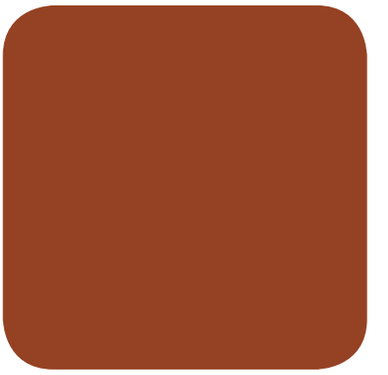
HOW DOES RESEARCH GROW INTO PRACTICE?


Photo credit: Sylvie's Photography




J.D. Robert Weibe Photography

2015–2016 **Annual Report**

fRI Research
Informing Land & Resource Management

Brent Rutley investigating locations visited by a collared grizzly bear in Willmore Wilderness Park (June 2015).

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MESSAGE FROM THE PRESIDENT

"I thank all of the partners and staff who have worked over many years to make this a successful organization."

DR. RICK BONAR | PRESIDENT

As the body of knowledge produced by fRI Research increases, our Board has recognized the need to place more emphasis on helping our partners transition the knowledge we generate into practice. The idea of "research growing into practice," our tagline for several years, is a goal we achieve when we support our partners. Their efforts, informed by our knowledge, improve land and resource management. A couple of examples illustrate the process.

A decade ago, we were asked to develop a way to estimate grizzly bear numbers using DNA. The method was then used to estimate the population of bears in Alberta, and it informed the decision to list the grizzly bear as threatened and develop a recovery plan. Last year, the fRI Research Grizzly Bear Program resurveyed the original study area and found that the grizzly bear population has increased substantially. This news will help partners continue their efforts to recover grizzly bear populations in Alberta.

Over the years, fRI Research has supported several associations involved in measuring forest growth and yield. These and others have merged to form the Forest Growth Organization of Western Canada (FGrOW), which fRI Research continues to support.

FGrOW is a leading source of forest growth research, and it is attracting more partners through word of mouth. As a result of the associations coming together, efficiency has improved, and so has investment, which increases the quantity and accuracy of forest growth knowledge. Partners are facing challenges such as how to maintain sustainable forest harvest levels in a changing climate, and FGrOW is helping them meet that challenge.

On a personal note, my term as president will come to a close at the end of 2016, and this is my last president's message. It has been my privilege to be involved with fRI Research since the beginning in 1992, and I thank all of the partners and staff who have worked over many years to make this a successful organization. As I'm fond of saying, we must be doing a good job because our partners keep asking for more knowledge and opening their wallets to pay for it. I'm honoured to have been part of that over the years. As the 25th anniversary approaches in 2017, I'm confident that this amazing organization will continue to prosper and provide timely and relevant knowledge to our partners.

MESSAGE FROM THE GENERAL MANAGER

"I have every confidence that the people of fRI Research will ensure that it will continue to thrive and provide value for our supporters and partners well into the future."

BILL TINGE | GENERAL MANAGER

As I step down as GM of fRI Research in June 2016, I can attest that managing an entity as unique as this organization is quite a way to complete a career in forestry. Years ago, as I leaned over another tree seedling, ensuring its root plug was vertical and firmly—but not too firmly—embedded in the soil, I never in my wildest dreams thought I would be leading a world-class group of researchers. But life moves on, plans come to fruition, and retirement was always in my plans.

When I reflect on my three-and-a-half-year stint, I continue to marvel at the commitment and drive of the researchers at fRI Research. Their passion for their work and genuine thirst for knowledge is inspiring. The folks who support them and enable their quest deserve an equal amount of credit, from the field assistants, to the GIS analysts, to the accountant and those who work to disseminate our knowledge; everyone plays a role in delivering quality research to our partners.

As Rick Bonar explained on my first day, the partners of fRI Research are the foundation of our success. Their interest in our organization is driven by their interest in informing policy or management practice through science-based knowledge. This is a truly noble and admirable endeavour.

I leave behind a legacy of structure, documented processes, and definition of roles. We have a new name, and more importantly, a new brand that frees us from our former geographic scope. Our research programs and associations continue to thrive, even in these challenging times of fiscal restraint. Our shareholder base has not only been stable, but has increased with the addition of Canfor Corporation and Norbord Inc., a demonstration of support and a commitment to science-informed practice.

With the guidance of the Science Advisory Committee (SAC), we now have a publishing policy—a clear and public-facing statement of how we approach the publication of our knowledge. I have relied extensively on the Board's 2012–2017 business strategy, of which the formation of the SAC was a key direction, and very much appreciate the Board's support during my tenure as general manager.

As we face the future and all its attendant uncertainty, we can celebrate the past as our proud and productive 25-year history is documented in one of the final products of the Forest History Program. After my involvement with this fine and credible research organization, I have every confidence that the people of fRI Research will ensure that it will continue to thrive and provide value for our supporters and partners well into the future.

PARTNERS

Partnerships are the foundation and lifeblood of fRI Research. Through the contributions and actions of partners, issues are identified and analyzed, resources are assembled, and new knowledge is created, transferred, and integrated into land and resource management in Alberta and beyond. The strength of fRI Research would not be what it is today without partners' commitment, and fRI Research is honoured to have their contributions in any form. fRI Research offers and supports flexible and inclusive partnership structures and opportunities that are broadly described by the categories listed below. These are not exclusive, and many partners find a role for themselves in more than one category.

Shareholders

Under Alberta legislation, shareholders are legally responsible for directing the affairs of the non-profit fRI Research. Shareholders provide stable core funding and in-kind contributions to support the overall operation of fRI Research.

The shareholders of fRI Research are Alberta Agriculture and Forestry, Alberta Environment and Parks; Canfor Corporation; ConocoPhillips Canada;* Jasper National Park; Norbord Inc.; Repsol Oil & Gas Canada Inc.;* Suncor Energy Inc.;* West Fraser Mills Ltd., Hinton Wood Products; and Weyerhaeuser Company.

** These companies are shareholders through the Foothills Energy Partners.*

Program and Project Partners

These partners provide funding and/or in-kind contributions to directly support fRI Research programs and/or projects or collaborate on programs, projects, or other matters of mutual interest. Many of these partners are also responsible for land, resource or forest management, and are interested in using fRI Research knowledge and tools in their businesses.

Alberta Indigenous Relations
Alberta Agriculture and Forestry (Hinton Training Centre, Bruce Mayer)
Alberta Conservation Association
Alberta Environment and Parks (Land-use Secretariat; William A. Switzer Provincial Park)
Alberta Institute of Agrologists
Alberta Professional Planners Institute
Alberta Riparian Habitat Management Society (Cows and Fish Program)
Alberta Innovates (Bio Solutions, Energy and Environment Solutions)
Alberta Newsprint Company
Alberta-Pacific Forest Industries Inc.
Alberta Upstream Petroleum Research Fund
Apache Canada Ltd.
Arctos Ecological Consulting
Aseniwuche Winewak Nation of Canada
Bandaloop Landscape-Ecosystem Services
Banff National Park
BC Oil and Gas Research and Innovation Society
Blue Ridge Lumber, a division of West Fraser Mills Ltd.
Bow River Basin Council
Brock University
Canadian Association of Petroleum Producers
Canadian Wildlife Health Cooperative
Canadian Land Reclamation Association, Alberta Chapter
Canadian Natural Resources Limited
Carleton University
Cequence Energy Ltd.
City of Dawson Creek, British Columbia
Climate Change and Emissions Management Corporation (CCEMC)

Daishowa-Marubeni International Ltd.
Devon Energy Corporation
Ducks Unlimited Canada
Edson Forest Products,
a division of West Fraser Mills Ltd.
Encana Corporation
Environment and Climate Change Canada (Canadian Wildlife Service, National Conservation Program, Habitat Stewardship Program)
F.C. Pollett Inc.
Fisheries and Oceans Canada
FOLLOWIT
Foothills Forest Products
FORCORP
Forest History Association of Alberta
Forest Resource Improvement Association of Alberta
Government of British Columbia (Environment; Forests, Lands and Natural Resource Operations)
Government of Northwest Territories (Environment and Natural Resources)
Government of Saskatchewan (Ministry of Environment)
Grande Cache Tourism & Interpretive Centre
Grande Prairie Tourist Information Centre
Hinton and District Chamber of Commerce (Tourist Information Centre)
Louisiana Pacific Canada Ltd.
Manning Forest Products, a division of West Fraser Mills Ltd.
Millar Western Forest Products Ltd.
Mistik Management Ltd.
National Sciences and Engineering Research Council of Canada (NSERC)
Natural Resources Canada, Canadian Forest Service (Northern Forestry Centre, Pacific Forestry Centre, Canadian Wood Fibre Centre)
Northland Forest Products Ltd.
Norwegian University of Life Sciences
Norwegian Institute of Bioeconomy Research
Paramount Resources Ltd.
Pembina Pipeline Corporation
Peregrine Helicopters
Peter J. Murphy Forest Consulting Ltd.
Petroleum Technology Alliance Canada
Progress Energy Canada Ltd.
Robert Stevenson
Saskatchewan Ministry of Environment
Scandinavian Brown Bear Research Project
Seven Generations Energy Ltd.
Shell Canada Limited
Slave Lake Pulp, a division of West Fraser Mills Ltd.
Spatial Systems
Spray Lake Sawmills
Sundre Forest Products, a division of West Fraser Mills Ltd.
Sustainable Forestry Initiative
Teck Coal Limited (Cardinal River Operations)
Tolko Industries Ltd.
Tom Peterson
Tourmaline Oil Corp.
Town of Grande Cache (Tourist Information Centre)
Town of Hinton
TransCanada Corporation
University of Alberta
University of British Columbia
University of Calgary
University of Guelph
Université Laval
University of Oslo
University of Saskatchewan
University of Victoria
University of Washington
Western University
Vanderwell Contractors (1971) Ltd.
Western Boreal Aspen Corporation
Westmoreland Coal Company (Coal Valley Mine)
Wildlife Genetics International
Wilfred Laurier University
XTO Energy Inc.
Yellowhead County
Yellowstone to Yukon Conservation Initiative

Alignment Partners

These partners do not provide direct financial or in-kind support to fRI, but they have specifically expressed their support for and alignment with fRI Research vision and goals.

Alberta Chamber of Resources
Alberta Forest Products Association
Alberta Forest Genetic Resources Council
Alberta Biodiversity Monitoring Institute
Alberta Society of Professional Biologists
Alberta Stewardship Network
Alberta Trappers' Association
Athabasca Watershed Council
British Columbia Institute of Technology
Canadian Institute of Forestry (Rocky Mountain Section)
Canadian Model Forest Network
College of Alberta Professional Foresters
College of Alberta Professional Forest Technologists
Conservation Biology Institute
Council of Forest Industries
Defenders of Wildlife
EMEND (Ecosystem Management Emulating Natural Disturbance) Project
Ember Research Services Ltd.
Forest Products Association of Canada
FORREX
FP Innovations (Wildfire Operations Research)
GeoConnections – Government of Canada
Golder Associates
Greenlink Forestry Inc.
Hinton Fish & Game Association
Hinton Historical Society
Inside Education
Integrated Ecological Research
International Model Forest Network
Jasper-Yellowhead Museum & Archives
KBM Resources Group
Millenium EMS Solutions Ltd.
Municipality of Jasper
NAIT Boreal Research Institute
Nature Conservancy Canada
NatureServe Canada
Northern Rockies Tourism Alliance
Oldman Watershed Council
Ontario Ministry of Natural Resources and Forestry
Palisades Stewardship Education Centre
Silvacom
Sustainable Forestry Initiative
TerrainWorks (formerly Earth Systems Institute)
Tourism Jasper
Town of Edson
Trout Unlimited Canada
University of Montana
University of New Brunswick
University of Waterloo
Vilhelmina Model Forest
Wildlife Habitat Canada
Woodland Operations Learning Foundation
World Wildlife Fund Canada

A MOUNTAIN PINE BEETLE ECOLOGY PROGRAM PROJECT

mpbep.fRIresearch.ca

IMPROVING THE ABILITY TO SLOW THE SPREAD OF MOUNTAIN PINE BEETLE

Since 2006, the Government of Alberta has been collecting data during its mountain pine beetle control efforts. Now, in a large project funded by the fRI Research Mountain Pine Beetle Ecology Program and the Province, researchers have been using that data along with forest inventory data supplied by some of the province's forest management agreement holders to determine whether or not control efforts are successfully restricting the eastward spread of the beetle.

