# Scoping Report to Investigate the End-user Needs, Design and Development for a Coastal Dune Ecosystem Database

# TFBIS Project 280:   Appendices

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# Appendix 1. Coastal ecosystems database end user survey results

## 1. Introduction

The Dune Restoration Trust of New Zealand (Dunes Trust) is a network that services a wide range of interests, organisations and individuals undertaking a variety of programmes related to the management and restoration of our coastal dune ecosystems throughout New Zealand.  The network consists of members and representatives from Coast Care group, iwi, coastal property owners, management agencies, research providers, universities including students, industry and private businesses.  In our experience, the individuals and groups we interact with often require similar types of information but 'pitched differently', in various formats and on different time scales (e.g. information needs can be dependent upon the stage of a restoration group).  However, the requirements for the use, storage and reporting of information about the coastal ecosystem is highly variable across the different organisations and individuals involved.

As part of the 2012 TFBIS Coastal Dune Ecosystem Database Scoping Report, the Dunes Trust undertook an online survey for the purpose of gaining an understanding of the end-user needs for information and data about the coastal dune ecosystem.  To our knowledge, this was the first time the Dunes Trust network and other respondents involved had been surveyed specifically about their coastal dune information needs.  As such the survey questions were deliberately general about respondents information use, collection and needs.

The following document summarises the results of this online survey for the purposes of highlighting and prioritising user-needs.  Due to the self-selecting nature of the survey sample and the qualitative parameters of the survey, the results from the survey are indicative of an interested group and are not meant to be statistically representative.  Respondents were also able to skip questions that weren't applicable to them which decreases the statistical relevance of the survey data.

Further information and analysis can be sought directly from the Dunes Trust.

## 2 Methodology

### 2.1 Database workshop

The Dunes Trust undertook a workshop at its annual conference in February 2012.  The purpose of the workshop was to gauge the types of information and data individuals and groups working in coastal dune ecosystems currently used/recorded, what they thought would be useful and establish some priorities.  The outcomes of the workshop provided the basis to develop both the end-user survey and interview series under taken as part of the TFBIS Coastal Dune Ecosystem Scoping Report.

### 2.2 On-line survey

The survey design was undertaken by the Dunes Trust Coastal Ecosystems Database Project Team which includes members of three regional councils, the Department of Conservation and the Dunes Trust Coordinator.  The basis for the question design (e.g. which topics to include in selection lists) resulted from the Database Workshop held at the 2012 Dunes trust Conference.

The survey was undertaken using SurveyMonkey and distributed via the Dunes Trust networks as well as other nationwide networks including the New Zealand Plant Conservation Network (NZPCN).  Regional/district council Coast Care programme managers/administrators were asked to directly send the survey to their contacts and

Coast Care groups.  The survey was accessible via direct emails, from the Dunes Trust website and Facebook page.  Messages about the survey were also sent out via Twitter.

## 3.   Results of the Coastal Ecosystem Database Survey

### 3.1 Scope and interpretation

The key results from the on-line survey of coastal management agencies and coastal interest groups relevant to developing a coastal ecosystem database as part of a further TFBIS project are summarised.

Raw data collated from this survey has been analysed to provide indicative results to aid in the decision making process of whether to/or what to design to enable the Dunes Trust to best support it's network and objectives of dune restoration.

The results below provide indicative information about the type of information and data our end-user groups currently use and may need in the future, where they most often source information, any preferences they have to the format information is presented in, and additional tools that would be useful if developed.

The results are summarised from the raw data and further investigation may be required to refine specific needs if the projects identified from this study are progressed.  Some of the data collected via the survey provides an indication of projects that the Dunes Trust could undertake, but are not directly relevant to TFBIS.

### 3.2  Response Rate

A breakdown of the respondents by organisation or group is provided in Table 1. Of the 103 respondents that undertook the online survey, 69%  answered all questions.

**Table 1: The number of respondents by organisation or interest group category to the on-line survey of information needs on coastal sand dunes in New Zealand.**

| Indicated organisation/group category | Response count | Response percent | Regions represented |
|---|---|---|---|
| Coast Care or Beach Care Group | 28 | 34.6% | 9 |
| Other Community Group | 10 | 12.3% | 5 |
| NGO | 3 | 3.7% | 2 (may be national NGO) |
| District Council | 11 | 13.6% | 5 |
| Regional Council | 20 | 24.7% | 7 |
| DOC | 10 | 12.3% | 8 |
| University or Research Institute | 3 | 3.7% | 2 |
| Other  - listed as contractors/ consultants, 'groups of interested resident', seaweek, Reserve Board, Unitary Authority, CRI | 18 | | 7 |
| TOTAL | 103 | | |

### 3.3  Current information use

Respondents were asked to comment on the information they currently use for the activities they undertake related to the coastal dune environment. A list of information topics was provided as well as the ability to make further comment.

Whilst all the topics were indicated as being used, overall, respondents indicated the highest use of information related to weed control (82% of respondents), planting guidelines (72% of respondents), species lists (70% of respondents), and scientific literature (59% of respondents). Animal pest control information, policy information, historic photographs, funding information and building guidelines (e.g. for coastal structures) were indicated as being used less often (based on overall responses).

There was some variances based on the respondents' organisation or group.  This indicates that whilst all groups use weed control information and species lists, council and DOC staff currently also use scientific literature more than other groups, and Coast Care and other community groups use planting guidelines more than other groups.

### 3.4  Current information collected to monitor coastal restoration work

The respondents were asked to indicate which, if any, monitoring methods they use and data they collect to help monitor their coastal restoration work.  They were provided with a list of common monitoring methods carried out in the dune environment and an opportunity to make further comment.

All of the monitoring methods were indicated as being carried out and recorded in one or more regions by one or more respondent categories (i.e. the organisation they identified with).  The monitoring method and data collection most used currently is use of photo points (66% of respondents).  Site surveillance monitoring (e.g. observations about plant damage, informal tracks, vandalism, etc) was the next most common method being undertaken (48% of respondents), followed by dune profiles (42%).  All other monitoring types are undertaken by less than 35% across all respondents.  Within this overall result, there was variance based both on organisation type and location.

Respondents from Coast Care groups or district councils indicate that these three methods (photo points, site surveillance, dune profiles) are used most often.  It is not clear as to whether monitoring indicated as taking place at Coast Care sites is being undertaken by group members themselves or by an agency on behalf of that group.

Over 40% of all regional council respondents indicated they undertake photo point, plant survival, dune profiling and pest trapping monitoring and data collection.  Of note, less than 35% of regional council respondents indicated they were undertaking vegetation transects and mapping in the coastal dune environment. However, this was noted as one of the most important types of information needed for coastal dune restoration work/activities.

DOC respondents indicated that they are primarily undertaking vegetation mapping, threatened species and habitat mapping and site surveillance monitoring. Some are also carrying out monitoring of dune profiles, plant survival, pest trapping, volunteer hours and vegetation transects.

The least amount of data collected related to monitoring of indigenous fauna – e.g. pitfall tracks or kaimoana distribution and density.  Very few groups who responded to the survey are collecting this information.  Of those respondents collecting information about kaimoana distribution, 80% are located in Northland.  Those respondents undertaking monitoring using pitfall traps are located in the Hawkes Bay and Manuwatu-Whanganui and were invariably Coast Care or other community groups.

Additional comments included groups who didn't do monitoring or didn't consider themselves at a stage where monitoring was important (i.e they had only started up); and that other people had responsibility for monitoring (e.g. councils).

Additional monitoring methods and data collection currently used by respondents are: wildlife sightings (including behavioural and unusual observations) mainly bird counts; climate and tidal information (council respondent); historical knowledge of plant life in the dunes; and anecdotal information from local community members (e.g. about how local coastal environments have changed or otherwise).

Table 2 provides an indication of the types of monitoring and associated data collection being undertaken around the country and by which groups and agencies. Note that this is based on the information provided by survey respondents so will not be a full reflection of monitoring being undertaken around the country. Given that there is no consistency of approach to monitoring the coastal dune environment in New Zealand, a more comprehensive study focussed solely on monitoring would need to be undertaken if there was a need to establish exactly what level of monitoring and for what purpose is being undertaken in the coastal dune environment.

**Table 2: Monitoring method/data collection used in the coastal environment by regions and organisation/group categoryas indicated by survey respondents. Note there were no respondents from Taranaki, West Coast or Chatham Islands.**

| Monitoring method/data collection | Region where monitoring undertaken | One or more of these groups undertaking monitoring in the region |
|---|---|---|
| Dune profiling | Northland, Auckland, Bay of Plenty, Gisborne, Manuwatu-Wanganui, Wellington, Canterbury, Otago | Coast Care groups, District & Regional Councils, DOC, University/Research Institutes |
| Photo points | Northland, Auckland, Waikato, Bay of Plenty, Gisborne, Hawkes Bay, Manuwatu-Wanganui, Wellington, Tasman-Marlborough-Nelson, Canterbury, Otago | Coast Care and other community groups, NGO's, District & Regional Councils, DOC |
| Site surveillance | Northland, Auckland, Waikato, Bay of Plenty, Gisborne, Manuwatu-Wanganui, Wellington, Tasman-Marlborough-Nelson, Canterbury, Otago | Coast Care and other community groups, District & Regional Councils, DOC |
| Vegetation mapping | Northland, Auckland, Bay of Plenty, Hawkes Bay, Wellington, Tasman-Marlborough-Nelson, Canterbury, Otago | Coast Care and other community groups, District & Regional Councils, DOC |
| Vegetation transects and/or plots | Northland, Auckland, Bay of Plenty, Hawkes Bay, Manuwatu-Wanganui, Wellington, Canterbury, Otago | Coast Care and other community groups, District & Regional Councils, DOC, University/Research Institutes |
| Plant numbers and survival | Northland, Auckland, Bay of Plenty, Manuwatu-Wanganui, Wellington, Tasman-Marlborough-Nelson, Canterbury, Otago | Coast Care and other community groups, District & Regional Councils, DOC, University/Research Institutes |
| Pest trapping numbers | Northland, Auckland, Bay of Plenty, Hawkes Bay, Wellington, Canterbury, Otago | Coast Care and other community groups, NGO, District & Regional Councils, DOC |
| Pest tracking tunnels | Northland, Auckland, Manuwatu-Wanganui, Wellington, Otago | Coast Care and other community groups, Regional Councils, DOC |
| Volunteer numbers | Northland, Auckland, Hawkes Bay, | Coast Care and other community |

| and hours | Manuwatu-Wanganui, Wellington, Canterbury, Otago | groups, NGO, District & Regional Councils, DOC |
|---|---|---|
| Kaimoana (distribution, abundance, health etc) | Northland, Auckland | Coast Care and other community groups, District Council |
| Pitfall traps | Hawkes Bay, Manuwatu-Wanganui | Coast Care and other community group |

### 3.5 Useful tools to carry out coastal restoration work

Respondents were asked to indicate how useful a series of tools would be for their dune restoration work.  They were given a list of tools and the opportunity to write in other ideas.  All tools were indicated as being very useful or useful by at least 44 individual respondents (61% of those that answered the question).  Overall the most useful tools indicated were: weed and pest control guides (63% of respondents), dune planting guides (61%), restoration project planning templates (55%), site preparation guides (51%), planting or other calculators (48%), signage examples and templates (48%) and a photo library searchable by location. The tools indicated as being least useful overall were: suppliers and materials lists, and diagrams and photographs of structures.

