Wildfire Operations Research
Advisory Committee Meeting Minutes
March 18, 2014

LOCATION

Alberta Innovates, Edmonton, AB

ATTENDEES

FPINNOVATIONS

Mark Ryans
Ray Ault
Jim Thomasson
Greg Baxter
Steve Hvenegaard
Rex Hsieh
Roy Campbell

GOVERNMENT

Quentin Spila, Adam Gossell	ESRD
Ryan Tew (online)	ESRD
Michael Benson	BCFS
Dave Bokovay	CIFFC
Chris Dallyn	Sask
Larry Nixon (online)	GNWT
Dan Thompson	CFS
Colin MacFaden, Den Boychuk (online)	OMNR

INDUSTRY

Terry Popowich (online)	Discovery Air
Rick Solomon, Jamie Stewart, Dwayne Floden	FireFox Inc.
Mike Schnarr	Eco Fire Solutions
Shirley Niven	Sereca Fire Consultants
Cliff Henderson, Revie Lieskovsky	Conair Aviation
Con Dermott	Vanderwell Contractors Ltd
Nigel Day	Mustang Helicopters
Mathew Christie	Mustang Helicopters

WELCOME

Introductions and announcements.

Fall 2013 meeting minutes tabled and approved by Mike Benson; seconded by Quinton Spila.

Agenda Change:

Projects with proposals will be included under regular updates within their appropriate research themes. The proposals will be voted on at the time they are presented.

RECENTLY COMPLETED PROJECTS

Table 1 lists projects completed since the last advisory meeting (October 1, 2013). A column for return on investment (ROI) has been added to capture the value of the project to the organization that championed it. Where costs and ROI are the same in the table indicate that an ROI estimate has not yet been returned to FPInnovations. Going forward, we will try to identify the value of a project at the front end to help determine our research priorities.

Table 1. Projects completed since the 2013 fall advisory meeting on October 1, 2013.

PROJECT	LEAD RESEARCHER	COST	RETURN
National forest fuels management workshop	Colleen Mooney	$34,850	$100,000
Potential fire behaviour in deep chipped fuel beds: field studies and observations on the BC Hydro northern transmission line right-of-way	Steve Hvenegaard	$29,700	$1,000,000
Ignition device evaluations and evaluation framework	Roy Campbell	$15,000	$15,000
Unmanned vehicle system – demonstration event	Jim Thomasson	$1,200	N/A
Database for the Alberta FireSmart vegetation monitoring program	Rex Hsieh	$56,000	$120,000
Remote weather station cameras for GNWT	Jim Thomasson	$3,500	$3.500
BC woody debris management – website	Rex Hsieh	$2,000	$2,000
Forest fuel typing methods used in Canada	Greg Baxter	$4,500	$4,500
Aerial torch tracking system development	Jim Thomasson	$5,000	$100,000
Fire behaviour documentation database	Rex Hsieh	$510	$5,000

2014 PROJECT UPDATES

COMMUNITY PROTECTION

1. **Forest fuel treatment study – mulching**
   Steve Hvenegaard

   Mulching research is taking place in a number of locations: Red Earth (AB), Fort Providence (NWT), Horse Creek (AB), Gregg Lake (AB), Slave Lake (AB) and north of Terrace (BC). Projects look at mulching intensity, fire behaviour, and productivity of equipment.

2. **Long-term FireSmart monitoring protocol**
   Steve Hvenegaard

   Steve presented the process involved in establishing monitoring protocols. The methodology will be complex and this could turn into a multi-year project.

3. **National forest fuels management workshop**
   Colleen Mooney (presented by Greg Baxter)

   Workshop was held Jan 14–16, 2014 and was invite-only. All of the agencies were invited to send three participants; most agencies were able to attend. Workshop proceedings, including the presentations, are available on our website.

   Q: [C. Henderson] Is the vocabulary describing treatments, etc., the same across Canada?
   A: No, the FMTT is considering a fuel management thesaurus, as terms vary from province to province.

