Manaaki Whenua
Landcare Research

NVS Annual Report for the 2020/21 year

Prepared for: Manaaki Whenua – Landcare Research

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NVS Annual Report for the 2020/21 year

Contract Report: LC4086

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Manaaki Whenua – Landcare Research

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1 Overview

The National Vegetation Survey (NVS) databank continues to focus on primary data acquisition, curation, and provision. The aim is to ensure ongoing, up-to-date delivery of New Zealand's vegetation plot data to enhance fundamental understanding of our biota and ecosystems and to meet conservation and biosecurity priorities and sector needs. The NVS databank now holds data from over 122,000 vegetation survey plots (associated with over 1,675 projects), of which c. 26,000 are permanent. These span all major ecosystems and a diverse range of naturally uncommon ecosystems.

This report covers the period from July 2020 to June 2021. NVS continues to support national initiatives for reporting on and monitoring New Zealand's biodiversity by serving as the repository for the national-scale monitoring programme of the Department of Conservation (DOC) for biodiversity, and for the Ministry for the Environment (MfE) concerning land use and carbon storage and sequestration (referred to as Tier 1 and LUCAS, respectively).

Data sourced from the NVS databank have supported publications and knowledge gains encompassing New Zealand-focused themes, including

- a comprehensive review of naturalised plant species in New Zealand
- an evaluation of whether New Zealand's indigenous forests and shrublands are carbon neutral
- conservation planning to safeguard New Zealand's myrtle species against myrtle rust
- an assessment of the distribution and species richness of taramea (*Aciphylla* species), a taonga species group used traditionally by Māori to produce perfume oils, which is now the basis for an emerging Māori-driven industry.

Publications using data from NVS that contributed to global-scale themes include:

- an assessment of nitrogen-fixing plant abundance and distribution
- an analysis of alpine vegetation species diversity
- a test of how the environment and disperser communities determine the diversity of fruit colours in natural ecosystems.

2 New plot records archived in NVS

Twenty-one new projects[1], comprising 53 data sets and their associated electronic data, were added to NVS in 2020/21 (year to 30 June 2021; see Figure 1 and Appendix 1), with a total of 466 plots added. This brings the total number of projects with electronic data in NVS to 1,700, comprising 122,497 individual plots. Data additions since 2000/01 are shown in Figure 1, by major provider.

