

VOICEPIPE

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The Newsletter of the BIO-Oceans Association



Dr. Ruth Jackson accepting the 2019 Beluga Award from committee chair, Melanie Maclean (left), at the presentation ceremony, May 21, 2019 (Andy Sherin photo)

CSS Acadia Update
 Significant progress on
 restoration project
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Beluga Award 2019 Presentation Ceremony

The Oceans Association presented Dr. Ruth Jackson with the Beluga Award this past May 21st. President Andy Sherin welcomed the many attendees to the ceremony and highlighted the role of the OA in establishing and continuing the tradition of this award. Chair of the Beluga Award committee, Melanie Maclean, introduced the main speaker of the day, Patrick Potter who provided the citation for Ruth's nomination. He demonstrated how Ruth met the award's criteria throughout her career. Those criteria are an unselfish dedication to community spirit at the Bedford Institute of Oceanography (BIO), exceptional contributions to the success of BIO projects, initiatives or programs, and unselfish effort that encourages cooperation and fosters the team-work approach of BIO.

After graduating from Dalhousie with a BSc, in 1972 Ruth came to work for the GSC here at BIO. She got her Masters degree from Durham University in 1978. From 1979-81 she went North to the Eurasian Basin on the FRAM experiments with the Americans. This experience sparked her passion for Arctic Science and taught her about geophysical fieldwork and logistics in the Arctic. The experience led to work on CESAR (1983) with Steve Blasco and Peta Mudie and others, followed by Ice Island 85, 86, 90. Somewhere in there, she took a year to earn her PhD from the University of Oslo and the production of the Circumpolar Map of Bedrock Geology, a collaborative project between Canada and Russia.



Patrick Potter delivers the citation for Ruth Jackson's nomination for the Beluga Award. (Andy Sherin photo)

But Arctic Science is expensive, so there were times when Ruth came back down south, to focus on geological questions closer to home, acquiring and working up refraction survey data. For example, in 1994, she got involved in The Big Shot Experiment. The Navy were shock testing their new frigates, setting off large explosive charges nearby and hoping the hull would remain intact. At the GSC, that sounds a lot like a seismic source. Ruth hosted folks from Ottawa and put a large team of staff and volunteers together to lay out seismometers every two kilometres from Halifax to Rimouski to record the seismic waves and map the Appalachian crust and upper mantle.

Around this time, Ruth began to sneak back up North, collaborating with Russians, Americans, Norwegians and Germans. Paying it forward, Dr. Jackson supported many graduate students as she herself had been and had longstanding partnerships with many Dalhousie students, post-docs and professors. In 2001, Ruth collaborated with the Germans on an expedition to Nares Strait aboard the icebreaker Louis Saint-Laurent to address some long-standing controversies regarding

tectonic model of plate motion, prompting Borden Chapman to state in his letter of support:

"In 2001 Ruth acted as Chief Scientist on board the CCGS Louis S. St-Laurent. It was a multidisciplinary mission, in the Nares Strait, involving many scientists from around the world. Boy did she have her hands full. Twenty or more prima donna scientists, all on one 400-foot ship, all demanding ship time at the same time, because their program was more important than any of the others. How she managed to pull that off was a bit of masterful diplomacy, but I believe everyone went home with what they had hoped to achieve. And GOOD science was the result."

In September 2003, Ruth hosted ICAM (International Conference on Arctic Margins) right here. She had invited 130 scientists to Dartmouth to take part in nine technical sessions related to Arctic Margins. The conference was to begin September 29, 2003. If that date sounds familiar, it's because that's the day Juan came to town. The hurricane knocked out power to BIO for the week. But, as the show must go on, Ruth led a team of dedicated volunteers who made it all happen. The change in venue scarcely had an impact on the program. There was no panic, no crying "why me?"; just an acceptance of the facts and rapid improvisation to achieve success: much like arctic fieldwork really.



