

NVS ANNUAL REPORT FOR THE 2002-03 YEAR

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Developments of the National Vegetation Survey (NVS) databank

Building on the major developments during 2001–02, the past year has seen consolidation of that year's achievements, and modifications in light of end-user feedback. It is clear from interactions with researchers involved in initiatives on vegetation data management in Europe and North America that development of the NVS databank is at the forefront of similar developments internationally. During the past year, Susan Wisser was an invited speaker to present developments and future plans for NVS at a Vegbank working group meeting in the USA; Vegbank is the North American repository for plot-based vegetation data and also participated in the first international symposium on international efforts in vegetation databanking in Naples, Italy. Recently Susan has been made a member of a working group "Ecoinformatics and data exchange for vegetation science" which is under the auspices of International Association for Vegetation Science (IAVS). Linkages to Vegbank and IAVS databanks (in Europe and North America) allow us to participate in, and help lead international efforts to set standards for vegetation data management and exchange, including best practice for curation and storage of data and protocols for use of data. They also offer opportunities for economy of effort, such as inclusion of data modules from other systems, where developments are more advanced than achieved to date in New Zealand. Susan's participation in these international forums has been funded largely through the PGSF. Other international linkages have been forged with a visiting computer modeler from the US Forest Service, George Racin, who worked with Larry Burrows in a user needs analysis for the NVS databank (funding from the Terrestrial and Freshwater Biodiversity Information System [TFBIS] programme). This project is described in more detail below.

In 2001–02 most of the electronic data in NVS was migrated from its previous means of storage in discreet ASCII text files to a SQL-server database; during 2002–03 nearly all remaining data sets in structured formats were migrated to the SQL-server database. Data can be supplied to users in a variety of formats including MS-Excel spreadsheets or in ASCII text files; the user can specify the preferred format in on-line requests through the NVS web site. Further refinements of the MS-Access data entry screen include linkages to the Plant Names database, so that authoritative names and associated data (e.g. native or exotic status, common names) can be linked to six-letter codes typically used in collecting field vegetation data.

Further databank development has been achieved with NSOF funding of a prototype for a data entry and retrieval system for forest and shrubland data collected as part of the Carbon Monitoring System (CMS). CMS is a national level permanent plot-based approach to measuring carbon stored in indigenous forests and shrublands and is funded by The Ministry for the Environment (MfE). MfE has funded data collection over the past two years and has indicated the vegetation component of CMS data will be stored in NVS. The NSOF project used data collected in 1998 from a pilot project (an east–west transect of the central South Island) and the first year of CMS to develop and test a data entry, editing and viewing interface, and, using XML language, has developed facilities for on-line interrogation of the data, and calculation of carbon on a by-plot or aggregated plot basis. Once data entry is funded for the newly collected data, the NSOF-funded developments will provide the basis

for the development of a full-fledge data management system for CMS that will enable rapid and efficient data entry, and the use of these data for calculating national carbon budgets. Additionally, we envisage that the data entry facilities developed for the CMS will provide an alternative for the MS-Access data entry screens that NVS now uses.

Developments in NVS have seen increasing sources of funding from end users to contribute to further developments during 2002–03. For example, past funding from the Department of Conservation (DOC) was instrumental in development of the data retrieval component of NVS web site. Funding this year enabled inclusion of all field plot manuals typically used in plots in NVS as PDF documents that can be downloaded from the web site. End-user feedback, from DOC staff and Landcare Research staff, led to refinements of the NVS web site, and further refinements are imminent.

A major new source of support for NVS is the TFBIS Programme. TFBIS is currently supporting an assessment of user needs to determine what technical developments are required to make data entry and retrieval from NVS easier and thus promote the use of NVS data to a wider set of individuals and agencies. During the last year, this fund also supported initiatives to incorporate major outstanding sources of data (details later in this report). TFBIS has made a commitment to support development of dynamic links of spatial information (including locations of plots) to GIS layers available over the Internet. Another possible source of support for NVS is through the Microsoft Innovation project. A project currently short-listed for funding from this source would facilitate presentation of point data (NVS plot locations) and distributions of nominated plant species over the Internet (again, see later in this report).

Requests for data from the National Vegetation Survey (NVS) databank

Thirty-one requests for original NVS data or ancillary documentation were received between July 2002 and June 2003 (Table 1). The largest number of requests was from the Department of Conservation, with fewer from staff of Landcare Research and small numbers from students, Forest Research, territorial local authorities and others.