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

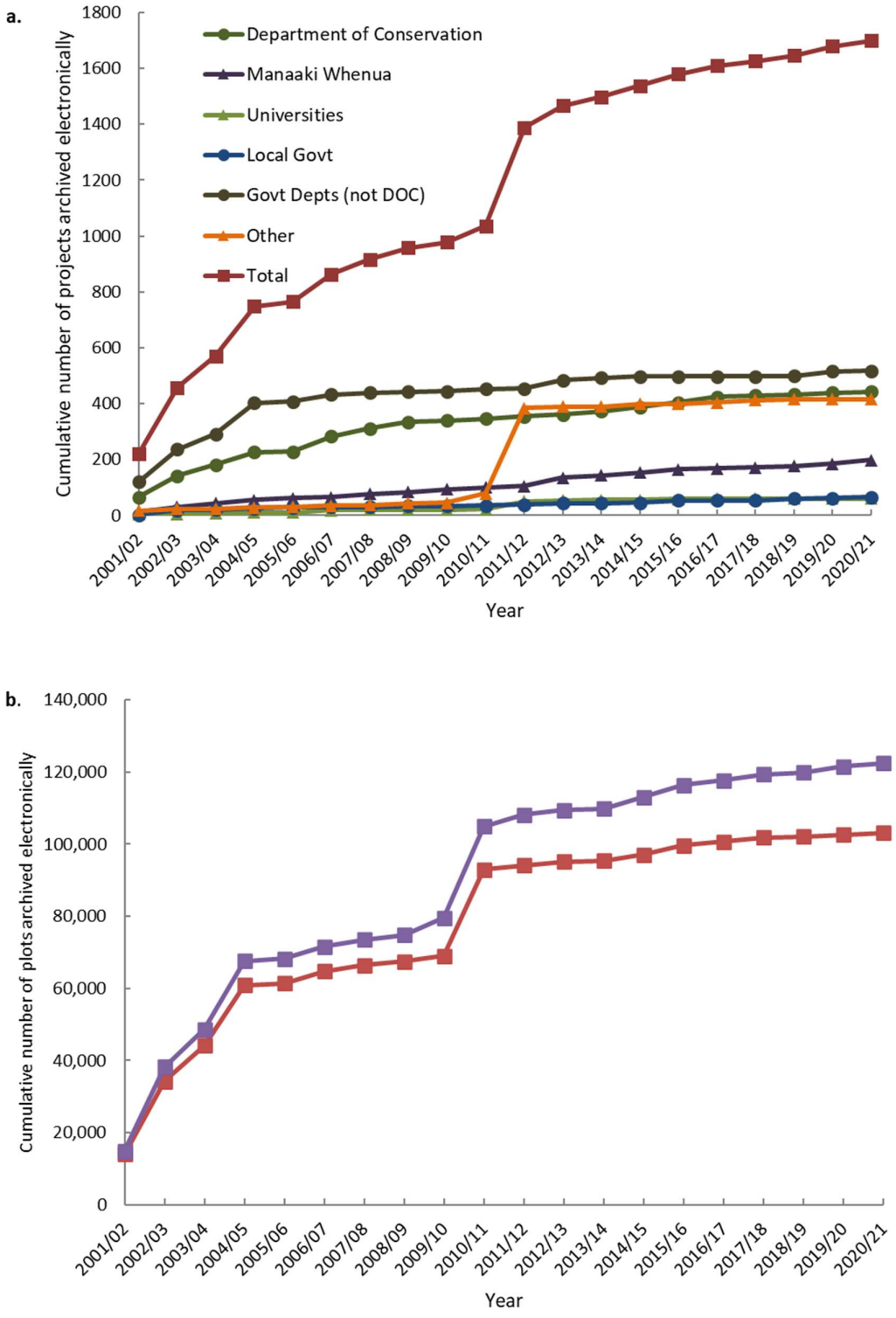

Figure 1. a. Cumulative number of projects archived in NVS, total and from five major contributors, by financial year since the current relational database was developed in 2000. b. Cumulative number of plots archived in NVS, by financial year, over the same period. The red line represents new plots archived; the purple line represents plot measurements archived, which shows plots that have been remeasured. Both figures include projects migrated over time from legacy data management systems used in the past (e.g. data stored as text files compatible with FORTRAN-based analytical tools) or non-NVS formats (e.g. EXCEL).

Major sources of new data this year include:

- three remeasurements of 130 tagged seedling plots in Puketī Forest (Te Tai Tokerau), established to monitor the growth and mortality of seedlings of canopy tree species
- a project established in Taranaki to measure the drivers of *Lophomyrtus bullata* size–density distributions and how these affect myrtle rust infection (96 plots)
- the partial remeasurement of Greater Wellington Regional Council permanent plots for their State of the Environment reporting on upland forests (16 plots on public and private land in the Greater Wellington Regional Council area)
- the 2020 remeasurement of long-standing lakeshore plots on lakes Te Anau, Manapouri and Hauroko (Murihiku) established in 1974 (49 plots) to assess the environmental effects of lake-level management, and the 2021 partial remeasurement of these plots to assess the mortality of trees and shrubs after the high-lake-level event during November/December 2019 (40 plots)
- the measurement of 106 plots in Russell State Forest, with Te Roopu for Russell State Forest (Te Tai Tokerau), to understand the current state of vegetation and bird communities.

NVS Express software facilitated the addition of data for six projects (144 plots) to NVS during 2020/21. Remaining projects were migrated from other formats or entered manually.

3 Archiving physical records

Electronic data are only one part of NVS. The physical archive, maintained under climate-controlled conditions, contains irreplaceable field plot sheets, annotated maps and aerial photographs, photographs of plots themselves, and other invaluable documentation. Many of these ancillary records are vital for relocating plots for future remeasurement and providing details that allow correct interpretation of electronic data.

The archive also includes original paper records that have yet to be digitised. Currently there are 141 boxes of physical records in the NVS archive whose contents require assessment for suitability for accessioning. Once accessioned, plot records will need to be digitised to make their information more widely accessible.

This year substantial efforts were made to accession data from 67 data sets deposited with the NVS databank after the closure of Timberlands West Coast, a state-owned enterprise formed to manage forests after the disestablishment of the New Zealand Forest Service. These data provide an unrivalled resource on forest composition, tree size–class distributions, and tree demography in primary and secondary, managed, and unmanaged, beech and podocarp forests throughout Westland, spanning 1970 to 1999.

4 Enhancing the quality of existing data sets

We have continued to devote resources to addressing much-needed data corrections and revisions across historical data held in the NVS databank. Consistency and high-quality data are especially important for retaining the confidence of data users, in both central and regional government agencies, and with national and international researchers. Following is a selection of corrections and revisions undertaken.

Project data

We corrected the date of c. 1,300 grassland projects that were being reported as having been collected in 2009, the year in which they were migrated into the main data set. This was achieved by improving the query that specifies when data sets were added to the NVS databank.

Plant names and attributes

In taxonomy, a misapplication occurs when a scientific name is used for a taxon that does not include the features of the type specimen within its range of variation. This can happen when the taxon was described based on a specimen from one geographical area, for example, and then later considered to occur in a second geographical area. As the taxon is studied more thoroughly it may be determined that the taxon in the second geographical area is really something different. In this example, the taxon name from the first geographical area is still a valid name, but it was misapplied in the second geographical area.

Plant names in the NVS databank are linked to the reference taxonomy for New Zealand in Ngā Tipu o Aotearoa. In the past, misapplications were not part of Ngā Tipu o Aotearoa, so there was no way to automatically replace the misapplied name, used in the NVS databank, with the name that would be more suitably applied to that taxon. Our solution has been to manually override misapplied names using a list that we periodically updated. This year we started a project to develop an automated solution to take advantage of more complete data on misapplied names in Ngā Tipu o Aotearoa. We have started to catalogue all the misapplied names currently used in the NVS taxon table. In so doing, we learned that misapplications can be associated with synonyms and different taxon concepts, which makes the problem more complex than we originally envisioned. In the coming year we will work to further define the nature of this problem so that we can devise a robust, hopefully automated, solution to resolve it.

