Four-toed Salamander (*Hemidactylium scutatum*). Photo courtesy of Larry Evon

James McLean Oliver Ecological Centre

2004 Annual Report

Trent University's Long Term Environmental Research and Monitoring Centre

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Director's Report

The past year has seen much consolidation of the research and teaching work at the Oliver centre. As detailed elsewhere in the report, we continue to offer our field ecology courses through the Ontario University Program in Field Biology which attracts students from universities throughout Ontario. The student acceptance of these courses has been exceptional and my thanks particularly to our Manager, Dr Eric Sager for his co-ordination of this and for his excellent and enthusiastic teaching. Sheena Symington Sager has taken time off to raise her family of two boys but continues as a dedicated on-the-spot enthusiast for the important work of the Oliver Centre.

Graduate student research continues to be the main research feature at the centre. The scope of the research is increasing and the accumulation of long term records and knowledge of the habitats are allowing the researchers to develop better predictions as to effects of stresses and directions of change. Some particularly interesting and new research has been done on the movement of the persistent organic fire retardants, emanating from urban centres but being transported to the Kawarthas and retained for a while in the organic layers of the forest soils. The effect of both snow and rain on the quantities deposited has been looked at by Todd Gouin, one of Professor Don Mackay's doctoral students. Professor Shaun Watmough has also been very active at the centre, using it as part of a very large scale study of the effects of air pollution stress on nutrient retention and recycling in forest trees.

The long term monitoring of Oliver biota continues, with frog watch, butterfly annual updates, saw-whet owl banding all increasing our knowledge of the behaviour of the resident and visiting fauna at the site.

We have welcomed many local community visitors and have run short courses and meetings for them and for national and international visitors. Generous donations, such as that of Mrs. Audrey Hanbidge, have allowed us to build 2 beautiful wooden cabins for student and researcher accommodation and for use as a small classroom, which has improved facilities for all users.

The report contains details of the wide variety of activities that went on in 2004 and we hope readers will enjoy it and feel that they are involved and get a better understanding what is being achieved.

Tom Hutchinson, Director
Oliver Ecological Centre.

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. It also is the base for three annual residential undergraduate field courses.

Oliver Memories

Sheena Symington worked with Miss Oliver to develop an archival history of the property and of the Oliver family. She was able to document stories from Miss Oliver which provides a wonderful insight into life at the Oliver farm as it used to be. We are including some of these in the Annual Reports to provide a perspective on how it was and how it is today, in its new use by Trent University. This year's submission actually comes from the very first guests, Abner and Clara Bailey, that came to Lakeview Farm in 1906 on their honeymoon. These two poems were written in 1934 on a piece of birch bark that the Bailey's collected on Boyd (Big) Island on that first trip.

"Days at Lakeview"

We came to your home as transient guests-
The first of a growing throng.
I think you must have thought us fiests
We stayed in bed so long.
'Twas the country air that made us sleep
I must have some excuse
For the way we wasted your time for you
As if it was no use.

We drank our coffee and ate our toast
Served us by Annie Blair.
Across the room sat our patient host
Crooning a plaintive air
As she rocked little Margaret to sleep
In an old-time rocking chair
"Mother's Ain Wee Lambie" it seems to me
Were the words she used to sing
I can see it all, as it used to be-
The Summer- kitchen and everything
Even Kelpie who barked but wagged his tail
As if his friendship ne'er would fail.

Then we strolled at leisure down to the beach
And rowed away, way out of reach
Of the shore of the lake.
Thinking a 'longe perhaps we'd take
Or maybe, a big black bass.
Oh! The thrill that came from the 'longe I got
(Almost-yet didn't get)
A grandfather one, he weighed a lot.
My hands felt cold and my forehead hot
My heart went thump and my teeth were set
But that grandfather 'longe I did not get
He saucily jerked away.
But fishing was good, we caught a lot
The water was warm, the sun was hot
We lazily drifted - the world forgot.
He fixed the bait for the fish to take-
I dragged my fingers in Pigeon Lake.

We came along-side Nogey's Isle
We spied a cabin there
We tied the boat, we tiptoed up

But found it mostly bare.
All was silence, we found no clue-
Just a little bench and a chair or two.
We heard a laugh - a shrill-like tune
('Twas only the cry of the silly "Loon")
We sat on the porch a little while
Then left to visit the great "Big Isle".

To us, "Big Island" was a place of fairyland delight
Whose open spaces charmed us - whose forests dark as night
With interlacing branches and moss- grown fallen trees
Bespoke of undisturbing hand
And centuries of peace.
A peaceful quiet geigned o'er all,
The lull of waves upon the stones-
A sunlight ray thru branches tall-
And here and there some dropping cones-
A yellow moccasin hid in leaves-
Happy bird-calls in the trees-
A place for perfect rest.

In the distance, as out of the Big Wild West
We saw the object of our guest,
A herd of Buffalo Cows.
Nearer and nearer and nearer they came
There they stood as if they were tame.
We had been told they would not harm
But I looked at them with some alarm.
We took their picture as they stood,
Then quick they fled and were lost in the Wood.

One day we all went picnic bound.
We met the folks from all around.
My sleeves were tied with velvet bows.
"You will set the style", you said "All those
Will copy your bows, who came today".
I never heard 'fore I came away.

"Jim will take you", one day you said.
We had to rise early that day from bed.
You gave us a lunch and a pail to make tea.
We had a good time that day, us three
And it lingers still in our memory.
We loved the days spent on the Lake-
The hospitality which we found.
It is not always that you take
Such pleasant thoughts when home-ward bound.

