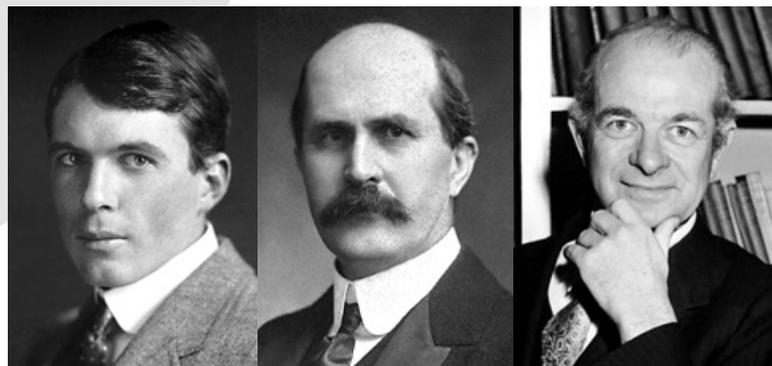


Roebling Medal.

Dr. Frank Hawthorne (Canada Research Chair in Crystallography and Mineralogy, Department of Geological Sciences) is the 2013 winner of the Roebling Medal, the highest award of the Mineralogical Society of America. Named for Colonel Washington A. Roebling (1837 - 1926) the medal is the most prestigious award in mineralogy in the world. **Dr. Norman Halden** (Dean, Clayton H. Riddell Faculty of Environment, Earth, and Resources) notes that previous recipients of the Roebling Medal awarded since 1937 include William Lawrence Bragg in 1948, who with his father William

Henry Bragg also received the Nobel Prize for their analysis of crystal structure using X-Rays, and Linus Carl Pauling in 1967 who also won the Nobel Prize for his work on chemical bonding. Dr. Hawthorne's work, using bond topology and valance matching, has provided a quantitative theoretical framework for mineral paragenesis and stability. The year 2014 has been designated as the International Year of Crystallography to mark the centenary of x-ray diffraction as well as the 400th anniversary of Kepler's observation in 1611 of the symmetrical form of ice crystals, which began the wider study of the role of symmetry in matter.



Pictured: (left) Dr. Frank Hawthorne. (inset) Roebling Medal. Image credit: Mineralogical Society of America: www.minsocam.org/Images/Roebling_Front.jpg (accessed April 16, 2014). (above, left to right) William Lawrence Bragg, William Henry Bragg and Linus Carl Pauling. Photo Credits: Nobel Media AB 2013. Nobelprize.org. (accessed April 16, 2014).

Awards and Honours.



Taras Zaporozan (M.Sc. in Geological Sciences candidate) and **Tim Hayward** (B.Sc. G. Sc. (Geophysics Honours), 4th year) of the Department of Geological Sciences won the 8th Annual Society for Exploration Geophysics Challenge Bowl before a large and enthusiastic audience at the Hilton Americas in September 2013.

The competition involved teams not only from Canada and the USA but also the University of Lagos, China University of Petroleum-Beijing, Makerere University, the University of Pisa, King Saud University, and Novosibirsk State University.

Pictured: (left to right) Peter Duncan (emcee), Tim Hayward and Taras Zaporozan. Photo Credit: Society for Exploration Geophysicists.

Parnali Dhar-Chowdhury (Natural Resources Institute, Ph.D. student) won the Sanofi Pasteur Award for Communicable Disease Epidemiology as the best of the more than 1,000 candidates for her paper entitled "**Understanding Dengue Transmission and Risk Factors through Ecohealth Approach in Bangladesh**". The Award, consisted of \$2,500 US in addition to reimbursement of travel, accommodation, and registration expenses for conference attendance. The 16th International Congress on Infectious Diseases (ICID) was held in Cape Town, South Africa in April 2014, by Dr. Michael Decker, Vice-President and Global Medical Expert at Sanofi Pasteur.

