

# Mobilising Vegetation Plot Data: the National Vegetation Survey Databank



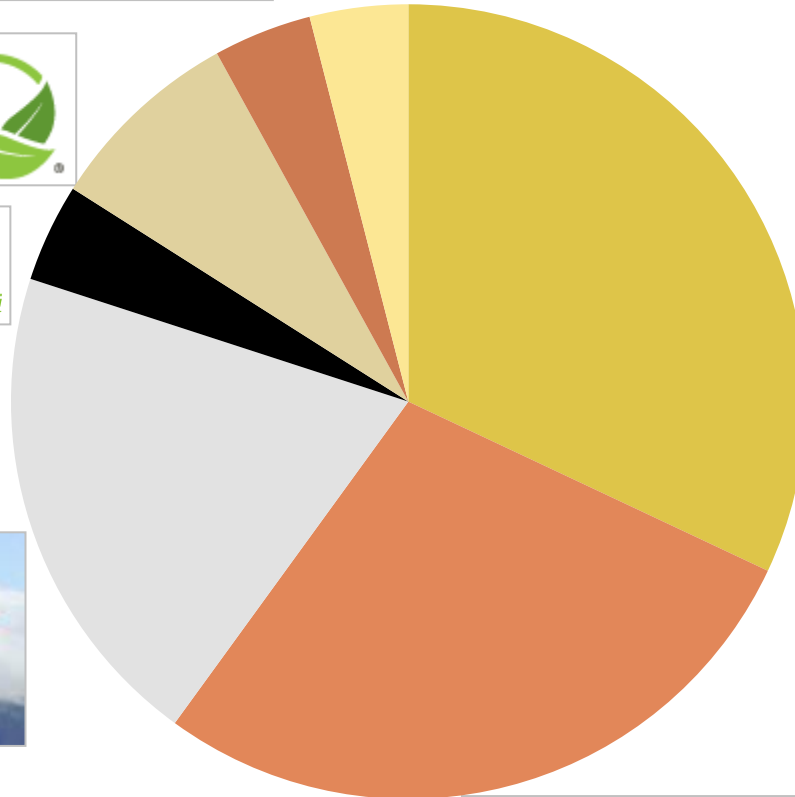
Susan Wiser  
April 2016

<http://nvs.landcareresearch.co.nz>



**LANDCARE RESEARCH**  
MANAAKI WENUA


# Nationally Significant Databases and Collections



# Types of databases & collections

- **Real-time data**
- Geospatial
- Living organisms
- Preserved specimens
- Observations

Welcome to GeoNet - the official source of geological hazard information for New Zealand.




Quakes Info ⓘ Drums Regions ▾ New Zealand: All Felt Map & Stats

[Home](#) / Quakes

## Felt Quakes

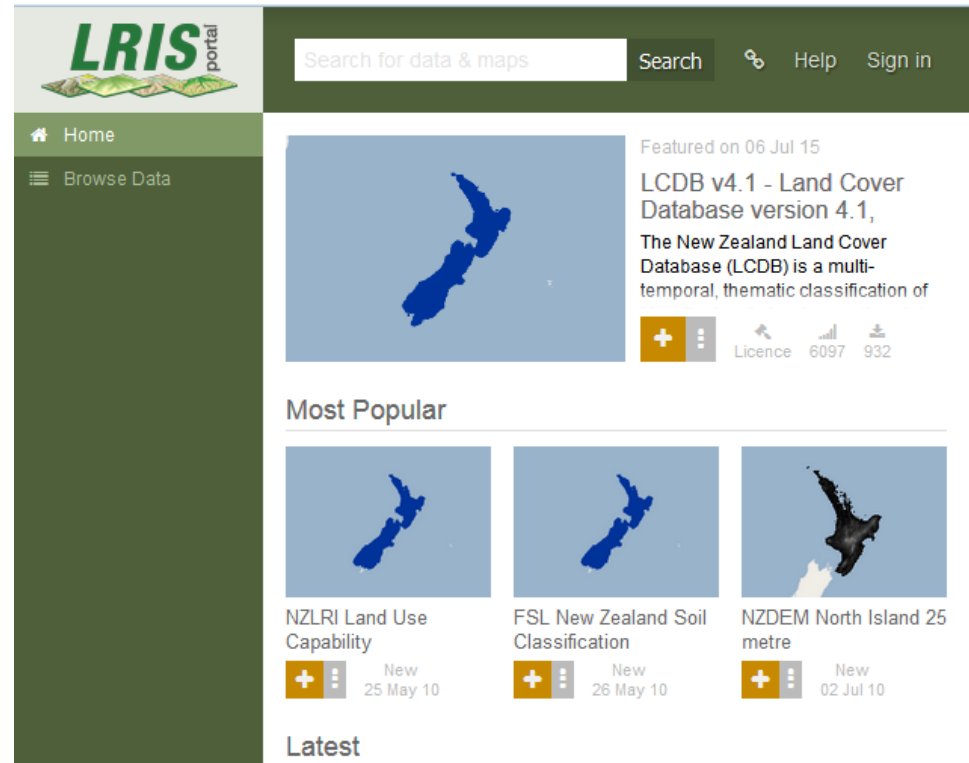
This is a list of recent earthquakes that may have been felt in the New Zealand region.

|   |                               |                    |
|---|-------------------------------|--------------------|
|  | Intensity ⓘ <b>light</b>      | <i>13 mins ago</i> |
| NZST  | Tue, Apr 12 2016, 11:49:45 am |                    |
| Depth   | 23 km                         |                    |
| Magnitude   | 3.3                           |                    |
| Location  | 15 km north-west of Masterton |                    |

[quake details...](#)

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The screenshot shows the LRIS portal interface. At the top left is the LRIS portal logo. To its right is a search bar with the text "Search for data & maps" and a "Search" button. Further right are links for "Help" and "Sign in". Below the logo is a navigation menu with "Home" and "Browse Data". The main content area features a "Featured" section with a map of New Zealand and text describing the "LCDB v4.1 - Land Cover Database version 4.1". Below this is a "Most Popular" section with three items: "NZLRI Land Use Capability", "FSL New Zealand Soil Classification", and "NZDEM North Island 25 metre". Each item includes a small map thumbnail, a title, and a "New" date. At the bottom is a "Latest" section.

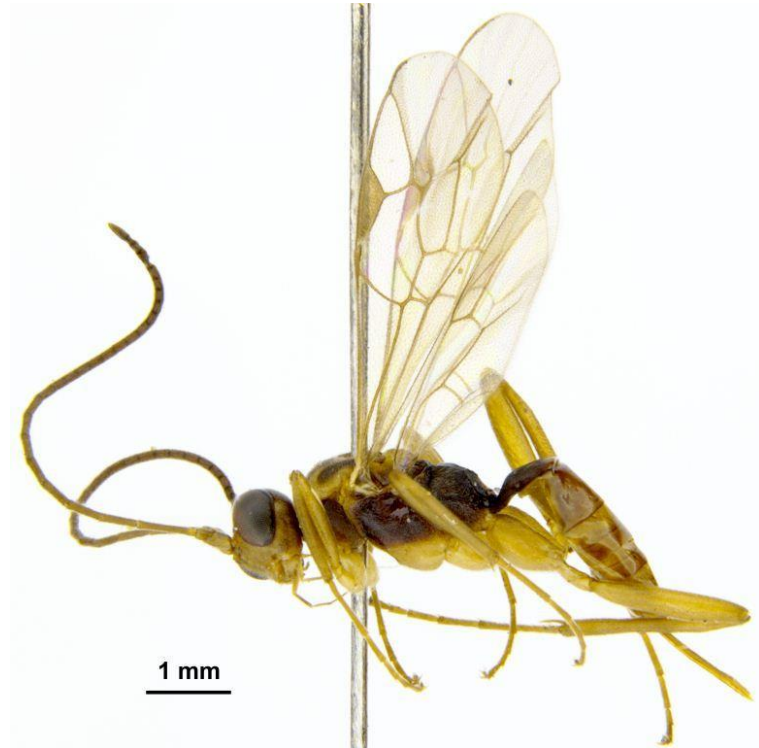
# Types of databases & collections

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# Types of databases & collections

- Real-time data
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- What is the NVS Databank?
- How are NVS data used?
- Lessons learned
- Open Data





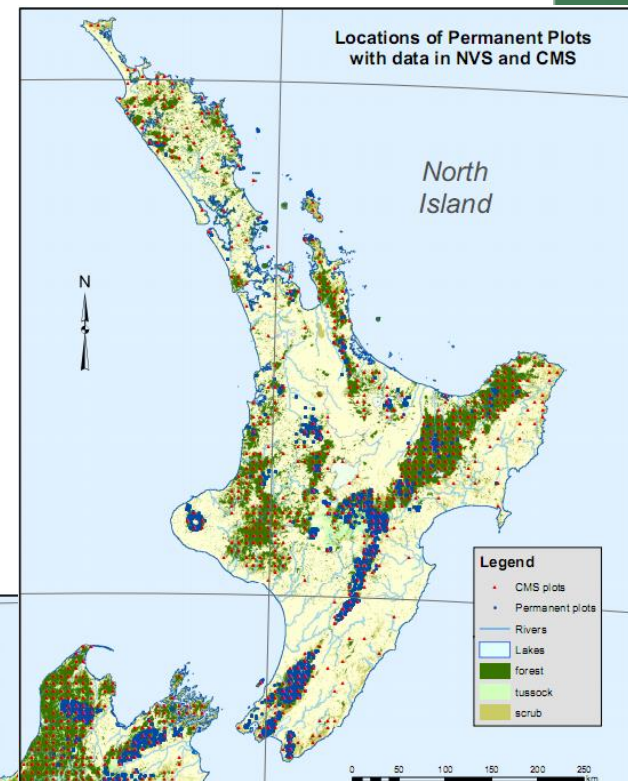
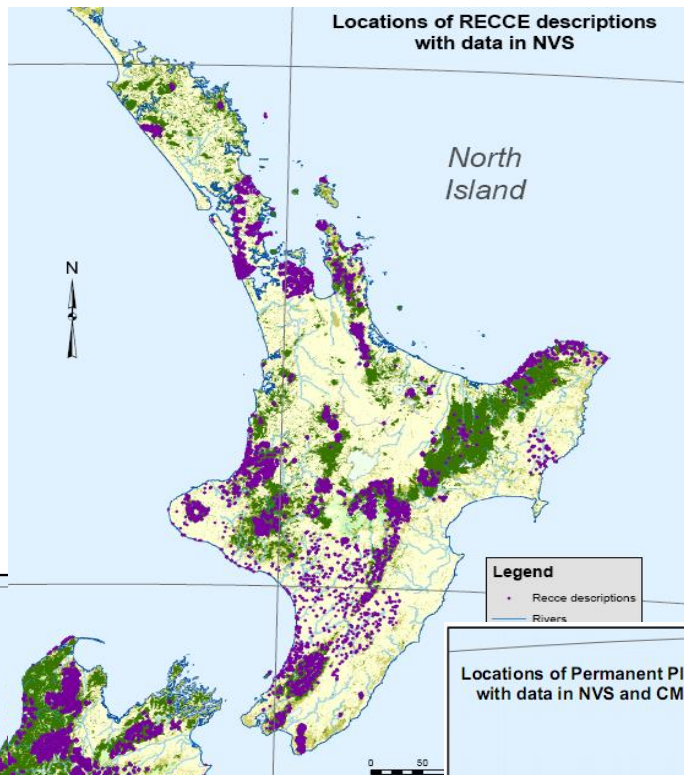
# What types of data are in the NVS databank?