The bonds of friendship drew us back,
Long years had passed between.
The baby had grown to woman hood
And one I had never seen
Was there to greet us when we stepped
Again within the door
Of the little summer kitchen,
Which had grown a spacious floor.

It was hard to picture some things
As they used to be before.

I had come so far to see you,
I could hardly wait the time.
We passed between the tables.
The stairs we had to climb.
The little rooms on either side
The passage-way, were new,
Then all of a sudden, I heard you say,
"Come here, till I look at you!"

We had a pleasant visit
But I missed the tete-a-tete
Of those other quiet evenings,
But the people were nice to meet.

The days went by-they were pleasant days
But I think I spent them in a haze.
Some days were glad-some days were sad
Thinking of other days I'd had.
But I knew you could not spend them with me
Because your time was seldom free.

I got a little used to things before I came away.
To see you all had been a joy. I hope some other day
When the Wander-lust shall get us
And before I get too gray
To dream once more on Pigeon Lake,
To see your cheery smile,
Take off my had and sit me down
And stay a little while.

For the friends that we love the best, my dear,
Are the friends of long ago.
The ground that has the strongest lure
Is the ground we used to know
When our feet were young and our hearts were light
And clouds sailed swiftly out of sight
Leaving a sky, all blue.

Clara Sperry Bailey
Dec. 18th, 1934

"The Other Side"

I also went to "caygeon."
To sit beneath the tree,
But, being just a common "Man"
She writes no poems of me.

She writes of places that she saw,
Of things she did and thought
But were it not for "Jim and I"

No fish would have been caught.

We rowed the skiff, we caught the bait
We also dug the worms,
We coaxed the fish right to her hook
And doctored her "Sun Burns".

We almost, taught her how to swim,
In lovely Pigeon Lake
Encouraged her to wet her feet
And the final plunge to take.

She sings no praise of Jim and I
And "Herbie Smith", while there:
Is never mentioned in her poems
But she speaks of "Annie Blair"

Her picturse are of "Lady Pigs"
"Jim's" Bull's not even shown,
'Tis plain to see, that in her book
The Masculines are unknown.

As she has said, the friends we made
Along Kawartha's shore
Have lingered in our memory
And brought us back once more.

Abner
December, 1934.

Property improvements

Hanbidge Donation

Audrey Hanbidge of Peterborough generously donated money in memory of her husband Errol Hanbidge to construct a second small cabin for the property. As with the first cabin, which was constructed in 2002 using money donated by Mrs. Hanbidge, Savarin Lumber of Bobcaygeon designed and assembled the cedar-log cabin. This cabin will ultimately be used to house researchers during their stay at the Oliver Centre, but currently we are using it for teaching purposes and as space for hosting meetings and public workshops.

Plate 1. Hanbidge cabin, designed and constructed by Savarin Lumber, Ltd. of Bobcaygeon in October, 2004. Photo courtesy of Sheena Symington.

Butterfly garden construction
Funds were secured from the Ministry of Natural Resources Community Fisheries and Wildlife Involvement Program to construct a series of butterfly gardens. Shrubs and wildflowers native to the region were purchased from local nurseries and a local quarry donated the rock that was used to create one of the gardens. Erin Crowe and Scott Farrow took the lead in creating 3 new gardens for the Oliver Centre. We were also able to use the funds to purchase 50 Butternut Hickory tree seedlings as we begin to recognize the need to replace many of the mature trees throughout the main yard of the property.

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 has supported graduate students at the Oliver Centre for five years. The recipients for the academic year 2003-2004 were:

1. Rebecca Grant (M.Sc. candidate with Dr. Tom Hutchinson).

2. Ian Reeves (M.Sc. candidate with Dr. Neil Emery)

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, Dr. Eric Sager, living on site in the main house with his family. The cottage on the property provides accommodation for two-week residential field courses, as well as graduate and undergraduate students conducting research at the Oliver Centre.

2004 Oliver Ecological Centre Management Committee

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

Finances

Table 1. 2004 Receipts

User fees	$11,715.28 - this money is used for day-to-day upkeep of the Oliver Centre
Grants:	
CFWIP grant (MNR) – Pigeon Lake Loon Survey	$1,500.00
CFWIP grant (MNR) – Butterfly/bird habitat improvement	$1,000.00
Donations:	
Community group donations	$100.00
Individual donation towards cabin construction	$25,300.00
Individual donation towards annual loon survey	
Individual donation towards air pollution research	$14,000.00

***In-kind donations**:*	
Buckeye Marine, Inc. – Bobcaygeon	Boat trailer
Individual donation	15 ft aluminium boat and 40 hp Johnson motor
Individual donation	Dissecting microscope
Individual donation	50 rails antique cedar fencing

User Fees

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

2004 Major Equipment Purchase

- Thermo Environmental Instrument Model 49C Ozone Analyzer
- 9.9 hp Mercury outboard motor
- 15 ft. Larsen boat with 55 hp OMC
- 3 Onset meteorological stations for the measurement of wind speed, air temperature, and solar inputs
- Minolta SPAD 502 Chlorophyll meter, Ocean Optics Mini-spectrometer

Community Outreach

Sheena Symington was asked to write a feature article depicting the life of Marjorie Oliver for the Trent University Alumni Magazine which was published in the spring edition.

Eric Sager was asked to provide input and guidance to the Kawartha Lakes Stewards Association with respect to their desire to monitor/manage aquatic macrophytes throughout the Kawarthas.

