NVS Annual Report for the 2013/14 year

Landcare Research
Manaaki Whenua

NVS Annual Report for the 2013/14 year

Susan Wiser, Elise Arnst, Hamish Maule, Nick Spencer, Shirley Vickers

Compilers, Landcare Research

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Landcare Research, Gerald Street, PO Box 69040, Lincoln 7640, New Zealand,
Ph +64 3 321 9999, Fax +64 3 321 9998, www.landcareresearch.co.nz

Reviewed by:	*Approved for release by:*
Sarah Richardson Scientist Landcare Research	Peter Bellingham Portfolio Leader Measuring Biodiversity Change

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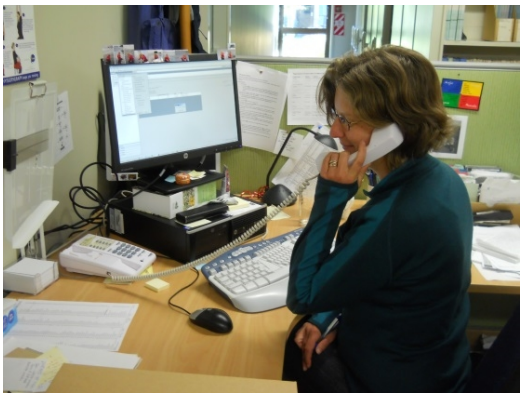
Contents

1 In memory of Hazel Broadbent McKenzie 1976–2014



If January 2014, Hazel Broadbent McKenzie, the NVS database manager, passed away after a long illness. She was a terrific person and she leaves behind a real gap in the NVS team.

To be able to be as effective as Hazel was takes being a very special and talented person. Clearly Hazel could do a range of different things and do them well. Her field experience provided a strong basis for her work with the data that results. She was extremely well-organised and an amazing multi-tasker. She set a high standard and worked to a high standard herself. She had a strong vision of the new directions we should be taking. She never shied away from stretching herself and learning new things, whether it was giving her first talk at a professional meeting, running a workshop or learning SQL(Structured Query Language, this is a database programming language, Greek to most of us!). She had a very strong service ethic. Hazel was one of those people who could be absolutely trusted to do her job even better than expected. At the same time, she was an extremely pleasant person to interact with; she always approached problems in a calm, measured way. Nick Spencer, our informatics specialist, told me that no matter how much stress he put her under, she always responded cheerfully and with a smile.

At the same time as keeping NVS organised, Hazel was also involved with many other projects, particularly fieldwork with a native carbon offset programme, a nationwide survey of dead wood (logs not people!), and at Hinewai understanding how forest develops through gorse. Larry Burrows said that she was one of those fantastic people to have in the field. She could be recording three different types of data at once, her records were always immaculate and in her quiet way she managed to keep everyone else on track to complete the job.

Hazel's commitment to her work was evident through the various phases of her illness, Hazel continued to come into work whenever she could – which was often! She was open about her health situation, which made things easier for us. All of the NVS team were extremely impressed with her ongoing commitment to NVS, her positive attitude and very much appreciated the help and advice she continued to give us as long as she was able.

The NVS team is a tight-knit group who enjoy working together and are deeply committed to a common goal. Hazel's loss leaves a big gap. At the same time, she is with us every day in the legacy she has left for us -- the systems and instructions she left for us that help us to carry on. I still feel like I wouldn't be surprised to see her sitting in her chair helping Margaret or answering someone's question over the phone. I also know that wherever she is now she is working towards what she believes in and in her no-fuss manner is helping others find what they need so that they can reach their goals as well.

(prepared by Susan Wiser)

2 Number of new records archived in NVS

A total of 20 new projects[1] were added electronically to NVS in 2013/14 (year to 30 June 2014; Figure 1 & Appendix 1) with a total of 1927 plots added. Of these 470 were newly established plots with the balance being remeasurements of permanent plots. Major providers of data and types of data since 2004/05 are shown in Figure 1.

Major sources of new data this year include the ongoing plot measurement to support LUCAS (Land Use and Carbon Analysis System) funded by the Ministry for the Environment and undertaken by the Department of Conservation (DOC), the last plots of the latest remeasure of the Thar Impact study, recce data from Auckland and Campbell islands and the Snares undertaken during the 2013 Australasian Antarctic Expedition, and the establishment of new plots and remeasurement of old plots within the Maungatautari Ecological Island (Sanctuary Mountain), a 3400-ha forest recently enclosed with a predator-proof fence.

