MODELLING SPATIAL AND TEMPORAL VARIABILITY IN EROSION RISK FOR WINTER GRAZING MANAGEMENT

Mitchell Donovan and R Monaghan

AgResearch Invermay, Mosgiel

Intensive grazing practices in New Zealand have received increasing attention as a potential cause of significant land degradation in the form of soil damage, accelerated rates of erosion and nutrient losses, and reduced plant yields (Drewry *et al.*, 2008; Laurenson *et al.*, 2018; McDowell *et al.*, 2003; Monaghan *et al.*, 2017). Field studies demonstrate pasture grazing can increase soil losses by up to 25%, while intensive-winter increased soil losses by up to 350-550% relative to ungrazed equivalents (Cournane *et al.*, 2011; Laurenson *et al.*, 2018; McDowell *et al.*, 2003; Monaghan *et al.*, 2017). Often, losses could be mitigated if critical source areas (CSAs) were avoided by grazing locations with relatively low susceptibility to surface erosion and soil loss (McDowell, 2006; Monaghan *et al.*, 2017). In order to help meet economic targets (e.g., dairy, beef, and sheep production) and sustainably manage environmental impacts (e.g., water quality, land preservation, greenhouse gas emissions), national efforts are aiming to mitigate sediment and contaminant losses from agricultural activity (Our Land and Water, 2018). In support of this effort, we evaluate land-use suitability (i.e., susceptibility to soil loss and degradation) for sheep and cattle grazing for 4 watersheds in Southland, New Zealand. In addition, we evaluate the contribution of sheep and cattle grazing to soil loss at watershed and regional scales for New Zealand. We develop a model to capture grazing's effect on soil physical properties and ground cover that can be integrated with the Revised Universal Soil Loss Equation (RUSLE). Initial modelling soil loss results are similar to those from field studies, with pasture grazing and intensive winter-grazing respectively increasing soil losses from plots on the order of 10-20% and 100-300%.

Editor's note: *An extended manuscript has not been submitted for this presentation.*
