Safely Using High Intensity Prescribed Fire Near Communities

Managing Fire in Changing Times
Wildland Fire Canada 2012
October 2-4, 2012
Kananaskis, Alberta

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Forces Driving Future Trends (B.J. Stocks Wildland Fire Canada 2010)

- Climate Change
  - Longer, more severe fire seasons
- Cumulative Drought Effects
  - Further stress to fuels (insect, drought, etc)
  - Water competition
- Continued Increasing Risk in the WUI
  - Still expanding
  - *Push back on fuel treatments
  - *Preparedness levels of ourselves and Municipal partners
- Escalating Emergency Demands
  - Increased trends of frequency and impact of other natural disasters
  - Fire management personnel playing increasing roles
- Strained Agency Budgets
  - Recession, staffing, infrastructure, etc.

One half or less resources available since Yellowstone 1988

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Other Factors….

- Long/short term effects resulting in increased fuel flammability
  - Increased fuel loads
    - Increasing CO2 slows decay in dead and down….
- Increasing Bureaucracy and Policy Issues
  - Complicates program delivery
- Older retiring workforce…
  - Fewer candidates to fill vacancies…
  - Greater turn around on fire crews
    - Demands for greater levels of training
  - Increasing numbers of specialized positions
- Agencies capacities to conduct pre-suppression work and planning
  - Public willingness and education needs
  - Increasing special interest groups with specific agendas

Increased flammability is not our future…… but a reality today….

"I have seen the Earth Change" Terra Nova

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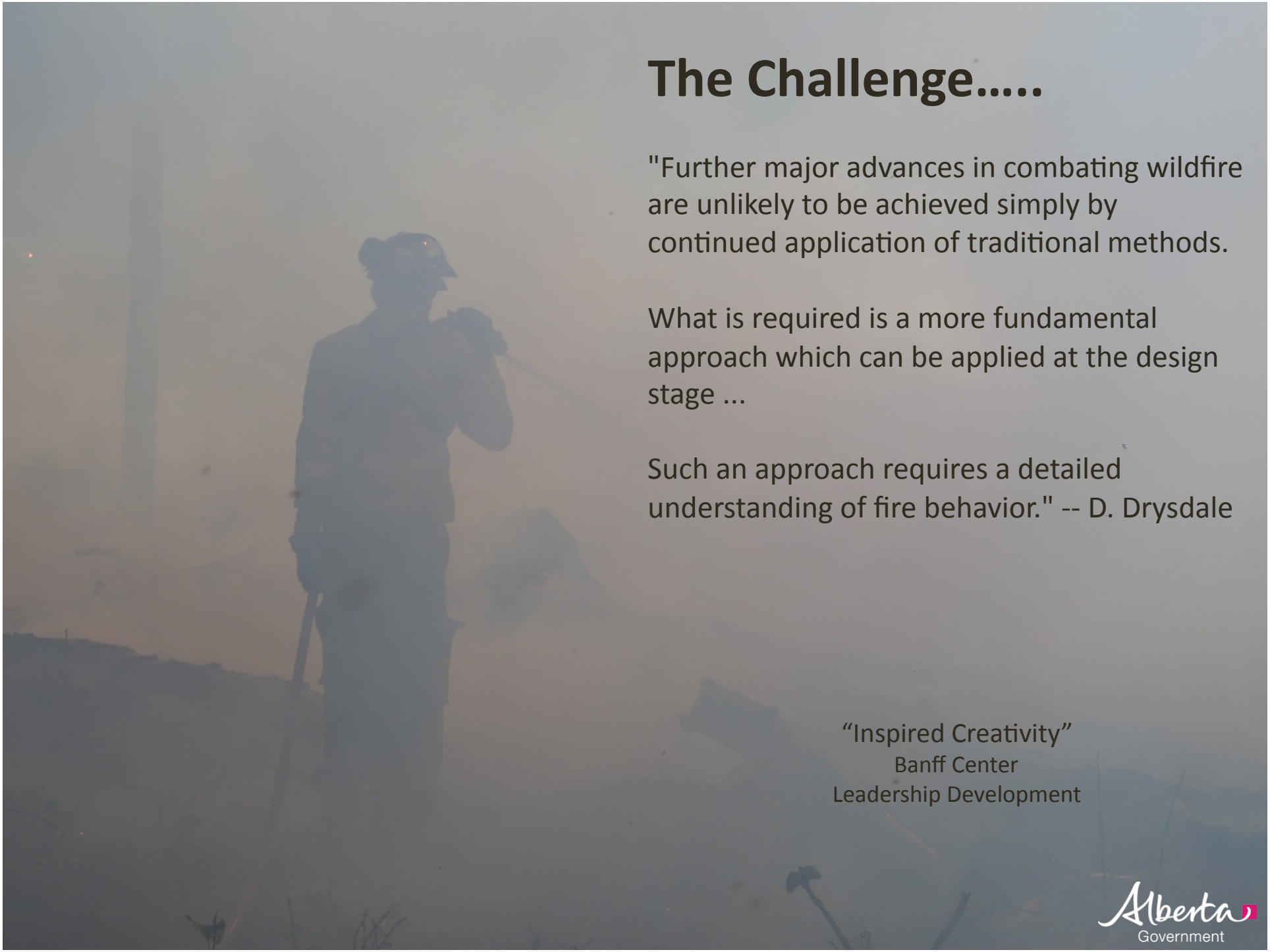

The Challenge…..

"Further major advances in combating wildfire are unlikely to be achieved simply by continued application of traditional methods.

What is required is a more fundamental approach which can be applied at the design stage ...

Such an approach requires a detailed understanding of fire behavior." -- D. Drysdale

Flying E 2007

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Mount Nestor 2008

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Saddle Mountain, Crowsnest Pass

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Saddle Mountain 2009

To maintain control…

- Used sprinklers along ridge top
- Employed large volume pump systems with elevation challenges
  - 200- 400 gallons/minute on the ridge top
- Used moisture regime changes between east and west facing slopes earlier in the season
- Hand ignition to closely manage ignition at a scaled pace
- East winds pulled the fire up the west facing slope

"Young Generals talk strategy, old Generals talk logistics…"

Mount Buller 2010

Steep slopes, provincial park standards requires different approaches to guard construction.