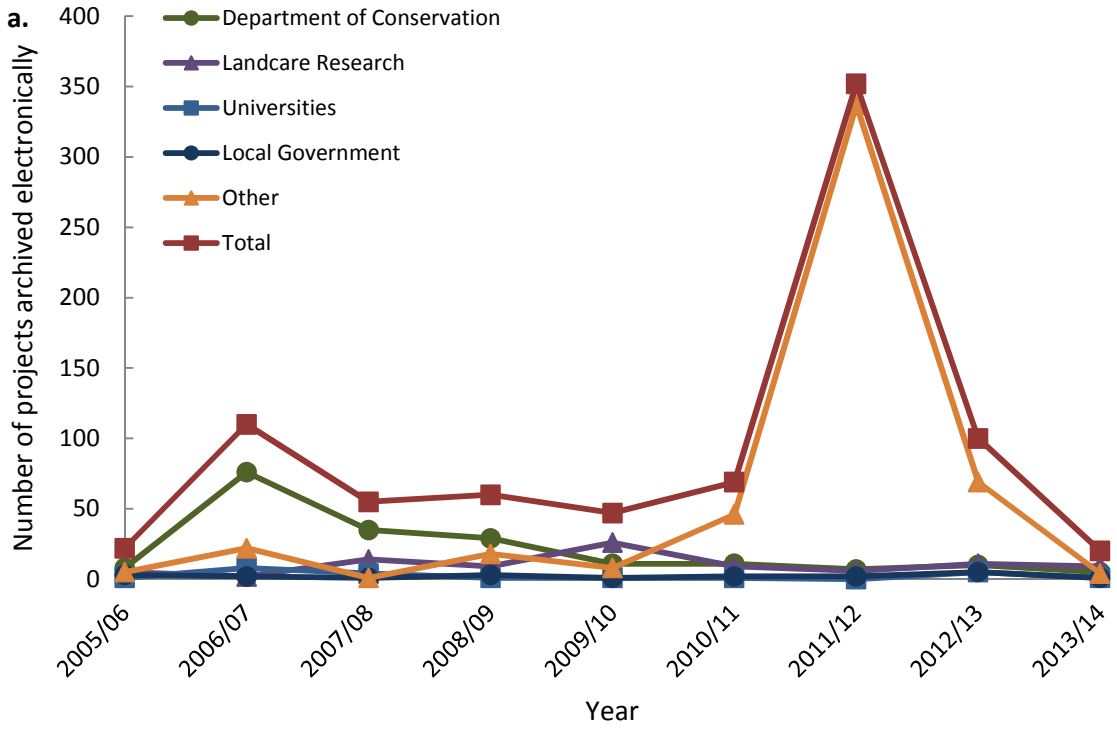


Figure 1 Number of projects archived in the National Vegetation Survey Databank, total and from four major contributors, per financial year since 2005/06.

[1] A project is a defined sampling event undertaken over a specific period. A project may have many methods and many plot observations (visits).

The uncharacteristically low level of addition of new projects into NVS is a concern. There are a range of reasons for this, some of which can be influenced by the NVS databank and others that cannot:

- In June 2014 we discovered the NVS Express upload process was not working correctly. This has now been fixed and we expect the nine projects (222 plots) deposited into NVS in 20113/14 via NVS Express represent under-reporting compared to effort.
- Much of the data archived in NVS historicallty has been collected by DOC. DOC is currently rationalising Tier 2 monitoring. Tier 2 will encompass local-scale inventory and monitoring where each local-scale sampling effort will be an individual project. Because of this the effort has been on the Tier 1, national-scale monitoring which is archived annually as a single project. We expect and increase in the number of projects archived when the Tier 2 system is up and running.
- In recent years the limited resources available to NVS have been put into a) increasing accessiblity of NVS data via the internet and b) improving the quality of existing data holdings. At the same time, the substantial backlog of data waiting to be digitised has continued to increase. Processing this backlog will be given high priority in 2014–15.