Pictured: (left to right) Dr. Michael Decker, Dr. Keith Klugman (President of ISID and director of the pneumococcal section of the Gates Foundation), awardees Parnali Dhar-Chowdhury and Dr. Dinh Nguyen Tran from Tokyo University, Japan and Dr. Eric Summers (ISID Program Director (extreme right)). Photo credit: Parnali Dhar-Chowdhury.



Remembering Dr. Klaus Hochheim.

Dr. Klaus Hochheim, a respected climatologist and research associate with the Centre for Earth Observation Science (CEOS) at the University of Manitoba, died tragically in a helicopter accident in the Canadian Arctic. He was 55 years of age.

Dr. Hochheim was aboard a Coast Guard helicopter over the Northwest Passage flying from the Canadian Research Icebreaker *CCGS Amundsen* when it crashed in September 2013. Two Coast Guard officers Pilot Daniel Dubé and *CCGS Amundsen* commander Marc Thibault were also killed in the accident.

Dr. Hochheim received his B.A. (Hons.) from the University of Winnipeg, followed by his MA/95 and PhD/03 from the University of Manitoba. He studied sea ice climatology and microwave and optical remote sensing in extreme conditions, having been part of projects and expeditions in both the Arctic and Antarctic. He worked extensively with ArcticNet, a Network of Centres of Excellence of Canada that brings together scientists and managers in the natural, human health, and social sciences with their partners from Inuit organizations, northern communities, federal and provincial agencies, and the private sector.

In February 2014 the theatre in the Nellie Cournoyea Arctic Research Facility was named the Dr. Klaus Hochheim Memorial Theatre. The dedication plaque unveiled at a private event reads: "*We dedicate this theatre to the memory of Dr. Klaus Hochheim (1958-2013) who lost his life while conducting arctic climate change research on behalf of the peoples of Manitoba, Canada and the World*".

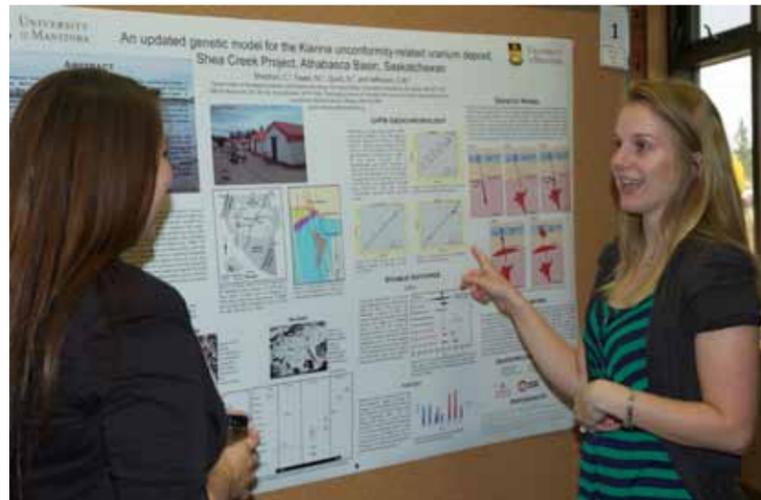
Artwork courtesy of Lauren Candlish.

Student Poster Competition.

To mark the 10th anniversary of the founding of the Clayton H. Riddell Faculty of Environment, Earth, and Resources, a student research poster competition was held during the University of Manitoba's 2013 Homecoming in September. The competition was open to undergraduate and graduate students and was judged by Dr. Digvir S. Jayas, (Vice-President (Research and International)), Dr. Danny Blair, (Principal of the Richardson College for the Environment/Associate Dean of Science, University of Winnipeg) and Dr. Christopher J. Adams (Rector, St. Paul's College).

