Wildfire Operations Research
Advisory Committee Meeting Minutes
October 21, 2014

LOCATION

Alberta Innovates, Edmonton, AB

ATTENDEES

FPINNOVATIONS

Mark Ryans
Ray Ault
Jim Thomasson
Greg Baxter
Rex Hsieh
Colleen Mooney

GOVERNMENT

Quentin Spila, Dave Schroeder, Wally Born	ESRD
Dale Thomas, Ryan Good, Maria Sharpe	ESRD
Andy Low (online)	BCFS
Dan Thompson, Kerry Anderson, Brian Simpson	CFS
Colin McFayden, (online)	OMNR
Jay Woosaree, Marshall McKenzie	AITF (Alberta Innovates Technology Futures)
Chris McGuinty	ESRD
Jon Large	Parks Canada

INDUSTRY

Terry Popowich (online)	Discovery Air
Rick Solomon	FireFox Inc./EFS
Revie Lieskovsky	Conair Aviation
Jeff Berry	Conair Aviation
Terry Malmas	Fortis
Dennis Chrystian	Air Spray

WELCOME

INTRODUCTIONS AND ANNOUNCEMENTS

- Spring 2014 meeting minutes approved by Jeff Berry; seconded by Quinton Spila.
- Ray Ault mentions that Roy Campbell and Steve Hvenegaard are not in attendance today for FPInnovations.
- We continue to contract Mark Ackerman, Gary Dakin and Rob Thorburn on a professional services basis.

RECENTLY COMPLETED PROJECTS

DEVELOPING AN INSTRUMENT TO MEASURE WILDFIRE INTENSITY

Mechanical Engineering graduate student has published a paper on the instrument and testing. (International Journal of Wildfire)

DEVELOPING A SIMULATED WILDFIRE HOTSPOT TARGET

U of A students designed a non-flaming target for use in IR testing.

REVIEW OF THE WILDFIRE CHEMICAL QUALIFICATION PROCESS

Directed project for CIFFC. Report has been delivered to CIFFC.

ATVS AS A POTENTIAL SOURCE OF WILDFIRE IGNITION

Completed a directed report for Alberta Justice.

AN IMPROVED FOAM DELIVERY SYSTEM FOR WILDLAND FIREFIGHTING

A project completed by the U of A's Mechanical Engineering design class.

DEVELOPING A DATABASE FOR ESRD'S WILDLAND FUELS INVENTORY PROGRAM

Database has been completed and is being used by ESRD.

DEVELOPING A LONG-TERM MONITORING PROTOCOL FOR FUEL TREATMENTS

Report on our website.

PRODUCTIVITY OF EQUIPMENT USED IN FUEL TREATMENT OPERATIONS

Five reports on our website for different pieces of equipment.

DESIGNING A NEW AERIAL-IGNITION TRACKING SYSTEM FOR ALBERTA

Report on our website.

LESS-FLAMMABLE NATIVE VEGETATION: A VIDEO

FPInnovations, ESRD, and AITF have worked together to produce a video summarising the work done in the less-flammable species project. Will be on YouTube soon with a link through our website.

SUSPENDED OR REMOVED PROJECTS

MECHANISED EQUIPMENT TACTICS

Assisting the USFS on data collection.

REVIEW OF WILDFIRE FACILITIES AND CATERING IN WESTERN CANADA

An ESRD directed survey project.

CONSTRUCTION OF A SECOND PORTABLE SMOKE DETECTION TOWER

Program turned over to ESRD Communications Shop.

Ray explained these were described as projects in past meeting minutes. However, our role has been to support the efforts of others. We should not have described them as projects, but rather as supporting initiatives. Consequently, these may not show up on our website as FPInnovations doesn't have control over the release of the results.

2014 PROJECT UPDATES

FOREST FUEL TREATMENT: UNDERBURNING

Work on this project takes place primarily at the NWT study site using fifteen 75 m x75 m plots. In 2014, the underburning that took place was to create a firebreak for a survival zone burn. Conditions were extreme, so we used great caution. A crew was on site to put out candling trees. Strips were kept close together to reduce chance of fire growing out of control.