**Variation based on respondent organisation**

All tools were noted as being very useful or useful by at least 11 Coast Care groups.  The tools indicated as being most useful by Coast Care and other community groups were: weed and pest control guides, signage examples and templates, dunes planting guides and planting or other calculators. Those tools of less use were suppliers and materials lists and diagrams/photographs of structures.

All tools were noted as being very useful or useful by at least nine individual respondents from regional councils. Tools indicated as being most useful were: weed and pest control guides, planting and other calculators, site preparation guides, dune planting guides and signage examples and templates.

The most useful tools indicated by district council respondents were: dune planting guides, restoration project planning templates, weed and pest control guides and signage examples and templates.

DOC respondents noted that the most useful tools would be diagrams and photographs of structures, planting or other calculators, and weed and pest control guides.

**Additional tools**

Other tools noted were: an electronic GIS and  database system that could build up species lists based on site information (e.g. threatened species, coastal currents, dispersal mechanisms, etc); a database to store transects and plot progress; an interactive 'notice-board'/discussion forum; standardised monitoring guidelines (e.g. dune profiles); and a dune 'habitats' guide.

### 3.6 Useful additional information

Respondents were given a list of information topics and asked to indicate how useful these are in relation to their coastal dune ecosystem restoration work. Respondents could comment on other information topics that were relevant to them that would aid them in effectively carrying tour coastal restoration and management work.

All topics were indicated as being very useful or useful by at least 47 individual respondents (68% of those that answered the question).  The following list is in order of very useful to least useful as indicated by respondents

overall.   And 87% of respondents indicated that having this information in one central accessible database would be very useful and 12% noted it would be useful.

Dune ecology
Back dune ecology
Coastal processes
Species lists by location
Local historical information
Weed and animal pest ecology
Funding sources
Past/current restoration work at nearby sites
Policy or management information (e.g. RMA case studies)

Other topics that were commented on as being useful were coastal erosion (which could be included within coastal processes) and eco-sourcing information.  There was no indication of the need for fauna information (except as it relates to pests) which may reflect the lack of emphasis on coastal fauna within the existing coastal management work programmes in management agencies.

## 3.7  Format of information

Respondents were asked to indicate how likely they were to use a variety of information formats. All the formats were indicated as being useful. Overall those indicated as being most useful (over 80% of respondents noted them as being very useful or useful) were:

Searchable databases (e.g. of species information)
Electronic fact-sheets
Maps of vegetation and species distributions
Maps showing restoration site locations
Electronic reference materials (e.g. scientific papers)
A web page, hosted by the Dunes Trust for your group(s) (e.g. holding contact details, group activities etc)

IPhone style applications overall were indicated as the least useful information format.

Analysis based on respondent 'type' indicated that Coast Care/community groups are more likely to use vegetation/species distribution maps, a webpage hosted by the Dunes Trust, maps showing restoration sites, searchable databases, online calculators and instructional videos.  This analysis highlighted that council and DOC staff are more likely use vegetation/species distribution maps, electronic reference materials, electronic factsheets, maps showing restoration site locations, searchable databases, online templates and online calculators. Respondents from Universities or Research institutes indicated that the format of information most likely to be used are electronic reference materials, vegetation/species maps and searchable databases.

## 3.8  Current information sources

Overall respondents indicated that the place they most often use to get information from is directly from council or DOC staff and scientists, consultants or other specialists.  To a lesser degree information is sought from council, DOC, other databases and Coast Care group members and websites.

Respondents identifying as Coast Care group or other community group members indicated that they source information most often from council and DOC staff, other Coast Care/restoration group members and to a lesser degree scientists, consultants or other specialists.

Respondents identifying as regional, district council or DOC staff indicated that the three most often used sources for information were council and DOC staff, scientists, consultants or other specialists and council or DOC databases.

### 3.9 Information about coastal restoration groups and projects

Respondents were asked to indicate what types of information, if any, they would like to be able to access about other coastal restoration groups or projects. They could select information types from a list and provide further comment.

Over 80% of all respondents noted that it would be useful to know the: location, contact details and view photos of groups and projects. Over 70% of respondents noted it would be useful to be able to find out information about group/projects operational plans, monitoring data and achievements.  There was little differentiation based on respondent type, although more respondents identifying as being from DOC or Coast Care groups/community groups indicated that group/project achievements would be useful to know than indicated by other respondent types.

One respondent (identifying as a Coast Care group member) indicated it would not be useful to know any information about other groups or projects.

Additional comments related to accessing information about Coast Care groups or projects were that: any practical information that could be applied to other/their own sites is useful; failures and barriers to success would be good to know; theoretical and practical workshops available for groups (uncertain whether this is related to a calendar of these events as the answer is not specific to the question); and historical information about a project.

# Appendix 2. Coastal ecosystem database interview series results

## 1.  Introduction

As part of the 2012 TFBIS Coastal Dune Ecosystem Database Scoping Report, the Dunes Trust undertook a series of interviews with individuals in organisations involved with coastal dune management, have responsibilities to manage coastal margins and/or have experience using/managing existing database systems. The purpose of these interviews was to gauge an understanding of:

- information requirements for coastal dune ecosystem management;
- access to information;
- monitoring being undertaken;
- storage and use of existing monitoring information;
- interest and use for an information 'hub' for coastal dune ecosystem information; and
- was to build on or learn from existing systems.

Interviews were carried out with staff from eight regional councils, three district councils, the Department of Conservation, Landcare Research, two universities and Project Leaders of relevant existing TFBIS database projects (BUGZ, NZBRN).

## 2    Methodology

A list of potential interviewees was developed based on known contacts within the coastal dune ecosystem field. A contacts database was developed and was built up as further contacts were provided through interviewees.

Potential interviewees were contacted via email containing background information and asked whether they would participate in a half hour telephone interview. Once a positive response was received an electronic invitation was sent to their diaries to set up the interview as well as any further information requested. Those who did not respond to original emails were contacted a second time and if there was no response, a different contact was sought.

The interview questions were developed by the Project Team based upon the 2012 Dunes Trust Conference Database Workshop and to complement the online survey.

## 3.  Results of Interviews with management agency staff

Key information on the requirements of a coastal ecosystems database based on agency interviews relevant to the TIFBIS scoping study is summarised. Detailed information collated from the agency interviews is tabulated at the end of this document.

### 3.1  Information requirements

**Reference database**

In general interviewees noted that it would be useful to have a reference database of word searchable dune restoration information.  This was seen as slightly less of a priority for councils that have large scale dune

restoration programmes in place (e.g. BOPRC) as they have a good source of existing reference material relevant to their region.

Interviewees noted that having this service would save time in locating information and provide the ability to cross reference information by e.g. location and species. It could also aid in allowing access to regional and local information, for example commissioned reports that are often held 'in-house' by local agencies, but could be relevant to other areas (e.g. weed control and coastal hazards investigations). Some interviewees also noted that this type of information 'hub' would be very useful for other staff within their agencies that are not involved directly with coastal management, as they could be directed to a comprehensive source of coastal dune ecosystem information that would allow for better integration between programmes.

When asked whether this information 'hub' would be useful to community groups and those outside of the agencies, interviewees in general noted it would be useful, but potentially the information types would be different. For example, Coast Care group members would be more likely to use practical guidelines rather than scientific references. Interviewees noted that they are the 'first port of call' for community members so them having good sources of relevant accurate information is imperative to effective information transfer and community restoration work.

Types of information to include in a reference database as noted by interviewees included:

- coastal processes, geomorphology and coastal hazards;
- planting information (species information, site preparation, species lists etc);
- commissioned formal consultants reports (e.g. coastal hazards, herbicide impacts on fauna etc);
- animal and weed control information;
- case studies on innovative approaches to management (e.g. weed control, successional planting etc);
- gravel beaches/cliffs;
- rare dune plants;
- restoration steps;
- relevant 'grey' literature; and
- New Zealand specific examples.

Agency interviewees also indicated functionality requirements such as:

- the ability to search information on a geographical basis;
- ability to search for 'key references' (i.e those that are 'proven'/verified by the scientific community)foremost and then delve into more abstract/unknown science with some level of interpretation; and
- the ability to search based on information 'format', e.g. scientific journal, best practice guidelines, etc.

It was noted by South Island interviewees that the South Island is different to the North in terms coastal environments, coastal management, utilisation of coastal areas and level of community engagement in restoration programmes. As such it is essential that this is taken into account when defining the types of information put into a system and the use value it will have. For example, general planting guidelines, etc are useful but there needs to be information contextually relevant to the South Island.


***Information sources***

In general, interviewees indicated that they source information about coastal dune ecosystems from similar locations. The sources noted most frequently were: Goggle Scholar (for scientific references), NZPCN (for flora

identification), Weedbusters (for weed identification), and the Landcare Research databases (flora). In addition, many indicated they hold a collection of their own reference materials (either in personal files, on in-house document management/database systems), and they often rely on colleagues/personal contacts throughout the country.

