Monarch larva and pupa. Photos courtesy of David Ferguson

James McLean Oliver Ecological Centre
2002 Annual Report

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Cover: *The pictures on the cover of the annual report are Monarch larva and pupa. Photos courtesy of David Ferguson.*

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Director's Report for the Oliver Centre 2002 - Tom Hutchinson

The Centre has now settled into a productive pattern of seasonal activities. The first rather beautiful cabin is now built near the house, with sleeping accommodation for 8 with a spartan but pleasant living area, and lovely views out over Pigeon Lake. Two remarkable ladies have played key roles in the development of this Trent facility. Marjorie Oliver for her generous and foresighted donation of her 270 acre estate, added to in 2002, with much of the original elegant furniture from the family home, and Audrey Hanbidge, whose annual donations are enabling the cabins to be built, allowing expansion of sleeping accommodation. We intend to have two more cabins built in 2003, giving a maximum capacity for accommodation of approximately 30 persons, when researchers and undergraduate field classes coincide.

This was the first year we reached our hoped for number of 3 two-week field courses, arranged for spring and late summer, thus allowing June – August for the exclusive use of researchers. This was the first year of joint courses with the Native Studies Department of Trent, and also of the operation of a sweat lodge for part of the summer.

The first graduate students graduated with their theses completed. We are now accumulating a significant library and web-site of the results of the research as well as documentation of the biodiversity of the estate. Bird, snake, butterfly, amphibians, lichens, fungi and plant lists are being made from detailed observation, some of a repeating nature, such as the annual loon survey on Pigeon Lake, where Robert Sarginson's pioneering efforts over the past 12 years have been taken over since 2001 by the Oliver Centre, with Robert's enthusiastic help. The saw-whet owl banding and recovery programme has now run for four years. The Oliver Centre seems to be on a direct fall migration route and the humane, careful banding of these birds has drawn many volunteers and a lot of enthusiasm. 299 birds have been caught over the four years of recording.

The Centre now regularly hosts meetings of local cottagers groups, as well as scientific workshops. Our intent is that the Centre become the regional headquarters for air pollution research, as well as for long-term climate change studies, and that small research workshops be held on a range of environmental science, ecological, wildlife and fisheries topics.

This year we have made grant applications for significant funding. The way funds are given these days nearly always requires matching funds. So, part of our endeavour is, with the help of the Development Office, to find donors, private business and industrial, who support the purpose and vision of the Centre or some particular programmes, and we then use their donations to obtain multiples of them from government agencies. Call Sheena Symington or I night or day if you feel the urge to donate and know of opportunities!!

Trent's Acquisition of the Oliver Centre from Miss Marjorie Oliver

On October 8th, 1998, Miss Marjorie Oliver donated her 270-acre estate on the shores of Pigeon Lake, near Bobcaygeon, Ontario, to Trent University. Miss Oliver donated this property on her 90th birthday, with the intention that it be developed as a long-term ecological and environmental research centre. The property contains a wide range of natural ecosystems - 94 acres of woodlands, 3.7 acres of wetlands, 2000 feet of shoreline, and a unique range of historical agricultural fields representing old field successions from forty, twenty and ten years of abandonment. Altogether this represents a wide range of habitats suitable for the teaching and research of both aquatic and terrestrial ecosystems. The 1903 majestic house and 1912 rustic cottage provide immediate accommodation for professors and students.

This property, named the James McLean Oliver Ecological Research Centre (in honour of Marjorie Oliver's father), provides a unique opportunity for researchers to conduct undisturbed short and long-term environmental and ecological research. The centre provides a forum for multi-disciplinary research to take place amongst collaborating experts in ecology, biology, limnology, toxicology, entomology, ornithology, geography, hydrology, climatology, atmospheric physics, and chemistry.

Marjorie's Memories

The Oliver History - Sheena Symington
We have worked with Miss Oliver to develop an archival history of the property and of the Oliver family. We have five stories from Miss Oliver with provide a wonderful insight into life at the Oliver farm as it used to be. We are including these in the Annual Report to provide a perspective on how it was and how it is today, in its new use by Trent University.

#2 Memories by Marjorie Oliver: Miss Marjorie Oliver has written a number to stories about aspects of her life growing up on Lakeview Farm, located on Pigeon Lake. The following is number two of Marjorie's stories.

"The Clock" by Marjorie Oliver

I stood for some time looking at the two clock keys as they lay in my hands. One was modern and new; one was frail and old. It was the old one that recalled from the far and misty past those happy, happy years of my childhood.

A clock that has been a part of your household for over a long period of time becomes very much a part of you, and your life becomes regulated by its stead ticking. I am thinking a particular clock that has been in our house for as long as I can remember - actually it has been in three houses. Its first home was a log house built by Grandfather, but the clock outlived him, and it became the property of Father who continued to live there until after he married Mother. The house was cold in the winter; its occupants insisted even the clock would creak and shiver during those long cold nights. Father and Mother decided it was time to build a new house beside the old one on the top of the hill overlooking the lake. On a fine day everything was moved from the old house to the new one and the clock was set on a special shelf in the kitchen. The shelf was well out of the reach of children's hands and it sat strong and sturdy between two doorways one leading to the cellar and one leading to the dining room. This is where I first became aware of the steady passing of time in minutes and hours. Mother had placed a china swan on each side of the clock. I always felt that it thought they were rather stupid as they seemed to be of no use to anyone, they couldn't even swim on that shelf. There is a glass door over the face of the clock so that when the light shone through the window at a certain time of day, it was hard to see the hands, and one would either squint or move around until the glare disappeared and time returned.

I have been told that before I was born Mother gave the clock a good cleaning - so good, in fact, that some of the paint on its face was chipped. On that same day Mother pasted a picture she had cut from some magazine on the lower part of the inside of the door; she did not like the inner workings of the clock displayed to all who set foot inside her kitchen. She pasted well; the picture is there to this day. Two ladies, wearing some form of drapery that I could never understand, stood day after day with their backs to the wall and stared out at our household.

The clock was strong; and without rest or break, it continued at tits never-changing pace counting the minutes and striking the hours all day and all night. When I was a child and visited my friends, I was often amazed by clocks that struck hours, half-hours and quarter-hours, and I wished that our clock on the kitchen shelf would do all these things, but Father was not happy when he was surrounded by too much sound. The hours were enough for him; he needed neither halves nor quarters.

Each night as my sister and I lay in bed in our room above the kitchen, we would become award, sooner or later, of the nightly ritual. Father would drag a chair - usually his own arm chair - over to the shelf, climb up, open the door and wind the clock. First came the slow steady muted sound of the winding of the minute hand; in my mind's eye I could see the z-shaped key held firmly in my father's hand as he wound up the weight on its fish line mechanism weight being wound on its line. Once the winding was done, we knew that for our family, the day was over. Periodically we would hear a dull clunk in the kitchen and we realized that one of the lines, having grown old and frayed, had finally given up its hold and had let its weight fall. Next day a length would be cut off the reel of fish line and Father would repair the damage.