In phase one, researchers found a measurable success rate in terms of slowing the spread of mountain pine beetle (MPB). "As we began going through the analysis, it was a little disheartening, because it looked like the detection and treatment rates weren't what we were hoping. But when we put it all together, we found that, even at those rates of detection and treatment, control activities were still having an impact on the rate of infestation in subsequent years," says Allan Carroll, professor, University of British Columbia.

This past year was the first year of phase two of the project, in which the team is trying to determine which strategies are the most effective when it comes to slowing the spread of the beetle. Initially, they are focusing on predicting the spread of the beetle across the province in the absence of any control intervention and then comparing the outcome to alternative control strategies to determine efficacy.

Part of the government's annual approach to collecting MPB management data is gathering information on how many beetle offspring have survived per attacking female from the previous year, and this is done at a large number of sites across Alberta. The information has provided an estimate of beetle productivity on a site-by-site basis, but it hasn't played a large role in the Province's decision-making process when it comes to determining high-priority areas for assessment and treatment.

That gave the research team an opportunity to develop a model for predicting MPB productivity, given stand characteristics and variations in climate from year to year.

"With this tool, we can predict an expected level of beetle productivity at any given site, in any given year. It also allows us to look at the landscape from the point of view of other values, so if you have to make decisions about MPB intervention in an area where there are caribou, for example, you can determine the areas with high beetle productivity and, ultimately, through our assessments of treatment efficacy, determine the most effective way of intervening to limit the impact on caribou," says Carroll.

The model could also offer an alternative to expensive ground surveys. That money could then be reinvested in improving detection and treatment rates to slow the spread of MPB even further.

"With this tool, we can predict an expected level of beetle productivity at any given site, in any given year. It also allows us to look at the landscape from the point of view of other values."

A FOOTHILLS LANDSCAPE MANAGEMENT FORUM PROJECT

flmf.fRIresearch.ca

INTEGRATED MODELLING CONTRIBUTING TO CARIBOU RANGE PLANNING

The Foothills Landscape Management Forum spent most of the 2015–2016 fiscal year leading an integrated footprint modelling process to contribute options and information for the caribou range plan for the Little Smoky and A la Peche herds. This is the first time integrated modelling has included the forecasting of development and vegetation recovery over time and space for both the energy sector and the forestry sector, making it possible to analyze various development options for meeting disturbance thresholds.

The project involved making projections for a 200-year planning horizon with the assumptions that the energy sector would put a particular footprint on the landscape and also do significant reclamation and restoration as work is completed. Several scenarios were run in a spatial model called Patchworks, which incorporated forestry's footprint as well as the energy sector's linear footprint—the pipelines, roads, seismic lines, and power lines that support development. This information was combined with projected growth using forestry information along with reclamation and restoration scenarios to determine the impacts of various development options.

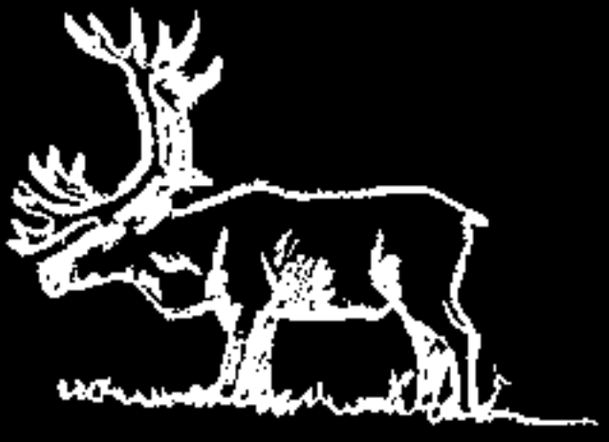
"Government would like to see this as a continued working forest. That doesn't mean there will be full-blown development; there will certainly be some impacts on what development might look like because of caribou, but they aren't saying no development," says Wayne Thorp, managing director, Foothills Land Management Forum (FLMF). "It's a matter of determining the types of constraints we can apply to make sure we still have a self-sustaining caribou herd in that area."

The forum produced a report for a ministerial task force that was appointed in January 2015. The report was submitted to the Province in July 2015. The government then hired an independent mediator to make recommendations, and that report was submitted in March 2016.

The Province is now developing a range plan, and it's hoped that it will clarify the roles of industry, government, and FLMF.

"All of this work will require some level of collaboration between the sectors and even within sectors. Things like mandatory integrated land management may be on the forefront of that work, and the forum has done work you could almost consider a pilot project as to how that might be done in the province," says Thorp, explaining how FLMF might be involved in the future.

"It's a matter of determining the types of constraints we can apply to make sure we still have a self-sustaining caribou herd in that area."



DETERMINING HOW BEARS USE GATED ROADS

The more roads in grizzly bear habitat, the higher the incidence of human-caused grizzly bear mortality. With this knowledge, there has been significant emphasis placed on reducing open road density in Alberta's forests by controlling access to roads. One technique for doing this is placing gates on roads to prevent vehicular traffic. Just how these gated roads are protecting bears wasn't known until a recent Grizzly Bear Program project was completed.

"Our research questions were, when you put gates on roads, do the bears recognize that it is safer for them behind the gated areas and do they respond differently around roads with gates," says Gordon Stenhouse, program lead, Grizzly Bear Program.

The answer is that gates don't make a difference to how grizzly bears use roads. While the gated areas are still safer for grizzly bears, it's not because the bears are changing their behaviour and choosing to stay in the gated areas.

"This means that bears aren't making decisions based on where the gates are," says Stenhouse. "So the gate is entirely about how you control human behaviour on the landscape. That knowledge can factor into decisions about access management in grizzly bear habitat in our province."

THE IMPACT OF GRIZZLY BEAR POPULATIONS ON CARIBOU POPULATIONS

Photo credit: Sylvie's Photography

In an effort to protect caribou populations, the Government of Alberta has expended much effort on trying to reduce the number of predators threatening the species, particularly wolves. But there were concerns that grizzly bear populations might be as big a threat as wolves, and that would have significant implications when it comes to how landscapes where both species live are managed. To get the answer, the Grizzly Bear Program has just completed a two-year project designed to determine the role that bear predation plays in the decline of caribou populations.

Researchers followed collared grizzly bears and collared caribou to track their interactions on the landscape and physically investigated caribou mortalities to determine if grizzly bears were the cause of death. Using GPS data, they also took note of clusters that showed a bear spending a longer than normal time in one location, then headed into the field to find out what was happening to cause the cluster. Sometimes bears were feeding on berries; other times they were sleeping; and sometimes they had killed an animal, such as a moose, caribou, or deer.

Findings show that, while bears are killing some caribou, it isn't a common occurrence. Over 80 percent of the ungulates killed by grizzly bears were adult and calf moose.

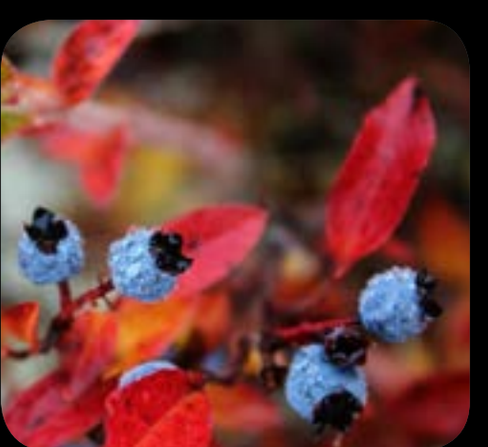
"However, as caribou populations decline, the loss of a few caribou is significant and it's important to know that grizzly bears plus other predators like cougars could also play a role in caribou population decline," says Gordon Stenhouse, program lead, Grizzly Bear Program. "Right now, it is a minor role, and that can help shape management decisions."

The project also found that caribou and grizzly bears select different habitat at different times of the year. Stenhouse explains that the discovery means that land managers don't have to choose one species over another when making management decisions. "It shows you can have caribou and bears on the landscape at the same time; you can make management decisions that will influence both species," he says.

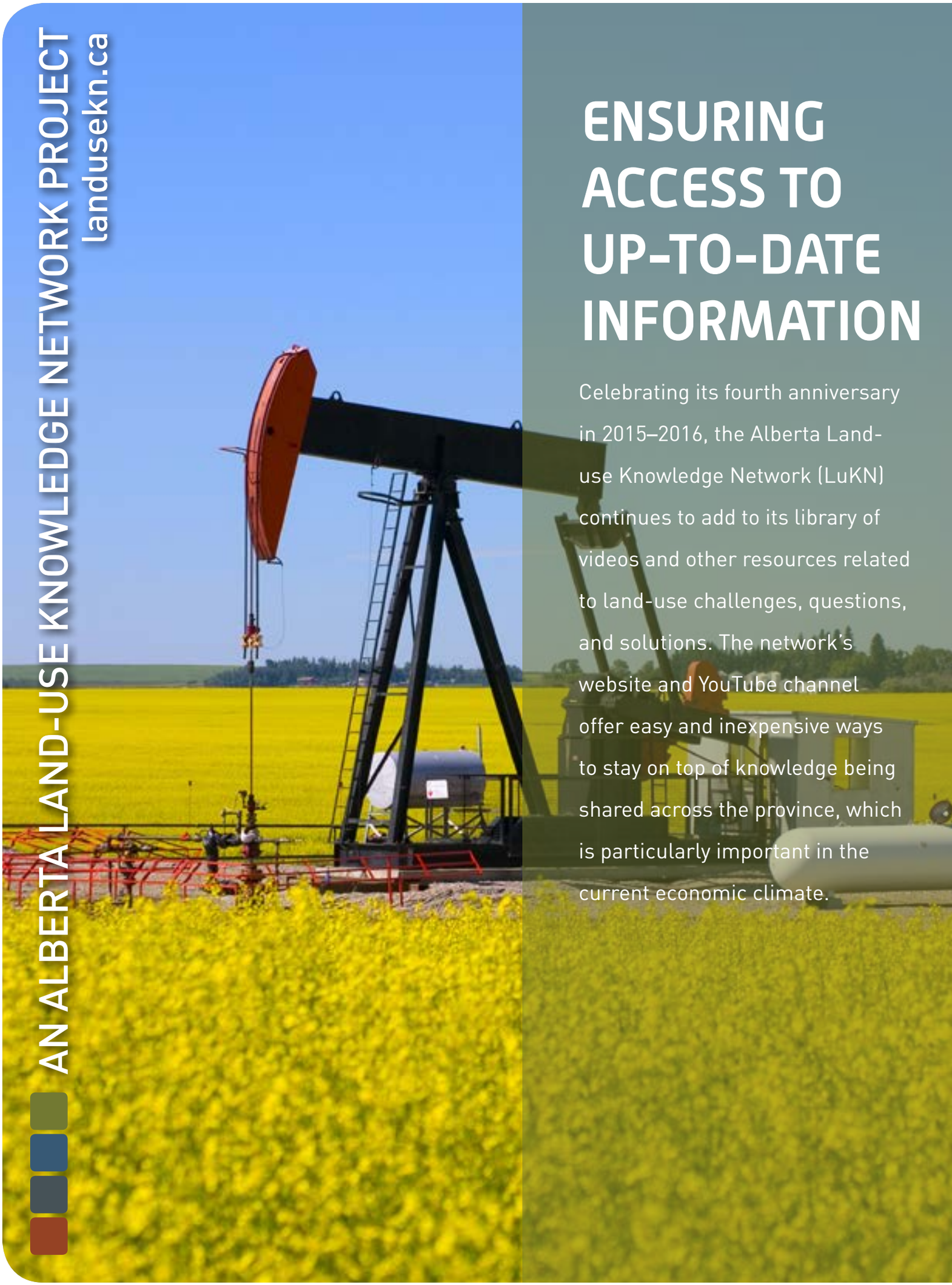
Varying Diets

One of the findings of the predation study is that there is a great deal of individual variation in terms of what grizzly bears are eating. Some bears do little or no killing of ungulates, preferring to eat clover, roots, and berries, while others rely on ungulates as their primary food source.

