



fall 2013
Renew

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UNIVERSITY OF ALBERTA
DEPARTMENT OF
RENEWABLE RESOURCES



Focussed on the future

A message from the Chair

The past month has been challenging in our Department as we were forced to downsize our staff in light of the recent provincial budget cuts to Universities. This was painful for us as we lost longstanding, valued employees – and friends.

But through these challenges, we remain committed to our principles of research and education. And the future looks bright. We have strong indicators of success: increased enrollment in all of our undergraduate degrees, new partnerships, continued growth in our research funding and our graduate numbers are climbing – including course-based masters programs in Forestry and Land Reclamation.

In 2013, we revised our undergraduate degrees, to ensure their relevance to the fields of natural resource management and conservation. In many cases the changes improved alignments across programs making it easier for students to shift their areas of focus as their interests mature over the course of their degree.

As you will see in the following pages, our work is relevant and instrumental to the growth of our province, and well beyond. I am honored to be the Chair of such a vibrant group of professors, students and staff.

Victor Lieffers, Chair

Vic.Lieffers@ualberta.ca

Research a 'game changer' for growing aspen

Growing aspen trees in a nursery has always been tricky business. Getting the trees to grow has been manageable; ensuring the success of trees when planted has been elusive. But Dr. Simon Landhäusser and his colleagues have developed an approach that his partners are calling a 'game changer'.

The approach itself is actually quite simple. In a greenhouse, aspen trees naturally want to grow quickly and reach up towards the light. However, Landhäusser and his colleagues found that by inhibiting the trees shoot growth, the tree invests more energy into growing roots and starch reserves. In doing this, they also found that they can 'nutrient load' seedlings, so that they have nutrient reserves to draw from when planted.

What this translates into is a significantly higher rate of success for seedlings, and a decreased need for fertilization on reclaimed sites. The nutrients and starch reserves stored in the trees allow them to grow very quickly on most sites – particularly on stressful sites. This means less need for fertilizer



application, but also less competition from other, more nutrient hungry, competing plants.

Larry Lafleur, a collaborator on the project and President of Coast to Coast Reforestation, says this work is already "making a huge difference by significantly improving the quality and survival of aspen trees on oil sands plantations". This work is an excellent example of how research is providing solutions for natural resource practitioners.

Jack pine trees just as vulnerable to mountain pine beetle



New research suggests that when it comes to mountain pine beetle attacks, jack pine trees are just as vulnerable as lodgepole pine trees, if not more.

Dr. Nadir Erbilgin and his colleagues have found that levels of two chemicals critical for mountain pine beetle success are not only present in jack pine trees, they are up to two times higher than in lodgepole pine trees.

The chemicals are alpha-pinene and 3-carene. Complex names but they play a relatively simple role in enabling mountain pine beetle success. When a tree is attacked by female mountain pine beetles, the tree releases 3-carene. The female then converts alpha-pinene from the host tree into trans-verbenol. These two chemicals, 3-carene and trans-

verbenol, form a critical attractant that encourages additional mountain pine beetles to 'aggregate' on the tree. This aggregation allows the beetles to overtake a tree in short time and weaken its defenses, killing the tree but enabling the mountain pine beetle eggs to develop into adult beetles.

It's unfortunate information for Canada's jack pine forests, which stretch from Alberta to Nova Scotia, as it confirms that jack pine trees make for an excellent host tree. The next piece of this complex puzzle is determining whether jack pine trees have the same amount of these critical chemicals across Canada. It's still possible that spatial variability of these chemicals might hinder the movement and success of mountain pine beetles in jack pine forests.



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Through devastation stems opportunity

Chaos and devastation were two words frequently used to describe the floods in Alberta this past June. And while those words certainly applied to the impacts on research programs in the Department of Renewable Resources, Dr. Mark Poesch is also adding an additional word to the mix – opportunity.

Since 2010, Poesch and his colleagues have been studying movement patterns and behaviours of lake sturgeon – an iconic, prehistoric looking fish that can reach lengths of 1.5 metres – on the Bow, Oldman and South Saskatchewan Rivers. But when Poesch heard reports of the floods he assumed his monitoring stations in the river, and the data they contained, were lost. He even began discussing options for alternate projects with his students.