3 Database development and integration

We have undertaken a number of technological developments this year. These include:

- Being able to link tags between coarse woody debris and previous tree records
- Speed improvements in the validation process
- New validations provided
- Functions to allow remeasurements of a plot to be displayed
- Making it easeir to export projects, methods or plots by putting an export button on the toolbar of the user interface for NVS database administration

Further enhancements were predicated by the need for the NVS system to be more effectively used for the DOC Tier 1 monitoring system, which is a major component of DOC's national system to monitor and report on biodiversity (see http://www.doc.govt.nz/about-doc/policies-and-plans/managing-natural-heritage/a-national-system-to-monitor-and-report-on-biodiversity/). The work built on year one enhancements (see NVS Annual Report 2012/13), which included extensions to the database and main data entry tool for Tier One data requirements. In year two the NVS team added new features and capabilities and provided ongoing data and helpdesk support to DOC staff. A significant extension has been to allow for data entry to occur from outside the Landcare Research computer network. This allows DOC staff to undertake Tier 1 data entry directly into the NVS database from DOC offices. The remote-access work has included speed improvements for efficient data connections and new security features to control data access. General improvements to the software's ease of use as well as bug fixing were undertaken. Data validation and correction methods were also extended to cover new data types and improve data quality. The team made improvements to the issue tracking and resolution system. These improvements made it easier for data entry staff to log data issues and provided a wider range of issue resolution actions for data

administrators. Enhancements to the NVS system allow NVS to provide new and improved indigenous vegetation data management services for DOC both lessening the need for DOC to fund these developments themselves and strengthening NVS' role as New Zealand's primary repository of plot-based vegetation data. In the future these new services will be available for other agencies, e.g. MfE and regional councils, providing a pathway for improving the management of such data throughout New Zealand.

4 Significant revisions of data

This year we devoted substantial resources to addressing much-needed data corrections and revisions including:

- Updating the Party data by merging duplicate records and updating others
- Adding organisations to datasets having no organisation specified in the metadata
- Clarifying ambiguous dataset names (e.g. various projects from the Taramakau)
- Investigating instances where a single plot measurement was associated with multiple projects
- Adding previously uncaptured data to datasets
    - Dead stems to Taramakau 1979
    - Data on cored trees to Harper-Avoca 1971-72
- Correcting instances where a plot measurement datum was outside that given for the project to which it belonged
- Replacing '0's where this signified 'missing' in a range of data fields
- Correcting tree heights suspected to be too short or tall
- Solving issues of diameter measuresments indicating extreme growth or shrinkage
- Removing 'dummy' tags where trees are not actually tagged
- Removed records of trees with no tag and no diameter

5 Increasing end-user awareness and capability

5.1 Training workshop in NVS Express

Susan Wiser and Hamish Maule delivered a full-day NVS Express Training Workshop in association with EcoTas13, the 5th Joint Conference of the New Zealand Ecological Society and the Ecological Society of Australia, in Auckland in November. The workshop acquainted eight participants with NVS Express. Participants included individuals from the Department of Conservation, regional councils, postgraduate students and private consultants. We first reviewed how data in NVS support practical conservation, and what kind of data the NVS Databank contains. We then trained the participants to use the NVS website to discover, request, and download data. We covered how to use NVS Express to enter data into NVS. Finally, participants worked through typical workflows for summarising and analysing common data types. All participants were positive about the workshop and said that they

would definitely recommend this workshop to their collegues. They also provided useful feedback to guide future extensions to this workshop and enhancements to NVS Express.

We plan to run similar workshops annually, in concert with the annual conference of the New Zealand Ecological Society.

5.2 Presentations for end users

Landcare Research staff associated with the NVS Databank delivered several presentations throughout the year to disseminate information to end users and other government agencies:

In October 2013, Nick Spencer gave the talk 'Solutions for standardising and mobilising data' at the Dataversity Workshop, in Wellington. The NZ biodata community is working towards a Biodata Services Stack: a collection of technologies and protocols allowing biodata to be harvested, aggregated and used in interoperable ways such as biodiversity and biosecurity modelling and reporting. This presentation highlighted practical barriers and outlined potential solutions to those barriers.

In May 2014, Susan Wiser gave a lecture on the National Vegetation Survey Databank to a Lincoln University degree course, ERST611 Advanced Environmental Monitoring. This has now become a standard component of the course and is delivered annually.

5.3 New NVS users

Between 1 July 2013 and 30 June 2014, 63 new people became registered NVS users.

6 Data-sharing agreements, data exchange, journal repositories

NVS is now being suggested by some journals as a repository for the raw data supporting published papers from the *New Zealand Journal of Ecology* website: 'Lengthy appendices containing raw data or extensive species frequency data can now be published in this way. However, authors are also encouraged to submit their raw data to relevant long-term online data repositories (e.g., the New Zealand National Vegetation Survey databank (NVS), NatureWatch NZ, eBird New Zealand).' http://nzes-nzje.grdev.co.nz/submit.php

6.1 Use of NVS data through the GBIF Portal

Between 1 July 2013 and 30 June 2014 there were 18 743 searches for species occurrence data in NVS (access to 1 259 718 records) and 575 downloads of species occurrence data (incorporating 3 572 586 records) that were accessed via the GBIF website.