4. **Database for the Alberta FireSmart vegetation monitoring program**
   Rex Hsieh

   Rex assisted ESRD in designing and building a database to store the information gathered by their vegetation-monitoring program.

   Q: Who does the entry into the database?
   A: ESRD's fuels inventory program personnel.

5. **Comparing air tanker drops in standing timber to FireSmart treatments**
   Ray Ault

   This is a proposal.

   The work is proposed to take place at South Slave Lake research site. The plan is to drop water on FireSmart sites and in closed stands (control). The footprint of the drop is what is of interest. The drops will be made during airtanker practice to reduce costs and IA crews will be used for data collection.

   Q: Will you be using one type of retardant?
   A: We will use water from bomber practices. Will be close to town so water best.

   Q: What are you hoping to get from this? Persistence? Coverage?
   A: More about the footprint and how it changes between closed stands and treated stands.

   Q: [R. Lieskovsky] Will you use all tankers?
   A: We will probably start with CL-215 and collect footprint, coverage level, and video.

Q: [D. Thompson] Will you drop in untreated as well?
A: Yes. We are using untreated (i.e. closed stands) as the control.

Comment: [S. Niven] This is more qualitative than quantitative.
Comment: [R. Lieskovsky] What is the purpose? Treated vs stand – it is an obvious difference; a 3D vs. a 2D model.
Comment: [C. Dallyn] This is good information to show communities.
Comment: [D. Bokovay] Hasn't this been done?
Comment: [A. Gossell] Good visuals to show people.
Comment: [M. Benson] This is a low amount of work to get done.

VOTE: High 0; Moderate 11; Low 0

Comment: [Ray Ault]: There are a number of projects not on the list for presentations. Nothing has changed on these projects so they are not presented today. However, contact the lead researcher if you have questions.

6. Machine productivity in forest fuel treatments
Steve Hvenegaard

This is a proposal.

This is exploratory work and could turn into a large project. It requires discussion. Should this project be broken down into smaller more short-term studies? Currently, there is a lack of data available on productivity that could help managers cost their projects. Several variables in mechanical fuel treatments make estimating costs difficult (equipment types and sizes; treatment type and intensity; stand type; stand density; terrain). Over the years, FPInnovations has developed the tools to collect productivity data in forestry operations. To date, we have collected data at Slave Lake over three weeks this winter.

Q: [M. Benson] Seems most research and treatments in black spruce.
A: There is research currently underway around Hinton in Lodgepole Pine.

Comment: [Ray Ault] This is exploratory work. What do you think about it? 30 years ago this data was missing in the forest industry, now it exists.
Comment: [C. Dermott] Need to first look at machines and figure out the correct machine for the job, then proceed on productivity.
Comment: [Ray Ault] We are new to this, so we need ideas and we can't do all machines. We could do a few studies a year, but on what machines?
Comment: [D. Thompson] After a few years, the data would be useful in fire models. Can include in growth models where equipment is being used on fires.
Comment: [C. Dermott] Need FireSmart objective first, then we know what to measure. Identify treatments then collect the data.

VOTE: High 2; Moderate 6; Low 3.

DETECTION / PREVENTION

7. **Remote camera Systems for wildfire management – a survey for Alberta**
   Ray Ault

   This is a directed project.

   This project was suspended last fall, but now we will work with WOO's to move forward. A task team is in place to develop a strategy for camera use and priorities. A number of areas in Alberta have their own cameras. This project would bring standards to the system.

   Q: What kind of cameras?
   A: Only images are sent, no infrared. This project brings all cameras together and how they can be used.

   Q: Does Saskatchewan do work like this?
   A: Yes

8. **Coordinating development of a simulated hot spot target**
   Ray Ault

   We have a 100 ha grid where we put out 20–25 hot spots to test aircraft IR capabilities. We would like these hotspots to not contribute as a fire risk. We are working with the U of A Mechanical Engineering 400 level design class to produce hot spots that can be used in these trials that will not pose a fire risk. There are two teams working on this and they have six solutions they will present in a report in April.