Table 1 End-user requests for original NVS data during 2002–03 (provided without interpretation, or searches across data sets)

End-user	Number of requests	Nature of enquiries
Department of Conservation	14	Original plot data (electronic files in ASCII and MS Excel formats, and photocopies of original plot sheets), metadata, plot locations, maps, general information
Landcare Research (including work contracted to Department of Conservation and to the Ministry for the Environment)	9	Original plot data (electronic files in ASCII and MS Excel formats, and photocopies of original plot sheets), metadata, plot locations, general information

University staff and students	3	Original plot data (electronic files in ASCII and MS Excel formats, and photocopies of original plot sheets)
Private consultant	2	Original plot data (electronic files in ASCII and MS Excel formats), metadata, reports, maps
Forest Research and Wildlands Consultants (work contracted to the Ministry for the Environment)	1	Original plot data (photocopies of original plot sheets), metadata, plot locations, list of species codes, general information
QEII National Trust	1	Original plot data (electronic files in ASCII and MS Excel formats)
Territorial local authority	1	General information
Total	31	

Requests for large-scale data continue to increase, for example to underpin such national initiatives as the Carbon Monitoring System. Data from NVS are also now perceived as essential to underpin major national initiatives from the Department of Conservation, notably its National Heritage Management System, and also to feed spatially explicit predictive models such as BIOSECURE and PestSpread. The number of individual data sets requested, or from which subsets of data were requested is described in Table 2.

Table 2 End-user requests for original NVS data during 2002–03 (provided without interpretation, or searches across data sets), in terms of requests for surveys and metadata

End-user	Number of data sets requested	Number of requests for metadata and ancillary information
Department of Conservation	96	24
University staff and students	82	0
Landcare Research (including work contracted to Department of Conservation and the Ministry for the Environment)	52	34
Forest Research and Wildlands Consultants (work contracted to the Ministry for the Environment)	29	29
Private consultant	1	2
QEII National Trust	1	0
Territorial local authority	0	1
Total	261	90

Web statistics

From its introduction on 1 October 2002 to 18 June 2003, the NVS web site (<http://nvs.landcareresearch.co.nz>) was hit 43, 579 times, overwhelmingly by New Zealand-

based sites. There were 542 visitors with multiple visits to the site. Identifiable users were most frequently from the Department of Conservation (15.3% of total hits, Table 3).

Table 3 Identifiable users of the NVS web site during 2002–03, tallied from the 100 most frequent users.

User	Number of hits on web site
Department of Conservation	6679
Private individual or company (New Zealand)	3756
University staff and students (New Zealand)	1468
Ministry of Agriculture and Forestry	567
University staff and students (outside New Zealand)	508
AgResearch	134
Ministry for the Environment	130
Total	43 579

The most frequently hit pages within the site were index pages (19.1% of 16 213 individual page hits), followed by hits on sites with detail about field techniques, manuals and field forms (15.8%), followed by searches for and requests for data (11.2%). Other hits included pages about data standards (2.3% of page hits) and protocols for data use and deposits (2.0%).

Various documents area available to download from the NVS web site, and over the period for which use was monitored, 2249 downloads of documents occurred. Documents downloaded are listed in Table 4, with the statistics for the number of downloads. Funds from the Department of Conservation allowed inclusion of two manuals on the site (Forest permanent plot manual and Grassland survey manuals), which first appeared in May 2003.

Table 4 Documents available to download on the NVS web site, and frequency of downloads.

Document	Number of downloads
Field guide to use of GPS	809
Managing biodiversity information: development of New Zealand's National Vegetation Survey databank (reprinted from <i>New Zealand Journal of Ecology</i> , 2001)	460
An assessment of the quality of data stored in the National Vegetation Survey database (reprint of Landcare Research contract report)	227
Reconnaissance plot pro-forma data sheet	174
Reconnaissance plot manual	158

Data standard guidelines for improving the quality of permanent plot data archived in the National Vegetation Survey database (reprint of Landcare Research contract report)	117
Forest seedling plot pro-forma data sheet	114
Forest tree diameter plot pro-forma data sheet	102
Forest permanent plot manual	56
Grassland survey manual	32
Total	2249