6.2 Use of NVS data through the NZPCN Website

NVS plant distribution records can be viewed and downloaded from the New Zealand Plant Conservation Network (NZPCN) website. Between 1 July 2013 and 19 June 2014, 1 911 685

NVS plant distribution records were viewed as map points on Google maps embedded in the NZPCN website, 57% of all distribution records viewed.

7 International collaborations

Our long-term collaboration with David Coomes (Cambridge University) led to our involvement in the paper 'Rate of tree carbon accumulation increases continuously with tree size' published in the prestigous journal *Nature.*

This study shatters a common assumption about how trees grow. It turns out that trees do not slow in their growth rate as they get older and larger; instead, their growth keeps accelerating. This means that big, old trees are better at absorbing carbon from the atmosphere than commonly assumed. An international team of researchers compiled growth measurements of 673 046 trees belonging to 403 tree species from tropical, subtropical and temperate regions across six continents, calculating the mass growth rates for each species and then analysing for trends across the 403 species. This study showed that for most tree species, mass growth rate increases continuously with tree size – in some cases, large trees appear to be adding the carbon mass equivalent of an entire smaller tree each year! This does not necessarily translate into a net increase in carbon storage for an entire forest. Old trees, after all, can die and lose carbon back into the atmosphere as they decompose. However, while they are alive, large old trees play a disproportionately important role in a forest's carbon dynamics. It is as if the star players on your favourite sports team were a bunch of 90 year olds!

This research illustrates the value of being able to pool large and regional-scale datasets to understand global issues. Data from NVS consisted of measurements of tagged trees across about 9000 independent permanent plots. Susan Wiser and the NVS team, especially Hamish Maule and Margaret Robinson, have made a major effort to validate and correct the 45 418 records indicating size, growth and mortality of individual trees that contributed to these findings. The results of this study were widely publicised in the popular media.

The Botanical Information and Ecology Network (BIEN) is a network of ecologists, botanists, conservation scientists and other researchers (including Susan Wiser and Nick Spencer) interested in global patterns of plant diversity, function and distribution (see previous NVS annual reports for more detail about this group). We have continued to provide our technical expertise to support publication efforts by this group resulting in two publications in high impact journals [see publications list below]. The first, by Morueta-Holme et al., provides the first scientific results from the largest botanical dataset assembled to collate data for species occurrences in the New World. We contributed the experience we have gained with NVS and developing an exchange standard for vegetation plot data to facilitate this data synthesis. The approach used could be applied to the New Zealand situation to help us better understand controls on species size-ranges here. This is important given that measures of species occupancy (i.e. the degree to which a species actually occupies its potential range) underpin several critical ecological indicators being developed and applied for environmental reporting in New Zealand. The second, by Lamanna et al., carried the integration of data further by incorporating data on species traits. This integration allowed us to present a conceptual framework for testing theories for the latitudinal gradient of species richness in terms of variation in functional diversity at the alpha, beta, and gamma scales. We confronted ecological community theory to large-scale observational data of tree species richness and functional diversity. We found that the patterns of functional trait

diversity are not consistent with any one theory of species diversity. These conflicting results indicate that none of the broad classes of biodiversity theory considered here is alone able to explain the latitudinal gradient of species diversity in terms of functional trait space.

Susan Wiser continues to serve as a scientific advisor to the New South Wales Office of Environment and Heritage: Vegetation Information and Mapping Programme. See NVS Annual Report 2012/13 for more detail about this appointment. Susan attended three meetings in 2013/14: July 2013, October 2013 and April 2014.

Susan is one of five Ecoinformatics experts from around the world who form the steering committee for the IAVS Working Group for Ecoinformatics. Numerous research institutions and national agencies have established databanks of species composition data that serve a multitude of purposes ranging from purely scientific to applications in nature conservation and landscape planning. Simultaneously, massive amounts of spatially explicit data on site attributes (e.g. climate, soils, topography) have become available. In addition, comprehensive data on specific taxa (e.g. distribution, phylogeny, life history traits, functional attributes) are becoming available. This emerging availability of large quantities of species co-occurrence, site attribute, and taxon attribute data is transforming the study of ecological communities. The IAVS Working Group for Ecoinformatics was formed to facilitate access to and analysis of such data. In particular, we wish to (1) establish standards for data exchange to facilitate data sharing, (2) provide tools for data identification, access, integration, storage, and analysis, and (3) facilitate communication among scientists studying community ecology through exploration of multiple large databases.

