

**Wildfire Operations Research
Advisory Committee Meeting Minutes
March 10, 2015**

LOCATION

Alberta Innovates, Edmonton, AB

ATTENDEES

FPINNOVATIONS

Mark Ryans (online)	Colleen Mooney
Ray Ault	Rex Hsieh
Greg Baxter	Steve Hvenegaard
Jim Thomasson	Roy Campbell

GOVERNMENT

Dave Schroeder, Quentin Spila, Tanya Letcher	Alberta ESRD
Chris McGuinty	Alberta ESRD
Chris Dallyn, Bob Spracklin (online)	Saskatchewan Environment
Dan Thompson	CFS
Larry Nixon, Matthew Coyle	GNWT
Vernon Marshall	YK WFM
Marc Mousseau	CIFFC
Jay Woosaree	AITF
Andy Low	BCFS
Jan Johnson (on-line)	USFS

INDUSTRY

Terry Popowich (online)	Discovery Air
Travis Holder	Campbell Scientific
Rick Solomon, Mike Schnarr	Direct Injection
Rob Hyslop	RGH Pacific EMS
Peter De Bruin	Budenheim
Rob Thompson	ALPAC
Mark Campbell, Gordon Frizzell	ICL Performance Products
Oleg Melnik, Shammawi Anderson	University of Alberta
Paul Lane	Airspray
Brent Greer	Fire Fox

WELCOME

- Introductions and announcements
- Fall 2014 meeting minutes approved by Dave Schroeder (Alberta ESRD) and seconded by Jeff Berry (Conair)

NEW DOCUMENTS POSTED TO WEBSITE

Thirteen new documents have been posted to the wildfire program website since the fall 2014 advisory meeting. The list of these can be found in these meeting handouts (see attached).

PROJECTS COMPLETED SINCE THE FALL MEETING

1. Developing a national fuel management reference database (Rex Hsieh)
2. Decision tool for remote camera systems (Jim Thomasson)
3. Protecting railroad bridge timbers from wildfire (Jim Thomasson)

SUSPENDED PROJECTS

1. Human-caused wildfires (Jim Thomasson)

We found a lab willing to test fire initiation for powerline-caused fires, but it turns out that the ignition process is very complicated and can't be replicated in a lab.

Comment: [T. Popowich] Ontario completed a review during the late 1990s or early 2000s where they looked at this. Found that when a tree falls on a line, there is usually no fire initially. But at the closest substation the breakers go off and they then send jolts of power to blast the tree off—then a fire may occur.

2. Assessing noise exposure in wildfire operations (Ray Ault)

This was Alberta ESRD project initiated as part of safety officer duties. Idea was to collect noise data from wildfire operations. Rob Thorburn collected data for Alberta ESRD in 2014 on contract. There appears to be no further role for FPInnovations so are suspending this project.

3. Building wrap for structure protection (Ray Ault)

This was a low priority project from the fall of 2013. We are suspending it until we have support from the Fire Commissionaires Office or another member with a direct responsibility for structure protection.

4. BC woody debris management workshop (Ray Ault)

This workshop was to be held in Kamloops this spring, but due to a lack of interest this has been suspended.

PRESENTATIONS: AFFILIATE PROJECTS

1. Western Canadian facilities and catering review (R. Campbell)

This was an Alberta ESRD directed project that focused on western Canadian facilities and catering delivery methods, at both incidents and firebases. The presentation captured common challenges, general similarities and differences between western provinces, as well as agency comments regarding inter-provincial interaction.

QUESTION: [J. Berry] Do provincial regulations inhibit the sharing of these types of resources?

ANSWER: Yes. Potentially this could be a show-stopper, but there was a genuine interest in understanding how each province operates, and it was felt that it is a conversation worth having in terms of supporting each other, in whole or in part.

2. Remote camera systems in wildfire management: an Alberta survey (R. Campbell)

This was another Alberta ESRD directed project, which focused on current and potential remote camera system use in wildfire management. The presentation captured general findings, camera system applications, management considerations based on practitioner feedback.