It's been shown that there is a strong linkage between the presence of ungulates and the health of grizzly bears, and individual variation in diet affects reproductive performance and growth. Consequently, the Grizzly Bear Program is going to be looking at how forestry regeneration practices will affect not only the growth and reproductive performance of bears but also ungulate populations.



AN ALBERTA LAND-USE KNOWLEDGE NETWORK PROJECT
landusekn.ca



ENSURING ACCESS TO UP-TO-DATE INFORMATION

Celebrating its fourth anniversary in 2015–2016, the Alberta Land-use Knowledge Network (LuKN) continues to add to its library of videos and other resources related to land-use challenges, questions, and solutions. The network's website and YouTube channel offer easy and inexpensive ways to stay on top of knowledge being shared across the province, which is particularly important in the current economic climate.

"Not as many people are able to travel to conferences and workshops," says Terri McHugh, program lead, Land-use Knowledge Network (LuKN). "Our work provides an alternative so people and organizations can keep up with the latest information and research and move forward with their professional development without having to spend the money to travel to a conference."

LuKN is becoming well known for its willingness to attend conferences, workshops, lectures, and seminars in Alberta and create videos of the content. By editing the video and audio with the presentation, the network gives viewers the experience of attending the event from the comfort of their own computers, at a considerably lower cost.

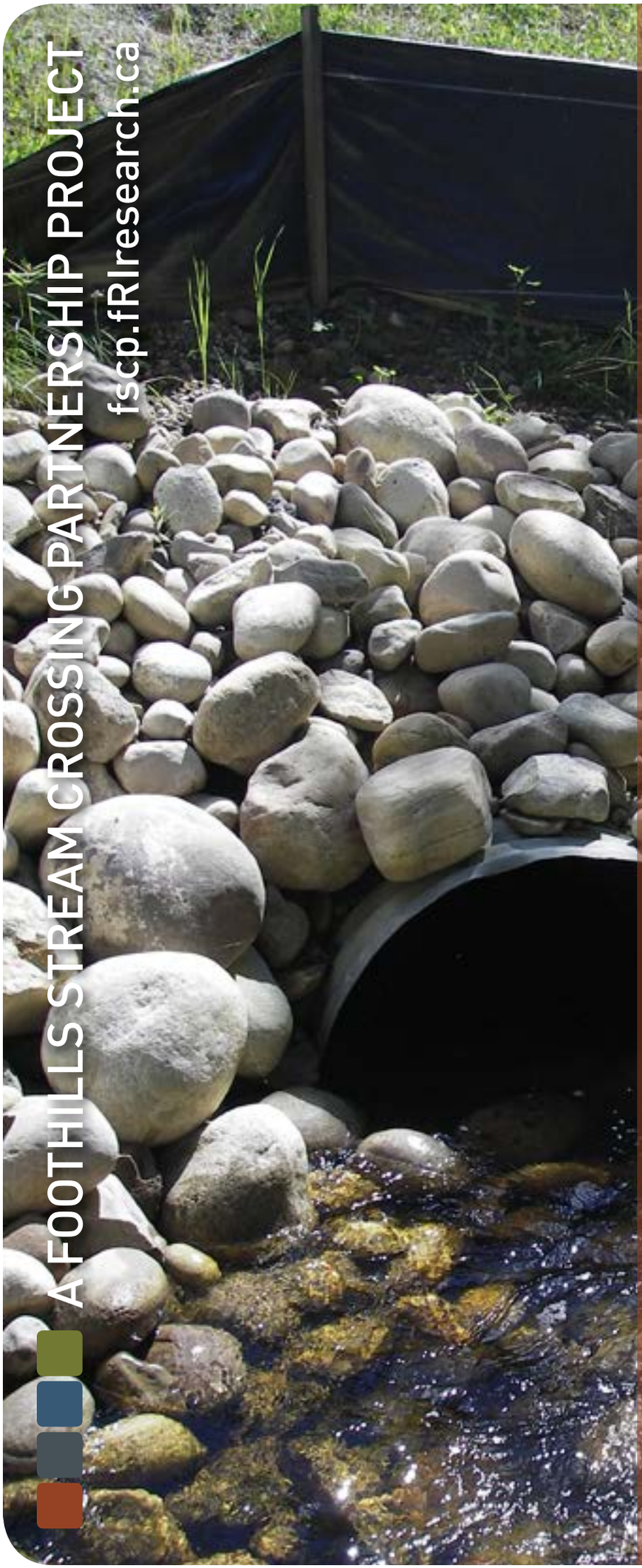
While LuKN used to reach out to organizations to ask if the network could provide the recording service, they now find that many groups, particularly smaller not-for-profit associations, rely on LuKN to participate and record their events.

"We've developed strong relationships with these groups, and this work helps them share their information with a broader audience," explains McHugh.

By March 31, 2016, there were more than 1,100 resources in the network's resource library at landusekn.ca, where visitors can find information on nature and biodiversity, people and community, industry and economy, and government and monitoring. More than 7,000 visitors used the website this year, with page views numbering 18,688.

The YouTube channel, LanduseKN, now has more than 1,000 videos. They had 53,050 views last fiscal, with viewers watching 258,009 minutes of video.

In terms of what information is popular, particularly on YouTube, LiDAR and urban agriculture videos continue to rank in the top 10. This is likely due to the wide-ranging applicability of such topics compared to other topics that are more specific to Alberta.



A FOOTHILLS STREAM CROSSING PARTNERSHIP PROJECT

fscp.fRIresearch.ca

IMPLEMENTING THE ROADWAY WATERCOURSE CROSSINGS REMEDIATION DIRECTIVE

The Roadway Watercourse Crossings Remediation Directive, signed in March 2015, outlines a Government of Alberta strategy for identifying and repairing stream crossings based on prioritizing watersheds. The Foothills Stream Crossing Partnership informed the strategy, and this year the partnership helped implement the directive.

"We assisted the regulators in selecting five priority watersheds and completed the inspections for those five watersheds. We also produced watershed remediation plans for the five priority watersheds and have submitted the plans to the regulators," says Ngaio Baril, project coordinator, Foothills Stream Crossing Partnership (FSCP).

FSCP also worked with the regulators to determine which watersheds would be priorities over the next five years, giving members an opportunity to prepare to do the work required to inspect and maintain stream crossings. From this point forward, 10 watersheds will be worked on each year.

Under the directive, Baril carries out the inspections, or members can do them on their own using tools developed by FSCP. All crossing sites that either have never been inventoried or have not been inspected in the last five years must be inspected, and members must develop remediation plans for all fish barriers. The plans are then compiled and submitted to the regulators.

FSCP has developed a detailed inspection protocol that looks at sediment, fish passage, and the performance and safety of the crossing. Data is entered into a tablet and uploaded into FSCP's online database. Member companies can then log in to view the inspected crossings as well as related inspection reports, files, and maps.

"The tablet and application are designed with a high level of data validation. This allows many different users with varying technical backgrounds to complete inspections using our protocols," explains Baril.

To help members more easily fulfill their obligations under the directive, FSCP enhanced its bridge inspection protocol to include more detail about the structure of the bridge. Previously, there wasn't enough detail to allow members to do full remediation planning, so they would have to make multiple trips to the crossing for additional measurements. Now, one visit to the bridge allows them to collect all the information they need so they can go back and do their planning at the office.

FSCP's online database has also been enhanced to allow members to upload documents related to a crossing. Documents such as third-party engineering reports or manufacturing instructions can now be stored with other stream crossing information, eliminating the need for members to maintain multiple files on company networks.

This year, FSCP completed approximately 1,700 stream crossing inspections.

FSCP Members

- Apache Canada Ltd.
- ConocoPhillips Canada
- Repsol Oil & Gas Canada Inc.
- Shell Canada Limited
- Hinton Wood Products, a division of West Fraser Mills Ltd.
- Canfor Corporation
- Millar Western Forest Products Ltd., Whitecourt
- Blue Ridge Lumber Inc., a division of West Fraser Mills Ltd., Whitecourt
- Weyerhaeuser Company, Drayton Valley

2015 Inspections by Crossing Type

215
bridges

1,174
culverts

2
fords

14
reclaimed crossings

368
cross drains

MAPPING CARIBOU FOODS

In the interconnected world of nature, managing for one value on the landscape has implications for many others. A project funded by Alberta Agriculture and Forestry, the fRI Research Mountain Pine Beetle Ecology Program, and the Forest Resource Improvement Association of Alberta (FRIAA) is looking at how mountain pine beetle management might affect food supplies and quality habitat for caribou and grizzly bears.

For the past two years, field crews have been collecting samples of caribou food in northwest and west-central Alberta. Now that data is being used to create the first GIS-based maps of lichens and other foods caribou eat during the summer months, as well as to map grizzly bear foods in northwest Alberta for the first time.

Field crews sampled over 700 transects distributed in intact forest stands, harvested stands, areas that have mountain pine beetle single-tree cut-and-burn control, and areas that have had mountain pine beetle kill. They've also sampled in areas where there have been wildfires to represent a range of management strategies that might be employed to address mountain pine beetle.

The project will give Caribou and Grizzly Bear Program partners and the Government of Alberta a new tool to inform land and resource management that considers mountain pine beetle and habitat for caribou and grizzly bears.

CONSIDERING CARIBOU IN LINEAR RESTORATION

One main focus of the Caribou Program is linear restoration, and current research is divided into two related projects—Analysis and Restoration of Seismic Cutlines in Southern Mountain and Boreal Caribou Range in West-Central Alberta, and Analysis and Improvement of Linear Features to Increase Caribou Functional Habitat in West-Central and Northwestern Alberta. The second project assessed both seismic lines and pipelines, and extended the Caribou Program study area into the Chinchaga caribou range in northwestern Alberta. Final analysis for these projects was completed in 2015–2016, and the result is a GIS map layer of seismic lines to help decision makers prioritize when making restoration decisions.

The projects looked at caribou, grizzly bear, and wolf response to regenerating seismic lines and pipelines using animal location GPS data, LiDAR measurements, and field data. This year, that information was combined with models of motorized human use of seismic lines, developed from field data collection over the past three years. This allowed researchers to develop a priority list of seismic lines for restoration, and to identify areas where human motorized use of linear features may counteract restoration efforts.