   Q: [C. Dermott] Do the companies have to pass?
   A: Yes. They have to achieve a certain level to be eligible for contracts

   Q: Does BC do this?
   A: No, but a number of companies have done the grid test

   Comment: This test qualifies the IR operator, not the aircraft.
   Comment: Can put these down in real fires where scanning is taking place for additional tests.
   Comment: Ontario has a grid, but has not used it.

9. **Documenting human-caused wildfires – power line fires**
   Jim Thomasson

   This project will provide data/evidence to investigators for fires caused by trees falling on powerlines. There is a power lab in BC and costs involved in using this are being investigated. Allows single phase, crossing conductors, and single powerline testing. The challenge is the ground path tree to generating source.

   Q: [C. Dermott] Are most single lines?
   A: They are when they come off the main lines.

   Comment: [D. Thompson] Any line-on-tree work?
   Comment: Single line may take a while to ignite a fire.

   Q: [M. Benson] Is the purpose for litigation?
   A: Industry education and evidence for litigation.

   Q: Are you looking at breakers flying off and starting fires?
   A: They don't fly off anymore; they dangle when tripped.

   Q: Are the utility companies funding this?
   A: No, not at this time.

10. **Fire detection workshop #4**
Ray Ault

This is a proposal.

The third detection workshop was held Nov 2 to 4, 2010 in Hinton. Given the number of new products available, such as Flame Sniffer from Australia, Insight Robotics from Hong Kong, the installation of an automated smoke detection system within Saskatchewan, and advancements in satellite technology, we believe it is time for another workshop. We propose to have the workshop at Alberta Innovates in Feb 2015. Having a meeting at Alberta Innovates makes it easier for travellers. Because we have hosted three of these events, we can do so efficiently. We would charge participants to attend.

VOTE: High 0; Moderate 9; Low 0.

Comment: This is a sound plan.

UTILITY CORRIDORS

11. **Bridge timber protection**
Jim Thomasson

This is a CN Rail Project.

Previous work has shown that bunching timbers is not an effective way to stop fire spread. Next step is to look at barriers to fire spread, wind speeds of 8–10 km/h, and develop a test method for coatings.

Q: Have you looked at concrete?
A: Concrete is not suitable for bridges – would breakdown very quickly.

Comment: Concrete coatings?? There is also lime-based concrete.

12. **Potential fire behaviour in deep chipped fuel beds: field studies and observations on the BC Hydro northern transmission line right-of-way**
Steve Hvenegaard

There are 300 km of new right-of-way north of Terrace BC where the debris has been mulched. We visited the site twice in 2013: once to see the area and the second time was to perform ignition tests and fire behaviour trials in the mulched fuel. This work is providing both BC Hydro with information on fire risk under their lines and the BCFS with information on the difficulties of firefighting in this fuel type. The plan is to return and do more burns under higher indices (summer burns).

13. **Test of fire detection systems for railway bridge protection**
Jim Thomasson

Early detection and suppression is required for wooden railroad bridges. There are detection systems that exist that can be used on bridge structures. We can't test a system on an active line, but the Iron Horse Trail, a decommissioned CN line in eastern Alberta, may be an option.

Q: How far can the system detect and does it detect heat or smoke?
A: Range is less than a kilometre and the system detects both heat and visible flame.

Comment: There are also thermal sensors from Insight Robotics.

AVIATION

14. Using a radiant panel to compare the relative performance of wildfire chemicals on forest vegetation
Ray Ault

This project involves the development of a test method to compare the relative performance of fire chemicals. The Aviation Working Group wanted to see the evaluation process include a test that would more closely represent a direct attack use of the products. The plan this summer will be to do this. With the U of A Mechanical Engineering Department, we applied for an NSERC grant to match our contribution of $22,000 of in-kind support for the study. A master's student and an international graduate student from India will work at the U of A to design the test method and run the trials. We are planning on the work to occur in June before the NWT. We will ask manufacturers to help with the product mixing and verify product quality as part of the test.

