

NVS ANNUAL REPORT FOR THE 2003-04 YEAR

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Developments of the National Vegetation Survey (NVS) databank

The year 2003–04 has been largely one of consolidation for the NVS databank after major technological upgrades during the previous two years. The vast majority of the data now resides in a SQL database format that allows ready extraction of data into formats favoured by most end-users (text files, spreadsheets and database files). Deposits and requests for data are now readily achieved on line through the NVS web site (www.nvs.landcareresearch.co.nz).

The major development during 2003–04 has been inclusion of a substantial amount of data funded by the Terrestrial and Freshwater Biodiversity Information System (TFBIS) programme. One project funded by the programme allowed the inclusion of 30 data sets that existed as hard copies in NVS but for which no electronic versions, hence no ready public access, existed. These data followed standard methods applicable to most NVS data. The data sets spanned from the Kermadec Islands to Southland and covered from the mid-1970s to 2002. Another project funded by the programme enabled some major data sets to be incorporated in NVS. These were surveys conducted by Hugh Wilson in Mount Cook National Park, Stewart Island and Banks Peninsula and data from 54 permanently-marked forest transects in the central North Island, established by Peter McKelvey of the New Zealand Forest Service in the late 1950s and some remeasured as recently as 2002. All of these data were collected according to methods not used elsewhere in NVS, so new data entry templates had to be devised to allow their inclusion. The addition of these high quality data adds significantly to the spatial and temporal coverage of NVS. The TFBIS programme has also funded a project to include in the NVS databank vegetation data from pastoral leasehold land in the eastern South Island montane grasslands, on transects monitored from the 1970s to the present. Before inclusion of the data can be completed there are many issues to be resolved regarding ownership of data and the land from which it was collected, since either or both has changed over time for all individual data sets. It is likely some of these data will be invaluable in assessing effects of changes in land management that follows tenure review. The TFBIS programme has jointly funded Landcare Research and DTZ New Zealand Ltd to resolve these issues and plan for eventual inclusion of the data in NVS, with safeguards to ensure rights of landowners and data collectors. Issues of data propriety and ownership identified as part of this project are helping in the redevelopment of the existing protocol for depositing and using data in the NVS databank.

During the year a new metadata schema was instituted for NVS that allows superior documentation of individual data sets. Metadata are now decoupled from the individual data sets and stored separately; this system is more flexible and allows a much broader range of vegetation data to be stored in NVS. An example of use of the new metadata schema this year was entry of metadata about the eastern South Island grassland transects by DTZ staff; these transects contain data collected in a standard format but not currently supported within the overall NVS architecture. Presently the new system of metadata capture is only available within Landcare Research but is designed so that it can be introduced on the NVS web site in the near future. This schema was developed with funding from the PGSF and NSOF through

the Database Integration programme. Another technological development during the year was a full live linkage between the codes used to denote species in the NVS databank and the Plant Names database (Ngā Tipu o Aotearoa). This development also ensures that changes in nomenclature over time can be accommodated when using data sets collected over decades.

Another project funded by the TFBIS programme during 2003–04 was to obtain better information from end-users about desirable features in a biodiversity database like NVS that allowed better facilities for data entry and retrieval of data. Based on views from a wide range of respondents from biodiversity managers to policy developers and IT experts, a report was prepared for the NVS web site that outlined how a process of data entry and retrieval might be expedited. A design for the NVS databank was proposed that also took into account international initiatives in managing vegetation data, and also took into account a prototype model developed as an adjunct to the NVS databank for storing, managing and reporting data on New Zealand’s carbon budget in indigenous forests and shrublands – typical in many ways of data stored in the NVS. The report can be downloaded from the NVS web site (see below).

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

Fifty requests for original NVS data or ancillary documentation were received between July 2003 and June 2004 (Table 1). The largest number of requests was from the Department of Conservation, with fewer from Landcare Research, University staff and students and the remainder were from private consultants, other Government agencies, and from an international body (GBIF).