"We've provided that GIS file to our funders, and it might be used to direct restoration efforts in caribou ranges that minimize the overlap between caribou and predators," says Laura Finnegan, lead researcher, Caribou Program. "It might also lead to some human-use restrictions on these linear features to ensure restoration is successful."

The research has pointed to the need to assess which seismic lines are on a trajectory toward natural regeneration and which might need restoration. There is also a need to understand which seismic lines have food that might attract ungulates like moose, deer, and elk. This work will be undertaken in 2016–2017.

"We're continually refining and fine-tuning these lines for restoration based on animal response and, potentially, the probability of restoration success," says Finnegan.

The Caribou Program has been working with the University of British Columbia, the Government of Alberta, the University of Montana, the University of Alberta, the University of Calgary, and the fRI Research Grizzly Bear Program on the seismic line project. Results will be presented at the North American Caribou Workshop in May 2016.

MONITORING CARIBOU HEALTH

A two-year project that began this year builds on mortality surveys carried out by the Caribou Program since 2013. Researchers are working with the B.C. Boreal Caribou Health Monitoring Program, the Canadian Wildlife Health Cooperative, and the University of Calgary to carry out the first detailed health survey of caribou in Alberta. "By understanding where and why caribou are dying, we can further direct priorities for restoration within caribou ranges. We can also determine how health and pathogens might change in the future with climate change and the spread of alternate prey like moose, deer, and elk within caribou ranges," says Laura Finnegan, lead researcher, Caribou Program.

The information will help identify herds that might be at risk from disease outbreaks, and can be used to inform management decisions regarding alternative prey.

Researchers aim to attend caribou mortalities within the first 24 hours of receiving a mortality signal from a GPS collar. Once at the site, they conduct detailed necropsies and investigations of the site to determine which predator, if any, was involved. Biological samples are also collected to provide additional information on plausible cause of death, and are used to help establish important baseline data about the current disease and health status of caribou in Alberta. Additionally, fecal surveys during the winter months are helping researchers collect baseline pathogen data across the range of west-central caribou herds.

BLAST FROM THE PAST

In the 1980s, a large fish and forestry experiment was conducted in which two watersheds were harvested—one with streamside buffers and one without. One other watershed was not harvested in order to compare a variety of effects. The site was decommissioned in the '80s, but stream flow monitoring continued into the '90s, and this extended hydrology component of the historical Tri-Creeks study was never analyzed. This year, a PhD student went back to the area to undertake a new ecohydrology project.

Student Amy Goodbrand will be looking at the hydrologic change after mountain pine beetle attack near the stand-scale plots established during another project. That data will then be linked to the larger scale using the Tri-Creeks study's larger dataset and numeric modelling.

"It provides a nice opportunity to show how foothills watersheds respond to forest harvesting," says Axel Anderson, program lead, Water Program. "And then we'll try to provide timely information on mountain pine beetle rehabilitation as well as information on how the beetle might affect not only the stand but the watersheds in the region."

Over the past year, researchers have been re-establishing one-hectare plots for the stand-level study. These include a control, a harvested plot, and plots that were 50 percent and 100 percent killed with herbicide to simulate mountain pine beetle attack. The trees are now in the grey attack phase, and monitoring of hydrological changes has begun.

The project includes re-establishing a hydrologic station and two meteorological stations. Snow surveys were done in the spring of 2016 at the stand level and watershed scale to gather data.

Funded by the Forest Resource Improvement Association of Alberta (FRIAA) and the fRI Research Mountain Pine Beetle Ecology Program, the ecohydrology project will generate information on how forest harvesting may affect flows. (The previous research shows how this may affect population dynamics of rainbow trout in the region.) From the perspective of mountain pine beetle rehabilitation, it is intended to help identify actions that can be taken to mitigate any negative impacts of mountain pine beetle attack on watersheds.

"We'll try to provide timely information on mountain pine beetle rehabilitation as well as information on how the beetle might affect not only the stand but the watersheds in the region."

CAPTURING 25 YEARS OF RESEARCH AND ITS APPLICATION IN PRACTICE

The fiscal year 2016–2017 marks the 25th anniversary of the Foothills Model Forest program, which eventually evolved to become fRI Research. As its last project, the Forest History Program is documenting the organization's long and rich history. As information gathering continues, interviewers are unearthing stories of projects and programs that continue to make a difference to how land and resources are managed, in the foothills and beyond.

"In the 1990s, we had a rather large Terrestrial Wildlife Program. Part of that program was the development of habitat suitability indexes (HSIs) and habitat supply yield curves for key wildlife species on the model forest research land base," says Robert Udell, program lead. "I've learned that those HSI models, known as the Foothills Model Forest HSI Models, continue to be the go-to models for those species during environmental impact assessments for development projects in B.C."

Similarly, during the early years, a watershed assessment model was adapted from a model that came out of the U.S., and was calibrated for both the foothills and boreal landscapes of Alberta. Udell was told consultants in Alberta were using it as late as 2012–2013.

This year, lead authors Udell and Bob Bott, who were also involved in the Forest History Program's first book, *Learning from the Forest*, in 2003, focused on structuring the 25-year history and gathering information. The book will be built around the Canadian Council of Forest Ministers' six criteria of sustainable forest management: biological diversity, ecosystem condition and productivity, watershed and aquatics, global ecological cycles, economic and social benefits, and society's responsibility for sustainable forest management. Part one will be an overview of the model forest program, and part two will delve into the work that's been done, beginning with the Foothills Model Forest, in each of the six criteria. A final chapter will discuss what became of the original model forests and what they contributed while they were functioning.

Researching the book has highlighted the importance of fRI Research's work both historically and today. For instance, in 2002 the FireSmart–ForestWise project developed and implemented a community protection plan for the montane forest around Jasper with substantial public involvement and support. The project remains highly regarded, providing a template and example that have been adapted for communities outside the park. As they develop the project, the authors are identifying opportunities for improving access to fRI Research publications and reports by interested members of the public, researchers, practitioners, and future historians. These will be tracked and offered to the Board after the project is completed.

Information for the book is coming from interviews, questionnaires, annual reports, work plans, value reports, publications, and five-year business plans. The first draft is expected to be complete by early 2017, with publication scheduled for the latter half of 2017.

SHARING INFORMATION

For the last five years, the Mountain Pine Beetle Ecology Program has been bringing scientists and practitioners together by hosting its annual Mountain Pine Beetle (MPB) Research Forum. The two-day event is an opportunity for land and resource managers to learn about the latest research related to MPB, and how various elements of the research support operational decisions in the future.

"It enters that science/policy interface, offering a way to convey science to those who can use it in decision making as well as in the development of policy," says Keith McClain, program lead, Mountain Pine Beetle Ecology Program.

The research forum attempts to highlight key research findings across the program's numerous projects to spark discussion with attendees and broaden their understanding of the dynamics of MPB as well as to provide scientists with insights on operational and landscape changes caused by the beetle. This is particularly important in helping researchers develop new hypotheses about population dynamics of the beetle in novel habitats in the hybrid zone of jack pine and lodgepole pine, which may cause new concerns regarding the spread of the beetle eastward and northward.

Recently, the forum expanded its subject base to include rehabilitation research, which is focused on above-ground and below-ground changes to sites and stands impacted by beetle infestation. The forum will continue to provide opportunities for sharing research results with practitioners and policy makers.

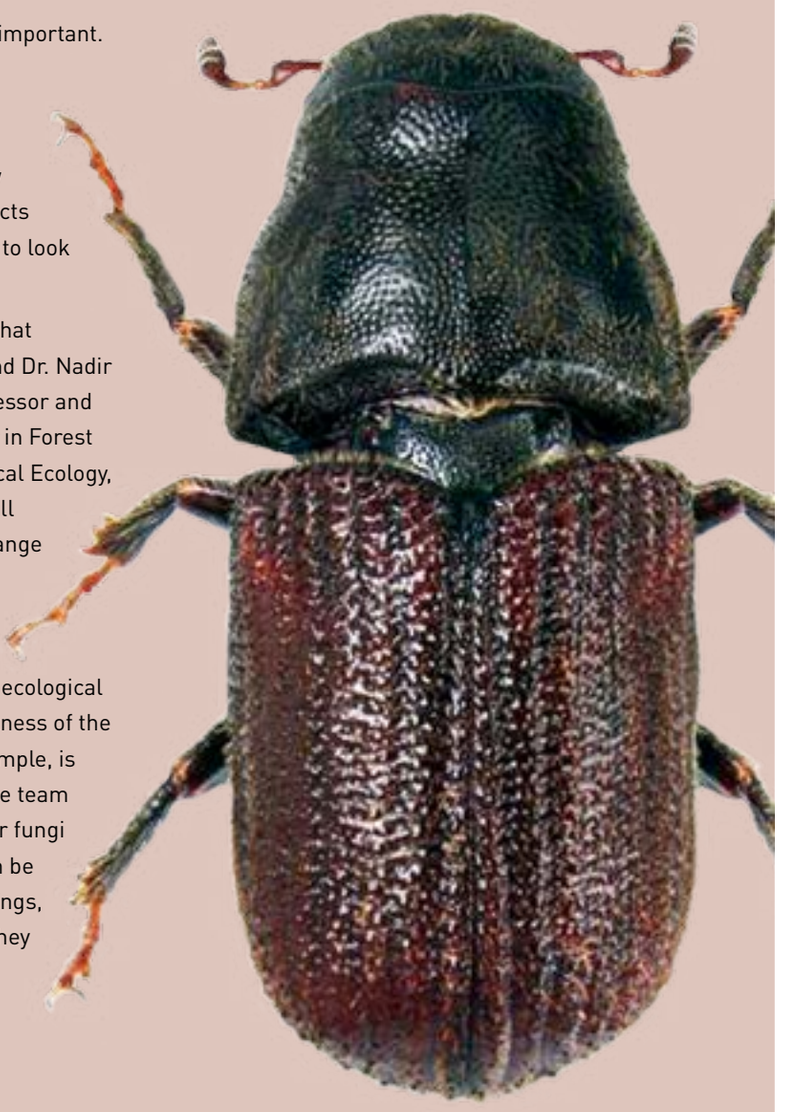
REHABILITATING AFTER MOUNTAIN PINE BEETLE

When it comes to the negative impact of mountain pine beetle attack on forest stands, researchers tend to focus on what's happening above the ground. This year, the Mountain Pine Beetle Ecology Program agreed to fund a project that's looking at the effects of the beetle below ground and how land managers can potentially mitigate those effects to improve seedling establishment.

In previous research, Dr. Justine Karst, assistant professor, Restoration Ecology, University of Alberta, and her team have shown that there is a pronounced shift in the composition of mycorrhizal fungi communities in the soils of beetle-killed stands. Mycorrhizal fungi act symbiotically with the root systems of trees, facilitating the absorption of water and nutrients. Karst has found that the change in composition negatively affects seedling establishment and has demonstrated in a greenhouse experiment that seedlings do worse when colonized by fungi from beetle-killed stands compared to when they are colonized by fungi from healthy pine stands.

"There are a lot of important below-ground changes following tree mortality that can then have implications for above-ground metrics in the future," says Karst, explaining why research in this area is important. "The change in this little fungal community can affect seedling establishment, and how seedlings establish affects what the forest is going to look like down the road."

In a three-year project that begins in 2016, Karst and Dr. Nadir Erbilgin, associate professor and Canada Research Chair in Forest Entomology and Chemical Ecology, University of Alberta, will explore whether the change in fungal community composition is seen in all or many beetle-killed stands or if other ecological factors, such as the wetness of the specific ecosite, for example, is influencing the shift. The team will also look at whether fungi from healthy stands can be used to inoculate seedlings, protecting them when they are transplanted into beetle-killed stands.



