



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.

Prior to starting our Newsletter, it sometimes appears that there might not be sufficient news out there to provide members with information that is not repetitive or not stale. The issues we promote.....responsible stewardship, good water quality, environmental public awareness and the crucial importance of the protection of the Bras d'Or Lakes become powerful mandates. The local newspapers are full of articles that focus on issues that speak to pollution and its effects on water quality. For example, boiling drinking water became almost a daily headline for

many communities in Maritime Canada this past summer.

Indeed, this past summer has been perhaps the driest on record in maritime Canada for the last 50 years. Domestic water sources dried up as water tables within the Bras d'Or Lakes watershed dropped below levels of access. This forced people to haul water, buy plastic bottled spring water for drinking and even bore new wells as old ones dried up.

Recently, the village of Baddeck drilled test wells to seek out new sources of water as Baddeck's traditional source of water, Peter's Brook was abysmally low. Furthermore, government officials have prohibited further tapping of Peter's Brook as a water source for Baddeck. Hence, the recent drilling of test wells and the need to search for a new reliable water source.

As a community Baddeck requires 350,000 gallons of water a day with a storage capacity of 1,250,000 gallons. The five month period between May and October puts the greatest pressure on Baddeck's water supply. This period corresponds with the seasonal tourist season. Baddeck has over 400 tourist rooms to fill each night. This number will grow as a new 32 unit motel comes on stream in the spring 2002 accommodating 64 guests.

As many of you are aware, the Bras d'Or Stewardship Society has promoted an upgrade to the Baddeck sewer treatment plant. We have made submissions to federal and provincial government agencies supporting Baddeck's need for a new sewage treatment facility. Water is the preeminent "conductor" for moving goods to the sewer treatment plant. Without the water that flows from Peter's Brook to the houses, businesses and tourist infrastructure, Baddeck would come to a standstill. In essence water is the medium that drives the economics of the community. Without a good supply of quality water, Baddeck would be indeed in perilous shape. This is true for every community settled adjacent to the Bras d'Or Lakes.

On October 5, 2001, the announcement was made that Baddeck would indeed get a new sewer treatment plant. This is a 2.2 million dollar upgrade made possible by the federal governments infrastructure program. Work on this plant should

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"Our Goal is to Protect, Conserve and Restore the Bras d'Or Lakes"

www.baddeck.com/bss



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commence once all contracts are met and the weather cooperates. The Bras d'Or Stewardship Society was pleased with the credits received for promoting this upgrade. Our mandate is to protect and insure water quality. Effluents from Baddeck's treatment plant flow directly into the Bras d'Or Lakes. One down, several to go.

Recently, the society has been informed that the village sewer plant in Whycomomagh can not handle much of the waste that flows into it. Millions of gallons of untreated sewage have poured into Whycomomagh Bay. There was an "unpalatable stink" in Whycomomagh this past summer. The society sees this unfortunate situation as our next challenge. It is an untenable situation. We suspect the same is true for other community sewage treatment plants in the watershed. The quality of the medium determines the environmental message.

The point of drawing attention to water supply and quality, be it for drinking, the medium that transports human waste products to be treated, or the all important provider of community economics and good health is that this century will see incredible emphasis on requirements of adequate water supply globally. It already is and will become a seriously contentious issue as water sources and water management policies are challenged by the politics of supply and demand. Every community, rural or urban, will have to develop sustainable water use management strategies that will protect water supply and the water quality. This is not an easy challenge to meet as it costs money and takes prudent planning. However, it must be done if future community water needs are to be met.

Henry W. Fuller

Remediation Initiative ~ Lakes Need Municipality Unity ~

by Jim Morrow

The quality of the Bras d'Or Lakes is going in the wrong direction Laurie Sutor told Victoria County Council on July 9th.

As the Bras d'Or Lakes Coordinator for the N.S. Department of the Environment Ms. Sutor believes that the Lakes are salvageable if the political will on the municipal level can come together and get reciprocal commitments from the provincial and federal governments.