- Plot location and site conditions
- Total vascular plant composition
- Plant abundance (density, cover, frequency)
- Plant identity & size (diameter, height)
- Individuals may be permanently marked

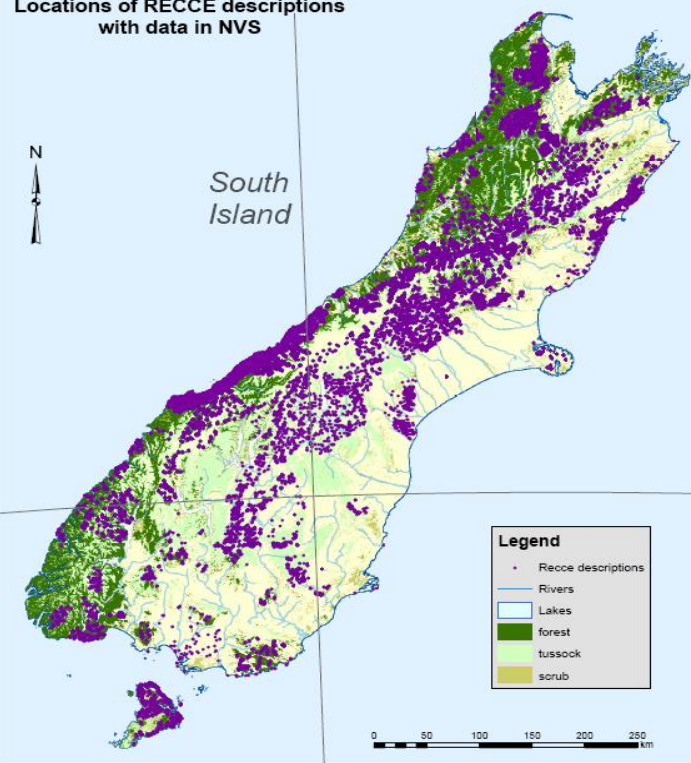


Other data often associated:  
leaf chemistry  
coarse woody debris  
herbivory  
soils

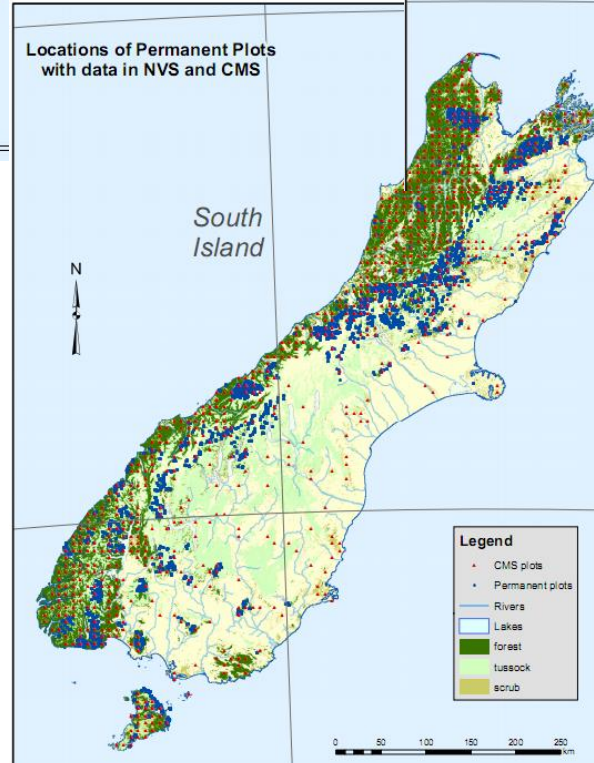
>94 000  
relevés



Locations of RECCE descriptions  
with data in NVS



Locations of Permanent Plots  
with data in NVS and CMS



>21 000  
permanent  
plots

# NVS is both a physical archive



# And an electronic one

MT FYFFE EXPRESS CORRECTED - Stem Diameter - Exclosure 1

File View Edit

Validate All Edit Mode New Note Show Header Species Defaults \* Associate Insert Stem species Add Sub Plot

Remaining Sub Plots

| #  | Sub Plot | Tag    | Verb. Code | NVS Code | (Stem species)             | Assoc | Assoc Type | Living Sta | Diameter | Height | Notes  |
|----|----------|--------|------------|----------|----------------------------|-------|------------|------------|----------|--------|--|
| 54 |          | New    |            |          |                            |       |            |            | cm       | m      |  |
| 1  | A        | A29    | GRILIT     | GRILIT   | Griselinia littoralis      |       |            | Not Found  |          |        | \$TAG CORRECTED FROM 29\$                                |
| 2  | B        | A30    | FUCEXC     | FUCEXC   | Fuchsia excorticata        |       |            | Alive      | 9.00     |        | \$TAG CORRECTED FROM 30\$                                |
| 3  | B        | A33    | CARSER     | CARSER   | Carpodetus serratus        |       |            | Alive      | 8.80     |        | TOP DYING \$TAG CORRECTED FROM 33\$                      |
| 4  | B        | AB5566 | COPLIN     | COPLIN   | Coprosma linariifolia      |       |            | Unknown    |          |        |  |
| 5  | C        | A31    | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Alive      | 3.40     |        | DOUBLE CHECKED, 2000 DBH WRONG \$TAG CORRECTED FROM 31\$ |
| 6  | C        | A32    | COPFOE     | COPFOE   | Coprosma foetidissima      |       |            | Alive      | 5.60     |        | \$TAG CORRECTED FROM 32\$                                |
| 7  | D        | A34    | PODHAL     | PODHAL   | Podocarpus hallii          |       |            | Alive      | 80.90    |        | \$TAG CORRECTED FROM 34\$                                |
| 8  | D        | A35    | PITTEN     | PITTEN   | Pittosporum tenuifolium    |       |            | Alive      | 8.30     |        | \$TAG CORRECTED FROM 35\$                                |
| 9  | D        | A37    | CARSER     | CARSER   | Carpodetus serratus        |       |            | Alive      | 7.10     |        | DOUBLE CHECKED \$TAG CORRECTED FROM 37\$                 |
| 10 | D        | A38    | COPLIN     | COPLIN   | Coprosma linariifolia      | 0     | Bracketed  | Alive      | 5.70     |        | \$TAG CORRECTED FROM 38\$                                |
| 11 | D        | A39    | COPLIN     | COPLIN   | Coprosma linariifolia      | 0     | Bracketed  | Alive      | 4.60     |        | \$TAG CORRECTED FROM 39\$                                |
| 12 | E        | 40     | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Alive      | 8.00     |        |  |
| 13 | E        | 41     | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Dead       |          |        | DEAD & FALLEN  |
| 14 | F        | 42     | PODHAL     | PODHAL   | Podocarpus hallii          |       |            | Alive      | 5.90     |        |  |
| 15 | F        | 43     | FUCEXC     | FUCEXC   | Fuchsia excorticata        |       |            | Alive      | 50.00    |        |  |
| 16 | F        | 44     | CARSER     | CARSER   | Carpodetus serratus        |       |            | Alive      | 11.00    |        |  |
| 17 | F        | AB5567 | COPTAY     | COPTAY   | Coprosma tayloriae A.P.Dru |       |            | Alive      | 2.80     |        |  |
| 18 | G        | 45     | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Not Found  |          |        |  |
| 19 | G        | 46     | CARSER     | CARSER   | Carpodetus serratus        |       |            | Alive      | 42.00    |        |  |
| 20 | G        | 48     | COPLIN     | COPLIN   | Coprosma linariifolia      |       |            | Alive      | 5.50     |        | \$REID FROM COPTAY\$                                     |
| 21 | H        | 51     | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Unknown    |          |        |  |
| 22 | H        | AB5568 | COPTAY     | COPTAY   | Coprosma tayloriae A.P.Dru |       |            | Alive      | 2.90     |        |  |
| 23 | I        | 52     | GRILIT     | GRILIT   | Griselinia littoralis      |       |            | Alive      | 18.90    |        | DOUBLE CHECKED TRUNK DAMAGED                             |
| 24 | I        | 53     | CARSER     | CARSER   | Carpodetus serratus        |       |            | Alive      | 5.50     |        |  |
| 25 | I        | 54     | PODHAL     | PODHAL   | Podocarpus hallii          |       |            | Alive      | 8.30     |        |  |
| 26 | I        | AB5569 | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Alive      | 2.80     |        | SNAPPED ABOVE TAG  |
| 27 | J        | 55     | COPTAY     | COPTAY   | Coprosma tayloriae A.P.Dru | 1     | Bracketed  | Alive      | 3.90     |        |  |
| 28 | J        | 56     | COPTAY     | COPTAY   | Coprosma tayloriae A.P.Dru | 1     | Bracketed  | Alive      | 6.60     |        |  |
| 29 | J        | 57     | COPTAY     | COPTAY   | Coprosma tayloriae A.P.Dru | 1     | Bracketed  | Alive      | 6.00     |        |  |
| 30 | J        | 58     | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Alive      | 7.40     |        |  |
| 31 | J        | AB5570 | PODHAL     | PODHAL   | Podocarpus hallii          |       |            | Alive      | 4.00     |        |  |
| 32 | J        | AC5589 | PSECOL     | PSECOL   | Pseudowintera colorata     |       |            | Alive      | 3.10     |        | TAG ACTUALLY AC5589 \$TAG CORRECTED FROM AC589\$         |

Updated EDIT LANDCARE\WiserS Setup



## LEARN



### What Is NVS?

All you need to know about the New Zealand National Vegetation Survey Databank

## DISCOVER



### Search for Data

Discover and download data through metadata, species, and maps

## PARTICIPATE



### Contribute Data

Add your data to NVS or send us your dataset corrections and annotations

# History of NVS up to last decade

- 1940-50s First national scale plot-based forest surveys
- 1960s Standardised methods for inventory and monitoring of native vegetation developed
- Late 1960s Beginning of electronic data capture
- Late 1980s Process for centrally archiving electronic and hard copy data formalised
- 1998 Nationally Significant database status accorded by FRST
- 2001 NVS moved from outdated platform to relational database
- 2003 Formal assessment of end-user needs

# User needs analysis identified four types of end-users:



**Researchers**



**Biodiversity Managers**



**Policy makers**



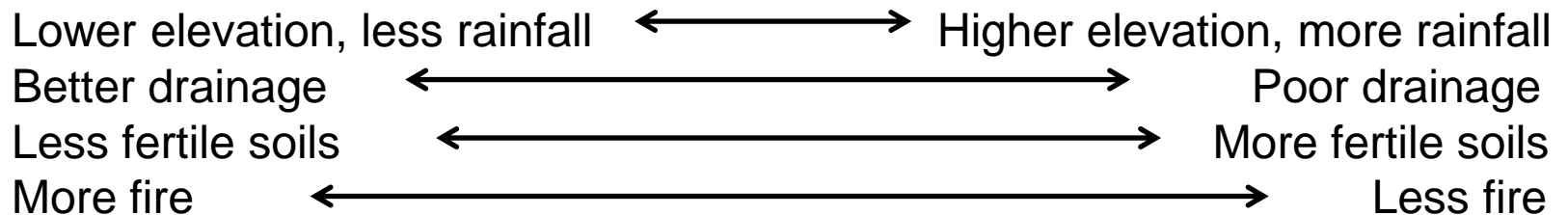
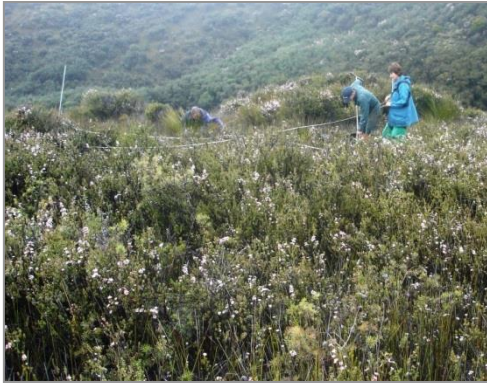
**Data networks**

