

# ELA UPDATE

Newsletter of the Experimental Lakes Area

Volume XII(1) May, 2005

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Research to Protect Fish Habitat  
and Lake Ecosystems

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# ELA Update

May 2005

As part of our ongoing efforts to keep the interested public informed about our research projects and related activities at the Experimental Lakes Area, we present this newsletter. Also available electronically, this is the twelfth year in which one or more such newsletters has been produced and distributed.

The **cover photo**, by John Shearer, shows ELA scientist Cheryl Podemski assisting SCUBA divers Jeremy Stewart and Natalie Nichols return to the boat after a dive in ELA Lake 375, site of the cage aquaculture experimental study.

While many of our lake studies can be carried out from the surface using remote sampling equipment, SCUBA diving has proven an indispensable tool for many studies where precise bottom sampling or visual observations are needed. The ELA field station is fully equipped to support research SCUBA divers, who must be fully certified and meet stringent operating requirements enforced by Fisheries and Oceans Canada.

**ELA Update** is produced by John Shearer, with support from other ELA researchers in the Environmental Science Division of Fisheries and Oceans Canada, Winnipeg. Its production is mandated under the terms of the Canada-Ontario agreement for the ELA.

## "Friends of the ELA"

### Working to Enhance Support for Research and Education at the ELA

The Government of Canada, through its Department of Fisheries and Oceans (DFO), provides the core team of researchers and most of the funding to maintain and operate the ELA field station. However, both federal funding and DFO's mandate have limits. With its unique facilities, the ELA can serve as a valuable platform for conducting a broad variety of environmental research and for educating young people to take up careers in environmental science, but other funding sources must be found to provide support for these activities.

To address this issue, a non-profit, charitable foundation, called the **Friends of the ELA Inc.**, has been created. The Friends of the ELA will benefit freshwater research at the Experimental Lakes Area by raising money to supplement and complement the research conducted by DFO at the Experimental Lakes Area. The focus will be on high-quality, long-term research and monitoring on environmental problems in Canada's freshwaters. This will include support for exceptional students to work at the ELA in pursuit of careers in aquatic science.

Friends of the ELA is managed by a volunteer Board of Directors, and research projects are approved by a Scientific Advisory Committee and by DFO. As a charitable organization, it will have access to funding from foundations and other private sources. The Friends of the ELA will benefit DFO by raising the profile of the ELA and its research. Your participation, in whatever form you may choose, is most welcome.

#### Want to support the Friends of the ELA?

Support for the Friends of the ELA is welcome from all individuals, groups and corporations who support the overall goals of conservation and protection of freshwater ecosystems. There are four categories of support; namely,

Bronze	\$20 to \$99	Silver	\$100 to \$499
Gold	\$500 to \$999	Platinum	\$1000 or more

#### Want to make a tax-deductible donation?

Donations can be sent to

**Friends of the ELA Inc.**  
**1504 – 201 Portage Avenue**  
**Winnipeg, MB R3B 3K6**

A receipt for income tax purposes will be provided.

Gifts may also be pledged over up to five years.

Supporters donating gifts of \$1,000 or more may also join our Visionary Circle.

# ELA Receives Special Funding for New Buildings

The remote location of the Experimental Lake Area is essential to the kind of research activities that we conduct. We need to study and manipulate lakes that are relatively unaffected by other human activities. However, to conduct ecosystem-scale research in such a location, we require a self-contained field station facility that can provide a full-time base of operations for the researchers. Not only do they work on site, they must also live on site for extended periods. Many students and other summer staff are on site for approximately 100 days each field season. Some of our regular research staff spend more than 150 days at the field station in a typical year. The station manager lives there year-round.

When the field station was established in 1969, most of the living accommodations were mobile bunkhouses, not well suited for long-term residency. A few years later, more permanent, frame cabins and small apartments were constructed. However, after more than 30 years, these ageing facilities are in need of replacement. Poorly insulated, and sitting on blocks or posts, they are costly to heat and susceptible to invasion by mice and other pests. In the past few years, two independent studies have recommended replacement of these buildings.

Fisheries and Oceans Canada has now allocated funds to replace several of these buildings with energy-efficient structures as part of a two-phase, multi-year infrastructure renewal for

the ELA. One of the goals for this renewal is to reduce dependence on fossil fuels used to provide heat and electricity.

The design phase of this project is just getting underway, so we can't provide details, but our plan calls for super-insulated, modular design such that only facilities in use at any given time need be heated to room temperature. We will be investigating various options to reduce energy use and maintenance costs, while providing the degree of privacy that individuals need while living in a communal field station. Part of the new complex will be used for winter accommodations, so it is imperative that this building be particularly energy efficient and adaptable to differing numbers and types of users.

