

National Report to the 15th General Assembly of ICA



Cartographic Activities in New Zealand 2007-2011

New Zealand Cartographic Society Inc



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Edited by

Igor Drecki

New Zealand Cartographic Society

Each national member of the International Cartographic Association (ICA) is required to submit a report on cartographic activities for the period between General Assemblies. This report has been prepared by the New Zealand Cartographic Society to meet the above requirement for the 2007-2011 period.

Introduction

A number of organisations and individuals have been invited to present a general perspective on cartographic activities in New Zealand. These contributions are either formal or simply offering personal views of individual contributors. It is believed that this approach gives another dimension to understanding the cartographic endeavours undertaken recently in New Zealand. Due to the limited resources of time and resources, unfortunately not all parties have been contacted. Also, some of those contacted have not responded to the invitation.

The report provides a 'snapshot' of some of the activities being carried out within the cartographic establishments and professional communities. It aims to bring together and highlight the accomplishments of professionals and researchers who advance cartography in the private, military and governmental sectors, as well as in education. The support provided by specialised cartographic libraries and map trade is acknowledged.

The report is arranged thematically. The themes include:

1. Cartographic and Mapping Societies
2. Central Government Organisations
3. Local Government Organisations
4. Military Mapping
5. Crown Research Institutes
6. Commercial Cartographic Firms
7. Cartographic Education
8. Resources for Research in Cartography
9. Map Trade

The New Zealand Cartographic Society is the national member of the ICA for New Zealand since 1976, while Land Information New Zealand became an affiliate member of the ICA in 2009.

1. Cartographic and Mapping Societies

There are three active map-oriented professional societies in New Zealand; the New Zealand Cartographic Society (NZCS), the Australian and New Zealand Map Society (ANZMapS) and the Surveying & Spatial Sciences Institute (SSSI), New Zealand Region. These are non profit organisations that gather a wide range of individuals - professionals, educators, curators and map enthusiasts. Despite their similar focus, there has been limited interaction between these societies over the last four years. One such interaction involves organisation of a map competition by the NZCS at the SSSI Conference in November 2011 in Wellington.

The New Zealand Cartographic Society

www.cartography.org.nz

The New Zealand Cartographic Society (ENV, The University of Auckland, Private Bag 92019, Auckland 1142) was founded on 23 February 1971 and its mission is to promote the development of cartography.

The Society is an open association for those individuals and organisations with an interest, passion and excitement in the study, production and use of maps. The membership, available as an individual or corporate, is open to all interested persons and organisations.

Volunteer members manage all Society activities. Services provided include the biennial National Cartographic Conference *GeoCart*, support for students to attend the Conference, biennial National Cartographic Exhibition, coordination of the National Children's Map Competition (part of the ICA Barbara Petchenik Children's Map Award), maintenance of the

Society's website, organisation of cartographic workshops, seminars and courses, and general cartographic information and advice. The Society publishes a newsletter *CartoGRAM*, *GeoCart* proceedings and materials, and occasional publications.

The Society's current Committee includes Geoff Aitken (President), Igor Drecki (Vice President), Tony Moore (Secretary), Lesley Murphy (Treasurer) and six members: Michelle Cooper, Pip Forer, Graeme Jupp, Tim Nolan, Roger Smith and Andrew Steffert. During the 2008-2010 term the following individuals also served on the Committee: Peter Knight, David Mole, Chris Weir and Richard Yates.

The New Zealand Cartographic Society is the official New Zealand representative to the ICA (since the 5th General Assembly in Moscow in 1976). Over the last four years, it has maintained its strong relationship with ICA by attending General Assemblies and actively participating in the International Cartographic Conferences, International Cartographic Exhibitions and ICA Commission's meetings. At the 2007 International Cartographic Exhibition in Moscow, Russia, the topographic map of the *Aoraki / Mount Cook Alpine Area* produced by Graeme Jupp from Terralink International Ltd won the Excellence in Topographic Mapping award. Igor Drecki is the New Zealand principal delegate to the ICA General Assembly and a member of the ICA Commission on GeoVisualisation, ICA Commission on Maps and the Internet and ICA Commission on Mountain Cartography. He is the current Editor of the *ICA News*, newsletter of the ICA. Geoff Aitken is the deputy delegate to the ICA General Assembly and Tony Moore is a member of the ICA Commission on GeoVisualization and ICA Commission on Geospatial Analysis and Modeling. Roger Smith is a member of the ICA Commission on Mountain Cartography and Michelle Cooper is the national coordinator of the Barbara Petchenik Children's Map Award.

In the last four years, the NZCS members attended several ICA events:

- ♦ 23rd International Cartographic Conference and 14th General Assembly of ICA in Moscow, Russia, August 2007
- ♦ Art and Cartography Symposium in Vienna, Austria, February 2008
- ♦ ICA Commission on Mountain Cartography Workshop in Lenk, Switzerland, February 2008

- ♦ 50th Anniversary of ICA in Bern, Switzerland, June 2009
- ♦ 3rd ICA Workshop on Geospatial Analysis and Modelling in Gavle, Sweden, August 2009
- ♦ 24th International Cartographic Conference in Santiago, Chile, November 2009
- ♦ ICA Symposium on Cartography for Australasia and Oceania in Auckland, New Zealand, September 2010

In December 2007 the Society hosted Dr Karel Kriz from the University of Vienna, Austria and Chair of the ICA Commission on Mountain Cartography. Dr Kriz delivered two presentations, one at the University of Auckland (17 December) on *The ICA Commission on Mountain Cartography: Research and Educational Issues and Geo-Communication, Cartography and Design*, attended mostly by academics and students, and one at Land Information New Zealand in Wellington on *Mountain Cartography and Topographic Mapping from a Central European Perspective and Decision Support Tools for Avalanche Risk Management at the Avalanche Warning Centre in Tirol, Austria*, attended by LINZ and Mountain Safety representatives, as well as members of the public.

The fourth National Cartographic Conference *GeoCart'2008* was held in September 2008. Attended by 75 delegates from nine countries, the programme delivered 45 paper and poster presentations, including five keynote addresses and a special presentation by Professor William Cartwright, President of ICA. The Conference Proceedings were published in the prestigious *Lecture Notes in Geoinformation and Cartography* series by Springer Verlag under the title *Geospatial Vision: New Dimensions in Cartography*.