Ray described a method where a shield will be used to cover half the test area. Let unshielded part ignite, then remove shield and allow radiation from panel and flames from ignited half influence the covered side. This brought up a lot of discussion and Ray will be waiting for ideas to be emailed to him on this. Because this is a direct attack project, some spray method is required.

15. Fire chemical qualification process review
Ray Ault

This is a directed project for CIFFC.

We will report on issues and concerns on aircraft delivery. We will develop a questionnaire and the pulp and pare divisions will work on the evaluation process. Thirty stakeholders will be interviewed in April.

Q: [C. Henderson] How does this meet Canada's needs?
A: This is exploratory to see if new standards are required. The Aviation Working Group wants to investigate other methods. There may be no change, but should be looked at.

Q: Can you work with USFS to save money?
A: The US owns the process, so they may not be interested in changes. The goal is to have possibly an equivalent standard, but there may be other tests and process that can be applied.

FOREST MANAGEMENT

16. UAV scanning for holdover fires in burning debris piles
***J**im Thomasson*

This project will look at whether UAV technology can be used to reliably detect holdover fires in winter burn-piles. The objectives include:

- Determine the costs and benefits of using a UAV to scan burn piles to detect holdover fires in the spring.
- Identify the scan procedures and approvals needed for flight.

The availability of a UAV means we can't scan piles until spring 2015. We might have UAV flights available to develop the methodology in the fall of 2014.

17. BC woody debris management program – website
Ray Ault

FPInnovations has been involved in coordinating proposals and developing a website for this project in the past. The projects in this program looked at clean air initiatives when dealing with harvest slash.

The program has moved on to research the gaps in fiber collection; and the handling, transportation, and utilization of harvest debris. Our role is to manage the funds and host the website.

18. IA capabilities in slash fuels – case study 2

Greg Baxter

This project follows on Case study 1, which took place at MacLean Creek in Southern Alberta where six plots of light, moderate, and heavy slash plots were burned to collect fire behaviour data and to test what an initial attack crew could control. We now have nine plots west of Edson produced by two harvest treatments. Again we have plots of light, moderate, and heavy slash. We will burn this summer if the right conditions materialise. IA crew capabilities will also be tested on a number of the plots.

Q: Is the IA crew on site?
A: Yes. They will be held back until fire reaches a predetermined size and intensity. They will then be 'released' to control the fire.

A number of other projects may make use of the slash burns such as the testing of sensors, and possibly protective wraps.

SAFETY

19. Survival zones for wildland firefighters

Greg Baxter

Ten grass fires and one in standing timber have been completed in this project. We have reports on PPE and human survivability, some case studies, and carbon monoxide data has also been collected. The rate of data collection on experimental fires has been slow, so a change in approach is required.

By working closely with Saskatchewan, we hope to use crown fires in their observation zones. We will travel to Saskatchewan this spring to demonstrate the gear and explain what we would require. When a fire breaks out, we would travel to Saskatchewan and attempt to place our gear in openings of specific sizes ahead of crown fires to collect the data.

20. Environmental lapse rate literature review

Greg Baxter

PHASE 1 investigated the science behind using the environmental lapse rate (ELR) as method of forecasting blow-up conditions and to determine whether equipment exists that can collect real-time data on wildfires. We completed a literature review of the ELR, its affect on fires and found a potential sensor used by Forest Protection Limited in New Brunswick that can be used to collect the required data.

We will look at the data this sensor collects to see if it can be used to compile a lapse rate profile. If so, we will then compare it against an Environment Canada radiosonde.

Q: How much does this sensor cost?
A: $30,000 installed and includes user software.

EQUIPMENT

21. Ignition device evaluations and evaluation framework

Roy Campbell

This is a directed project.

An evaluation framework (templates for nine devices) has been completed and is posted on our website. The intent is to build a database overtime by using the templates. The project status on the website "Completed"; however, it is our intention to gather this information over time.

