ENVIRONMENTAL RISK MANAGEMENT AUTHORITY

ERMA New Zealand

NGĀ KAIWHAKATŪPATO WHAKARARU TAIAO

‘Present in New Zealand’: A New Organisms Scoping Study

Prepared for the
Environmental Risk Management Authority
by
Don McGregor

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EXECUTIVE SUMMARY

1. An assessment is made of the scope, currency and reliability of the information held in databases of organisms present in New Zealand; and suggestions are made for ways in which determinations, applications and decision-making processes might be facilitated or streamlined by better use of databases.

2. Databases have been assessed as to their value to ERMA New Zealand.

It is recommended that ERMA New Zealand:

3. Provides links on its website to databases and other sites with information on organisms present in New Zealand.

4. Grades database content, in consultation with database providers.

5. Expedites decision-making on section 26 requests where a request is backed by evidence from a database, (and/or by a reputable taxonomist from an organisation which maintains a relevant database).

6. Provides guidance on its website on how to search for taxonomic and other information on organisms. This would include providing links to internet resources for taxonomic information, links to websites of organisations which develop and maintain taxonomic databases on New Zealand organisms, and advice on using library resources.

7. Improves access on its website to decisions by the Authority on determinations of whether or not an organism is a new organism, and applications for approvals for the release of new organisms. This information should be searchable by taxonomic groups (e.g. kingdom, phylum, class, order, family, genus and species), as well as by common name.

8. Includes links on its website to relevant expertise and experts listed by CRIs, universities, and other organisations or individuals.

9. Resolves any anomalies associated with the issue of import permits by MAF before the commencement of the new organisms provisions of the HSNO Act.

10. Encourages and facilitates use of section 27A of the HSNO Act for approvals at taxonomic classifications above the species level. This could reduce the need for section 26 determinations in the future.

11. Participates actively, as a key stakeholder, in the FRST advancement processes for their Biosecurity and Biodiversity Portfolios (to be incorporated in the Resilient, Functioning and Restored Natural Ecosystems Portfolio).

12. Explores, with MfE and other departments (such as MAF and DoC) opportunities for Cross Departmental Research Pool funding for database development.

1. INTRODUCTION

1.1 This scoping study had its origins in the Review of the New Organisms Capability of the Environmental Risk Management Authority (ERMA) (Ministry for the Environment, 2003, i.e. the 'Nahkies Review'), which recommended that "A short study of the scope of work required to complete core registers should be conducted, perhaps with MAF or DoC collaboration. ERMA and the Ministry of Fisheries (MFish) should discuss the requirements for a marine equivalent".

1.2 For this scoping study, 'core registers' has been interpreted as registers of organisms 'present in New Zealand'.

1.3 The objectives of the present study were:

(a) To establish the feasibility and cost of establishing an improved record of organisms present in New Zealand. These records may be used to help determine whether or not a HSNO Part V approval is required

(b) To potentially provide resources for a website project due to start in 2004/05 in the Public Awareness group. This website project will create a web page for New Organism applicant resources..

1.4 Section 2A(1) of the HSNO Act sets out the meaning of the term "New Organism", and Section 2A(2) sets down when an organism is not a new organism. Section 2(A)(1)(a) defines a "new organism" as "*an organism belonging to a species that was not present in New Zealand immediately before 29 July 1998*".

1.5 The Authority has developed policy on implementing sub-section 2(A)(1)(a) of the Act. ERMA New Zealand's Protocol of Interpretations and Explanations of Key Concepts (2003) records that the Authority adopts the following approaches:

(i) "*An organism is considered to be present in New Zealand if it can be established that the organism was permanently existing in New Zealand,* ***and*** *was not present solely by way of being contained in a recognised safekeeping facility, immediately prior to 29 July 1998.*

(ii) ***Permanently existing*** *means that the organism is in New Zealand all year round, irrespective of whether it is at large in the uncontrolled environment or held in an unofficial controlled environment.*

(iii) ***Immediate,*** *as in immediately prior to 29 July 1998, is taken to mean that there is evidence that the organisms existed in contemporary time i.e. within a time period during which extinction would have been very unlikely to have occurred, without evidence to the contrary. Thus if there is evidence of a viable community of organisms existing within a time span prior to 1998 significantly less than the normal life span prior or viability period (for example of spores or cysts) of the organism, that would be taken as sufficient evidence of being present in New Zealand immediately before 29 July 1998.*

(iv) ***Recognised safekeeping facility*** *is the term used to capture all pre-HSNO officially (hmainly CRI) facilities where organisms were deliberately held for reference or safekeeping purposes. …. A recognised safekeeping facility does not*

include unofficial but controlled environments such as glasshouses, aquariums, butterfly houses, bird cages etc. where the purpose was simply to keep the organism. All organisms held in these types of unofficial controlled environments prior to 29 July 1998 are regarded as being present in New Zealand and are not new organisms unless their original import was contrary to the Animals Act or Plants Act".

1.6 The taxonomic description of organisms present in New Zealand began from the collections made by Joseph Banks and Daniel Solander on James Cook's first voyage to New Zealand in 1769. Jules Dumont d'Urville and others made further collections in the early 19th century. The second half of the 19th century saw notable advances in taxonomic descriptions of New Zealand's fauna and flora. For example, the work of Capt F W Hutton, foundation Professor of Natural Sciences at Otago University (and of Biology at Canterbury College), culminated in the publication in 1904 of *"The Animals of New Zealand"*. From the early 1930s, Dr H H Allan, the first director of the Botany Division, DSIR, built up the extensive collection of New Zealand plants that formed the nucleus of what is now Landcare Research's Allan Herbarium.

1.7 Today, the most significant collections and databases of New Zealand plants, animals and micro-organisms are those held and maintained by the Crown Research Institutes Landcare Research and NIWA, and by the Museum of New Zealand - Te Papa Tongarewa. Many of these databases are, or soon will be, publicly available on the World-Wide Web. Other databases that are available on-line include those maintained by independent organisations, such as the Ornithological Society of New Zealand, which maintains the New Zealand Recognised Bird Names (NZRBN) Database; or by individuals, for example Dr Hamish Spencer, who with others from the Allan Wilson Centre for Molecular Ecology and Evolution, maintains the Checklist of the Recent Mollusca described from the New Zealand EEZ.

1.8 The international Species 2000 initiative (by the Global Biological Information Facility) had the objective of giving real time access to a listing of all known species of organisms on Earth. *Species 2000: New Zealand* aims to review and list the entire New Zealand biota, living and fossil. The two *Animalia* volumes will include species lists for all of Kingdom Animalia in New Zealand, except for Coleoptera for which genera will be listed. Volume 3 of New Zealand Species 2000 project, which will include all other Kingdoms (Plantae, and all Prokaryotes), is expected to be published in 2006 or 2007. Dr Denis Gordon, principal editor of the *Species 2000: New Zealand* volumes, has said that the species lists from the New Zealand Species 2000 publications will not be available on-line until at least two years after their publication as hard copies.

1.9 A series of tables describing databases that provide records of organisms present in New Zealand is provided in Appendix 1 of this report. These tables include an assessment of the scope, currency and reliability of the information held in the databases, whether they are in the public domain or not (and any charges for access), and whether individual databases might be worthy of recognition by ERMA New Zealand.

1.10 In chapter 2, suggestions are made for ways in which application and decision-making processes might be facilitated and stream-lined by better use of databases. There is an emphasis on facilitating access to information through ERMA New Zealand's website Other issues relating to 'present in New Zealand' determinations, including mechanisms for funding of development databases, are also discussed. Recommendations are set out in chapter 3. Tables on databases and other supplementary information are presented in the appendices.

2. USE OF DATABASES IN 'PRESENT IN NEW ZEALAND' DECISION-MAKING

2.1 The tables in Appendix 1 of this report list databases containing records of organisms present in New Zealand. Most of these databases are developed and maintained by public funds, chiefly from Vote: Research, Science and Technology. ERMA New Zealand can best contribute to improving records of organisms present in New Zealand by strongly supporting the continued development of these databases in directions that meet ERMA's needs. Specific ways in which this might be done are elaborated later in this chapter (see sections 2.28 – 2.31).

2.2 Ways by which HSNO decision-making might be facilitated and streamlined through better use of registers of organisms 'present in New Zealand' are discussed below. A focus is on improving access to resources though ERMA New Zealand's website. Other issues related to 'present in New Zealand' determinations are also discussed.

Grading of Databases

2.3 One way of facilitating and stream-lining decision-making is for ERMA New Zealand and the Authority to formally recognise selected databases as providing authoritative records of organisms present in New Zealand. Where an enquiry about the presence of an organism in New Zealand, or a request for a section 26 determination, is backed by sound evidence from one or more accepted databases, ERMA New Zealand should have authority to inform enquirers and applicants that the evidence is sufficient to satisfy HSNO 'present in New Zealand' criteria, and that there is no need to proceed with a formal request for a section 26 determination by the Authority. Examination by ERMA New Zealand of the evidence presented would need to confirm that the organism is 'permanently existing' and was present in New Zealand 'immediately prior' to 29 July 1998. If there is uncertainty about any aspect of information from an accepted database in relation to a request for a section 26 determination, enquires or applicants should be encouraged to seek a written statement resolving the uncertainty from a reputable taxonomist from the organisation responsible for maintaining an accepted database, and to submit this statement to ERMA New Zealand. If ERMA New Zealand is fully satisfied that the additional information in the written statement provides authoritative evidence of the presence of the organism in New Zealand, the enquirer or applicant should be advised that there is no need to proceed with a formal request for a section 26 determination by the Authority. However, if there is any doubt about the validity or strength of the information submitted, ERMA New Zealand should advise the enquirer or applicant that the request will need to be formally submitted to the Authority for resolution.

