



Healthy Landscapes Program Information Exchange Forum 2014

The fRI Healthy Landscapes Program (HLP) held an information forum on December 8 and 9 to provide an opportunity for practitioners, researchers, students, government, and industry decision makers to present and discuss cutting-edge natural pattern research. Themed panel discussions allowed for communication about how this knowledge can be used to improve land management activities in western boreal Canada.

The forum was hosted in the Maple Leaf Room at the Lister Conference Centre at the University of Alberta. The introductions and objectives were given by Dr. Rick Bonar, president of fRI, and Bill Tinge, general manager of fRI. Presentations focused on relevant and timely topics such as the relationship between climate, fire history, and water quality, and modelling historical levels of woodland caribou habitat.

This information forum has given participants plenty of opportunity to interact with speakers and engage in discussions and debates. Dr. David Andison, HLP lead, explains that often the best engagement happens after speakers leave the stage. The agenda for the event therefore divided the speakers into six major themes and included a panel-led discussion for each. Andison says, "It is difficult not to be humbled whenever more is revealed about how our forested ecosystems function, which makes us take a step back and reconsider some of our assumptions about what it is we are managing, why, and how."

The mission of the HLP is to partner with companies, non-governmental organizations, governments, and academics interested in exploring how we can design landscapes that are fully sustainable. This information forum provided the opportunity to strengthen this focus by sharing science-based research that is finding answers to questions about the complexity of managing boreal landscapes in the west, and the importance of ecosystem-based approaches, leading naturally to questions about changes in roles, responsibilities, policies, and practices. The HLP has been researching and testing ecosystem-based principles for nearly 20 years in the western boreal forest, and the forum featured its most recent research activities, including work done on wildfire

patterns, climate, habitat levels, and water quality, both at particular sites and at regional scales.

For more information and to register, go to <https://foothillsri.ca/event/healthy-landscapes-information-forum-2014>.



Mistohay, 2001



Mistohay, 2014

INSIDE: AFGO's Provincial Growth and Yield Initiative
Caribou Program Summer Fieldwork
Mountain Pine Beetle Rehabilitation Information Exchange Forum 2015
Knowledge Transfer at Conferences
Grizzly Bear Program Summer Fieldwork
New Peer-Reviewed Papers from the Grizzly Bear Program
A Summary of the Value Reports

Mountain Pine Beetle Rehabilitation Information Exchange Forum 2015

Planning is under way for the Mountain Pine Beetle Rehabilitation Information Exchange Forum 2015. It will be held April 22 and 23 in the Maple Leaf Room at the University of Alberta Lister Conference Centre.

This year, the forum will have an expanded agenda. Day one will allow participants to hear about and discuss current research on mountain pine beetle (MPB) biology and management. Day two will focus on how to rehabilitate beetle-killed landscapes. Participants will be challenged to provide ideas for rehabilitating damaged landscapes using scenarios and by developing silviculture prescriptions.

We hope to set the stage for this year's forum with a presentation describing some ecological calamity that far exceeded the impact we have witnessed as a result of the MPB in Western Canada, and explaining how the landscape has recovered from this calamity. We will show that in the years following the calamity, the affected ecosystems have been largely restored, and that while some aspects of the landscape are different, they have regained much of their



capacity to provide a flow of ecosystem services. Can we expect the same result in Alberta? With the support of sound scientific information and good decisions and commitment, the answer is yes.

Mark the date in your calendar. Registrations for the forum will open on February 9.

AFGO's Provincial Growth and Yield Initiative

The Provincial Growth and Yield Initiative (PGYI) was created by the Alberta Forest Growth Organization (AFGO) so participants could collectively obtain data on tree growth through repeated measurements of permanent sample plots (PSPs). This is the first time something of this scale has been undertaken in this sector in Alberta. Sharon Meredith, AFGO director, says, "I don't think I'm overstating its importance when I say it's making history in Alberta forestry."

The PGYI will meet two needs for Alberta forest managers. First, it will help in developing, calibrating, and validating Alberta's growth models, which will have an increased future role in both the Reforestation Standard of Alberta assessment process and the development of forest management plan yield curves—especially for managed stands. Second, organizations that participate in PGYI won't need to maintain as many PSPs as they would in an independent growth and yield program, leading to cost savings.