An example of use of NVS data in PGSF research

Mountain beech (*Nothofagus solandri* var. *cliffortioides*) forests, such as are found in Canterbury, are amongst the most species-poor forests, in terms of vascular plants, on earth. At Craigieburn forest, mountain beech is the sole dominant tree over several thousand hectares. Here, following disturbances such as storms or earthquakes, mountain beech follows a process of re-establishment as dense thickets of seedlings to pole stands and finally to tall forest over a process of *c.* 150 years, and often this results in mosaics of even-aged stands. Replicated stands of known age in these mountain beech forests (in plots, with data stored in NVS, combined with detailed soil nutrient data for each NVS plot) have allowed detailed investigation of the status of key mineral nutrients, and of carbon, during a process of stand development. When old stands are first disturbed, nutrients are redistributed into fallen logs, the forest floor and into the mineral soil. Biomass production peaks above ground before trees are 120 years old, while the mass of fallen logs (at a maximum immediately after disturbance) continues to decline in stands >150 years old. Calcium reaches a peak of aboveground storage at 25 years and continues to decline thereafter, and while nitrogen follows a similar course, it is likely that cations (such as calcium) are likely to be the main reason for declining productivity as stands age further. (Funding from PGSF: Biodiversity dynamics in forests and shrublands programme, Objective 2, Clinton *et al.* 1995 *European Journal of Soil Science*, **46**, 551–556, Allen *et al.* 1997 *Canadian Journal of Forest Research*, **27**, 323–330, Clinton *et al.* 2002 *Canadian Journal of Forest Research*, **32**, 344–352, and Davis *et al.* 2003 *Forest Ecology and Management*, **177**, 313–321).

New data incorporated into NVS

Forty-one new data sets were incorporated as electronic versions into NVS between July 2001 and June 2002 (Table 5). Forty-four files of updated metadata relating to these and existing data files were also incorporated. The great majority of these data sets derived from the Department of Conservation, and the Department contributed financially to the entry of all these data sets. A listing of new data sets incorporated as electronic copy into NVS is given in Appendix 1.

Table 5 Data sources for new data added during 2002–03 into the NVS databank.

Data source	Number of data sets	Revenue source for electronic data entry
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Department of Conservation	25	Department of Conservation
Landcare Research	6	PGSF
Wellington Regional Council	5	Wellington Regional Council
Marlborough District Council	2	Marlborough District Council
Ministry of Agriculture & Forestry	2	Ministry of Agriculture & Forestry
Auckland Regional Council	1	Auckland Regional Council
Total	41	

A synopsis of the newly entered data is shown in Table 6. Of the 41 data sets listed above, some contain more than one data type; hence the number of surveys listed is greater than the number in Table 5.

Table 6. Types of vegetation data added during 2002–03 into the NVS databank.

Data type	Number of surveys for which data entered
Stem diameter plots (mostly from standard 20x20 m plots)	32
Understorey (seedling and sapling) plots (mostly from standard 20x20 m plots)	32
Reconnaissance (“Recce”) plots (not including Protected Natural Areas (PNA) plots)	20
Metadata	44
Total	128

Extension and awareness

Updating of the National Vegetation Survey (NVS) Databank web site continues, with updated information on data stored and developments completed and in progress.

Staff funded by PGSF to work on NVS and others conducted a training workshop for DOC staff (DOC-funded) at Arthur’s Pass National Park. A dozen DOC field staff attended, and they came from either Conservancy or DOC Area Offices from the length of New Zealand. The workshop included training on a rationale for field monitoring, protocols for field data capture and common sources of error. An afternoon was spent remeasuring a forest plot from the NVS databank. The second day was spent analysing NVS data and learning about new developments in data access and the NVS web site.

Larry Burrows, with assistance from George Racin (US Forest Service) conducted an end-user survey on perceptions of the utility of NVS and data stored in the databank. The survey included questionnaires sent to users, and visits to end-users, including staff of DOC, Regional Councils, private consultants, and staff of universities and research institutes. Questions included aspects of data management (e.g., how frequently do they use NVS and how efficient do they find it, questions on the utility of the web site, and what new technology might they want to use?). Results of the survey will be reported in 2003–04 and we will plan for alterations and innovation according to the results of the survey (funded by the TFBIS programme).

Projects for 2003–04 year

Projects funded by the TFBIS programme for 2003–04 include:

- Completion of the user-needs assessment for improved access to NVS data. This will include posting a draft report of the assessment (based on interviews and an a questionnaire) on the NVS website, circulating it for comment and conducting a workshop for end users to consolidate our findings into a recommended strategy.
- A user-needs assessment to identify the requirements for data summary and analysis tools appropriate for vegetation data stored in NVS.

And the incorporation into NVS of:

- Data from permanent transects in eastern South Island montane grasslands (already in electronic database format). This is a joint contract to DTZ and Landcare Research to

ensure these valuable and well-curated data will be moved to the physical archives at Lincoln, and the electronic data is made available.

- Data from 52 forest transects in the central North Island, established from the late 1950s and many remeasured at least twice since.
- Data collected by Hugh Wilson during comprehensive surveys of Mount Cook National Park, Stewart Island, and Banks Peninsula.
- Data from at least 30 forest surveys nationally, including outlying islands such as the Kermadec, Chatham and Three Kings Islands, all of which will extend the geographic and temporal coverage of NVS data.

