Manaaki Whenua
Landcare Research

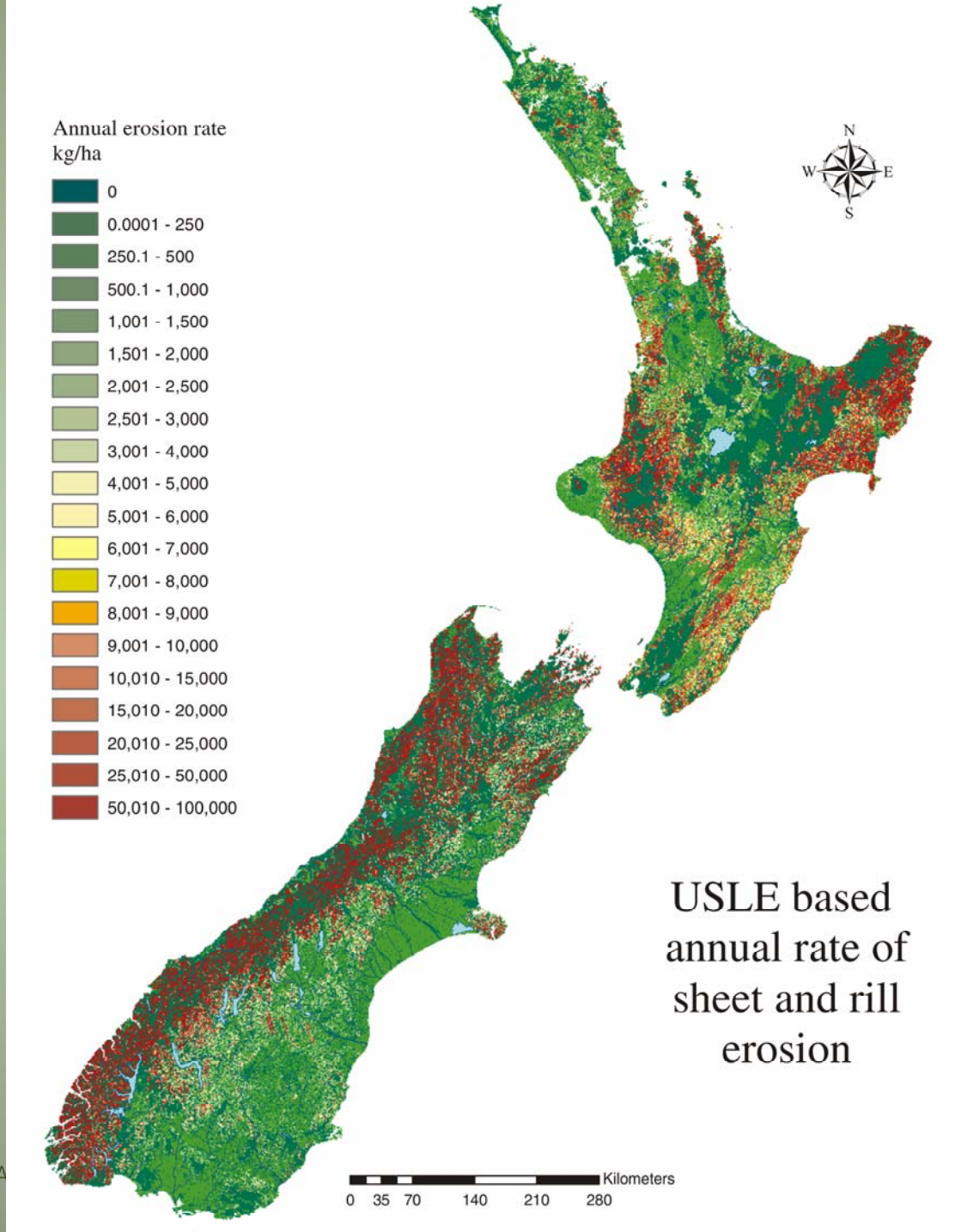
Erosion modelling in New Zealand: beginnings

John Dymond, Anne-Gaelle Ausseil, Harley Betts, Alison Collins, Jageth Ekanayake, Harley Betts
Landcare Research

A New Zealand USLE

(Surficial erosion only)