Eric Sager presented a talk to a consortium of lake associations on Stoney Lake entitled, "Shoreline development and its broader implications to lake health".

Eric Sager led a guided walk for the Stoney Lake Environmental Association of a local Kawartha peatland. Approximately 15 people attended.

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

Regular updates and announcements are published in the local newspapers of Bobcaygeon, Lindsay and Peterborough.

Table 2. Summary of Oliver Ecological Centre use in 2004

Organizer	**Function**	**Number of Participants**	**Duration**
Eric Sager (Oliver Centre Manager)	Canopy Access Inspection/Training	10	April 20
Lynn Davies (Trent University)	Native Studies Graduate Studies writing retreat	6	June 22-27

Tom Hutchinson (Trent ERS/Biology)	Graduate Students Becky Grant and Krista Campbell and research assistant Erin Crowe	3	May – August 35 days
Erin Crowe (Trent University) and Robert Sarginson	Loon Survey of Pigeon Lake	2	May – September 42 days
Neil Emery (Trent University, Biology)	Graduate Student Ian Reeves, honours student Scott Farrow, and research assistant Stephen Hart	3	May – August 28 days
Eric Nol (Trent University, Biology)	Graduate Student Sonya Richmond and research assistants	4	April – August 20 days
Michael Berrill (Trent University, Biology)	Graduate student Michelle Charbonneau and research assistant	2	April – June 15 days
Perce Powles and Ian Sandeman (Biology Department)	Silverside research	3	May – August 6 days
Chris Risley – MNR	NHIC field day	6	June 2
Eric Sager and Alex Smith (Trent University)	Ecology of the Kawarthas, 2-week residential ON field course	12	May 23 – June 4
Tom Hutchinson and Eric Sager	Oliver Ecological Centre Open House	40+	June 18
Jeff Bowman, MNR	Trapping of Flying Squirrels	2	July – Aug. 5 days
Meredith Carter (Otonabee Region Conservation)	Benthic Invertebrate Monitoring workshop	20	October 3
Shaun Watmough (Trent University, ERS)	ERSC 355 Pollution Ecology field trip	50	November
Ellen Bentzen (Trent University, Biology)	BI 305 Limnology field trip	46	October 4
Neil Emery (Trent University, Biology)	Bio 328H one day field trip lab at Oliver Canopy Access System	13	September 19
Tom Whillans (Trent University, ERS)	ERSC 351H Wetland Ecology one day field trip	45	September 26
Erica Nol (Trent University, Biology) and Chris Risley, Peterborough Field Naturalists	Banding of Saw-whet owls	20	October – November - 6 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 residential field courses and field trips from the main campus. This year, university courses that utilized the facilities and grounds included: wetland ecology, limnology, plant ecology, plant physiology, and pollution ecology.

Ecology of the Kawarthas

Twelve students attended the 2004 Field Course at the Oliver Centre, offered May 18 – May 30. Taught by Eric Sager of Trent University and Alex Smith of Guelph University, the focus was the ecology of forest and wetland communities. Generally, the course introduced 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 was placed 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 were again the major theme. Students designed a small research project that incorporates different components of one ecosystem and the interdependence of abiotic and biotic factors.

Plate 2. Participants in Ecology of the Kawarthas with Instructors Alex Smith and Eric Sager. Photo courtesy of Larry Evon – student participant from the University of Windsor.

Research and Monitoring Activities

Plate 3. Northern Saw-whet Owl released after being banded. Photo courtesy of Jerome Petigny.

Northern Saw-whet Owl banding activities at the James McLean Oliver Ecological Centre
Erica Nol, Biology Dept., Trent University

Summary:
Banding activities were conducted for the sixth year at the James McLean Oliver Ecological Centre of Trent University in 2004. A total of 76 Northern Saw-whet Owls were banded on 34 nights (average of 2.24 owls/night). This was very close to our five year mean (1999-2003) of 2.27 owls/night. No recaptures of these were reported to our station and no foreign banded owls were captured this year.

Objectives:
This project aims to document migration routes and survival of Northern Saw-whet Owls passing through the Kawarthas during their fall migration. Capture of the owls allows information on their condition, age, sex and other characteristics to be recorded. Long-term results of the project will show annual variation in age class survival and population fluctuation. The information obtained will contribute to our understanding of the life history and ecology of this seldom observed owl. These owls have a high rate of recapture as they migrate south from the boreal forest across Ontario and down into the Appalachian mountains in eastern United States. Numerous other banding stations to the south and north also attempt to capture the owls resulting in a relatively high rate of recapture for birds of their size. The data from this project are contributed to a Canada wide database on Northern Saw-whet Owl migration data maintained by Bird Studies Canada.

Net locations:
This year, as in previous years, 11 "thrush-size" mist nets were placed in three separate groups. Set A (3 nets) was located east of the cottage, set B (4 nets) was under the hydro line north of the cottage, and set C (4 nets) was west of the cottage. The nets in set B captured 46% of the owls banded this fall, followed by set C (30%) and set A (24%). CD audio lures of repeated saw-whet owl "toot" calls were used at each of the sets. The nets were opened for owl capture a standardized four hours each night, usually from 7 pm – 11 pm.

Results:
Seventy-six owls were captured between October 1st and November 6th. This year the season was extended to include the first week of November due to the relatively mild weather and the continuing capture of owls. Interestingly, the date of peak capture (October 22), on which 20 owls were captured, was about 8 days later than the normal average for peak captures. All owls were captured and released unharmed at the point of capture (no injuries or casualties occurred).
Temporal pattern of owl captures through the banding season in 2004 relative to 1999-2003.