## 3.2 Monitoring & data storage

Results from the interview series indicate that monitoring of the coastal dune ecosystem varies widely throughout the country. Interviewees noted that this reflects the differing priorities of management agencies in different locations, the individual motivations of staff within agencies, the stage that coastal restoration activities are at (i.e. whether there has been a long standing coastal programme within an agency or not, e.g. in general there is more monitoring being undertaken by BOPRC and ECAN) and to a lesser degree the motivations of community members involved in restoration work.

Monitoring programmes vary from large scale longitudinal biodiversity and geomorphological studies (e.g. BOPRC, ECAN), to operational monitoring (e.g. numbers of plants in the ground, minutes of meetings, before and after photographs and numbers of pests caught), to observational monitoring (site surveillance), to specific fauna surveys (Hawkes Bay Regional Council). In general monitoring data is stored on in-house stand-alone databases often with no backups. Few, if any, of these databases link to external databases or other agencies ensuring that information must be sought via personal contacts within agencies rather than directly via database access.

Those interviewees with well-established monitoring programmes indicated they have a lesser need for a database capable of holding coastal dune monitoring information.

When asked about monitoring undertaken by community groups and whether a system that would capture community-based restoration information would be useful - interviewees in general noted that a monitoring database may not be a high priority because many of the people they work with are focussed on the practical aspects of restoration work and may not be interested in entering and storing data. They suggested that staff and contractors would be more likely to use any monitoring tools/database currently. Interviewees who work closely with Coast Care groups noted that there would be at least one person in most of the groups who would be interested in having a role to collate and enter data and that this could also link in with schools and university students work.

Interviewees did note the importance of undertaking monitoring and capturing information that shows progress and cost effectiveness of their coastal programmes. Some interviewees with less established coastal management programmes noted that a database would be useful as somewhere to store information in the future.

## 3.3 Existing internal and external databases

Interviewees were asked about the existing databases they store information related to coastal dune ecosystems on. Again, this varied between organisations. Smaller organisations, such as district councils, more often have stand-alone databases related to specific programmes, e.g. drainage assets, that are not linked or integrated either within the organisation or externally. Regional councils and the DOC are able to support larger and more integrated systems however by in large these are not linked in any way between agencies, which means that information is often fragmented or duplicated between agencies. However, there are some

databases/software/tools that are already in existence or are being developed that in part are aimed at integrating information, although most are not specific to coastal dune ecosystems.

Examples of partially integrated database systems indicated include:

- IRIS (collaboration between six councils) is a software being developed to hold environmental monitoring data.  It will run 'self-service' modules where the likes of consent holders, contractors and potentially Coast Care groups could upload their information to and download it back out. Could hold vegetation/profile etc information.  May not hold photo points due to amount of data photos take up.
- BPAT – NIWA developed software being used by at least ECan and EW that could be further developed to hold more attributes and become web-based
- BOP/GW database being built to hold 'field-based' data

There are few Webap's being used as yet with the exception of BOP who have a Webap to record dune information and attributes – this was developed in-house and would likely be available for wider application by the Dunes Trust under necessary software agreements, etc.

## 4. Other existing databases relevant to development of a coastal dune ecosystem database

Further detail of these discussions is tabulated at the end of this document.

*NatureWatch NZ (NZBRN)*
NatureWatch NZ is a social medium format that offers a means of recording and searching natural history observations, such as species observations. Currently a user can create 'polygon-defined Places and place-defined Projects to which observations can be attached. By the end of 2012, the NZBRN plan on having additional functionality such as the ability to record repeat measurements of plants over time. This would provide for some of the functionality required by Dunes Trust end-users.  The project team for this database have indicated that as they build the next phase of their system, the Dunes Trust could collaborate and develop modules that suit our end-user needs. Further information about the features of NatureWatch NZ/NZBRN is provided in Appendix 5.

It is noted that advice given by the database developers involved in this project suggested it would be more advantageous to build a new, smaller database than to try and build modules onto an existing database.  This would provide better functionality, be more cost effective and meet the end-user needs more effectively.

*Naturespace*
The Naturespace website is a collaborative initiative to provide an information hub for community groups, individuals and landowners undertaking ecological restoration in New Zealand. It offers a range of resources and profile pages for community groups/restoration projects. Several groups that the Dunes Trust works with have profile information on Naturespace. It is noted that there could be some level of duplication between the group profile information being held on the Naturespace and Dunes Trust websites.  However, the end-user consultation carried out as part of this scoping report confirmed that there is a community of interest surrounding dune restoration and it is appropriate to have community group information within a specific Dunes Trust website and duplication could be minimised through appropriate links.

Naturespace collates some basic monitoring information related to projects such as the number of members groups have, the number of animal pests killed and plants planted on both a project specific and nationwide basis. The

service does not currently provide all of the functionality required by Dunes Trust end-users. For example, the monitoring system being developed by the Trust requires the ability for end-users to enter, interpret and report on attributes such as species survival rates over time and graphical display of dune profiles, on a site by site and nationwide basis. In the short term, the Dunes Trust intends to negotiate a reciprocal live link between the two sites so that users benefit from both.

### New Zealand Plant Conservation Network (NZPCN)

The NZPCN is specific to plants in New Zealand and offers users a range of functionality including the ability to log observational information, search for species information and search relevant journals and publications. The site was frequently noted by individuals interviewed during this scoping report as being useful.  A detailed assessment of the NZPCN site system was undertaken as part of the New Zealand Invertebrate Conservation Network (NZICN) TFBIS scoping report (Pawson and Griffiths, 2010).  The report found several disadvantages with using s similar system. Discussion undertaken with developers as part of this scoping report reiterated these issues, particularly with regard to the software platform which is becoming obsolete with fewer developers available for ongoing maintenance.

### BUGZ

The BUGZ database allows for full text search of the 'BUGS' bibliography (Ramsey and Crosby, 1992) – New Zealand's largest compilation of invertebrate literature and ability to match this with taxonomic namebank of uBio. The database is currently held within Landcare Research. This system was not mentioned in the end user consultation undertaken for this scoping report, which is not necessarily surprising given that very little invertebrate monitoring is being undertaken in eth coastal environment by local government or DOC. However, the BUGZ database holds information relevant to the coastal ecosystem and it is intended that the Dunes Trust negotiate a reciprocal live link between the two sites so that users benefit from both.  The process used to scan the BUGS bibliography is similar to the process that would be undertaken by the Dunes Trust to develop a literature database. The BUGZ database is specific to invertebrates and whilst there is an opportunity to learn from the process undertaken in developing this database, it is not an appropriate site to hold the wide range of coastal dune information required by end users.

### Existing digitisation projects

Interviews were held with individuals involved in the digitisation of the New Zealand Journal of Ecology and the New Zealand Botanical Society Newsletter.  The process used for each of these projects is similar to that which the Dunes Trust would undertake to digitise and scan coastal dune literature. The databases for these journals are fully text searchable and integrated with each related organisations website.

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| Summary of information generated from interviews with database users | | | | | |
|---|---|---|---|---|---|
| Agency | User needs - information | Information currently access via: | User needs – monitoring/ data storage | Existing/ developing databases | Opportunities (incl. interoperability) |
| **Northland Regional Council:**<br><br>**Coastcare Coordinator** | Having a one-stop-shop for coastal dune information would be useful particularly for council staff by saving time finding information<br>Most useful information to include: reports, geographical basis, hazards, weed control, planting, commissioned formal consultants reports etc<br>Be useful to be able to search on a geographical basis<br>Not many groups source own funding so information on how to do this not as high a priority currently | Own files<br>NZPCN website<br>Google scholar<br>Goggle search engine<br>Landcare Research sites<br>Other council sites<br>Weed databases | Currently store meeting minutes, site visit reports, photographs etc for Coast Care groups – this information is not currently linked to maps<br>Maps of Coast Care sites are on GIS system<br>Groups need to do monitoring currently hold record of what is been done at each working bee, photographs – information kept by NRC inside Coast Care programme and by groups on own computers<br>Few groups would be interested in uploading own information as yet | IRIS – six councils working to standardise software for data collection find storage<br>Maps photos and graphs on their system<br>The Hub – electronic data management system<br>Work Smart<br>ARC Mapping – GIS system | IRIS – contact C Cotham, NRC |
| **Auckland Council:**<br><br>**Biodiversity & Community Coast Care Program** | Benefit to community and staff<br>Useful information: <u>Stages of restoration</u>, understanding of ecology and changing environments over time; <u>Decision making process</u> for restoration which steps through the information needed to collate/observe, impacts over time, objectives, roles and strategies; key references in 'first search' then more scientific documentation requiring interpretation in deeper search; interpretive information – i.e. how to assist people interpret the habitats/ecosystem; species lists – but indicating key species required and why so people cant 'cherry pick'; how to make strategic decisions about restoration priorities; inhibiting factors of threatened species; weed control, more than just identification – provide reasons for controlling weeds, inhibiting factors etc to teach about ecosystem linkages. | In-house/'in-head' information<br>Landcare databases<br>Consultants reports | Species lists; dune profiling – very little information/expertise in the dune area. Auckland emphasis has been on engineering. | | Develop stages of restoration process & strategic decision making guides to restoration, similar to riparian process former Waitakere City Council developed |
| **Auckland Council:**<br><br>**Coastal Technical Advisory Group** | Useful information: 'dune restoration '101' i.e step by step process would be useful for their clients (community, parks staff, other staff etc) e.g. revised guidelines, best practice guides, using current NZ examples, case studies of the more innovative projects (e.g. Kaitoke), | CDVN information; text books, reference materials<br>EW database | | IMS – asset register<br>Information stored in an array of databases throughout Councils, no level of coordination as yet. Currently pulling all coastal | Run there own training programme, DT could collaborate with this Currently revising all dune work for parks, access, habits etc<br>Collaborate with AC Parks |

