Scoping Report to Investigate the End-user Needs, Design and Development for a Coastal Dune Ecosystem Database, July 2012

Prepared for Terrestrial and Freshwater Biodiversity Information Systems (TFBIS) Programme: Project 280

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Appendices – See '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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The Dune Restoration Trust of New Zealand (Dune Trust) like to acknowledge:

The TFBIS programme and fund advisors for resourcing this project; the in-kind support of Greater Wellington Regional Council, The Department of Conservation, Environment Canterbury, Northland Regional Council to undertake this project; the in-kind support of all the management authority staff who took part in interview series and the individuals who completed the online survey and took part in the workshops.

Executive Summary

The Dune Restoration Trust of New Zealand was successful with a funding bid to the Terrestrial Biodiversity and Freshwater Information Systems fund (TFBIS) (administered by the Department of Conservation) to undertake a scoping report into the development of a coastal dune ecosystem database.

A series of projects have been identified by end-users through a series of workshops, online surveys and interviews that together comprise a comprehensive information provision system for the wide range of agencies and community groups managing and/or carrying out restoration work in coastal dune ecosystems in New Zealand.

Two of these projects align with the TFBIS programme criteria and are detailed within this report:

Project A: Development of a literature/reference database to store and maintain coastal dune ecosystem information.

Project B: Development of a community-based database to store monitoring data directly related to coastal dune restoration projects and activities.

Two other projects have also been identified during the process of this scoping report:

Project C: Continued development of the Dunes Trust website, particularly the Coast Care pages, resource centre and links to other information.

Project D: Development of specific tools related to dune monitoring

Project A and B align with the TFBIS programme and are detailed in section 4.1 and 4.2. The Dunes Trust intends to submit an application for funding to TFBIS for Project A in the short term, and Project B on the successful completion of Project A. Projects C and D, whilst still important with regard to the overall provision of information about coastal dune ecosystems, align more closely with other funding sources or programmes.

It is recommended that the Dune Restoration Trust of New Zealand (Dunes Trust) apply to TFBIS to undertake Projects A and B over the next three years. The Dunes Trust will pursue other funding sources or programmes to develop the remaining projects identified by end-users.

1. Background

The Dunes Restoration Trust of New Zealand (Dunes Trust) is a not-for-profit registered New Zealand charitable trust. The Dunes Trust network consists of a wide range of individuals and groups that have interests in the New Zealand coastal environment including: Coast Care groups, iwi and hapu, district and regional councils, the Department of Conservation (DOC), Ministry for the Environment (MFE), research agencies, industry groups, educational institutions, sand dune forestry managers, and coastal property owners.

The Dunes Trust vision is to

> *"see the majority of New Zealand dunes restored and sustainably managed using indigenous species by 2050".*

Our goals are to:

- Provide a network for information exchange on sustainable management of dune ecosystems;
- To facilitate research on New Zealand dune ecosystems; and
- Promote public awareness of proven methods for protection, restoration, conservation and sustainable management of dune ecosystems.

The Dune Restoration Trust of New Zealand was successful with a funding bid to the Terrestrial and Freshwater Biodiversity Information Systems fund (TFBIS) (administered by the Department of Conservation) to undertake a scoping report into the development of a coastal dune ecosystem database.

The aims of this scoping report were to:

1. Survey and assess end-user needs for coastal dune ecosystem information to effectively manage dune ecosystems;
2. Explore options to provide this information in a way that is useful, freely accessible and updateable;
3. Assess the quantity and range of sources of existing coastal dune ecosystem information, including the Dunes Trust reference database, to determine the scale and scope of information a database would hold – including an assessment of copy right implications, digitising needs etc;
4. Evaluate existing database systems for possible alignment, linkages and/or construction parameters; and
5. Investigate the technological and process requirements for database construction, interoperability, maintenance etc.

A substantial amount of qualitative data was generated as a result of the end-user consultation and assessments carried out for this scoping report. Some quantitative data was also collected. The report summarises this information and outlines two discrete projects the Dunes Trust intends on submitting to the TFBIS programme for future funding. The projects are presented in line with the

suggested inclusions and detail requested by TFBIS for scoping reports. This includes information about needs and benefits, projects participants, ownership, stewardship and maintenance. In addition the report provides an outline of the technical parameters and platform required for database construction and preliminary costings. If funding is obtained to progress these projects, it is anticipated that a more detailed needs analysis will be required by the database developers that sets out construction phases, exact requirements and fixed price implementation.

Further information about the investigations undertaken as part of this scoping report is available in Appendices 1 through 5 and by contacting the Dunes Trust directly.

1.1 Scoping Report Methodology

To meet the deliverables of this report, the Dunes Trust undertook:

- end-user consultation including workshops at the 2012 Dunes Trust Conference, an open online survey and a series of interviews with relevant staff in organisations throughout the country with responsibilities for coastal ecosystem management;
- assessment of the existing Dunes Trust reference database and additional references not currently held in the database to investigate the quantity of potential references as well as any copy right issues and digitisation requirements;
- interviews with existing database users/managers/developers to investigate options for development, collaboration and interoperability; and
- internet searches of a selection of existing databases and technological platforms.

2. Summary of end-user needs consultation

End-user consultation consisted of workshops at the Dunes Trust Conference in Taipa, an online survey and a series of interviews with staff in management agencies with responsibility for coastal dune ecosystems throughout New Zealand. The purpose of the workshops, survey and interviews was to gain an understanding of the needs for information and systems related to coastal dune ecosystem management and restoration.

The workshops focused on what information was needed by groups to inform and inspire them to restore coastal ecosystems and also what information they were collecting or wanted to collect to measure success in the projects they were working on.

The online survey was designed based on the outcomes of the workshops. It was not restricted and as such the respondents were 'self-selected'. The interviews were directed towards agencies and staff that either run coastal dune programmes or have responsibility for coastal dune ecosystems. Further detail on the respondents and interviewees can be found in Appendices 1 and 2.

