A REVIEW OF THE USE AND MANAGEMENT OF PROTECTED NATURAL AREA PROGRAMME (PNAP) SURVEY REPORTS

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EXECUTIVE SUMMARY

The Terrestrial and Freshwater Biodiversity Information (TFBIS) Programme was established to improve awareness and management of New Zealand's indigenous biodiversity, and this can be facilitated by increased awareness and access to relevant data and information. Protected Natural Areas Programme (PNAP) survey reports and similar ecological survey reports are an important information resource on indigenous biodiversity and provide recommendations about the protection and management of natural areas throughout New Zealand. This report summarises the PNAP survey reports and similar ecological reports currently available, including the coverage of ecological districts by PNAP or other ecological surveys, and the extent of data currently digitised. Furthermore, this report assesses and provides advice on methods to facilitate access to hard copies and electronic copies and associated costs, and risks if access to existing PNAP and other ecological survey reports were to be improved. The purpose and structure of the report is based on a brief (Appendix 1) provided by the Department of Conservation.

The 51 published PNAP survey reports and 17 unpublished reports represent a major information resource on indigenous biodiversity which is well utilised and highly valued by a wide range of users. Although there has been variation in the methods used, and the coverage is not complete, collectively, PNAP survey reports represent an unmatched resource on a national scale, based on ecological districts. There is also largely one owner or custodian, the Department of Conservation, which makes future management more straightforward.

There are also a large number of other ecological survey reports, also covering much of New Zealand. These have, however, been undertaken for a wide range of parties, and the methods, evaluation systems, contents, and coverage vary widely.

The TFBIS Programme could usefully assist with improvements in the management, archiving, and ongoing provision of PNAP survey reports. A cost-effective and practical way to do this would be to establish a web-based central repository of image format .pdf files, available for supply either via the TFBIS Programme website or on CDRom.

ACKNOWLEDGMENTS

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CONTENTS

1. INTRODUCTION

The Protected Natural Areas Programme (PNAP) was initiated in New Zealand in the early 1980s. The primary intention of the programme was to identify and protect representative examples of the full range of indigenous biological and landscape features in New Zealand (PNAP Technical Advisory Group 1986). A survey framework was established by the subdivision of New Zealand into distinctive geographic and ecological units comprising 85 ecological regions and 268 ecological districts (McEwen 1987). This geographical subdivision provided the basis for the evaluation of natural areas, particularly application of the key criterion, representativeness.

The mandate for the Programme was derived from Section 3(b) of the Reserves Act 1977 (one of the Acts subsequently included in Schedule 1 of the Conservation Act 1987):

> *Ensuring, as far as possible, the survival of all indigenous species of flora and fauna, both rare and commonplace, in their natural communities and habitats, and the preservation of representative samples of all classes of natural ecosystems and landscape which in the aggregate originally gave New Zealand its own recognisable character.*

It should be noted, however, that representativeness has been a key criterion in scientific and nature conservation evaluations since the 1970s when it was applied widely in the United Kingdom, USA, and was first used in New Zealand.

PNAP survey reports have been prepared for various parts of New Zealand since 1983 and surveys were initially undertaken to provide a basis for negotiation with landowners about formal protection of Recommended Areas for Protection (RAPs). The intention of the early surveys was to identify the best representative examples of remaining ecosystems and habitats, and also to provide baseline data on remaining indigenous habitats in key parts of New Zealand. The initial focus on the identification of best representative examples has evolved during the life of the programme, reflecting societal changes and increased knowledge of ecological requirements for the sustainable management of indigenous ecosystems and species. There has also been increased recognition of the ecological importance of larger natural areas, connectivity, buffering and adjacent land uses, and ecological functioning and processes (c.f. O'Connor *et al*. 1990).

A recent review (Arand & Lauder 2002) identified that conservation managers and advisers (including consultants) have been having difficulty in getting access to PNAP survey reports and that this is a significant issue affecting conservation management. These concerns led to this review, which was initiated by the Department of Conservation to provide advice that will enable the Sponsor and the Steering Committee of the TFBIS (Terrestrial and Freshwater Biodiversity Information System) Programme to decide whether to fund a project to improve access to existing PNAP survey reports, in order to provide better support for biodiversity conservation (refer to Appendix 1 – Project Brief). There has also been increasing criticism, mainly by some farmers and farming lobby groups, about the use of PNAP survey information in schedules and inventories in district and regional plans under the

auspices of the Resource Management Act 1991. PNAP surveys have been undertaken for more than 20 years and they are still being undertaken. It is timely to undertake a review of this type about the accessibility and use of PNAP survey reports and other ecological survey reports.

This report includes an overview of the project methodology, a compilation of the type and number of existing PNAP and other ecological survey reports, and an assessment of the coverage of ecological districts by PNAP surveys and other ecological surveys. It also provides an assessment of the requirements of the users of survey reports, options for improving access to reports, and recommendations in relation to improved access to PNAP reports.

2. METHODS

All known published reports, draft reports, and reports in press were collated, along with a representative sample of other ecological reports (e.g. Significant Natural Area survey reports compiled for district and regional councils). A questionnaire was compiled to gather further information about the use of and access to PNAP survey reports and other ecological survey reports (refer to Appendix 2), and this was sent to selected staff of the Department of Conservation (mainly in conservancy offices), Regional Councils, and District Councils. The questionnaire included options to improve access to reports, and possible cost implications. Only seven completed questionnaires were returned and telephone interviews were undertaken with environmental policy planners within 63 regional and district councils.

3. NUMBER AND FORMAT OF PNA PROGRAMME SURVEY REPORTS

This section provides a summary of key elements of each completed (published and unpublished) PNAP survey report, including size (i.e. number of pages), publication format (i.e. hard copy and electronic versions), date of field survey, date of publication, and availability. An overview of the coverage of ecological districts by PNAP survey reports is provided in Section 5 below.

3.1 Number, size, formats, and ages of reports

Fifty-one PNAP survey reports have been published to date (refer to Table 1) and we are aware of 17 known unpublished reports (refer to Table 2), making a total of 68 reports. There may be other reports. Figures 1 and 2 show the survey coverage. The size of published reports varies from 60 to 504 pages (including appendices) and all reports have been produced in hard copy formats. The sizes of unpublished PNAP survey reports vary from 43 to 200 pages (refer to Table 2).

Dates of publication span a period of 19 years, from 1984 to 2003, and dates of field survey vary from 1983 to 1999. The usual length of time between field survey and publication is 3-5 years, although in some cases it has been as long as 10-12 years.

Table 1: Location, size, format, date of publication, and date of field survey for published Protected Natural Area Programme (PNAP) survey reports for relevant ecological districts*.

Key H = hard copy, D = digital version available, at least for RAP boundaries.

Ecological Region	Ecological District	Field Survey	Pages	Format	Publication Year	Agency
Western Northland	Ahipara	1994-1996	94	H	1998	DOC, Northland
Western Northland	Maungataniwha	1994-1995	415	H	2002	DOC, Northland
Aupouri	Aupouri	1994-1996	372	H	2003	DOC, Northland
Eastern Northland	Kaikohe	1994-1996	215	H	2000	DOC, Northland
Eastern Northland	Kerikeri	1994-1996	254	H	1999	DOC, Northland
Eastern Northland	Puketi	1994-1995	62	H	1998	DOC, Northland
Eastern Northland	Whangarei	1996-1998	322	H	2001	DOC, Northland
Eastern Northland	Whangaroa	1994-1996	194	H	1999	DOC, Northland
Auckland	Hunua	1987-1988	256	H/D	1999	Auckland Regional Council
Auckland	Rodney	1983-1984	191	H	1992	Auckland Regional Council
Auckland	Waitakere	1988-1989	285	H/D	1993	Auckland Regional Council
Coromandel	Colville Thames Tairua Waihi Te Aroha	1987-1989	295	H	1995	DOC, Waikato
Whakatane	Taneatua	1996	265	H	1999	DOC, Bay of Plenty
Raukumara	Motu	1983	153	H	1986	DOC, Bay of Plenty
East Cape	Waiapu	1983-1990	177	H	1995	DOC, East Coast/ Hawkes Bay
East Cape	Turanga	1990	131	H	1991	DOC, East Coast/ Hawkes Bay
East Cape	Pukeamaru	1984-1985	104	H	1988	DOC, East Coast/ Hawkes Bay
Wairoa	Tiniroto Waihua Mahia Matawai	1995-1997	504	H	2001	DOC, East Coast/ Hawkes Bay
King Country	Taumarunui	1999	334	H	2000	DOC, Wanganui
Taranaki	Matemateaonga	1995	96	H	1996	DOC, Wanganui
Taranaki	North Taranaki	1986	172	H	1991	DOC, Wanganui
Egmont	Egmont	1980-1983	85	H	1986	DOC, Wanganui
Moawhango	Moawhango	1987	103	H	1993	DOC, Wanganui
Hawkes Bay	Heretaunga	1993	140	H	1994	DOC, East Coast/ Hawkes Bay
Hawkes Bay	Maungaharuru	1994-1995	208	H	1996	DOC, East Coast/ Hawkes Bay
Rangitikei	Rangitikei	1993-1994	316	H	1995	DOC, Wanganui
Manawatu	Foxton	1989-1990	264	H	1992	DOC, Wanganui
Manawatu	Manawatu Plains	1993-1994	352	H	1995	DOC, Wanganui
Eastern Hawkes Bay	Eastern Hawkes Bay	1992	196	H	1993	DOC, East Coast/ Hawkes Bay
Wairarapa	Wairarapa Plains	1996	201	H	2000	DOC, Wellington
Molesworth/ Clarence	Balaclava Sedgemere Dillon	1987-1988	294	H	1994	DOC, Nelson/ Marlborough
	Manakau	1998	?	H	1998	DOC, Nelson/ Marlborough

Ecological Region	Ecological District	Field Survey	Pages	Format	Publication Year	Agency
Kaikoura	Kekerengu Aniseed Kowhai	1985	113	H	1986	DOC, Nelson/ Marlborough
North Westland	Ngakawau	1987-1988	178	H	1998	DOC, West Coast
Lowry	Hundalee	1997	257	H	1999	DOC, Nelson/ Marlborough
Puketeraki	Coleridge Craigieburn Cass	1987-1988	306	H	1990	DOC, Canterbury
Banks	Port Hills Herbert Akaroa	1983-1988	342	H	1992	DOC, Canterbury
Heron	Arrowsmith Hakatere Two thumb	1984-1985	214	H	1986	DOC, Canterbury
Heron	Mathias Mt. Hutt	1988-1990	248	H	1990	DOC, Canterbury
Mackenzie	Tekapo Pukaki Ben Ohau Grampians Ahuriri Omarama Benmore	1983-1984	60	H	1984	DOC, Canterbury
Waitaki	Hawkdun	1991-1992	118	H	1994	DOC, Otago
Kakanui	Dansey	1989-1990	106	H	1992	DOC, Otago
Central Otago	Lindis Pisa Dustan	1984-1985	236	H	1994	DOC, Otago
Central Otago	Old Man	1983-1984	174	H	1986	DOC, Otago
Central Otago	Manorburn	1984-1989	150	H	1992	DOC, Otago
Central Otago	Maniototo	Limited field survey	96	H	1994	DOC, Otago
Lammerlaw	Waipori	1990-1992		H		DOC, Otago
Lammerlaw	Macraes	1994		H		DOC, Otago
Waikaia	Nokomai	1986	139	H	1989	DOC, Southland
Waikaia	Umbrella	1985	179	H	1988	DOC, Southland
Southland Hills	Taringatura	1996	144	H	1998	DOC, Southland
Makarewa	Southland Plains	1994-2000	189	H	2003	DOC, Southland

* Note: Ecological districts in Northland have been revised by the Department of Conservation and the revised names and boundaries have been used throughout this report (they do not follow McEwen 1987).

Table 2: Location, size, format, and date of field survey for unpublished Protected Natural Area Programme (PNAP) survey reports

Ecological Region	Ecological District	Field survey	Pages	Format	Date of completion	Agency
Western Northland	Hokianga	1994-1995	200	H	n/a	DOC, Northland
Western Northland	Tutamoe	1994-1995	170	H	n/a	DOC, Northland
Eastern Northland	Whangaruru	1994-1995	150	H	n/a	DOC, Northland
Tokatoka	Tokatoka	1998-1999	130	H	n/a	DOC, Northland
Te Paki	Te Paki	1994-1995	150	H	n/a	DOC, Northland
Auckland/Kaipara	Awhitu Manukau Kaipara Tamaki				n/a	Auckland Regional Council
Whakatane	Te Teko*	1997-2003	130	H	n/a	DOC, Bay of Plenty
Kaimanawa	Kaimanawa**	1986	43	H	1991	DOC, Hawkes Bay, Tongariro/Taupo
Central Volcanic Plateau	Atiamuri	1994-1995	170	H	n/a	DOC, Taupo/ Tongariro
Northern Volcanic Plateau	Otanewainuku	1994	n/a	H	n/a	DOC, Bay of Plenty
Tainui	Herangi	1990s	52 plus appendices	H/D	1997	DOC, Waikato
Pahiatua	Woodville and Puketoi	1991-1992	146	H	1992	DOC, East Coast/ Hawkes Bay
Wairarapa	Eastern Wairarapa	1998	444	H	1998	DOC, Wellington
North West Nelson	Golden Bay	?	?	H		DOC, Takaka
Wairau	Hillersden Blenheim Wither Hills Grassmere Flaxbourne	?	?	H		DOC, Nelson
Lowry	Motunau and Cheviot	1994-95	173	H,D***	draft 2000	DOC, Canterbury
Canterbury Plains	High Plains and Low Plains	****	?	H	In progress	DOC, Canterbury

* Completed July 2003.
** Phase 1 reconnaissance survey only.
*** Completed, landowner consultation being arranged. RAP's digitised but not available to public.
**** Reconnaissance survey only, not yet completed (N. Head, DOC, pers. comm.).

