used in aquaculture. Eggs are stripped from random females and mixed in a bucket with milt from random males. If there is any selection, by natural or genetic modification, it is usually done to produce faster-growing, fatter, more-marketable fish.

"The target is wrong," Gross said. "We are targetting for only one quality, but many qualities are important. We are destroying the genetic quality of the fish."

Experiments have shown that guppies that are allowed to choose their own mate tend to survive better. Gross tested this hypothesis on salmon. He tagged spawning males and females and released them into a stream where they could be monitored. Then he tested the progeny. He found that hatchery-bred males were less active, less aggressive in courtship rituals and more prone to wounds.

Hatchery-bred females had the same behaviour and the same levels of aggression as their wild peers, but they were more liable to have unspawned eggs. They were also less successful in choosing and protecting their nests.

Gross compared three-year-old wild female Cohos with domestic fish. The wild fish were lithe, red in colour with a distinct beak that develops shortly before spawning. That beak is used to fight other females for the best nest sites. The domestic fish were fat, bloated with eggs, black in colour with a limited beak. This indicated that the domestic fish were over-weight, less aggressive and unprepared to attract a suitable male or compete for a good nesting site.

The same happens with Atlantic Salmon in Norway. Wild males have a bigger beak, are more aggressive and more streamlined. They have a fully formed tail and mature at four years of age. Domestic fish have a smaller beak that is often twisted from scraping the bottom or walls of their tank. They have a small, rounded tail from rubbing the tank walls, and mature at three years old.

"This messes up the gene pool," he said. The domestic and wild fish are so different that Gross suggested that they be included in a new subspecies that he labelled Salmo salar domesticus, instead of Salmo salar. "They are totally different animals." To make it worse, many of the farmed fish escape and interbreed with wild ones to create hybrids.

Gross is also worried about the husbandry methods used by both ranchers and farmers in British Columbia. He has a low level of concern with the Atlantic Salmon imported to B.C. because they cannot normally interbreed with wild Pacific salmon. But he is seriously worried about interbreeding between domestic Chinook and Coho salmon and the wild of the same species in British Columbia. He is somewhat concerned about the ecological damage caused by Atlantic salmon in B.c. because these fish are not well adapted to local conditions. He is very concerned about ecological damage caused by Pacific species that escape.

Diseases are a particularly serious concern. A large number of diseases and parasites spread through the fish farms and infected animals often escape into the wild. Moreover, the aquaculturists indiscriminately use antibiotics, copper sulphate and other potentially damaging substances in huge quantities.

Gross noted that David Suzuki and other environmentalists want to ban the use of Atlantic Salmon on the West Coast because they see them as unwanted exotics. But Gross argued that Atlantic Salmon are far less damaging to the local environment than

local species because they do not interbreed with local species, are not well-adapted to local conditions and eventually die out.

Gross is very pessimistic about the future of wild salmon on both coasts. He believes that the number of wild Atlantic Salmon will eventually dwindle from about 20 million to about 200,000. This is insignificant when compared with the huge population of domestic Atlantic Salmon, a number he estimated at about 160 million.

Partly in jest, he said Atlantic salmon could eventually evolve into four SUbspecies. The current Salmo salar will become S. salar naturalis, a wild species which will be found occasionally in northern waters away from commercial fisheries. The farmed fish will become S. domesticus pacifica on the west coast and S. domesticus atlanticus on the east coast.

But consistent breeding and genetic manipulation could create a fourth subspecies which he named S. domesticus poulet - the chicken fish - which would be created for the human dinner table. It would be fat, fast-growing, fecund and lazy, and bear as little relationship to the wild fish as a domestic cow does to a wild Oryx.

If that seems far-fetched, he said that aquaculturists are already combining the DNA of plaice with Atlantic and Pacific salmon to create a new breed that he said grows at "an astounding rate."

In conclusion, Gross said aquaculture is both a boon and a bust for nature. It creates diversity within the species, but it also destroys what we have.

QUESTIONS:

Q: Will the domesticated fish revert to the wild type after they escape?

A: They do revert, but never to the original. Instead they become a kind of feral salmon that lies somewhere between the wild and domestic types. He said Lake Ontario has one of the best feral populations in the world. The Atlantic salmon has disappeared in Lake Ontario, but the introduced Chinook is now breeding in the wild in such numbers that it has become a popular sport fish. It was originally introduced to control alewives, another exotic, but it has also been a problem because it limits the number of the rare Red-sided Dace and Brook Trout.

Q: Can domesticated salmon be compared to domesticated cattle?

A: Fish are the last of the hunted vertebrates. Cattle originated with the Oryx, an African bovine that is now virtually extinct. They evolved into cattle, an inherent component of the human food chain. "No breeding, no cattle, no grain and no people." Cattle are now raised on industrial farms, just like salmon. "That's the way it will be."

One partial solution to the problem of fish farms is to zone some areas as "wild fish parks." Alaska bans fish farms, but not ranching, while fishing rights to a part of Greenland were sold to a group of conservationists.