| Summary of information generated from interviews with database users | | | | | |
|---|---|---|---|---|---|
| Agency | User needs - information | Information currently access via: | User needs – monitoring/ data storage | Existing/ developing databases | Opportunities (incl. interoperability) |
| (internal coast consultancy function, engineers, planners etc) | backdune planting, reshaping, innovations/examples of weed control case studies – how to manage specific weeds and how others have managed them | | | data/information within Auckland Council together – are putting together a business case to develop a database to hold this information – likely to be GIS based, unsure of whether be accessible by the community or hold community information, may be web-based. Will pick up dunes information and overlay into Council system | Department for backdune project (not just biodiversity department) Contact: Tracey Tristram, Advisor Environmental Programmes/Community Group Coordinator/facilitator; Danielle (Parks) |
| **Waikato Regional Council:** **Coast Care Coordinator** | Useful information: word-search papers - herbicide impacts; key coastal references; geomorphology; consultants reports (e.g. hazard reports) Keep it basic and practical: animal and weed control and case studies, herbicides impacts on fauna Planting calculator useful Plant profiles (printable): picture; status; where grows; stage in succession; natural distribution – make this printable Be god to help fast track newer groups Shoreline changes/history – what happened at a site in the past (find via catchment board archives etc) | Own files NZPCN website Google scholar | Monitoring data for beachcare not a high priority – would use photo points need standard methods including 'triggers' on when to take pictures Beachcare members unlikely to use – more interested in practical work but would be interested in historical information about their own patch Need to be able to sort information by location | BPAT – NIWA software, free, dune profile maps REMP – regional eustaurine monitoring database Ecobase – IQuest (EW purchased from ARC) holds ecological data – could hold vegetation data and export raw data to excel | Would avoid the uncertainty of Council budgets and staff changes |
| **Bay of Plenty regional Council:** **Coast Care Coordinator** | BOP has low use for an external database but would be valuable for the rest of the country | NZPCN Weedbusters Google Scholar DT Trustees | Significant surveying done of dune geomorphology and vegetation – data all stored and drives LTC/SOE reporting and planning Not high on priority list or BOP as they have there systems sorted. | BOPLASS – TA's and BOP work off one platform Land Resources Database – biosecurity, erosion, biodiversity, care groups etc. Currently being overhauled Natural Environment Regional Monitoring Network | Developed a WebAp to load coast care activities, lots of attributes – polygons, fencing, plants, hours etc. Developed in-house and could buy/share with BOP, contact K Winston-Lee. Anything developed must be kept simple Develop something through the |

| Summary of information generated from interviews with database users | | | | | |
|---|---|---|---|---|---|
| **Agency** | **User needs - information** | **Information currently access via:** | **User needs – monitoring/ data storage** | **Existing/ developing databases** | **Opportunities (incl. interoperability)** |
| | | | | | RC Biodiversity Forum Wellington and BOP doing a field based database system |
| **Hawkes Bay Regional Council:**<br><br>**Coastal Scientist** | Sand dune systems not focus of coastal work, some restoration work done by land Management group.<br>Very few enquiries from DCs about coastal information – DCs doing very different work<br>PDF library would be very useful: Council reports, science papers, best practice guidelines (although would not use much because it is not a focus area for council), monitoring programmes (how to set up etc)<br>Monitoring database: useful to hold data, would provide a starting point which would be useful | Google scholar<br>UK Science Journals<br>Other Councils website for reports | Fauna surveys | In-house databases (four), not linked to other internal databases or external databases<br>Fauna data on Cadas (Cawthorne) | Currently looking to revamp databases |
| **Hawkes Bay Regional Council:**<br><br>**Land Management Officer/ Community Restoration Programmes** | Small coastal programme, four sites, driven by community with support from DC & RC, groups at early stages of restoration but with sites at different stages of restoration. Program currently funded through regional landcare scheme as this is the only existing mechanism to fund coastal projects – NB if areas not fenced then cant be funded under landcare scheme on private land.<br><br>Useful to have information in one place so don't have to 'dig' out each time.<br>Useful information: restoration plans, case studies of working with existing structures – sea walls etc, gravel beaches/cliffs; rare dune plants; weeds; restoration steps – need to include how to decide how much to take on; getting information/support from DC's etc; how to maintain momentum | Search external literature online<br>Direct communication with contacts around country | Monitoring data collected: operational, number of plants planted, area planted, area sprayed.<br>Maybe would have a couple of people interested in monitoring/collecting /storing data – but one group doesn't have any internet access. | In-house databases (four), not linked to other internal databases or external databases | HBRC has cliffs, not too many sandy beaches, but impressive systems on private land that could collaborate on (ocean beach, rinaika?)<br>Have their own native plants booklet that we could collaborate with<br>Put out a 'seed collection call' to groups about getting seed in for next years plants |
| **Greater Wellington** | 'One stop shop' useful for staff, students, sponsors and community members. | Google scholar<br>NZPCN | Store coast community group information<br>Store biodiversity information | In-house system<br>GIS based biodiversity data | Plant calculator<br>Photo slide idea |

**Summary of information generated from interviews with database users**

| Agency | User needs - information | Information currently access via: | User needs – monitoring/ data storage | Existing/ developing databases | Opportunities (incl. interoperability) |
|---|---|---|---|---|---|
| **Regional Council:**<br><br>**Take Care, Biodiversity & Strategy Staff**<br>**Note staff have been involved with the development of Restoration Day and Naturespace** | Useful information to contain: essential papers on dune restoration that relate to a step by step process to go through<br>Useful to have database that can log dune profile information, backdunes information and beach 'WOF' information<br>Link to site where there are existing monitoring tool protocols e.g. bird counts, pest trapping etc | Google search engine<br>In house databases<br>Landcare research/NIWA databases (vegetation/ coastal hazards specific) | | | Dune profiling monitoring process/tool being developed by GW<br>Develop a site 'WOF' template |
| **Waimakariri District Council:**<br><br>**Engineer/ local Coast care group** | Useful to have a central place to go to for information because it is spread all over the place - however coastal restoration is not a priority for Waimakariri so it would be dependent on the staff involved as to how much it was used; good for new groups and students.<br>Useful to include: published reports | Published reports<br>Draw on Ecan information and staff | Monitoring database useful to have: up to date mapping of landform types over laid with vegetation distribution.<br>Monitoring database not as useful as information collected based on council programmes and coasts not a priority.<br>Council staff and contractors would use a database where they uploaded information – very few community groups<br>Value will come of this as council become more aware of the changes occurring with sea level rise. | In house, stand alone, resource type specific | Value will come as council face the changes with sea level rise<br>Contacts: HDC J Batchelor, N Parminter re need for information about coastal hazards; G Burns TKOT restoration work; A Spencer DOC |
| **Canterbury Regional Council:**<br><br>**Coastal Scientist**<br>(liaised with Ecan ecologists and coastal water scientist prior to interview) | Ecan does not have a large coast care programme. In the 90's the City Council injected money to do a reshaping and restoration programme which came from an operational budget so the community didn't need to be involved – thus hasn't been community driven historically.<br>Information requests from the community: coastal erosion rates; where to get plants from; how to get funding for plants etc<br>Coastal groups based around estuaries and harbours so requests for information on | In house monitoring and data management systems<br>Google search/international examples<br>Agency staff and consultants | Longstanding rigorous coastal profiling monitoring programme, geomorphology (every year) and some vegetation transects (every five years) – stored on BPAT<br>Collect data on sea level, deep water wave conditions etc – collated on spreadsheets<br>Ecological monitoring – wetland and vegetation mapping, ARC GIS mapping<br>Identifying coastal access points (from NZCPS), i.e. pedestrian, vehicle, official/unofficial, wheelchair compatible etc | Internal databases are regional wide focussed.<br>Use BPAT – NIWA software, free, dune profile maps<br>Biosecurity weeds database – shared between Ecan, CCC and DOC, currently a hybrid system, is looking to develop into GIS based system<br>Coastal ecology and water quality stand alone database – 'squalark' | BPAT, could make links through DRT website? Free to NZ government organisations and Universities – NB for local government, would have to collect data first which requires operational programmes<br>Avon Heathcote PDF library example<br>Need to be specific about who is in charge of maintaining such as site |

| Summary of information generated from interviews with database users | | | | |
|---|---|---|---|---|
| **Agency** | **User needs - information** | **Information currently access via:** | **User needs – monitoring/ data storage** | **Existing/ developing databases** | **Opportunities (incl. interoperability)** |
| | sedimentation and water quality (e.g. Avon Heathcote)<br>Useful information to have in a database/information system: simple information such as - how to start a group; restoration steps '101'; template/decision making process on how to start<br>A nationwide suppository for coastal dune information would be useful | | Useful to have base line monitoring information and then monitor against that: zonation mapping, habitats and vegetation mapping, threats in dunes (e.g. weeds), useage, coastal protection measures, access ways<br>Ecan has e.g. vegetation mapping information but would need to be converted to any 'new' system | Other information collated in excel – e..g marine invertebrates | |
| **Lincoln University:**<br><br>**Senior Lecturer** | Aren't good sources of information easily available so a nationwide system would be very useful<br>Information to include: location of restoration sites and projects; contacts for these sites; contacts for specific advice on dune restoration topics; species lists and distribution information; grey literature | NZPCN<br>Landcare Plant Traits database | Has undertaken project with Stephen Hartley to undertake national dune monitoring but don't have the money to write it up.<br>Currently input information to the National Vegetation database - Landcare Monitoring database would be useful to have students/groups unload data in a standardised way therefore making it 'easier' for students to use the data – more useful nationally.<br>Mapping species distribution could be part of student project.<br>Very useful for national level information: students could collect information via thesis and load into database | University doesn't have a digital archiving system or data repositories – so data input to the Landcare research, national Vegetation Database<br>Specimens information sent to the Lincoln museum<br>Fauna lists may go to BUGZ<br>All universities collect and collate data differently – no standardised system | Standardise the way groups input data – how old is the group, what stage of restoration are they at, what is the history of success<br>Write up national dune monitoring survey<br>Information system would need good simple search functions/dashboard<br>Useful to have links as to where to get plant s/seed from<br>University can set up experiments/restoration projects but cant afford to pay students to plant etc so good to have better links with Coast care groups/projects |
| **Timaru District Council:**<br><br>**Parks Liaison Officer** | Main area of work coastal restoration work using native species – Caroline Bay<br>Behind the rest of the country with coast care – not community driven like in North Island<br>Useful to have central 'one stop shop' of information<br>Information to include: NZ specific examples; coastal processes; plant species; pest species in coastal areas and management of these | Google searches – but end up with a lot of irrelevant international work<br>Council reports<br>Direct emails to contacts (e.g. scientists)<br>Ecan information | Council in their infancy with monitoring data in coastal dune area – not a priority to do more monitoring – backdune project very useful because it will carry out monitoring for Council | Existing email system<br>Document management system<br>Access/excel databases | Coastal – not just dune ecosystems<br>Backdune monitoring data generation and example storage facilities |