	1999-03	2004
25%	09-Oct	17-Oct
50%	15-Oct	22-Oct
75%	21-Oct	25-Oct
100%	06-Nov	06-Nov

The migration peak was later (7 to 10 days) this year than the previous years.

Age

HY (hatch year)	46/76 owls = 61% (57% in 2003)
AHY (after hatch year)	23/76 owls = 31% (39% in 2003)
U (unknown)	7/56 owls = 9% (4% in 2003)

The age structure is quite similar to the previous years.

Sex

Using the Brincker Wing-Mass sexing method we had 3 males (4%), 66 females (87%) and 7 unknown sex (22%). Clearly there is a higher proportion of females that are being captured.

Acknowledgements:
This project could not have taken place without the support of the Oliver Ecological Centre of Trent University and the Peterborough Field Naturalists (PFN). The Oliver Centre allowed use of their cottage for banding and PFN provided volunteers and financial support. Over 20 volunteers aided the permitted banders by helping them open nets, make net checks and record information during banding.

The Canadian Lakes Loon Survey of Pigeon Lake 2004 – Erin Crowe
The beginning of the fall season brings with it the completion of another successful season of loon monitoring on Pigeon Lake. The objective of this study is to ensure the continued collection of observational data on the Common Loon population is completed yearly. Specific data is recorded on the breeding success of mated pairs, number of adult loons that make up the lakes population, and the number of young that are successfully fledged from downy young to loon young. The current statistics will then be compiled with archival records for the same population and is used by Bird Studies Canada, the Ministry of Natural Resources and Trent University's James McLean Oliver Ecological Centre for research and management strategies (Table 1).

This year the loons met with limited breeding success on Pigeon Lake. The considerable wet conditions throughout the summer proved to be challenging to the incubation of eggs. The known loss of at leas four nests can be attributed specifically to high water levels along the Trent-Severn System during the end of May and beginning of June. It is their choice of nesting sites that make them susceptible to the effects of high water levels.

Loons choose to nest right along the waters edge for one main reason, protection. The anatomy of a loon does not allow them to move quickly on land. Therefore, nests that allow for fast access to the water are an adaptive strategy that provides loons with greater ease at avoiding predators as they have much greater

mobility and speed in the water then on land. Once hatched, young will only stay in the nest for a day or two, so easy water access is also important during this vulnerable stage as well.

This preferred nesting location has one major downfall on water bodies with fluctuating water levels, which is the fact of rising water levels can cool eggs in a nest for long enough to kill the developing embryo. High water coupled with wave action can even wash nests away, which was the case in two locations on Pigeon Lake this spring. Two other nests that were being monitored became abandoned after the normal incubation time (28-32 days) was exceeded. In these cases the eggs were removed from the nest and sent to the Canadian Wildlife Service, where testing for Mercury (Hg) and other contaminates will occur.

The cooler weather also delayed the emergence of young on the lake. The first downy young this year hatched on the lake during the first week of June. The last was hatched during the first week in August, which is quite late in the rearing season for the arrival of young. The occurrence of the late arrival is likely a second attempt for this breeding pair, as loons do possess the ability to produce a second clutch of eggs if the first were unsuccessful. In total, 22 known eggs were produced, 2 of which did not hatch, and 2 were lost to predators. Of the 18 eggs that hatched, 15 survived to the loon young stage.

Beside natural predators like racoons, musky, and predatory birds, there are human induced dangers to the survival of the downy young. Three of the most evident on Pigeon Lake include fishing tournaments, recreational boating, and habitat destruction through shoreline development. The problem associated with fishing tournaments are based upon the observations of Bob Sarginson, who first initiated the Pigeon Lake loon monitoring program. He discovered that through the process of jigging for bass along the shoreline where loon nests are present, the adults are scared off the nests long enough for the eggs to cool or, if the eggs have hatched, the adults will abandoned their young. Mr. Sarginson lobbied the MNR and fishing tournament organizers to prohibit the running of tournaments during the Loon's critical breeding season (May to mid-June) to reduce the loss of downy young. This past summer, breeding occurred later because of the cooler, wet weather and downy young were being hatched just before two bass tournaments occurred on the lake. During this period between the 10^{th} and 18^{th} of July, two downy young were lost. Whether or not these losses can be directly attributed to these tournaments is uncertain, but it is worthy of consideration and further study.

Irresponsible boating in areas of high boat traffic is another consideration for the loss of downy young. In certain sections of the lake where there is heavy boat traffic, mated pairs have been able to breed successfully but have continued to lose their young within a few weeks. Again, these deaths cannot be directly correlated to boats, but irresponsible boat driving was witnessed on more than one occasion this summer. When boaters drive within a few feet of loons, downy young that are unable to dive and lack waterproof feathers can drown from increased wave activity or become hypothermic. These incidences can be curtailed with continued education of safe boating and wildlife concerns in the Kawarthas. It is possible for humans and wildlife to coexist, it just takes a little more effort on our part.

The adult loon population on the lake fluctuated between 35 – 57 adults. However, with at least 23 pairs maintaining territories on the lake, the population average is 46 individuals. Loons are known territorial birds and it may be of interest for future students to start taking pictures of loon pairs with zoom focus for the purpose of greater identification. The white banding around a birds neck is unique to each and therefore acts as a way to distinguish whether the same adults are returning to the same territories each year.