5 Technological improvements

5.1 Enhancements to the NVS database, user interface and supporting systems

Ongoing external co-funding demonstrates the commitments of our partners to the NVS databank. Strong collegial relationships among organisations allow us to partner with these organisations to mutually support activities benefiting New Zealand 'Inc.' A key example this year has been our collaboration with MfE and DOC to develop a way to transfer data to and from hand-held electronic data capture devices via an application programming interface. Ultimately this advance will liberate both agencies from the need to collect all data as paper copy in the field. A data exchange schema was developed, piloted, and successfully implemented to import data provided by DOC. Data export, testing and further developments are ongoing. DOC's Tier 1 programme plans to replace the use of hard-copy field sheets with an electronic data capture system in the 2020/21 field season. NVS staff have contributed expertise and documentation to support the development of electronic data capture capacity.

6 Data-sharing agreements, data exchange and journal repositories

We collaborate with numerous domestic and international initiatives to broaden the impact of the data held in NVS. These collaborations facilitate the use of NVS data by users who otherwise may have remained unaware of these data and their potential. In addition to one-off collaborations, NVS contributes data to four initiatives, as follows.

- The sPlot initiative (https://www.idiv.de/?id=176&L=0) is the largest repository of plant community data in the world, with the goal of understanding global patterns in plant diversity across facets, biomes, and scales. NVS provides data from 19,018 plot locations spanning forests, shrublands and grasslands. There are currently 11 global research collaborations involving New Zealand data and researchers.
- The Manaaki Whenua – Landcare Research Datastore (https://datastore.landcareresearch.co.nz/) provides a means for authors of scientific publications to meet journal open access requirements. NVS data are provided in the cleaned and aggregated form that transparently links to publication results. These data sets are resolved via DOIs provided with the original publication or by searching. Between 1 July 2020 and 30 June 2021 the 12 data sets associated with the NVS databank were viewed 551 times. The most commonly viewed data set was one containing plot-level biomass data from the LUCAS / Tier 1 plot network.
- The Global Biodiversity Information Facility (GBIF; https://www.gbif.org) provides open access to data about all types of life on Earth. NVS provides a refreshed data set to the GBIF every month: in September 2021 we provided 1,575,092 unique occurrence records (https://www.gbif.org/dataset/788439f0-3b56-11dc-8c19-b8a03c50a862). Between 1 July 2020 and 30 June 2021 there were 6,089 downloads of species occurrence data, incorporating 1,511.4 million records (Figure 2).

- The Global Forest Biodiversity Initiative (http://www.gfbinitiative.org/ supports cutting-edge research and policymaking in forest science and related initiatives. NVS has contributed data on forest biomass increment and species richness from a set of remeasured permanent plots.