I think that once in a awhile the feelings of the clock were hurt a bit when Father would go tot he telephone, push the button on the left side of the box, turn the crank on the right side to get the attention of the operator and say, "What is the correct time please?" I used to imagine that the face of the clock reflected its embarrassment as it tried to hide behind its hands.

Father and Mother grew old and to escape the cold of winter and the certainty of being snowed-in, built a house in the village and moved there. For some reason the clock was left at the farm house. Father never felt that he had left his old home, for every spring there was the going-home day. He would stand for a time on the hill overlooking the lake to see that all was well with his property; then he went inside to wind his clock which always responded to his touch. When Father died, the clock missed his gentle hands, and it would not be comforted by anyone else's; it just stood still.

A fixer of clocks attempted to set it straight and explained as he handed me the two keys that the thread of the old one had worn and that the new one would "do the trick". It worked for a while, but I think the clock is frail and it misses the old days as I miss the nights when Father climbed onto his chair to wind up both weights of his clock so that he could hear it strike while he was dreaming of the good days when he alone was responsible for all things at the farms, and when he and Mother and his children regulated their lives by its steady ticking.

One fall day when I was closing up the farm house in preparation for winter, I realized how lonely I had become for the members of my family who, one by one, had left this land for a "better one", and my eyes fell on the face of the silent clock. I took it from its shelf and carried it in my arms to the waiting car. The chipped face, the faded picture, the heavy weights, and the twisted key brought back to mind those simple days when our household was made bright by the steady ticking and striking of Grandfather's clock. It now sits in a special corner in the house in the village just as old folks used to do when they no longer trusted themselves to do their daily tasks.

Plate 2. Photo of the Oliver's clock as it now sits on the wall of the main house at the James McLean Oliver Ecological Centre. Photo courtesy of Eric Sager.

Richard Ivey Foundation Scholarships

In 1999 the Richard Ivey Foundation awarded $125,000.00 to graduate students undertaking theses research at the Oliver Ecological Centre in the area of biodiversity. This award will support graduate students at the Oliver Centre for five years. The recipients for the academic year 2002-2003 were:

Krista Campbell (M.Sc with T. Hutchinson) is studying the effects of ozone pollution on crops in the Kawarthas.

David Ireland (M.Sc candidate) is gathering life history/behaviour information on Bullfrog population of Nogies Creek. He is tracking the bullfrog's movements by permanently marking individuals in addition to conducting genetic analysis on individuals through the extraction of DNA through blood acquisition.

Amy Grear (MSc candidate) is researching the die-off of woodfrogs in ponds surrounding the Oliver Centre. The title of her thesis is *A World Out of Balance: Assessing the Cause, Occurrence and Implications of an Emerging Wildlife Pathogen.* Her supervisor is Professor Michael Berrill.

The Audrey Hanbidge Donation

Audrey Hanbidge of Peterborough generously donated money to construct a small sleeping cabin to house researchers during their stay at the Oliver Centre. This donation was made in memory of her husband Errol Hanbidge.

Plate 3. The Audrey and Errol Hanbidge cabin. Construction started November 2001. Photo courtesy of Eric Sager.

Organizational Structure of the Oliver Ecological Centre

The management committee, appointed by President Patterson, governs the Oliver Ecological Centre. The Director of the Centre is Dr. Tom Hutchinson. The Centre has a Manager, Sheena Symington, living on site in the main house were visiting researchers are also welcomed. The cottage on the property provides accommodation for field courses as well as graduate and undergraduate students conducting research at the Oliver Centre.

2002 Oliver Ecological Centre Management Committee

Professor Tom Hutchinson (Chair/Director) Environmental and Resource Studies and Biology
Professor Chris Metcalfe, Dean of Research and Graduate Studies
Professor Jim Schaefer, Biology, Alternate: Professor Erica Nol, Biology
Professor Tom Whillans, Environmental and Resource Studies
Professor Colin Taylor, Dean of Arts and Science
Professor Peter Lafleur, Geography
Ms. Susan Mackle, Development Office Vice-President
Ms. Sheena Symington, Oliver Ecological Centre Manager
Mr. Robert van Dompseler, Physical Resources Manager
Mr. Mark Ridgway, MNR

2002 Receipts

User fees	$11,745.00 00 - this money is used for day-to-day upkeep of the Oliver Centre
Donations:	
Endowment	$131,541.00 an invested **endowment** of which the annual interest is available for Oliver Centre long-term maintenance
Individual donations	$25,000.00
In-kind donations*:*	
Canadian Centre for Inland Waters, Dept. of Fisheries and Oceans, Burlington, ON	Boat Loan: 18 ft Boston Whaler – loaned specifically for researcher use
Individual donations	Furniture for House valued at $8,505.00

User Fees

Overnight accommodation is $10/person for academic purposes
Note: Fees for groups and conferences are negotiated directly with the Manager or Director

2002 Equipment purchase

Significant equipment purchases for research at the Oliver Ecological Centre include the construction of one small sleeping cabin for researchers using the Oliver facility. This construction was made possible by a generous donation made by Mrs. Audrey Hanbidge in memory of her husband, Errol Hanbidge.

Plate 4. The Oliver Ecological Centre cottage was built in the early 1900's and now provides summer residence for researchers and field course participants. This cottage can accommodate up to fourteen researchers at one time. Photo Courtesy of Lois Davidson, June 2002.

Community Involvement

An Open House organized by Sheena Symington on June 22, 2002 provided a great opportunity for local residents and cottagers to visit the centre and meet the Oliver Ecological Centre researchers. Tom Hutchinson, Director of the Oliver Centre provided an update on current research taking place at the Centre. A number of graduate students spoke of their Oliver Centre research. As well, a series of displays allowed an informal setting for graduate and undergraduate students to present their research projects.

Plate 5. Annual Open-House at the Oliver Ecological Centre in June 22, 2002. The audience is being addressed by current director Tom Hutchinson.

Outreach

The James McLean Oliver Ecological Centre Web-page can be located at:
http://www.trentu.ca/olivercentre

Regular updates and announcements are published in local newspapers in both Bobcaygeon and Peterborough.

Summary of Conference, Meeting and Field Trip Use of Oliver Centre in 2002

Organizer	Function	Number of Participants	Duration
Brenda Koenig and Karen Gowanlock, Trent University and MNR	ERSC/NAST 215H Native Studies 2 week residential field course	12	April 28 – May 8
Tom Hutchinson (Trent ERS/Biology)	Summer Students – Forested Ecosystem: Alison Clark and Dave Ferguson - plant diversity; Krista Campbell and Patti – effects of ozone on agriculture crops	4	May - August
Tom Hutchinson (Trent University ERS/Biology)	Pollination and reproductive success of spring flora species	2	May - July
Alison Clark (Trent University) and Robert Sarginson	Loon Survey of Pigeon Lake	2	May – August 42 days (Robert alone)
Chris Risely - MNR	NHIC field day	6	May 11
D. Woodfine, T. Hutchinson (Trent University), V. Higgins (University of Toronto)	Ecology of the Kawarthas, ON Field Course	12	May 19 –May 31
Lisa Bridges (with Jim Schaefer, Paul Wilson, MNR)	Trapping of Flying Squirrels	3	June 3 - 6
Sheena Symington (Oliver Centre Manager)	Canopy Access Inspection/Training	10	June 18
Sheena Symington (Oliver Centre Manager)	Oliver Ecological Centre Open House	30	June 22
Mark Dockstator (Trent University)	Native Studies Teaching Retreat	8+	August 11-Aug 18
Dave Woodfine and Eric Sager (Trent University)	Wetland Ecology: Life on the Edge. 2 week residential field course	12	August 25-Sept 6
Pauline Quesnelle (Trent University GSA)	Graduate Student “Welcome” Party	32	September 6
Tom Hutchinson (Trent, ERS and Biology)	Mark Wilson – mushroom identification and diversity in Oliver Centre ecosystems	1	August 10 – September 10
Heather Smith (Peterborough Field Naturalists)	Mark Wilson - Mushroom walk and identification	15	September 15
Peterborough Field Naturalists (with E. Nol)	Saw whet owl banding	20	September 30 for five weeks