105 individuals responded to the online survey and of these 69 completed all questions in the survey. The respondents represented a range of organisation types with 47% identifying themselves as Coast Care or other community restoration groups, 38% from district or regional council, 12% from DOC, and 3% from research institutes (either CRI's or universities). This is thought to be generally representative of the community of interest.

Interviews were carried out with staff from eight regional councils, three district councils, the Department of Conservation, Landcare Research, and two universities. Note, other organisations were contacted but did not respond to the request for an interview.

Results of the survey and interviews are outlined in Appendices 1 and 2. Key findings from the end-user consultation are summarised below:

2.1 Information needs

- Overall, results show that the current needs of end-users for information about the coastal dune ecosystem are similar in topic, with the highest needs being for information relating to **weed control, planting guidelines, species lists and scientific literature**. Survey results show that agency staff have a higher need for scientific literature than other groups, and Coast Care and community restoration groups have a higher need for planting guidelines than other groups. Interview results support this finding and also suggest that agency staff are often the 'first point of call' for information needed by community members and colleagues not directly involved with coastal ecosystem restoration programmes. Therefore, providing an information service to agency staff may in effect allow better accessibility of information to community members and other agency staff.

- The concept of developing a reference database for coastal dune ecosystem information is well supported by the end-user consultation. **87% of survey respondents indicated that having**

information in one central 'hub' would be useful and the large majority of interviewees confirmed this finding. Important information topics to include in this system are: dune ecology, back dune ecology; coastal processes (including hazards and erosion); planting information (e.g. species lists by location, site preparation); information on beach types (e.g. gravel and sandy beaches); grey literature; and New Zealand specific information. The format of information required within this system should include: scientific papers, commissioned reports (e.g. engineering reports commissioned by councils), species lists, investigation or case studies commissioned by agencies/research institutes and best practice guidelines. The functionality of this system needs to allow users to search documents by location and by document type/format.

- Additional information needs were identified by end-users that sit outside of a literature/reference database. These include: a map of Coast Care groups and restoration projects around the country that provides information such as contact details, restoration goals, success stories and group profiles etc.; a restoration planning template and decision making process for starting up a coastal restoration group or project; and a variety of practical tools and case studies. These information needs are listed in Table 1 with an indication of how the Dunes Trust could meet them within our existing capacity or by collaborating with other organisations.

2.2 Monitoring

- Results indicate that the approaches being taken to monitor coastal dune ecosystems across the country relate largely to the specific management programmes within each individual organisation or group. Given that there is a wide variation of management programmes associated with the coastal dune ecosystem across the country, there is as expected a correspondingly wide variation of monitoring approaches. Monitoring programmes vary from large scale, comprehensive, longitudinal biodiversity and geomorphological studies related to larger coastal programmes (e.g. Bay of Plenty Regional Council, Environment Canterbury), to operational monitoring of Coast Care and restoration project outputs (e.g. numbers of plants in the ground, minutes of Coast Care meetings, before and after photographs, numbers of pests caught), to observational monitoring by contractors and Coast Care members (e.g. site surveillance, bird counts), to very specific outcome monitoring (e.g. fauna surveys). Methods being used include **dune profiling, site surveillance recordings, vegetation mapping, vegetation transects, plant survival recording, pest tracking tunnel and recording volunteer hours/numbers** etc. Currently information about these techniques and how they can be effectively utilised to specifically monitor coastal restoration projects is not available in once place. As a consequence, the methods are not always consistent from one site to the next. Furthermore, the existence of monitoring programmes is not always widely known beyond the participating group or agency.

- Survey results indicate that the monitoring technique most often used is the use of photo points. However it was noted by more than one interviewee that, whilst photo point monitoring may be fairly standardised within some agencies, it is not well standardised by all those using the technique in the coastal environment (e.g. Coast Care groups) and the information is stored in a variety of ways that are not accessible. Interviewees noted that monitoring could be improved

by standardising this method, and providing guidelines and examples to everyone working in coastal restoration and management. However, the information would require a storage facility and perhaps some interpretation by experienced coastal practitioners.

- In general, data from monitoring that is undertaken by agencies is stored on in-house stand-alone databases. 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. Again, as a consequence of in-house database systems, the mere existence of monitoring data that could be potentially valuable to other end-users is often not known.

- There is an inconsistent approach to specifically monitoring the progress of Coast Care or coastal dune restoration projects around the country. This appears to be related to a number of factors including: a lack of tools or standardised methods for monitoring, a lack of funding for monitoring, a traditional 'output or operational monitoring' focus, a lack of incentive or knowledge from community groups about the needs for monitoring. Some agencies carry out monitoring (largely output or operational) on behalf of groups, and few groups carry out their own monitoring.

- There is a need identified to provide and promote some standardised methods for monitoring dune restoration projects that can be used by agency staff, contractors and community members. There is an associated need to provide a database system that can store this information in a way that remains accessible to these groups.

- Some agency and university staff interviewed noted that it would be advantageous to have a GIS based database that could store and overlay the wide variety of monitoring information related to the whole coastal dune ecosystem including: all flora and fauna species distributions; geomorphological information; outcome and output/operational monitoring data; etc. It was envisaged that this database could hold information from all the agencies (councils, DOC, CRI's, universities, community groups etc) thus providing a comprehensive nationwide monitoring system, accessible throughout the country. It was noted, by the interviewees, that this is an 'aspirational' concept that would be extremely difficult to undertake given the variation of mandates and resources available for coastal programmes within the agencies. Interviews with agency staff involved with developing and administering databases (such as the IRIS database) noted that this type of project would require significant resources, would take several years to develop due to the number of parties involved, and may duplicate existing GIS capabilities on a regional basis. Discussions with database developers noted that the current approach to database development is to build specific databases that are smaller and able to 'talk' (integrate with) other databases, rather than building large all encompassing systems.

