

ELA UPDATE

Newsletter of the Experimental Lakes Area

Volume VIII, Issue 1

June 2001

What's Inside?

Busiest Season Ever....	2
ELA on Television.....	2
METAALICUS Experiment.....	3
New Leadership.....	5
Research '00 Review.....	6
New Buildings Ready.....	7
Community Outreach.....	8

**Research to Protect Fish Habitat
and Lake Ecosystems**



ELA Update

June 2001

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. Formerly known as *ELA News*, this is the eighth year that one or more such newsletters has been produced and distributed.

The **cover photo** of this edition shows Brian Birch of the Kenora Bass Club assisting ELA researcher Doug Allan to remove live fish from a trap net. Mr. Birch was on a tour of the ELA with other club members. Most ELA lakes have small populations of larger fish. By live-trapping and tagging them, then returning these fish to the lake, we can study their recruitment, growth, and survival without reducing their numbers. Angling in these lakes would reduce these populations and make interpretation of our studies very difficult. For this reason, angling is prohibited in many of the designated research lakes.

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.

Busiest Ever Field Season is Anticipated

The Experimental Lakes Area is now in its 34th year of operation, and this promises to be the busiest yet. With three major experimental studies, FLUDEX, METAALICUS, and an estrogen addition, now underway, there will be dozens of visiting researchers on site from across Canada and the United States.

While METAALICUS (see article on the next page) is the largest study, there will be plenty of other activity. FLUDEX, the Flooded Upland Dynamics EXperiment, now entering its third year of experimentation, has a research team that includes a number of ELA staff, plus researchers from the Universities of Alberta, Waterloo, and Wisconsin. The Estrogen experiment has attracted researchers from the Universities of Kansas and Saskatchewan, and from Environment Canada. Smaller studies will bring researchers to the ELA from other universities and agencies.

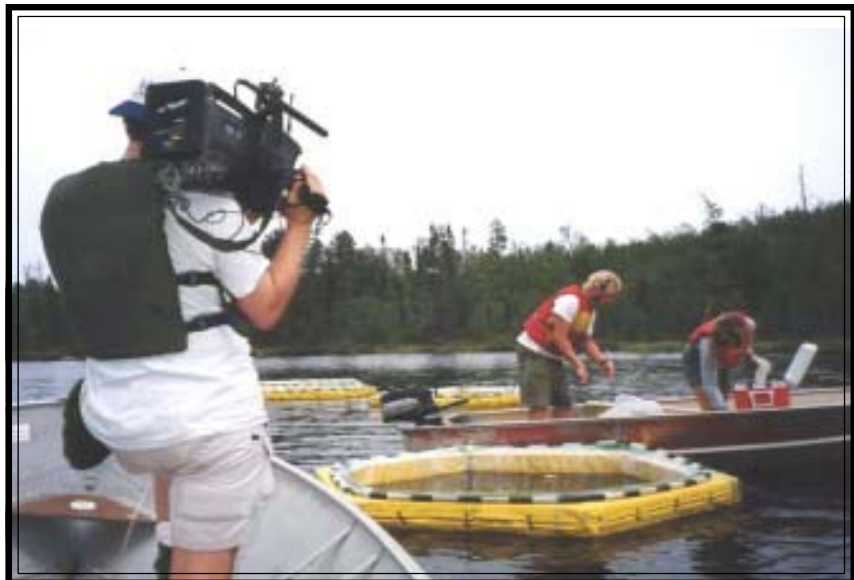
The ELA on Television

The television program "*Adventures North*" recently aired an episode focusing on some of the major research projects at the Experimental Lakes Area. Taping for the episode took place last August, and series producer and host, Steve MacInnis, assembled the final footage in April.

The *Adventures North* series,

which specializes in northern sporting adventures, airs on various networks and cable channels in both Canada and the United States and specializes in northern fishing and hunting adventures. This was the first series episode dedicated entirely to the science that helps understand northern ecosystems.

Adventures North cameraman records ELA estrogen researchers on Lake 260



METAALICUS Experiment Given Final Approval to Proceed

Mercury is now the most widespread contaminant of freshwater fish. All over Canada, even in remote lakes, large, predatory fish contain high concentrations of toxic methyl mercury. The Ontario Ministry of Environment has issued fish consumption warnings for more than 80% of the lakes that they have tested across the province. Humans eating too much of these fish run the risk of mercury poisoning.

What is the source of this mercury, particularly in remote lakes? Is it naturally occurring in the soils and bedrock, or is it of human origin?