E = R K L S C P	*National data layer*
E is soil loss (kg/ha)	
R is rainfall factor = f(annual rainfall)	*LENZ*
K is soil erodibility = f(soil texture)	*fundamental soil layers*
L is slope-length factor = f (slope length)	*EcoSat 15m DEM*
S is slope factor = f(slope angle)	*EcoSat 15m DEM*
C is cover factor = f (%cover)	*EcoSat woody layer*
P is management practice factor	



USLE based annual rate of sheet and rill erosion

New Zealand empirical erosion model
(all erosion processes)

Appropriate for small catchments and larger

E = R K C *National data layer*

E is mean annual soil loss (kg/ha/yr)

R is rainfall factor = f(annual rainfall) *LENZ rainfall layer*

K is geology factor = f(erosion terrain) *Erosion Terrains*

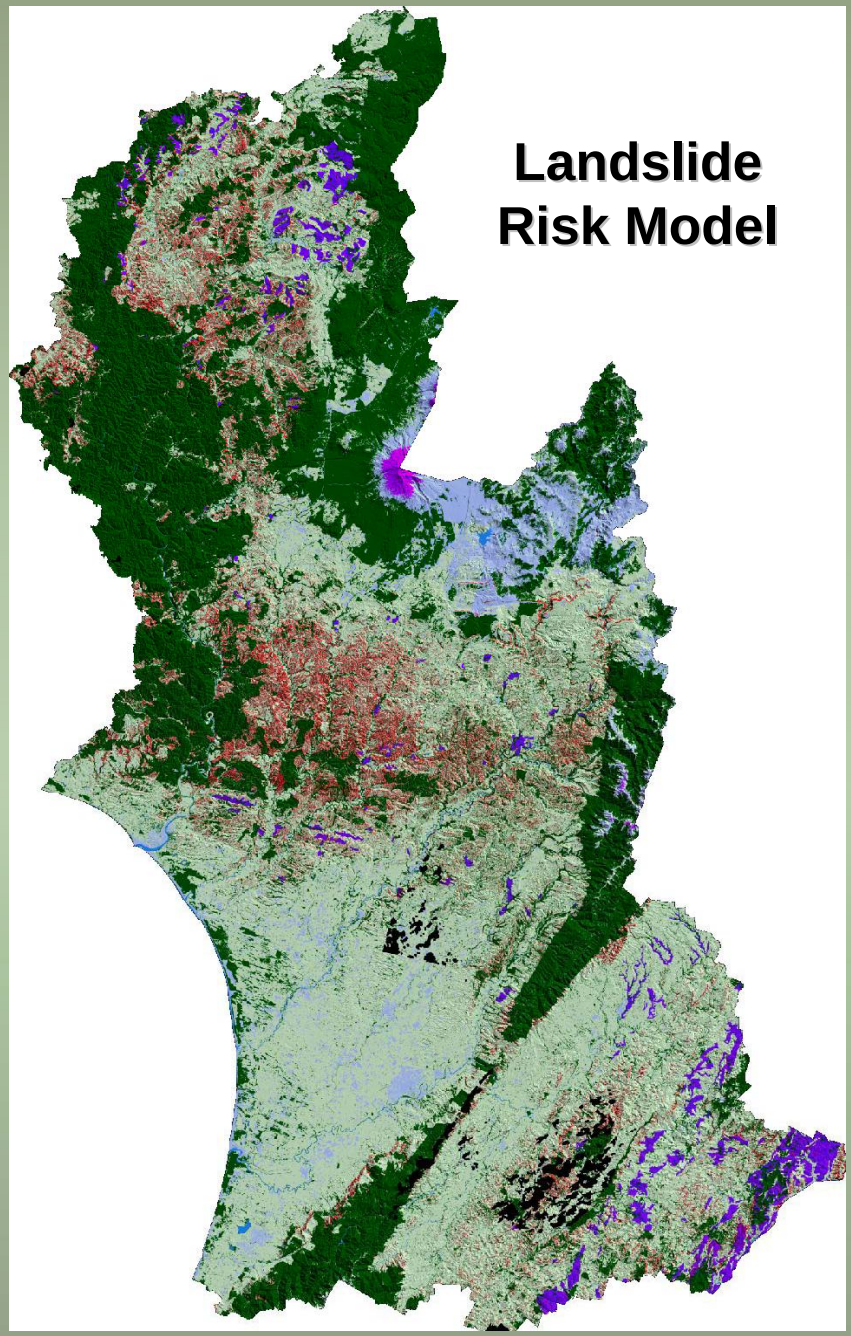
C is cover factor = f (%cover, erosion terrain) *EcoSat woody layer*