8 Conservation and management outcomes

Aerial imagery of wetlands sourced from LCDB must be ground truthed before this distribution information can be used in policy decision making. The Department of Conservation now recommends collecting plot survey data and archiving them in NVS for such purposes. They recommend that this be done to improve the classifications and accuracy of the LCDB unit boundaries. See http://doc.govt.nz/Documents/science-and-technical/drds341entire.pdf

9 Web statistics

Over recent years an increasing number of organisations are providing links to the NVS website as a resource for vegetation data, as a provider of information on vegetation monitoring, and as a New Zealand Government conservation resource. On average 35% of page views result from direct traffic indicating that frequent users bookmark the website. Access via search engines (30%) is the second most frequent pathway to the NVS website. Twenty-seven percent of page views resulted from referrals from other sites.

Some new and interesting links to the NVS website and database include those from:

- Background material for a Department of Conservation training course on measuring vegetation plots
- The New Zealand Entomological Society provides a link under the ‘New Zealand Flora’ section of their Tools and Resources page

- Lincoln University on their pages 'Databases related to Ecology', 'Websites relating to Horticulture and Forestry' and 'Specialist Agricultural Databases'
- The Botanical Institute Library of Tbilisi, Georgia, on their Internet Directory for Botany
- The websites for the African Network for Environmental Sustainability and the World Environmental Volunteers & Activists links to our vegetation plot sampling manuals.

From 1 July 2013 to 30 June 2014, the NVS website was visited 3507 times, a 3% increase from the 2012/13 year (3395 visits) and there were 15 983 pageviews. There were 1550 unique visitors to the site. Of the current year's hits that could be traced to origin, the majority of visits were from New Zealand (82%), followed by the USA/Canada (4%), UK (2%) and Australia (2%). The website was also visited by people from another 66 countries. The data access aspect of the new website is proving popular with 33% of page views, with the data search tool attracting nearly half of those. The Index page received 20% of all page views and details about field techniques, manuals, and field forms were also popular (7% of page visits).

10 NVS data requests

A total of 48 individual requests for NVS data and metadata were made during 2013/14 and 3679 datasets were supplied (Figure 2a, b), an increase of 10 requests and 317 datasets over the 2012/13 year. The principal agencies requesting data and number of datasets supplied since 2004 are shown in Figure 2b. Two of the major agencies requesting data (DOC and Landcare Research) have made similar numbers of requests over recent years; however, a couple of large requests has greatly increased the number of datasets supplied to DOC staff. Most data requests this year have been made directly through the website's data request tool, which is proving popular and frees up NVS data admin staff to perform other tasks. However, more complex and unusual data requests are still handled manually.