Table 3. 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	1.2	No tournaments June/July
1997	100% of lake/river	19 pairs, 19 DY, 11 LY	.58	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
2003	100% of lake/river	22 pairs, 23 DY, 17 LY	.772	
2004	100% of lake/river	16 pairs, 18 DY, 15 LY	.937	May 22, July 10, 11, Aug. 14, 15, Sept. 5, 18

Brook Silverside Research (*Labidesthes sicculus* Cope) – *Emeritus Professors Perce Powles and Ian Sandeman, Trent University*

Three years ago we commenced researching this little-known species, with a view to extending the knowledge of its life history. While it is abundant throughout the Kawartha Lakes, it often goes unnoticed because it is a small species, rarely reaching 10 cm in length, which feeds in schools just offshore, always tending to be near the surface. In fact, on occasion it jumps out of the water to capture small insects. It is the only fish we have in Canada which is purported to live only one year. Thus our first aim was to look at otoliths (ear bones), and age the fish in days lived, to see if this suggestion obtained from studies based on scales, is true. Daily rings on the otoliths were clear to read, and we found that silversides do in fact, overwinter, as the winter annuli were clearly seen, and then die off presumably after spawning, sometime in the following summer. Young were produced over a two-month period in summer, as fish from the previous summer grew into maturity (present hypothesis), as opposed to the species being a fractional spawner, and the same individual putting out several broods of eggs during the summer (as is the case with most cyprinids, or minnow family).

We now have a good idea of growth rate and sizes of fish produced from several Kawartha Lakes, mainly Pigeon and Rice. We have data on egg sizes, and size at maturity, sex ratios, and are currently investigating the reproductive physiology and behaviour. Two posters have been presented, one at CCFFR in Ottawa, and one last year in Norway. The beach at Oliver has provided us with a number of very useful samples, and is now one of our main sampling sites.

Distribution and genetics of flying squirrel populations in Ontario –
Jeff Bowman- MNR, Project Leader
This research project is investigating the distributions in Ontario of two species, the northern (*Glaucomys sabrinus*) and the southern (*G. volans*) flying squirrel. A primary objective of the study is to use flying squirrel populations as a case study for the development of landscape genetics techniques. Landscape genetics is the application of population genetics to landscape ecology.

Both of Ontario's flying squirrel species are associated with mature forests and we will use a landscape genetics approach to test whether squirrel populations in Ontario are isolated due to forest loss and fragmentation. Isolation increases extinction risk. In our study, we will use genetic techniques to measure whether squirrel populations are connected to one another by dispersal.

Another objective of this study is to improve our understanding of the relative distributions of the two flying squirrel species in Ontario. Our preliminary field studies have suggested that the southern flying squirrel is more widely distributed in Ontario than previously believed. This squirrel is listed nationally by COSEWIC as a species of special concern due to its restricted distribution; in Ontario, it is considered only to occur south of 45 degrees latitude.

However, our investigations thus far suggest that this is not the case. The broader than expected range of southern flying squirrels may be a result of their being previously overlooked, or it may be a result of recent range expansion, possibly associated with global warming. In any case, we seek to clarify these uncertainties.

Methods
Field sampling of squirrel populations

Both squirrel species will be live-trapped during 2002-2004 at several sites across Ontario (one site is the Oliver Ecological Centre), from the most northern, near Temagami, to the most southern, near Rondeau Provincial Park. At each site, 60-80 squirrel traps will be placed in trees and checked daily for at least 1 week. Captured squirrels will be identified for age and sex, weighted, examined for body condition, and marked with a numbered ear-tag. A minimum of twenty individuals per site (of each species that occurs at a site) will be sampled for DNA by pulling 10-20 tail hairs. (This research is being conducted under an animal care protocol approved by the Ontario Ministry of Natural Resources. We are trapping in the Kawartha Highlands Area, of which the 20 traps at the Oliver Centre would be a sub-section; the remainder of our traps will be up HWY 507).

Conclusions
The genetic data will be analyzed to examine questions of landscape fragmentation and range expansion. The linking of high-resolution genetic data to GIS databases allows specific hypotheses to be tested on the genetic structure and movements of organisms relating to ecological and environmental variables (such as climate change) through spatial statistical analyses.

Project Contact: Dr. Jeff Bowman, Research Scientist
Wildlife Research and Development Section, Ontario Ministry of Natural Resources
300 Water Street 3N, Peterborough, ON, K9J 8M5. 705-755-1555
jeff.bowman@mnr.gov.on.ca

The residence time of the heavy metals lead and cadmium in the forest floor.
Shaun Watmough, ERS Program, Trent University

Lead and cadmium are highly toxic trace elements that historically have been released into the environment through a number of anthropogenic activities including metal smelting, coal burning, and gasoline. Although the highest contamination levels in soils and vegetation generally occur close to emission sources, extremely high levels have been measured in the forest floor at remote high elevation sites in the United States due to the long-range transport in the atmosphere. In eastern North America, emissions of these potentially toxic elements have decreased substantially in recent years, although many workers have suggested that these toxic metals will remain in the forest floor and potentially available to biota and humans for many decades. In this study, small amounts of stable isotopes of lead (^{207}Pb) and cadmium (^{111}Cd) were applied to plots beneath a sugar maple (*Acer Saccharum* Marsh) or white pine (*Pinus strobus* L.) canopy at the James McLean Oliver Research Centre (JMOEC) in July 2000 and their concentration will be monitored over the long-term. After 1 year, 77 % (maple) and 30 % (pine) of the lead tracer and 92 % (maple) and 82 % (pine) of the cadmium tracer had been lost from the forest floor. The rapid loss of metals from the forest floor appears to be due to the rapid turn over of the forest floor at the JMOEC. The metal tracer accumulated in the upper mineral soil and lead isotope data indicate that the majority of anthropogenic lead that has been deposited during the 20th century has accumulated in the upper 0-10 cm of mineral soil. Less than 5 % of the anthropogenic lead measured at the JMOEC had accumulated in forest biomass. This is the first example were stable metal isotopes have been used to determine the residence time of trace metals in the forest floor. When combined with data from a regional survey, results from this work will be used to develop models that accurately predict the residence time of trace metals in the forest floor in Canada and level of reduction that may be expected at current or predicted levels of deposition.