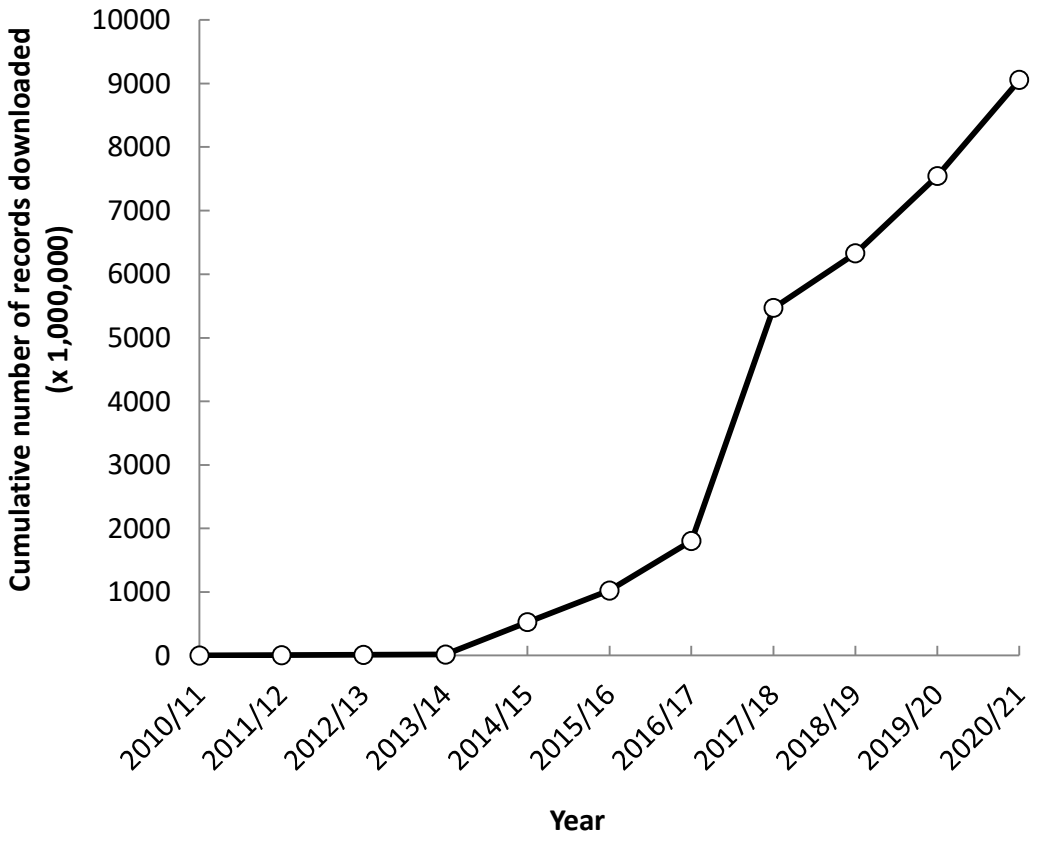

Figure 2. Cumulative number of species occurrence records supplied by the NVS databank that have been downloaded from the GBIF portal since 2010.

7 Use of the NVS website

7.1 Access to NVS data

This year NVS provided 4,510 data sets to meet 138 individual requests (Figure 3). Eighty-three percent of data sets requested were supplied via the NVS website, and 17% were custom requests, with data manually extracted from NVS. Strong use of the NVS website search function is encouraging, as this suggests our recent improvements are helping users discover and request data themselves.

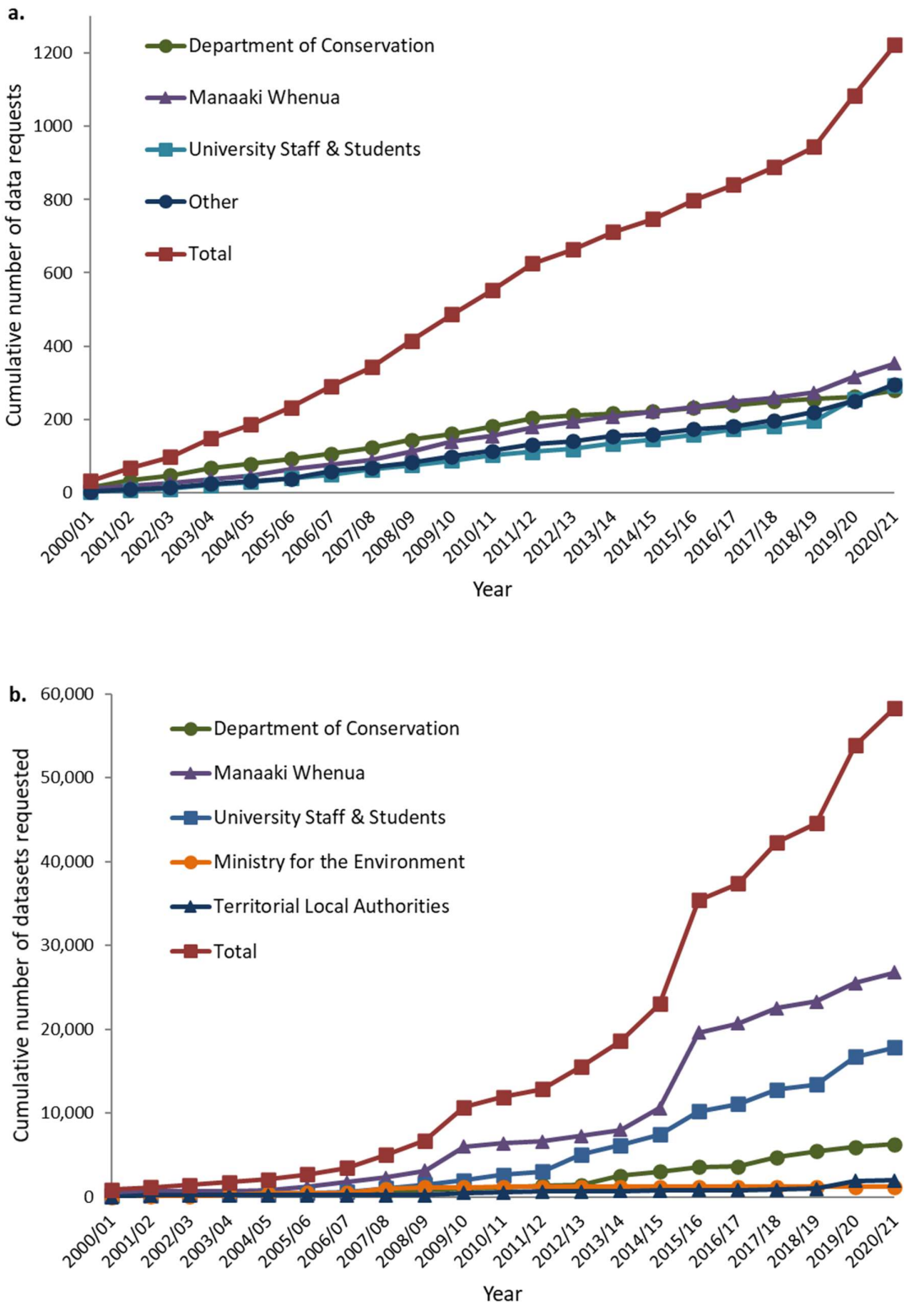

Figure 3. Trends in number of requests for NVS data since 2000, by end-user type. a. cumulative number of requests; b. cumulative number of data sets requested (and delivered).