Table 1 End-user requests for original NVS data during 2003–04 (provided without interpretation, or searches across data sets)

End-user	Number of requests	Nature of enquiries
Department of Conservation	20	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)	10	Original plot data (electronic files in ASCII and MS Excel formats, and photocopies of original plot sheets), metadata, plot locations, general information, NVS species codes, synthetic requests across multiple data sets
University staff and students	10	Original plot data (electronic files in ASCII and MS Excel formats, and photocopies of original plot sheets), metadata, plot locations, aerial photographs, synthetic requests across multiple data sets

Private consultants	4	Original plot data (electronic files in ASCII and MS Excel formats), metadata, reports, maps, NVS species codes
Private individuals	2	Metadata, reports
Ministry for the Environment (through contractors Landcare Research and Wildlands Consultants for Carbon Monitoring System)	1	Original plot data (electronic files in ASCII and MS Excel formats, and photocopies of original plot sheets), metadata, plot locations, maps, general information
GBIF	1	Spatial data derived from reconnaissance plots
Environmental NGO	1	Species lists
MAF	1	Photocopies of original plot sheets
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Total	50	
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Costs associated with meeting requests for individual data sets are funded by the PGSF. A key development made possible largely through the redevelopment of the electronic database has been the capacity to meet ‘synthetic’ requests for data, i.e., to interrogate multiple data sets for single or various attributes (Table 2). This process currently requires that a program be written specially to scan the data for the attribute in question, for which the person or organisation making the request needs to pay, and those who request data need to have first secured permission for inclusion of data sets that are not automatically public domain. Examples of ‘synthetic’ requests for data during the year include occurrence of defined weed species (such as *Hieracium* and *Trifolium* species) in NVS plots nationally.

Table 2 End-user requests for original NVS data during 2003–04, in terms of requests for surveys and metadata

End-user	Number of data sets requested	Number of requests for metadata and ancillary information	Syntheses across multiple data sets
Ministry for the Environment (through contractors Landcare Research and Wildlands Consultants for Carbon Monitoring System)	192	192	
Department of Conservation	74	9	
Landcare Research (including work contracted to Department of Conservation)	30	2	1
University staff and students	20	6	5
Private consultants	13	2	
Private individuals		2	
GBIF			1
Environmental NGO		1	
MAF	1		
Total	330	214	7

An example of use of NVS data in PGSF research

A major field in ecology internationally has been stimulated with the recent proposal that universal physical laws limit the sizes of organisms and this in turn governs how ecological communities are structured (Enquist *et al.* 1998, *Nature*, **395**, 163–165 and Enquist & Niklas 2001, *Nature*, **410**, 655–660). Tree size structures from forest stands throughout New Zealand were used to evaluate this proposal, drawing on data from the NVS databank. Unlike most similar attempts to evaluate the proposal, the New Zealand study used data collected using identical methods nationally. Additionally, growth and mortality of individual tree stems could also be included in the evaluation because the 1546 permanent NVS plots used in the study had been remeasured. The New Zealand study found that the physical laws did predict tree size structure for smaller stems but not for larger stems; major disturbance events may better explain observed patterns in size structure of larger stems. In New Zealand forests nationally there was also a departure from the size structure predicted by physical laws of ‘scaling’ for the smallest stems: there were fewer than the law predicts and this departure was increasingly evident with time. Researchers interpreted this as a consequence of the comparatively recent influence of browsing ungulates on New Zealand forests; ungulates may have depleted forest understoreys (hence numbers of stems) compared with older, larger stems that established before they invaded (Funding from PGSF: Biodiversity dynamics in forests and shrublands programme, Coomes *et al.* 2003 *Ecology Letters*, **6**, 980–989 and Coomes *et al.* 2003 *Conservation Biology*, **17**, 450–459).

