



## **Challenges in identifying small-scale wetlands using remote sensing**

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Wetlands play a key role in controlling flooding and non-point source pollution. In New Zealand, it has been estimated that over 90% of the former wetland area has been lost within a century and a half and there is an ongoing trend in wetland ecosystems. The remaining wetlands are mostly very small (less than 0.5 ha) and are continuously being drained. This increases the need for detailed identification and assessment of wetlands which would also improve our understanding of their ecological functioning. However, the inventory and characterization of wetland habitats are most often limited to small areas or done on a coarse scale. The diversity of wetlands and the speed of the change makes it challenging for both the field scientists and the remote sensing analysts to identify and inventory these. The aim of this study is to evaluate the combination of multispectral imagery (Landsat), radar imagery (ALOS PALSAR and Sentinel 1), orthophotos and LiDAR data to precisely map the distribution of small-scale wetland habitats. Fusion of high-resolution orthophotos (0.4 m), Landsat imagery (30 m) and LiDAR-based terrain indices (Topographic Wetness Index) were used to identify small-scale wetlands in the Waituna catchment in the Southland region, New Zealand. Classification accuracy was highly improved when combining LiDAR data and multispectral images, enabling to delineate wetlands with the size of 0.1-0.2 ha. However, the orthophotos alone gave also satisfactory results with overall accuracy being 87%.