We know that humans are burning large quantities of coal and other fossil fuels, which contain trace amounts of mercury. During the combustion of these fuels, the mercury is released to the atmosphere and gradually drifts downwind with weather systems. Eventually, it falls back to earth. Everywhere on the planet, we can measure mercury falling from the sky. However, no clear link has yet been demonstrated between the mercury falling from the sky and the mercury found in fish. Now, researchers at the ELA have a unique opportunity to demonstrate whether such a link exists.

After three years of careful planning and pilot studies, ELA researchers have received final permission from the Ontario government to proceed with a special experiment in which less than a teaspoonful of very rare, and very expensive, mercury will be experimentally added to a small watershed over two or three years. Using a special instrument called a mass spectrometer, scientists can track the movement of this new mercury within the ecosystem and determine whether it moves into the lake food web.

Called the Mercury Experiment To Assess Atmospheric Loading in Canada and the United States, or METAALICUS, the project has been endorsed by the Canadian Council of Ministers of the Environment and the United States Environmental Protection Agency. It has received approvals from the Ontario Ministries of Environment and Natural Resources, and from Environment Canada.

A large team of researchers from across Canada and the United States are collaborating on this important study. In addition to a number of our ELA staff researchers, scientists from the Universities of Alberta, Quebec, Toronto, and Trent, plus U.S. researchers from Maryland, Tennessee, and Wisconsin, are participating. Much of the funding for the project is coming from the United States. Senior scientists from Sweden and Canada are providing additional guidance.

We know that measurable amounts of mercury are currently falling from the sky at the ELA. During this experiment, which is expected to continue for two or three years, a small amount of additional, new mercury will be experimentally added to a small lake and its watershed, simulating the amount of mercury that might be falling on the system if it were located in eastern North America. ELA Lake 658 has been selected for the experiment, based on its size, its fish species, and the presence of a small wetland.

As with all lakes in northwestern Ontario, this system already contains a significant amount of mercury. The new mercury being experimentally added will have special properties that distinguish it from the common mercury already present, and permit scientists to follow its movements within the ecosystem. While the new mercury will be distinguishable from that already present, it should behave identically in the ecosystem. In fact, three different forms of new mercury will be added, each with a different atomic weight, and each distinguishable from the mercury already present in the system. Because they are so rare, these special forms of mercury were extremely costly to purchase, with less than a teaspoonful costing approximately \$500 thousand.

In the experimental design, one of these rare forms of mercury will be added directly to the lake water.



ELA Lake 658, site of the METAALICUS experiment to investigate links between mercury fallout and mercury in fish

...Continued from previous page

A second will be sprayed on the upland forest that drains to the lake, and the third will be sprayed on the small wetland that drains to the lake. Samples taken from the lake will be carefully analysed using a mass spectrometer to determine how much of each of the new forms of mercury is present. It should be possible to trace any of the newly-added mercury if it moves into the food web and eventually reaches the larger fish.

Given the very small amount of new mercury that will be experimentally added to Lake 658 and its watershed, we do not expect any long-term impacts, either on the lake or on its fish populations. There will be no measurable effects downstream. Even if a tiny amount of the added mercury does move downstream, it will be

diluted so much that we will not be able to detect it.

If we discover that some of the new mercury, particularly that added to the upland or the wetland, accumulates within the lake's food web, and particularly within the fish, this will be clear scientific evidence that recently deposited mercury can increase the mercury levels in fish. It will provide a powerful argument to convince decision makers that mercury should be removed at large power plants, before it is allowed to escape up the stacks into the air. This, in turn, would cause mercury concentrations in fish to begin declining, thereby reducing the health risks to persons eating this fish.

If this METAALICUS study yields the results that are anticipated, it has strong potential to do what several historic ELA experiments

have previously accomplished; namely, influence policy and spur legislation for environmental protection in both Canada and beyond.

Did You Know?

Last field season, the ELA hosted almost 6600 person-days of on-site research and direct support activity, with approximately 90% occurring during the May through October "field season". The winter period also saw over a thousand person-days of construction activity, making the past year our busiest to date. However, early projections indicate that the 2001 field season may exceed these numbers significantly. With all this activity, it appears that there will be more than 60 persons living and working on site at the field station during much of the summer.

New Leadership in Key ELA Roles

Drew Bodaly is New Chief Scientist

On April 1, 2001, Dr. R.A. (Drew) Bodaly succeeded Dr. John Rudd as the Scientist-in-charge and Section Leader of the Experimental Lakes Area.

Drew has been working at the ELA for about a decade, but has been with Fisheries and Oceans, working out of the Freshwater Institute, since the 1970's. His earlier work examined fish populations in Southern Indian Lake, Manitoba, prior to and following the diversion of the Churchill River into the Nelson River. He was instrumental in discovering that fish living in newly flooded reservoirs rapidly accumulate toxic

methyl mercury. Drew is an international expert on the subject of fish populations and mercury contamination.

