



Healthy Rivers  
PLAN FOR CHANGE

Wai Ora  
HE RAUTAKI WHAKAPAIPAI



RAUKAWA CHARITABLE TRUST  
TE POARI MANAAKI O RAUKAWA



TŪWHARETOA  
MĀORI TRUST BOARD

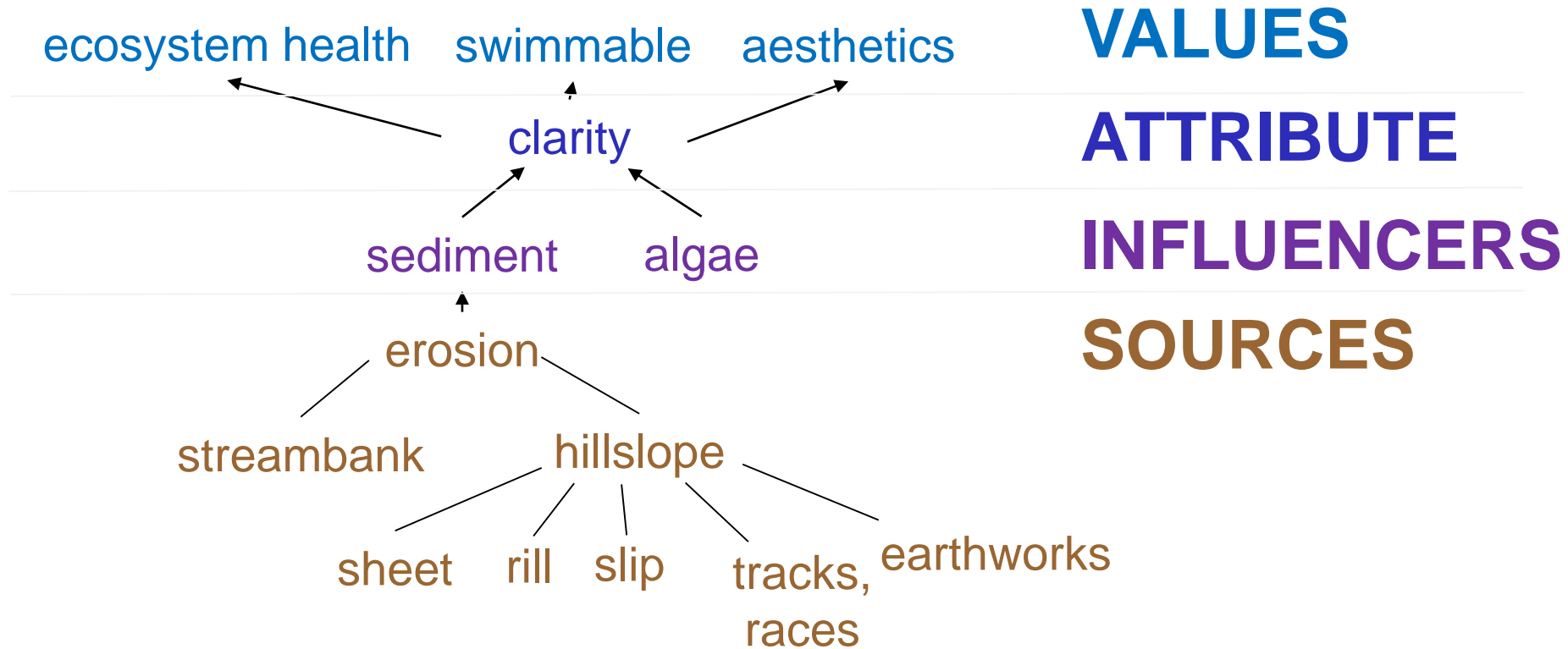


# Sediment sources and mitigations

Presentation to CSG 12  
June 4<sup>th</sup> 2015

Alan Campbell (WRC) and Bryce Cooper (TLG)

