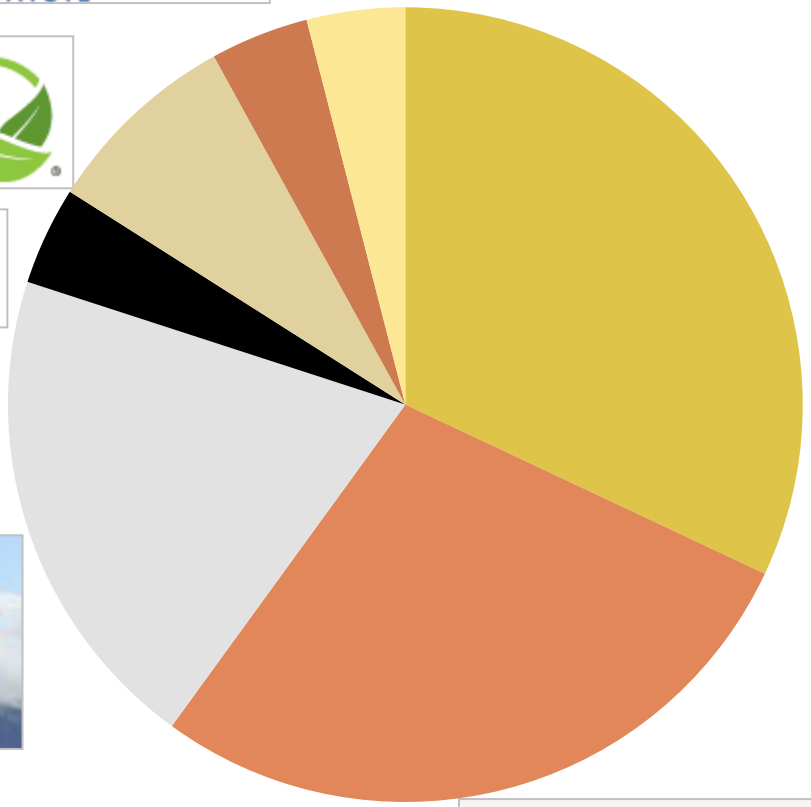
Mobilising Vegetation Plot Data: the National Vegetation Survey Databank

Susan Wiser
April 2016

http://nvs.landcareresearch.co.nz

LANDCARE RESEARCH
MANAAKI WHENUA

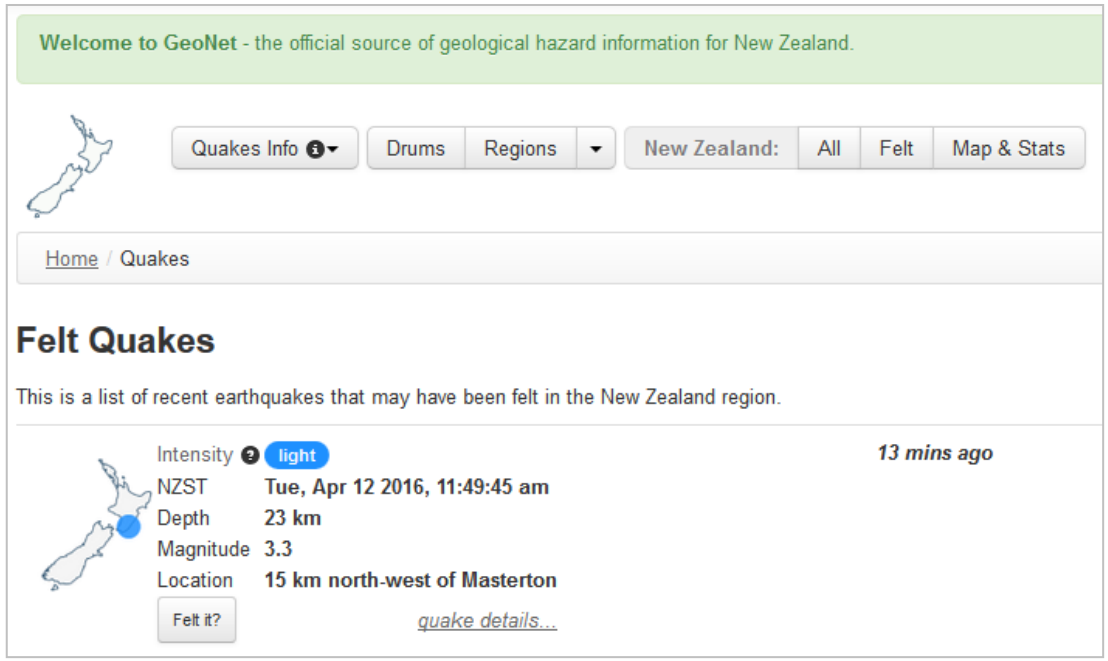
Nationally Significant Databases and Collections



http://natsigdc.landcareresearch.co.nz/natsigdc_list.html

Types of databases & collections

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



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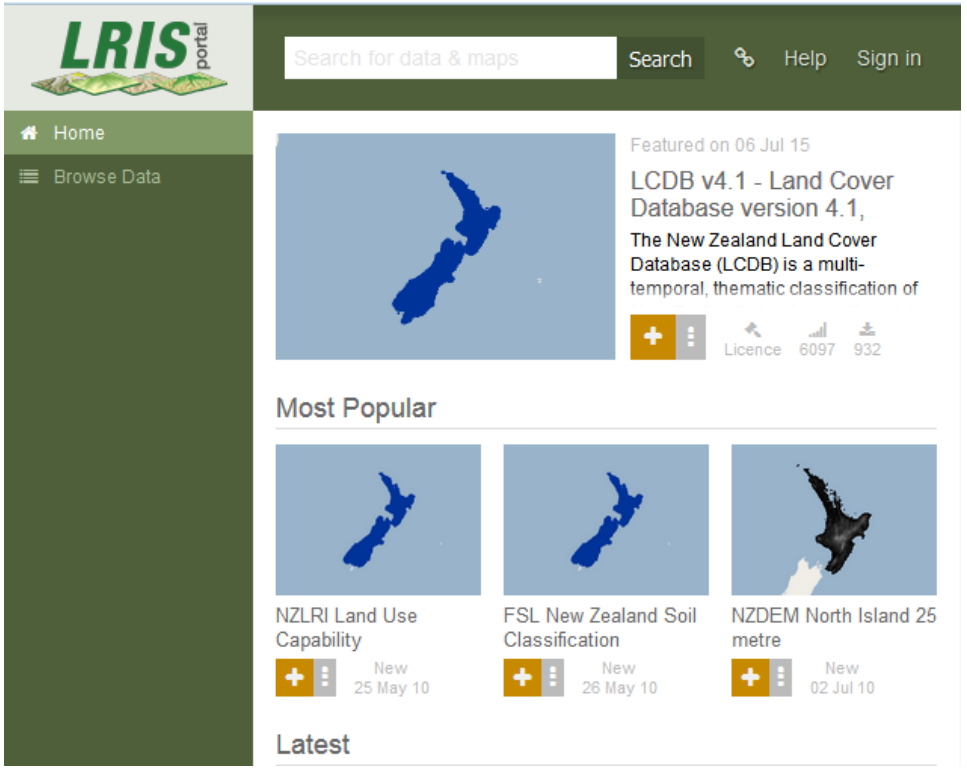

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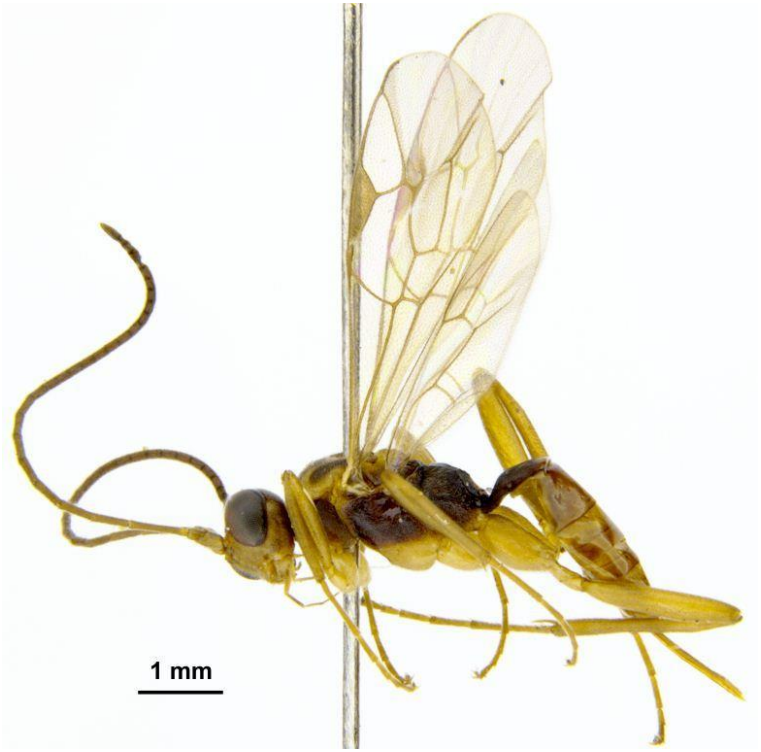

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- What is the NVS Databank?
- How are NVS data used?
- Lessons learned
- Open Data

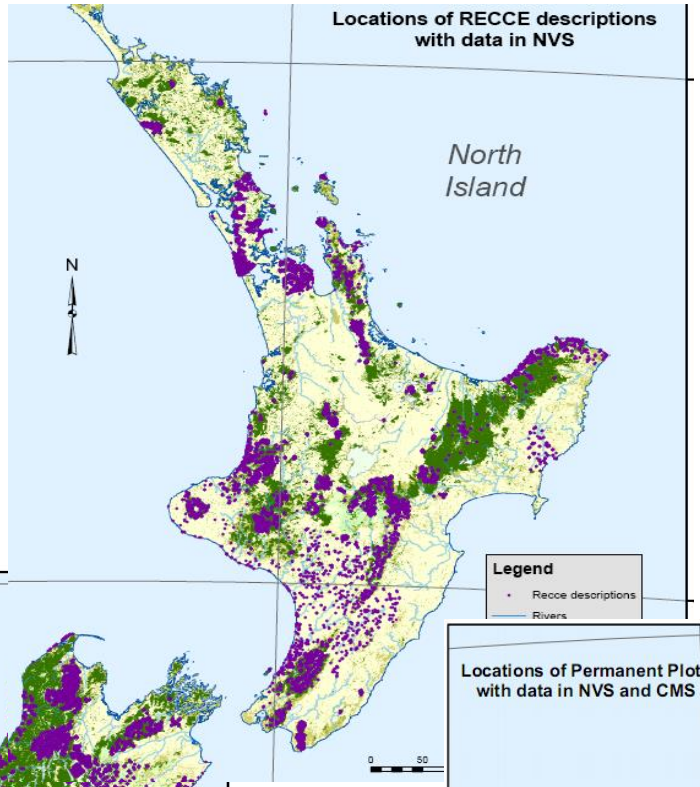
What types of data are in the NVS databank?