First prizes were awarded to undergraduate student **Brandi Shabaga**, M.Sc. student **Caitlin Sheahan**, and Ph.D. student **Parnali Dhar Chowdhury** each receiving \$500. Runner-Ups were undergraduate student **Jemma Harrison**, M.Sc. student **Eranga Galappathth**, and Ph.D. student **Richard From** each receiving \$250. Honourable mentions for most innovative poster design were awarded to undergraduate student **Sarah Freeborn**, M.Sc. student **Oyekunle Ola**, and Ph.D. student **Olivier Gagne**. The Riddell Faculty wishes to particularly acknowledge **Dr. Janna Wilson** (Department of Environment and Geography) for organizing the event.

Pictured right: Caitlin Sheahan, with her first place M.Sc. poster. Pictured below: (left to right): Brandi Shabaga, Sarah Freeborn, Eranga Galappathth, Oyekunle Ola, Parnali Dhar Chowdhury, Richard From, Olivier Gagne, and Dr. Mary Benbow. Photo credits: Jason Jorgenson.



Verna Kirkness Science Education.

The Faculty was delighted to host four students June 3rd to 8th 2013 as part of a Verna J. Kirkness Education Foundation initiative. The Foundation offers scholarships to Aboriginal students in Grade 11 to spend a week at a university working with research scientists in their laboratories. Our visiting students were from Fisher River and Peguis First Nation and they were particularly interested in understanding contaminants in the environment. To this end, the students spent their week in Winnipeg working with **Drs. Norman Halden, Fei Wang, and Mark Hanson**, along with their technicians and students, to analyze fish, water, and soil brought from their communities.

With Dr. Halden and Ph.D. student **Tracey Loewen** (who also toured the students around and helped organize their week), the students processed their fish by first removing the otoliths, aka the ear bone. The otoliths were then analyzed by LA-ICP-MS (laser ablation – inductively coupled plasma mass spectrometry) in Dr. Halden's lab. This process allowed the students to see the exposure to various trace elements of the fish over their lifespan from their aquatic environment. Tracey found that, *"We watched the students change from a shy, quiet group to one that expressed excitement and interest as the week progressed. The student group enjoyed the hands-on aspects of the research!"*

In Dr. Wang's Ultra-Clean Trace Elements Laboratory (UCTEL), the four students analyzed trace element concentrations in water samples (tap water and lake water collected from

their own communities) under the guidance of Dr. Wang and technician **Debbie Armstrong**. As the students had some energy drinks with them that day, the drinks were thrown into the mix as well. The analysis was performed with an ultra-sensitive ICP-MS and an atomic fluorescence spectrometer. The elements analyzed included aluminum, arsenic, cadmium, lead, mercury, phosphorus, and uranium. Afterwards, the group sat down to discuss the meaning and implications of their data. Dr. Wang says, *"It was amazing to see their facial expressions when they looked at each other in the cleanroom suits. In that I sensed a mix of amusement, disbelief, and pride."*

Finally, in Dr. Hanson's lab, they looked at changes in earthworm behaviour upon exposure to soil collected from their communities. With the help of summer student **Daniel Seburn**, the students set up a test by which worms were given the choice to move into either soil collected by the students, or fresh topsoil. After leaving the worms alone for a bit, their locations were determined, and their preferences assessed. In this case, the worms seemed to prefer being in all soils equally, implying that the samples from the two communities didn't contain anything that the worms found too distasteful. Dr. Hanson stated, *"It was great to see them realize that we have all sorts of tools at our disposal to understand the state of our environment, including the lowly earthworm!"*

All in all, the students were exposed to a diverse array of research environments and approaches during their week with the Faculty. We look forward to hosting new students in the future, and perhaps seeing some of these students in our classes in the coming years.

Pictured: Derek Dumas, Student Participant, Cranberry Portage, MB and Verna J. Kirkness.



From the Arctic to the Galápagos.

An expedition to the Galápagos Islands originated from the Arctic Ocean, at least for **Dr. Feiyue Wang**, (CEOS and the Department of Environment and Geography) and revealed a new mechanism for the oxidation of mercury in the atmosphere.

