



spring 2017 Renew

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UNIVERSITY OF ALBERTA
DEPARTMENT OF
RENEWABLE RESOURCES



GROWTH & renewal

A message from the Chair

As spring arrives in Alberta, we are focused on growth and renewal in the Department of Renewable Resources.

Most recently we hosted a site visit for the accreditation of our undergraduate Forestry programs. Our program left a positive impression on the reviewers, who appreciated seeing the quality and diversity of the educational and experiential opportunities we offer to our students. The reviewers also heard complimentary reviews of our program from both employers of our graduates, and alumni themselves.

We have recently hired Dr. Carol Frost, a Conservation Biologist with expertise in Entomology, as a new Assistant Professor. A University of Alberta graduate, she is currently completing her Post-Doctoral Fellowship in Sweden and will be joining us in January 2018. In addition, we are advertising for a new Assistant Professor in Silviculture with candidate seminars to be scheduled for September, which you are welcome to attend.

I would like to say a warm thank-you to Dr. John Spence who will be retiring at the end of June after a long and productive career. During his 10 years as Chair of the Department he steered us through a period of unprecedented growth and change. His research achievements, impacts on students through teaching, and his success in connecting us with a diverse group of external partners will be sorely missed.

I hope you enjoy reading the stories in this issue of Renew, which profile just a few of our many achievements and the impact we are having on the sectors that support us.

Ellen Macdonald

Chair, Department of Renewable Resources



Fisheries researchers suggest promoting resiliency, not a single species, in face of climate change

A major review recently published in the journal *Fisheries* suggests that climate change will produce significant changes to western Canada's freshwater fish populations, and the best solution is the adoption of an ecosystem-based approach.

Mark Poesch, the lead author on the study, says that a "complicated and diverse set of issues are predicted to unfold" with climate change.

Poesch notes that, historically, fisheries have been managed species by species, but this approach simply will not work in the future.

"We need to build resiliency within the ecosystem, as opposed to focusing on the needs of one species," said Poesch.

The review suggests that, moving forward, fisheries managers should identify opportunities to create biodiverse systems. This approach is believed to maximize the ability of the ecosystem to withstand future stresses, including those resulting from climate change.

An ecosystem-based approach is already being adopted for the Milk River Watershed of southern Alberta, which is home to an assemblage of fish species that is unique in Canada. The project aims to conserve a variety of species including the Western Silvery Minnow (Endangered), Rocky Mountain Sculpin (Threatened) and Mountain Sucker (Threatened).





New technologies changing the face of genetic selection in forestry

A recent \$5.6 million grant aims to identify key tree genetics that will help forests become more resilient in the face of climate change and more resistant to pest outbreaks. Using advanced genetic techniques, the landmark study aims to achieve in 10 years what has historically taken 30 years.

Forest genetics has long been an important field of research in forestry, helping managers select for traits like rapid growth and superior wood density. The forests of the future, however, will also need to be resilient against the effects of climate change; managers no longer have the luxury of focusing on a select few traits, as the importance of drought- and pest-resistance increases.

“As we consider the role of climate change, maintaining a healthy forest is just as important as growing a bigger forest,” said Barb Thomas, the project leader.

Genetic selection trials lasting 30 years were once necessary to identify key genetic traits in Alberta’s slow-growing trees, but recent advances in the field of genomics are bringing formerly impractical approaches into the mainstream. These new techniques, combined with modelling of past data from 30-year-old genetic selection trials, allow scientists to produce results in a third of the time.

The project, led by Barb Thomas and co-led by Nadir Erbilgin and Yousry El-Kassaby, is a collaborative effort between scientists from the University of Alberta, University of British Columbia, University of Calgary and Oklahoma University. It is supported by funding from Genome Canada, Genome Alberta, Genome BC, the University of Alberta, the University of Calgary and Alberta Innovates BioSolutions, and in-kind contributions from the Government of Alberta, Blue Ridge Lumber and Weyerhaeuser.

New fire scientist brings leadership and applied insight

There's a new Assistant Professor of Wildland Fire in the Department of Renewable Resources and she's determined to make an impact on students and managers through her teaching and research.

Jen Beverly brings a diverse perspective to the academic community. A fire scientist by training, she recently took an opportunity to work for industry and expand her leadership skills. Now she's returned to research with a broader perspective and significant enthusiasm.

Beverly's research will focus on the interactions between people, ecosystems, and wildfire risk, building on her work using predictive modeling to estimate the probability of fire initiation. It's a topic that has drawn far more attention since the massive Fort McMurray wildfire in 2016.