"There is not going to be a lot of money required from the Municipal level," she said and added that Municipalities do have certain responsibilities but not extra commitment.

Victoria County through Warden Gerald Sampson has been instrumental in getting the water quality of the lakes on the agenda of the other three Municipal units which are on the Bras d'Or Lakes.

Ms. Sutor said "Warden Sampson has helped initiate the efforts to remediate the effects of raw sewage going into the Lakes."

With the collective political will, Ms. Sutor said, the province will initiate a program for sewage remediation on the

Bras d'Or Lakes right now.

Municipal Councillors quizzed Ms. Sutor quite closely on the possibilities of the province downloading more responsibilities on to the Municipalities for environmental cleanup

Councillors from North of Smokey said some of the worst areas in the Municipality requiring environmental remediation are not on the Bras d'Or Lakes and questioned whether they would have to wait until the Bras d'Or Lakes are cleaned up before they will see any assistance in the their districts.

Ms. Sutor replied that they only need to come forward showing what work is required and the province will asses their need. Ms. Sutor agreed that Victoria County is not one of the offenders of the environment but one of the defenders.

"Without Victoria County's initiative, the program for environmental remediation would not be at the point it is now," Ms Sutor said.

She said if all the Municipalities are on side she would expect the money for sewer remediation to be on the table by fall.

Ms. Sutor provided ten points which were directed at municipalities and First Nations requiring their commitment to sewage remediation. They are:

- * Commitment to view the sewage management issue affecting the Bras d'Or Lakes from three perspectives: sewage treatment plants, on-site sewage disposal systems, and recreational boating.
- * Commitment to act as a unified body to develop a plan for implementation and seek funding to support it - i.e. (MOU among municipalities and First Nations).
- * Commitment to identify priority areas where on-site sewage disposal systems are malfunctioning.
- * Commitment to co-operate with the responsible regulatory agencies to perform a current audit of sewage treatment plants and provide an action plan to address any identified deficiencies.
- * Commitment to ensure sewage treatment plant operators receive

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the required training.

- * Commitment to recommend to government agencies the regulatory changes they feel are required to ensure the health of the Bras d'Or Lakes with respect to sewage.
- * Commitment to ensure ongoing education and awareness for the public with respect to the care and maintenance of on-site sewage disposal systems.
- * Commitment to additional public education directed at the risks associated with the dumping of raw sewage into the Bras d'Or Lakes from recreational and other marine craft.
- * Commitment to review and to establish, where applicable, "Deed Transfer Regulations" which will provide for upgrading of on-site sewage disposal systems at the time of a property sale.
- * Commitment to create "waste management districts" to manage pump-outs and on-going maintenance and repair of on-site sewage disposal systems with a view to stimulating private sector growth in this area while ensuring environmental protection.

She also reviewed ten points directed at Government Agencies which she believes the Municipalities and First Nations would agree with. They are:

- * Commitment to work co-operatively and collaboratively with municipalities and First Nations to develop a strategy to deal with sewage waste issues from sewage treatment plants, on-site sewage disposal systems, and sewage from marine craft.
- * Commitment to provide human resources necessary for adequate and ongoing support, within the individual departmental capacity to do so.
- * Commitment to provide technical and advisory support to efforts by the Municipalities and First Nations to address issues related to sewage management.
- * Commitment to open dialogue among all stakeholders.
- * Commitment to enforcing environmental legislation in a fair, predictable, and consistent manner.
- * Commitment to identify and pursue funding programs in cooperation with other government agencies.
- * Commitment to participate in educational efforts to inform the public about all aspects of on-site sewage disposal systems.
- * Commitment to evaluate the operation, maintenance, and administration of sewage treatment plants, on-site sewage disposal systems, and facilities used in the handling, transport, and disposal of sewage sludge.
- * Commitment to investigate innovative technologies

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NEWS ITEMS

Student Summer Project:

This past summer, The Bras d'Or Stewardship Society employed Jaime Burke, a student, for a ten week period to inventory and assess certain aspects of known subdivisions along the perimeter of the Bras d'Or Lakes. This project was wide ranging with regards to geography, but focused upon number of lots, lot sizes, availability of potable water and the carry capacity of subdivided land with regards to on-site sewage disposal systems.