- What is the NVS Databank?
- **How are NVS data used?**
- Lessons learned
- Open data

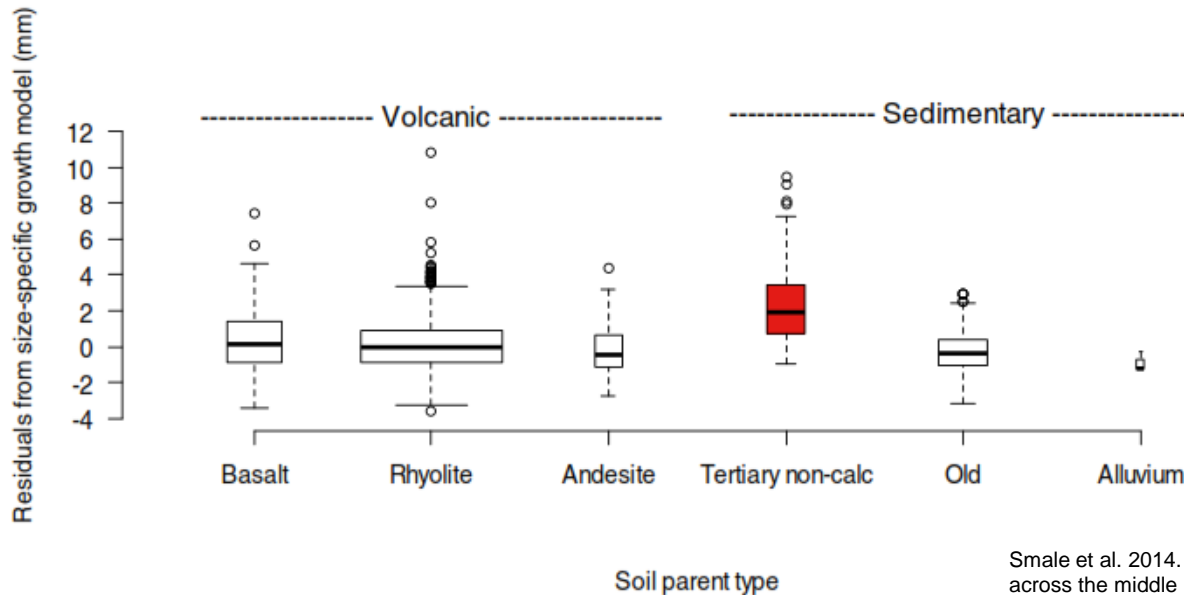
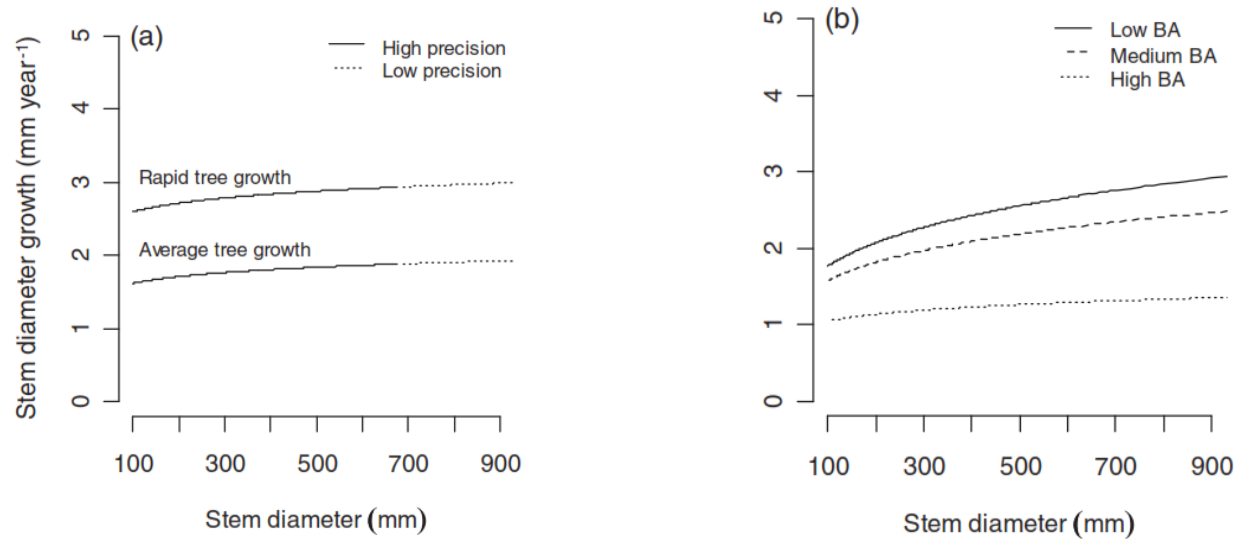




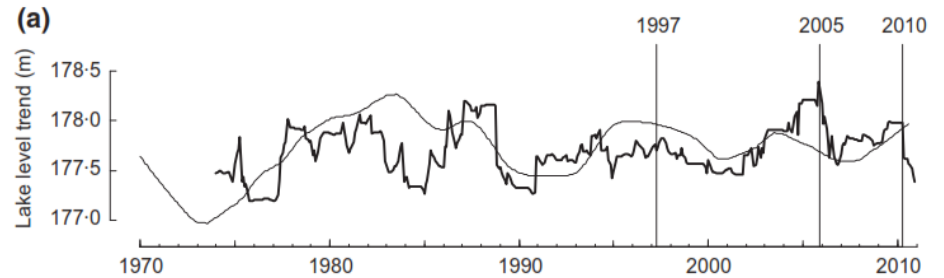
# Regional Scale: describing naturally uncommon gumlands



# Regional scale: tawa growth rates



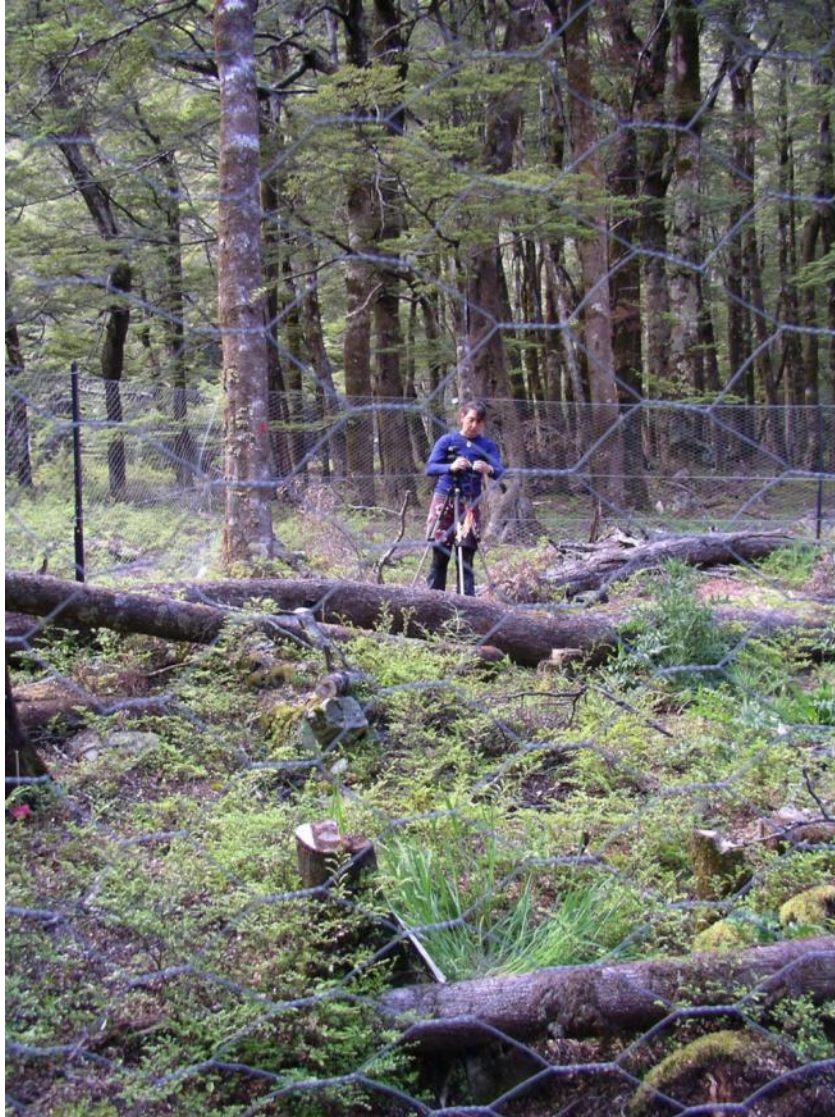
# Regional scale: Lakes Manapouri and Te Anau shorelines



# National Scale: Predicting climate change impacts



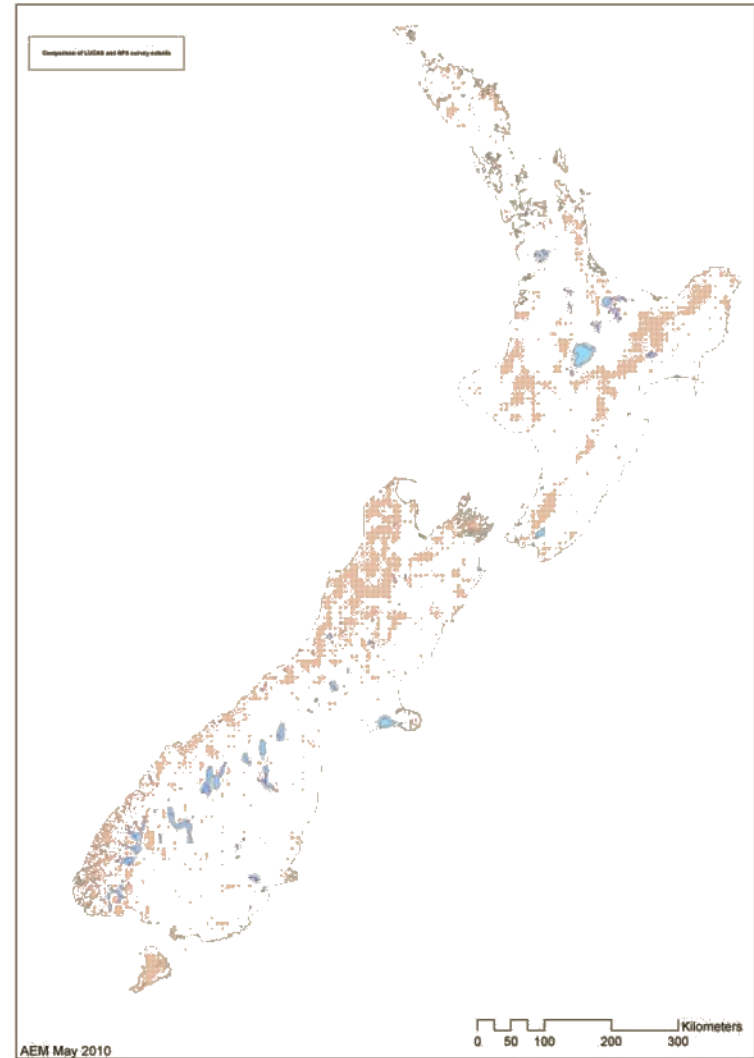
# National scale: Impacts of exotic browsing mammals



