Bioenvironmental Data as a Web Service

ATLAS OF LIVING AUSTRALIA
sharing biodiversity knowledge

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Adam Collins

The Atlas of Living Australia

The Atlas of Living Australia is one project within (Australia's) National Collaborative Research Infrastructure Strategy

Focus: Exposing integrated species information

Budget: AU$51m since 2007

My role: Scientific advice to ALA, outreach to research community

Occurrence Records	Species	Data downloads	Registered users
71,449,694	120,002	1,575,180	39,131
		(12.7B records)	(1,500/day)

Australian iconic species

Browse some of our most popular species, or search over 100,000 species within the ALA.

Explore by location

Browse species by pre-defined region or by location.

Mapping & analysis

Explore species occurrence records using the Spatial Portal or search records for species occurrences.

Contribute to the ALA

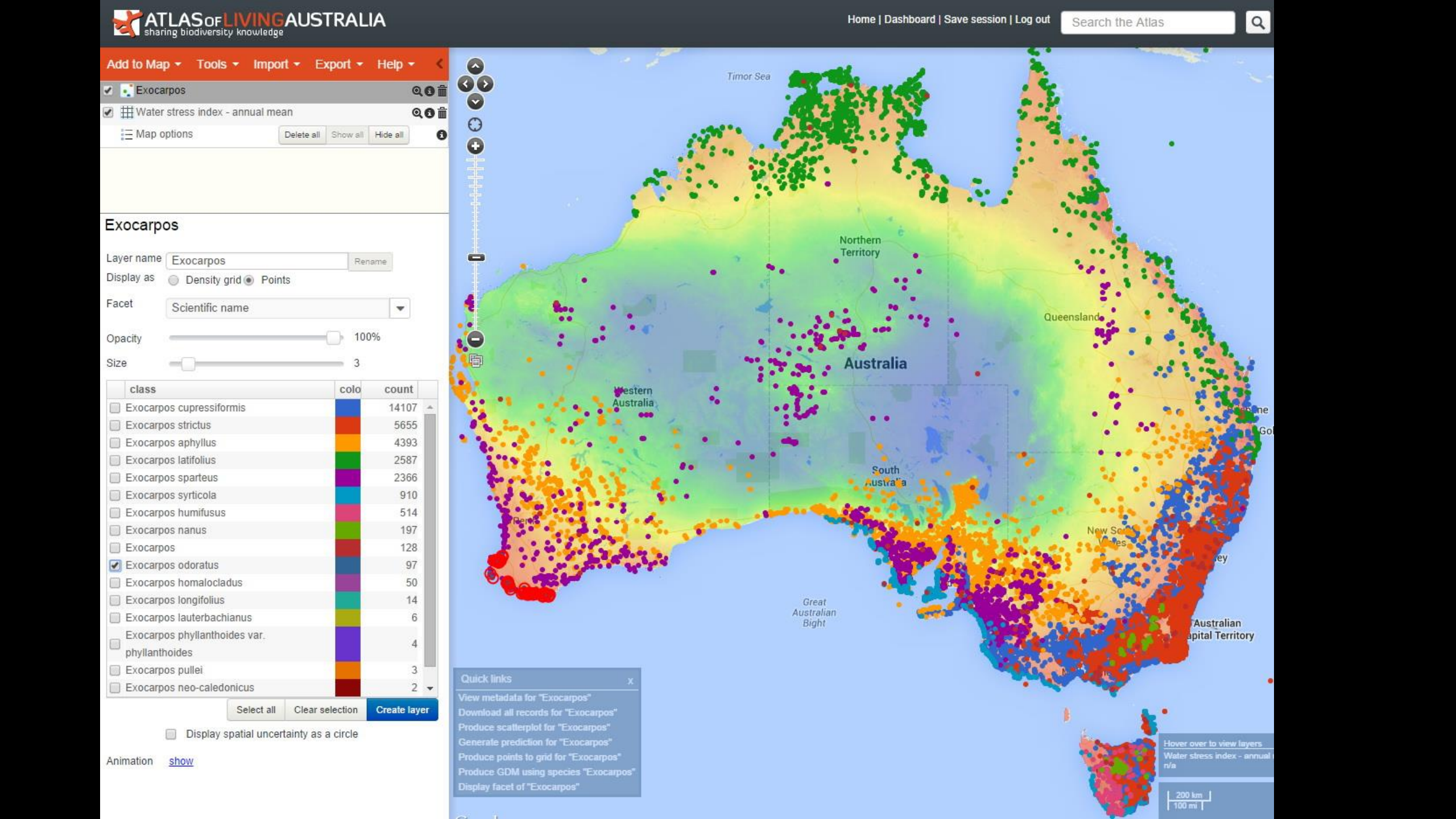
Get involved in citizen science, digitise survey records, or contribute your sighting to the ALA.

