Title	Solitary Islands Marine Park (Commonwealth) marine ecosystems, substrates and geomorphology

Abstract

Marine ecosystems, substrates and geomorphic features have been classified using multibeam echosounder and marine lidar data for the Commonwealth Solitar Islands Marine Park (SIMP). This package contains three datasets, including: 'marine ecosystems and substrates', which defines reef and sediment areas delineat depth intervals (10 m increments); 'marine geomorphology', which defines seabed landforms; and 'bathymetry sources', which outlines the source coverages of t bathymetric mosaic. A bathymetry mosaic was generated using data sourced from the NSW DCCEEW bathymetry mosaic (NSW DCCEEW, 2023), updated with mu echosounder data collected within SIMP in 2023. Seabed 'landforms' were derived from the bathymetry mosaic using the Seabed Landforms Classification Toolbo (Linklater et al. 2023), which characterises seabed morphology to classify features as 'reefs', 'peaks', 'scarps', 'plains' and 'depressions and channels'. Landform were subsequently grouped into hard and soft substrate features and labelled to conform to the NESP Natural Values Common Language (Hayes et al. 2021) and Seamap substrate classification scheme (Butler et al. 2017).

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References:

Butler, C., Lucieer, V., Walsh, P., Flukes, E. and Johnson, C. (2017). Seamap Australia [Version 1.0] the development of a national benthic marine classification sch the Australian continental shelf. Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Australia, https://seamapaustralia.org/wp-content/uploads/2017/11/Seamap_Australia_Version1_2017.pdf.

Hayes, K. R., Dunstan, P., Woolley, S., Barrett, N., Howe, S. A., Samson, C. R., Bowling, R., Ryan, M. P., Foster, S., Monk, J., Peel, D., Hosack, G. R., Francis, S. O. (20 Designing a targeted monitoring program to support evidence based management of Australian Marine Parks: A pilot on the South-East Marine Parks Network. Re Parks Australia and the National Environmental Science Program, Marine Biodiversity Hub. Parks Australia, University of Tasmanian and CSIRO, Hobart, Australia, https://www.nespmarine.edu.au/system/files/Hayes%20et%20al_SS2_M8_D7_M4_Designing%20a%20targeted%20monitoring%20program%20to%20support%20e based%20management%20of%20AMPs.pdf.

Linklater, M, Morris, B.D. and Hanslow, D.J. (2023). Classification of seabed landforms on continental and island shelves. Frontiers of Marine Science, 10, https://doi.org/10.3389/fmars.2023.1258556.

NSW Department of Climate Change, Energy, the Environment and Water (2023). NSW bathymetry sourced from multibeam and marine lidar surveys, https://datasets.seed.nsw.gov.au/dataset/nsw-bathymetry-sourced-from-multibeam-and-marine-lidar-surveys.

Resource locator

Data Quality Statement	Name: Data Quality Statement Protocol: WWW:DOWNLOAD-1.0-http--download Description: Data quality statement for Solitary Islands Marine Park (Commonwealth) marine ecosystems, substrates and geomorphology Function: download
Solitary Islands Marine Park (Commonwealth) marine ecosystems and substrates	Name: Solitary Islands Marine Park (Commonwealth) marine ecosystems and substrates Protocol: WWW:DOWNLOAD-1.0-http--download Description: Classified marine 'ecosystems' (based on Hayes et al., 2021) and 'substrates' (based on Butler et al., 2017) for the Commonwealth Solitary Islands Marine Park an waters extending seaward. Butler, C., Lucieer, V., Walsh, P., Flukes, E. and Johnson, C. (2017). Seamap Australia [Version 1.0] the development of a national benthic marine classification sch the Australian continental shelf. Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Australia. Hayes, K. R., Dunstan, P., Woolley, S., Barrett Howe, S. A., Samson, C. R., Bowling, R., Ryan, M. P., Foster, S., Monk, J., Peel, D., Hosack, G. R., Francis, S. O. (2021). Designing a targeted monitoring program to evidence based management of Australian Marine Parks: A pilot on the South-East Marine Parks Network. Report to Parks Australia and the National Environment Science Program, Marine Biodiversity Hub. Parks Australia, University of Tasmanian and CSIRO, Hobart, Australia Function: download
Solitary Islands Marine Park (Commonwealth) marine geomorphology	Name: Solitary Islands Marine Park (Commonwealth) marine geomorphology Protocol: WWW:DOWNLOAD-1.0-http--download Description: Classified seabed landforms (based on Linklater et al., 2023) for the Commonwealth Solitary Islands Marine Park and waters extending seaward. Linklater, M, Morris, B.D. and Hanslow, D.J. (2023) Classification of seabed landforms on continental and island shelves. Frontiers of Marine Science, 10, https://doi.org/10.3389/fmars.2023.1258556. Function: download
Solitary Islands Marine Park (Commonwealth) bathymetry coverage	Name: Solitary Islands Marine Park (Commonwealth) bathymetry coverage Protocol: WWW:DOWNLOAD-1.0-http--download Description: Source bathymetry data coverages for classified ecosystems, substrates and geomorphology (landforms) for Commonwealth Solitary Islands Marine Park and wa extending seaward. Function: download

