NIWA
Taihoro Nukurangi

Review of threats to New Zealand's marine environment

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Authors/Contributors:

Susan Jane Baird, Brent Wood, Alison MacDiarmid, David Thompson

For any information regarding this report please contact:

Neville Ching
Contracts Manager

+64-4-386 0300
n.ching@niwa.co.nz

National Institute of Water & Atmospheric Research Ltd
301 Evans Bay Parade, Greta Point
Wellington 6021
Private Bag 14901, Kilbirnie
Wellington 6241
New Zealand

Phone +64-4-386 0300
Fax +64-4-386 0574

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Reviewed by

Julie Hall

Approved for release by

Barbara Hayden

Executive summary

The Department of Conservation is seeking to improve New Zealand's understanding of the pressures on, or threats to, the marine environment. This project sought to identify and summarise existing analyses on human-induced impacts to New Zealand marine species, habitats, or ecosystems as the first step of a wider objective to create a marine threats web catalogue that could be readily searched and updated.

To achieve this aim, a broad search was undertaken of the available New Zealand literature seeking information, reports, and papers from a wide range of New Zealand and overseas institutions that have conducted reviews, studies, or research into anthropogenic threats that may adversely affect or threaten New Zealand marine species, habitats, ecosystems, and trophic levels or guilds of organisms. Broad search terms (threat, pressure, environmental effect, impact, and risk) were used in combination with keywords for sixty-nine known human activities that operate globally, in catchments, or directly in the ocean and pose a threat to marine species, habitats, or ecosystems.

The search initially identified almost 400 references that report on direct or indirect threats to marine species or ecosystems and that operate in the New Zealand region. The references were categorised into broad threat categories: aquaculture, climate change, environment modification, commercial fishing, recreational and customary fishing, harvest, mining, non-indigenous species, pollution, renewable energy, and tourism. A "general" category included references discussing multiple human impacts, and two other categories (threat background, threat management) were used for information providing general background to understanding threats and the management of threats. Some papers covered several different types of threats under one broad threat heading, and others covered several of the broad threat categories. For some threats, relevant reports are available directly from websites: for example, the majority of the commercial fishing threat-related reports are accessible on the Ministry of Fisheries (now part of the Department of Primary Industries) and Department of Conservation websites. Thus, rather than include all these reports, the websites have been added as references; this action reduced the number of references to 236.

Many reference details were sourced from web-based searches of science journals. Other sources include report series published by local government bodies and government departments and ministries, university Masters and PhD student theses, industry reports, books of abstracts from conferences, and book chapters.

The references were further described by a summary of information relevant to: the scope of species, habitats, and ecosystems impacted by each threat; the spatial extent of each threat (i.e., whether local to a particular place, restricted to a particular habitat or widespread and general); the temporal extent of the threat (i.e., ranging from short-term of hours or days to more or less continuous over years or decades); the types of data or data sets used in the analyses; the methodology used to identify and determine severity of threat; the key findings of the analysis; and keywords. This provided the framework for the inclusion of each reference in a searchable web catalogue, implemented using the Bluenet MEST version of Geonetwork.

1 Background

Improving New Zealand's understanding of the pressures on, or threats to, the marine environment forms an integrated component of the Department of Conservation's (DOC) Marine Conservation Team's drive to achieve, through the PlanBlue strategic framework, the Department's vision in the marine context. This work supports this plan by providing sources of information relevant to human-induced threats to the marine environment for use in a searchable web-based catalogue.

The specific objectives of this review were to identify and summarise existing analyses on human-induced impacts to New Zealand marine species, habitats, or ecosystems, categorising each analysis in terms of:

- threats identified and/or described
- scope of species, habitats and ecosystems impacted
- spatial extent
- temporal extent
- datasets used in the analyses
- methodology used to identify and determine severity of threat
- key findings of the analysis

This final report summarises the extent of literature review conducted, including a list of databases searched, and the extent of material identified in the search and entered into the web catalogue.

2 Extent of literature review

2.1 Search terms

A broad search was made of the available literature seeking information, reports, and papers from a wide range of New Zealand and overseas institutions that may have conducted reviews, studies, or research into anthropogenic threats that may adversely affect or threaten New Zealand marine species, habitats, ecosystems, and trophic levels or guilds of organisms.