Here are some examples of intended uses of these data.

- A PhD student from Auckland University of Technology used NVS data for site selection as part of a wider project investigating the impacts of wilding pines in New Zealand.
- A post-doctoral fellow from the University of Canterbury requested data to test for higher-order interactions among tree species in forest communities.
- Multiple data sets have been requested by tertiary education staff for the purposes of designing lectures, course materials and lab exercises.
- Data have been used to support cases in the Environment Court.
- Tree occurrence data were requested by Scion to model optimal sites for planting future forests.

7.2 Document and software downloads

Various documents and software are available to download from the NVS website, and Table 1 shows the number of unique downloads for the most popular of these resources during 2020/21.

Table 1. Number of unique document downloads from the NVS website during 2020/21 (compiled using Google Analytics)

Item	No. of downloads
NVS Plant Names List	389
Forest Plot pro forma data sheets (Recce, Stem Diameter and Sapling etc.)	294
Reconnaissance (Recce) plot manual *	105
DOC Tier 1 pro forma data sheets	55
Foliar browse index: methodology, pro forma data sheets and foliage cover scale	64
Permanent plot manual *	59
DOC Tier 1 Inventory & Monitoring and LUCAS plots field manual	54
Grassland Recce pro forma data sheets	88
NVS Express software package	42
NVS Excel data entry template	37
NVS Express data entry manual	28
Grassland permanent plot manual	18
Recent publication list	17
Using VegX with NVS – and example export	15

*Combined totals for expanded and field guide manuals.

7.3 Web statistics

From 1 July 2020 to 30 June 2021 the NVS website was visited 4,291 times (compared to 6,375 visits in 2019/20), and there were 13,790 page views (compared to 28,699 views in 2019/20).

There were 2,474 unique visitors to the site over this period. Of the current year's hits that could be traced to origin, most were from New Zealand (53%), followed by North America (10%), China (9%), Australia (9%), the Netherlands (5%), Germany (3%) and the United Kingdom (1%). The website was also visited by people from another 64 countries.

8 Increasing end-user awareness and capability

There are currently 679 registered NVS users, with 81 new users registering between 1 July 2020 and 30 June 2021.

NVS provides the primary indigenous forest data repository and user interfaces for the DOC Biodiversity Monitoring and Reporting System (Tier 1) and MfE Land Use Carbon Analysis System (LUCAS) programme. Regular engagement with and collaboration between the parties ensures the services provided by NVS are always being optimised to meet the needs of these two programmes and to support data quality.

In March 2021 Holden Hohaia (Manaaki Whenua – Landcare Research) held a wānanga to demonstrate how to interact with plot data, such as those held by NVS, in the open source software QGIS.

9 Outputs and impact associated with the NVS databank

9.1 Contract reports

The impact of NVS data is demonstrated by the ongoing data contributions to, and use of NVS data by, agencies, environmental consultants, and researchers working on both basic scientific and applied problems. Because contract reports are commissioned by agencies and organisations to meet their immediate needs, they provide more specific indicators of how NVS data are meeting emerging policy and management needs. The following projects are examples of those that yielded contract reports during 2020/21 using data archived in NVS.

Lake shore management

Plot-based vegetation data form the core of lake shore monitoring at Te Anau, Manapouri and Hauroko to determine vegetation responses to fluctuations in lake level. These data form the basis of Meridian's lake-level management prescriptions, and the collaboration is exemplary for its use of ecological data to balance sustainability of ecological integrity with revenue generation from hydro power.

- Monks AM, Schlesselmann A, Brownstein G, Burrows LE 2020. Monitoring of shoreline vegetation at Lakes Manapouri, Te Anau and Hauroko 2020. Manaaki Whenua – Landcare Research contract report LC3802 prepared for Meridian Energy.

The high-water event during November/December 2019 at Lakes Manapouri and Te Anau resulted in several instances in which the duration of lake levels in the high range bands exceeded those prescribed in the operating guidelines for managing the water levels at these lakes. A subset of the lake shore monitoring plots was resurveyed a year after the event to investigate any delayed effects on the vegetation from the high-water event.

- Monks AM, Brownstein G, Schlesselmann A 2021. Assessment of the effects of the 2019 high water event on the terrestrial vegetation at Lakes Manapouri and Te Anau – resurvey. Manaaki Whenua – Landcare Research contract report LC4075 prepared for Meridian Energy.

Environmental reporting by regional councils

Plot-based vegetation data were used by Greater Wellington Regional Council (GWRC) to produce a Terrestrial State of the Environment report and an analysis of water catchment health. GWRC also used plot-based vegetation data, alongside measures of bird and pest animal abundance, to report on the outcomes of pest animal control for forest ecological integrity. In 2020/21 data from beech forests were used to report on a suite of vegetation metrics.

- Schlesselmann AE, Gormley AM, Richardson SJ, Bellingham PJ 2021. Assessment of the ecological integrity of beech dominated forests of managed Key Native Ecosystems in Greater Wellington. Manaaki Whenua – Landcare Research contract report LC3965 prepared for the Greater Wellington Regional Council.

