



E&ES NEWS 2015

FOR ALUMNI & FRIENDS OF THE ACADIA DEPARTMENT OF
EARTH AND ENVIRONMENTAL SCIENCE



GREETINGS FROM THE HEAD OF DEPARTMENT

Hello all alumni and friends of the Earth and Environmental Science Department at Acadia University. 2015 was an exciting year for the

Department; we have 150 majors enrolled in our three programs and our spring 2016 field schools are expected to be filled to capacity. Our field schools (all four of them!) continue to be a key component of our undergraduate programs and the feedback from both graduates and employers is that they continue to be important in student development. The costs of travel and accommodation are funded by the fees the students pay but are subsidized by alumni donations through our field school funds (thank you!). These funds also help students with demonstrated financial need. We welcome your continued support of these essential courses, without which we would be unable to offer transformative field courses to our students.

We continue to push forward with upgrading and replacing both field and laboratory equipment. Hands-on experience remains an important part of our three programs and we are committed to providing

training in the use and application of analytical equipment. We are excited about the possible development of a new Canada Foundation for Innovation funded lab in chemical sediments in Huggins spearheaded by Peir Pufahl. Nelson O'Driscoll (CARE lab, Irving Centre) and Pam Frail (Rock Room) continue to run important "hands-on" labs, both in need of support. You will see more about lab upgrade opportunities in the newsletter.

We love hearing from you and encourage you to let us know where you are and what you have been up to. Our contact with alumni continues to be very important as it helps us guide our programs and also provides a perspective on the opportunities that our undergraduate programs provide, especially important in the current job market. Whether you are a practising Geoscientist or Environmental Professional or have pursued another career path we'd love to hear how those experiences affected you. Please feel free to send your contact info and a career or family update to Rob.Raeside@acadiau.ca

All the best in 2016!

Ian Spooner

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Nelson O'Driscoll and Dr. Allison Walker (Acadia Biology) received funding in October 2015 from the Arthur L. Irving Family Foundation to fund a study on mercury accumulation in lichens and fungi in the Maritimes.



Cliff Stanley, graduate student Steven Kramar, and honours student Tom Bagley attended the Int. Applied Geochemistry Symposium (IAGS) in Tuscon, Arizona, in April. Steve gave a presentation "Rocks Under Hanson Lake: Building A Chemostratigraphic Model To Aid Base Metal Exploration", for which he won runner up for "best oral student presentation"



Peir Pufahl is collaborating with Dr. Nicholas Tosca, Oxford to collaborate on a \$1M project focused on the evolution of life. This project will provide research experience for Acadia students on cycling of elements over time.



Sandra Barr was named the 2015 winner of the J. Willis Ambrose Medal, which is awarded by the Geological Association of Canada for sustained dedicated service to the Canadian earth science community.



Alice Cohen spent part of June 2015 in NWT conducting SSHRC Insight Development Grant research on "Managing Uncertainty: The role of ecosystem governance in Southern NWT".

Many of you, especially the environmental science graduates, will have fond memories of the Morton Centre. Over the years it has been the focus of research projects, retreats, field trips and summer work experiences. The Morton Centre has now been a part of the E&ES portfolio for 20 years! The last 5 years have seen many changes. Extensive renovations, trail development and partnerships with Bluenose Coastal Action Foundation, Michelin Canada and the ESST Program at Acadia have resulted in the MC being the centre for a number of environmental education opportunities aimed primarily at youth in the Lunenburg region.



Brook Nodding (ENVS 2000), Cate de Vreede (ENVS 2005), Alan Warner (Acadia ESST) and Ian Spooner have been coordinating the educational and research programs which have employed many Acadia students. Michelin has provided 6 years of support (we are entering into year 4) which ensures program stability and development. The newly renovated basement at the Morton Centre can sleep up to 8 people and now has a full kitchenette and toilet and shower. This space has primarily been used for students conducting research or working for BCAF. For more information about the Morton Centre or if you are considering supporting our programs at the MC, contact Ian at ees@acadiau.ca. Send along your pictures of the MC!