The search terms for threats were wide and inclusive and included key words such as threat, impact, pressure, effect, influence, force, risk, and hazard. These search terms were used in combination with sixty-nine human activities that operate globally, in catchments or directly in the ocean to that threaten marine species, habitats or ecosystems (Table 1). The list of New Zealand habitats used to help define the literature search is provided in Table 2, based on those identified by MacDiarmid et al. (2012)[1].

[1] MacDiarmid, A.; McKenzie, A.; Sturman, J.; Beaumont, J.; Mikaloff-Fletcher, S.; Dunne, J. (2012). Assessment of anthropogenic threats to New Zealand marine habitats. *New Zealand Aquatic Environment and Biodiversity Report No. 93.* 255 p.

Table 1: Threats to New Zealand marine habitats deriving from potentially hazardous human activities that were reviewed in this study. Note that some threats such as oil pollution, plastic pollution, and sewage derive from a mix of both land-based and marine-based activities (after MacDiarmid et al. 2012).

Threat/Impact/Pressure/Effect/Influence/Force/Risk/Hazard		
Marine-based threats		
Commercial fishing	**Engineering**	**Invasive species**
Bottom trawling	Sand/gravel extraction	Space occupiers, competitors
Midwater trawling	Dredging	Disease
Scallop or oyster dredging	Mining – surface suction	Predators
Trapping fish or crayfish	Mining – deep hole extraction	
Set netting	Mining – other methods	**Shipping**
Jigging	Dumping of dredge spoils	Animal strikes
Longlining	Coastal reclamation	Noise pollution
Purse-seining	Causeways	Ship grounding/sinking
Displacement of fishing activity	Pontoons	
	Piled wharves/sheds	**Ecotourism**
Recreational and customary fishing	Pile moorings/markers	Marine mammal/seabird watching
Trapping fish or crayfish	Seawalls	Diving
Paua gathering/diving		Reef trampling
Spear fishing		Noise
Set netting	**Pollution (at sea)**	Feeding wildlife
Line fishing	Oil or oil products	Vehicles
Seaweed gathering	Plastic	
Shellfish gathering	Sewage	
	Acoustic discharges/guns	**Other threats**
Aquaculture	Electromagnetic charges	Anchoring
Benthic accumulation of debris	Dumping of war ammunition	Algal blooms – toxic & massive
Decrease available primary production		Increased turbidity
Increase in habitat complexity	**Direct harvest**	Research activities
	Seabird; seaweed	
Land-based threats		**Global threats**
River inputs	**Pollution (in catchments)**	**Increasing greenhouse gases**
Decreased sediment loading	Oil or oil products	Increase in sea level
Increased sediment loading	Plastic	Increase in sea temperature
Decreased freshwater discharge	Sewage	Increase in intertidal temperature
Increased freshwater discharge	Heavy metals	Increase in UV radiation
Dampening of flows	Nitrogen & phosphorous	Ocean acidification
	Pesticides, including PCBs	Change in currents
Urbanisation, land clearance, tilling practices, leaching, erosion, forestry	Herbicides	Increased storminess
		Altered rainfall
		Increased stratification

Table 2: Marine habitats used to help define the literature search about threats to New Zealand's marine environment. The mean, or approximate mean, depth of the habitat below high water spring tide is also indicated (from MacDiarmid et al. 2012).