"There are a lot of important below-ground changes following tree mortality that can then have implications for above-ground metrics in the future."

A FOREST GROWTH ORGANIZATION
OF WESTERN CANADA PROJECT fgrow.fRIresearch.ca

EXPLORING ALTERNATIVE HARVEST TREATMENTS

The strip cut understory protection trial (SCUP) is exploring one way to potentially get more harvestable volume from the same land base. Traditionally, operators harvesting aspen haven't left the spruce understory intact; SCUP is helping answer the question "What if they did?"

Strip cut understory harvesting is a treatment in which most of the aspen overstory is removed and the spruce understory is left behind to continue growing. SCUP plots include an extraction area where all the trees are removed to allow room for harvesting machinery. The machinery is then used to reach into a removal area and take out the aspen while carefully avoiding the understory spruce. The project is monitoring the response of the understory spruce to overstory removal.

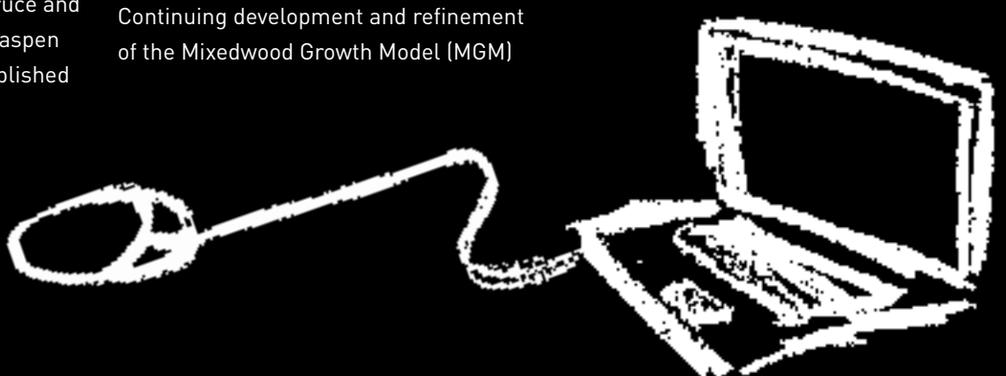
"With this kind of approach you are retaining spruce that can be upwards of 20 years old, so quite a lot of growth has already happened on these trees," says Sharon Meredith, director, Forest Growth Organization of Western Canada (FGrOW). "You are able to get a rotation spruce crop much sooner than you could get harvestable trees with clear-cutting."

There is increased interest in this sort of harvesting now that more companies have joint forest management areas. Shared management creates opportunities to focus on both coniferous and deciduous harvest levels. This new approach provides more incentive for trying new approaches to harvesting. The SCUP trial data is being incorporated in the University of Alberta's Mixedwood Growth Model so the association's members can use it to make predictions about how such stands will grow.

Expanding FGrOW's Partnership

In January 2016, the Western Boreal Growth and Yield Association (WESBOGY) became an FGrOW project team member. This move formalizes a collaborative partnership with the University of Alberta as well as with WESBOGY members. Ongoing initiatives under FGrOW's WESBOGY project team include the WESBOGY Long-Term Study (LTS), which started in 1990 and looks at spruce and aspen growth in stands with different aspen and spruce densities. Plots were established in recently harvested areas, with spruce being planted at two densities. Aspen were thinned to different densities at about age five. The earliest of the 11 LTS installations have now been monitored for more than 25 years. Trial installations are located in Alberta, British Columbia, Manitoba, Saskatchewan, and the Northwest Territories.

Continuing development and refinement of the Mixedwood Growth Model (MGM) is another major WESBOGY project. Data from the LTS, as well as from other trials and permanent sample plots, were used to develop and improve MGM's projections of how stands grow over time. Members use MGM to develop yield curves for mixedwood stands for use in long-term plans.



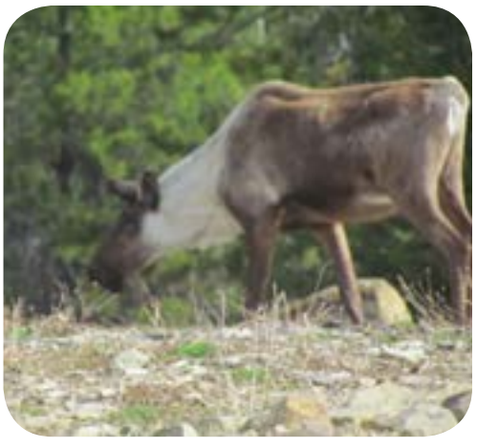
A FOOTHILLS LANDSCAPE MANAGEMENT FORUM PROJECT
www.cariboupatrol.ca | flmf.fRIresearch.ca

EXPANDING THE CARIBOU PATROL

The Caribou Patrol Program completed its fourth year of working to reduce mortality within the A la Peche caribou herd as it crosses Highway 40 between Hinton and Grande Cache each spring and fall. An initiative of the Aseniwuche Winewak Nation (AWN), the program has been very successful and has grown to engage and educate the public in a variety of ways. Now AWN is building on that success, applying for a multi-year commitment from Environment Canada.

"Caribou Patrol is a building block for the engagement of Aboriginal people in the region on caribou recovery. AWN has a vision that they would like to turn that program into something much larger, getting involved in other areas such as monitoring, caribou recovery, population management, educating industry and locals, and restoration," says Wayne Thorp, managing director, Foothills Landscape Management Forum. The forum provides administrative and geographic information system support for the patrol.

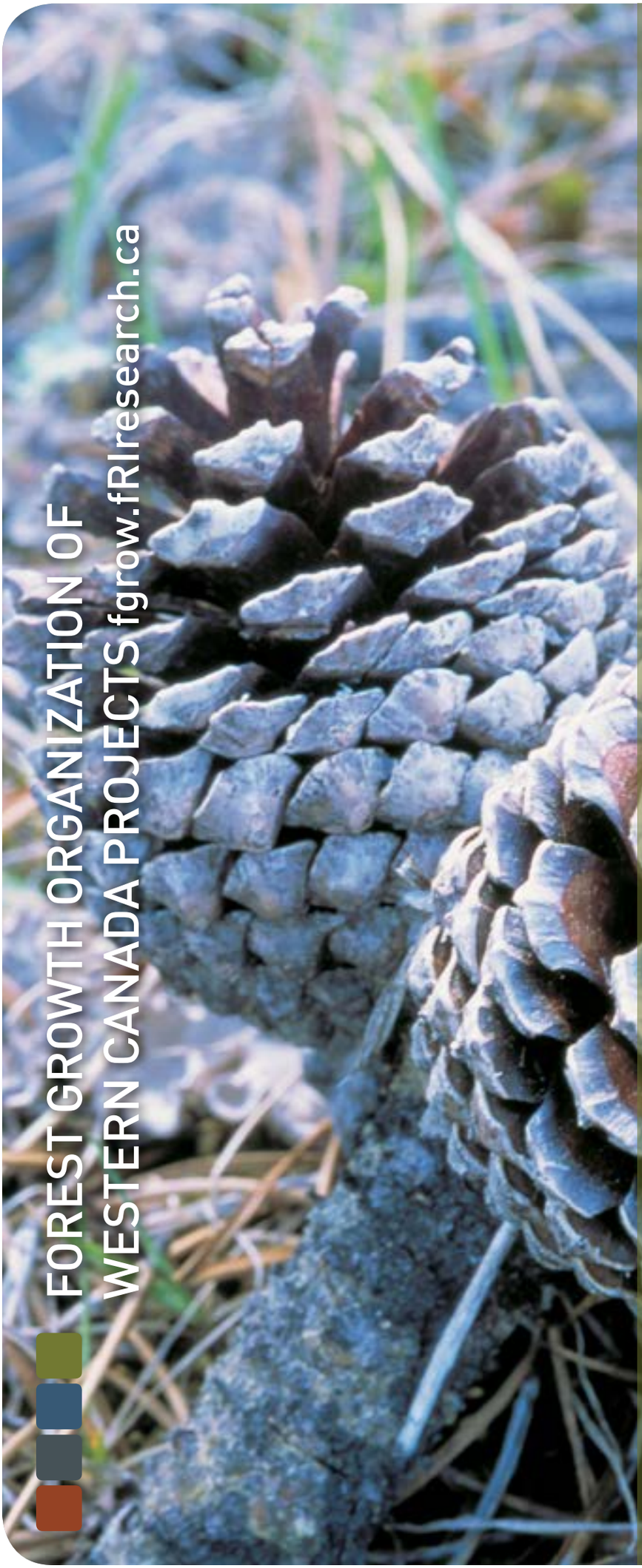
AWN has signed a memorandum of understanding with the Minister of Environment, setting the stage for moving forward and working with government on caribou recovery strategies. A multi-year agreement will reduce annual fiscal constraints, allowing AWN to engage indigenous people in the local community and work on a full spectrum of caribou recovery strategies.



Activities

A number of activities are carried out by the Caribou Patrol Program to help protect the A la Peche herd. These include:

- Warning motorists when caribou are likely to be on specific roads
- Collecting data from caribou collars and sightings by the public
- Engaging the public through email, text, phone, website, Twitter, Instagram, or Facebook
- Providing passports that can be used to record information about caribou sightings, which can then be passed to the Caribou Patrol
- Providing EduKits to schools, industry, and the public
- Giving presentations at local schools



FOREST GROWTH ORGANIZATION OF WESTERN CANADA PROJECTS fgrow.frIresearch.ca

BRINGING PEOPLE TOGETHER

The goal of tree improvement is to select for and breed trees with more desirable characteristics. Tree improvement work in Alberta is primarily aimed at producing faster-growing trees, with more recent focus on resilience to insects, disease, and climatic stress. But while tree improvement has gone on for years, information is lacking on how it is actually translating into yields though operational forestry practices, and whether the gains are high enough to warrant the investment.

"We know that trees are taller, but we don't know how this relates to volume at rotation," says Sharon Meredith, director, Forest Growth Organization of Western Canada (FGrOW). "Additionally, tree improvement test sites tend to be controlled for vegetation competition and other factors—they're not the conditions you would find if you were doing regular reforestation."

The Realized Gain Trial project started by Tree Improvement Alberta (TIA), which joined FGrOW as a project team in April 2016, is trying to quantify how improved stock will grow when it is planted in normal circumstances after harvesting. Funded through FRIAA open funds, the three-year project will see the establishment of a number of plots throughout the province that will allow researchers to directly compare the growth of planted trees from wild seed to that of trees that come from improved seed.

"That's one of the really exciting things about having TIA as part of FGrOW. It's going to facilitate the tree improvement people and growth and yield people working together to provide answers that are really important to our members. It's pretty hard to keep justifying continued investment if you can't give some tangible benefits for increased allowable cuts," says Meredith.