# National scale: Impacts of exotic browsing mammals

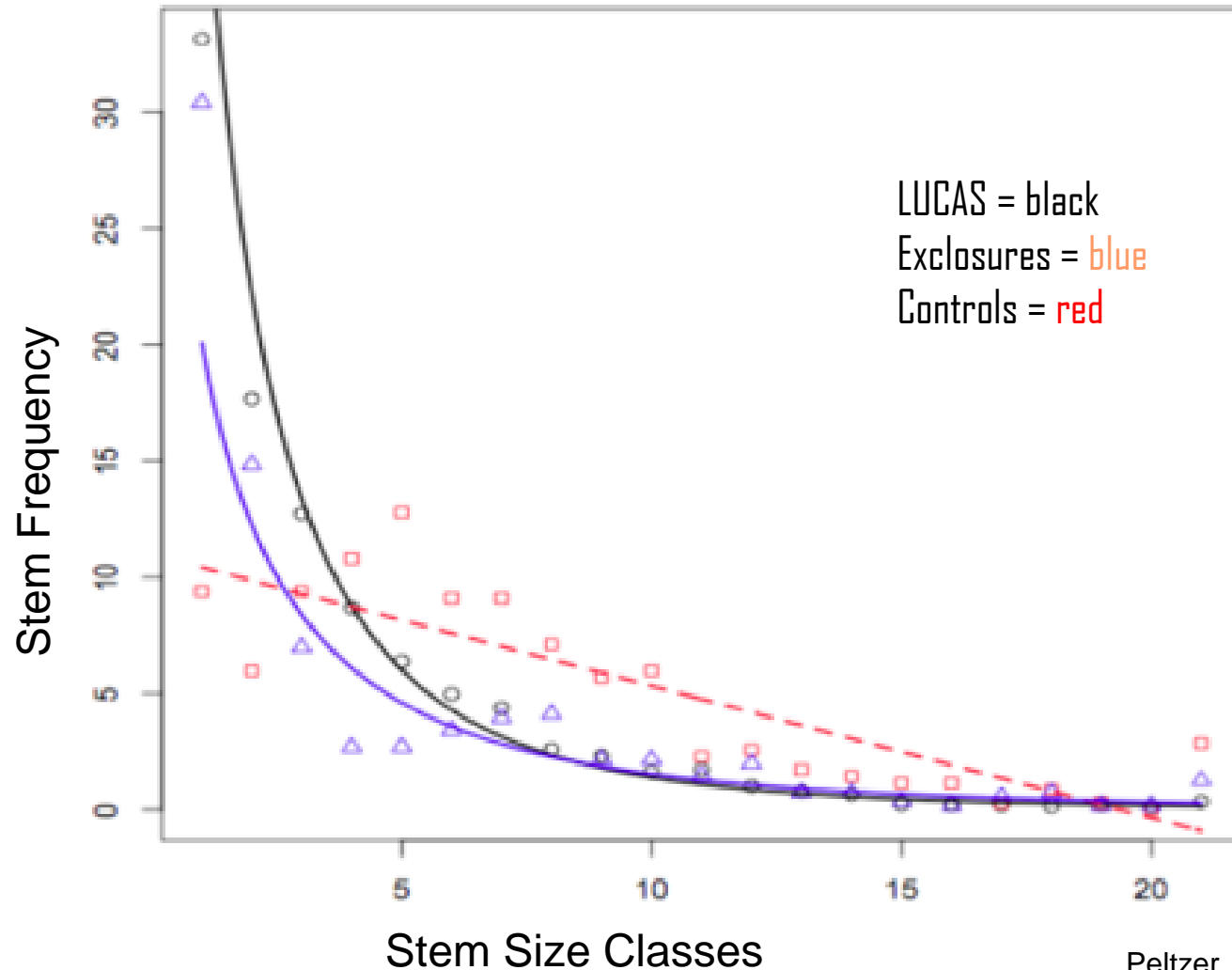


Long-term exclosure plots



LUCAS Natural Forest Inventory

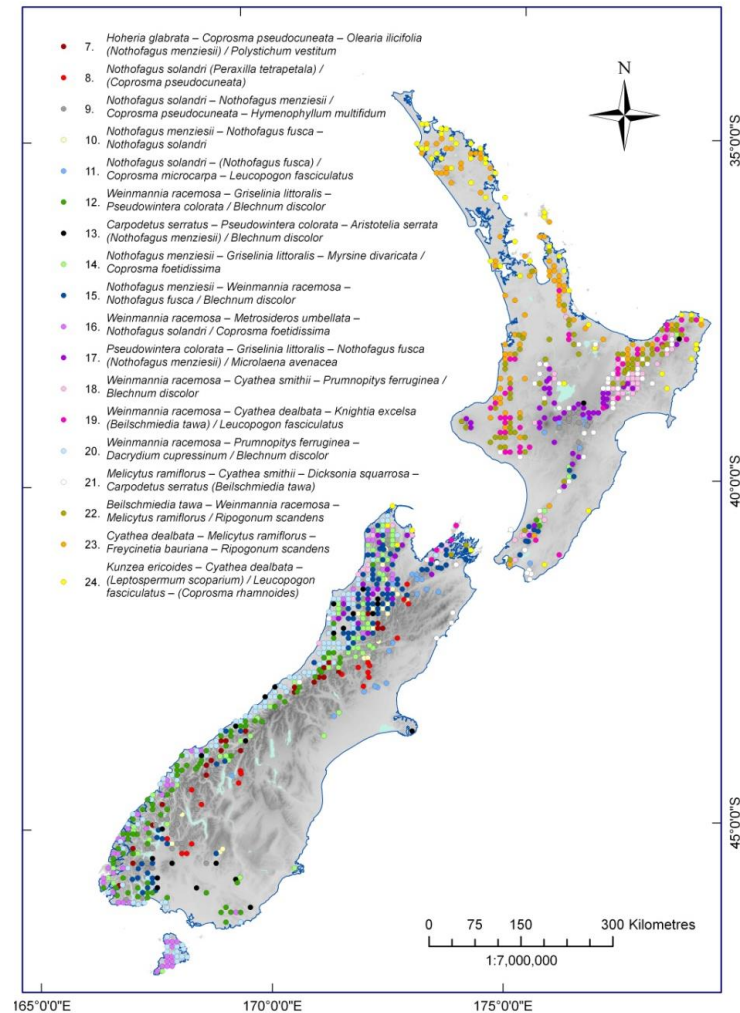
# National scale: Impacts of exotic browsing mammals



*Melicytus ramiflorus*

Peltzer, Duane A., et al. "Disentangling drivers of tree population size distributions." *Forest Ecology and Management* 331 (2014): 165-179.

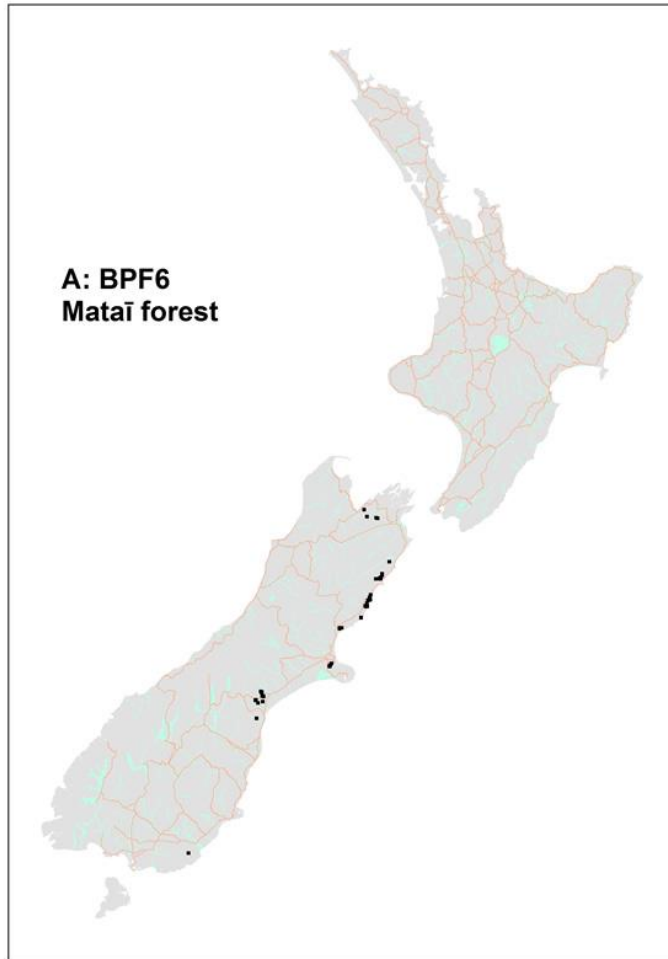
# National scale: Vegetation classification