The fifth National Cartographic Conference, *GeoCart'2010*, and the first ICA Symposium on Cartography for Australasia and Oceania was held in Auckland in September 2010. Attended by 79 delegates from nine countries, the programme delivered 43 paper and poster presentations, including six keynote addresses and a special presentation by Professor William Cartwright, President of ICA. The Conference Proceedings are to be published in the *Lecture Notes in Geoinformation and Cartography* series by Springer Verlag later in 2011. Immediately before *GeoCart'2010*, the Society delivered an exciting and current *Map Design with ArcGIS* Workshop

within its *EduCart* initiative launched in 2007. The workshop focused on the use of GIS with sample data to produce high quality cartographic products. The sessions were mainly hands-on, but covered a few talks on principles of cartographic design, relief modelling and generalisation. The main presenter was Prof Cynthia Brewer (USA), supported by Dr Chris McDowall and Igor Drecki.

In February 2011 the Society celebrated its 40th Anniversary at the *Celebration of New Zealand Mapping* dinner. The celebration was attended by 143 people from as far away as Hong Kong, representing about 2800 years of mapping experience! This was surely a record at any national event. Three brief presentations were made at the event: *Our History* by former President Rob Phillips, *The Problems of Authentication in a Digital Environment* by Chief Topographer Geoff Howard, and a glimpse of *The Cartographies of Tomorrow* by ICA President William Cartwright. They were welcomed by mapping staff old and new.

As well as our guest speakers we were privileged to have our only living Life Member with us, Doug Francis. Doug held a number of senior mapping management positions, and often had to fight for resources for mapping programmes and education. He was awarded Life Membership in 1987. Even at 91 Doug maintains a strong interest in mapping. During the proceedings Vice President Igor Drecki was made a Life Member of the Society for his strong and lasting contributions to the cartographic community in New Zealand.

Much of our mapping history was displayed, and quietly appreciated, among the 'memorabilia' in a separate room. A slide show recorded some of the historic events and personalities since 1931 (currently accessible through the Society's website). Participation by GNS Science, Wellington City Council, Critchlows, Terralink International, Land Information New Zealand, Geographx, and NewTopo as sponsors in the technical displays was also appreciated. The success of the event was, in part, attributable to the collaborative nature of national mapping in earlier years.

At the 40th Anniversary event, the Society launched the first product in its *CartoPRESS* publication initiative that aims to promote the discipline of cartography and New Zealand's cartography and mapping heritage. The booklet commemorates the NZMS 260 (1:50 000) and

NZMS 262 (1:250 000) series topographical maps published between 1977 and 2009. The memoir has been compiled to permanently record New Zealand's first national metric topographical map series. As well as the valuable contributions from experts, and references to historic original materials published in the *New Zealand Cartographic Journal*, Graeme Jupp's penchant for detail and variations in the series make his personal contribution full of interest.

Included in the booklet's 100 pages are articles and colour illustrations concerning the development of each series from the 1970s until 2009. It also includes a definitive list of all editions and reprints of each map of both series. The booklet is A5 portrait format and perfect bound for posterity; only 150 copies have been printed and are available from the Society (see website for details).

The Society coordinated New Zealand's contribution to the International Cartographic Exhibition and to the 2011 edition of Barbara Petchenik Children's Map Award. A total of eleven cartographic items will feature in Paris together with ten works by New Zealand children.

The Australian and New Zealand Map Society

www.anzmaps.org

The Australian and New Zealand Map Society (ANZMapS) is an amalgamation of the former New Zealand Map Society (NZMS) and the Australian Map Circle (AMC).

ANZMapS, promotes all aspects of cartography to a wide range of potential users. ANZMapS was created from the merger in March 2009, of the Australian Map Circle (formed 1973) and New Zealand Map Society (formed 1977). ANZMapS promotes communication between producers, users and curators of maps, runs workshops to improve the skills and status of persons working with map collections, and acts as a forum for development and effective use of map collections.

Membership includes map producers, librarians and the map curators of the several national, state and territory libraries and state mapping agencies, publishers, designers, GIS specialists, academics, researchers, and anyone with an interest in maps.

Topics of particular interest to the Society are the history of cartography and exploration as relating to the SW Pacific and Antarctica, military

mapping for the war efforts of both countries, and general map production, use and design in each country.

ANZMapS publishes a refereed journal, *The Globe*, (inherited from the AMC and incorporating the now defunct *New Zealand Map Society Journal*). While irregular, the journal increased in frequency from 1-2 issues a year to 2-3 currently, and has been able to incorporate more colour pages to better reproduce cartographic images, and is attracting an increasing interest from academics. Recent publication schedule included No 59 (2007), Nos 60 and 61 (2008), Nos 62 and 63 (2009), Nos 64, 65 and 66 (2010) and No 67 and forthcoming No 68 (2011).

The Society holds a conference each year on different aspects of map use and mapping. Recent conferences include:

- ♦ Canberra, 2007: *Finding the limits...*
- ♦ Wellington, 2008: *Under the Southern Cross*
- ♦ Brisbane, 2009: *300 Years of Mapping* (with Mapping Sciences Institute, Australia)
- ♦ Adelaide, 2010: *Mapping Climate: an environment for change*
- ♦ Sydney, 2011: *Southern latitudes*

The new Society awards the *Dorothy Prescott Prize* to the best paper presented at its conference each year, and also the *Patricia Alonso Memorial Prize*, to the best third-year student in the cartography course at RMIT University in Melbourne (carried over from the AMC). The Society is keen to support tertiary cartography courses both Australia and New Zealand, but the last few years have seen cartography merged into more technical geomatics or GIS courses, which are beyond this society's remit, and better served by other professional GIS and geomatics organisations.

The society has an email list, a website and an irregular newsletter which is now posted to the website, rather than directly on paper to members. ANZMapS List promotes communication among members and others interested in maps and cartography. More information is available from the Society's website

2. Central Government Organisations

In New Zealand, there are several government departments that engage in cartographic activities, mainly in map publishing, assembly and maintenance of various spatial databases and dissemination of maps on the Internet. These include Land Information New Zealand (LINZ), Department of Conservation and Statistics New Zealand. LINZ is the national mapping organisation that publishes all topographical and nautical maps in New Zealand. Department of Conservation publishes park maps and recreation maps. Statistics New Zealand provides a wide range of statistical and administrative mapping products. Other government organisations produce maps on irregular basis and maintain a vast array of spatial databases relevant to their area of operation.