Mechanical Engineering students collected heat flux data, which peaked at 12 kW/m^2. This is relatively low because we did not let the fire grow.

FOREST FUEL TREATMENT: MULCHING

Worked along with ESRD and CFS to collect data. We want to collect data over a range of conditions. Burned two mulch plots in August at Horse Creek and collected heat flux data for each fire. Heat flux was high (over 30 kW/m^2) on a slow moving fire.

FIRE BEHAVIOUR AND INITIAL-ATTACK CREW CAPABILITIES IN BURNING HARVEST DEBRIS

Nine plots have been surveyed and fireguards have been put in place. Fuel load data has been collected. Foothills Wildfire Management Area staff attempted to burn the plots in August, but weather conditions were unfavorable. Plans are to burn in the spring of 2015. This fieldwork will compliment work completed in Bragg Creek in 2012.

USING THE ENVIRONMENTAL LAPSE RATE TO FORECAST WILDFIRE BLOW-UPS: LITERATURE REVIEW

The objective is to determine if super adiabatic conditions could develop near an active fire and if we can measure it in real time to provide firefighters advance warning of possible increase in fire behaviour. Literature review showed steep lapse rates can break down and cause erratic, strong winds to drop to the surface. There are environmental characteristics that can produce these conditions. Being able to predict where they may occur could improve firefighter safety. At this time the data provided is very coarse.

Comment [Jeff Berry]: Should pull the data for the Strawberry Hill Fire and the Barrier Fire to see the atmospheric profile for those days. He believes steep lapse rates had an influence.

Comment [Kerry Anderson]: Believes we are on the right track, but the critical piece of information deals with the height and thickness of the capping layer. If we know in the morning the specifics for the capping layer we can predict, or at least warn, of a possible breakdown of the cap and the resulting increase in gusty winds at the surface. Recommended we work with meteorologists on this as they deal specifically with this for tornado prediction. They are the experts in this area.

Comment [Dave Schroeder]: Thinks we should go through case studies to see if there may be examples. Is this information important or do we already know it?

Comment [Kerry Anderson]: Providing meteorologists with on-site data is important for prediction. Can fill in between where atmospheric soundings are made.

Comment [Jeff Berry]: Collecting daily observations for predictions is very important. If the set of conditions are in place, a notice could be sent out to assist in fire management.

Comment [unknown]: Lost Creek data should also be investigated.

Comment [Terry Popowich]: Should look at fatalities and near misses for possible data.

Comment [Andy Low]: BC supports this work. We would assist with large-scale data.

Ray explained that we are still unsure how to proceed with this project and will bring to the spring meeting a clear project plan.

USING THE ENVIRONMENTAL LAPSE RATE TO FORECAST WILDFIRE BLOW-UPS: FIELDWORK

While in Halifax for Wildfire Canada, Jim Thomasson took a few days to meet with Forest Protection Limited (FPL) of New Brunswick. FPL uses the AIMMS-20 and AIMMS-30 sensor, which were identified as potential tools for measuring and providing real-time data for the calculation of environmental lapse rates.

FPL has five methods of retrieving data from the sensors depending on user's needs. This will be investigated while working along with FPL.

TESTING FIRE DETECTION SYSTEMS ON A TIMBER RAILWAY BRIDGE

We developed a test procedure to establish product detection capabilities at the Moose Lake Trestle near Bonnyville, Alberta. The test procedure will determine if a system can detect a small heat source (<0.01 m^2). FPInnovations will be the independent testing organization providing an evaluation on a fee for service basis. FPInnovations will evaluate a detection system for Insight Robotics in the spring of 2015. Initial work with Insight was conducted this fall.