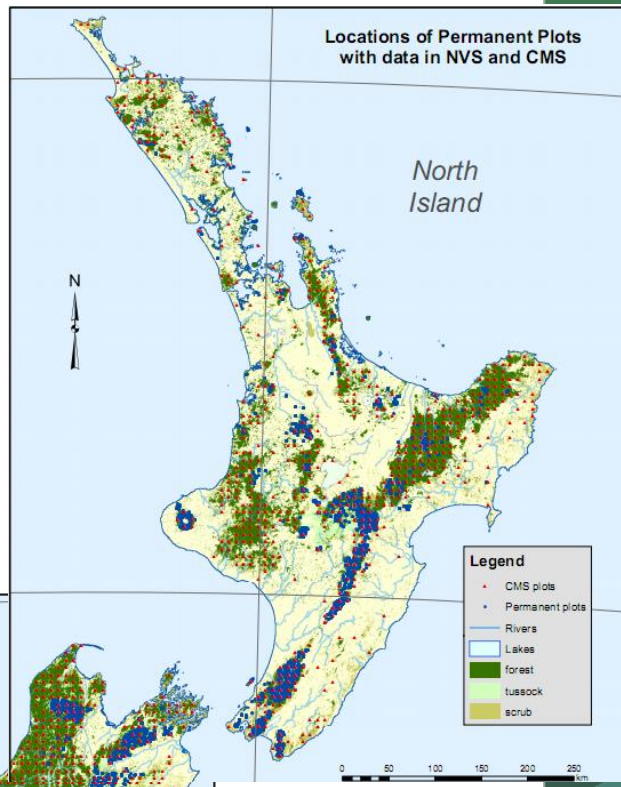
- Plot location and site conditions
- Total vascular plant composition
- Plant abundance (density, cover, frequency)
- Plant identity & size (diameter, height)
- Individuals may be permanently marked

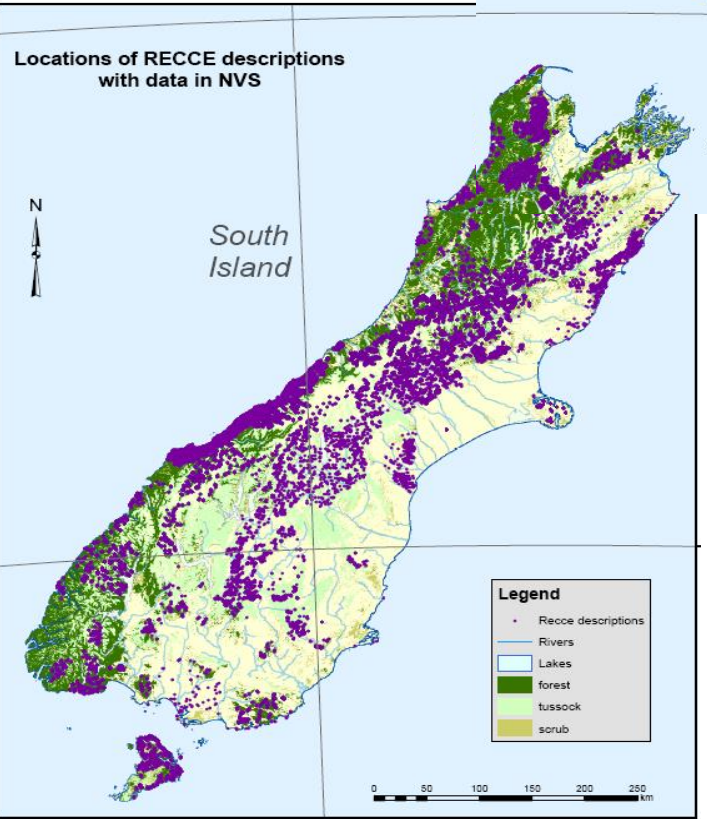
Other data often associated:

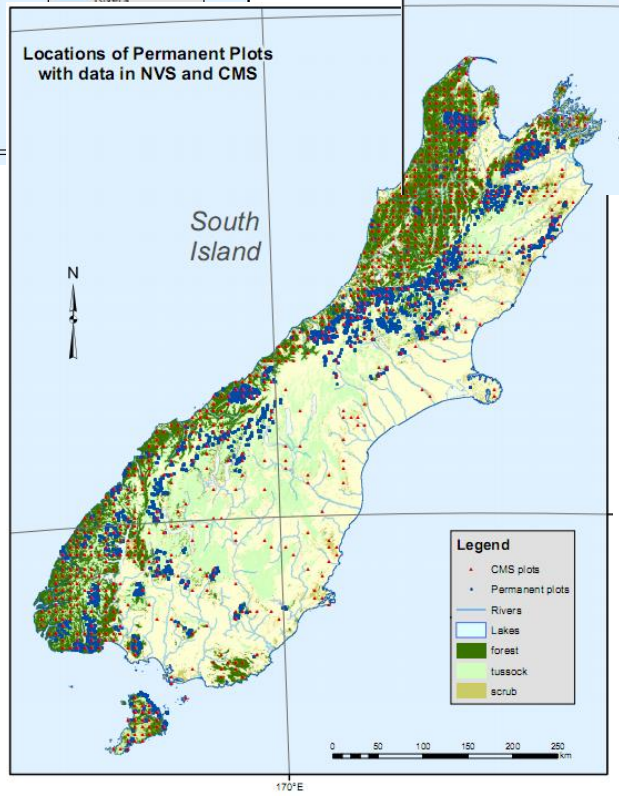
leaf chemistry
coarse woody debris
herbivory
soils

>94 000 relevés





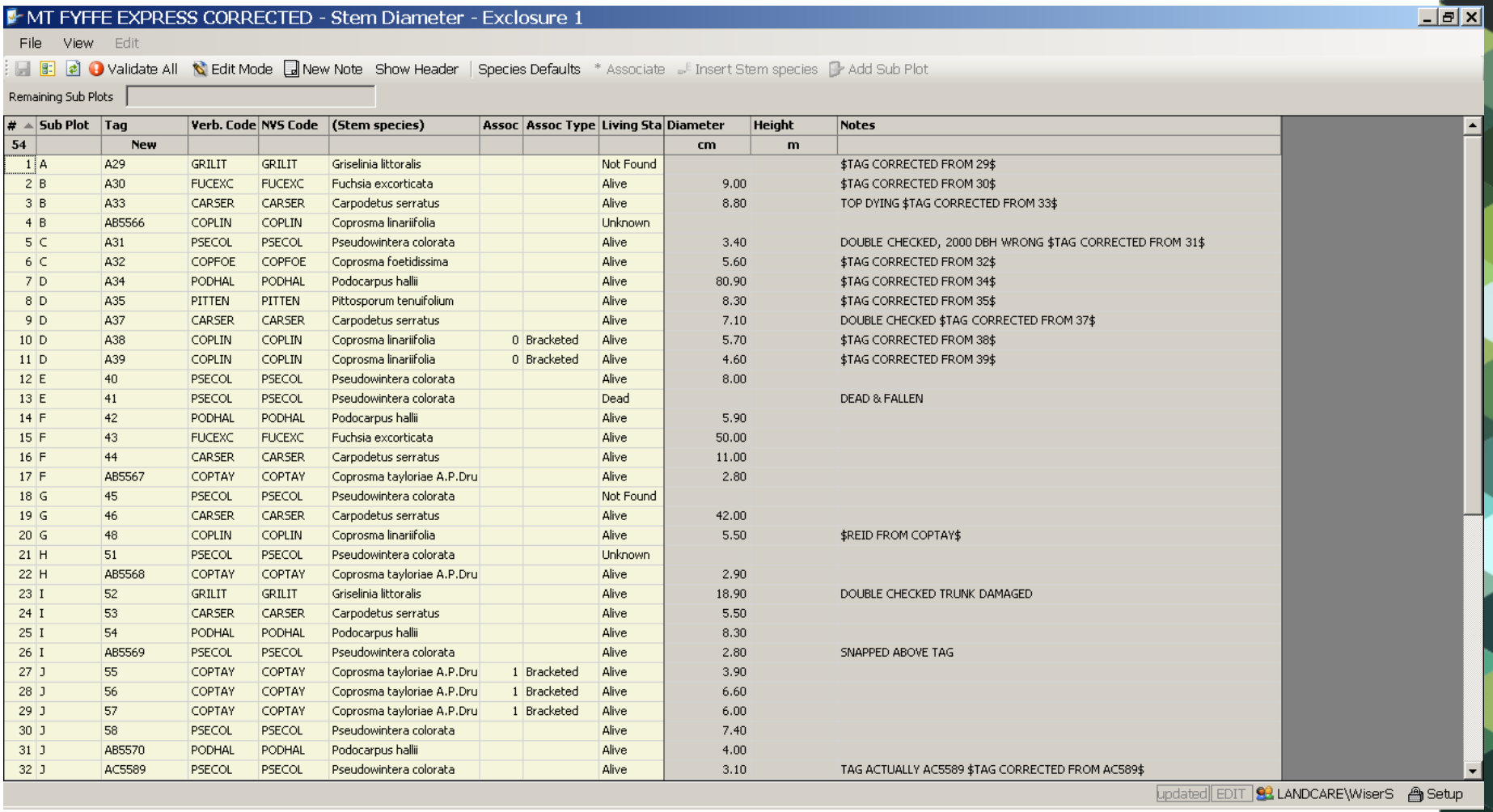




>21 000 permanent plots

NVS is both a physical archive

And an electronic one



#	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 $TAG CORRECTED FROM AC589$

New Zealand National
Vegetation Survey Databank

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

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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