Land Information New Zealand

www.linz.govt.nz

On 23 September 2009, LINZ released 451 sheets in the NZTopo50 series (scale 1:50 000), and 31 sheets in the NZTopo250 series (scale 1:250 000). These superseded, respectively, the NZMS 260 and NZMS 262 series maps, which had been in continuous circulation since 1977. This was the first occasion on which LINZ had simultaneously released an entire map series, marking a successful transition to the New Zealand Geodetic Datum 2000 (NZGD2000) and New Zealand Transverse Mercator (NZTM) projection. All 482 maps were printed in a portrait A1 format to the recognised New Zealand topographic standard.

Representation of topographic features and symbols for the Topo50 series was achieved using customised software and pre-press facilities provided by 1Spatial (formerly Laser-Scan) in the United Kingdom. Text placement and editing work was undertaken by a team of LINZ cartographers.

Concurrent with the launch of the new series, high-resolution TIFF files of all Topo50 and Topo250 maps were available as free downloads from LINZ's website. A significant outcome of the release was that all maps, both in printed and digital form, were for the first time consistent in colour and registration. Geo-referenced TIFF images, comprising the prime rectangle of each map and suitable for GIS systems, have proved popular, especially with web-based mapping products and services.

Thirty Topo50 map sheets have since been fully updated and released as second editions, and 105 map sheets have been subject to a selective update and released as an edition 1.01.

Maintenance of the National Topographic Database continues as a core function of LINZ's National Topographic Office, with emphasis on improving the spatial accuracy of the data. High resolution satellite imagery and aerial photography is the primary source, with GIS data of many features sourced from a number of Government and commercial agencies. An important part of the revision programme is sourcing hut and track information, which allows the release of more frequent editions of maps in remote wilderness areas.

With the availability of the Topo50 series and online TIFF images, LINZ withdrew its *NZTopoOnline* service in 2010. Topographic vector data is now available in LSLIFF (1Spatial's generic format), and as ESRI shape files, again as free downloads from LINZ's website.

In 2010 LINZ supplied the New Zealand Defence Force with an updated topographic database at 1:500 000 to assist with the creation of aeronautical charts for the Royal New Zealand Air Force. A new topographic series utilising this database is planned to replace the existing 1:500 000 scale NZMS 242 series.

New Zealand's offshore islands, including the Campbell, Auckland, Snares, Bounty and Antipodes islands, and those in the Kermadec Group, were updated from satellite imagery in 2010-11. LINZ plans to release TIFF and Geo-TIFF files of these maps, some at 1:25 000, later in 2011.

In early 2011 LINZ commenced work on new 1:50 000 topographic maps of Darwin Glacier, Dry Valleys, and Ross Island in Antarctica. LINZ and its predecessors, in conjunction with USGS and the US National Science Foundation, have been producing topographic maps in these areas since the 1990s. Most of this mapping was published at 1:50 000 using a Lambert Conformal Conic Projection based on WGS72. LINZ is currently converting this map data to the new McMurdo Sound Lambert Conformal 2000 (MSLC2000) projection, and is aiming to release this data as new Antarctic maps in draft form by the end of 2011.

LINZ's current work on the Antarctic project is to ensure names are assigned to the correct feature with the correct co-ordinates. Names will

then be cartographically placed before the draft maps are released. The New Zealand Geographic Board, which has naming jurisdiction over the Ross Dependency, has been collaborating with the United States on assigning names over these areas for some years, so their depiction on the new maps will provide certainty and accuracy for features that are named – both recently and historically.

Future initiatives about to be progressed by LINZ include taking a stronger leadership role in the coordination of acquisition of imagery, both aerial and satellite and the creation of a National Elevation Data Framework.

The National Hydrographic Authority (NHA), within LINZ, is responsible for the production of hydrographic charts of New Zealand, the South West Pacific nations of Tokelau, Cook Islands, Niue, Tonga and Samoa, and the Ross Dependency in Antarctica. NHA continues to produce both traditional paper charts and raster charts in encrypted format for use in navigational software. Charts are updated by fortnightly Notices to Mariners.

A resolution of the United Nations International Maritime Organisation (IMO) has driven the production of charts in vector format, called Electronic Navigational Charts (ENCs). This resolution requires all hydrographic authorities produce ENCs of major ports and approaches by 1 July 2012. These ENCs are captured from paper charts and NHA is continuing the capture undertaken by the Royal New Zealand Navy Geospatial Intelligence Organisation.

NHA is populating a database, called CARIS Hydrographic Production Database (HPD), with the ENCs. 86 official ENCs have been released to date and a further 30 are required to meet the IMO resolution. Additionally, NHA is producing ENCs of its area of responsibility in the South West Pacific and Antarctica, which are due for release in 2011.

HPD will be the source of all paper charts in the future. Considerable cartographic enhancement is required to create a paper chart from an ENC. Five paper charts, of a folio of 190 charts, have been produced from HPD to date.

In 2009, following the ICC 2009 in Santiago, Chile, LINZ became an affiliate member of the ICA.

3. Local Government Organisations

Most local government organisations in New Zealand are similar in their approach to cartographic activities. Cartography is carried out by either GIS, Planning or Draughting departments. They produce and publish maps of their areas of responsibility on a variety of themes. District and City Councils are primarily concerned with the production of zoning, planning and infrastructure maps, while Regional Councils focus on environmental control and resource mapping.

Some local government organisations adopted a novel approach to meet mapping requirements, where dedicated cartographic sections, or suitable individuals, are undertaking cartographic production.

Horizons Regional Council

www.horizons.govt.nz

The majority of mapping outputs at Horizons Regional Council are GIS maps as compared to cartographic maps. Most of our mapping business uses marked up aerial ortho-photos or aerial diagrams that will show the location of consents, compliance inspections or total farm mapping. These outputs require only basic information and have been largely automated by using templates and scripting. There is little perceived requirement for cartographic input above basic layout. Other products include maps or diagrams for reports or presentations including powerpoint, mapbooks for catchment surveys and engineering works, posters or wall charts, emergency management and crisis mapping, and map services for the corporate viewer. Horizons Regional Council also provides mapping services to assist external agencies.