CALL FOR SUPPORT: LABS in E&ES

Throughout our newsletter you will see reference to our continued commitment to field and lab studies at Acadia. Along with the Rock Room and microscopy labs in Huggins and the environmental lab facilities run by Nelson O'Driscoll at the Irving Centre, Peir Pufahl is developing a Canadian Foundation for Innovation proposal for a lab in chemical sedimentology. All labs require ongoing support.



Dr. Peir Pufahl

Please consider supporting our labs through a donation. In-kind support is also gratefully accepted so if there is a piece of equipment you think may be useful to the department be sure to get in touch with us through email (ees@acadiau.ca) or through Facebook, just type in Earth and Environmental Science Acadia in the Facebook search bar.

GEO-HAPPENINGS

As usual, the start of the winter term coincided with the Atlantic Geoscience Colloquium, this year held at Mt. Allison University, during the first of many major snowfalls of last winter. In spite of the forecast, 12 students and all the Geology professors attended, 6 students gave papers or posters, and MSc student Dewey Dunnington won the Graham Williams award for best graduate student poster. At the end of term the Geology and Environmental Science students joined forces to celebrate the end of term with a pot-luck dinner in the Curling Club. Special recognition is given to Rikki Simpson, past president of the Fletcher Club, and winner of the Cameron Award for her meritorious efforts on behalf of the club.

Field school this year will be remembered as one of those landmark years – both for the size of the class (26 students) and the depth of the snow (over a metre where Sarah went through at Georgeville Beach!) Students



On the rhyolite at Arisaig; iceberg to aid cooling

Much excitement in the early fall term centred on fourth-year student David Maguire, whose French Toast Deluxe doughnut proposal reached the final stage of the Tim Horton's "Duelling Donuts" competition – look for it in the shops this spring!

Fall term provided opportunity for field trips to Walton, Rainy Cove, and across the bay to Parrsboro, as well as the annual AUGC, this year at St. Mary's University. Congratulations to Katie McCulloch, winner of the top prize, the Science Atlantic Award. Katie's paper was on plutonic rocks in the Cobequid Highlands – work arising from her summer position with the Nova Scotia Dept. of Natural Resources and her thesis, supervised by Sandra Barr.

We were very pleased to welcome Stu Venables back in the department – although his reason for crossing the country was for the 1999 football team reunion at Home-

coming, he stuck around another couple of days to tell classes about petroleum exploration and the regulatory side of fracking. The year closed out with a joint Fletcher Club/ESSA pot luck Christmas dinner, with about 70 people enjoying reminiscences of the year and a lot of fine cooking.



Rikki Simpson, Cameron Award recipient

measuring trends and plunges of folds on the Arisaig ignimbrite probably wished for a little of that Ordovician heat in the face of ice floes offshore. At least we didn't have to contend with 30 lobster boats, as the season was delayed 10 days by the ice!

At the national meeting of the Geological Association of Canada, Sandra Barr was awarded the J. Willis Ambrose medal, for "sustained dedicated service to the Canadian Earth Science community" – a well-deserved award indeed. She followed that up with the release of a popular format book on the Geology of Nova Scotia, which was launched with a book-signing event in the Irving Centre in May.



Katie McCulloch

WE NEED YOUR HELP!
Every year the E&ES Department provides assistance to students attending field school. With your support we can do more! Details are on the enclosed flyer.

DEPARTMENT NEWS

Keep up to date with the department by visiting the departmental website at <http://ees.acadiau.ca/>

ALUMNI SPOTLIGHT

If you have an item of interest, or any news of your activities (or those of your classmates), please let us know. We will try to incorporate as much as possible into future newsletters. Send details to Dr. Barr or Dr. Raeside at the Department of Earth and Environmental Science (sandra.barr@acadiau.ca, rob.raeside@acadiau.ca).