2.4 Finalising criteria to be used in grading databases, and the actual grading of databases, would best be done in consultation with representatives of organisations that maintain key collections and databases, e.g. Landcare Research, NIWA, and Te Papa. Accepted databases should satisfy a number of criteria, including that:

- they are regularly maintained and continually updated by recognised taxonomists
- they provide full taxonomic nomenclature including the names of taxonomic authorities and dates of publication of taxonomic names
- they list synonyms
- they can be accessed freely, normally via the World-Wide Web.

- they provide information relevant to ERMA's 'present in New Zealand' criteria
- taxonomists responsible for the databases can be readily contacted for additional information;

2.5 On the basis of these criteria, I have tentatively assessed the following databases, listed in Appendix 1, as possible accepted databases for ERMA New Zealand use.

Grade I Databases

Database	Maintained by
Allan Herbarium (CHR) and Databases, including: • The Plant Names Database • The All New Zealand Species Database	Landcare Research
Te Papa Herbarium	Te Papa
New Zealand Fungi Herbarium and Database (PDD)	Landcare Research
International Collection of Micro-organisms from Plants (ICMP).	Landcare Research
New Zealand Recognised Bird Names (NZRBN) Database.	Ornithological Society of New Zealand (OSNZ)
Te Papa's Fish Collections and Database	Te Papa
Checklist of the Recent Mollusca described from the New Zealand EEZ	Dr Hamish Spencer and others, Allan Wilson Centre for Molecular Ecology and Evolution
List of New Zealand Recent Foraminifera	B W Hayward, Auckland University
New Zealand Arthropod Collection (NZAC), and associated databases, including: • NZACbugs • BUGS • Databases for: Acari; Aranae; Diptera; Hemiptera; Heteroptera; Hymenoptera: Lepidioptera; Coleoptera; and Nematodes.	Landcare Research

2.6 There are other databases in preparation that might eventually be added to the accepted group by ERMA New Zealand. These include:

Database:	Being prepared by:
Crustose Coralline Algae of New Zealand	Dr Wendy Nelson, NIWA, for MFish
Phytoplasmas, plant viruses, and viroids of New Zealand	Dr Mike Pearson, University of Auckland (plant viruses and viroids); Dr Ross Beever, HortResearch (phytoplasmas), for MAF.
List of wildlife species present in New Zealand.	Dr Joanna McKenzie, Massey University, for MAF
Species 2000: New Zealand publications	Dr Denis Gordon, NIWA (editor-in-chief)

An assessment of these databases should be made after they are published.

2.7 A second set of databases might be accorded informal recognition by ERMA New Zealand. Databases I have tentatively assigned for informal use are a more diverse group than those I have assigned to the accepted group, and the criteria used in their assessment more varied. The informal group of databases contain information that could be helpful for applicants for determinations or approvals under the HSNO Act. Not all 'Grade II' are strictly taxonomic databases. For example, the New Zealand Plant Collections Register provides a directory of private gardens containing significant collections of ornamental plants, listed by family or genera. Ornamental plants are not always well covered in Landcare Research or Te Papa's databases, and the Register provides an additional source of information that applicants should be encouraged to

follow up if the trees or shrubs they are interested in are not listed elsewhere. The owners of the gardens are very likely to have lists of the species in their gardens, and are likely to be able to respond to questions applicants may have relating to the presence in New Zealand of species of ornamental plants belonging to the family or genera they have in cultivation.

Grade II Databases

Database	Maintained by
MAF Plants Biosecurity Index	MAF Biosecurity Authority
Aquatic Plants Database	NIWA
New Zealand Plant Collections Register	Royal New Zealand Institute of Horticulture
Forest Research Mycological Herbarium	Forest Research
Te Papa Mammals Collection.	Te Papa
Invasive Mammals Bibliography	Dr Carolyn King, Waikato University
Te Papa Bird Collection and Database	Te Papa
HerpWeb New Zealand: Reptiles and Amphibians in New Zealand	The New Zealand Herpetological Society, Inc.
New Zealand Herptofauna	Society for Research on Amphibians and Reptiles of New Zealand (SPARNZ)
Te Papa's Biological Collection and Database: Molluscs	Te Papa
Checklist of New Zealand Diptera	Entomological Society of New Zealand
NIWA Museum Database	NIWA
PPIN (Plant Pest Information Network)	MAF

2.8 The Invasive Mammals Bibliography lists and provides access to literature on feral mammals in New Zealand. Dr Carolyn King, who maintains the webpage, is an appropriate person to respond to enquiries from potential applicants. The list of wildlife species present in New Zealand, at present being assembled on behalf of MAF, may eventually provide a comprehensive list of introduced mammals and birds. HerpWeb New Zealand provides a list of species of reptiles and amphibians in New Zealand. However, it is not clear from the webpage whether an appropriately qualified taxonomist is responsible for maintaining the list and, therefore, how authoritative it might be. On the other hand, the New Zealand Herptofauna webpage provides access to literature and scientific expertise on New Zealand's amphibians and reptiles. It is not, in itself an inventory of organisms present in New Zealand, but provides access to taxonomic information and expertise on amphibians and reptiles present in New Zealand.

2.9 Some databases tentatively assigned to the informal group, such as those maintained by Te Papa, might be worthy of accepted status. The consultative group of experts suggested above could advise ERMA New Zealand on this.

2.10 MAF's Plants Biosecurity Index is a secondary taxonomic database, which is not directly maintained by taxonomic experts. It is assessed as informal for this reason, and also because it is not kept fully up to date with taxonomic changes, nor does it include all synonyms, or authority names and dates. PPIN (MAF's Plant Pest Information Network) is an excellent store of taxonomic and other information on plant and soil pest organisms in New Zealand. It is not publicly available, but enquirers should be encouraged to direct specific enquiries about pest species to MAF.

2.11 NIWA's Marine Museum Database is undoubtedly the best database of marine organisms (excluding seaweeds) in New Zealand. However, it is not available on the World-Wide Web, and NIWA charges $100 for each search of its database. Similarly, NIWA's Aquatic Plants Database is not publicly available; it is not a comprehensive

taxonomic database of freshwater plants in New Zealand, but it does provide the best store of information available on New Zealand freshwater plants

2.12 Applicants should be encouraged to quote relevant information from accepted and informal (and other) databases in their applications. Where an enquiry or request for a section 26 determination is unsupported by information from accepted databases, enquirers or applicants should be encouraged to seek a letter or report from a reputable taxonomist from an organisation which maintains a relevant accepted database. If a letter or report from an accepted taxonomist includes authoritative information supporting the case that the organism satisfies ERMA New Zealand's 'present in New Zealand' criteria, then ERMA New Zealand might advise the applicant that the organism satisfies the criteria and there is no need to proceeded with a section 26 determination. However, if there is any doubt concerning the validity or the strength of the information provided, the matter would need to be formally resolved by the Authority.

2.13 Accepted or informal recognition of databases by ERMA New Zealand would need to be accompanied by appropriate comments and qualifications. It would need to be made clear that the presence of a name of an organism on any list does not, by itself, guarantee that the organism satisfies ERMA New Zealand's 'present in New Zealand' criteria. Conversely the absence of an organism from a list does not, by itself, mean that the organism is not present in New Zealand. For example, it is known that Landcare Research's databases provide comprehensive lists of native species, but may not include all exotic organisms in cultivation or in private collections. It should be made clear that the databases listed (and many other taxonomic databases) are 'living' documents that are continually revised and updated in the light of new information.

2.14 An advantage of ERMA New Zealand setting criteria for databases is that it provides an opportunity for setting standards for developers of databases to aim for. It would give ERMA New Zealand an opportunity to prescribe what it wants in 'present in New Zealand' databases, for example, information on 'permanently existing' and presence in New Zealand 'immediately prior' to 29 July 1998. It could also provide an incentive for upgrading of informal databases to be accepted.

Facilitating Access to Information

2.15 ERMA New Zealand should provide more guidance (on its website) than it does at present on how to obtain taxonomic and other information on whether or not organisms are present in New Zealand. There is a wide range of internet resources to assist users who are searching for taxonomic and other information on organisms. ERMA New Zealand could provide links on its website to such internet resources. Examples of such resources are given in Appendix 2.

2.16 There are numerous hard copy taxonomic publications which could be of assistance to applicants. Some hard copy publications duplicate information available on the World-Wide Web; others provide unique sources of information. A list of relevant hard copy publication is given Appendix 3. A similar list could usefully be posted on ERMA New Zealand's website. There are many other hard copy publications (books and articles in scientific journals) too numerous to list, that provide information on organisms that are, or may be, present in New Zealand. Applicants should be advised to consult their library and use their library's resources, including interloan services, to gather information needed for applications to ERMA New Zealand. Applicants should be made aware that they can search the National Library's catalogue at www.natlib.govt.nz/en/catalogue/index.html.

2.17 ERMA New Zealand is intending to improve access on its website to decisions by the Authority on determinations of whether or not an organism was a new organism, and applications for approvals for the release of new organisms. This information should be searchable by taxonomic groups (e.g. kingdom, phylum, class, order, family, genus and species), as well as by common name. Synonyms of organisms which have been the subject of decisions by ERMA New Zealand should also be readily accessible to website inquirers.

2.18 ERMA New Zealand's website should include links to expertise or experts listed on websites of CRIs, universities and other organisations or individuals. For example, Landcare Research's website at www.landcareresearch.co.nz/services/biodiversity.asp gives information on services they offer, and contact names and email addresses for those who might provide services, e.g. Invertebrate Biodiversity: Stephen Moore. Similarly NIWA at www.niwa.co.nz/rc/biodiv/ lists its research programmes in marine and freshwater biodiversity and biosecurity and gives the names and email addresses of key contacts.

2.19 Though initiatives such as these, ERMA New Zealand will go a long way to fulfilling the spirit of section 11(f) of the HSNO Act, which states:

11. Powers, functions, and duties of the Authority -

The Authority may-

(f) Keep such registers relating to hazardous substances and new organisms as may be required by this Act or as may be necessary to administer this Act.