3.2 Field survey methods

Most PNAP survey reports are based on field surveys of vegetation and habitats, although some are Phase 1 or reconnaissance reports based primarily on existing information at the time of the compilation. The techniques used for identification of areas selected to be the subject of field inspections within relevant ecological districts are generally similar, including reconnaissance field surveys, inspection of topographical maps and aerial photographs, and review of existing unpublished/published ecological reports. More recent surveys have tended to rely heavily on past reconnaissance field surveys and database records (if available) when selecting areas to be surveyed. There has been considerable variation in the methods used for field survey and vegetation and habitat classification. The extent and types

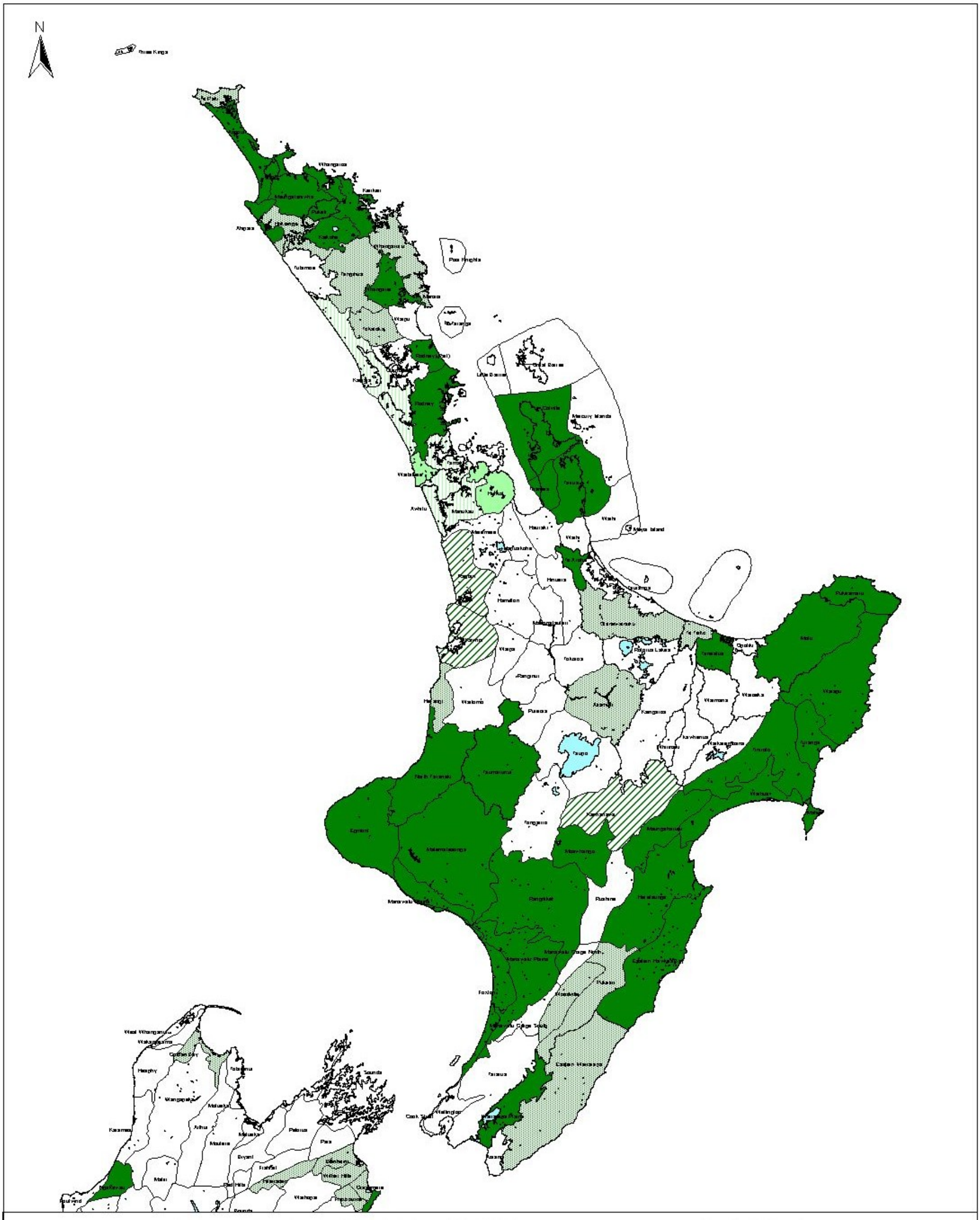

Figure 1 Ecological Districts with PNAP survey coverage - North Island

Legend

- PNAP survey report published (DoC)
- PNAP survey report published (regional council)
- PNAP survey report unpublished (DoC)
- PNAP survey report unpublished (regional council)
- PNAP Reconnaissance inventory
- Ecological District boundary
- Lakes

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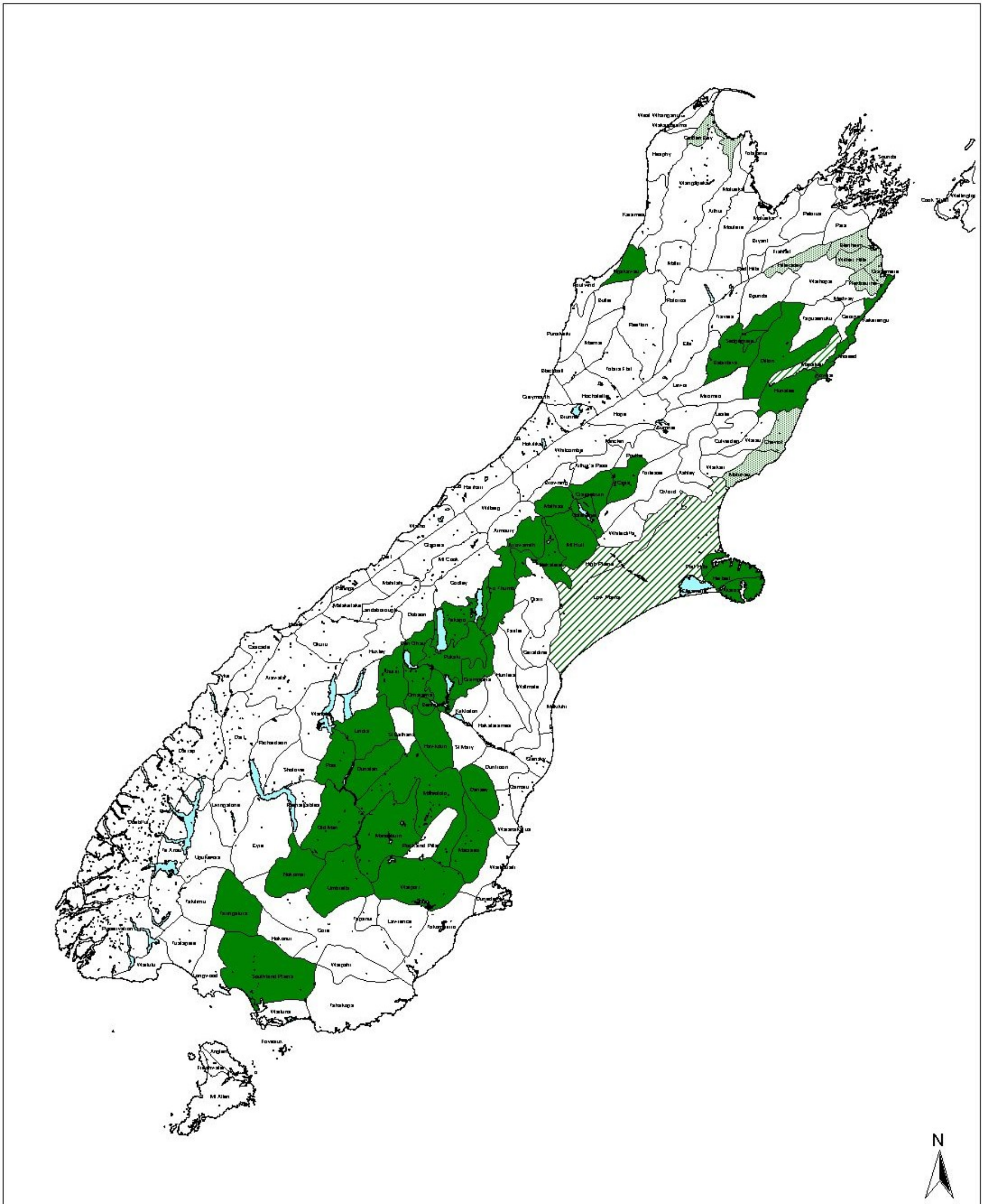

Figure 2 Ecological Districts with PNAP survey coverage - South Island

Legend

- PNAP survey report published (DoC)
- PNAP survey report unpublished (DoC)
- PNAP Reconnaissance inventory
- Ecological District boundary
- Lakes

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1:2,500,000

of field surveys carried out in the various projects range from detailed field inspections and assessment of indigenous vegetation and habitats to road-based reconnaissance surveys using binoculars. The sizes of sample plots established within vegetation or habitat types of interest also varies (e.g. 10 × 10 m, 20 × 20 m, and variable area), as did the methods used to select plot locations (e.g. random locations, transect lines along pre-determined bearings). Some surveys did not use sample plots. The methods used to classify vegetation types also varied between surveys. Most use broad vegetation or habitat categories or systems developed in other studies (e.g. Atkinson 1985 was used in the Manawatu Plains Survey). Twinspan (a vegetation classification and ordination software package) was used in some surveys to classify vegetation categories/communities. In a number of surveys, particularly earlier ones, evaluation of natural areas generally followed the methods provided in the PNAP Survey Manual (Myers *et al.* 1987). However, Bellingham (2001) has noted that there have been departures from methods recommended in Myers *et al*. (1987), and later surveys have increasingly not involved detailed field inspections and plot-based sampling.

3.3 Information in published PNAP survey reports

Most PNAP survey reports have similar structures and types of contents, although writing styles vary considerably, reflecting the styles of the many different authors. The reports generally consist of an overview of geology/landscapes, vegetation (types present), and flora and fauna within the ecological district(s) covered by the report.

The levels of information presented in published PNAP reports varies considerably (refer to Table 3). Most survey reports include a fauna section (e.g. Mitchell *et al*. 1992, Denyer *et al*. 1993, Leathwick *et al*. 1995a, Ravine 1992, 1995, 1996, Whaley *et al*. 2001), providing general overviews (where applicable) for mammals, reptiles, frogs, fish, and invertebrates. Others, however, present information from more detailed fauna surveys, e.g. the use of pit-fall traps (Dickinson 1988 and 1989). All reports provide reasonably detailed descriptions of Recommended Areas for Protection (RAPs) and some also provide information on existing protected areas (expressed as the number of sites, or the percentage of the ecological district protected).

All reports contain RAP descriptions and maps, and information on flora and fauna within each RAP. In most cases boundaries of RAPs have not been digitised except in more recent reports or those commissioned by other agencies or jointly with the Department of Conservation.

3.4 Commissioning agencies

Most PNAP surveys have been undertaken or commissioned by the Department of Conservation and survey reports are generally 'owned' by the Department, although in some cases regional councils have commissioned the surveys and related reports (e.g. Auckland Regional Council - Awhitu, Hunua, and Waitakere Ecological Districts). There are now many cases, however, where regional councils have utilised information from DOC-funded PNAP survey reports in regional databases; e.g. Horizons Regional Council, Wellington Regional Council, Environment BOP, and Environment Canterbury.

3.5 Availability of published reports

PNAP survey reports are generally available through respective Department of Conservation conservancies, relevant regional councils, and some libraries (public and universities). The Landcare Research library at Lincoln holds the full series of PNAP survey reports that have been published in a numbered Department of Conservation series (although not all published reports have been assigned a number). There are however a number of reports missing from the collection, including those published by Territorial Local Authorities (TLAs) (P. Bellingham, pers. comm.). Although there are many sources from which to obtain PNAP survey reports, the availability of reports has not been widely publicised. None are available in an electronic form in their entirety. The boundaries of individual RAPs identified within the reports are seldom available in agency GIS systems, with very limited public access to this information. Digitising of RAP boundaries has been done by Auckland Regional Council (Hunua ED), MAF (for the East Coast forestry project), and Horizons Regional Council which has collated data from all of the PNAP surveys within its region.

Table 3: Overview of the types of information presented in published Protected Natural Area Programme (PNAP) survey reports

Key G= General overview only, not a detailed field survey.