2.3 Additional tools and services

A list of additional tools and services was identified by end-users that do not specifically relate to the TFBIS programme. These are noted in Table 1 and further information is available in Appendix 1 and 2.

3. An assessment of reference materials relevant to developing a coastal dune ecosystem literature database

The quantity and range of sources of existing coastal dune ecosystem information, including the limited pre-existent 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 literature database. This analysis has included an assessment of a substantial sample (700 references) of a range of hard copy and electronic information sources as identified to date by the Dunes Trust in the form of author, title and source. However the scale of information sources on coastal sand dunes is considered to be vast. Determining how best this information can be incorporated into an on-line coastal sand dune database is considered in this report. Further detail including the types of outputs and classification of materials into subject areas is available in Appendix 3.

3.1 Scale of coastal dune information

There is clearly a vast quantity of information on coastal sand dunes that is considered directly 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 information sources relevant to New Zealand sand dunes.

3.2 Existing Dunes Trust Reference Database

There has been a small and incomplete reference database initiated by the Dunes Trust over the last three years. This has been carried out on the back of other projects as time and resources permit largely using in-kind time by trustees and members of the Trust. The Dunes Trust Database currently has the following aspects:

- It 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 indicated;
- 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 without further searching;
- A large proportion are unpublished technical articles many of which are known not to be digitised and therefore not usually 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;
- There is a relatively small proportion books in the current database that are mostly under copyright. However, freely available digitised copies have not been identified

Currently the Dunes Trust Reference Database comprises a list of 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.

3.3 Developing a Coastal Reference Database

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 in one of several categories, e.g. 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;
- Books formed a relatively small component of the reference database most of which have copyright issues and consequently only a few are freely available on-line. However, end-user feedback via the survey and interviews indicates books are not a high priority for digitising and most are readily available from libraries and educational institutes.
- While there are some copyright or client confidentiality issues with some technical reports, an investigation of a sample of reports within the Dunes Trust reference database indicates this is likely to be minor, and indeed access to many of these reports via client websites (many of whom are public bodies such as councils) have made them readily available anyway.

4. Project definition and scope

The end-user consultation (summarised in section 2) identified a range of projects required to provide effective information and data services to organisations and individuals working in the field of coastal dune management and restoration. These are outlined in Table 1 below, and further information is available in the Appendices 1 and 2 or by contacting the Dunes Trust directly.

End-user consultation and needs definition also indicated that it would be highly advantageous to provide a 'single entry point' for users to access information on all aspects of sand dune morphology, ecology, management and restoration directly relevant to New Zealand. However, it is recognised by the Dunes Trust Project Team that it is important not to duplicate existing information or systems. As such it is proposed that coastal dune ecosystem information be provided in a way that: 'fills the gaps' of existing databases/information provision; integrates with and/or links directly to information held within other databases or systems; and that is based on user-needs. This was taken into consideration as the projects where defined.

The first column in the Table 1 identifies the end-user need and the project the Dunes Trust envisages meeting this need. The projects are:

Project A: Development of a literature/reference database to store and maintain coastal dune ecosystem information.

Project B: Development of a community-based database to store monitoring data directly related to coastal dune restoration projects and activities.

Project C: Continued development of the Dunes Trust website, particularly the Coast Care pages, resource centre and links to other information.

Project D: Development of specific tools related to dune monitoring

Project A and B align with the TFBIS programme and are detailed in section 4.1 and 4.2. The Dunes Trust intends to submit an application for funding to TFBIS for Project A in the short term, and Project B on the successful completion of Project A. Projects C and D, whilst still important with regard to the overall provision of information about coastal dune ecosystems, align more closely with other funding sources or programmes and as such are not detailed in the following sections other than where they are directly relevant to Projects A and B.

Table 1: End-user Needs Identified

Need/requirement	Description	Identified End-users
Coastal literature database (Project A)	A comprehensive list of all references relevant to coastal sand dunes in New Zealand covering all aspects including flora, fauna, coastal processes, restoration and management issues, historical information, etc. Database to comprise: ▪ Relevant journal papers, conference proceedings, technical reports, factsheets, periodicals and unpublished material. ▪ Author, title, reference source, pages, abstract and keywords for all references. ▪ Full versions of published information sources such as pdfs or direct links to where this information can be obtained. ▪ Where there are copyright issues, providing practical options for legitimate access. ▪ Word searching capability by author, title and keywords (including scientific and place names).	Management agency staff (i.e. councils, DOC), consultants, research institutes (i.e. universities and CRI's), Coast Care groups
Community-based monitoring database (Project B)	Provision of an interactive monitoring system for local management and restoration projects including data capture, data storage, analysis via calculators and interpretation of project performance by site, species or other variable. There is a priority development of monitoring methods and tools to support dune restoration activities that can be applied consistently on a nationwide basis. Planning for the development of a community-based comprehensive monitoring system is currently underway by the Dunes Trust. It is envisaged that the community-based monitoring database will be critical for storing and enabling interactive use of this monitoring information. (This will not duplicate existing systems available i.e. species observation data.)	Management agency staff (i.e. councils, DOC), universities, Coast Care groups
Practical guidelines, toolkits, calculators Project C & D	A purpose-built separate database/website with pdf versions or links to relevant guides, toolkits and calculators required by end-users involved in dune restoration and management. Priorities indicated are: standardised methods for photo point monitoring and data collection including somewhere to store photos for community groups; process-based restoration planning guidelines; dune vegetation transects/profile guidelines; regionally specific planting and weed control guidelines; planting calculator[1]; other standardised monitoring methods/guides for coastal dune environments. Links to guidelines and factsheets on websites such as councils.	Coast Care and other community group members, management agency staff (i.e. councils, DOC)
Site maps and species lists Project A & C (links to other websites/	Links to or pdf versions of maps and regional or site-specific species lists of flora and fauna relevant to coastal ecosystems. These can be provided by other existing systems such as NZPCN.	Management agency staff (i.e. councils, DOC), consultants, research institutes (i.e. universities and CRI's),