| Summary of information generated from interviews with database users | | | | | |
|---|---|---|---|---|---|
| Agency | User needs - information | Information currently access via: | User needs – monitoring/ data storage | Existing/ developing databases | Opportunities (incl. interoperability) |
| | Coast care very low key, not priority for Council | | | | |
| **Dunedin:**<br><br>**Past Council Staff member, currently runs an Environmental Consultancy** | North Island is ahead of south – South Island has traditionally used works programs because the beaches are reserve areas so didn't need the community engaged – funding relates to land tenure.<br>The environment is different – the beaches are cold, bleak, big and dynamic, the usage and development level is different – this means a very different style to restoration (if any). Currently dune management relies on personalities within agencies.<br>Central information site very useful: generic information (as currently) is useful but need to look at <u>contextual & locative</u> information that applies to the South Island, plant differences/growth rates etc; restoration of marram dunes given farming interest etc; usage and site differences; need to provide enough context that people can interpret it to their own sites; how to run a good meeting, generic rules, succession plans for groups with elderly members etc; planting information including species lists and how they relates to ecological districts; backdune restoration & backdunes restoration in combination to foredune restoration; ecological districts; construction information - what makes a good and bad boardwalk, also how to make good access for horses/vehicles etc | Google searches<br>Council/DOC databases<br>Direct contact with colleagues | Need - data that tells the story of the beaches and changes over time<br>Need - methods that coastal communities can use –profiles, vegetation, photo points<br>Need – to provide people with the ability to feedback their own information and ideas<br>An interpretive online blog or database would be good so that people can feedback on their ideas/trials – this could provide a mechanism for community members to stay in contact and stay inspired<br>These need to feed into a regional system – to show context/interpretation on a regional basis. | Company database<br>Council databases | South Island case studies – environment, industry, plant distribution and establishment etc<br>Contextual locative information for South Island sites – e.g. historic reports/ surveys etc – so that people can interpret what is happening at their site<br>Restoration of marram dunes<br>Story community group information so that it is keep as a means of succesional planning<br>Provision of relevant information e.g pictures of pingao in South and North island showing differences and explaining why |
| **Environment Southland:**<br><br>**Land Sustainability Officer** | Not a large amount of coastal ecosystem management or monitoring work undertaken by ES.<br>Some subdivision triggers dune work.<br>Southland dunes are highly modified, largely marram dunes with few indigenous plants left, some dune slacks with flax/wetland | Aerial photos<br>Other councils/DOC | Aerial photography database - used to assess dune morphology/changes/accretion etc, show history of the dunes<br>No dune profiling | Aerial photography database<br>Reports held across numerous databases – Re gigging this system to make more accessible | Dunes are preferred habitat for cows (over wintering etc) therefore part of farm planning – provide information via LMO's and farm plans e.g. encouraging fencing<br>History of dune modification |

| Summary of information generated from interviews with database users | | | | | |
|---|---|---|---|---|---|
| **Agency** | **User needs - information** | **Information currently access via:** | **User needs – monitoring/ data storage** | **Existing/ developing databases** | **Opportunities (incl. interoperability)** |
| | vegetation; narrow strips flanked by farms; different recreational useage than highly populated North Island sites. Difficult to get buy-in from farming community because changing the dunes, changes the potential sqm grazing availability. Opportunities working with DOC e.g. Waipara point, Port Grey. Useful information: types of indigenous plants; process to manage dunes from marram dominated to indigenous vegetation (recontouring/mitigation planting); basic planting programmes; ways of encouraging people to recognise the value of dune systems and benefits they provide; coast care group establishment & facilitation | | | | and use via aerial photography DOC replacing marram large scale on Stuart Island, case study Oreti group close to Oreti Beach could be keen to get involved with dune restoration on small scale Contact: N Cruikshank |
| **Invercargill City Council:**<br><br>**Parks Manager** | Not a lot of coastal dune work, 2000 ha at Sandy Point but little restoration/monitoring activity apart from early reports on stabilisation of sand Central information database would be useful Useful information to include: site specific historical reports; reclamation and restoration of sand dunes; success stories of communities/projects; east south coast examples; bigger picture climate change impacts Community reads about restoration projects elsewhere (e.g. introducing natives etc) but southland has marram issues that are very different from North Island examples – need information, case studies about this. | Historic information on file | Monitoring database might be useful in the future – sharing data is essential, important not to duplicate systems. | Sequal database, in house, stand alone Council looking at opportunities for database development | Study on whether it is practical/possible to restore marram dominated 'sandhills' given constraints of farming, lack of native species etc. |

| Summary of information generated from interviews with technical database managers/project leaders | | | | |
|---|---|---|---|---|
| **Location & Contact** | **Database/Information system** | **Content** | **Relevant functionality** | **Opportunities** |
| **NRC**<br><br>**Technical Database Process Manager** | IRIS – database software being developed between Northland, Southland, West Coast, Taranaki, Horizons, Waikato Regional Councils.<br>Planned to release for resting in December | Biodiversity, land management, biosecurity information and monitoring data<br>Spatial data not defined yet<br>GPS data goes through GIS system currently<br>Data to be tied to location | Mobile devices to capture field data which can be feed into the database<br>'Self-service' modules where consent holders, contractors potentially community groups can go in and upload their own information and download information about their site | Learn from process involved in standardising information: data consistency, protocols, standardised recording and interpreting functions across councils<br>Once self service modules are built, community groups could submit their information and then report on it from the site – this could be freely available in web portals.<br>If was to store monitoring photo points, would have to be very low resolution because of the band width required and storage size required. |
| **EBOP**<br><br>**Technical Monitoring/ Database Administrator** | Land Resources Database – building a biodiversity module. LRD, property based, operational data, rebuilding to hold much more detail. Biodiversity module to include vegetation mapping. | SNA/PNA style mapping and information (similar to DC), coastal plan mapped, GIS layers e.g biodiversity<br>Natural Environmental Regional Monitoring Network. Links with District Councils.<br>Includes historic extent of dunes, current extent of dunes, vegetation mapping including management feeds (e.g. weed control). | Currently technical staff have to extract data, redevelopment will mean other users can extract information | Land Resources Database contact: Jim Fretwell |
| **New Zealand Botanical**<br><br>**Digitisation Project Team** | Botanical Society Newsletter Digitisation Project (TFBIS funded) | All NZ botanical Society Newsletter content | Search by year, search by key word, full text search | Opportunity to use the existing scanning equipment and have the scanning process managed by Steve Pawson and undertaken by Canterbury University students. |
| **BUGZ Database**<br><br>**Project Manager** | BUGZ/ NZICN<br>BUGZ Bibliography of New Zealand Terrestrial Invertebrates - Online | Full text search of the 'BUGS' bibliography (Ramsey and Crosby, 1992) – New Zealands largest compilation of invertebrate literature and ability to match this with taxonomic namebank of uBio. | Currently held inside of Landcare research with limited user access. Suggestion that the infrastructure for the system needs to be revisited.<br>BUGZ database allows dynamic matching/integration of full text database against the taxonomic namebank of uBio (universal Biological indexer and organiser)<br>Creates virtual links to international databases | Opportunity to use the existing scanning equipment and have the scanning process managed by Steve Pawson and undertaken by Canterbury University students.<br>Opportunity o set up collaborative steering group to look at options for scoping wider project between a number of information service providers: NZPCN, Te Papa, DOC, Landcare fungal database etc. |

| | | | (GBIF, NCBI, IT IS) | |
|---|---|---|---|---|
| **New Zealand Ecological Society**<br><br>**Digitisation Project leader** | New Zealand Journal of Ecology digitisation project | New Zealand Journal of Ecology | Level of functionality depends on funds available, e.g. providing a system that can automatically OCR journals; geo-tagging the data<br>Can view abstract and individual articles, can search citations and full text<br>This project used lower end of proof reading because of funding constraints, but eth OCR technology is beter now so probably wouldn't need high level of proof reading anyway | Documented process on Journal of Ecology project available detailing technical platform etc. |
| **New Zealand Biodiveristy Recording Network (NZBRN)**<br><br>**Chair and one other member of the NZBRN stakeholder steering committee** | NZBRN, NatureWatch NZ – iNaturalist platform | Observational natural history information. Commitment to quality information and citizen science. Will link to New Zealand Organisms Register. | Users can create projects and place where they can attach observational information to e.g. bird sightings<br>Utilising social media capacity to peer review records<br>Developing eth ability to tag individual items and make observations over time – therefore possible to log survival rates of individual specimens<br>Ability to 'update' species lists by taking an old list from the site into the field and then entering updated sightings information.<br>Links to the NZ node of the Global Biodiversity Facility (GBIF) | Opportunity to collaborate with NZBRN on the next phase of their build to develop modules to meet Dunes Trust end user needs.<br><br>Information provided to Dunes Trust, see Appendix 5 |
| *Attempts were made to request interviews with Project Leaders/Managers of other databases including NZPCN & Naturewatch. These attempts were unsuccessful. It is noted other interviewees and individuals on the Dunes Trust Project Team are very familiar with these systems and have provided feedback on options for integration etc.* | | | | |

# Appendix 3: Content and functionality for a coastal dune ecosystem literature database

**Introduction**

The quantity and range of sources of existing coastal dune ecosystem information, including the Dunes Trust reference database, has been interrogated to determine the scale and scope of information that is relevant to the development of a coastal dune information database. This analysis has included an assessment of a substantial sample of a range of hard copy and electronic information sources as listed to date by the Dunes Trust. However the scale of information sources on coastal sand dunes is considered to be vast. Determining how best this information can be incorporated into a nationally available interactive on-line coastal sand dune database is considered in this report.

**Scale of coastal dune information**

There is clearly a vast quantity of information on coastal sand dunes relevant to New Zealand. A search of Google and Google Scholar for instance using key words reveals tens of thousands of information sources. Even with a restricted number of keywords the following searches using Google Scholar revealed the following numbers:
- 'New Zealand Sand Dunes' – total items found: 23,800 (Google Scholar);
- 'New Zealand Dunes' – total items found: 22,600;
- 'New Zealand Sand Dune Vegetation – total items found: 10,500;
- 'New Zealand Sand Dune Database – total items found: 3,920.