Unique resource identifier

Code	f0e83f61-3790-4707-8dfe-2e505fbf3fd3

Presentation form	Map digital
Edition	1
Dataset language	English

Metadata standard

Name	ISO 19115
Edition	2016

Dataset URI	https://datasets.seed.nsw.gov.au/dataset/f0e83f61-3790-4707-8dfe-2e505fbf3fd3
Purpose	Coastal and marine management and research
Status	Completed

Spatial representation

Type	vector

Spatial reference system

Code identifying the spatial reference system	4283

Spatial resolution	5 m

Topic category	

Keyword set	
keyword value	MARINE
	MARINE-Coasts
	MARINE-Geology-and-Geophysics
	MARINE-Reefs
	PHOTOGRAPHY-AND-IMAGERY-Remote-Sensing
	GEOSCIENCES
	GEOSCIENCES-Geomorphology
	ECOLOGY-Ecosystem
	ECOLOGY-Habitat
	ECOLOGY-Landscape
Originating controlled vocabulary	
Title	ANZLIC Search Words
Reference date	2008-05-16

Geographic location	
West bounding longitude	153.13
East bounding longitude	153.46
North bounding latitude	-30.46
South bounding latitude	-29.66
NSW Place Name	Solitary Islands Marine Park (Commonwealth)

Vertical extent information	
Minimum value	-100
Maximum value	2228
Coordinate reference system	
Authority code	urn:ogc:def:cs:EPSG::
Code identifying the coordinate reference system	5711

Temporal extent	
Begin position	2022-01-09
End position	N/A

Dataset reference date	

Resource maintenance	
Maintenance and update frequency	As needed
Contact info	
Contact position	Data Broker
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Responsible party role	pointOfContact