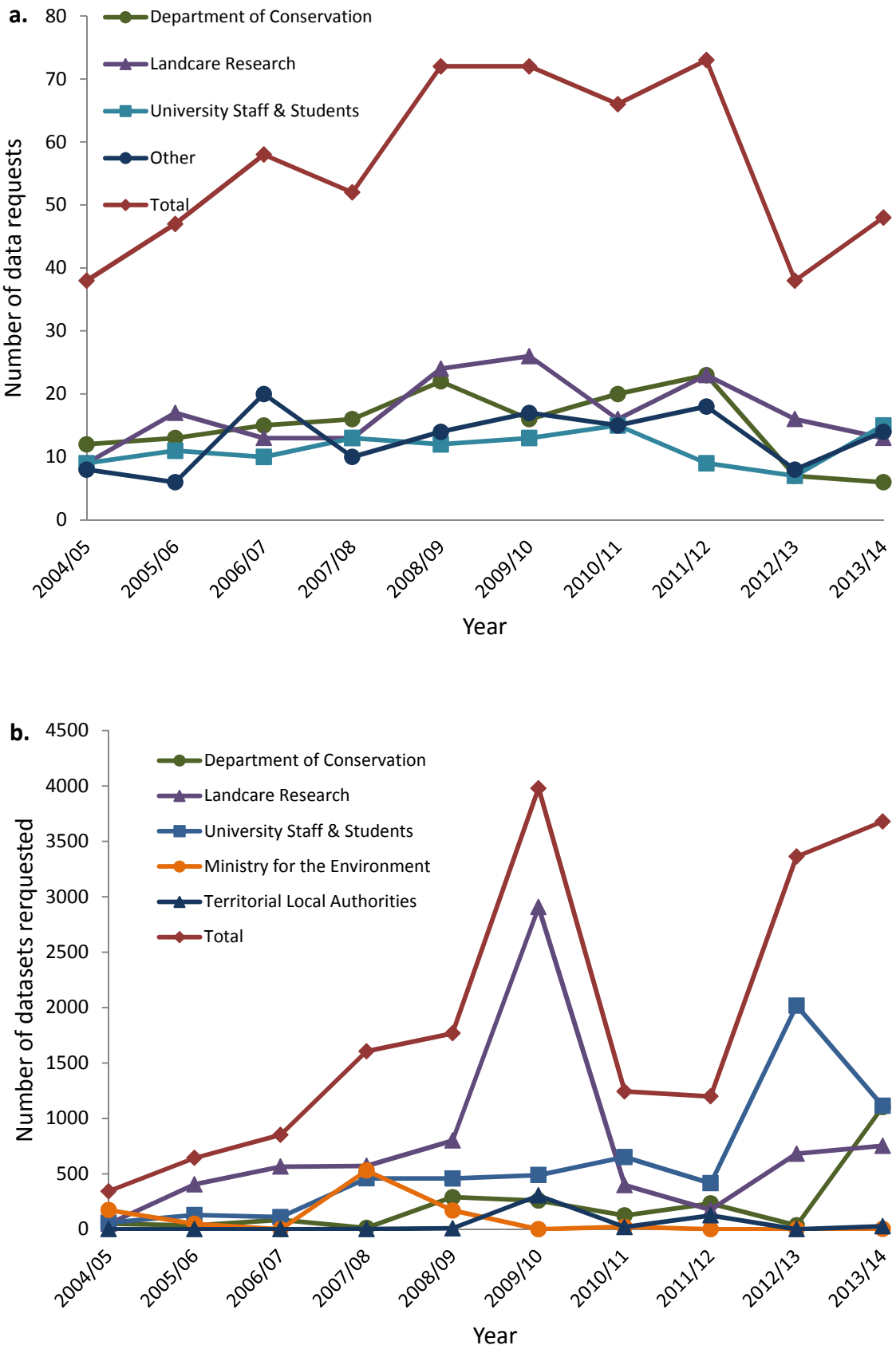


Figure 2 Requests for data from the National Vegetation Survey Databank per financial year since 2004/05: (a) total number of requests and from three major data-users and (b) number of datasets requested, total and from five major data-users.

11 Publications directly associated with the NVS Databank

Publications and conference presentations funded by the NVS program (4 total)

Allen RB, Bellingham PJ, Holdaway RJ, Wiser SK 2013. New Zealand's indigenous forests and shrublands. In: Dymond J ed. Ecosystem services in New Zealand: conditions and trends. Lincoln, Canterbury, Manaaki Whenua Press. Pp. 34–48.

Lamanna CA, Blonder B, Violle C, Kraft NJB, Sandel B, Simova I, Donoghue JC, Svenning JC, McGill BJ, Boyle B, Buzzard V, Dolins S, Jørgensen PM, Marcuse-Kubitza A, Morueta-Holme N, Peet RK, Piel W, Regetz J, Schildhauer M, Spencer N, Thiers BM, Wiser SK, Enquist BJ In press. Functional trait space and the latitudinal diversity gradient. Proceedings of the National Academy of Sciences (USA).

Morueta-Holme N, Enquist B, McGill B, Boyle B, Jorgensen P, Ott J, Peet R, Simova I, Sloat L, Thiers B, Violle C, Wiser S, Spencer N, Dolins S, Donoghue II J, Kraft N, Regetz J, Schildhauer M, Svenning J In press. Habitat area and climate variability determine geographic variation in plant species range sizes. Ecology Letters: doi:10.1111/ele.12184.

Stephenson NL, Das AJ, Condit R., Russo SE, Baker PJ, Beckman NG, Coomes DA, Lines ER, Morris WK, Rüger N, Álvarez E, Blundo C, Bunyavejchewin S, Chuyong G, Davies SJ, Duque Á, Ewango CN, Flores O, Franklin JF, Grau HR, Hao Z, Harmon ME, Hubbell SP, Kenfack D, Lin Y, Makana JR, Malizia A, Malizia LR, Pabst RJ, Pongpattananurak N, Su SH, Sun IF, Tan S, Thomas D, van Mantgem PJ, Wang X, Wiser SK, Zavala MA 2014. Rate of tree carbon accumulation increases continuously with tree size Nature 507: 90–93. doi:10.1038/nature12914.

Refereed publications

The following 17 2013/14 publications used data archived in the NVS Databank.