Need/requirement	Description	Identified End-users
databases)		Coast Care groups
Coast Care groups and coastal managing agency contacts Project C	Mapped location and contact details of Coast Care groups and contacts usually via regional or district councils are provided graphically for each region. Largely completed by the Dunes Trust[2]. Requires updating and linking to community group and agency profiles (refer next).	Management agency staff (i.e. councils, DOC), consultants, research institutes (i.e. universities and CRI's), Coast Care groups
Community group/agency profiles Project C	Option for individual Coast Care groups and agencies to either provide a link to their websites and/or provide information so that a group and/or agency profile can be set up on the Dunes Trust website. Profile to be specific to restoration, management and protection of coastal ecosystems.	Management agency staff (i.e. councils, DOC), universities, Coast Care groups
Site specific profiles Project B (in the short term)	Option for a summary of site-specific information on representative site characteristics for each region and active coast care group including: history of management; current status; and recording of work undertaken up to the present. Links to relevant vegetation maps, species lists, site-specific references. Historical and contextual information on a site by site or at least on a region by region basis relevant to coastal sand dunes.	Management agency staff (i.e. councils, DOC), consultants, Coast Care groups
Coastal weeds and management database Project C & links to other websites/ databases	Researched and proven recommendations for coastal weed management, particularly in relation to herbicide use in the coastal environment. Links to Weedbusters website, DOC weed manuals and publications, relevant council factsheets and websites; references on weed control, health and safety, identification etc. relevant to coastal sand dunes.	Management agency staff (i.e. councils, DOC), consultants, research institutes (i.e. universities and CRI's), Coast Care groups
Animal pests and management database Project C & links to other websites/ databases	Researched and proven recommendations for coastal pest animal management in the coastal environment. Links to pest animal control options for coastal sand dunes such as council and DOC websites.	Management agency staff (i.e. councils, DOC), consultants, research institutes (i.e. universities and CRI's), Coast Care groups
Search-ability and linkages Project A & B - using databases that are built to link with others, including internationally (e.g. GBIF)	Enable word searching across all different components of the databases and provide links between each where relevant.	Management agency staff (i.e. councils, DOC), consultants, research institutes (i.e. universities and CRI's)

[1] Since that start of this project, a planting calculator has been created and is now available at http:??www,dunestrust.org.nz/resources/planting-calculator/

[2] http://www.dunestrust.org.nz/coastcare-groups/coastcare-groups-map/

4.1 Project A: Development of a searchable database for literature/references related to coastal dune ecosystems

4.1.1 Rationale

Currently there is no coastal dune ecosystem literature/reference database or comprehensive electronic bibliography available in New Zealand. Our end-user survey consultation confirmed that data (such as operational restoration data) and information (such as commissioned reports about local coastal hazards or local scientific studies) are held across a wide range of organisations and individuals in a range of formats, including on home computers, hard copies in archive boxes, in agency databases – much of which is valuable but inaccessible by most of those working in coastal dune ecosystem restoration and management.

Of the council staff (regional, district and territorial authority) who responded to the survey, over 90% indicated that having information about coastal dune ecosystems together in one searchable database/information system would be very useful. Council staff who were interviewed also noted this would be useful particularly for staff who may not have experience in the coastal dune environment, to save time trying to find reports and scientific papers each time they were needed, to see what has been researched/reported on in other areas that might be applicable to their own work, and because there aren't good sources of information easily available for this ecosystem. Similarly, 100% of the DoC staff and Coast Care group members who responded to the survey indicated that having information about coastal dune ecosystems in one place would be useful.

Two interviewees noted that given the potential pressure of climate change and sea level rise, information about this ecosystem will become more important in adaptation and resource management planning.

4.1.2 Project context

Coastal dune ecosystems are amongst the most modified and degraded of all the major ecosystems in New Zealand (New Zealand Coastal Policy Statement 2010). Modification has included almost total removal of original dune forests, extensive disruption and loss of other native dune vegetation, and introduction of a wide range of competing exotic plant species. Grazing animals have also significantly impacted dune ecosystems, particularly more palatable species that evolved without grazing pressure. Human-induced disruption of stabilising dune vegetation also resulted in significant modification of dune ecosystems by wind erosion – a widespread issue from the 1800's to the mid 1900's. Stabilisation of these sands almost exclusively used exotic species, many of which are now widespread in remaining natural duneland ecosystems. Extensive coastal subdivision and development over the last 30-50 years has also severely impacted remaining dunelands. The combined effect of the above pressures has been significant. For instance:

- Original native duneland vegetation sequences from sand binding species on the dune face through to mature forest now remain in only two sites on the entire east coast of New Zealand;
- Within the Waikato Region, 98% of coastal sand dune vegetation has been lost since 1840 with the remaining 2% extensively modified;
- Many dune plant species are now listed as nationally threatened including pingao, sand pimelea, sand tussock, and sand spurge.

The areas of natural duneland ecosystem that remain are typically either narrow truncated ecosystems or small isolated remnants often subject to impact and encroachment from adjacent land use.

For coastal communities and agencies to effectively undertake restoration and management of coastal dunes ready access to current and historical information relevant to their site is essential.

This project will fill a 'gap' in the accessible biodiversity information related to the coastal dune ecosystem. Providing this information in an accessible electronic format will allow for integration and increased accessibility of information between end-users within New Zealand regardless of which agency or organisation they are part of, as well as accessibility via international search engines.

There are existing document management systems throughout New Zealand that hold information that is relevant to the coastal dune ecosystem. In the main, these are local or regional council databases, DOC databases, CRI databases or specific databases such as NZPCN and BUGZ.