Spider Hoe with feller head

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Hand ignition in lower indices secures the guard allowing for more intense burning later…..

Select the more flammable fuel types and burn them out early when indices are still low. Permits you to safely burn other fuel types in higher indices later.

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Embrace and utilize new technology

- Power fill bucket fills in the same time as conventional buckets but only requires 15-20 cm of water resulting in faster turn around times, more water per hour

- Power Flow buckets provide better control and management of drops increasing value and utilization

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A basic fire behaviour fundamental is that different fuels respond with different intensities under the same conditions…

- Fuel modification is a common FireSmart approach to vegetation management to reduce fuel loads, changing fuel types with the intent of decreasing fire intensities (in comparable indices) near values at risk

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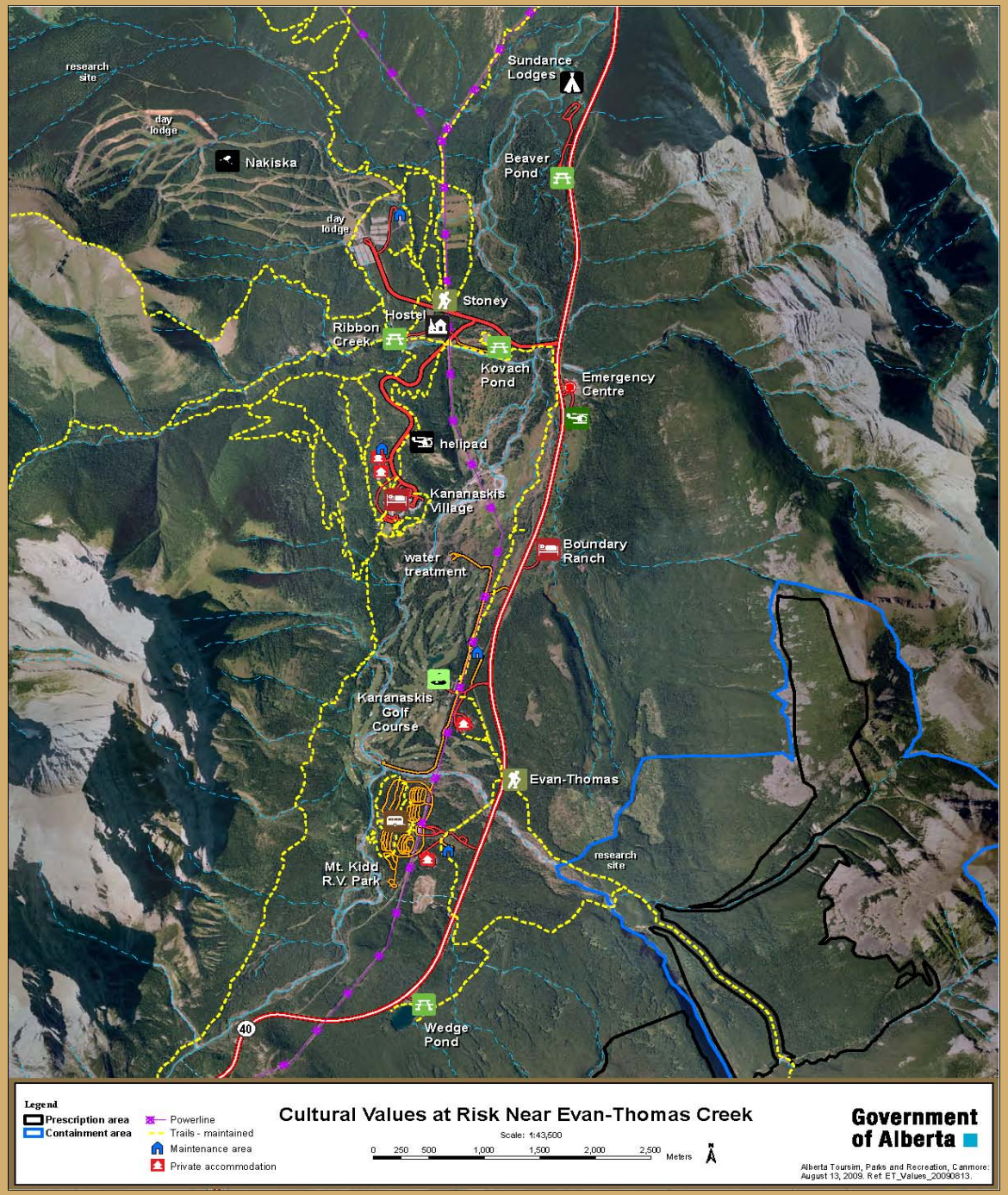
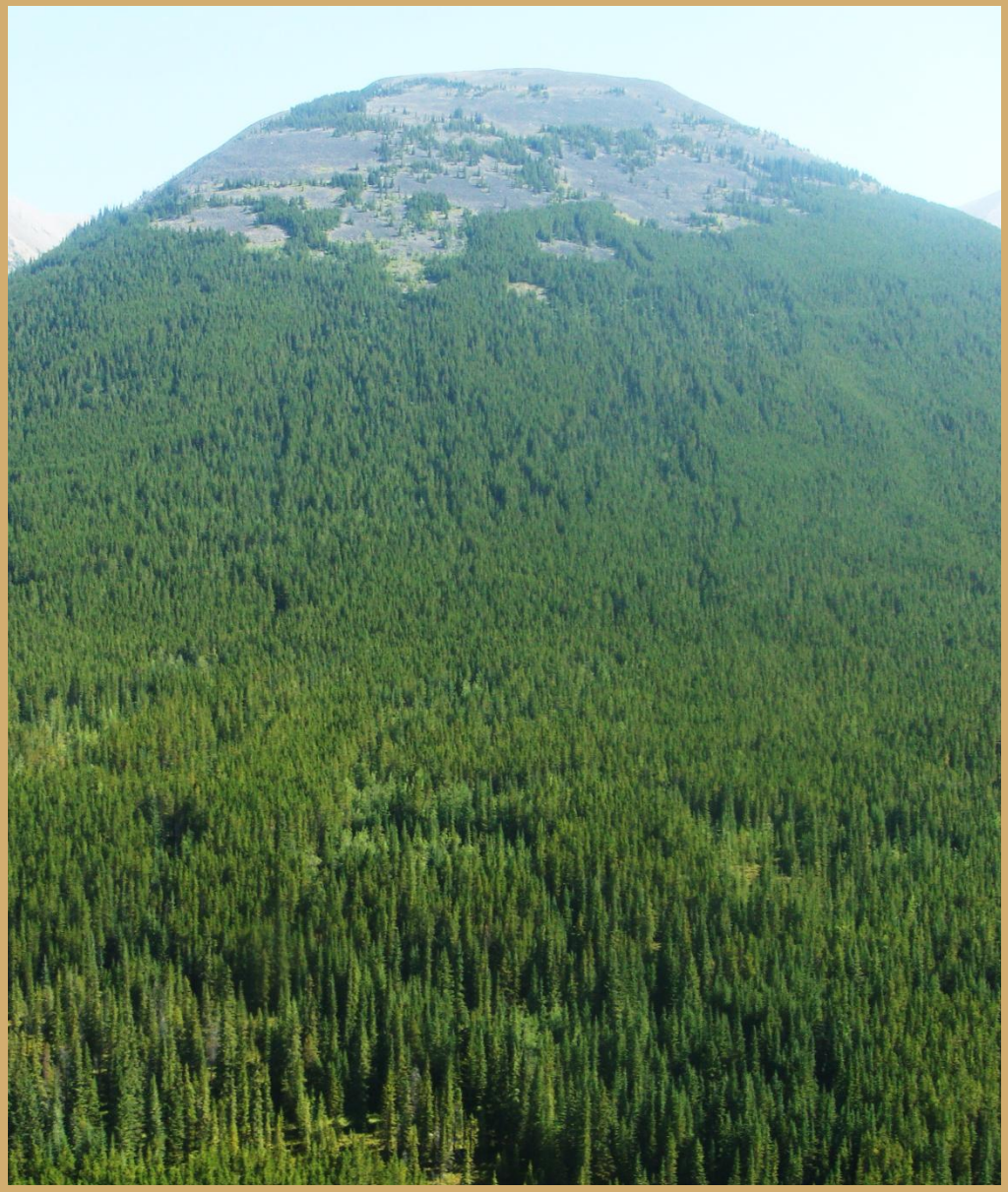