Browse ALA news

Browse news and events from around the ALA community, and keep up to date with how we are engaging with our users.

ALA knowledge base

Learn about the ALA and discover the many different ways in which we can help you achieve your goals.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Water stress index - annual mean
Map options
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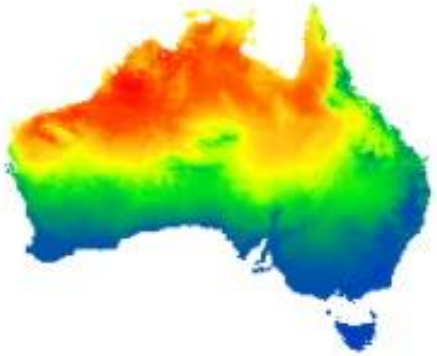
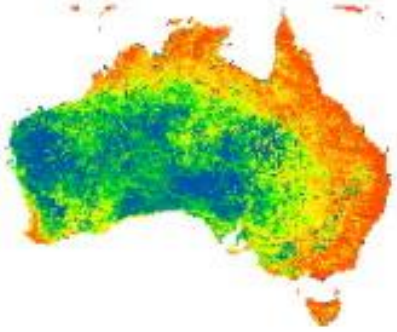
Hide all
Exocarpos
Layer name
Exocarpos
Rename
Display as
Density grid
Points
Facet
Scientific name
Opacity
100%
Size
3
class
colo
count
Exocarpos cupressiformis 14107
Exocarpos strictus 5655
Exocarpos aphyllus 4393
Exocarpos latifolius 2587
Exocarpos sparteus 2366
Exocarpos syrticola 910
Exocarpos humifusus 514
Exocarpos nanus 197
Exocarpos 128
Exocarpos odoratus 97
Exocarpos homalocladus 50
Exocarpos longifolius 14
Exocarpos lauterbachianus 6
Exocarpos phyllanthoides var. phyllanthoides 4
Exocarpos pullei 3
Exocarpos neo-caledonicus 2
Select all
Clear selection
Create layer
Display spatial uncertainty as a circle
Animation
show
Timor Sea
Northern Territory
Queensland
Australia
Western Australia
South Australia
Great Australian Bight
Australian Capital Territory
Quick links
View metadata for "Exocarpos"
Download all records for "Exocarpos"
Produce scatterplot for "Exocarpos"
Generate prediction for "Exocarpos"
Produce points to grid for "Exocarpos"
Produce GDM using species "Exocarpos"
Display facet of "Exocarpos"
Hover over to view layers
Water stress index - annual
n/a
200 km
100 mi

http://spatial.ala.org.au/layers

Climate	Temperature	2030A1BMk35M: Temperature - annual max mean	2030A1BMk35M_maxtm	Mean annual maximum temperature (°C) - future climate scenario for 2030 A1B emissions CSIRO Mk3.5 GCM medium climatic sensitivity - OZCLIM + ANUCLIMv5.1	Environmental (gridded)	CSIRO Ecosystem Sciences	GDM-Ready, 2030-centred	 Click to view this layer
Vegetation		Enhanced Vegetation Index (2012-03-05)	auscover_evi	Enhanced Vegetation Index (2012-03-05)	Environmental (gridded)	AusCover		 Click to view this layer
Marine	Region	Geomorphology of the Australian Margin and adjacent seafloor	geo_feature	Geomorphology of the Australian Margin and adjacent seafloor	Contextual (polygonal)	GA	reef, shoal, bank, slope, basin, trench, shelf	 Click to view this layer

