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Renew

in this issue:

- 1** New chair begins charting path forward
- 5** Forestry titan's legacy lives on
- 8** Pandemic drives new teaching approaches



UNIVERSITY OF ALBERTA
DEPARTMENT OF
RENEWABLE RESOURCES



Charting our PATH

A message from the Chair

In the Department of Renewable Resources, we resolutely believe that excellence in research and student learning are interconnected. Excellence in research fosters quality teaching and the practice of teaching brings fresh perspective and innovation to research. With this connection in mind, I am excited to take on the role of Chair of this invigorating department.

I would like to take this opportunity to acknowledge the work of the former Chair, Ellen Macdonald, whom without we would not be where we are today. Following Ellen into this new role is the biggest challenge I have been presented with. I am eager for the opportunity and humbled that my colleagues have trusted me with this challenge.

As Chair, one of my priorities is to build further on the department's academic strengths, while also addressing a lack of critical mass in some of the emerging fields such as Indigenous resource management and many others. My strategy is to tap into unique resources and help build synergies within and between departments to bring in new hires and expand resources. Furthermore, engagement with external stakeholders in agriculture, forestry and environment sectors are critical for fostering innovation.

Please don't hesitate to reach out for discussions on our department's existing work or future collaborative opportunities.

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New Professor in growth and yield brings cutting edge tools to teaching, research



Robert Froese RFP recently joined the Department of Renewable Resources as an Endowed Chair in Forest Growth and Yield. After spending 18 years as a Professor at Michigan Technological University he is excited to return to the familiar forests of western Canada that he fondly remembers exploring in his youth.

Froese's plans focus on bringing cutting edge technologies and a new generation of forest models to students and research partners. His three core areas of research include developing models that are sensitive to values beyond timber such as carbon and climate change, advancing opportunities for precision forestry by applying new technologies to forest inventory, and using remote sensing tools to develop the next generation of forest growth and yield models.

A key underlying goal for Froese is to keep foresters in the forest as technologies advance. Many foresters chose the discipline for its connection to the outdoors and Froese wants to see foresters embrace and inform new innovations to maintain opportunities for on-the-ground applications and implementation. He also believes that training students with emerging tools and technologies will keep foresters connected with the place they love most and preserve a vibrant forestry sector.

The Chair position in growth and yield is funded by Alberta's forestry companies and through the support of the Forest Resource Improvement Association of Alberta (FRIAA).

Composted biosolids contribute to circular economy



As urban populations grow so do biosolids generated from municipal wastewater treatment plants. However, new research from graduate student Carmen Roman-Perez and Guillermo Hernandez-Ramirez, Associate Professor in the Department of Renewable Resources, has shown that biosolids can be beneficial for crop yields while keeping greenhouse gas emissions low. This cyclic economy allows farmers to cut their dependency on artificial fertilizers, reducing both costs and environmental impact.

The idea of a circular economy has particular appeal to municipalities that may be struggling to manage large volumes of human waste. When these biosolids are used as fertilizer, nutrients derived from the biosolids are returned, closing the circle, and connecting the urban and rural landscapes in a sustainable way.

“We can take advantage of nutrients and decrease the dependence on commercial fertilizers,” said Roman-Perez about opportunities to make use of municipal biosolids in agriculture.

Not all biosolids are created equal, however. How the waste is processed influences plant productivity, processing costs, nitrogen uptake by crops and greenhouse gas emissions. Roman-Perez and Hernandez-Ramirez looked at three different methods of processing biosolids (mesophilic anaerobic digested, alkaline-stabilized, composted) and found that composted biosolids showed the greatest increases in crop productivity and lower greenhouse gas emissions when compared to other biosolid types. A practical mix was found to be half composted biosolids and half commercial fertilizers. This allowed plants to access nutrients quickly from commercial fertilizers, while also benefiting from the longer-term release of nutrients from the biosolids.

Ongoing research aims to improve comparisons of sustainable use of biosolids for land reclamation and life cycle assessment.

Ellen Macdonald retiring after impactful career



After a 32-year career as a forest ecologist at the University of Alberta Ellen Macdonald is transitioning into retirement. Over Macdonald’s decorated career she supervised 57 graduate students and was awarded the University of Alberta’s highest honour for a professor in 2019—the University Cup.

Reflecting on her career, Macdonald says the most rewarding aspect has been the students and the people she has worked with.

“To see students go on and make great contributions through their careers, and to have previous students speak about how much they learned in my courses, these are the real high points for me in my career,” stated Macdonald.