Ruth and her husband, John, at the Beluga Award ceremony. (Andy Sherin photo)

Later that same year, December 2003, Canada ratified UNCLOS – The United Nations Convention of the Law of the Sea. Over the subsequent decade, with American and Danish collaboration, Ruth led a series of expeditions to the Arctic collecting bathymetric and seismic reflection and refraction from ice-breakers and two on-ice refraction experiments. Patrick commented that he was fortunate to be invited to take part in the Alpha Ridge Test of Appurtenance in 2008 and saw first-hand Ruth's style of leadership: modest, democrat-

ic and approachable.

“I often think back fondly on that experience as a career highlight for me and a master class in how to lead, motivate and inspire. In addition to offering opportunities to collaborators, colleagues and students, Ruth has also made great efforts to encourage and enable the active participation of members from northern communities in field programs, as wildlife observers and technicians. Many returned in later years for subsequent field programs.”

As Mary-Lynn Dickson said in her letter of support:

“Although Ruth is retired, she is a valued member of the team completing Canada’s Arctic Ocean submission that will be filed with the United Nations in 2019. I am impressed by the depth of Ruth’s experience, knowledge and her willingness to share this information and new ideas with me and the team. Her professionalism and dedication to this legacy project, and her enormous scientific contributions will help to ensure that the proposed outer limits of Canada’s continental shelf in the Arctic Ocean will become Canada’s last international boundary that defines our country. Ruth is a positive role model for all of us working at BIO; she is a delightful colleague who is humble, kind and gracious. Ruth is a giver, not a taker. She has improved our institution by having the vision and drive to establish the Fossil Garden and working with others in community gardens. Ruth embodies living life to the fullest, and along with her husband, John, is an outdoor enthusiast enjoying hiking, cycling, and kayaking.”

The fossil forest in the BIO courtyard grew out of two of Ruth’s passions: gardening and arctic science. In her spare time, Ruth is an avid gardener and has had a long association with the Atlantic Rhododendron and Horticultural Society, serving for many years as president. The recently inaugurated Bernard Pelletier Arctic Fossil Forest was Ruth’s idea. Many of us have good ideas, but Ruth put in the time and effort to make it happen. As Mike Sinclair said in his letter of support: “Ruth is very persuasive, and tenacious, in achieving the goals that she sets for both herself and BIO. It took ... years of continuous activity on her part to complete the project. The creation of the “Fossil Forest” is pretty well Ruth’s long-term gift to the Institute and the visiting public.”

Patrick concluded by checking Ruth’s accomplishments against the criteria for the Beluga Award, and it was clear that she deserved the award, saying, “And now there’s nothing more but for Ruth to take her place with the rest of the winners. Congratulations Ruth.”

In her gracious acceptance speech, Dr. Jackson expressed her pleasure in being nominated for the Belu-

ga Award, saying she was “tickled pink.” In particular,



Dr. Ruth Jackson accepts the award and relates some stories and words of wisdom. (Andy Sherin photo)

Ruth mentioned Patrick Potter’s effort to put forward her nomination. She thanked everyone she worked with, as she considers this to be a result of a team effort – anything that she accomplished throughout her career came from the dedicated efforts of all those people she worked with. Ruth always trusted her team and those she worked with, especially in the Arctic where you had to make things work with what was on hand. But at times, she did have some doubts. She related a story about a flight to the north that had an overnight stop in Montreal where some of the technicians partied way too hard. (You can ask Ruth for the details of the flight north the next day, just to protect everyone’s identity).

Ruth considered her period at BIO as an exciting time for ocean research, with many opportunities for seagoing research. While it was exciting, it wasn’t always comfortable. On one trip abroad an old converted sealing ship, the *Karlson*, she had to keep a four hour watch on a gravimeter, lying on the floor, watching the dials blink their readings while the ship pitched and rolled. The person with the watch before her was Kathy Sullivan, who went on to be an astronaut with NASA. Ruth said that in retrospect, the watch keeping duty would have been great training for space travel.