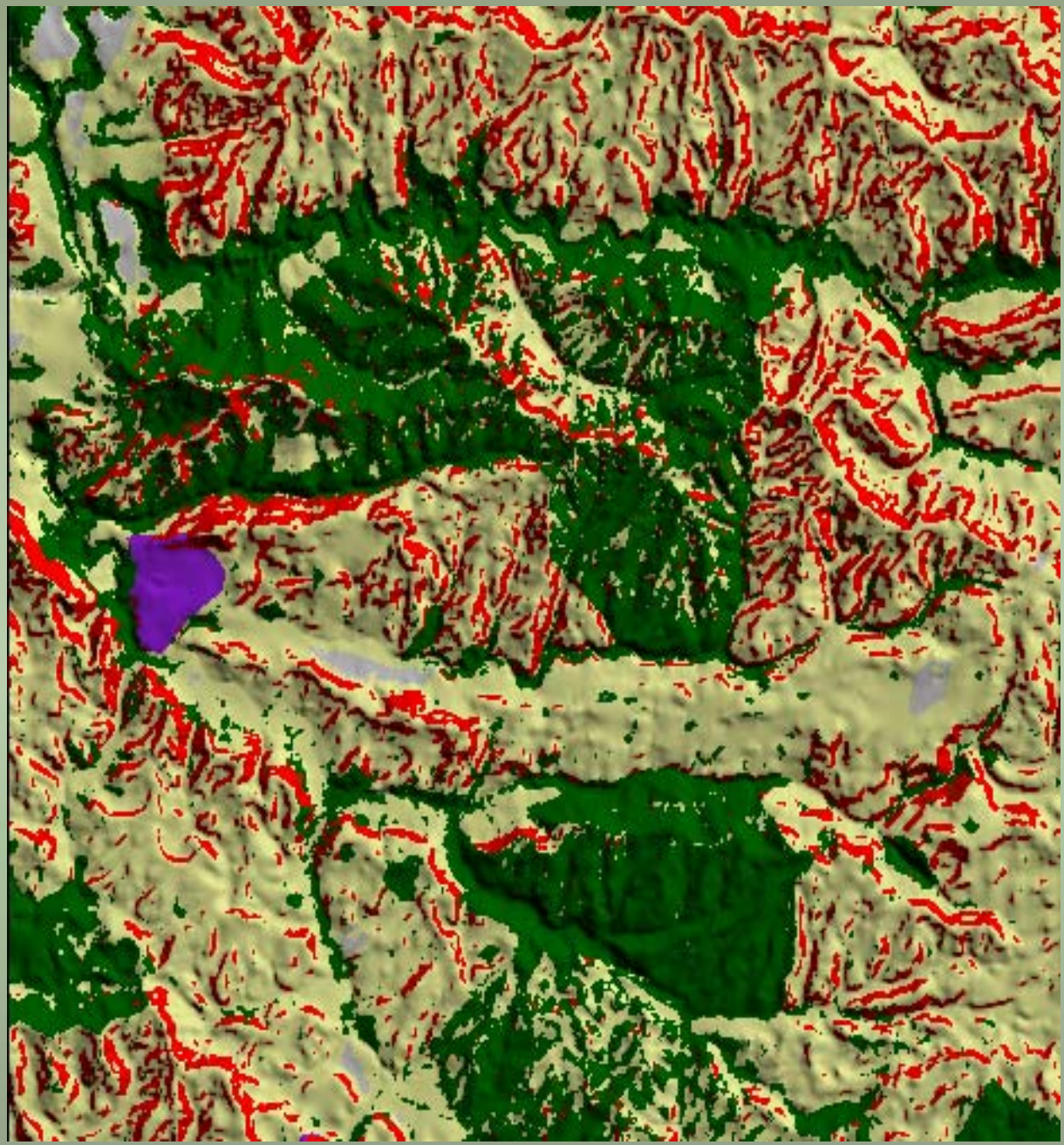
e.g.