Concurrent with the building replacement project, we are planning to upgrade our drinking water supply system to ensure that it meets new federal and provin-

cial standards.

Once the design has been completed, Public Works and Government Services Canada will be calling for tenders to remove old buildings and construct the new facilities. We anticipate that this work will begin in late summer or early fall and continue through much of next winter.

If all goes well, the new accommodations should be ready for use in the spring of 2006. When completed, the new facilities will be capable of sleeping approximately 24 persons, or about a third to half of the personnel normally on site during the field season. As part of the second phase in future years, a new wet/fish laboratory, communications upgrade, and replacement of other buildings are planned. This will enhance the living and working conditions in the field station and make operations more cost effective.



*This four-section, eight-bedroom complex, constructed in 1972, is one of the residential buildings scheduled for replacement within the next year.*

# Third Annual Open House Draws a Crowd

One of our challenges is keeping the local communities updated on what is happening at the ELA. For the past several years, our staff have offered an annual "Open House" bus tour of the ELA facility, alternating between residents of the Kenora/Sioux Narrows area and the Dryden/Vermilion Bay area. In 2004, we offered the tour to citizens from the Kenora region.

On the morning of Saturday, September 18, some 70 folks, clutching bag lunches, cameras, and spare clothing, climbed into two buses at the Kenora Recreation Centre and began the 95 km trek east on Highway 17, then south on the Pine forest road toward the destination. A few had been to the ELA before, but for many this was a new experience. Given the kind of weather that we had endured throughout the summer of 2004, the sun climbing above the eastern horizon was a welcome sight for all.

While Bus 1 trundled on toward the field station, the second bus stopped near the midpoint of the Pine Road to visit the site of the cage aquaculture experiment. Here the bus occupants met their guide for the day, Diane Orihel, who would shepherd them through the rest of the tour. At the end of a short bush trail lay Lake 375. In the middle of the lake, 10,000 growing rainbow trout inhabited a large, floating, mesh cage. On shore, a small shed housed solar-powered equipment that were electronically tracking a number of the lake's native fish, which had been surgically implanted with battery-powered, sensor-transmitters that indicate the fish locations. Scientists Cheryl Podemski and Paul Blanchfield described the various aspects of the study to the visitors.

Meanwhile, Bus 1 reached the field station. Here, following a much appreciated washroom break, the bus occupants met their guide, Susan Kasian, and attended a PowerPoint introduction to the ELA, presented by John Shearer in the main dining hall. They then proceeded to the main laboratory building for a series of demonstrations.

In the lab, Patricia Ramlal and Jessie Clasen provided demonstrations of equipment used for lake sampling; Stephen Page and Ray Hesslein demonstrated chemical analyses of fresh water; Michael Turner gave an overview of studies in the nearshore areas of lakes; Cheryl Podemski displayed examples, both live and preserved, of various insects, crustaceans, and other invertebrates that live on and in the bottom of lakes and streams; Laurie Wesson showed the visitors examples of the tiny animals, called zooplankton, that are found in the open lake water.

When Bus 2 reached the field station, its passengers also viewed the PowerPoint presentation, then moved to the nearby lake shore for a live demonstration of fish trapping, measuring and release, the techniques used for many years by fish populations researchers at the ELA. Ken Mills, Sandra



*ELA researchers Sandy Chalanchuk, Patrick Buat, and Ken Mills give a demonstration of how live fish are captured, sedated, measured, weighed, and tagged, before being released back into the lake. When this procedure is repeated for a number of years, an accurate estimate of fish population size can be obtained.*



*Chemist Stephen Page shows some of the tour participants how water samples are processed in the ELA chemistry laboratory. Each water sample can be analyzed to determine the amounts of various substances that it contains, either dissolved within, or as tiny, floating particles.*

Chalanchuk, Doug Allan, and Patrick Buat, along with budding junior scientist Brendan Allan, hosted the event.

Over the next several hours, the folks from both buses were able to view the laboratory demonstrations and the fishing demonstration. They had time for lunch, and they were able to tour the workshop complex and service areas. Some even found time to visit with acquaintances that they hadn't seen for a while.

After a final washroom break, the folks from Bus 1 climbed back on and headed back out the Pine Road. After a short stop and tour of the meteorological, or weather, station, they continued on to the aquaculture site for the stop that they had bypassed on the way in.

Finally, the participants assigned to Bus 2, having completed their field station tours, climbed aboard for the short trip to the weather station. By about 4:00 pm, both buses were ready to head north to Highway 17.