A decade ago the council had about ten dedicated ESRI ArcInfo/ArcGIS and AutoCAD users at head office and the area offices. The IT department managed core spatial datasets and produced most of the maps and plans. Simple maps would be supplied to external graphic designers for publications.

Now, hardware and software technology has advanced and internal processes have changed to allow ArcGIS to be used in all of the teams for analysis of spatial data as part of their research or by individuals who require an interface with spatial data. Teams and individuals produce their own maps as required. The twenty five plus users

display a wide range of experience and capability from novice through to very capable. Only a few of the ArcGIS users have had formal training in data handling or data theory and have just picked it up as they have gone along. While most of the more recent graduates have completed a paper or two in GIS as part of their studies there are only a handful of staff that hold a formal qualification in GIS. Even fewer have worked as a cartographer for any length of time and are able to offer cartographic services.

While there is a demand for good quality maps by staff and the community, cartographic mapping is not a significant activity within the daily routine of the GIS mappers. The need for a greater cartographic input to mapping is recognised and supported but it is time that is the limiting resource. I would say that most of our mappers would embrace the theory, training and tools to enable them to produce a better map. Then there are others who are happy to accept the default symbology without question and some clients will say "that's good enough".

As we move towards mapping styles that present information, rather than data (where data products can be had by anyone through automated means), where mapping product lifespans are longer and circulation wider, cartographic mapping will likely come of age in this organization.

Bay of Plenty Regional Council

www.boprc.govt.nz

It's been four years since I last reported on the State of Cartography at the BOP Regional Council and since there have not been many changes in the way we create our maps but a lot has changed in the structure of our team which will in time impact how we make our maps in the future.

Back then I asked the question "... maybe shared services really are the way to go?" Turns out I'm able to predict the future...

At the start of this year the Regional Council appointed a new manager to look after our team. He has been given the responsibility of combining the Tauranga City Council and Bay of Plenty Regional Councils GIS/Cartography Teams. We spent the first part of the year getting the systems and processes in place to enable us to work as one. Now it's just a matter of time before it becomes a reality. Shared services would allow for knowledge, time and resources to be shared across

organisations, allowing for the cartographic service to be of a higher quality.

One of the outcomes from this is the need for Cartographic Standards; this will ensure a consistent look and feel across organisations and provide the means for GIS staff to create quality cartographic maps in an efficient manner. A process to establish standards have been formulated which includes consultation with experts and interested parties to ensure the standards created will be most effective for everyone involved.

We are looking into creating a Cartographic Toolbox which would be structured by scale including layer files, map templates, scalable annotation, and customised colour palettes for graphic and aerial mapping, all using ArcMap. At this stage we will be following the LINZ 1:50000 topographic series symbology (it's nationwide, tried and true) and great examples of symbology from across the region and the country. From these sources we will develop a standard that we will share.

We have a lot of work ahead of us but I can see that this will be of great benefit to, not just our two Councils, but by all of the Councils in the region, and potentially even further afield. Watch this space...

4. Military Mapping

The New Zealand Defence Force has recently established the Geospatial Intelligence Organisation (GIO) that services the geospatial requirements of New Zealand Army, Air Force and Navy.

**New Zealand Defence Force
Geospatial Intelligence Organisation**
www.nzdf.mil.nz/jgsf/

As of 1 Jul 2008, the Joint Geospatial Support Facility (JGSF) was renamed the NZDF Geospatial Intelligence Organisation (GIO) and command was transferred from Chief of Navy to HQNZDF (AC SCI).

The primary military role of GIO is to provide geospatial intelligence and geospatial information products to support NZDF military operations, exercises and other activities in the delivery of outputs; and by agreement, to Government and

other approved customers in order to support defence policy objectives.

Geospatial intelligence (GEOINT) is defined as intelligence derived from the exploitation and analysis of integrated imagery and geospatial information about features and activities of defence, security or foreign intelligence interest, viewed in the context of location and time.

To ensure data integrity and to avoid unnecessary duplication, DGIO is the principal data acquisition authority for geospatial data for the NZDF and currently maintains a central Geospatial database for NZDF use. Further customisation of Geospatial data to meet the detailed needs of commanders and intelligence staff is undertaken by unit Geospatial Staff.

Hydrographic Operations, the NZDF's central provider of maps and charts, digital databases and feature foundation data, which undertakes commercial hydrographic services on behalf of the RNZN, will remain under the command of Chief of Navy.

5. Crown Research Institutes

Crown Research Institutes (CRIs) are government-owned businesses with a scientific purpose. Each institute is based around a productive sector of the economy or a grouping of natural resources. Three CRIs in particular are actively engaged in cartographic activities. These are: GNS Science, National Institute of Water and Atmospheric Research (NIWA) and Landcare Research New Zealand.

GNS publishes a range of New Zealand geological and magnetic maps (predominantly at the scales of 1:250 000 and 1:50 000), as well as other related scientific maps. More recently, GNS developed a series of modeling tools for natural hazard predictions and monitoring. NIWA publishes a variety of oceanic and bathymetric charts. Their posters and maps are characterized by innovation and cartographic fidelity. Landcare Research New Zealand publishes a range of innovative and research-driven cartographic products. Their *Land Environments of New Zealand* won several awards, including the Excellence in Cartography Award at the ICA's International Cartographic Exhibition in A Coruña, Spain, in 2005.

GNS Science

www.gns.cri.nz

GNS Science is a government-owned agency specialising in earth and isotope science research. Public Good Science funding has supported continued geological mapping that was previously undertaken by GNS's New Zealand Geological Survey predecessor. A 16 year project is concluding in 2011 with publication of the last of 21 new geological maps that cover New Zealand at 1:250 000. The project, known as *QMAP*, has compiled existing and new information into a GIS from which high quality, lithoprinted maps have been printed from 8-9 digital colour separation files. Since 2007 geological maps of the Aoraki, Taranaki, Christchurch, Whangarei, Fiordland, Haast and Rotorua areas have been printed. These maps with accompanying explanatory texts are available for sale. The underpinning GIS data contain rich attributes that describe the various geological features for each map. These data are also available for sale as digital vector GIS data CDs with accompanying ArcMap and ArcReader projects. The GIS data for each of the 21 map sheets are being combined with minor updates into the *QMAP Seamless GIS* which will become the authoritative, digital-only geological map of New Zealand at 1:250 000.