Ecological Region	Ecological District	Vege-tation/ Flora	Fauna	Format	RAP maps	Digital RAP boundaries	Date of publication	Agency
Western Northland	Ahipara	✔	✔	H	✔	?	1998	DOC
Western Northland	Maungataniwha	✔	✔	H	✔	?	2002	DOC
Aupouri	Aupouri	✔	✔	H	✔	?	2003	DOC
Eastern Northland	Kaikohe	✔	G	H	✔	?	2000	DOC
Eastern Northland	Kerikeri	✔	✔	H	✔	?	1999	DOC
Eastern Northland	Puketi	✔	✔	H	✔	?	1998	DOC
Eastern Northland	Whangarei	✔	✔	H	✔	✔	2001	DOC
Eastern Northland	Whangaroa	✔	✔	H	✔	✔	1999	DOC
Auckland	Hunua	✔	G	H	✔	✔	1999	DOC
Auckland	Rodney	✔	G	H	✔	✔	1992	DOC
Auckland	Waitakere	✔	G	H	✔	✔	1993	ARC
Coromandel	Colville Thames Tairua Waihi Te Aroha	✔	✔	H	✔	x	1990,1995	DOC
Whakatane	Taneatua	✔	G	H	✔	x	1999	DOC
Raukumara	Motu	✔	✔	H	✔	x	1986	DOC
East Cape	Waiapu	✔	G	H	✔	x	1995	DOC
East Cape	Turanga	✔	G	H	✔	x	1991	DOC
East Cape	Pukeamaru	✔	G	H	✔	x	1988	DOC
Wairoa	Tiniroto Waihua Mahia Matawai	✔	G	H	✔	x	2001	DOC
King Country	Taumarunui	✔	G	H	✔	?	2000	DOC
Taranaki	Matemateaonga	✔	G	H	✔	?	1996	DOC

Ecological Region	Ecological District	Vege-tation/ Flora	Fauna	Format	RAP maps	Digital RAP boundaries	Date of publication	Agency
Taranaki	North Taranaki	✔	✔	H	✔	x	1991	DOC
Egmont	Egmont	✔	G	H	✔	?	1986	DOC
Moawhango	Moawhango	✔	G	H	✔	?	1993	DOC
Hawkes Bay	Heretaunga	✔	✔	H	✔	X	1994	DOC
Hawkes Bay	Maungaharuru	✔	✔	H	✔	X	1996	DOC
Rangitikei	Rangitikei	✔	✔	H	✔	?	1995	DOC
Manawatu	Foxton	✔	G	H	✔	X	1992	DOC
Manawatu	Manawatu plains	✔	G	H	✔	?	1995	DOC
Eastern Hawkes Bay	Eastern Hawkes Bay	✔	✔	H	✔	?	1993	DOC
Wairarapa	Wairarapa Plains	✔	✔	H	✔	?	2000	DOC
Molesworth/ Clarence	Balaclava Sedgemere Dillon	✔	G	H	✔	X	1994	DOC
	Manakau[1]	✔	✔	H	?	X	1998	DOC
Kaikoura	Kekerengu Aniseed Kowhai	✔	✔	H	✔	?	1986	DOC
North Westland	Ngakawau	✔	G	H	✔	?	1998	DOC
Lowry	Hundalee	✔	✔	H	✔	x	1999	DOC
Puketeraki	Coleridge Craigieburn Cass	✔	✔	H	✔	✔	1990	DOC
Banks	Port Hills Herbert Akaroa	✔	✔	H	✔	✔	1992	DOC
Heron	Arrowsmith Hakatere Two thumb	✔	G	H	✔	✔	1986	DOC
Heron	Mathias Mt. Hutt	✔	✔	H	✔	✔	1990	DOC
Mackenzie	Tekapo Pukaki Ben Ohau Grampians Ahuriri Omarama Benmore	✔	✔	H	✔	✔	1984	DOC
Waitaki	Hawkdun	✔	✔	H	✔	✔	1994	DOC
Kakanui	Dansey	✔	✔	H	✔	x	1992	DOC
Central Otago	Lindis Pisa Dustan	✔	G	H	✔	✔	1994	DOC
Central Otago	Old Man	✔	✔	H	✔	?	1986	DOC
Central Otago	Manorburn	✔	✔	H	✔	?	1992	DOC
Central Otago	Maniototo	✔	✔	H	✔	X	1994	DOC
Lammerlaw	Waipori	✔	✔	H	✔	?	1994	DOC
Lammerlaw	Macraes	✔	✔	H	✔	?	1997	DOC
Waikaia	Nokomai	✔	G	H	✔	?	1989	DOC

[1] Reconnaissance survey only.

Ecological Region	Ecological District	Vege-tation/ Flora	Fauna	Format	RAP maps	Digital RAP boundaries	Date of publication	Agency
Waikaia	Umbrella	✔	G	H	✔	?	1988	DOC
Southland Hills	Taringatura	✔	✔	H	✔	✔	1998	DOC

Some of the unpublished PNAP survey reports are currently undergoing peer-review or other work prior to publication and are generally not readily available, although some information may be provided on request. One report (Herangi ED) is in a final pre-publication stage and some are in press (e.g. Otanewainuku ED).

4. OTHER ECOLOGICAL SURVEYS AND REPORTS

This section discusses a sample of other published and unpublished ecological survey reports. They include ecological surveys commissioned by Territorial Local Authorities (TLAs), regional councils, forestry companies, the Department of Conservation, and Non-Government Organisations. Figures 3 and 4 show an estimation[1] of the coverage of other ecological surveys within TLA districts.

4.1 Range, size, formats, and ages of reports

Many ecological survey reports, other than PNAP survey reports, have been prepared over the period 1979[2]-2003, although most are unpublished. The contents of each report varies, along with the level of detail, although most contain site maps for natural areas, descriptions of natural areas, and information on vegetation and habitats, flora, and fauna. Few projects have generated digital boundaries of natural areas and most are only available in a hard copy format.

Seventeen ecological survey reports are listed below that have contents or significant elements similar to PNAP surveys (or Phase 1 compilations) and reports (refer to Table 4). The total number will be much greater, as many regional and district councils have undertaken or are conducting inventories to address Section 6(c) of the Resource Management Act 1991 (refer to Table 5). This table provides examples only of the types and content of other ecological survey reports and is by no means comprehensive.

Forestry companies and other organisations (e.g. Forest and Bird) have also commissioned or undertaken ecological surveys and produced reports. However, the number of these reports is unknown. Many of the surveys undertaken by forestry companies have been carried out to obtain Forest Stewardship Council certification, to enable the companies to sell timber or timber products into particular overseas markets, or to comply with requirements of the Forests Amendment Act 1993.

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1 These reports vary widely in terms of methods, coverage, and presentation styles. It was also difficult to determine exactly what has been done and the status of some projects.

2 Park G. and Walls G. 1979: Survey of forest remnants on Nelson alluvial plains, Botany Division, DSIR.

Table 4: Examples of other ecological survey reports with key elements similar to Protected Natural Area Programme (PNAP) survey reports (including reconnaissance reports)

Key G= general overview only provided; H = hard copy; D= digital natural area boundaries.

Report title(s)	Ecological region	Ecological districts	No. of Pages	Site maps	Digital site boundaries	Veg/ Flora	Fauna	Format	Date of completion	Date of field survey	Commissioning Organisation
Heritage Inventory – A Landscape Assessment of the South Waikato District 1991-1992	Waikato, Western Volcanic Plateau	Tokoroa, Maungatautari, Hinuera	54	✔		G		H	1992	1991-1992	South Waikato Branch of Forest and Bird
The Opotiki Coast – Ecological Survey and Assessment of the Coastline of Opotiki Ecological District	Whakatane	Opotiki	28	✔		✔	✔	H	1991	1990	DOC East Coast/Hawkes Bay
Natural Heritage of the Opotiki District	Whakatane (part), Raukumara, East Cape (part)	Opotiki, Taneatua (part), Waioweka, Motu, Pukeamaru (part)	559	G		✔		H	1999	1997	Opotiki District Council/ Environment BOP
Ecological Assessment of Natural Areas in Carter Holt Harvey Plantation Forests	Coromandel	Tairua	123	✔	✔	✔	✔	H	2000	1999-2000	Carter Holt Harvey
Rotorua Lakes Ecological District Natural Area Survey	Central Volcanic Plateau	Rotorua Lakes	551	✔	✔	✔	✔	H/D	1998	1996-1997	Rotorua District Council and Environment BOP
Natural Heritage of the Rotorua District	Rotorua	Rotorua Lakes, Atiamuri, Otanewainuku	657	✔		✔	✔	H/D	1998	1996-1997	Rotorua District Council
Wetland and Streamside Survey of Eight Bay of Plenty, Rotorua, and Taupo Plantation Forests	Northern Volcanic Plateau (part), Eastern Volcanic Plateau (part), Western Volcanic Plateau	Kaingaroa, Whirinaki, Atiamuri, Kaimanawa, Otanewainuku,	169	✔		✔	✔	H	1997	1996	Fletcher Challenge Forests Ltd, Timber Management Co. Ltd

Report title(s)	Ecological region	Ecological districts	No. of Pages	Site maps	Digital site boundaries	Veg/ Flora	Fauna	Format	Date of completion	Date of field survey	Commissioning Organisation
	(part), Central Volcanic Plateau, Kaimanawa	Rotorua Lakes, Tokoroa, Taupo									
Natural Heritage of the Kawerau District	Northern Volcanic Plateau, Whakatane	Rotorua Lakes, Te Teko	72	✔		✔	✔	H	1996	1996	Kawerau District Council
Significant Indigenous Vegetation in the Bay of Plenty Coastal Zone	Whakatane, Northern Volcanic Plateau	Opotiki, Taneatua, Te Teko, Otanewainuku, Tauranga, Motu, Pukeamaru, Motiti, White Island, Mayor Island, Waihi	412	✔	✔	✔		H	1994	1991-1993	Bay of Plenty Regional Council
Wildlife and Wildlife Habitat in the East Cape Region (Rasch 1989a)	Whakatane, Raukumara, East Cape, Wairoa, Urewera, Hawkes Bay	Taneatua, Opotiki, Waioeka, Motu, Pukeramaru, Waiapu, Turanga, Tiniroto, Waihua, Mahia, Waimana, Waikaremoana, Ikawhenua, Maungaharuru	172			✔	✔	H	1989	1983-1985	DOC
Wildlife and Wildlife Habitat in the Bay of Plenty Region (Rasch 1989b)	Coromandel, Northern Volcanic Plateau, Central Volcanic Plateau, Western Volcanic Plateau, Eastern Volcanic Plateau, Whakatane, Urewera, Raukumara	Te Aroha, Mayor Island, Tauranga, Otanewainuku, Rotorua Lakes, Motiti, White Island, Tokoroa, Atiamuri, Kaingaroa, Whirinaki, Te Teko, Taneatua, Waimana, Ikawhenua,	136			✔	✔	H	1989	1982-1984	DOC

Report title(s)	Ecological region	Ecological districts	No. of Pages	Site maps	Digital site boundaries	Veg/ Flora	Fauna	Format	Date of completion	Date of field survey	Commissioning Organisation
		Waioeka									
Botanical Conservation Values of Lands Administered by the Bay of Plenty Conservancy	Coromandel, Waikato, Northern Volcanic Plateau, Eastern Volcanic Plateau, Western Volcanic Plateau, Central Volcanic Plateau, Whakatane, Raukumara, Kaimanawa, Urewera, Hawkes Bay, Wairoa	Waihi, Te Aroha, Hauraki, Hinuera, Otanewainuku, Rotorua Lakes, Motiti, Tauranga, Te Teko, Taneatua, Whirinaki, Kaingaroa, Atiamuri, Taupo, Tokoroa, Kaimanawa, Waimana	556	✔		✔		H	1995	1995	DOC, Bay of Plenty Conservancy
Botanical Conservation Assessment of Crown Lands in the Urewera/ Raukumara Planning Study Area	Urewera and Raukumara	Te Teko Taneatua Ikawhenua Whirinaki Waimana Waikaremoana Waioeka Motu Opotiki Pukeamaru	140			✔		H	1988	1985	Department of Lands and Survey, and New Zealand Forest Service
Indigenous Biodiversity of Tauranga District – State of the Environment Reporting 2000	Northern Volcanic Plateau	Tauranga, Otanewainuku	309	✔	?	✔	✔	H	2000	1999	Tauranga District Council
Wildlife and Wildlife Habitat Values of the Mamaku Plateau – an Overview	Central Volcanic Plateau, Northern Volcanic Plateau, Western Volcanic Plateau	Otanewainuku, Rotorua Lakes, Tokoroa	59	✔		✔	✔	H	1983	1982	New Zealand Wildlife Service
Wildlife and Wildlife	Te Paki, Aupouri,	Te Paki, Aupouri,	272	✔		✔	✔	H	1982	1977-	New Zealand

Report title(s)	Ecological region	Ecological districts	No. of Pages	Site maps	Digital site boundaries	Veg/ Flora	Fauna	Format	Date of completion	Date of field survey	Commissioning Organisation
Values of Northland	Kaipara, Tangihua, Tokatoka, Western Northland, Eastern Northland	Maungataniwha, Whangaroa, Ahipara, Hokianga, Kaikohe, Puketi, Kerikeri, Whangaruru, Tangihua, Tokatoka, Waipu, Kaipara								1979	Wildlife Service
Natural Areas of Christchurch: Evaluation and Recommendations for Management as Heritage	Canterbury Plains	Low Plains, Port Hills	47 + appen-dices	✔		✔		H	1993	1993?	Centre for Resource Management, Lincoln University

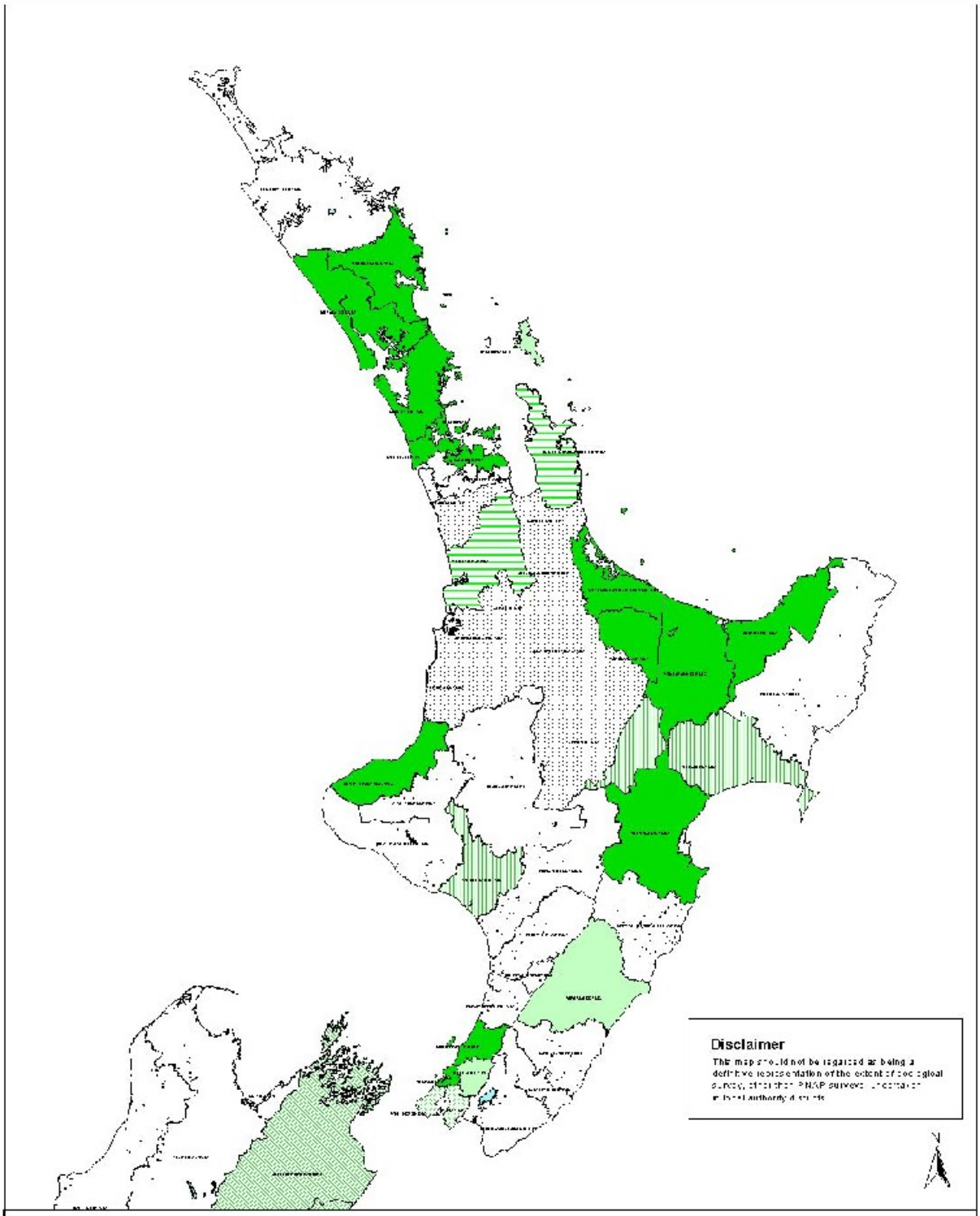

Figure 3 Territorial Local Authority Districts where Ecological Surveys (other than PNAP surveys) have been undertaken