In looking back at her career, Ruth said that she never had any great ambitions other than to work on interesting projects. While occasions to go to sea may be reduced today, there are still many other opportunities for interesting and productive research. We need people out doing projects, looking at questions and seeking answers. And that sentiment is one of the many reasons that Dr. Ruth Jackson is the 2019 Beluga Award recipient.

Public Gets Sneak Peek of 106-year-old CSS *Acadia's* Massive Restoration

***Acadia* survived Halifax Explosion, only Canadian vessel still afloat to serve in both First, Second World Wars**

Courtesy of Cassie Williams CBC News (Full Article available at <https://www.cbc.ca/news/canada/nova-scotia/acadia-sneek-peek-restoration-halifax-waterfront-1.5254805>)

The smell of Douglas fir, fresh paint and the tap, tap, tap of people working in what looks like a greenhouse on top of the 106-year-old CSS *Acadia* draws the curiosity of onlookers along Halifax's waterfront. The vessel is approaching the end of the first of three phases of work to restore the "Grand Old Lady" to her former glory. The project is no small task with dozens of people working for months to remove the rust and decay that has accumulated on the ship over the years.



The CSS *Acadia* was open to the public for the first time this season on Aug. 22 and 23 to allow people a sneak peek to see the work that's been done to the 1913 vessel. (Cassie Williams/CBC)

"It makes me feel immensely proud... because we're setting up *Acadia* to be in tip-top shape, as good as we can get her, true to her heritage nature and her original integrity," said Calum Ewing, museum director at the Maritime Museum of the Atlantic. He said the vessel will continue to bring the history of hydrographic and ocean sciences in Canada, and the life of seafarers, to the public. On Thursday and Friday (Aug. 22 and 23)

from 11 a.m. to 4 p.m., the ship will open to the public for the first time this season to allow people a sneak peek at what's been happening underneath the plastic cover the ship has been hiding under.



Calum Ewing is the museum director and has worked at the Maritime Museum of the Atlantic for more than 30 years. (Cassie Williams/CBC)

Ewing said the *Acadia* was built in England by some of the craftsmen who constructed the Titanic. The vessel was designed to map coastal areas and is thought to be the only Canadian ship still afloat today to have served in both the First World War, when it guarded Halifax harbour, and the Second World War. The ship also survived the blast of the Halifax Explosion in 1917. "The same carpenters and welders and shipbuilders that worked on Titanic built this vessel," said Ewing, noting the chief scientist's cabin looks like one of the first-class suites on the Titanic. Museum staff have big ambitions for the vessel, the largest artifact in its collection. Ewing said the new durable winter cover will extend the ship's season into the fall and spring. He said the work will allow for more programming, including becoming a floating classroom. "I'm really thrilled about the potential future use of *Acadia*," said Ewing.

Communities, Culture and Heritage Minister Leo Galvane said the restoration work is important, especially with the museum's plans to offer more youth programming aboard. "This is a wonderful, wonderful vessel for Nova Scotians and visitors to the province to come and see and experience, but more than that, it's to bring our youth here to talk about the work of the *Acadia* so that history, that heritage, that sense of pride that the *Acadia* brings out," he said.



CSS *Acadia* is thought to be the only Canadian ship still afloat today to have served in both the First and Second World Wars. (Cassie Williams/CBC)

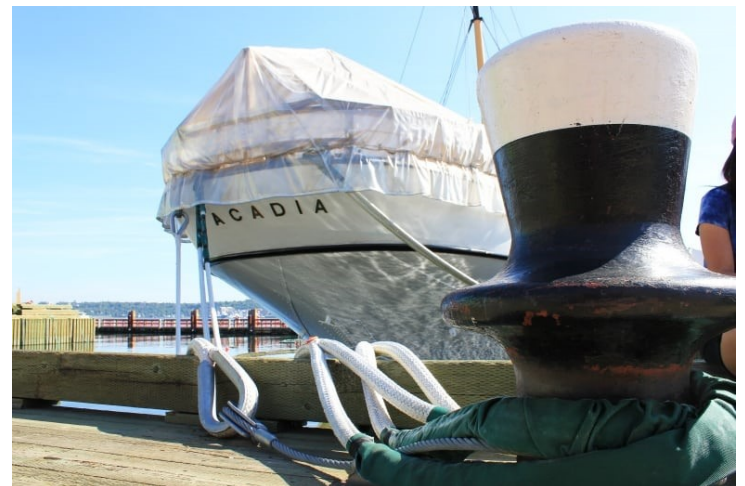
The Department of Transportation, which is involved in the project, said the cost for the first phase is on budget. When that stage is done, likely this fall, the cost will be released. The total cost of the three phases will be revealed when the project is complete. The last assessment of the *Acadia* for the Department of Transportation, in 2013, estimated restoration costs of at least \$1.4 million. However, that only took into account the visible degradation, not any potential damage below the water line or in other hidden nooks and crannies.