Alan Armitage dropped by in the summer for a visit with his wife and son. He has relocated from Vancouver to Fredericton, and enjoys the smaller city environment. He continues to work as a geological consultant with GeoVector, most recently on Cu-Au porphyries, epithermal Au and Ag deposits, uranium deposits in Saskatchewan and Central America.

Robert Bekkers (MSc 1993) dropped by the department while attending a conference at the KC Irving Centre. He is Project Manager, Environmental Engineering, with LVM-Maritime, based in Dartmouth, NS.

Peter Brown retired from Chevron after a 29-year career in international oil and gas exploration and development. He writes, "it's been good fun and we have a lot to be thankful for – certainly for the great Geology education I got at Acadia 1982-1986." He and Johanna were looking forward to a little slower pace in the beautiful Gulf Islands, offshore British Columbia.

Andy Daniels lives in Windsor, NS, and works worldwide. When we caught up with him he was in Albania heading up a feasibility study on a nickel laterite project. He writes, "I figured it out a long time ago that I was never the top student but I learned 'how to learn'

and over the past 30 years have spent my time learning at each step. I am one of these people who is passionate about what they do BUT have to be on a steep learning curve all the time or I get bored and move on".

Perry MacKinnon (BSc 1982) was encountered at the NSDNR Geology Matters conference in November 2014, not only doing his job as a consulting geologist but also selling products of his hobby, the carving of beautiful pieces from Cape Breton Island marble. Sandra Barr was ecstatic about the polar bear that she purchased. Perry is now based in North Sydney, NS.

Robert Moroz (MSc 1994) is senior geologist with AMEC, based in Saskatoon.

Randy Snow (MSc 1985) dropped in at the start of term, having just delivered his son to the Engineering program at Dalhousie. This was his first trip back east since he moved to Calgary in the 80s, where he is an explorationist with Canadian National Resources Limited in Calgary.

Paul Ténrière moved to Toronto in 2014, now working in the Toronto Stock Exchange. He likes being in the thick of the industry meeting people every day who run mining companies. His job is to help ensure the mining companies listed on TSX are following the disclosure rules and vetting new mining companies interested in listing on the TSX for the first time.

STAYING CONNECTED

We love to keep in touch with the graduates from our programs. Whether you are working in the environmental or geological industries, or have used your degree to leverage a career in another area, or have discovered a completely different area to work in, or have retired - we want to know what you are doing. So do drop us a note to ees@acadiau.ca (that message goes to Ian Spooner), and help us to update our files. As an added bonus, if you provide us with your email address, we will be able to provide you with our newsletters in a more timely manner than via Canada Post! Rest assured we will not distribute or sell your email address - we will use it exclusively for this type of communication.

ROCK ROOM

Many of you may have worked in the "rock room" in your time at Acadia - whether as a (minimally) paid assistant, or in preparation of thin sections for your "Strat Project." Our operator now is Pam Frail, who took some courses at Acadia before heading off into the gemmology world. She now massages rocks from far and wide into high quality thin and polished sections, to satisfy the never-ending appetites of students and professors.



WHERE ARE THEY NOW?

Each year we ask a graduate to write an article on his/her past and current activities since leaving Acadia. This year Terry Hennigar, who graduated from Acadia in 1965 provided a perspective.

My career spans 50 years of comprehensive experience in engineering, environmental science, hydrogeology, water resources management, and groundwater protection, including aquifer evaluation, high capacity well design and construction, aquifer analyses, groundwater supplies, and open loop geothermal systems.

It all began at Acadia in 1963 when Professor Rupert McNeill introduced a new course in the curriculum that dealt with groundwater. University Senate required at least two students to sign up for the course, and Phil Brown (my right winger on the hockey team) and I were the first, and only two students that year. What we didn't know at the time was that this course was the only course in Atlantic Canada that

focussed on society's very valuable groundwater resources. We also were not aware at the time that the Nova Scotia Dept. of Mines had just established a 'Groundwater Section' within the Minerals Division.