Habitat	Mean depth (m)	Habitat	Mean depth (m)
Harbour & Estuary		**Exposed coast**	
Salt marsh	0.0	Sandy beach	1.0
Mangrove forest	0.5	Cobble beach	1.0
Intertidal mud	1.0	Intertidal reef	1.0
Intertidal sand	1.0	Gravel/pebble/shell 2–9 m	405
Intertidal reef	1.0	Sand 2–9 m	405
Subtidal mud	5.0	Subtidal reef 2–9 m	405
Subtidal sand	5.0	Turfing algal reef	7.0
Subtidal reef	5.0	Kelp forest	10.0
Cockle bed	2.0	Biogenic calcareous reef	15.0
Pipi bed	2.0	Gravel/pebble/shell 10–29 m	19.5
Seagrass	3.0	Mud 10–29 m	19.5
		Sand 10–29 m	19.5
Sheltered coast		Subtidal reef 10–29 m	19.5
Sandy beach	1.0	Gravel/pebble/shell 30–200 m	115.0
Cobble beach	1.0	Mud 30–200 m	115.0
Intertidal reef	1.0	Sand 30–200 m	115.0
Gravel/pebble/shell 2–9 m	4.5	Subtidal reef 30–200 m	115.0
Mud 0–9 m	4.5		
Sand 2–9 m	4.5	**Slope habitat**	
Subtidal reef 2–9 m	4.5	Hard canyon	400.0
Kelp forest	10.0	Soft canyon	400.0
Gravel/pebble/shell 10–29 m	19.5	Gravel/pebble/shell 200–2000 m	1100.0
Mud 10–29 m	19.5	Mud 200–2000 m	1100.0
Sand 10–29 m	19.5	Sand 200–2000 m	1100.0
Subtidal reef 10–29 m	19.5	Reef 200–2000 m	1100.0
Fiord habitat		**Deep habitat**	
Inner fiord rockwall	50.0	Vent (hot & cold)	800.0
Inner fiord rockwall	50.0	Seamount < 2000 m	1000.0
Fiord sediment	100.0	Seamount > 2000 m	3500.0
Fiord water column	50.0	Soft abyssal 2000 m+	3500.0
		Hard abyssal 2000 m+	3500.0
Pelagic habitat		Trench	5000.0
Coastal water column inside 50 m contour	25.0		
Shelf water column from 50–200 m contour	125.0		
Slope water column in photic zone	50.0		
Slope water column below photic zone	1500.0		
Deep ocean water column in photic zone	50.0		
Deep ocean water column below photic zone	3000.0		

2.2 Databases and other sources consulted

Five databases were searched initially. These primarily identified journal papers and articles:

1. Web of Science (1990–2011)
2. Aquatic Sciences and Fisheries Abstracts (1971–2011)
3. Oceanic Abstracts (1981–2011)
4. Fish Fisheries & Aquatic Biodiversity Worldwide
5. NIWAcat [NIWA library catalogue]

Further searches were made, with emphasis on web search engines and catalogues such as the DOC library catalogue and Te Puna which gives access to many publicly-available reports and papers held by government departments, Crown Research Institutes, and universities. University libraries were searched for their collections of student theses. Where the information provided was no more than the thesis author and title, an interloan copy was obtained.

Other sources likely to hold reports or publications relevant to marine threats were searched or contacted for information not already captured. Many of the reports relevant to marine threats are available on both national and local government websites and can be identified through a search engine on each site. These searchable report facilities are continually being updated as new reports are completed, published, and made available. For instance, DOC, Ministry of Fisheries[2], and Ministry of Agriculture and Forestry (MAF)[2] have specific webpages on their websites that provide access to holdings on threatened species, effects of fishing on bycatch and target species, and invasive species respectively. Other relevant websites funded by national and local government bodies include those for the Parliamentary Commissioner for the Environment, NZ Government Aquaculture, Envirolink, and regional council sites, such as the Auckland Regional Council (now part of Auckland Council). Websites that provide ongoing information based on regular conferences (for example, New Zealand Marine Sciences and the International Fishers' Forum) are also referenced to provide access to up-to-date information. Because there was a limit in the amount of time available to complete this work, the inclusion of references to these websites, rather than attempting to include all the reports held on the websites, enabled us to provide links to several substantial sources of current literature that can be readily identified and accessed. However, we were able to include many references for the biosecurity reports completed by NIWA for MAF, as well as the link to further updates in the report series.

We also approached individuals likely to possess detailed knowledge about particular threats to New Zealand's marine environment for access to their own compilations of relevant papers and reports.

3 Extent of material identified

Initially almost 400 papers were identified through the search. Almost half of these are available through 17 webpages as individual reports that may or may not be part of report series that are continually being updated; thus, the most recently-published material is available through these searchable publication lists. Other than these reports, 219 are

[2] From July 2011, the Ministry of Fisheries became part of the Ministry of Agriculture and Forestry, and after 30 April 2012 this enlarged Ministry of Agriculture and Forestry will be part of the Department of Primary Industries.

included as references that report on direct or indirect threats to the New Zealand marine environment through human activities. Thus, the word “reference” applies to the relevant reports and webpages. All references were assigned to broad categories listed in Table 3. References reported on the impacts of human activities from the estuarine and coastal communities through to the deep ocean and from the benthic environment through the water column to surface waters, including higher marine predators such as protected species of seabird and marine mammal.