Museum boat builder Eamonn Doorly said once the work is finished, the museum may open the ship up as an event space. A lot of the work done so far in the first restoration phase is not obvious. Ewing said the prep work to get the steel deck ready for the Douglas fir top was no small feat. Before the honey-coloured planks were laid, the job involved scraping, patching, riveting and sealing. "It's an ideal wood to use for the decking," said Ewing. "It's very solid, yet not too heavy, and it stands up very well to the everyday use of a ship. And so it was traditionally used as decking and it was certainly the original decking that was used on *Acadia* when she was built."

Glavine said once the three phases of the work are complete, the ship will be protected for decades to come. The ship has also undergone sampling in 720 spots using ultrasonic blasts to measure the hull thickness, which gives the caretakers a baseline to compare hull degradation year over year. There's more work to be done. The two other phases of the work will include

replacing the electrical system, working on the boilers, installing Wi-Fi and taking the ship out of the water into drydock.

When the *Acadia* is finally put in drydock — the tender for which will go out in September — even more in-depth ultrasonic testing can be done, testing the hull thickness in 2,500 places. The museum has also installed a state-of-the-art bilge pump that will keep the interior from becoming flooded if it takes on water, as well as two new vacuum toilets for the comfort of visitors. The museum has also added all new mooring lines and hurricane hawsers to further protect the ship from getting jostled too much in storms.



Dozens of people have been working for months to remove the rust and decay that has accumulated on CSS *Acadia*.. (Cassie Williams/CBC)

BIO OA Efforts for the Restoration of the CSS *Acadia* Showing Results

The Oceans Association has been actively pushing for the provincial government to restore and maintain the CSS *Acadia*. We formed a working group in 2017 to work with other interested parties to increase awareness of the deplorable state of this ship and to consider options for the restoration of the historic vessel. We are pleased that the Department of Transportation and Infrastructure Renewal (DTIR) has taken these steps to begin the process of restoring the CSS *Acadia* which will allow the public to discover the history of this vessel once

all the repairs are completed. We will continue to monitor the process to ensure that the necessary work continues.

We have also committed to work with the Maritime Museum of the Atlantic to better utilize the photos of the *CSS Acadia* that are in the BIO photo archives.



New decking almost complete with only the caulking left to finish. (Andy Sherin photo)



Visitors entering for the tour. (Andy Sherin photo)



BOOK REVIEW

John F. Marra. 2019. Hot carbon: Carbon-14 and a revolution in science. Columbia University Press, New York, 264 p.

This most readable new book presents an exhaustive review of the radioisotope carbon-14 and its many applications in science. It begins by describing its discovery in 1940 during experiments at the Berkeley Radiation Laboratory and then outlines the research that led to the

understanding that carbon-14 occurs naturally around the world at low levels due to cosmic radiation bombarding nitrogen in the atmosphere. After reviewing developments in the analytical detection of carbon-14, it addresses the many practical applications to which carbon-14 has been applied over the past 60 years. These include dating historical artifacts, unraveling the chemistry of photosynthesis, understanding ocean circulation, measuring the productivity of the ocean and understanding climate change. This fascinating technical story is made very readable by including personal information on the principal players who conducted the research and describing what actually happened behind the scenes.