# Context



# Clarity: current state (varies in space and time)

FMU	Location	State
Upper Waikato	Main stem	A or B or C
	Tribs	1 B 10 C 4 D
Middle Waikato	Main stem	C
	Tribs	1 C 7 D
Waipa	Main stem	B or C or D
	Tribs	1 B 2 C 8 D
Lower Waikato	Main stem	D
	Tribs	2 C 12 D

# Erosion varies in space and time

- Erosion risk driven by:
  - Geology
  - Soils
  - Slope
  - Climate
  - Vegetation cover
  - Land use – e.g., arable, pastoral, forestry,..
  - Land management – e.g., stocking, tracks, stream fencing,...
- Scale is important

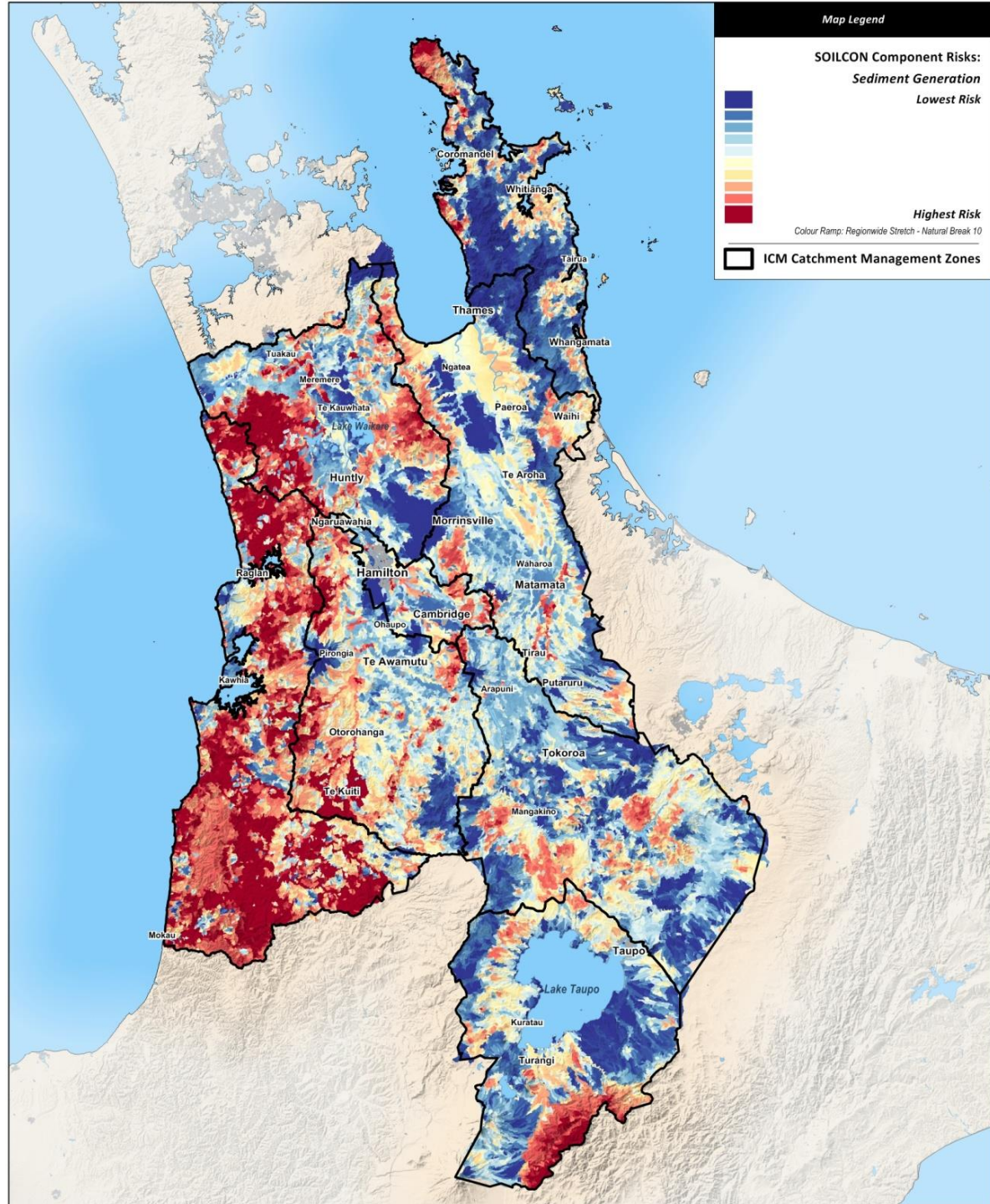
Scale is important — ‘diffuse set of point sources’