USING UAVs TO SCAN WINTER BURN PILES

The forest industry is interested in determining if UAV technology can be used to reliably detect holdover fires from winter burn piles. Initial work on proof of concept was carried out in Hinton this summer. The project will determine the costs and benefits of using a UAV to scan burn piles compared to helicopter or handheld IR, and identify approval and operational requirements.

This project was proposed by Millar Western in March and is managed by FPInnovations Forest Operations with assistance from the wildfire group. Partial funding has been received from AIAE (UAV Forest Management Applications in Alberta), NRCan, and industry membership.

FPInnovations got a blanket allowance for Alberta to use its UAV. However, there are restrictions: we cannot fly it higher than 120 m AGL, and we cannot fly it over populated areas. The cost of the unit was $100,000. It has a 50-minute flight duration.

Comment [Quentin Spila]: Can you provide the Transport Canada contact where you got your blanket allowance? Want to learn about the process. ESRD is concerned with potential airspace conflicts above wildfires.

FOURTH INTERNATIONAL WILDLAND FIRE DETECTION WORKSHOP

The 2015 workshop will be the fourth hosted by FPInnovations. It is proposed for Feb 25–26 at Alberta Innovates Technology Futures in Edmonton. Potential themes are:

- Current conditions and trends
- Public reporting opportunities
- Advances in satellite technologies
- New approaches to land-base detection
- Innovations in aerial-based detection
- Infrared scanning resources

Contact Ray for email updates.

MATCHING HELICOPTER DROP VOLUMES TO WILDFIRE INTENSITY

The objective of this project is to determine the threshold fire intensity at which helicopter bucket drops are no longer effective. We will document helicopter bucket drops to calculate the gallons of water required to decrease the HFI (head fire intensity) of a fire to allow direct attack by firefighters.

This summer we documented helicopter bucket drops on three BC wildfires. Using video from across the valley did not provide useful data. Access to, and visibility of, the drop zone is a significant challenge. A potential solution may be to use helicopter-mounted multi-view cameras. Small cameras, like a Go-Pro, were purchased and affixed to the helicopter bucket. The video collected from these cameras is encouraging.

This winter we will analyse the video along with drop records to calculate volumes and flow rates and assess the multi-camera platform.

USING A RADIANT PANEL TO COMPARE WILDFIRE CHEMICALS

The objective of this project is to develop a method to compare the relative performance of wildfire chemicals in a laboratory setting. We are working with U of A Mechanical Engineers on a NSERC Grant.

Several tests were completed using water, foam, gel and retardant. Samples were timed to ignition. The mesh cage had a control side and a side where a chemical was applied. A methodology was developed from the tests. Additional data will be collected this winter and we will present the findings in the spring.

WOODY DEBRIS MANAGEMENT PROGRAM

The program is funded by British Columbia to encourage the development of new technologies that help industry manage woody debris without compromising air quality. The program began in 2009 and has funded eleven projects so far.

FPInnovations role was to manage the process and develop a website. We have now been asked to plan and host a workshop. We will be working with members of the BC Woody Debris Management Working Group to develop an agenda and a speaker list. Workshop will be by invitation only and be around 30 participants. It is tentatively scheduled for Feb 19 in Kamloops. The objective of the workshop is to engage the BC forest industry to identify current challenges that limit woody debris management. The outcome is to identify knowledge gaps and future research needs that can be funded by the program.

Comment [Dave Schroeder]: Can proposals come from outside BC? Is there any link to the Joint Fire Science Program? Good idea, we will follow-up.

DEVELOPING WILDFIRE SMOKE TRAINING VIDEOS FOR LOOKOUT OBSERVERS

This is an Alberta-directed project to create videos that will assist the training of new lookout observers. We record fires from lookouts and at ground level simultaneously and place the clips side-by-side in a video. In 2013, we recorded four fires to make 11 training videos. In 2014, we were only able to record one fire. From this we produced a one-minute training video.

Future plans in 2015 are for more videos in different fuel types and two well-defined smoke columns for Tim Kline at ESRD.