Increasing use of Web Map Services (WMS) and Web Feature Services (WFS) is being made. The existing 1:1 000 000 Geological Map of New Zealand WMS, viewable through the *OneGeology* portal, is soon to be joined with a new 1:250 000 geological map of South Victoria Land and the *QMAP* series.

National Institute of Water and Atmospheric Research

www.niwa.co.nz

New Zealand Regional Bathymetry (2008): a new bathymetric map of the New Zealand region, compiling data from a variety of central government-funded, commercial and overseas data-sets. This map is an update of the NZ Regional Bathymetry chart published in 1997 and represents the state of our knowledge of the shape of the sea-floor around NZ.

New deep-sea sediment and ocean circulation chart: this new chart summarises archived and previously unpublished distributions of seafloor sediments from the New Zealand coast to the deep ocean, incorporating updated

interpretations of the regional ocean circulation patterns and NIWA's most recent multibeam bathymetry. This work updates the last NZ regional sediment chart published almost 20 years ago in 1989.

Beneath the waves, Wellington Harbour:

The survey of Wellington Harbour was completed using a multibeam echosounder transmitting a fan of 254 beams of high frequency sound to measure water depth. A total of 5.765 billion soundings were collected to survey the entire harbour. As well as water depth, a secondary signal of reflected sound (backscatter) is recorded. Backscatter intensity can help identify the type of seafloor material: whether it's soft or hard, or whether sediments are fine or coarse-grained. An informative poster has been produced highlighting features of Wellington Harbour including: Dredging and propeller wash, the South Seas Ship Wreck, Freshwater springs and Sediment waves.

The Dynamic Seabed of Cook Strait: Cook Strait, between North and South Islands of New Zealand, is characterised by strong winds, rough seas, and vigorous tidal currents that scour and move sediment on the seabed. Major tectonic faults that cross the Strait are earthquake and tsunami hazards, and periodically the region is shaken severely by large earthquakes, the last in 1855. Deep submarine canyons incise the continental margin and extend almost to Wellington's harbour entrance. Their flanks are scarred by many giant submarine landslides that are shaping the seabed on geological time scales of thousands of years. This dynamic seascape is a recreational playground, a significant fisheries ground, a source of geological and oceanic hazards, and a challenge for engineers who manage the power and telecommunication cables that are laid on the seafloor, and those who wish to harness the tides for future energy. For three decades marine scientists have been studying the seabed of Cook Strait to understand the processes that shape it and have now produced a poster set comprising an informative poster and high-impact, frame-able high resolution seafloor map

NIWA releases bathymetric data for public access: NIWA has made a public release of the 250m NZ region bathymetry (i.e., *Undersea NZ*). This release took the form of a web-based service where the public can download for free a range of products (tiffs to shapefiles (contours) to digital terrain models) of NZ's bathymetry for use across sectors, ranging from school projects to

researchers and industry. A level of urgency surrounded this process so that NIWA can be recognised publically as the main provider of NZ bathymetric data.

6. Commercial Cartographic Firms

The commercial cartographic industry in NZ is continuing to expand overall, with more small firms taking advantage of computerised technology and access to a variety of spatial databases to produce a widening variety of map products. The background to the selection of actors in the mapping arena, big and small, follows.

Terralink International Ltd

www.terralink.co.nz

Terralink International is New Zealand's most trusted source for land and property information, spatial data services and geospatial solutions. At the core of Terralink's business are spatial databases containing layers of information about every point of New Zealand. Terralink holds, maintains and manages the most comprehensive, accurate, and up-to-date land and property database available in New Zealand, and is the provider of geospatial data, services and solutions across all major sectors including: Central and Local Government, Emergency Services, Telecommunications, Utilities, Transport, Insurance, Real Estate, Banking & Finance, Health, Agriculture, Education, Engineering, Property Professionals, Retail, and Consumers.

Terralink has extensive expertise across the full geospatial spectrum, including data replication and integration, GIS system design and architecture, spatial data maintenance, data hosting and management, data analytics, geocoding services, photogrammetry, cartography, and web design and delivery.

Terralink International has been a major provider of cartographic services in New Zealand for over a decade, and continues to maintain and provide one of the most comprehensive and up-to-date cartographic databases available in New Zealand. Utilising this comprehensive dataset, Terralink provides a range of high quality and specialised cartographic services, including custom mapping, urban street mapping,

cartographically represented GIS analysis, and the delivery of high quality cartographic basemaps and datasets to customers via web based applications and services.

The trend in New Zealand cartography has seen a move away from the demand for hard copy maps, and customers are now wanting to be able to access highly accurate and up-to-date cartographic data via digital and online/mobile mapping technology.

Terralink is at the forefront of this in New Zealand, and has invested heavily in preparing and developing its cartographic datasets and services so that they can be easily and seamlessly integrated with other GIS data layers, and also easily accessed and used by customers via smart online applications and technology.

Terralink's core cartographic datasets are based on stringent specifications and established processes, and are fully maintained and updated on a daily basis. These datasets and layers are able to be combined to create customised topographic and/or thematic services that can be accessed via the web or in common mapping applications such as ArcGIS Desktop.

Terralink's base urban cartographic dataset at 1:20,000 scale is utilised to undertake a range of client specific custom mapping projects, and is also licensed to customers as an entire dataset for them to access and utilise within their own GIS systems.

One of Terralink's exciting new cartographic initiatives is their latest web product offering called *eMap*. *eMap* has combined Terralink's core scale-less datasets and cartographic databases with public data to create enhanced base-maps for client use. The cartographic data within *eMap* is updated daily via a nightly change detection and map update process. This allows feedback and changes to be incorporated into the map quickly due to the flow through of data maintenance changes to the final maps. Automatic labelling and symbology has been set up in two complementary map styles. Data is offered at scales ranging from 1:500 to 1:16,000,000, is interactive and provides powerful query capabilities.