Difficulties and Problems

2.20 Some groups of organisms may be expected to continue to provide difficulties with regard to determinations of whether or not they are present in New Zealand. Such groups include aquarium fish; caged birds; many groups of insects; protozoa; ornamental plants; fungi; free-living bacteria. There are at least two sorts of questions that provide difficulties:

(i) Taxonomic questions; e.g. some species of aquarium fish are very hard to identify with certainty, even by specialist fish taxonomists. Identification may become easier over time, for example through development of DNA libraries of organisms and of molecular identification techniques

(ii) Questions related to ERMA New Zealand's 'present in New Zealand' criteria, e.g. some insects are irregular 'migrants' borne on the wind from Australia – it may be difficult to provide evidence on whether or not they are permanently established in New Zealand. Or there may be old records of organisms, but no recent records of their occurrence in New Zealand.

2.21 Aquarium fish pose particular difficulties. Before the commencement of the HSNO Act, MAF issued import permits for ornamental fish (and other organisms) under the Animals Act or the Plants Act. MAF has developed and used Import Health Standards as a primary reference for the issuing of import permits. Two hundred and eighty organisms are listed on MAF's Import Health Standard for aquarium fish. Of these, 160 organisms are listed as genera (and not as species). Many of these genera contain large numbers of species. According to Dr Bob McDowell, NIWA, one genus, *Barbodes,* contains 800 species, some of which would readily establish in New Zealand. Dr McDowell reported that even experts find these species difficult to identify. In an attempt to find out what species are in New Zealand, the Federation of New Zealand Aquatic Societies initiated a survey of species in 2002. However this survey is of

limited use, and has not been validated because of the difficulties of identification of species.

2.22 Under the now-expired provisions of Part XVI – Transitional Provisions: New Organisms of the HSNO Act, deemed approvals were able to be made to cover organisms imported on the basis of import permits issued under the Animals Act and the Plants Act. Very few deemed approvals were made.

2.23 Issues and possible anomalies resulting from MAF's approval of imports of organisms on the basis of import permits issued under the Animals and Plants Act need to be resolved through discussion with MAF. MAF holds electronic copies of import permits issued since 1997 under the Animals Act and the Plants Act, and MAF's archives files cover periods prior to that.

2.24 The HSNO Act was amended in 2003 to allow approvals to be given at any taxonomic classification (section 27A). This provides for greater flexibility for 'generic' approvals at higher taxonomic levels, e.g. at the genus level, or the family level. It also provides for approvals for organisms whose specific parentage may be difficult to unravel. This could be particularly useful for dealing with inter-generic hybrids of orchid or other plant cultivars. Such use of s27A offers possibilities for reducing the need for section 26 determinations in the future. There may be situations where it would be appropriate for the Chief Executive of ERMA New Zealand to take the initiative in seeking approvals under section 27A.

Database Integration and Development

2.25 The Database Integration Project was initiated by Landcare Research with FRST and NSOF funding in 1999. The aim was to:

> *"…build on many existing, nationally significant collections/resource databases by placing them on a managed, common hardware/software platform within integrated data structures. This involves developing and implementing data standardisation, data entry, curation and reporting procedures. It will create authoritative data dictionaries of nomenclatural and bibliographic information linked to diverse collection, observational and spatial data. It will be delivered through either centralised or distributed systems and will be subject to standard procedures to protect data integrity, security and access rights*".

2.26 From the beginning it was realised as important for the Database Integration Project to provide data services to outside organisations, such as DOC and MAF. An overview of the Database Integration Project, prepared by Dr Jerry Cooper, Landcare Research, is reproduced in Appendix 4.

2.27 The Database Integration Project has now been running for five years, but there may still be opportunities for ERMA to influence its future directions, and to influence database development through Vote: Research, Science and Technology funding

2.28 FRST funding for the Database Integration Project will continue in 2004/05; its future beyond that will depend on the FRST's 'advancement' of their Biosecurity and Biodiversity Portfolios in the second half of 2004. These portfolios are being amalgamated to become the Resilient, Functioning and Restored Natural Ecosystems Portfolio (see http://www.frst.govt.nz/research/ecosystemPilot.cfm). It would be desirable for ERMA New Zealand to actively participate, as a key stakeholder, in the advancement processes.

2.29 There is widespread interest in biological databases and their development in a range of departments such as MfE, DoC, MAF, and MFish (as well as MoRST and Statistics).

Databases are import resources for developing and implementing biodiversity and biosecurity policies and strategies nationally and regionally. Development of databases to meet ERMA New Zealand's requirements, as well as those of other government departments and agencies, would be a possible candidate for Cross Departmental Research Pool (CDRP) funding.

2.30 The objectives of the CDRP are to:

- fund high quality cross-departmental research, which will support the achievement of the Government's strategic priorities
- catalyse new relationships and capabilities within and between departments so that over time departments take responsibility for investment in long term high quality research
- develop a portfolio of research activity divided between smaller, short term projects to catalyse new relationships and capabilities, and multi-year large scale projects to provide key building blocks for Government's decision-making.

2.31 From 2004/2005 responsibility for CDRP is being transferred from MoRST to FRST. ERMA New Zealand (with MfE's support) should consider entering into discussions with FRST at an early stage (while FRST is developing its CDRP strategy and priorities) about ERMA New Zealand's database requirements, and how they might fit with FRST's plans for the CDRP. In the past, work by research providers, such as Landcare and NIWA, has been supported by CDRP funds.

3. RECOMMENDATIONS

It is recommended that ERMA New Zealand:

3.1 provides on its website links to databases with information on organisms present in New Zealand

3.2 assigns databases, in consultation with database providers, to groups designated as accepted for ERMA New Zealand purposes or for informal us as required

3.3 expedites decision-making on section 26 requests where the request is backed by evidence from an accepted database, (and/or by a reputable taxonomist from an organisation which maintains a relevant accepted database)

3.4 provides guidance (on its website) on how to search for taxonomic and other information on organisms. This would include providing links to internet resources for taxonomic and other information, links to websites of organisations which develop and maintain taxonomic databases on New Zealand organisms, and advice on using library resources

3.5 improves access on its website to decisions by the Authority on determinations of whether or not an organism is a new organism, and applications for approvals for the release of new organisms. This information should be searchable by taxonomic groups (e.g. kingdom, phylum, class, order, family, genus and species), as well as by common name

3.6 includes, on its website, links to relevant expertise and experts listed by CRIs, universities, other organisations or individuals

3.7 resolves any anomalies associated with the issue of imports permits by MAF before the commencement of the new organisms provisions of the HSNO Act;

3.8 encourages and facilitates use of section 27A of the HSNO Act for generic approvals above the species level. This could reduce the need for section 26 determinations in the future

3.9 participates actively, as a key stakeholder, in the FRST advancement processes for their Biosecurity and Biodiversity Portfolios (to become the Resilient, Functioning and Restored Natural Ecosystems Portfolio)

3.10 explores, with MfE and other departments such as MAF and DoC, opportunities for Cross Departmental Research Pool funding for database development.

APPENDICES

Appendix 1: List of databases

1. Plants

Group of organisms	Plants
Name of database	Allan Herbarium (CHR) and Databases
Maintained by	Landcare Research
Contact details	Aaron Wilton (Herbarium and Database Manager; Biodiversity Informatics) Michelle Breach (Database Administrator) Isle Breitweiser (Herbarium Keeper) 03 325 6700 plantInfo@landcareresearch.co.nz
Brief description	Collection of over 560,000 specimens, with 5,000 to 8,000 being added annually. Two thirds of the specimens are of indigenous plants with the remainder divided between naturalised, cultivated and foreign specimens. Several databases are associated with the Allan Herbarium[1]. The Plant Names Database records the scientific names of plant taxa in the New Zealand flora. It includes the current names for lichens, algae liverworts, mosses[2], ferns, and seed plants that are wild in New Zealand. The database also includes synonyms for New Zealand lichens, mosses and ferns. The Allan Herbarium Specimen Database currently contains c. 130,000 records, or approximately 20% of the specimens in the collection. Specimens are added to the database according to research and conservation priorities. The All New Zealand Species Database contains a list of all vascular plant species recorded as being present in New Zealand. The database currently lists records for approximately 28,000 species and 7000 synonyms. These records are derived from a wide range of sources. Database search fields include: family name, taxonomic name, previous names, determination name (including author, year of publication), determiner, collection date, and locality.
Currency, reliability of data	Continually updated. Reliable information, but there are gaps, e.g. plants in cultivation, private collections, seaweeds.
Access **Web addresses**	World Wide Web www.landcareresearch.co.nz/research/biodiversity/[plantsprog/services.asp and http://nzflora.landcareresearch.co.nz
Cost of access	Databases: Public domain, free. Questions can be directed to taxonomists in Landcare's Plant Biosystematics Research Programme. Charges are based on cost recovery with a discretionary charge per day.
ERMA New Zealand recognition	Accepted

[1] See also: *Flora of New Zealand.* Landcare Research. 5 volumes; three volumes of *Flora of New Zealand Desmids;* and one volume: *Flora of New Zealand Lichens.*
http://Floraseries.landcareresearch.co.nz

[2] See also: *Moss Flora of New Zealand* Alan Fife A comprehensive Moss Flora of New Zealand is currently being prepared to supersede that of Sainsbury (1955). Expected to be published 2005/06.