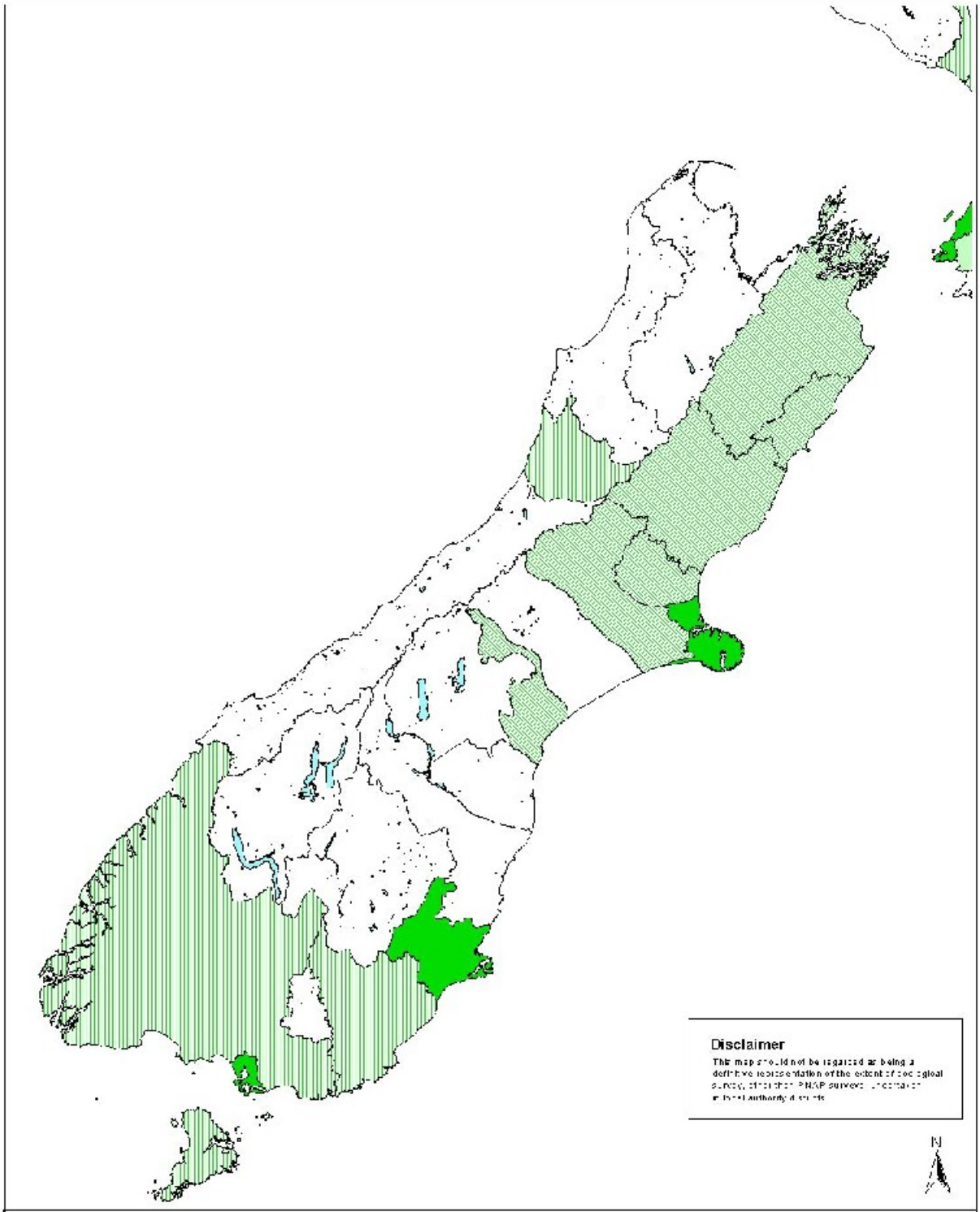

Figure 4 Territorial Local Authority Districts where Ecological Surveys (other than PNAP surveys) have been undertaken

4.2 Field survey methods

As with PNAP surveys, the field surveys carried out in these projects varies in type, intensity, and detail, although there is considerably more variation in the latter. Ecological information may have been obtained from a variety of sources including interpretation of aerial photographs with associated ground truthing, roadside surveys, and detailed field-based vegetation sampling and fauna surveys.

4.3 Use of information

Many district and city councils have incorporated ecological survey information or ecological inventories into district plans, often as lists of significant natural areas, and planning maps may show boundaries for significant sites (refer to Table 5). The nature of ecological information included in district plans varies between councils and this information may have been obtained from a number of sources e.g. PNAP surveys, vegetation and habitat surveys conducted by ecological consultants, past ecological surveys (e.g. N.Z. Wildlife Service SSWI sites), universities, and local government staff.

4.4 Availability of reports and information

Ecological survey reports (and lists of significant natural areas compiled by local government agencies) may be made available to the public in various forms. Information included in a notified District Plan is in the public domain and is freely available. Some councils, such as Rodney, Hamilton, New Plymouth, Nelson, Tasman, and Southland, have provided ecological information on their websites and in some cases have site boundaries available on the Council GIS (e.g. Hamilton, Taupo, Tauranga, Rotorua, Nelson, and Southland). Some regional and district councils are still compiling plans or may be involved with Environment Court processes, and related ecological survey information therefore may not be currently available to the public. Some councils have chosen to work collaboratively with landowners and leaseholders and community groups before making any information on Significant Natural Areas available to the public. In some cases, ecological survey information will only be made available to landowners and leaseholders with natural features on their properties. Other councils have not yet completed ecological inventories and may not do so as they may have used other planning techniques to protect significant areas of indigenous vegetation and habitats. (These may include vegetation clearance rules and/or support for voluntary protection initiatives, including provision of technical support and funding for formal protection, fencing, pest and weed control.)

Digital boundaries for natural areas are generally only available for sites identified more recent reports (1997-2003), and it is likely that electronic copies are available for many of these reports, although the owners may not wish to release them. Forestry companies (at least the larger ones) tend to have digital site boundaries in their electronic information systems and have also established related databases to enable forest managers to have rapid access to information on natural areas on a day-to-day basis.

Table 5: Ecological survey reports and data (including Protected Natural Area Programme (PNAP) survey) held by District and City Councils, and an assessment of their availability (based on responses to the survey questionnaire in Appendix 2)

Key: P✔ = Council holds PNAP survey reports
E✔ = Council holds other ecological survey reports
H = hard copy
W = web-based access provided
D = database
GIS = digital site boundaries

District/City	Ecological surveys/ PNAP reports	Ecological surveys underway or completed	Ecological surveys or RAPs Incorporated into District Plan	Format	Reports available (on request)
Far North	E✓	✓			
Whangarei	E✓	✓			
Kaipara	P✓	✓		H	✓
Rodney	E✓P✓	✓			
North Shore	P✓	✓			
Waitakere	P✓		✓	H/D	✓ (some restrictions)
Auckland	P✓	✓	limited	H	(some to be released in future)
Manukau	E✓	✓(in prep)		H	✓
Papakura	E✓	✓(in prep)	limited	GIS	✓
Western Bay of Plenty	E✓	✓	✓	H/D	✓
Tauranga	E✓	✓		H/D	✓
Rotorua	E✓	✓		H/D	✓
Kawerau	E✓	✓		H	✓
Whakatane	E✓	✓		H	✓
Opotiki	E✓	✓		H	✓
Franklin	E✓		limited	H	✓
Waikato	E✓	✓(in prep)	✓	H/D	✓ (only hard copy)
Hamilton	E✓	✓	✓	GIS	✓
Waipa	E✓	✓	limited	H	✓
Otorohanga		✓	limited	n/a	
Waitomo				n/a	n/a
Thames-Coromandel			limited	n/a	✓
Hauraki			limited	H	✓

District/City	Ecological surveys/ PNAP reports	Ecological surveys underway or completed	Ecological surveys or RAPs Incorporated into District Plan	Format	Reports available (on request)
Matamata – Piako	E✓	✓		H	✓
South Waikato	E✓	✓		H	✓
Taupo	E✓	✓ (in prep)		H	✓
New Plymouth	E✓	✓	✓	H/W	✓
Stratford (west and east)			limited	H	✓
South Taranaki	P✓		✓	H	✓
Ruapehu			limited	H	✓
Wanganui	E✓	✓(in prep)	limited	H	(some data released)
Manawatu			Limited/ PNAP	H	✓
Tararua		✓(in prep	limited	H/W	✓
Palmerston North	E✓	✓(in prep)	limited	H/W	✓(only hard copy)
Horowhenua	E✓		✓(in prep)	H	✓(eventually)
Gisborne	P✓		✓(RAPS)	H/W	✓
Wairoa	P✓	✓(in prep)	limited	H	✓
Hastings	P✓/E✓	✓(in prep)	limited	H/D	✓
Napier			limited	H	✓
Central Hawkes Bay			limited	H	✓
Rangitikei			limited	H	✓
Kapiti Coast	E✓	✓		H/D	✓
Porirua	E✓	✓		H	✓
Upper Hutt		✓(in prep)		n/a	n/a
Lower Hutt			limited	H/W	✓
Wellington	P✓/✓	✓(in prep)	limited	H/GIS	✓
Masterton	E✓	✓(in prep)	limited	H/GIS	✓(hard copy only)
Carterton			limited	H	✓
South Wairarapa				n/a	n/a
Nelson	E✓	✓	limited	H/GIS	✓
Tasman	E✓	✓	✓	H/GIS	✓(hard copy only)
Marlborough	E✓	✓	limited	H	
Kaikoura	P✓	✓(in prep)	limited	H/D	
Buller		✓(in prep)	limited	H	
Grey	Ecological✓			H	
Hurunui	P✓		✓limited		
Waimakariri	E✓	*	✓	H/D	✓(hard copy only)
Christchurch	P✓,E✓		✓	H/D	✓

District/City	Ecological surveys/ PNAP reports	Ecological surveys underway or completed	Ecological surveys or RAPs Incorporated into District Plan	Format	Reports available (on request)
Banks Peninsula	P✓			H/D/GIS	
Selwyn	P				
Ashburton	P✓	(is proposed)	✓	H	✓(some data not available)
Timaru	P✓	✓		n/a	n/a
Mackenzie	P✓	✓(in prep)	✓		
Waimate	P✓		✓	H/GIS	✓(hard copy only)
Waitaki	P✓			n/a	n/a
Dunedin	E✓	✓		H	
Clutha		✓(in prep)		n/a	n/a
Queenstown Lakes			limited	H/GIS	✓
Gore	E✓	✓(in prep)	limited	H	✓(some data not available)
Invercargill	E✓	✓	✓	H/W	✓ (becoming available soon)
Southland	E✓	✓(in prep)	limited	H/W	✓

* Based primarily on existing information?

4.5 Summary

In summary, a large number of ecological survey reports have been completed by regional and district councils throughout New Zealand. These include many district-wide surveys, regional studies of freshwater wetlands (e.g. Otago Regional Council, Tasman District, Environment Canterbury, Environment Waikato, Environment Bay of Plenty, Auckland Regional Council)**,** geothermal areas (Environment Bay of Plenty, Environment Waikato), compilation of regional databases of information on indigenous vegetation and fauna, including PNAP survey data (e.g. Horizons Regional Council, Wellington Regional Council, Environment BOP - although the latter has significant deficiencies and a new database is being developed), and regional studies of current and historic vegetation cover, and the establishment of related regional databases (e.g. Environment Waikato). It should be noted that the Department of Conservation has also undertaken "regional" inventories (within relevant conservancy boundaries) of indigenous vegetation and fauna habitats on private land (e.g. re-evaluation of SSBI sites in the Wanganui Conservancy in the late 1990s; implementation of an ongoing conservancy-wide SSBI survey programme throughout the Northland Conservancy). There have also been conservancy-wide compilations of information on the vegetation and flora of protected areas, providing a useful context for comparison with unprotected natural areas (e.g. Bay of Plenty Conservancy).

It appears that there is generally only limited public awareness of and use of most ecological surveys/inventories undertaken by local government agencies. There are some exceptions in particular districts where landowners and lessees, Federated Farmers, and conservation groups are very aware of the information resources. However, even these groups are unlikely to be fully aware of the range and types of information available. Awareness has been heightened where there has been public controversy associated with an inventory, for example in association with provisions proposed for District Plans (e.g. Banks Peninsula, Hurunui, Far North, Western Bay of Plenty).