Stats

140 class layers (e.g., states)
358 environmental (e.g., temp)
100+ ready to be deployed

Resolution

100m - 1km

Extent

Local to global

Discover by

Name, short name, classification, id, tags

Classification (1 of 2 levels)

Area Management
Biodiversity
Climate
Distance
Fire
Hydrology
Marine
Political
Sensitive Data
Social
Substrate
Topography
Vegetation

Add to Map | Tools | Import | Export | Help

- Acacia Forests and Woodlands
- NVIS 4.1 Major Vegetation Subgroups
- NVIS 4.1 Major Vegetation Groups

Map options | Delete all | Show all | Hide all

NVIS 4.1 Major Vegetation Groups

Layer name: NVIS 4.1 Major Vegetation Gro | Rename

Opacity: 100%

show legend | hide legend | popup legend

Rainforests and Vine Thickets
Eucalypt Tall Open Forests
Eucalypt Open Forests
Eucalypt Low Open Forests
Eucalypt Woodlands
Acacia Forests and Woodlands
Callitris Forests and Woodlands
Casuarina Forests and Woodlands
Melaleuca Forests and Woodlands
Other Forests and Woodlands
Eucalypt Open Woodlands
Tropical Eucalypt Woodlands/Grasslands
Acacia Open Woodlands
Mallee Woodlands and Shrublands
Low Closed Forests and Tall Closed Shrublands
Acacia Shrublands
Other Shrublands
Heathlands
Tussock Grasslands
Hummock Grasslands
Other Grasslands, Herblands, Sedgelands and Rushlands
Chenopod Shrublands, Samphire Shrublands and Forblands
Mangroves
Inland aquatic – freshwater, salt lakes, lagoons
Cleared, non-native vegetation, buildings
Unclassified native vegetation
Naturally bare – sand, rock, claypan, mudflat
Sea and estuaries
Regrowth, modified native vegetation
Unclassified Forest
Other Open Woodlands
Mallee Open Woodlands and Sparse Mallee Shrublands
Unknown/no data