The PGYI Subcommittee has developed a document that provides minimum standards for data collection and submission, as well as best practices to assist companies with developing or enhancing their PSP programs. In addition, it has directed the development of a centralized database to house the PSP information in a standardized format and provide quality control for data standards, which will be completed by the end of the year.

Using a gap analysis process, the subcommittee has also determined the number and types of plots that participating organizations will contribute to PGYI.

The number is based on the harvest level, and there are three allowable cut categories. PGYI participants will collectively submit at least 900 natural-stand PSPs and 1,200 managed-stand PSPs. These plots will be accessible to all participating organizations. However, it is hoped that companies will submit more plots than the required minimum. The target is to have 1,800 natural-stand PSPs and 2,400 managed-stand PSPs submitted to the database.

In addition to providing key data for the development, calibration, and validation of growth models, PGYI will standardize data collection, storage, and compilation, and facilitate data sharing between companies and Alberta Environment and Sustainable Resource Development. It will also provide a dataset that will support the improvement of growth models in the long term and accelerate model development, making credible and defensible growth models available earlier for managed-stand yield-curve development.

Work on the initiative began in 2010, with the first business case completed in February of 2011, and the process has been moving along at a steady pace. It has formal buy-in from all forestry company forest management area holders and the Alberta government, and all have signed the memorandum of understanding. The next step is for all participants to input data from their PSPs into the shared database by December 2015. This unique project is expected to be ongoing.

Grizzly Bear Program Summer Fieldwork

The Grizzly Bear Program (GBP) has completed summer fieldwork that delved into the rates of grizzly bear predation on caribou within two caribou ranges in west-central Alberta: the A la Peche herd and the Redrock/Prairie Creek herd. It also completed a grizzly bear population census of the entire Bear Management Area 3 (BMA 3) Yellowhead Grizzly Bear Population Unit.

The grizzly bear predation research began in the spring of 2014. Field crews captured and radio collared adult grizzly bears within the two caribou ranges. GBP biologist Karen Graham followed eight grizzly bears over the course of the summer. The work included tracking the movement of the bears and visiting location clusters, which were defined as sequential collar locations where no movement had occurred for four hours or longer. Since it was not feasible to visit all the clusters, a number were randomly selected and visited if they looked to be of interest. "Interesting clusters included bears that remained in the same place for longer than 10 hours in duration, there were two different clusters in the same spot, or movement of the bear prior to the cluster showed a sudden change in direction," explains Graham.

At these bear clusters, researchers searched for evidence of bear activity, such as a bear bed, an animal carcass, or evidence that plants like cow parsnip, roots, or berries had been eaten. They examined any scat found to see whether bones or hair were present, indicating that the bear had eaten meat in the last eight to fourteen hours. If a meat scat was found at a bed, efforts to visit the cluster prior to that bed cluster were made. If a carcass was found, bones were collected to confirm the species, age, and sex of the animal. The researchers also attempted to determine whether the animal was killed by the bear or scavenged by the bear after being killed by another predator. This work provided an opportunity for researchers to better understand the animals being consumed by grizzly bears, and the type of diets these bears have within their home range.

In the Yellowhead region, grizzly bear hair samples were collected to estimate the population of grizzly bears in BMA 3. The BMA 3 Yellowhead Population Unit spans from Highway 16 in the north to Highway 11 in the south, and from the British Columbia border in the west to the eastern edge of the grizzly range between Hinton and Edson. The population estimate from 2014 will be compared to results from 10 years ago in the same area, to look at population trends in the region. For the first time, the southern part of Jasper National Park has also been included in the population estimate. "We are hoping to learn how many grizzly bears there are in southern Jasper National Park, and what their distribution is in the region," says project biologist Tracy McKay. "We will also gain information about the gender of the grizzly bears in southern Jasper, so we will have an idea of how many reproducing females may be in the population."