NorthSouth GIS New Zealand

www.northsouthgis.com

Explorer Graphics Limited (EGL) is undergoing a transition to become NorthSouth GIS New Zealand (NSG NZ). This is in recognition of the

role that NSG NZ plays in the global NSG Group. NSG Group is headquartered here in New Zealand and includes companies in Los Angeles (NSG LLC) and Hyderabad (NSG India Pvt).

NSG NZ focuses on implementing enterprise geographic information systems (GIS) based on Esri's ArcGIS platform. We have applied enterprise GIS at the heart of organizations in New Zealand as diverse as Taranaki Regional Council, Auckland Airport and Ministry for the Environment. GIS supports a wide range of functions from supporting decision making processes through evidence-based policy making to carbon accounting. NSG NZ has also been engaged as a major participant in international projects such as those on behalf of the Port of Los Angeles and the Regional Organization for the Protection of the Marine Environment (ROPME) in Kuwait.

In every case, the map outputs have to be presented in a way that effectively communicates the intended message. So despite our inevitable focus on digital and web mapping, the role of the cartographer is as important as ever here at NSG NZ: to design a beautiful and effective map. All too often we still see very poor web maps that are cluttered, ugly and misleading. We are on something of a mission to ensure that cartographic principles are understood by all organizations that are implementing GIS. There was a time when technology was a barrier to producing an effective web map; today, technology is enabling web maps that can match the printed map in terms of quality of appearance.

NSG NZ's work also includes more traditional cartographic outputs. We continue to produce the visual navigation aeronautical charts for Airways Corporation and the Civil Aviation Authority in New Zealand, under the leadership of New Zealand Aerial Mapping (NZAM), we are privileged to be working on the series mapping of the newly surveyed and monumented Kuwait-Saudi border. In both cases, although the output consists of high quality, hardcopy, large format maps and an atlas, our approach utilizes the cartographic power of modern GIS. We are using a seamless geographic database to manage the production of high quality cartography at a variety of different map scales, as well as associated map marginalia automatically, from a single database repository. The resultant print files produced directly from the GIS are provided to the offset printer, without having to be managed by any

intermediary software for film, plate making and final map production. While this is introducing significant savings into the map and chart production process, the workflow process is most especially preserving the integrity of the source map data.

NSG NZ continues to work with our heartland clients in regional and local government spanning from Cape Reinga, at the top of the North Island, to Bluff at the southernmost point in the South Island. Much of the work of these organizations revolves around 'location' and maps are a key communication medium for a range of activities from District Plan production, land and resource management, to plant pest management and control. One of the interesting trends we are helping implement is the use of maps in smart phones, the very small screens of these devices require innovative approaches to cartography. We are also working with leading edge technologies such as augmented reality.

Some are in denial that cartography is relevant today and that image-based technologies render the cartographer redundant. We disagree - we believe this is another chapter in the ever-evolving story of cartography and a real opportunity for the innovative cartographer. After all, there were those who wrote off cartographers when lithographic plates came along. We are but responding to new challenges and taking advantage of technology to deliver very real and high quality cartography.

Geographx NZ Ltd
www.geographx.co.nz

Geographx is a small mapping company that has earned a reputation for innovation and bold design. Its focus is to emphasise the 'art' in cartography, even if this means swimming against the tide in a world where the demand for function far outweighs the demand for form. As bigger, more established companies move away from pure cartography and more into the wider servicing and delivery of spatial information, Geographx is finding a rewarding niche market for its specialist products and services.

Geographx provides cartographic design and custom mapping for a New Zealand and international clientele. It offers special skills in 3D cartography and prides itself on its ability to produce maps that successfully communicate the character of complex landscapes. It also develops

raster datasets, supplying terrain models and relief base maps to the GIS sector, cartographers and other end users. It has produced a range of print products, including award-winning atlases, and books, and an ever-growing selection of wall map posters.

The company is Wellington-based, operating from an historic former observatory that overlooks the city and harbour from a hilltop site in the Botanic Gardens. The building's past associations with time keeping and navigation (the New Zealand equivalent of the Royal Observatory at Greenwich) provide a constant source of cartographical inspiration.

A significant recent project has seen the company develop derivative raster land cover datasets covering the greater part of Asia, Europe and North Africa. This was for the New Zealand Meteorological Service and their international clients providing weather reporting on television.

Back in New Zealand, we provide a diverse range of custom mapping services to the Department of Conservation, the Government organisation charged with managing one third of the country's total land area. This includes the design and production of large format wall maps for National Park visitor centres, signboards for road-end trailheads, map data for the department's internal use, map posters, brochures and sundry GIS services.

We act as cartographer to *New Zealand Geographic* magazine, and we are a regular and long-time contributor of 3D maps to *New Zealand Wilderness* magazine.

In 2008, the company was part of an international team of cartographers working on *Earth*, voted Best World Atlas at the 2009 ICA conference in Santiago. Geographx was responsible for the hill shaded relief in this tome, also for cartographic artwork on the USA, Mexico, Central America, South America and New Zealand map plates.

At the present time we are heavily involved with *Earth Platinum*, a massive book measuring 1.8m x 1.4m which, when published by Millennium House in Australia will be the largest world atlas ever produced. This project poses a number of technological challenges which require some innovative solutions. Geographx is coordinating a team of cartographers on 5 continents to bring this production together. We are also producing the relief mapping.

A current in-house project involves the development of a new New Zealand wide land cover raster dataset at 5metres/pixel resolution, and a new national digital elevation model at 10m resolution.

New Zealand is a cartographer's delight with its diversity of landforms. Geographx is nevertheless intent on further developing its overseas contacts and interests. We regularly host interns from European cartography schools, and value these placements for the cross-cultural experience and the opportunities they provide to exchange ideas.

NewTopo (New Zealand) Ltd

www.newtopo.co.nz

Since 2005 NewTopo has produced 28 topographic maps setting high standards of cartographic excellence and utility. A retired cartographer, Geoff Aitken of Lower Hutt, perceived the need for quality cartographic products and, with the assistance of cartographic software from Lorient in Paris, has developed maps that are uniquely suited to the New Zealand map-user's needs and environment.