The information provided by Jaime in his final report is invaluable as it provides a synopsis of the extent of subdivisions contiguous to the Bras d'Or Lakes. There are over 1,000 lots available for sale. Many do not have adequate sources of potable water. A dry summer such as this past one suggests future problems of water supply and appropriate on-site sewage treatment.

Piks Project:

In September, the nine months Piks Project drew to a conclusion. Heather Atiya worked assiduously during this period with many individuals to help develop and enhance this community driven web site. The site is still in the evolutionary stage, but is available to anyone at: <http://link.quick.to/piks>

Baddeck Sewage Treatment Plant:

It has already been noted in the introduction to this issue of THE BLUE HERON that Baddeck will get its new sewage treatment facility. This 2.2 million dollar infrastructure project will increase capacity of volume of treatable waste. The new capacity will allow healthy economic development within the community of Baddeck. No longer, hopefully, will untreated waste enter into the Bras d'Or Lakes from Baddeck. This is a huge boost to protecting and conserving the integrity of the watershed's environment.

Construction of this new 2.2 million facility is forecast to commence in spring 2002. Construction time is estimated to last for a year. Hence, come spring 2003 should see the new plant in service. This plant will have the capability of processing 900,000 gallons of sewage effluent a day according to the Rawdon/ABL Sewage Treatment Predesign Study, presented in December 2000. This report is available for public review at the Village Commission Office in the Baddeck Court House.

NEWS ITEMS

Summer Membership Meeting:

About 30 individuals attended the society's summer meeting held in the Masonic Hall in Baddeck on August 18, 2001. Reports were presented. Guest speaker, Laurie Sutor, the provinces recently hired Bras d'Or Lakes facilitator, presented a ten point document being circulated for municipal approval by the four Cape Breton Municipalities. This document provides a common ground for moving ahead on policy and future planning initiatives with regard to protecting and conserving the Bras d'Or Lakes and its watershed. This ten point memorandum is included in this newsletter courtesy of Jim Morrow, editor of the Victoria Standard.

2001 Membership Results:

This year proved to be a record year with regard to funds raised from our membership campaign. To date, over \$16,500.00CN was raised through various contributions. A goal had been set to raise \$10,000.00 which exceeded this amount by \$6,500.00 We are indebted to everyone who made a contribution. The response suggests that the society is well recognized by our members for its efforts. Many thanks. Members do make the difference.

Bras d'Or Watch:

Recently it has been brought to the attention of the society of an unsightly clear cut at the head of Baddeck Bay. A sizeable portion of land abutting the Bras d'Or Lakes has been clear cut from the Beinn Breagh Road to the shoreline. It is believed this cut was made to access a view of Baddeck Bay.

The cut trees and undergrowth were just left on the ground. No buffer zone was established between the shoreline and the area cut. Such a blatant lack of responsible stewardship of the land is not acceptable. Currently, the felled trees are being burnt along the shoreline. Some of these trees were large full grown pines.

The impact of shoreline scarification along the perimeter of the Bras d'Or Lakes is always at issue. Private property owners have a responsibility to insure that their shore front work i.e. perceived improvements is not unsightly and degrading to the environment.

Ironically, the first of twelve simple steps to keep 'your paradise' intact in the "LIVING BY THE WATER" pamphlet states: KEEP THE LOT WELL TREED----NEVER CLEAR CUT! The Living By The Water Project can be accessed at: www.livingbywater.ca

"REMEDIATION" CONT'D

which are related to the improvement of design, care, and maintenance of on-site sewage disposal systems and handling of sewage sludge collected for final disposal.

