

Identifying feasible wetland locations in catchments using LiDAR

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Wetlands play a key role in controlling flooding and diffuse source pollution. In New Zealand over 90% of the former wetland area has been lost within a century and a half, and the trend is continuing particularly for small wetlands in agricultural landscapes. There is a need for detailed identification and assessment of the wetlands remaining, and also of potential locations for wetland rehabilitation and creation to help manage diffuse contaminant losses. Although comprehensive mapping of New Zealand palustrine wetlands has been done by Landcare Research, encompassing both the contemporary and historic extent of wetlands, it is limited to wetlands with a minimum size of 0.5 ha. It therefore excludes information on the numerous small wetlands, which cumulatively represent a significant proportion of the wetland resource still remaining. Suitable locations for wetlands are strongly correlated with topography and soil moisture, and often contain characteristic wetland vegetation. The objective of the current study was to provide a method to map the most feasible locations for wetland rehabilitation in the upper Waituna catchment in Southland. LiDAR provided detailed information on the topography. A digital elevation model (1 m DEM) was hydrologically corrected and hydrological modelling was performed in ArcGIS 10.3. To determine suitable areas for wetlands several derivatives were calculated from DEM – slope, flow accumulation, Strahler stream order and Topographical Wetness Index. High-resolution orthophotos (0.4 m) were used to identify infrastructure that would limit wetland restoration, and visual checking was used to see if the predicted wetland areas were reasonable. Finally, six potential sites for wetland creation were delineated, covering 1.4% of the total catchment area. The majority of suitable sites identified were found to be areas that had recently been drained. Farmers are unlikely to be willing to invest money to reconstruct wetlands in such areas which they have recently spent considerable effort and money to drain.