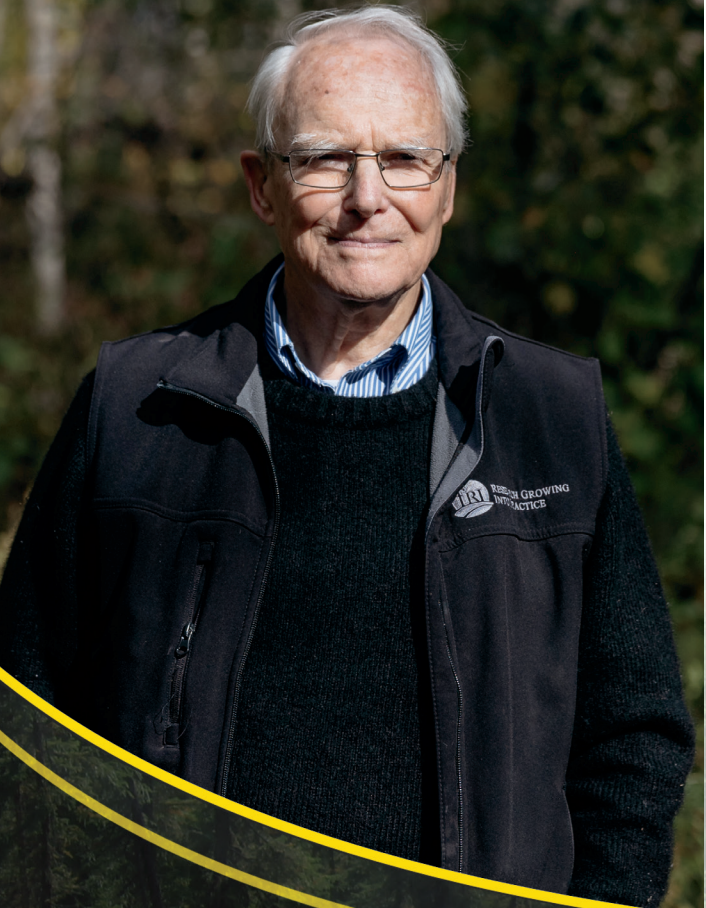
She also relished her time working on applied forest ecology challenges, specifically the EMEND (Ecosystem-based Management Emulating Natural Disturbances) project located in north-western Alberta. Aspects that stood out for Macdonald included the collaborations and the broad impact of the science developed at EMEND.

To close out her career, Macdonald took on the role of Chair of the Department of Renewable Resources. During her time as Chair she successfully hired five people in five years—finding creative ways to fund growth during a time when budget cuts and layoffs at the University were a norm.

As she transitions into retirement, Macdonald will spend the next two years in a part-time role wrapping up some of her most impactful projects.

Macdonald joined the University of Alberta as a Post-Doctoral Fellow in 1988, and quickly transitioned into an Assistant Professor role in 1989. As the only female professor in the department at that time, Macdonald charted new territory for women in science and in the disciplines of forestry and forest ecology specifically. She concluded her career as the first female Chair in the department’s history.

Loss of forestry titan, Peter Murphy, inspires field school support



On October 29, 2020, the Alberta forestry community lost a beloved friend in Peter Murphy. His 90-years were filled inspiring people young and old about forests and forestry. This legacy will now live on through an endowment that will help cover the costs of field school for future forestry students.

“I always saw Peter as an incredibly kind, gentle, relentlessly optimistic man. He never saw the dark side of anything, and he always had a smile and a quirky sense of humour,” reflected Vic Lieffers, Professor Emeritus who was hired by Murphy in 1989.

Murphy had a particularly acute impact on institutions and organizations dedicated to the education of foresters and the practice of forestry. His leadership and impact led colleagues to see a natural fit for pursuing an endowment for forestry field school in his name.

“Field school experiences are expensive but also very important to students . . . Peter understood the importance of field school and so we wanted to help the students get that experience,” stated Ellen Macdonald, Professor in the Department of Renewable Resources.

Macdonald and colleague Cynthia Strawson spearheaded a campaign to raise funds for the field endowment from industry and the family of Peter Murphy. The idea of long-term financial support for field training opportunities was naturally appealing to industry.

“We want good quality forestry graduates. . . so we wanted to ensure there was a quality field school component at the University of Alberta,” stated Allan Bell, a Woodlands Manager at Tolko who helped generate interest in the endowment among his industry colleagues.

With the endowment nearly in place, funds will be prioritized to support students attending the advanced forestry field school, with residual funds used to support senior level field learning. The endowment will ensure Murphy’s legacy will continue to influence and inspire foresters for generations to come.