Web statistics

From 1 July 2003 to 30 April 2004, the NVS web site (<http://nvs.landcareresearch.co.nz>) was hit 46, 534 times. While it was possible to report with some confidence about which agencies were hitting the website in the 2002–03 report, adoption of firewalls and other technologies by many agencies resulted in no useful statistics to report similarly this year. The most frequently hit pages within the site were those sites with detail about field techniques, manuals and field forms (27.0% of 17 181 individual page hits). Searches for data constituted 6.5% of hits, using on-line tools such as maps and searches for text. Other hits included pages about data standards (2.3% of page hits) and protocols for data use and deposits (3.7%).

Various documents are available to download from the NVS web site, and over the period for which use was monitored, 2249 downloads of documents occurred. Major documents hit that may also have been downloaded are listed in Table 3.

Table 3 Documents available to download on the NVS web site, and frequency of hits on individual documents.

Document	Number of hits
Forest permanent plot manual	1712
Reconnaissance plot manual	1246
Managing biodiversity information: development of New Zealand's National Vegetation Survey databank (reprinted from <i>New Zealand Journal of Ecology</i> , 2001)	963
Field guide to use of GPS	777
Grassland survey manual	373
NVS Annual Report 2002–03	146
Reconnaissance plot pro-forma data sheet	145
Forest tree diameter plot pro-forma data sheet	142
An assessment of the quality of data stored in the National Vegetation Survey database (reprint of Landcare Research contract report)	136
Data standard guidelines for improving the quality of permanent plot data archived in the National Vegetation Survey database (reprint of Landcare Research contract report)	120
Facilitating data entry and retrieval from a national biodiversity database (reprint of Landcare Research contract report)	115
Forest seedling plot pro-forma data sheet	111
Total	5986

New data incorporated into NVS

Forty-eight new data sets were incorporated as electronic versions into NVS between July 2003 and June 2004 (Table 4). Forty-four files of updated metadata relating to these and existing data files were also incorporated, funded by the PGSF. Most of these data sets derived from the Department of Conservation and one of its predecessor organisations, the New Zealand Forest Service. A listing of new data sets incorporated as electronic copy into NVS is given in Appendix 1.

Table 4 Data sources for new data added during 2003–04 into the NVS databank. Numbers in brackets indicate the number of data sets for which data entry was funded through the TFBIS programme, administered by Department of Conservation.

Data source	Number of data sets	Revenue source for electronic data entry
Department of Conservation	21 (18)	Department of Conservation directly, TFBIS
Landcare Research	11 (2)	PGSF, Department of Conservation, Ministry for the Environment, TFBIS
New Zealand Forest Service	10 (10)	TFBIS
Hugh Wilson (for Department of Lands and Survey and Department of Conservation)	3 (3)	TFBIS
University of Canterbury	1 (1)	TFBIS
Christchurch City Council	1	Christchurch City Council
University of Hamburg, Germany	1	University of Hamburg, Germany
Total	48 (34)	

A synopsis of the newly entered data is shown in Table 5. Metadata were added for all new surveys and ancillary text files for 37 of these surveys, with additional ancillary text files also added for another 14 archived data sets.

Table 5. Types of vegetation data added during 2003–04 into the NVS databank.

Data type	Number of plots entered
Stem diameter plots (mostly from standard 20x20 m plots)	219
Understorey sapling plots (mostly from standard 20x20 m plots)	173
Understorey seedling plots (mostly from standard 20x20 m plots)	185
Reconnaissance (“Recce”) plots (including methods employed by Hugh Wilson)	5919
Forest transects (data from 20 × 210 m transects)	54
Metadata	51

Extension and awareness

Staff funded by PGSF to work on NVS and others conducted a training workshop for DOC staff (DOC-funded) at Turangi, central North Island in October 2003. A dozen DOC field staff attended, and they came from either Conservancy or DOC Area Offices from throughout New Zealand. The workshop included training on a rationale for field monitoring, protocols for field data capture and common sources of error. A day was spent near Ohakune remeasuring forest plots 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. Peter Bellingham attended and advised on DOC's ecological inventory and monitoring course, held in Kaiapoi in June 2004. Larry Burrows conducted an end-user survey on perceptions of the utility of NVS and data stored in the databank (see earlier details). The survey involved several dozen individuals representing *c.* 12 organisations and concluded with a workshop with about 6 of those organisations represented to disseminate results.