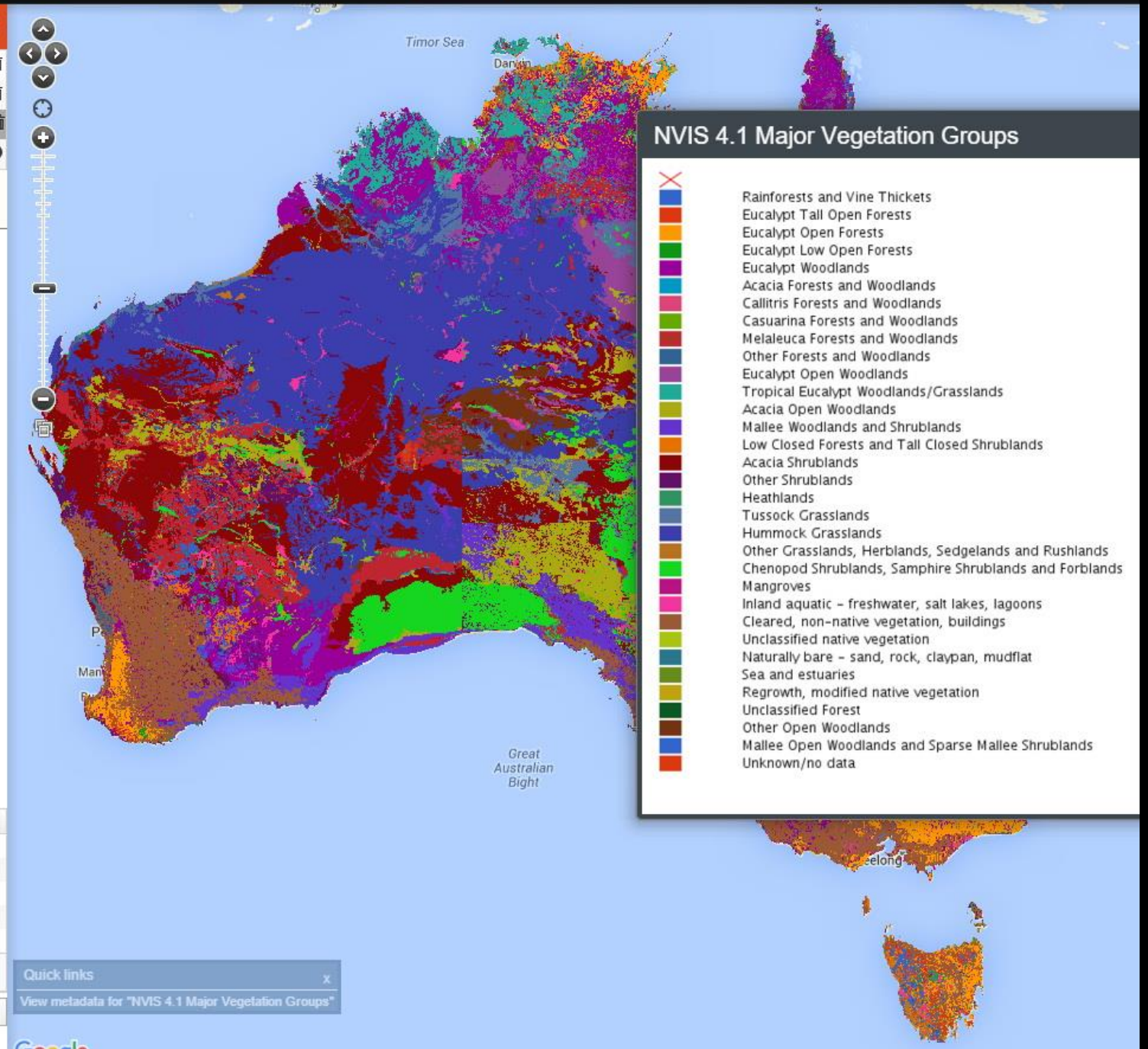
Select a row to highlight on the map

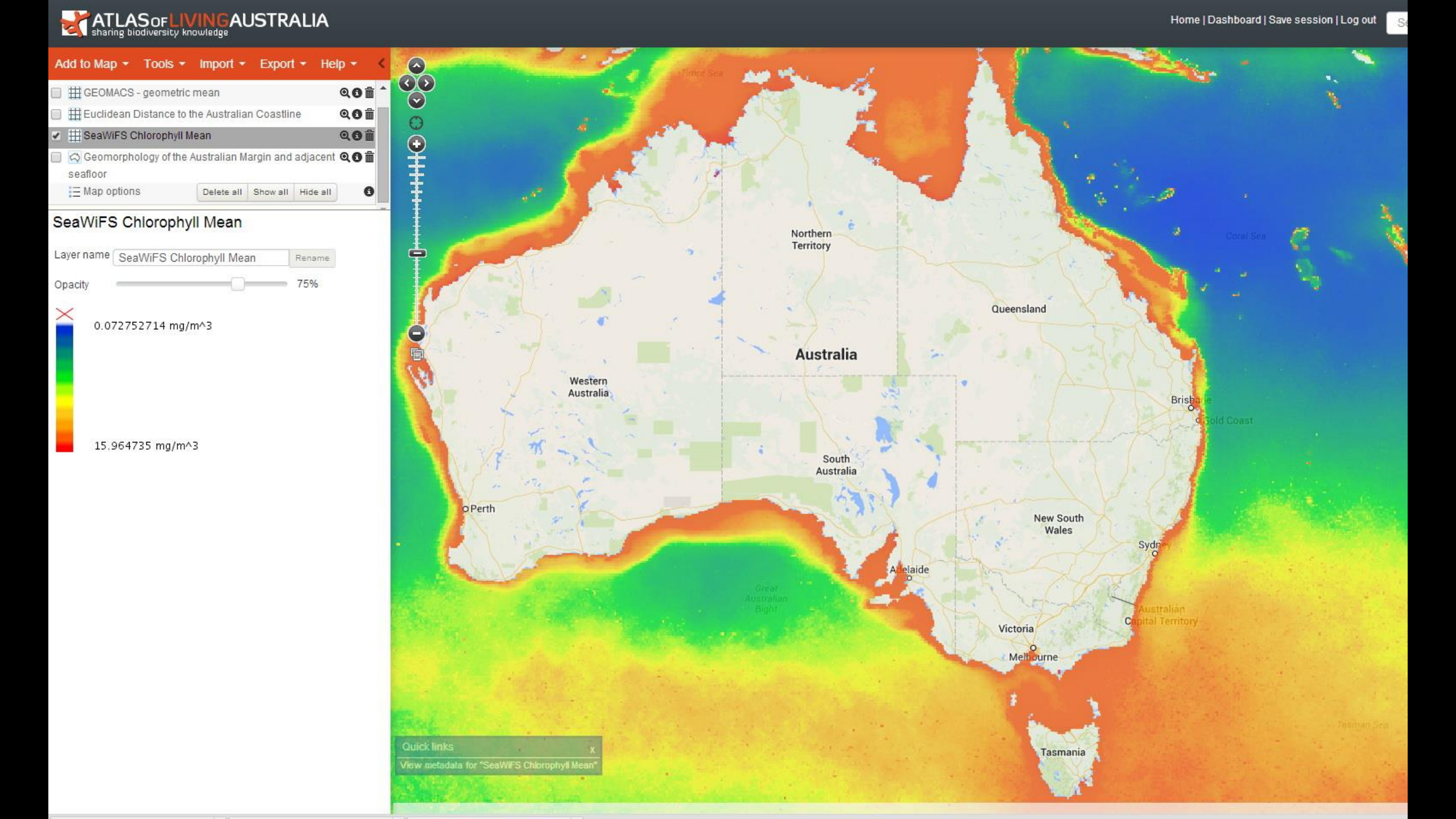
search | Filter | Clear Filter

name	
Acacia Forests and Woodlands	
Acacia Open Woodlands	
Acacia Shrublands	
Callitris Forests and Woodlands	
Casuarina Forests and Woodlands	

1 /7 [1 - 5 / 33]