Local and regional authorities

Local or regional authorities hold literature/ references within their document management systems and libraries. Coastal staff spoken to during this investigation indicated they file documents within these systems and/ or keep their own personal files of 'most useful' documentation. Document management systems are stand alone and not linked between councils or with other agencies (e.g. DOC). Community members and external agency staff can request information from council staff and some documents are available in pdf form from council websites. Staff noted that having this information available in one place that is user-friendly and leads to accessing essential information would significantly reduce the time it takes to locate 'good' information to carry out their work.

Department of Conservation

The Department of Conservation has significant information within document management systems, libraries, databases and archives related to coastal dune ecosystem in offices throughout New Zealand. This information is accessible via the department and some is integrated with databases that are accessible by other agencies.

Other sources

Universities and CRI's hold significant amounts of information that relate to the coastal dune ecosystem. However much of this information is again on 'in-house' stand-alone databases with limited access outside of the organisations. Private engineering and environmental consultancy

company's hold commissioned reports (for example coastal hazards, coastal erosion, profile surveys, etc) that are not easily accessible via those organisations, but may be available from council document management systems.

4.1.3 Proposed coastal literature database

It is proposed to develop a comprehensive coastal literature database. This project will:

- increase access to reliable information on coastal dune ecosystems to support restoration management and implementation by management agencies, research institutes and community members;
- provide better connectivity between the community of interest associated with coastal dune ecosystems locally, nationally and internationally;
- provide for better linkages and a level of integration between the biological, physical and social aspects of coastal dune ecosystem management and restoration; and
- provide for greater understanding of this dynamic environment.

4.1.4 Benefits

This project has been discussed with staff involved in coastal management within the Northland, Auckland, Waikato, Bay of Plenty, Hawkes Bay, Wellington, Canterbury and Southland Regional Councils as well as the Waimakariri, Timaru, Dunedin and Invercargill City/District Councils; the Department of Conservation; Lincoln University; Environmental Consultants; and selected CRI scientists. In every case staff noted that there was benefit in providing information about coastal dune ecosystems in one central location. Staff noted specifically that:

- coastal programmes vary dramatically in scale and scope around the country and as such information is collated on an individual programme, district or regional basis with limited sharing between regions or at a national level;
- staff turnover can mean that information is lost or becomes less accessible;
- staff are unable to access historic reports or information even when they know it exists;
- staff use a wide variety of sources to find information and much of it is not easily accessible and therefore time consuming; and
- having a central source of information would decrease the time and effort it takes to find information about coastal dune ecosystems.

Those who will benefit from this project are staff within a variety of departments in management and government agencies, students studying any aspect of the coastal dune ecosystem, community groups requiring information generic to coastal restoration or specific to their region, and any person working in the coastal environment requiring reference information (e.g. consultants, engineering firms, researchers, school teachers etc.).

4.1.5 Proposed process and participants

It is envisaged that this project will be lead by a Dunes Trust Steering Group. This group will include the Dunes Trust Project Manager, an appointed contractor and representatives from DOC, Local Government, the Dunes Trust Research Committee and Lincoln University. The group will report to the Dunes Trust Research Committee and the TFBIS Fund Advisor.

During the processing of literature it is likely the Trust will source information relevant to other organisations, such as the New Zealand Plant Conservation Network (NZPCN). It is envisaged that the Dunes Trust process this information (e.g. digitise species lists via OCR scan), hold it within our system and provide it to other organisations for their use. In addition, there will references within other database systems that are relevant to the Dunes Trust literature database. Where this information is freely accessible from another system, the Trust will provide a perma-link directly to that system, rather than duplicating the information.

Further detail on the process and participants is provided in Table 2.

Note that the Project Team have had discussions with two database development companies about this project. Whilst indicative quotes and technical specifications were obtained, a final decision on the developer to be appointed has not been made.

Table 2: Process and participants to develop a coastal dune ecosystem literature database

Project implementation phase	**Organisation**	**Responsible for**
Project Governance	Dunes Trust Steering Group	Deciding on final project specifications including criteria of literature inclusion and data tagging Decision making Appointing contractors Signing-off MOU's on behalf of the Dunes Trust (Dunes Trust research Committee Chair or Dunes Trust Chair)
Project Management	Dunes Trust Project Manager, appointed by Steering Committee	Overseeing each phase of the project Undertake reporting duties Contract management Developing MOU's for participants
Collation of information/ references	Dunes Trust approved contractor *Preliminary discussions held with Environmental Restoration Ltd*	Project Management, e.g. maintaining project contact database Refining criteria for literature/ reference collation Sourcing and tracking all literature Negotiating MOU requirements for literature providers
	Relevant Regional and	Providing relevant literature and/or links to

	District Council staff	freely accessible literature within existing database
	Department of Conservation	Providing relevant literature and/or links to freely accessible literature within existing database
	Dune Restoration Trust Trustees/ contacts	Providing relevant literature, providing feedback on criteria for inclusion of literature, providing feedback on criteria for tagging data
	Other organisations (e.g. CRI's, Universities etc)	Providing relevant literature and/or links to freely accessible literature within existing database
Literature/ reference processing	Dunes Trust approved contractors *Preliminary discussions held with Environmental Restoration Ltd, Scion Copy Centre and Steve Pawson (Scion, BUGZ, NZICN)*	Scan & process documentation using Optical Character Recognition scanning (OCR) Source and check quality of information digitised Enter citation information Tag with key words etc Transfer information to database developer Run tests once data is uploaded to database to check quality/accuracy Maintain and update the database (separate contract will be negotiated for this purpose)
Database development	Dunes Trust approved contractors *Preliminary discussions held with Egressive and Infoage*	Construct and test the database Host the database Carry out technical maintenance on the database
Design work	Dunes Trust approved contractors *Preliminary discussions held with Cerulean the existing Dunes Trust web design contractor*	Provide website technical platform information to the developers to enable integration with the database Provide design work for the database, i.e. the landing page, to align to existing website design, and the online user guide.
Extension/ Advertising	Dunes Trust Communications Steering Group	Launch and promote the database through the existing Dunes Trust networks and events including regularly published newsletters to members and project partners. Undertake a training workshop at the annual Dunes Trust Conference Develop a user guide for the database to be accessible from the Dunes Trust website.
Other	e.g. NZPCN	e.g. receive information relevant to their organisation e.g. species lists

4.1.6 User Requirements

The major use of this database will be to search literature and other information (e.g. maps) based on key words including subjects (such as coastal processes), species names, place names, beach type, beach name, etc. This is relevant for all our end-users, although potentially more important for those in management agencies and research institutes.

