

# Lake Winnipeg Research Consortium Inc. Newsletter

March 2008 - Volume 1, Issue 1

## Message from the Managing Director

Welcome to our first newsletter. The Lake Winnipeg Research Consortium (LWRC) has come a long way since its inception in 1998. We now own and operate the research vessel MV *Namao* and have secured multi-year funding to conduct three research cruises a year. Our research team was strengthened with recent additions from Environment Canada and the university community. We also now have funding to support part-time administrative staff, which will allow for more effective programming, management and communication of LWRC activities. Up to now, much of that effort has been done on a voluntary basis.

Our work on the lake since 2002 has been primarily of a monitoring nature. That is, we measure the same parameters such as water chemistry, temperature, transparency, plankton and bottom organisms (benthos) at the same locations each year. This must be done throughout the open-water season (i.e. the spring, summer and fall) because natural changes in water temperature and the availability of light from spring to fall greatly affect the results we see. We must also do this for a number of years to

better understand year to year natural changes so that we can distinguish them from those caused by humans. For example, we had a "normal" year

in 2002 followed by a very hot, dry year in 2003, a cool wet year in 2004 and high flows in 2005. In the summer of 2006, due to low Red River flows and reduced sediment loads, the water in the south basin was much clearer. Clear water allows light to penetrate to greater depths in the water, which stimulates the growth of algae. As a consequence, we saw the south basin covered by a widespread algal bloom in the fall of that year. This did not happen in 2007 because the south basin had its normal murky appearance. Taking into account these natural seasonal and annual changes, we are now in the process of determining the extent of the impact that human activities are having on the lake. This is the only variable that we can control.

The approach that the LWRC is taking is to involve everyone, because everyone has something to contribute. Everyone also has a responsibility for the well-being of the lake. By working together, we can protect this precious resource now and for future generations to come. Thank you to those who have become involved in this initiative and welcome to those who would like to become a part of it.



# General News & Information

Nine community foundations have come together to contribute financially toward the LWRC's administration.

The Annual Science Workshop will be held on March 17<sup>th</sup> to 19<sup>th</sup> at the Freshwater Institute in Winnipeg. (details below)

The LWRC will again be conducting three research surveys over the open water period in 2008.

Environment Canada is installing a new laboratory on the upper deck of the MV *Namao* to enhance water quality research being conducted on the lake.

The Province of Manitoba and Environment Canada have established the Federal-Provincial Lake Winnipeg Basin Committee and the Lake Winnipeg Basin Science Sub-Committee to examine watershed issues.

The LWRC's Education Program will include dedicated ship time for schools on board MV *Namao*.

The Grindstone Cottage Owners' Association, an LWRC member, is sponsoring a prize at the Manitoba Schools Science Symposium for a Lake Winnipeg Science Project.

The LWRC continues to inform Manitobans and others about the state of Lake Winnipeg. Recent presentations include:

Transport Canada Conference, Gimli  
Charleswood Rotary Club, Winnipeg  
Manitoba Wildlife Federation, Gimli  
Natural Resources Canada, Winnipeg  
Winnipeg Aquatics Workshop, Winnipeg  
Red River Basin Commission, Winnipeg  
Red River Basin Commission, Fargo, ND  
Riparian Health Council of MB, Winnipeg  
Canadian Hydrotechnical Conf., Winnipeg  
Partners of Sask. River Basin Conf. Winnipeg  
Can. Soc. for Chem., 90th Conf., Winnipeg  
International Water Institute, Grand Forks, ND  
Whitshell Cottage Owners Assoc. Winnipeg  
Solid Waste Assoc. of North Amer. Petersfield  
MB Water Stewardship Regional Meeting, Gimli  
MB Chapter Wildlife Society, Delta Field Station  
Intl Water Inst 3rd Annual Conference, Grand Forks  
Lake Balaton Climate Change Workshop, Siofolk, Hungary  
University of MB Aquatic Biology Research Group, Winnipeg  
30th Congress Intl Assn of Theor. and Appl. Limnol., Montreal, QU

Science Teachers Association of MB, Winnipeg  
Sisters of the Holy Name, Winnipeg  
St. Boniface College, Winnipeg  
Creative Retirement, Winnipeg  
Health Canada, Winnipeg  
Laurier Club, Winnipeg

# Annual Science Workshop

## Developing an Ecosystem Model for Lake Winnipeg Management

March 17th - 19th, 2008 at the Freshwater Institute  
501 University Crescent, Winnipeg

The Lake Winnipeg Research Consortium will hold its 2008 Science Workshop from Monday, March 17th (starting at 1 pm) to Wednesday, March 19th (ending at noon).