From both the journal sources and report series available on specific websites, most references concerned the effects of fishing, the introduction of non-indigenous species, environment modification, and tourism. Many references contain information pertinent to several threats within one broad threat category, and others are pertinent to more than one category.

Table 3: Number of references (for individual reports and websites) listed under each broad threat category and the activities and causes described for each threat. Note, a reference may be included in more than one category.

Broad threat categories	No. references	Notes
Aquaculture	20	Mussel, oyster and finfish farming, impact assessments, introduction of pest and diseases, resuspension, fouling of environment
Climate change	17	Ocean acidification, risk assessment
Commercial fishing	53	Fishing activities, environmental effects, risk assessment, development of indicators, estimation of incidental catch of protected species and bycatch fish, cephalopod, and invertebrates, target species stock assessment
Energy	7	Wave, turbines
Environment modification	72	Catchment, coastal, urbanisation, sedimentation, agriculture, power station discharge, dredging. Does not include monitoring of environment and yet to include regional council reports available online as pdfs
General	6	Variety of anthropogenic effects, including threat categories listed here
Harvest	11	Seabird harvest; shell collection; historical fishing/whaling/sealing
Mining	9	On land, seabed, sand
Non-indigenous species	73	Ballast, biofouling, introduced species, risk assessment
Pollution	36	Chemical, heavy metals, waste-water, storm-water, plastics
Recreational fishing	17	Recreational and customary fishing
Threat background	164	Added relevant information: experiments, reviews, and developments in understanding of marine ecosystem functioning: for example, functioning of soft sediment environment
Threat management	87	General threat assessment, marine reserves, mitigation, policy
Tourism	93	Ecotourism, diving, whale watching, human disturbance, vehicles, vessels, trampling

A “general” category includes less specific references and two further categories include papers relevant to understanding certain threats (“threat background”) and information about management policies, measures, and general methods for threat assessment relevant to the New Zealand marine environment (“threat management”). Many references are included in these categories because of the informative nature of the material contained in their reports.

The number of references available is not a good indication of the magnitude of the threat. For instance, the effects of increasing greenhouse gases, including ocean acidification, ranked the top threat to New Zealand marine ecosystems in a recent expert assessment (see MacDiarmid et al. 2012), yet the climate change category has few New Zealand-focussed references pertinent to this topic. Similarly, the threats from ecotourism were ranked very low by MacDiarmid et al. (2012), principally because the spatial impact was limited and the number of species affected was small, yet this category here has a large number of references available.

The referenced material comes from several broad information sources: science journals, unpublished student theses, conference papers, regional council, local and national government reports, international organisation reports, and books/chapters. The bulk of the easily accessible information came from science journals and local and national government reports. A variety of threats was covered by student theses which generally proved difficult to identify and source. The number of conference papers located on threats to New Zealand marine ecosystems may be only a fraction of what have been presented, but most are not available electronically. For example, the 2005 Annual Conference of New Zealand Marine Sciences Society, 4th International conference on Marine Bioinvasions, and NZ-US MARGINS Programme Meeting (NZ Marine Sciences Society 2005) reference contains over 160 pages of abstracts relating to science describing human impacts in the marine environment. Although the science in that reference is not fully described, the reference provides information on the nature and extent of the science completed or underway and gives the lead author’s contact details for further enquiry.

For some threat categories, there are series of reports that provide a wide spatial extent of knowledge of the threat impact. For example, in the “Non-indigenous species” category, the MAFBNZ technical reports on port surveillance provided a large source of comparable material for ports and harbours around New Zealand. Similarly, in the “Fishing” category, chapters of the online Ministry of Fisheries plenary reports provided measures of threat to fish, cephalopod, shellfish, and crustacean fisheries. The collated references include few confidential client reports undertaken by NIWA and other research providers; these can be difficult to identify and usually have restricted access. There appear to be few books or book chapters specifically about threats to New Zealand marine species, habitats, or ecosystems.

For some references, information about marine threats is stored by regional councils in paper format only and thus are not easily found or accessed. In some instances, research has been commissioned and completed but the reports remain confidential to the client.

4 Categorisation of information

The reports and publications were assessed for categorisation by:

- the type of threats,
- the scope of species,
- habitats and ecosystems impacted by each threat,
- the spatial extent of each threat (i.e., whether local to a particular place, restricted to a particular habitat or widespread and general),
- the temporal extent of the threat (i.e., ranging from short-term of hours or days to more or less continuous over years or decades),
- the types of data or data sets used in the analyses,
- the methodology used to identify and determine severity of threat,
- the key findings of the analysis, and
- keywords.