The weather had been glorious all day, with sunny skies and warm weather. However, just as the last group was leaving the aquaculture study site at Lake 375, a dark cloud moved in and a light sprinkle of rain dampened the dust

on the road. It certainly wasn't enough to dampen the spirits of the tour participants, who universally seemed to thoroughly enjoy the day. Our ELA staff shared the enthusiasm of the visitors, and we look forward to more opportunities to share our work with those in the public who express an interest.

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## DFO Review of ELA Operations

In last year's *Update*, we noted that an internal audit and evaluation process was underway within Fisheries and Oceans Canada to evaluate the Experimental Lakes Area program and make recommendations to senior managers.

This results of the audit were made public in September 2004. The auditors praised the scientific record of the ELA, but concluded that some of our research will have to be realigned to meet the new priorities of the Department. They also recommended that users of the facility, including our own DFO staff, be charged more to work on site, in order to eliminate an operating shortfall that has arisen through rising costs and reduced operating allocations.

The auditors did conclude that the ELA was a valuable facility and recommended that the ageing buildings be replaced with energy efficient structures that would minimize operating costs.

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### *Did you Know?*

Each year, more than 5,000 person-days of research are carried out on site at the ELA by more than 200 different researchers from Fisheries and Oceans Canada and more than 20 partner organizations (other government, universities, private sector).

These folks go through a lot of food, plus other supplies and services, which we purchase from local businesses whenever possible. Over the years, the ELA often has been able to employ young people from the local area as summer research assistants.

# Research '04 Review

Two major experimental studies continued at the ELA in 2004, while follow-up monitoring continued on another. A group from the University of Alberta conducted some smaller experiments to investigate the impacts of climate change and interactions with lake acidification. Our long-term monitoring program continued to study five natural lakes to better understand how they respond to climatic patterns and to provide a reference for what is being observed in the experimental systems. A variety of graduate student projects and other small studies also took place. We will highlight a few of the larger studies here, but more details are available on the internet at <http://umanitoba.ca/institutes/fisheries/resact.html>.

## **METAALICUS Study**

The **Mercury Experiment To Assess Atmospheric Loading In Canada and the United States** was active again in 2004, and is beginning to provide some important results. This experimental study, dubbed METAALICUS, involves researchers from close to a dozen labs across Canada and the United States. They are seeking to determine the relationship between atmospheric deposition of mercury to lakes and their watersheds, and the levels of mercury in food chains and fish.

We know that humans are releasing a lot of additional mercury into the air by burning huge quantities of coal and other fossil fuels. We know that this mercury eventually falls back to earth. Until now, no one has been able to demonstrate that this newly deposited mercury moves rap-

idly into the food web and into fish.

To achieve this goal, the scientists are adding tiny amounts of traceable, new mercury to a small ELA lake and to the land that drains into this lake. This simulates the typical amount of mercury that many eastern Canadian (e.g. New Brunswick) lakes receive from the air annually.

Using a process called mass spectrometry, this new mercury can be distinguished from the mercury that is already in the lake and watershed, and is continuing to fall from the sky.

Now, after four years of additions, significant quantities of the new mercury added directly to the lake water are being found in the fish. Some 30% of the mercury found in the lower food web, including small fish, is the traceable mercury newly added to the lake. While it has long been suspected, this is the first clear scientific evidence that newly deposited mercury moves quickly into the food web. Thus far, only the mercury added directly to the lake has been detected in the fish. Some of the mercury newly deposited on land is now in the lake, but not yet found in the fish.

## **Aquaculture Study**

The second major experimental study ongoing in 2004 was the Cage Aquaculture experimental farm. This study, conducted in partnership with the Northern Ontario Aquaculture Association under the Aquaculture Collaborative Research & Development Program of DFO, is examining the environmental impacts of

open cage, fish farming on the lakes where it occurs, and on the native fish populations. To do so, a small, commercial-scale operation has been set up in ELA Lake 375. Each spring, for the past two years, some 10,000 female rainbow trout fingerlings have been placed in the cage and fed commercial fish food until just before freeze-up. The fish, which have increased about 10 times in weight by this time, are then harvested and shipped for processing and commercial sale by the industrial partner.

While this small fish farm is operating, ELA researchers are carefully monitoring the lake water, the sediments under the cage, and a variety of species native to the lake, from algae to lake trout. We want to know how this farm may be affecting the natural conditions in the lake, and particularly the native fish.

In order to monitor the behaviour of native lake trout and white suckers in the lake, a number of these have been surgically implanted with battery-powered devices, which send out signals that can be picked up by solar-powered receiving stations located around the lake. These signals are transmitted to a base station on shore where specialized equipment connected to laptop computers can process the data and plot the position of each fish every few minutes. This information also includes the depth of the fish. By watching the computer screen, one can trace the movements of each tagged fish over the previous period of time. Once these data are processed, the researchers can detect whether



Farmed rainbow trout are dipped from the aquaculture cage suspended in the lake and readied for shipping to market in November. The fish now weigh about a kilogram each.

patterns of movement have changed in response to the presence of the cage full of rainbow trout.