Global Biodiversity Information Facility
Free and Open Access to Biodiversity Data

sPlot

NEW ZEALAND
PLANT CONSERVATION NETWORK
Rōpū hononga Koiora Taiao ki Aotearoa

Data networks

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

Regional Scale:
describing naturally uncommon gumlands

Lower elevation, less rainfall ⟷ Higher elevation, more rainfall

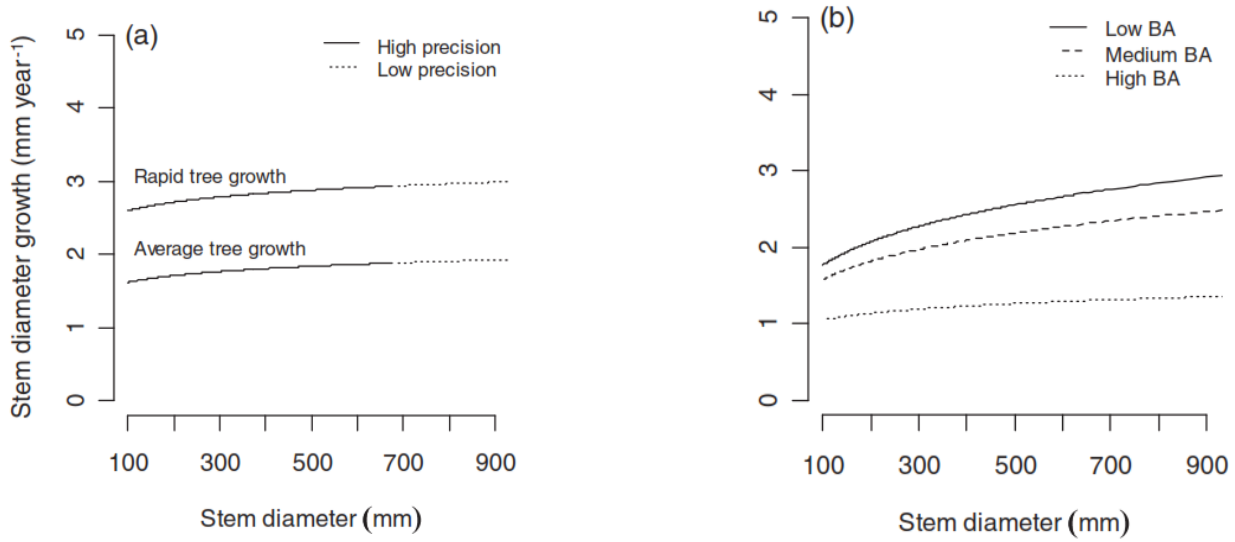
Better drainage ⟷ Poor drainage

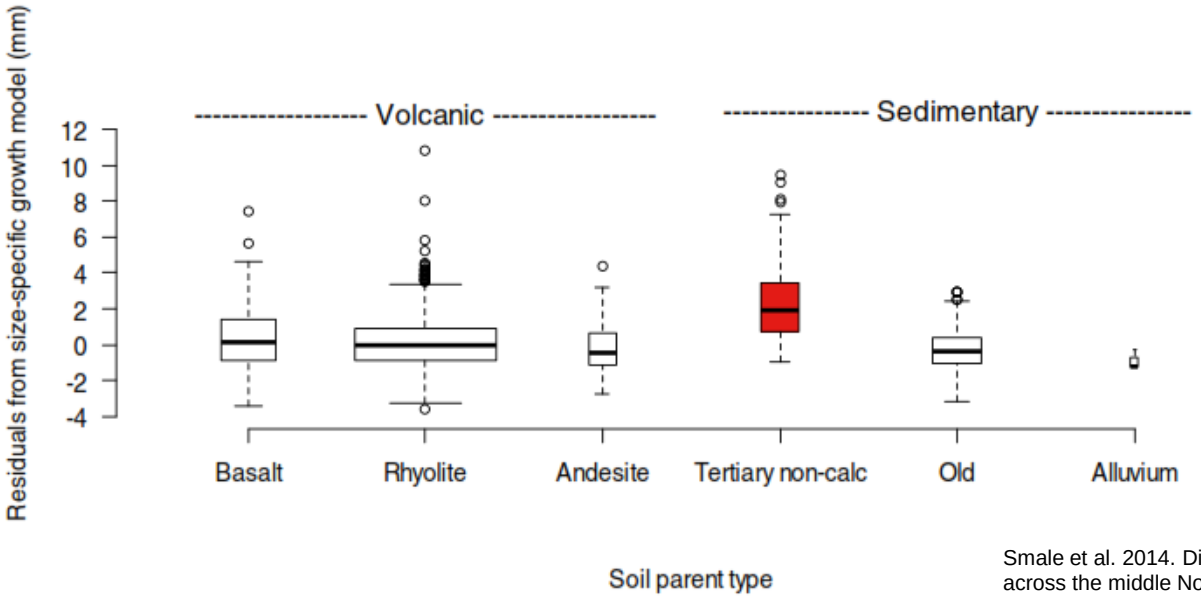
Less fertile soils ⟷ More fertile soils

More fire ⟷ Less fire

Clarkson et al. 2011. Vegetation ecology of gumland heaths in northern New Zealand. *New Zealand Journal of Ecology*

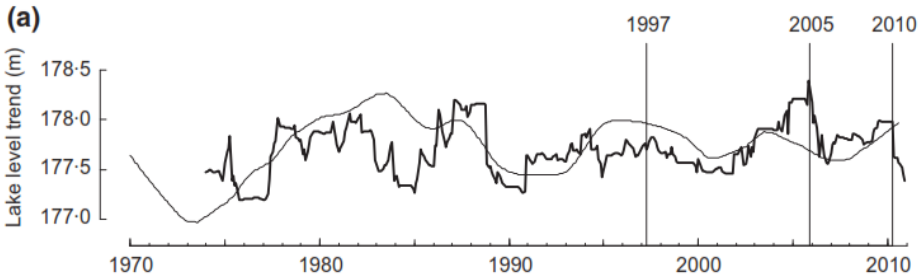
Regional scale: tawa growth rates





Smale et al. 2014. Diameter growth rates of tawa (*Beilschmiedia tawa*) across the middle North Island, New Zealand–implications for sustainable forest management. *NZ J Forestry Science*

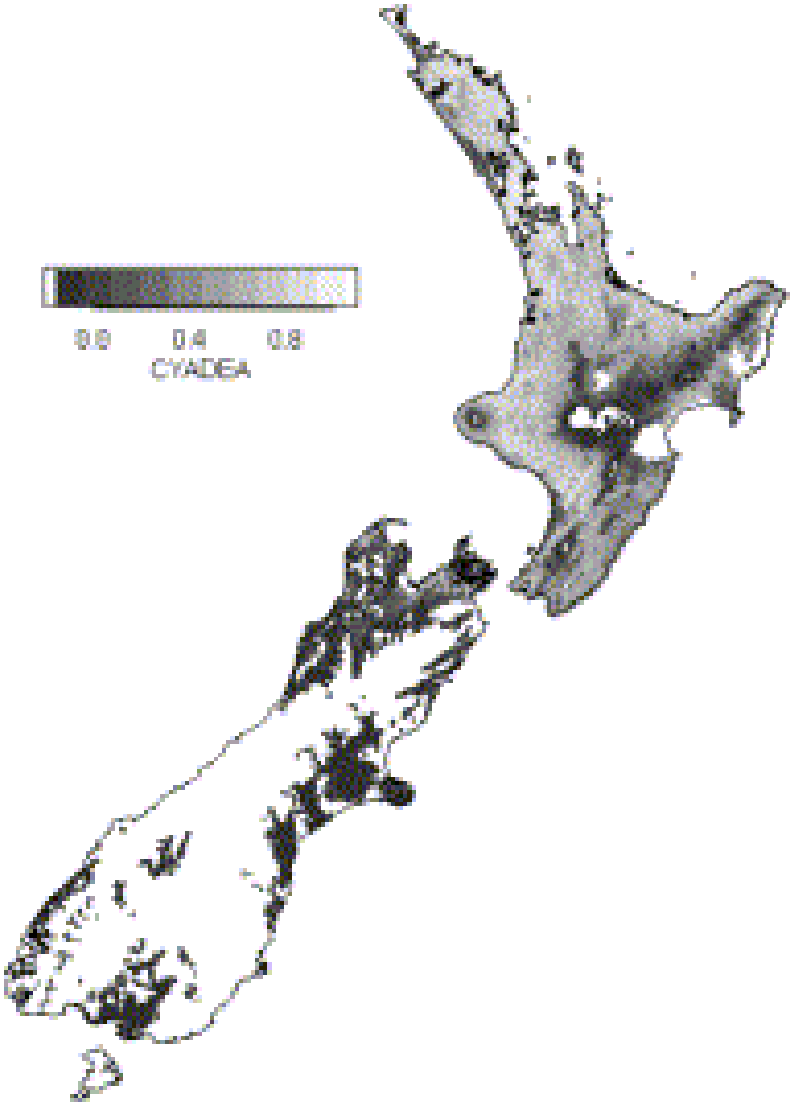
Regional scale: Lakes Manapouri and Te Anau shorelines