Bay of Plenty Regional Council used plot-based vegetation data to design a sampling framework for the Kaimai Mamaku Forest Park to determine the outcomes of management interventions on ecological integrity.

- Mason NWH, Price RJ 2021. Sampling design options for forest monitoring in the Bay of Plenty Region and the Kaimai-Mamaku forest park. Manaaki Whenua – Landcare Research contract report LC3925 prepared for Bay of Plenty Regional Council.

Estimates of carbon stocks in natural forests

Natural forests and shrublands on farmland are an important carbon stock. Plot-based vegetation data were used to estimate the total carbon stock in the remaining areas of woody vegetation on the 40% of New Zealand that is managed as sheep and beef farms.

- Case B, Ryan C 2020. An analysis of carbon stocks and net carbon position for New Zealand sheep and beef farmland. Contract report prepared by the Department of Applied Ecology, School of Science, Auckland University of Technology. https://beeflambnz.com/sites/default/files/news-docs/BL_Carbon_report_for_review_final_submit.pdf

9.2 Published papers

Publications provide an indicator of scientific excellence. Data archived in the NVS underpinned at least 21 peer-reviewed publications in 2020/21. The actual number of publications and contract reports will be higher as many authors do not cite the source of the data they use, nor do they report back to us on the actual use they have made of the data they sourced from the NVS databank.

Bellingham PJ, Richardson SJ, Gormley AM, Allen RB, Cook A, Crisp PN et al. 2020. Implementing integrated measurements of Essential Biodiversity Variables at a national scale. Ecological Solutions and Evidence 1(2): e12025. doi: https://doi.org/10.1002/2688-8319.12025

Brandt AJ, Bellingham PJ, Duncan RP, Etherington TR, Fridley JD, Howell CJ, et al. 2021. Naturalised plants transform the composition and function of the New Zealand flora. Biological Invasions 23(2): 351–366. doi:10.1007/s10530-020-02393-4

Burge OR, Bellingham PJ, Arnst EA, Bonner KI, Burrows LE, Richardson SJ, et al. 2020. Integrating permanent plot and palaeoecological data to determine subalpine post-fire succession, recovery and convergence over 128 years. Journal of Vegetation Science 31(5): 755–767.

Carpenter JK, Walker S, Monks A, Innes J, Binny RN, Schlesselmann A-KB 2021. Factors limiting kererū (*Hemiphaga novaeseelandiae*) populations across New Zealand. New Zealand Journal of Ecology 45(2). doi:10.20421/nzjecol.45.30

Chidawanyika F, Chikowore G, Mutamiswa R 2020. Thermal tolerance of the biological control agent *Neolema abbreviata* and its potential geographic distribution together with its host *Tradescantia fluminensis* in South Africa. Biological Control 149: 104315. doi:10.1016/j.biocontrol.2020.104315

Dobson-Waitere A, MacIntosh R, Ellison MF, Smallfield BM, van Klink JW 2021. Taramea, a treasured Māori perfume of Ngāi Tahu from *Aciphylla* species of Aotearoa New Zealand: a review of Mātauranga Māori and scientific research. Journal of the Royal Society of New Zealand, in press. doi:10.1080/03036758.2020.1856147

Donovan GH, Gatziolis D, Mannetje A, Weinkove R, Fyfe C, Douwes J 2021. An empirical test of the biodiversity hypothesis: exposure to plant diversity is associated with a reduced risk of childhood acute lymphoblastic leukemia. Science of the Total Environment 768: 144627. doi:https://doi.org/10.1016/j.scitotenv.2020.144627

Elith J, Graham C, Valavi R, Abegg M, Bruce C, Ford A, et al. 2020. Presence-only and presence-absence data for comparing species distribution modeling methods. Biodiversity Informatics 15(2): 69–80. doi:10.17161/bi.v15i2.13384

Fernandez RD, Ceballos SJ, Aragón R, Malizia A, Montti L, Whitworth-Hulse JI, et al. 2020. A global review of *Ligustrum lucidum* (Oleaceae) invasion. The Botanical Review 86(2): 93–118. doi:10.1007/s12229-020-09228-w

Keppel G, Craven D, Weigelt P, Smith SA, van der Sande MT, Sandel B, et al. 2021. Synthesizing tree biodiversity data to understand global patterns and processes of vegetation. Journal of Vegetation Science 32(3): e13021. doi:10.1111/jvs.13021

McCarthy JK, Wiser SK, Bellingham PJ, Beresford RM, Campbell RE, Turner R, et al. 2021. Using spatial models to identify refugia and guide restoration in response to an invasive plant pathogen. Journal of Applied Ecology 58: 192–201. doi:10.1111/1365-2664.13756

McGlone MS, McNutt K, Richardson SJ, Bellingham PJ, Wright EF 2020. Biodiversity monitoring, ecological integrity, and the design of the New Zealand Biodiversity Assessment Framework. New Zealand Journal of Ecology 44(2): 1–12.