This provided the framework for the tabulated and referenced summaries for each of the seven points listed above and, ultimately, for their inclusion in the searchable web catalogue as the next step for this work. Note that a reference may be listed under more than one category.

The NIWA library-accessed internet searches provided an opportunity to search and download a wide variety of journals. For each reference record, the abstract of the paper or report was briefly summarised under the categories listed above. Two examples of the tabulated information, ready for loading into the web catalogue, are given below: one under the broad threat category of “Environment modification” and the other representing a report series (that includes material under several categories) on a searchable webpage (Tables 4 & 5).

5 Implementation

Geonetwork, a metadata catalogue application, met all the requirements for making this body of metadata available online. In particular, the Australian version of Geonetwork, Bluenet MEST, conformed best with the aim of this project.

A description of the catalogue development and implementation is provided in Appendix 1. The catalogue is accessed via a home/landing page provided on the DOC website. This page provides some introductory text to the catalogue and its use.

Table 4: Example of information summary for a record in the "Environment modification" category. The "Abstract" row includes information summarised from the paper.

Reference	Alfaro, A.C. (2010). Effects of mangrove removal on benthic communities and sediment characteristics at Mangawhai Harbour, northern New Zealand. *ICES Journal of Marine Science 67(6*): 1087–1104.
Abstract	This study investigated the effect of mangrove removal on the community ecology of mangrove stands and adjacent habitats within Mangawhai Estuary, northern New Zealand, between March 2004 and September 2006. The vegetation, benthic macrofauna, and sediments were sampled within habitats (marshgrass, mangrove stands, pneumatophore zones, sandflats, and channels) at a treatment site (mangroves removed) and two undisturbed sites, before and after mangrove-removal activities. THREATS IDENTIFIED AND/OR DESCRIBED: Mangrove spread and removal SCOPE OF SPECIES, HABITATS AND ECOSYSTEMS IMPACTED: Mangrove forest, associated macrofauna, sediments SPATIAL EXTENT OF THREAT STUDIED: Experimental study sites <1 ha TEMPORAL EXTENT OF THREAT STUDIED: 30 month study DATASETS USED IN THE ANALYSES: Private datasets on outcome of BACI experiment held by the author METHODOLOGY USED TO IDENTIFY AND DETERMINE SEVERITY OF THREAT: Experimental removal of mangroves using BACI design KEY FINDINGS OF THE ANALYSIS: Mangrove eradication was followed by immediate changes from a muddy to sandier environment, which favoured an overall increase in the abundance of crabs, snails, and bivalves.
Keywords	*Avicennia marina australasica*, benthic fauna, biodiversity, estuarine ecology, mangrove removal, sediment characteristics

Table 5: Example for information summary for a record that represents a report series on a website.

Reference	Aquatic Environment and Biodiversity Research (AEBR) report series - Ministry of Agriculture and Forestry [including Fisheries]
Abstract	This series continues the Marine Biodiversity Biosecurity Report series which ended with MBBR No.7 in February 2005. The series is the reporting framework for the aquatic environment research commissioned by MAF that relates to the environmental effects of fishing and is presented to a stakeholders working group (the Aquatic Environment Working Group). The areas of research covered by these reports include: • bycatch of fish (including sharks), squids, and invertebrates • bycatch of protected species – seabirds, marine mammals, marine reptiles, and corals • the effects of fishing on the seafloor • the effects of land modification on the marine environment • development of management standards (for example, ecological indicators, risk assessment) The reports are all available at: http://fs.fish.govt.nz through the link “Fisheries management/Research” then “research reports” to get to the Documents Library page. This site can be searched (filtered) by the topic of interest and the acronym AEBR.
Keywords	seabirds, turtles, coral, sharks, marine mammals, protected species, coastal modification, risk assessment, ecological indicators, bycatch, fishing effects, land modification, seamounts

6 Acknowledgements

We thank Hannah Russell of the NIWA library for the literature search of the search engines available through NIWA, and Shona MacKay of the Department of Conservation Head Office Library for advice, access to the DOC library catalogue, and use of the library. We also thank Sarah Hucker (DOC) for her very helpful discussions about coastal threats information sources.