The author, John Marra, was a graduate student in the Department of Oceanography at Dalhousie University in the 1970s. He was in fact the last of Gordon Riley's many students and went on to spend most of his career studying marine productivity at the Lamont Doherty Earth Observatory of Columbia University and later at Brooklyn College. John includes in the text some of his own personal experiences working with carbon-14 that also contributes to the readability. He describes in considerable detail the controversy over the accuracy of carbon-14 in measuring ocean productivity, in which Gordon Riley played a central role, and how it was resolved. The book also makes reference to several BIO scientists and programs.

I highly recommend this book to anyone with an interest in radiochemistry, Earth processes, oceanography, climate change and human history. It is both enjoyable and informative to read. It contains numerous illustrations, including photographs of the principal players, notes, key scientific references and an index. The book is available as both hard copy and on line. A copy is now available in the BIO Library.

Don Gordon

(Editor's Note: While we do not have a recurring section on book reviews, readers are encouraged to submit reviews of any books they think may be of special interest to our members. Publication will be at the editor's discretion.)

Visit to the Shubie Canal Flume House

Members of the OA toured the recently reconstructed flume house that is part of the ongoing work by the Shubenacadie Canal Commission to develop Starr Park and the Dartmouth Marine Railway site. The Commission has been instrumental in preserving the historic features of the Shubenacadie Canal Waterway and providing access to the waterway for the education and the enjoyment of the public. More information on its activities and programs can be found at <https://www.shubenacadiecanal.ca/>.

Mike Hughes led the members on the tour, explaining details of the excavation of the site and the



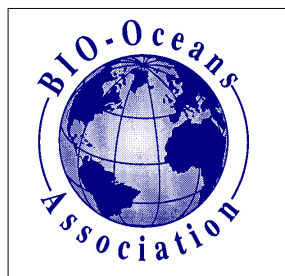
construction of the replica flume house. Considered an engineering marvel at the time of its original construction completed in 1861, the canal project quickly failed as the newly constructed railways proved to be a better alternative for transporting goods back and forth to the Bay of Fundy. The Commission has offered tours this summer on a limited basis, but hopes to be able to provide more tours in the coming years. After the tour, participants continued on to lunch at the Wooden Monkey, another fine feature of downtown Dartmouth. Thanks to Mike Hughes for organizing the tour.



The replica crown gears are exceptionally realistic, even at close viewing, but they are actually made of Styrofoam by AtlantexCreativeWorks, a local firm that specializes in sets for movie productions. (Andy Sherin photo)



Some of the OA members listening as Mike Hughes describes the workings of the flume house. (Andy Sherin photo)



From the President

It is with some trepidation that I formally take on the position of President after our Annual General Meeting. There are big

shoes to fill not the least of which is our new Past President Claudia Currie. Also I would like to thank Michael Murphy for taking over the editorship of the *Voiceline*. This is his first issue and he has done a spectacular job putting it together.

Our AGM left us with some significant vacancies in our Executive. The two most challenging are the social convenor position and the post of First Vice President / President Elect. I would like to thank Mike Hughes for his loyal tenure as social convenor and also for his knowledgeable tour of the Shubenacadie Marine Railway reconstruction in Dartmouth that was enjoyed by several members and friends. The tour is reported on in an article in this issue.

Another thank you is due to Melanie MacLean who has stepped down as chair of the Beluga Award Committee. She led the committee in discovering two remarkable Beluga Award recipients. A new committee chair will be announced soon.

Two items high on my agenda for my first year of tenure as President are first, filling the vacant positions on the Executive in particular convincing someone from the membership ranks to take on the position of First Vice President. I know there are many members with the skills and knowledge that could be exercised in the service of the Association. I would ask them to seriously consider stepping forward. Secondly, the number of Association members is stagnant and I would like to see this change in a positive direction during my time as President. I will be asking the Executive to give serious thought to strategies to address this issue. Ideas from members at large are encouraged and can be sent to me at my email address of asherin@ncf.ca

I had the opportunity to walk the deck of the CSS *Acadia* during the two days it was open to the public this summer (see the article in this issue). Minister Glavine has made good on his promise to the Association to have the ‘Grand Old Lady’ open to the public this summer even though it was only for a short time. There is much work still to be done. I did however have the opportunity to speak with museum staff and hope to arrange a meeting this fall between the museum, the Association and BIO management to discuss the collection of photos of the *Acadia* that Don Gordon has cataloged.