Allen RB, Dickie IA, Easdale TA, Hurst JM, Wiser SK 2013. Desarrollo de sistemas de manejo para producción de madera en bosques de *Nothofagus* de Nueva Zelanda. In: Donoso P, Promis Á eds Silvicultura en bosques nativos: avances en la investigación en Chile, Argentina y Nueva Zelandia. Chile, Marisa Cuneo Ediciones. Pp. 198–219.

Beckmann M, Bruelheide H, Erfmeier A 2014. Local performance of six clonal alien species differs between native and invasive regions in Germany and New Zealand. Austral Ecology 39: 378–387.

Coomes D, Flores O, Holdaway R, Jucker T, Lines ER, Vanderwel MC 2014. Wood production response to climate change will depend critically on forest composition and structure. Global Change Biology: 04/2014; doi:10.1111/gcb.12622.

Dickie IA, Koele N, Blum JD, Gleason JD, McGlone MS 2014. Mycorrhizas in changing ecosystems. Botany 92: 149–160.

Forsyth DM, Ramsey DSL, Veltman CJ, Allen RB, Allen WJ, Barker RJ, Jacobson CL, Nicol SJ, Richardson SJ, Todd CR 2013. When deer must die: large uncertainty surrounds changes in deer abundance achieved by helicopter- and ground-based hunting in New Zealand forests. Wildlife Research 40: 447–458.

Gallagher RV, Englert Duursma D, O'Donnell JO, Wilson PD, Downey PO, Hughes L, Leishman MR 2013. The grass may not always be greener: projected reductions in climatic suitability for exotic grasses under future climates in Australia. Biological Invasions 15: 961–975. [Data sourced from GBIF]

Holdaway RJ, McNeill SJ, Mason NWH, Carswell FE 2014. Propagating uncertainty in plot-based estimates of forest carbon stock and carbon stock change. Ecosystems 17: 627–640.

Kardol P, Dickie IA, St. John MG, Husheer SW, Bonner KI, Bellingham PJ, Wardle DA 2014. Soil-mediated effects of invasive ungulates on native tree seedlings. Journal of Ecology 102: 622–631.

Lusk CH, Jorgensen MA 2013. The whole-plant compensation point as a measure of juvenile tree light requirements. Functional Ecology 27: 1286–1294.

Lusk CH, Kaneko T, Grierson E, Clearwater M 2013. Correlates of tree species sorting along a temperature gradient in New Zealand rain forests: seedling functional traits, growth and shade tolerance. Journal of Ecology 101: 1531–1541.

Mason NW, Beets PN, Payton I, Burrows L, Holdaway RJ, Carswell FE 2014. Individual-based allometric equations accurately measure carbon storage and sequestration in shrublands. Forests 5: 309–324.

Mason NWH, Wiser SK, Richardson SJ, Thorsen MJ, Holdaway RJ, Dray S, Thomson FJ, Carswell FE. 2013. Functional traits reveal processes driving natural afforestation at large spatial scales. PLOS One 8(9): e75219. http://dx.plos.org/10.1371/journal.pone.0075219.

Richardson SJ, Holdaway RJ, Carswell FE 2014. Evidence for arrested successional processes after fire in the Waikare River catchment, Te Urewera. New Zealand Journal of Ecology 38: 221–229.

Scrimgeour J, Molles L, Waas JR 2013. Vertical variation in flight activity of the lesser short-tailed bat in podocarp and beech forests, Central North Island, New Zealand. New Zealand Journal of Ecology 37: 193–198.

Tomasetto F, Duncan RP, Hulme PE 2013. Environmental gradients shift the direction of the relationship between native and alien plant species richness. Diversity and Distributions 19: 49–59.

van Hengstum T, Hooftman DAP, Oostermeijer JGB, van Tienderen PH 2014. Impact of plant invasions on local arthropod communities: a meta-analysis. Journal of Ecology 102: 4–11. [Data sourced from GBIF]

Wyse SV, Burns BR, Wright SD 2014. Distinctive vegetation communities are associated with the long-lived conifer *Agathis australis* (New Zealand kauri, Araucariaceae) in New Zealand rainforests. Austral Ecology 39: 388–400.

Contract reports

The following six 2013/14 reports used data archived in the NVS Databank.

Bellingham PJ, Richardson SJ, Gormley AM, MacLeod CJ, Forsyth DM 2013. Department of Conservation biodiversity indicators: 2013 assessment. Landcare Research Contract Report LC1621, for the Department of Conservation, Christchurch, New Zealand.

Easdale T, Hurst J, Smale M, Burrows L, Allen R 2013. Salvage of historical beech thinning trial data (Sustainable Farming Fund Project L11/139). Landcare Research Contract Report LC1627, for the Farm Forestry Association and The Māori Trustee.