research site
day lodge
Nakiska
Sundance Lodges
Beaver Pond
day lodge
Stoney
Hostel
Ribbon Creek
Kovach Pond
Emergency Centre
helipad
Kananaskis Village
Boundary Ranch
water treatment
Kananaskis Golf Course
Evan-Thomas
research site
Mt. Kidd R.V. Park
Wedge Pond
40
Legend
Prescription area
Containment area
Powerline
Trails - maintained
Maintenance area
Private accommodation
Cultural Values at Risk Near Evan-Thomas Creek
Scale: 1:43,500
0 250 500 1,000 1,500 2,000 2,500 Meters
Government of Alberta
Alberta Tourism, Parks and Recreation, Canmore: August 13, 2009. Ref: ET_Values_20090813.



New challenges sometimes require new approaches….

The challenge…

- Continuous, homogenous fuels.
- Extensive values at risk
- High visibility and use
- Traditional approaches maintain a high level of risk

One solution….

- Reverse engineering
- Increase surface fuel loading to force a response in lower indices…

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A New Approach…..
"Fuel Amendment"

- "Amend" the fuels to increase fuel loading at ground level with the intent of increasing fire response and intensities in lower Fire Danger Indices.

- The resulting new fuel type was an "unknown" but would still be more flammable than the surrounding fuels.

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Developing a prescription for a new fuel type is full of unknowns….

Foliar Moisture Content Inputs	
Projection date	Sep 01 2010
Date of min FMC known	No
Date of minimum FMC	
Latitude (°N)	50
Longitude (°E)	115
Elevation above sea level (m)	3000
FBP Primary Inputs	
Fuel type	C3
Grass fuel load (tonnes/ha)	20
Degree of curing (%)	70
Percent conifer (%)	0
Percent dead fir (%)	
Fine fuel moisture code	91
Wind speed (kph)	
Wind adjustment factor	
10 metre wind speed (kph)	23.2
Cardinal wind direction (°)	SW
Percent ground slope (%)	25
Aspect of slope (°)	West
Elapsed time (mins)	30
Dir for spread calculation (°)	
FBP Advanced Inputs	
Height to live crown base (m)	Default
Crown fuel load (kg/m²)	Default
Foliar moisture content (%)	120
Acceleration Inputs	
Acceleration model	Closed

Initial spread index	CFB BUI 25	30	35	40	45	50	55	60	65	70
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0.04	0.39
15	0	0	0	0	0	0	0	0.27	0.53	0.64
16	0	0	0	0	0	0	0.35	0.61	0.72	0.78
17	0	0	0	0	0	0.31	0.64	0.76	0.82	0.86
18	0	0	0	0	0	0.63	0.78	0.85	0.89	0.91
19	0	0	0	0	0.53	0.77	0.86	0.9	0.93	0.94
20	0	0	0	0	0.72	0.86	0.91	0.94	0.95	0.96
21	0	0	0	0.53	0.83	0.91	0.94	0.96	0.97	0.98
22	0	0	0	0.73	0.89	0.94	0.96	0.98	0.98	0.99
23	0	0	0.01	0.83	0.93	0.96	0.98	0.99	0.99	0.99
24	0	0	0.55	0.89	0.95	0.98	0.99	0.99	0.99	0.99
25	0	0	0.73	0.93	0.97	0.99	0.99	0.99	1	1
26	0	0	0.83	0.95	0.98	0.99	0.99	1	1	1
27	0	0	0.89	0.97	0.99	0.99	1	1	1	1
28	0	0	0.92	0.98	0.99	1	1	1	1	1
29	0	1	0.95	0.99	0.99	1	1	1	1	1
30	0	1	0.97	0.99	1	1	1	1	1	1
31	0	1	0.98	0.99	1	1	1	1	1	1
32	0	1	0.98	1	1	1	1	1	1	1
33	0	1	0.99	1	1	1	1	1	1	1
34	0	1	0.99	1	1	1	1	1	1	1
35	0	1	0.99	1	1	1	1	1	1	1