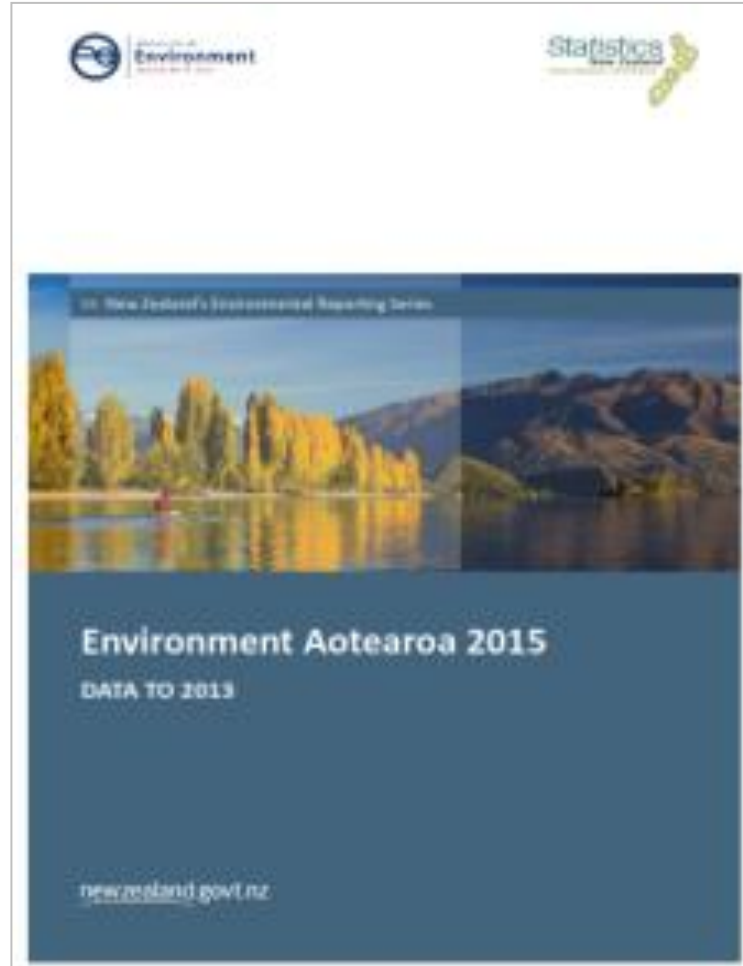


# National scale: Vegetation classification

Rare types defined: lowland Matai forest

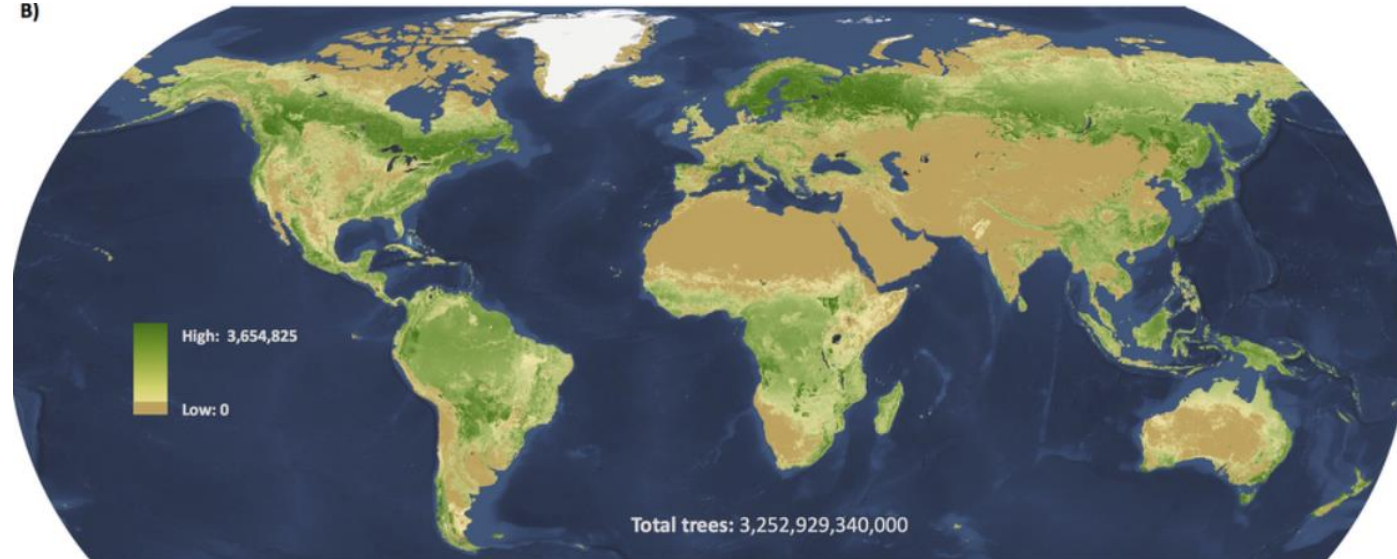


# National scale: State of Environment Reporting



# Uses of NVS: Global scale

B)



## ARTICLE

doi:10.1038/nature14967

### Mapping tree density at a global scale

T. W. Crowther<sup>1</sup>, H. B. Glick<sup>1</sup>, K. R. Covey<sup>1</sup>, C. Bettigole<sup>1</sup>, D. S. Maynard<sup>1</sup>, S. M. Thomas<sup>2</sup>, J. R. Smith<sup>1</sup>, G. Hintler<sup>1</sup>, M. C. Duguid<sup>1</sup>, G. Amatulli<sup>3</sup>, M.-N. Tuanmu<sup>1</sup>, W. Jetz<sup>3,4</sup>, C. Salas<sup>5</sup>, C. Stam<sup>6</sup>, D. Plotto<sup>7</sup>, R. Tavan<sup>8</sup>, S. Green<sup>9,10</sup>, G. Bruce<sup>9</sup>, S. J. Williams<sup>11</sup>, S. K. Wiser<sup>12</sup>, M. O. Huber<sup>13</sup>, G. M. Hengeveld<sup>14</sup>, G.-J. Nabuurs<sup>14</sup>, E. Tikhonova<sup>15</sup>, P. Borchardt<sup>16</sup>, C.-F. Li<sup>17</sup>, L. W. Powrie<sup>18</sup>, M. Fischer<sup>19,20</sup>, A. Hemp<sup>21</sup>, J. Homeier<sup>22</sup>, P. Cho<sup>23</sup>, A. C. Vibrans<sup>24</sup>, P. M. Umunay<sup>1</sup>, S. L. Piao<sup>25</sup>, C. W. Rowe<sup>1</sup>, M. S. Ashton<sup>1</sup>, P. R. Crane<sup>1</sup> & M. A. Bradford<sup>1</sup>

The global extent and distribution of forest trees is central to our understanding of the terrestrial biosphere. We provide the first spatially continuous map of forest tree density at a global scale. This map reveals that the global number of trees is approximately 3.04 trillion, an order of magnitude higher than the previous estimate. Of these trees, approximately 1.30 trillion exist in tropical and subtropical forests, with 0.74 trillion in boreal regions and 0.66 trillion in temperate regions. Biome-level trends in tree density demonstrate the importance of climate and topography in controlling local tree densities at finer scales, as well as the overwhelming effect of humans across most of the world. Based on our projected tree densities, we estimate that over 15 billion trees are cut down each year, and the global number of trees has fallen by approximately 46% since the start of human civilization.

Forest ecosystems harbour a large proportion of global biodiversity. The current estimate of global tree number is approximately

- What is the NVS Databank?
- How are NVS data used?
- **Lessons learned**
- Open data



# Lesson 1: Use standards



**Geographic**



**Organism  
names**



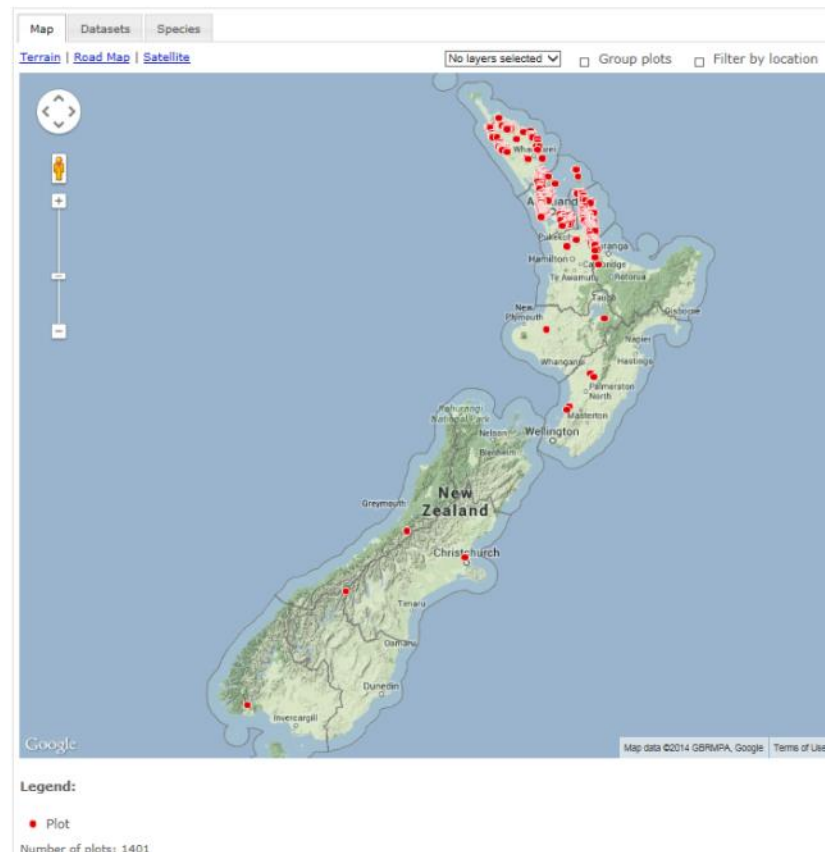
# Geographic standards allow ready integration with spatial layers to show species distributions

Search Species Names

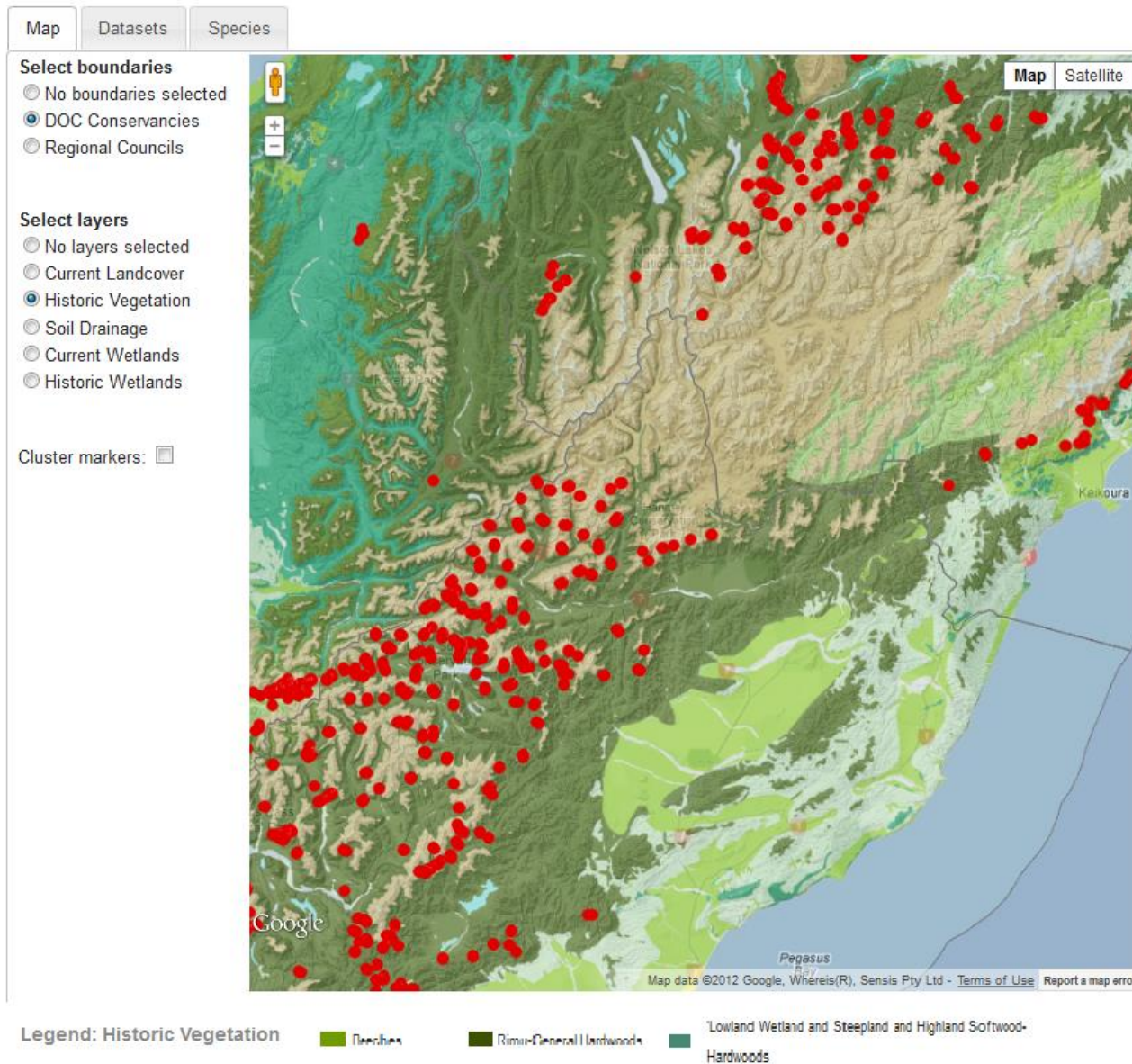
Search DOC Conservancy

Tip: You can search each item separately or combine them to fine-tune your results.


