



THE BLUE HERON

The Bras d'Or Stewardship Society

P.O. Box 158, Baddeck, Nova Scotia B0E 1B0

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The newsletter of *The Bras d'Or Stewardship Society* informs society members and interested individuals of the society's activities. Newsworthy events that have a direct impact on the Bras d'Or Lakes and its watershed are topics of our newsletter focus.

In August 2002 **The Bras d'Or Stewardship Society** will "celebrate" its fifth birthday. This is a significant milestone in the history of a once fledgling organization that relies on volunteer management and its membership base for continued operations.

We hope that at our semi-annual general meeting on August 10, 2002, there will be time to review the evolution of the society, its successes and perhaps even "hazard" a guess as to the society's future. Looking back over the past five years suggests that the initial organization of the society commenced at an opportune moment given the real need for an organization to "champion" the cause of the Bras d'Or Lakes and its watershed.

Central to the society's objectives, is the desire to continue to foster constructive debate amongst citizens, visitors, and members of the native community in conjunction with the three levels of

government, municipal, provincial and federal. Pat Bates, our chairman, has provided exemplary leadership in fostering an atmosphere of positive dialogue across many perceived and real boundaries be they personal, political, geographic or ethnic.

We believe that through the society's efforts over the last five years that there now exists a much better level of understanding generating positive interaction amongst all the key players. Incrementally, we know that progress has been made in coming to grips with the real threats to the Bras d'Or Lakes and its watershed.

We all know that the greatest threat comes from fecal coliform contamination.

During the last five years, the society has been able to gather existing information regarding fecal coliform contamination focusing on existing malfunctioning municipal waste systems, dysfunctional domestic sewer beds and waste from boats pumped directly into the Bras d'Or Lakes. The society has worked diligently to bring these issues to the public's attention using the press, radio and written letters to municipal, provincial and federal departments. The information is out there for public consumption.

One area that has received minimal attention regarding the negative impact on the Bras d'Or Lakes and its watershed is the continuing segmentation of properties under subdivision provisions. We highlighted in the January 2002 issue of **THE**

BLUE HERON our last summer's project focused on inventorying the various subdivisions that border the shoreline of the Bras d'Or Lakes. Our work inventoried nearly 1,000 shoreline perimeter lots within various subdivisions.

In fact, our project was really only a "beginning subdivision review" as there are significant "issues" regarding the environmental integrity of current and future subdivision development along the shores of the Bras d'Or.

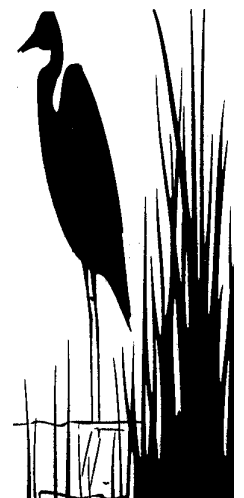
These issues focus on the growing limitation of public access to the waters of the Bras d'Or Lakes, availability of potable water supply, the capacity of particular lots to sustain on site sewer systems, rising values of property and the long term effects of continuing subdivision developments on natural aesthetics.

We know that many of the lots do not have access to sustainable supply of

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"HEADLINE ARTICLE" CONT'D

potable water. Water table levels suffer in times of drought. Gypsum often underlies many lot sites in certain locations preventing access to good quality ground water.

We know that many of the lots rest on suspect soils which may not be able to carry the load of human waste. One residence on fifty acres is acceptable. Twenty-five houses on 2 acre lots may violate the land's carrying capacity.

We know that there exist no rules regarding the pumping of human waste from boats into the waters of the Bras d'Or Lakes. Coves and harbours upon which subdivisions boarder may become polluted.

We know that subdivided property forces up real estate values which in turn force property tax increases. This limits ownership potential and forces the break up of significant acreage.

We know that wooded shorelines get cleared for open lake views which encroach upon the natural continuity of previously forested shoreline perimeters.

Property owners hungry for unobstructed views of the water often fail to practice good stewardship planning of shorefront property. Clear cutting to the water's edge can lead to a violation of shoreline integrity leading to erosion, a loss of plant diversity and potential undermining of habitat on both land and in the water. The first to suffer may be shellfish beds. There are 48 sites now closed to shell fishing within the confines of the Bras d'Or Lakes. You can view these closures at the following web site: www.novascotia.ca/epb/sfish/maps/ns/area7

Indeed, after five years, **The Bras d'Or Stewardship Society** is alive and well.