"My focus is on offering managers insights and solutions to do their jobs in the best way possible," said Beverly.

Teaching will also be a core focus for Beverly. She will draw on her recent experience with innovative approaches to teaching and student mentorship, including online and adult learning courses.

"I'm excited to grow a new generation of fire researchers and support these students to make



significant contributions in their work, wherever they go," stated Beverly.

She has practical experience as a Helitack Crew Leader, Initial Attack Fire Boss and Incident Commander. She also worked as a researcher with the Canadian Forest Service and most recently served as director of the department's course-based Masters Program. She started her position as an Assistant Professor in January of 2017 and is a collaborator in the newly renamed Canadian Partnership for Wildland Fire Science.



Innovations in teaching plant identification prove a picture is worth a thousand words



A recent McCalla Professorship awarded to Simon Landhäusser is helping his team modernize the way plant identification is taught while encouraging students to be more adaptive in their learning.

Traditional approaches to plant identification have focused on memorizing specific plant characteristics – like branch patterns, leaf shapes and flower structures. Pressed plants were viewed by students in the lab during the winter months, when fresh plant specimens were not available and opportunities for field trips were limited. But instructors haven't been happy with their students' ability to adapt their knowledge and apply it to the challenge of field identification.

“Part of our goal is to move students away from purely memorizing traits, to more adaptive skill sets, better equipping them for future employment,” said Fran Leishman, the lead coordinator for the project.

The solution? Landhäusser and his team decided to bring the field into the lab with the goal of creating a more realistic environment for learning plant identification. Photographs of plants in their natural environment are complemented by close-up photos. With this new approach, students learn key plant traits, gain a more applied perspective of what the plants look like in the field, and have the information they need to use botanical keys for identification.

Detailed photographic composites have been prepared for 160 plant species so far, with plans to inventory up to 300 plants. In the future, this digital resource could potentially be integrated into an online or mobile application, further broadening its impact.

The McCalla Professorship is an annual award given to University of Alberta professors who are focused on improving the learning environment for students.



Spence leaves **legacy** of **perspective**, **systems thinking**, as he shifts to retirement

His journey began in small-town Pennsylvania with a deep sense of adventure and curiosity. He was the first in his family to get on a commercial flight and the first to travel internationally. Now, John Spence is retiring as one of the most respected forest entomologists in the world.

Indeed, it's been a long, productive career for Spence. Over 205 publications. Over 75 graduate students and post-doctoral fellows. And a significant impact on the way people think about ecological systems. It's not uncommon to run into past students who remember Spence's teachings and give him credit for helping them

see the ecosystem as a system, not as a series of individual parts.

Reflecting on his career, Spence quickly lists off several highlights: graduate student mentorship, finding and studying the world's largest water strider, and helping establish one of the world's largest forest management experiments, EMEND, in northwestern Alberta.

But what stands out for Spence are two sabbatical leaves he refers to as "mind expanding." One was to Oxford, the other to Michigan State, and Spence considers both to be formative scientific journeys. Spence also cherishes his time spent in Africa and Finland, which he refers to as "spectacularly satisfying." Few know that Spence was a key contributor to solving corn borer challenges in Africa. By building on his work in Alberta, Spence helped determine how intercropping could increase productivity and decrease pest damage.

When asked to provide words of wisdom for younger colleagues, Spence recalls an experience as a teenager. He was working with friends to load hay bales on a hot summer day. When they finished, the teenagers tried to convince their friend's father to reward them for their hard work by purchasing a few cases of beer. The wise father responded to them, "You must learn to let your work be your reward."

Wise words still to this date, and words that Spence has undoubtedly managed to live up to during his long and storied career.





Professor **growing** strong **relationships** with Chinese **agricultural university**

In a world where collaboration and innovation know no borders, Miles Dyck has been working hard to grow relationships and connections in the Loess plateau of northern China. In two short years, Dyck has successfully established strong connections with the Northwest Agriculture and Forestry University—the second-highest ranked agricultural university in China.

Dyck recently spent two months in China teaching graduate courses, touring research sites and learning more about local challenges in agriculture. He notes that the challenges faced in China are very different from those in Canada, with greater implications for feeding local populations.

“Our challenges [in Canada] are generally based on technology—herbicide resistance, advanced




breeding, etcetera. However, the challenges faced in northern China are more fundamental in terms of taking steps to improve productivity and feed their own people,” said Dyck.