QUESTION: [V. Marshall] You mentioned missed opportunities.

ANSWER: Yes. We found most camera systems tend to be designed around a single purpose, when in fact there may be multiple needs; thus missed opportunities in the sense of failing to capture multiple camera system needs at the design stage.

QUESTION: [unknown] Solar powered?

ANSWER: Many of the systems tend to be solar-powered systems, but some use AC power where when and where available.

QUESTION: [unknown] Is work done mostly in-house?

ANSWER: Depends on the system, but often the communications techs are the go-to folks; a simpler system may see practitioner use and maintenance.

COMMENT: [V. Marshall] In YK they also tap into road weather stations and cameras.

ANSWER: Yes, good point. Although we haven't referenced it in our presentation, some of the AB folks did mention that they sometimes accessed AMA cameras for a variety of reasons.

QUESTION: [J. Berry] Any system better for transmitting data?

ANSWER: FireNet is very good, but depends on situation. This would again be system dependent.

PRESENTATIONS: UPDATES and RESULTS for NEW PROJECTS

1. Decision tool for remote camera systems (J. Thomasson)

The pieces of a camera system can easily be purchased off the shelf; however, understanding the trade-offs and advantages of different choices is difficult to explain. This decision tool will help a user choose between different options based on the user's needs. We identified fifteen variables or system requirements, and four options for each.

QUESTION: [D. Schroeder] Whom would I source for this? It would be tough to continually update. Will that be part of the matrix?

ANSWER: No. We are not planning to include vendor or product information in the matrix. The product costs and technology change rapidly and it is too much to manage. The matrix can be used to help define the camera system that meets requirements and budgets.

Representatives from YK, SK and BC indicated they are interested in looking closer at camera matrix to determine how they might use it. The matrix would be a helpful tool for non-radio shop folks to make camera and system selections.

2. Evaluation of smartphone infrared-scanning accessories (J. Thomasson)

A number of these apps are already available for people to use. We are developing an assessment process for the technology to determine whether they will work in an operational wildfire context.

We will test under various weather conditions and times of day. We will use glowing targets starting close to the target then move farther away. We will also simulate a ground fire scenario by burying the target in sand.

QUESTION: [unknown] Is the application here for ground crew use?

ANSWER: Yes.

3. Development of a national fuel management reference database (R. Hsieh)

This was a directed contract with the Forest Fuels Task Team, which was administered by the Canadian Forest Service.

There has been a lot of fuel management work completed across the country that fuel managers can learn from, but none of this information is being captured in a way that can easily be shared. This national database will store fuels management information for future analysis and sharing.

The project has three phases that will be complete by March 20, 2015.

- Inception Phase – scope and required fields identified
- Elaboration Phase – develop data model
- Construction Phase – build prototype and user interface

QUESTION: [unknown] Can you include latitude and longitude for spatial data? Is it point or polygon data?

ANSWER: It is catalogued as point data, but can attach polygon map in file.

QUESTION: [unknown] Where will this be held?

ANSWER: The database will be accessed through a CIFFC portal.

QUESTION: [O. Melnik] Are forest characteristics included?

ANSWER: These can be entered, but not required. For example, in Saskatchewan the Stanley Mission Fire burned into a black spruce treatment. This info can be included.

4. Fuel treatment maintenance operations: productivity and effects on potential fire behaviour (S. Hvenegaard)

Objectives of this study are to document the change in the fuel environment and potential fire behaviour as well as document productivity of equipment.

Case Study 1: Fiddle River (on east Jasper boundary). It was treated in 2010 and re-treated in 2014. Left two 30 m x 30 m untreated plots to be used for a fire behaviour comparison.

PRESENTATIONS: UPDATES and RESULTS for ONGOING PROJECTS

1. Using the environment lapse rate to forecast wildfire blow-ups (G. Baxter)

The work done to date on this project include a literature review, contact with Forest Protection Limited regarding use and cost of AIMMS sensor, and contact with BCFS to collect stability data on a number of blow-up fires.