These searches have been carried out at a broad level and as with all general searches on the internet, there will be significant overlap and repetition within and between the searches. In addition, the quality of the material found has not been assessed. However, the scale of items found with these example on-line searches does reflect the potentially large number of relevant information sources relevant to New Zealand sand dunes.

**Dunes Trust Reference Database**

There has been a small and incomplete reference database initiated by the Dune Restoration Trust of New Zealand over the last three years. This has been carried out on the back of other projects as time and resources permit largely using inkind time by trustees and member of the Trust. The Dunes Trust Database currently has the following aspects:
- It only comprises a list of references collated to date loaded into an Excel file;
- Each reference comprises author(s), year, title and identification of publication or source;
- Abstracts or keywords are not indicted;
- It has limited word searching ability;
- There is no indication of the availability of the reference or any copyright issues;
- Many references are only available in hard copy and location of these is not indicated or in many cases is not known;
- A large proportion are unpublished technical articles many of which are known not to be digitised and therefore not available on-line;

- The type of document or information source listed is not indicated other than what can be inferred from the reference, e.g. peer-reviewed journal, conference proceedings, article, unpublished source, etc…
- The format and size (number of pages) of each reference is not always indicated.

Currently the Dunes Trust Reference Database comprises a list of only 700 references most directly related to coastal sand dunes. It is estimated that this is likely to be only a small proportion of the sources of information on coastal sand dunes relevant to New Zealand collated to date.

### *Types of outputs*

The database comprises a range of output types from peer-reviewed journal papers to articles in periodicals (Table 1). The highest proportion of references is in the form of technical reports, journal papers and conference proceedings. The output types with the lowest number or sources as listed to date in the Dunes Trust database include factsheets, management plans, guidelines and websites.

**Table 1: Proportion of output types within the current Dunes Trust Reference Database based on 700 data sources relevant to coastal sand dunes in New Zealand that have been collated to date. The proportion of references available on-line either as abstracts or in full as pdf files based on a sample within each output type is estimated.**

| Output type | No. of sources | Proportion (%) | Estimated proportion available as abstract only | Estimated proportion available in full as pdfs |
|---|---|---|---|---|
| Peer-reviewed journal papers | 184 | 25.6 | 35 | 20 |
| Books and book chapters (incl. booklets) | 75 | 10.4 | 25 | 8 |
| Conference proceedings and papers | 107 | 14.9 | 30 | 20 |
| Theses – Diploma, Masters, PhD | 39 | 5.4 | 10 | 20 |
| Technical reports | 163 | 22.6 | 10 | 30 |
| Bulletins – published | 58 | 8.1 | 4 | 25 |
| Periodical and newsletter articles | 22 | 3.1 | 5 | 30 |
| Factsheets | 12 | 1.7 | 0 | 50 |
| Unpublished reports and articles | 38 | 5.3 | 0 | 0 |
| Management plans | 15 | 2.1 | 0 | 60 |
| Guidelines, manuals or tool kits | 6 | <1 | 0 | 33 |
| Websites | 2 | <1 | n/a | n/a |

A proportion of the published and unpublished material is under copyright so is not readily available without contacting the publisher, author or agency or group that have written the output. These include many journal papers, virtually all books, and outputs in the 'grey literature' including technical and unpublished reports. It is not possible within this scoping study to determine the proportion of freely available vs copyrighted material within the current Dunes Trust coastal reference database. Providing users of the database with information on availability and necessary avenues for accessing sources is amongst the priorities for developing an interactive coastal reference database.

Notwithstanding copyright issues, there are a range of formats that the references are currently available on-line such as via Google or Google Scholar ranging from access to the abstract and keywords only to full pdf versions of the report, article or paper. A number of journals are providing free access to pdf versions of full papers while many others only provide an abstract. Based on a sample of each

output type, the estimated proportion of references available as full papers, reports, articles or chapters of books on-line as pdfs is shown in Table 1. This clearly indicates there is a significant proportion of the coastal reference database that is not readily accessible. A relatively high proportion of plans and factsheets as expected are available on-line. Conversely, only a small proportion of books and booklets are available in full on-line, and these are mostly the latter. For journal papers and estimated 35% have abstracts available and only 20% have the full paper on-line.

Only 20-30% of most other published and unpublished sources are available in full on-line (Table 1). Many of these do not have copyright issues and therefore could be easily made more available to agencies and interest groups keen to become informed on the wide range of coastal management issues relevant to New Zealand. Substantial effort is therefore required in digitising the potentially significant amount of key information on New Zealand sand dunes and their management that is languishing as unpublished reports and other 'grey literature' sources.

At a conservative estimate of 1500 references on coastal sand dunes, up to 1000 may require digitising or a significant time spent to find an on-line source.

***Classification into subject areas***

As part of this scoping study, respondents to the survey have prioritised their key requirements for a coastal database in terms of broad and specific subject areas of interest. The feedback from the survey has allowed us to refine our assessment the current references listed in the Dunes Trust database. The nine most frequently prioritised broad subject areas are shown in Table 2. The proportion of references and information sources within each subject category are also indicated based on those currently listed in the Dunes Trust Coastal Reference Database.

While there is some degree of subjectivity in placing some of the information sources within some of these categories, especially as some references cover a range of subject areas, the list does give an indication of scale of references within each broad area. The subject area with the most references is Dune ecology reflecting to some degree that it is a catch-all for many general references that don't fit directly with any of the others listed. Funding sources have not been listed by the Dunes Trust and is likely to be better listed in a separate database for Coast Care groups. Similarly, references relating to local historical information has not been captured by the current list of coastal references.

**Table 2: The number and proportion of references within broad subject categories based on the 700 references listed to date in the Dunes Trust Coastal Reference Database. These are the major subject categories that have been selected from a survey of coastal interest groups and agencies carried out as part of this scoping study.**

| Subject categories | No. of source | Proportion (%) |
|---|---|---|
| Dune ecology | 161 | 22.4 |
| Back dune ecology | 80 | 11.1 |
| Coastal processes | 98 | 13.6 |
| Species lists by location | 52 | 7.2 |
| Local historical information | 0 | 0 |
| Weed and animal pest ecology | 97 | 13.5 |
| Funding sources | 0 | 0 |
| Past/current restoration work at nearby sites | 32 | 4.4 |
| Policy or management information (e.g. RMA case studies) | 49 | 6.8 |
| General – not specific to other categories | 151 | 21.0 |

**Subject areas by output type**

Table 3 provides a breakdown of the proportion of references in the Dunes Trust database by output type and subject category based on the 700 references listed. This provides an indication of the subject areas and output types that are a priority for the next stage in establishing an interactive user-friendly reference database for those involved and interested in coastal sand dune characteristics, restoration and management.

Journal papers, papers published as part of conference proceedings and technical reports are the main method of publication across a range of subject areas on coastal sand dunes including dune ecology, backdune ecology, coastal processes, and weed and animal pest ecology. Species lists invariably are those attached to journal and conference papers and policy and management information tend to be categorised either as plans or technical reports. Books are classified as mostly general or under dune ecology, both relative broad subject areas reflecting the wider scope of most books published on coastal areas.

**Implications for setting up a coastal database**

In response to the database survey as described above, Coastcare and other community groups indicated a need for the following:

- Vegetation maps, information on species distribution and restoration work undertaken at both a national and local level.
- Tools such as calculators, guidelines, and information setting out restoration methods on a step-by-step basis.

Coastal management agencies indicated in the survey a need for:

- Vegetation and species distributions and restoration works including maps showing sites where this information was available;
- Electronic scientific papers, electronic factsheets;
- Electronic templates for coastal activities such as restoration and weed control;
- Reports commissioned by councils and the Department of Conservation;
- Historical information with an emphasis on local and contextual information; and
- More information on coastal sand dunes in South Island sites and their issues and management.

The evaluation of the current Dunes Trust reference database has highlighted substantial gaps in providing information to both coastal community groups and managing agencies. Providing a list of coastal dune related references will alert users to the existence of scientific papers, factsheets and technical reports but these are largely of a generic nature or are specific to a particular species or site studied. There is clearly a need for a database system that would allow end users easy accessibility to a wide range of aspects of coastal sand dunes and their management. In developing a coastal reference database, key features and priority actions include:

- Only a fraction of the relevant coastal references have been collated to date. Continue to locate all relevant coastal material into a reference list;
- Determine availability and in what form each reference can be accessed – reference only, abstract only, on-line pdf of full reference, etc…;
- Determine across all references implications of copyright or other restrictions for on-line access.

- Digitising the substantial quantity of unpublished or 'grey literature' and making this available on-line;
- Providing links to other key databases and websites of relevance to New Zealand coastal sand dunes; and
- Developing a user-friendly interactive reference database system with full word and subject searching capability.