The province had recognized groundwater as a mineral resource, and hired a groundwater geologist as Chief of a new section to hire staff, and direct exploration to evaluate groundwater resources. The first field crew, summer of 1964, was in the Annapolis-Cornwallis valley, working out of the Acadia Geology department. Most of the work was sampling water wells for chemistry, plotting locations, assessing well logs (if available), and interpreting the geology of the aquifer materials.

I was hired as a full time 'Groundwater Geologist' in May 1965 and continued working on the Valley project with Dr. Peter Trescott, at the time a doctoral student from the University of Illinois. In 1966 I registered at Dalhousie for Master of Hydrogeology, which I completed in 1968 while working with the Department of Mines. The Groundwater Section was well equipped with a hydraulic rotary drill rig, geophysical instrumentation for seismic surveys and down-hole logging, a lab for grain size analyses of samples, and pumping test equipment. Our objectives were to determine the nature, distribution, hydraulic characteristics and potential yield of aquifers across the province. One of the more interesting, high profile projects was the fresh water study of Sable Island during the early 1970s when Mobil Oil discovered oil and gas on the island.

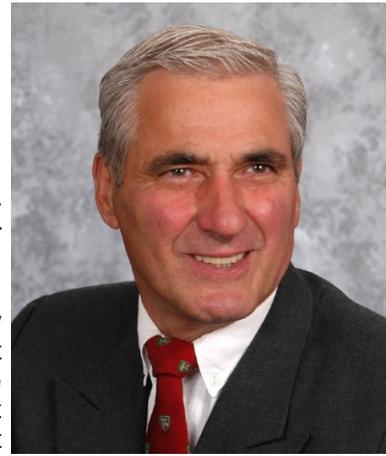
I also served as an adjunct Associate Professor at Dalhousie and the Technical University of NS for 22 years teaching graduate courses in hydrogeology, where I supervised thesis research by graduate students; conducted research in groundwater resource evaluation, management, and protection; and planned, organized, and participated in workshops, seminars, courses on hydrogeological field methods, and conferences. During the past 20 years I have carried out forensic scientific and engineering investigations for insurance companies and legal firms in the process of claim settlements and litigation related to water supply and contamination cases, and managed a number of projects utilizing geothermal energy.

The first, and largest, open-loop geothermal system I was involved with was to provide air conditioning for the new Irving Environmental Centre at Acadia in 2001. The source of water, at a constant 10°C, is from a Quaternary gravel aquifer at depths from 25 to 40 m. The extent of the aquifer is not well defined, but the objective was to locate the supply well as far south from the Minas Basin as possible to reduce the risk of salt water intrusion during pumping. A review of existing subsurface infrastructure on campus, and exploratory drilling indicated a suitable location for a supply well between Elliott Hall and Main Street. The system is very efficient, reducing air temperatures in the greenhouses and the main facility to a comfortable 20°C. I was also commissioned to design and oversee installation of the open-loop geothermal air-conditioning system for the new Biology building in 2006. The supply and return wells for the biology geothermal system are also located in the same aquifer system as those for the Irving system.

Project work for groundwater supplies has taken me across Canada and the USA, to China, Germany, Venezuela, Australia, and the Philippines. I have had a lot of fun, I still have fun, and find it difficult to retire, mainly because of the satisfaction from developing sustainable supplies of the most precious 'mineral' resource....groundwater! I am now approaching retirement as President and Principal Hydrogeologist & Engineer, Terry W. Hennigar WATER Consulting. Challenging work includes operating as an independent consultant with specialities in water and aquifer technical environmental resources. Projects that keep my attention include open-loop geothermal applications for both heating and cooling. Technological advances over the past 30 years have made the use of low gradient earth energy as a reliable and efficient method of heating and cooling in our climate. Heat pumps using the temperature gradient between ambient air and that of Mother earth's relatively constant temperature at given depths are gradually being applied as a 'green' and sustainable method of heating and/or cooling. Opportunities for consulting on such geothermal projects keep postponing retirement for me!