A proposal prepared by Landcare Research and submitted to the New Zealand Microsoft Innovation Centre has recently been short-listed as one of seven taken forward for further development before the announcement of the winners on 21st July.

(<http://www.nzinnovationcentre.net.nz/English/Submissions/ShortlistedProjects.htm>).

The project proposes a simple demonstration of the emerging business information standards of UDDI/Web-Services (Universal Description, Discovery and Integration) to facilitate data and application exchange/integration between Landcare Research and, in the first instance, the Department of Conservation. In essence, this technology will provide seamless access to a number of key datasets within Landcare, specifically the Organism Names Database (in conjunction with GBIF NZ) and components of the NVS databank. Direct access to the information and services provided by these two datasets is widely viewed as important both within Landcare Research and other agencies. The service will be developed acknowledging the New Zealand government E-GIF (e-Government Interoperability Framework) standards, and conform to the requirements of DOC, as a key client of Landcare Research. If successful in attracting funding, the project will provide an early demonstration of E-GIF within the New Zealand science community.

Publications in which NVS data were used

- Allen, R.B., Bellingham, P.J. & Wiser, S.K. 2002. Developing a forest biodiversity monitoring approach for New Zealand. *New Zealand Journal of Ecology*, **27** (2), in press.
- Allen, R.B., Bellingham, P.J. & Wiser, S.K. 2003. Forest biodiversity assessment for reporting conservation performance. *Science for Conservation*, **216**, 1–50.
- Allen, R.B., Rogers, G.M. & Stewart, G.H. 2002. Maintenance of key tree species. *Science for Conservation*, **190**, 1–60.
- Bellingham, P.J. & Allan, C.N. 2003. Forest regeneration and the influences of white-tailed deer (*Odocoileus virginianus*) in cool temperate New Zealand rain forests. *Forest Ecology and Management*, **175**, 71–86.
- Coomes, D.A., Allen, R.B., Forsyth, D.M. & Lee, W.G. 2003. Factors preventing the recovery of New Zealand forests following the control of invasive deer. *Conservation Biology*, **17**, 450–459.
- Coomes, D.A., Duncan, R.P., Allen, R.B. & Truscott, J. 2003. Tree size-frequency distributions are not described by simple scaling rules. Submitted to *Ecology Letters*.
- Davis, M.R., Allen, R.B. & Clinton, P.W. 2003. Carbon storage along a stand development sequence in a New Zealand *Nothofagus* forest. *Forest Ecology and Management*, **177**, 313–321.
- Leathwick, J.R. 2002. Incorporating the effects of inter-specific competition when modelling species distributions at landscape scales. *Biodiversity and Conservation*, **11**, 2177–2187.

Lehmann A., Overton J.McC. & Leathwick, J.R., 2002. GRASP: Generalized regression analysis and spatial predictions. *Ecological Modelling*, **157**, 187–205.

Lloyd, K.M., Lee, W.G. & Wilson, J.B. 2002. Competitive abilities of rare and common plants: comparisons using *Acaena* (Rosaceae) and *Chionochloa* (Poaceae) from New Zealand. *Conservation Biology*, **16**, 975–985.

Zaniewski, A.E., Lehmann, A. & Overton, J.McC., 2002. Predicting species distribution using presence-only data: A case study of native New Zealand ferns. *Ecological Modelling*, **157**, 261–280.

Book:

Leathwick, J., Wilson, G., Rutledge, D., Wardle, P., Morgan, F., Johnston, K., McLeod, M. & Kirkpatrick, R. 2003. *Land environments of New Zealand*. David Bateman, Auckland.

Contract reports:

Allen, R.B., Norton, D.A., Benecke, U. & Wiser, S.K. 2002. Silvicultural guidelines based on ecological site classification. Landcare Research Contract Report LC0102/154. Prepared for the Ministry of Agriculture and Forestry. 48 p.

Other reports:

Whitehead, D. (Compiler). 2002. Carbon storage in shrubland and forest ecosystems: A review of research results 2000-2002. Landcare Research internal report.

Popular articles:

Conference presentations:

Wiser, S.K. 2002. *New Zealand initiatives in vegetation databanking*. Invited speaker, VEGBANK working group meeting, National Center for Ecological Analysis and Synthesis, Santa Barbara, California, 12-14 September 2002.

Wiser, S., Cooper, J., Spencer, N. & Burrows, L. 2003. *New Zealand's National Vegetation Survey Databank: improving access and interoperability*. 46th International Association for Vegetation Science Symposium, 9–13 June 2003, Naples, Italy.