10 metre wind speed (kp	ISI FFMC 85	86	87	88	89	90	91	92	93
15	5.4	6.2	7.1	8.3	9.6	11.1	12.8	14.8	17.2
16	5.7	6.5	7.5	8.7	10	11.6	13.5	15.6	18
17	5.9	6.8	7.9	9.1	10.6	12.2	14.2	16.4	19
18	6.2	7.2	8.3	9.6	11.1	12.8	14.9	17.2	19.9
19	6.6	7.6	8.7	10.1	11.7	13.5	15.6	18.1	20.9
20	6.9	7.9	9.2	10.6	12.3	14.2	16.4	19	22
21	7.3	8.3	9.6	11.1	12.9	14.9	17.3	20	23.1
22	7.6	8.8	10.1	11.7	13.5	15.7	18.2	21	24.3
23	8	9.2	10.6	12.3	14.2	16.5	19.1	22.1	25.5
24	8.4	9.7	11.2	12.9	15	17.3	20.1	23.2	26.9
25	8.9	10.2	11.8	13.6	15.7	18.2	21.1	24.4	28.2
26	9.3	10.7	12.4	14.3	16.5	19.2	22.2	25.7	29.7
27	9.8	11.3	13	15	17.4	20.1	23.3	27	31.2
28	10.3	11.8	13.7	15.8	18.3	21.2	24.5	28.4	32.8
29	10.8	12.5	14.4	16.6	19.2	22.3	25.8	29.8	34.5
30	11.4	13.1	15.1	17.5	20.2	23.4	27.1	31.3	36.3
31	12	13.8	15.9	18.4	21.3	24.6	28.5	33	38.1
32	12.6	14.5	16.7	19.3	22.3	25.9	29.9	34.6	40.1
33	13.2	15.2	17.6	20.3	23.5	27.2	31.5	36.4	42.1
34	13.9	16	18.5	21.3	24.7	28.6	33.1	38.3	44.3
35	14.6	16.8	19.4	22.4	26	30.1	34.8	40.3	46.6
36	15.4	17.7	20.4	23.6	27.3	31.6	36.6	42.3	49
37	16.1	18.6	21.4	24.8	28.7	33.2	38.4	44.4	51.3
38	16.9	19.4	22.4	25.9	29.9	34.6	40	46.3	53.4
39	17.5	20.2	23.2	26.9	31.1	35.9	41.5	48	55.4
40	18.1	20.9	24	27.8	32.1	37.1	42.9	49.6	57.2

Required Values

FFMC 91, Wind 23 = ISI 19.1

BUI 45 - 55 at ISI 19.1 to get 53 - 86% CFB

- Acceptable range of CFB in C3 Fuels (ISI and FFMC based)
- Increased risk of unacceptable fire behaviour due to response by crown fuels rather than small slash fuel types
- Unacceptable CFB values
- CFB of 80% achieved when the 10 meter wind speed is 16.9 and the FFMC is 91 in C3 fuels
- Unacceptable 10 meter wind speed and FFMC values (>80% CFB)

Solution - Create a matrix to determine what indices it would take for the surrounding fuel types to respond, then lowered the indices values to ensure a non response.

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- Communication Plan
  - More complex than Incident Planning
- Smoke Management
  - Calgary Regional Air Zone
- Road Traffic Strategies
- Public Management
- Trail Closures
- Interagency Relationships and Co-operation
  - KID Council
  - FireSmart
  - Tourism, Parks, Recreation

PRESCRIBED FIRE

EVAN-THOMAS CREEK PRESCRIBED FIRE

2011

Project Description:

The Evan-Thomas Creek prescribed fire is approximately 408 hectares and located in Elbow-Sheep Wildland Provincial Park in the Kananaskis Valley. It is located about 30 kilometres southeast of Canmore, and five kilometres southeast of Kananaskis Village on Highway 40.

Timelines:

The Evan-Thomas Creek prescribed fire is scheduled to begin in the 2011 season. Operations will only commence when forecasted weather, on-the-ground forest conditions, and smoke management conditions permit. Fire managers will only proceed when they can ensure a safe operation that will meet the overall objectives of the prescribed fire. There will be no operations from May 15 to June 7, July 1 to August 1, or over the Labour Day long weekend.

Goals of the prescribed fire:

(as detailed in Kananaskis Country Vegetation Management Strategy)

To reintroduce the natural benefits of wildfire in an area that will support future wildfire suppression and forest management activities.

WHAT THE PRESCRIBED FIRE WILL ACHIEVE:

1. **Ecological:** Improve and expand wildlife habitat, restore the diversity of vegetation and remove prime pockets of mountain pine beetle habitat.
2. **Land Management:** Reduce the potential threat of large scale wildfire to communities and infrastructure in the surrounding area. This prescribed fire will create a landscape level break which fire crews can work from to prevent the spread of wildfire in the valley.

During operations, the area immediately adjacent to the prescribed fire will be closed to public access. Public roads and highways are expected to remain open; minor delays may be experienced. Some backcountry users and nearby communities may be impacted by temporary trail and facility closures, with smoke potentially affecting visibility. Smoke may be visible during burning operations, and may settle into nearby valleys during overnight and early-morning periods.