Muscarella R, Emilio T, Phillips OL, Lewis SL, Slik F, Baker WJ, et al. 2020. The global abundance of tree palms. Global Ecology and Biogeography 29(9): 1495–1514. doi:10.1111/geb.13123

Paul T, Kimberley MO, Beets PN 2021. Natural forests in New Zealand – a large terrestrial carbon pool in a national state of equilibrium. Forest Ecosystems 8: 34. doi:10.1186/s40663-021-00312-0

Saldaña-López A, Vilà M, Lloret F, Manuel Herrera J, González-Moreno P 2021. Assembly of species' climatic niches of coastal communities does not shift after invasion. Journal of Vegetation Science 32(2): e12989. doi:10.1111/jvs.12989

Simpson KJ, Jardine EC, Archibald S, Forrestel EJ, Lehmann CER, Thomas GH, et al. 2021. Resprouting grasses are associated with less frequent fire than seeders. New Phytologist, 230(2): 832–844. doi:10.1111/nph.17069

Sinnott-Armstrong MA, Donoghue MJ, Jetz WJ 2021. Dispersers and environment drive global variation in fruit colour syndromes. Ecology Letters 24(7): 1387–1399. doi:10.1111/ele.13753

Tamme R, Pärtel M, Kõljalg U, Laanisto L, Liira J, Mander Ü, et al. 2021. Global macroecology of nitrogen-fixing plants. Global Ecology and Biogeography 30(2): 514–526. doi:10.1111/geb.13236

Testolin R, Attorre F, Borchardt P, Brand RF, Bruelheide H, Chytrý M, et al. 2021. Global patterns and drivers of alpine plant species richness. Global Ecology and Biogeography 30(6): 1218–1231. doi:10.1111/geb.13297

Testolin R, Carmona CP, Attorre F, Borchardt P, Bruelheide H, Dolezal J, et al. 2021. Global functional variation in alpine vegetation. Journal of Vegetation Science 32(2). doi:10.1111/jvs.13000

Valencia E, de Bello F, Galland T, Adler PB, Lepš J, E-Vojtko A, et al. 2020. Synchrony matters more than species richness in plant community stability at a global scale. Proceedings of the National Academy of Sciences of the United States of America 117(39): 24345–24351. doi:10.1073/pnas.1920405117

9.3 Conference presentations

Very few people attended or presented at conferences this year due to travel restrictions arising from Covid-19, so there were few uses of NVS data in conference presentations.

Richardson SJ 2020. Holy grail or flight of fancy?: can plant functional traits predict ecosystem function? Keynote to the New Zealand Ecological Society, 4 December 2020, Lincoln University, New Zealand.

9.4 Theses

The following 2020/21 theses used data archived in NVS.

Nepia RE 2020. Understanding the role and impact of introduced honey bees in a submontane indigenous forest ecosystem. PhD thesis, University of Waikato, NZ.

Nomura M 2020. Past and current drivers of species climatic niches and geographic distributions. PhD thesis, University of Otago, NZ.

Rossignaud L 2020. Land use effects on biodiversity and ecosystem services. PhD thesis, University of Canterbury, NZ.

9.5 Book chapters

Allen RB 2021. *Rusa timorensis*. In: King CM, Forsyth DM eds. The Handbook of New Zealand Mammals, 3rd edn. Melbourne, CSIRO Publishing. Pp. 431–511.

9.6 Other uses

Computer model outputs (not publications) by Mike Thorsen:

- a surface of conservation needs for the Hawke's Bay region for Hawke's Bay Regional Council
- wildlife and plant life vulnerability to predators in the Tasman District.

Appendix 1 – New electronic data sets in NVS, 2020/21

Data sets digitised by Manaaki Whenua – Landcare Research

Balls Clearing 2019

Cora Lynn Douglas Fir 2020

FIORDLAND LAKES 2021

MT BARKER WILDING PINES 2020

ORONGORONGO PERMANENT PLOTS 1977

PUKETI FOREST - BRAMLEYS RIDGE 2017

PUKETI FOREST SEEDLING PLOTS 2017

Raukumara Monitoring 2005

Russell State Forest 2021

Taranaki Lophomyrtus bullata plots 2020

Te Anau Wetlands 2018

Urewera Post-Fire Succession 1981

Data sets entered using NVS Express and migrated into NVS

FIORDLAND LAKES 2020

GREATER WELLINGTON STATE OF THE ENVIRONMENT MONITORING 2019

Northern Kaimai vegetation monitoring 2005

SECRETARY ISLAND FOREST 2017

WAIRARAPA WETLAND EXCLOSURES 2019

WAIRARAPA WETLAND EXCLOSURES 2020

Data sets migrated from other formats into NVS

Pirongia Phenology 2020

PUKETI FOREST SEEDLING PLOTS 2009

PUKETI FOREST SEEDLING PLOTS 2012

Hard-copy plot sheets accessioned and archived

Ahaura Quintinia bark thickness 1973

Ahaura- Regeneration and Timber Inventory 1978

Bay of Plenty Wetland Monitoring 2014-2019

Beech Thinning Trial N246 1965-1980 (as summary data only)

Beech Thinning Trial S104 1953-1967 (as summary data only)