A global contaminant, mercury is transported in the air primarily as elemental mercury, a relatively inert gas. However, once oxidized, it becomes much more reactive and can readily end up in the ocean, where it is taken up and enriched in fish and marine mammals. How mercury is oxidized in the air is thus key to understanding the risk of mercury in marine ecosystems and to humans who consume seafood. The current wisdom holds that such oxidation occurs primarily by reactive bromine, which is produced from seawater bromide in the presence of sunlight. Extensive studies, including those by Dr. Wang's group, have shown that is the case in the Arctic, where the reactions are further enhanced by sea ice and snow.

In June 2009, the Canadian Research Icebreaker *CCGS Amundsen* took a "detour" to the Beaufort Sea via the Panama Canal. Since bromine concentrations in tropical air are extremely low, one would not expect much oxidation of mercury. Surprisingly, the instrument on board the ship detected very low levels of elemental mercury in the air when the ship was transiting through the tropical ocean.

While on sabbatical at Harvard University in 2010, Dr. Wang considered these oxidation pathways and was invited to join a Spanish-led research campaign on the Galápagos Islands. This unique location provided a remarkable contrast to arctic environments in which to test solutions to this paradox. Dr. Wang, his group members **Debbie Armstrong** and **Marcos Lemes**, and Spanish collaborators led by Dr. Alfonso Saiz-Lopez, spent a total of 7 months in 2011 in the Galápagos Islands, first in Isla Isabela and then Isla San Cristobal. They successfully obtained the first time series of real-time mercury chemistry in the tropical air. And sure enough, they saw elemental mercury being consistently oxidized to reactive mercury in early afternoons, despite undetectable levels of bromine. These findings suggest that the atmospheric transport of mercury to the oceans, and the subsequent health risk, could be much higher than we previous thought, particularly in tropical oceans.

This research was recently published in the journal *Atmospheric Chemistry and Physics*. Dr. Wang's research on mercury has contributed to the science leading to the UNEP's legally binding Minamata Convention on Mercury. Canada signed on the Convention on October 10, 2013.

Dr. Wang's Galápagos research was supported in part by the Clayton H. Riddell Endowment Fund and the University of Manitoba Research Grant Program.