Teaching at the Oliver Ecological Centre

The variety of habitats (wetlands, old abandoned fields, forests, shoreline and lake) in addition to proximity of the Oliver Centre to Trent University makes it an excellent site for one-day field trips. To date, field trips to the Oliver Centre include wetland ecology, limnology, herpetology and plant ecology courses.

During 2002, three residential field courses were offered at the Oliver Ecological Centre.

Environmental assessment techniques for aboriginal communities
This course taught by Brenda Koenig (Trent University) and Karen Gowanlock (MNR) was offered April 28 – May 8, 2002. The course description is the following: The primary objective of this course is to provide students in the Indigenous Environmental Studies program with appropriate western scientific theory and basic scientific skills to address environmental and natural resource issues that are frequently encountered on Indigenous lands. It is intended for students with little or no background in science.

Plate 6. 2002 Participants in the Environmental assessment techniques for aboriginal communities (ERSC/NAST 215H) residential field course.

Ecology of the Kawarthas
Twelve students attended the 2002 Field Course at the Oliver Centre, offered May 20 – June 1. Taught by David Woodfine and Tom Hutchinson of Trent University and Verna Higgins of University of Toronto, the focus was terrestrial plant ecology, aquatic ecology (limnology) and ornithology. The course description is the following: This course will introduce students to a wide range of ecosystems at the Oliver property and in the surrounding area. These included hardwood forest, old field successions, wetlands, lake shorelines and lakes themselves. Some emphasis will be on the ecology of target groups, i.e. amphibians, reptiles, fish and zooplankton, as well as birds, flowering plants and lichens. Ecological sampling and methods of investigation and analysis will be a theme. Students will design a small research project that incorporates different components of one ecosystem and the interdependence of abiotic and biotic factors. A number of lectures will be given in the first week. During much of the second week, students will design and carry out their own research projects.

Plate 7. 2002 Participants of Ecology of the Kawarthas (BIOL-ERSC 386H), a two-week residential field course.

Wetland Ecology: Life on the Edge

Twelve students attended the Life on the Edge field course offered Aug 25- September 6, 2002. This course taught by David Woodfine and Eric Sager both of Trent University focused on the littoral zones of lakes and wetlands. The course description is the following: This course will examine the role of littoral and wetland communities in the functioning of the Kawartha Highlands ecosystem. This will include a combination of field and laboratory work examining both flora and fauna of these eco-zones. Students will learn the role that these systems play in greater hydrological cycle. In addition to identification of key species, field topics include bogs succession, effect of shoreline development on littoral communities and provincial wetland evaluation.

Plate 8. 2002 Participants of Life on the Edge: Wetland Ecology (BIOL-ERSC 387H), a two-week residential field course.

Teaching Camp for Traditional Aboriginal Knowledge and Spirituality – Mark Dockstator of Trent University. A preparatory gathering was held at the Oliver Centre in August in order to determine the suitability of the land at the Oliver Centre to develop a future "field school" that would teach aspects of Aboriginal spirituality/indigenous knowledge, utilizing a traditional camp setting and learning environment. This gathering with the invited Elder was very successful and there is a request to use the facility again next year.

Collection of Baseline Data at Field Station

The Banding of Saw-whet Owls – Chris Risley

A banding operation was conducted at the Oliver property of Trent University in the Fall of 2002 to capture and band migrating Northern Saw-whet Owls (Aegolius acadicus). The project is volunteer-run by staff and students of Trent University and members of the Peterborough Field Naturalists. About 20 volunteers participated this fall.

Banding was conducted in woods near the cottage on the Oliver property. Seven nets were arranged in three areas; hardwood forest east of the cottage, on a hydro cut in cedar bush to the north and in mixed forest to the west. The nets were opened for at least four hours from 7 pm to 11 pm on each night suitable for banding. Banding was not conducted on rainy, snowy or windy nights. The dates of operation for 2002 were from Sep 30 to Oct 28. During this time, the nets were open a total of 522.2 net hours (or an average of 19.3 net hours per night). A net hour is one net open for one hour (helps standardize netting effort comparisons between years and stations). Tape recorder or CD players with owl calls were used as lures during the netting operation.

A total of 56 saw-whet owls were captured in the fall 2002 season. The largest number caught was on Oct 10 when six were caught but also Oct 8 & 15 when five were caught. The average number caught per night when nets were up was 2.1 owls. The owls can be aged by wing feather moult patterns and the breakdown was: hatching year: 27, second year: 16, after second year: 7, after hatching year 1 and unknown 5. Owls may be sexed by wing chord length (females are larger) although overlap between the sexes and difficulty knowing how wing chord should be measured makes it unreliable; our data would suggest: male 1, female 35 and unknown 20. It is unlikely that the sex ratio is this skewed. Another method sexing using weights and wing chord is available but has not been applied to our data.

Saw-whet owls have the highest rate of recapture of any land-bird in North America. One owl was caught on Oct 17 which had been banded at another location and two owls which we banded were subsequently caught in Virginia and Pennsylvania.

Table 1. Northern Saw-whet owl captures by age, sex and age/sex class at the Oliver Ecological Centre banding station (1999-2002). 2002 data has been added to a table constructed by Sarah Dauncey as part of her Honours Thesis April 2002.

Number of Owls Caught

	1999	%	**2000**	%	**2001**	%	**2002**	%	**Total**	Overall %
Age										
HY	**67**	51	**14**	19	**13**	35	**27**	48	**121**	40
AHY	**65**	49	**60**	81	**22**	60	**24**	43	**171**	57
U	**0**	0	**0**	0	**2**	5	**5**	9	**7**	3
Total	**132**	100	**74**	100	**37**	100	**56**	100	**299**	100
Sex										
M	**27**	20	**9**	12	**1**	3	**1**	2	**38**	13
F	**92**	70	**63**	85	**25**	67	**35**	62	**215**	72
U	**13**	10	**2**	3	**11**	30	**20**	36	**46**	15
Total	**132**	100	**74**	100	**37**	100	**56**	100	**299**	100
Age/Sex										
HYM	**23**	17	**3**	4	**0**	0			**26**	11
HYF	**38**	30	**9**	12	**10**	27			**56**	23
HYU	**6**	5	**2**	3	**3**	8			**11**	5
AHYM	**4**	3	**6**	8	**1**	3			**11**	5
AHYF	**54**	40	**54**	73	**15**	41			**123**	50
AHYU	**7**	5	**0**	0	**6**	16			**13**	5
UU	**0**	0	**0**	0	**2**	5			**2**	1
Total	**132**	100	**74**	100	**37**	100			**243**	100

HY and AHY age classes denote hatch-year and after hatch-year individuals, U is of unknown age
M sex categories indicating male, F indicating female and U is of unknown sex.