International interrogation of the NVS databank was made possible during 2003–04 via the GBIF website for spatial locations of species in all public domain data sets.

Publications in which NVS data were used

- Allen, R.B.; Bellingham, P.J.; Wiser, S.K. 2003. Developing a forest biodiversity monitoring approach for New Zealand. *New Zealand Journal of Ecology* 27: 207–220.
- Coomes, D.A.; Duncan, R.P.; Allen, R.B.; Truscott, J. 2003. Disturbances prevent stem size-density distributions in forests from following scaling relationships. *Ecology Letters* 6: 980–989.
- Davis, M.R.; Allen, R.B.; Clinton, P.W. 2004. The influence of N addition on nutrient content, leaf carbon isotope ratio, and productivity in a *Nothofagus* forest during stand development. *Canadian Journal of Forest Research*, in press.
- Dymond, J.R.; Shepherd, J.D. 2004. The spatial distribution of indigenous forest and its composition in the Wellington region, New Zealand, from ETM+ satellite imagery. *Remote Sensing of Environment* 90: 116–125.

Contract reports:

- Peltzer, D.A.; Allen, R.B.; Rogers, G. 2003. Relationship between animal pests and condition of vulnerable forest types: red beech collapse and mortality of *Libocedrus bidwillii*. Landcare Research contract report LC0203/160. Prepared for the Department of Conservation. 25 p.
- Wiser, S.K.; Allen, R.B.; Peltzer, D.A.; Benecke, U.; Baker, G.; Coomes, D.A. 2003. Growth and survival of residual trees after harvesting. Landcare Research Contract Report LC0203/125. Prepared for the Ministry of Agriculture and Forestry. 32 p.

Popular articles:

- Bellingham, P. 2003. Capitalising on historical and current vegetation data to address environmental issues. *Te Taiao* 2: 12–13.

Bellingham, P. 2004. Living record of New Zealand's vegetation proving to be priceless. *Discovery* 9: 8–9.

Conference presentations:

Payton, I.J.; Beets, P.N.; Barton, J.P.; Newell, C.; Beadel, S. 2003. Every cloud has a silver lining: a biodiversity upside to the Kyoto Protocol. New Zealand Ecological Society Conference, Auckland, 16–20 November 2003.

Spencer, N.; Wiser, S.; Burrows, L. 2003. Globalising vegetation data management. New Zealand Ecological Society Conference, Auckland, 16–20 November 2003.

Other presentations:

Larry Burrows presented on LCR biodiversity databases (using the NVS example) to a TFBIS meeting on 'Improving information systems to support Terrestrial and Freshwater Biodiversity Conservation in New Zealand'. Wellington, 11 November 2003.

Larry Burrows attended a workshop on 'Saving and sharing research data - policy and practice' organised by the Health Research Council of New Zealand, Wellington, 25 November 2003.

Susan Wiser was invited to give the presentation 'The National Vegetation Survey Databank' at the Department of Conservation's National Inventory and Monitoring Meeting, 27–28 April, 2004. She described the history of the NVS databank, its content, technological developments since 2000 and future plans.

Peter Bellingham gave presentations to the Landcare Research Board (November 2003) and to Murray Bain, CEO of the Foundation for Research, Science and Technology (May 2004) on the history, development and benefits derived from NVS.

Appendix 1. Listing of new data sets incorporated as electronic copies into NVS, July 2003 – June 2004.