Clear highlight

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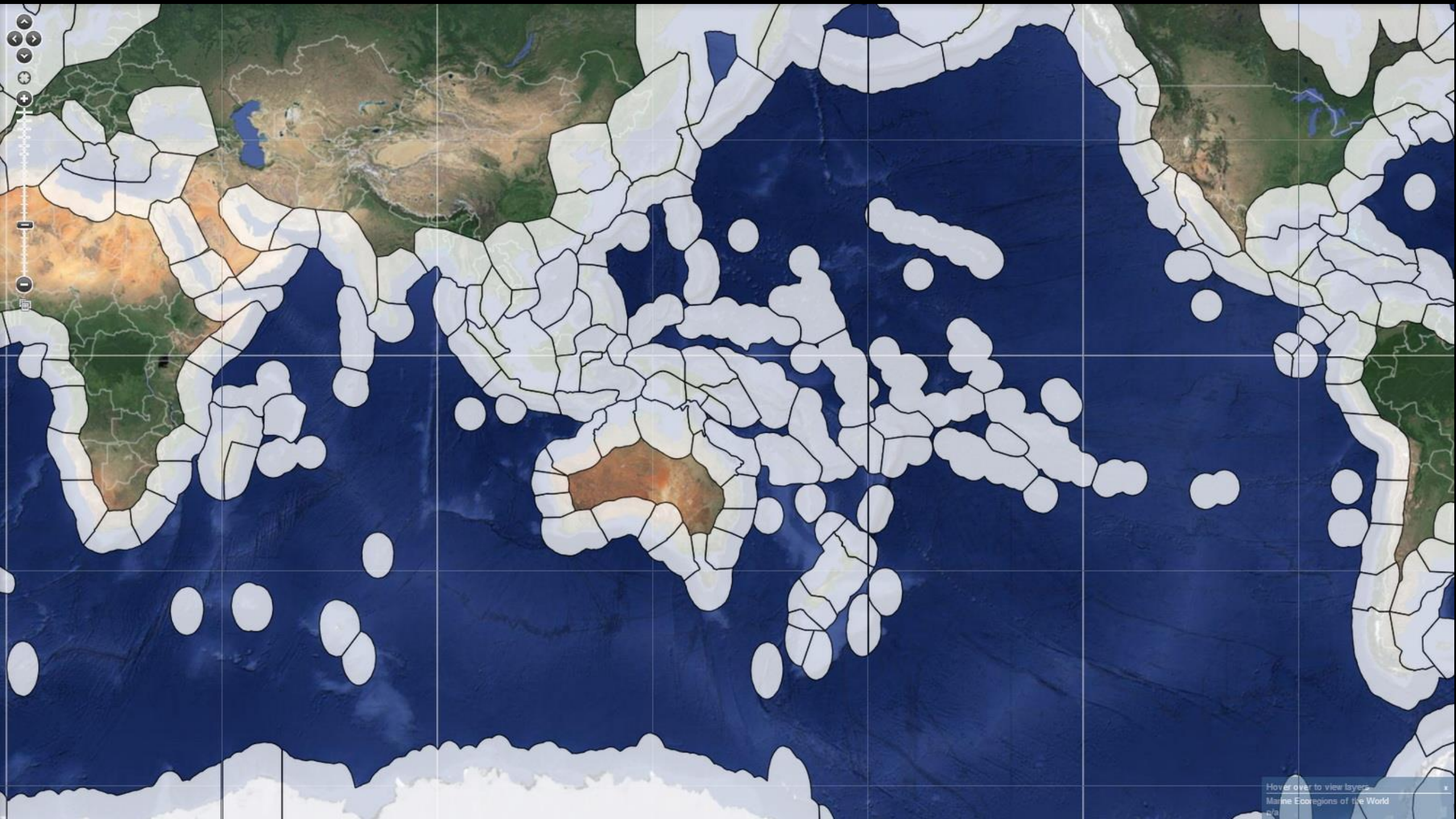
GEOMACS - geometric mean
Euclidean Distance to the Australian Coastline
SeaWiFS Chlorophyll Mean
Geomorphology of the Australian Margin and adjacent seafloor
Map options
Delete all
Show all
Hide all
SeaWiFS Chlorophyll Mean
Layer name
SeaWiFS Chlorophyll Mean
Rename
Opacity
75%
0.072752714 mg/m^3
15.964735 mg/m^3
Northern Territory
Queensland
Australia
Western Australia
South Australia
New South Wales
Perth
Adelaide
Sydney
Brisbane
Gold Coast
Victoria
Melbourne
Australian Capital Territory
Tasmania
Great Australian Bight
Coral Sea
Tasman Sea
Quick links
View metadata for "SeaWiFS Chlorophyll Mean"


Hover over to view layers
Marine Ecoregions of the World

Tools that demonstrate the ‘value-add’ of Integrating Biological and Environmental Data

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Home | Dashboard | Log out

Add to Map | Tools | Import | Export | Help

- E.Gunnii vs E.Nitida
- Eucalyptus nitida
- Eucalyptus gunnii
- Map options

E.Gunnii vs E.Nitida

Species display settings

Download image | Download data

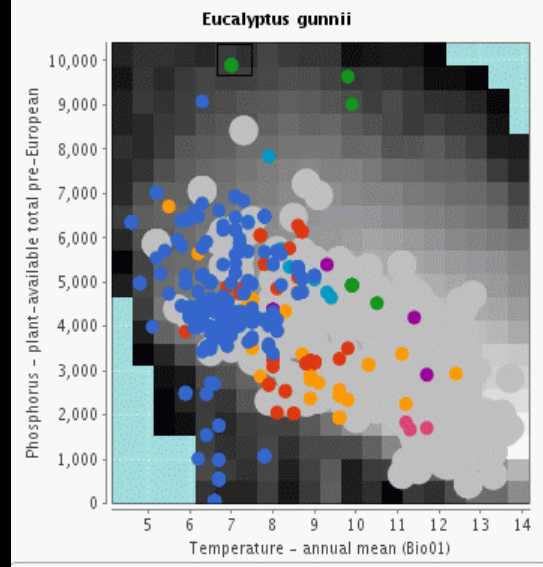
Records selected: 6 add in/out layers to map

Temperature - annual mean (Bio01): 6.64834 - 7.47840

Phosphorus - plant-available total pre-European: 9680.25 - 10382.4

Highlight occurrences on the scatterplot that are in an area

Clear



Scatterplot legend

Press the Apply button after changes using the sliders, colour palette or facet selection.