However, thanks to the extensive help from his partners at the provincial and federal government

he was able to retrieve 70% of his monitoring stations. With the data now in hand, Poesch sees a unique opportunity. “These types of extreme events are projected to increase in the face of climate change. This presents an opportunity to quantify what type of changes we might expect to see in our rivers and to the species that inhabit them” said Poesch.

“You just can’t plan for these types of events and so when they do occur it can make for an interesting study” said Terry Clayton with Alberta Environment and Sustainable Resource Development. Studying the movement and behaviors of this species before and after the floods will undoubtedly help to better understand the iconic lake sturgeon.



Acorn recipient of prestigious 'Medal of Honor'

John Acorn, one of the most decorated entomologists and science communicators in Canada, has been awarded the Entomological Foundations Medal of Honor – an award reserved only for those that have made outstanding contributions to the study of insects.

For Acorn, there's nothing quite like being honored by those he respects the most – his peers. "To be recognized by people who know entomology better than anyone else, that's really neat" said Acorn about the award.

A lifelong insect fanatic, Acorn has spent his life inspiring generations of kids and adults to take an interest in nature. His TV series – Acorn the Nature Nut – is one that was, and continues to be, a household regular. Acorn says that for him, one of the best rewards is "meeting students that come up and tell me they were inspired to study insects because of my work. That's pretty special."

Acorn is currently an instructor in the Department of Renewable Resources and continues to inspire people through his teaching and community outreach.



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One of a kind **'Clean Lab'** opens its doors

When speaking to Dr. Bill Shotyk about the new, one-of-a-kind, lab at the University of Alberta, he uses the phrase 'Clean Lab'. But in this case, 'clean' seems like a significant understatement.

When you walk into the lab, a gush of air flows against you – ensuring that 'contaminated' air can't enter the lab space. Then there's the distillery, which Shotyk assures is not for making vodka but rather for ensuring contaminants can't make their way into chemicals used in the lab. The distillery evaporates the pure chemicals and leaves any contaminants behind so they can't bias test results. Even the air receives double filtration to ensure that even the finest particulates can't impact the testing of samples.

It all seems a little excessive until you understand the impact this lab could have on our

understanding of contaminants in our environment. Shotyk is working on multiple projects in the oil sands and agricultural regions of Alberta to gain a better understanding of what chemicals are naturally occurring in the environment and which might be the result of industrial processes.

Work like this can't be completed effectively without an excessive focus on cleanliness. For example, Shotyk's past work has shown that even the type of bottles scientists collect their samples in can have profound impacts on analysis results. With a lab like this, scientists will be able to almost eliminate outside contaminants, and be able to garner an accurate picture of the influence of natural and man-made impacts on our ecosystems.



Forestry students National champs – again

For a second straight year, forestry students from the University of Alberta have been crowned National champions at the Canadian Institute of Forestry's annual quiz bowl.

It was a hard fought win against their long-time competitor – the University of British Columbia. "It was awesome winning two years in a row" said Ross Hobbs who was on both of the winning teams the past two years.

When asked what it says about the forestry program at the University of Alberta, Hobbs said "the fact that our teams are so consistent year after year is a real testament to the quality of instructors and courses here".

The champions from left to right: Nikki Marburg, Shayna Mason, Ross Hobbs, and Kyle Elliott



Reclamation graduate school earns major award

After only two years in operation, the unique Land Reclamation International Graduate School (LRIGS) has earned its first major award.

LRIGS won the Canadian Land Reclamation Association (CLRA) Edward M. Watkin Award, in recognition of major contributions to land reclamation, especially through service to foster advances in regulation, reclamation success, and development of personnel and students.

Andrea Granger, President of the CLRA said that "LRIGS is fostering a more forward looking approach to land reclamation through education, new technologies and knowledge transfer, and is highly deserving of this award."