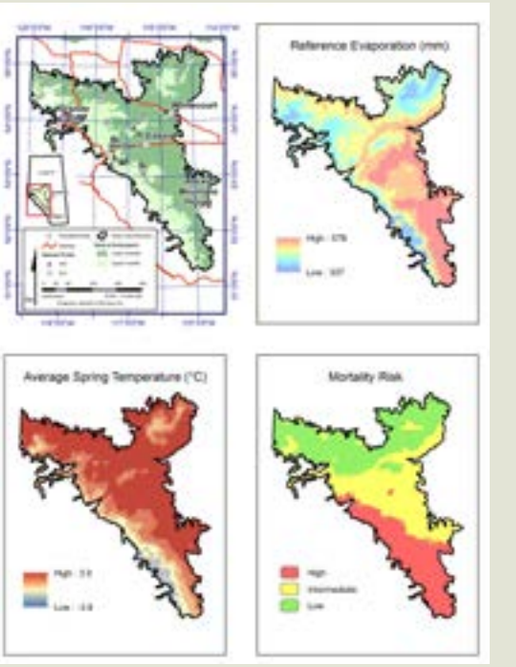
YEARS OF INFORMATION

Started in 2000 with the establishment of 408 plots across the Alberta foothills, the Regenerated Lodgepole Pine Trial has now contributed years of data to help forestry companies and government understand the effect of planting density, site productivity factors, and silviculture treatments on the growth of lodgepole pine in post-harvest regenerating stands. The measurement data has been used to develop a model, the Foothills Reforestation Interactive Planning System (FRIPSY), which allows foresters to input initial stand conditions and project forward to determine expected stand conditions at year 14.

"There is a lack of understanding of how young managed stands grow. This tool helps silviculture foresters make decisions about how to treat their stands and what they can expect the outcomes of the treatments to be," explains Sharon Meredith, director, Forest Growth Organization of Western Canada (FGrOW).

The data is also being used to look at the impacts of climate on lodgepole pine mortality and root disease. This work helps foresters make decisions about the silviculture treatments with the best chances of reforestation success on different sites.

FRIPSY is primarily used by FGrOW members operating in the foothills pine regions, but it may have wider application. "Because we can share data and knowledge within our organization, we think there is a lot of potential to apply the techniques used in developing this model to other tree species," says Meredith.



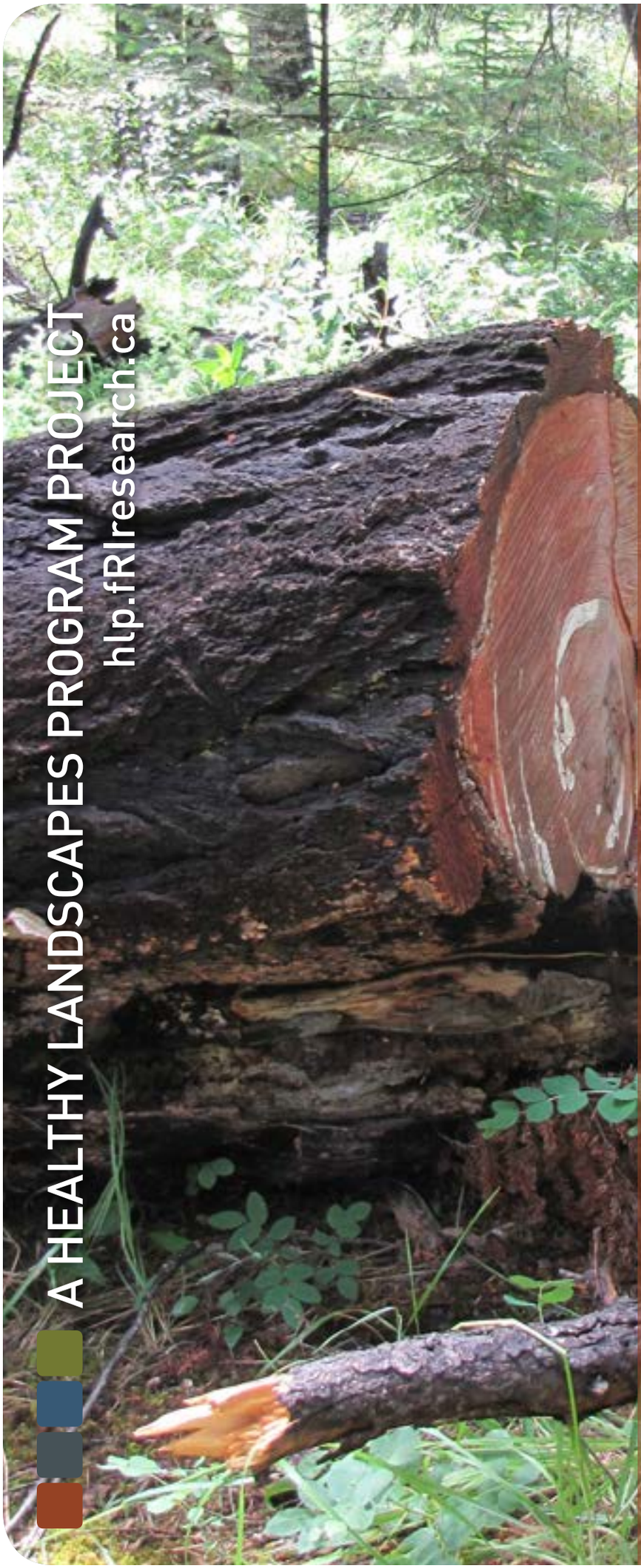
COLLABORATION BRINGS BENEFITS

The Provincial Growth and Yield Initiative is the first undertaking of its kind in Alberta and possibly in Canada. By joining forces and pooling their permanent sample plot (PSP) data, the province's forestry industry is reducing the workload on individual forestry companies while increasing the amount of data available to those developing growth and yield models.

Over three years, FGrOW has been working to develop standards for collecting PSP data and has assigned each of the participating organizations the number of plots it must maintain; this number is based on the company's annual allowable cut. Companies must also have specific types of plots based on the natural subregions and forest cover types on their contributing land base.

Participating companies load PSP data into a central database, and all contributors as well as those developing models have access to it. If they wish to do so, companies can contribute additional PSP data that is only available to the modellers.

"The forestry companies see this as a great opportunity because participating in this program reduces individual companies' requirements for establishing and measuring PSPs. By pooling data and cooperating, members will get not only better growth and yield models but also more efficient growth and yield plans," says Sharon Meredith, director, FGrOW.

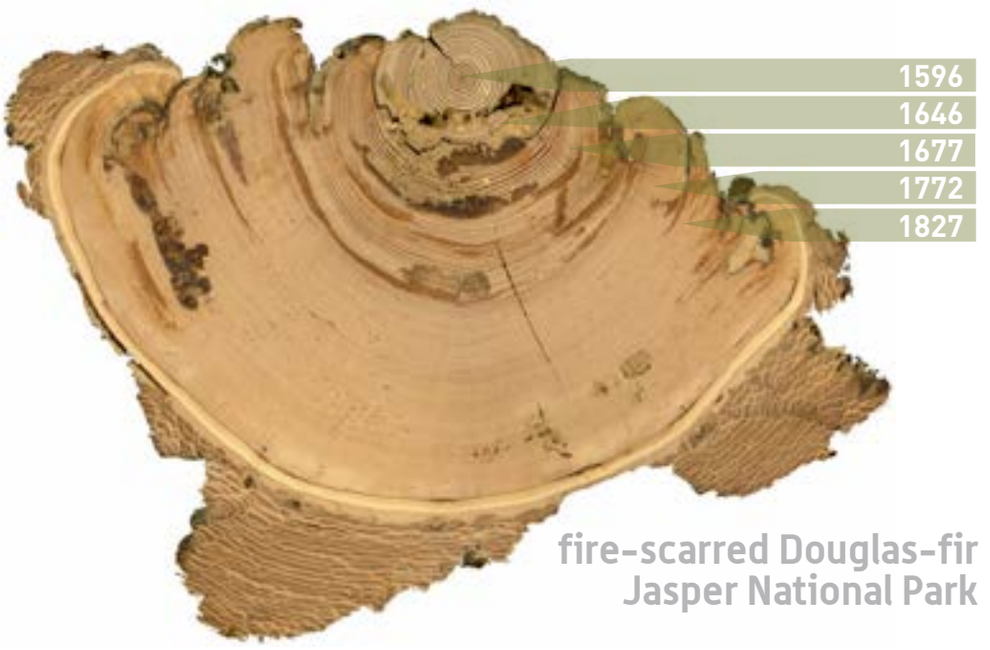


A HEALTHY LANDSCAPES PROGRAM PROJECT
hlp.fRIresearch.ca

FIRE, WATER, AND CLIMATE

The multi-year Fire, Water, and Climate Project is almost complete, and researchers have found what they hypothesized to be true—in at least some parts of the foothills, the fires that raged historically varied in their degree of severity. The project brings forth compelling data that could mean changing the way we look at the role of land management activities and illustrates the importance of asking the right questions.

The Fire, Water, and Climate Project is the direct result of an earlier Healthy Landscapes study, started almost 20 years ago, that looked at historical wildfire patterns. The findings challenged the long-held assumption that all fires in the foothills were high-severity, stand-replacing fires that occurred every 100 to 120 years.



fire-scarred Douglas-fir
Jasper National Park

"We started looking at individual historical fires that burned in the foothills and found that some of them had very high levels of residuals. At the same time, a repeat photography study showed pictures of the foothills from 100 years ago, and there were very different ecosystems than there are today, with areas of very low-density trees and open grassland areas. It wasn't the blanket of highly dense trees we see today," says David Andison, program lead, Healthy Landscapes Program.

This unexpected result prompted researchers to ask a new question: Could parts of the foothills be subject to a mixed fire regime, where smaller cool fires mix with larger hot ones? This spawned a small pilot study six years ago in the Berland area, just east of the Willmore Wilderness Park. The fire scars found after intensive field sampling confirmed that there were indeed a series of lower-intensity fires occurring more frequently than previously thought. This result in turn generated enough interest to expand the study to a larger area of the northern foothills, which is now almost complete.

In the Fire, Water, and Climate Project, tree rings and lake sediment cores were used to track what happened on the landscape over time. "We could go back about 300 years using tree rings and up to 2,000 years looking at sediment cores," explains Andison. "What we found was that in a couple of different places in Alberta—in Jasper and just outside in the Berland—but also at similar study sites in B.C. on the western side of the Rockies, there was fairly significant evidence of lower-severity fires that wasn't obvious unless you were looking for it." The lower-severity fires were occurring every three to five decades and didn't kill all the trees, but simply thinned out the forest.

The implications are profound, as they could mean that fire control has been creating dense, pure conifer forests when Mother Nature would have created mixed-density, mixed-species stands that would have burned at a much lower severity level. The result may be a forest that is much simpler than it was historically, which could translate into loss of habitat types, lower resilience to the impacts of climate change, and an increased risk of high-severity fires that threaten lives, communities, and properties.

The findings also challenge some long-held assumptions about forest and land management activities. "If there is a desire to restore parts or all of the foothills to their historical conditions, we will need to become more adept at using disturbance tools," says Andison. "Reintroducing fire to the current landscape through prescribed burns or wildfire management will be challenging because of the heightened fire risk levels associated with vast expanses of dense conifers. On the other hand, partial harvesting techniques can help reintroduce fine-scale complexity, particularly when used in conjunction with prescribed fire."

Despite making significant progress on understanding historical fire regimes in the foothills, we still lack many of the details. The Healthy Landscapes Program has recently received funding for the next phase of research, which will study the partial burn phenomenon in the montane and subalpine forests between the U.S. border and Highway 1 and allow for the creation of a predictive modelling tool—the first of its kind in the world.

Ensuring Strong Science

Four Canadian universities are involved in the Fire, Water, and Climate Project. The participation of the University of British Columbia, Guelph University, Brock University, and Western University gives the study a strong foundation of scientific credibility in the form of published peer-reviewed literature.

"It means we can stop arguing about the knowledge," says Andison of the significance of the involvement of multiple universities. "The science is sound, it's solid, and now we can start considering implications, and if or how we might want to respond."

Watch for New Tools Coming Soon

Over the past year, the Healthy Landscapes Program has been diligently working to launch a new website—lessonsfromnature.ca—as well as an online course. The website will serve as a place to access objective, professional, unbiased information on ecosystem-based land management and healthy landscapes approaches.