- * Commitment to sign an agreement with municipalities and First Nations dealing with a strategy to improve the quality of the Bras d'Or Lakes by managing the sewage waste streams from sewage treatment plants, on-site sewage disposal systems, and sewage waste from recreational and other marine craft.

THE WONDERFUL WORLD OF WEBSITES:

Thinking out of the box is often easier than one thinks. The expanding universe of web sites provides an infinite invitation to explore topics of interest. If used properly the information available in the web site world is as good a source for enlightenment as any. In fact, it better as you can sit at home and roam at random. The best part is the information is free. The links that can be accessed from each site offer incredible information variety and exponential rewards.

Below are four web sites that pursue environmental issues. Each has its own domains of concern, but together they focus on local and global environmental issues in a most up to date format.

www.ns.ec.ca/epb/sfish/maps/class

This site is dedicated to shellfish closures in the four Atlantic Provinces. Maps are accessible which show the extent of shellfish closures due to pollution. The maps for the Bras d'Or Lakes are highly instructive and can be printed. There are good links from this site as the site is a component of Environment Canada's web site.

www.livingbywater.ca

This site is dedicated to the ecology of shorelines to assist individuals in protecting their shorelines through appropriate stewardship. Handbooks are being developed for each Canadian province to help residents understand the principles of shoreline stewardship. An excellent pamphlet is available on the site regarding responsible shoreline stewardship.

www.scorecard.org

This site is devoted to documenting all aspects of pollution targeting specific sites in North America. You can find out about pollution in your place of residence by entering your

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Subdivision Survey

Reported by Heather Atiyah

An important survey of subdivision development around the Bras d'Or Lakes Watershed was undertaken this summer by the Bras d'Or Stewardship Society. Jamie Burke, a summer student hired by the Society, worked on the project that is designed to provide an overview of subdivision development around the Bras d'Or Lakes.

It has been recognized that development around the Lakes is increasing. Subdivision developments can pose threats to the environment if not conducted according to guidelines, with attention to the potential impact such developments have on the environment. According to Burke's report, "With the increase in development comes the greater chance of contamination." Some of the considerations to take into account are factors such as sewage disposal systems, sources of water supply, and siltation from clear cutting and road construction.

According to Burke's report, the aim of this project is to construct an updatable file or a virtual historical database of

all properties that have been subdivided in the last fifteen years that are bordering the Bras d'Or Lakes. Because this information is on a database, it can be updated and new subdivision developments added to the database to provide an inventory of subdivision development around the Lakes.

Burke retrieved information for the database from a variety of sources: Planning offices; Realtors; developers; residents and observation. A questionnaire was also distributed to developers and landowners. The questionnaire addressed issues such as the size of the subdivision, number of lots for sale, number of waterfront lots,

water and sewer information, vegetation, and possible contaminate sources on the property. To their credit, most people were cooperative about supplying this information.

Burke's report indicates that so far as this year, there are approximately 71 subdivisions in the watershed area for a total of 1,047 lots. There are approximately 39 subdivisions with direct waterfront property, for a total of 391 waterfront lots. Lots vary in size according to location. Some larger subdivision developments are considering central or community sewage treatment, but the majority (80-85%) are individual septic systems.

PIKS project holds promise for the future

By Heather Atiyah

The PIKS project holds the promise of bringing people, groups and communities together for a common goal: protecting the Bras d'Or Lakes watershed for future generations to enjoy. To date, 27 organizations became involved in contributing data and information to PIKS. This diverse client list includes Federal government, non-profit organizations, Aboriginal groups and private businesses.