Currently, in addition to his new management duties, Drew is leading the FLUDEX research project, which is investigating the impacts of flooding forested areas in the Boreal Shield.

Dr. Rudd decided to step down after two years at the helm of the ELA. John is still heavily involved with ELA research as a co-leader of the METAALICUS mercury study (see page 3).

Delorme is New Station Manager

Ian Delorme assumed the position of ELA field station manager

on May 15, 2001. Ian's many skills, and his experience gained in assisting the former manager, Neil Fisher, for several years, will be invaluable as we enter another busy field season.

Neil Fisher has moved on to a position as a Fish Habitat Biologist, working out of the Freshwater Institute in Winnipeg.

The ELA field station manager is responsible for the day-to-day operations and maintenance of the field station and the infrastructure associated with it. He lives on site year-round, and must be skilled in a wide variety of tasks. In addition, the station manager is often the primary representative of the ELA in dealing with merchants and others in the local community.

Drew Bodaly (right) officially welcomes new station manager, Ian Delorme, by presenting him with the hallowed "red jacket" at a brief ceremony in the ELA dining hall. Both Drew and Ian have key roles in the future of the ELA.



Research '00 Review

More than 200 different researchers from more than a dozen different agencies and universities worked at the ELA during 2000.

In addition to the METAALICUS study (see page 3), which was conducting baseline studies on Lake 658 and doing pilot-scale experiments in anticipation of starting the whole watershed mercury study this year, the FLUDEX experiment was busy with its second year of flooding in the three artificial reservoirs. Dr. Karen Kidd and her team were doing preparatory studies in preparation for addition of a synthetic estrogen to Lake 260, commencing this spring. Dr. Michael Turner was continuing to investigate the long-term, natural recovery of experimentally acidified Lake 302. Dr. Ken Mills and his team were following the effects on fish populations of removing half the rooted aquatic vegetation ("weeds") from Lake 191. A group from the University of Texas was wrapping up a long-term study in several other lakes, and various graduate students and other visiting researchers were working on their own smaller projects. Other researchers are "mining" the long-term data sets to study climate change.

Here a few of the highlights from major studies.

FLUDEX

This study is investigating how the flooding of upland vegetation and soils can affect production of both methyl mercury and greenhouse gases. It attempts to simulate what happens along the

edges of large hydro reservoirs that flood boreal forest.

Three small reservoirs have been constructed on forested upland sites. For the second year, these reservoirs were continuously flooded from June to October, 2000. Production of methyl mercury remained high in all reservoirs. Somewhat surprisingly, there was little indication that greenhouse gas production was waning, despite the reduced amounts of carbon available in the sparse vegetation and thin soils.

The third season of flooding is now underway, with researchers from DFO and the Universities of Alberta, Waterloo, and Wisconsin continuing to monitor these systems. Major funding for this project is coming from Manitoba Hydro, which is already using knowledge gained to assist in planning for its future projects.

Hormone Mimics

Many human-produced chemicals, when released to the environment, are able to chemically mimic certain natural hormones, causing disruption of various life processes, including reproduction. A potent synthetic estrogen is used in birth control pills. This chemical can pass, unaltered, through women's bodies and through sewage treatment plants, eventually being released to streams and lakes. Even low concentrations in these water bodies may have adverse effects on fish populations by interfering with normal hormonal balances. Feminized male fish, sometimes containing rudimentary eggs, have been found in

such waters. Obviously, these males are no longer able to successfully fertilize other eggs. However, these waters also contain other contaminants that may be having similar effects. By studying the estrogen effects in an ELA lake, we can clearly determine if the estrogen is causing the reproductive disruption.

We have now begun to add low concentrations of this estrogen to Lake 260, and to follow the responses in both fish and invertebrates. During 2000, pilot studies showed that the estrogen breaks down fairly rapidly in lake water. We will need to add a small amount of estrogen continuously to maintain the low target concentration. We predict that reproductive problems will be evident in some populations within a year or two.

Acidification Recovery

While acid rain no longer attracts much media attention, it continues to be a serious problem in many lakes in eastern Canada. At the ELA, we continue to follow the natural recovery of lakes that we experimentally acidified during the 1970's and 1980's. The information being gained is invaluable for managers trying to assess the future of thousands of lakes in acidified regions.

Our studies show that acidified lake ecosystems will recover naturally, if we stop the input of acid. However, it can take many years, particularly if a lake ecosystem has been badly damaged. Biological recovery is very complex, and the resulting food web will probably differ from that present prior to acidification.