In addition to surveys carried out by regulatory authorities there are increasing numbers of ecological surveys being undertaken by private landowners. Forestry companies have undertaken ecological surveys to be able to provide information for their planners, to ensure that significant indigenous vegetation and habitats are protected during harvest and planting operations, and to provide information to underpin resource consent applications. As already noted, within the last five years many forestry companies have undertaken many ecological surveys and implemented monitoring programmes to obtain international certification with the Forest Stewardship Council or to comply with conditions of the Forests Amendment Act 1993. Some of these initiatives have been large scale undertakings, across wide parts of New Zealand (e.g. Fletcher Challenge Forests/Timber Management Company/ Kaingaroa Timberlands have undertaken surveys of natural areas in 25 ecological districts, and Carter Holt Harvey Forests in 36 ecological districts, the latter with additional surveys underway or pending within a further 13 ecological districts). Boundaries of natural areas identified in these surveys have generally been digitised and information is held in Geographic Information Systems (GIS), with linked databases. Information held by forestry companies is generally not made available to

the public, although they do consult widely with stakeholders, including DOC and environmental NGO's.

Maori and other large private landowners are also increasingly initiating and undertaking ecological surveys. This is generally being done to underpin the development of ecological restoration plans.

All of the above users and their advisors will undoubtedly continue to utilise information in PNAP survey reports.

5. COVERAGE OF ECOLOGICAL DISTRICTS BY PNA PROGRAMME AND OTHER ECOLOGICAL SURVEY REPORTS

To date 104 ecological districts (out of a total of 268, or 38 percent) have been surveyed under the auspices of the Protected Natural Areas Programme. A total of 51 PNAP survey reports have been published and 17 are unpublished or are still being completed (Figures 1 and 2; Tables 1 and 2). One hundred and sixty-four ecological districts have not been surveyed as part of the PNAP (Table 6; Appendix 3). However, other ecological surveys have been undertaken in many of these ecological districts. It appears that a further 77[1] ecological districts not surveyed as part of the PNAP have been subject to other ecological surveys, although these may vary widely in terms of methodology, survey intensity, and comprehensiveness. A further 40[1] or so ecological districts appear to have been subject to limited ecological surveys (Figures 3 and 4).

The 88[1] ecological districts which have not been surveyed as part of the PNAP and where other comprehensive ecological surveys have not been carried out have been tabulated based on the levels of formal protection and the percentage of indigenous vegetation remaining in each ecological district for these areas (refer to Table 6). Of the 48 ecological districts with less than 20 percent cover of indigenous vegetation, some type of ecological survey has been undertaken in 26[1] of them, some of which could be considered to be reasonably comprehensive in terms of coverage and the type(s) of information gathered. It must be emphasised that these assessments are indicative only.

There are pitfalls in using this method for the assessment of information deficiencies and relative priorities. For example, the total area of protected habitat in an ecological district may be >50%, but this may represent relatively common habitat types (e.g. montane beech-dominant forest) whereas other significant but limited habitat types (e.g. wetlands, coastal or semi-coastal forest) may not be represented in the protected area network. Priority setting for ecological survey/information gathering needs to also be based on the representation of specific habitats on a local, regional, or national scale. This assessment of relative levels of formal protection is based only on the extent of remaining indigenous vegetation and land administered by the

[1] Note: Indicative numbers only.

Table 6: Summary of Ecological Districts where Protected Natural Area Programme (PNAP) surveys have not been undertaken.

% Indigenous Vegetation[1]	% of ED Protected (land administered by DOC only)			
	<10	10-20	20-50	>50
<10	Culverden*, Duntroon, Geraldine, Glenavy, Gore, Hamilton*, Hinuera*, Kaingaroa*, Makikihi, Motueka*, Oamaru, Waikari*, Waipa, Waipahi.			
10-20	Opotiki*, Moutere*, Fairlie*, Hapuakohe, Lawrence*, Maungatautari, Otamatea*, Tauranga, Tokomairiro*, Waikouaiti, Waimate.	Ellesmere*, Hauraki, Tokoroa*.		Mt Cook*.
20-50	Dunedin*, Raglan, Waiau*, Waipu*, Waitomo, Wellington*, Whitecliffs*.	Hokonui*, Kawhia, Meremere, Ranginui, Rotorua Lakes*.	Longwood*, Para*, Tahakopa*, Tuatapere*, Upukerora*, Waihi, Waituna*.	Armoury, Browning, Godley*.
>50	Ashley*, Foveaux, Hakataramea*, Leslie*, Medway*, Orari, Richardson, Rock and Pillar, Tapuaenuku*, Wanaka.	Hunters*, Shotover, Taupo*.	Blackball*, Cook Strait*, D'Urville, Dobson*, Eyre, Foulwind, George*, Greymouth*, Harihari, Hochstetter*, Hokitika, Kirkliston*, Lewis*, Manawatu Gorge, Mercury Islands, Miromiro*, Oxford*, Pureora, Remarkables, Sounds*, St Mary, Sumner*, Tairua, Takitimu*, Tapanui*, Tararua*, Torlesse*, Tutamoe*, Waihopai*.	Anglem, Aorangi, Arawata, Arthur*, Arthurs Pass*, Bounds*, Brunner*, Bryant, Buller, Cascade, Darran*, Dart, Doubtful*, Ella, Fishtail*, Freshwater, Glaciers, Great Barrier, Haast, Heaphy, Hope*, Huxley, Ikawhenua*, Karamea, Landsborough, Little Barrier*, Livingstone, Mahitahi, Maimai, Manawatu Gorge, Mataketake, Matiri, Mayor*, Minchin*, Mt Allen, Okuru, Paringa, Pelorus*, Poor Knights, Poulter*, Preservation*, Punakaiki, Pyke, Red Hills*, Reefton, Rotoroa*, Ruahine, Te Anau*, Taranga, Three Kings, Tongariro, Totara Flat, Totaranui*, Travers*, Waiho, Waikaremoana, Waimana*, Waioeka, Waitutu*, Wakamarama*, Wangapeka, West Wanganui*, Whirinaki*, Whitcome, Wilberg.

Key

[1] From landcover database (1996).

* Other ecological surveys have been undertaken or are underway in this ED.

Department of Conservation. It does not take into consideration areas that may be protected by other mechanisms (e.g. Nga Whenua Rahui kawenata and QEII covenants). Nevertheless, protected areas within most ecological districts, especially in the South Island high country, are predominantly administered by DOC. There are, however, extensive areas of Ngawhenua Rahui kawenata and QEII covenant in some districts (such as Motu Ecological District).

In spite of the above drawbacks, there is still considerable merit in setting indicative priorities based on the representation of indigenous vegetation and habitats within each ecological district. The lower the amount remaining, considered in conjunction with level of protection and types of features protected, the higher the relative priority for ecological survey. It is generally also necessary to undertake assessments of representativeness of indigenous vegetation and habitats at a more detailed scale than ecological districts. Districts can be subdivided using bioclimatic zones and landform units (c.f. Beadel *et al*. 1998) to provide more detailed levels of analysis. Land Environments of New Zealand (LENZ) also provides an analytical framework for the evaluation of the representation of indigenous vegetation and habitats at various scales.

6. USE OF PNAP SURVEY REPORTS

The main users of PNAP survey reports have changed over time. Past users and usage is summarised below for two main periods: pre-1990 and post-1990.

Pre-1990

The main users pre-1990 were staff of Crown land management agencies (Department of Lands and Survey, New Zealand Forest Service, and Department of Conservation from the late 1980s), and ecologists. In the South Island, PNAP survey reports were used to provide information on applications for discretionary consents under the Land Act e.g. for forestry, cultivation, and burning of tussock grasslands. There was also a Land Settlement Board moratorium preventing the granting of applications over RAPs, and this remained in place in the early days of the Department of Conservation. Information was also used by the QEII National Trust when developing early property plans, e.g. Birchwood Station.

Post-1990

The pre-1990 pattern of usage probably continued until the early 1990s when there was a marked change with the advent of the RMA in 1991. This led, within a few years, to increased use of PNAP survey reports as a source of information for district and regional plans, and as a basis for ongoing tenure reviews in the South Island high country. A list of recent users is provided in Table 7. These include central and local government agencies (e.g. Department of Conservation, District and Regional Councils, MAF), environmental/ecological consultants, CRI's (Landcare Research), NGO's (e.g. QEII, Forest and Bird, Fish and Game New Zealand), private landowners (e.g. forestry companies, Iwi groups), planners, and university staff and students.

Anticipated Future Users and Usage

The likely future users of PNAP survey reports are likely to be similar to users post-1990 (Table 7), but the usage of reports (and related ecological data) is expected to increase. For example, council planners are now commonly requesting PNAP survey reports in relation to the assessment of proposed subdivisions and related mechanisms to protect indigenous vegetation and habitats (e.g. protection lots in exchange for subdivision lots) and MAF obtained and digitised RAP boundaries relevant to the East Coast forestry project (RAPs have also been included, as 'Protection Management Areas', in the Gisborne District Plan).

Iwi groups are also becoming increasingly aware of PNAP survey reports and their potential usefulness to underpin management planning, ecological restoration initiatives, and related funding applications. NGO's (e.g. Fish and Game New Zealand and Forest and Bird) are likely to make increasing use of the reports and ecological data, in relation to resource consent applications and protection proposals, although they are well aware of the limitations of older reports in particular. Ultimately, usage will reflect the usefulness, accuracy, and relevance of the information in the survey reports. Usefulness will decline as reports age, unless new data is collected, although they will continue to provide baseline data and information for a very long time, probably at least several decades.

Awareness and Access Issues

Published PNAP survey reports are available to the public and are provided, on request, to local authorities and consultants (including CRI's) by the Department of Conservation and Councils. Reports are loaned, photocopied (in full or part), or purchased and the contents are used in GIS or database environments. Purchase costs range from free to $50 per copy for a survey report) (refer to Table 7).

Access, and use, is constrained in some places by the limited number of hard copies of some reports currently available. There is a reported case of central copies being held in a DOC Conservancy office, and staff, and others, have to travel to that office to get access to reports. This involves considerable cost and also means that there is some risk of damage over time as the central copies are photocopied.

Public awareness of PNAP survey reports is generally limited and the number of requests for individual reports (in part or whole) is usually less than 10 per year. However, there has been increased interest in access to PNAP survey information for translation into databases or GIS formats, particularly from planners, NZ Landcare Trust, QEII, ecological consultants, and councils. Access to older PNAP survey reports is becoming increasingly difficult and hard copies of these reports are still sought after.

It should be stressed, though, that the number of direct users of PNAP survey reports is not an absolute measure of the use of the information contained in the reports. This is because the direct users of PNAP survey reports generally use information in the report to prepare other reports that may be utilised by many people. For example information derived from a PNAP survey report may be used to prepare an ecological

report about an area that is then used by planners and managers of government agencies, NGO's, and public stakeholders.

PNAP survey reports and the associated data are considered by many agencies to be a fundamental information resource. Improved access and awareness of reports is considered to be vitally important by planners and ecologists working on biodiversity-related issues, along with provision of funding for the publication of as yet unpublished reports.

There are also issues with the storage and access to the base data that underpins each PNAP survey report. It is impossible to divorce the relationship between availability of the reports and the derived data and information within them (e.g. RAP maps) from the need for access to the underlying data - this may be reinterpreted according to need (e.g. for RMA purposes) far more readily than the derived data. Also, accuracy and errors can be deduced far more readily from the primary data than from a report (P. Bellingham pers. comm.).

Other issues associated with PNAP survey reports

There are varying views on the accuracy of the different PNAP survey reports and this is largely dependent on when field surveys were undertaken, and when the reports were published (refer to Table 7). Some data from older PNAP survey reports may be out-dated, but the reports (and their underlying data) nevertheless provide important baseline information. There were comments by some questionnaire respondents that PNAP survey reports for some areas should be reassessed, and that up-to-date aerial photographs would be a useful way to determine whether RAPs were still present or whether they had been destroyed or reduced in extent. While this would be a useful exercise, it would not be a practical way to assess less obvious modification or compositional changes. It would also be easier to do for indigenous forest and shrubland habitats than for tussock grasslands, dunelands, and wetlands. Some habitats of ecological importance which were not included in existing PNAP survey reports have subsequently been recognised as significant indigenous habitats by landowners or others, and could also be included in new reports. Other issues raised by respondents included:

- The relative accuracy of RAP boundaries, e.g. not following an intended ridgeline.
- The inclusion of farm buildings or land of little ecological value within RAPs.
- The problems associated with the interpretation (and mapping) of vegetation and habitat mosaics.
- Inadequate experience or qualifications of the field surveyors (e.g. students or recent graduates rather than experienced ecologists), the role(s) of scientific advisors, and the lack of transparent peer review.