Richardson S, Thomson F, et al. 2013. Utility of a permanent plot network to detect change in the ecological integrity of forests in the Manawahe Ecological Corridor, Bay of Plenty. Landcare Research Contract Report LC1623, for Bay of Plenty Regional Council, Whakatane.

Richardson SJ, Wiser SK, Cieraad E 2014. Vegetation heterogeneity within mapped ecosystem types across the Department of Conservation's Biodiversity Management Units (BMUs). Landcare Research Contract Report LC1854.

Overmars F, Lloyd B 2012. Proposed escarpment mine: Vegetation survey of Trent Stream Area and Southern Denniston Plateau. Prepared for Buller Coal LTD, Westport.

Wiser SK, Easdale T, Cieraad E 2013. Review of the tawa timber resource. Landcare Research Contract Report LC1675, for the Tūhoe Tuawhenua Trust.

Conference presentations

The following three 2013/14 conference presentations used data archived in the NVS Databank.

Scrimgeour J, Molles LE, et al. 2013. Vertical variation in flight activity of the lesser short-tailed bat in podocarp and beech forests, Central North Island, New Zealand, ECOTAS. 24-29 November 2013, Auckland, New Zealand.

Wiser SK, Buxton RP, Helm A 2013. Using species complementarity to set conservation priorities: which species are most important? Presented by Susan Wiser, Stream C, Session 10, on Thursday, 28 November 2013. ECOTAS. 24–29 November 2013, Auckland, New Zealand.

Wyse SV 2013. New Zealand kauri under threat: consequences for the wider forest ecosystem. ECOTAS. 24–29 November 2013, Auckland, New Zealand.

Theses

Adkins NEH 2012. Vegetation assessment to understand the effect of feral goat populations on native flora composition. Master of Forestry Science, University of Canterbury.

Thomson RE 2013. Reproductive biology and ecology of the endemic New Zealand tree *Ixerba brexioides* (tāwari). Master of Science, University of Waikato.

Wyse SV 2013. The role of New Zealand kauri (*Agathis australis*) in structuring forest community composition. PhD, University of Auckland.

Other

Wiser S. 'Rate of tree carbon accumulation increases continuously with tree size: article in *Nature* and relationship to the National Vegetation Survey Databank' to the Landcare Research Board, 27 February 2014.

Wiser S. 'The National Vegetation Survey Databank'. Lecture given to degree course: ERST 611 Advanced Environmental Monitoring, Lincoln University, May 2014.

Appendix 1 – New electronic datasets in NVS 2013/14

Listing of new *electronic datasets* incorporated into NVS, July 2013 – June 2014

AUSTRALASIAN ANTARCTIC EXPEDITION 2013
Kaweka Wilding Pines 2012
Lambies Stream Wetlands 2013
Maungatautari, Mount 2006
Maungatautari, Mount 2007
Mt Barker Wilding Pines 2012
Mt Hutt Alpine Altitudinal Plant Community Response 2011
NZICMS: Main 2009–2013
NZICMS: Other 2009–2013
NZICMS: Restricted 2009–2013
South West Island (Three Kings Islands) 1997

In addition, the following datasets have been entered using *NVS Express* and incorporated into the NVS Databank

Ashburton Lakes 2013
GLENDHU PAIRED CATCHMENT 2012
MT IDA BIODIVERSITY MONITORING PROJECT 2012
PORT HILLS, CHRISTCHURCH 2013
THAR IMPACT SITE - CARNEY'S CREEK 2013
THAR IMPACT SITE - FITZGERALD 2013
THAR IMPACT SITE - HOOKER 2013
THAR IMPACT SITE - TOWNSEND 2013
Wairau Biodiversity 2013

Hard-copy plotsheets of these projects are either archived or in the process of being archived.

Listing of new hard-copy datasets added to NVS

INDIGENOUS FOREST RESOURCE 1977
SOUTHLAND BEECH PROJECT 1976
MAUNGAHARURU PNA SURVEY 1994 – 1995
LILLBURN - ELDER RD - BEECH THINNING 1977 – 1978
KUMARA 1996
Maungatautari, Mount 2014
PUANGIANGI ISLAND 2014
WOODLAW 1989
UREWERA POST-FIRE SUCCESSION STUDY 1981
WHATAROA - SALTWATER - FOREST DISTURBANCE 1993
UREWERA POST-FIRE SUCCESSION STUDY 1981
GRANVILLE - AHAURA/KOPARA COULD BE BLOCK 1970's