For more information please contact Rick Arthur,
Wildfire Prevention officer – (403) 297-5317

To receive email updates, contact srd.southernrockies@gov.ab.ca

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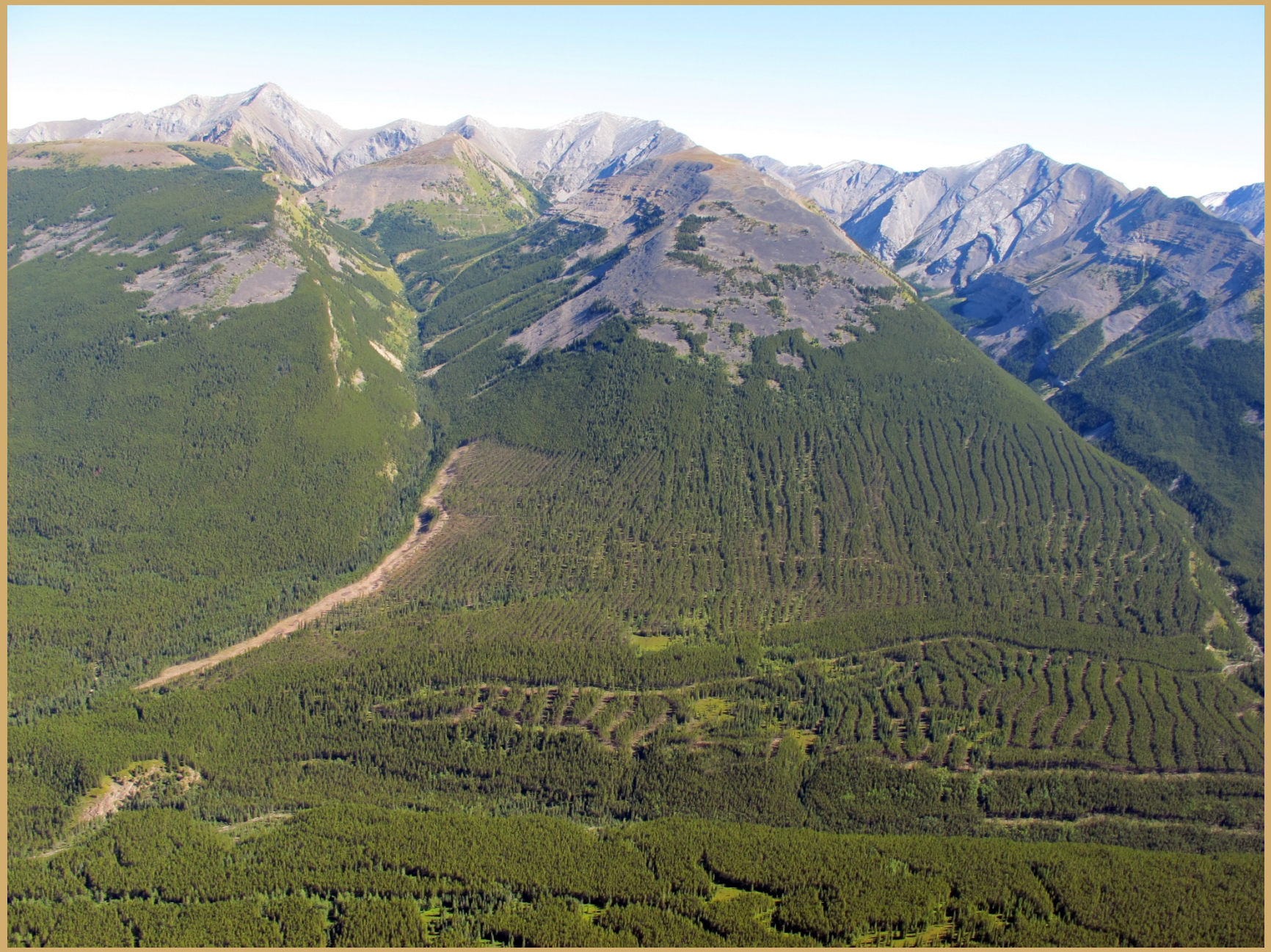

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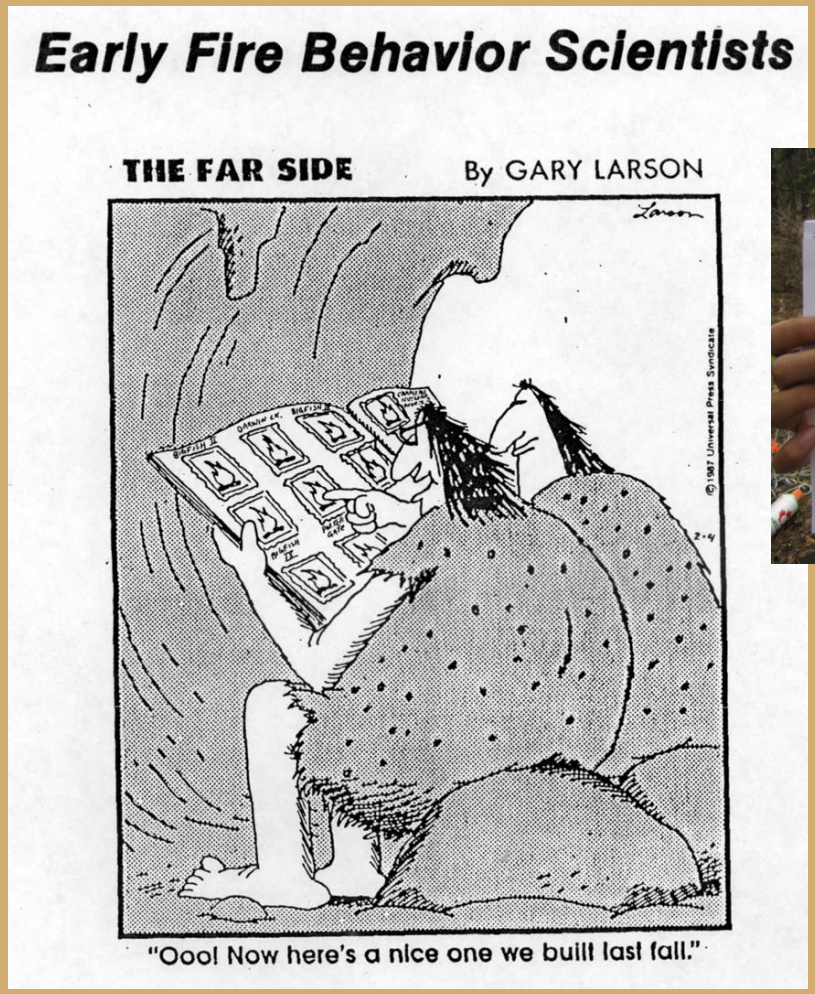
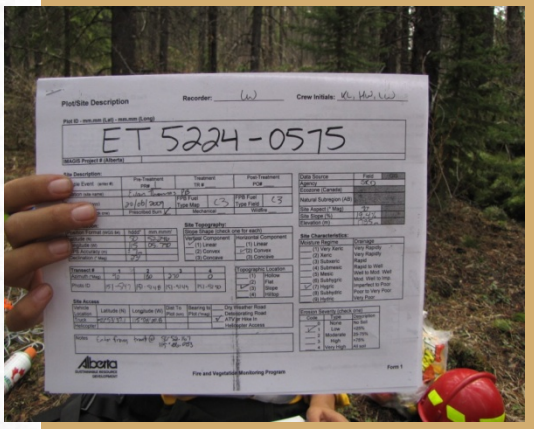
Get the Research people out on your burns….