**Table 3: The proportion of information sources within the Dunes Trust reference database by subject category and major output type. This is based on only 700 references listed to date which is estimated to be small component of the references relevant to coastal sand dunes in New Zealand.**

| Subject categories | Percentage of Information Sources (Number of documents) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Journals | Books | Proceedings | Theses | Technical Reports | Bulletins | Periodicals | Factsheets | Unpublished Reports | Plans |
| Dune ecology | 5.7 (41) | 1.4 (10) | 2.4 (17) | 1.3 (9) | 5.0 (36) | 3.5 (25) | 1.5 (11) | 0.1 (1) | 1.1 (8) | 0.1 (1) |
| Back dune ecology | 1.8 (13) | 1.3 (9) | 2.5 (18) | 0.4 (3) | 3.1 (22) | 0.7 (5) | 0.3 (2) | 0.6 (4) | 0.6 (4) | |
| Coastal processes | 2.9 (21) | 0.8 (6) | 1.3 (9) | 2.6 (19) | 4.4 (32) | 0.6 (4) | | | 0.8 (6) | |
| Species lists by location | 3.3 (24) | 0.1 (1) | 1.7 (12) | 0.1 (1) | 0.7 (5) | 0.4 (3) | 0.3 (2) | | 0.3 (2) | 0.1 (1) |
| Local historical information | | | | | | | | | | |
| Weed and animal pest ecology | 6.1 (44) | 0.7 (5) | 2.1 (15) | 0.6 (4) | 1.8 (13) | 0.3 (2) | 0.7 (5) | 0.6 (4) | 0.7 (5) | |
| Funding sources | | | | | | | | | | |
| Past/current restoration work at nearby sites | | | 1.0 (7) | | 3.5 (25) | | | | | |
| Policy or management information (e.g. RMA case studies) | 0.6 (4) | 0.3 (2) | 1.4 (10) | 0.4 (3) | 1.7 (12) | | | | 0.7 (5) | 1.7 (12) |
| General – not specific to other categories | 5.1 (37) | 5.8 (42) | 2.6 (19) | | 2.5 (18) | 2.6 (19) | 0.3 (2) | 0.4 (3) | 1.1 (8) | 0.1 (1) |

# Appendix 4: Monitoring database for coastal dune ecosystems

**Introduction**

The Dunes Trust is currently in the planning stages for setting up a comprehensive community-based monitoring system for restoration and management of coastal sand dunes throughout New Zealand. The vision of the Trust is to provide Coast Care groups and coastal managing agencies with a user-friendly monitoring system that will provide up-to-date information on all relevant aspects of dune ecology, morphology, management issues and options, and restoration initiatives.

A major component will be to provide practical methods and templates for local communities to be able to undertake their own monitoring. Essential to this will be an interactive monitoring database system whereby participating coastal community groups and agencies can take ownership of their monitoring data and information and retrieve useful feedback on the performance of their restoration initiatives. It is envisaged that virtually all restoration and management programmes on sand dunes aimed at improving indigenous biodiversity and natural dune form and function will benefit from this proposed monitoring system and an integrated monitoring database.

**Other database systems**

Currently there is no monitoring database system for coastal sand dunes. However, there is likely to be scope for developing such a system within one or more current database systems such as the iNaturalist database system evolving from the New Zealand Biological Resources Network (NZBRN) and the plant-based database systems of the New Zealand Plant Conservation Network (NZPCN). Methods and advantages of integrating the proposed coastal monitoring database with the iNaturalist database are listed in Appendix 5.

**Requirements for a monitoring database**

Development of a monitoring database will allow for a quantifiable measure of the success or otherwise of each restoration and management programme by site and by Coast Care group or managing agency. In addition, local communities will have direct feedback on their initiatives and will be able to learn directly from their monitoring programmes what is working or not, and therefore implement changes to improve outcomes in future activities and initiatives. This effectively provides an audit of resources measured against objectives and outcomes for each project and site.

The features required within at monitoring database system for coastal sand dunes include:
- *Identifier* – of project, site and community group and/or managing agency
- *Site Location* – link to Google Earth of similar digitised mapping system
- *Site history profile* – history of dune management and restoration at the site
- *Species lists* – local lists of native and exotic species, flora and fauna, vegetation map…
- *Description of management and restoration activity* – planting, monitoring natural regeneration, pest animal control, weed control…
- *Objectives* – aims of the group and for the site
- *Data capture* – each activity to have proformas or templates developed with fields for capturing information and data:

- o Site description – cross-sectional dune profiles, site description, proximity of site to the sea, climate information, vegetation cover, pest animal pressure, development and other human-induced influences, cultural aspects, etc…
- o Planting – design and layout, dates, remeasurements, survival, height, crown spread, plant vigour/health…
- o Weed control – species, methods, frequency, followup…
- o Pest animal control – species counts, methods, trap line maps/GPS coordinates…
- o Monitoring of natural regeneration – transect and plot design, permanent or temporary, frequency of measurement, methods, plot size, etc…
- o Sand dune infrastructure – signage, fencing, accessways, installation dates, maintenance…
- *Data entry and storage* – by community and/or agency, direct onto website or via moderator…
- *Interpretation* – summaries/graphs of results, feedback to local communities, improvement of practices, linking cross-sectional dune profiles and other site information to restoration performance, improved restoration and management practices on sand dunes
- *Links* – access to other relevant local information on websites, key references, etc…

**Benefits of an integrated monitoring system**

Coastal dunes systems in New Zealand are classified as the most threatened of our natural ecosystems where human disturbance including presence of animal pests, grazing, weeds, and development severely impact on the natural function and indigenous biodiversity of the dunes. The implementation of community-based monitoring system that comprises an interactive database will provide almost immediate benefits for restoration and management programmes of degraded sand dunes throughout New Zealand. This will empower local Coast Care groups to take ownership of their sand dune issues and in partnership with managing agencies monitor restoration and management programmes. The proposed integrated monitoring system and database for coastal sand dunes is likely to provide insights for others involved in restoration of other ecosystems such as riparian, wetland and forests.

# Appendix 5 – Information provided by possible collaborators and contractors

## NZBRN and the new iNaturalist generation website - integration with the proposed Dunes Trust monitoring database

**Information provided by Colin Meurk & Jon Sullivan (NZ Bio-Recording Trust)**

**Background**

The NZ Dunes Trust is seeking to develop a system for recording and reporting the existence of, history and biological/morphometric/phenological information about dune projects or places.

The new iNaturalist-based website of NZBRN (soon to be launched) is a massive jump in immediate or potential features and ease-of-use over our legacy system. Like our legacy system, it allows users to enter in their observations of species (what, where, when, doing what, status, etc.), search for and download records, and display observations on distribution maps. Unlike our legacy system, iNaturalist introduces a slew of important new features, while also being easier to use and much more modern in its underlying database infrastructure.

The core purpose and functionality of iNaturalist and our new NZBRN are to grow and service an online community of naturalists and their observations. We want to increase society's connections to nature and use community observations to better document and understand nature and its changes.

**Services**

For the NZ Dunes Trust, we can provide the means to make, store, and view observations of species (presence, abundance, sought but not found, age, stage, phenology, etc.).  We can provide this both through Project webpages on our system and through data (maps, observations, photos) fed dynamically from our system to external websites. Our new Projects and Places functionality allows for additional information to be displayed about projects and places (logos, links, text, etc.).

The following are the new features we anticipate will be most valuable to the NZ Dunes Trust.

*Projects*

   Users can create and join projects, which can be places and/or taxa of special interest. When creating a project, you can restrict observations to within a specified place (defined by a polygon) and/or a particular group or list of species (Figs 1a-c).

   Project webpages include a description of the project with links to more information (such as your own website), a map of recent observations, and a list of recent observations. You can grab a Project widget that can be added to any website and will dynamically display all of the latest observations.

   Anyone can currently create and join any website but we are working on allowing project administrators to restrict project members as invitation only.

   You can create a field list of all the species recorded by approved recorders for the project accompanied by pictures.

*Species records*

New users can sign in with their Facebook, Google, or Yahoo Ids (if they wish) or create a user ID and password in our system.

All species of any organism type may be recorded, in any organism order, by typing in the scientific or vernacular name and choosing from a list of options that contain the entered string. When hooked to NZOR (soon to be launched), we will handle observations of any species in NZ. All the birds, reptiles, fungi, plants, insects, shellfish (and more!) at one site can be recorded into our system.

Specify if planted or not (or possibly)

Specify if searched for but not found

You can optionally add your observations to suitable Projects, either at the time of entry or afterwards. Observations can be made from within Project webpages or from the main observation entry page.

You can upload photo(s) associated with any observation (of a species or site view). This can be done by uploading photos directly to our system or linking to them from your Flickr or Picasa photo gallery. If you use the latter options, our system will automatically grab any species identification, date, time, and geo-tag information in those photos.

You can request an identification ("ID Please") when you add an Observation.

You can comment on other people's records (based on the photos) and agree with identifications or submit an alternative identification which can be accepted or rejected by the original author of the observation. Simple identifications are often made in a matter of hours by the iNaturalist community. When an ID has been confirmed by a second party our system automatically accords it 'research grade' so gives some quality assurance.

Like the legacy NZBRN, you can protect your observations by setting the geo-privacy to private or obscured. All other observations can be found and downloaded by anyone. (We are exploring the option of adding Project-level geo-privacy settings for our new invitation-only Projects.)

## *Download data onto a spreadsheet*

 All data can be downloaded in CSV spreadsheets, KML files for viewing in Google Earth, and RSS to display on other websites. Downloads can be made from within a Project or by searching the main site for combinations of species, place, and date/time.

There is a bulk upload capability which we will be expanding on (it is currently restricted to 100 rows per uploaded file, similar to the original NZBRN, but we will be soon allowing much larger files to be uploaded).

## *Access via iPhone or Android*

iNaturalist has iPhone and Android apps which we are currently optimizing for NZ. This allows users to add new observations using their smart phone's camera, clock, and GPS. It syncs with a user's selected projects (and allows users to find and join nearby projects).

*Explore*

Look at existing records according to searches on any of the input data. All our public data can be found and downloaded, and we share it with GBIF so other sites can use it too (e.g., the Encyclopedia of Life).

View species distribution maps that include both our observations and publicly accessible additional data.

*Learn*

- Look up information about any organism or place – displaying information from a variety of sources (Wikipedia, Flickr, GBIF, etc.). Users can create additional places (as points or polygons) and annotate species traits (currently just the colour(s) but with potential for expansion).

- The webpage about Places has three tabs. One shows an illustrated and annotated species list of all species at that site, the other lists all observations made at that place, and the third displays a Flickr gallery of photos tagged with that place name and the Wikipedia page (if it exists) on the place of that name (anyone can add photos to Flickr for free and create and edit Wikipedia pages).

*Robust, modern open source Platform*

- We thoroughly surveyed the available options for this next generation of NZBRN and while it has been a slow transition, it will stand us in good stead and is a newer, open-source platform. By joining with an existing open source project, we can continue to advance, not just with our own development, but also the development work on inaturalist.org and other sister projects (e.g., one currently in development for Costa Rica's biodiversity institute, INBio).

**Business Case**

- We will support a range of features not represented elsewhere in NZ:

    o We cover all organism groups

    o Combination of ease-of-use and richness of  features

    o State of Art social media features for building an on-line community (we will launch with the legacy data from over 3000 reporters)

    o Modern, future-proofed, open source system that will continue to improve

- Sources of future funding and sponsorship

    o We are working through this as present but as a Charitable Trust we will be seeking funding from the usual sources and some corporate membership.