22. Designing a new wildfire sprinkler

Roy Campbell

This is a directed project.

Last fall this project was placed on hold. Our plan is to proceed with the construction of a prototype this year and conduct testing.

23. An in-line mixing system for heli-torch systems

Roy Campbell

Prototype design, construction, and initial testing was completed last year. A number of improvements were identified and continued testing is anticipated this year. The project will be complete after this final testing stage.

24. An improved foam-mixing system for wildland firefighting

Roy Campbell

This is a directed project.

This project was run as a 2013 U of A Mech. Eng. Design project, but we had some reservations with the design. The project was re-done this winter and we are in Phase 3 of the 2nd design (Phase 1 & 2 2014 Reports posted to our website). The final report is due April 9, 2014. Prototype testing will be handled as a second project if warranted.

25. Developing an instrument to directly measure fire intensity

Ray Ault

We have had a grant with mechanical engineering for several years. We have been working on a couple of generations of the thermal cube—an instrument that measures fire intensity (KWm^2). Last year Erik Sullivan worked with us and he has completed his MSc thesis based on validating the approach for a low-cost field instrument. We have used the old thermal cube to quantify the intensity for the cabin burns and fuel treatments in the NWT, and Greg has used it for grass burn work for firefighter safety. This summer we will have ten of the new cubes available for our studies. The USFS is using a similar approach to quantify fuel treatment effectiveness.

The next step is to have the results of the thermal cube validated in the literature so this is a scientific recognized approach. We have a role in the field data collection, but see a University Ph.D. publishing peer-reviewed papers on the sensors.

26. Mechanized equipment tactics for fire and fuels operations

Roy Campbell

This is more of collaboration than a project. FPInnovations participated in a 2011 Heavy Equipment Training Workshop in Missoula, and we have since been contacted to assist the US with Canadian content for a manual titled “Mechanized Equipment Tactics for Fire and Fuels Operations”. Our role includes completing a survey and identifying Canadian agencies with which they can collaborate. We have circulated the survey information through CIFFC. So far, only Alberta has responded, but we have seen some interest from both Saskatchewan and British Columbia.

27. Western Canada wildfire facilities and catering review

Roy Campbell

This is a directed project.

This is an ESRD initiative aimed at improving facilities and catering during large wildfire incidents. We are currently working with ESRD’s Logistics Working Group to conduct a survey (Alberta, British Columbia, and Saskatchewan) and produce a report. Information should be of interest to other agencies as facilities and catering can be an expensive part of agency budgets and firefighter support is key to successful operations.

28. Exploring the use of building wrap for structure protection

Ray Ault

This was a proposal, however we learned from the USFS that a report has been completed and therefore a detailed project is not required.

Ray will complete a small write-up on the application of the wrap products and place on our website. The project will look at the possible use of protective wrap on structures such as houses or well sites when threatened by wildfire. Testing may take place during the slash burning near Edson this summer.

29. AVT caused fires

Greg Baxter

This is a directed project.

Alberta Justice has asked FPInnovations to replicate the work done on the ATV project completed in 2003–04 with a specific ATV, in specific fire weather and seasonal conditions.

WRAP UP

Ray Ault reviewed the Key Performance Indicators (KPI) that were developed for the fire research group:

1. Work with members on projects put forward to them
2. Deliver projects on time and on budget
3. Services to members implemented and adopted
4. Support agencies during extreme fire conditions and outbreaks
5. Expand research network
6. Diversify memberships

Q: Have you approached the Office of the Fire Commissioner?
A: Yes, but their legal department is holding things up.

Wildfire Canada 2014 is to be held in Halifax in October. FPInnovations has held their fall advisory meeting at Wildfire Canada in the last two conferences (Kitchener and Kananaskis). It has been decided that this year's fall meeting will not be held at this conference, but will be held **Tuesday, October 21, 2014** at this location**.**

Ray then presented the fire group's annual budget. The group will be starting the year with a deficit, but that will be corrected with directed projects.