Q: Should we eat farmed salmon?

A: There are now so many fish farms that salmon has become a low-priced commodity, selling for as little as 20 cents a pound, available in thousands of restaurants and supermarkets. Some fish farms are uneconomic at these prices and are shutting down.

Q: Why not release Atlantic Salmon in Lake Ontario?

A: About 200,000 are released every year, but sport fishermen prefer the Chinook because it is bigger.

Q: What happened to Splake, a hybrid of Speckled Trout and Lake Trout, a form of salmon?

A: These were an artificial hybrid and are dying out.

Q: How do sport fishermen relate to conservationists?

A: They do not always get on because they view fish from a different perspective. But Gross said they should get together more often because they have many goals in common.

Q: Do wild and domesticated salmon taste the same? Do they have a similar nutritional value?

A: Virtually all salmon sold in restaurants and supermarkets are now farmed. It is difficult to tell them apart from a taste viewpoint, but domesticated fish often have a higher fat content. Domesticated fish often have a thin white line of fat between the muscle segments. The nutritional value is slightly different, depending on the nature of the food fed in farms.

Q: Do fish farms affect the local environment?

A: They can have a huge effect. Fish farms harbour a wide range of fish diseases, sea lice and other problems, which spread to the wild population. The Bay of Fundy fish population was decimated by diseases from farms. Aquaculturists use vast amounts of noxious products to control these diseases, and those chemicals spread to the surrounding water. Fish feces are also a serious concern, especially since they pollute common waters, owned by the public. In many areas, fish farms have been set up in beautiful surroundings, thereby destroying the scenery.

Q: Does the damming of rivers reduce the nutrients carried upstream by the spawning salmon?

A: Salmon account for a substantial part of the nutrients in the spawning beds. Tests on the pelts of grizzlies and black bear show that up to 40 per cent of their diet comes from ocean sources.

The speaker was thanked by Jennifer Young.

NOTES & OBSERVATIONS:

Carrick said a Virginia enthusiast named William Sladen and Bill Leishman tried to migrate Trumpeter Swans down the Eastern Seaboard using an ultralight. They planned to fly from Oak Orchard, a preserve near Rochester, N.Y., to Virginia, but the swans wouldn't flyover the Appalachians. He had to truck them over the mountain range in the fall and again in the spring. In Carrick's opinion, they were too strongly imprinted. Carrick said he found that birds that were relatively tame but not imprinted fared best, as demonstrated by his successful flight of Trumpeter Swans from Sudbury to Indiana and back. Sladen was also required by the D.S. Fish and Wildlife Service to collect all the birds after the experiment because the D.S. officials didn't want Trumpeters released on the Eastern Seaboard.

Carrick reported the birth of four beavers on April 12, a month earlier than usual. Usually they appear about May 15.

Young saw an opossum on Hwy 400 just south of Holland Marsh.

Falls saw a kingfisher flying with a freshly caught goldfish in its mouth.

Bertin said he found a feral goldfish in Kensington Market. It looked very similar to a wild carp in size and colour, but lacked the carp's characteristic barbs. Goldfish revert to the wild form if they escape.

Norma Martin saw a Snow Goose accompanied by two Canada Geese. It stayed in the Belleville area for about a day.

Ron Scovell just came back from Long Point where he counted 109 species on one day, down from his record of 120. He spied a strange-looking Canada Goose that was white from its breast to the top of its head. It was the size of a Snow Goose, leading him to wonder whether it was a hybrid of the two species.

Sandra Eadie saw a Grey-headed Gull on a recent trip to London. Apparently, it had escaped from a local zoo.

Fred Bodsworth commented on the number of exotics flying around.

Claire Muller reported that a British magazine, The Countryman (April, 2002) had an article by Bill Odie, in which he said the following:

> It was probably in the late 1950s, that the word "twitcher" was coined. Nowadays, the dreaded **"t"** word is often used by the media as if it were exactly synonymous with "bird watcher." As is often the case, the media have got it wrong. I am conducting a personal crusade to bring back the true meaning of the word "twitcher."
>
> Once and for all, twitching is the pursuit of rare birds. When you see one of those articles, where hundreds ofbirders are gathered together, having travelled maybe hundreds of miles to see a rare little bird that has already been found - that is a "twitch." They are "twitchers." They are "twitching."
>
> It is believed that the word was first used by a bunch of Birmingham birders who used to ring each other weekly to exchange news or rumours of rarities before setting off to wherever the bird had been reported. They would get so worked up at the prospect off ticking of a rarity that they would tremble, palpitate or "twitch."
>
> Have you "twitched" recently?

THE NEXT MEETING:

The next meeting will be held in Room 432 of the Uoff zoology labs at 8 pm on May 21. The speaker will be Tom Mason, curator of invertebrates at the Metro Toronto Zoo, and an expert on reptiles. Mason is knowledgeable about Costa Rica through his involvement with COTERC -- the Canadian Organization for Tropical Education and Rainforest Conservation.

-30-