Research plays a critical role in the developing field of wildfire science. There are very few opportunities that could be better than engaging fire scientists in the prescribed burn program. Failure to do so is an opportunity lost.





(**Subliminal Message** – If you haven't done it yet, check out Rebecca and Sara's poster on the Evan Thomas PB….)

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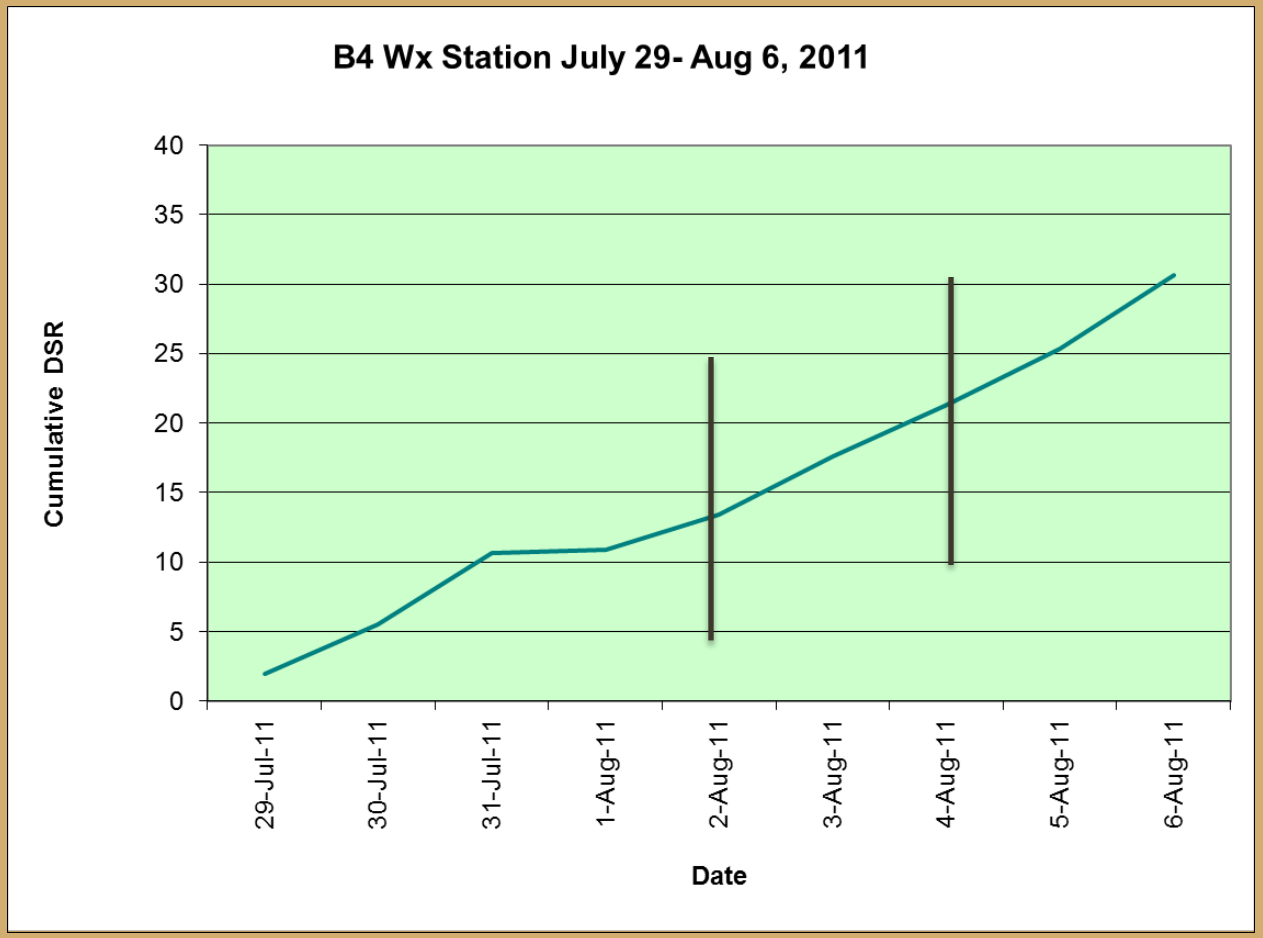
B4 Weather Aug 2, 2011

