LICA
Lakeland Industry & Community Association

ANNUAL REPORT 2008

CONTENTS

ELAINE STAUDZS
2008 LICA Photo Contest

VISION

LICA is a partnership of industry and community supporting a healthy environment.

MISSION

LICA gathers, interprets, shares, and/or responds to information on development in the LICA region, for the benefit of all.

VALUES

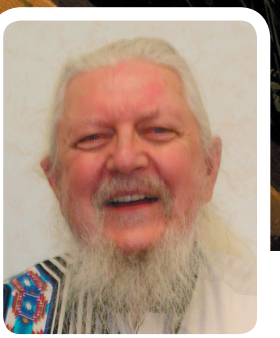
- Trust, Honesty & Respect
- Clarity & Open-mindedness
- Transparency & Cooperation
- Responsible Development

HEATHER ROBERTSON
2008 LICA Photo Contest

LICA GEOGRAPHICAL AREA

OWEN DAVIES
2008 LICA Photo Contest

MESSAGE
FROM THE CHAIRMAN



Welcome to the 2008 Annual Report of the Lakeland Industry and Community Association (LICA). It has been an interesting year for the Association, which has spent its first full year in a new facility, much more conducive to meeting space, library space, and administrator and employee space. The facility is also home to LICA's two independent standing committees – the Beaver River Watershed Alliance (BRWA) and the LICA Airshed Zone.

LICA is an association of community, government and industry stakeholders, who believe that we need to talk to share information to understand and have influence on resource development. A volunteer board of 12 Directors manages the Association's activities providing direction to its committees.

One of LICA's mandates is to resolve local and regional issues regarding traffic and noise and to provide contact information. As well, the LICA Airshed Zone monitors air emissions. The Beaver River Watershed Alliance (BRWA) deals with water use and the health of the area's water resources.

The Communications Committee's mandate is to provide education through sharing information. The committee has sponsored display booths at open houses, as well as the Bonnyville Trade Show. In addition, it provides a schedule of LICA's upcoming meetings, which is printed in the Bonnyville Nouvelle in order to inform those who may wish to attend meetings. The Communications Committee also assembles the information for each year's annual report.

LICA is pleased to welcome new members into the organization at any time throughout the year. These individuals must be 18 years of age or over, reside or conduct business within the LICA area, which includes the entire M.D. of Bonnyville No. 87, as well as all of the County of St. Paul No. 19. A membership form is available on LICA's website (www.lica.ca). Also available on the website are monthly calendars of activities and lists of resources. Resources include meeting minutes, maps, air monitoring results, study results and other committee information.

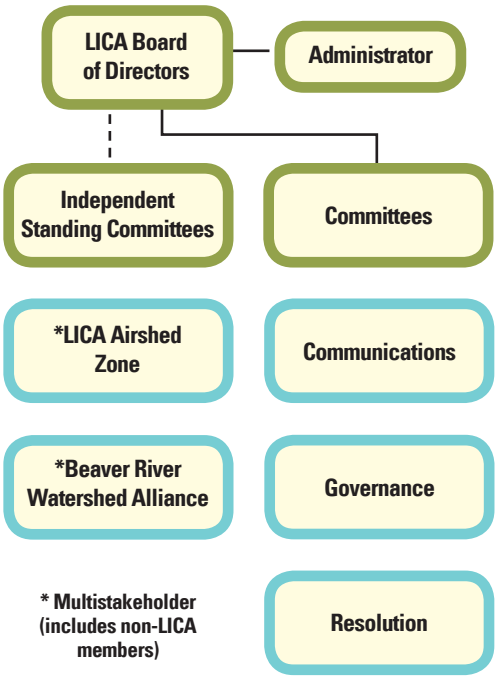
A big thank you goes out, again, to the Board of Directors for their dedication and countless hours of work on the Board, as well as the various committees they sit on. Thank you as well to our Administrator, Charmaine Code, her Administrative Assistant, Tanya Fukushima and her Accounting Assistant, Gail Nielsen, for their support and hard work.

Robert Deresh
Board Chairman

BOARD & COMMITTEES

BOARD OF DIRECTORS (ABOVE): Back Row (L-R): Ajaz Quraishi (Director), Annette Ozirny (Director), Sandy Martin (Alt. Director), Ted Lamb (Director), Delano Tolley (Director), Ryan Wartman (Observer), Norman Quinney Jr. (Director) Front Row (L-R): Robert Deresh (Chairman), Sherry Hennessey (Treasurer), Harold Ross (Vice-Chairman), Mildred Dunham (Alt. Director). Missing from Picture: Iris English (Director), Kathryn Wiebe (Director), Murray Ireland (Director), Monty Moore (Alt. Director) & Shirley Benson (Director).

ORGANIZATIONAL STRUCTURE

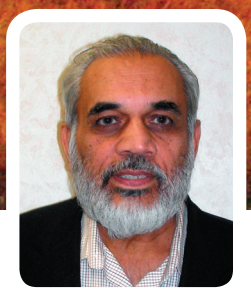


The **COMMUNICATIONS COMMITTEE** works to enhance communication materials, as well as the communication process, amongst all parties. Members include Beverly Smith, Ajaz Quraishi, Mildred Dunham, Mary Smith, Justin Robinson, Annette Ozirny, Harold Ross (Co-Chair), Carrie Rawlake (Co-Chair) and Robert Deresh (LICA Board Chairman).

The **GOVERNANCE COMMITTEE** develops, monitors and ensures compliance with LICA policies and bylaws. Members include Iris English, Kathryn Wiebe, Robert Deresh (LICA Board Chairman), Mildred Dunham, Mary Smith, Delano Tolley, Paula McMillan and Carrie Rawlake.

The **RESOLUTION COMMITTEE** facilitates the resolution of concerns and issues. Members are Mary Smith, Mildred Dunham, Robert Deresh (LICA Board Chairman) and Ward Nicholson.

VOLUNTEER



AJAZ QURAISHI

Ajaz Quraishi was one of eight children of a school principal in Hyderabad, India (near Mumbai). In 1967, at age 26, Ajaz followed his brother to Canada and Edmonton in hope of a better future. That first year, he worked in the Peace River area on an oilfield survey crew. In 1972 he met a wonderful lady - Lynda, whom he married later that year. Three children Amina, Abrahim and Adam, completed their family.

Ajaz continued to advance toward the oil industry, getting his heating technician qualifications at George Brown College in Toronto, and in 1976 moving his family to Edmonton, where he gained his Power Engineer Certificate.

Two years working at Lakeland College in Vermilion as a power-house engineer were followed by the family's move to Edson, and Ajaz's employment with Procor Sulphur in Fox Creek and later "two-in, two-out" for Imperial Oil in Norman Wells.

Their family moved to Cold Lake when Ajaz got an in-company Imperial Oil transfer to shift leader/shift engineer in 1984, just as the heavy oil industry was beginning to develop. During his career, Ajaz saw the Cold Lake ESSO project expand from its infancy to a world-class facility.

Ajaz has always been involved in his community. He is politically active, currently serving as a Regional Director of the Progressive Conservative Association of Alberta and as Vice-President of Finance and CFO of the Bonnyville / Cold Lake Progressive Conservative Association.

Ajaz believes in committing his time and energy to humanitarian causes, not-for-profit organizations, and professional organizations, and is a proven and dedicated fund-raiser, justly proud of the money the local Radio Auction and Charity Golf Day bring to the United Way. The City of Cold Lake recently presented "Mr. Volunteer" with the Cold Lake Ambassador Award and the Province of Alberta has inducted him to their Volunteer Wall of Fame.

Ajaz brings his supportive and positive attitude to his LICA involvement, where he currently serves on the Board, the Communications Committee, the Beaver River Watershed Alliance and the LICA Airshed Zone. He believes in making an informed decision, implementing and moving on.

Ajaz loves and takes great pride in his nine grandchildren, whom he and Lynda visit often in Calgary.

LINDA FOX
2008 LICA Photo Contest

PROFILES

KATHRYN WIEBE

Kathryn, youngest of three daughters of Mychailo and Kateryna Kozak, was born in Ukraine. The family immigrated to Canada in 1949 and settled in southern Alberta. Her early years were materially poor, but meaningful and happy. Although fortunate not to personally experience the discrimination that she saw in the 1950s, it led her to vow that she would always fight for fairness and society's vulnerable.

Kathryn and John Wiebe, married 37 years, met in Edmonton in graduate studies in the history department, and have four sons - Michael, Mark, Jonathan and Zenon. The first years of their marriage were spent traveling and working in Europe. Back in Canada, Kathryn taught upgrading on the Cote Reserve in Saskatchewan and ESL at Malaspina College in Nanaimo. In 1979 they moved from Calgary to Bonnyville, where for the next nine years, Kathryn was Director of FCSS. She names her greatest accomplishment as the development of the Parent Child Centre.

A by-election victory in 1991 gave her a seat on the Bonnyville Town Council, and she was elected mayor in 1998, committing to and serving two terms.

Kathryn's environmental concerns and interests led her to join the Lakeland Environmental Society in the late '80s. Environmental commitments since then include: Northern Care, a provincial initiative to reduce waste and promote recycling; Moose Lake Water Study, determining quality and quantity of the lake as Bonnyville's water source; introduction of the Water for Life initiative to ensure protection of the Moose Lake watershed; and the Cold Lake Beaver River Water Management Basin Advisory Committee that reviewed and up-dated earlier Beaver River basin studies.

In 1999, Kathryn was one of the original organizers of LICA. In 2007, she was elected as a community alternate to the board and in 2008 as a board member. Kathryn enjoys the consensus model that LICA uses for arriving at decisions, and is not a proponent of the adversarial approach. She believes LICA's role is to increase community understanding of the development of the oil industry in our region and the way in which it affects our environment.

A strong believer in community involvement, she likes to remind herself of one of her favourite Chinese proverbs: "Better to light a candle than curse the darkness."

Kathryn was recently appointed to the University of Alberta Senate.

FINANCIAL STATEMENTS

OWEN DAVIES
2008 LICA Photo Contest

MERCIER TAY LLP
PROFESSIONAL ACCOUNTANTS

REVIEW ENGAGEMENT REPORT

To the Members of:
Lakeland Industry & Community Association
Bonnyville, Alberta

We have reviewed the statement of financial position of the Lakeland Industry & Community Association as at December 31, 2008 and the statements of operations and change in net assets, equity in property and equipment and cash flows for the year then ended. Our review was made in accordance with generally accepted standards for review engagements and accordingly consisted of enquiry, analytical procedures and discussion related to information supplied to us by the association.

A review does not constitute an audit and consequently we do not express an audit opinion on these financial statements.

Based on our review, nothing has come to our attention that causes us to believe that these financial statements are not, in all material respects, in accordance with the basis of accounting disclosed in the notes to financial statements.

Mercier Tay LLP
PROFESSIONAL ACCOUNTANTS

Bonnyville, Alberta
February 24, 2009

STATEMENT OF OPERATIONS AND CHANGE IN NET ASSETS

FOR THE YEAR ENDED DECEMBER 31, 2008 (UNAUDITED)	2008	2007
REVENUE		
Operating		
Memberships	$59,000	$59,000
Other receipts from members	$585,522	$620,230
Grants	$67,192	$63,678
Alberta Environment contract income	$41,250	-
Interest	$204	$155
Total Operating	$753,168	$743,063
Programs		
Airshed	$46,462	$10,012
Water study	$58,154	$35,551
Total Programs	$104,616	$45,563
Total Revenue	$857,784	$788,626
EXPENDITURES		
Operating		
Airshed	$131,432	$179,950
Amortization	$14,229	$7,971
Annual Report costs	$33,000	$56,335
Board & committee	$51,900	$40,600
Contracted services	$143,334	$97,485
Insurance	$3,160	$2,343
Interest & bank charges	$364	$489
Meetings	$12,599	$8,520
Occupancy costs	$50,053	$19,766
Office	$15,061	$18,144
Professional fees	$2,014	$5,991
Property taxes	$3,308	-
Public relations	$21,005	$20,744
Training & development	$2,680	$7,707
Travel	$17,857	$19,093
Wages & employee benefits	$47,114	$35,223
Total Operating	$549,110	$520,361
Programs		
Airshed costs	$66,979	$32,119
Water study costs	$130,555	$36,231
Total Programs	$197,534	$68,350
Total Expenditures	$746,644	$588,711
Excess of revenue over expenditures	$111,140	$199,915
Invested in property & equipment	($5,587)	($111,063)
Unrestricted net assets, beginning of year	$169,478	$80,626
Unrestricted net assets, end of year	$275,031	$169,478

SUZANNE MICHAUD
2008 LICA Photo Contest

JOINING LICA

Join us and find out first hand what industry development is going on in your area. Represent the voice of the community and facilitate solutions that reflect community interests and concerns. Participate with community, industry and government members who meet on a regular basis to share information and discuss community concerns.