The growth and evolution of the society is a factor of the dedication of the current board of directors. We would like to have more input from our members as the society is dependant on

its membership for survival. We take pride in our self-sufficiency in terms of financial needs. So, please if you are interested in taking a more active part in the society's activities, feel welcomed to do so. **We must build for the next five years. We will continue to need your help.**

Henry W. Fuller, Treasurer

BRAS D'OR WATCH:

In the January issue of The Blue Heron attention was brought regarding a clear cut along the shore of Baddeck Bay. Recently, it has been brought to the attention of the Society of a proposed construction of a house on a marginal piece of shorefront property on the opposite side of Baddeck Bay from the clear cut. Inspection of the proposed building site revealed a small pond almost at sea level, which will be disturbed/invaded if the proposed house construction proceeds. The site is such that an on site sewage bed is impossible to construct. The plan is to pump the sewage across the Baddeck Bay road to an adjacent property. The Society has contacted the Nova Scotia Department of Environment about the adverse environmental concerns regarding the proposed development of this piece of shorefront land. Violation of shorefront land is an on going concern of the Society.

The Bras D'Or Environment

All of the signs are that the importance of the Bras d'Or Lakes as a major Nova Scotia and Canadian asset and resource has risen substantially. Measuring progress over the last five years we can determine that we have advanced in our efforts to protect this Cape Breton icon in several respects.

First, the decision to approve funding and work schedule for the upgrade of the Baddeck Village sewage treatment plant is real progress. Second, the matter of getting the Whycocomagh/Waycobah Bay sewage/stench issue before people at three levels of government is important. Third, the increase in total number of pump-out stations for pleasure craft on the Bras d'Or lakes is progress.

Of particular interest is the number of people and organizations now expressing an interest in and concern for the long term protection of the Bras d'Or Lakes by showing up at meetings and seminars to discuss measures that need to be instituted. For example, at one such gathering held at Eskasoni in late May there were sixty people from many locations in attendance. People appear more ready to identify problem areas, particularly where the discharge of untreated sewage is involved and work together to find solutions.

Three non-sewage issues that continue to arise are receiving more attention. They are clear cutting of trees and the resulting land scarification to the water's edge, the discharge of ballast water from ocean-going vessels into the Bras d'Or Lakes, and the number of old derelict automobiles and refrigerators at various locations in the watershed area.

In the latter instance, the fear is that these metal rejects rust over time releasing fuel, engine oils as well as

SEE "BRAS D'OR ENVIRONMENT" PAGE 3

"BRAS D'OR ENVIRONMENT" CONT'D

battery fluids and ammonia or Freon into the watercourse and eventually into the lake. This problem is not just confined to the Bras d'Or Lake Watershed. It does, however, have particular adverse effects for those sections of the lakes suitable for swimming and recreation as well as oyster fishing.

A recent complaint received in Sydney from a concerned citizen caused us to check out the methods for having derelict cars removed. The information received reveals that the Nova Scotia Recovery Agency located in Truro has a shared funding arrangement in place with many if not all-municipal governments. The agreement provides for a 50-50 cost sharing between The Recovery Fund and the respective municipal unit where upon an auto is determined to be abandoned and derelict and requested by a citizen/property owner to be removed. It appears that people are generally uninformed about this program which would help significantly clean up some unsightly premises near the Lakes.

Pat Bates, Chairman

Sewage From Boats Update

At the instigation of the Bras d'Or Stewardship Society (the Society) under The Green Craft Challenge Initiative, and with the help of a number of informative posters with much person to person contact. Pat Bates accompanied by four students, spent much of the summer of 1998 travelling the perimeter of the Bras d'Or Lakes informing the boating and indeed the general public, of the necessity of addressing the issue of the discharge of raw sewage from boats directly into the Lakes. Among other places Pat and his 'gang' pitched their metaphorical tents in Baddeck, St.Peters, Iona, Dundee, Marble Mountain, and Big Bras d'Or.

They also attended Baddeck Regatta and the Bacardi Cup in East Bay.