REMOTE CAMERA SYSTEMS FOR WILDFIRE MANAGEMENT: AN ALBERTA REVIEW

In February 2014, Alberta created the Remote Camera Systems Task Force. Its objective is to develop a provincial strategy for using remote cameras systems for wildfire management. FPInnovations' role was to conduct a series of interviews with key wildfire management staff in Alberta. This is a directed project for Alberta. Preliminary findings:

- Increased use of remote cameras in nine of Alberta's ten wildfire management areas.
- The areas are at different stages of implementation, knowledge, and experience.
- Cameras are used for detection and monitoring of fire, but also for monitoring fuels, weather, and infrastructure.

AN IN-LINE MIXING KIT FOR HELITORCH SYSTEMS

An in-line mixing system was designed and built by Gary Dakin and Mark Ackerman in 2012. This was a ground-based system that mixed the Flash 21 A and B in the line. Next step was to design this for the aerial torch. The prototype was field tested in 2013 and two problems were identified. The first was instability in flight, which was corrected this year. The second was inconsistent mixing. This has not been corrected yet.

Ray advised that we might not be able to produce a suitable gelled fuel using the static mixing tube. We will look for alternatives and solutions this winter.

Comment [Jeff Berry]: It is tough to get right mix; time, temp, etc. are all involved. Maybe mixing line is not long enough. Have you asked Mark Campbell for assistance?

Comment [unknown]: It could also be the Flash 21 A and B.

Comment [Jon Large]: Parks sees the safety and time benefits of the in-line mixing aerial torch and would sponsor the work.

Comment [Maria Sharpe]: Could test this in Janvier and the Lac La Biche area in the spring during hazard reduction burns.

FIRE BEHAVIOUR IN MULCH FUELBEDS ALONG LINEAR CORRIDORS

We continued our studies along BC Hydro's Northwest Transmission Line. Looked primarily at moisture profiles in the chip fuelbed and ignition potential under drought conditions. Results were similar to what we saw in 2013.

Comment [unknown]: How can moisture content be great than 100%? It is based on the dry weight of the sample.

SURVIVAL ZONES FOR WILDLAND FIREFIGHTERS

We collected data on the Birch Fire Complex in the NWT. We placed cameras and sensors ahead of burnout operations. A clearing that we thought would have been survivable was completely consumed by fire and was clearly not at all survivable.

ONGOING PROJECTS WITH NO UPDATES

We have not made any progress on these projects since the last meeting because of weather, logistics, or resources.

CANOPY PENETRATION OF AIRTANKER DROPS IN FOREST FUEL TREATMENTS AND UNTREATED STANDS

This project is scheduled to take place in the spring of 2015 near Slave Lake.

DOCUMENTING HUMAN CAUSED FIRES

DETERMINING THE EFFECTIVENESS OF WATER-ENHANCING GEL AS A FIRE-CONTROL AGENT

DESIGN AND EVALUATION OF A NEW WILDFIRE SPRINKLER

We are taking the design made by the engineering students to make a prototype this winter.

FOREST FUEL TREATMENT STUDY: STAND CLEANING

This was to be done in the NWT, but no burning was allowed because of the conditions.

FOREST FUEL TREATMENT STUDY: LIGHT STAND THINNING

The plot is ready in the NWT, but no burning was allowed because of the conditions.

ASSESSMENT OF NOISE EXPOSURE IN WILDFIRE OPERATIONS

Rob Thorburn did some data collection this past summer.

PROTECTING RAILWAY BRIDGE TIMBERS FROM WILDFIRE

PROJECT PROPOSALS

REMOTE CAMERA SYSTEM FOR WILDFIRE MONITORING IN BC

This project was proposed by BCFS. They had used remote cameras in the past two seasons to track the progress of selected modified-response fires. A better system would be a valuable tool for monitoring fire behaviour during suppression operations, prescribed burns, and research burns. The cameras they used were not purpose-built and thus not the ideal system. They want a camera system that will:

- provide time-lapse still images, or video, as required
- allow two-way communication
- have infrared capability

Comment [Dave Schroeder]: Is this a directed project? Are other agencies interested and can this be covered in the detection workshop?