**Planned Additional Features**

- It is intended to add more fields during the next developmental phase. Eventually it would be intended that individual groups, projects or users would customize for their own needs and/or select for display only those fields relevant to them. In the first instance we anticipate a professional page of additional fields that is tabbed from the main, public home page (Fig. 2). These immediately new fields will likely include:

- o Identifier for field site

- o Identifier for zone or subplot

- o Identifier for individual plants or animals (tag number)

- o Density and cover

- o Height, spread, dbh

- o Phenology (leafless, flower (HML), Seed/Fruit (HML), Seedling (HML))

- o Health/Vigour (includes dead)

- GBIF upload and download so all species depictions and graphics will include some million or so records from NZ available through GBIF
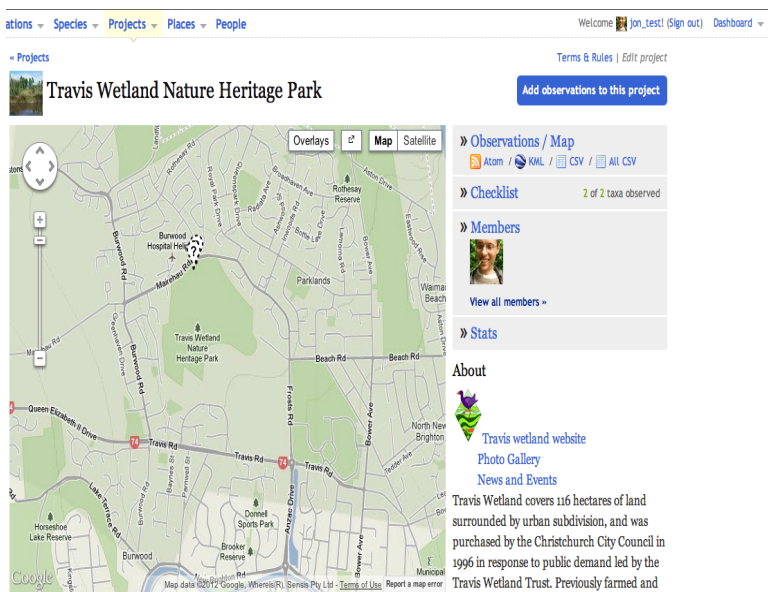


Fig 1a: Travis Wetland project – showing links to the Travis Wetland Trust's website, etc.

Travis Wetland covers 116 hectares of land surrounded by urban subdivision, and was purchased by the Christchurch City Council in 1996 in response to public demand led by the Travis Wetland Trust. Previously farmed and drained, the area is now being managed as a Nature Heritage Park.

Travis wetland is a lowland freshwater wetland, located in the midst of an urban environment. It is one of the few surviving fragments of the once extensive wetland habitat that covered much of Christchurch prior to European settlement.

Travis wetland is an inspiration example of an urban wildnerness being restored for its conservation, recreational, and educational values. Volunteers help out with planting and weeding on monthly working bees. If you live in the area, you are most welcome to join us there.

**Native nature at Travis wetland**
Travis is the most important freshwater wetland for birds in Christchurch, supporting about half of Christchurch's pukeko

Fig 1b: Travis Wetland project – scrolled down to include additional information about project.



Fig. 1c: Polygon drawn around restoration project area (Travis Wetland)

Fig. 2a: iNaturalist home page before extra fields expanded using "optional extras"



Fig. 2b: The iNaturalist home page with "optional extras" fields expanded. The intention for our extra fields, itemised above, would be to have a "pro-version" button that would expand to a new page with the additional fields.

**Business Development Ltd**
New Zealand

**SHORT FORM AGREEMENT FOR CONSULTANT ENGAGEMENT**

**Between InfoAge Business Development Limited (Consultant) AND**

| | | |
|---|---|---|
| **Dunes Trust (Client)** | **Reference Number** | **5999** |
| **Kirsten Crawford** | | |
| | **Date** | **09-Aug-12** |
| **Wellington** | **Valid Until** | **23-Aug-12** |

**Database Design and Development**

| SERVICE(S) | UNITS | RATE | AMOUNT |
|---|---|---|---|
| **DATABASE SERVICES** | | | |
| Project A: Coastal Dune Ecosystem Reference Database: Detailed analysis of user requirements conducted in meetings with Kirsten, definition of specific needs and documentation of requirement | 8 | $125.00 | $1,000.00 |
| Development of Project A: Coastal Dune Ecosystem Reference Database. Web based database system as per briefing document, mySQL, php and possible other technologies.  Estimated development cost is $15,000 - $30,000 depending on scope, specific requirements and technology options chosen. | 160 | $125.00 | $20,000.00 |

**Database Services Total: $21,000.00**

**Total ex GST: $21,000.00**

**Programme for Services**

The programme will be agreed at the time of order confirmation.

**Timing of Payments**

20th of month

**Information or Services to be provided by Client**

The Client engages the Consultant to provide the Services described above and the Consultant agrees to perform the Services for the remuneration provided above.  Both Parties agree to be bound by the provision of the Short Form Model Conditions of Engagement (attached).  Once signed, this agreement, together with the conditions overleaf and any attachments, will replace all or any oral agreement previously reached between the Parties.

CLIENT AUTHORISED SIGNATORY (IES):

_____     _____     _____
Name                                                      Signature                                              Date

**Purchase Order Number:** _____     **Please fax all pages to 04 384 4452.**

# SHORT FORM MODEL CONDITIONS OF ENGAGEMENT

1. The Consultant shall perform the Services as described in the attached documents.

2. In providing the Services the Consultant shall exercise the degree of skill, care and diligence normally expected of a competent professional.

3. The Client shall provide to the Consultant, free of cost, as soon as practicable following any request for information, all information in his or her power to obtain which may pertain to the Services. The Consultant shall not, without the Client's prior consent, use information provided by the Client for purposes unrelated to the Services. In providing the information to the Consultant the Client shall ensure compliance with the Copyright Act 1994 and its amendments and shall identify any proprietary rights that any other person may have in any information provided.

4. The Consultant acknowledges that it will have access to confidential information of the Client and shall use its best endeavours to prevent the use, publication or disclosure of such information.

5. The Client may order variations to the Services in writing or may request the Consultant to submit proposals for variation to the Services. Requested departures from the scope of services will be considered chargeable enhancements.

6. The Client shall review the services delivered and, no more than twenty business days after receiving the product from the Consultant, approve the services or specify in writing the manner in which it fails to conform to any of the specifications (whereupon the Consultant will promptly make all required corrections for the Client's approval). Following verbal or written approval by the Client of the services, the services are to be considered approved. If approval is not received from the Client with twenty business days, the services are deemed to have been approved and accepted by the Client.

7. The Client shall pay the Consultant for the Services the amount of fees and expenses at the times and in the manner set out in the attached documents. Where this Agreement has been entered by an Agent (or person purporting to act as Agent) on behalf of the Client, the Agent and Client shall be jointly and severally liable for payment of all accounts due to the Consultant under this Agreement.

8. All amounts payable by the Client shall be paid as per the timing of payment clause in this agreement. Late payment shall constitute a default, and the Client shall pay default interest on overdue amounts from the date payment falls due to the date of payment at the rate of 18%pa plus a $25 monthly account admin fee. In addition the costs of any actions taken by the Consultant to recover the debt.

9. In the event that the Client does not adhere to the Payment Terms the Consultant shall have the right to cease all work for the Client until payment is made for outstanding invoices.

10. Where services are carried out on a time charge basis, the Consultant may purchase such incidental goods and/or Services as are reasonably required for the Consultant to perform the Services. The cost of obtaining such incidental goods and/or Services shall be payable by the Client. The Consultant shall maintain records which clearly identify time and expenses incurred.

11. Except for a breach of obligations set out in this contract, the Consultant will in no circumstances be held liable to the Client for any loss of any kind (including lost profit or contracts, anticipated savings, costs or expenses of any kind arising out of the use of the system supplied, revenues or goodwill) or any other indirect or consequential loss or claim by third party arising out of the use or operation of any goods or services supplied by the Consultant, whether such loss or damage arises directly or indirectly from the programs or services supplied or from any information contained in, or omissions from, the documentation.

12. The Client may suspend Services or terminate the Agreement in writing specifying the reason for suspension or termination. 25% of the total project fees will be payable within 7 days by the Client and in addition any expenses borne by the Consultant, will be payable by the Client. Any deposit paid is non-refundable.
Suspension or termination shall not prejudice or affect the accrued rights or claims and liabilities of the Parties.

13. The Consultant shall retain intellectual property/copyright in all drawings, specifications and other documents prepared by the Consultant. The Client shall be entitled to use them or copy them only for the Works and the purpose for which they are intended. The ownership of data and factual information collected by the Consultant and paid for by the Client shall, after payment by the Client, lie with the Client. The Client may reproduce drawings, specifications and other documents in which the Consultant has copyright, as reasonably required in connection with the project but not otherwise. The Client shall have no right to use any of these documents where any or all of the fees and expenses remain payable to the Consultant.

14. The Client grants permission for the Consultant to publish the Client's name as a Client on the Consultants website. Where the service is a web site, the Client grants permission for the Consultant to place a link to the Client's website from the Consultant's website and the Client shall allow the website to contain author's credit links to the Consultant's website.

15. The Consultant has not and will not during the term of this Agreement or at any time after it, assume any obligation as the Client's Agent or otherwise which may be imposed upon the Client from time to time pursuant to the Health and Safety in Employment Act 1992 ("the Act") arising out of the engagement. The Consultant and the Client agree that, for the purpose of the Act, the Consultant will not be the person who controls the place of work in terms of the Act.

16. Disputes shall first be referred to conciliation for settlement.

17. This Agreement is governed by the New Zealand law, the New Zealand courts have jurisdiction in respect of this Agreement, and all amounts are payable in New Zealand dollars.

18. The parties acknowledge that execution of a facsimile copy/pdf copy via email of this agreement and transmission thereof by facsimile/pdf each to the other shall be sufficient to constitute offer and acceptance and to satisfy the requirements of section 2, Contracts Enforcement Act 1956.

**Signed:**                    **Name:**                    **Date:**