Acadia University has been good for me, and the good Lord has blessed me with good health and a supportive family. My wife Heather and I were married while at Acadia and she has been supporting me for more than 53 years. We have been blessed with four lovely children, and are enjoying six interesting and active grandchildren. Three of our grandchildren are at Acadia, one in Kinesiology, and plays for the Acadia Axemen hockey team, one in Environmental Geoscience, and interested in Hydrogeology, and the third in Kinesiology, specializing in Yoga as a certified instructor.

Terry Hennigar, P.Eng., FCSCE, FEC



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AWARDS TO SANDRA BARR AND ROB RAESIDE



Dean Peter Williams, with Sandra and Rob Sciences.

At the fall Council meeting of the Faculty of Science, Sandra Barr was recognised with the Faculty's Established Researcher award, in recognition of her many years of work and hundreds of publications on the geology of Atlantic Canada. The award is mandated to recognize "significant sustained research achievement" and Sandra's research in igneous petrology, tectonics, stratigraphy, paleontology, and geochronology for four decades in the Atlantic region practically defines that. She and her students and collaborators have deciphered the geology of the Atlantic Region in the context of modern plate tectonics and terranes, never shirking new and often controversial techniques and ideas, in a most exemplary fashion. Sandra is also highly regarded as a teacher in classes ranging from Introductory Geology to graduate level, and she is a major contributor to the organization of the geosciences in Canada and abroad, as conference organizer, journal editor, society president, and currently President-Elect of the Canadian Federation of Earth

At the same meeting, Rob Raeside was recognised with the Faculty's Service Award. Rob served as our Department Head for 18 years, even simultaneously serving as Acting Head of Chemistry for a year and sojourning as acting Dean of Science. As well as being a dedicated teacher and mentor, Rob has been by turns, Secretary and then President of Faculty Council, Chair of Senate, and has served on innumerable committees, often as Chair. In the larger Earth Science community, Rob has served in numerous roles in APICS/Science Atlantic, including five years as chair of the council, for the Atlantic Geoscience Society (AGS) as "perpetual secretary" and the Mineralogical Association of Canada (MAC) as short course series coordinator and editor since 1997. His service to AGS has been recognized as a recipient of the Distinguished Service Award and to the MAC by the Berry Medal. He was instrumental in re-energizing the moribund Council of Chairs of Canadian Earth Science Departments (CCCESD) and has served as its Secretary since 1998. In summary, Rob embodies the concept of service.

SANDRA BARR LAUNCHES BOOK ON "GEOLOGY OF NOVA SCOTIA"

Authors Sandra Barr and Martha Hickman Hild have collaborated on a popular book on the "Geology of Nova Scotia". Written in an informative, but non-technical style, with hundreds of colour photographs and maps, the book takes readers to 48 fascinating sites from northern Cape Breton to the tip of Cape Sable Island, and from the Precambrian Shield to the opening of the Atlantic. Every site is accessible and described with both the geologist and the interested naturalist in mind. Here Sandra and Martha are pictured at the signing launch in May. *Geology of Nova Scotia* is available from Boulder Publications, Amazon, and bookstores across Nova Scotia.



CAPE BRETON FIELD SCHOOL - 30 YEARS OF WATERFALLS

by Rob Raeside

Brenda retired after 30 years of cooking at the Gaelic College and reminded us that the Geology Senior Field School had been running out of that centre for 30 years also! Both Sandra and I were quite taken aback when we realised how long it had been. Although we didn't run it every year we must have hiked up Goose Cove Brook over 50 times now, and probably photographed the same five waterfalls every time! The expressions on students' faces never change - an initial awe when they see the water pouring off the cliff high above, then the realization we would have to climb around it.