The Canadian Lakes Loon Survey of Pigeon Lake 2002 - Alison Clark
The summer of 2002 was the second year the James McLean Oliver Ecological Centre participated in the Canadian Lakes Loon Survey. Again, Robert Sarginson acted as mentor to the project. To this end, Robert not only shared nest and territory locations, but actively surveyed the southern end of the lake throughout the season. Robert's experience conducting the loon survey played a critical role in this years' survey success. Guidance and assistance from Eric Sager and Sheena Symington also contributed greatly to the operation of the survey.

This summer proved to be a fruitful season for the Common Loon on Pigeon Lake. By mid-May sixteen pairs had been established. Before the end of June twenty-five pairs could be found between Nogies Bay and Emily Provincial Park, five of which were not successful and did not attempt re-nesting. Two nests located on floating wild rice mats were pillaged. Mink is currently the prime suspect. Other lost nests may have been washed out by either motorcraft wakes or changes in water table fluctuations resulting from the Trent Severn damn system. A total of thirty downy young were present on the lake by July and twenty-five survived to be large young at the end of August. This gives a reproductive success rate of 1.25 young per nest: a truly outstanding outcome for the loons. The reproductive rate can indicate whether a population is increasing or decreasing. In 2002, loon pairs on Pigeon Lake replaced themselves and further added to the population. Indeed, one pair successfully fledged three young. This accomplishment is unprecedented in the last fourteen years of the survey. The last available provincial reproductive rate for loons is 0.5 young per nest from 1999. If this rate were to continue, loons would not successfully replace themselves. That is, the loon population of Ontario could decline. Clearly, Pigeon Lake has a lot to offer loons.
Loons are sensitive to changes in their environment, many of which are caused by human activities. For instance, shoreline development can influence loon populations. Loons use shorelines to build their nests. Natural shorelines provide habitat for fish, their primary food source, and create an area of refuge for young. Much of Pigeon Lake's shoreline is developed. Effort should be taken to maintain or enhance natural shorelines that will encourage loon nesting. Lead sinkers and jigs can also impact on loon populations. Loons, as with many birds, consume pebbles to aid digestion. Often, loons will pick up lead sinkers which results in lead poisoning and ultimately death of the bird. Using non-lead sinkers will eliminate this consequence.

Motor boats and jet skies can create large wakes that can wash-out loon nests. These fast moving water crafts give loons little notice. Loons may be easily frightened which could adversely affect nesting or disturb young hiding amongst vegetation. On Pigeon Lake boat activity is quite high, particularly in the northern half where water is deeper and contains fewer weeds. Interestingly, the majority of pairs nested south of Jacob's Island. Here, waters are shallow and weedy with less fast moving boat activity. The loons on Pigeon Lake may in fact be adapting to life with expanding human activity. However, it is the responsibility of all Pigeon Lake residents to ensure that people and loons co-exist.

Years of monitoring fishing tournaments and loon success has demonstrated that tournaments held during critical nesting periods may negatively impact loon breeding success. This year major fishing tournaments did not commence until the month of July. At this point, the majority of loons had already hatched. These efforts may provide explanation for the great loon success on the lake and the results may offer incentive to continue these endeavours.

Pigeon Lake is one of the most productive loon lakes in Ontario. This year's loon survey confirms this notion. Loons are an integral part of life on Ontario lakes. They are interwoven into Canadian culture. Their melodic songs bestow delight to those fortunate enough to co-inhabit the same environment. The Canadian Lakes Loon Survey is an essential tool in ensuring that loon populations continue to prosper. The results of these endeavours assist in indicating potential problems and declines as well educating the public on how our activities can complement the Common Loon.

Table 2. Pigeon Lake Loon Survey

Year	% Pigeon Lake	# Loon Nests	% Young Per Nest	Bass Tournament
1989	20% of lake	5 pairs, 4 DY, 3 LY	.6	July 1
1990	30% of lake	6 pairs, 5 DY, 3 LY	.5	late June or early July
1991	50% of lake	12 pairs, 8 DY, 6 LY	.5	June 29-30
1992	100% of lake and Pigeon River	22 pairs, 23 DY, 19 LY	.863	July 25/26 1st tournament
1993	100% of lake/river	21 pairs, 25 DY, 19 LY	.904	No tournaments June/July
1994	100% of lake/river	22 pairs, 23 DY, 11 LY	.5	July 3
1995	100% of lake/river	18 pairs, 11 DY, 7 LY	.388	July 1, 2, 9, 15, 30
1996	100% of lake/river	15 pairs, 20 DY, 18 LY	1.02	No tournaments June/July
1997	100% of lake/river	19 pairs, 19 DY, 11 LY	.57	June 29, July 12, 13
1998	100% of lake/river	20 pairs, 21 DY, 13 LY	.65	July 4, 5, 11, 12, 18, 19, 25, 26
1999	100% of lake/river	21 pairs, 23 DY, 16 LY	.762	July 10, 17, 18, 24, 25, 31
2000	100% of lake/river	23 pairs, 27 DY, 21 LY	.913	July 23-29
2001	100% of lake/river	21 pairs, 19 DY, 17 LY	.809	June 30, July 14, 15, 21
2002	100% of lake/river	20 pairs, 30 DY, 25 LY	1.25	July 13,14,21,27

Plate 9. Mother Loon with triplets on Pigeon Lake, a real rarity. This picture is courtesy of Robert Sarginson. June, 2002.

Documentation of Ecological Information

Nutrient cycling experiments- Professor Tom Hutchinson
Nutrient cycling experiments have been set-up in the mature sugar maple forest to assess the impact of litter on soil nutrient cycling and plant growth. During the fall of 1999 leaf litter was collected from the Sugar Maple area of the forest to be sorted, identified, dried and archived for future use/analyses.

Climate records - A MET station was established in June 2000. The software at this station records a reading every half-hour for average air/soil temperature and relative humidity, total rain fall and snow depth, wind direction and speed and solar irradiance. It is intended to establish the Oliver Centre as a regional climatological and air pollution centre.

Long-term Salamander Survey – Professor Joe Cebek
Two species of the salamander, the red-backed and blue-spotted salamanders, are regularly found at the Oliver Centre. Salamanders have moist, sensitive skins that make them especially vulnerable to disturbances in their habitat. Ecologists have started using the abundance of salamanders to help them identify healthy forests; i.e. salamander densities can be high in mature, diverse forest stands. Since 2000, we have been monitoring salamander abundance at the Oliver Ecological Centre with a long term goal of tracking population trends at the site. On July 19th, 2001 cover boards were set out along the south side of an ephemeral pond. These boards will provide long term covers for salamanders. The data collected from this study will give an estimate of density and species composition of the local salamander population.

