

Table 1: Data sources used to develop the 2025 Natural Values Ecosystems Map

Input type	Specific input	Source for 2025 NVCL Ecosystems	Changes relative to 2021 and notes
Bathymetry	Bathymetry base grid	Geoscience Australia Bathymetry 2024, National 250m grid https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/67703	Improved and extensively updated product relative to 2009 product used for 2021 map
Geomorphology	National seamounts	<i>Seamounts and raised seabed features of the Australian Margin</i> (Flukes 2023) https://metadata.imas.utas.edu.au/geonetwork/srv/eng/catalog.search#/metadata/dc4c761f-eb4d-4fe4-b071-e110bbe7c8f3	More recent and detailed dataset. Inputs used for 2021 map are coarse in resolution and now outdated.
Geomorphology	CSIRO Seamounts	Seamount Reef estimated using the estimate of potential live Solenosmilia habitat mapped as vulnerable marine ecosystems as identified in Williams et al (2020). https://www.frontiersin.org/articles/10.3389/fmars.2020.00187/full	No change
Geomorphology	GA Geomorphology	Harris, P., Heap, A.D., Passlow, V., Sbaffi, L., Fellows, M., Porter-Smith, R., Buchanan, C., Daniell, J. 2005. Geomorphic Features of the Continental Margin of Australia. Record 2003/030. Geoscience Australia, Canberra https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/69797	No change (used for banks and shoals)
Geomorphology	GA Canyons	National Marine Canyons of Australia. https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/77010	No change (but note that classification of 'shelf-incising' has been revised based on updated bathymetry grid).
Seafloor habitats	Seamap Australia National Benthic Habitat Layer	Lucieer V, Walsh P, Monk J, Flukes E (2025). Seamap Australia National Benthic Habitat Layer (NBHL) 2025. Institute for Marine and Antarctic Studies (IMAS), University of Tasmania (UTAS).	Now includes all relevant data for <ul style="list-style-type: none"> - Seagrass (including previous CAMRIS sources) - Coral reefs (including National Tropical Reef Features dataset and data previously sourced from CAMRIS, WCMC and the Allen Coral atlas) - TODO: check if it also has NESP survey data
Seafloor habitats	NESP MaC 2.3 Oceanic Vegetation		New ecosystem type of oceanic vegetated sediment (for vegetated reef flats in atolls)
Temperate reef observations	CSIRO Deep Reefs	Kloser RJ and Keith G (2010) Key Ecological Features of the East and South-east Marine Regions: "deep reefs" within 150-	No change. Uses rasters generated previously.

		700 m depths. Draft report to the Department of the Environment, Water, Heritage and the Arts	
Temperate reef observations	NESP Surveyed Reefs	Heaney, B Davey C 2019. Hydrographic Survey of the Freycinet, Huon and Tasman Fracture Australian Marine Parks. BF2019_v01. CSIRO Report to IMAS and PA	No change. Uses rasters generated previously.
Temperate reef observations	NESP Surveyed Reefs	https://www.nespmarine.edu.au/document/seafloor-biota-rock-lobster-and-demersal-fishes-assemblages-tasman-fracture-commonwealth	No change. Uses rasters generated previously.
Temperate reef observations	NESP Surveyed Reefs	https://www.nespmarine.edu.au/document/biological-and-habitat-feature-descriptions-continental-shelves-australia's-temperate-water	No change. Uses rasters generated previously.
Temperate reef observations	NESP Surveyed Reefs	Ierodiaconou, D Young, Y O'Brien S 2020 Hydrographic Survey of Apollo Marine Park. Report to PA	No change. Uses rasters generated previously.
Temperate reef observations	NESP Surveyed Reefs	Lucieer, VL Porter-Smith, R Nichol, SL Monk, J Barrett, NS 2016 Collation of existing shelf reef mapping data and gap identification - Phase 1 Final Report Shelf reef key ecological features. Report to NESP	No change. Uses rasters generated previously.
Temperate reef observations	NESP Surveyed Reefs	Vandenbossche, P Davey, C 2018 Hydrographic Survey of the Boags Commonwealth Marine Reserve in Southwestern Bass Strait. BF2018_v01. Report to PA	No change. Uses rasters generated previously.
Temperate reef observations	NESP Surveyed Reefs	Additional locations were identified through conversations with local fishers. Neville Barret pers comm.	No change. Uses rasters generated previously.
Islands	NESP 3.17 50k coastlines	https://www.data.gov.au/data/dataset/australian-coastline-50k-2024-nesp-mac-3-17-aims	