The workshop provides a forum for presentation of 2007 research activities (Tuesday) to which all LWRC researchers, LWRC members and the general research community are invited. The review and planning sessions on Monday afternoon and Wednesday morning are limited to LWRC researchers and science managers engaged in scientific research on the lake.

### The workshop will allow researchers to:

- 1) define an integrated research program and ecosystem model to inform lake management (Day 1 – closed discussions)
- 2) present research findings from the 2007 surveys (Day 2 – open to all LWRC members)
- 3) plan the 2008 field program (Day 3 – closed discussions).

The final agenda will be posted on the LWRC website prior to the event.

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## Education & Outreach Program

The recent contribution by the community foundations has greatly enhanced the capacity of the LWRC to further develop its Education & Outreach Program. Our primary focus is on the development of resource materials for teachers, as well as teacher training. The school field program is also being enhanced and will include dedicated ship time on board the research vessel MV *Namao* to allow greater hands-on participation by students.

A number of new projects will also begin this spring as part of the LWRC's Special Projects Program, including one that is being initiated by members of the Arts community. Stay tuned!

Schools and colleges involved in the LWRC Education Program include:

- |   |  |
|---|--|
| Arthur A. Leach, Winnipeg                   | Isaac Beaulieu, Sandy Bay First Nation |
| Cecil Rhodes, Winnipeg                      | J.H. Bruns Collegiate, Winnipeg        |
| Charles Sinclair, Fisher River First Nation | Linden Meadows, Winnipeg               |
| Charleswood Junior High, Winnipeg           | Nellie McClung Collegiate, Manitou     |
| Concordia College, Moorhead, MN             | Rockwood, Winnipeg                     |
| Gimli High, Gimli                           | Springfield Collegiate, Oakbank        |
| Grant Park Collegiate, Winnipeg             | University of Manitoba                 |
| Green Valley, Grunthal                      | University of Winnipeg Collegiate      |
| Home school community, Winnipeg             | Westwood Collegiate, Winnipeg          |

# How Does the LWRC Work?

## Who We Are

The LWRC is a non-profit organization. At present, 32 partners comprise the LWRC, including academia, government, First Nations, industry and recreational interests. Its diverse membership is designed to include all who have an interest in, and a responsibility for, the well-being of Lake Winnipeg.

Managing Director: Dr. Al Kristofferson

Science Coordinator: Mr. Alex Salki

Education Coordinator: Dr. Karen Scott

Board of Directors:

Dr. G.H. Lawler (Scientist Emeritus, DFO)

Dr. Darren Gillis (University of Manitoba)

Mr. Dave Bergunder (Freshwater Fish Marketing Corporation)

Mr. Terry Miles (Manitoba Hydro)

Mr. Bill Barlow (RM of Gimli)

Dr. Al Kristofferson (LWRC)

MV *Namao* crew: (see next page)

## How We Are Funded

Funding for operation of the LWRC's research vessel MV *Namao* is provided by the Federal and Provincial governments, the City of Winnipeg and Manitoba Hydro. Additional funding has been provided by the Manitoba Pork Council and Fish Futures Inc.

Nine community foundations in Manitoba have recently pooled resources to provide the LWRC with \$82,000 for each of two years to cover administrative costs, with some extending their contributions to three and five years. The foundations include: Winnipeg Foundation, Thomas Sill Foundation, Dauphin and District Community Foundation, Lake of the Woods Water Sustainability Foundation, Selkirk and District Community Foundation, Westshore Community Foundation, Lake Winnipeg Foundation, Brandon Area Community Foundation, and Community Foundation of Portage and District. Many Rural Municipalities and cottage owners' associations contribute funds on an annual basis and we receive one-time donations from organizations and individuals. These donations support the LWRC's

Education and Outreach Program. The LWRC's application for charitable status is pending.

## What We Do

The main objectives of the LWRC are to:

- coordinate multi-disciplinary research on the lake,
- develop and implement an education and outreach program, and
- provide a dedicated and capable research platform (MV *Namao*).