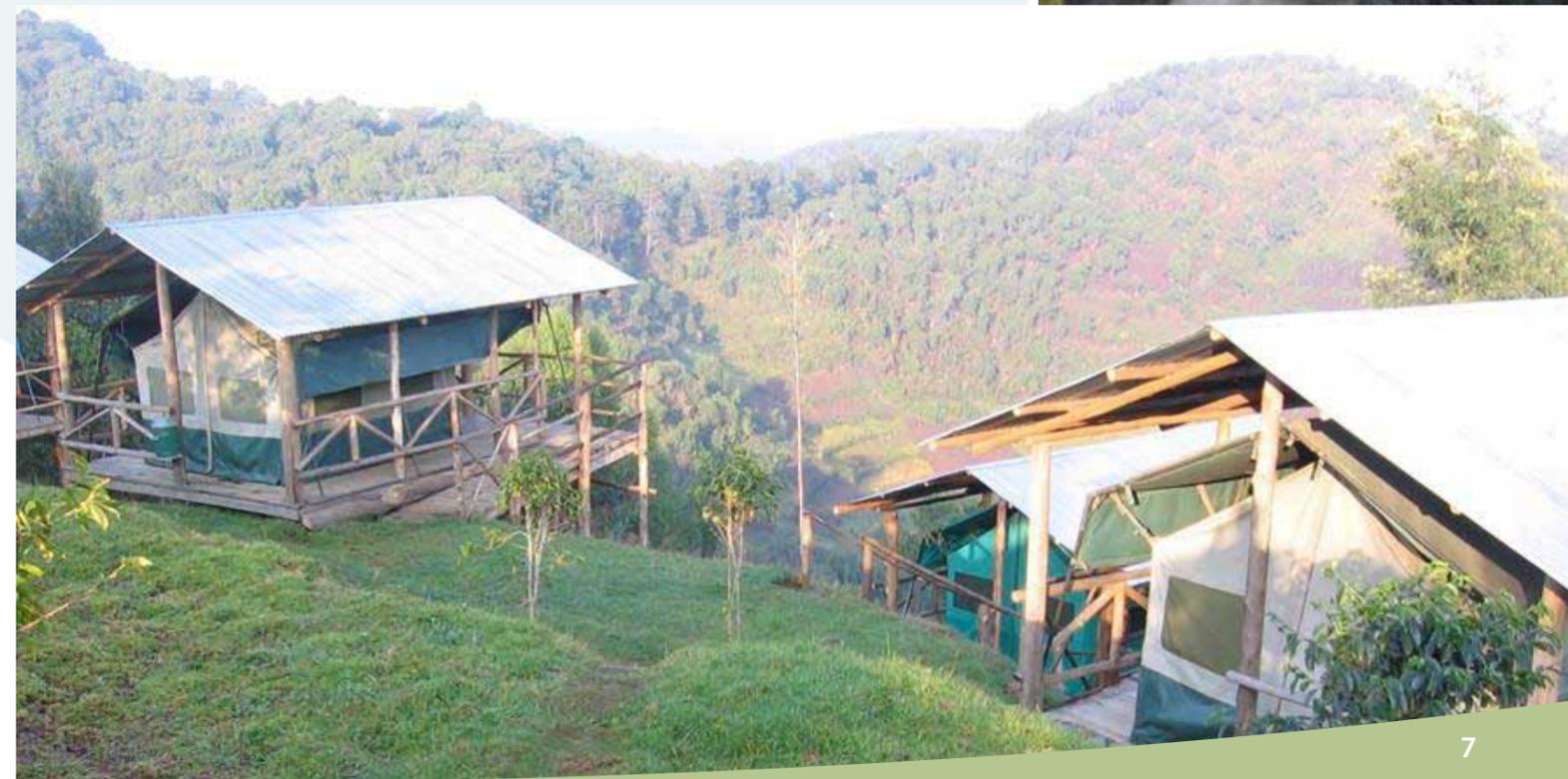
Pictured (from top to bottom) Blue-footed boobies in Isla Isabela; Galápagos giant tortoise in Isla San Cristobal; Shirt exchange ceremony at the end of the study; Galápagos marine iguana in Isla San Cristobal. Photo credits: Feiyue Wang.

Video Releases.

The docu/drama "*Putul Kotha*" or "*The Tale of Green Dreams*" was screened in November, 2013. The video, a joint production of **Dr. Emdad Haque** (Natural Resources Institute (NRI)) and his student **Mohammad Rony**, builds on experiential knowledge among students at the NRI about poor families in Bangladesh. These families attempt to turn around their lives by borrowing small amounts of capital from a non-governmental organization even though they have no collateral assets. With the support from the Clayton H. Riddell Endowment Fund and the Canadian International Development Agency (CIDA) this is a story about how people at the grass-roots level can build their dreams with institutional support. The story and screenplay have been written by Mohammad Rony based on student research outcomes and his first hand observation in the field in Bangladesh. The director of photography of this video is Ryan Klatt who has previously been engaged in productions for NRI.