Bar a few quibblers, they were well received, even though their presentation made it clear that most boats based in, or using the Bras d'Or Lakes, did not contain holding tanks or even if they do, they are not used. Pat Bates followed up by sending letters on this matter on behalf of the Society, to the various government departments concerned, including the Nova Scotia Department of Environment.

Initially, nothing much seemed to come of these efforts, under the auspices of the Sustainable Communities Initiative (SCI). The Nova Scotia Department of Environment set up a Boating and Pleasure Craft Task Force jointly chaired by Bras d'Or Lakes Co-ordinator, Laurie Sutor representing the provincial department of environment and Brad Parks representing the federal government, to move the agenda forward. The goal is to obtain a "designation" under the Canada Shipping Act for the Lakes, which would essentially outlaw the discharge of raw sewage from boats into the Lakes.

This undertaking was also discussed regularly at monthly meetings of the Society, as well at the Society's Annual General Meeting in March 2002. At this meeting Brad Park informed members that the task Force intended to make application to get a designation for the lakes under the Canada Shipping Act. Two hundred letters of support are required to provide credibility. At a subsequent meeting the Society board voted to circulate Society members with a request to pen such support letters to the Task Force.

To date, the Task Force has received close to 100 support letters. This is an excellent response, but 100 more letters are required. If you have not done so, I would ask you to compose and send your own letter in support of such designation to the Task Force, C/O Laurie Sutor, P.O. Box # 2, River Bourgeois, N.S. B0E 2X0.

It is worth noting that the application for a designation under the Canada Shipping Act is by no means a simple task. Indeed, it would appear to be almost quite deliberately structured with the objective of deterring all but the most persistent and most determined from making any such application under the Act. However, I have been informed that despite these difficulties, the Task Force intends to move forward with completing the application. This will take time and determination. We wish them the best in their endeavors.

Dr. James V. O'Brien

NOTICE

**The semi-annual
general meeting of
the Bras d'Or
Stewardship Society
will be held at the
Masonic Hall on
Saturday, August 10,
2002 at 2:00 pm.**

**All society members
are welcome to
attend.**

**Please feel free to
bring a friend who is
interested in the
future of the Bras
d'Or Lakes.**

**A guest speaker will
be scheduled.**

NEWS ITEMS:

Membership:

Our annual membership 2002 campaign has raised close to \$7,000.00. In year 2001 total membership revenues amounted to \$16,453.00. We would like to reach a goal of \$10,000.00 in membership revenue for 2002. So, if you have not paid your 2002 membership fee, now is your chance to help us meet our goal!

CBC Presentation:

At a later date, a full featured radio show will be presented to the public dedicated to the Bras d'Or Lakes. The society is indebted to Bill Doyle and Ian MacNeil for the in depth reportage covering a diverse range of topics. Such efforts enhance the profile of the Bras d'Or Lakes and its watershed in terms of public awareness and media recognition.

Biosphere Designation:

Grosvenor Blair, chairman, founder and benefactor of The Bras d'Or Preservation Society has embarked upon a campaign to bring "United Nations Biosphere Designation" to the Bras d'Or Lakes Watershed. The designation would bring welcomed global recognition to the Bras d'Or Lakes.

Bras d'Or Lakes Interpretive Center:

The Bras d'Or Lakes Interpretive Center opened on June 10, 2002. The center provides information on the Bras d'Or Lakes Watershed to interested residents and visitors.

It is located in the restored Old Post Office in Baddeck. The center is open

from 11a.m. to 7 p.m. . It is operated by the Bras d'Or Preservation Foundation which is supported by private funds.

Aquaculture Bankruptcy:

Bras d'Or Fisheries, Inc., a fin fish aquaculture operation, declared bankruptcy in the fall of 2001. This was preceded by the bankruptcy of Scotia Rainbow, Inc. This entity based in Arichat had a high economic profile with significant federal financial support. This operation owned fish cages in the Bras d'Or Lakes in Nyanza, Whycocomagh and Dina's pond. There are still fish in some cages that may have been neglected regarding feed requirements.

A grow out facility owned by a New Brunswick company at Seal Island has been abandoned. A good number of fish cages remain in the water. Shore based premises have been left unattended. The society is concerned about the adverse effects that derelict fish holding pens (a hazard to navigation) and decaying buildings will bring to this site. Who is responsible for this mess is not clear!