As a member, you will be part of new environmental initiatives that are planned for the region. You will have access to the expertise around the table. Think green – join us today to work with committed individuals to ensure a healthy environment.

OPPORTUNITIES FOR INVOLVEMENT

If you live or conduct business in the LICA region, and you are 18 or older, consider a membership. You will be kept up to date on activities and events. We have a number of activities during the year, such as the TD Canada Trust Great Canadian Shoreline Cleanup and the LakeWatch program, that you can participate in, whether you are a member or not. You can also run for a position on the Board of Directors at the Annual General Meeting, being held on May 27 this year.

Or, you can get involved with one of the following committees: Governance, Communications, Resolution, Airshed Zone and Beaver River Watershed Alliance. Check it out – we would love to have you join us!

HOW TO JOIN AS A MEMBER OR VOLUNTEER

Contact us (see back cover), visit the LICA website at www.lica.ca, or come out to join an activity or observe a meeting. You are always welcome at our table.

? did you know

Airshed Zones work within a designated geographical area to monitor, analyze and report on air quality. They also recommend and implement actions to improve air quality within their zones. See page 15 for more about LICA's airshed which was endorsed as Alberta's seventh airshed in December of 2005.

A **Watershed** is an area of land that drains into a shared destination such as a river, stream, lake, pond or ocean. Wetlands and groundwater are vital components of a watershed. A watershed can be any size and often there are sub-watersheds within a larger watershed. See page 27 for more information.

WILFRED RASHKE
2008 LICA Photo Contest

COMMUNITY ACTIVITIES

Over the course of the year, LICA members and volunteers participated in many community activities that helped raise the profile of LICA and its initiatives, as well as improve the health of our local environment. Several of these projects are identified on the following pages.

JESSIE LAKE TD SHORELINE CLEANUP

The TD Great Canadian Shoreline Cleanup is an initiative of the Vancouver Aquarium and is sponsored by TD Canada Trust. It is an event that takes place across Canada, usually in September. Volunteers collect and record the type and amount of garbage they find along the shoreline of Jessie Lake. The data collected is submitted to the Cleanup Coordinators in Vancouver. To see the national, provincial and local data please visit their website at www.vanaqua.org/cleanup.

A heartfelt thank you to all the volunteers who generously gave their time to help with the cleanup at Jessie Lake on September 2, 2008. Approximately 100 kg of garbage was collected along two kilometers of shoreline. An immediate and direct result of their efforts is that the Jessie Lake shoreline is more pleasant to walk along and safer for wildlife.

A special thank you goes out to Kathryn Wiebe who coordinated the cleanup and the group of adults with developmental disabilities who graciously volunteered their time. We are planning once again to organize this event at Jessie Lake on September 8, 2009. Please join us.

2008 MOST COLLECTED ITEMS

ITEM	QTY.
Food wrappers / containers	384
Bags (paper & plastic)	337
Cigarettes, filters & packaging	266
Beverage containers (plastic, glass & cans)	200
Cups & cutlery	108

WALKING WITH MOOSE

The Beaver River Watershed Alliance (BRWA) is proud to financially support Walking with Moose, a Moose Lake Watershed Society initiative that began in the summer of 2008. The goal of this project was to provide local youth in the area with a field trip that became a direct link with existing school curriculum while creating awareness, interest and a passion for the local environment.

The field trip created a setting that allowed the students to learn about the diverse ecosystems around Moose Lake while having a fun filled, adventurous day full of hiking. The day consisted of stops both in the Moose Lake Provincial Park as well as the Pelican Point region.

Students were able to study key niches in these areas through centers focused on wildlife signs and tracks, bogs and marshes, and catching aquatic invertebrates.

The full day outing was a great opportunity to educate the students about the impacts of the past while providing them with the tools for future preservation. It was an excellent trip that brought about much inquisition and knowledge, making it rewarding for both the students and the volunteers. The society feels it is important that the stewards of tomorrow are educated and aware today. We look forward to the continuation of Walking with Moose in the years to come.

CRANE LAKE ECO DAY

Crane Lake ECO Day is an annual educational activity to raise awareness of issues concerning Crane Lake. The event involves local residents, cottagers and campers with the main focus being on children. We sometimes combine ECO Day with LakeWatch water sampling. Various experts are invited to participate by providing displays and expertise including Alberta Lake Management Society (ALMS), Municipal District of Bonnyville, Fish and Wildlife, Ducks Unlimited, Alberta Environment, Alberta Stewardship Network, LICA, BRWA and others.

AG & WATER DAY

The 2008 Ag & Water Day (pictured above and below) was an informative event for the approximately 20 people who participated. The day included a visit to Tellier Ranch for a stop at the winter watering site, a project jointly funded by Ducks Unlimited to protect low lands. The day also included a tour of a riparian area and a presentation by Cows & Fish. Another highlight was also the project dedication for the Moose Lake Watershed Society. The event concluded with a reception at Shaw House where LICA representatives in attendance had an opportunity to provide promotional items for participants.

Those attending indicated that the day was a good reminder that although Mother Nature is a great healer, it takes a long time to restore a wetland or riparian area to health. It is therefore important that each of us be aware of how we are affecting the land and always display respect, regardless of the area. We don't own the land, we are only borrowing it from future generations.

? did you know

LICA is proud to send this publication to over 17,000 homes & businesses in our region so that you can read about the association's accomplishments and see what is planned for 2009.

COMMUNITY REGISTRATION NIGHTS

LICA was present at a number of 2008 Community Registration Nights, including Cold Lake, Bonnyville and Elk Point (pictured above). LICA representatives were on hand with our display, along with a great deal of information and promotional items for the numerous people that visited our booths.

TRADEX 2008

We were also pleased to again have our booths at Tradex '08, a three-day annual trade fair held in Bonnyville in April 2008.

Many visitors stopped by the LICA, Airshed Zone and BRWA displays (pictured below) to learn about us and our work, as well as to investigate opportunities to be involved in our association.

? did you know

There are 18 different species of **orchid** to be found in the Beaver River watershed and some of these are quite rare. The rare species include: Western Twayblade (Listera caurina Piper), Bog Adder's Mouth (Malaxis paludosa), Slender Bog Orchid (Malaxis paludosa) and the Northern Slender Hooded Ladies Tresses (Spiranthes lacera).

Striped Coral Root Orchid
Photo by Marsha Hayward

LAKEWATCH PROGRAM

SCOTT CAMERON

LakeWatch is a community monitoring program for stewardship groups and individuals to understand both water quality and water quantity trends at their lakes, while increasing awareness and fostering community participation. It is one of the programs administered by the Alberta Lake Management Society (ALMS). LICA has been a participant in the LakeWatch Program since 2002.

LAKE SAMPLING MINI 101

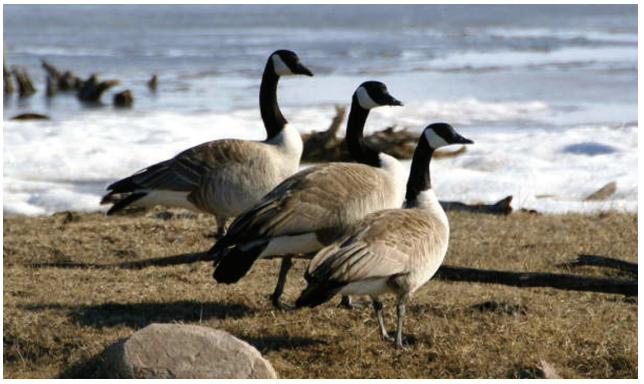
ALMS technicians assist volunteers to test the lakes five times during the summer (June to September), collecting important physical data such as water temperature, clarity and pH. Once all the data is collected ALMS produces a water quality report for each lake, including recommendations, that educates lake users and guides water restoration and management efforts.

SUMMER 2008

In the summer of 2008, 29 lakes were sampled throughout Alberta on a three week rotation. Nine of these were sampled in the Beaver River basin and include Laurier, Kehewin, Marie, Crane, Bear Trap, Amisk, Beaver, Skeleton and Stoney Lakes. Sixteen local volunteers assisted with sampling the lakes. Thank you to each of them for their enthusiasm and commitment.

Special thanks go out to Gord and Laurie Coulman who have volunteered at Crane Lake over the past three years, Maxine Howland who has volunteered at Bear Trap Lake for the past three years, and to Dave Lozinski who sampled both Amisk Lake and Beaver Lake this year.

LakeWatch reports are available on the ALMS website www.alms.ca.



LYNN BEAUPRE
2008 LICA Photo Contest

SUMMER 2009: CALL FOR VOLUNTEERS

For 2009, 10 lakes are slated once again to be sampled and include Laurier, Marie, Bear Trap, Tucker, Amisk, Beaver, Touchwood, Whitefish, Skeleton and Stoney Lakes.

If you are interested in volunteering with the lake sampling and have access to a motorized boat (length required depends on size of lake and needs to be confirmed with ALMS technician), please read the Volunteer Welcome Package on the ALMS website at: www.alms.ca/content.php?content=1#VWP. Important information about requirements and safety are contained therein.

You can also contact the BRWA for more information, to sign up for volunteering and/or if there are other lakes not listed in the table that you would like to see sampled. We look forward to hearing from you.

BRWA Contact Information:
e: ek.brwa@lica.ca p: 780.635.4920

ALMS SAMPLING PLAN (LICA-FUNDED LAKES)

LAKE	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angling	X	X	X						
Bluet	X	X	X	X					X
Garnier	X	X	X	X					X
Laurier	X	X	X			X	X	X	
Kehewin	X	X	X	X		X	X		X
Marie	X	X	X			X	X	X	
Moose	X	X	X	X	X				
Frog		X	X	X	X				X
Hilda			X	X	X	X			X
Fishing				X	X				
Crane				X	X	X	X		
Wolf				X	X	X			
Muriel					X				
Bear Trap					X	X	X	X	X
Tucker					X	X		X	
Amisk							X	X	X
Beaver							X	X	X
Touchwood								X	
Whitefish								X	X
Skeleton							X	X	X
Stoney						X	X	X	

LAKEWATCH PROGRAM VALUE

- Provides a link between BRWA, LICA and the community
- Increases education and awareness amongst lake users and others about the aquatic environment
- Provides recommendations on how to address information gaps and offers lake management options
- Fosters and enhances public involvement in lake management processes
- Facilitates linkages between aquatic scientists and lake users
- Provides reliable water quality data at significant cost-savings

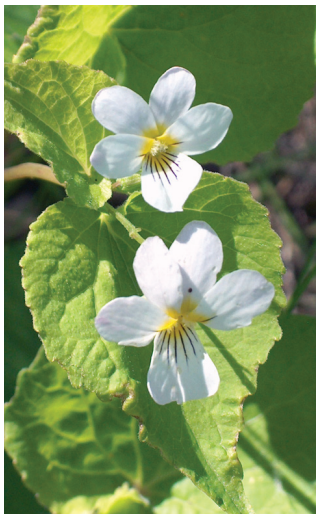
ROSE GREKUL
2008 LICA Photo Contest

AIRSHED ZONE

MESSAGE FROM THE CO-CHAIRS

The year 2008 has been another successful one of operations for the LICA Airshed Zone. We have now completed three years of work and we continue to progress in gathering, interpreting and sharing information regarding our airshed.