T 23 RH 26 Wind W6 DP 3

FFMC 89 DMC 29 DC 228 ISI 5.3 BUI 44 FWI 13 DSR 2



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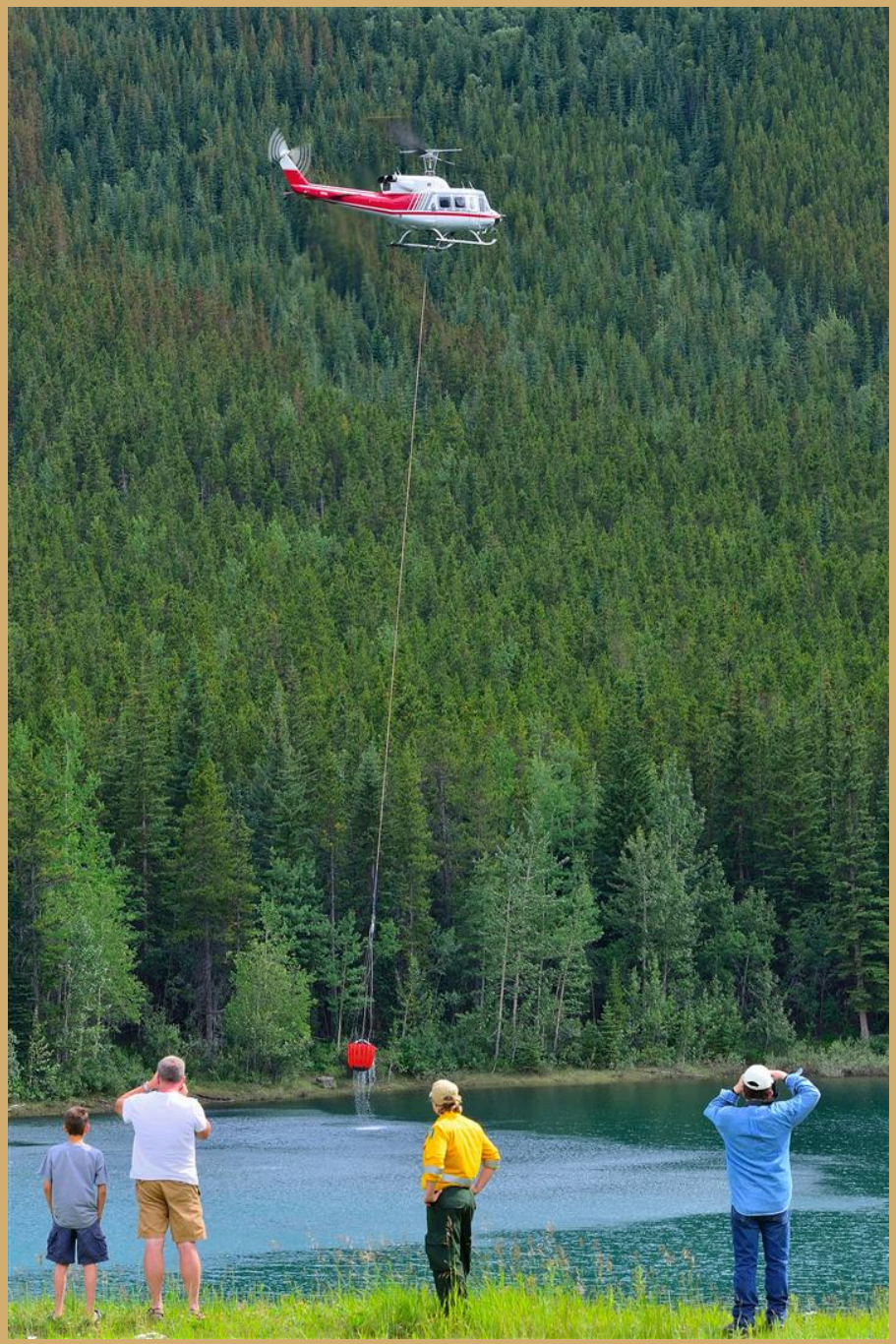

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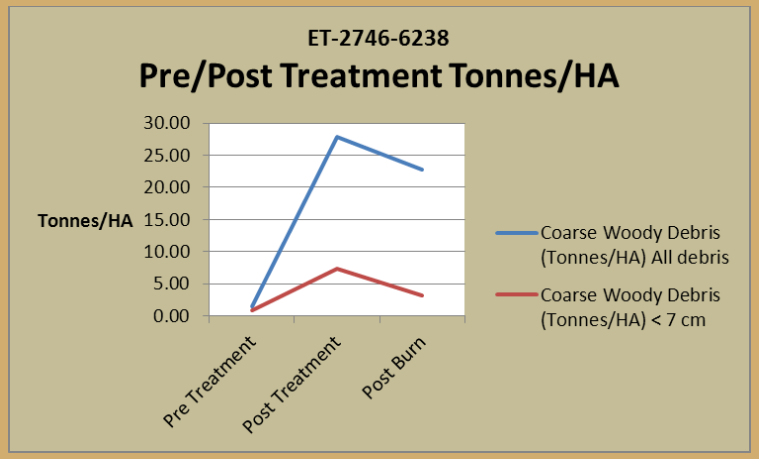
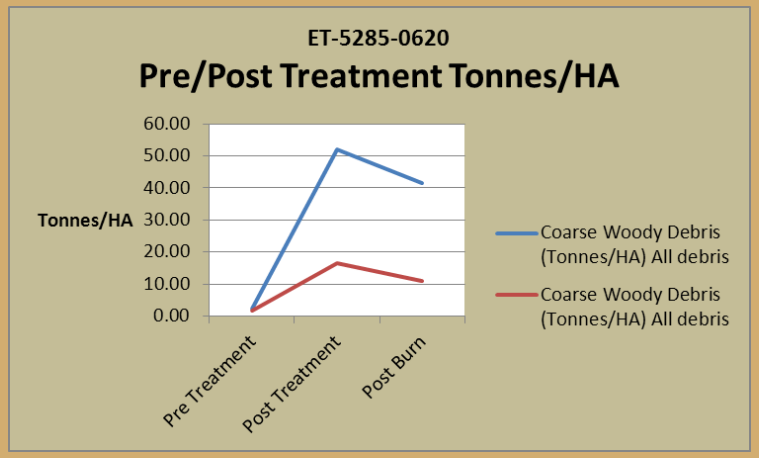
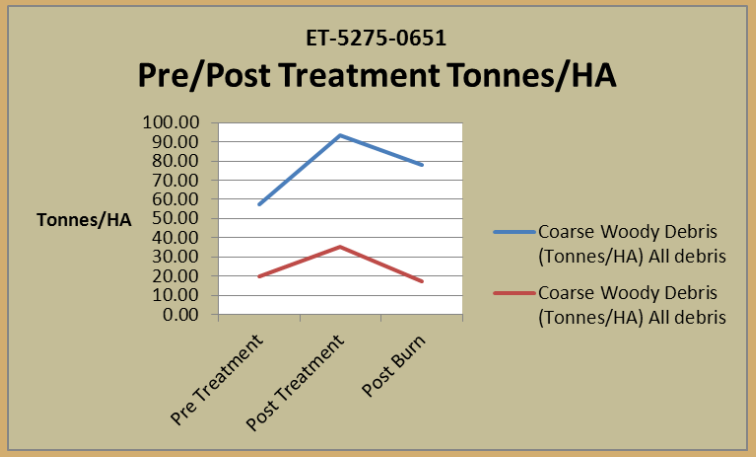
Temp (°C)	RH (%)	Wind	FFMC	DC	DMC	ISI	BUI	FWI
23	30	SW 7 (km/h)	91	235	32	7	48	17