## Additional Filters



# ...and to retrieve covariates from spatial layers



# Ability to update taxonomic names



Ngā Tipu o Aotearoa  
- New Zealand Plants  
Manaaki Whenua - Landcare Research DATABASES

ALL DATABASES PLANTS PORTAL NGĀ TIPU HOME SEARCH ABOUT FEEDBACK HELP

NAME SEARCH  
COLLECTION SEARCH  
DESCRIPTION SEARCH  
IMAGE SEARCH  
LITERATURE SEARCH

## *Pseudopanax anomalus* (Hook.) K.Koch (1859)

kingdom: *Plantae* phylum: *Spermatophyta* class: *Magnoliopsida* order: *Apiales* family: *Araliaceae* genus: *Pseudop*

Details Synonyms Subordinate taxa Collections Distribution Description Images Keys Literature Links Associations

### DETAILS

Name Status: A Synonym of [Raukaua anomalus \(Hook.\) A.D.Mitch., Frodin & Heads \(1997\)](#)

Place of Publication: Koch, C. In: Koch, C.; Fintelmann, G. A. 1859: *Wochenschrift für Gärtnerei und Pflanzenkunde* 2

Publication Page: 366

Orthography: as 'anomalum'

Rank: species

Treatment Article: Mitchell, A.D.; Frodin, D. G.; Heads, M. J. 1997: Reinstatement of *Raukaua*, a genus of the Araliaceae centred in New Zealand. *Journal of the Royal Society of New Zealand* 27: 315.

Terms of Use



# Use of NZ standard for taxonomic names allows integration with trait data



The screenshot shows a Microsoft Internet Explorer browser window with the address bar displaying <http://ecotraits.landcareresearch.co.nz/>. The browser's menu bar includes File, Edit, View, Favorites, Tools, and Help. The address bar also shows navigation buttons for Back, Forward, Stop, Home, Search, Favorites, Media, and a Go button. The website header features the logo for Manaaki Whenua Landcare Research and the title 'Ecological Traits of New Zealand Flora'. Below the header is a navigation menu with links for ALL DATABASES, PLANTS PORTAL, ECO TRAITS HOME, SEARCH, ABOUT, FEEDBACK, and HELP. The main content area is titled 'Ecological Traits of New Zealand Flora' and includes a vertical image of red berries on the left. The text describes the database as a 'one-stop-shop' for plant-related questions and provides a link to explore the database. It also mentions a 'publication list' and lists trait categories covered by the database: Status in NZ, Distribution, Morphology, Reproduction, Flower and Fruit, and Other/Wetland. A 'Download trait data' section is also present, mentioning a web service and a contact person, Kevin Richards.

http://ecotraits.landcareresearch.co.nz/ - Microsoft Internet Explorer

File Edit View Favorites Tools Help

← Back → Search Favorites Media

Address <http://ecotraits.landcareresearch.co.nz/> Go Links »

 **Ecological Traits of New Zealand Flora**  
Manaaki Whenua - Landcare Research DATABASES

ALL DATABASES PLANTS PORTAL ECO TRAITS HOME SEARCH ABOUT FEEDBACK HELP

## Ecological Traits of New Zealand Flora

Click [here](#) to start exploring the traits database...

This database of ecological traits, linked to Landcare Research's suite of databases related to plant systematics, is designed as a one-stop-shop for questions such as 'what kind of plant is this?', 'is it a weed?', 'does it produce viable seeds?', 'how is the seed dispersed?'.  
See [About](#) the ecological traits database for more details including the [publication](#) list.

### Trait categories covered by this database


|   |   |   |   |   |  |
|---|---|---|---|---|--|
| <br>Status in NZ | <br>Distribution | <br>Morphology | <br>Reproduction | <br>Flower and Fruit | <br>Other/Wetland |
|---|---|---|---|---|--|

### Download trait data

A web service is also available for downloading plant trait data. For more information email [Kevin Richards](mailto:Kevin.Richards@landcare.co.nz) at Landcare Research. The sample application for the web service can be downloaded from [here](#).

Done Local intranet

# Lesson 2: Build on existing efforts



**ALERT!** VegBank will be moved to a new server very soon (12/16 or 12/17). You are on the old server now, if you see this

LOGIN | DATASETS | LOGOUT

Jump to...

find  containing

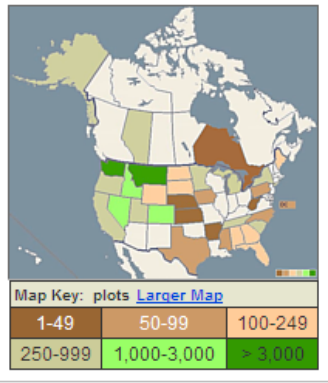
download 0 items

advanced search | browse data

HOME | FAQ  
SUBMIT DATA | ABOUT  
MY ACCOUNT | SITE MAP

## Find Plots

- [Browse plots](#)
- [Simple search](#)
- [Search with a map](#)
- [Advanced plot search](#)



## Recently Added Plots

| Project  | Added     |
|--|-----------|
| <a href="#">Fort Hood Vegetation Map</a>         | 23-Apr-08 |
| <a href="#">Short Mountain Wildlife Mana...</a>  | 20-Sep-06 |
| <a href="#">Alvar NYHP</a>                       | 05-Sep-06 |
| <a href="#">Vegetation of the east slope ...</a> | 05-Apr-06 |

## Plant Taxa

- [What is a plant concept?](#)
- [Browse plants](#)
- [Search plants](#)
- [Submit plants](#)

## Plant Communities

- [What is a community?](#)
- [Search communities](#)
- [Submit communities](#)

## Supplemental Data

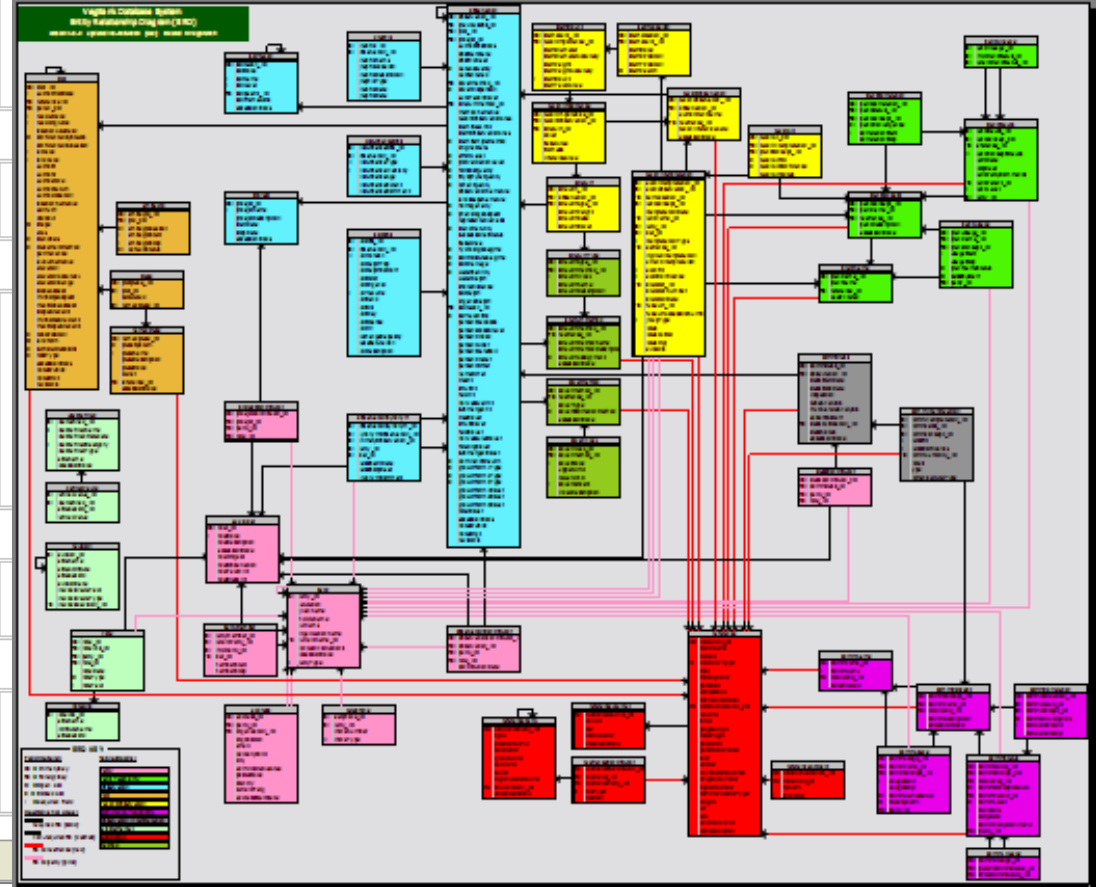
- [People](#)
- [Stratum methods](#)
- [Cover methods](#)
- [Projects](#)
- [References](#)
- [Search supplemental data](#)

## Data in VegBank

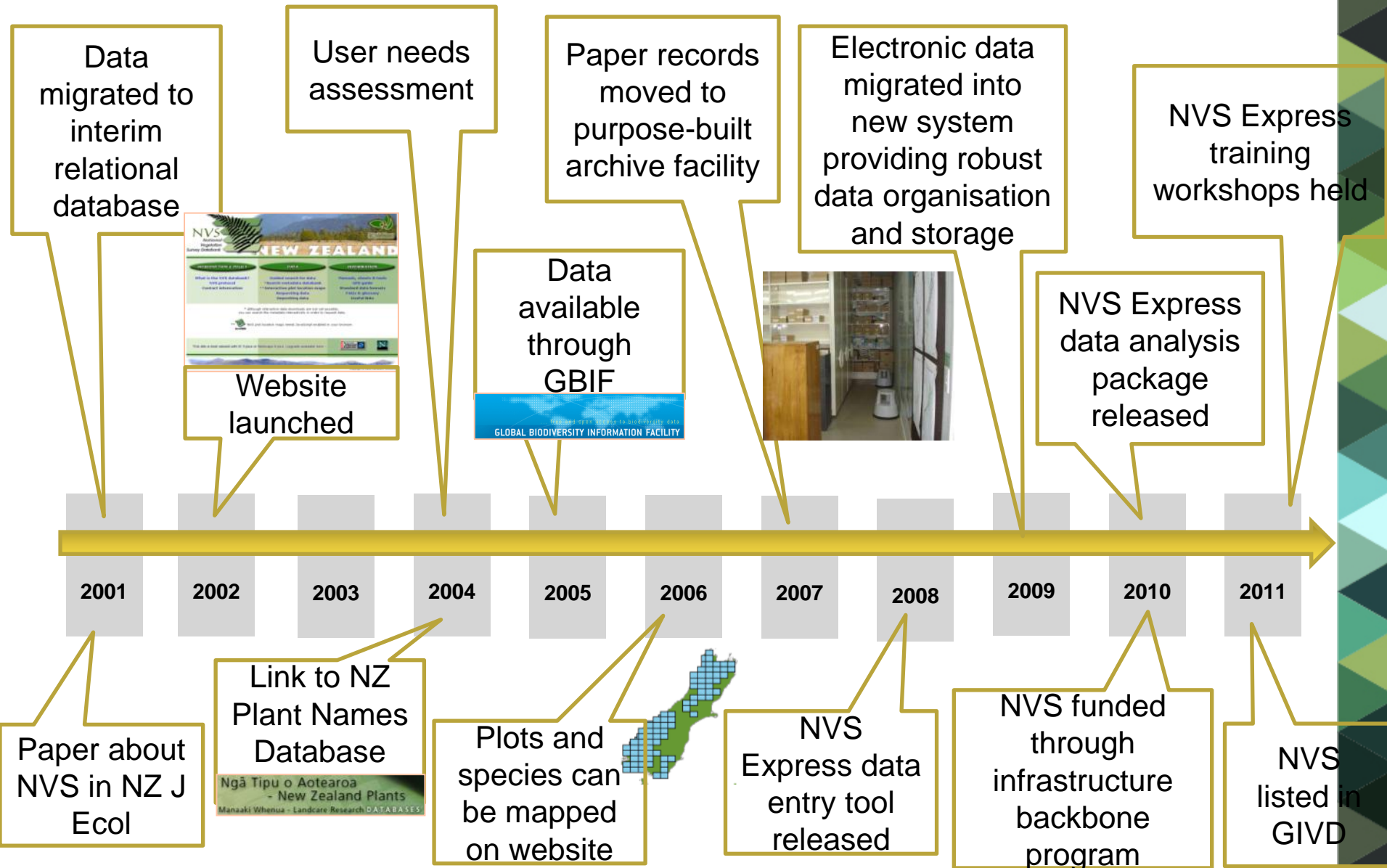
|                         |       |
|-------------------------|-------|
| Plots:                  | 22341 |
| --Classified Plots:     | 15665 |
| ----to NVC communities: | 5162  |
| Plant Concepts:         | 91984 |
| --accepted by USDA:     | 43753 |
| ----and on plots:       | 7217  |
| Community Concepts:     | 15128 |
| --in the NVC:           | 8390  |
| ----and on plots:       | 896   |