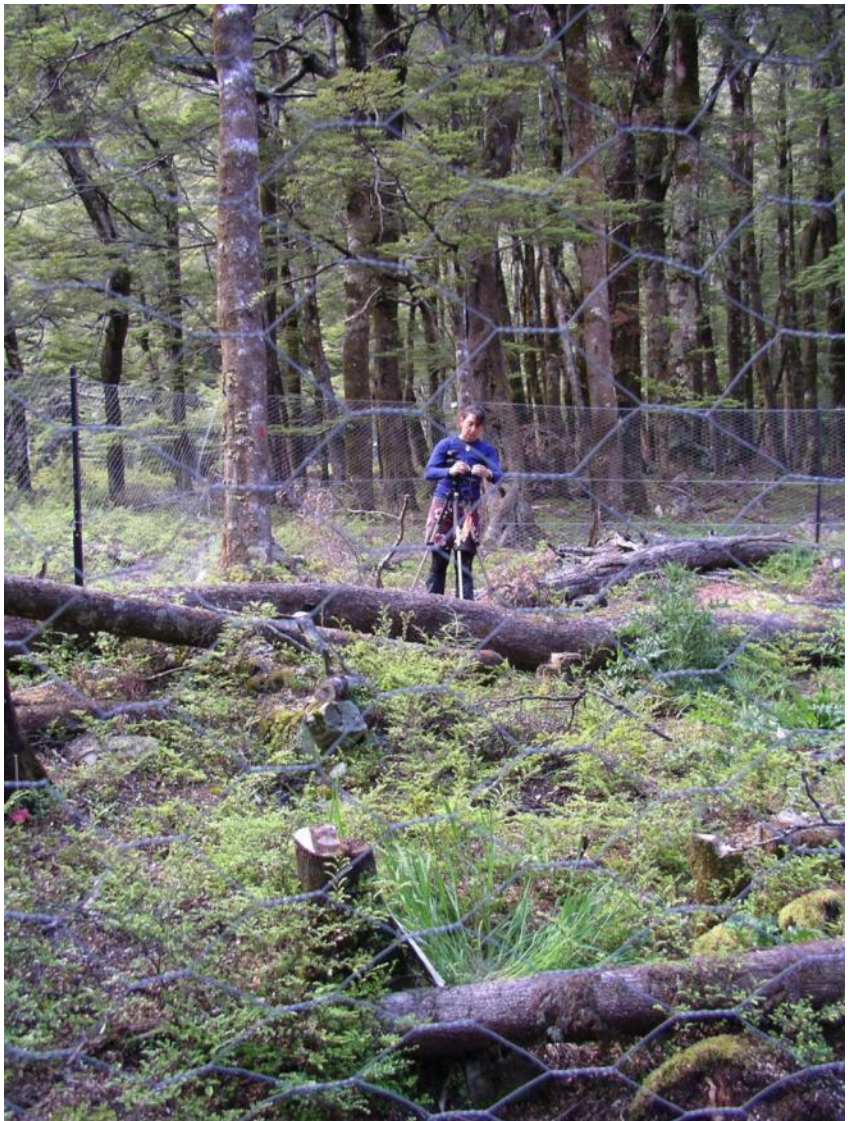

Gratiola concinna Colin Ogle


Trithuria inconspicua Dennis Gordon

National Scale: Predicting climate change impacts



National scale:
Impacts of exotic browsing mammals



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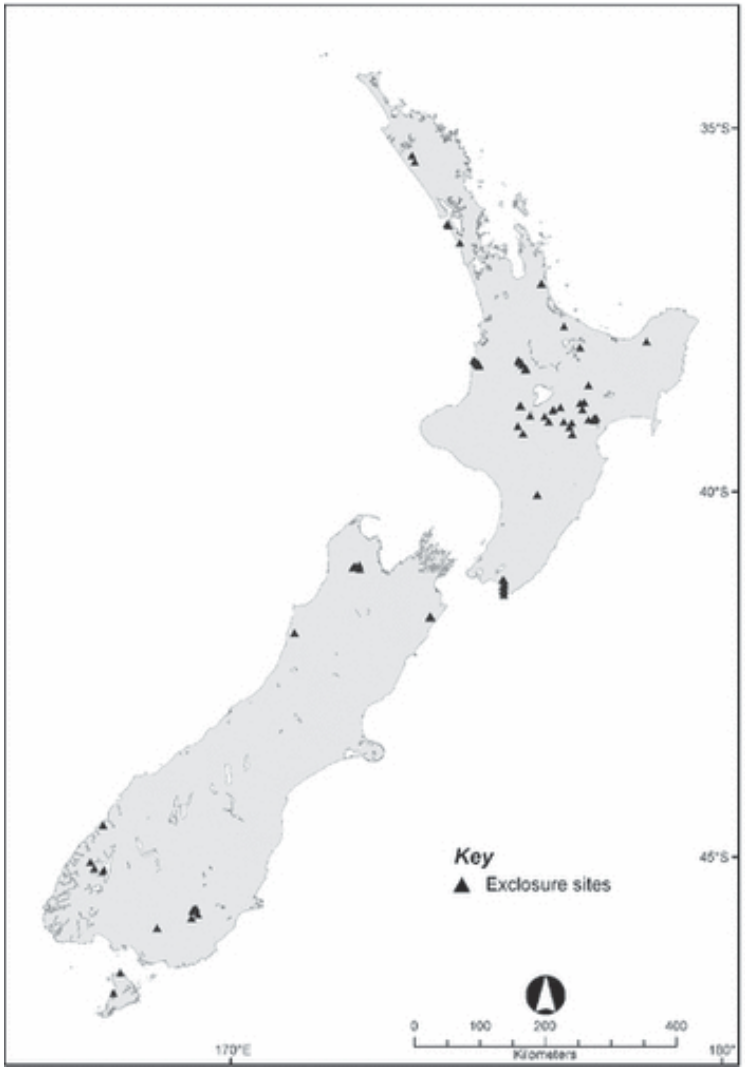
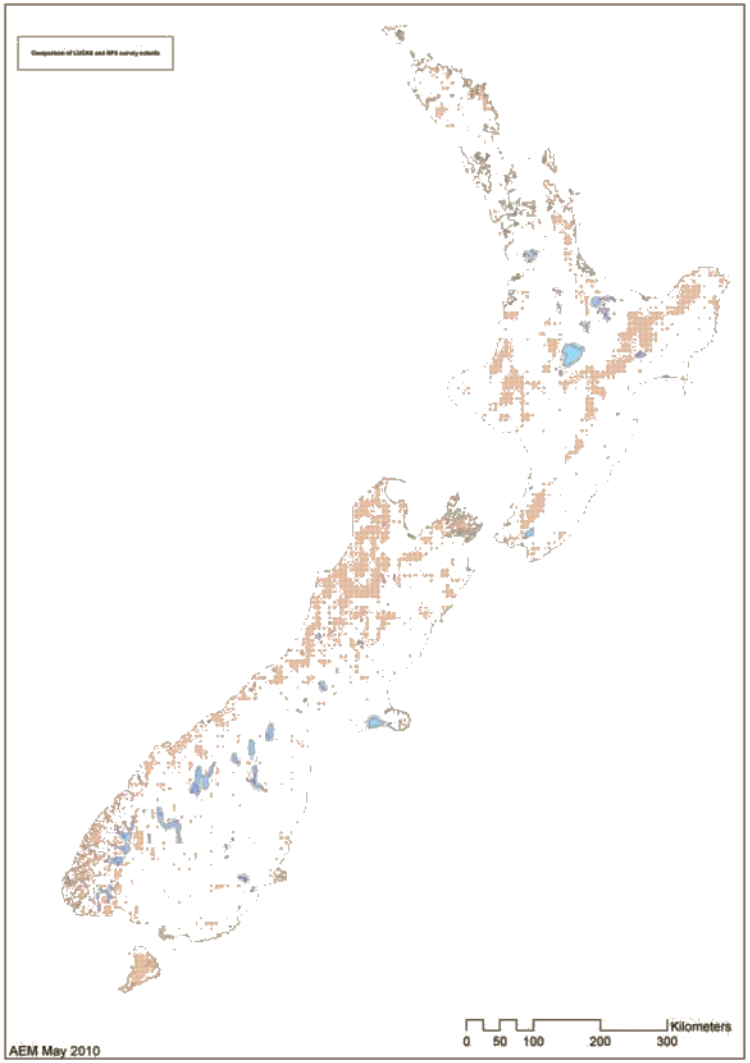
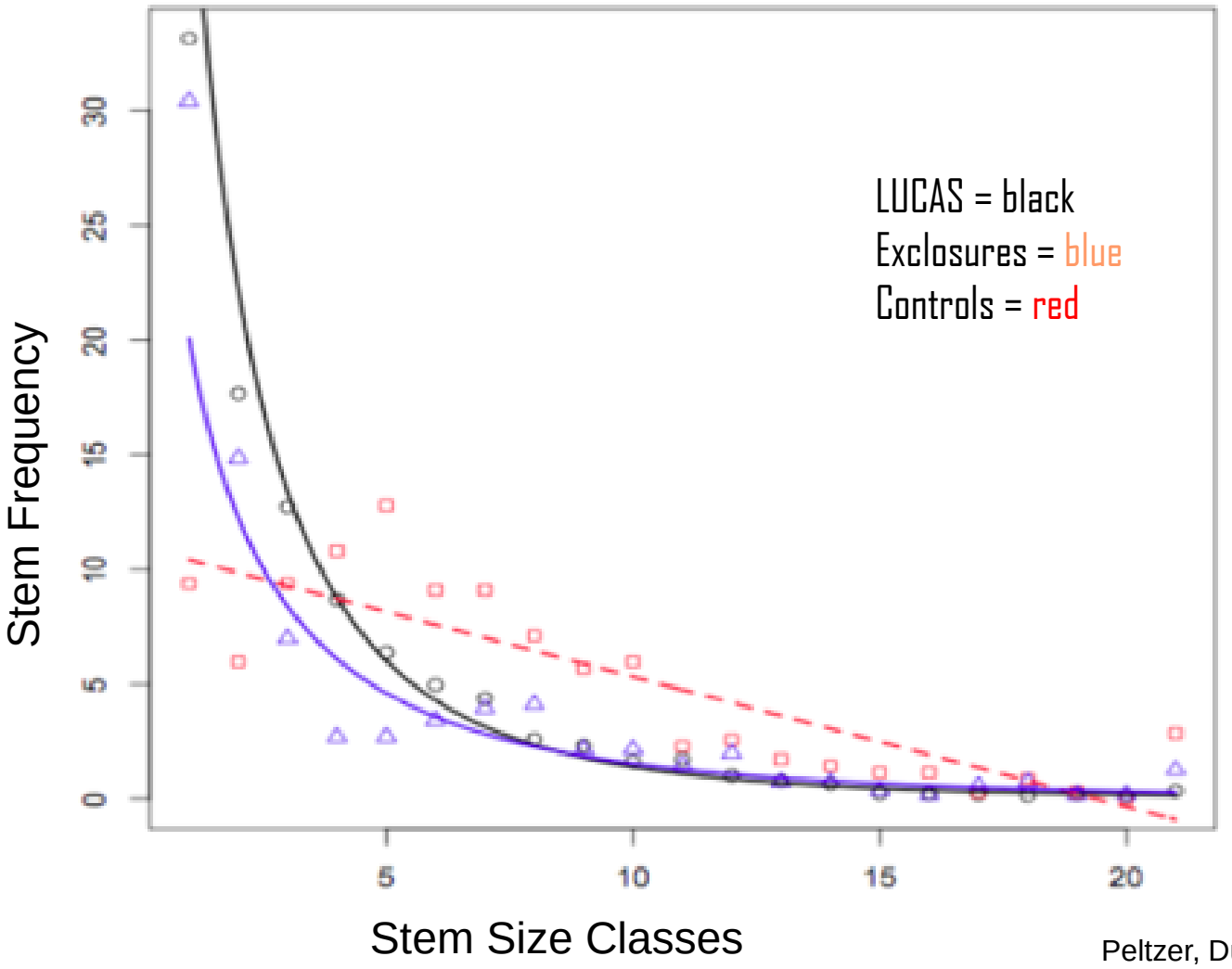


Long-term exclosure plots



LUCAS Natural Forest Inventory

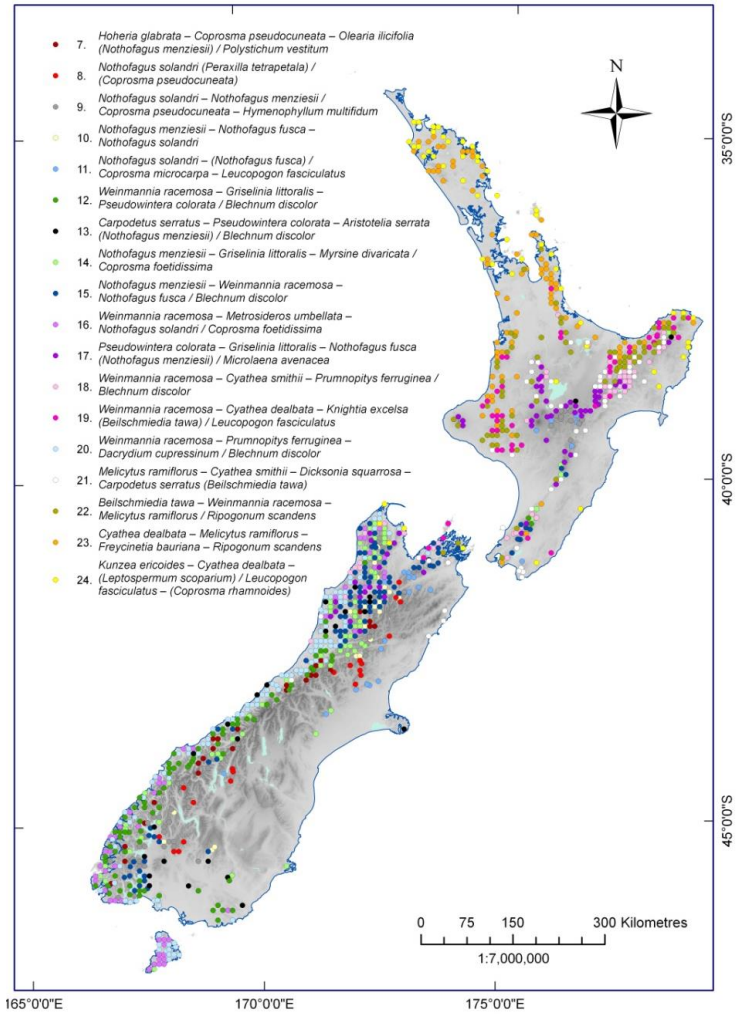
National scale:
Impacts of exotic browsing mammals