landslide dominated terrain C=1 for grass, 1 for bareground, 0.1 for forest

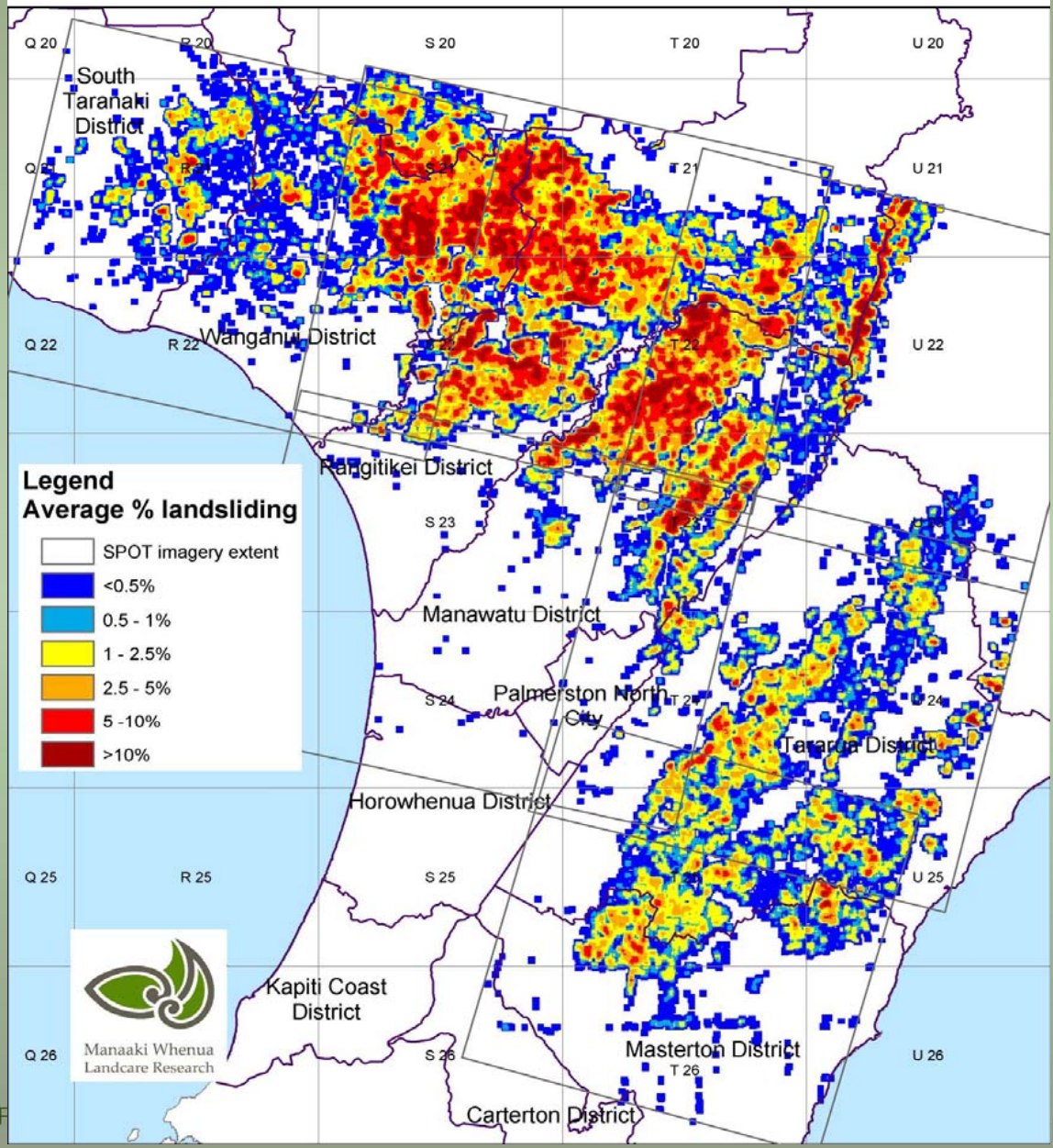
gully dominated terrain C=1 for grass, 10 for bareground, 0.1 for forest