## News

[Map plots: Example | Datacart |](#)



# Lesson 3: Modular development with demonstrable achievements



Data migrated to interim relational database

User needs assessment

Paper records moved to purpose-built archive facility

Electronic data migrated into new system providing robust data organisation and storage

NVS Express training workshops held



Website launched

Data available through GBIF



NVS Express data analysis package released

2001

2002

2003

2004

2005

2006

2007

2008

2009

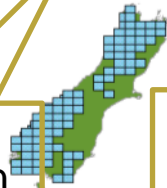
2010

2011

Link to NZ Plant Names Database



Plots and species can be mapped on website



NVS Express data entry tool released

NVS funded through infrastructure backbone program

NVS listed in GIVD

# Lesson 4: close collaboration between scientists and informatics specialists

## Plant ecologists



## Database management data entry

## Database design, integration, programming, website

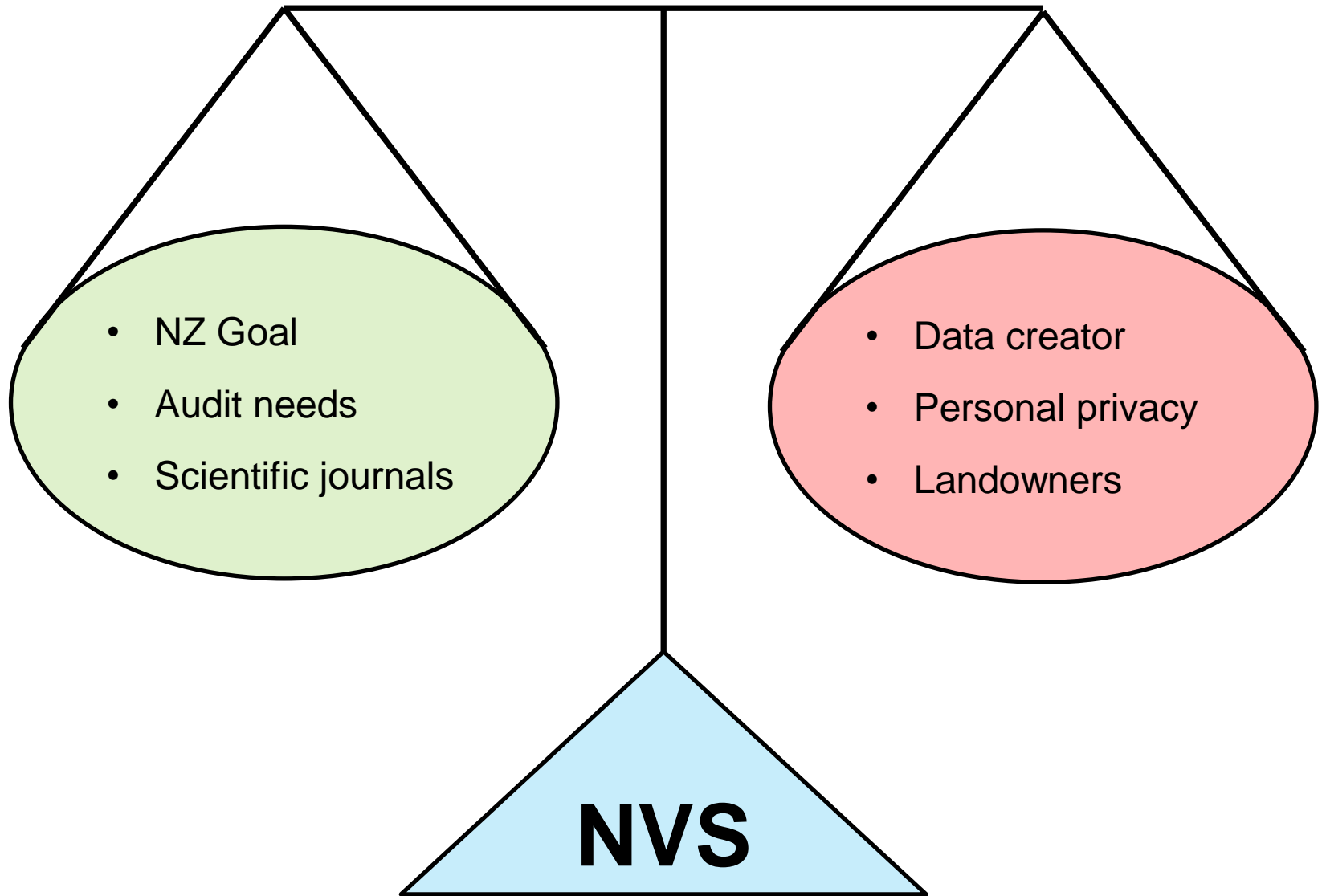


# Lesson 5: Strong service ethic



- What is the NVS Databank?
- How are NVS data used?
- Lessons learned
- **Open data**





- NZ Goal
- Audit needs
- Scientific journals

- Data creator
- Personal privacy
- Landowners

**NVS**

- Tracking Data use

# Meeting audit requirements: the problem of a “living” database

| Year | Tree tag | Taxon                       | DBH  |
|------|----------|-----------------------------|------|
| 2000 | C8615    | <i>Melicytus ramiflorus</i> | 13.5 |

| Year | Tree tag | Taxon                        | DBH |
|------|----------|------------------------------|-----|
| 2006 | C8615    | <i>Brachyglottis repanda</i> | 4.6 |



# Meeting audit requirements: the problem of a “living” database

| Year | Tree tag | Taxon                       | DBH  |
|------|----------|-----------------------------|------|
| 2000 | C8615    | <i>Melicytus ramiflorus</i> | 13.5 |

| Year | Tree tag | Taxon                        | DBH                  |
|------|----------|------------------------------|----------------------|
| 2006 | C8615    | <i>Brachyglottis repanda</i> | <del>13.5</del> 13.6 |

Data downloaded at different times will be different!

# Our solution: archiving the data package

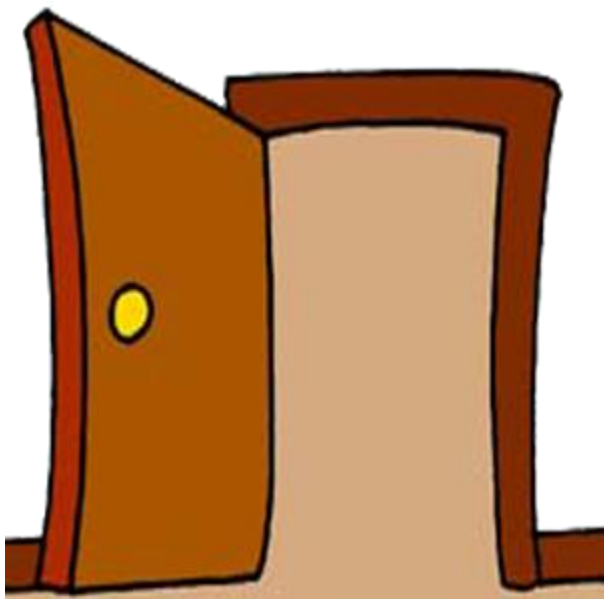
Library Tools

Documents Library Susan Wiser

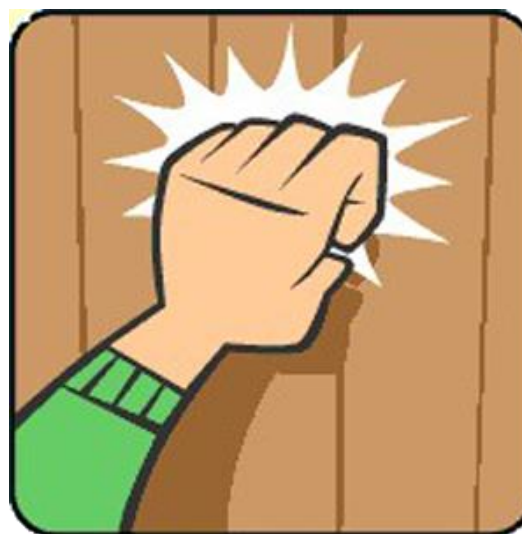
Edit Document | Check Out | Check In | Discard Check Out | Version History | Document Permissions | Delete Document | View Properties | Edit Properties | E-mail a Link | Alert Me | Download a Copy | Send To | Manage Copies | Go To Source | Workflows | Publish | Unpublish | Approve/Reject | Cancel Approval | I Like It | Tags & Notes

