



**Manaaki Whenua**  
Landcare Research

Manaaki Whenua – Landcare Research is a research organisation of dedicated scientists, researchers and experts committed to helping New Zealanders understand and live well with our land.

We want to ensure all New Zealanders have the knowledge and tools to live productively with our land and preserve it sustainably for future generations.

We work with stakeholders across New Zealand, including national, regional and local government, Māori, the primary production sector, the science and research sector and the general public to achieve meaningful impact for our science.

Timely and accurate data on land cover are critical for land and environmental management, providing a basis for better resource management decisions without compromising environmental outcomes.

#### **New Zealand Land Cover Database**

The most widely-used source of land cover monitoring data in New Zealand is the New Zealand Land Cover Database [LCDB]. This is a digital land cover map of New Zealand derived from satellite imagery which is updated regularly (nominally every 5 years). It contains detailed information on 33 categories of land cover and their boundaries, providing a record of land cover change over time.

The LCDB is a multi-temporal digital thematic map of land cover and land use with a reliable and consistent technical framework, to record land cover change. The latest version of the LCDB [version 4.1] provides a series of 'snapshots' of land cover at 1996, 2001, 2008 and 2012. In v4.1 the LCDB coverage was extended to the Chatham Islands, necessitating an additional two cover categories. Version 5 of the LCDB will be released in early 2020, adding a snapshot for 2018.

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# Smarter remote sensing for effective land management

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The land cover classification has evolved over the years, but compatibility has been maintained and each version contains a full consistent historical record. It is licensed under the Creative Commons Attribution 3.0 New Zealand.

The LCDB was designed to be compatible in scale and accuracy with Land Information New Zealand's 1:50,000 topographic database. The LCDB is intended for use in areas such as state of environmental monitoring, forest and shrub inventory, biodiversity assessment, pest control, trend analysis and infrastructure planning. It is also used as input to a variety of environmental models, for example erosion risk or nitrate leaching.

## Advanced Remote Sensing Aotearoa

This world-leading research programme is developing new methods to unlock next-generation satellite-based remote sensing; analyse vegetation phenology and structure; and synthesise vegetation plot data.

As well as providing new approaches for future LCDB and other datasets the research will support improved:

- characterisation of environmental condition for national and international reporting
- biodiversity monitoring and more targeted conservation and pest control efforts
- determination of the quantity/timing of flowers to optimise mānuka honey harvesting
- characterisation of habitats (e.g. wetlands) to prioritise protection/rehabilitation, and identify regional economic opportunities
- forest mapping to manage kauri dieback and protect kauri, a taonga species
- vegetation mapping to improve fire management.

## Mapping crops and land use at paddock scales

Where more detailed mapping than LCDB is needed, time-series satellite imagery can be used to create maps at paddock scale to identify specific crops, crop types, and timings. For example, we produce maps of winter forage cropping on a regional or national scale. These are used to help understand land-use change, inform freshwater limit-setting processes, and explore potential erosion impacts. We also produce paddock scale maps of summer agricultural and horticultural cropping.

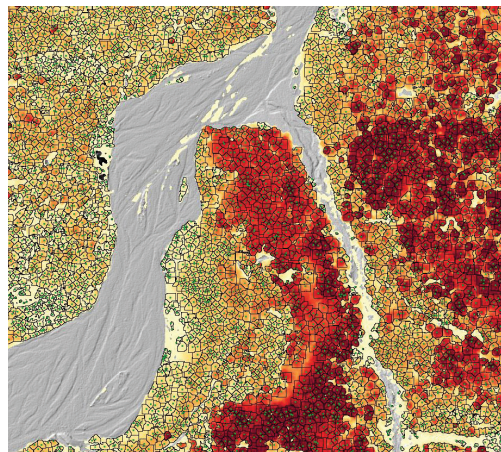
## Remote sensing services

Currently, Manaaki Whenua primarily uses optical imagery from Sentinel-2 satellites and radar imagery from Sentinel-1 satellites. Analysis ready data derived from these satellites form a platform for providing remote sensing services to regional councils and other organisations who need to monitor environmental change.

Manaaki Whenua has developed a number of automated processes that enable this work to be done efficiently - these include paddock boundary mapping and automated cloud clearing.

Manaaki Whenua also offers remote-sensing expertise in the following areas:

- Advice on satellite services
- Data archive searches
- Satellite data ordering and supply
- Contract research work
- Commercial contracts in all aspects of environmental monitoring and mapping using digital technologies.



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