This year saw the completion of our in-depth Network Review, as well the Implementation Plan, both major projects to ensure that we have the most effective and representative air monitoring network for our region. We have commenced implementing the various recommendations and will continue to review and bring forward other improvements.



DIANE BRISCOE
2008 LICA Photo Contest

We are also pleased to have been able to complete our Acidification Study which studied the effects of potential emissions on acid deposits in the area, providing further valuable information about the airshed.

As we write this message, we are bringing into operation our second and third continuous monitoring stations, bringing the network to three continuous and 25 passive monitoring stations throughout the region.

Anyone with an interest in regional air quality is invited to participate in our Canister Air Sampling Program. Under this program, a resident can gather air samples which are then tested for quality and the results are provided to the resident.

It is with pleasure that we thank our many volunteers, industry representatives and our Program Manager, Michael Bisaga, for their ongoing commitment toward excellent air quality. We invite you to consider becoming involved by attending a meeting, visiting our website, or contacting our office. Best wishes on behalf of the LICA Airshed Zone.

Kathleen Zellweger & Ralph McGregor
LICA Airshed Zone Co-Chairs

MICHELLE PROULX
2008 LICA Photo Contest

REGIONAL AIR QUALITY MONITORING NETWORK

LICA currently uses two types of monitoring approaches in the regional air quality monitoring program.

• A coarse grid of passive air monitoring stations is distributed across the region generally using a 3x3 township grid where access allows.

Each of these stations provides a one month average measurement of up to four pollutants depending on where the station is situated; sulphur dioxide, nitrogen dioxide, hydrogen sulphide, and ozone are monitored by the passive monitoring network. See the following page for a detailed map.

• A continuous air monitoring trailer in Cold Lake provides near instantaneous measurements of air quality at that location, however, data are generally reported in 1-hour average segments. Data from this trailer is available through the LICA website at www.lica.ca

A second trailer, previously operated by Imperial Oil near their Maskwa plant, began transmitting data to the LICA website in mid-2007. A third trailer is also planned for the St. Lina area.

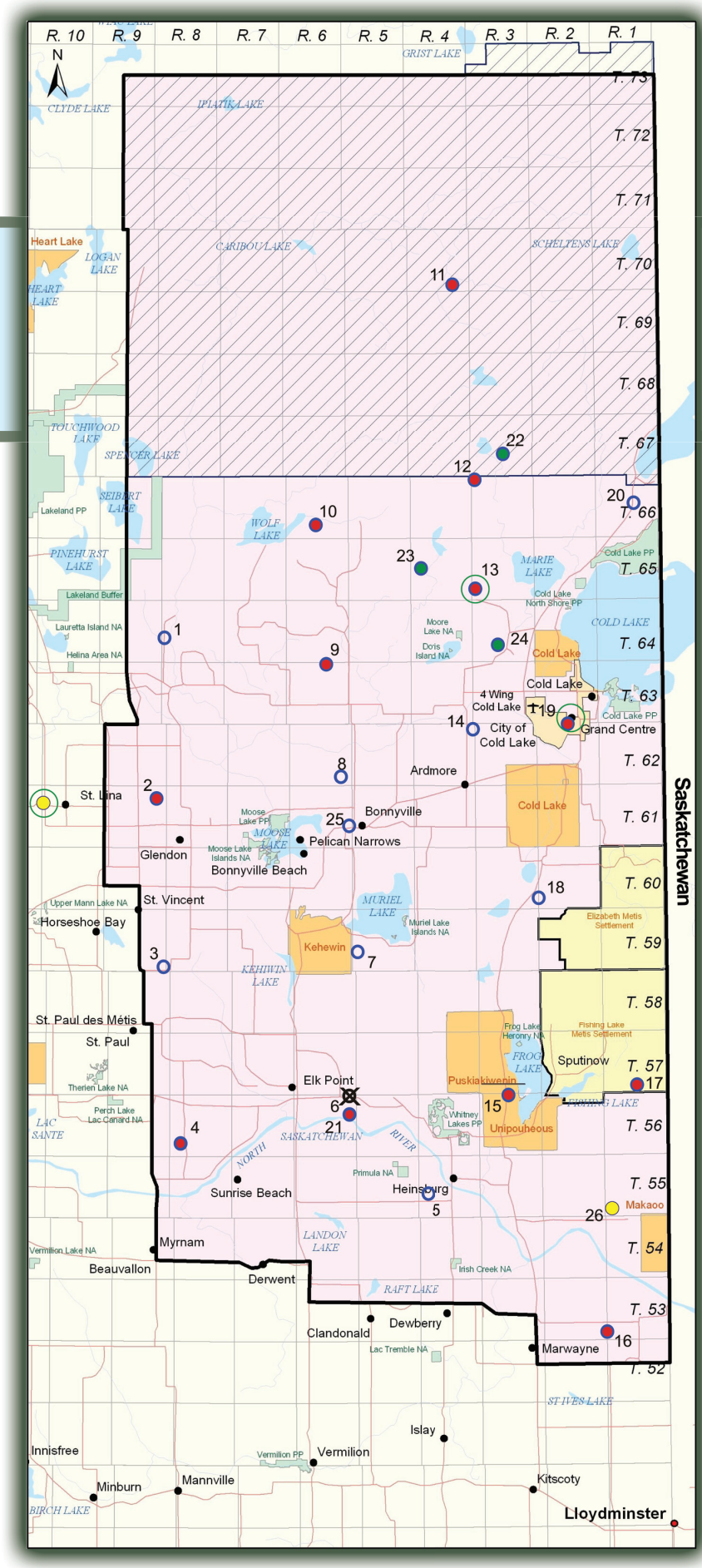
AIRSHED ZONE COMMITTEE: Back Row (L-R): Ajaz Quraishi (Director), Harold Ross (Alt. Director), Roxane Bretzlaff (Alt. Director), Kay Lee Kinch (Director), Frank Haggard (Alt. Director), Mike Trefry (Director). Front Row: L-R): Robert Deresh (LICA Board Chairman), Kathleen Zellweger (Co-Chair), Ralph McGregor (Co-Chair), Michael Bisaga (Program Manager). Missing from Picture: Mary Smith (Director), Mildred Dunham (Director), Nadine Blaney (Director), Annette Ozirny (Director), Monty Moore (Director), Sherry Hennessey (Alt. Director), Norman Quinney Jr. (Director).

LICA's Successes

- LICA has become a place to learn about resource development in the area.
- LICA addresses issues on a regional basis.
- LICA fosters openness and trust.

LICA AIR MONITORING STATIONS

1. Sand River
2. Therien
3. Flat Lake
4. Lake Eliza
5. Telegraph Creek
6. Elk Point Airport (decommissioned)
7. Muriel - Kehewin
8. Dupre
9. La Corey
10. Wolf Lake
11. Foster Creek
12. Primrose
13. Maskwa
14. Ardmore
15. Frog Lake
16. Clear Range
17. Fishing Lake
18. Beaverdam
19. Cold Lake South
20. Medley - Martineau
21. Fort George
22. Burnt Lake
23. Mahihkan
24. Hilda Lake
25. Town of Bonnyville
26. Tulliby Lake



PARAMETERS MONITORING IN THE LICA NETWORK

The LICA Airshed Zone monitors a number of parameters through its various programs. Below are descriptions of the major compounds measured through the passive and continuous monitoring programs.

Total Hydrocarbons (THC)

- A family of chemicals containing carbon & hydrogen
- Sources include vegetation, petroleum & chemical industries, dry cleaning, fireplaces & natural gas combustion.

Total Reduced Sulphur (TRS)

- Includes hydrogen sulphide, mercaptans, dimethyl sulphide, dimethyl disulphide & other sulphur compounds, but does not include sulphur dioxide
- Potential sources are as listed for H_2S

Respirable Particulate Matter ($PM_{2.5}$)

- Airborne particles in solid or liquid form with a median diameter of less that 2.5 micrometers
- Sources include construction, agriculture, combustions & forest fires
- Can also be formed by the reaction of other pollutants

Sulphur Dioxide (SO_2)

- A toxic, colourless gas with a pungent odour
- Primarily formed by combustion processes or by the flaring of gas containing certain sulphur compounds

Hydrogen Sulphide (H_2S)

- A toxic colourless gas with a “rotten eggs” odour
- Potential sources may include “sour” oil & gas, animal feedlots & sewer gas

Nitrogen Dioxide (NO_2)

- A toxic colourless, pungent reddish-brown gas
- Formed by the reaction of atmospheric ozone with the nitric oxide produced from combustion

Ozone (O_3)

- A strong oxidizer with a sweet smell
- Can be transported from the upper atmosphere or produced by the reaction of oxides of nitrogen with volatile organic compounds

PASSIVE AIR QUALITY MONITORING

Since July 2003, LICA has been operating a passive air quality monitoring network. The data produced through passive monitoring is suitable for the identification of long term air quality trends and assessing spatial variability, a typical approach in making regional-scale air quality assessments.

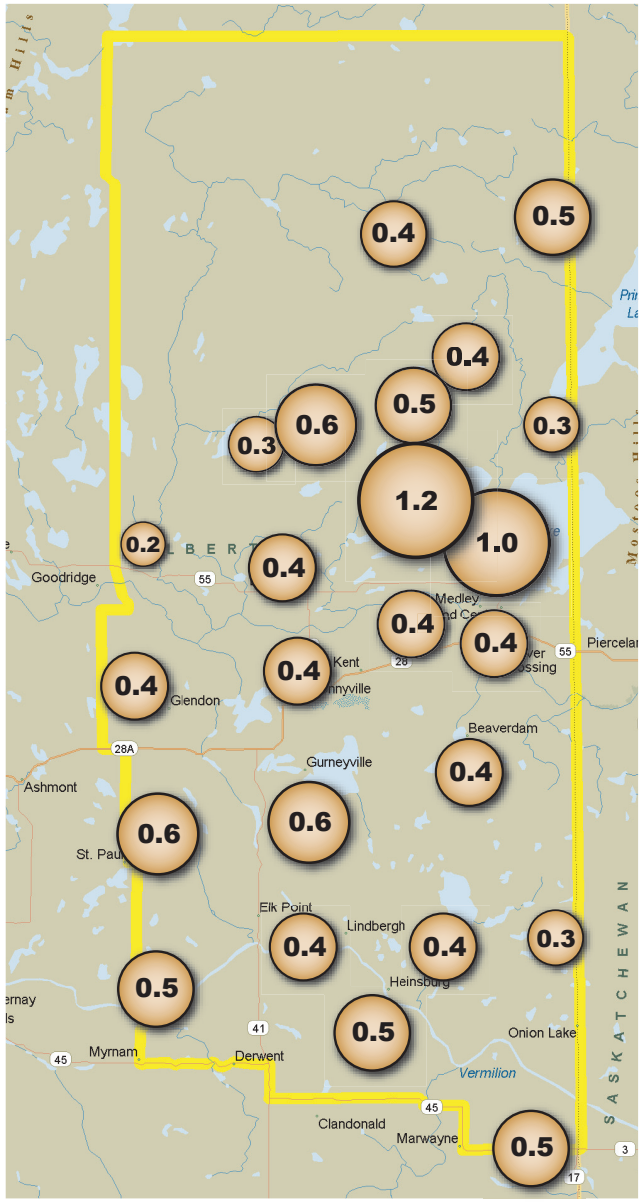
The advantages of the passive samplers used by LICA are their accuracy, low detection limits, simple design, ease of use and cost effectiveness. Passive samplers rely on the principles of permeation and diffusion to physically uptake the specific compound being sampled.