In a future issue of The Blue Heron it is intended to tell the story of the history of fin fish farming on the Bras d'Or Lakes. This is a thirty year history of huge capital investment and unfortunate failure.

David Gunn, AMTRACK CEO

Society board member, David Gunn, resident of West Bay has been lured out of a peaceful retirement to run Amtrak, the United States passenger rail service. David has been a committed board member whose regular input will be

missed. David, however, will still be remain a member of the board. He now commutes from West Bay to Union Station in Washington, D.C. .

Shell Fish Closures:

Select locations are closed to shell fishing. This year two more sites have been closed to shellfish harvesting. One closure is between Dundee and West Bay. The other is in Malagawatch. Efforts are being made to open conditionally currently closed areas in the River Deny's Basin, once a bountiful source of oyster production. Forty-eight sites are now closed to shell fishing.

Baddeck Sewer Treatment Plant:

The construction of the new 1.8 million-dollar Baddeck sewage treatment plant is planned to begin in August 2002. The new plant will be entirely indoors under one roof when completed. The site will remain below Baddeck's schools adjacent to the Bras d'Or Lakes. The treated effluent will be discharged five hundred feet from the shoreline. Recently, the assets of the current Baddeck sewage treatment plant were transferred from Victoria County to the village of Baddeck.

DFO Publication

The publication highlighted in the January 2002 issue of The Blue Heron is at the printers. At this time there is not a definite date when the document will be available. We are hoping that by September, the publication will be available.

See Insert

OCEAN MANAGEMENT RESEARCH NETWORK

Part one of the Ocean Management Research Network took place on June 17 and 18 at The Gaelic College in Saint Ann's, Nova Scotia. Local participants, public and private industry representatives, and academic interests were afforded an opportunity to discuss the welfare of Canada's oceans and coastal resources. Over the two-day span, presentations were grouped together under three umbrellas, which provided the backdrop for inquiry and discussion.

Panel one dealt with stewardship of the Bras d'Or Lakes. Speakers included Pat Bates, Chairman of the Bras d'Or Stewardship Society; Tom Johnson, Director of Operations at the Eskasoni Fish and Wildlife Commission, and Dave Duggan from the Oceans and Coastal Management Division of the Department of Fisheries and Oceans. Panel two explored the challenges and results facing aquaculture and fishing industries. A diverse group of presenters shared their concerns toward the shellfishery and mussel farming, while others offered presentations for improving governance and coordination of coastal resources. The final panel explored the diversity in approach from Atlantic to Pacific offshore activities. Special interest was given to the public consultation process on scientific matters.

Pat Bates, Chairman of the Bras d'Or Stewardship Society established the tone for discussion as he examined the challenges to an inland sea as a different component to ocean management. Bates

observed that we share similar risks with the oceans in terms of pollution and mismanagement of resources. Johnson presented the Bras d'Or Lakes Coastal Mapping Project. He explained that information is contained within a database entitled "Netululimk GIS" which serves as a resource for both public and private interests. Duggan described the role DFO is playing for improved coordination of the Lakes activities. He continued with an examination of multiple projects the department is overseeing to encourage responsible development and restoration of the Lakes.

Panel two commenced with biologist Michael Berry from Alby Systems, located in Alert Bay, British Columbia. Berry explained the development and implementation of the "Local Interactive Mapping Model (LIMM)". The goal of this system is to provide a forum that recognizes social, cultural, economic, and environmental functions of British Columbia's coastal resources. LIMM is an interactive database that filters internal and external input and is designed to coordinate data on marine habitat and fishery resources. Berry maintains that this framework could be applied to the East Coast in a similar fashion, to assist planning activities, remediation exercises and enhanced awareness of the value and diversity within the ocean.

Panel three began Tuesday morning. Presenters examined the different strategies employed from coast to coast. The basis for these discussions revolved around oil and gas rights. Dr. Teresa MacNeil discussed the role she played as the Public Review Commissioner in the recent public review held on the effects of potential oil and gas exploration offshore Cape Breton Island. MacNeil remarked that despite setbacks in this process, "it

was a great opportunity to combine science and local knowledge." Sam Na'ang'a, PhD candidate for the University of New Brunswick, proposed a management regime that could facilitate good governance of marine space. He suggested that a marine cadastre could represent a modular for single depository of information pertaining to marine space rights, regulations and responsibilities. It could also house marine boundaries, bathymetry, navigation, and environmentally sensitive areas. Another presentation within this panel explored the usefulness of Marine Protected Areas (MPA). A graduate student from Memorial University discussed the benefits of MPA's and their utility in recovery management initiatives. This presentation was grounded in the success of previous studies conducted along the Chilean Lateral.