In addition to conducting three 25-day lake-wide research surveys per year, the LWRC hosts an annual Science Forum at which participating scientists present their research findings, identify data gaps and develop short- and long-term research plans that will contribute to the most effective management strategy to restore and sustain Lake Winnipeg.

This collaborative approach produces a more powerful research team than any single agency can develop on its own. One of the conclusions reached by Canada's Senate Standing Committee on Fisheries in their February 2002 Report was:

*"As an organization that facilitates multi-disciplinary science, coordinates public and private research, and promotes information-sharing, the Lake Winnipeg Research Consortium is a model that could be emulated elsewhere in Canada."*

The MV *Namao* is also used for educational purposes and many school groups, colleges and universities have come aboard. The ultimate aim of our Education Program is to kindle an interest in young people to become more engaged in caring for water.

## How To Become A Member

Write a letter to the Managing Director indicating your organization's desire to become a member of the LWRC. The application will then be reviewed by the LWRC Board of Directors, and a response will follow.

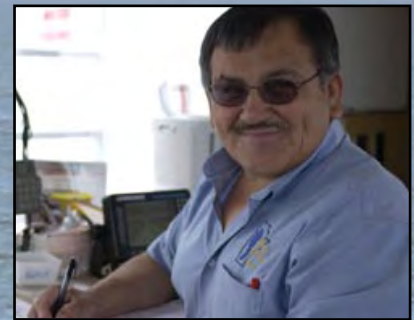
# Meet the Captain & Crew of the MV *Namao* (2007)



Chief Engineer  
Dan Richmond



Captain  
Mervin Sinclair



Chief Officer  
Walter Lea



Second Engineer  
Ken Anderson



Boatswain  
Kelly Cooke



Field Coordinator  
Natalie Asselin



Cook  
Rhonda Thorsteinson



Deck Hand  
Wesley Cooke



Deck Hand  
Dwayne Swaffer



Deck Hand  
Brian Groot

# The Status of Lake Winnipeg

Lake Winnipeg is unique among large world lakes. With an area of nearly 25,000 km<sup>2</sup>, it is the 10<sup>th</sup> largest lake. But with an average depth of only 12 m, it is also the shallowest of the great lakes. This simple feature combined with the fact that so much land area, almost 1 million km<sup>2</sup>, drains into Lake Winnipeg, makes it highly susceptible to natural and human-induced impacts, which are altering water quality and habitat in the lake.

Among the most important factors influencing Lake Winnipeg are climate, river flows, invasive species, and phosphorus. The most visible change in the lake is the formation of large, dense blooms of blue-green algae on the surface of the lake. In recent years, the amount of algae in Lake Winnipeg is higher than in any of the 10 largest lakes.

The increase in blue-green algae in Lake Winnipeg appears to be a response to a set of factors, which includes warmer water and more phosphorus. The south basin of Lake Winnipeg is now 2° C. warmer than it was in the early 1900s, likely as a result of climate change. This increase in water temperature has increased the growth rate of plants and animals, including commercial fish species. Warmer water is also affecting the structure of the community of small animals that live in the lake (zooplankton) as the warm water varieties thrive at the expense of the ones that prefer cool water.

Phosphorus levels in Lake Winnipeg are dependent on the total volume of water and the amount of phosphorus entering the lake from rivers, streams and precipitation. The Red River is the most important source of phosphorus to Lake Winnipeg. The quantity of phosphorus in the Red River is mainly a function of the amount of phosphorus in soils, as well as the intensity and frequency of rainfall events that carry the phosphorus off the land into the river. The spring snow melt period is an especially important time for run-off of phosphorus-rich water to the river and ultimately to the lake.

Due to this dependence on snow melt and rainfall events, the annual Red River phosphorus loads are highly variable as shown by federal and provincial studies during the last four decades.

Inter-annual differences of 300 to 400% were observed during the early 1970 and late 1990 periods. If Red River flow variability increases with global warming, as predicted by regional climate models, it will become increasingly important to strictly manage phosphorus and water in the Red River basin if we hope to achieve improvement in Lake Winnipeg water quality.