In the early days, conditions were quite primitive - picnic tables in the cafeteria and a big bare dance floor with mirrors on the walls for mapping work. Although the residence buildings are still the same, they have been renovated several times, and all now have toilets and showers in the bedrooms, and washers (and sometimes driers) and wifi are available. Equally impressive are the changes to the landscape - when we started the field school, the highlands of Cape Breton had just experienced a spruce budworm outbreak, and the woodlands on the plateau had been recently logged to salvage the wood. As the years went by, the logging roads got washed out, and we can no longer access the streams from "on top". Likewise, many of the trails and old roads to the gypsum quarry have been lost, and in places it is easier to walk in the woods than on the roads, now overgrown with a thick mass of 3-foot high balsam fir. The coast-line of Kellys Mountain is no longer easily accessible as the road is questionable for rental vans, and much of the shore has been bought up for building cottages.



However, the local people are still very welcoming of us, and in some places have cut new hiking trails that we use. And of course the Gaelic College has continued to develop - so much so that we often overlap with wedding parties, which always make for interesting Saturday night events! One thing that hasn't changed is the enthusiasm our students bring to camp - although they do flag a bit toward the end, and that infamous all-nighter still happens for a few, students always comment on how much they learned, how much they finally understood for the first time, and, yes, how much they enjoyed the experience!

Waterfall 3 on Goose Cove Brook

Visiting Alumni Speakers: An important part of the E&ES experience

Visiting speakers continue to be an important part of the academic experience at Acadia. In 2015 two alumni returned to Acadia to talk about their post-graduate experiences. Stu Venables (B.Sc. Geology 1999) was back in Huggins discussing his work in oil and gas exploration and regulation. Stu worked for several years in the petroleum sector in Alberta before moving to Victoria to work with the BC Oil and Gas Regulatory Commission. Although it was the first morning back from study break, Stu spoke to a full class in the Clastic Rocks course about petroleum exploration, and to an even larger group at lunchtime (pizza may have helped!) on the regulatory side of fracking in exploration. Brent Murphy (B.Sc. Geology 1989) gave a well received presentation to over 50 environmental and geoscience students about his experiences obtaining social licence for the KSM copper property in northwestern British Columbia. Since 2010 Brent has been the V.P. Environmental Affairs for Seabridge Gold. We welcome talks from alumni on all aspects of earth and the environment, send an email to our speaker coordinator Sandra Barr sandra.barr@acadiau.ca if you are interested in contributing.



STUDENT NEWS



Fletcher Geology Club



The Fletcher Geology Club field trip headed to Parrsboro to view the amazing range of geology along the Cobequid-Chedabucto fault zone. Don Raeside gave a tour of Wassons Bluff with time travel included, and Clarkes Head where we saw new rock types every 50 m, and collected museum-quality calcite crystals. Below: the group at Cap d'Or where Alex Squires collected native copper.

On September 19, 17 students accompanied Rob Raeside on an excursion along the Noel Shore to view Carboniferous stratigraphy and structural geology of this coastline. Blessed by exceptionally low tides and hot, sunny weather, the group discovered natural petroleum leaks in gypsum, pyrolusite and dog-tooth calcite, tempestite breccia, Carboniferous and Triassic sand dunes, as well as the famous flora of the Horton Bluff Formation and stunning folds of Walton.



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the environmental science students association



Nelson O'Driscoll accompanied 9 students from Acadia to the 2015 Science Atlantic Meeting at St. Mary's University in Halifax. Jillian Bennett and Michael Brophy presented their honours research in oral presentations. In addition Erin Mann and Sara Klapstein presented their PhD research. The opening speaker was Aboriginal Elder Albert Marshall who spoke about the need for merging traditional knowledge with science.



Seventeen students completed the ENVS 2523 field course this spring, braving miserable weather to collect insects, sediment cores, tree samples, coastal invertebrates, and to hone their mapping skills. The sunshine did come through at the end of the week and it was much appreciated! Students had a great time despite the weather and practiced hands-on techniques in environmental science.