

### **Integrating and reusing marine spatial data** to support a sustainable blue economy in New Zealand

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### Marine Management in New Zealand







### **NZ Marine Economy**







### **Rich in biodiversity**







### **Risk and threats**



Follow the kuku story through the issues

identified in the report.

Issue 2: Our activities on land are polluting our marine environment

Beach litter in New Zealand



Up to 200x Increase of average annual sedimentation rates and variability in Waikato since Europeans arrived.

Issue 3: Our activities at sea are affecting the marine environment

### >99%

The amount of New Zealand imports and exports transported by sea.

1.00

100

### 335,812 km<sup>2</sup> The total trawled area in

The total trawled area deepwater fisheries (1990–2016).



### NZ Ocean management system

### Fisheries / Biosecurity Minerals & Conservation Shipping Resource Other & Climate Aquaculture Mining Management Conservation Act 1987 Change Heritage New Fisheries Act 1996 Biosecurity Act 1993 Maritime Transport Crown Minerals Act Marine Reserves Act Resource Zealand Pouhere 1971 Management Act Act 1994 1991 Taonga Treaty of Waitangi Climate Change 1991 Act 2014 (Fisheries Claims) Response Act 2002 Wildlife Act 1953 **Exclusive Economic Continental Shelf Act** 1964 Zone and **Exclusive Economic** Marine and Coastal Settlement Act 1992 Marine Mammals Zone and **Continental Shelf** Area (Takutai Māori Commercial Protection Act 1978 (Environmental Continental Shelf Moana) Effects) (Environmental Act 2011 Aquaculture Claims Effects) Hauraki Gulf Marine Act 2012 Settlement Act 2004 Park Act 2000 Act 2012 Submarine Cables and Pipelines Māori Fisheries Act Fiordland (Te Moana Protection Act 1996 2004 o Atawhenua) Marine Management **Exclusive Economic** Fisheries (Quota Act 2005 Zone and Operations **Continental Shelf** Validation) Sugar Loaf Islands (Environmental Act 1997 Marine Protected Effects) Area Act 1991 Act 2012 Kaikōura (Te Tai o Marokura) Marine Management Act 2014





### **Integrated decision making**









# Marine Geospatial Information







### **Collect once, use many times**







# NZ MGI Working Group





### **Findable and Accessible**

✓ Search

Relevance

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Order by:



Q Search for website content

### 376 datasets found for "marine geospatial"

Greater Wellington Regional Council Marine Geospatial Data Inventory Greater Wellington Regional Council

This data inventory is a list of datasets with metadata that describes each dataset's contents, publisher, contact point, licensing, open status, temporal and spatial details....

CSV

©OpenStreetMap, ©CARTO

### **T** Organisations

Can't find it?

+

-

Filter by location

**Request a dataset** 

Clear

1

Northland Regional ... (77) Ministry for Primar... (62) Greater Wellington ... (58) Environment Canterbury (52)

National Institute ... (44)



### MGI Portals

The NZ MGI Data Portal study was undertaken to

- 1. support data users in finding, accessing and reusing NZ MGI
- 2. encourage data custodians to share the MGI they hold

### Te Kete Körero a Te Takutai Moana 🖗

- Purpose: assists applicants and decision makers in the context of the Marine and Coastal Area (Takutai Moana) Act 2011
- Functionality: discovery, viewing and access to MGI including permits/licenses to occupy marine space; marae: LINZ parcels: DDC data: and other MGI

### LAWA 🖓

- · Purpose: makes environment data collected by regional and unitary councils, MfE and Cawthron Institute freely available to the public
- . Functionality: discovery, viewing and access to environmental data (i.e. land, air and water related data)

### Ira Moana 🖓

- Purpose: delivers a searchable database for genetic data from natural populations of wild organisms
- Functionality: discovery, viewing and access to genetic data and other information about biological samples

### New Zealand Petroleum Basin Explorer

- Purpose: displays data published by GNS, NOAA, NZP&M, NIWA, LINZ, DOC, and other organisations
- Functionality: discovery, viewing and access to bathymetric, geophysical and sea level data

### LINZ Data Service (LDS)

- · Purpose: provides free online access to LINZ's most up-to-date land and seabed data
- · Functionality: discovery, viewing and access to hydrographic and topographic data

### IHO Data Centre for Digital Bathymetry &

- · Purpose: displays the locations of seafloor data collected through international campaigns.
- Functionality: discovery, viewing and access to bathymetric data

### NZODN 🖓

- · Purpose: access point for marine data published by NZ organisations (e.g. NIWA, Central government agencies, Cawthron Institute, councils, universities, etc.)
- Functionality: discovery, viewing and access to marine biological, geophysical, bathymetric and oceanographic data.



Environment Southland's marine data inventory Environment Southland List of publicly available marine-related datasets from Environment Southland.

### CSV

MPI Marine Geospatial Inventory Ministry for Primary Industries

List of available marine geospatial datasets from the Ministry for Primary Industries/Fisheries New Zealand.

### **Interoperable and Reusable**

### NZ MGI Working Group

### NZ Marine Geospatial Information Metadata Guidance

The metadata guideline provides recommendations on the content, structure and formats of metadata describing marine geospatial datasets in New Zealand to ensure consistency in how marine geospatial data is described, managed, published and therefore to facilitate its discovery.

### Structure, field names and contents

The following table describes the field name and field content conventions a data provider shall use when creating, managing and providing metadata for a dataset.