A new initiative will be to develop an ongoing relationship with the Titanic Society under the leader-

ship of Steve Blasco. I met with their President Dee Ryan Meister and developed some joint action items. I invite members to contact me with any ideas and concerns so the Executive can continue to serve you better.

Comings and Goings Rob Fensome (GSC-A)

Rob Fensome recently spent a week on the Orkney Islands, off northern Scotland. The trip was not specifically geological, but it is hard to avoid rocks on Orkney. The islands are composed almost exclusively of Devonian “Old Red Sandstone”, and rocks from the islands have given archaeological and historic sites on Orkney a distinctive consistency and continuity for over 5000 years. The oldest sites are now believed to have predated and possibly inspired more southerly megalithic structures such as Stonehenge. Rob is planning a “brown-bag” lunchtime presentation on Orkney sometime in the fall.



The Broch of Gurness, built of dry-wall sandstone blocks about 2000 years ago. Brochs were defensive structures and/or status symbols of the iron-age people that lived here. (Photo courtesy of Rob Fensome)



The Old Man of Hoy is probably the most famous sea stack in Great Britain and a favourite with rock climbers. (Photo courtesy of Rob Fensome)

Article courtesy of *Below the Waterline*, the staff newsletter of GSC-A, edited by Kate Jarrett.

Another Face of Iceland

(Charles Schafer)

Several days before my cruise ship (*Celebrity Silhouette*) docked at Reykjavik, it made a short one day visit to Akureyri, the unofficial northern capital of Iceland located on the north side of Iceland at about latitude 65° 40' N or about 100 km south of the Arctic Circle. Although this area of Iceland received its first settlers during the 9th century, by 1562 the only large buildings in Akureyri were shops and storehouses of Danish merchants. The first residential house was built in 1778, and the city received its municipal charter in 1786. Cod and herring fishing companies developed during the 1800's and larger fishing companies were established during the 20th century. By the start of the 21st century, Akureyri had become home to the headquarters of some of Iceland's largest fishing companies. The city itself is situated at the head of the 60 km-long Eyafjörður or "Island Fiord", in recognition of Hrisey Island about 35 km down the fiord from Akureyri. The island is the second largest in Iceland with a small community of about 150 inhabitants at its southern end and has become a popular venue for bird watchers and tourists.

According to my cruise ship's daily news flier, "It is difficult to find a place in Iceland where the Danish influence from the time when Iceland was under the Danish Crown is as visible as in Akureyri". Population growth of the municipality has been linked to surrounding districts that feature conditions well-suited for agriculture (i.e., deep valleys sheltered from cool sea breezes and a deep sheltered harbour). By 2017, the population of greater Akureyri stood at 18,400 inhabitants about 15% of the size of Reykjavik. Present day Akureyri boasts about 1600 university-level students that represent slightly less than half of the current Reykjavik University student population.

My wife and I joined the *Silhouette* in Southampton along with about 2600 tourists. When we tied up at Akureyri, about 400 of us navigated the sloping gangplank for our too short visit to the city. Akureyri offers a full range of venues for tourists such as whale watching, horse riding tours, and bus tours to hot springs and other tectonic features. Restaurants found throughout the city offer a full range of delights including sushi, T-bone steak along with a Subway and a unique Hamburger Factory restaurant that serves 15 varieties of square-shaped hamburgers for those in need of a "quick fix" lunch. The dock is located near a seaside parkland that winds along the coast to the city's modern airport. About a 3 km-long asphalt walking path through the park brought us to the old section of town adjacent to the airport and to the city's history museum. The first