Melicytus ramiflorus

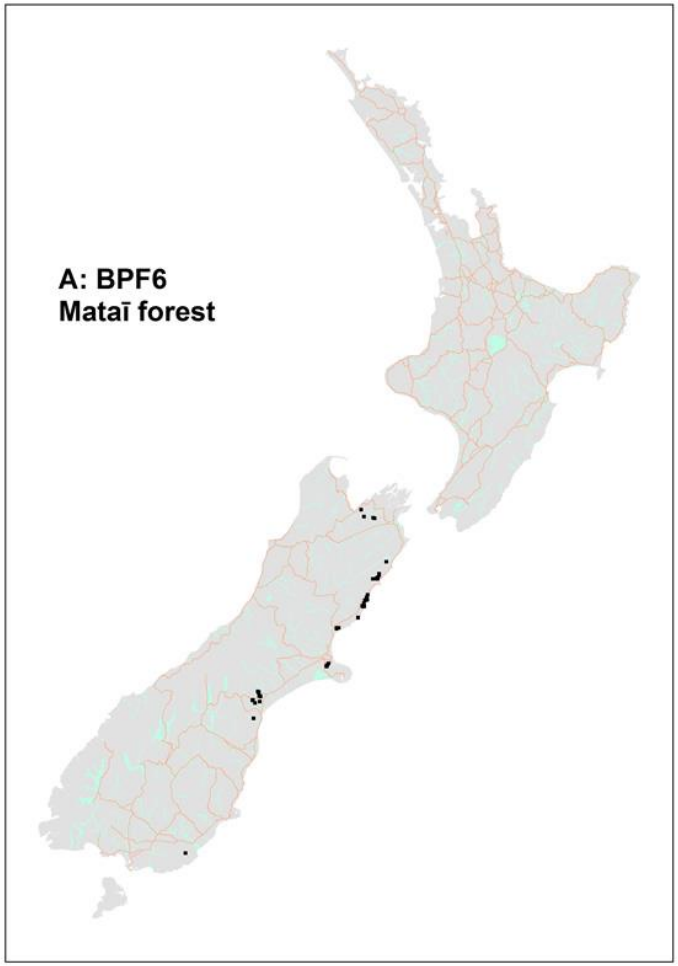
Peltzer, Duane A., et al. "Disentangling drivers of tree population size distributions." Forest Ecology and Management 331 (2014): 165-179.

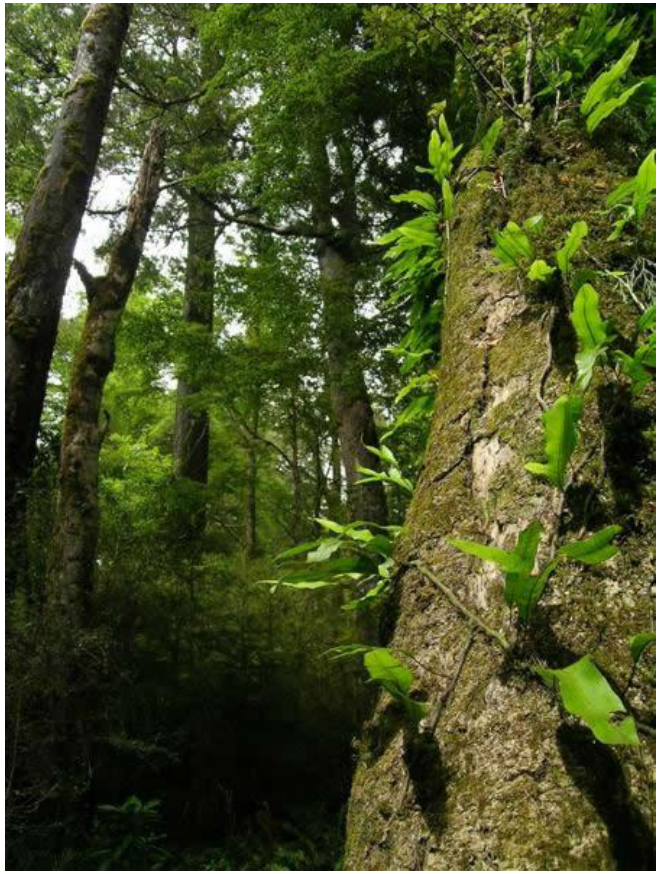
National scale: Vegetation classification



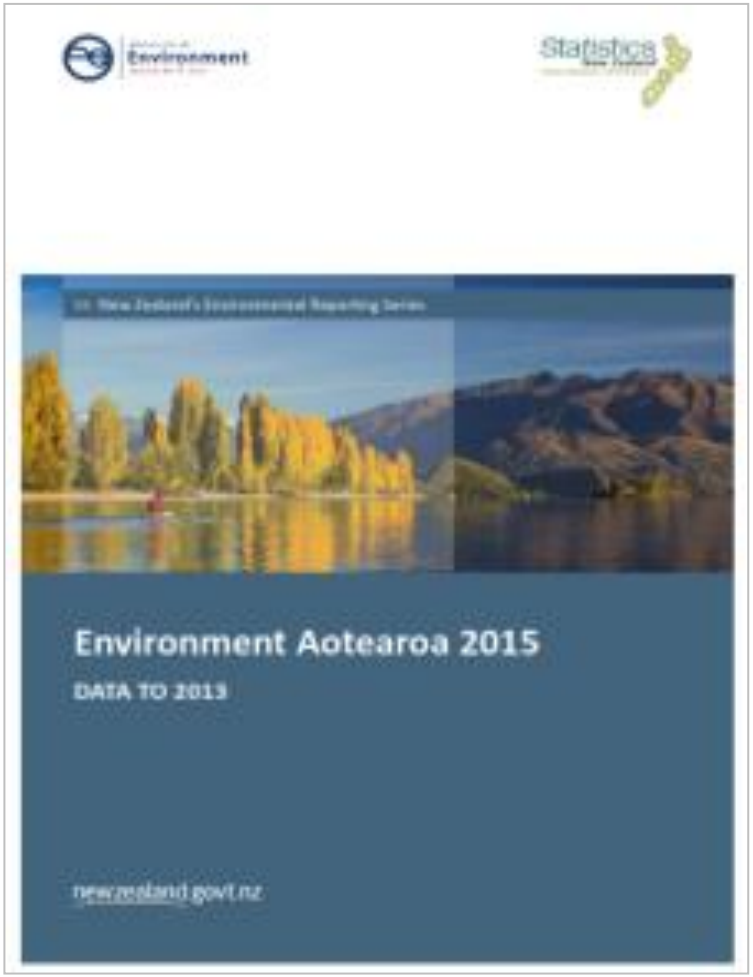
National scale: Vegetation classification

Rare types defined: lowland Mataī forest

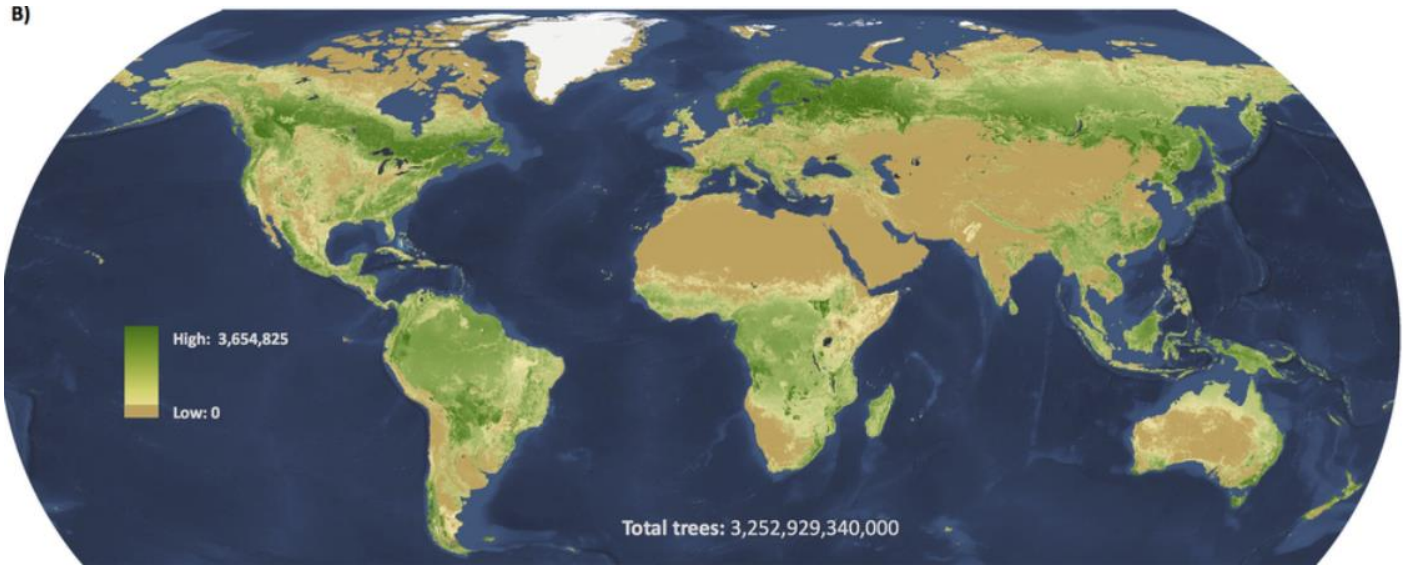




National scale:
State of Environment Reporting



Uses of NVS: Global scale



ARTICLE

doi:10.1038/nature14967

Mapping tree density at a global scale

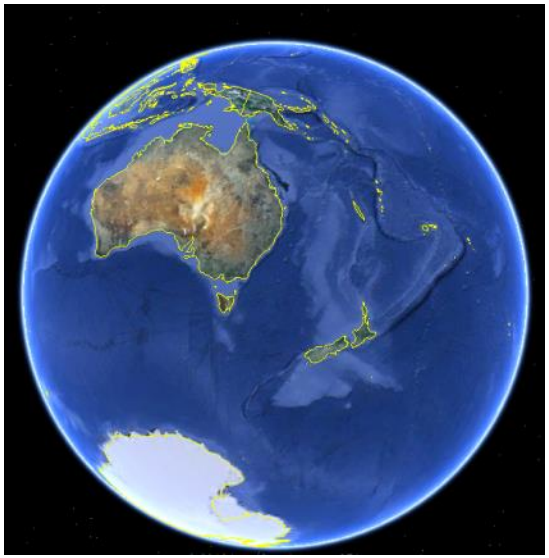
T. W. Crowther[1], H. B. Glick[1], K. R. Covey[1], C. Bettigole[1], D. S. Maynard[1], S. M. Thomas[2], J. R. Smith[1], G. Hintler[1], M. C. Duguid[1], G. Amatulli[3], M.-N. Tuanmu[3], W. Jetz[1,3,4], C. Salas[5], C. Stam[6], D. Piotto[7], R. Tavani[8], S. Green[9,10], G. Bruce[9], S. J. Williams[11],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