- For simplicity, a 'flat' structure is followed (as opposed to a hierarchical approach). This
  allows implementation as a simple tabular format.
- Some of the fields only require 'Text' entry and it is left to the data provider to determine the most useful content according to the guidelines in column 'Description / Guidelines for field contents'. No field size limit is prescribed.
- For some of the fields, content best practices are recommended. Using these content best practices will enable easy discovery / enterprise search across published data sources. Guidance for common formats (e.g. use of ISO8601 datetime string for Temporal Coverage) is provided in a separate table below.
- This guideline specifies minimum mandatory fields, and as a best practice a data
  provider shall aim to provide as many metadata fields as possible and useful (to
  comprehensively describe the dataset). A data provider can add more data fields for
  this purpose, and, preferably these additional fields shall be based on existing
  standards, such as Ecological Markup Language (EML), Dublin Core, ISO19115 or other
  relevant published standards.

### Relationship to relevant standards

This guideline / best practice shall be consistent with existing metadata standards, and a range of relevant (international) standards that are already heavily used are referred to here, and equivalent fields / structures for these standards are listed.

- Ecological Markup Language (EML), as used in GBIF / OBIS for describing ecological datasets <u>https://eml.ecoinformatics.org</u>
- ISO19115-3 International Standard provided through the International Standards Organisation (ISO) for 'Geographic information — Metadata' <u>https://www.iso.org/standard/32579.html</u>
- The Dublin Core<sup>™</sup> Metadata Element Set is a vocabulary of fifteen properties for use in resource description maintained by the Dublin Core<sup>™</sup> Metadata Initiative (DCMI) <u>https://www.dublincore.org/</u>

### Use of vocabularies

Use of vocabularies is important to enable consistent search and discovery across published data sources. However, mandated vocabularies limit flexibility in describing specifics / details



### Marine Geospatial Information Themes

Categorising marine geospatial information in a consistent way has many benefits, including:

- supporting better data management practices,
- facilitating discovery, access, publication and reuse of information, internally and externally,
- improving data interoperability.

The categories recommended in this document aim of provide consistency in the NZ context and support the development of a NZ National MGI Inventory. The categories draw on input from international initiatives (i.e. IHO MSDI WG, AusSeabed, Australian Ocean Data Network) and the NZ MGI community through the NZMGI Working Group.

Please note: keywords/tags are not intended to be exhaustive nor exclusive to the themes and data types, these are examples.

### Administrative areas and boundaries

for data related to marine management and human usage

| Data types                                | Examples of keywords / tags   |
|---|---|
| Maritime jurisdictions                    | contiguous zone, exclusive economic zone, EEZ, continental<br>shelf, high sea; maritime governance; jurisdictional<br>boundaries; territorial sea   |
| Marine conservation areas                 | protected areas; habitat classification; Marine Protected<br>Areas <sup>1</sup> ; marine mammal sanctuaries; reserves; marine<br>conservation; restored areas; conservancy; marine parks;<br>benthic protection areas |
| Regulatory use<br>restrictions            | military areas; defence operations; energy exploration areas;<br>permit boundaries; harbour limits; dredged areas; activity<br>management areas; monitoring areas   |
| Fishing/aquaculture<br>areas              | marine farms; fishery zones; fisheries; aquaculture; seaweed<br>harvesting; fish farm; quota management areas; trawl<br>footprint   |
| Mining<br>extraction/exploration<br>areas | boulder exploration; drilling areas; exploration zones;<br>extraction areas   |

### MGI case study library

See how MGI can be used to inform important decision-making and support our communities.

- Case study 1 <u>Habitat mapping Queen Charlotte Sound / Tõtaranui and Tory Channel / Kura Te Au</u> 2018 (PDF 8MB)
- Case study 2 Impact of earthquake on marine ecosystems Kaikoura 2016 (PDF 7MB)

Last Updated: 5 August 2021



https://www.linz.govt.nz/sea/ma rine-geospatial-information

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-protectedareas/mpa-policy-and-implementation-plan.pdf



<sup>&</sup>lt;sup>1</sup> as defined in the MPA Policy and Implementation Plan 2005

### **Communication and Collaboration**









### **Enable informed & connected decisions**









### Joining Land and Sea (JLAS)















### **Tidal Model**







## **Improved Tidal Model**



### 2000 – 32,000 nodes

2021 – 3,500,000 nodes





### **Gridded Tidal Surfaces**

| <b>HAT</b> : Highest Astronomical Tide          | LAT: Lowest Astronomical Tide                  |
|---|--|
| MHWS-10: Upper 10 percentile of all high waters | MLWS-10: Lower 10 percentile of all low waters |
| MHWS: Mean High Water Springs                   | MLWS: Mean Low Water Springs                   |
| MHW: Mean High Water                            | MLW: Mean Low Water                            |
| MHWN: Mean High Water Neaps                     | MLWN: Mean Low Water Neaps                     |
| MSL: Mean Sea Level                             |  |





### **Coastal Link Sites**







## **Algorithm development**



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### New Zealand Vertical Datum Conversions

Use this form to convert heights between different vertical datums used in New Zealand. See <u>instructions for carrying out height conversions</u> for more information.

If you want convert coordinates between other datums, projections and height systems used in New Zealand use the coordinate conversion form.

### Input height system

New Zealand Vertical Datum 2016

Select the height coordinate to enter - none, ellipsoidal, or an orthometric system. Note: Ellipsoidal heights are in terms of the ellipsoid of the input coordinate system.

### Output height system

New Zealand Vertical Datum 2016

Select the height coordinate to calculate - none, ellipsoidal, an orthometric height coordinate, or geoid heights. Note: The geoid height option calculates the height of the geoid at the point - not the height of the point above the geoid. To get the height of the point above the geoid you must pick an orthometric height system (eg New Zealand Vertical Datum 2016). Ellipsoidal and geoid heights are in terms of the ellipsoid of the output coordinate system.





# Thank you!

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