Beech Thinning Trial S221 1969-1975 (as summary data only)

Beech Thinning Trial S224 1971-1980 (as summary data only)

Beech Thinning Trial S227 1971-1985 (as summary data only)

Beech Thinning Trial S317 1967-1985 (as summary data only)

Beech Thinning Trial WD324 1970-1992 (as summary data only)

Beech Thinning Trial WD70 1975

Beech Thinning Trial WD70 1977

Beech Thinning Trial WD70 1978

Beech Thinning Trial WD70 1979

Beech Thinning Trial WD70 1981

Beech Thinning Trial WD70 1983

Blackwater- Fletchers Creek Timber Inventory 1970

Blackwater- Fletchers Creek Timber Inventory 1981

CAMPBELL ISLAND - FENCE LINE TRANSECTS - 1970

GLENHOPE SMALL COUPE HARVESTING TRIALS FOREST 1995-1996

GRANVILLE FOREST SMALL COUPE HARVESTING TRIALS 2005Dec

GRANVILLE FOREST SMALL COUPE HARVESTING TRIALS 2019

Granville Timber Inventory 1980

Grey-Inangahua - Beech regeneration 1972

Hochstetter- Deep Creek 1980

Hochstetter SA651- Regeneration 1995

Hochstetter Timber Inventory 1989

Kaniere- Blue Bottle Road- Podocarp Regeneration 1984- 1985

Kaniere- Blue Bottle Road- Podocarp Regeneration 1985

Kaniere- Blue Bottle Terrace- Podocarp Regeneration 1984

Kaniere- Coal Creek- Podocarp Regeneration 1984-1985

Kaniere- Podocarp Regeneration 1984

Kaniere- Timber Inventory 1982

Karamea- Kimberley Timber Inventory 1988

Mahinapua- Frosty Creek Road- Podocarp Regeneration 1984

Mahinapua- Kaka Terrace- Podocarp Regeneration 1984

Mahinapua- Mt Misery- Podocarp Regeneration 1984

Mahinapua- Ruatapu Road- Podocarp Regeneration 1984

Mahinapua- Staircase West Road- Podocarp Regeneration 1984

Mahinapua- Timber Inventory 1982

Maruia Timber Inventory 1979

Mawhera- Blackwater/Sunday Creek Timber Inventory 1987

Mawhera- Notown Timber Inventory 1989

Mawhera SA586- Regeneration 1995

Mawhera- View Timber Inventory 1989

Mikonui- Mair Creek Timber Inventory 1989

Mikonui- Purcell Timber Inventory 1989

Mount Oneone mapped stand 1962

Mt Greenland Timber Inventory 1989

National Inventory and Monitoring Tier 1 Tahr vegetation data 2019-2020

Nemona- Podocarp Regeneration 1984-1985

Nemona SA632- Regeneration 1994

Nemona SA653- Regeneration 1994

Paparoa- Craigieburn- 1984

Pink Pine 1980

Podocarp Thinning Trial- Ahaura WD290 1980

Podocarp Thinning Trial- Mahinapua- WD405 1982

Podocarp Thinning Trial- Mahinapua- WD405 1985

South Westland DOC Domestic Stock Grazing Exclosures

Southern Nelson Indigenous Timber Inventory -Maimai 1978-1980

Southern Nelson Indigenous Timber Inventory- Radcliffe Range 1975-76

Southern Nelson Indigenous Timber Inventory- Te Wharau 1969-70

Station Creek canopy gaps 1994

STATION CREEK GROUP SELECTION TRIALS FOREST 2000

STATION CREEK GROUP SELECTION TRIALS FOREST 2001

STATION CREEK GROUP SELECTION TRIALS FOREST 2002

STATION CREEK GROUP SELECTION TRIALS FOREST 2003

STATION CREEK GROUP SELECTION TRIALS FOREST 2004

STATION CREEK GROUP SELECTION TRIALS FOREST 2005

STATION CREEK GROUP SELECTION TRIALS FOREST 2006

STATION CREEK GROUP SELECTION TRIALS FOREST 2011

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STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 1998

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STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2000

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2001

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2002

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2004

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2005

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2006

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2008

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2011

STATION CREEK SMALL COUPE HARVESTING TRIALS FOREST 2021

Te Wharau Timber Inventory 1988-1989

Timberlands Karamea Inventory 1998

Timberlands Working Circle 1 Operational Area Inventory 1994

Timberlands Working Circle 2 1996-1997

Timberlands Working Circle 2 1999

Timberlands Working Circle 2 Operational Area Inventory 1994

Timberlands Working Circle 3 1994

Timberlands Working Circle 3 Operational Area Inventory 1993-1994

Timberlands Working Circle 4 1998-1999

Timberlands Working Circle 4 Maruia 1998

Timberlands Working Circle 4 Operational Area Inventory 1994

Timberlands Working Circle 5 1995

Timberlands Working Circle 6 Operational Area Inventory 1994

Timberlands Working Circle 7 Operational Area Inventory 1994

UREWERA - RUATAHUNA - SEEDLING SURVEY - 2003-04

Westland Regeneration 1977-1978