While results are still preliminary, we have observed some significant changes in the sediments



Rainbow trout are packed in ice for shipping to the processing plant in southern Ontario.

under the cage and in the behaviour of some native fish. Work is continuing and we plan to operate the fish farm again in 2005. While some changes during the first few years may be small, we will try to determine whether there is cumulative impact over several years of operation at the same site.

### Estrogen Study

Our third major study was investigating the impacts of low concentrations of a synthetic estrogen in lake water. This estrogen is used in birth control pills. When women use these pills, the estrogen is not broken down in their bodies and is released in their urine. Most sewage treatment does not effectively destroy the

substance, and it is released, in low concentrations, to downstream rivers and lakes. There is evidence that fish populations in these downstream waters are being feminized by the estrogen, and this may impact their ability to reproduce. Entire populations could be at risk.

In the ELA study, estrogen was added to Lake 260 from 2001 through 2003. Only enough was added to maintain the concentration at 5 to 6 parts estrogen per trillion parts water. Even at these incredibly low concentrations, we saw evidence of feminization in many of the fish and in some of the other species in the lake.

No estrogen was added during 2004, and the concentrations in the lake are no longer detectable. However, we did continue to monitor the lake, and particularly the fish populations. Most of the fathead minnows, a short-lived species, have disappeared from the lake, presumably because their ability to reproduce had declined. Many of the males had begun to produce eggs in their testes.

Now that the estrogen has disappeared from the lake, we expect that populations will recover. However, we will continue to monitor the ecosystem, and particularly the longer-lived fish species, to see whether they also may have experienced reproductive problems during the years of estrogen addition.

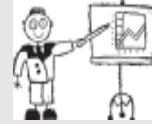
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### *Did you Know?*

2005 will be the 38th year of operation for the Experimental Lakes Area. More than 1000 publications have been produced documenting the research.



# Community Outreach



Visit the ELA on the Web: <http://umanitoba.ca/institutes/fisheries>

In addition to the annual Open House event (see page 4), ELA staff participated in a number of other tours and events involving the public.

In early May, 2004, the ELA hosted a display in a booth at the Kenora Home Show. About a dozen ELA staff members took turns meeting visitors and discussing various water quality issues. Folks visiting the booth were invited to fill out a short questionnaire indicating interest in the fall "Open House" bus tour. Those submitting the form were also eligible for a draw prize of souvenir merchandise. This year, we are presenting a similar display at the Dryden Sports and Home Show. While spring is a very busy time for us, we enjoy these opportunities to meet with the local public and talk about our research activities.

In this vein, we also staffed a display booth at the Annual General Meeting of the Lake of the Woods District Property Owners Association in May 2004. In addition to ELA information, the booth displayed results of work done by colleagues to investigate problem algae on the Lake of the Woods.

About 30 members of the LOWDPOA toured the ELA in July. Following a general introductory talk, and a short tour of the field station, We were able to show them a number of laboratory demonstrations, the weather

station, and the aquaculture experimental study.

A number of school and youth groups also participated in day tours of the ELA during 2004. These included OMNR Stewardship Rangers from Kenora, Fort Frances, and Red Lake; high school classes from St. Thomas



*Dryden High School students view a water transparency demonstration by ELA Biologist Doug Allan at the annual Conservation Course.*

Aquinas and Beaverbrae in Kenora, Grassy Narrows High School, and Dryden High School.

A self-organized group of citizens from Dryden also requested and were given a day tour of the facilities.

The Dryden Conservation Course held each spring has become an annual ritual for John Shearer, who has been a participating instructor since about 1978. In

2004, fisheries biologist Doug Allan (see photo, this page) worked with John and two OMNR biologists to present the module on water resources. This long-running, educational event will celebrate its 49th anniversary this year and the ELA is planning to participate once again.

One unusual event in 2004 was a stopover at the ELA by the "Mission Green" environmental awareness tour team. The ELA was selected as one of 85 environmentally significant sites between Newfoundland and British Columbia that the team chose to visit and highlight on the cross-Canada tour. A General Motors Canada web site was used to publicize the tour and the sites visited.

We plan to continue giving tours and other public presentations in 2005. If you have a group that would like to know more about the ELA and what we do there, please give us a call. We can usually find some way to make it happen. Also, visit our web site. The URL is listed at the top of this page.

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*Anyone wishing to learn more about the ELA is invited to contact John Shearer, ELA Operations Manager, 501 University Crescent, Winnipeg, MB R3T 2N6. Phone: 204-983-5206. Fax: 204-984-2404*

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