New Buildings Ready for Use

After a busy winter of construction activity, two new facilities at the ELA are now in full use.

Laboratory Complex

The largest of these is the second phase of a new laboratory complex (pictured below), which houses most of the station's on-site laboratory and office functions.

In combination with the first phase, completed in 1999, this complex contains over 700 square metres of working space, plus equipment storage space. The working space includes laboratories for chemical analysis of water samples, a "clean room" for analysing samples containing low levels of mercury, and a variety of biological laboratories. Also included are field offices for staff and visiting researchers, workrooms for our field sampling and hydrometric programs, a first aid room, and a general office. The equipment storage, along with some additional space for a future laboratory and offices, is located

in a lower level.

This new laboratory building replaces five old lab trailers and buildings, and provides up-to-date air exchange and other features to meet current health and safety requirements.

Seasonal Residence

The second new facility is a seasonal residence created within the shell of the former main laboratory building. This new residence incorporates 10 bedrooms, washrooms, and a sitting room. A screened porch provides additional common space during warmer weather.

The new residence replaces several 30-year old bunk trailers and will be used primarily to accommodate students working at the ELA during the spring, summer and fall periods. Located near the Lake 240 swimming beach and volleyball court, the building has already been named the "Beach House".

Continuing Renewal

These new facilities are the latest examples of a continuing commitment by Fisheries and Oceans Canada for renewal of the ELA station facilities. Over the past three years, several million dollars have been spent on the new laboratory, a new workshop complex, a station manager's residence, and the "Beach House". Within the next couple of years, we hope to see a new fish laboratory/wet lab and some further upgrading of our on-site living accommodations. In addition, we plan to upgrade some of our service infrastructure, including the station water supply system.

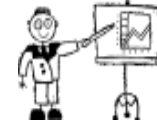
With research activity at record levels, these improved facilities are badly needed. By making life easier for station residents, the improvements enable the scientists to focus on the unique research that has given the ELA its international reputation for scientific leadership, innovation, and excellence.

A bird's eye view of the new laboratory complex providing state of the art facilities for analysing samples





Community Outreach



Visit ELA on the Web: www.umanitoba.ca/institutes/fisheries

Dryden Display Booth

Experimental Lakes staff participated in the annual Dryden Sports and Home Show, held in the Dryden Arena from April 19 through 21. It was great to meet the hundreds of people who stopped by the ELA booth to chat and ask questions. Hopefully, we were able to shed some light on the "mysteries" of our research.

Drew Bodaly, Ken Mills, Mike Stainton, and John Shearer represented the ELA at the event. Various displays and hand-outs highlighted some of the research activities and equipment used.

Based on a short survey completed by many of the visitors, there is a great deal of interest in a possible "open house" at the ELA facility. We will be investigating the possibilities of holding such an event, possibly on a Saturday. Anyone interested in visiting the ELA and viewing first-hand the facilities, would be invited to register and attend. Stay tuned for more information.

LOWDPOA Meeting

On April 23, ELA had a small display booth at the Annual Meeting of the Lake of the Woods District Property Owner's Association, held at the International Inn in Winnipeg. John Shearer was assisted by Claire Herbert

and Hedy Kling, who answered questions about algal blooms in Lake of the Woods. ELA research is of particular interest and relevance to cottagers, and the LOWDPOA, through its Executive Director, Gerry Wilson, has been a friend of the ELA for many years.



Dr. Ken Mills shows fish net to Vermilion Bay school tour

Public Tours and Talks

Over the past year, groups from Eagle River School, from Lillian Berg School in Vermilion Bay, from Springfield Collegiate in Oakbank, Manitoba, and from Beaverbrae Secondary School in Kenora have visited the field station. An illustrated talk about the ELA was presented to interested campers at Blue Lake Park last August.

Web Site Use Grows

The ELA web site (see the URL, above) contains a wealth of information about the Experimental Lakes Area, its history, facilities, and activities. During the

past year, the level of visitation to this web site has increased steadily, an indication that more and more people are finding something of value at the site.

An Electronic Newsletter?

With the increasing number of people who are connected to the internet and have e-mail, it is now feasible to consider making our *ELA Update* available via this electronic means. While we would continue to provide a paper newsletter to those who are not "wired", anyone wishing to assist us in saving paper and postage could receive the same information electronically.

If you would prefer to receive the *ELA Update* via the internet, please send an e-mail message to John Shearer (ShearerJ@dfo-mpo.gc.ca) indicating this. If there is enough interest, we will post an electronic version in future and let you know via e-mail when and where it is available.

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
E-mail: ShearerJ@dfo-mpo.gc.ca