Although many themes emerged throughout the conference proceedings, general concern toward the lack of ocean governance was very prominent. Presenters advocated the necessary steps to achieve a coordinated communication and management regime. Most would agree that this process should originate from the community level. In other words, involvement at the local level is instrumental for better management of Canada's oceans. Participants, presenters and guests were enthusiastic about this experience, as an environment of healthy debate and discussion was facilitated well.

Deanne Noonan

Deanne has been hired by the Society for ten weeks to work on media and public relations promotion.

The Three Pillars

Environmental issues have started to arise to the forefront of today's media attention. This focus encompasses a wide variety of concerns, from the operations of oil and chemical companies to the simple existence and sustainability of human life. The following will focus on the three fundamental pillars that are essential to protect, conserve and restore the Bras d'Or Lakes.

The first pillar is public education. In order to even start to address the problems we are faced with, we must thoroughly understand them, which is brought about through the channels of education. Public education is the cornerstone of creating positive change. People have already started to realize the deleterious effect of fecal coli-form contaminants entering the Bras d'Or Lakes. This can be highlighted through vivid and accurate quantitative data such as Environment Canada's shoreline sanitary surveys. These surveys identify the source points of contamination caused by malfunctioning septic systems and in some cases

no septic systems. Another indication of the negative trend in water quality can be made clear to the public through the increasing number of shellfish closures in the lake each year. These closures act as the canary in the coal mine. The main culprits of contamination are malfunctioning municipal and domestic septic systems and the lack of holding tanks in pleasure boats. Creating public awareness is the fundamental foundation of bringing about positive change.

The second pillar concentrates on creating a public will, which is made

possible by first creating public awareness through education. People will now begin to realize that poor water quality will adversely affect their livelihood, especially in the shellfish and tourism industries. The shellfish industry has already made major inroads on the global marketplace, bolstered by private investment. This is



Father & Son oyster fishing on the Bras d'Or

an industry that can create more than sustainability but rather long term economic growth. The tourism industry also depends on clean water in order to grow and create prosperity. The importance of clean water will continue to be in the limelight as more people now depend on the shellfish and tourism industries to generate income and support their families.

The third pillar moves onto the importance of a political obligation. Now that a public will has been created to focus on improving the water quality of the lake in a proactive manner, it will

start to initiate a political voice, whereby action must be taken. In order to have this, not only heard but acted upon we need an effective vehicle to create operational policy, through the entanglements of a sprawling bureaucracy. Improving this system of bureaucracy is a long and involved process that takes diligent persistence

to create sound policies. Bureaucrats need to be replaced by government experts, who understand the situation and problems we face. These people must also have the authority to make decisions and implement policies that can be adequately enforced. The people who create these policies need to have in-depth consultation with the stakeholders in the industries these policies will affect.

In closing, I hope this article emphasizes the major problems we face that include malfunctioning municipal and domestic septic systems and the lack of holding tanks in pleasure boats. The three pillars, which include public education, creating a public will and the political obligation are the key factors that in turn will

create a change on the political playing field. We must begin to act on our own accounts, rather than depend on someone else to forge our future on something as important as our own livelihoods.

William Crawford

William is the son of James and Juliana Crawford. William has completed his first year at Acadian University. The photo depicts William and his father, a Society board member, posing before a long day's work taking care of oyster beds in the Bras d'Or Lakes.

Dialogue With a Difference

by Susan Hachey

On May, 31st, 2002, the Sustainable Communities Initiative's Bras d'Or Lake Field Team and the Unama'ki Institute of Natural Resources (UINR) hosted a dialogue with several community groups from the area. The purpose was to bring people together to share information, to discuss issues and priorities in the Bras d'Or watershed and to introduce the SCI Field Team and UINR as important community resources.