Group of organisms	Plants
Name of database	Te Kahui
Maintained by	Te Papa Tory Street Wellington
Contact details	Patrick Brownsey (Curator) Simon Whittaker (Collection Manager) 04 381 7000
Brief description	About 254,000 native and exotic dried plant specimens, including 140,000 angiosperms and gymnosperms; 20,000 pteridophytes; 54,000 mosses and liverworts; 15,000 lichens; and 25,000 algae. Te Papa holds New Zealand's most comprehensive marine algal collection; all NIWA's collections of marine algae are deposited in Te Papa. Te Papa's marine algae are not on Landcare's database of plant names.
Currency, reliability of data	Te Papa holds numerous historical collections. These include specimens that were collected by Joseph Banks and Daniel Solander in 1769, and those of other notable collectors throughout the 19th and 20th centuries (e.g. William Colenso, Thomas Kirk, W.R.B. Oliver). Data as reliable as collection labels. Te Papa does not hold information on plants in cultivation or garden plants.
Access **Web address**	At present access to the database is by request to the curator. Te Papa's New Zealand collections of mosses, liverworts, lichens, ferns[3], and marine algae are databased; databasing of angiosperms and gymnosperms is in progress. Te Papa, in conjunction with Auckland Museum and Landcare Research, is working to have all its collections databases available on-line; this could be achieved by 2006. ERMA New Zealand could have access to the database now by developing an MoU with Te Papa (using that between DoC and Te Papa as a guide).
Cost of access	Free for simple requests. Discretionary charge for significant research by Te Papa staff.
ERMA New Zealand recognition	

Group of organisms	Plants
Name of database	MAF Plants Biosecurity Index
Maintained by	MAF Biosecurity Authority Wellington
Contact details	Gerard Clover 04 470 2742
Brief description	"Lists genus, species and common names of plants recorded as present in New Zealand at some time" and some prohibited species not recorded in New Zealand. MAF's Plants Biosecurity Index has a number of functions: • index of what is here in New Zealand • index of what is prohibited • index of plants prohibited under Misuse of Drugs Act • reference for Import Health Standards. The primary purpose ofMAF's Plant Biosecurity Index is to support MAF's plant health requirements. Can be searched by: genus, species, common name, nursery stock, entry prohibited.
Currency, reliability of data	MAF's Biosecurity Index has no formal link to Landcare's databases to record changes in taxonomy; there is no regular comparison of databases.

[3] See also: Patrick Brownsey &John Smith Dodsworth. 2000. *New Zealand Ferns and Fern Allies*. Bateman

	MAF is not interested when an addition, amendment to Landcare's lists is not relevant to MAF's Import Health Standards responsibilities. As far as MAF is concerned synonyms are only an issue if there is a problem at the border. MAF is more interested in names in common usage than in being up to date with taxonomic changes. Does not contain authority names or dates There are organisms on the Index that are not present in New Zealand. In compiling the Index, MAF went through records of old import permits in 1998. MAF's Index was fairly accurate in 1998, but is less so now.
Access **Web address**	World-Wide Web. Can be interrogated at: www.maf.govt.nz/biosecurity/plants.htm and www1.maf.govt.nz/cgi-bin/bioindex/bioindex.pl)
Cost of access	Free.
ERMA New Zealand recognition	Accepted, with qualifications.

Group of organisms	Plants, especially trees and, forest flora of New Zealand
Name of database	National Forestry Herbarium
Maintained by	Forest Research, Rotorua
Contact details	Curator: Chris Ecroyd 07 343 5609 Chris.Ecroyd@forestresearch.co.nz
Brief description	Reference collection of c. 25,000 pressed, dried specimens. Specialises in conifers, eucalypts, and other tree species[4]; biodiversity of NZ forests; also indigenous and adventive flora of the Bay of Plenty and central North Island. Provides taxonomic information on plantation forestry and indigenous species. All specimens databased.
Currency, reliability of data	
Access **Web address**	Information requests to the Curator. Database not available on-line. http://www.forestresearch.co.nz/topic.asp?topic=Herbarium&title=Herbarium
Cost of access	Forest Research offers a Tree Identification Service at $40 per sample. Other commercial queries charged at an hourly rate.
ERMA New Zealand recognition	To be determined.

Group of organisms	Poplars and willows
Name of database	New Zealand Poplar and Willow Collection
Maintained by	HortResearch Aokautere
Contact details	Ian McIvor Brent Clothier: 06 356 8080
Brief description	Approximately 100 spp and hybrids of *Populus* and 200 spp and hybrids of *Salix.* Living collection for identification, phenological and disease observations.
Currency, reliability of data	Current, reliable lists of collection.
Access **Web address**	Not databased. Enquiries to HortResearch www.hortresearch.co.nz
Cost of access	
ERMA New Zealand recognition	No. Species are listed on MAF Plants Biosecurity index.

[4] See also: Forest Research Bulletin No. 124 - *Introduced Forest Trees in New Zealand: Recognition, Role and Seed Source.* (18 vol).

Group of organisms	Flaxes
Name of database	New Zealand Flax Collection
Maintained by	Landcare Research
Contact details	Sue Scheele 03 325 6700
Brief description	Living collection established by the Rene Orchiston Collection of 50 cultivars of *Phorium* spp. donated 1986. Updated annually (usually two to five additions per year). Ethnobiological database Ngā Tipu Wakaoranga.
Currency, reliability of data	Updated annually.
Access **Web address**	By enquiry to curator, Landcare Research.
Cost of access	Cost recovery.
ERMA New Zealand recognition	No. (Taxonomic information available on Landcare Research's All New Zealand Species Database).

Group of organisms	Freshwater macrophytes, freshwater pest plants
Name of database	Freshwater Biodata Information System (FBIS)
Maintained by	NIWA
Contact details	FBIS Team fbis@niwa.co.nz Mary de Winton 07 8561797 Macrophyte Data Administrator:
Brief description	Comprises plant survey results for 206 lakes, over 17,500 plant records, using survey method of Clayton (1983), and other supporting information Comprises over 2,000 invasive plant survey results held by the DoC, New Zealand Herbaria, and regional councils. The Pest Status and Aquatic Weed Risk Assessment Ranking of invasive plant species are also recorded.
Currency, reliability of data	Multiple entries.
Access **Web address**	http://fbis.niwa.co.nz
Cost of access	Free.
ERMA New Zealand recognition	To be determined.

Group of organisms	Living collections by genera of plants
Name of database	New Zealand Plant Collections Register
Maintained by	Royal New Zealand Institute of Horticulture
Contact details	Dr Keith Hammett 488c Don Buck Road Massey Auckland
Brief description	Register of nearly 400, mainly private, plant collections. List organised by genus, indicates number of species held but does not name them. Provides access to locations and contact details of collections of particular families and genera of plants.
Currency, reliability of data	
Access **Web address**	Publicly available at www.rnzih.org.nz/
Cost of access	Free
ERMA New Zealand recognition	Informal. Note: Source of information about particular genera in private gardens in New Zealand.

Group of organisms	Orchids
Name of database	List of New Zealand Orchid Species
Maintained by	New Zealand Native Orchid Group
Contact details	Ian St George 22 Orchard St Wadestown Wellington istge@rnzcgp.org.nz
Brief description	Gives genus, species, authority, date. Provides references.
Currency, reliability of data	Last updated December 2000. Editor's personal view.
Access **Web address**	Available at: http://www.anos.org.au/groups/newzealand/nznogframe.html
Cost of access	Publicly available.
ERMA New Zealand recognition	To be determined.

Group of organisms	Trees
Name of database	Notable Trees of New Zealand Register
Maintained by	Royal New Zealand Institute of Horticulture.
Contact details	Ron Flook 539 Rocks Road Tahunanui Nelson 03 548 6539 flook@netaccess.co.nz
Brief description	Database of every notable tree registered in New Zealand. Can be searched by any combination of registration number, botanical name, common name, or district.
Currency, reliability of data	
Access **Web address**	Publicly available at www.notabletrees.org.nz/
Cost of access	Free.
ERMA New Zealand recognition	No.

Group of organisms	Grasses
Name of database	Margot Forde Forage Germplasm Centre
Maintained by	AgResearch Palmerston North
Contact details	Warren Williams 06 356 9019 warren.williams@agresearch.co.nz
Brief description	National genebank for 70,000 seed samples of 2000 spp. forage and grassland plants; databank of introduced and indigenous forage and grassland plants. Many (circa 1400) of the species are held in containment; they are not 'present in New Zealand'.
Currency, reliability of data	Continually updated.
Access **Web address**	
Cost of access	Information available by enquiry to Dr Williams – no charge. http://www.agresearch.co.nz/agr/agrsci/plant/2%20PBG%20Germplasm%20Centre.pdf
ERMA New Zealand recognition	To be determined.

2. Fungi

Group of organisms	Fungi[5]
Name of database	New Zealand Fungal Herbarium and Database (PDD)
Maintained by	Landcare Research
Contact details	Peter Buchanan mycologyDB@landcareresearch.co.nz
Brief description	30,000 names (including synonyms), many with full bibliographic citations; from 74,000 collections. Fully databased[6]. Provides links to distribution maps, literature, descriptions, keys, taxonomic groups.
Currency, reliability of data	Continually updated –1,000 to 2,000 collections are added annually. The data is continuously updated and changes will appear on the website quarterly. The taxonomic content of the site is reviewed by expert systematists within Landcare Research in collaboration with workers throughout New Zealand and elsewhere.
Access **Web address**	Publicly available at http://nzfungi.landcareresearch.co.nz/html/mycology.asp
Cost of access	Free.
ERMA New Zealand recognition	Accepted.

Group of organisms	Human fungi
Name of database	New Zealand Human Mycology Reference Culture Collection and Database.
Maintained by	Auckland District Health Board.
Contact details	Dr Karen Rogers (Manager) 09 307 4949 extn 6087
Brief description	Reference collection of samples from New Zealand and overseas. Database Includes confidential patient information. Presence of a fungus in the culture collection does not mean that the fungus is 'present in New Zealand'. Some of the isolates are from overseas, or from patients who have picked up infections overseas. AHDB forwards to Landcare isolates held by ADHB for validation and deposition in Landcare's collection.
Currency, reliability of data	Current. Reliable
Access: **Web address:**	Information on isolates available on Landcare's database. Contact Dr Rogers re medical samples or enquiries.
Cost of access	
ERMA New Zealand recognition	No.