Documentation of Ecological Information

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.

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.
Boards were sampled by volunteers Dave Ireland, Alison Clark, and Tina Howe.

Species inventories

Table 4. **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

Table 5. Oliver Centre Reptile and Amphibian Spring Checklist generated by students participating in the Ecology of the Kawarthas

Frogs/Toads:

Spring peepers (*Pseudacris crucifer*)
Chorus frogs (*Pseudacris triseriata*)
Leopard frogs (*Rana pipiens*)
Wood frogs (*Rana sylfatica*)
American toads (*Bufo americanus*)
Grey tree frogs (*Hyla versicolor*)
Green frogs (*Rana clamitans*)
Bullfrogs (*Rana catesbeiana*)

Plate 4. Grey Tree Frog (*Hyla versicolor*). Photo courtesty of Larry Evon.

Salamanders:

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

Plate 5. Red-backed salamander (*Plethodon cinerus*). Photo courtesy of Larry Evon.

Reptiles:

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

Plate 6. Snapping turtle (*Chelydra serpentina*). Photo courtesy of Larry Evon.

Table 6. Oliver Centre butterfly checklist generated by Erin Crowe

Papilionidae (swallowtails)

Canadian Tiger Swallowtail (*Papilio canadenis*)
Black Swallowtail (*Papilio polyxenes*)

Plate 7. Canadian Tiger Swallowtail (*Papilio canadensis*). Photo courtesy of Larry Evon.

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*)
Summer Azure (*Celastina landon violacea*)
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*

Nymphalidae (brushfoots)

Tawny Crescent (*Phyciodes batesii*)
Northern Crescent (*Phyciodes cocyta*)
Pearl Crescent (*Phyciodes tharos*)
Eastern Comma (*Polygonia comma*)
Gray Comma (*Poygonia progne*)
Question Mark (*Polygonia interrogationis*)
Mourning Cloak (*Nymphalis antiopa*)
American Lady (*Vanessa virginiensis*)
Painted Lady (*Vanessa cardui*)
Red Admiral (*Vanessa atalanta*)
White Admiral (*Limenitis arthemis arthemis*)
Viceroy (*Limenitis archippus*)
Eyed Brown (*Satyrodes eurydice*)
Appalachian Brown (*Satyrodes Appalachia*)
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*)
Columbine Duskywing (*Erynnis lucilius*)
Little Glassywing (*Pompeius verna*)
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*)
Crossline skipper (*Polites origenes*)
Silvery spotted skipper (*Epargyreus clarus*)
Leonard's Skipper (*Hesperia leonardus*)

Graduate Student Research

PhD Candidate: 2004

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

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: 2004

Ranavirus and Amphibians: virology, pathology and pesticide induced immunosuppression
Michelle Charbonneau, (MSc Candidate) with Michael Berrill (Supervisor) Biology, Trent University, Peterborough, ON, Canada.

Iridovirus (Ranavirus), an emerging wildlife pathogen, has been implicated in several frog population kills in Central Ontario. Ranavirus involvement in three wood frog tadpole die-off events has been documented

at the James McLean Oliver Centre Pond, north of Buckhorn Ontario, in the mid-summer of 1999, 2000, and 2001. Conversely, the Oliver Centre Pond wood frog tadpoles appeared healthy in 2002 and 2003. Recently, wood frog die-off events were recorded in 2003 at two historically unaffected wetlands in the area: Poplar Pond and the Parker Property Wetland, both of which are also located in the same area north of Buckhorn, Ontario. Ranavirus involvement in the 2003 events will be confirmed using PCR amplification of a region in the viral major capsid protein. The mechanism of ranavirus transmission remains unknown and little is known about the etiology of ranavirus disease, which acts rapidly to terminate the tadpole population. Ranavirus disease is a unique emerging infection in that it affects otherwise pristine areas, which have received little detrimental anthropogenic impact. Given the known immunosuppressive potential of pesticides, we hypothesize that low-level pesticide exposure adversely affects the tadpoles ability to mount an immune response to ranavirus.

Future research objectives include: 1. Map amphibian die-off events throughout Ontario; 2. Assess samples retrieved from die-off events and from healthy populations for the presences of ranavirus and confirm that ranavirus is the pathogen responsible for local frog kill events; 3. Isolate the ranavirus from the Oliver, Poplar and Parker sites and compare it with ranavirus isolated from other geographic locations; 4. Test the pesticide immunosuppression hypothesis, which requires isolation and culturing of our ranavirus in order to be able to challenge tadpoles in vivo, in conjunction with low-level pesticide exposure.