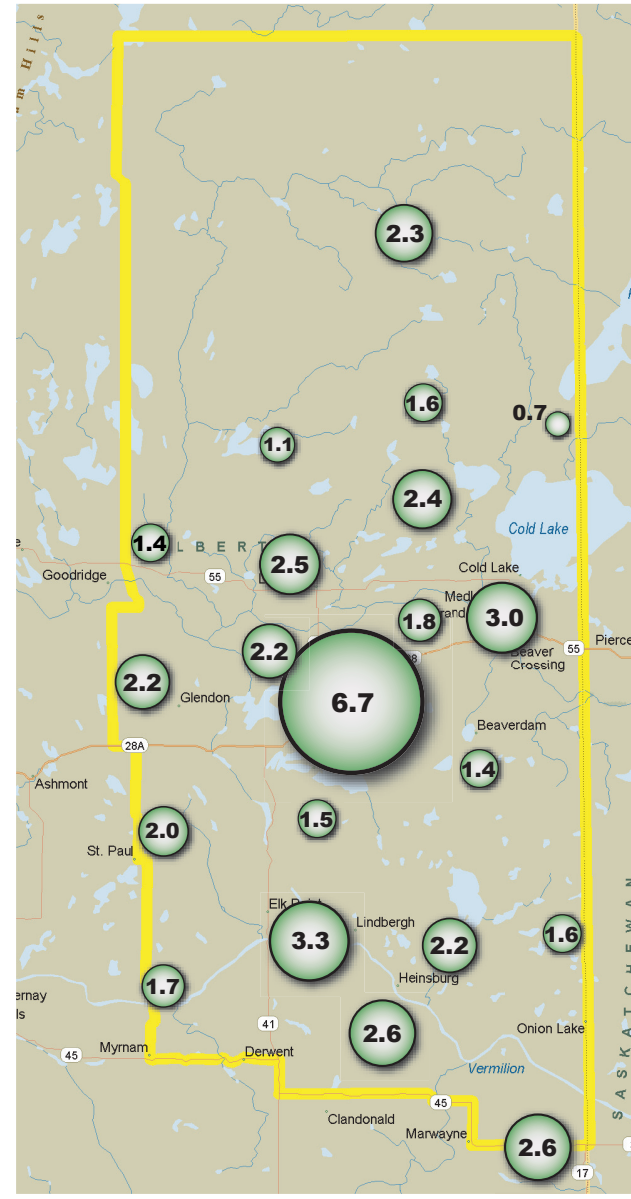
This method is an alternative to active sampling or continuous monitoring where an air sample is drawn or forced mechanically into or through a collection device or past a detector. For 2008, the LICA Passive Monitoring Network consisted of 25 permanent stations configured to monitor sulphur dioxide, nitrogen dioxide, ozone, and hydrogen sulphide. Passive monitoring is conducted year-round on a monthly interval with duplicate samples rotated through 10 per cent of the sites for quality assurance purposes.

Passive Air Quality Monitoring stations within the LICA network

ANALYSIS OF PASSIVE MONITORING RESULTS

To illustrate the spatial patterns of the parameters measured in the LICA passive monitoring network, the following series of figures uses bubble maps to show the annual concentration in parts per billion (ppb).



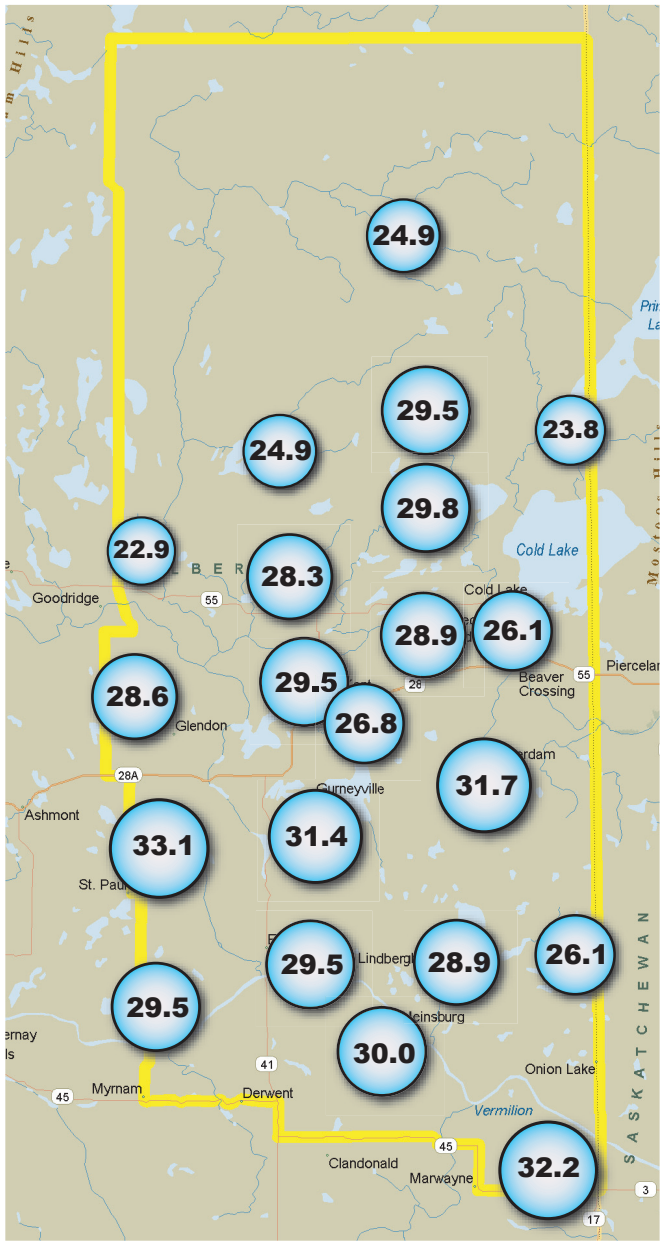


SULPHUR DIOXIDE

The highest concentrations of sulphur dioxide were measured in the north part of the airshed zone. The thermal heavy oil plants that operate near the Cold Lake Air Weapons Range are the major source of sulphur dioxide in the LICA area, therefore, it is not surprising that elevated concentrations were measured in these areas. Although elevated at certain locations, the concentrations were well below the annual Alberta Ambient Air Quality Objective of 11 ppb.

NITROGEN DIOXIDE

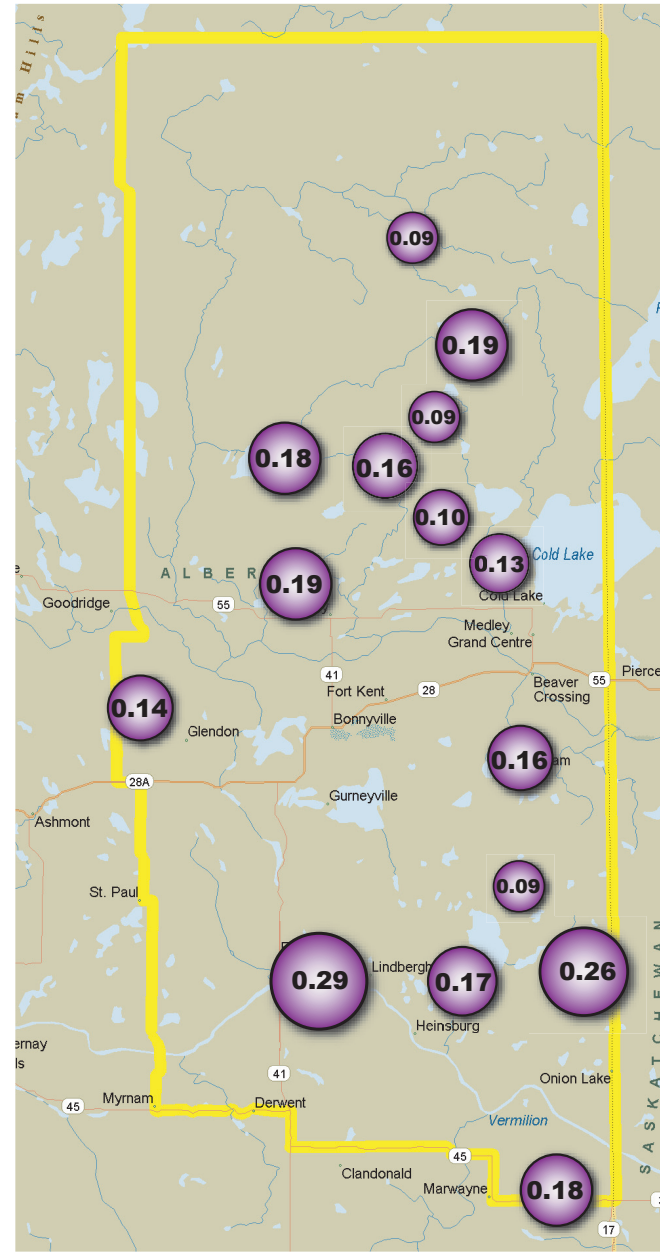
Bonnyville shows the highest annual average nitrogen dioxide measurements in the network in 2008 due to its proximity to vehicles and home heating sources. LICA has plans to implement a portable monitoring trailer to further investigate air quality in the southern part of the airshed zone where elevated concentrations of nitrogen dioxide were also measured. Although the annual average concentration of nitrogen dioxide was elevated at various monitoring stations, they were well below the annual Alberta Ambient Air Quality Objective of 32 ppb.



OZONE

For 2008, the spatial pattern of ozone in the LICA area continues to be very subtle. In general, sites that are closest to combustion sources have the lowest concentrations of ozone due to its destruction by nitric oxide which is emitted by vehicles, home heating and other fossil fuel burning processes.

This pattern is especially evident at sites close to towns or highways where overall low annual average ozone concentrations were measured, however, elevated nitrogen dioxide concentrations were also measured (nitrogen dioxide and nitric oxide are emitted by similar sources). There is currently no annual Alberta Ambient Air Quality Objective for ozone.



HYDROGEN SULPHIDE

Similar to 2007, the highest concentrations of hydrogen sulphide were measured in the southern parts of the airshed zone near Fishing Lake, Fort George and Clear Range. Elevated concentrations at these locations are largely driven by what appears to be episodes of higher concentrations during the summer months rather that sustained elevated concentrations throughout the year. Some investigation of the surroundings suggests that feedlots and small sloughs are the sources. Warmer temperatures would likely cause accelerated decomposition of animal waste and plant material which would produce hydrogen sulphide at a faster rate than during cooler months. Currently, there is no annual Alberta Ambient Air Quality Objective for hydrogen sulphide.

CONTINUOUS AIR QUALITY MONITORING

Continuous monitoring involves drawing air through a commercial analyzer calibrated to produce an output that is proportional to the ambient concentration of the compound being monitored. This methodology provides the greatest resolution but is also the most costly.

LICA's Cold Lake South Station (pictured below) is configured for monitoring a number of parameters from a wide range of natural, industrial, non-industrial and mobile emission sources. The air quality and meteorological parameters monitored are consistent with those in other Airsheds within Alberta.

These include: sulphur dioxide, total reduced sulphur compounds, various oxides of nitrogen, ozone, total hydrocarbons, and fine or respirable particulate matter 2.5 microns in diameter and smaller.

Air quality depends on the rate that pollutants are emitted to the atmosphere and the rate at which these compounds are dispersed away from the sources. Air pollution transport and dispersion are influenced by wind speed and direction, the temperature structure of the atmosphere, the solar cycle, turbulence and changes in these elements induced by local topography.