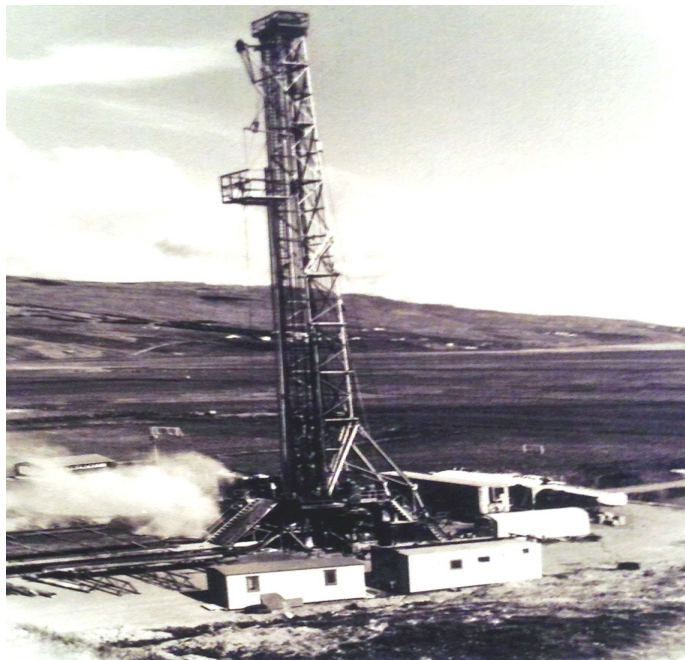
thing I noticed was that the park's grass was already 10 cm high in some parts that had not been mowed. A glance at the adjacent hillside revealed hardwood trees that already had a full growth of leaves. Along parts of the side banks of the park's walking path, patches of pussy willows had already gone to seed and other species of flowers (e.g., daffodils) were in full bloom. At first, I was puzzled by all of this advanced spring growth until I realized that, at this time of the year (middle May), the hours of sunshine on a clear day at Akureyri's latitude are considerably longer (16.5 hours on the day of our visit) than what Nova Scotia residents enjoy at latitude 45° N during this time of the year. The weather during our visit featured short intervals of light drizzle with temperatures in the 12-14 degrees C range. The Akureyri History Museum is located on a rather steep hillside near the centre of the old City. The steep walk up from the lower street to the museum entrance reminded me of my driveway in Waverley. The museum offers two floors that are packed with well-illustrated physical displays and posters that document the City's history and commercial development over the past several centuries. The visit was well-worth the \$15 CAD admission fee. We were back aboard the *Silhouette* by 3 PM and, by 8 PM the ship was steaming to our next port of call at Reykjavik and then on to the Shetland Islands. But that's another story.



Looking toward the steep flight of church steps from a main street in Akureyri. Note that the city streets and sidewalks are paved with blocks instead of asphalt (Schafer photo).



Parents of the Yule Lads. As the legend goes, the mom is a very bad, grim troll that eats misbehaving children (Schafer photo).



Drilling for geothermal water circa 1976 (Akureyri Museum photo). Throughout most Iceland cities, geothermal energy (steam and very hot water) supplies the energy for electricity generation and to heat private homes and public buildings.



Sorting the day's cod catch circa 1925 to 1935 (Akureyri Museum photo).



Last turf (sod) house in Akureyri, circa 1949 (Akureyri Museum photo).

Editor's Keyboard:

It is an honour to take on the role of editor of the *Voicepipe*. I want to thank President Andy Sherin, both for his long service as the previous editor and for his help in making the transition as smooth as possible. After putting this first edition together, I now have a much fuller appreciation of the work he has put in as the editor since 2010.