The healthy landscapes course is being created with the Woodland Operations Learning Foundation (WOLF). It's primarily for land managers and planners, including those in the oil and gas industry, who want to design disturbance events that are more ecosystem friendly. Watch for both tools in 2016.

A MOUNTAIN PINE BEETLE ECOLOGY PROGRAM PROJECT

mpbep.fRIresearch.ca

UNDERSTANDING THE FOREST'S ABILITY TO REGENERATE AFTER MOUNTAIN PINE BEETLE

How much help do forest stands that have been attacked by mountain pine beetle need in order to regenerate and become healthy stands again?

That's a question explored by those involved in Beyond Beetle, a five-year project with several components. Two of the interesting projects under Beyond Beetle involve looking at whether natural regeneration of pine or other trees is occurring on sites killed by mountain pine beetle, and testing an experimental partial-harvesting method for sites that have been partially killed by the beetle.

This year was the second year of the natural regeneration part of the project. Researchers visited sites to collect samples and determine whether tree regeneration is occurring. If it is, they are also making note of which tree species are growing.

"It will give an idea of the site types that are not going to regenerate naturally so decisions can be made about whether and how to treat those sites to get them to regenerate," says Ellen Macdonald, a professor of Forest Ecology at the University of Alberta and one of four principal investigators involved in Beyond Beetle. "It will also provide information that can be used in models for projecting the future growth and yield of these stands."

So far, the results indicate very poor natural regeneration of pine, with a number of sites showing no natural regeneration after six to eight years. Macdonald says that competing vegetation appears to be part of the problem. Seed limitation is another significant challenge.

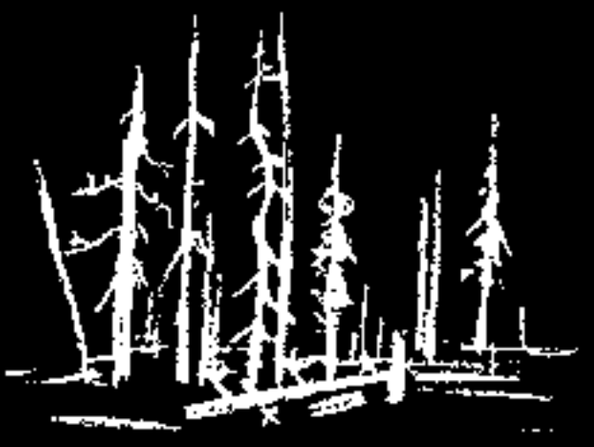
"In a natural situation, the cones on the pine are going to stay closed until a fire comes along, because they require a lot of heat to open them," she explains. "They may open if the sun is shining on them and can get them warm enough, but typically it will take a number of years before they will open on the tree and rain the seeds down."

Macdonald's team has found more natural regeneration on poorer, drier sites, likely due to less competition and the presence of sunlight. The highest density of trees naturally regenerating on the sites was black spruce or white spruce, indicating that the sites may be converting to another species.

A companion study exploring innovative regeneration techniques involving partial harvesting is being conducted north of Grande Prairie, Alberta. This larger project involves harvesting some residual trees in partially killed stands while leaving others, potentially providing a management option when it's not feasible to completely harvest a stand. Macdonald's team is monitoring the natural regeneration of pine and spruce at those sites. This was the first year of this portion of the project.

Beyond Beetle is being funded by fRI Research, Alberta Innovates Bio Solutions, the Forest Resource Improvement Association of Alberta, and the Government of Alberta and is a collaboration with the Canadian Forest Service. "It's a real collaboration between different organizations that are interested in finding out what the future is going to look like for these types of forests and trying to do the science and research that's necessary to make wise decisions about their management," says Macdonald.

"In a natural situation, the cones on the pine are going to stay closed until a fire comes along, because they require a lot of heat to open them."



TESTING INNOVATIVE TOOLS

Technology can be very useful for understanding and managing environmental footprint and degradation, but it must be designed to work in Alberta's unique environment. In a project funded by the Forest Management Branch of Alberta Agriculture and Forestry and FRIAA with Canfor Corporation, Grande Prairie, researchers are determining whether a NetMap tool developed in the U.S. accurately predicts road erosion, which can cause problems related to sedimentation pressures on fish.

The first phase of the project was completed this year, with the Water Program funding the underlying data structure development. Over the next two field seasons, K. Jared Fath, a University of Alberta PhD student, will collect data to validate the product.

"Generally we have indicators like road densities and, above a certain threshold, there would be an issue. Our hope is to help move beyond the indicator by validating tools that can pinpoint where sediment is coming from and help partners better manage pressures on watershed values," says Axel Anderson, program lead, Water Program.

TELLING ALBERTA'S LONG-TERM HYDROLOGY STORY

Long-term research sites are critical for understanding impacts on forest hydrology because of the necessity of first understanding the natural range of variability before looking at the effects of harvesting or other anthropogenic activities. Over the past five decades, much work has been done in Alberta, but most of the research conducted during the 1960s, '70s, and '80s was not published in mainstream journals.

"These long-term research sites that have run for multiple years are at the heart of forest hydrology," says Axel Anderson, program lead, Water Program. "With climate change, they are becoming very valuable because they can help us understand how different climate cycles and forest change will affect stream flow, temperature, or other important stream attributes."

Long-term watershed studies have led to the development of hydrologic models, knowledge of the impacts of natural disturbances, outdoor laboratories, information for managing natural disturbances, and more. In Alberta, many of the early research sites were shut down in the 1980s but were restarted with other partners. However, there is a lack of coordination when it comes to watershed forest hydrology research in the province because not everyone working in the field is aware of what has been done or is going on today.

One of the Water Program's early objectives was to provide coordination to forest hydrology research. This project is an effort to compile and summarize what has been done historically and what's currently being done, and get the information into the hands of those who can use it. The Water Program worked with these groups to summarize the research sites in a *Forestry Chronicle* publication. This is one small step toward understanding the objectives of past and present sites.

PROJECT LIST
FOR THE 2015–2016 WORK PLAN YEAR

The following activities and projects were undertaken by fRI Research programs and associations in 2015–2016.

Programs

Alberta Land-use Knowledge Network

- LuKN Resource Library Development and Knowledge Sharing
- Content Creation for landusekn.ca Resource Library and YouTube Channel
- LUS Regional Plan Compliance Online Course

Caribou Program

- Analysis and Restoration of Seismic Cutlines in Southern Mountain and Boreal Caribou Range in West-Central Alberta
- Direct and Indirect Response of Caribou to Dynamic Forest Landscapes (year 3 of 3)
- Analysis and Improvement of Linear Features to Increase Caribou Functional Habitat in West-Central and Northwestern Alberta
- Potential Impacts of Mountain Pine Beetle and Management Actions on Grizzly Bear and Caribou Populations in West-Central Alberta
- Assessing Disease Prevalence and Caribou Health in West-Central and Northwestern Alberta
- Caribou Behaviour and Success in Relation to Oil and Gas Development: Are All Disturbances Created Equal?

Forest History Program

- Northern Rockies Ecotour App
- A Logging History of the Whirlpool Valley, Jasper National Park
- 25-Year History of fRI Research

Geographic Information Systems Program

- Online Mapping and Visualization
- Tool Development and Customization

Grizzly Bear Program

- Determining the Importance of Grizzly Bear Predation on Southern Mountain Caribou Populations
- Research to Support Recovery and Long Term Conservation of Grizzly Bears in Alberta
- Collecting Scat with Citizen Science to Monitor Grizzly Bear Populations

Impacts of New Forestry Approaches on Grizzly Bear Habitat Use and Movement

Yellowhead Grizzly Bear Population Inventory

Healthy Landscapes Program

Foothills Fire, Water, and Climate

Natural Patterns Short Course

Natural Wildfire Patterns – Phase IV

Historical Event Patterns

NEPTUNE DSS

OnFire Research Database

LANDWEB Western Canada Boreal Landscape Dynamics

Healthy Landscapes Demonstrations

Natural Wildfire Patterns – Phase V

Dedicated Healthy Landscapes Communications & Extension Initiative

What's EBM? – What Does a Healthy Landscapes Approach Look Like?

Mountain Pine Beetle Ecology Program

Cold Tolerance of Mountain Pine Beetle: Impact on Population Dynamics and Spread in Canada

Development of Monitoring Tools to Detect Mountain Pine Beetle at Low Densities on the Eastern and Northern Edge of Beetle Expansion into Saskatchewan and Northwest Territories

Tria-Net: Dynamics of Endemic Mountain Pine Beetle Populations in Novel Pine Habitats

Stand Dynamics After Mountain Pine Beetle Attack

Assessing the Effectiveness of Alberta's Forest Management Strategies Against Mountain Pine Beetle

Impacts of Mountain Pine Beetle on Hydrology and Vegetative Redevelopment in Lodgepole Pine Forests of West-Central Alberta: Phase II – Ecological Responses in the Grey Attack Stage

Beyond Beetle: Natural and Facilitated Lodgepole Pine Regeneration after Mountain Pine Beetle Outbreaks in Alberta

Stand Dynamics after Mountain Pine Beetle Attack

Comparison of Understory Burning and Mechanical Site Preparation to Regenerate Lodgepole Pine Stands Killed by Mountain Pine Beetle

Water Program

Watershed Cumulative Effects Assessments for the Green Area: Groundwater/Surface Water Interaction in a Headwater Catchment in the Eastern Slopes: Implications for Hydrological Response of Forestry and Forest Disturbance

Data Management and Innovative Support for Long-term Watershed Research: Walt Jeffrey

Watershed Cumulative Effects Assessment for the Green Area: Understanding Groundwater/Surface Water Interactions for the Foothills Including in Cumulative Effects for Drinking Water Source Protection

Impacts of Mountain Pine Beetle on Hydrology and Vegetative Redevelopment in Lodgepole Pine Forests of West-Central Alberta: Phase II – Ecological Responses in the Grey Attack Stage

Riparian Review: A Review of State of Science and OGR for the Operations Division of the Forest Management Branch, Alberta Agriculture and Forestry

Tactical and Strategic Implications of Mountain Pine Beetle Rehabilitation Strategies on Alberta Forest Values

Associations

Foothills Landscape Management Forum

Caribou Patrol: Aboriginal Participation in Caribou Recovery Strategies

Integrated Land Management Plan and Its Linkage to ESRD Land Use Framework – Subregional Plans

Data Management

Foothills Stream Crossing Partnership

2015 Summer Stream Crossing Inspections

Ongoing Improvements to Database and Online Tool

Watershed Remediation Planning and Annual Reporting to Regulators

Forest Growth Organization of Western Canada

Cutblock Inventory Classification Subcommittee

Strip Cut Understory Protection Trial

Dynamic Aspen Density Experiment

Establishment of PSP Network to Monitor Stand Dynamics and Establish Yield Curves for Stands Killed by Mountain Pine Beetle

Stand Dynamics After Mountain Pine Beetle Attack

Provincial Growth and Yield Initiative (PGYI)

Cooperative Management of Historic Research Trials

Regenerated Lodgepole Pine Project

Stand Dynamics Following Canopy Removal and Release of Advance Regeneration in Aspen and Lodgepole Pine Dominated Stands

Improved Estimation of Tree Mortality and Stand Breakup

Improving Site Index Estimation for Alberta

Tree Improvement Alberta

Climate Change and Emissions Management Corporation (CCEMC) Tree Adaptation Risk Management Project

The Geographic Information Systems Program and Communication Services provide support services to all programs and associations at fRI Research.