The ultimate goal of this project is to improve firefighter safety. We need to determine if sensor is accurate enough to provide the data we need, and we need to determine if the data can be used to identify potential blow-up conditions.

We made contact with Rick Lannovile (Kamloops), who uses daily atmospheric soundings during the fire season to assist in predicting atmospheric stability. We also met with Kamloops Fire Center and Conair to discuss use and logistics of using a sensor.

A USFS document titled *Current State of Knowledge* identifies atmospheric stability as a subject area that requires more research. The Haines Index is too broad. Literature tells us that very low RH% and atmospheric stability are keys to extreme fire behaviour.

The data collected can be used for a number of different things. Winds aloft can be an indication of potential turbulence; cap thickness can provide information on possibility of a cap breakdown and sudden mixing (turbulence). The data can be used by Environment Canada to fill in between soundings.

The methodology used by Rick Lanoville involves using 08:00 soundings from Environment Canada for the Kelowna station. He observes the 700 mb temperature and compares it to high elevation weather stations to calculate a lapse rate. Depending on the lapse rate, warnings are provided on potential fire behaviour.

QUESTION: [unknown] Is this more for the BC environment than the prairies?

ANSWER: No it is applicable to all areas of the country. Conditions in BC valleys can produce steep lapse rates causing super-adiabatic conditions. The prairies are more prone to wind driven fires and the breakdown of caps.

COMMENT: [T. Popowich] I was in two Ontario fires when a breakdown of the cap was responsible for a fire blow up. This is not just a mountain valley issue.

QUESTION: [J. Berry] Why not just use the Haines Index now?

ANSWER: With the work Rick Lanoville is currently doing for Kamloops, it is already beyond what the Haines can be used for given its broad scale.

COMMENT: [Q. Spila] I see the possible benefits of data collected at a local level.

There are four possible options to us to move this project forward. This must be decided by a steering committee to help direct the project. The steering committee consists of:

- Gerry Cormier (Forest Protection Limited)
- Rick Lanoville (Consultant)
- Jeff Berry (Conair)
- Bruce Woodcock Aventech (maker of AIMMS instrument)
- Quinton Spila (Alberta ESRD)

Option One: Run a test program out of Kamloops on one aircraft. Compare data to fire behaviour.

Option Two: Work with Forest Protection Limited and collect data from spray or fire flights to analyse.

Option Three: Work with Kamloops Fire Center to work on case studies when stability and dry air cause extreme fire behaviour.

COMMENT: [D. Thompson] Provides a link to CFS Stability Maps that are calculated every day during fire season.

COMMENT: [T. Popowich] This data should be sent to the IC.

COMMENT: [unknown] We could use the MARS Agreement to fly out an Forest Protection Limited plane to BC for a week or so to collect data around fires during the summer.

2. Using a radiant panel to compare wildfire chemicals (R. Ault)

Our objective is to compare the relative performance of chemicals (foam, gels, retardants and water) using a lab-based performance test. The work is conducted at the University of Alberta.

We used dried pine branches and placed them in a mesh container. We placed them in the chemical and then placed them in front of the radiant panel. The time to ignition was recorded as well as when glowing embers were produced. Then it was timed until flames appeared.

All the information will be on website. The methodology will be published in a master's thesis this coming fall. In the future, companies may contract with the University to test their products using the radiant panel.

QUESTION: [P. De Bruin] Are you looking at coverage levels?

ANSWER: No. At this time we are keeping amounts of chemical consistent. Because branches submerged in product it can be assumed to be maximum coverage level.

QUESTION: [M. Campbell] Is there going to be a temporal aspect to this? For example, dip in the product and then leave it for 1, 2, or 4 hours before testing with radiant panel?

ANSWER: This could be done, but it will depend on the feedback we get from advisory members once the initial work is reported.

3. Developing an Instrument to measure fire intensity: a field ready package (R. Ault)

We started with the thermal cube, which Erik Sullivan improved in his M.Sc. thesis. The next step is to design a field-ready package that is easy to use. We are looking for volunteers for a committee to determine the parameters for this package. Will require about 3 or 4 conference calls to work this out.