PIKS, an acronym for the Paqtatek-Prism Integrated Knowledge System, is a database set up on the World Wide Web. It looks and performs like a website, except this website is interactive. People or groups or organizations can view information online or obtain access to the database through a secure password and input their own information. The word *Paqtatek* comes from the Mi'Kmaq word meaning light rays emitting from the earth, representing knowledge and truth. It was chosen to acknowledge the high cultural value the Bras d'Or Lakes have to the Mi'Kmaq people and their contributions to protecting the

Lakes. The 9 month project, which began last December for the Bras d'Or Stewardship Society, went through a number of technical changes. Heather Atiyah and George Paul, the Community Facilitators for the project, met with people and groups around the Lakes to encourage participation in this worthwhile project. Through community involvement a number of people raised issues regarding this website. Some of those issues included the difficulty in accessing the site and the challenges people and groups faced when trying to input data or search a specific topic.

With help from Environment Canada

and the Department of Oceans and Fisheries, modifications to the website have been ongoing. Although the project "officially" ended this fall, the website is still up and running. People are encouraged to view the site, input their information. There is a site administrator available for help. Other partners in this project include Una'maki Institute of Natural Resources, Eskasoni Fish and Wildlife Commission, University College of Cape Breton, Enterprise Cape Breton Corporation and the Bras d'Or Preservation Foundation.

Water Sampling and Shoreline Survey

By Cheryl Berube, Eskasoni Fish and Wildlife Commission.

The Eskasoni Fish and Wildlife Commission (EFWC) has for the past four years worked in partnership with Environment Canada to provide water quality monitoring for shellfish growers and harvesters. Water quality monitoring is done with the assistance of Ray Prosper and Bert Lewis—two of the EFWC's Fishery Guardians.

In 1997, the EFWC provided financial and inkind support for the program which monitors the numbers of fecal coliform in oyster growing areas. This is done in order to allow shellfish growing areas to comply with the Canadian Shellfish Sanitation Program. One of the purposes of this legislation is to prevent the outbreak of diseases related to the consumption of molluscan shellfish from water contaminated with pollution.

The program is designed to identify and evaluate all sources of pollution to shellfish growing and harvesting waters. The

program examines many areas where pollution may affect shellfish including during handling and processing. The area the EFWC has been involved in has been with the water quality monitoring and in the last two years, the sanitary shoreline survey.

These surveys are important in order to make a judgement on the classification of areas so that public health is protected. Lorraine Marshall is our sanitary shoreline technician. She has been involved in survey reconnaissance for the past two years. She has worked with Don Walters and Christopher Craig to survey areas of Cape Breton. Last year she worked in South River Denys Basin, Whycocomagh Bay, Nyanza



Bay, Grand Narrows, Iona, and MacAskill Harbour.

This year, Marshall is surveying West Bay, Dundee, Pringle Harbour, Marble Mountain, Malagawatch, West Bay Head, River Denys Basin, St. Anne's Harbour and Bras d'Or West. The survey involves interviews with homeowners and on-site inspections as well as the taking of water samples from pipe outflows, rivers and brooks.



"WEBSITES" CONT'D

zip/postal code. This site is continually updated. Already a national data base is being documented to track pollution from the World Trade Center collapse. One could spend hours exploring the information available here.

www.thegreenpages.ca

This site is a new web site developed by students. It offers a cross Canada information center on Canadian environmental concerns. Each province has its own portal so you can access provincial environmental issues quickly. This site seems to be updated daily. The links from this site are extensive and eclectic. This is a great place to get a detailed overview of Canadian environmental problems within a regional framework.

www.gov.ns.ca/natr/forestry/strategy

This site provides access to the new Nova Scotia wildlife habitat and water protection regulations that become law on January 14, 2002. Anyone doing forestry work within the watershed of the Bras d'Or Lakes should be following the new regulations which specify three techniques that must be followed on all provincial and private woodlands.



"We are all too inclined, I think, to walk through life with our eyes closed.

There are things around us and right at our very feet that we have never seen, because we have never looked. We should not keep forever on the public road, going only where others have gone; we should leave the beaten track occasionally and enter the woods. Every time you do that you will be certain to find something you have never seen before. Of course, it will be a little thing; but do not ignore it, one discovery will lead to another, and before you know it you will have something worth thinking about to occupy your mind, for all really big discoveries are the results of thought."