| Open & Check Out   | Manage                | Share & Track       | Copies      | Workflows   | Tags and Notes |
|--|-----------------------|---------------------|-------------|---|----------------|
| NVS-302cb82c-2b1f-4eb1-a953-fb2f3b6f68b9                                     | 4/12/2014 12:06 p.m.  | Kale Sniderman      | nvs service | bioclimatic research as indicated earlier   |                |
| NVS-Arnst-20141204-082425  | 4/12/2014 8:26 a.m.   | Anne-Gaelle Ausseil | nvs service | Mapping floral resources for pollinators in the upper Ruamahanga  |                |
| NVS-855eaebf-c0de-452d-a036-728d2edfc309                                     | 3/12/2014 7:53 p.m.   | Kale Sniderman      | nvs service | as explained for earlier request  |                |
| NVS-27a1e3ef-570b-4f1a-aa9a-40a78adefe55                                     | 3/12/2014 6:55 p.m.   | Kale Sniderman      | nvs service | Palaeoclimate research. I am reconstructing palaeoclimates from ~4 million years ago from fossil pollen assemblages from the Australian Nullarbor. These assemblages include Geniostoma (Loganiaceae), which is rare in Australian rainforests, but widely distributed in NZ. We are basing our palaeoclimate reconstructions on presence/absence data, (that is, quadrat or other survey data), rather than on presence-only data. Unfortunately, our compilation of Australian quadrat data includes only two records of Geniostoma. To generate a meaningful climate estimate from Geniostoma which is comparable to those for our other taxa, we are interested in acquiring quadrat/survey data from NZ, in order to estimate the distribution of the genus within temperature- and precipitation-space. Hence we need a large quantity of quadrat data: both with and without Geniostoma, in order to define this distribution using generalised additive models. |                |
| NVS-f093e15d-6826-4985-b358-355a53bb1ba1                                     | 3/12/2014 12:22 p.m.  | David Roberts       | nvs service | I am writing a paper trying to reconcile vegetation theory with large well-vetted data sets and this data set is of historic importance due to Wiser and De Caceres's papers.   |                |
| NVS-Arnst-20141202-041314  | 2/12/2014 4:14 p.m.   | Anne-Gaelle Ausseil | nvs service | Mapping floral resources for pollinators in the upper Ruamahanga  |                |
| NVS-2f93d4a2-26b9-400c-a173-e904efefbc1a                                     | 1/12/2014 9:51 a.m.   | Jane Meiforth       | nvs service | Proposal for a PhD on Kauri Dieback disease   |                |
| NVS-Ridden-20141126  | 26/11/2014 3:48 p.m.  | Johnathon Ridden    | Elise Arnst | Mistletoe distributions. Updated query with PlotobsID, date and parties added.  |                |
| <input checked="" type="checkbox"/> NVS-0909239b-7aa2-47de-a703-323baea91970 | 21/11/2014 10:00 a.m. | Greg Nelson         | nvs service | Looking at abundance and distributions of Chionochloa.  |                |

# Meeting 'Open Data' requirements: Data sets may require permission from owners to access



**Open**



**Conditional**

**50:50**

# Meeting 'Open Data' requirements: satisfying NVS need to report use



Available on-line at: <http://www.newzealandecology.org/nzj>

Evidence for arrested successional processes after fire in the Waikare River catchment, Te Urewera

Sarah J. Richardson<sup>1</sup>, Robert J. Holdaway and Fiona E. Carswell  
 Landcare Research, PO Box 60940, Lincoln 7640, New Zealand  
 \*Author for correspondence (Email: richardson@landcareresearch.co.nz)

Published online: 9 April 2014

Abstract: *Ant...*

Global Change Biology (2011) 7, 389–403

**Strategies to estimate national forest carbon stocks from inventory data: the 1990 New Zealand baseline**

PETER N. BEETS<sup>1</sup>

GRAEME M. J. HALL  
 and CHRIS J. GOULD  
 \*Landcare Research, PO Box 60  
 Correspondence: Graeme Hall, f

Abstract  
 An estimate of  
 partially sati  
 Convention

## LETTER

doi:10.1008/nature12914

### Rate of tree carbon accumulation increases continuously with tree size

N. L. Stephenson<sup>1</sup>, A. J. Dale<sup>2</sup>, R. Condit<sup>3</sup>, S. E. Russo<sup>4</sup>, P. J. Baker<sup>5</sup>, N. G. Beckman<sup>6</sup>, D. A. Coomes<sup>7</sup>, E. R. Lines<sup>8</sup>, W. K. Moritz<sup>9</sup>, N. Rüger<sup>10</sup>, E. Alvarez<sup>11</sup>, C. E. Burslem<sup>12</sup>, S. Bunyavechewin<sup>13</sup>, G. Chuyong<sup>14</sup>, S. J. Davies<sup>15</sup>, A. Duggie<sup>16</sup>, C. N. Ewango<sup>17</sup>, O. Flores<sup>18</sup>, J. F. Franklin<sup>19</sup>, H. K. Gou<sup>20</sup>, Z. Hao<sup>21</sup>, M. E. Harmon<sup>22</sup>, S. P. Hubbell<sup>23</sup>, D. Kenfack<sup>24</sup>, Y. Lin<sup>25</sup>, J.-R. Makana<sup>26</sup>, A. Malhi<sup>27</sup>, L. B. Malmer<sup>28</sup>, R. J. Palmiotto<sup>29</sup>, N. Penggattanasurak<sup>30</sup>, S.-H. Seo<sup>31</sup>, I.-F. Sun<sup>32</sup>, S. Tapp<sup>33</sup>, D. Thomas<sup>34</sup>, P. J. van Mantgem<sup>35</sup>, X. Wang<sup>36</sup>, S. K. Wiser<sup>37</sup> & M. A. Zavala<sup>38</sup>

Forests are major components of the global carbon cycle, providing substantial feedback to atmospheric greenhouse gas concentrations. Our ability to understand and predict changes in the forest carbon cycle—particularly net primary productivity and carbon storage—increasingly relies on models that represent biological processes across several scales of biological organization, from tree leaves to forest stands<sup>1–3</sup>. Yet, despite advances in our understanding of productivity at the scales of leaves and stands, no consensus exists about the nature of productivity at the scale of the individual tree<sup>4</sup>, in

unit leaf area (or unit leaf mass)<sup>5,6</sup>, with the implicit assumption that declines at these scales must also apply at the scale of the individual tree. Declining tree growth is also sometimes inferred from life-history theory to be a necessary corollary of increasing resource allocation to reproduction<sup>7–10</sup>. On the other hand, metabolic scaling theory predicts that mass growth rate should increase continuously with tree size, and this prediction has also received empirical support from a few site-specific studies<sup>11–13</sup>. Thus, we are confronted with two conflicting generalizations about the fundamental nature of tree growth, but lack a global assess-



# Meeting 'Open Data' requirements: NVS solution

The screenshot displays the Landcare Research Datastore website. At the top, the navigation bar includes the 'DATASTORE' logo, the Landcare Research and Manaaki Whenua logos, and links for 'Datasets', 'Organizations', 'Groups', and 'About'. A search bar is located on the right side of the header.

The main content area is divided into several sections:

- Search Your Data:** A search box with the placeholder text 'eg. Gold Prices' and a magnifying glass icon. Below it are 'Popular Tags' for 'New Zealand', 'Taxonomy', and 'Systematics'.
- Landcare Research Datastore statistics:** A summary of site metrics: 10 datasets, 4 organizations, 2 groups, and 2 related items.
- Welcome to the Datastore - the Landcare Research Data Repository:** A banner image showing a person in a field with a camera, accompanied by the text: 'Welcome to the Datastore - the Landcare Research Data Repository. By using this site you agree to the Terms and Conditions'.
- Landcare Research:** A section with the Landcare Research logo and the text 'Top level organisation for depositing datasets...'. It features a 'Rabbit Information Database' (described as a searchable database of published and unpublished articles and references relevant to wild rabbits and their...) and 'Phylogenetic Trees - Clitopilus Etc' (described as data for Maximum Likelihood phylogenetic trees published in: New species and combinations of some New Zealand agarics...). Both sections include an 'HTML' button.
- Biodiversity Data:** A section with a folder icon and the text 'Biodiversity Data Biodiversity related datasets'. It also features 'Phylogenetic Trees - Clitopilus Etc' (described as data for Maximum Likelihood phylogenetic trees published in: New species and combinations of some New Zealand agarics...) with a 'next' button.

The footer contains links for 'About Landcare Research Datastore', 'CKAN API Open Knowledge Foundation', and 'OPEN DATA'. It also states 'Powered by ckan' and includes a language dropdown menu set to 'English'.

datastore.landcareresearch.co.nz

# Soil fertility induces coordinated responses of multiple independent functional traits

Melissa M. Jager<sup>1</sup>, Sarah J. Richardson<sup>2</sup>, Peter J. Bellingham<sup>2</sup>, Michael J. Clearwater<sup>1</sup> and Daniel C. Laughlin<sup>1\*</sup>

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## Summary

1. A central goal of functional ecology is to determine how independent functional traits are filtered by environmental conditions to improve our understanding of the community assembly. Soil fertility clearly influences community composition, but it is unclear how plant functional traits are most strongly associated with gradients of increasing nutrient availability.
2. We hypothesized that leaf economic traits and stem tissue density would be strongly associated with soil fertility given their direct relationship to soil resource acquisition and use. We also hypothesized that functional traits that are commonly associated with competition (e.g. maximum height), shade tolerance (seed mass) and resistance to disturbance (bark thickness) would be unrelated to soil fertility.
3. We measured 13 functional traits from 30 tree species occurring in 40 plots across a nutrient gradient in a mature warm temperate rain forest in Northland, New Zealand. Principal component analysis revealed that leaf economic traits and stem tissue density were strongly associated with soil fertility, while maximum height, shade tolerance and resistance to disturbance were unrelated to soil fertility.

## Acknowledgements

This research was supported by a grant (UOW1201) from the Royal Society of New Zealand Marsden Fund, a University of Waikato Research Scholarship, and Core funding for Crown Research Institutes from New Zealand's Ministry of Business, Innovation and Employment's Science and Innovation Group. We thank the Piki te Aroha Marae Trust and the Pukekū Forest Trust, Adrian Walker and the NZ Department of Conservation, Mike and Annette Richardson, Cate McInnis-Ng, Kris Kramer-Walter, Rowan Buxton, Chris Morse and Antonia Vincent for their help and support.

## Data accessibility

All data used in this study, including plot-level species basal area, plot-level environmental variables and species' functional traits, are available online at Landcare Research Datastore (<http://dx.doi.org/10.7931/V11593>).

## References

Baraloto, C., Paine, C.E.T., Patiño, S., Bonal, D., Hérault, B. & Chave, J. (2010) Functional trait variation and sampling strategies in species-rich plant

## Puketi Forest 2011 Trait variation along a toposequence

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### Organization



### National Vegetation Survey Databank (NVS)

The National Vegetation Survey Databank (NVS) is a physical archive and electronic databank containing records of over 94,000 vegetation survey plots - including data from over... [read more](#)

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# Puketi Forest 2011 Trait variation along a toposequence

Trait variation along a toposequence - we sampled forest composition along a toposequence in permanent plots and matched composition to trait values and soil chemistry.

The data support an article in *Journal of Ecology*: Jager MM, Clearwater MJ, Richardson SJ, Bellingham PJ, Laughlin DG. 2014. Soil fertility induces coordinated responses of multiple independent functional traits. *Journal of Ecology* (doi:10.1111/1365-2745.12366).

*These resources (data files) represent snapshots of data extracted from the National Vegetation Databank (NVS) for analysis supporting this manuscript. NVS is a living database, and data are subject to error correction and other amendments over time. The most current version of these data can be requested via the NVS website by searching for the datasets "Puketi 2011" and "Puketi Traitspace 2012".*

### Data and Resources

- 
**Metadata: Puketi trait variation along ...**  
 Field descriptions/definitions for the 3 CSV data files: plot... [Explore](#)
- 
**Plot environment coordinates CSV**  
 Plot-level locations and soil chemistry measures. Clicking on the map... [Explore](#)
- 
**Species traits CSV**  
 Species mean trait values sampled across the plots. [Explore](#)
- 
**Species basal area CSV**  
 Sum basal area for each species in each plot. [Explore](#)

- Northland
- Puketi
- bark thickness
- leaf economics
- maximum height
- plant functional tr...
- seed mass
- soil fertility
- temperate rainforest
- topography
- wood density



- Exciting science
- Evidence-base for reporting and management
- Integration with other national databases and collections
- Long-term ecosystem dynamics