Location: Three 55 m transacts along the south side of the Wood Pond.
Cover boards: 36 - 100cm^2 cedar boards. Placed 5 m apart. 12 boards/ transact.
Total area covered: 550 m^2
The four corners of the survey plot were flagged and GPS readings were taken.
Sampling frequency: 6 times each summer
Potential species: Northern Redback, Blue spotted, Four-toed, Spotted salamander, Red-spotted newt.

2002 Update for Salamander Survery – Professor Joe Cebek
Salamander monitoring continued at the Oliver property in 2002. Chris Reaume, an honours student at Trent University checked under cover boards roughly every 2 weeks from May to July. Red-backed salamanders were found regularly in May and early June; small numbers of blue-spotted salamanders were also found in this time period. Spring soil temperatures averaged 20° C. With the start of summer, soil temperatures under the cover boards were sometimes in excess of 25° C; Chris seldom found salamanders from late June on. One four-toed salamander was also found in 2002, confirming the presence of this species on the property.

Amphibian research at the Oliver Centre -Professor Michael Berrill and associates

Species diversity and population monitoring:
We assessed the occurrence and relative abundance of frogs in ephemeral wetlands on the Oliver Centre property and in adjacent ponds and inlets, including Nogies Creek. We documented breeding populations of Spring peepers (*Hyla crucifer*), Chorus frogs (*Pseudacris triseriata*), Leopard frogs (*Rana pipiens*), Wood frogs (*Rana sylvatica*), American toads (*Bufo americanus*), Tree frogs (*Hyla versicolor*), Green frogs (*Rana clamitans*) and Bullfrogs (*Rana catesbeiana*). Of these, only the Leopard frog occurred in unexpectedly low numbers.

Unexpected developments:
1) Wood frog tadpole die-off
Wood frogs breed in early spring in the two of the major ponds that we monitored. Both ponds dried up by the end of the summer of 2000, 2001 (but not 2002) and must be considered ephemeral. They are about 300 meters apart, and are about the same size and appearance. In one of the ponds, Wood frog tadpoles grew successfully to metamorphosis and dispersed away from the pond before it dried up. However, in the

second pond in 2000 and 2001, the tadpoles died in the late stages prior to metamorphosis. Such a catastrophic die-off is very unusual and concerning. Preliminary analysis indicates it is due to a virus known to occur elsewhere in North America but never reported in Ontario before. Because of the potential significance of this event, we are launching a detailed enquiry into tadpole deaths across the province.

2) Bullfrog populations in decline
Bullfrogs breed in suitable habitats in permanent water in the area. In particular, they breed along most of the length of Nogies Creek. Data from previous studies in the 1970s and then again in the early 1990s suggested that there may have been some decline in population sizes. For two seasons, we monitored the Bullfrogs in populations scattered along a 6 km stretch of Nogies Creek, including the sites included in the previous studies. We marked 300 adults each season by inserting a small chip into the abdomen of each - when recaptured, we could identify each of these using a wand-like chip reader. We are able now to identify the marked frogs until they die or disperse out of the area. Preliminary results indicate that the populations of Bullfrogs have declined precipitously since the 1970s, and we are exploring the potential causes.

***Websites**:*
We have constructed a website linked to the main Oliver Centre website which provides an introduction to the amphibians of the Oliver Centre and adjacent wetlands.
As well, we have constructed an interactive website for anyone who has noticed a tadpole die-off anywhere in Ontario and wishes to send us information about it..

Personnel involved:
Neil Osborne, Tina Howe, Dave Ireland, Amy Greer, Chris Reaume and Sue Chow have been involved in various parts of the project. Neil did much of the initial work on the Wood frogs. Dave spent most of two months living at the Oliver Centre in both 2001 and 2002, monitoring and marking Bullfrogs each night (with the assistance of Neil and then Chris). Amy has worked on the question of the tadpole die-offs and their causes, and developed the tadpole die-off website. Sue did most of the work on the website on amphibians of the Oliver Centre, including the art. Tina has worked at times on all parts of the project.

Mushroom Survey – Professor Tom Hutchinson. Mark Wilson spent the month of August 2002 identifying mushrooms at the Oliver Centre and surrounding areas. One hundred and thirty-one species of mushroom were identified from thirty-four different families. A complete Mushroom List for the Oliver Centre 2002 is available upon request.

Table 3. Oliver Centre Bird List

1. Common Loon
2. Canada Goose
3. Mallard
4. Hooded Merganser
5. Red-breasted Merganser
6. Common Merganser
7. Common Flicker
8. Pileated Woodpecker
9. Downy Woodpecker
10. Yellow-bellied Sapsucker
11. Great-blue Heron
12. Green Heron
13. Ruffed Grouse
14. Osprey
15. Red-tailed Hawk
16. Turkey Vulture
17. Merlin
18. Kestrel
19. Ring-billed Gull
20. Spotted Sandpiper
21. Ruddy Turnstone
22. Mourning Dove
23. Whip-poor will
24. Belted Kingfisher
25. Ruby-throated Hummingbird
26. Black-capped Chickadee
27. Rose-breasted Grosbeak
28. Cedar Waxwing
29. Eastern Kingbird
30. Least Flycatcher
31. Eastern Phoebe
32. Eastern Wood Pewee
33. Philadelphia Vireo
34. Warbling Vireo
35. Red-eyed Vireo
36. Chestnut-sided Warbler
37. Black-throated Green Warbler
38. Ovenbird
39. Yellow Warbler
40. Common Yellowthroat
41. American Redstart
42. Golden-winged Warbler
43. Black-and-white Warbler
44. Clay-coloured Sparrow
45. Field Sparrow
46. Song Sparrow
47. Chipping Sparrow
48. Savannah Sparrow
49 Bobolink
50. Baltimore Oriole
51. Purple Martin
52. Barn Swallow
53. Tree Swallow
54. Grey Catbird
55. Brown Thrasher
56. Eastern Bluebird
57. American Robin
58. Wood Thrush
59. Veery
60. House Wren
61. Black-billed Cuckoo
62. Red-winged Blackbird
63. Eastern Meadowlark
64. Common Grackle
65. Common Crow
66. Blue Jay
67. Northern Cardinal
68. American Goldfinch
69. Brown-headed Cowbird
70. European Starling
71. Ruby-crowned Kinglet
72. Hermit Thrush
73. Yellow-rumped warbler
74. Hairy woodpecker
75. White-breasted nuthatch
76. Olive-sided flycatcher
77. Great crested flycatcher
78. Nashville warbler
79. Myrtle warbler
80. Blackburnian warbler
81. Northern waterthrush
82. White-throated sparrow
83. White-crowned sparrow
84. Eastern towee

***bolded items indicate added in 2002**

Table 4. Oliver Centre Reptile and Amphibian Spring Checklist

Frogs/Toads:
- Spring peepers (*Pseudacris crucifer*)
- Chorus frogs (*Pseudacris triseriata*)
- Leopard frogs (*Rana pipiens*)
- Wood frogs (*Rana sylfatica*)
- American toads (*Bufo americanus*)
- Grey treefrogs (*Hyla versicolor*)
- Green frogs (*Rana clamitans*)
- Bullfrogs (*Rana catesbeiana*)