Table 7: Summary of responses to a questionnaire on Protected Natural Area Programme (PNAP) survey reports sent to Councils and Department of Conservation staff

Location	Agency prepared PNAP survey reports	Publicly available	Type of information available	Requested (how often) <10 per year	Costs	Present/ anticipated users of reports	Past users of reports	Accuracy of reports
Auckland	✔	✔ (some)	H, Database, GIS	infrequent	$50/loan	Councils, DOC, QEII, Students, Universities, consultants, Landcare, some use for subdivision/ funding mechanisms	Councils, government and research agencies	variable
Napier	✔	✔	H	infrequent	$30 approx.	Private landowners QEII National Trust Councils Fish and Game NZ NZ Landcare Trust Forestry companies	Private landowners QEII Trust Councils Fish and Game NZ Landcare Trust Forestry companies	✔
Gisborne	✔	✔	H	infrequent	$12-50	Landowners, District councils, FandB, iwi groups, MAF, QEII, Nga Whenua Rahui, Forestry companies	Landowners, District councils, Forest and Bird, iwi groups, QEII	variable
Rotorua	✔	✔	H	infrequent	$200 (colour maps)	Doc Staff, Private, e.g. Forest and Bird,	-	variable
Whangarei	✔	✔	H	infrequent	$20-30	PNAP/SSBI- District and regional councils, planners, Iwi, environmental/ecological consultants, university libraries, QEII, Forest and Bird, NZ Landcare Trust, landowners	Same as present	
Christchurch	✔	✔	H	infrequent	?	NGOs (QEII, NHF), landowners, councils, DoC staff	Same as present	variable

Table 8: Summary of responses to a questionnaire on non-PNAP ecological reports sent to Council and Department of Conservation staff

Location	Agency prepared ecological reports	Publicly available	Format	Frequency of requests	Costs	Present users of reports	Past users of reports	Accuracy of reports
Auckland	✔	✔ (some)	Hard copy, Database, GIS	infrequent	$50 or loan	Councils, DoC, QEII, Students, Universities, consultants, landcare	Councils, government and research agencies	variable
Hamilton	✔	✔ (some)	Hard copy	< 1 per year	$15-20 (per 15min)	Public groups Internal staff - Science, policy, biosecurity, consents	-	
Rotorua	✔	✔	Hard copy	occasionally	< $20	Regional/district councils, Nga whenua Rahui, QEII, Forest and Bird, local communities	-	variable
Whangarei	✔	✔	Hard copy	occasionally	$10 - $50	PNAP/SSBI- District and regional councils, planners, Iwi, environmental/ecological consultants, university libraries, QUEII, Forest and Bird, NZ Landcare Trust, landowners	Same as for present users	
Canterbury	✔	Landowners and lessees only	Hard copy	<1 per year, post out information to landowners	Small amount	Landowners	Some records kept in library loans	variable

- The use of PNAP survey data for district and regional planning. Some respondents commented that the information was never collected for that purpose. This is apparently not the case as this particular potential application was indicated in early background documentation that information gathered under the auspices of the programme could be used for land use planning purposes (e.g. 1980's PNAP survey poster of "Protect the Best of What is Left", and other background material produced by the PNAP Technical Advisory Group in 1986).

- Related to this, some landowners/lessees consider that survey information should be confidential. This is, however, problematical if the surveys are undertaken by (or on behalf of) public agencies, using public funding. This issue has led to some information being withheld from reports e.g. the Hundalee PNAP survey report, and other reports not being published to date, e.g. Motunau-Cheviot. This issue has similarities to the common requirement for "silent files" on waahi tapu and is being applied in a natural area survey currently underway in the Marlborough District.

- Refusals (by landowners) for field team access to parts of some ecological districts being surveyed, raising questions about assessments of representativeness (it should be noted, however, that such sites may have been assessed using good quality aerial photographs, often combined with visual assessment from roads, neighbouring properties, or high points.

- The ongoing evolution of nature conservation theory and practice and the development of the Resource Management Act have both influenced the assessment and design of RAPs and the survey reports, e.g. a better understanding of the importance of linkages, corridors, buffering, and ecological functioning. The viability of RAPs can be dependent on adjacent land use, especially if RAPs are small or their boundaries do not follow catchments or other natural boundaries.

7. USE OF OTHER ECOLOGICAL SURVEY REPORTS

Non-PNAP ecological survey reports have generally been commissioned to meet a particular need, such as a requirement for up-to-date information for a District Plan or Regional Plan, or to enable a large landowner to assess and improve environmental management. The users of these ecological survey reports include local government agencies (e.g. science, policy, biosecurity, and resource consent staff), landowners (e.g. forestry companies), Iwi (e.g. via Nga Whenua Rahui), public groups, local communities (e.g. community-based restoration groups), , and NGO's (e.g. QEII, Forest and Bird, Fish and Game New Zealand) (refer to Table 8).

Availability and ease of access to survey reports varies and depends on who commissioned the reports/surveys. Ecological reports commissioned by regional and district councils are generally available to the public. Often members of the public, landowners, and even community-based restoration groups are not aware that this type of ecological survey information is available, despite it being in the public domain. In

some cases, particularly when District Plans are still in the planning stages or are the subject of references to the Environmental Court, information may be withheld from the public domain. Additionally, databases and GIS digital data relating to ecological surveys has often been compiled for internal use within an agency which commissioned the survey(s) or collated existing information. Relatively few people may be aware of the existence of these digital data sets.

Ecological surveys undertaken for private companies/landowners (e.g. forestry companies) are generally not publicly available.

Ecological survey reports held by the Department of Conservation are usually publicly available. They are mostly available in hard copy form and are photocopied for the public on request, although public awareness of the existence of a particular report may be very limited.

Awareness of ecological surveys is generally limited, although some regional and district councils and QEII are actively increasing awareness by sending information to landowners (e.g. mailing out information, providing newsletters, and making brochures available).

8. OPTIONS FOR FUTURE MANAGEMENT OF PNAP SURVEY REPORTS

User Needs

Respondents made various suggestions in relation to the potential improvement of access to PNAP survey reports. Responses and suggestions varied markedly, although there was a general consensus that there was a need for easier access to hard copies, particularly older reports. Funding to publish PNAP survey reports that are currently in draft form or "in press" was also considered to be important by respondents. In some cases the unpublished reports may include information that has been withheld from public circulation at the request of landowners or lessees, although this is unlikely to be the general situation.

Users also suggested that digital databases of survey information are essential. Suggestions varied on how this should be implemented and what should be included, but maps and digital RAP boundaries were considered to be particularly useful, with associated access to databases in conservancy offices and available on a website (say as .pdf files). This does not necessarily address issues associated with access to the underlying data, rather that the RAP boundaries and related descriptions in the reports are made more accessible. Some DOC conservancies have already compiled databases of PNAP survey data (e.g. Northland have amalgamated information from SSBI[1] and PNAP surveys, and DOC Canterbury has compiled all RAP boundaries in a GIS data layer). Auckland Regional Council have digital RAP boundaries in their GIS and an associated database for the Waitakere and Hunua Ecological Districts. Sharing of databases between agencies (e.g. DOC and regional councils) is reasonably

[1] Sites of Special Biological Interest.

common, Landcare Research has information from most published PNAP survey field cards in the NVS database, and ownership of the data and access to it is the subject of a formal agreement between DOC and Landcare Research. It is likely, though, that relatively few people outside of government agencies are aware of the existence of or use this data set (probably even relatively few people in the Department of Conservation). Environment BOP and the Department of Conservation are currently exploring options for easier sharing of databases held by regional councils and the Department.

Scientific reports produced by the Department of Conservation are now available as .pdf files on a website (www.doc.govt.nz/publication/004~science-and research/ index.asp). The Department of Conservation library in Wellington is also proposing to establish a central repository of .pdf files which could be made available via the DOC intranet and website (Janet Forbes, DOC, pers. comm.).

Risk Assessment

A summary of issues associated with various options for improved access to PNAP survey reports is provided in Table 9. Some risks are likely if there is easier access to PNAP survey reports and similar ecological studies (refer to Table 9). Threatened plants and fauna (including CITES considerations) are important issues and there is some concern that 'releasing' or creating better access to reports may enable easier identification of habitats for threatened species vulnerable to illegal harvest or trafficking. Access to information of this type is already restricted in some instances (A. Julian, Auckland City Council, pers. comm.). A small group of DOC staff were questioned about this issue - most thought that there was little risk and one mentioned CITES issues as a possible concern. It should be noted, however, that PNAP survey reports generally do not provide exact locations of threatened species, although locations can be derived if they are listed as being present within a particular RAP or habitat type.

Potential risks associated with easier access were also discussed with a small group of people with close links to environmental non-government organisations. They considered that there was relatively little risk associated with easier access to reports, although they did make the following observations:

- That there have been cases, albeit limited, where RAPs identified in PNAP survey reports have been actively damaged by a fringe element in the rural landowner community.

- That many landowners are increasingly sensitive about allowing ecologists to have access to their land due to fears that information could be used against them.

- There are particular sensitivities associated with the use of PNAP survey information in the tenure review process in the South Island high country.

Various regional and district councils have been forced to address issues (e.g. accuracy and verification of site records) relating to information in PNAP survey reports and other survey reports. Public controversy about the inclusion of lists (and

maps) of Significant Natural Areas (SNAs) on private land in district plans has lead, in many cases, to in-depth assessments of the accuracy of RAPs and the original survey data, where these provided the basis for the identification of an SNA. It is clear that the distinction between RAPs and SNAs has become increasingly blurred (c.f. Bellingham 2001). Difficulties have often been highlighted by the many different approaches being used by different agencies. Some councils have included lists of areas within a notified district plan and are working collaboratively with private landowners. Other councils have not included SNAs in private ownership in district plans and instead rely on voluntary initiatives by private owners who may approach a council, QEII, other covenantors (e.g. the Banks Peninsula Conservation Trust) or Department of Conservation about covenants or other opportunities for protection of indigenous biodiversity.

There are also issues associated with the exclusion of information from PNAP survey reports as a result of landowners' requests. It can also be difficult to get access to the original survey data, including the field survey cards, as their storage location is sometimes unclear. The insecure storage of original field cards is a related issue of concern as there are now several examples of original survey data being lost.

A significant issue and risk is where lists and boundaries relating to significant natural areas are out of date or incorrect. This issue has been raised in many submissions to district plans in various parts of New Zealand and has led to councils reassessing boundaries and undertaking further ecological surveys to rectify apparent inaccuracies or changes over time. It has also resulted in a considerable level of bad publicity for PNAP surveys (and methods) in the rural landowner community. On the other hand, many sites have been modified or destroyed by landowners, intentionally or unintentionally (a notable example is the recent aerial spraying of 700 ha of RAPs in the Wairoa District).

Comments from a small number of Department of Conservation staff (respondents to the email questionnaire) suggest that there is little risk likely to be associated with improving access to PNAP survey reports and other ecological survey reports as much of the information on significant natural areas is already in the public domain and councils have (in many cases) already compiled inventories and notified private landowners. It was also suggested that there is also an obligation to make information available in the public domain that was gathered by a public agency using public funding.

There is a strong case for caveats to be placed on all PNAP survey reports, alerting potential users of the need to check and verify whether site information is still relevant and accurate. These issues are of heightened concern, in our experience, for reports based on survey data that is more than 8-10 years old, and this will become an issue for all PNAP survey reports. Although information from older reports is more likely to be out of date, there may also be problems with more recent reports - RAP boundaries may have been mapped incorrectly or there may have been mapping translation errors. The latter can occur if digital mapping was done at a different scale to the original hard copy mapping, or mapping was done using an unregistered digital mapping base. Even recently-identified RAPs may have been destroyed by landowners or modified by particular land uses .

The pros and cons of various options to improve access to PNAP survey reports are set out below.

Status Quo

The lowest cost and least risky approach would be to maintain the status quo, although there are significant ongoing risks with eventual loss of reports and associated data. PNAP survey reports are not well known beyond relevant ecologists, landowners and lessees, planners, relevant DOC and council staff, university staff and students, and NGO's. They are more widely known where particular reports have been exposed to public controversy.

If this option is followed, information about RAPs and related ecological data will remain relatively inaccessible and under-used. This will in turn hinder knowledge of existing natural areas, and their management. It will also become increasingly difficult to obtain copies of reports over time.

Provide an Easily Accessible List of Reports

Another low risk strategy would be simply to provide a list of all reports, authors, year of publication, and where they are available from (and their cost) on the TFBIS Programme website. This would also be a low cost strategy with issues and risks similar to the status quo option above. Unfortunately some of the older reports may only be available from libraries, and this option may not greatly improve general awareness or access to PNAP survey information. This option could also include updates on the status of reports that are unpublished or in press.

Provide a Central Repository of Reports

(a) Hard Copies of Reports

A central hard copy collection would need to be established, and copies would be provided at cost as required. This would need to be (or should be) associated with a web-based list, as described above. Given that PNAP surveys are part of a national programme, this would provide a practical and relatively low cost option. If the central hard copy collection were distributed to relevant regional centres, members of the public could possibly obtain them more readily, though this would be more complicated and may not actually be any more efficient.

(b) Electronic Files

All reports could be scanned and saved in .pdf format and then provided on CDRoms or supplied (downloaded) via a website as requested. CD's could also be distributed to relevant regional centres. Scanning of all reports (to date 51 published and 16 unpublished) would involve some cost (see below). Conversion to .pdf format is relatively simple, quick, and low cost if reports are already available in an electronic format. It is however a different matter if each individual page has to be scanned, or even just all of the maps in each

report, as this will be a time consuming activity for *c*.51 reports. (Scanning will be much quicker if an auto-feed facility is used for loose leaf hard copies.)

Scientific reports published by the Department of Conservation are now available on www.doc.govt.nz/publication/004~ science-and research/index. asp and the Department's library in Wellington is considering the establishment of a central repository for .pdf files. Copies of all PNAP survey reports could be made available on the DOC website, and there are various options to do this, either as .pdf files or HTML files. .Pdf files can be either in image format or a searchable format. There are pros and cons associated with both of these options. .Pdf files are also relatively large. This is not an issue for broadband-based web access or for the supply of reports on CDRom. Some large documents will need to be broken down into sections so that each section can be downloaded relatively quickly.

Documents could also be provided as HTML files. Costs will be more than the image format .pdf option. However .html is a web-based code that does not preserve the original layout of the document and, for this reason, this option is not recommended.

Another option would be to provide a web-based master list with linked image format .pdf files for each report that include only the cover page, the abstract, and the contents pages. Viewers could then assess the coverage and content of each report and then order a hard copy, if required, from a central repository.