The maps are designed to encourage walking in peri-urban areas around Auckland, Wellington and Christchurch, and tramping on the many public tracks within the New Zealand National Parks. On scales appropriate to the area of interest, the maps have a realistic landform which provides a useful geographic context for the essential topographic information. The road network is very detailed and yet is clear and easy to follow.

NewTopo's maps were the first topographic maps to be produced on the New Zealand Transverse Mercator Projection. Printed on synthetic paper, high-wet-strength, or quality coated papers, the maps are presented folded in a clear vinyl wallet. The maps reflect a high level of cartographic technology and production, resulting in very high quality long-lasting products. A digital copy of each map may be purchased for personal use to enable users to enlarge small areas and print them or to incorporate the extracts in other documents or software.

The maps explore the utility of Land Information New Zealand's LIFF 1:50 000 topographic data and the graphic possibilities of Lorient's cartographic software while producing a useful map product for walkers. Papers describing these features and the development of

NewTopo's unique graphic presentation were presented to the Society's *GeoCart'2006* and *GeoCart'2010* conferences.

7. Cartographic Education

This section focuses on cartographic education at universities. Amongst the eight universities in New Zealand, only the University of Waikato, Auckland and Otago offer courses with a strong cartographic content. Cartography has not been taught at any New Zealand polytechnic since 1994.

Due to the absence of academic cartographers and funding opportunities, cartographic research in New Zealand is somehow limited. *GeoCart*, National Cartographic Conference is the only national cartographic forum specifically dedicated to share research ideas and facilitate networking amongst cartographic community. Contributions from New Zealand authors rarely appear in the international cartographic literature.

Cartographic Education and Research at Universities

University of Otago
www.otago.ac.nz

Cartographic activity at the University of Otago for the reporting period has been concentrated in five groups on campus: at the National School of Surveying, Department of Information Science, Department of Geography, Department of Geology and Department of Applied Science.

At undergraduate and graduate level, a major development in the last four years has been the introduction of a dedicated paper teaching geovisualization and some elements of cartography. The topics covered comprise the representation of space (including 3D) and time (encompassing the cartographic elements of the paper), interfaces (including virtual and augmented reality), cognition and exploration. In the lab, the students explore 3D geographic representation in an online virtual reality environment, design and develop their own interactive geospatial interfaces, and use visual tools to explore complex spatial data sets. This paper was devised and delivered by Tony Moore of Surveying, with help from Holger Regenbrecht of Information Science on virtual reality and augmented reality interfaces. Starting in 2010, this

paper has now run twice, garnering good reviews from the students. This course has been supported at 2nd Year level by a strengthening of the teaching and practice of cartography first principles in the introductory GIS course. The geovisualization paper supports the University's Bachelor of Applied Science in GIS and Postgraduate Diploma of Science (PGDipSci) in GIS. In addition to this, Holger Regenbrecht (Information Science) runs a year-long geographic augmented reality project that underpins his graduate level *Multimedia Interfaces* paper.

At postgraduate level, the last four years has seen one PhD and one PGDipSci completion out of Information Science and Surveying respectively. The PhD study was investigating the cognitive processes of ambulance dispatchers related to the computer displays they use (which are to a greater or lesser degree geographical or map-based in nature) and testing alternative displays, one of which is based on a novel dual-layer monitor (Jared Hayes, now with AgResearch). The PGDipSci dissertation investigated the use of Virtual Reality for Hydrographic Surveying, where the position of a 3D boat in an on-board virtual environment was updated by GPS in real time (Andrew Ternes, now with Port of Melbourne). There is another PGDipSci dissertation in progress, investigating the applicability of online virtual environments to the Surveying, specifically Urban Design profession (Sisi Zhang, School of Surveying).

In the period covered by this report there has been one journal paper (with one other in press), four book chapters (with one other in press) and sixteen conference contributions from Otago researchers in Surveying, Information Science and Applied Science conducting cartography / geovisualization research. Specific topics include the geographic visualization of web site hits (Nigel Stanger), a temporal cartography of wilderness travel (Mick Abbott), investigation of art and cartography coupling, including comic art; geovisual analytics of crime data (Tony Moore), augmented mobile phone visualization of spatiotemporal annotation (Julian Muenster and Mariusz Nowostawski), the hydrographic virtual reality project outlined previously, visualisation of uncertainty using quadrees (Julian Kardos, now with Intergraph) and the

use of cartograms in a GIS context to reflect a user's interest in regions of a map display (Grant Carroll, now with Marlborough District Council). In addition to this there has been a book edited by Tony Moore with Igor Drecki of the University of Auckland (*Geospatial Vision* published by Springer, 2008) containing selected papers from the *GeoCart'2008* conference. A second book based on the *GeoCart'2010* conference is currently in production.

Professional cartographic outputs coming out of the university includes the map output that forms part of publications such as books, book chapters, journal articles and scientific reports (Geography – Tracy Connolly, Geology – Luke Easterbrook, Information Science and Surveying). As well as the graduate and undergraduate papers mentioned before, Geography offers graphics training for their postgraduates which places emphasis on map design skills and Geology runs a short course on *GIS for Geology Training Series* in which some of the basics of cartography are covered (with an emphasis on the needs of geologists). The university is also represented on the committee of the New Zealand Cartographic Society with Tony Moore (as Secretary) performing research coordination and website management tasks.

Finally, we were saddened at the passing of Bruce McLennan in 2008. Through his cartographic work out of Information Science, then AgResearch, Bruce produced maps that were recognised nationally and internationally (his *Indigenous Grasslands* work for the World Conservation Union won a prize at the NZ ESRI Users' conference). He is missed.

8. Resources for Research in Cartography

There are a number of map collections in New Zealand which have sufficient depth in their repositories to be able to provide materials for serious research.

University of Auckland Library www.library.auckland.ac.nz

The University of Auckland Library's map collection is focused primarily on New Zealand, Australasia and the Pacific. It includes

topographic, cadastral, photo mosaic, planning and geological maps, as well as street maps, tourist maps and other commercial maps. It is housed in the General Library map room. The previous custodians of the map room, the Geography subject librarian and the Geology subject librarian, retired in 2010 after 75 years service between them. Recently they integrated the print maps which had been distributed around the university into one collection and provided catalogue access to the New Zealand, Australian and Pacific maps. The newly appointed School of Environment subject librarian is charged with maintaining the print collections and helping to develop digital map and data collections and GIS support and services to the university community.