User's functional scope

The functional scope describes what the Dunes Trust reference database users will be able to do when they visit the database. The level of functionality depends upon the scope of the build and as this is reviewed over time the build may develop to include a higher level of functionality. The priority in the first instance is to provide a search mechanism for all users and an administrative ability to the Dunes Trust approved administrators.

All users (Coast Care groups/ public users/ management agency staff, CRI's etc)

- ability to carry out full text search for information related to topics such as coastal processes, dune ecology, restoration, weaving etc
- ability to search based on geographic location e.g. search for all information related to a region or site/beach; and
- ability to search for information related to specific species, e.g. pingao or spinifex.

Dunes Trust database administrators (in addition to the above functions)

- ability to 'bulk upload' information to the database that is efficient and cost-effective; and
- add to or edit the site including uploading and removing information and editing the search menus if required

There is also the technology available that would allow for additional levels of functionality where-by:

- approved users could upload information that is automatically digitised by the system. This may lessen the user requirements of Dunes Trust database administrators. This would require additional funding but provides an opportunity to spread the work load and maintenance of the database amongst a wider range of users, potentially making it more sustainable and functional; and
- approved users could comment on validity/relevance of references and to allow a system of peer review.

If this were undertaken, the following additional user functionality would be:

Dune Trust approved database user/provider

- ability to 'bulk upload' information to the database;
- upload information on an adhoc basis;
- receive a notification that the information had been uploaded and required 'proofing' and tagging; and
- enter comments into the system to effectively 'peer review' the documentation.

4.1.7 Relationship with other systems

As noted previously this database will provide links to other databases where relevant information is freely available. For example where there is a relevant report commissioned by the Northland Regional Council (NRC) sitting on the NRC website – the citation information and a live link to the report will be within the Dunes Trust database.

The database developer *Egressive* has indicated that if the system is built using modern open source software, the literature within the system will be able to be 'picked-up' on international search engines. The Dunes Trust website is currently built on the open source platform MySQL which will integrate with the system proposed by *Egressive* (see below) and *Infoage* (see quote Appendix 5).

4.1.8 Relationship with partners – achieving consensus, developing agreements

The Trust has existing relationships with many of the organisations who will be providing material for this project (e.g. councils and DOC) and who could be using this system. Where information is provided by these and other external organisations, a standard Memorandum of Understanding (MOU) shall be developed that sets out the roles and responsibilities of each party and the specific usage of that material, for example where there are any copy right issues. Materials will be provided in electronic and/or hard copy. The Dunes Trust will seek to gain the permission to remove bindings from publications for ease of scanning. Any requirements related to the need to rebind specific publications will be outlined in the above agreements.

4.1.9 Ownership and funding

It is proposed that the Dunes Trust will manage and own this project. The Dunes Trust is well respected in the area of coastal dune restoration and is seen as an independent body. The Trust was established in collaboration with management agencies, research institutes, industry and communities to facilitate information development and sharing to promote the restoration of coastal dunes. It is the only national body committed to the restoration and management of our sand dunes using indigenous plants to restore natural dune form and function.

The Trust has strong relationships and works closely with virtually every Coast Care group and managing agency (councils) involved in such work in the country. It has a nationwide membership and is governed by a Board of Trustees that represent the wide range of interests in the coastal dune

environment including well respected research scientists, industry, policy makers and implementers, iwi and community members.

4.1.10 Stewardship and maintenance

It is proposed that the Dunes Trust would have stewardship over the database and decisions about stewardship in the future would be undertaken by the Research Committee of the Dunes Trust.

Content Maintenance

It is proposed that the database be reviewed on an annual basis by the Dunes Trust Research Committee and the database administrator(s). This review will entail: assessing whether the user-needs have changed and/or how well they are being met; assessing whether the navigation or search functions need altering; managing the process to bulk upload any additional documentation; providing additional specifications for work to the database developer, e.g. additional linkages to other sites/databases, upgrade of functionality etc.; and fund raising for maintenance of the database for consecutive years based on the outcomes of the annual review.

Technical Maintenance

It is proposed that maintenance related to the technical platform of the database will be undertaken by the database developer (where the database is housed). The Dunes Trust Research Committee will have responsibility for providing specifications for alterations to the database to the developers. The developers will have responsibility for making these alterations and providing information to the Dunes Trust Research Committee about future technological opportunities and limitations that are relevant to the database.

4.1.11 Transferrable technology

This project will use modern Optical Character Recognition (OCR) that has already been utilised within existing TFBIS projects. Depending on the funding available to support this project, it will comprise a level of functionality that allows the system to automatically ORC uploaded documentation - the process of using this technology will be transferable to other TFBIS projects.

4.1.12 Technical platform

The technical platform we expect to use for this project will utilise open source development software that is proven within the national and international setting. The use of open source software ensures that the capital and ongoing costs are decreased by removing the burden of paying ongoing licensing fees. Open source software is being constantly updated by developers around the world to integrate with new technologies and software. We understand that this software is currently being utilised by other TFBIS projects (e.g. NZBRN).