SUMMARY OF FINANCIAL STATEMENTS

REVENUES $6,601,432

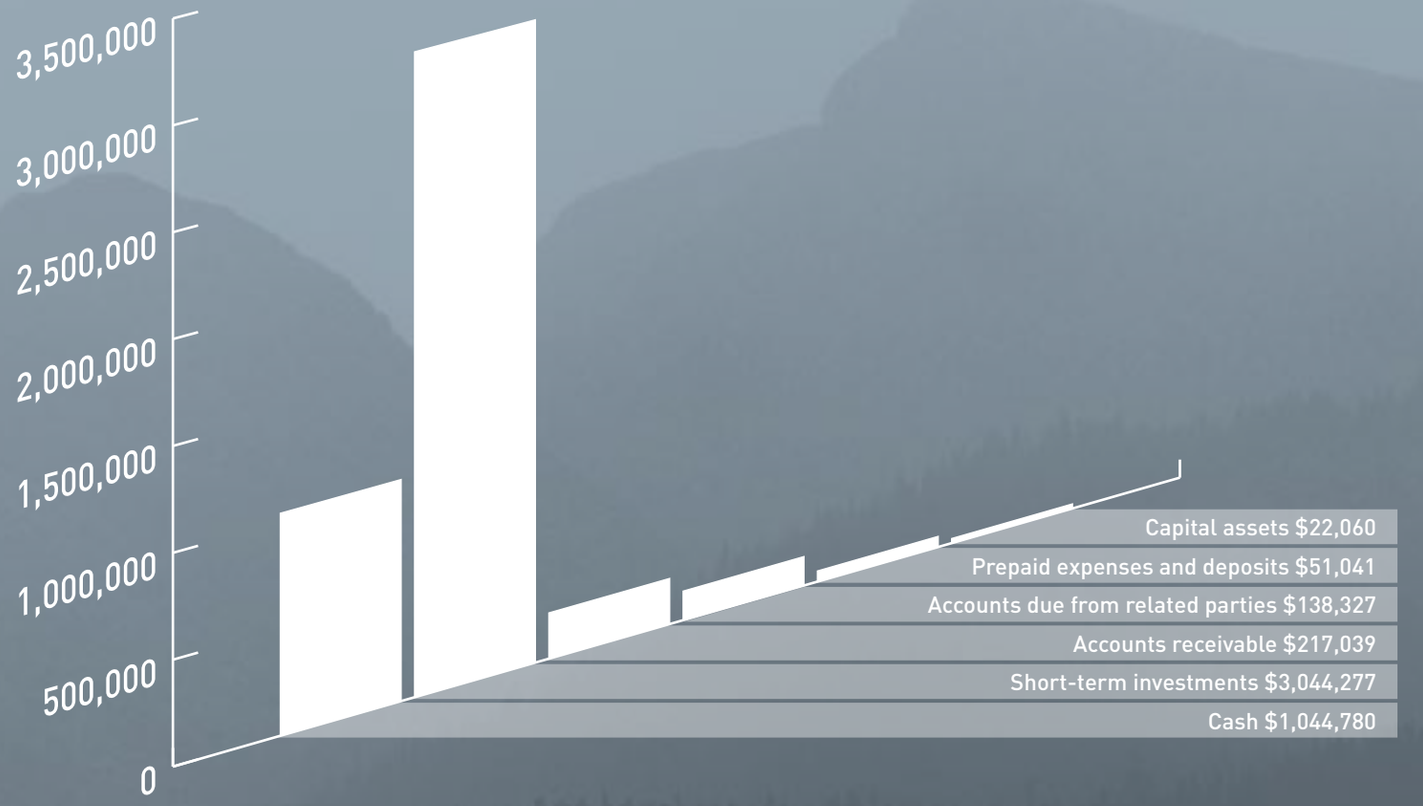
Contributions:

- Government agencies $1,981,078
- Corporate $1,586,240
- Non-profit entities $2,862,068
- Universities $38,071
- Interest income $34,029
- Other income $99,946

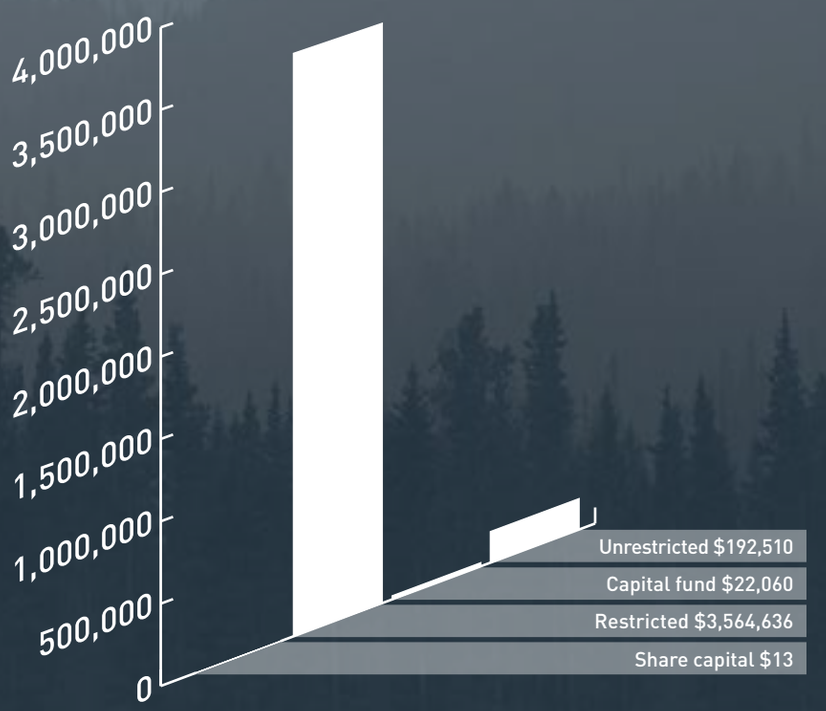
EXPENSES $6,557,694

- Amortization $12,354
- Bank charges and interest $3,984
- Provision for doubtful accounts $15,472
- General operating expenses $1,088,455
- Wages/employee benefits $1,933,014
- Subcontracts $3,504,415

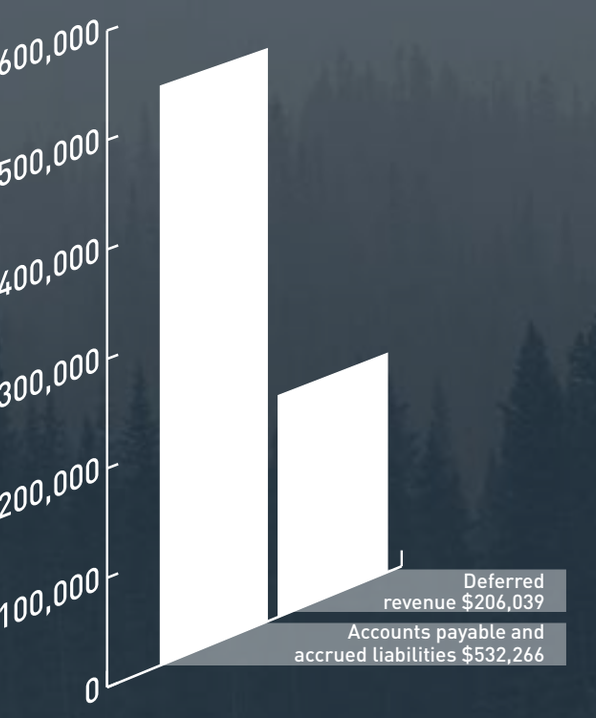
ASSETS $4,517,524



FUND BALANCE $3,779,219



LIABILITIES $738,305



BOARD OF DIRECTORS 2015–2016

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Dr. Rick Bonar, Chief Biologist – Hinton Wood Products, a division of West Fraser Mills Ltd.

Mark Cookson, Woodlands Manager – Blue Ridge Lumber Inc., a division of West Fraser Mills Ltd.

Wendy Crosina, Manager – Wildlife Ecology, Weyerhaeuser Company Limited

Garth Davis, Senior Coordinator – Land Management, ConocoPhillips Canada

Steve Donelon, Assistant Deputy Minister – Parks Division, Alberta Environment and Parks

John Doornbos, Manager – Operational Programs, Northern Forestry Centre, Canadian Forest Service, Natural Resources Canada

Cory Enns, Director – Policy and Capacity, Alberta Indigenous Relations

Greg Fenton,[2] Superintendent – Jasper National Park, Parks Canada

Alan Fehr,[3] Superintendent – Jasper National Park, Parks Canada

Earl Graham, Director – District 2, Alberta Association of Municipal Districts and Counties

Dr. Ken Greenway, Director – Strategic Forestry Initiatives Section, Alberta Agriculture and Forestry

Stan Holmes, General Manager Alberta Timberlands – Weyerhaeuser Company Ltd.

John Kerkhoven, Senior Advisor – Foothills Gas, Suncor Energy Inc.

Jesse Kirillo, External Relations – Repsol Oil and Gas Canada Inc.

Dr. Vic Lieffers, Department Chair and Professor – Department of Renewable Resources, University of Alberta

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Rachelle McDonald,[4] Executive Director – Aseniwuche Winewak Nation

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Salman Rasheed,[6] Manager – Resource Conservation, Jasper National Park, Parks Canada

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Darren Tapp, Executive Director – Forest Management Branch, Alberta Agriculture and Forestry

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Erica Sivell,[12] Treasurer – fRI Research; Divisional Controller - Hinton Wood Products, a division of West Fraser Mills Ltd.

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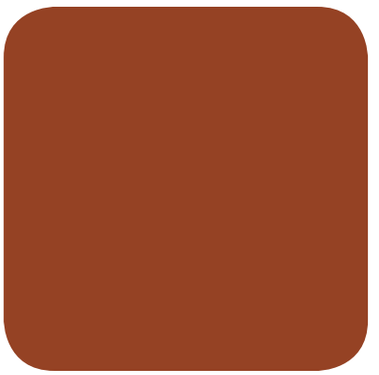
Garry Power, Divisional Controller – Hinton Pulp, a division of West Fraser Mills Ltd.

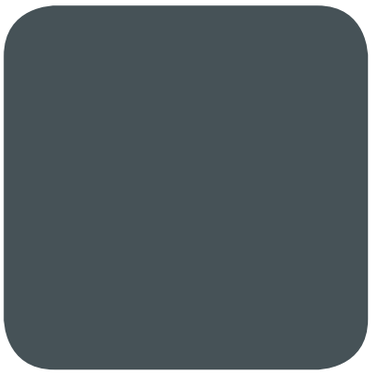
Bill Tinge, General Manager – fRI Research

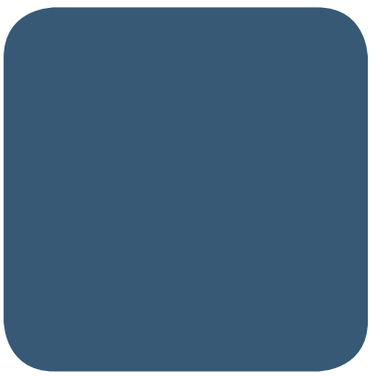
1 Resigned October 2015
2 Resigned December 2015
3 Appointed March 2016
4 Resigned December 2015
5 Appointed December 2015
6 Appointed March 2016
7 Appointed October 2015
8 Appointed December 2015
9 Appointed March 2015
10 Resigned December 2015
11 Resigned March 2016
12 Appointed March 2016

Photo Credit: Skyler DesRoches

fRI Research
Informing Land & Resource Management







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Questions? Comments on this annual report?

Please contact us at:
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