The collections are predominantly used by staff and students from the Schools of Environment, Architecture and Planning, Fine Arts, Engineering, and Business, as well as Anthropology, History and Law. Currently, GIS expertise is held largely within the Geography department, with increasing interest from other disciplines. The library aims to provide basic GIS support, in collaboration with experts from Geography, for the university as a whole.

The next steps in collection development are to provide access to spatial data and digital maps. It is anticipated that paper collections will continue to be used alongside digital ones, at least for the near future. The challenge is to provide integrated location-centred access to print and digital resources to enable all resources to be used to full potential.

Alongside the service changes, changes are being made to the physical space of the map room to make it easier for clients to find resources and to provide more work and display space. The vision is to create a communal space where staff and students from all disciplines can work with maps and spatial data, carry out analyses using GIS and create spatial representations relevant to their areas of research, with assistance from library and GIS staff. Discussion is invited with people from other academic libraries who are embarking on similar ventures.

Auckland War Memorial Museum Library www.aucklandmuseum.com

The cartographic collection of the Auckland War Memorial Museum Library numbers approximately 10 000 sheet maps, as well as some

atlases; but also includes cartographic material in relevant periodicals, a number of books, and some manuscripts. Most of the sheet maps are 20th century, but there is a fair representation of early maps and charts from the 17th- 19th centuries bound into travel literature or official publications. The collection is largely historically and geographically relevant to New Zealand and the Pacific, although, being part of a War Memorial Museum, there is a strong European element from both World Wars.

Cataloguing activity is limited by time and staffing constraints, but there has been a steady increase in the number of maps available online over the last five years. This cataloguing has included a shift in the classification to bring the map collection in line with the major part of the published material (Library of Congress). The Library has limited space available for the map collection despite major building works at the Museum that finished in 2006; however, a re-housing project is ongoing with the purchase of horizontal plan chests.

Recent activity has focussed on conserving and digitising important maps in the collection; these include the early (pre-1800) maps, cadastral plans showing the growth of Auckland, maps pertinent to current reader requirements, and those destined for exhibition.

The Library collections as a whole are rich in travel literature, and mining this information is coming to the fore as the Museum explores areas for exhibition. The Library is open to the public 6 days a week, and encourages readers to search the online holdings early in their research.

University of Waikato Library

www.waikato.ac.nz/library

The University of Waikato's map collection is based in the University Library. Like the University, the collection dates from the early to mid 1960s. The Library was fortunate to acquire part of the collection of the New Zealand Geographical Society, which formed the backbone of the subsequent collection. It is looked after by a Map Librarian. The collection is available during normal opening hours of the Library.

The collection comprises about 50,000 items, mostly in hard copy. Online access is now provided to various cartographic tools and databases. Books about maps, cartography, GIS, gazetteers and a wide range of atlases are also

held. The emphasis is on New Zealand and the collection includes topographic, geology, soil, forestry, hydrographic, and oceanographic maps. The collection aims to be current and comprehensive in these areas. A small historical collection, concentrating on the Waikato, has been built up.

Alexander Turnbull Library Cartographic Collection

www.natlib.govt.nz/atlib/

The core of Alexander Turnbull Library Cartographic Collection is manuscript and published maps of New Zealand dating from the 17th Century to the present day. Alexander Turnbull's own collection of early maps by settlers, sailors, missionaries and government surveyors was the foundation of the collection. In 1972, when the library gained legal deposit status, there were about 11,000 items. The collection now has over 60,000 items and continues to grow through legal deposit, purchase and donation.

The collection's strengths are in maps, charts and plans of the exploration and early charting, surveying and development of New Zealand. Some international maps are collected, in particular maps of Antarctica, the Pacific Islands and areas of conflict where New Zealand forces have been deployed during the 20th Century. The collection also holds historic and modern atlases, geographic information resources in other formats (e.g. photos, DVDs and CDs), and books and serials on the various aspects of cartography. Hardcopy items are reference only while most digital images of maps are accessible via the web.

Since October 2009, and until early 2012, the majority of the hardcopy items have been inaccessible to the public. During this time, a small selection of 19th Century maps of New Zealand's North Island – as per client request – and current New Zealand maps, charts and atlases have been accessible through the library's temporary reading rooms. When the library building is re-opened access to the Cartographic Collection will have been enhanced. While the collection has been closed, library staff have taken the opportunity to ensure that the majority of the Cartographic Collection is fully described on the library's online catalogues. Funding was also set aside for digitizing maps, and has been largely used to participate in the digitization of historic Department of Lands & Survey maps series, a

University of Auckland School of Environment project. By the time, the Cartographic Collection is reopened in 2012, it will hold over 6,000 digital images of historic maps and charts.

You can search for and order digital images of maps through *Timeframes* (<http://timeframes.natlib.govt.nz>), the Alexander Turnbull Library online pictures database. The library's native catalogues are still the best place to start searching for full descriptive records of cartographic materials (<http://nlzcat.natlib.govt.nz> for published items and <http://tapuhi.natlib.govt.nz>) for unpublished items.

University of Otago Hocken Collections

The map collection has approximately 12,000 items built up from Dr Hockens' original collection of less than 80 items. The collection consists of maps, charts, aerial photos and atlases, and relevant periodicals. The collection focus is particularly on New Zealand, with selective coverage of Australia the Pacific and southern Polar regions. Holdings are particularly strong for Dunedin sales plans and material relating to Southern New Zealand. There is a small but good collection of early world and Pacific maps and charts (1650 - 1850). The focus is historical but the library does collect current material and holds the major series maps of New Zealand. The Map Curator works mornings. The library, which is part of the University Library but also open to the public, is housed in a modern building in Anzac Avenue, Dunedin.

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9. Map Trade

The map trade in New Zealand is operated mainly through bookstore chains. The selection is very limited, primarily street and travel maps, and focused on each store's local area. Souvenir shops in tourist areas frequently offer a better selection, which includes topographical maps. There are only a handful of specialised map shops, most notably Auckland Map Centre, The Map Shop (Wellington), Map World New Zealand (Christchurch) and Map and Chart Shop in Hamilton.