**NATIONAL**  
**REGIONAL**  
**CATCHMENT**  
**SUB-CATCHMENT**  
**FARM**  
**PADDOCK**  
**SITE**

# National scale

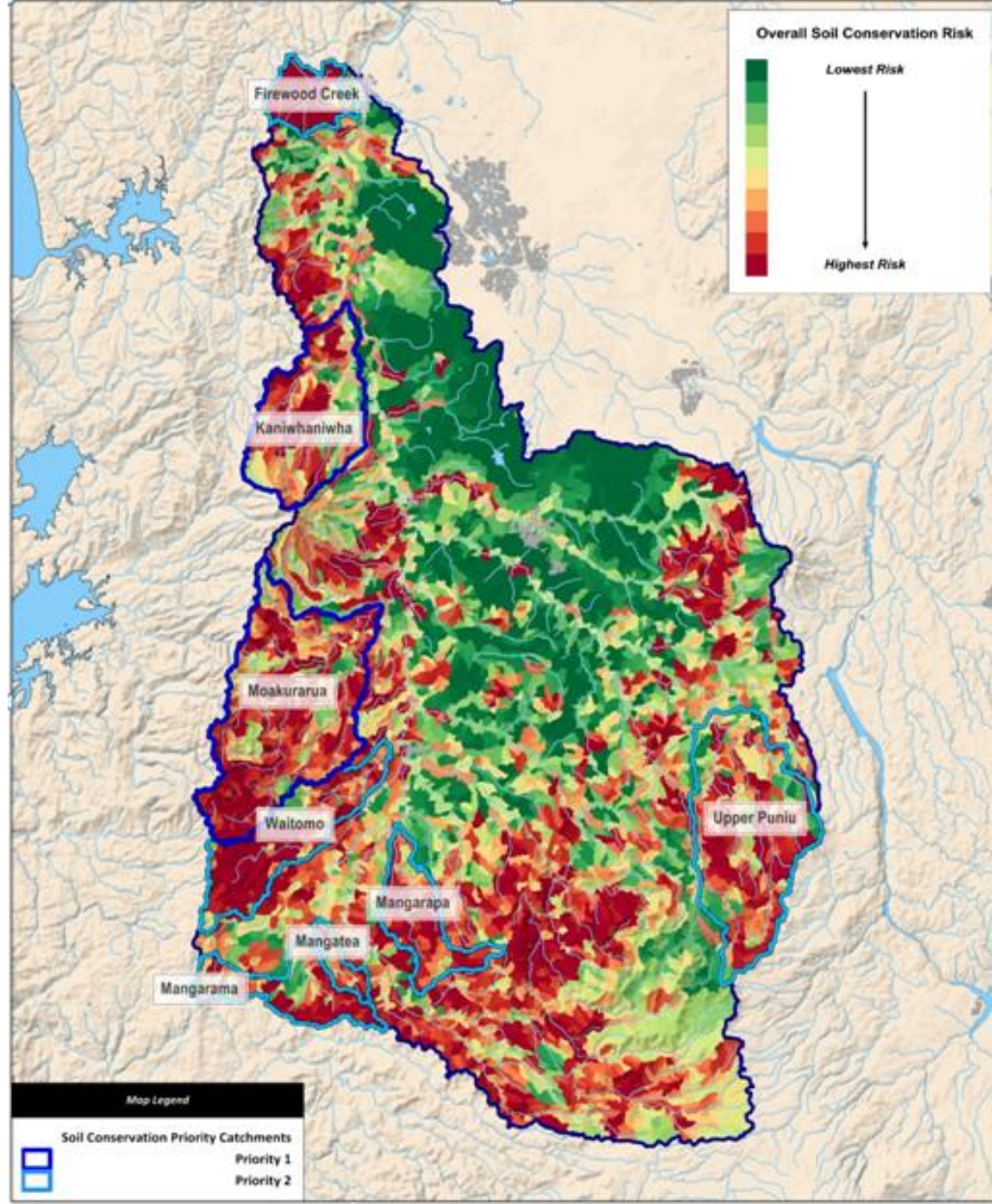


# Regional overview of estimated sediment risk



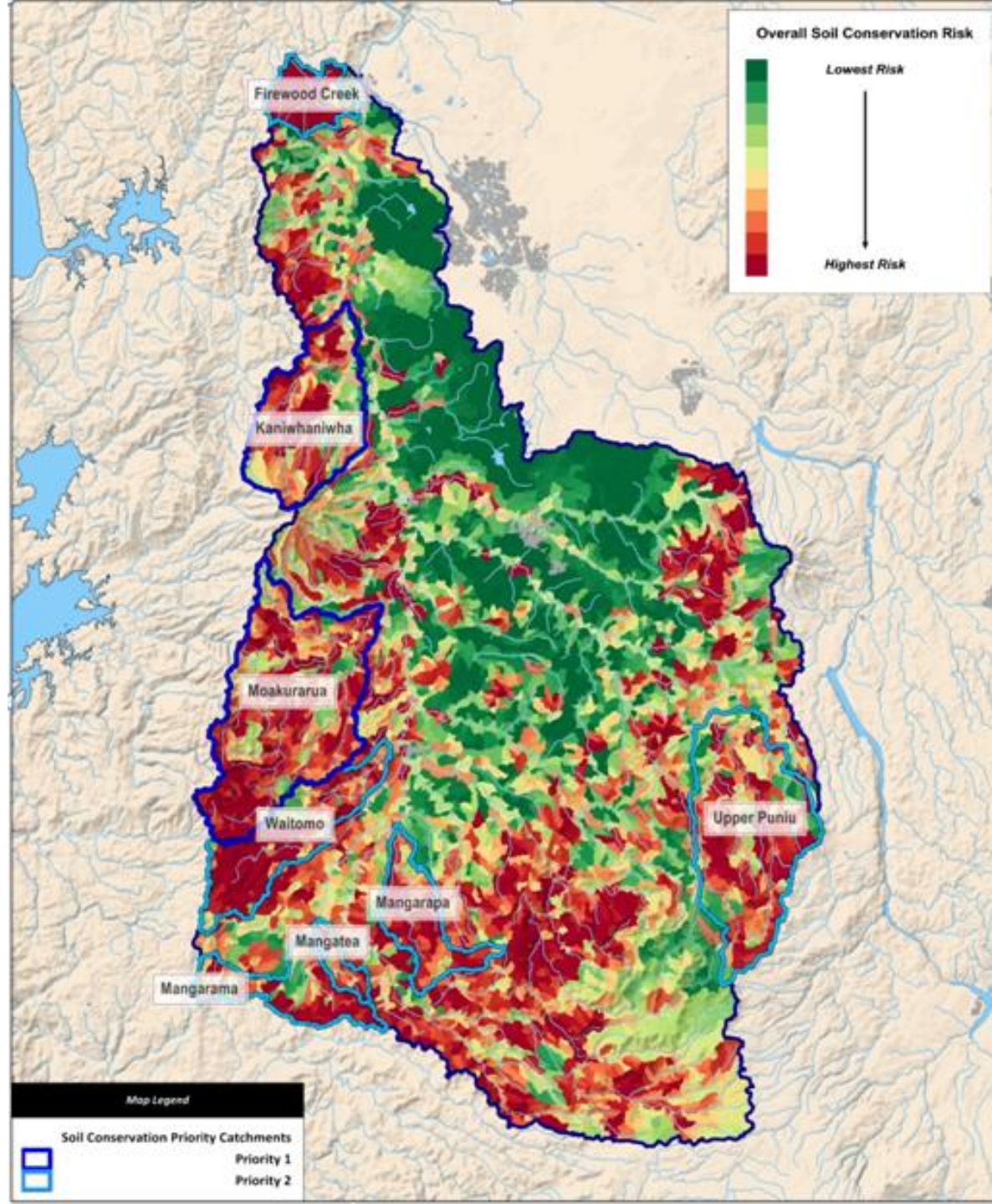


# Waipā priority soil conservation areas



“Landslides and stream bank erosion are the dominant process of sediment generation in the Waipā, with these processes more dominant in pasture landscapes”