Group of organisms	Forest and wood fungi
Name of database	Forest Research Mycological Herbarium and Forest Research Culture Collection
Maintained by	Forest Research
Contact details	Margaret Dick (Curator) 07 347 5899 margaret.dick@forestresearch.co.nz
Brief description	Approximately 3,000 herbarium and 1,500 culture collections of pathogenic and saprophytic (particularly wood-decaying) fungi (and a few

[5] See also entry below under "Bacteria"for: International Collection of Micro-organisms from Plants (ICMP).

[6] See also: The *Fungi of New Zealand* series: a series of books, administered by Landcare Research, published by Fungal Diversity Press.

	algae and lichens) from temperate New Zealand native forests, exotic plantations and urban planting amenities.
Currency, reliability of data	Collections continually updated.
Access **Web address**	By enquiry to curator. Not available online.
Cost of access	Access free for scientific purposes; no restrictions on data release. A free identification service is available to members of the public, importers, growers and forest owners with concerns about possible incursions.
ERMA New Zealand recognition	Informal.

3. Algae

Group of organisms	Marine micro-algae
Name of database	Cawthron Micro-algae Culture Collection
Maintained by	Cawthron Institute
Contact details	Dr Lesley Rhodes 03 548 2319, lesley.Rhodes@cawthron.org.nz
Brief description	Reference and diagnostic culture collection of marine indigenous and exotic micro-algae.
Currency, reliability of data	Continually updated.
Access **Web address**	http://www.cawthron.org.nz/microalgae_culture_collection.htm
Cost of access	Free.
ERMA New Zealand recognition	To be determined.

Group of organisms	Marine algae - Crustose Coralline Algae of New Zealand
Name of database	
Maintained by	NIWA
Contact details	Dr Wendy Nelson w.nelson@niwa.co.nz
Brief description	Current MFish research project
Currency, reliability of data	Current research programme.
Access **Web address**	Crustose Coralline Algae of New Zealand http://www.niwa.co.nz/ncabb/abb/2002-02/
Cost of access	Enquiries to Dr Nelson
ERMA New Zealand recognition	To be determined.

4. Bacteria

Group of organisms	Bacteria, fungi
Name of database	International Collection of Micro-organisms from Plants (ICMP)
Maintained by	Landcare Research.
Contact details	Dr Peter Buchanan (Programme Leader) 09 574 4100 BuchananP@landcareresearch.co.nz
Brief description	Over 12,000 strains of live micro-organisms from New Zealand and overseas, from plants, soils, and the environment. Contains over 6000 strains of bacteria and 6000 strains of fungi including yeasts. Includes cultures of world's bacterial and fungal plant pathogens.
Currency, reliability of data	Continually updated
Access **Web address**	Available on line at: http://nzfungi.landcareresearch.co.nz/icmp/search_cultures.asp
Cost of access	Free.
ERMA New Zealand recognition	Accepted.

Group of organisms	Bacteria
Name of database	New Zealand Reference Culture Collection, Medical Section
Maintained by	ESR Kenepuru.
Contact details	Pat Short (Curator) 04 914 0705 pat.short@esr.cri.nz
Brief description	4,000 cultures. Database (catalogue) alphabetical list of species (no dates or authority names); numerical index
Currency, reliability of data	Never fully up-to-date
Access **Web address**	Data duplicated on Landcare's database. Catalogue on web at: www.esr.cri.nz – click publications, then New Zealand Reference Culture Collection, Medical Section
Cost of access	Free.
ERMA New Zealand recognition	No. Note: Included in Landcare Research's ICMP database

Group of organisms	Bacteria.
Name of database	New Zealand Reference Culture Collection, Veterinary Section.
Maintained by	AgResearch Wallaceville
Contact details	Dr Geoff deLisle 04 922 1300 geoff.delisle@agresearch.co.nz
Brief description	5000 cultures of mycobacteria and other bacteria related to veterinary microbiology.
Currency, reliability of data	Not assessed.
Access **Web address**	Not assessed.
Cost of access	
ERMA New Zealand recognition	To be determined.

5. Viruses

Group of organisms	Plant viruses.
Name of database	Phytoplasmas, plant viruses, and viroids of New Zealand
Maintained by	School of Biological Sciences University of Auckland MAF BA.
Contact details	Gerard Clover MAF Wellington. Dr Mike Pearson (plant viruses and viroids) University of Auckland Dr Ross Beever (phytoplasmas) Landcare Research Tamaki
Brief description	Current MAF research project; "The project will review and update the plant virus, phytoplasmas and viroids records of New Zealand. The primary aim is to verify and record presence, but distribution data will be recorded where available".
Currency, reliability of data	
Access **Web address**	"It is anticipated that MAF BA, in association with the research provider, will publish this review in a peer-reviewed scientific journal".
Cost of access	
ERMA New Zealand recognition	To be determined.

6. Weeds

Group of organisms	Weeds
Name of database	Invasive Weeds Database.
Maintained by	Landcare Research, Dunedin
Contact details	Dr Bill Lee 03 477 4050 leew@landcare.co.nz
Brief description	Native and introduced species listed with a variety of phenological data. The purpose of the database is to predict which plant communities are vulnerable to invasion by invasive weeds and which plant species are likely to become invasive
Currency, reliability of data	
Access **Web address**	Only accessible to Landcare staff. Enquiries to Landcare Research.
Cost of access	Discretionary cost-recovery charges.
ERMA New Zealand recognition	No. But could provide useful information re 'weediness'.

7. Mammals

Group of organisms	Mammals
Name of database	Te Papa Mammals Collection
Maintained by	Te Papa Tory Street Wellington
Contact details	04 381 7000
Brief description	6,000 specimens. One of the largest collections of marine mammal skeletons in the world. Extensive and important collection of introduced mammals as well as rare native bats.
Currency, reliability of data	
Access **Web address**	Database to be in public domain by 2006?
Cost of access	
ERMA New Zealand recognition	Informal.

Group of organisms	Feral Vertebrates: Mammals, Birds, Amphibians, and Fish
Name of database	Feral.org.au Database[7].
Maintained by	Dr Carolyn King
Contact details	Dr Carolyn King Department of Biological Science University of Waikato c.king@waikato.ac.nz (maintains the New Zealand portion of the database formally found at http://www.invasive-animals.org.nz/)
Brief description	Th feral.org.au database contains information on vertebrate invasive animals in Australia and New Zealand. The type of information includes: published and unpublished research, technical reports, management practices, threat abatement plans and legislation. Whilst some full-text information is provided, this site does not reproduce documents available online elsewhere, but rather provides a short summary and link to where the full-text can be accessed.
Currency, reliability of data	Updated approximately every 6 months.
Access **Web address**	Publicly available at: http://www.feral.org.au/
Cost of access	Free.
ERMA New Zealand recognition	Informal.

[7] See also: *Handbook of New Zealand Mammals*. Carolyn M. King, Oxford. 1998. 2nd edition to be published 2005.

Group of organisms	Exotic mammals and birds
Name of database	List of wildlife species present in New Zealand.
Maintained by	MAF
Contact details	Christine Reed MAF 04 4702756 Christine.reed@maf.govt.nz
Brief description	The 'Epicentre' at Massey is developing a wildlife disease surveillance strategy for MAF/MOH/DOC. Part of this is listing wildlife present in New Zealand. The project is being led by Dr Joanna McKenzie. "Wildlife" includes terrestrial vertebrates native to New Zealand, feral terrestrial vertebrates introduced to New Zealand, marine mammals, freshwater fish, native macro-invertebrates, and invertebrate vectors. It does not include wildlife held only in captive collections.
Currency, reliability of data	
Access **Web address**	
Cost of access	
ERMA New Zealand recognition	To be determined.

8. Birds

Group of organisms	Birds
Name of database	New Zealand Recognised Bird Names (NZRBN) Database.
Maintained by	Ornithological Society of New Zealand (OSNZ). http://osnz.org.nz/
Contact details	Chris Robertson OSNZ PO Box 12397 Wellington osnz@xtra.co.nz
Brief description	Provided on OSNZ webpage as downloadable Excel sheet. Provides key to distribution: gives where found in mainland New Zealand, oceanic, outer islands, Antarctica. Gives information on status: endemic; introduced by human agency; straggler (irregular visitor; rare vagrant; probably extinct; extinct. Also gives key to DoC threat classification: 1. Nationally critical 2. Nationally endangered. 3. Nationally vulnerable 4. Serious decline 5. Gradual decline. 6. Sparse. 7. Range restricted. N. Not threatened. C. Colonizer. M. Migrant. V. Vagrant. E. Extinct
Currency, reliability of data	Updated regularly by Rare Birds Committee of OSNZ. Highly reliable and authoritative.
Access **Web address**	Public Domain. Web access: http://bird.org.nz/nzrbn.htm
Cost of access	Free.
ERMA New Zealand recognition	Accepted.

Group of organisms	Birds
Name of database	Te Papa Bird Collection and database
Maintained by	Te Papa Tory Street Wellington
Contact details	Gillian Stone (Collections Manager) 04 381 7304.
Brief description	World's largest and best collection of New Zealand birds Fully databased.
Currency, reliability of data	Continually updated. Database includes all information on collection labels for items. Many items are old, although collections are being added to continually. Provides very good information on birds, (especially but not exclusively indigenous birds), that have been found in New Zealand". Contains 60,000 birds)
Access **Web address**	To be in public domain from 2006?
Cost of access	Casual enquiries free. No charge.
ERMA New Zealand recognition	Informal.

Group of organisms	Birds, mammals, reptiles, amphibians.
Name of database	Auckland Museum Land Vertebrates Collection http://www.aucklandmuseum.com/?t=266
Maintained by	Auckland Museum
Contact details	Brian Gill Land Vertebrate Collections. Private Bag 92 018, Auckland 09 309 0443 bgill@aucklandmuseum.com
Brief description	Comprises over 12,500 bird specimens, 2,500 amphibians and reptiles and 1,000 land mammals. Specimens are primarily from northern New Zealand, but there is also a significant amount of material from elsewhere in the country, from islands of the south-west Pacific, from Australia and from around the world.
Currency, reliability of data	Continually updated. Database based on collection labels.
Access **Web address**	Type specimens to be on website from 2005; others to follow.
Cost of access	
ERMA New Zealand recognition	To be determined.