The interpretation of the continuous data is supported by basic meteorological measurements. Meteorological parameters measured in support of LICA's Regional Air Quality Monitoring Program are:

- Wind speed & direction
- Temperature
- Relative humidity

COLD LAKE SOUTH STATION RESULTS SUMMARY

The table below provides a summary of the data collected at the Cold Lake South continuous monitoring station. Where applicable, the data are compared to Alberta Ambient Air Quality Objectives (AAAQA).

COLD LAKE SOUTH CONTINUOUS MONITORING STATION RESULTS

PARAMETER	Maximum 1 hr.	Date measured	Annual average	1 hr. AAAQA	Annual AAAQA
Sulphur Dioxide (ppb)	8	Aug. 8	0.14	172	11
Nitric Oxide (ppb)	45	Feb. 22	1.47	none	none
Nitrogen Dioxide (ppb)	47	Feb. 22	4.94	212	32
Total Oxides of Nitrogen (ppb)	149	Feb. 22	6.47	none	none
Ozone (ppb)	63	April 25	25.93	82	none
Total Hydrocarbons (ppm)	6.6	June 5	1.91	none	none
Total Reduced Sulphur Compounds (ppb)	6	Aug. 3	0.01	none	none
Particulate Matter - $PM_{2.5}$ ($\mu g/m^3$)	56.6	July 6	1.44	80	none

UNDERSTANDING AIR QUALITY: NETWORK REVIEW

Periodic reviews of ambient air quality monitoring networks are necessary to address ongoing changes in regional and local air quality management priorities and needs.

Over the last decade, significant change has occurred in several areas in the LICA region including: regional growth and emission patterns, understanding human health impacts associated with exposure to various pollutants, understanding of pollution transport and transformation, and ambient monitoring technology.

Furthermore, network objectives and priorities change over time and need to be re-evaluated to ensure that they fit with the current uses and needs of the network.

LICA determined that a more strategic approach is necessary to address air quality monitoring network objectives and allow for future objectives to be incorporated. An extensive review of the LICA air quality monitoring network was therefore required to develop a strategy that ensures the network is meeting community, provincial and federal goals to maintain and improve air quality in the region.

In 2007, LICA commissioned a third party network review; the project was completed in early 2008. The scope of the review included a network description, establishment of network objectives and priorities, development of a strategic framework, a rigorous statistical analysis of the network and its stations, and recommendations for changes to the network.

Based on a stakeholder workshop held in June 2007, objectives for the air monitoring program were established. A new strategic framework was proposed to help guide the development of the air quality monitoring network in the LICA region.

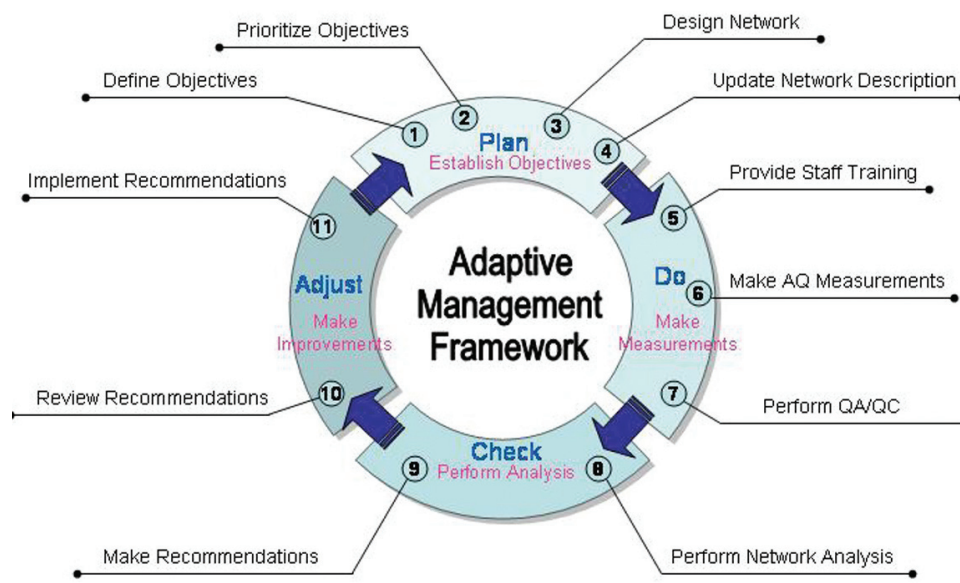
Establishing a clear framework with which LICA can reassess the network's objectives as needs change over time was identified as a key strategic goal.

Using the new framework, the LICA monitoring network's performance was assessed based on the objectives identified from the stakeholder feedback. The new framework is based on the "Plan-Do-Check-Act" cycle, an adaptive management framework common to environmental management systems (see figure below).

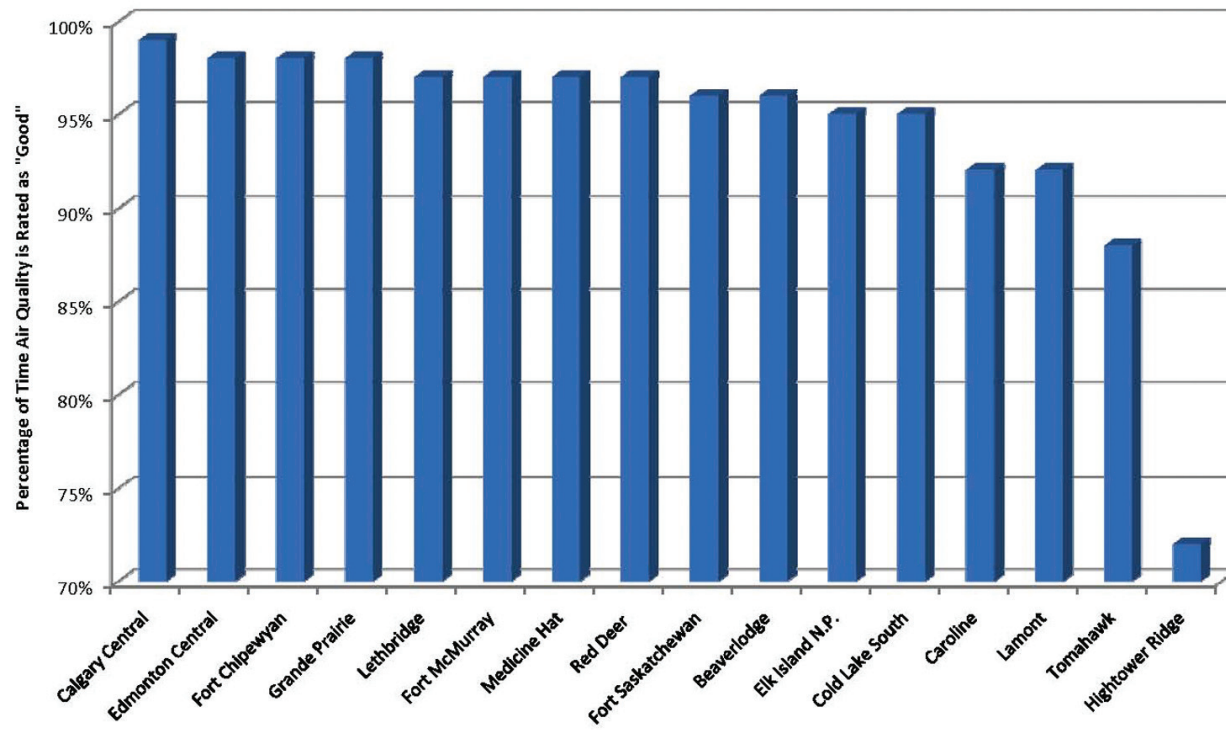
Two different statistical analyses and a qualitative evaluation of the network objectives were employed in the review of the LICA ambient air quality monitoring network. The first, a temporal analysis, provides descriptive time-series information for data from the passive monitors and the continuous monitor.

The second analysis employs a variety of spatial statistical techniques such as a comparison between the continuous and passive data.

Finally an evaluation of the network objectives was provided that considers the findings from the workshop along with the network review analyses. A number of recommendations were made for the LICA monitoring network and an Implementation Plan was developed to address the various recommendations. LICA will be working on implementing the recommendations in 2009 and 2010.



COMPARISON OF AIR QUALITY IN DIFFERENT REGIONS OF ALBERTA



AIR QUALITY INDEX

An air quality index can be determined using data collected at the Cold Lake continuous monitoring station. The Air Quality Index (AQI) is a system developed to provide the public with a meaningful measure of outdoor air quality that is simple and easy to understand.

From the AQI, we can effectively rate air quality Good, Fair, Poor or Very Poor. The AQI converts concentrations of five major air pollutants to a single numerical value and matching description. A rating of 0-25 indicates Good air quality, 26-50 is Fair, 51-100 is Poor, and more than 100 is Very Poor.

The AQI is based on outdoor concentrations of carbon monoxide, fine particulate matter (PM2.5), nitrogen dioxide, ozone and sulphur dioxide. A minimum of four of the above listed pollutants is required to calculate the AQI.

For 2008, the reported AQI for Cold Lake South was rated as “Good” 95 per cent of the time. The chart above illustrates how Cold Lake’s AQI compares to other locations in the province. Most of the Fair AQI’s in Cold Lake were caused by ozone levels in the spring (naturally occurring).

? did you know

Continuous monitoring of ground level ozone is achieved using its ultraviolet light (UV) - absorbing properties, similar to how ozone protects us from UV light when it is in the upper atmosphere. An ultra-violet light process is used to continuously monitor ozone. Within a chamber in the analyzer, the sampled air is exposed to UV light, which is absorbed by ozone. The amount of UV light absorbed is proportional to the amount of ozone in the sample; that is, the more UV light is absorbed, the greater the amount of ozone in the sample.

JAN BOONE
2008 LICA Photo Contest

DID YOU KNOW?

LIGHT POLLUTION REDUCTION INITIATIVE

LICA Industry members have taken the initiative to review, as a group and as individual companies, a variety of actions to reduce light pollution. Each of those companies has been enterprising in looking at their various operations and agreed to work toward common goals.

Various companies have successfully implemented a number of strategies, but of course all activities are not being implemented by all companies. Highlights of the initiatives include:

1. Completion of facility and well pad light surveys.
2. Outfitting some or all pads with directional focused lighting or downward facing installations.
3. Timers are being used on the lights at some electrified pads so that they are not on all night, but rather come on for only a predetermined period of time if an operator or trucker comes on site.
4. Utilizing photo electric lighting (only on in the dark).
5. Lighting only on buildings, with no yard lighting, and extra lighting is brought in only if needed.
6. Reflectors and diffusers are being utilized to minimize night-light glare.

Field trials have been conducted to, among other things, develop standard operating procedures to fulfill health and safety requirements, turn off all external pad lights, determine ability to operate lights from the control room and retrofit vehicle(s) with truck mounted lighting to assist with night surveillance.

Future study will determine if the projects are operating successfully or require modification and include the review of various lighting options given the progression of technology.

More information can be accessed at the International Dark Sky Association website: www.darksky.org.

PALEOLIMNOLOGY STUDY

LICA, Alberta Environment and the Universities of Waterloo and McGill, have now completed a paleolimnology study in the Beaver River Basin. Four lakes were sampled in the summer of 2007: Moose Lake and Vezeau Bay, Marie Lake, Wolf Lake and Kehewin Lake.

Paleolimnology is the study of water body bottom sediment profiles to assess historical changing conditions in inland lakes, rivers and ponds.

It is a proven method to assess changes in water quality and quantity over time. The indicators used in this study to track 200 years of change were diatom algae, plant pollen, pigments from algae, plants and some bacteria, and chironomid (insects and midges) sub-fossil remains (incomplete fossilization process).

All that mud at the bottom of the lake that squishes through your toes is a treasure chest of fascinating information! For further details of the Paleolimnology Study, please visit: www.lica.ca/downloads.

ERCB DIRECTIVE 038: NOISE CONTROL

With the continued growth of oil and natural gas operations in Alberta, there are increasing sources of noise. Some of the most common are associated with compressor stations, processing plants, well batteries and well drilling and servicing.