Salamanders:
- Blue spotted salamanders (*Ambystoma laterale*)
- Spotted salamanders (*Ambystoma maculatum*)
- Red-backed salamanders (forest breeders; *Plethodon cinereus*)
- Four-toed Salamander *(Hemidactylium scutatum*)

Reptiles:
- Painted turtles (*Chrysemys picta*)
- Snapping turtles (*Chelydra serpentina*)
- Water snakes (*Nerodia sipedon*)
- Eastern Garter snakes (*Thamnophis sirtalis sirtalis*)

Table 5. Oliver Centre Butterfly Checklist

Papilionidae (swallowtails)
- Canadian Tiger Swallowtail *Papilio canadenis*
- Black Swallowtail *Papilio polyxenes*

Pieridae (whites & yellows)
- Cabbage White *Pieris rapae*
- West Virginia White *Pieris virginiensis*
- Mustard White *Pieris napi*
- Orange Sulphur *Colias eurytheme*
- Clouded Sulphur *Colias philodice*

Lycaenidae (gossamer-wings)
- Harvester *Feniseca tarquinius*
- Spring Azure *Celastrina ladon*
- Silvery Blue *Glaucopsyche lygdamus*
- Eastern Tailed-Blue *Everes comnytas*
- Banded Hairstreak *Satyrium calanus*
- Coral Hairstreak *Satyrium titus*
- Acadian Hairstreak *Satyrium acadia*
- Bronze Copper *Lycaena hyllus*

Table 5. continued

Nymphalidae (brushfoots)

Tawny Crescent *Phyciodes batesii*
Northern Crescent *Phyciodes cocyta*
Eastern Comma *Polygonia comma*
Question Mark *Polygonia interrogationis*
Mourning Cloak *Nymphalis antiopa*
American Lady *Vanessa virginiensis*
Red Admiral *Vanessa atalanta*
White Admiral *Limenitis arthemis arthemis*
Viceroy *Limenitis archippus*
Eyed Brown *Satyrodes eurydice*
Northern Pearly-eye *Enodia anthedon*
Little Wood-Satyr *Megisto cymela*
Common Ringlet *Coenonympha tullia*
Monarch *Danaus plexippus*
Great Spangled Fritillary *Speyeria cybele*
Atlantis Fritillary *Speyeria atlantis*
Meadow Fritillary *Boloria bellona*
Common Wood Nymph *Cerecyonis pegala*

Hesperiidae (skippers)

Northern Cloudywing *Thorybes pylades*
Juvenal's Duskywing *Erynnis juvenalis*
Dreamy Duskywing *Erynnis icelus*
European Skipper *Thymelicus lineola*
Least Skipper *Ancyloxpha numitor*
Peck's Skipper *Polites peckius*
Tawny-edged Skipper *Polites themistocles*
Northern Broken-Dash *Wallengrenia egeremet*
Hobomok Skipper *Poanes hobomok*
Dun Skipper *Euphyes bimacula*

Research 2002

EMAN Plots established at the James McLean Oliver Research Station – Tom Hutchinson and Rebecca Grant

The Ecological Monitoring and Assessment Network (EMAN) operates on the basis that long term data sets, each using the same standard methods, should provide insights about species change over broad regions, raise questions for additional research, and help define or avoid certain environmental problems. To acquire long-term data sets it is necessary to establish permanently marked sample areas, to allow for return visits and monitoring procedures.

During the months of July and August 2002, five EMAN monitoring plots were established at the James McLean Oliver Research Center. The purpose of the plot establishment was to enable assessment and future monitoring of forest health in four different forest types and one early successional open field. One 20m by 20m plot was established in each of the following forest types; mature sugar maple (*Acer saccharum)* stand, mature white cedar (*Thuja occidentalis)* stand, mixed hardwood stand, open early successional field, and a mixed white pine (*Pinus strobus*) stand.

At each of the plots several assessment strategies were used in order to evaluate the health of the trees within the stand. All trees within the plot were tagged and numbered, and measured for their diameter at breast height (DBH). Each tree within the plot was then mapped in relation to all others, computer software allowed the generation of a tree map identifying the position of each numbered tree within the

plot. Tree height and tree condition were evaluated as well. Tree condition was assessed and assigned to one of 9 categories that were based on the trees vertical positioning (standing, leaning, fallen) and whether it was dead or alive. Crown condition of the trees was visually assessed and fitted to a category, as was stem health and crown class. Regeneration assessment was accomplished at each site as well, this involved identification and counts of seedlings and saplings present within the plots.

The data resulting from the plot assessments indicate that all plots are in good health in relation to tree condition and regeneration ability. The data collected will contribute to the database for all EMAN monitoring plots, which will be used to predict and evaluate problems on a regional scale in the future.

Oliver ozone garden research summary – Tom Hutchinson and Krista Campbell

The vegetable garden located at the James McLean Oliver Ecological Centre was one of five gardens included in a geographical analysis of the effects of increasing levels of tropospheric ozone on crop plants carried out during the summer of 2002. Tropospheric ozone is the main chemical constituent in smog, an increasingly common weather phenomenon affecting southern and central Ontario during the summer. Ozone is formed by a reaction between nitrous oxides (the major causes being factory emissions and vehicle exhaust) and volatile organic compounds, which can only take place in the presence of sunlight. The free radical compound, ozone, which results is generally found away from the source of the emissions since the reaction takes time and all the compounds are carried by wind and air currents while the process is taking place. Ministry of Environment and Energy data shows that the Peterborough area consistently receives among the highest levels of smog (and therefore concentrations of ozone) in the province. This is due Peterborough's geographic location, north east (downwind) of Toronto, a major source of vehicle emissions, and of some major sources of factory emissions generated in south western Ontario and in the northern United States.

Ozone can be very damaging to many types of vegetation as well as to human health. There have been numerous studies completed assessing the magnitude of crop loss due to ozone exposure and quantifying the associated economic losses. Recently studies have shown significantly decreased lung capacities of people engaged in physical labour outdoors during smog episodes and increased incidence of asthma attacks and respiratory distress have been proposed to be a direct result of increased ozone concentrations in summer air.

This study was interested in determining qualitatively how crops grown in different geographic regions in central Ontario were being affected by summer concentrations of ozone. The garden sites tested were located at Trent University, the Hutchinson farm near Norwood, the McKillop farm near Westport, the Green farm near Huntsville and the Oliver Centre near Bobcaygeon. Damage to vegetation was assessed by monitoring for visible leaf damage on the crops. Visible ozone damage is characterized by leaves showing intervienal bleaching and/or interveinal necrosis. This results in early senescence of the affected leaves.