- Dave Schroeder Alberta ESRD
- Dan Thompson CFS
- Larry Nixon GNWT

4. Fire Behaviour in mulch fuelbeds along linear corridors: Copper River case study (S. Hvenegaard)

The Copper River fire occurred in northwestern BC alongside a linear corridor (a BC Hydro transmission line) and included initial attack with two heavy helicopters. Key points:

- Fast initial attack
- Use of two heavy helicopters on IA
- Short turnaround for water and fuel

5. Effectiveness of mulching as a forest fuel treatment: progress at Red Earth (S. Hvenegaard)

This project is a collaboration between the CFS, Alberta ESRD, FPInnovations, and McMaster University. The objective is to document crown fire behaviour in mulched fuel treatments. The CFS is interested in fire behaviour and fire weather. The data will be used in FIRETEC model.

Students from McMaster University are interested in moss fuels and depth of burn in peat. They will be observing hot spots in peat as well. FPInnovations will support by collecting surface fire behaviour data.

6. Protecting railroad bridge timbers from wildfire: coatings (J. Thomasson)

This was directed research for CN Rail. The project involved testing coatings on bridge timbers that reduce or eliminate fire spread. This included:

- Intumescent paints – swells with heat to form carbon insulator
- Water and salt based fire preventers (water evaporates leaving a salt barrier)
- Fire barriers – physical barriers, sealants

We performed burn tests on bridge timbers with a variety of coatings and ignition methods. Creosote is the problem. It melts at 66°C and then flows easily over the timbers spreading fire. We found that creosote timbers are difficult, if not impossible to protect with topical treatments.

This project is considered complete. Focus has now changed towards short-range detection and suppression systems. New coatings may be considered, but as a new project as with mechanical barriers.

7. Using UAV's to scan winter burn piles (J. Thomasson)

Potential sites include Miller Western near Whitecourt and Swan Hills. We will concentrate on one or two areas. Tentative testing dates are April 13–17 with the UAV and April 20–24 with a helicopter. Test plan is in development. FPInnovations will:

- Provide test support to Forest Operations
- Establish calibration IR targets in area
- Ground truth for hot spots
- Compare hand scan, UAV scan, and R/W scan

8. An in-line mixing kit for helitorch systems (R. Campbell)

Continued refinement and testing of the helitorch to resolve issues.

IMPORTANT NOTES

- An article was published in Wildfire Management about portable camera tower #1 that is used for the Chisholm fire lookout.
- Portable tower number 2 is 90% complete. All the equipment has been ordered and we expect delivery by the fiscal year end.

PROJECTS ON THE 2015 SUMMER WORK PLAN

The complete list of projects on our summer workplan was included in the meeting handouts (see attached). The projects listed here did not have presentations at this because there were no changes or progress since the fall meeting. Ray just gave a quick synopsis of each.

1. Canopy penetration of airtanker drops in forest fuel treatments and untreated stands (R. Ault)
This project is to take place in the Slave Lake area in treated and untreated stands. We anticipate fieldwork will take place in early May.
2. Design and Evaluation of a new wildfire sprinkler (R. Campbell)
The Mechanical Engineering design class at U of A produced a sprinkler design that we will have built this summer.
3. Determining the effectiveness of water enhancing gels as a fire control agent (R. Ault)
This is an on-going project that will look to collect data on the effectiveness of gel drops on wildfires.
4. Developing wildfire smoke training videos for lookout observers (R. Hsieh)
Three to four more smoke videos are required to complete this project. These can be from either PB's or wildfires.
5. Effectiveness of light stand thinning as a forest fuel treatment (C. Mooney)
A plot is planned for burning in the NWT this summer.
6. Effectiveness of stand cleaning as a forest fuel treatment (G. Baxter)
This project has plots in the NWT and can also use PB's in Alberta.
7. Effectiveness of underburning as a forest fuel treatment (G. Baxter)
Underburning will be documented in the NWT this summer and talks with the Cranbrook Forest District are underway to see if we can use their spring burns.
8. Fire behaviour and IA crews capabilities in burning harvest debris (G. Baxter and S. Hvenegaard)
Nine plots in three light, moderate, and heavy slash fuels are set for burning in the Edson Forest this spring. IA crews will be tested on these burns. Talks are also ongoing with the LLB forest for possible sites in their slash fuels. This project carries on from the six burns carried out in the Southern Rockies in 2012.
9. Matching helicopter drop volumes to fire intensity (R. Ault)
When is a medium bucket not enough? We are looking at fire behaviour and water drops.