Group of organisms	Passerine birds
Name of database	Passerines in present in New Zealand
Maintained by	
Contact details	
Brief description	In August 1996 MAF published in *Sentinel* a list of passerine species identified by the Aviculture Society as being present in New Zealand. A list based on that from the *Sentinel* article was published in a MAF Import Health Standard in November 1997. This list, with additions and amendments, formed the basis of the S2604002 application from Glen Holland, Director of the Auckland Zoological Park.
Currency, reliability of data	The Authority's decision will be authoritative.
Access **Web address**	S2604002 application (and subsequent decision, when made). http://www.hsno.govt.nz/no.shtm ?
Cost of access	Publicly available.
ERMA New Zealand recognition	Accepted, subject to ERMA New Zealand's determination.

9. Reptiles and Amphibians

Group of organisms	Lizards, snakes, turtles, frogs.
Name of database	Herpetofauna Database
Maintained by	DoC
Contact details	Benno Kappers (Database Administrator) 06 8344865 bkappers@doc.govt.nz Mandy Tocher (Scientific Officer - Herpetologist) 03 474 6949 mtocher@doc.govt.nz
Brief description	Database contains: species taxonomy information, species observation records, marked animal observation records. Data will include records held by universities and museums.
Currency, reliability of data	At present database is available to DoC staff only; requests from outside can be serviced through database administrator.
Access **Web address**	Available on DoC's BioWeb. BioWeb will be available via DoC's Extranet as read-only or with read/write access. The latter will require a formal agreement to be negotiated.
Cost of access	Subject to negotiation.
ERMA New Zealand recognition	To be determined.

Group of organisms	Reptiles and Amphibians
Name of database	New Zealand Herptofauna
Maintained by	VUW: Society for Research on Amphibians and Reptiles of New Zealand (SPARNZ). http://www.vuw.ac.nz/srarnz/
Contact details	ben.bell@vuw.ac.nz
Brief description	Holds a collection of New Zealand herpetology references, including amphibian.
Currency, reliability of data	
Access **Web address**	http://www.vuw.ac.nz/srarnz/bibliography.htm
Cost of access	Public domain.
ERMA New Zealand recognition	Informal.

Group of organisms	Reptiles and Amphibians
Name of database	HerpWeb New Zealand: Reptiles and Amphibians in New Zealand
Maintained by	The New Zealand Herpetological Society, Inc.
Contact details	PO Box 6046 Moturoa New Plymouth, warwick.brown@world-net.co.nz
Brief description	Provides information on, and lists of, New Zealand species of geckos, skinks, native frogs, and tuatara.
Currency, reliability of data	Not tested, but appears up-to-date and reliable.
Access **Web address**	Publicly available at http://members.tripod.com/hoodoodvb/herpweb/home.html
Cost of access	Free.
ERMA New Zealand recognition	Informal.

Group of organisms	Reptiles and Amphibians
Name of database	Te Papa's reptile and amphibian database.
Maintained by	Te Papa Tory Street Wellington
Contact details	Raymond Coory (Curator of Reptiles) 04 381 7302.
Brief description	5,000 New Zealand and overseas items. Database of collection label information.
Currency, reliability of data	Continually updated. Not a comprehensive database.
Access **Web address**	Currently by enquiry to curator. Will be publicly available on web by 2006?
Cost of access	No charge currently.
ERMA New Zealand recognition	To be determined.

10. Fishes

Group of organisms	Fishes
Name of database	National Fish Collection and associated database held by Te Papa.
Maintained by	Te Papa Tory Street Wellington
Contact details	Andrew Stewart (Collection Manager - Fishes) Clive Roberts (Curator - Fishes) 04 381 7000
Brief description	Largest and most comprehensive collection of New Zealand fishes, comprising over 260,000 specimens, containing more than 95% of species recorded from New Zealand. Becoming fully databased; nationally and internationally important.[89]
Currency, reliability of data	Continually updated. High quality taxonomy.
Access **Web address**	Te Papa working to have selected parts of its collection database on web; some information could be online by 2006. See: http://www.tepapa.govt.nz/TePapa/English/CollectionsAndResearch/CollectionCareAndAccess/CollectionAccess/
Cost of access	
ERMA New Zealand recognition	Accepted.

Group of organisms	Freshwater fishes
Name of database	New Zealand Freshwater Fish Database (NZFFD).
Maintained by	NIWA
Contact details	Jody Richardson 07 856 7026 j.richardson@niwa.cri.nz or fwdba@frc.niwa.cri.nz
Brief description	Records of occurrence of fish in fresh waters of New Zealand, including offshore islands. Includes species information.
Currency, reliability of data	Continually updated, but no regular update programme. The data is collected by a variety of collectors who have varying skills in correctly identifying fish species.
Access **Web address**	Access requires registration with NIWA.
Cost of access	
ERMA New Zealand recognition	To be determined.

Group of organisms	Aquarium fish
Name of database	Tropical Fish in New Zealand
Maintained by	Federation of New Zealand Aquatic Societies
Contact details	Carol Mercer 24 Mahoe St Inglewood 06 756 7758 majminmerc@infogen.net.nz

[8] See also: Chris Paulin et al., 1989. *New Zealand fish: a complete guide.* Te Papa Press, Wellington. Comprehensive keys of New Zealand fishes (reprinted 2002).

[8] See also: Clive Roberts & Chris Paulin, 1997. Fish collections and collecting in New Zealand, pp. 207-229. *In*: Collection Building in Ichthyology and Herpetology. *Amer. Soc. Ichthy. Herp., Special Publ., 3.*

[9] Publication (Clive Roberts primary author) of new two-volume comprehensive illustrated guide to New Zealand's EEZ fishes expected 2009.

Brief description	"This is a very crude and unscientific survey of tropical fish species available in New Zealand". Can be searched by scientific name and common name. Survey was started on 25 June 2002 The list was taken from MAF's "Import Health Standard for Importation into New Zealand of ornamental fish and marine invertebrates from all countries"[10]. The MAF list contains many entires at genus level e.g. *Platydoras* spp. – catfish. See: www.maf.govt.nz/biosecurity/imports/animals/standards/fisornic.all.htm
Currency, reliability of data	Not validated. Not reliable.
Access **Web address**	http://www.fnzas.org.nz/index.php?id=404&puid=278
Cost of access	Publicly available.
ERMA New Zealand recognition	No

[10] Dr Bob McDowell, NIWA, is currently examining this list. He has reported that 280 organisms are listed in MAF's Import Health Standard; of these 160 are listed as genera; many of these genera contain large numbers of species. The most is the genus *Barbara* which contains 800 species, some of which would readily establish in New Zealand.

11. Mollusca

Group of organisms	Molluscs
Name of database	Checklist of the Recent Mollusca described from the New Zealand EEZ
Maintained by	Allan Wilson Centre for Molecular Ecology and Evolution
Contact details	Dr Hamish Spencer Department of Zoology University of Otago PO Box 56 Dunedin
Brief description	A list of all 2902 described species and subspecies of Recent and Sub-recent Mollusca from the New Zealand EEZ. Each entry is substantiated by a bibliographic reference for the record and its most recent nomenclatural combination. Both endemic and adventive species are identified. Covers all marine and non-marine molluscs from New Zealand, with separate listing of introduced non-marine pulmonate species. Non-established species from earlier lists, and fossil species have been excluded.
Currency, reliability of data	Up-to-date (first published 2003); supersedes Powell's 1979*New Zealand Mollusca: Marine, Land and Freshwater Shells.* Author estimate there are 1700 spp. that have been collected that are awaiting formal description. Authors intend to revise list annually. High quality, reliable information.
Access **Web address**	Publicly available at: http://toroa.otago.ac.nz/pubs/spencer/Molluscs/
Cost of access	Free.
ERMA New Zealand recognition	Accepted.

Group of organisms	Molluscs
Name of database	Te Papa's Biological Collection and Database: Molluscs.
Maintained by	Te Papa Tory Street Wellington
Contact details	Bruce Marshall (Curator of Molluscs) 04 381 7000
Brief description	Extensive, fully databased collection (335,000 species lots) and of New Zealand molluscs with a comprehensive list of names.
Currency, reliability of data	Database from collection labels
Access **Web address**	Will be on web by 2006?
Cost of access	
ERMA New Zealand recognition	Informal, when on web

12. Terrestrial arthropods

Group of organisms	Insects, spiders, mites, centipedes, millipedes etc.
Name of database	New Zealand Arthropod Collection (NZAC).
Maintained by	Landcare Research Mt Albert.
Contact details	Trevor Crosby (Curator) 09 849 3660
Brief description	World's foremost collection of New Zealand insects and mites, containing about 6.5 million specimens. Not fully databased. Databases include: - NZACbugs contains information on species present in New Zealand; restricted to species that are considered to be of special importance or have recently been revised, e.g. wetas, orchard leafrollers, and *Fauna of New Zealand* revisions. - BUGS a bibliographic database of 16000 records of New Zealand terrestrial invertebrates. - Pacific database of species of the Pacific. Separately accessible searchable databases for: Acari; Aranae; Diptera; Hemiptera; Heteroptera; Hymenoptera: Lepidioptera; Coleoptera.
Currency, reliability of data	Continually updated. High quality taxonomy.
Access **Web address**	Parts of NZACbugs are available on the web (e.g. genera of Coleroptera and Hymenoptera in NZAC)[11]. BUGS is publicly available on CD-ROM Pacific is being made available on the SPC/FAO Web http://www.landcareresearch.co.nz/research/biodiversity/invertebratesprog/nzac/
Cost of access	Databases available on web free. However, web databases are incomplete; for other information, including research by Landcare Research staff, there is a discretionary charge.
ERMA New Zealand recognition	Accepted.