Table 2: Classification steps used to define the 2025 Natural Values Ecosystems map for benthic ecosystems

Step	Ecosystem	Decision rules	Class No.	Changes for 2025 update and notes
1	Shelf unvegetated sediments	GA Bathy < 0m AND >= - 200m	1	Uses updated (2024) GA 250m bathymetry grid
2	Upper slope unvegetated sediments	GA Bathy < -200m AND >= -700m	2	Uses updated (2024) GA 250m bathymetry grid
3	Mid-slope sediments	GA Bathy < -700m AND >= -2000m	3	Uses updated (2024) GA 250m bathymetry grid
4	Lower slope reefs & sediments	GA Bathy < -2000m AND >= -4000m	4	Uses updated (2024) GA 250m bathymetry grid
5	Abyssal reefs & sediments	GA Bathy < -4000m	5	Uses updated (2024) GA 250m bathymetry grid
6	Seamount sediments	Aus_seamounts_raised_features = TRUE	6	Uses updated (2024) GA 250m bathymetry grid
7	Seamount reefs	CSIRO Seamount Reefs = TRUE	18	No change
8	Shelf incising canyons	Select features by GA Canyons depth > -200m	7	Re-classified canyon depths based on updated GA250 layer
9	Shelf vegetated sediments	National Benthic Habitat Layer NAT_HAB_CL = “seagrass” OR “mixed macrophytes” OR (“mixed biota” and Hab_ORIG includes “seagrass”) and substratum NOT “hard”	9	CAMRIS seagrass data now no-longer directly used. Now based only on NBHL seagrass. Those areas with substrata classified as “Mixed Hard/Soft” are included with reefs as these are typically patchy reef separated by sediment at fine scale.
10	Oceanic shallow coral reefs	National ‘all coral reef’ = TRUE OR GA geomorphic feature = “bank/shoals” AND GA Bathy >= -30m AND continental shelf = F	8	No-longer directly using WCMC, Allen coral atlas or rule-of-thumb classification of coral/not coral based on latitude. Now based
11	Shallow coral reefs	National ‘all coral reef’ = TRUE AND GA Bathy >= -30m & IS Coral (Latitude >= -32.69) AND Continental Shelf = TRUE	10	No-longer uses latitude-based classification for coral vs rocky but based on mapped extent from NBHL. Also includes NBHL_unvalidated layer.
12	Shallow rocky reefs	National ‘all rocky reef’ = TRUE AND GA Bath >= -30m AND IS NOT Coral (Latitude < 32.69)	11	No-longer uses latitude-based classification for coral vs rocky but based on mapped extent from NBHL. Also includes NBHL_unvalidated layer (with the exception of NESP Tier 2 multi beam collation).