COMMENT: [unknown] Will GoPro camera systems on the bucket help? Could look straight down and back at fire to capture effectiveness of drop.

COMMNET: [J. Berry] This is a math exercise. Know amount dropped, relate FWI to evaporated water and compare fireline intensity (kW/m) to the amount of absorbed water.

10. Survival zones for wildland firefighters (G. Baxter)

Following the successful collection of data on three wildfire burn-offs last summer in the NWT, FPIinnovations is looking to collect more data on wildfires or PB's. We have contacted Sask and have the list of Alberta PB's planned for this spring and summer. We also have a plot ready for burning in the NWT.

11. Testing short-range fire detection systems: Insight Robotics (J. Thomasson)

This is another method of bridge protection for timber railway bridges. Goal is to set up a detection system that triggers a sprinkler system to extinguish or control the fire.

PROPOSALS AND VOTING

- No project proposals put forward.
- Next Meeting: Tuesday October 6, 2015

MEETING HANDOUT – DOCUMENTS POSTED TO THE WEBSITE SINCE THE FALL 2014 MEETING

- **DOCUMENT TITLE:** *Wildfire detection in western Canada – trends and innovations*
DOCUMENT TYPE: *Final Report*
PROJECT TITLE: *Wildfire detection in western Canada – trends and innovations*
PROJECT STATUS: *Completed*
- **DOCUMENT TITLE:** *An evaluation procedure for short-range fire detection systems*
DOCUMENT TYPE: *Final Report*
PROJECT TITLE: *Developing an evaluation procedure for short-range fire detection systems*
PROJECT STATUS: *Completed*
- **DOCUMENT TITLE:** *Summary of mulch treatment operations Slave Lake Mulch Research Area*
DOCUMENT TYPE: *Summary Report*
PROJECT TITLE: *Effectiveness of mulching as a forest fuel treatment*
PROJECT STATUS: *Ongoing/Current*
- **DOCUMENT TITLE:** *Fire behaviour data collection in mulch fuelbeds*
DOCUMENT TYPE: *Poster*
PROJECT TITLE: *Effectiveness of mulching as a forest fuel treatment*
PROJECT STATUS: *Ongoing/Current*
- **DOCUMENT TITLE:** *Data collection in a natural opening in timber (No.1 – 3)*
DOCUMENT TYPE: *Update Reports*
PROJECT TITLE: *Survival zones for wildland firefighters*
PROJECT STATUS: *Ongoing/Current*
- **DOCUMENT TITLE:** *Environmental lapse rate: description, detection, influence on wildfires, and relevant technologies*
DOCUMENT TYPE: *Update Report*
PROJECT TITLE: *Using the environmental lapse rate to forecast wildfire blow-ups*
PROJECT STATUS: *Ongoing/Current*
- **DOCUMENT TITLE:** *Error reduction in the heat flux sensor used in forest fires*
DOCUMENT TYPE: *Poster*
PROJECT TITLE: *Developing an instrument to measure wildfire intensity*
PROJECT STATUS: *Ongoing/Current*
- **DOCUMENT TITLE:** *Developing an instrument to measure wildfire intensity: project progress and next steps*
DOCUMENT TYPE: *Update Report*
PROJECT TITLE: *Developing an instrument to measure wildfire intensity*
PROJECT STATUS: *Ongoing/Current*
- **DOCUMENT TITLE:** *Designing a field-ready package for Sullivan’s wildfire energy transfer sensor*
DOCUMENT TYPE: *Plan*
PROJECT TITLE: *Developing an instrument to measure wildfire intensity*
PROJECT STATUS: *Ongoing/Current*
- **DOCUMENT TITLE:** *Observations of the Coulson Martin Mars and Firewatch 76 operations on the 2011 wildfires in Mexico*
DOCUMENT TYPE: *Final Report*
PROJECT TITLE: *Evaluation of Coulson’s Martin Mars and Firewatch S76 at the 2011 wildfires in Mexico*
PROJECT STATUS: *Completed*