Eight crews conducted the DNA project: four crews covered the provincial area, one helicopter crew covered remote areas in the province, and two crews were deployed into Jasper National Park. Additionally, a part-time crew with helpers from fRI and Parks Canada assisted inside the park. Jasper, along with the entire Yellowhead area, was sectioned off into seven-square-kilometre grids. Researchers set up 195 lure sites on the provincial side and 75 lure sites in Jasper National Park. Grid cells and sample sites were selected with a focus on making direct comparisons between current and 2004 population estimates. Every site was checked for hair every two weeks, and these visits included adding more scent lure. To get all this work done, McKay's team hiked up to 20 kilometres a day carrying bottled cow blood and tools to set up collection sites.

In Jasper National Park, barbed wire was also set up around approximately 50 naturally occurring bear-rub trees. Since it was not possible to visit each grid cell across the Yellowhead Population Unit, established population modelling techniques will be used to extrapolate from the data the GBP collected and to calculate a population estimate. This research has the potential for significant impacts to industry best practices and grizzly bear management strategies across the Yellowhead region. The grizzly bear DNA analysis will be done over the winter months, and population estimates are expected in the spring of 2015.



fRI will not have an AGM this year. Instead, the Communications and Extension Program will focus its time on education and gaining networking opportunities by attending more workshops and conferences.

We would like to congratulate the Honourable Robin Campbell on his promotion to the role of Minister of Finance, President of Treasury Board. We would also like to welcome the Honourable Kyle Fawcett into his new role as the Minister of Environment and Sustainable Resource Development.

Knowledge Transfer at Conferences

Two priorities of our business strategy are knowledge transfer and partner outreach and support. With these goals in mind, staff and researchers have attended several conferences this fall.

Sean Kinney attended a conference of the Canadian Institute of Forestry and the Society of American Foresters. These two organizations joined with the International Union of Forest Research Organizations World Congress October 8–11 in Salt Lake City. As the largest forest management expo in the United States, it was an opportunity to informally discuss forestry-related topics in a space shared with over 4,000 forest management professionals and scientists, including delegates from over 100 countries.

Meanwhile, the 72nd annual Alberta Forest Products Association AGM and conference took place at the Fairmont Jasper Park Lodge October 7–9. Invited speakers included the Honourable Kyle Fawcett, Minister of Environment and Sustainable Resource Development, and Richard Ireland, the mayor of Jasper. It provided an avenue for Bill Tinge, general manager, to talk about fRI's work and hear about the work of others, including new approaches to industry and academic partnerships.

Chantelle Bambrick, ILM researcher, project lead for the Foothills Landscape Management Forum, and Sean Kinney, program lead for the Communications and Extension Program, attended the Exploring PPSR under Western Skies Conference at Mount Royal University in Calgary September 9–10. The conference focused on the benefits of citizen science and the opportunities that exist for research with a citizen science component.

Similarly, the sixth annual Safari Club International (SCI) Drayton Valley Chapter Fundraising Banquet on September 20 was an excellent opportunity to talk about citizen science research being done by the Grizzly Bear Program. SCI is a society passionate about protecting and conserving the outdoors and its resources, and the banquet was attended by avid hunters and outdoor enthusiasts. Gord Stenhouse, Grizzly Bear Program lead, and Anja Sorensen, wildlife research biologist intern, talked about the recently launched Grizzly Bear Scat App citizen science research and how interested citizens can become involved.

Through ongoing involvement in such information-sharing opportunities, fRI will continue to enhance the quality of its work and bring the benefits of its research to other organizations.

A Summary of the Value Reports

Each year, fRI creates value reports summarizing the achievements of its programs and associations. The latest value reports cover work done from April 2013 to March 2014 that provided valuable data to the oil and gas sector, the forestry sector, government, and Alberta as a whole.

The oil and gas sector has benefited from fRI research that helps it manage ecological issues. Some of the research projects involve collaboration with other programs. For example, the Caribou Program and Grizzly Bear Program recently completed the first year of two collaborative research projects. The first project will assess the effect of forest regeneration of seismic lines on animal movements. The second will assess the effect of forest regeneration of cutblocks on animal movements and non-invasively monitor caribou herd populations through fecal collection.

The forestry sector likewise looks to fRI for research about land-use issues and sustainable and responsible stewardship of the environment. A partnership between forest management companies, the Alberta Forest Growth Organization (AFGO) recently undertook a provincial growth and yield initiative to cooperatively collect data used for developing growth models and yield cycles. Another AFGO initiative is a strata subcommittee that provides recommendations about how best to use data collected through the Reforestation Standards of Alberta in the forest management planning process.