As an example, Dyck toured orchards and learned that soil water reserves have slowly been drained over the course of 20–30 years of apple orchard growth. In response, Chinese researchers are developing rain water harvesting techniques to capture runoff and encourage soil water recharge.

The growing partnership is of core interest to the University of Alberta. Dyck hopes that with a strong foundation, this partnership can lead to future research collaborations and additional opportunities to mentor Chinese graduate and undergraduate students.



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Preparing **students** to provide **solutions**

Student Profile: Lauren Echiverri

Lauren Echiverri started her Master's degree with a fierce passion for plants and she's finishing with a sense of achievement, having provided managers with tangible solutions for maintaining biodiversity on forested landscapes.

Echiverri studied the relationships between understory plants and site moisture by making use of Wet Areas Mapping—a provincial inventory that predicts depth-to-water values across forested regions of the province.

Echiverri found that patterns in understory plant abundance and species composition are related to depth-to-water values. Her results showed that after harvesting in coniferous stands, wetter areas increased in plant diversity and abundance, while drier areas had similar diversity and abundance values as unharvested stands. In contrast, harvested deciduous stands had reduced plant cover on drier sites, while wetter areas were similar to unharvested stands.

Her recommendations are two-fold. First, place green-tree retention patches across a range of depth-to-water values to ensure a variety of understory communities are maintained. Second, reduce harvesting intensity on wetter sites of conifer stands and drier areas of deciduous stands as these areas were more sensitive to harvesting. In this way, forest managers can improve overall plant diversity and resilience in their harvest blocks.

Echiverri completed her work under the supervision of Ellen Macdonald, and worked at the Ecosystem-based Management Emulating Natural Disturbances (EMEND) research site. She is an excellent example of how the Department of Renewable Resources is *preparing students to provide solutions*.

Funding for Echiverri was provided through an NSERC Strategic Grant.

Mobile app connects students, ecosystems, and technology



An innovative mobile application, *DigiMapping*, is helping students learn about landscapes and soils, increase their spatial awareness, and learn applied field skills to better equip them for their future careers. It's all thanks to a forward-thinking team of soil scientists in the Department of Renewable Resources.

The idea of using an app to connect students to digital maps started as a way of modernizing teaching approaches, but it has grown into much more. Guillermo Hernandez-Ramirez, one of the lead scientists developing *DigiMapping*, noted that companies were increasingly using digital apps for field identification of soils, ecosites, and a broad range of environmental variables. The app was a way to move students from paper maps to more integrated and dynamic tools.

"We are creating an applied foundation that students can build on during employment," said Hernandez-Ramirez.

In addition to modernizing teaching approaches, Hernandez-Ramirez sees potential for the app to better connect students to the environment around them.

"One of the core skills we saw students were missing was the ability to relate information at a specific site to the landscape around them. We saw an opportunity to help students increase their spatial awareness," said Hernandez-Ramirez.

The app contains over 20 different data layers, including soils and vegetation cover. It is integrated with GPS and operates on any mobile device. Using newly-purchased field-ready tablets, the app was tested at Spring Field School in May 2017 and it will be used in a range of soils courses starting in the fall of 2017. The team has also designed the app to be applicable to a range of disciplines, including agriculture, forestry, hydrology, and land reclamation. It will be publicly available once completed. Funding for the app has been provided by the University of Alberta's Centre for Teaching and Learning.

Events: Bringing science to you

> North American Forest Ecology Workshop (NAFEW)

Sustaining Forests – from Restoration to Conservation; June 18-22. Edmonton, Alberta. For more information go to: www.nafew.org

> Forest Genetics 2017 Conference

Forest Health and Productivity in Changing Environments; June 26-29. Edmonton, Alberta. For more information go to: www.forestgenetics2017.ca

> Mark your Calendar: Fall 2017 Forest Industry Lecture Series

November 2nd. Dr. Monika Emelko, a water treatment engineer from the University of Waterloo. She will be speaking about the importance of forest management and land use on drinking water supplies.

> Missed the last Forest Industry Lecture?

Tree Improvement in the Genomics Era by Dr. Yousry A. El-Kassaby from the University of British Columbia. View the recording here: www.tinyurl.com/fils2017

> Missed the last Bentley Lecture in sustainable agriculture?

Teaching Sustainable Agriculture at an Environmental Tipping Point: Is the Sky Falling? by Dr. Fran Walley from the University of Saskatchewan. View the recording here: www.tinyurl.com/Bentley2017



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