The Peter J Murphy Forest Industry Field Learning Endowment is made possible through contributions from: Eberlein Family Charitable Foundation, Alberta Newsprint Company, Alberta-Pacific Forest Industries Inc, Canfor Corporation, Mercer International Inc, Millar Western Forest Products Ltd., Tolko Industries Ltd., West Fraser Timber and Vanderwell Contractors Ltd. To date, an additional 11 private donors have contributed. Anyone who wants to support the fund can make an online donation at uabgive.ca/fieldschool.



Peatlands prove key to protecting adjacent upland forests from fire

New research has shown that peatlands hold the potential to buffer the effects of climate change by providing areas of fire refugia and reducing fire severity. These benefits are also not limited to the peatland area and extend into adjacent uplands, protecting important habitats for unique species.

These processes are being studied by graduate student Christine Kuntzemann and Scott Nielsen, Professor in the Department of Renewable Resources. Together with their team they are unravelling the complex relationships between peatlands, forest fires and climate change. Their focus on fire refugia—areas that don't burn during forest fires—is helping map out which habitats will be more important for assisting species adaptation to a changing climate.

Refugia are rare on the landscape and maps of refugia probability and predicted fire severity have potential to be used in the management of caribou habitat and those of birds who gravitate to old forests.

As fires increase due to climate change, the ability of peatlands to not only protect themselves but also adjacent areas can help inform land management. Kuntzemann and Nielsen see opportunities for prioritizing peatlands and adjacent upland forests when picking out conservation areas. There is a greater value in reducing or avoiding industrial disturbance in peatlands and surrounding upland forests because of their extended influence on surrounding lands.

The study is part of a broader collaboration led by Diana Stralberg at Natural Resources Canada and is funded through an NSERC Advancing Climate Change Science in Canada grant.



Pandemic shines light on new approaches for teaching

The covid-19 pandemic has forced significant change and adaptation onto many aspects of society, and university teaching has been no exception. When pandemic restrictions directed people to stay close to home, Professors had to quickly adapt their courses to the virtual world. Carol Frost, an Assistant Professor in the Department of Renewable Resources, saw the challenging transition as an opportunity to reinvent her courses by incorporating new teaching principles she'd already had her eye on.

Frost realized that students learned best when they engaged with the material rather than simply attend lectures. So she flipped her approach with the goal of increasing levels of interaction and engagement. Lectures were provided as pre-recorded videos so that time spent on Zoom could be used for discussing and working through problems in smaller groups. Students were encouraged to engage in the

class and give regular feedback on the new teaching methods. The approach worked so well that when students were given the opportunity to transition back to the classroom, many still chose to connect virtually.

Through this challenge Frost has gained valuable knowledge about designing classes that are universally accessible to groups that struggle with or are unable to attend traditional classes. She has also found positive associations between the new delivery style and student retention and understanding of complex concepts. Frost believes her new style of teaching has broader implications beyond the pandemic for improving the accessibility of education.



Ongoing methane release raises long-term questions about end pit lakes

End pit lakes associated with oil sands mining are built using consolidated tailings to form the lake bed. Then, a 'water cap' is placed on top of the tailings to form the lake. The long-term goal is for end pit lakes to evolve and eventually begin to function like natural lakes.

Siddique and colleagues have found that the residual degradable hydrocarbons found within tailings material fuel microorganisms that break down the hydrocarbons into gases such as carbon dioxide and methane. These biogenic gases are produced in underlying tailings in end pit lakes. As the gasses, primarily methane, move towards the water surface, they carry residual bitumen and clay particles—increasing turbidity and introducing compounds of concern into the surface water.

End pit lakes are a potential reclamation method identified in oil sands reclamation plans. However, new research indicates that ongoing methane production may influence turbidity and movement of residual hydrocarbons into the water cap. The releases could have implications for the long-term sustainability of end pit lakes according to Tariq Siddique, Professor in the Department of Renewable Resources, and co- investigator of the study.

This does not mean end pit lakes will cease to be an important reclamation tool. Siddique's study has so far documented this process in the short-term following end pit lake creation and his future work aims to provide clarity about how long this process is expected to occur. These future studies will help to project the natural evolution of these end pit lakes and provide more clarity about their long-term sustainability.

The study, developed in collaboration with Ania Ulrich, Professor in the Department of Civil and Environmental Engineering, was recently completed and publication is underway. The research was funded by NSERC and Syncrude Canada.

Conservation biology student receives arctic research award

Jared Gonet, a PhD student in the Department of Renewable Resources is the recipient of a 2021-2022 Association of Canadian Universities for Northern Studies (ACUNS) POLAR Northern Resident Scholarship Award. The ACUNS award program recognizes students and early-career



researchers from across Canada for their research and outreach work in the Arctic and sub-Arctic. Gonet's research looks at the intersection of Indigenous knowledge and western science in conservation planning. The scholarship is valued at \$10,000.



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