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

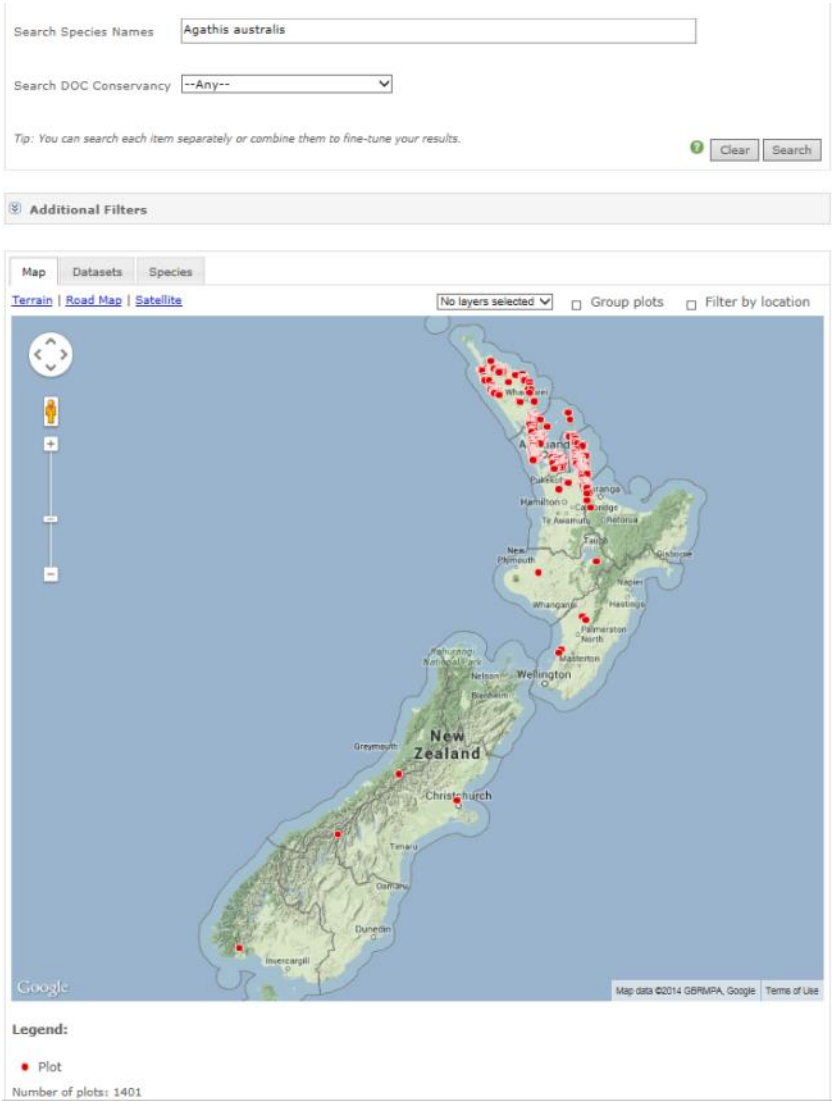
Lesson 1: Use standards



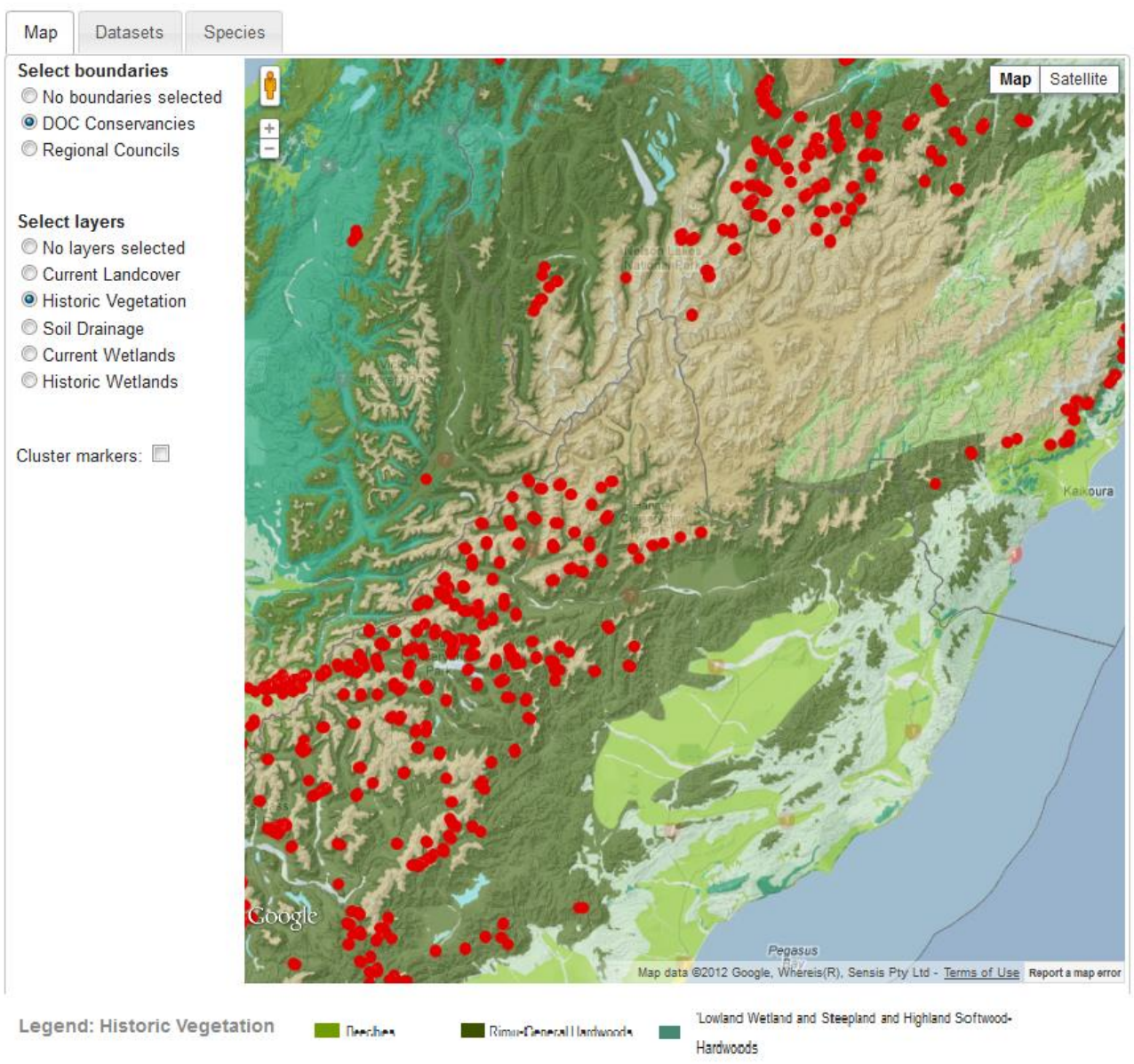
Geographic

Organism names

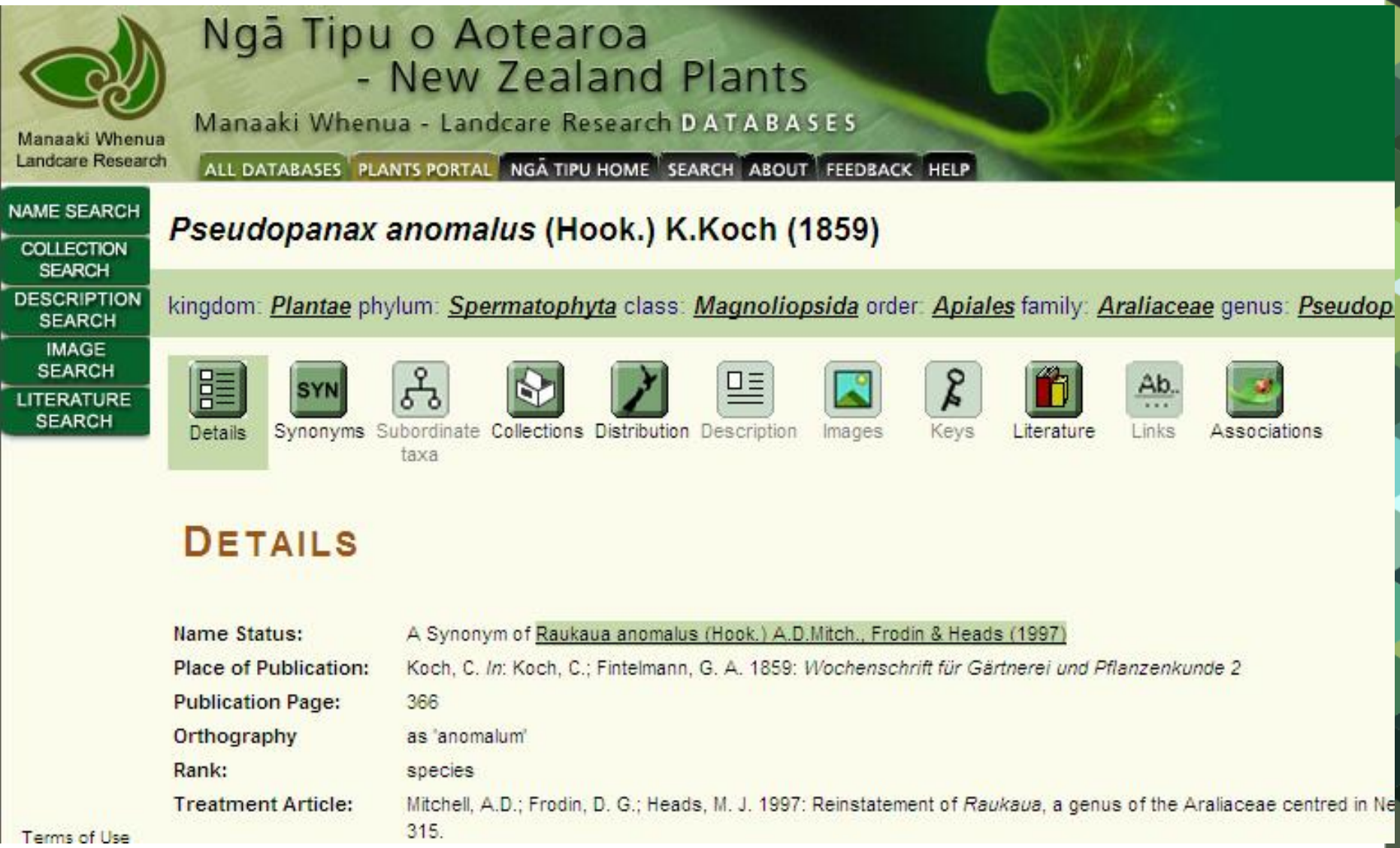
Geographic standards allow ready integration with spatial layers to show species distributions