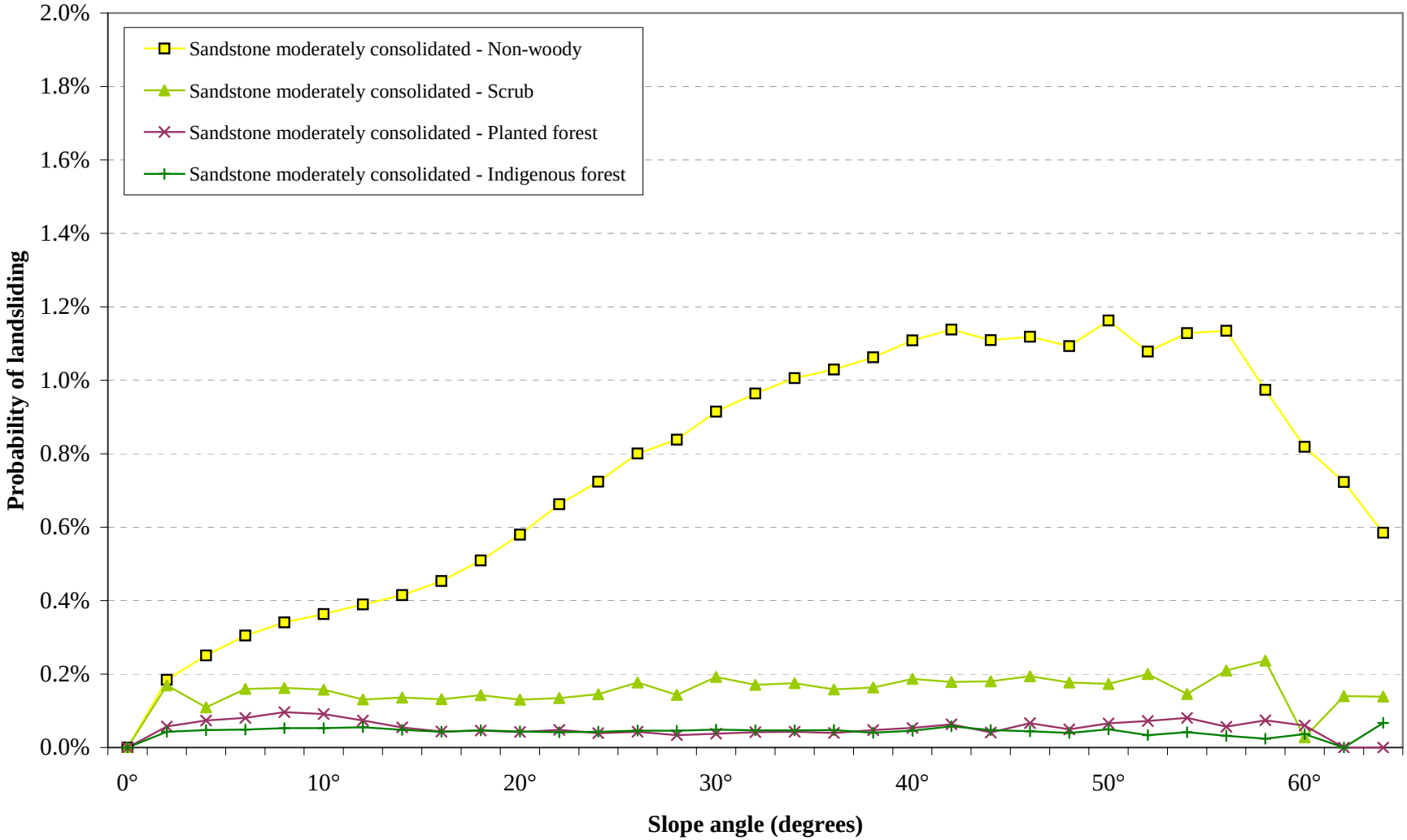
surficial dominated terrain C=1 for grass, 100 for bareground, 0.5 for forest


Landslide
Risk Model



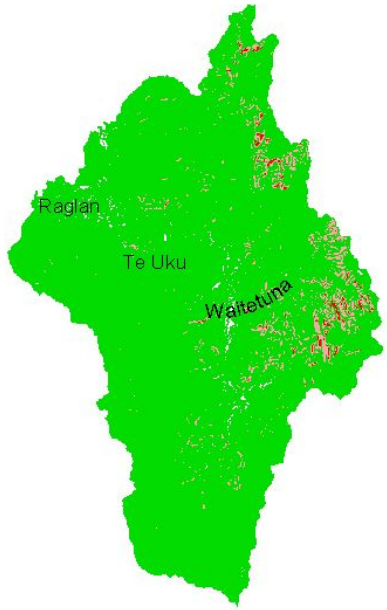
Summary map of landsliding in the February storms 2004




Sandstone moderately consolidated - Non-woody
Sandstone moderately consolidated - Scrub
Sandstone moderately consolidated - Planted forest
Sandstone moderately consolidated - Indigenous forest
Probability of landsliding
2.0%
1.8%
1.6%
1.4%
1.2%
1.0%
0.8%
0.6%
0.4%
0.2%
0.0%
0°
10°
20°
30°
40°
50°
60°
Slope angle (degrees)