Banks Peninsula 1983–1988 Recce (PNA programme)
Canterbury GRASP survey 2000 Recce, text file
Central North Island 1957–2002 Forest transects
Chatham Island – Pitt Island 1998 Recce, Diameter, Understorey, text file
Chatham Island – Pitt Island Exclosures 1997 Recce, Diameter, Understorey, text file
Chatham Island 1997 Recce, Seedling, text file
Coastal saltmarsh and driftline plant communities throughout New Zealand from Manfred Haacks, University of Hamburg
East Coast GRASP survey 2001 (Boffa Miskell) Recce, text file
Great Barrier 1987 photos, slides, negatives, text file
Great Barrier Island 2002 recce, diameter, understorey, text file
Great Barrier Island 2003 recce, diameter, understorey, photos, slides, negatives, text file
Great Island (3 Kings) 2002 Recce, Diameter, Understorey, text file
Hauhungatahi 1997–1998 Diameter, Understorey, text file
Hokitika / Styx 1985–86 text file
Hokonui 1986 Diameter, Understorey, text file
Hokonui Exclosures 1975 Diameter, Understorey, text file
Hokonui Exclosures 1981 Diameter, Understorey, text file
Hokonui Exclosures 1986 Recce, Diameter, Understorey, text file
Hurunui 2000–2001 Recce
Hurunui Possum Diet 2001 Recce
Hurunui South 1976–77 text file
Ikawhenua Range (“How Long?” project) 1997 Recce (plots added)
Kaimai / Wharawhara 1974 text file
Kaimanawa, West 2000–2001 Recce, text file
Kaingaroa 1996 Recce, Misc (soil data), text file
Kakahu Bush (Ebex) 2002 recce, text file
Ketetahi 1999–2000 Recce, text file
Manawatu Gorge Exclosures 1996 Recce, Diameter, Understorey, text file
Mangaehuehu Scenic Reserve 2003 recce, diameter, understorey
Matemateonga (“How Long?” project) 1996–2003 Recce (plots added)
Moehau 2000 Recce, text file
Mokoia Island 1993 Diameter, Understorey, text file
Mokoia Island 1996 Diameter, Understorey, text file
Mount Cook National Park 1968–1970 Recce
Paringa–Otoko Wildlife 1984–85 text file
Peel Forest Sycamore Management Study 2002 Diameter
Poerua 1984–85 text file
Port Hills, Christchurch 2003 Recce, Diameter, Understorey, text file
Puketi (Kokako) 1983 Recce, text file
Raoul Island 1979 Recce, Diameter, Seedling, text file
Raoul Island 1979 text file
Raoul Island 1982 Recce, Diameter, Understorey, text file
Raoul Island 1984 Recce, Diameter, Sapling, text file
Raoul Island 2000 Recce, Diameter, Understorey, text file
Richmond Range (“How Long?” project) 1997–2003 Recce
Rotoehu 1991 Recce, Diameter, Understorey, text file

Rotoehu 2000 Recce, Diameter, Understorey, text file
Rotoehu Exclosures 1983 Diameter, text file
Rotoehu Exclosures 1991 Recce, Diameter, Understorey, text file
Rotoehu Exclosures 2000 Recce, Diameter, Understorey, text file
S.W.M.E.P. Karangarua 1984–85 text file
S.W.M.E.P. Mahitahi River 1984–85 text file
S.W.M.E.P. Moeraki 1985 text file
Stewart Island 1978–1984 Recce
Taipo River 1983–84 text file
Te Hoe 2002 Recce, Diameter, Understorey, text file
Te Hoe Exclosures 2002 Recce, Diameter, Understorey, text file
Tongariro Exclosures – Kaimanawa 3rd measure 1991–93 text file
Waimakariri 1971–72 text file
Waingaro–Anatoki 1986–87 Recce (plots added)
Waitaha River 1984–85 text file
Wanganui River 1983–84 text file
West Coast GRASP survey 2001 Recce, text file

Miscellaneous:

GRASP Canterbury (Calibration Plots) 2000 Point Height Intercept, text file
GRASP West Coast (Calibration Plots) 2001 Point Height Intercept, text file
Matemateaonga Stage 2, 2003 Foliar Browse Index plot sheets, text file

Plot sheets archived for:

Hurunui 2000–2001 Diameter, Understorey
Wither Hills 2002–03 recce, seedling, misc diameter/sapling plot sheets, text file