- **DOCUMENT TITLE:** *A demonstration of night operations for wildfire water delivery using the Coulson Firewatch airborne command and control system and night-vision goggle-equipped S-61*
DOCUMENT TYPE: *Final Report*
PROJECT TITLE: *Night operations for wildfire water delivery using Coulson's Firewatch airborne command and control system*
PROJECT STATUS: *Completed*
- **DOCUMENT TITLE:** *A decision tool for remote camera systems*
DOCUMENT TYPE: *Final Report*
PROJECT TITLE: *Developing a decision tool for remote camera systems*
PROJECT STATUS: *Completed*
- **DOCUMENT TITLE:** *Fire behaviour case study for the Copper River Fire*
DOCUMENT TYPE: *Final Report*
PROJECT TITLE: *Fire behaviour in mulch fuelbeds along linear corridors*
PROJECT STATUS: *Completed*

MEETING HANDOUT – PROJECTS ON OUR 2015 SUMMER WORK PLAN

- AN IN-LINE MIXING KIT FOR HELITORCH SYSTEMS
Roy Campbell
- CANOPY PENETRATION OF AIRTANKER DROPS IN FOREST FUEL TREATMENTS AND UNTREATED STANDS
Ray Ault
- DESIGN AND EVALUATION OF A NEW WILDFIRE SPRINKLER
Roy Campbell
- DETERMINING THE EFFECTIVENESS OF WATER-ENHANCING GEL AS A FIRE-CONTROL AGENT
Ray Ault
- DEVELOPING AN INSTRUMENT TO MEASURE WILDFIRE INTENSITY: A FIELD-READY PACKAGE
Ray Ault
- DEVELOPING WILDFIRE SMOKE TRAINING VIDEOS FOR LOOKOUT OBSERVERS
Rex Hsieh
- EFFECTIVENESS OF LIGHT STAND THINNING AS A FOREST FUEL TREATMENT
Colleen Mooney
- EFFECTIVENESS OF MULCHING AS A FOREST FUEL TREATMENT
Steve Hvenegaard
- EFFECTIVENESS OF STAND CLEANING AS A FOREST FUEL TREATMENT
Greg Baxter
- EFFECTIVENESS OF UNDERBURNING AS A FOREST FUEL TREATMENT
Greg Baxter
- EVALUATING SMARTPHONE INFRARED-SCANNING ACCESSORIES FOR WILDFIRE OPERATIONS
Jim Thomasson
- FIRE BEHAVIOUR AND INITIAL-ATTACK CREW CAPABILITIES IN BURNING HARVEST DEBRIS
Greg Baxter and Steve Hvenegaard
- FIRE BEHAVIOUR IN MULCH FUELBEDS ALONG LINEAR CORRIDORS
Steve Hvenegaard
- FUEL TREATMENT MAINTENANCE OPERATIONS: PRODUCTIVITY AND EFFECTS ON POTENTIAL FIRE BEHAVIOUR
Steve Hvenegaard
- MATCHING HELICOPTER DROP VOLUMES TO WILDFIRE INTENSITY
Ray Ault
- SURVIVAL ZONES FOR WILDLAND FIREFIGHTERS
Greg Baxter
- TESTING SHORT-RANGE FIRE DETECTION SYSTEMS: INSIGHT ROBOTICS
Jim Thomasson
- USING THE ENVIRONMENTAL LAPSE RATE TO FORECAST WILDFIRE BLOW-UPS
Greg Baxter and Jim Thomasson
- USING UAVs TO SCAN WINTER BURN PILES
Jim Thomasson