It is not possible to eliminate all noise due to energy-related developments. However, if operators build proper sound-control features into their facilities, sound levels can be kept to acceptable minimums. The Energy Resources Conservation Board (ERCB) recognizes that protection from excessive energy industry-related noise is important to the quality of life of Albertans.

An ERCB surveillance staff member recording noise activity.

Portable noise meter

Noise control directives have been in effect since 1973. The ERCB's latest revision, Directive 038: Noise Control, issued February 16, 2007 replaces all previous editions of Directive 038, as well as Guide 38: Noise Control Directive User Guide and Interim Directive ID 99-8. Directive 038 has been under review since late 2002. This prolonged review period is the result of extensive stakeholder consultation, comprehensive international literature reviews, and the gathering of field data related to research projects undertaken by the ERCB Compliance and Operations Branch staff in association with other acoustical engineers and academics.

Although ERCB requirements cannot guarantee that residents will not hear sounds from a facility, the basic principles of noise control are clear:

- Sound level increases must be kept to acceptable minimums.
- Overall quality of life for the neighbors of energy facilities must not be impaired.
- Indoor sound levels should not change significantly, particularly as they affect normal sleep patterns.

The ERCB noise control directive is recognized as one of the most stringent in the world. It is:

- Used in other Canadian Provinces and U.S. states as a model for their noise regulations.
- Adopted as de facto requirements by other regulators (National Energy Board, BC Oil and Gas Commission).
- Consistent with World Health Organization noise limits.

For more information on Directive 38 or on how we regulate the safe, responsible, and efficient development of Alberta's energy resources: oil, natural gas, oil sands, coal, and pipelines, go to the ERCB web site: http://www.ercb.ca.

NEW PLACES, NEW FACES

On April 30, 2008 LICA members and local dignitaries gathered for a ribbon cutting ceremony to officially open the new LICA office in Bonnyville, Alberta located at 5107W - 50 Street. This event provided the public with an opportunity to tour the new location and meet LICA staff and members.

The office has ample meeting space to accommodate various board and committee meetings and provides a welcoming atmosphere for all visitors. If you haven't already, we welcome you to stop by and check out our new location and of course, visit our staff members, whom will be introduced in the following paragraphs.

Charmaine Code joined LICA as Administrator in September 2008, after moving to our region the previous year. Originally from Saskatchewan, Charmaine's background is in municipal government administration. When not at LICA, Charmaine can be found spending time with family, golfing, biking, walking and gardening.

LICA is fortunate to have had Gail Nielsen as an employee for two and a half years. Gail was promoted to Accounting Assistant at the end of last year. Gail also hails from Saskatchewan and enjoys participating in hockey and camping with her husband and two sons.

Charmaine Code
Administrator

Gail Nielsen
Accounting Assistant

Tanya Fukushima
Administrative Assistant

Tanya Fukushima came to Bonnyville from southern Alberta in 2007 and has been with LICA as Administrative Assistant since the end of 2008. Tanya's interests include golf, curling and travel with her husband and friends.

2008 SYNERGY CONFERENCE

Synergy Alberta provides province-wide support to new and existing synergy groups, promotes the synergy process and facilitates education in areas related to synergy. Alberta community synergy groups which have committed to the fundamental principles of Synergy Alberta can become members, and individuals, corporations, and government bodies or departments who share a passion for synergy can support the work of Synergy Alberta as non-voting friends.

210 participants attended the October 2008 Synergy Alberta conference in Red Deer, including six from LICA. This annual event is an excellent opportunity to network with other synergy groups and listen to speakers such as Dan McFadyen, Chair of the Energy Resources Conservation Board; Michael Lickers, Founder of the Ghost River Rediscovery Program; David Collyer, President of the Canadian Association of Petroleum Producers and Dr. David Schindler, Professor of Ecology, University of Alberta Killam Chair.

Information sessions included Rural Emergency Plans, Potential Effects of Oil and Gas Development on Groundwater and Water Wells, Land Values and Pipelines, Risk-Based Land Use Planning, Collaborative and Multi-stakeholder Approach to Water Management Issues and Ambient Air Quality Trends.

BEAVER RIVER
WATERSHED ALLIANCE

MESSAGE FROM THE CO-CHAIRS

The past year has been very successful for the Beaver River Watershed Alliance (BRWA). The challenges of undertaking the task of completing an Integrated Watershed Management Plan for the area are being met with great enthusiasm from a dedicated group of volunteers, members and partners.

The diverse make up of our Steering Committee has resulted in many great ideas being brought forward with regard to watershed management in the Beaver River Basin.

Beaver River Watershed Alliance

During 2008 the group worked on and completed several projects based on the recommendations set out in the updated Cold Lake Beaver River Water Management Plan. In the upcoming year we will be working on a number of projects geared toward the collection of data within the Beaver River Basin.

These projects will be focused on aquatic ecosystem health, relationships between groundwater and surface water, wetland inventories and mapping, and the development of a groundwater data base.

The scientific information gathered through these projects will assist us in the development of an "Integrated Watershed Management Plan" for the Beaver River Basin. More details can be found in the BRWA program managers report.

There are many challenges associated with watershed planning and we must remember the three goals of Alberta's water for life strategy; "safe secure drinking water supplies" "healthy aquatic ecosystems" and "adequate water quality and quantity to support a sustainable economy." Together we look forward to meeting these challenges and working to make a positive contribution to Alberta's Water for Life Strategy.

Roxane Bretzlaff & Trevor Matthews
Beaver River Watershed Alliance Co-Chairs

YVETTE SHOSTAK
2008 LICA Photo Contest

WEBSITE DEVELOPMENT

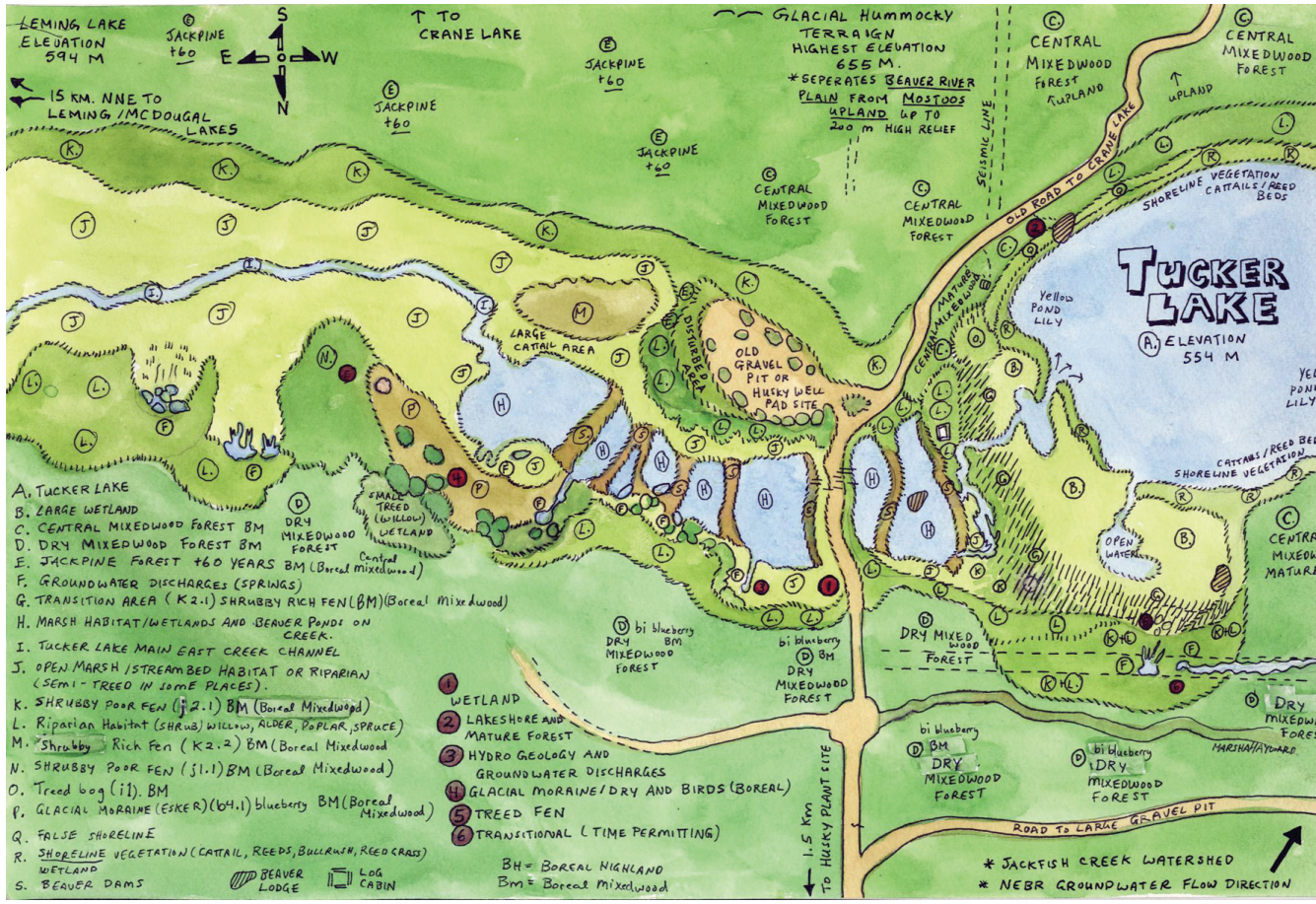
The BRWA website is in progress and will be up and running in April. It is a dynamic site, chock-full of interesting information about water-related issues, particularly the Beaver River watershed and the BRWA, our activities in the watershed, events, links, reports, resources, etc. and will be friendly for both dial-up and highspeed users. The BRWA web address is: www.beaverriverwatershed.ca.

POTENTIAL ACIDIFICATION IMPACT STUDY

The LICA Airshed Committee carried out an exploratory study in 2007/08 to assess current levels and impacts of acidic and acidifying material such as oxides of Nitrogen (NOx) and Sulphur dioxide (SO2) depositions on soils, water and vegetation in the LICA area. The study recommended the monitoring of a number of lakes in the LICA area to better determine their sensitivity to acid deposition.

As the BRWA works with ALMS (by seeking volunteers) on sampling lakes in the Beaver River basin, there are a number of lakes where the Airshed has air quality monitoring stations and ALMS has carried out water quality sampling, so water and air quality data can be matched up at these lakes. The BRWA has been discussing with ALMS the possibility of sampling some lakes where air quality is monitored, but there has been no water quality tests done.

BEAVER RIVER WATERSHED ALLIANCE COMMITTEE:
Back Row (L-R): Ajaz Quraishi (Member), Joe Prusak (Member), Kathryn Wiebe (Alt. Member), Stephanie Lundgreen-Nielsen (Alt. Member), Marsha Hayward (Alt. Member), Georges Binette (Member), Bill Fox (Member), Kay Lee Kinch (Member), Jordan Walker (Member), Susan Dahlseide (Member), Heather Harms (Observer), Delano Tolley (Member). Front Row (L-R): Dave Lozinski (Member), Robert Deresh (LICA Board Chairman), Roxane Bretzlaff (Co-Chair), Trevor Matthews (Co-Chair), Eleanor Kneffel (Program Manager). Missing from Picture: Gordon Graves (Alt. Member), Keith Schick (Member), Dwayne Latty (Alt. Member), Theo Charette (Member), Don Sinclair (Member), Mike Krywiak (Alt. Member), Gene Sobolewski (Alt. Member).



STEERING COMMITTEE WATERSHED TOUR

This is an annual event initiated in early 2008 as an opportunity for members of the Steering Committee to get familiar with the Beaver River watershed. On a gorgeous June 24 day the Steering Committee had a bus and walking tour of Tucker Lake (with talks given on surface water and groundwater by Dr. Ernst Kerkhoven (Hydrologist) and Brent Welsh (Hydrogeologist) from Alberta Environment, a tour of the Husky facility and a tour of the Cold Lake Fish Hatchery.