Studies in other lakes have shown that the prolific growth of blue-green algae can also be linked to exotic species, such as rainbow smelt. Rainbow smelt invaded Lake Winnipeg in the early 1990s and now have reached sufficiently high numbers that they are affecting the zooplankton community and possibly increasing the phosphorus recycling rate within the lake. More phosphorus, in turn, promotes the growth of blue-green algae. The increased productivity of edible green algae, zooplankton and rainbow smelt has contributed to record high walleye yields in Lake Winnipeg. This is favourable; however, it is not sustainable as blue-greens increasingly overwhelm the algal community.

The challenge facing lake managers will be to select nutrient targets that will improve Lake Winnipeg water quality and, at the same time, maintain a highly productive fishery. Published reports on Lake Winnipeg of an environmental nature number fewer than 50 compared with the 1000s of similar studies that have been conducted on North America's Laurentian Great Lakes. There is a need for a dedicated research initiative to understand this complex ecosystem and to effectively establish nutrient targets for this magnificent lake.



The Red River - the most important source of phosphorus to Lake Winnipeg.

# What's So Special About "Blue-Greens"?

"Blue-green algae" has become a fairly common term these days, often associated with deteriorating water quality in lakes around the world, including Lake Winnipeg. Why the spotlight on blue-greens? What makes them so special and even dangerous?

Let's start with what blue-green algae are - bacteria. We call them algae because they share some characteristics with algae, like photosynthesis. However, they also share characteristics with bacteria, hence their other name "cyanobacteria".

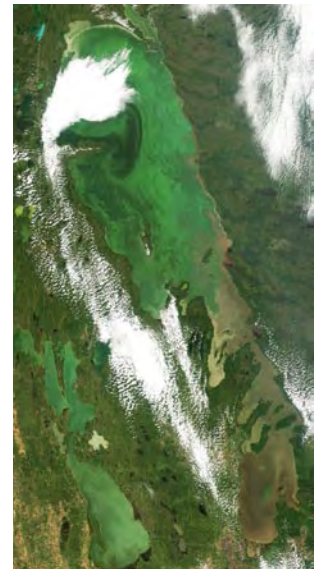
Like algae and plants, most cyanobacteria are important as photosynthetic organisms that produce oxygen. They also have 'gas vesicles', which provide buoyancy to their cells allowing movement up and down in the water wherever light is most favourable. Light is needed for growth so this gives cyanobacteria an important competitive edge over algae.

Another remarkable ability of blue-greens (or cyanobacteria) involves nitrogen. Nitrogen, like phosphorus, is a nutrient that is required by all living things, from bacteria to humans. Generally, algae need at least 16 times more nitrogen than phosphorus for balanced growth. Scientists describe this requirement as the "N to P ratio" of 16:1. If phosphorus enters a lake and there is not a relative increase in nitrogen, the N:P ratio may decrease to less than 16:1. When this occurs, blue-green algae thrive at the expense of other groups of algae. This is because many blue-greens (not all of them) have the unique ability to use, or "fix", nitrogen from the air above the lake if there is not enough nitrogen dissolved in the water. Algae can not do that. Consequently, a lack of nitrogen relative to phosphorus will

favour the proliferation and dominance of many species of blue-greens.

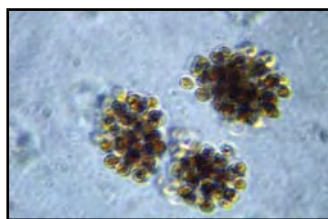
As remarkable as they may be, blue-green algae also cause serious problems for humans. Among the more troubling is the production and release of potent nerve and liver toxins into the water. If ingested, they pose a risk to the health of humans and other animals. Not all algal blooms are toxic; however, there is no way to tell without analyzing the water. Blooms of algae also clog fishers' nets making them visible to fish, time-consuming to clean and a health concern of fishers. Blue-greens also clog filters and cause taste and odour problems in drinking water.

In Lake Winnipeg, blue-green algae form large 'blooms' that have increased in size and frequency over the last 15 years due largely to a disproportionate amount of phosphorus entering the lake. Blue-greens now dominate the once diverse community of algae. As algae form the base of the food web, important changes in both the structure and function of the rest of the food web are being observed.



Satellite image of a blue-green algal bloom in the north basin.

From a human perspective, blue-greens are often considered a nuisance at best and deadly at worst. However, they are one of the earliest life-forms on Earth and have successfully existed here for over two billion years, often in the most extreme hot, cold and saline environments. This, together with their remarkable features, make it hard not to have a certain level of admiration for them.



Common bloom forming blue-green algae found in Lake Winnipeg.



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