## Waipā priority soil conservation areas



# Slump, soil slip



# Earth slip, soil slip



# Earth slip



# Slump, earth slip, sheet



# Soil slips



DEC 11 2009 11:54

# Soil slip, sheet





# Soil slip



# Soil conservation technical handbook



- Ministry for the Environment
- Ministry of Agriculture and Fisheries
- NZ Association of Resource Management

Best practice June 2001

# Mitigations

<p>Shallow mass movements</p>	<p>Fencing – stock management Pasture re-establishment Managed reversion Pole planting</p>
<p>Deep seated mass movements</p>	<p>Fencing – stock management Managed reversion Dewatering techniques Pole planting Erosion control forestry</p>

# Pole planting



# Afforestation.



# Mixed plantings



# Stream bank erosion



# Stream bank erosion





# Stream bank protection



# Stream bank protection



# Stream bank remediation



# Stream bank remediation



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# Rill erosion

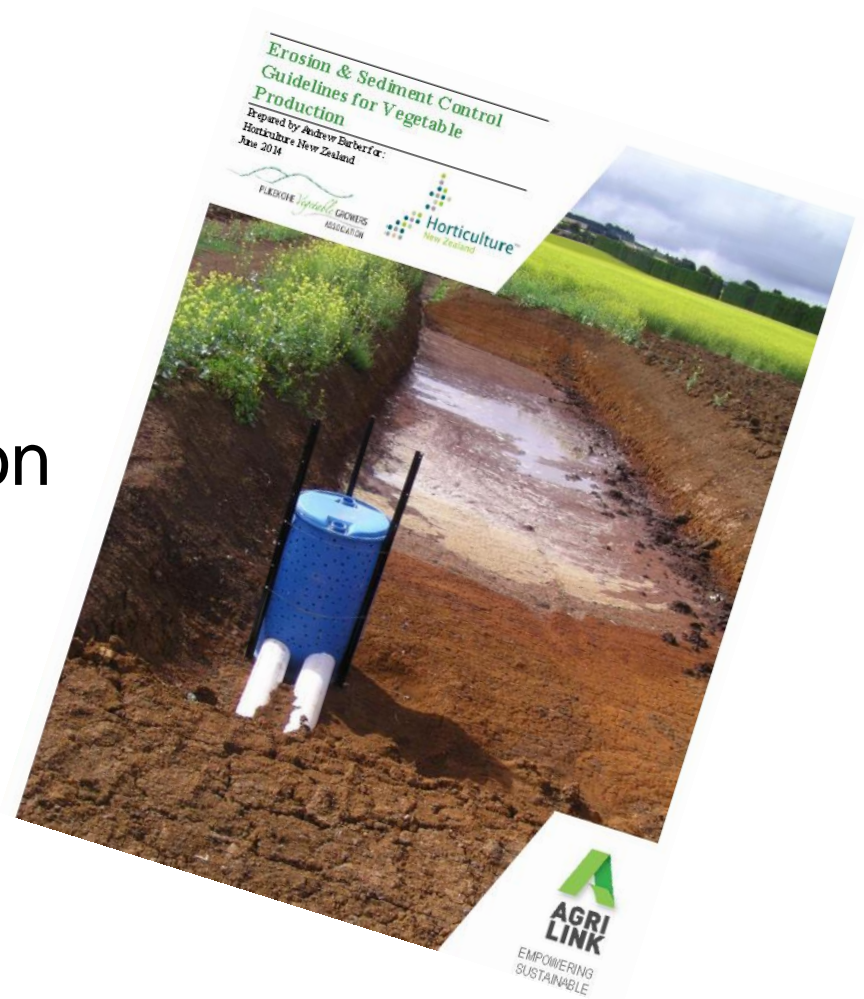


# Mitigations - arable

- Minimum tillage
- No-tillage (direct drilling)
- Stubble retention
- Strip or contour cultivation
- Ripping wheel tracks
- Cover crops
- Fallow