Lineage	A bathymetry mosaic (5 m cell size) was generated for all areas beyond 3 nm (Commonwealth Waters) mapped with multibeam echosounder and marine lidar by NSW DCCEEW. Bathymetry data collected around SIMP between September 2022 and September 2023 were mosaicked ('Mosaic to New Raster') in ArcGIS 10.8 (ESRI) with the NSW bathymetry mosaic dataset (NSW DCCEEW, 2023), with multibeam surveys conducted in 2023 as the highest priority. The Seabed Landforms Classification Toolbox (Linklater et al. 2023) was used in ArcGIS (ESRI) to prepare the mosaic and perform the 'landforms' classification. The bathymetry mosaic was first smoothed to reduce speckled noise from the input mosaic ('Smooth DEM' tool with 3 iterations). Terrain variables of slope, ruggedness, finescale bathymetric position index (BPI, 27 cell radius) and broadscale BPI (150 cell radius) were derived using the Seabed Landforms Classification Toolbox and a 'surface elements' classification was performed using default settings (rugg = 0.0005; finescale BPI 27 cell radius = -100, 0, 100; broadscale BPI 150 cell radius = -100, 0, 100; slope = 10 degrees). Preliminary landforms were generated (ruggedness noise = 0.0003), and manually reviewed and edited to produce the resulting landform classification. Manual edits included the removal of inferred soft sediment 'banks' (updating 'reefs/banks' class to 'reefs' only) and additional editing of 'depressions and channels' within reef outcrops (outlined as 'optional edits' in Linklater et al. 2023). The resulting landforms classification defines features including 'reefs' (rugose outcrops), 'peaks' (uppermost parks of rugose outcrops), 'scarps' (reef areas > 10 degrees slope), 'plains' (flat, smooth areas), 'depressions and channels rugose' (low, rugose areas within reef outcrops) and 'depressions and channels smooth' (low, smooth areas within reef outcrops). The landform classification represents the 'Geomorphology' classification shapefile. To produce the 'Ecosystems_Substrates' classification shapefile, depth intervals were generated from the bathymetry mosaic at 10 m increments using the 'Depth intervals' tool in the Seabed Landforms Classification Toolbox, and landform classes were relabelled to conform to the NESP Natural Values Common Language (NVCL) terms (Hayes et al. 2021) and Seamap Australia Substrate Classification (Butler et al. 2017). The NVCL terms were applied at the 'Ecosystem Complex' ('EcoComplex' attribute field) and 'Ecosystem' ('Ecosystem' attribute field') levels. The Seamap Australia Substrate Classification was applied using Level 1 terms ('Substr_L1' attribute field). The resulting 'Ecosystems_Substrates' classification has not been validated by ground-truthing data. To create the 'Ecosystems_Substrates' classification, landforms features 'reefs', 'peaks', 'scarps' and 'rugose depressions and channels' were labelled as 'hard substrata' (Substrate) as these are inferred areas of reef outcrops. Hard substrata features shallower than 30 m depth were defined as 'Shallow reefs (Ecosystem Complex) – Mesophotic Rocky Reefs (Ecosystem)'. Hard substrata features deeper than 70 m depth were defined as 'Deep reefs (Ecosystem Complex), 'Rariphotic shelf reefs' (Ecosystem)'. 'Plains' landform features were labelled as 'soft substrata' (Substrate). Soft substrate features were defined as 'shelf sediments' (Ecosystem Complex) and 'shelf vegetated/unvegetated sediments' ('Ecosystem'). The 'Ecosystem Complex' shelf sediment classes 'vegetated sediments' and 'unvegetated sediments' were aggregated as biotic cover was not incorporated into the classification approach, and therefore a collective 'shelf sediments' term was applied. The landforms feature 'depressions and channels – smooth' were labelled as 'mixed hard and soft substrata' (Substrate) as these smooth lows within the reef outcrop may be inferred as reef or sediment. To align to the 'mixed hard and soft substrata (Substrate) categories, the NVCL terms were aggregated in these areas to 'mixed shelf reefs and sediments' (Ecosystem Complex) and 'mixed shelf reefs and shelf vegetated/unvegetated sediments' (Ecosystem). The resulting classification was separated into two shapefiles: 1. 'Marine ecosystems': which defines the 'Ecosystem Complex' and 'Ecosystem' classes under the NESP NVCL (e.g. shallow reef, mesophotic rocky reef) and 'Substrate' classes under the SeaMap Australia substrate classification (e.g. hard substrata). 2. 'Geomorphology': which defines the seabed morphology as 'landforms' produced by the Seabed Landforms Classification Toolbox (e.g. peaks). A 'sources' shapefile was also generated to outline the bathymetric data sources and coverage. The shapefile contains an 'INPUT' attribute field which describes the priority order of the bathymetry mosaic. SIMP multibeam echosounder data collected from September 2022 to September 2023 was given first priority, followed by the marine lidar data collected in 2018. The existing bathymetry mosaic (DCCEEW, 2023) was the lowest priority as it includes surveys from 2005-2012.
Limitations on public access	
Scope	dataset
DQ Topological Consistency	
Effective date	2024-09-27
Explanation	The datasets were checked for polygon overlaps and no topology errors were observed.

Responsible party

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Responsible party role	pointOfContact

Metadata point of contact

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Metadata date	2024-10-09T22:31:30.654542
Metadata language	