The documentary "*Uganda: Sustainable Tourism*" aired on Prairie Public Television in September 2013, and featured **Dr. Michael Campbell's** (Acting Head, Department of Environment & Geography, and Director, Natural Resources Institute (NRI)) six-year CIDA funded project, "*Enhancing Rural Livelihoods in Uganda through Sustainable Community Tourism*". The 30-minute documentary chronicled how the project helped three Ugandan communities build their tourism industry while also protecting the abundant wildlife and ecologically sensitive scenery. Dr. Campbell worked with Makerere University graduate students and local communities to develop leadership and human resource capacity at the university level to provide sustained training and integration at all levels of the tourism industry. As of December 2012, the tented camp that was established as part of the project, had received over 380 visitors in the year and earned over \$16,000 US. The Kibla group had purchased a large parcel of land on the Dura Swamp for expansion of their apiary and tree nursery.

Pictured right: "*Obia*" (troublemaker) a black back in the Bitakura Group nearing maturity. Pictured below: Ruhija Gorilla Friends Tented Camp. Photo credits: Dr. Michael Campbell.



Teaching Social Justice through Community Research.

For decades critical human geographers have been doing research in the communities in which they live and work. While community based research and community engagement are buzzwords in contemporary higher education and research-funding discourses, the sentiment of scholars being in the world ties us to a long lineage of teaching and research influenced by ideas of social justice. The geographer's unique perspective on issues of spatial justice are particularly useful in an increasingly neoliberalized and polarized world.

Over the last three years, the Social Geography of the Environment course led by **Dr. Ann Marie Murnaghan** (Department of Environment and Geography) has collaborated with Food Matters Manitoba to bring the social geographer's skills in census analysis and the environmentalist's interest in supporting and growing local food

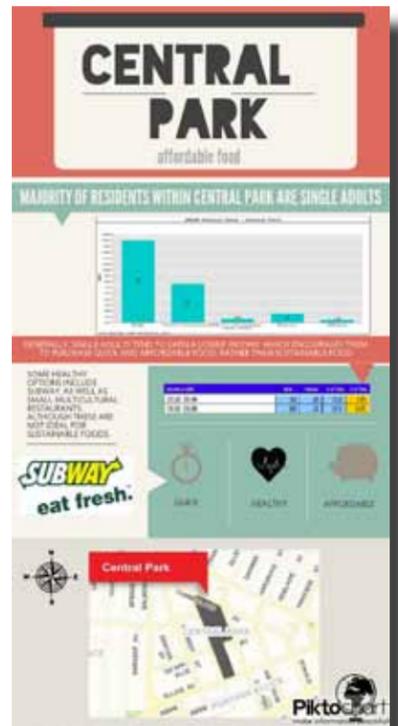
systems. With vital support from **Anna Weier** (M. Environment, 2008) and Stefan Epp-Koop, the class conducted fieldwork in grocery stores to compare the costs of nutritious food with the needs of the community residents. This year the project has expanded to produce resource brochures supporting local food systems, and analyses of the National Household Survey in Winnipeg supporting FMM's Downtown Food Assessment, led by Julie Rempel.

In the Urban Geography course, Dr. Murnaghan and her class have conducted safety audits and provided results to the City of Winnipeg and Campus Security. Students have highlighted issues and concerns about geographies of fear, and taken critical perspectives on crime prevention through environmental design (CPTED). This year, the group is partnering with Jackie Avent and Anders Swanson of Active and Safe Routes to School, a

project of Green Action Centre, to help with data collection and analysis finding baselines and community needs in Fort Richmond, Wildwood, and the West End. The class's reports will influence policy makers to help parents, children, and communities become more active in their transportation and commuting methods.

The City of Winnipeg is an excellent laboratory for social and urban geographies; it's a historical place, with a palpable legacy of struggles for social justice. In the age of Wikipedia, Dr. Murnaghan thinks teaching students how to apply their knowledge and critique the world becomes our real challenge.

Pictured below: Samples of some of the resource brochures made by the students.



Alumni Profile – Dr. Alexis Knispel Kanu.