Ozone levels monitored at the Oliver centre were consistently above 50ppb, the concentration considered to be the safe threshold for plants. Despite these high concentrations, most of the crops in the garden did not show signs of visible ozone damage. However, three of the four bean varieties did show signs of visible damage generally associated with ozone exposure. Beans are known to be particularly vulnerable to ozone exposure, and were the only crop to show definitive signs of damage in any of the study gardens. While the beans did produce pods, an interesting follow up to this study would be to study the harvest weight of bean crops grown at the Oliver exposed to ambient (normal) air and in a chamber with filtered air to determine if the natural levels of ozone experienced in the area during the summer are high enough to be detrimental to bean crop yields.

Species Inventory and Community Structure Evaluation of the Oliver Ecological Center Cedar Forest - Alison Clark and Dave Ferguson, July 2002

The cedar forest located in the southwest corner Oliver Ecological Centre along the north-western region of Pigeon Lake subscribes to the typical Eastern white cedar forest conditions. Dominant tree species are Eastern white cedar, black ash (*Fraxinus nigra*), red maple (*Acer rubra*), bur oak (*Quercus macrocarpa*), basswood (*Tilia americana*), and American elm (*Ulmus americana*). However, most tree species, with the

exception of cedar, are saplings. The total lowlands area is 5 hectares, while the actual forest is approximately 2 hectares. It is bordered by a small marshy cove to the west and a hydro-cut and open field to the north and east. South of the cedar forest is lake and Oliver Centre cottage.

The overstorey and understorey vegetation was calculated using a cruise strip method. Four parallel transects, running NE 30 degrees, were set up measuring a total of 320m in length. All tree and shrub species within 1m of either side of the transect were measured for diameter at breast height (DBH) and classified into vertical strata position based on height and DBH. The classifications are as follows: Dominant Overstorey, Co-dominant Overstorey, Understorey, Super Sapling, Sapling and Shrub. At every 10m interval on the transect, the ground flora and composition was inventoried using a $1m^2$ quadrat. All forbs species were identified and graminoids when flower presence made it possible. A relative cover was given for higher plants, moss, floor litter, bare soil, downed woody debris, and rocks. Tree seedling and shrubs were identified, counted, and given a relative cover. A complete species plant list was completed for the entire cedar forest. Thus all edge species including lakeshore and meadow plants. According to Martin *et al* (2001) who have studied several cedar forest in Ontario and established age-specific community structures, this cedar forest is at least 100 years old. The basis for this claim stems from the presence of certain herbs such as Jack-in-the-pulpit (*Arisaema triphyllum*), evening enchanters nightshade (*Circeae alpine*), and bladder fern (*Cystopteris bulbifera*).

Graduate Student Research

PhD Candidate: 2002

The interactive effects of increased UV-B and nitrogen on seedlings of Acer saccharum *in temperate deciduous forests 1999-*

Sager, Eric (PhD Candidate) with Tom Hutchinson (Supervisor) Environmental and Resource Studies Program, Trent University, Peterborough, ON, Canada.

A field experiment has been established to assess the impact of increased exposure to UV-B, due to stratospheric ozone thinning, and nitrogen fertilization on foliar characteristics and flavonoids on sugar maple seedlings. In the spring of 1993, surface UV-B reached levels that were 40% above normal and this was directly related to a reduction in total stratospheric ozone with the primary causal agent being the eruption of Mt. Pinatubo. While 1993 may be anomalous with respect to the high levels of UV-B experienced at more temperate latitudes, the continued loading of ozone depleting chemicals into the atmosphere could result in the annual occurrence of those conditions experienced in 1993. The fact that these large increases in UV-B are occurring in spring at a time when new plant foliar growth is occurring may present a risk to the long-term health of forests. The continued deposition of nitrogenous compounds, largely originating from automobile exhaust and industrial emissions, represents another potential stress to forests. The long term deposition of nitrogen to forest systems can lead to eutrophication, which leads to increases in plant growth and productivity, and eventual acidification of soils. Previous studies have demonstrated that prior land-use history and the buffering potential of the soil parent material plays a significant role in preconditioning the response of the forest of nitrogen fertilization and possible saturation. Therefore, experimental plots have been set up at two sites, the James McLean Oliver Ecological Centre, where the soils are highly alkaline, and the Haliburton Forest and Wildlife Reserve where the soils are much more acid sensitive. Native sugar maple seedlings are being exposed to ambient and sub-ambient levels f biologically effective UV-B radiation. Nitrogen fertilizer (NH_4NO_3) gas also been applied at levels equivalent to an additional 50 kg $N \cdot ha^{-1} \cdot yr^{-1}$ over the last two growing seasons.

For additional information please contact Eric Sager at (705)748-1101 extension 1647 esager@trentu.ca or Tom Hutchinson at (705)748-1634 thutchinson@trentu.ca

Air-surface exchange of PBDEs and PCBs: Evidence for an "early spring pulse" and long-range transport – 2002

Todd Gouin, (PhD Candidate) with Don Mackay (Supervisor) Canadian Environmental Modelling Centre, Trent University, Peterborough, ON, Canada.

Polybrominated diphenyl ethers (PBDEs) are a class of fire retardants that are emerging as a "new" persistent organic pollutant. Due to their suspected toxicity, potential for bioaccumulation in aquatic food chains and detection in environmental samples of air, water, sediment and fish, PBDEs may pose a growing environmental threat. In a collaborative study conducted at the James McLean Oliver Ecological Centre during the spring of 2000, which involved researchers from the Canadian Environmental Modelling Centre at Trent University and Lancaster University in England, 36 air samples and 12 leaf-litter samples were collected over a three-day period, prior to bud burst, in order to measure the simultaneous diurnal variations in PCBs and PBDEs. Compared to PCBs, relatively little information exists on environmental levels of PBDEs, especially pertaining to atmospheric and temperature dependent data. Thus by comparing the diurnal data obtained for PCBs, which have been well studied, to data obtained for PBDEs for the same samples, we hoped to provide valuable insights about the air-surface exchange of these compounds, and determine if PCBs and PBDEs behave similarly.

Total PBDE concentrations in the air ranged between 90 and 1250 pg/m^3, and were dominated by the lighter congeners (PBDE-17, 28 and 47), while concentrations of total PCBs ranged between 100 and 950 pg/m^3, and were dominated by the lower chlorinated (tri- to tetra-) congeners, namely PCB-18, 22, 28, 31, 49 and 52. It is hypothesised that the high PBDE concentrations are the result of an "early spring pulse" in which PBDEs deposited in the snowpack over the winter are released with snow melt, resulting in elevated concentrations in the surface and air. As a result of evaporation and partitioning into foliage following bud burst, PBDE concentrations in air were observed to return to low values of 10 to 20 pg/m^3. A paper discussing the results of this study has been published in *Environmental Science and Technology* (2002, *36*, 1426-1434).

Currently the research group at the Canadian Environmental Modelling Centre, led by Don Mackay and Todd Gouin, is focused on better understanding the mechanisms influencing this "early spring pulse" effect. This is a collaborative effort which involves researchers from Lancaster University, Environment Canada and the James McLean Oliver Ecological Centre, and began in the winter of 2002 with a comprehensive investigation of the "spring pulse hypothesis" at the James McLean Oliver Ecological Centre. A number of high volume air samples, litterfall and surface organic material were collected over the course of several months (winter to late spring). Samples will be analysed for PCBs and PBDEs. In addition to the intensive sampling campaign at the Oliver Centre, a number of passive air samplers (PUF disc samplers), which have been previously tested (Shoeib and Harner, *Environmental Science and Technology*, 36, 4142-4151) have been deployed at ten locations representing a variety of rural and urban sites. Thus, it is hoped that by combining data collected from both the passive air samplers and the high volume air samples that we will provide a better sense of the spatial and seasonal distribution of PBDEs.

