# **Post-wildfire erosion in New Zealand**

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## Outline

- Wildfires in NZ overview
- Wildfire data who, what & access
- Wildfire research in NZ some & increasing
- Post wildfire erosion what we know (not much)
- 5 fire case studies photos
- Summary & takeaways





## Wildfires in New Zealand

- NZ is largely rural most people in cities
- 4000 vegetation fires/year burning 6000 ha
- 1-2% from natural causes lightning
- Annual cost \$100 million
- Escapes a frequent cause
- Mostly affect rural land, economic losses low
- Loss of life is generally low
- Recent large wildfires involve peri-urban & dwellings
- One of many 'natural' hazards
- Likely increase with climate change
- Increasing interest by agencies and public



Data from Scion

1000

of fires 750

Number 500 250

Burnt (Ha) 6000

Area 2000

4000

#### Data & data management

- Fire Emergency NZ (FENZ) is key agency for all fire related information - NOW
- Historically multiple agencies collected data fire data
- No current centralised database but is coming
- Scion will release new wildfire database





500

## **Wildfire Occurrence Database Attributes**





Fire Environment	Variable	% of fires where no data was available
Fuels	Land Cover	12.31
Topography	Elevation	0.62
Topography	Landform	0.92
Topography	Slope	1
Topography	Aspect	2.95
Topography	Slope direction	5.34
Weather	Noon temperature, relative humidity	1.5
Weather	Noon FWI, ISI, FFMC, DMC, DC, BUI, DSR	1.6
Weather	SOI and ENSO	1.6
Weather	Precipitation	22
Weather	Temperature, Relative humidity	25
Weather	Wind direction	26
Weather	Noon FDC, HFI, ROS	61
Weather	FWI, ISI, FFMC	80
Weather	FDC, HFI, ROS	91
Weather	Soil moisture and temperature	94
Weather	Wind speed*, noon wind speed*	100

\*At the time of writing there is no wind speed data available for any weather stations as it is in the process of being corrected, so all wind speed values are missing from the FOD.

## Wildfire research in New Zealand

- Historical research NZFS
- Active research stable and likely to increase
- Small programmes
- Focus has been on:
  - aspects of fires on vegetation & ecology;
  - fire used as a management tool;
  - flammability of vegetation;
  - hazard mapping re climate change;
  - community adaptation & planning in response to climate change;
  - causes of wildfires
- None on post-wildfire erosion & geohazards
- Scion lead research agency dealing with wildfire research, but others involved



## Post wildfire erosion studies in NZ – what we know ()

- Not much! but erosion does happen
- Little research done or published
- Wanaka debris flow Smith (2018)
- Wildfires are a hazard and are recognised but post-fire erosion and geo-hazard research not really on the radar – yet.
- This workshop has prompted interest by other NZ researchers!







- Burnt 1600 ha
- 1 life lost
- 9 homes destroyed





#### Wanaka – 2018





Figure 8 Localised small scale rill erosion.

Figure 9 Shallow translational landslide.





- Burnt 200 ha
- Grassland
- Post-fire debris flow hazard concern





Smith HG (2018). Assessment of post-fire debris flow hazard, Hillend Station, Wanaka. 32 p.

## Pigeon Valley – 2019

- February 2019
- Elevated fire danger conditions
- 2300 ha burnt farmland and 1400 ha planted forest
- 1 house lost
- 3 weeks to contain
- 3000 people evacuated
- Likely cause agricultural discing in rocky paddock
- Cost up to \$50M
- Concern about erosion





## **Pigeon Valley – erosion control**

- Sediment pond 40 m x 20 m x 4 m dug in incised channel – level outfall
- Now filled with gravel, water pond smaller
- Post-fire sediment response dominated by channel scour delivering coarse sediment (hydro response to forest removal)
- Suggested hillslopes didn't deliver much as vegetation recovered quickly – oversown
- 6 years of tree and veg growth, reduced water flows
- Sediment was not measured





#### Lake Ohau village - 2020





Photos from Investigation report

- Burnt 5043 ha
- 48 homes destroyed
- Mixed fuel types grass, forest
- 9 days to put out
- Accidental electrical



Photos from Investigation report

#### Port Hills –2024







- Early in the fire
- Spread right (W) to left (E)
- Grassland and plantation

- Mid-fire
- Spreading east

#### Port Hills –2024

Images from FENZ report into the 2024 Port Hills fire.



Port Hills –2024





- Largely aerial fighting
- Grassland and plantation
- 1 house lost

- 650 ha burnt
- Adventure Park damaged again
- Undetermined cause

#### Port Hills –2024

#### **Recovery - Close out**

- Environmental
  - Environmental Sector Group.
  - Offers of help, DIA.
  - Port Hills Plan Potential separate workstream for the fire ground.
- Worsley's and Kennedys Bush Tracks.
- Close out report.







## Summary

- Wildfires happen in NZ and are possibly on the increase
- Burn intensity & area may not be as great as in other places
- Data is collected and access will be improved new database
- Most research is on other aspects not related to erosion or post-fire hazard
- Little post-wildfire erosion or geo-hazard information to date - future research will expand to include this
- Renewed interest in hazards generally wildfire risk into residential planning decisions – including cascading geohazards
- Funding might be an issue as NZ currently going through biggest reforms in science system in 30 years & economic climate not great
- Opportunities for collaboration & data sharing please get in touch.





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