13	Mesophotic coral reefs	National 'all coral reef' = TRUE AND GA Bath < -30m AND GA Bathy >= -70m AND Continental Shelf = TRUE	12	No-longer uses latitude-based classification for coral vs rocky but based on mapped extent from NBHL. Also includes NBHL_unvalidated layer.
14	Mesophotic rocky reefs	National 'all rocky reef' = TRUE AND GA Bath < -30m AND GA Bathy >= -70m AND Continental Shelf = TRUE	13	No-longer uses latitude-based classification for coral vs rocky but based on mapped extent from NBHL. Also includes NBHL_unvalidated layer (with the exception of NESP Tier 2 multi beam collation).
15	Oceanic mesophotic coral reefs	National 'all coral reef' = TRUE OR National 'all rocky reef' = TRUE AND GA Bathy < -30m AND GA Bathy >= -70m AND IS NOT Coral (Latitude < -32.69) AND Continental Shelf = FALSE	14	No-longer uses latitude-based classification for coral vs rocky but based on mapped extent from NBHL. Also includes NBHL_unvalidated layer.
16	Rariphotic shelf reefs	National 'all coral reef' = TRUE OR National 'all rocky reef' = TRUE AND GA Bathy < -70m AND GA Bathy >= -200m	15	No-longer uses latitude-based classification for coral vs rocky but based on mapped extent from NBHL. Also includes NBHL_unvalidated layer (with the exception of NESP Tier 2 multi beam collation).
17	Upper slope reefs	GA Canyons = TRUE OR National 'all coral reef' = TRUE OR National 'all rocky reef' = TRUE AND GA Bathy < -200m AND GA Bathy >= -700m	16	Uses re-classified canyon depths based on updated GA250 layer
21	Mid-slope reefs	GA Canyons = TRUE OR National 'all coral reef' = TRUE OR National 'all rocky reef' = TRUE AND GA Bathy < -700m AND GA Bathy -2000m	17	Uses re-classified canyon depths based on updated GA250 layer
22	Islands (including cays and islets)	NESP MaC 3.17 AIMS Aus Coastline = T	27	
23	Oceanic vegetated sediments	NESP MaC 2.3 Oceanic veg = T	28	

Table 2: Classification steps used to define the 2025 Natural Values Ecosystems map for pelagic ecosystems

Step	Ecosystem	Decision rules	Class No.	Changes for 2025 update and notes
1	On shelf (neritic) epipelagic	GA Bathy < 50m AND GA Bathy >= -200m	23	Uses updated (2024) GA 250m bathymetry grid
2	Off-shelf (oceanic) epipelagic	GA Bathy < -200m	22	Uses updated (2024) GA 250m bathymetry grid
3	Mesopelagic	GA Bathy < -200m AND GA Bathy >= -1000m	21	Uses updated (2024) GA 250m bathymetry grid
4	Bathypelagic & Abyssopelagic	GA Bathy < -1000m	20	Uses updated (2024) GA 250m bathymetry grid

Table 3: Classification steps used to define the 2025 ‘all coral reef’ layer

Step	Decision rules	Comments
1	GA 2006 Geomorphology Feature = “Banks/Shoals”	Identified Banks and shoals contain hard substrate
2	NBHL unvalidated NAT_HAB_CL CONTAINS “coral”	Coral records from NBHL unvalidated (includes Alen Coral Atlas data)
3	NBHL (validated) SC_Level1 NOT "Soft Substrata"	Exclude mapped soft substrate from NBHL (unless classified as coral biota in next step)
4	NBHL (validated) NAT_HAB_CL CONTAINS “coral biota”	Use NBHL mapped coral biota occurrence

Table 4: Classification steps used to define the 2025 ‘all rocky reef’ layer (all

Step	Decision rules	Comments
1	NESP Predicted Reefs = TRUE	
2	NBHL unvalidated SC_Level1 NOT "Soft Substrata"	Exclude mapped soft substrate from NBHL (unless classified as hard in next steps)
3	NBHL unvalidated SC_Level1 CONTAINS "hard" and NOT CONTAINS “CORAL” and DATA_SC NOT CONTAINS “Tier 2”	All records for reef occurrence
4	CSIRO Deep Reefs = TRUE	
5	NESP Surveyed Reefs = TRUE	
6	GA 2006 Geomorphology Feature = “Banks/Shoals”	Identified Banks and shoals contain hard substrate
7	Aus_seamounts_raised_features = TRUE and SHELF = T	Identified Pinnacles on the continental shelf
8	NESP surveyed sediment = F	
9	NBHL (validated) SC_Level1 NOT "Soft Substrata"	
10	NBHL (validated) SC_Level1 = “Hard Substrata”	
11	All coral reefs = F	Exclude any remaining areas already classified as coral reef

Appendix A. Natural values common language ecosystems classification hierarchy.

Blue text indicates additions for 2025.