In this edition, we can see the breadth of the OA's activities, from the Beluga Award ceremony honouring Ruth Jackson, our work in pushing the provincial government to restore the CSS Acadia, and organizing so-

cial events like our tour of the flume house. Also included are articles on members' activities and book reviews. The make-up of this newsletter will always be in flux as we depend on our members to contribute ideas and articles. Some will want articles on scientific work at the Institute, others will want more general articles. Both will have a place here and I will only be able to judge the balance between these by getting your comments. So let me know what types of information you want to see here, or better yet, contribute ideas and articles. It is your newsletter, I just put the stories and photos into the format. *Michael Murphy*



ABOUT THE BIO-OCEANS ASSOCIATION

The Bedford Institute of Oceanography Oceans Association (BIO-OA) was established in 1998 to foster the continued fellowship of its members; to help preserve, in cooperation with the Institute's managers and staff, BIO's history and spirit; and to support

efforts to increase public understanding of the oceans and ocean science. Membership is open to all those who share our objectives. Most current members are present or past employees of BIO or of the federal departments of Environment, Fisheries and Oceans,

and Natural Resources (or their predecessors) located in the Halifax Regional Municipality. Membership is \$10.00 per year, \$40.00 for five years, or \$150.00 for a lifetime membership.

OFFICERS AND DIRECTORS

PRESIDENT	Andy Sherin	902-466-7965	asherin@ncf.ca
VICE-PRESIDENT / PRESIDENT-ELECT	Vacant		
VICE-PRESIDENT	Borden Chapman	902-865-8155	bcchapman@eastlink.ca
PAST PRESIDENT	Claudia Currie		
SECRETARY	Pierre Clement		psnhclement@gmail.com
TREASURER	Lori Collins	902-466-3791	lcollins@accesscable.net
DIRECTORS AT LARGE:	Gordon Fader	902-455-6100	gordon.fader@ns.sympatico.ca
	Mike Sinclair	902-431-3811	sinclairm@mar.dfo-mpo.gc.ca
	David McKeown	902-477-5887	davidmckeown@hfx.eastlink.ca
	Betty Sutherland	902-454-6557	jesuther@dal.ca
	Steve Blasco	902-464-1566	steveblasco222@gmail.com
	Don Gordon	902-469-2798	donald.gordon@dfo-mpo.gc.ca

COMMUNICATIONS: NEWSLETTER, PR, AND WEB SITE

NEWSLETTER EDITOR	Michael Murphy	902-826-7210	michaelmurphy@eastlink.ca
PR AND MEMBERSHIP	Jennifer Hackett	902-832-1158	bio.oceans@gmail.com
WEBMASTER	Jasmine Hayden	902-221-5613	jasmine.hayden@dfo-mpo.gc.ca

COMMITTEES / WORKING GROUPS: CHAIRS

BELUGA AWARD	Vacant		
EQUIPMENT ARCHIVES	David McKeown	902-477-5887	davidmckeown@hfx.eastlink.ca
	Philip Spencer	902-861-3651	philipspencer@bellaliant.net
GRAPHIC DESIGN	Randy King		
BIO ARCHIVES	Art Cosgrove	902-443-7945	
NSIS LIAISON	Don Gordon	902-469-2798	donald.gordon@dfo-mpo.gc.ca
OUTREACH	Peter Wells	902-237-0600	oceans2@ns.sympatico.ca
SACKVILLE HISTORY LIAISON	Charles Schafer	902-861-3145	charlestschafer@hotmail.com
EVENT COORDINATOR	Keith Manchester	902-861-3509	k.manchester@ns.sympatico.ca
TITANIC SOCIETY LIAISON	Vacant		
	Steve Blasco	902-464-1566	steveblasco222@gmail.com

PAST PRESIDENTS

Robert Reiniger (1998-2000), Dale Buckley (2000-02), David Nettlehip (2002-04), Donald Peer (2004-06), Betty Sutherland (2006-08 and 2010-11), Bob O'Boyle (2008-10), Paul Keizer (2011-13), Mike Hughes (2013-15), Michael Murphy (2015-17), Claudia Currie (2017-2018)

Association Mailing address: Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, NS B2Y 4A2.
VoicePipe mailing address: c/o Michael Murphy, 79 Amelinda Crescent, Boutiliers Point, NS B3Z 1X5.

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