***Back Row:** Peter Beckett, Chris Powter, Andrea Granger, Zhichao Jiao, Alison Bijman, Brett Campbell, Matthew Gelderman **Middle Row:** Jenna Abou Rizk, Valerie Miller, M. Anne Naeth, Kangyi Lou, Alison Murata **Front Row:** Sarah Ficko, Michal Guzowski, Victoria Collins, Nils Dietrich*



Sulfur improves 'bank account' of agricultural soils

New research from Dr. Miles Dyck suggests that over the long-term, sulfur application can boost yields and increase carbon sequestration in sulfur-deficient agricultural soils.

The finding comes from a long-term study which compared 'typical' fertilization – nitrogen, phosphorus, potassium – to fertilization that included sulfur. The net result was that over time soil organic carbon – the savings account for these soils – was significantly increased. This increase enabled the soils to sequester more carbon and maintain more of the critical nutrients and organic matter that are critical for long-term soil sustainability and crop yield.

Naturally occurring sulfur-deficient soils occupy an area of about 4 million ha in the cultivated areas of the Canadian Prairie Provinces. This work is a valuable contribution to a growing body of knowledge that highlights the importance of sulfur to long-term soil productivity and encourages development of agricultural management practices that reduce agriculture's carbon footprint.

The work was conducted as part of a long-term research program at the Breton Plots, a University of Alberta research farm.



Agreements deepen partnerships with China



Agreements signed October 24 by the University of Alberta and a leading Chinese university founded by Dr. Sun Yat-sen—the revolutionary founder of modern China—are broadening opportunities for student and faculty exchanges and collaborative research.

Attended by Governor General of Canada David Johnston, a signing ceremony held at Sun Yat-sen University in Guangzhou, China formalized three agreements between the two institutions that pave the way for broader co-operation and builds on existing partnerships such as the SYSU-Alberta Joint Lab for Biodiversity Conservation.

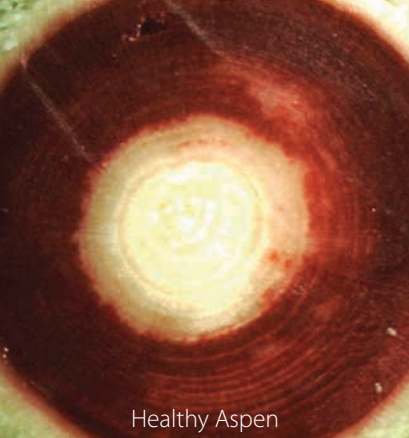
Established through the efforts of Dr. John Spence and led by Dr. Fangliang He, both in the Department of Renewable Resources, the joint lab has drawn collaborative researchers from around the globe including the United States, Australia and Europe, as well as Canada and China.

“The loss of biodiversity is a global issue and we need multinational collaboration to tackle it. Scientific research and academic exchanges have no boundaries,” said He who added that graduate students and post-doctoral fellows from China and Canada also benefit from working together in the lab, building a legacy of international co-operation for vital future research.

Cutting-edge research produced by the lab teams on species extinction and the importance of ecology and biodiversity conservation has appeared in high-impact publications such as *Science*, *Nature* and *The Economist*. As well, the differing climates offered by Alberta and southern China have allowed for hypothesis testing that could one day help address Alberta’s ecological challenges, He noted.



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Healthy Aspen



Sudden Aspen Decline (SAD)



Drought makes **aspen trees struggle** to keep their 'plumbing system' functioning

The death of aspen trees has recently been documented across the western boreal forest, raising many questions about the cause of this die back. Dr. Uwe Hacke has found that a leading explanation is that drought is affecting the plumbing system of aspen trees.

Aspen trees depend on an intricate network of vessels, or 'pipes', that carry water from their roots up to their leaves. When aspen trees experience severe drought or freezing, they can begin to

accumulate air in their pipes – a process known as embolism. This air limits the flow of water and impairs photosynthesis, increasing the risk of aspen die back during future drought events.

By developing an understanding of these microscopic vessels, Hacke is helping build the foundational knowledge required to breed plants that are more resilient to drought conditions.

Credits:

Content: Matthew Pyper, Bev Betkowski (China partnership article), Michel Proulx (Reclamation award article).
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Renew

Department of Renewable Resources
University of Alberta
751 General Services Building
Edmonton, AB T6G 2H1
CANADA

Phone: 780-492-4413

Fax: 780-492-4323

www.rr.ualberta.ca



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