Fifty-two participants representing more than thirty organizations and agencies gathered in a circle at the new Eskasoni Fish and Wildlife Commission

The Lake is ill, and today we are engaging in a healing process.

facility. Following a welcome and introduction by Mi'kmaq Elder Albert Marshall, the UINR and the SCI each gave a short explanation of their respective mandates and activities. Each participant then spoke in turn, introducing his/her organisation and talking about the Bras d'Or, the changes seen over the years, and the concerns these changes bring.

Participants told of shellfish closures, contaminated swimming areas, excavation of areas causing erosion, enforcement issues and the problem of bilge and ballast water disposal.

They noted the dependence of Cape Breton communities on the Lake, and connected social and environmental issues. They

Health is not just about hospitals, but about environment.

spoke about the economic and social forces that determine human and community health, and they also recognised the progress being made - new

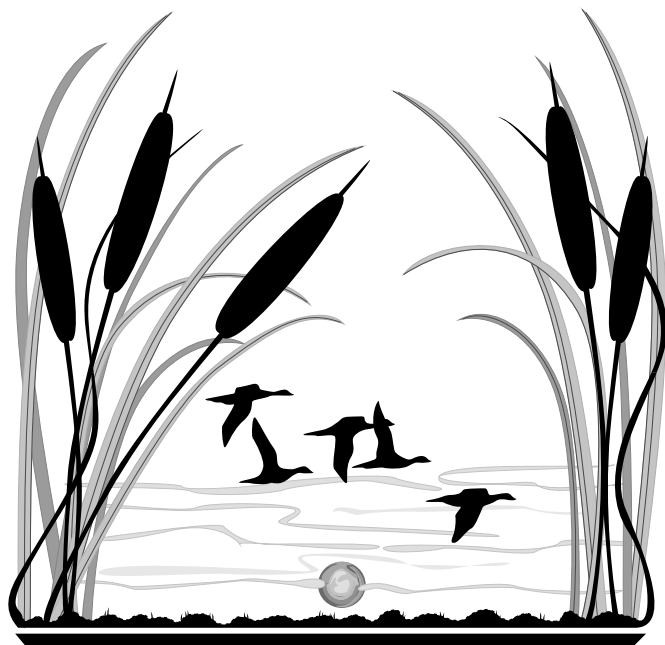
regulations for forest operations on private and public lands, upgraded sewage systems, mapping projects, research, and educational efforts.

Finally, people spoke of the urgent need to protect the lake; they talked about "ownership" and stewardship, about education and getting people to use best practices, and about the need for collaboration among government agencies, and between government and communities.

A number of potential next steps were suggested, with most emphasis placed on continued cooperation between

government departments and all communities around the lake, with the First Nations as a full partner. This collaborative effort has already begun with the SCI field team which consists of representatives from First Nations, municipal, provincial and federal departments and agencies working together on quality of life issues in the Bras d'Or Lake watershed. The Unama'ki Institute of Natural Resources was incorporated in 1999 as a society for the investigation, study and protection of the Bras d'Or Lakes and its watershed on behalf of the five Cape Breton (Unama'ki) First Nations.

Susan Hachey is acting Director of the Sustainable Communities Initiative.



The Bras d'Or Stewardship Society

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Bras d'Or Watch

to report any observed acts,
incidents and violations that
threaten the integrity of Bras d'Or
Lakes please call:

1 800 565 1633

Our Email: stewardship@baddeck.com

2002

BRAS D'OR STEWARDSHIP SOCIETY

- | | | | |
|-----------------|--------------------------|----------|--|
| MEMBER | <input type="checkbox"/> | \$15.00 | <input type="checkbox"/> Yes, I am in favour of conserving and restoring the |
| FAMILY | <input type="checkbox"/> | \$25.00 | Bras d'Or Lake and watershed through |
| CONTRIBUTOR | <input type="checkbox"/> | \$50.00 | responsible stewardship. |
| SUPPORTER | <input type="checkbox"/> | \$100.00 | <i>Name</i> |
| LIFETIME MEMBER | <input type="checkbox"/> | \$500.00 | <i>Address</i> |

Mail check or money order along with your name and address to:

Bras d'Or Stewardship Society
P.O. Box 158
Baddeck, Nova Scotia, B0E 1B0

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A New Publication on the Bras d'Or Lakes.

by Tim Lambert

A new publication on the Bras d'Or Lakes is nearing completion. An upcoming issue of the Proceedings of the Nova Scotia Institute of Science is being dedicated to the natural history of the Lakes. The topics to be discussed are geology, formation and erosion of beaches, physical oceanography, chemical oceanography, large invertebrate animals and fish of the Bras d'Or Lakes, together with a section on human demographics of the watershed area. Although the journal publishing these articles is a true science journal, this issue will be somewhat different in that the language used will be as jargon free as possible so as to be more accessible and more appealing to the general public. Here are brief outlines of the chapters included.