MSc Candidates: 2002

Nogies Creek Bullfrog Research 2001-

Ireland, David (MSc Candidate) with Michael Berrill (Supervisor) Biology, Trent University, Peterborough, ON, Canada.

Bullfrog research has been a continuing process at Nogies creek since 1977. Anecdotal and observational evidence suggests a once "booming" population has undergone severe declines in numbers. The primary cause of such declines has been attributed to large commercial/illegal harvests during the 1950's and 1960's. Past research concentrated on life history and behavioural changes over time. Long term data of this nature aids in the understanding of a single, dynamically changing, "closed" population. Present research is

focusing on the question of what constitutes a population. Without sufficient immigration/colonization from geographically distinct stocks, do the Bullfrogs of Nogies Creek have the ability to rebound from population reductions of the past? More specifically, have these Bullfrogs retained sufficient genetic diversity to adapt to an ever changing, increasingly contaminated landscape?

Methods used to test such questions include:

1. Gathering life history and behaviour information
2. Permanently marking individuals to gain data on local movement within and between the breeding seasons.
3. Extracting DNA, through blood acquisition, for individual genetic analysis.

Comparative, 'reference' sites, on the Pigeon River System are also being studied and the Oliver Ecological Centre provides a unique, accessible home base to conduct this research.

For more information please contact David Ireland, direland@trentu.ca or Michael Berrill at mberrill@trentu.ca

A World Out of Balance: Assessing the Cause, Occurrence and Implications of an Emerging Wildlife Pathogen. 2001-

Greer, Amy (MSc Candidate) with Michael Berrill (Supervisor) Biology, Trent University, Peterborough, ON, Canada.

The family Iridoviridae contains viruses that have been classified as diseases of amphibians, fish and invertebrates. The cause of an epizootic, systemic disease causing death within larval wood frogs and leopard frog metamorphs at three different locations within Southern Ontario was investigated. Liver tissues from affected animals were examined histologically for pathological tissue changes as well as tested for the presence or absence of an Iridovirus infection using molecular genetic techniques and analysis. Animals involved in die-off events at all three locations were found to exhibit characteristic clinical signs and liver pathology indicative of a viral infection. Samples collected during die-off events from 1999 - 2002 at the Oliver Pond, Kortright Centre for Conservation, and Gannon's Narrows tested positive for a Ranavirus infection (Family: Iridoviradae). Wood frog egg broods from the Oliver pond were also found to test weakly positive for Ranavirus infection. This finding suggests that vertical transmission may play a role in maintaining the pathogen within a population. An Iridovirus has been identified as an agent that has the ability to cause disease and death within wood frog and leopard frog populations within Ontario. If these die-offs continue they may be of a magnitude so severe that this type of pathogen could be a direct contributor to amphibian population declines within Ontario as well as local or widespread extinction.

For more information please contact Amy Greer, amgreer@trentu.ca or Michael Berrill, mberrill@trentu.ca

Undergraduate Honour Thesis Research

Characterization of Cytokinins in Leaves from a Mature Acer Saccharum Canopy Using HPLC-Electopspray Tandem Mass Spectrometry.

Held, Mark (Honours Biology) with Neil Emery (Supervisor) Biology, Trent University, Peterborough, ON, Canada

The effects of canopy structure on the distribution and abundance of cytokinins (CK) remain uninvestigated. CKs are signaling molecules that regulate stomatal conductance and inhibit leaf senescence. Thus, they likely play key signaling roles in orchestrating canopy strategies, even within a single tree. Data pertaining to cytokinin identification and abundance in the canopies of dominant tree types is completely lacking in the literature. All such existing data from trees have relied upon immature seedlings grown in

artificial environments. Here we report the first *in situ* measurements of cytokinin abundance from a mature *Acer saccharum* canopy. Tissue samples were collected at two height classes within several mature sugar maple trees (Trent University Research Station, Pigeon Lake, ON) during the summer of 2002. Leaf extracts were purified to test for the possible presence of 8 forms of CK. Detection was confirmed after two steps of solid phase extraction (C_{18} and strong cation exchange) by HPLC-electrospray tandem mass spectrometry (LC-MS-MS). The riboside pathway predominated with iPA as the most abundant CK. iPA is the presumed precursor of *trans*-ZR and DZR, which were the most abundant active forms. *cis*-ZR was also observed in some samples. Although free base CK like Z and DZ were not detected, significant quantities of iP were present. Results from upper and lower canopy positions will be compared with a view to understanding the role of CK regulation of leaf development and physiology with particular attention to contrasting roles at different canopy height classes.

For more information please contact Mark Held, maheld@trentu.ca or Neil Emery at nemery@trentu.ca

Master Theses Completed

Bell-Allen, Rhonda: An Examination of the Milfoil Weevil (Euhrychiopsis lecontei) Within Eurasian Watermilfoil Beds in Pigeon Lake, Canada. M.Sc. 2002

Bridges, Lisa: Spatial Scale and Environmental Structure: Habitat Selection of the Eastern Grey Squirrel (Sciurus carolinensis) in Central Ontario. M.Sc. 2002

Gouin, Todd: Long-range Transport of Organic Contaminants: The role of air-surface exchange. M.Sc. 2002

Phillips, Judith: Matrix Land-Use and the Nesting Density and Breeding Success of Three Species of Forest-Nesting Birds. M.Sc. 2002

Undergraduate Theses Completed

Bell, Rhonda. April, 2000. *Spatial and Temporal movement of the Aquatic Weevil* (Euhrychiopsis lecontei) *within the Kawartha Lakes: A potential Biological Control for Eurasian watermilfoil.* Environmental Resource Studies with M. Fox and T. Whillans.

McLeod, Brenna Annie, April 2000. *The influence of temperature on growth and behaviour of the adult green frog* (Rana clamitans) *and the pre-metamorph wood frog* (Rana sylvatica) *in ephemeral ponds.* Biology with Michael Berrill.

Newman, Daniel, April, 2000. *Island microhabitats in a riverine wetland near Nogies Creek, Ontario: the role of logs for species and community diversity.* Biology with Michael Berrill.

Taillon, Dan. April 2001. *The Effects of Residential Development on Littoral Zone Fish Communities.* Environmental and Resource Studies Program. with Michael Fox.

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Gouin, T., Mackay, D., Webster, E., Wania, F. 2000. Screening Chemicals for Persistence in the Environment. *Environ. Sci. Technol*. 34: 881-884.

Watmough, S.A., Hutchinson, T.C. 2002. Uptake of ^{207}Pb and ^{111}Cd through bark in mature Sugar Maple, White Ash and White Pine: A field experiment**.** *Environmental Pollution*.