Establishment of a National PNAP Survey RAP Database

All RAP boundaries in published PNAP survey reports could be digitised and a database established of related attribute data. There would be major costs and risks associated with this option:

- Database design and input.
- Costs of digitising RAPs in reports where they are not already digitised.
- Updating of database records to ensure current extent of RAPs has not altered from when they were originally identified. Some of this work will already have been done by ecological consultants or the Department of Conservation, as a result of reassessment of significant natural areas proposed for inclusion in district and regional plans.
- Development of protocols for management and updating of the digital data.
- The origins of all data would need to be recorded - this is particularly important. There are also considerable risks associated with the amalgamation of data from surveys of different ages. The establishment of separate linked databases for each PNAP survey report would help to minimise these risks. Whatever approach is followed, there is also a risk that information will be transferred or translated

incorrectly if this was not done by an experienced ecologist with knowledge of the area in question.

There are various other permutations of this approach that could be followed such as only digitising RAP boundaries, or compiling a database of records on each RAP. All of these approaches are fraught with significant problems and risks, and we do not recommend that this type of approach is adopted on a national basis (some regional councils and Department of Conservation conservancies have already adopted this approach, which is more easily and appropriately managed on a regional scale).

Formats and Costs

The various options presented in Table 9 for future management of access to PNAP survey reports all have different strengths, weaknesses and risks, as already discussed. They also have different cost implications, ranging from no cost through to a significant level of expenditure.

The Taneatua ED PNAP survey report (Beadel *et al*. 1999) is 267 pages long and is probably a reasonably typical report in terms of length and layout. Based on this report, indicative costs to convert the 51 published PNAP survey reports to image format .pdf files, searchable .pdf format files, or HTML files are:

- Image format .pdf - *c*.$5,000, although total costs are likely to be in the region of $5-10,000.

- Searchable .pdf format - *c*.$20,000, with likely total costs of $20-25,000. This is based on 90 percent of the reports being searchable and the remainder (e.g. maps) being non-searchable.

- HTML - *c*.$27,000, with likely total costs of *c*.$30,000.

The Most Cost-Effective Approach

The lowest cost approach is probably to establish a central repository of hard copy PNAP survey reports published by the Department of Conservation, combined with a web-based master list on the TFBIS Programme web page. Sources for other PNAP survey reports could also be provided. Reports could be distributed, on request, from a centralised hard copy repository, while retaining a minimum number of each report.

Costs would include collection of all remaining copies into a central repository, which would be minimal, and provision of storage space and some staff time to manage the collection - this would also be minimal once the collection was established. There may also be a need to reprint copies as numbers diminish - this would be a significant cost. A long-term cost would be associated with this approach (i.e. maintaining the service), and short-term costs associated with finding a unit to manage it within DOC, which would not necessarily easily achieved. Although involving least cost, this

Table 9: Options for future management of access to Protected Natural Area Programme (PNAP) survey reports and related costs, strengths, weaknesses, and risks associated with the various options.

Option	Requirements	Cost	Strengths	Weakness	Risks
Status quo.	None	None	Simple, low cost.	No change in present situation.	Refer to text. Increasing difficulty of access to a diminishing number of copies available for purchase.
Establish a central repository of hard copies	Assessment required of which reports need to be reprinted.	$30-<$200/ copy	Simple, low cost. Would maintain availability of reports for the foreseeable future. Free access to older copies.	Could be held within one or two conservancies only, or centralised in Wellington.	Little, as already available to public.
Provide a list of reports on website	Contact relevant agencies.	Minimal	Simple, low cost.	Still need to provide improved access to hard copy reports.	Few. Similar to status quo.
Compile a database of RAP data	Compile information from existing reports.	Likely to be significant	Information available nationally, easy access. Easily updated information (very useful). Information for many agencies.	Possible conflicts between existing databases; need standardisation between databases; major issues/problems with different data ages; also major issues with updating/database management; protocols would be required for data access and use.	Major. Inaccurate data (especially taken from older reports). This can be managed by the use of appropriate caveats.
Compile a database of RAP data and digitise RAP boundaries	Compile information from existing reports, digitise site boundaries.	Likely to be significant	Detailed information available nationally, easy access, Easily updated information (very useful). Information for many agencies.	As for above. Possible conflicts between existing databases, would take some time to compile information for GIS. Need to link base data rather than simply rely on derived data provided in a PNAP survey report.	Major. Inaccurate data (especially from older reports). This can be managed by the use of appropriate caveats.

Option	Requirements	Cost	Strengths	Weakness	Risks
Digitise RAP site boundaries only	Assessment of maps in reports/ and possibly of maps not included in reports.	Probably less than $20,000(?), if no checking is required.	Very useful. Information for many agencies.	As for above. Need to assess if boundaries remain accurate, particularly, though not exclusively, for older reports.	Possible, particularly if the accuracy of boundaries is doubtful. Private land owner, Biosecurity, CITES issues.
Provide PNAP survey reports as .pdf image format files or as searchable .pdf format	Scan all reports in .pdf file format. Establish a central electronic repository.	Varies from relatively minor to significant (see text).	Easy (and fast) electronic transmission.	Few, other than those associated with hard copies.	As for hard copies.
Provide PNAP survey reports in html file format	Two obvious options: (i) Scan the first few pages of each report, say including the cover page, abstract, contents pages. Provide a list of reports on the TFBIS Programme website and these pages. (ii) Scan entire reports and make available on website. Would need to establish a central electronic repository.	Significant	Easy (and fast) electronic transmission.	Could be utilised more easily by PNAP opponents?	Conversion to html format results in the loss of original formatting. Can be easily converted to 'useable' file format?

approach is not entirely suitable nor preferred as most potential users now expect information to be available via the internet. The development of an image format .pdf file of each report is a logical extension of this approach and is likely to be the most cost-effective option in the longer term.

9. CONCLUSIONS AND RECOMMENDATIONS

There is now a large resource of ecological survey reports that cover much of New Zealand. Many have been prepared for district or regional councils and for large landowners. The types and levels of field survey, and relative ease of access, varies widely for these reports, most of which are unpublished. The national series of PNAP survey reports, 51 published and 16 unpublished, is a key element of this resource, covering much of New Zealand where there is significant land use pressure. These reports, some of which are based on surveys undertaken in the 1980s, still provide a valuable information resource for a diverse range of users. There has been some (ongoing) controversy over the use of PNAP survey data and reports in RMA plan processes but users nevertheless still want ongoing access to existing information that has been funded and published largely by a central government public agency, the Department of Conservation (some have also been funded by regional and district councils).

There are many often complex issues associated with access to other ecological survey reports undertaken by other parties, and these issues (e.g. ownership, age, accuracy, formats) and access protocols are unique to each report. Addressing these matters, if initiated, will be complex and time-consuming. For these reasons, the TFBIS Programme should not try to address access and other management issues for other than PNAP survey reports.

There is considerable merit in providing easier ongoing access to PNAP survey reports, for the following reasons:

- The programme, although there are gaps, has nevertheless been implemented on a national scale. There is a high degree of coverage of both the North and South Islands.

- Regionally and in total, the survey reports provide an enormous information resource.

- There is largely one “owner” or “custodian”, the Department of Conservation. This will make it much easier to manage the process of providing easier access.

- There has been ongoing usage of the reports, even the oldest ones.

- There is ongoing recognition of the importance of the reports and associated data and demand for improved access from a range of users.

- Any system established to enable easier access could also be utilised by district and regional councils who have undertaken and/or funded some PNAP surveys.

- The need for improved access has also been identified in a previous review and this need was reiterated at the November 2003 workshop sponsored by the TFBIS Programme. During the workshop many people confirmed that their ability to conserve indigenous biodiversity was handicapped by difficult access to PNAP survey reports, and that improved access would be a good thing.

A Recommended Approach

Our recommendation is to use a web-based approach to provide image format .pdf files on request. All hard copies will need to be scanned to develop the .pdf files, which can then be supplied and provided either on CD Rom or via the web. There would be considerable merit in a central repository of .pdf files as this would establish a secure long term storage facility for the reports and negate the need for any reprinting of hard copies as supplies diminish (although some may already be out of print).

A web-based system should provide a master list linked to image format .pdf files. Downloads of reports, or parts of reports, should be able to be undertaken as required. Orders could be provided via the website but payment (if required) should not be web-based. The only requirements for payment should be for hard copies (if available) or copies on CDRom. Downloads should be free of charge. This type of system would be easy to set up, cost-effective, and easy to administer. It would also carry few, if any, risks over and above the present situation. A map could also be provided on a website showing the spatial coverage of each report, i.e. boundaries of the relevant ecological district(s). A web-based system, with appropriate key words, would also be relatively easy to locate for users of the main search engines. An appropriate place for this would be in the Information Resources section of the Biodiversity Information Online website which is already maintained by the TFBIS Programme. This could be easily managed whether or not the reports are held on the Biodiversity Information Online website server or any new central DOC repository of .pdf files.

A centralised repository of hard copy reports could also be established, although this is a lower priority than a web-based system. A simple way to do this would simply be to ensure that copies of all published reports are held by the DOC Head Office Library (as well as relevant conservancy office libraries).

Funding should also be provided to publish all completed but unpublished reports, including those where information about RAPs has been excluded, or where publication was not pursued for other reasons. This should include reports which are currently in progress, as they are completed. However, it is not expected that funding should be provided by the TFBIS Programme, rather this should be funded by the relevant part of an organisation(s) which commissioned a report.

Caveats are needed on all reports, indicating potential problems relating to the age and relative accuracy of the information content. They should acknowledge that, even in areas covered by recent reports, RAPs and other natural areas may have been modified or destroyed in a relatively short time, and that boundaries may need to be checked in the field. The caveat should also outline the need for consultation with

private landowners and lessees, procedures for access to sites on private lands, or any other actions which could affect landowners or lessees. A caveat could be along the following lines:

> "Users of this report should note that although every effort has been made to ensure the accuracy of PNAP survey reports, they were nevertheless compiled from a reconnaissance survey that may have been undertaken some time ago. Users need to confirm the accuracy of information provided in reports. Please also note that much of the information relates to sites in private ownership and that landowners' permission must be obtained for access to private properties and that landowner consultation should be undertaken if the information is used in any way that potentially affects landowners' rights and responsibilities."

In summary, the most cost-effective way to achieve the aim of improved access to PNAP survey information is through an internet portal comprising:

- A map of ecological districts showing the coverage of PNAP survey reports, linked to a database which provides basic details of the ecological district name, and survey report title, linked to image format .pdf versions of the PNAP report, and a unique identifier.

- Image format .pdf versions of all published PNAP survey reports (broken down into easily downloadable sections).

A further option could involve the following:

- A digital layer of all RAPs and other priority natural area boundaries, linked to a database which provides basic details of name, number, area, ecological district, survey report title, linked to RAP descriptions in the image format .pdf version of the report, and a unique identifier.

- A digital layer of centre-points of all other areas described in survey reports, again linked to a database which provides basic details of name, number, area, ecological district, survey report title, linked to area descriptions in the image format .pdf version of the report, and a unique identifier.

This latter option is regarded as having some significant risks in terms of ongoing data management and is not as high a priority as providing copies of image format .pdf files of the PNAP survey reports.

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APPENDIX 1

PROJECT BRIEF

BACKGROUND

In February 2000 the Government adopted the New Zealand Biodiversity Strategy (NZBS), which sets out how we can halt the decline in New Zealand's variety of naturally occurring plants, animals and ecosystems (our indigenous biodiversity). Four months later, in June 2000, the Government announced a new Funding Package of $187 million over the following five years to achieve the goals of the NZBS. This funding has enabled biodiversity management agencies to increase their "hands on" work programmes, e.g. to manage more threatened species and a wider range of ecosystems, and to initiate other new work.

One of the new work programmes is the Terrestrial and Freshwater Biodiversity Information System (TFBIS) Programme, which has been allocated $9.6 million (GST inclusive) over five years and $2.714 million annually thereafter. The purpose of the TFBIS Programme is to support the conservation of New Zealand's indigenous biodiversity by increasing awareness of and access to data and information about indigenous biodiversity and how to conserve it.

The Department of Conservation administers the TFBIS Programme, on behalf of all agencies and organisations that contribute to the management of New Zealand's indigenous biodiversity.

This Agreement covers a project to provide professional advice about the options for and benefits and risks of improving access to existing Protected Natural Areas (PNA) Programme survey reports. Some conservation managers and advisers (including consultants) have submitted that the difficulty they have accessing published PNA Programme survey reports is a significant issue affecting biodiversity conservation (Joseph Arand and Glen Lauder 29 June 2002 "Information Issues and Solutions Identified by New Zealand Terrestrial and Freshwater Biodiversity Management Contributors" Unpublished report prepared for the Sponsor and Steering Committee of the Terrestrial and Freshwater Biodiversity Information System (TFBIS) Programme. Department of Conservation, Head Office, Wellington. 10p. Summary Report - TIFBIS Programme - Biodiversity).

The desired outcome of the Director-General for this Agreement is to obtain advice that will enable the Sponsor and Steering Committee to make a confident and appropriate decision about whether to fund a project to improve access to existing Protected Natural Areas (PNA) Programme survey reports, in order to support biodiversity conservation.

1. SERVICES

The Contractor's services to be performed under this Agreement are as follows:

1.1 Prepare a report for the TFBIS Programme Sponsor, Steering Committee and Manager that:

Part 1: Range and Number of PNA Programme and Other Similar Ecological Survey Reports

a) describes the broad range of contents and styles of published and unpublished but completed PNA Programme survey reports

b) categorises each published and unpublished but completed PNA Programme survey report according to the broad category that it belongs to, the size of the report (i.e. number of pages), the formats that is has been published in (i.e. hard and electronic versions), the date of publication, the date of field survey, and its availability.

c) describes the range and estimated number of information products derived from published and unpublished but completed PNA Programme survey reports—e.g. digital boundaries of recommended areas for protection—i.e. contents and styles, formats, date of preparation, owner, and availability.

d) describes the range and estimated number of other published or completed but unpublished ecological survey reports that are similar to PNA Programme survey reports—e.g. ecological surveys commissioned by local councils or all or part of their territorial authority—i.e. contents and styles, formats, date of preparation, the date of field survey, and availability .