For the implementation of the web catalogue, we thank: the NIWA Systems Development Team for the set-up and maintenance of the web catalogue; New Zealand Geospatial Office for support and assistance in Geonetwork deployment and interoperability; and Silverstripe for technical assistance with Geoportal interoperability. We also thank the developers of the Geonetwork application for provision of a free and robust application.

This work was completed under DOC contract No. 4285 and No. 4327.

Appendix 1: Implementation of the NZ Marine Impacts Gateway metadata catalogue

The New Zealand National Institute of Water and Atmospheric Research (NIWA) was commissioned by the Department of Conservation (DOC) to implement a web-based threat catalogue, as a means to improve the accessibility of marine threats information.

Requirements

1. Develop a metadata schema and profile that:
   - provides fields that allowed all relevant tabulated outputs from the review to be stored
   - is consistent with appropriate New Zealand government standards and guidelines
   - allows full interoperability with planned Government and Departmental computing systems
   - be fully transferable to Departmental servers
   - contain a user-friendly keyword search facility

2. Fully populate the catalogue with the content from the marine threats review.

3. Prepare a report detailing the technical specifications and provide any recommendations relevant to the future operability of the catalogue. [This appendix represents this output.]

Methods

Tool selection

NIWA has deployed several metadata catalogues over recent years and has built up a level of experience in this area. A benefit from this was that DOC and NIWA agreed to follow an existing example of a suitable toolset and appropriate standards. Previous evaluations by NIWA confirmed Geonetwork as a suitable tool for metadata catalogues.

The European and Mediterranean Water Information System (EMWIS) undertook a review of metadata catalogue tools (Grellet 2009[3]). The summary of this report states: “From the requirement matrix analysis process, Geonetwork Open Source was proposed as the most suitable tool for the next steps of this project. This tool is fulfilling all mandatory requirements plus some optional ones. It has an ever growing community and involvement in metadata catalog projects all around the world.”

The US Federal Geographic Data Committee (FGDC) undertook a review of ISO19115 compliant metadata editors, available online at http://www.fgdc.gov/metadata/iso-metadata-editor-review. Although this did not make a formal recommendation, in the three domains considered, Operating Environment, Metadata Development and Metadata Management, Geonetwork (v2.4.1) scored highest.

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[3] Grellet, S. (2009). MED-WIS project “Preparation of a metadata catalogue of water information sources.” Task 1 - Review of existing tools. Available online at http://www.emwis.net/documents/meetings/fol725266/nfpco2009/documents/WP1_V1.1.pdf/download/1/WP1_V1.2.pdf

These reviews, as well as NIWA's experience, suggested that Geonetwork was a robust, flexible and powerful metadata management tool with a low risk of failure in this instance.

The main functionality provided by the Geonetwork application includes:

- Immediate search access to local and distributed geospatial catalogues
- Up- and downloading of data, graphics, documents, pdf files and any other content type
- An interactive Web Map Viewer to combine Web Map Services from distributed servers around the world
- Online editing of metadata with a powerful template system
- Scheduled harvesting and synchronization of metadata between distributed catalogs
- Support for OGC-CSW 2.0.2 ISO Profile, OAI-PMH, Z39.50 protocols
- Fine-grained access control with group and user management
- Multilingual user interface

Metadata standards

When implementing previous catalogues, NIWA had discussed relevant standards and appropriate profiles with Land Information New Zealand (LINZ) and the New Zealand Geospatial Office (NZGO). The profile needed to be compliant with the ISO 19115 and ISO 19139 standards. The most appropriate profile based on this standard, with a focus on the marine dataset space, rather than a terrestrial one, is the Australian Marine Communities Profile (MCP) (Reed 2008[4]). Bluenet MEST, an enhanced version of Geonetwork developed jointly by CSIRO and the University of Tasmania, comes with full support for the MCP profile, and was selected as the most suitable Geonetwork platform to use for this catalogue.

Initial implementation

An initial installation of Bluenet MEST was deployed by NIWA and demonstrated to appropriate DOC staff to assess fitness for purpose. The ISO19115 standard specifies a rich and complex metadataset, and the option of including a more user friendly third-party search interface was discussed, but was not required. The system met all the user needs, although some branding and small customisations were made.