Comment [Jon Large]: Parks is interested. We could use this in the backcountry.

Comment [Dave Schroeder]: Maybe this could be a set of guidelines for system cost and performance. A database where you can input the characteristics and performance you want from a camera system and the database would suggest a camera for you; an online tool to assist in choosing a system.

Comment [Jay Woosaree]: Vegreville uses camera systems for a number of things. Could contact them for information and suggestions.

Comment [Dave Schroeder]: A broader look at this project would be good.

Comments: [Andy Low]: Remote camera companies approach them all the time. A guide would be good that the companies could access.

Comment [Terry Popowich]: Suppliers always approach them as well.

Comment [Maria Sharpe]: A table format for cameras, weather stations, radios, IR cameras, etc. that can be updated annually with new technology would be very good.

Comment [Kerry Anderson]: If we had this, vendors would probably approach us to fill in the gaps.

This could be more of a camera selection matrix—we need this, we want that—all leading to a possible product. The discussion continued around technology advancement, the need to keep any information current, and the desire to involve vendors. Ray promised to dig into it deeper and provide a comprehensive proposal in the spring.

EFFECTIVENESS OF THE FLIR ONE INFRARED IPHONE ACCESSORY FOR WILDFIRE OPERATIONS

This project was proposed by ESRD. With ESRD now using iPhones, the wildfire branch believes it is only a matter of time before people want to use this technology. ESRD would like to test this product before users start to purchase it.

The unit is basically a case for the iPhone that turns into an IR camera. Is this a $350 gadget or is it useful? It is proposed that FPInnovations investigates the usefulness of this unit.

Comment [Marshal McKenzie]: Are there not specs from the manufacturer? We have the specs, but can it do what the manufacturer says it can?

Comment [Jon Large]: It would be good to compare to other IR products.

Comment [Tom Burton]: Does it record? Yes. It can be used with video on the iPhone.

Comment [unknown]: Work with Jamie Babcock. He is the IR coordinator for Alberta.

Comments: [Andy Low]: It may not pass government security.

Comment [Terry Popowich]: Interested if it works.

A show of hands by the members indicated that this project proposal is approved and will be included on our 2015 work plan.

AIRTANKER DROPS: HOW CAN YOU MANIPULATE A LOAD FOR BETTER COVERAGE?

This project was proposed by Jeff Berry (along with Larry Paul). They are wondering if changing droplet size would improve coverage. What can be done with tanks, etc. to get optimal coverage? Jeff suggested an in-depth look at this; perhaps a literature review should be the first step.

Comment [Dave Schroeder]: What is the potential gain? If you can get a consistent coverage, you could save a lot. Are there any problems using tanks?

Comment [Ray Ault]: This will be exploratory work. We will start with a literature search, talk to the US, and learn what the question is and how it would work.

Comment [unknown]: Would this give individual companies a competitive advantage at the time of contract bidding?

Comment [unknown]: Talk to Ryan at the USFS.

Comment [Jon Large]: Parks does not use airtankers, but it would help knowing you are getting the coverage level you want.

Comment [Quentin Spila]: Vendors bidding on work have to meet the requirements. This should be a directed project from Conair to FPInnovations.

Comment [Jeff Berry]: This is a larger issue. The findings should be shared.

Comment [Dave Schroeder]: There is a benefit to knowing what is out there. If benefits can be gained by improving it, it would be beneficial to all. It would be good to get specific numbers. For example, coverage level 4 will be improved by 15%.

Comment [Ray Ault]: Our approach will be to talk to the USFS, write up a proposal and circulate before the next meeting.

Comment [Revie Lieskovsky]: Yale put out a paper on droplet size in the 1970s.

NEXT MEETING

Scheduled for Tuesday, March 10, 2015.