Hanna Janzen, Marsha Hayward and Sarah Emons organized this tour and Marsha presented the BRWA with a beautiful painting - her creation - of the western area of Tucker Lake (pictured above).

For 2009, the Steering Committee is planning a tour and site visits of the upper part of the Beaver River basin, around the Amisk River area. As an historical note, the Amisk River was at one time called the Beaver River. The Amisk is a significant tributary of the current Beaver River.

A tour of this area will give the Steering Committee a good in-person view of the area and will be helpful as we develop a State of the Basin report for the upper basin to complement the existing Cold Lake – Beaver River Basin Water Management Plan (2006).

PUBLIC EDUCATION - ECODAYS

Education and outreach is one of the key mandates of the BRWA and we are pleased to partner with other water-related organizations in the basin with their EcoDays. In 2008, we partnered with the following:

- Walking with Moose, Moose Lake Watershed Society (June 19 - 23)
- Crane Lake EcoDay, Crane Lake Advisory & Stewardship Society (July 3)
- Water & Agriculture Day, Moose Lake Watershed Society, Cows & Fish, Lakeland Agricultural Research Association (July 11)
- Shoreline 101 Field Day, Summer Village of Pelican Narrows, Moose Lake Watershed Society & Department of Fisheries & Oceans (September 12)
- Shoreline 101 Evening Talk, Moose Lake Watershed Society, Cows & Fish, LARA (September 12)

ALBERTA WATER QUALITY AWARENESS DAY

Alberta Water Quality Awareness (AWQA) Day is an annual event coordinated by the Alberta Lake Management Society (ALMS). Its purpose is to create awareness and interest of Albertans in the state of water quality of their local waterways such as ponds, lakes, wetlands, rivers and streams.

From May 15th to August 31st, 2008 nearly 3100 Albertans of all ages sampled 645 sites for four basic water quality parameters: temperature, dissolved oxygen, pH and turbidity. Data is submitted to the AWQA online database and compiled into a report.

The BRWA and LICA Board members sampled Cold Lake Marina on June 3, 2008. See table below. To receive your free test kit, register by April 30 online at the AWQA website: www.awqa.ca.

COLD LAKE MARINA WATER QUALITY RESULTS

VARIABLE TESTED	RESULT	WHY IS IT IMPORTANT?	WHAT DOES IT MEAN?
Water Temperature	12ºC	• All organisms, including aquatic organisms, require a certain temperature range to function. • Temperature affects the amount of oxygen water can hold, how chemicals dissolved in the water will act, metabolic rate of organisms, rate of photosynthesis of aquatic plants	• This is an expected temperature for this geographic area and for the time of day and season.
pH	8.5	• Measures the level of acidity or alkalinity in the water (0 is the most acidic and 14 is the most alkaline or basic). • pH affects water chemistry and biological functioning of organisms (e.g. at low pH, certain heavy metals become toxic to organisms) • Rocks and soil where the water body is located affects the pH as well as human activity such as runoff of pesticides, pharmaceuticals, cleaners and chemical spills.	• This level indicates the water is slightly alkaline (or basic), but still in a healthy range. This is natural for this area since Alberta's soils tend to be rich in carbonate.
Dissolved Oxygen	8 ppm* *Parts Per Million	• Indicates oxygen levels in the water that is available to aquatic organisms. 0 ppm means there is no detectable oxygen available for organisms. • The amount of DO organisms require varies with the type of species.	• This is good • Abundant and diverse life is sustained in this area of Cold Lake • Good ability to filter and assimilate toxins - ability to clean itself and maintain health (a value of 4 ppm or less indicates decreased to no ability to maintain abundant and diverse life). 0 ppm means no life is maintained and the water body is highly susceptible to disease and toxins.
Turbidity Source: Alberta Lake Management Society. AWQA Field Guide & Instructions	0 JTU** **Jackson Turbidity Units	• Indicates measure of water clarity. Clarity is affected by the amount of material floating or suspended in the water (such as mud, silt and algae).	• 0 JTU is good • Allows aquatic organisms to see; light can reach aquatic plants, dissolved oxygen levels are good, water temperature is at levels where organisms can function, generally keeps a water body healthy and odour free.

MONITORING FOR A HEALTHY AQUATIC ECOSYSTEM

The BRWA is responsible for supporting and delivering outcomes of Alberta's Water For Life Strategy. One of these objectives is to ensure a healthy aquatic ecosystem for the Beaver River Basin.

To do this, the BRWA embarked on an ambitious program affectionately referred to as the AHEM (Aquatic Healthy Ecosystem Monitoring) project. This program will give us an understanding of the watershed's health, a perspective of community values related to watershed health and a list of areas where improvements can be made and actions to get there. This project will cover the entire watershed from Beaver Lake / Long Lake to the Saskatchewan border. To do this, the BRWA is relying on many member organizations, including LICA.

To kick this initiative off, a sub-committee was formed to work out program management details and decide on various projects that would contribute to our understanding of ecosystem health. The sub-committee organized a workshop for Steering Committee members in order to establish guiding principles that would provide direction for the types of projects and initiatives the BRWA would like to pursue.

A significant part of the AHEM program is a partnership study with the Alberta Conservation Association (ACA) who will be providing their expertise, experience and crew of field technicians and scientists to complete the necessary field work and reporting that will be used to create a fish conservation index, a fished-based index of biological integrity for the watershed.

The development of a fish conservation index for the Beaver River will contribute to a better understanding of the influences of human land-uses

An Aquatic Healthy Ecosystem Monitoring Steering Committee workshop in December.

on the health of the aquatic ecosystem. Specifically, the study will look at the contributing impacts of agriculture, urban development and petroleum sectors on the health of the Beaver River system.

A second important contribution is that resource managers will be provided with a rapid assessment tool for characterizing aquatic ecosystem health. This tool would assist managers when assessing current levels of impairment and can also be used to easily predict effects of land-use activity changes.

Data will be collected on fish community composition using electrofishing at 30-40 sites per study year for a total of approximately 80 sites (i.e. two-year field study). In addition to studying fish communities, water chemistry and local habitat features will also be included. Sampling sites will be distributed throughout the watershed along the main stem of the Beaver River and major tributaries (Sand River, Amisk River) and will be selected based on disturbance levels (low to high) and accessibility.

Although agriculture, road construction and industrial activities are prominent in the watershed, the cumulative effects of these human activities on aquatic health, including fisheries resources is largely unknown.

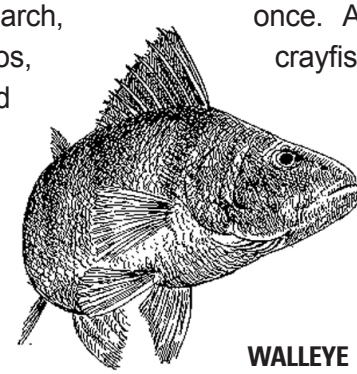
The ACA project will go a long way towards establishing the state of the Beaver River watershed's aquatic ecosystem health. The report will show linkages of river conditions to human land-uses, identify reaches with low scores through spatially-explicit maps, and provide comments on the health of the entire basin. The final product will include an assessment tool for biologists and resource managers to easily calculate index scores for a river section under study using their fish catch data.

HISTORICAL FISHERIES - BEAVER RIVER BASIN

As part of the Aquatic Health Ecosystem Monitoring (AHEM) Program the BRWA has contracted the Alberta Conservation Association to carry out a historical survey of the Beaver River watershed to provide historical fisheries information (i.e., species composition, abundance, and distribution) for comparisons with current status.

The historical survey consists of three components: 1) archival publication search, 2) historical and current fisheries photos, and 3) angler interviews (public and retired fisheries staff) including surveys.

As of December 2008, a total of 27 surveys were completed. After speaking with fisheries biologists and locals from the area, some common themes became evident among interviewees.



WALLEYE

Robert Savannah,
U.S. Fish & Wildlife Service

In general, reports indicated the water level in the Beaver River has declined enough over the last 30 years that river fishing is almost impossible now in many areas. Parts of the river, especially between Beaver Lake and the confluence of the Amisk River, now contain many barriers to fish movement, such as beaver dams and culverts, which did not exist before the 1970s or 80s.

As a result of low water levels and barriers, fish are not able to move freely between lakes and tributaries connected to the river, and fish numbers have declined so much that fishing is now only barely possible during spring runoff. Also, most anglers agree that known spawning areas are being affected by low water levels in local streams connecting the lakes and rivers.

Most anglers reported catching mainly walleye and northern pike in the past, although many also caught suckers and perch. Few anglers caught burbot, and one angler reported catching a sauger once. A few interviewees reported regular crayfish and fresh-water clam harvests.

In the early years (the 1930s to 1970s), almost every angler indicated that fish were highly abundant, and that their limit for at least one species was easily taken during a trip.

In contrast to the early years, most anglers now indicate that fishing opportunities in the rivers and creeks are very poor. It appears that the fisheries were healthy and abundant in earlier years, and have since declined in quality in the last 20 to 30 years due to low water levels, increased road construction and improvements, oil and gas activity, agriculture and brush clearing.

In summary, we have obtained important data from numerous interviews that will help with the development of the Beaver River Ecosystem Monitoring Program. A more detailed summary of the data will be provided in the future.

GROUNDWATER DATABASE SYSTEM

A web site and database system that includes regional groundwater data from industry and government observation wells is currently being developed by the Beaver River Watershed Alliance. The site is designed to collect, store and provide groundwater data within a single database and will be accessible to the public.

Currently, all levels of government as well as industrial operators collect information regarding groundwater quality and quantity, availability, occurrence, yield and uses.

By having a system of information that is visual and more easily accessible through an interactive database system, the volumes of information available related to groundwater will be more easily interpreted so that stakeholders and decision makers in the region can better address groundwater related concerns. A preliminary version of the website has been developed and will be introduced to the BRWA Steering Committee prior to its broader public release this year.

Alberta Environment field technicians measuring winter lake levels.

WINTER LAKE LEVEL STUDY

How groundwater and surface water interact to potentially affect lake levels is a common topic of discussion among residents within the Beaver River basin and many different opinions abound. Studies undertaken for the recently completed management plan update have provided us with a better idea of how some surface water bodies (lakes) can potentially lose or gain water from connected or adjacent aquifers.

But, it became evident that more research was needed to determine the volumes of these losses or contributions and if lake level changes can be attributed to groundwater interactions. Because there are other factors that affect the lake level water balance (such as precipitation, evaporation, surface water inflows and outflows) it is difficult to determine the role of groundwater in the overall equation. A new approach is underway to help answer this question.

Alberta Environment, in partnership with the BRWA, has launched a two year study that intends to examine groundwater / surface water interaction on specific lakes in the Beaver River Basin. This pilot study was inspired by the work of Dr. Garth van der Kamp (Environment Canada) and is the first of its kind in Alberta.

Alberta Environment Hydrogeologist Brent Welsh and Dr. Ernst Kerkhoven (Hydrologist), have designed a program to install underwater data loggers in 10 Beaver River watershed lakes. These underwater probes were installed before winter freeze-up and will remain under the ice all winter where they will record information used to measure winter lake levels. The idea is that any change to the lake level would be the result of a combination of the weight of the snow pack and groundwater influence as there are no other significant inflows and outflows taking place during the winter months.

The rationale for the study is that groundwater/ surface water interactions can be assessed on lakes during the ice covered months provided that increases in water level caused by the weight of the snow pack are understood. In lakes with negligible surface inflows and outflows during the winter months, changes in water levels are due to a combination of any groundwater flows and the weight of snow on the ice cover. By measuring the change in snow cover on the lake, the influence of the snow weight can be accounted for and the remaining change in water level can be attributed to groundwater. Installing data loggers will allow for continuous monitoring and also help distinguish between snowfall events and groundwater inflow or outflow.