Other presentations:

Burrows, L.E. 2003. *National Vegetation Survey databank: Recent advances, current developments and future issues*. Meeting of Nationally Significant Databases and Collections, Wellington, 2 April 2003.

Appendix 1. Listing of new data sets incorporated as electronic copies into NVS, July 2002 – June 2003.

Blue Mountain exclosures 2001 Diameter, Understorey, text file
Caples/Greenstone 2001–2002 Recce, Diameter, Understorey, extra Sapling, text file.
Fiordland North 1975–76 Diameter (update)
Fiordland North 1998 Diameter (update)
Granville Forest Small Coupe Harvesting Trials 2003 Misc. Diameter, Misc. Sapling, Misc. file, text file.
Great Barrier Island (Te Paparahi Stewardship Area) 1987 text file.
Great Barrier Island (Te Paparahi Stewardship Area) 2002 recce, diameter, understorey, text file.
Great Barrier Island (Te Paparahi Stewardship Area) 2003 recce, diameter, understorey, text file.
Harper/Avoca 1999–2000 Understorey
Hokitika 1957–58 text file
Hokitika 1963–64 text file
Hokitika 1971–1972 text file update
Hokitika 1971–72 text file
Hokitika 1971–72 text file
Hokitika/Kokatahi 1979–1980 text file
Hokitika/Kokatahi 1996 text file
Hokitika/Kokatahi 2001–02 Recce, Diameter, Understorey, text file
Hurunui South 2001–2002 Recce, Diameter, Understorey, text file
Kaikoura Floodplain Succession Study 2001 Recce, text file
Kaimanawa Mountain Beech 1999 Diameter, Understorey, text file.
Kaimanawa, West 1980 Diameter (update), text file.
Kaimanawa, West 2000–2001 Diameter, Understorey, text file.
Kaimanawa/Rangitikei 1981–1982 text file
Kaimanawa/Rangitikei 1999–2000 text file
Ketetahi 1999–2000 Diameter, Understorey.
Manawatu Gorge Exclosures 2000 Diameter, Understorey, text file
Maruia – Diggers Creek 2003 Recce, Misc. file, text file
Moehau 1991 Diameter (update), Understorey (update).
Moehau 2000 Diameter, Understorey.
Mokoia Island 2001 Recce, Diameter, Understorey, text file.
Okarito 1983–84 text file
Oxford 1985–86 text file
Peel Forest Sycamore Management Study 2001 Recce, Diameter, Understorey, text file
Pukepoto 1982–1983 Diameter (update), Understorey (update).
Pukepoto 1994 Diameter (update), Understorey (update).
Pukepoto 1999 Diameter, Understorey.
Ruahine Exclosures – Triangle Exclosure 1999 Diameter, Understorey, text file
Ruahine/Pohangina 1975 text file
S.W.M.E.P. Paringa–Otoko 1984–85 text file
South Westland Possum Impacts 1997 text file
Tararua 2001–2002 recce, diameter, understorey, text file.
Tawharanui Regional Park 2001–02 Recce, Diameter, Understorey, text file
Te Kuha 2002 PNA, text file
Te Tapui exclosures 1992 Recce, Diameter, Understorey

Te Tapui exclosures 1999 Recce, Diameter, Understorey, Foliar Browse Index
Upper Waitaki Riverbed Basin 2002–2003 recce, misc site info, text file.
Waipapa 1991 Understorey (update), text file
Waipapa 1995 Understorey, text file
Waipapa 2000 Recce (update), Diameter (update), Understorey (update), text file (update)
Waitaki 1985–86 text file (update)
Wellington Exclosures 2001–2002 recce, diameter, understorey, text file.
Wellington Exclosures 2002–2003 recce, diameter, understorey, text file.
Wellington Land District 2000–2001 recce, diameter, understorey, text file.
Wither Hills 2001–02 Diameter/Misc excel file, Recce, Understorey, text file
Wither Hills 2001 Diameter/Misc excel file, Recce, Understorey, text file

20 level 3 datasets have been archived in NVS

Canterbury Botanical Society Species Lists.doc
Dennis Bush
Dennis Wetland

Miscellaneous:

Round Bush 2000 Foliar Browse Index data

Plot sheets archived for:

Great Island (Three Kings Islands) 1982–83 Diameter, Understorey
Great Island (Three Kings Islands) 2003 Recce, Diameter, Understorey
Karioi 2002 Diameter, Understorey, text file
Orongorongo exclosures 2002–2003 Recce, Diameter, Understorey