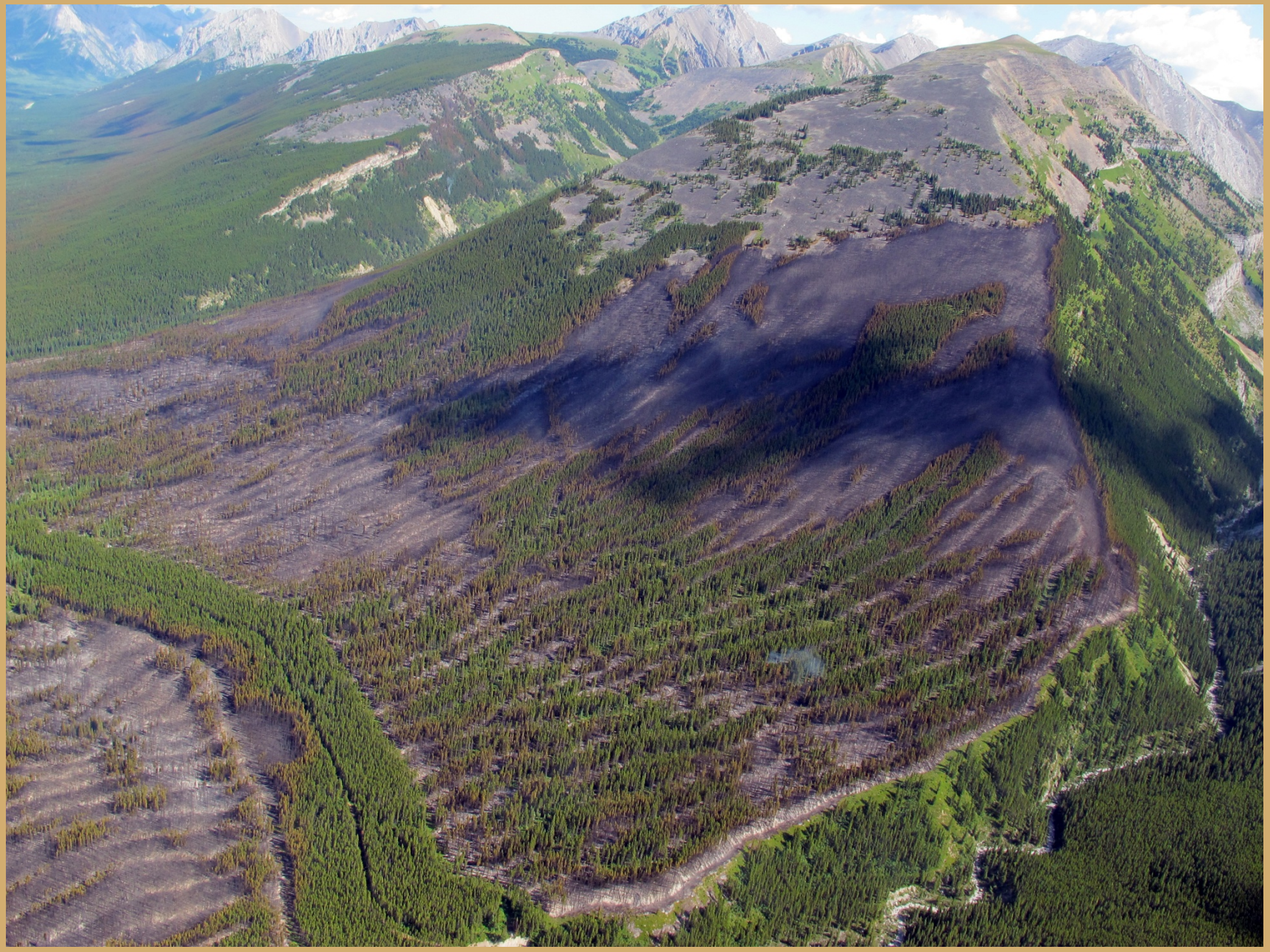
Fuel type*	ROS (m/min)	Intensity (kW/m)	Intensity Class
Jack pine slash (S1)	11	20,540	6
Spruce – balsam fir slash (S2)	10	14,742	6
Mature pine (C3)	2.4	933	2

Plot ID	ROS (m/min)	Intensity (kW/m)	Intensity Class
ET-2746-6238	7	5582	5
ET-5285-0620	6	6296	5
ET-5241-0602	15	6394	5


ET-2746-6238
Pre/Post Treatment Tonnes/HA
Tonnes/HA
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Pre Treatment
Post Treatment
Post Burn
Coarse Woody Debris (Tonnes/HA) All debris
Coarse Woody Debris (Tonnes/HA) < 7 cm


ET-5285-0620
Pre/Post Treatment Tonnes/HA
Tonnes/HA
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Pre Treatment
Post Treatment
Post Burn
Coarse Woody Debris (Tonnes/HA) All debris
Coarse Woody Debris (Tonnes/HA) All debris


ET-5275-0651
Pre/Post Treatment Tonnes/HA
Tonnes/HA
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Pre Treatment
Post Treatment
Post Burn
Coarse Woody Debris (Tonnes/HA) All debris
Coarse Woody Debris (Tonnes/HA) All debris



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Interagency burns are not a challenge, they are an opportunity to broaden your agencies outlook, share it skills, and learn from each other.

Special thanks to the dedication of the Southern Rockies area staff and to Tourism, Parks and Recreation for working closely with us and making this task much easier……

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