The most important component of the study will involve two field visits at each lake during the ice covered months to perform a snow survey, an ice thickness measurement, and a depth of water to base of ice measurement. This will be to assess how the weight of the snow affects the lake water level. The weight of the snow on a lake results in an increase in water level, so it is necessary to distinguish this from a possible groundwater contribution.

Most of the lakes in this winter lake level study have declining lake levels and have suspected weak connections to groundwater. However, for comparison purposes, a few lakes have been included where it is thought that there might be a good connection to groundwater. The process of selecting lakes for the study included screening to ensure that inflows and outflows of surface water through inlets and outlets and licensed and domestic users are well understood or negligible. In the case of Muriel Lake, an underwater data logger was not installed because this lake has a Water Survey of Canada monitoring station that operates during the winter. The lakes being studied are Beaver, Chickenhill, Garner, Herald, Upper Mann, Lower Mann, Minnie, Missawawi, Muriel, North Buck and Skeleton.

Gathering information related to surface water / groundwater interaction is one of the recommendations listed in the recently updated Beaver River Basin Water Management Plan. This study will provide more insight into this frequently asked question as well as help educate the members of the public who are concerned about groundwater use and declining lake levels.

Alberta Environment's Brent Welsh installing a data logger.

MOOSE LAKE WATERSHED SOCIETY

The Moose Lake Watershed Society (MLWS) began to implement the Moose Lake Watershed Management plan at full steam in 2008 by undertaking many different activities and events. Most of the projects focused on education and awareness, with one of the major processes falling under riparian areas. The projects included environmental reserve signage, Walking with Moose and the Island Bay park proposal. Recently the committee became an official registered society creating the opportunity for funding which was previously inaccessible.

Island Bay "park" is adjacent to the large island on Moose Lake and is currently one of the society's main focal points. It is crown land located on the west side of the lake and encompasses 13 sections with a variety of land uses including trails, youth camps, oil and gas sites and grazing leases.

The society is in the process of protecting this area by creating a proposal to have the environmentally and culturally important region turned into a provincial park with recreational zones. Environmental signage was completed in September in the Fontaine, Model, and Birch Grove subdivisions, as well as the Summer Village of Pelican Narrows. This will be continued around Moose Lake in the summer of 2009, providing both visitors and property owners with an awareness of the environmental reserves.

Walking with Moose is an initiative that began in the summer of 2008 with 300 youth from a local middle school participating. The full day outing was an excellent opportunity to educate students about the impacts of the past, while providing them with the tools for future preservation. The unique learning experience makes it rewarding for both students and volunteers.

The MLWS had a busy 2008 and is gearing up for 2009. We invite you to join us at our events and our monthly meetings as community involvement is important for the conservation, preservation and enjoyment of the amazing watershed we are so lucky to have. We look forward to the year ahead, and hope to see you all out there.

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Ryan Wartman: (780) 205-7107

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Ted Lamb: (780) 639-5010

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GERMAINE PRYBYSH
2008 LICA Photo Contest

KEY CONTACTS

UTILITY EMERGENCIES

ATCO Electric (24 Hour)	1-800-668-5506
Alta Gas, Bonnyville	1-866-222-2067
EPCOR	1-800-667-2345
NE Gas Co-op, Bonnyville	780-826-4002
Buried Utilities Locations	1-800-242-3447

ENERGY RESOURCES CONSERVATION BOARD

Bonnyville Field Centre	780-826-5352
General Inquiries	403-297-8311

GOVERNMENT OF ALBERTA

Service Alberta (Toll-Free)	310-0000
Registrar of Land Agents	780-415-4600
Surface Rights Board	780-427-2444
Land Compensation Board	780-422-2988
Genia Leskiw, MLA	780-826-5658
Ray Danyluk, MLA	780-645-6999

ALBERTA ENVIRONMENT

Emergency, Spills & Complaints	1-800-222-6514
General Inquiries (North region)	780-427-7617

ALBERTA AGRICULTURE, FOOD & RURAL DEVELOPMENT

General Inquiries	310-FARM (3276)
The Farmer's Advocate	780-427-2433

ALBERTA HUMAN RESOURCES & EMPLOYMENT

Workplace Health & Safety	1-866-415-8690

ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT

Fish and Wildlife Division	
Bonnyville	780-826-3142
Cold Lake	780-594-7876
St. Paul	780-645-6313
Public Lands Division	
Bonnyville	780-826-4297
St. Paul	780-645-6336
Report-A-Poacher	1-800-642-3800
Report a Forest Fire	310-FIRE (3473)

ALBERTA INFRASTRUCTURE & TRANSPORTATION

Transportation of Dangerous Goods (Emergencies)	1-800-272-9600

REGIONAL HEALTH AUTHORITIES

Aspen RHA Head Office	780-349-8705
East Central RHA Head Office	780-608-8800

GOVERNMENT OF CANADA

Environment Canada	
Prairie & Northern Office	
General Inquiries	780-951-8600
Severe Weather Reporting	1-800-239-0484
Brian Storseth, MP	1-800-667-8450
National Energy Board	1-800-899-1265

GLOSSARY OF INDUSTRY TERMS

Abandoned Well: A well that is permanently shut-in where the casing has been cut sub-surface and capped with a metal plate.

Abandonment: Converting a drilled well to a condition that can be left indefinitely without further attention and will not damage freshwater supplies, potential petroleum reservoirs or the environment.

Acid Deposition: A broad term for the different ways acidic compounds precipitate from the atmosphere and deposit onto surfaces. It can include wet deposition be means of acid rain, fog and snow and dry disposition of acidic particles (also known as aerosols).

Alberta Ambient Air Quality Objectives (AAAQO): Are established by Alberta Environment to define desired environmental quality that will protect public health and ecosystems. The following are some of the factors considered when establishing air quality objectives; sensitivity of receptors, substance behavior in the atmosphere, natural levels and fluctuations, pollution control, and monitoring technology. AAAQOs are used to assess compliance and evaluate the performance of industrial facilities; all industrial facilities must be designed to meet AAAQOs.

Aquifer: A body of permeable rock, for example, unconsolidated gravel or sand stratum, that is capable of storing significant quantities of water, is underlain by impermeable material, and through which groundwater moves.

Artesian Well: A well that penetrates a confined aquifer. The water level in these wells rises above the upper surface of the aquifer due to the pressure in the confined aquifer. If the water pressure is great enough, the well will overflow.

Background Concentration: The concentration of a chemical substance in an area considered to be relatively unaffected by industry or other human activity. Background often refers to naturally occurring or uncontaminated levels. Background concentrations in one region may be different than those in other areas.

Barrel: The common unit of measuring petroleum. One barrel contains approximately 159 litres.

Battery: Equipment to process or store crude oil from one or more wells.

Benzene: A light aromatic hydrocarbon, which occurs naturally as a part of oil and natural gas activity. It is a component of car exhaust and can be emitted from oil and gas facilities. It is a known carcinogen and is an occupational and public health concern.

Biodiversity: The variety and abundance of species (plants and animals) and the natural communities, ecosystems and landscapes in which they occur.

Bitumen: A thick, sticky form of crude oil that has the consistency of molasses. It doesn't flow and can't be pumped out of the ground without being heated or diluted.

Blow-out: An uncontrolled flow of gas, oil or other fluids from a well.

Brackish Water: Saline, non-potable water that is poorly suited for domestic or agricultural purposes and is typically located below the bedrock. Technically, brackish water contains between 0.5 and 30 grams of salt per litre.

Coalbed Methane (CBM): Also known as Natural Gas from Coal (NGC); natural gas contained in coal seams. CBM/NGC is not being produced in the LICA region.

Cogeneration: A highly efficient energy system that produces both electricity and heat from one energy source.

Cold Flow: The production of oil and gas reservoirs using the natural energy available in the reservoirs and pumping techniques.

Condensate: Hydrocarbons, usually produced with natural gas, which are liquid at normal pressure and temperature.

Consensus Decision Making: A process for group decision-making. An entire group of people can come to an agreement where the input and ideas of all participants are gathered to arrive at a final decision that is acceptable to all. Consensus fosters better solutions and the growth of community and trust among participants.

Cyclic Steam Stimulation (CSS): A method of producing heavy oil which involves injecting steam, allowing time for the steam to heat and soften the heavy oil and producing the heavy oil from the same wellbore used to inject the steam.

Diluent: Light petroleum liquids used to dilute bitumen and heavy oil so they can flow through a pipeline.

Directional (Deviated) Well: A well drilled at an angle from the vertical by using a slanted drilling rig or by deflecting the drill bit; directional wells are used to drill multiple wells from a common drilling pad or to reach a subsurface location beneath land where drilling cannot be done.

Ecosystem: A natural unit consisting of all plants, animals and micro organisms in an area functioning together with all the non-living physical factors of the environment.

Enhanced Oil Recovery (EOR): Any method that increases oil production by using techniques or materials that are not part of normal pressure maintenance or water flooding operations. For example; natural gas can be injected into a reservoir to “enhance” or increase oil production.

Fracturing/Fracing: The process of cracking open deep sub-surface formations to create passages for the reservoir to flow more easily into the wellbore.

Hydrogen Sulphide: A toxic colorless gas with a “rotten eggs” odor. Potential sources include “sour” oil and gas, animal feedlots and sewer gas (i.e. leaks).

Landspraying: The practice of spraying drilling fluid on the surface. The ERCB sets regulations for the management of drilling waste.

Nitrogen Dioxide: A toxic, pungent reddish-brown gas. Formed by the reaction of atmospheric ozone with the nitric oxide produced from combustion.

Ozone: A strong oxidizer with a sweet smell. Can be transported from the upper atmosphere or produced by the reaction of oxides of nitrogen with volatile organic compounds.

Respirable Particulate Matter: Airborne particles in solid or liquid form with median diameter less than 2.5 micrometers. Sources include construction, agriculture, combustion and forest fires. Can also be formed by the reactions of other pollutants.

Shut-in Well: A well that is closed off to stop production (or prevent flow).

Sulpher Dioxide: A toxic, colorless gas with a pungent odor. Primarily formed by combustion processes of flaring of gas containing sulphur compounds.

Suspended Well: A well that is not currently producing. Equipment may still be present on the well site.

Total Hydrocarbons: A family of chemicals containing carbon and hydrogen. Sources include vegetation, petroleum and chemical industries, dry cleaning, fireplaces, natural gas combustion and aircraft traffic. Vehicles are the major source of hydrocarbons at urban locations.

Total Reduced Sulphur: Includes hydrogen sulphide, mercaptans, dimethyl sulphide, dimethyl disulphide and other sulphur compounds, but does not include dioxide. Potential sources are as listed for H2S.

MARIE ILCHUK
2008 LICA Photo Contest

PHOTO CONTEST 2008

LICA's 2008 Photo Contest was a huge success with approximately 175 entries received. Of course this resulted in a difficult decision for the judges as so many inspiring and professional quality photos were received.

After all was said and done, Lillian Hopf (Bonnyville) was chosen as the first place winner, garnering a prize of $200 for her photo entitled "Wolf Creek," which is showcased above.

Suzanne L. Michaud (St. Paul) took home second place and a prize of $100 for her photograph "Fall Frost." Third place prize of $75 went to Sheryl Nagy (Bonnyville) for her piece "Sunset on Jessie Lake."

LICA extends their sincere congratulations to each of the winners, as well as to all participants for the impressive variety and high quality of photos submitted. We are pleased to be able to highlight many of these photos throughout this publication, as well as in various other items during the year.

LICA will again host a Photo Contest in 2010. Watch for our notice and regulations early next year and in the meantime, start gathering your ideas for some more great photos.

Sheryl Nagy, Sunset of Jessie Lake (above). Suzanne Michaud, Fall Frost (below).

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Cover Photo: Sheryl Nagy