Group of organisms	Terrestrial arthropods
Name of database	Te Papa's Entomology Collection.
Maintained by	Te Papa Tory Street. Wellington
Contact details	Ricardo Palma (Curator) Phil Sirvid (Collection Manager) 04 381 7000
Brief description	Approximately 600,000 specimens Includes insects, spiders, other arachnids, centipedes, millipedes, tardigrades, parasites.
Currency, reliability of data	Continually updated. Not well databased.
Access: **Web address:**	Enquiries to curator. Database may be available on web by 2006?
Cost of access	Enquiries free; may be a discretionary charge for substantial research.
ERMA New Zealand recognition	Not at present.

[11] See also: *Fauna of New Zealand* monograph series. (Currently 48 volumes)

Group of organisms	Terrestrial arthropods
Name of database	Auckland Museum Insect Collection (AMNZ)
Maintained by	Auckland Institute and Museum
Contact details	John Early. Phone: 09 309 0443 Private Bag 92 018, Auckland
Brief description	About 150,000 specimens. Includes comprehensive collection of New Zealand insects, spiders, centipedes.
Currency, reliability of data	Continually updated. Partly databased. Aim is to have database completed in 5 – 10 years. All new specimens have data entered as they are received.
Access **Web address**	Enquires to curator.
Cost of access	Enquiries free; may be a discretionary charge for substantial research.
ERMA New Zealand recognition	No.

Group of organisms	Forest insects and parasitoids
Name of database	Forest Research Insect Collection.
Maintained by	Forest Research
Contact details	Dr Brian Richardson,(Unit Manager) Forest Biosecurity and Protection Unit. Brian.Richardson@forestresearch.co.nz John Bain (Diagnostic Service Manager and Curator)
Brief description	Research and diagnostic collection of approximately 100,000 mainly forest insects and insects affecting timber use. Also parasitoids of forest and wood organisms. Not databased
Currency, reliability of data	
Access **Web address**	Enquiries through Forest Biosecurity and Protection Unit.
Cost of access	No charge for scientific information.
ERMA New Zealand recognition	No.

Group of organisms	Terrestrial arthropods
Name of database	Entomology Research Museum (LUNZ)
Maintained by	Ecology and Entomology Group Lincoln University
Contact details	John Marris (Curator) marris@lincoln.ac.nz Dr Adrian Paterson (Senior Lecturer in Entomology)
Brief description	Collection of 150,000 specimens, mainly New Zealand, and particularly South Island, Chatham Islands, and sub-Antarctic Islands. Includes wide range of specimens of agricultural and horticultural importance. Strong on Coleoptera, micro-Hymenoptera, and tussock grassland Lepidoptera. Not databased.
Currency, reliability of data	Collection reflects interests and expertise of staff. Taxonomic quality probably high in areas of their expertise.
Access **Web address**	Taxonomic publications of staff and students listed at: www.lincoln.ac.nz/spes/research/museum.htm.
Cost of access	
ERMA New Zealand recognition	No, but avenue for enquiries re: species of agricultural and horticultural importance.

Group of organisms	Diptera
Name of database	Checklist of New Zealand Diptera
Maintained by	
Contact details	Not given
Brief description	Provides genus and species names, with authorities and dates for families and sub-families of Diptera in New Zealand. Indicates where there is doubt about presence in New Zealand.
Currency, reliability of data	Issued on 3 March 2000 Not updated since.
Access: **Web address:**	Publicly available at: http://www.ento.org.nz/Diptera.htm
Cost of access	Free.
ERMA New Zealand recognition	Informal

13. Nematodes

Group of organisms	Nematodes
Name of database	The National Nematode Collection of New Zealand
Maintained by	Landcare Research Mt Albert
Contact details	Gregor Yeates YeatesG@landcareresearch.co.nz Trevor Crosby CrosbyT@landcareresearch.co.nz
Brief description	Lists both endemic New Zealand type specimens and non-New Zealand species. (Part of the NZAC). Accompanied by bibliography.
Currency, reliability of data	Webpage lists "each nematode species held in the NNCNZ on 31 December 1995".
Access **Web address**	Publicly available at: www.landcareresearch.co.nz/research/biodiversity/invertebratesprog/nzac/nncn
Cost of access	Free.
ERMA New Zealand recognition	Accepted (part of NZAC).

14. Marine fauna

Group of organisms	Marine organisms
Name of database	NIWA Museum Database
Maintained by	NIWA, Greta Point
Contact details	Dr Wendy Nelson Dr Denis Gordon 04 386 0300.
Brief description	Database catalogues all identified species in NIWA Museum. 120,000 records from 7000 stations. Gives genus, species, phylum, order, family, station location, depth, sediment type, distribution.
Currency, reliability of data	One of the world's most comprehensive marine databases. No time series information so not useful for determining historic baselines.
Access **Web address**	Not publicly available. One of the main uses is internal NIWA taxonomic studies[12].
Cost of access	$100 charge for each search.
ERMA New Zealand recognition	Informal – terms need to be discussed with NIWA

Group of organisms	Foraminifera
Name of database	List of New Zealand Recent Foraminifera
Maintained by	B W Hayward
Contact details	B W Hayward Department of Geology University of Auckland Private Bag 92 019 Auckland b.hayward@geomarine.org.nz
Brief description	Gives order, family, authority and date. Provides references.
Currency, reliability of data	Kept current
Access **Web address**	Publicly available at; http://homepages.ihug.co.nz/~bw.hayward/html/NZ_Rec_Forams.htm
Cost of access	Free.
ERMA New Zealand recognition	Accepted.

Group of organisms	Invasive marine organisms in New Zealand
Name of database	Marine Bioinvaders of New Zealand
Maintained by	Cawthron Institute
Contact details	Dr Lesley Rhodes 03 548 2319
Brief description	Text and references for animal and plant species that have established in New Zealand.
Currency, reliability of data	Dated July 1999.
Access **Web address**	Enquiries to Cawthron Institute. List available at: http://www.cawthron.org.nz/Assets/minvaders.PDF
Cost of access	Free.
ERMA New Zealand recognition	To be determined.

[12] Information published in a large number (circa 119 volumes) of NIWA *Biodiversity Memoirs* (formerly *New Zealand Oceanographic Institute Memoirs*)

15. Species 2000

Group of organisms	New Zealand organisms
Name of database	Species 2000: New Zealand
Maintained by	
Contact details	Dr Denis Gordon (Editor) NIWA 04 386 0300
Brief description	Species 2000: New Zealand aims to review and inventory the entire New Zealand biota, living and fossil, out to the boundaries of the EEZ. The two Animalia volumes will include species lists for all of Kingdom Animalia in New Zealand, except for Coleoptera for which genera will be listed. Volume 3 of NZ Species 2000 project will include all of other Kingdoms (Plantae, and all Prokaryotes). Denis Gordon will start working on that July 2004, and would hope to have ready for publication by June 2005.
Currency, reliability of data	Goal is that Species 2000 species lists will be continually updated, but that will depend on commitment of compilers of individual species lists. Proposal is that value will be added to databases over time by adding localities, common names, and synonyms.
Access **Web address**	Text for two volumes covering Kingdom Animalia on track to be sent to the University of Canterbury Press by 30 June 2004. Likely to be published in 2005. Species lists from NZ Species 2000 Animalia will eventually be posted on web, but not for a while (2 years?) because UC Press wants people to buy hard copy.
Cost of access	
ERMA New Zealand recognition	Accepted, when publicly available.

16. PPIN

Group of organisms	Plant pests.
Name of database	Plant Pest Information Network (PPIN)
Maintained by	MAF Biosecurity Authority
Contact details	Dr Barney Stephenson (National Adviser) 04 474 4100
Brief description	National database and scientific network for the collection, collation, management and dissemination of plant pest surveillance information. Holds records of pest occurrence, their hosts and distribution records on fungi, bacteria, viruses, nematodes, insects, etc
Currency, reliability of data	Maintained to AS/NZS ISO 8402 standard. "The preferred (currently accepted usage) genus and species name, including authority shall be listed, together with 'the most recent' synonyms. The preferred family name shall be listed, where applicable. The most widely accepted common name shall be listed. For viruses, the preferred acronym shall be listed." A reference is provided that authenticates the scientific name and the synonyms used.
Access **Web address**	Not all information publicly available. Enquires to MAF MAF is looking at a web interface.
Cost of access	No cost.
ERMA New Zealand recognition	Informal.

Appendix 2: Internet resources for searching for taxonomic and other information on organisms.

New Zealand sites

- PIPERS New Zealand Pages: New Zealand Plant & Garden Web Sites
  http://www2.piperpat.co.nz/nz/ag/plants.html

- Royal New Zealand Institute of Horticulture – Links page
  http://www.rnzih.org.nz/pages/hortlinks.html

- Plant Database at HortNET New Zealand
  http://www.growinglifestyle.com/h165/garden/plants/

- World Species List - New Zealand
  http://species.enviroweb.org/countries/ooonz.html

- PIPERS New Zealand Pages -New Zealand Animal and Wildlife Web
  http://www2.piperpat.co.nz/nz/ag/animals.html

World-wide sites

- Search for Species (of birds)
  http://www.birdlife.net/datazone/search/species_search.html

- BioResearch
  http://bioresearch.ac.uk/

- Integrated Taxonomy Information System (USDA)
  http://www.itis.usda.gov/

- Search Bowl
  http://www.searchbowl.com/-/Science/Biology/Taxonomy/

- Advanced Query of GRIN Taxonomy
  http://www.ars-grin.gov/cgi-bin/npgs/html/taxgenform.pl

- Plants For A Future - Database Search
  http://www.ibiblio.org/pfaf/D_search.html

- Yahoo Biology: Systematics and Taxonomy
  http://dir.yahoo.com/Science/Biology/Systematics_and_Taxonomy/

- The NCBI Taxonomy Homepage
  http://www.ncbi.nlm.nih.gov/Taxonomy/tax.html/

- The NCBI Taxonomy Site for Bacteria
  http://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?name=Eubacteria

- Science Search: Biology –Taxonomy
  http://www.science-search.org/index/Biology/Taxonomy/

- University of Washington University Libraries: Information Gateways
  http://www.lib.washington.edu/resource/search/ResFull.asp?Field=keyword&ID=103009.