Dr. Alexis Knispel Kanu (Ph.D. in Geography, 2010) is the executive director of the Lake Winnipeg Foundation (LWF), an environmental non-governmental organization. Guided by its Science Advisory Council, LWF seeks collaborative solutions to ensure a clean, healthy Lake Winnipeg and watershed now and for future generations. As executive director, Alexis is spearheading the development

of LWF's Lake Winnipeg Health Plan, a science-based roadmap of actions and solutions to improve the health of Lake Winnipeg.

"The exciting challenge ahead of us is to bring together diverse stakeholders and build a sense of collective responsibility. This isn't just an environmental issue – it's an economic and social issue as well. All Manitobans must be engaged in the solutions," Alexis says.

Alexis' education in environment and geography prepared her well for the challenge ahead. *"I learned to consider diverse voices and think critically about the issues we face today,"* she says.

"My education fed my passion for building healthy connections between people and the environment."

Alexis' doctoral research examined the ecology and landscape biology of genetically modified canola plants that had escaped from cultivated fields. With the guidance of her advisor, **Dr. Stéphane McLachlan** (Department of Environment and Geography), Alexis was able to broaden the scope of her learning at the University of Manitoba to include volunteer work with rural communities in southern Manitoba. As part of the teaching team for the travel study course, *"Living Rural Communities and Environments,"* Alexis learned much about the value and vibrancy of Manitoba's communities.

To learn more about the work of the Lake Winnipeg Foundation, visit: www.lakewinnipegfoundation.org

Pictured left: Dr. Knispel Kanu. Photo credit: Joe Goertz Photography. Pictured right Grindstone and background Grand Beach. Photo Credits: Mutch Photography.



GAC-MAC Winnipeg 2013

“At the Centre of the Continent”.

The Joint Annual Meeting of the Geological Association of Canada and the Mineralogical Association of Canada returned to the Prairies on May 22 to 24, 2013. Over 740 delegates gathered in Winnipeg at the Convention Centre to share their latest research findings, to discuss topical issues, and to catch up with colleagues and friends.

The diverse technical program offered four symposia and 30 special and general sessions spanning the gamut of Earth science research and teaching in Canada and internationally. Some of the highlights include the plenary addresses by Paul Hoffman (Harvard University, University of Victoria) on *The Origin of Laurentia* and by Harold Gibson (Laurentian University) on *The Science and the Discovery of Volcanogenic Massive Sulphide Deposits*. The Exhibits Hall was a popular venue in the afternoons as delegates gathered to view the poster presentations, visit the exhibit booths, and chat with colleagues and friends over a drink or two. Beyond the main meeting, the technical program included short courses on *Uranium: Cradle to Grave and Petrography of Layered Mafic Intrusions*, and field trips to the Rice Lake mine trend, VMS and

gold deposits at Snow Lake, Bird River greenstone belt, Flin Flon mining district, Ordovician-Silurian boundary interval in the Williston Basin, and the Manitoba Legislative Building.

The Outreach Program featured the EdGEO teacher workshop and one-day field trip to southwestern Manitoba, which attracted over 40 participants. The special session on First Nations Geoscience brought together First Nations elders and professional Earth science educators and teachers to share their perspectives on Earth science outreach and teaching programs. The well-attended Geoscience in Our Lives public presentation was given by **Dr. Jim Teller** (University of Manitoba) on *The Drowning and Draining of Manitoba: From Lake Agassiz to Today*.

Special events at Winnipeg 2013 featured the Prairie Roundup, where participants rode the Prairie Dog Central Railway (complete with a train hold-up) to Grosse Isle for a prairie-style BBQ, and the Wind-up event at the Forks National Historic Site, where delegates and a much-relieved Organizing Committee relaxed and dined al fresco near the confluence of the Assiniboine and Red Rivers.



Pictured: (above) Hold-up of the Prairie Dog Central train and capture of four “desperados” during the Prairie Roundup event. From left to right: Richard Wardle, Alan Galley, Alan Bailes, **Norman Halden**. Photo credit: Jim Teller

Pictured: (below) The Geoscience in Our Lives public presentation given by **Jim Teller** (University of Manitoba) on *The Drowning and Draining of Manitoba: From Lake Agassiz to Today*. The presentation was sponsored by the Clayton H. Riddell Faculty of Environment, Earth, and Resources. Photo credit: Rob Barrow.