Ecosystem complexes	Ecosystems	Ecosystem components
Deep shelf reefs	Mesophotic coral reefs	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Macroalgae
		Marine reptiles
		Mobile macroinvertebrates
		Sessile invertebrates
	Mesophotic rocky reefs	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Macroalgae
		Mobile macroinvertebrates
		Sessile invertebrates
	Rariphotic shelf reefs	Benthic and cryptic fish
		Demersal fish
Demersal sharks and rays		
Mobile macroinvertebrates		
Sessile invertebrates		
Intertidal areas	Beaches	Infauna
		Shorebirds and waterbirds
	Intertidal coral reefs	Benthic and cryptic fish
		Macroalgae
		Mobile macroinvertebrates
		Sessile invertebrates
	Rocky shores	Benthic and cryptic fish
		Macroalgae

		Mobile macroinvertebrates
		Sessile invertebrates
Islands (including cays and islets)	Islands (including cays and islets)	Forest
		Grassland
		Herb field
		Marine reptiles
		Seabirds
		Shorebirds and waterbirds
		Shrubland
Lower-slope and abyssal reef and sediments	Abyssal reef and sediments	Benthic and cryptic fish
		Demersal sharks and rays
		Demersal fish
		Infauna
		Mobile macroinvertebrates
		Sessile invertebrates
	Lower-slope reef and sediments	Benthic and cryptic fish
		Demersal sharks and rays
		Demersal fish
		Infauna
		Mobile macroinvertebrates
		Sessile invertebrates
Oceanic reefs	Oceanic mesophotic coral reefs	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Macroalgae
		Mobile macroinvertebrates
		Sessile invertebrates
	Oceanic shallow coral reefs	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays

		Macroalgae
		Mobile macroinvertebrates
		Seagrass
		Sessile invertebrates
	Oceanic vegetated sediments	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Macroalgae
		Mobile macroinvertebrates
		Sessile invertebrates
Seamounts (including guyots)	Seamount reefs	Benthic and cryptic fish
		Demersal sharks and rays
		Demersal fish
		Mobile macroinvertebrates
		Sessile invertebrates
	Seamount sediments	Benthic and cryptic fish
		Demersal sharks and rays
		Demersal fish
		Infauna
		Mobile macroinvertebrates
Shallow reefs	Shallow coral reefs	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Macroalgae
		Mobile macroinvertebrates
		Seagrass
		Sessile invertebrates
	Shallow rocky reefs	Benthic and cryptic fish
		Demersal fish

		Demersal sharks and rays
		Macroalgae
		Mobile macroinvertebrates
		Seagrass
		Sessile invertebrates
Shelf vegetated sediments	Shelf vegetated sediments	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Infauna
		Macroalgae
		Mobile macroinvertebrates
		Seagrass
Shelf, upper and mid-slope unvegetated sediments	Mid-slope sediments	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Infauna
		Mobile macroinvertebrates
		Sessile invertebrates
	Shelf unvegetated sediments	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Infauna
		Mobile macroinvertebrates
		Sessile invertebrates
	Upper-slope sediments	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Infauna
		Mobile macroinvertebrates
		Sessile invertebrates

Upper and mid-slope reefs (including canyons)	Mid-slope reefs	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Mobile macroinvertebrates
		Sessile invertebrates
	Shelf-incising canyons	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Mobile macroinvertebrates
		Sessile invertebrates
	Upper-slope reefs	Benthic and cryptic fish
		Demersal fish
		Demersal sharks and rays
		Mobile macroinvertebrates
		Sessile invertebrates
Water column	Bathypelagic & Abyssopelagic	Abyssopelagic fauna
		Bathypelagic fauna
	Mesopelagic	Mesopelagic fish
		Mesopelagic micronekton
		Pelagic mobile invertebrates
		Pelagic sharks and rays
		Plankton
	Off-shelf (oceanic) epipelagic	Marine mammals
		Marine reptiles
		Oceanic epipelagic fish
		Pelagic mobile invertebrates
		Pelagic sharks and rays
		Plankton
	Seabirds	
	On-shelf (neritic) epipelagic	Coastal epipelagic fish

		Marine mammals
		Marine reptiles
		Pelagic mobile invertebrates
		Pelagic sharks and rays
		Plankton
		Seabirds