The role of Cytokinins (CK) and Abscisic Acid (ABA) in regulation of stomata within a mature Sugar Maple (Acer saccharum) forest canopy

Ian Reeves, (MSc Candidate) with Neil Emery (Supervisor) Biology, Trent University, Peterborough, ON, Canada.

Forest ecosystems exert a strong influence on global water and carbon cycles through gas exchange, which is controlled primarily through the stomata. Consequently stomata can exert a major influence on global water and carbon cycles[1]. It is therefore surprising that little is known about the mechanisms that control stomata. Stomata are known to respond rapidly to changes in environmental conditions, both at whole plant, local area and even single leaf scales [2] with densities and size of stomata changing in new leaves in response to environmental conditions[3]. This ability to react and change to local changes in environmental conditions at multiple levels suggests some method of rapid signaling that can be spread throughout the whole plant. However there is little known about the mechanism controlling or signaling of these responses.

ABA is thought to promote the closure of stomatal pores and it has been suggested that CKs play a role in the opening of stomatal pores. This system of regulation would mimic the roles that CKs and ABA have shown in regulation of leaf senescence. Study of ABA in several deciduous tree species shows that ABA undergoes variation in concentration throughout the growing season and in some cases responds to changes in water relations of the tree. There have been no studies to my knowledge that track CKs over a full season in relation to environmental conditions. It is also of note that most the studies concerning ABA and CK mentioned previously were on xylem sap and did not look at CKs or ABA within the leaves of the canopy. The majority of studies concerning ABA or CKs within leaves deal with small greenhouse plants or seedlings and very few analyse mature trees. The Oliver property canopy walkway offers a unique opportunity to carry out physiological measurements *in-situ* within a mature forest canopy.

This research project encompasses three key aspects: i) tracing vertical stratification and seasonal variation of CKs and ABA within leaves, xylem and phloem, ii) vertical and seasonal variation in transpiration rates within the canopy, and iii) patterns in stomatal densities thourghout the canopy. The research is carried out *in-situ* within a forest canopy, which allows for comparison to fluctuation of environmental variables and stressors throughout the canopy. The objective is to combine these three aspects to form a better understanding of the mechanisms controlling gas exchange within the canopy and potential role of CKs and ABA within this process. This project will also provide a thorough survey of patterns of the plant growth regulators CKs and ABA within the canopy.

Phenolic effects of ground level ozone on soybean (Glycine max) and white bean (Phaseolus vulgaris) crops grown in the Kawartha Lakes area.

Krista Campbell, (MSc candidate) with Tom Hutchinson (supervisor) ERS/Biology, Trent University, Peterborough, ON, Canada.

Ground-level ozone is the main chemical constituent in smog, an increasingly common weather phenomenon affecting southern and central Ontario during the summer. Ozone is formed under warm, sunny conditions by a reaction between nitrous oxides (largely caused by vehicle exhaust and industrial emissions) and volatile organic compounds (VOC's). Each summer, the Peterborough Kawartha Lakes area receives among the highest ozone levels in Ontario due to its location, downwind (northeast) of Toronto.

High ozone concentrations have been shown to be detrimental to plant growth in various field and controlled environment experiments. The purpose of this study is to determine how ozone specifically effects the production of certain stress-induced phenolic compounds in soybean and white bean varieties adapted to grow in the Peterborough Kawartha Lakes area. This will be accomplished through the determination of concentrations of specific phenolic compounds present in soybean and white bean crops grown under unmodified field conditions. Follow-up lab experiments will expose the same crop varieties to ideal growing conditions, some major environmental stresses (including ozone) both in isolation and in combination with each other. Determining the phenolic concentrations of the crops grown under these simulated stress conditions and comparing them with the phenolic concentrations of the crops grown under natural conditions in the field may lead to a better understanding of both the conditions causing ozone stress responses and the actual effects of natural stresses on soybeans and white beans.

Characterization of the morphological, physiological and biochemical parameters of foliage in the upper canopy of sugar maple (Acer saccharum Marsh.) under ambient stress conditions

Rebecca Grant, (MSc Candidate) with Tom Hutchinson (Supervisor) ERS/Biology, Trent University, Peterborough, ON, Canada.

The response of mature tree canopies to ambient stress factors is poorly understood. The logistical difficulties of *in situ* measurements in the canopy have led to extrapolations from seedling and chamber based studies. In the current study, leaf morphology, stomatal conductance and enzyme defense systems were characterized at two distinct locations in the upper canopy of eight mature sugar maple trees over the course of two growing seasons. Rather than the anticipated sun shade leaf differences, it was found that foliage occupying a position of high light was morphologically and physiologically similar to foliage occupying a position of low light, yet enzyme activity differed significantly between the respective positions. In both years superoxide dismutase and glutathione reductase activity showed seasonal but opposite trends that were influenced by ambient ozone concentrations. Results from this study provide direct evidence that the uppermost canopy layer is not homogeneous with respect to stress conditions and/or enzyme defense activity. These results also demonstrate for the first time a seasonal trend in deciduous tree enzyme activity that is affected by ambient ozone concentrations.

The impacts of landscape characteristics on the reproductive success of forest birds.

Sonya Richmond (MSc candidate) with Erica Nol (Supervisor) Biology, Trent University, Peterborough, ON, Canada.