Pictured: (inset) **Jeff Young** (left) thanking Jim Teller for his presentation on *The Drowning and Draining of Manitoba: From Lake Agassiz to Today*. Photo credit: Rob Barrow.



Society of Canadian Ornithologists.

The Clayton H. Riddell Faculty of Environment, Earth, and Resources, and the University of Manitoba, were proud to host and sponsor the 2013 Annual Meeting of the Society of Canadian Ornithologists from August 12-14, 2013. The theme, “*Should we conserve endangered species or endangered spaces?*” was timely, given Manitoba Conservation’s announcement in April that it will introduce North America’s first legislation to protect endangered ecosystems. The plenary speakers addressed this theme from the perspectives of provincial governments (Jim Duncan), federal governments (Gilles Seutin), and non-governmental organizations (Debbie Badzinski), providing broad and interdisciplinary perspectives on the conservation of birds.

In association with Bird Studies Canada, there was also a popular and widely attended special session on citizen science and its role in avian conservation and research. Again, this session was timely, as Bird Studies Canada is currently overseeing Manitoba’s first Breeding Bird Atlas (MBBA), which will assess and describe the distributions of birds across Manitoba. Programs such as the MBBA are dependent on the contributions of skilled volunteers. Several MBBA contributors attended the conference, and the MBBA lead scientist, **Christian Artuso** (Ph.D. in Geography, 2009) of Bird Studies Canada, presented on the unique challenges faced in conducting broad-scaled, volunteer-based studies in remote areas.

This year’s conference reinforced the fact that research in the field of ornithology is extremely strong in Canada. Participants heard from an outstanding selection of speakers on a range

of topics, from genetic differentiation of sapsuckers to avian adaptations to climate change in mountain ecosystems. Because the quality of the talks was so high, competition for the student awards was fierce. Ultimately, Stephanie LaZerte of the University of Northern British Columbia was awarded first place in student presentations for her research on urban acoustics; second place was awarded to Alana Westwood of Dalhousie University for her presentation on the occurrence of threatened bird species in Nova Scotia’s biosphere reserve; first place for student posters was awarded to Rakesh Mistry of Wilfrid Laurier University for his research on the effects of parasites on migration.

The conference also included evening and field activities, taking advantage of Manitoba’s marvelous August weather. Naturalist and award-winning environmental educator John Acorn sang numerous ornithology-related original songs during the welcome reception. The banquet was held at Fort Whyte Alive, where participants enjoyed hiking, and observing the captive burrowing owl population, before an excellent meal. Finally, the conference was concluded with a “*Birding and Barbeque*” event at Oak Hammock Marsh. Overall, the 2013 SCO conference was a great success in bringing together Canadian ornithologists, and in raising their awareness of the roles of Manitoba’s natural ecosystems in conserving birds in Canada.

Photo: A wet Manitoba meadow.

Photo credit: **David Bruinsma** (M.N.R.M. 2012).



Picturing the Planet.

As a regular feature "*Picturing the Planet*" bring inspiring and informative images taken by our students, staff, and faculty.

At 2,400 meters above the sea level, the Izaña Atmospheric Observatory Station (Tenerife, Spain) is one of the premier locations on Earth for studying the transport and reactions of aerosols and trace gases in the "*free troposphere*" and their exchange with the air below. At the far left of the photo is a real-time mercury instrument operated by

Dr. Feiyue Wang, (CEOS and the Department of Environment and Geography). Seventeen kilometers west from the station is the volcanic Mount Teide (3,718 meters, shown as the background in the right), the highest mountain in all the islands of the Atlantic Ocean (Photo credit: Feiyue Wang).



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