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# Pumice gully





# Pumice gully



# Pumice deposition



# Detention dam



# Detention dam

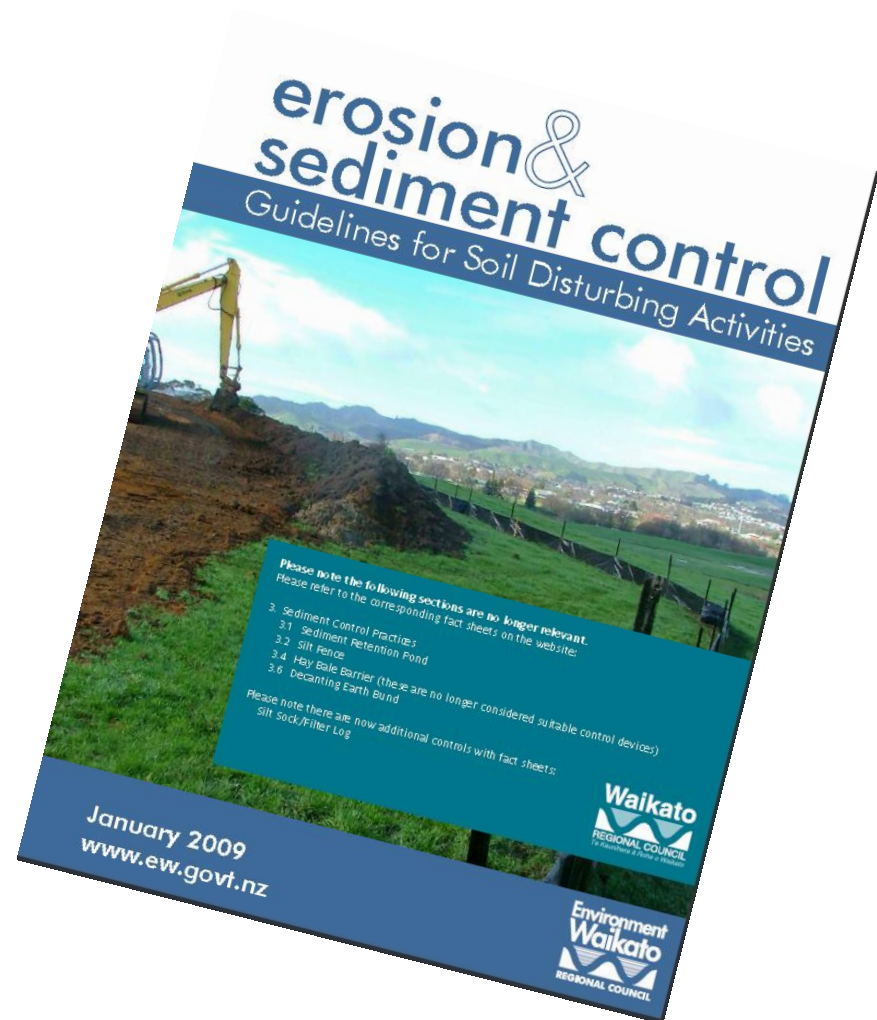


# Point sources

- Tracks and races
- Earthworks

# Point sources

- Tracks and races
- Earthworks



# Menu

of practices to  
improve water quality



WAIKATO

ROTORUA | TAUPO



Dairy for life



# Key points

- Erosion processes are variable and site-specific.
- Land use should match capability
- Treatments / mitigations;
  - Well understood
  - Preventive and/or remedial
  - Site specific
  - Dependent on land use
  - Typically multi-year
  - Include land management
  - Dependent on ongoing maintenance