Geology

The evolution of the Bras d'Or Lakes since the retreat of the last ice sheets 15,000 years ago is inferred from echo sounding and seismic investigation and coring of the bottom sediments. The thickness of stratified sediment in the Lakes overlying glacial till shows that there was a step-like retreat of ice towards a late ice centre in the western part of the Bras d'Or Lakes. As ice retreated, a lake formed in the area of the modern Bras d'Or Lakes and probably drained through Little Bras d'Or Channel. Echo soundings indicate ancient river channels on the continental shelf, which suggest that sea level 15 thousand years ago was perhaps 50 m lower. Rising sea level since that time flooded the ancestral Bras d'Or Lakes at 9 to 10 thousand years ago and the water level may have risen 15 m before falling again in the early Holocene (geologic period). Sea levels rose again and the Lakes were finally flooded by the sea 4 to 5 thousand years ago.

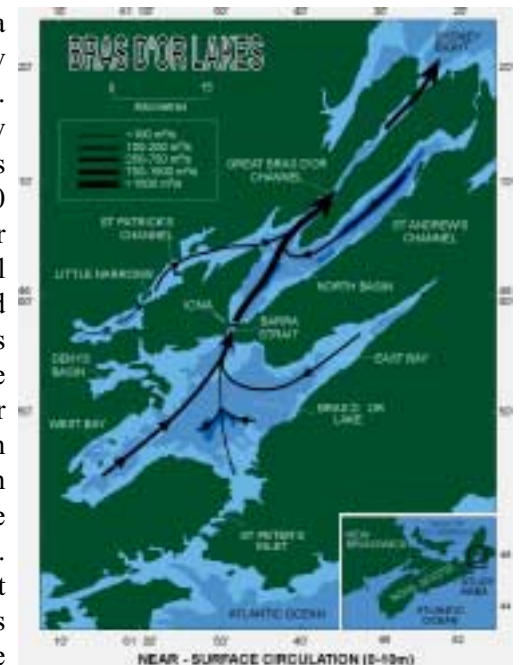
Evolution of Beaches

Little coastal geological research has been conducted in the Bras d'Or Lakes. This is the first re-examination of the coastline since the early 1900s. The 1234 km of coastline is extremely varied in relief and morphology. In terms of composition, 13.5% of the shores are rock, 1.6% are artificial or human-made, and the remainder is composed of unconsolidated sediment. It is estimated that 27% of the shores are along narrow channels and embayments which are sheltered from higher wave energy, but many are low lying which makes them more vulnerable to increased flooding as sea level rises. Many of the larger coastal barriers noted by researchers in the late 19th century are still present. Using the oldest and most recent air photos and aerial video, changes at selected coastal barriers are assessed and a conceptual model for coastal barrier evolution is presented. Five natural phases of evolution were identified: (1) initiation, (2) growth, (3) establishment, (4) breakdown and (5) stranding or collapse. An alternative outcome for many barriers is artificial constraint (6), which is becoming more common as human activity increases in the Lakes.

Physical Oceanography

In the Bras d'Or Lakes the mean water circulation for the spring to fall seasons consists of a surface flow towards the ocean and a subsurface flow into the Lakes. The outflow from the Lakes is about 1100 cubic metres per second. Vertical exchanges and flushing times throughout the Lakes and their effects on oxygen distribution are discussed. Currents at some locations in the Lakes are frequently so weak that they cannot turn the rotors of conventional current meters;

at other sites, they can be so strong that they rival flows in the Bay of Fundy. Of note are observations from Barra Strait and the Great Bras d'Or Channel that feature maximum flows of about 1 and 3 metres per second dominated by strong tidal currents. Temperature and salinity change markedly from Sydney Bight into the Lakes and vertically within the Lakes. Sea level variations caused by tides decrease rapidly from the entrance to the Lakes along the Great Bras d'Or Channel. On the other hand, low frequency fluctuations of sea level in Sydney Bight brought about by atmospheric pressure changes are only slightly weakened as they spread into the Lakes. Surface wave data from the North Basin and Bras d'Or Lake compare reasonably with relationships that relate wind speed and fetch to significant wave height. The long-term mean ice cover for the Lakes is derived from 30 years of data.