The Project team contacted the information technology company *Egressive* as one of the options to provide database development and hosting services on the recommendation of Steve Pawson (Scion, Canterbury and Project Leader of previous/existing TFBIS projects). *Egressive* has over a decade commercial experience working with MySQL, PostgreSQL and other open source software.

Discussions with *Egressive* indicate that the technical platform(s) for this database are as presented in Table 3.

Table 3: Technical Platform for the Dunes Trust Literature/Reference Database

Web Framework	Ruby on Rails	Open source full-stack web application framework
Database	MySQL or PostgreSQL	MySQL is the most common standardised language used to access databases and is defined by the ISO SQL standard. the Dunes Trust website currently uses MySQL PostgreSQL is the database engine used by the NatureWatch site (the iNaturalist implementation being built for NZBRN)
Content Management System	Drupal	Drupal is a leading library of software with an estimated 7 million implementations worldwide (Engineindustries.com) It is module based, flexible and scalable
Web server/ search platform	Apache Solr	Fast powerful text search capabilities including geospatial functionality and database integration Written in Java – commonly used language

Note that *Infaoage* also specialises in using a range of open source software including MySQL and Apache.

The Dunes Trust recently launched new website uses MySQL and initial investigation indicates it will integrate well with this proposed technical platform.

Note this proposed technical platform will need to be reviewed as part of the developer's project analysis to be undertaken if the Dunes Trust is successful with funding of this project.

4.1.13 Extension and advertising

Extension and advertising for this project will be designed and undertaken by the Dunes Trust Communications Steering Committee. The database will be advertised through the existing Dunes Trust networks and events including regularly published newsletters to members and project

partners. Once the database is complete, a training workshop will be held at the subsequent Dunes Trust Annual Conference and the database will be available to use online at the Conference. A user guide for the database will be produced for the Dunes Trust website.

The database administrator will provide updates to that network on any new uploads and periodically enquire as to whether there are new documents that need to be uploaded.

4.1.14 Estimated Project Costs

The estimated costs for a project to develop a literature database for coastal dune ecosystems including implementation and ongoing maintenance costs are given in Table 4.

Table 4: Estimated Project Costs for a Literature Database

Project implementation	**Estimated costs**
Project Governance	$2,000 of expenses (note there is substantial in-kind labour from partner agencies and Dunes Trust Trustees not accounted for in this figure)
Project Management & Reporting - *Dunes Trust Project Manager*	$10,000
Document collation, scanning and processing – *Environmental Restoration Limited* in collaboration with the *Scion Copy Centre*	$33,000
Database construction and testing – *Developer to be appointed*	Estimated cost based on medium sized database base build by *Infoage* - $15,000-30,000* Estimated cost based in discussion with *Egressive* - $20,000-50,000 depending on final functionality requirements*
Design work – *Cerulean*	$ 3,000
Extension / Advertising – *Dunes Trust Communications Steering group and appointed media contractors*	$ 2,000
Estimated Total	**$100,000**
Ongoing maintenance costs	
Database hosting & ongoing technical maintenance	Monthly charge based on size of final database, estimated under $1,000 per month
Database administrator ongoing content maintenance	$1,600 (Monthly charge based on estimated 8 hours work per month after database is operational)

* Note these figures are a general indication of cost only. This scoping report provided the resources to carry out discussions with developers about database options, possible technical platforms and estimated costs for development. As such, if funding is secured to continue with this project, the project costs will need to be reviewed based on more detailed analysis required by the developers. One company noted that this analysis would cost $5,000 plus travel. This cost has been built into the estimated project costs above. A quote has been supplied by *Infoage*, see Appendix 5.

4.2 Project B: Coastal dune ecosystem monitoring database to store and report on community-based restoration activities

4.2.1 Rationale & Context

End-user consultation highlighted a need to provide a system to: store monitoring information specifically related to coastal dune restoration projects; provide this service on a nationwide basis; and in a way that is relevant and accessible to the Dunes Trust community of interest.

Consultation also highlighted the need to research and develop dune monitoring approaches and tools that can be applied consistently across the community of interest and on a nationwide basis.

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 management agencies and local community groups 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.

The following section provides an outline of the setup of the database component of a coastal sand dune monitoring system and the functionality required. Further information of a proposed monitoring database for coastal dune systems planned by the Dunes Trust is provided in Appendix 4.

4.2.2 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 a 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.

4.2.3 User Requirements to store and report on community-based restoration activities

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 a 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 digital 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, etc;
- ***Description of management and restoration activity –*** planting, monitoring natural regeneration, pest animal control, weed control, etc;
- ***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 such as:
    - 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;
    - Planting – design and layout, dates, re-measurements, survival, height, crown spread, plant vigour/health, etc;
    - Weed control – species, methods, frequency, follow up, etc;
    - Pest animal control – species counts, methods, trap line maps/GPS coordinates, etc;
    - Monitoring of natural regeneration – transect and plot design, permanent or temporary, frequency of measurement, methods, plot size, etc;
    - Sand dune infrastructure – signage, fencing, accessways, installation dates, maintenance, etc;
- ***Data entry and storage –*** by community and/or agency, direct onto website or via a 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.

Users' functional scope

The functional scope describes what the Dunes Trust Monitoring Database users will be able to do when they visit the site. The level of functionality depends upon the scope of the build and as this is reviewed over time the build may develop to include a higher level of functionality. The priority in

the first instance is to provide a mechanism where users can upload, manipulate and report on their information and have this verified/commented on by Dunes Trust approved administrators.

All users (most likely to include Coast Care groups, university students, management agency staff, environmental practitioners, etc.) require the following functionality:

- ability to define a project and upload information as listed above about that project;
- fill out forms that capture data in a standardised way;
- receive notice that the information has been successfully uploaded and sent to the moderator for verification before being visible/widely available on the site;
- search for other information related to that site;
- zoom in and out on a map to see where neighbouring projects are located;
- be able to search details on neighbouring projects; and
- able to download or print a series of features/information about their project to use in restoration plans/reporting, etc.