For government organizations—such as Alberta Environment and Sustainable Resource Development, Alberta Tourism, Parks and Recreation, and Parks Canada—fRI provides knowledge and tools for managing public lands and wildlife. These help to shape decisions that ensure economic benefits for the province while encouraging biodiversity. The Foothills Landscape Management Forum (FLMF) is advancing integrated land management in Alberta. Industry and government are working together with the aid of FLMF to reduce the impact of resource extraction on watersheds, animals such as grizzly bears, and recreational space for people.

Finally, Alberta as a whole benefits from initiatives such as the Water Program. Through collaborative research and partnerships, this program undertakes projects that involve a wide range of interconnected environmental issues. Work has included development and technical support to help the Government of Alberta implement a watershed assessment procedure developed by the Water Program. The program has also worked with the Foothills Stream Crossing Partnership, University of Alberta, and Grande Prairie government to discover the effects of culverts on fish communities.



New Peer-Reviewed Papers from the Grizzly Bear Program

An important component of the research process is sharing information with others by publishing papers in peer-reviewed journals. Over the summer and fall, the Grizzly Bear Program published eight papers.

“Macronutrient Optimization and Seasonal Diet Mixing in a Large Omnivore, the Grizzly Bear: A Geometric Analysis,” by Sean Coogan, David Raubenheimer, Gordon Stenhouse, and Scott Nielsen, was published in October in *PLOS ONE*. The authors applied geometric models to understand how the nutritional composition of food available to the grizzly bear compared with optimal macronutrient intake. They also assessed the seasonal nutritional limitations for grizzly bears in west-central Alberta. The analysis showed that most food available to bears in this study area was high in protein, compared to lipids or carbohydrates.

“Home Range, Movements, and Denning Chronology of the Grizzly Bear in West-Central Alberta,” by Karen Graham and Gordon Stenhouse, was published in October in *The Canadian Field-Naturalist*. The paper presents data on home range size, movements, and denning chronology collected using global positioning system (GPS) collars on grizzly bears in west-central Alberta. This data allows researchers to assess the adaptability of this species and the impacts of habitat and climate change.

“Fine-Spatial Scale Predictions of Understory Species Using Climate and LiDAR-Derived Terrain and Canopy Metrics,” by Wiebe Nijland, Scott Nielsen, Nicholas Coops, Michael Wulder, and Gordon Stenhouse, was published in August in the *Journal of Applied Remote Sensing*. For this research, light detection and LiDAR data was used to predict the occurrence and development of 14 understory plant species across 4,435 square kilometres. The researchers’ predictions about these food sources for grizzly bears were compared against more conventional climate and land-cover-based models.

“Idiosyncratic Responses of Grizzly Bear Habitat to Climate Change Based on Projected Food Resource Change,” written by David R. Roberts, Scott Nielsen, and Gordon Stenhouse, was published in July in *Ecological Applications*. They assessed climate change vulnerability for grizzly bears in the southern Canadian Rocky Mountains. They used presence-absence information from 7,088 field plots to estimate ecological niches and to project changes in future distributions of each species.

“Assessing the Impact of Field of View on Monitoring Understory and Overstory Phenology Using Digital Repeat Photography,” by M. Vartanian, W. Nijland, N. Coops,

C. Bater, M. Wulder, and G. Stenhouse, was published in June in the *Canadian Journal of Remote Sensing: Journal Canadien de Teledetection*. The authors examined the impact of field of view on the capacity of cameras to detect changes in phenology of individual species in an image time series. This is important because phenological patterns of plants and other components of the forest ecosystems—like understory vegetation—are significant indicators of climate variability and show the availability of food for wildlife.

“Grizzly Bear Ungulate Consumption and the Relevance of Prey Size to Caching and Meat Sharing,” by Bogdan Cristescu, Gord Stenhouse, and Mark Boyce, was published in June in *Animal Behaviour*. Management of predator-prey systems can be improved with knowledge about where prey is ingested. For this research, they investigated habitat characteristics at 124 sites where radio-collared adult grizzly bears consumed ungulates, and contrasted them with paired random sites.