Initial data entry

As a result of previous experience with such catalogues, NIWA has appointed a Metadata Curator, a role responsible for carrying out metadata entry of the outputs from the current search and their validation, distinct from the system and software administration role provided by IT/IS support staff. NIWA's metadata curator was responsible for entering the metadata records from the Marine Threats Review with the assistance of the IT/IS staff for administration and configuration tasks.

4 Reed, G. (2008). Marine Community Profile of ISO 19115.Version 1.4.Australian Ocean Data Centre, 2008. Available online at http://www.aodc.gov.au/files/MarineCommunityProfilev1.4.pdf

Specifications

Version: BlueNetMEST version 1.4.6, generally consistent with Geonetwork version 2.5.

Server details: Separate Geonetwork and database servers are deployed as virtual machines (VMs) at NIWA. The Geonetwork server is configured with 4Gb memory and 12Gb disk, the database server with 1.5Gb memory and 100Gb storage. Both are running Suse Linux Enterprise Server, version 11, Geonetwork is run under Apache Tomcat. The underlying database is Postgres, version 8.3.

This configuration is supporting several separate, but concurrent Geonetwork catalogues.

Interoperability

DOC currently manages internal metadata using ESRI's Geoportal. This is a comparable application to Geonetwork, particularly appropriate for organisations with an investment in ESRI's suite of GIS related applications. It is important not just for this project, but for the development of a national federated network of metadata catalogues, that the various tools used to implement these catalogues are robustly interoperable.

When Geoportal was released, both it and Geonetwork supported the Open Geospatial standard for metadata catalogue data sharing, the Catalog Service for the Web (CSW). [This somewhat unwieldy name was used because the acronym WCS (for Web Catalog Service) was already taken for the Web Coverage Service.] Idiosyncrasies in the implementation and CSW dialects between the two packages cause problems in reliable interoperability, and NIWA, DOC, NZGO, Silverstripe and others have worked with the Bluenet MEST developers to address this. Geonetwork is currently able to harvest records from ESRI Geoportal, and vice versa.

Resources

As an Open Source tool, Geonetwork is freely available for download from the internet, and can be installed and started relatively easily. However, it is a flexible and powerful application, supporting various underlying databases and an embedded web map client. The customisation and configuration of Geonetwork requires considerable expertise, despite the high level of documentation available. This is not a downside of this particular tool, it is an issue common to all such applications. Although it is a FOSS (Free and Open Source Software) application, originally funded and developed by the United Nations, it has proved pervasive and successful enough that commercial software companies provide support for installation, deployment, and ongoing operation.

However, as an Open Source application, all the information necessary for a successful deployment of Geonetwork is freely available online. These take various forms, mostly accessible from the Geonetwork home page, but a web search for “geonetwork support” or “geonetworkhowto” will return links to online information provided by a wide range of Geonetwork users.

A list of useful resources is provided below.

- Full notes and a downloadable CD from a 2010 Geonetwork workshop run by OSGEO "GeoNetwork for dummies, or how to setup an SDI in 3 hours": http://2010.foss4g.org/workshop12.php
- Geonetwork training materials from the International Waters Learning Exchange (IW:LEARN) provides exercises on simple data entry and administration tasks: http://iwlearn.net/abt_iwlearn/events/tunisia-geonetwork-workshop/geonetwork-training-materials
- The Geonetwork home page provides a wealth of information, downloadable documentation, user and developer guides, public wiki, companies providing professional support, etc.: http://geonetwork-opensource.org/
- Any standard Geonetwork installation automatically provides full documentation (Help). This covers administration and casual user instructions, and is a large document to work through, but generally it describes everything most users ever need to know. For a printed copy, a PDF version of the official documentation can be downloaded from: http://geonetwork-opensource.org/docs.html, as well as other useful documents.
- The version of Geonetwork used is Bluenet MEST, developed at the University of Tasmania, provides online support as well as the original Geonetwork support. This is found at: http://www.bluenet.org.au/index.html, and detailed online documentation is found the help page at: http://www.bluenet.org.au/MEST_help.html
- As a project of OSGEO, further information is available at http://www.osgeo.org/geonetwork, including both developer and user mailing lists providing community support. The Australia/New Zealand Chapter has a local mailing list and is described here: http://wiki.osgeo.org/wiki/Aust-NZ
- The Australian Geonetwork User Group is supported by the Australian Government Office of Spatial Data Management: http://www.osdm.gov.au/Metadata/GeoNetwork/Resources/default.aspx