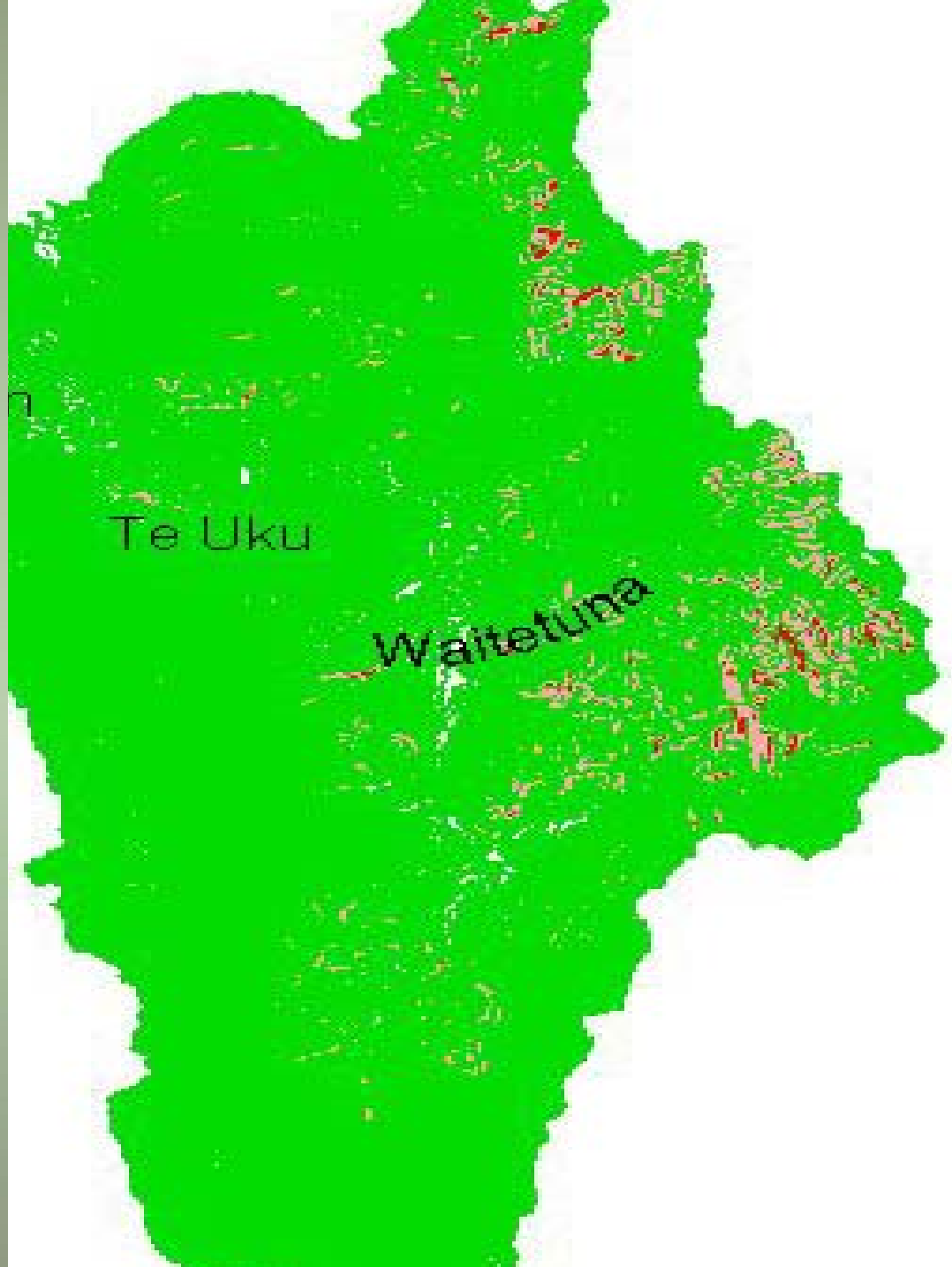
Stability of hill slopes in Waitetuna Carchment Raglan

(landslide component for SHETRAN)



Stability

- Critically unstable
- Unstable
- Stable


Te Uku
Waitetuna

Catchment-wide erosion and sediment transfer model (all erosion processes)

- erosional landforms
- depositional landforms
- channels
- sediment transfers between elements (magnitude/frequency relationships)