Alexander Graham Bell

*Submitted by
Sharon Morrow*

Parks Canada Workshop on Ecological Integrity

Representatives from the Bras d'Or Stewardship Society were invited by Parks Canada to participate in an Orientation Program on Ecological Integrity - A Call to Action. The workshop, designed and delivered by Parks Canada staff to Parks Canada staff and community partners was held in the new Wagamatcook Community Centre on November 13 -14.

We learned that put simply, "ecological integrity" is achieved when all components of an ecosystem are interconnected and in balance. Parks Canada defines the components of an ecosystem as:

1. physical elements, such as water rocks and nutrients
2. biodiversity, which addresses the composition and abundance of species and communities in an ecosystem, and finally
3. the ecosystem processes which make the ecosystems work such as fire, flooding and predation.

Parks Canada is committed to the maintenance and restoration of ecological integrity when considering all aspects of park management.

Ecological integrity management concepts and principles were not new to us, nor to the other participants in the workshop. However, the development of the thought process when considering how components in an ecosystem work together, was logical and sensitive and

was indeed a great learning experience for us. The focus during the workshop was the importance of knowledge sharing and indeed the need for team work when identifying complex ecosystems.

Heather Dauphinee presented the Highland Links Golf Course as an example of Parks Canada's commitment to ecological integrity. A vision, accompanied by hard work, determination and support by management, staff and golfers, resulted in this world class golf course achieving the Audubon Certification.

As members of the Society, we were privileged to participate in this workshop. Whether in our homes or at our work, or in our capacity as volunteers, we all have the responsibility to apply the basic principles of "ecological integrity" to our daily activities. Outside of Parks Canada jurisdiction, these principles may result in conflict. As human beings, we are part of the biodiversity within the ecosystem. We make

choices, and often because of the choices we make, we are the stressors in the ecological system. Hopefully, the preliminary knowledge we gained at the Ecological Integrity Workshop will assist us as we move toward the Society's goal of maintaining and restoring the complex ecosystems in the Bras d'Or Lakes and its watershed.

Reported by: Lynn Baechler

The Blue Heron,

the newsletter of the Bras d'Or Stewardship Society, will be published periodically to keep members informed of important issues and concerns regarding projects, responsible stewardship, and important events. The Blue Heron would like input from its readers. Please submit to:

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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:

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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

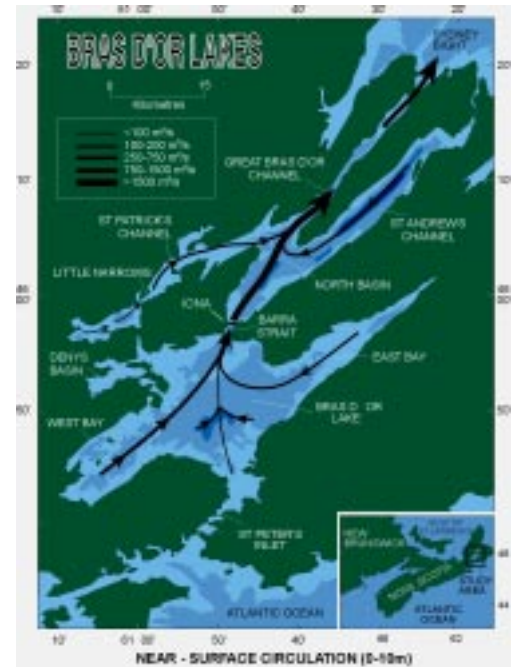
The evolution of the Bras d'Or Lakes since the retreat of the last ice sheets 15,000 years ago is inferred from echo sounding and seismic investigation and coring of the bottom sediments. The thickness of stratified sediment in the Lakes overlying glacial till shows that there was a step-like retreat 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 Whycomagh 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 \$10.