Part 2: Coverage of Ecological Districts by PNA Programme and Other Similar Ecological Survey Reports

e) describes the coverage of ecological districts by PNA Programme survey reports, i.e. districts:

- described in published PNA Programme survey reports
- described in completed but unpublished PNA Programme survey reports (i.e. no further editorial or review work required)
- described in PNA Programme reports that are still being written
- described in PNA Programme reports that are still being surveyed under the auspices of the PNA Programme
- that have not been covered under the PNA Programme
- that have not been covered by the PNA Programme surveys where protected natural areas comprise more than 50% of the land area of the district
- that have not been covered by the PNA Programme surveys where protected natural areas comprise less than 20% of the land area of the district

f) estimates the coverage of ecological districts by other similar ecological survey reports, i.e. districts covered by:

- similar published ecological survey reports
- similar completed but unpublished ecological survey reports
- similar ecological surveys that are still underway.

g) estimates the coverage of ecological districts that have not been covered by the PNA Programme surveys or other similar ecological survey reports (published or completed but not published):

- where protected natural areas comprise more than 50% of the land area of the district
- where protected natural areas comprise less than 20% of the land area of the district.

Part 3: Use of Reports and Associated Issues

h) describes past users and usage of PNA Programme survey reports

i) describes anticipated future users and usage of PNA Programme survey reports

j) describes any awareness and access issues associated with usage of PNA Programme survey reports

k) describes any other issues associated with PNA Programme survey reports: e.g. whether the age of the underlying data derived from PNA Programme field surveys means that, in some specific cases, the information in published and otherwise completed reports is out of date

l) describes the awareness, access and other issues associated with usage of other similar ecological survey reports.

Part 4: Options for Improving Access to Reports

m) describes the essential and other desirable user requirements for access to PNA Programme survey reports

n) describes the options for improving access to existing survey reports, including digitising them (into e.g. HTML and/or PDF versions), creating and distributing CD versions, and re-publishing hard copies. The delivery options should include the Internet, and the establishment of a "copy centre" to supply hard copies or CDs of the survey reports.

o) assesses the costs, strengths and weaknesses of each option against the user requirements (and any other relevant criteria), including any risks.

The risks should include an assessment of whether easier access to PNA Programme survey reports is likely to lead to potentially disruptive national campaigns, or regional campaigns, advocating for increased protection of sites identified in survey reports, or whether the provision of easier access to survey reports through the TFBIS Programme might be perceived by landowners and other stakeholders to be an attempt by DOC to initiate or facilitate such a campaign. The report must describe how to manage such risks, through both the option chosen, and the way that it is promoted.

Part 5: Recommendations

p) describes the least risky approach to improve access to survey reports

q) describes the most cost-effective approach

r) describes your personal recommended approach.

The information in the report will be derived from personal knowledge, interviews (either in person or via telephone), and research. A small number of representative users of PNA Programme and related survey reports shall be interviewed such as:

- some DOC Technical Support Managers and Officers, such as Dave Hunt (Rotorua) and Wendy Holland (Whangarei)
- DOC Regional Office Support officer for the PNA Programme – Paul Mahoney (Central Regional Office)
- DOC Conservancy Advisory Scientists
- DOC Community Relation Managers/Officers - Planners
- Regional and District Council equivalents
- independent contractors: Mike Harding and Markus Davis are two that are recommended.

1.2 Send a digital version of the draft report, in Microsoft Word, to the Supervisor and to at least two other independent Contractors for their review by Friday 13 June 2003.

1.3 Send a digital copy of the final report, in Microsoft Word, to the Supervisor by the Completion Date.

2. SPECIAL CONDITIONS

2.1 The Contractor must consider the potential risk for causing injury, damage, loss or liability through the Services and resulting information products covered by the Agreement. The Contractor must seriously consider acquiring appropriate Public Liability, Professional Indemnity and Statutory Liability insurance.

2.2 The Department of Conservation's Standard Terms and Conditions of Independent Contracts (Version 1.3) is amended in the following way:

(i) Clause 3.6.3 shall be modified by adding a new subclause (d) to read as follows: (d) take all practicable steps to ensure that it complies with the Code of Practice for VDU (visual display unit) users shown at the OSH website, namely www.osh.dol.govt.nz.

2.3 The Contractor must follow national and international standards—such as taxonomic standards and standards for computer virus protection and inter-operability standards, including the *New Zealand E-Government Interoperability Framework* and the New Zealand Government Locator Service metadata standard—when carrying out the Services under this Agreement.

2.4 The Contractor must meet any obligations under the Copyright Act 1994 or Privacy Act 1993 pertaining to data or information used as part of this Agreement.

APPENDIX 2

PNAP QUESTIONNAIRE

ACCESS AND COST

- Has your agency prepared any PNAP reports? If so, which ecological districts (or parts thereof) do they cover?

- Are they, or parts of them, publicly available? If so, how can users access them? If not publicly available, why not?

- Have users ever asked to directly loan or purchase a hard copy of a PNAP report prepared by your agency? How often? Which survey reports appear to be particularly difficult to access? Do you have any copies available to loan or purchase? Do you ever re-produce entire reports or parts thereof for users? What does this cost? How often do you do this?

- Has your agency prepared other similar ecological survey reports (i.e. not under the auspices of the PNAP)? Are these reports or parts thereof publicly available? If so, how can users access them? If not, why not?

- Have users ever asked to directly loan or purchase a hard copy of other similar ecological survey reports? Do you have any copies available to loan or purchase? Do you ever re-produce entire reports or parts thereof for users? What does this cost? How often do you do this?

USE OF REPORTS AND ASSOCIATED ISSUES

- Who are the present users of PNAP and similar ecological survey reports? (Do you get inquires about the reports from public/private groups? e.g. farmers, Landcare etc.) *Specify whether Ecological survey or an official PNAP report.*

- Who were the past users of PNAP and similar ecological survey reports? (Do you keep records of inquires/loans of reports?) *Specify whether Ecological survey or an official PNAP report*

- Who are the anticipated users of PNAP and similar ecological survey reports? Specify whether ecological survey or an official PNAP report

- How accurate is the information in PNAP reports/ecological surveys? That is, is the data within reports up to date, or has there been significant changes to land cover/use at the sites described in the PNAP reports? For example, have some or all of the recommended areas for protection or other natural areas become smaller, or has the grazing regime changed?

- What percentage of the recommended areas for protection are now legally protected (c.f. covered by rules in district plans?)

OPTIONS FOR FUTURE ACCESS TO REPORTS

- What are the essential and other desirable user requirements for access to PNAP survey reports? Is electronic access to the individual reports – either online or via CDs – essential or desirable? (e.g. as PDF files). Or would just reprinting reports that are currently difficult to access, and others that are likely to be difficult to access in the future, be good enough?

- Would combining the contents of the published reports into a searchable " PNAP Report" database with associated maps of overall coverage of ecological districts, RAPs and natural areas be more useful?

- Do you need access to digital boundaries of recommended areas for protection?

- Opinion on/identify any risks involved with increasing access to PNAP/Ecological surveys. Perception of landowners to increased access to reports?

ECOLOGICAL DISTRICTS WHERE PROTECTED NATURAL AREA PROGRAMME (PNAP) SURVEYS HAVE NOT BEEN UNDERTAKEN - PERCENTAGE COVER OF REMAINING INDIGENOUS VEGETATION AND LEVELS OF LEGAL PROTECTION (ONLY FOR LAND ADMINISTERED BY DEPARTMENT OF CONSERVATION)

Protected natural areas = <20% of Ecological District			**Protected natural areas = 20-50% of Ecological District**			**Protected natural areas = >50% of Ecological District**		
Ecological District	% Indigenous Vegetation[1]	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)
Ashley*	71.17	0.51	Blackball*	86.69	47.82	Anglem	99.86	93.44
Culverden*	2.02	0.78	Cook Strait*	48.17	25.49	Aorangi	80.95	52.06
Dunedin*	31.16	4.98	D'Urville	76.95	25.08	Arawata	72.60	88.85
Duntroon	6.74	0.35	Dobson*	48.35	35.32	Armoury	28.62	75.33
Ellesmere*	11.85	10.81	Eyre**	69.79	38.29	Arthur*	76.72	62.28
Fairlie*	15.19	0.44	Foulwind	59.41	22.15	Arthur's Pass*	58.37	96.26
Foveaux	64.13	8.90	George*	84.14	20.52	Bounds*	68.43	78.67
Geraldine**	7.26	1.75	Greymouth*	68.43	30.14	Browning**	37.82	90.24
Glenavy**	4.25	2.67	Harihari	65.51	41.71	Brunner*	75.10	56.09
Gore**	3.09	0.60	Hochstetter*	69.49	22.84	Bryant**	64.62	53.71
Hakataramea*	51.48	2.15	Hokitika	66.41	42.28	Buller	97.41	81.34

Key

[1] From landcover database (1996).

* Other comprehensive ecological surveys have been undertaken or are underway in this ED.

** There have been other limited ecological surveys (e.g. forestry, companies, council inventories).

*** Part surveyed only.

Protected natural areas = <20% of Ecological District			Protected natural areas = 20-50% of Ecological District			Protected natural areas = >50% of Ecological District		
Ecological District	% Indigenous Vegetation[1]	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)
Hamilton*	3.86	0.62	Kirkliston*	95.21	20.78	Cascade**	87.28	95.84
Hapuakohe**	15.39	5.10	Lewis*	86.37	44.03	Darran*	80.43	97.74
Hauraki**	18.62	14.54	Longwood*	46.40	30.42	Dart**	70.06	84.41
Hinuera*	0.87	0.22	Manawatu Gorge	54.92	31.78	Doubtful*	95.28	98.83
Hokonui*	45.47	10.76	Mercury Islands	69.45	25.42	Ella**	83.67	97.29
Hunters*	60.79	11.25	Miromiro*	74.29	31.16	Fishtail*	61.78	56.71
Kaingaroa*	6.89	8.67	Oxford*	57.17	22.24	Freshwater	99.99	99.61
Kawhia**	41.66	19.30	Para*	40.98	25.15	Glaciers	60.16	97.61
Lawrence*	17.29	1.68	Pureora**	51.64	48.55	Godley*	39.61	55.24
Leslie*	61.20	0.49	Remarkables	77.56	21.49	Great Barrier	88.92	52.62
Makikihi**	1.60	1.30	Sounds*	75.32	40.73	Haast	91.36	84.41
Maungatautari**	11.59	6.28	St Mary	67.87	21.01	Heaphy**	99.44	98.68
Medway*	64.91	0.84	Sumner*	75.59	36.21	Hope*	94.37	95.33
Meremere**	27.16	12.03	Tahakopa*	38.97	24.25	Huxley	70.90	63.88
Motueka*	3.45	6.39	Tairua	58.14	35.75	Ikawhenua*	97.07	73.98
Moutere*	18.86	9.06	Takitimu*	50.56	46.67	Karamea	87.39	72.87
Oamaru	2.65	0.28	Tapanui*	52.42	39.81	Landsborough	65.05	99.72
Opotiki*	18.94	4.95	Tararua*	80.16	49.72	Little Barrier*	98.89	98.91
Orari**	80.80	7.52	Torlesse*	84.49	38.61	Livingstone**	73.13	57.11
Otamatea*	10.08	0.85	Tuatapere*	43.67	22.97	Mahitahi	84.28	98.90
Raglan**	20.12	2.09	Tutamoe*	61.36	39.04	Maimai	80.88	60.33
Ranginui**	27.80	15.71	Upukerora*	47.12	34.15	Manawatu Gorge	61.79	53.56
Richardson	75.00	8.90	Waihi**	47.08	30.42	Mataketake	94.51	99.56
Rock and Pillar**	80.43	9.35	Waihopai*	62.69	24.43	Matiri**	89.28	86.47
Rotorua Lakes*	45.79	16.82	Waituna*	40.76	24.28	Mayor*	100.00	100.00
Shotover	84.18	13.37				Minchin*	80.64	98.07
Taupo*	52.85	17.83				Mt Allen	99.35	90.41

Protected natural areas = <20% of Ecological District			Protected natural areas = 20-50% of Ecological District			Protected natural areas = >50% of Ecological District		
Ecological District	% Indigenous Vegetation[1]	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)
Tokoroa*	12.20	15.44				Mt Cook*	15.57	99.98
Tapuaenuku*	61.06	7.12				Okuru	88.16	97.52
Tauranga	10.00	0.50				Paringa	96.19	96.33
Tokomairiro*	17.09	4.01				Pelorus*	77.56	68.30
Waiau*	24.50	0.25				Poor Knights	100.00	98.22
Waikari*	8.01	0.50				Poulter*	81.35	54.13
Waikouaiti**	18.89	6.01				Preservation*	97.46	96.69
Waimate**	13.56	1.81				Punakaiki**	96.66	86.36
Waipa**	2.37	0.60				Pyke**	97.76	92.92
Waipahi**	8.76	3.64				Red Hills*	85.35	85.72
Waipu*	29.39	7.40				Reefton**	90.13	77.74
Waitomo**	21.50	6.54				Rotoroa*	78.89	62.77
Wanaka	86.25	13.65				Ruahine**	74.04	61.71
Wellington*	35.70	0.65				Taranga	100.00	99.32
Whitecliffs*	30.50	4.02				Te Anau*	95.56	77.25
						Three Kings	100.00	96.86
						Tongariro**	54.17	51.59
						Totara Flat**	87.08	65.87
						Totaranui*	83.52	70.14
						Travers*	65.61	89.64
						Waiho	83.96	78.54
						Waikaremoana**	86.24	76.83
						Waimana*	98.70	82.06
						Waioeka**	71.50	61.15
						Waitutu*	99.20	76.13
						Wakamarama*	91.54	84.84
						Wangapeka**	97.33	97.08

Protected natural areas = <20% of Ecological District			Protected natural areas = 20-50% of Ecological District			Protected natural areas = >50% of Ecological District		
Ecological District	% Indigenous Vegetation[1]	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)	Ecological District	% Indigenous Vegetation	% of ED Protected (DoC only)
						West Whanganui*	76.35	56.19
						Whirinaki*	76.60	70.17
						Whitcombe	75.30	95.98
						Wilberg	69.50	98.90