- Looksmart: Plant Taxonomy, Guides and Directories
  http://search.looksmart.com/p/browse/us1/us317834/us53672/us10089384/us10156190/

- Plant Systematics and Evolution – Links
  http://www.csdl.tamu.edu/FLORA/tfp/tfplinks.html

- Scott's Botanical Links - Subject Index
  http://www.ou.edu/cas/botany-micro/bot-linx/subject/sub-syst.shtml

- Taxonomy of Landscape Plants
  http://members.tripod.com/~Hatch_L/tlan1.html

- Guide to Internet Resources for Biological Taxonomy & Classification
  http://mclibrary.nhmccd.edu/taxonomy/taxonomy.html

- Botany Reference Resources
  http://library.humboldt.edu/~rls/botany.htm

- Diversity of Life Web Index - Links and Information to Explore Biodiversity
  http://www.geocities.com/RainForest/6243/diversity.html#All

- Academic Info - Botany Taxonomy
  http://www.academicinfo.net/bottax.html

- AOL.CA - Main > Science > Biology > Taxonomy
  http://search.aol.ca/cat.adp?id=27163&layer=&from=subcats

- Botany WWW Sites
  http://www.botany.org/bsa/www-bot.html

- UNEP-WCMC Species Database
  http://www.unep-wcmc.org/index.html?http://sea.unep-wcmc.org/isdb/Taxonomy/help_output.cfm~main

- World Species List - Animal SEARCH
  http://species.enviroweb.org/osearchan.html

- Database of IPM Resources (DIR) Insect Taxonomy and Systematics
  http://www.ippc.orst.edu/dir/gateway/entomology/insectTaxonomy.html

- Internet Resource Guide for Zoology
  http://www.biosis.org.uk/free_resources/resource_guide.html)

- Biology/Botany: Internet Resources
  http://www.wlu.ca/wwwlib/subject/biol/ibio.html

Appendix 3: Hard copy publications providing information on the presence of organisms in New Zealand

- *Flora of New Zealand.* Landcare Research. 5 volumes; plus three volumes of *Flora of New Zealand Desmids;* and one volume: *Flora of New Zealand Lichens.*

- *Moss Flora of New Zealand* Alan Fife A comprehensive Moss Flora of New Zealand is currently being prepared to supersede that of Sainsbury (1955). Expected to be published 2005/06.

- Patrick Brownsey & Don Smith. 2000. *New Zealand Ferns and Fern Allies*. Bateman

- Forest Research Bulletin No. 124 - *Introduced Forest Trees in New Zealand: Recognition, Role and Seed Source.* (18 vol).

- B.T. Coffey and J.S. Clayton. (1988). *New Zealand Waterplants: A guide to plants found in New Zealand*. Ruakura Agriculture Centre, Hamilton.

- The *Fungi of New Zealand* series: a series of books, administered by Landcare Research, published by Fungal Diversity.

- *Handbook of New Zealand Mammals.* Carolyn M. King, Oxford. 1998. 2nd edition to be published 2005.

- Gill B J & A H Whitaker. 2001. *New Zealand frogs and reptiles*. David Bateman Ltd, Albany, Auckland.

- Chris Paulin. 1989. *New Zealand fish: a complete guide.* Te Papa, Wellington. Comprehensive description of New Zealand fish (out of print).

- New two-volume comprehensive illustrated guide to New Zealand's EEZ fishes expected 2005/06. (Clive Roberts primary author).

- *Fauna of New Zealand* monograph series. (Currently 48 volumes covering a selection of New Zealand arthropods).

- NIWA *Biodiversity Memoirs* (formerly *New Zealand Oceanographic Institute Memoirs*). (119 volumes)

Appendix 4: An Overview of the Database Integration Project at Landcare Research

Database Integration (DI) is a FRST/NSOF supported activity, initially over the five year period 1999 to 2004. The initial aims of DI were to modernize and integrate (with some prioritisation) the databases identified by FRST as 'nationally significant'. Landcare Research is the custodian of seven of the 25 nationally significant databases and collections.

These are:

NVS - the national vegetation survey databank (which consists of a digital and physical archive of plot based vegetation records)
CHR - the national plant herbarium and associated databases
PDD - the national fungal herbarium and associated databases
ICMP - an international of collection of living micro-organisms from plants, and associated databases
LRI - the land resource information system and associated databases (including the national soils database)
NZAC - the national collection of arthropods,

The ethno botany database of New Zealand (PeoplePlants) and the living collection of Flax.

More details on the content and coverage of these collections and databases can be found on our website (http://www.landcareresearch.co.nz/databases/index.asp).

In the three and a half years that I have been associated with the project we have re-engineered all of these databases from legacy, individual systems into corporately managed databases. In doing so we have built a skilled development team who now additionally work on many related projects arising from opportunities provided by the outputs from DI.

The initial agenda for DI was to concentrate on providing internal data management services and to physically integrate the various systems. In fact, we have only loosely adhered to this agenda for a number of reasons.

(i) It was rapidly perceived as equally important that we provide data services outside the organization, i.e. to provide web-based access to the information content in these databases for use by DoC, MAF, etc.
(ii) The phrase 'and associated databases' covers many more resources than were originally envisaged. For example, NZFUNGI was physically integrated from 9 different 'databases' on primary data associated with collections, systematic literature, pathology literature, type collection information, herbarium management data etc. Consequently, the integration process was a major challenge, but one that has resulted in some very significant combined resources being developed and which are consequently attracting increasing attention from DoC, MAF, ERMA etc. However, the initially unrecognised effort has also meant that some initial targets sank in priority and have not yet been achieved. We still do not have adequately re-engineered data management support systems for some of our collections
(iii) It rapidly became apparent that we needed two sister projects to enable the aims of DI. One of these is ongoing and is concerned with integrating our geo-spatial data into a corporately managed resource. The second was to provide a corporate storage system for very many research-related data-sets created by scientists that can't easily be 'integrated' into the core systems. The result is the Research Data Repository (http://RDR.LandcareResearch.co.nz).

(iv) At the onset of the DI project the world of information management was (and still is) changing rapidly. The development of XML as a data description and exchange language fundamentally shifted the way we approached DI. The emphasis moved from 'data integration' to 'data interoperability' and we were early adopters of much of the new technology. This has had the single most significant impact on our information development strategy.

Interoperability and distributed information systems

The development and acceptance of XML, its incorporation into tools like Microsoft .Net, and the pervasiveness of the Internet, has changed the way information systems should be developed. It is no longer necessary to physically, centrally integrate information resources. It is now possible to allow information to flow from one resource to another and, therefore, possible to build distributed information systems that may be queried dynamically. The banks have been doing this for years but it has taken the existence of XML and associated software tools to allow the scientific community to catch-up. The current IT developments in this area include SOAP-based web-services, Universal Data Integration and Discovery (UDDI), GRID computing over advanced networks, Resource Description Framework (RDF) and the semantic web.

The first information systems for which this approach is appropriate are those that contain primary data (not summarised, secondary, reported data as contained in MAF's PPIN, or DOC's BIOWEB). Thus, in biology, most progress has been made in the area of genomics (bioinformatics) where massive amounts of primary data are generated and the pressure from the biotechnology sector to access and use this data has driven the field. Much of LCR's biodiversity data fits into this category of being primary data. However, before disparate biodiversity systems can be made interoperable and, thus, 'virtually integrated' it is necessary to agree on common data standards and data exchange structures. This has led to an explosion in international initiatives to agree on such standards and to create test implementations of distributed systems. It has led to the development of the numerous 'ML languages like the Ecological Metadata Language (EML), and the creation of national and international consortia such as the Global Biodiversity Information Facility (GBIF), The Ocean Geographic Biodiversity Information System, the US Knowledge Network for Biocomplexity and the National Ecological Observation Network. Long before coming to Landcare Research I was the IS Manager for CABI Bioscience, an inter-governmental organisation for sustainable development based in the UK, where I was involved in the development of the Species2000 initiative to create a global catalogue of all species, and international networks for exchanging information from microbial databases (MINE). Here I continue that international work and I'm currently the GBIF Node Manager for New Zealand (contributing 1.6 million specimen/observation records to the current global total of 25 million), I'm a member of the GBIF science committee for the Electronic Catalogue (ECAT) of the names of organisms, member of the Taxonomic Databases Working Group (TDWG) committees on descriptive data, geospatial data, collection/observation standards, and name data. TDWG/CODATA – is the de-facto international biological standards body and I am organizing the 2004 meeting of TDWG here in Christchurch at which over a hundred international experts on biodiversity informatics will discuss the latest issues in this area.

This background and experience leads me to these observations. New Zealand, for various reasons, is now well behind in developing and implementing biodiversity information systems that should sit alongside the current developments in other countries. These systems, and the potential data that could reside within them, are of national and international importance in the areas of biodiversity, biosecurity and biotechnology. Even if we had the systems in place there is a massive legacy of undigitised historical data and a lack of procedures for ensuring digitisation and quality control of current data. Implementing these systems and mobilizing the existing data requires significant investment in infrastructure and coordination and

cooperation between many agencies and other resource providers. This isn't happening in New Zealand at the moment (despite Government initiatives like E-Government Interoperability Framework). At Landcare Research it is likely that we will continue to develop our systems along these lines with the resources made available to us. I will also continue to contribute to the international efforts on various initiatives and continue to push for some action in this direction from the relevant agencies in New Zealand – including ERMA.

Jerry Cooper
Landcare Research
Lincoln
20th May, 2004