Dunes Trust Moderators (in addition to the above functions) require the following functionality:

- receive notification of information upload;
- verify the information that has been uploaded and set it to be available to the site;
- edit and/or remove/add information to the site; and
- provide feedback via the site to the developer about technical issues identified.

Dunes Trust Database Administrator (in addition to the above functions) will require the following functionality:

- ability to 'bulk upload' information to the database; and
- add to or edit the site including uploading and removing information and editing the search menus if required.

Technology is available to provide for additional functionality. This could include an interactive forum whereby the database users could partake in an interactive forum with the database moderator(s) and other forum participants to discuss their interpretation of results and projects. If funds were available to add this level of functionality, the additional functional scope could include:

All users

- able to put questions about their observations and results directly to the database moderator and/or other appointed forum participants.

Dunes Trust Moderator(s) and Administrator(s)

- able to enforce the rules of such as forum by e.g. notifying participants of their breaking rules and removing content; and
- able to respond to participants directly through the forum.

4.2.4 Other database systems

Currently there is no monitoring database system specifically designed to effectively store and report on coastal dune data and provide open access to this on a nationwide basis. There are a number of existing databases within management authorities and research institutes that hold coastal information and have the capacity to store community based restoration information, however these are largely 'in-house' databases that do not allow access to external users and often have privacy issues related to their content. In addition the information within these systems is largely relevant to a specific geographic location.

There is a range of existing databases/information systems, independent of management and research agencies that provide information on a nationwide basis, are largely open access (although some require a membership fee), provide for mixed audiences similar to those of the Dunes Trust, and offer some of the functionality required by Dunes Trust end-users. Preliminary investigations were carried out to: highlight opportunities for the Dunes Trust to integrate restoration information into an existing system; collaborate with other providers to build on or develop a new system; and/or utilise the technical platform of an existing system. Where possible, detailed discussions were held with individual managers/administrators of these systems. A summary of these discussions set out below and further information is available in Appendix 2.

Once the Dunes Trust comprehensive community-based monitoring system is further developed and the information being generated becomes more defined, further discussion on collaboration will be held with each of the parties below.

IRIS

The IRIS software/database system is being developed between six councils throughout New Zealand. The system is designed to hold biodiversity, land management, biosecurity information and all monitoring information and will provide a level of consistency for data management across the agencies. 'Self-service' modules will be developed in the future where consent holders and, potentially community groups such as dune restoration groups, could access parts of the database to upload/ download information specific to their needs. However, the database will not be accessible on a nationwide basis and there will be little to no capability for the Dunes Trust to tailor aspects of the system to specifically meet end-user needs.

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.

4.2.5 Proposed process and timeframes for monitoring database build

The Dunes Trust proposes that the monitoring database be developed once the comprehensive community-based monitoring system for restoration and management of coastal sand dunes has

been established. This will provide agencies and community groups with a consistent approach (including methodologies and tools) to monitoring dune restoration projects. This system is being developed over the next two years. This will clarify the types of data being generated, by which users, and therefore further define the user requirements for the database.

When it is timely to progress the development of the database, the Dunes Trust intends to collaborate with groups administering existing databases (such as the NZPCN, BUGZ, NZBRN/NatureWatch NZ) to investigate the development of a system that can support a wider range of end-user needs and/or is more cost effective to build and maintain. It is envisaged that the Dunes Trust will set up a steering committee to drive this process. Preliminary discussion with the TFBIS Fund Advisor about this opportunity indicated that it would be necessary to submit a separate project application for this purpose. The Dunes Trust will likely submit an application on that basis in 2013.

5. Conclusions & Recommendations

The Dunes Trust has the capacity to continue to develop and provide a 'hub' of information and interactive tools for those working in coastal dune restoration. End-user consultation undertaken as part of this scoping report identified a number of needs for coastal dune ecosystem information provision and some indication of priorities. Section 4 of this scoping report provides details of the two projects that are considered priority for developing a comprehensive database system for coastal dune ecosystems in New Zealand.

- Project A: Development of a literature/reference database to store and maintain coastal dune ecosystem information.
- Project B: Development of a community-based database to store monitoring data directly related to coastal dune restoration projects and activities.

Whilst both of these projects align with the criteria for the TFBIS programme, the Dunes Trust proposes that this is undertaken in a two-stage process involving separate applications for each project. The rationale for this includes:

- Both projects are substantial undertakings and will require significant resources to complete;
- Preliminary work has been undertaken for the literature/reference database and the Trust already has a reference database containing over 700 items;
- As a prerequisite Project A will provide opportunity to refine methods and outputs for second phase development of the monitoring database system;
- Consistent nationwide community-based monitoring guidelines are required first to provide data for a monitoring database; and
- There is scope to initiate a collaborative process to investigate options for developing a database that can effectively hold restoration monitoring information across a wider range of users.

Recommendations

To meet the user-needs of the community of interest and the requirements for provision of information systems relevant to New Zealand's coastal dune ecosystems, it is recommended that:

- The Dunes Trust submits a funding application to TFBIS for development of a literature/reference database for coastal dune ecosystems relevant to New Zealand (Project A, as defined in this report);
- Once the literature database system is completed, and methodologies refined and tested, the Dunes Trust submit a further application for developing the community monitoring database system (Project B as defined in this report);
- The Dunes Trust pursue other funding sources or programmes to develop those projects identified by end-users that do not align specifically with TFBIS programme criteria(Projects C & D listed in Section 4).

6. References

New Zealand Coastal Policy Statement 2010: Department of Conservation. Wellington. 28p.

Pawson, S. and Griffiths. 2010: Building the New Zealand Invertebrate Conservation Network (NZICN) TFBIS scoping report. Entomological Society of New Zealand. Unpublished.