...and to retrieve covariates from spatial layers



Ability to update taxonomic names



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

Lesson 2: Build on existing efforts

VEGBANK

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 plots containing go

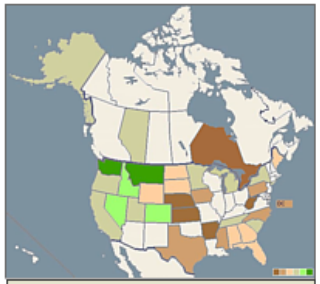
advanced search | browse data

HOME FAQ SUBMIT DATA ABOUT MY ACCOUNT SITE MAP

download 0 items

Find Plots

Browse plots
Simple search
Search with a map
Advanced plot search



Map Key: plots Larger Map

1-49	50-99	100-249
250-999	1,000-3,000	> 3,000

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

News

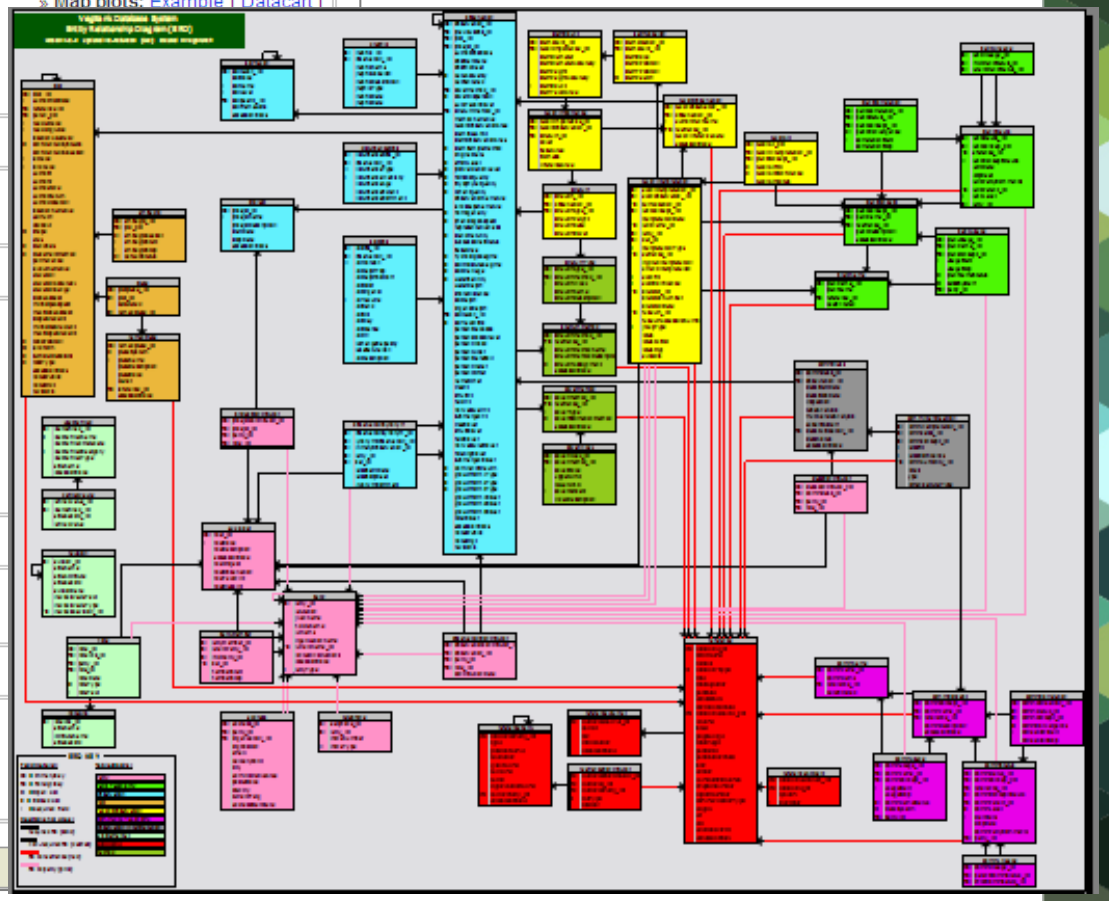
» Map plots: Example | Datacart |

Recently Added Plots

Project	Added
Fort Hood Vegetation Map	23-Apr-08
Short Mountain Wildlife Manag...	20-Sep-06
Alvar NYHP	05-Sep-06
Vegetation of the east slope ...	05-Apr-06

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



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Lesson 3: Modular development with demonstrable achievements

2001
- Data migrated to interim relational database
- Paper about NVS in NZ J Ecol

2002
- Website launched

2003

2004
- User needs assessment
- Link to NZ Plant Names Database

2005
- Data available through GBIF

2006
- Plots and species can be mapped on website

2007
- Paper records moved to purpose-built archive facility

2008
- Electronic data migrated into new system providing robust data organisation and storage
- NVS Express data entry tool released

2009

2010
- NVS Express data analysis package released
- NVS funded through infrastructure backbone program

2011
- NVS Express training workshops held
- 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?
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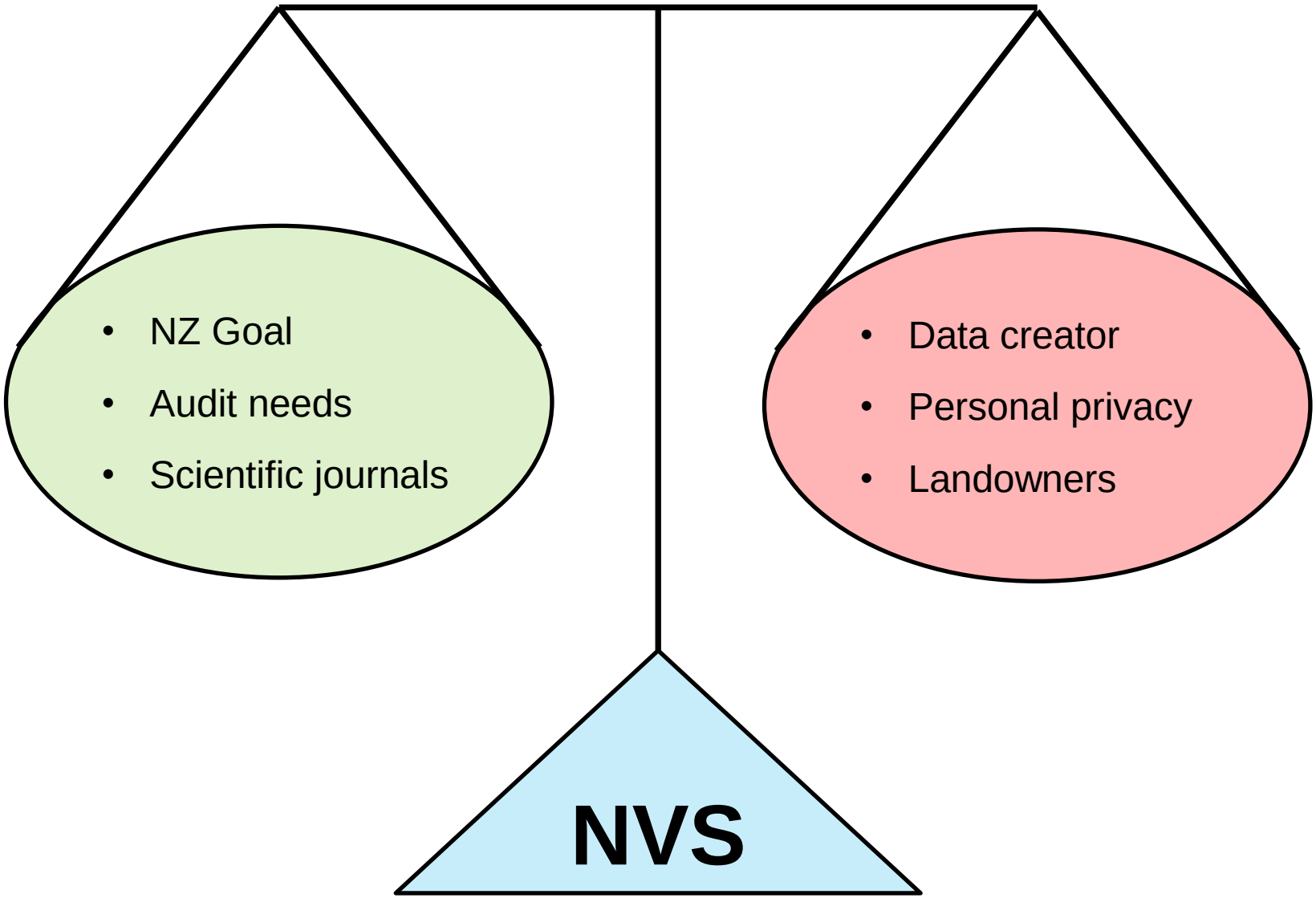
- **Open data**