“Den Selection by Grizzly Bears on a Managed Landscape,” by Karine Pigeon, Scott Nielsen, Gord Stenhouse, and Steve Cote, was published in June in the *Journal of Mammalogy*. The authors’ research objective was to determine the den selection of male and female grizzly bears at multiple spatial scales in the boreal forest and the Rocky Mountains of Alberta, Canada. Since denning behaviour is not well understood, and current land and forest management plans do not consider this factor, there are currently no mitigation measures to minimize the possible impacts on the denning habitat of grizzly bears. This work was done by comparing dens to random available locations within fall home ranges.

“Quantifying Long-Term Stress in Brown Bears with the Hair Cortisol Concentration: A Biomarker That May Be Confounded by Rapid Changes in Response to Capture and Handling,” by Marc Cattet, Bryan Macbeth, David Janz, Andreas Zedrosser, Jon Swenson, Matthew Dumond, and Gord Stenhouse, was published in May in *Conservation Physiology*. This study deals with the range of factors that are associated with and could influence cortisol concentrations in the hair of free-ranging brown bears. Researchers identified the presence or absence of capture, restraint and handling, along with different methods of capture, as important factors that appeared to influence hair cortisol concentration in a time frame too short to be explained by passive diffusion from the blood supply alone.



Caribou Program Summer Fieldwork

The Caribou Program spent the summer in the field collecting data to support three ongoing projects. Currently, the program is conducting research on the impacts of mountain pine beetle (MPB) in Alberta forests, and in particular the effects that MPB infestation and associated forest harvesting aimed at preventing and controlling the spread of the beetle may have on the food supply of caribou and grizzly bears. The team is also researching revegetation stages of linear features in relation to human and wildlife traffic, with the goal of prioritizing linear features for restoration in order to increase caribou functional habitat.

A collaborative effort with the Grizzly Bear Program, the MPB project involved two field crews collecting vegetation data. They quantified the presence and abundance of plant species that are important forage items for caribou

or grizzly bears at sites stratified by forest age and level of MPB infestation, as well as sites that had been burned by wildfires and sites that had been harvested either to control the spread of MPB or as part of normal harvest operations. The purpose of this research is to understand and assess how MPB—through infestation but also through preventative harvesting of at-risk timber stands and control harvesting of infested stands—will alter the food supply for caribou and grizzly bears. This research will potentially provide important knowledge for the Government of Alberta and the forest industry about the expected impacts of MPB on wildlife populations, and recommendations stemming from the research will help minimize the negative impacts of MPB on these already endangered species.

Two other Caribou Program field crews spent the summer collecting data to support two projects examining how humans, caribou, predators, and other wildlife use linear features on the landscape, while assessing landscape variables such as topography, vegetation regrowth, and the density of anthropogenic disturbance. Throughout the field season, the crews visited 144 sites on seismic lines, and 124 sites on old roads and pipelines.

This research is being done to investigate the hypothesis that regeneration stage and terrain attributes interact with one another to influence use of linear features by humans, ungulates, and predators. By untangling these interactions, the Caribou Program hopes to uncover species-specific patterns in use of linear features and determine how these patterns relate to ease of travel and forage abundance. The research may shed light on how best to rehabilitate linear features and where to concentrate efforts in order to restore functional habitat for caribou. Doug MacNearney, biologist with the Caribou Program, explains the purpose of the work: “If we can identify the factors leading to use of linear features by predators, caribou, and humans, we will be able to work towards creating conditions that discourage use and thus lessen the impact on caribou.”

Reading Material

Visit foothillsri.ca to read this and other publications.

Return undeliverable copies to:

Box 6330

Hinton, AB

Canada T7X 1X6

T: 780-865-8330 | F: 780-865-8331

About fRI

The Foothills Research Institute (fRI) is a unique community of partners joined by a common concern for the welfare of the land, its resources, and the people who value and use them. fRI connects managers and researchers to collaborate effectively in achieving fRI's vision, which is to support and contribute to sustainable land and resource management.

Over the years, fRI has grown, expanding in scope, broadening and increasing partnerships and funding, and expanding in activity and interest beyond forest lands. Our programs and partners determine where we do research. We now collaborate with colleagues regionally, provincially, nationally, and internationally through new agreements and understandings.