This project is part of an ongoing project initiated in 2001 by other students in Erica Nol's lab, to evaluate the impact of the landscape surrounding medium-sized woodlots on the forest bird communities and their insect prey. As the last year of this project we aimed to increase the sample size, particularly of nests of ovenbirds, wood thrushes and American robins. We are working in 17 forest fragments and the Oliver Ecological Centre hardwood forest is one of these sites. For each species, we were able to achieve these goals. The results from the bird work confirmed our initial findings that parasitism increases substantially on the nests of Wood Thrush when houses are embedded into the forest. The nature of the agriculture in

the matrix does not seem to impact either predation rates or rates of parasitism. These results will have important implications for municipal planning.

The second objective was to resample ground insects in the 17 forest fragments, both because we were interested in whether the surrounding landscape impacted these important prey communities, and also because we were interested in whether the insect fauna were largely native or introduced. Pit traps were established and sampled weekly in each forest. With the help of the assistants over 400 samples were processed, obtaining sample biomass, identifying all insects to order and pinning all Coleoptera for later identification. Early results suggest that for some insect families (eg. Weevils) nearly all individuals were non-native. By contrast , the carabid beetle communities in these forests remain largely native.

Completed Student Theses at the Oliver Ecological Centre

PhD Theses Completed

Sager, Eric: 2003. The interactive effects of three global stressors on the growth morphology and chemistry of *Acer saccharum* and *Pinus strobus* seedlings.

Burke, Dawn: 1998. The relationship between forest fragmentation, food abundance, nest site habitat, and reproductive success of forest breeding birds: A study in the PeterboroughrRegion of Ontario.

Master Theses Completed

Greer, Amy. 2004. The epizootiology of six amphibian mortality events in south central Ontario, Canada, 1999-2002.

Ireland, David. 2004. Demographic connectivity and sex-biased dispersal in Bullfrogs (*Rana catesbeiana*).

Taillon, Dan. 2004. Walleye (*Stizostedion vitreum*) egg and larval production and survival on rehabilitated spawning sites in Pigeon Lake, Ontario.

Bell-Allen, Rhonda. 2002. An examination of the Milfoil Weevil (*Euhrychiopsis lecontei*) within Eurasian watermilfoil beds in Pigeon Lake, Canada.

Bridges, Lisa. 2002. Spatial scale and environmental structure: habitat selection of the Eastern Grey Squirrel (Sciurus carolinensis) in Central Ontario.

Gouin, Todd. 2002. Long-range transport of organic contaminants: The role of air-surface exchange.

Phillips, Judith. 2002. Matrix land-use and the nesting density and breeding success of three species of forest-nesting birds.

Undergraduate Theses Completed

Farrow, Scott. April 2004. Differential effects of ABA and cytokinin on stomatal conductance and transpiration among seedling, sapling, and mature sugar maple (*Acer saccharum*). Biology with Neil Emery

Held, Mark. April, 2003. The relationship between cytokinins and height class in mature *Acer saccharum* canopies. Biology with Neil Emery.

Reeves, Ian. April, 2002. Distribution of epiphytic bryophytes in a northeastern temperate forest. Biology with Neil Emery

Taillon, Dan. April 2001. The effects of residential development on littoral zone fish communities. Environmental and Resource Studies Program with Michael Fox.

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, 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.

Publications

Gouin, T., Mackay, D., Jones, K.C., Harner, T., and Meijer, S.N. 2004. Evidence for the "grasshopper" effect and fractionation during long-range atmospheric transport of organic contaminants. Environmental Pollution 128:139-148.

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Watmough, S.A., Hutchinson, T.C. and Dillon, P. 2004. Lead dynamics in the forest floor and mineral soil in south-central ON. Biogeochemistry 71(1):43-68.

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Cousins, I.T., and Gouin, T. 2003. Vegetation-air exchange facilitates the long-range transport of some SVOCs. Stochastic Environmental Research and Risk Assessment 17:241-243.

Gouin, T., and Harner, T. 2003. Modelling the environmental fate of the polybrominated diphenyl ethers. Environment International 29:717-724.

Ireland, D., Osborne, N., and Berrill, M. 2003. Marking medium to large-sized anurans with passive integrated transponder (PIT) tags. Herpetological. Review 34: 218-220.

Watmough, S.A., Hutchinson, T.C. 2003. Uptake of ^{207}Pb and ^{111}Cd through bark in mature Sugar Maple, White Ash and White Pine: A field experiment**.** Environmental Pollution, 121:39-48.

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Gouin, T., Thomas, G.O., Cousins, I., Barber, J., Mackay, D., and Jones, K.C. 2002. Air-surface exchange of polybrominated biphenyl ethers and polychlorinated biphenyls. Environmental Science and Technology 36:1426-1434.

Jobes, A.P. 2002. Influence of age, sex, and weather on the timing of fall migration in northern saw-whet owls in central Ontario. Ontario Bird Banding 33:38-50.

Watmough, S.A. 2002. A Dendrochemical Survey of Sugar Maple (*Acer Saccharum Marsh*) in South-Central ON, Canada. Water, Air and Soil Pollution. 136:165-187.

Burke, D.M. and Nol, E. 2001. Age ratios and return rates of adult male Ovenbirds in contguous and fragmented forests. Journal of Field Ornithology 72:433-438.

Burke, D.M. and Nol, E. 2000 Landscape and fragment size effects on reproductive success of forest breeding birds. Ecological Applications 10:1749-1761

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Burke, D.M. and Nol, E. 1998. Influence of food abundance, nest-site habitat, and forest fragmentation on breeding Ovenbirds. Auk 115:96-104.

Burke, D.M. and Nol, E. 1998. Edge and fragment size effects on the vegetation of deciduous forests in Ontario, Canada. Natural Areas Journal 18:45-53.