QUANTIFYING WATER QUALITY RISKS FOLLOWING FIRE

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CONTEXT

wildfire

water contamination
risk

TODAY’S TALK

2011-2012 research activity:
1. Black Saturday Air Photo (AP) analysis
2. Instrumented research catchments
3. Germ-grain model development

WHY DO WE CARE ABOUT POST FIRE DEBRIS FLOWS?

Normal erosion event after fire

Post-fire debris flow

POST-FIRE DEBRIS FLOWS

Where will they occur? How big will they be? How common are they?

POST-FIRE DEBRIS FLOWS

Where will they occur? How big will they be? How common are they?
1ST ATTEMPT BACK IN 2008.....

2ND ATTEMPT....

IDENTIFYING FEATURES
- Deep linear scour lines to bedrock
- Large fans of deposited rock

AIRPHOTO IDENTIFICATION OF POST FIRE DEBRIS FLOWS
- Stanley–March 2009
- Stanley–March 2010

HOW DO WE KNOW AIRPHOTO INTERPRETATION IS CORRECT?
- Field mapping of post fire debris flows

Kilmore Murrindindi Complex
Mudgegonga Beechworth Complex

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• ca. 400,000ha burnt, >80% forested
• Air photo mosaic 1 year apart
Precision of Air Photo Analysis

Precision = \frac{True \ Positive}{True \ Positive + False \ Positive}

Post-Fire Debris Flows

Where will they occur?
How big will they be?
How common are they?

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Instrumented Catchments
Exploring risk factors

Instrumented Catchments
Exploring the "window of risk"
**INSTRUMENTED FIELD CATCHMENTS**

**Method**
- 2 levels of “dryness”
- 3 levels of fire severity
- other variables constant
- in-situ field instrumentation
- runoff and erosion
- 3-6 years of measurement

**TREATMENTS/FACTORS**

**Dryness**
- North facing aspect
- South facing aspect

**Fire severity**
- Unburnt
- Prescribed fire
- Wildfire

**Vegetation recovery**
- North facing (drier)
  - North 33 months (November 2011)
- South facing (wetter)
  - South 23 months (January 2011)

**EROSION DIFFERENCE NORTH V SOUTH**

**RUNOFF DIFFERENCE NORTH V SOUTH**
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MODELING POST FIRE DEBRIS FLOW RISK

“EPISODIC PATCHES OF ACTIVITY”
GERM-GRAIN MODEL...

Debris flows occur where high intensity fires and storms intersect with susceptible catchments.

In order to use this model, need to know:
1. Rainfall thresholds
2. The frequency of rainfall > thresholds
3. The frequency of fires
4. The size of storms and fires

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THANKS

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