Chemical Oceanography

What is known about the water chemistry of the Lakes is reviewed and some model results are presented that combine what is known about the water circulation and external inputs of chemicals to estimate some parameters of biological productivity and to predict chemical distributions where data are currently unavailable. Overall, the low nutrient inputs to the Lakes can only support a relatively low level of natural biological productivity, and the contribution of sewage and other man-made sources of nutrients is very small. However, localised build-ups of both natural and nutrients of human origin have affected the water quality of some micro-environments in the Lakes, resulting in the eutrophication of sites like the west end of Whycomomagh Bay and some of the barachois ponds around the Lakes. Although the available data on contaminants are limited, there is no indication that any persistent organic or heavy metal contaminants are a concern within the Lakes. The environmental quality is in general very good. This status is a result of the small population density and the very limited industrial development around the Lakes. Maintaining or improving this status will require good management of current and future activities in the Bras d'Or Lakes and their watershed.

Bottom Dwelling Invertebrates

The distribution of large epibenthic invertebrates (lobsters, crabs, bivalve molluscs and echinoderms) in the Bras d'Or Lakes is reviewed, and possible limiting factors are identified. The basis for the review are published and unpublished studies, including recent trawl surveys directed at fish and trapping studies directed at lobsters and green crab. The reduced salinities within the Lakes probably limit the distribution of several species (rock crab, sea scallops and possibly lobsters), particularly during the more sensitive larval period. Lobsters are less abundant within the Bras d'Or Lakes than on the outer coast of Cape Breton Island. Possible reasons are the Bras d'Or Lakes reduced salinity and limited cobble bottom substrate coupled with possible low food availability and low egg production. Low egg production may be the result of overfishing of lobsters in the past. The life history and physiology of the eastern oyster appears to be well suited to the areas of the Lakes with warm summer temperatures. The oyster populations in the Bras d'Or Lakes are limited by natural predators (e.g. starfish and the newly arrived green crab), competitors (e.g. blue mussel), and overfishing. The green crab, a new arrival to the Bras d'Or Lakes will likely have negative effects on bivalves such as oysters, but the overall effect of green crab on the Bras d'Or Lakes food web is difficult to predict. Recent trawl surveys indicate both sea urchins and starfish are present in considerable abundance, but little is known about their ecological roles in the Bras d'Or Lakes.

Ecology and Fish

A review of past biological research in the Bras d'Or Lakes is provided along with results from recent and ongoing research. Groundfish trawl surveys from 1952, 1967



and 1999/2000 are compared and changes in abundance and distribution of major groundfish species are noted. The most common species occurring in all of these surveys were winter flounder (*Pseudopleuronectes americanus*) and cod (*Gadus morhua*). The biggest change over the nearly 50 year span of these investigations was in the abundance of American plaice (*Hippoglossoides platessoides*) which used to be very common in the Lakes but have been rare in recent surveys. The Lakes contain at least one, and probably two, resident populations of cod and are home to a population of spring-spawning herring. The unique nature of the Bras d'Or Lakes is emphasized in relation to the diversity of species they contain. Glacial relicts can be found within a few kilometers of warm temperate species. The Lakes are ideally suited for ecosystem studies; for, in addition to their unique biology, they are readily accessible and can be easily sampled on a daily basis.

Population of the Bras d'Or Lakes Area

A statistical profile of the population along the Bras d'Or Lakes is provided. It covers the major topics of the Census of Canada in 1996 including: population, age and sex, language and ethnicity, citizenship and immigration, education, families and households, labour force activity and income.

Interest in Ordering?

If you are interested in acquiring a copy of this book please contact the Bras d'Or Stewardship Society, leaving your name and means of contact. You will be notified when the issue is available. The cost has not been established as yet, but will probably be around \$25.