- Tracking Data use

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

Year	Tree tag	Taxon	DBH
2000	C8615	*Melicytus ramiflorus*	13.5

Year	Tree tag	Taxon	DBH
2006	C8615	*Brachyglottis repanda*	4.6

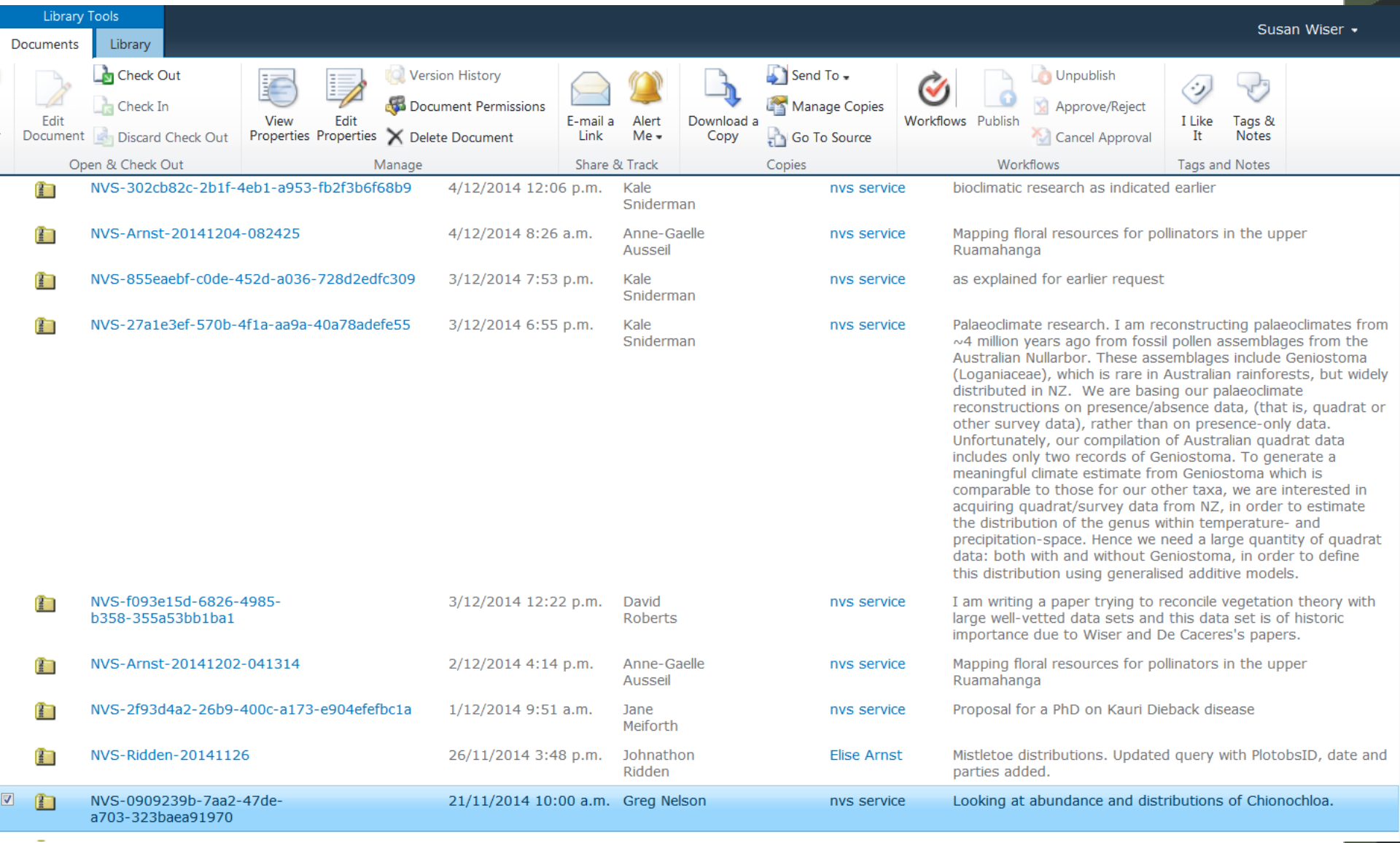
Meeting audit requirements: the problem of a “living” database

Year	Tree tag	Taxon	DBH
2000	C8615	*Melicytus ramiflorus*	13.5

Year	Tree tag	Taxon	DBH
2006	C8615	*Brachyglottis repanda*	13.6

Data downloaded at different times will be different!

Our solution: archiving the data package



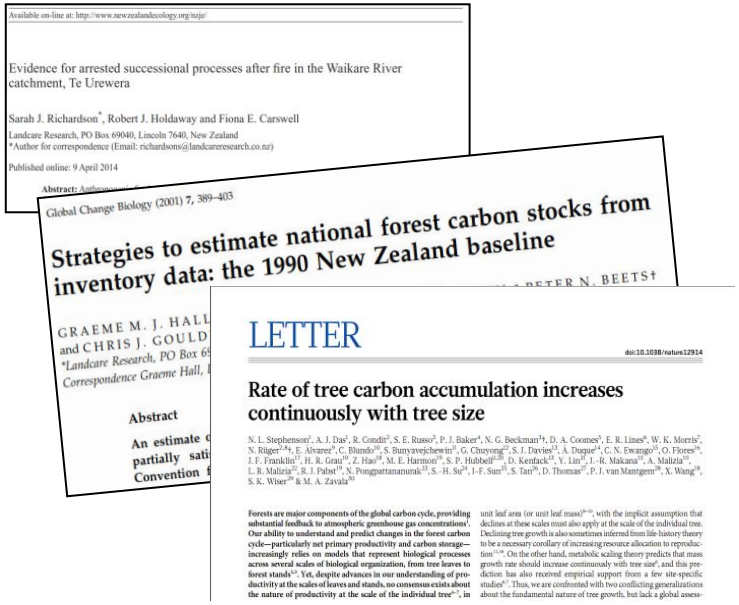
Meeting ‘Open Data’ requirements: Data sets may require permission from owners to access

Open

Conditional

50:50

Meeting ‘Open Data’ requirements: satisfying NVS need to report use



Available on-line at: http://www.newzealandecology.org/nzje/

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

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Published online: 9 April 2014

Abstract:

Global Change Biology (2001) 7, 389–403

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

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Abstract

An estimate
partially sati
Convention

LETTER

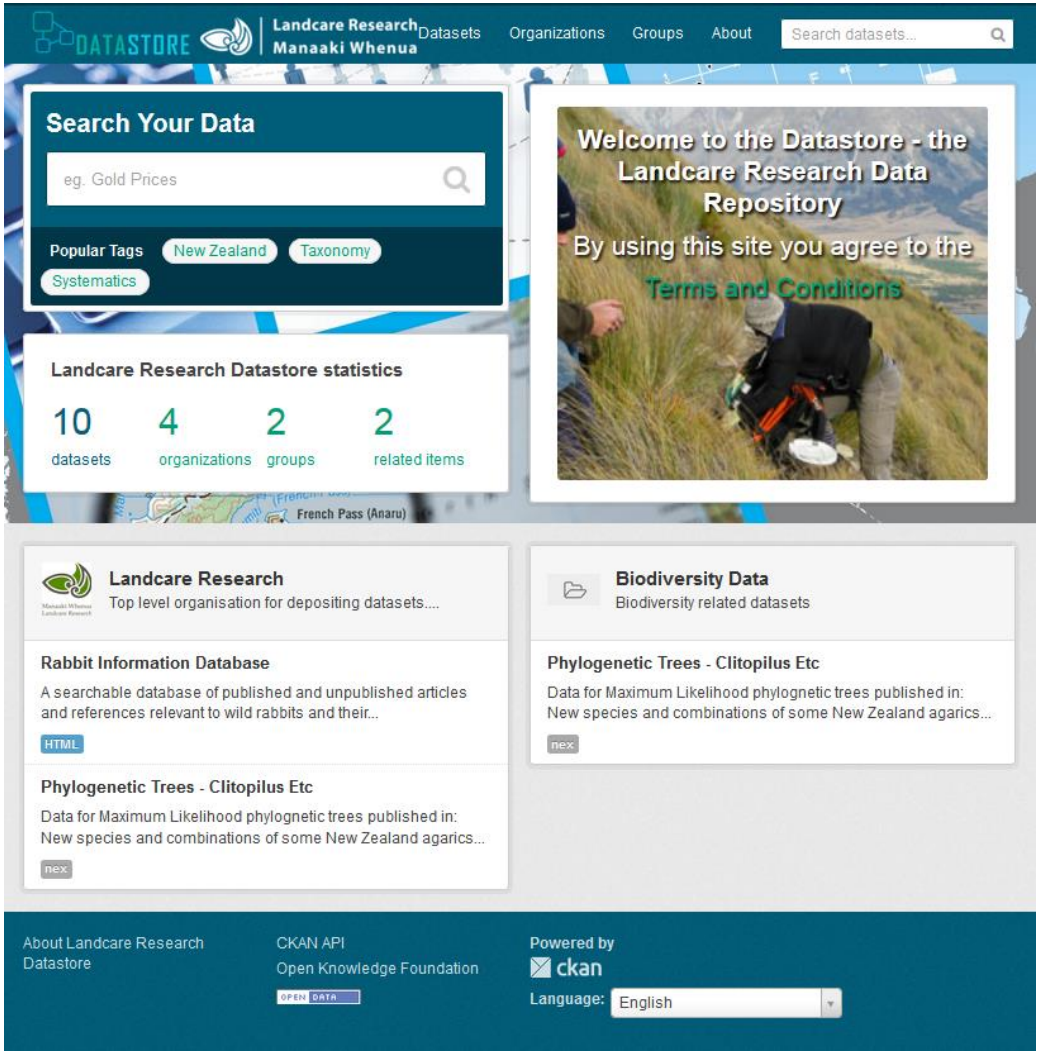
doi:10.1038/nature12914

Rate of tree carbon accumulation increases continuously with tree size

N. L. Stephenson[1], A. J. Das[1], R. Condit[2], S. E. Russo[3], P. J. Baker[4], N. G. Beckman[5]†, D. A. Coomes[6], E. R. Lines[6], W. K. Morris[7], N. Rüger[1,8], E. Alvarez[9], C. Blundo[10], S. Bunyavejchewin[11], G. Chuyong[12], S. J. Davies[13], Á. Duque[14], C. N. Ewango[15], O. Flores[16], J. F. Franklin[17], H. R. Grau[18], Z. Hao[19], M. E. Harmon[20], S. P. Hubbell[21,22], D. Kenfack[13], Y. Lin[23], J.-R. Makana[13], A. Malizia[24], L. R. Malizia[25], R. J. Pabst[13], N. Pongpattananurak[13], S.-H. Su[23], I-F. Sun[11], S. Tan[26], D. Thomas[27], P. J. van Mantgem[28], X. Wang[19], S. K. Wiser[29] & M. A. Zavala[30]

Forests are major components of the global carbon cycle, providing substantial feedback to atmospheric greenhouse gas concentrations[1]. 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[2,3]. 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[4–7], in unit leaf area (or unit leaf mass)[8–10], 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[11,12]. On the other hand, metabolic scaling theory predicts that mass growth rate should increase continuously with tree size[2], and this prediction has also received empirical support from a few site-specific studies[13]. 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



datastore.landcareresearch.co.nz

100 YEARS Journal of Ecology

British Ecological Society

Journal of Ecology 2015, **103**, 374–385 doi: 10.1111/1365-2745.12366

Soil fertility induces coordinated responses of multiple independent functional traits

Melissa M. Jager[1], Sarah J. Richardson[2], Peter J. Bellingham[2], Michael J. Clearwater[1] and Daniel C. Laughlin[1]*

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Summary

1. A central goal of functional ecology is to determine how independent functional
tively filtered by environmental conditions to improve our understanding of the mech
munity assembly. Soil fertility clearly influences community composition, but it is
plant functional traits are most strongly associated with gradients of increasing nutrie
2. We hypothesized that leaf economic traits and stem tissue density would be stro
with soil fertility given their direct relationship to soil resource acquisition and use.
hypothesized that functional traits that are commonly associated with competition f
mum height), shade tolerance (seed mass) and resistance to disturbance (bark thick
unrelated to soil fertility.
3. We measured 13 functional traits from 30 tree species occurring in 40 plots acros
gradient in a mature warm-temperate rain forest in Northland, New Zealand. Princi

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 Puketī 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 DC. 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

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- Long-term ecosystem dynamics