Opacity 100%

Map Size 8

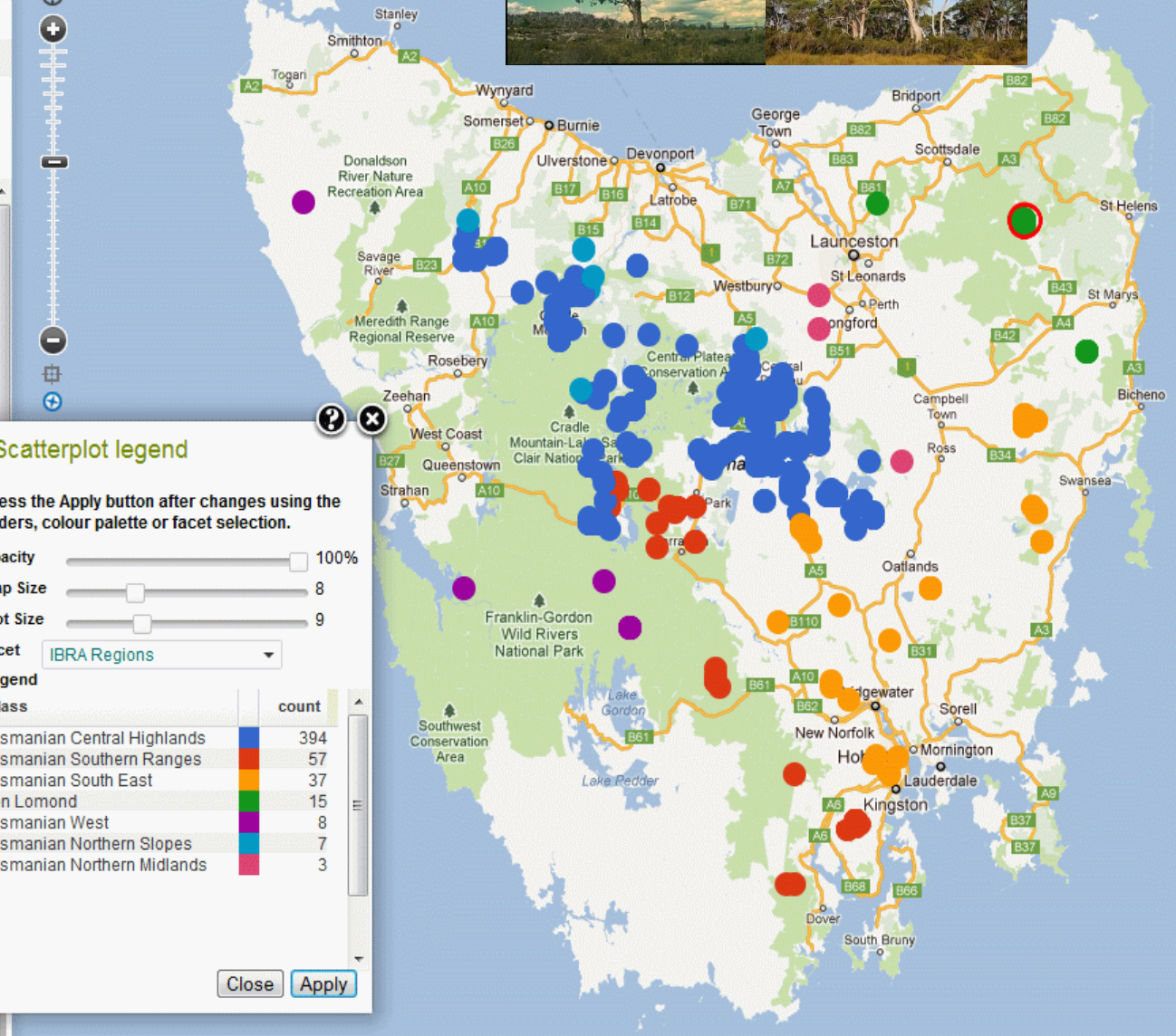
Plot Size 9

Facet IBRA Regions

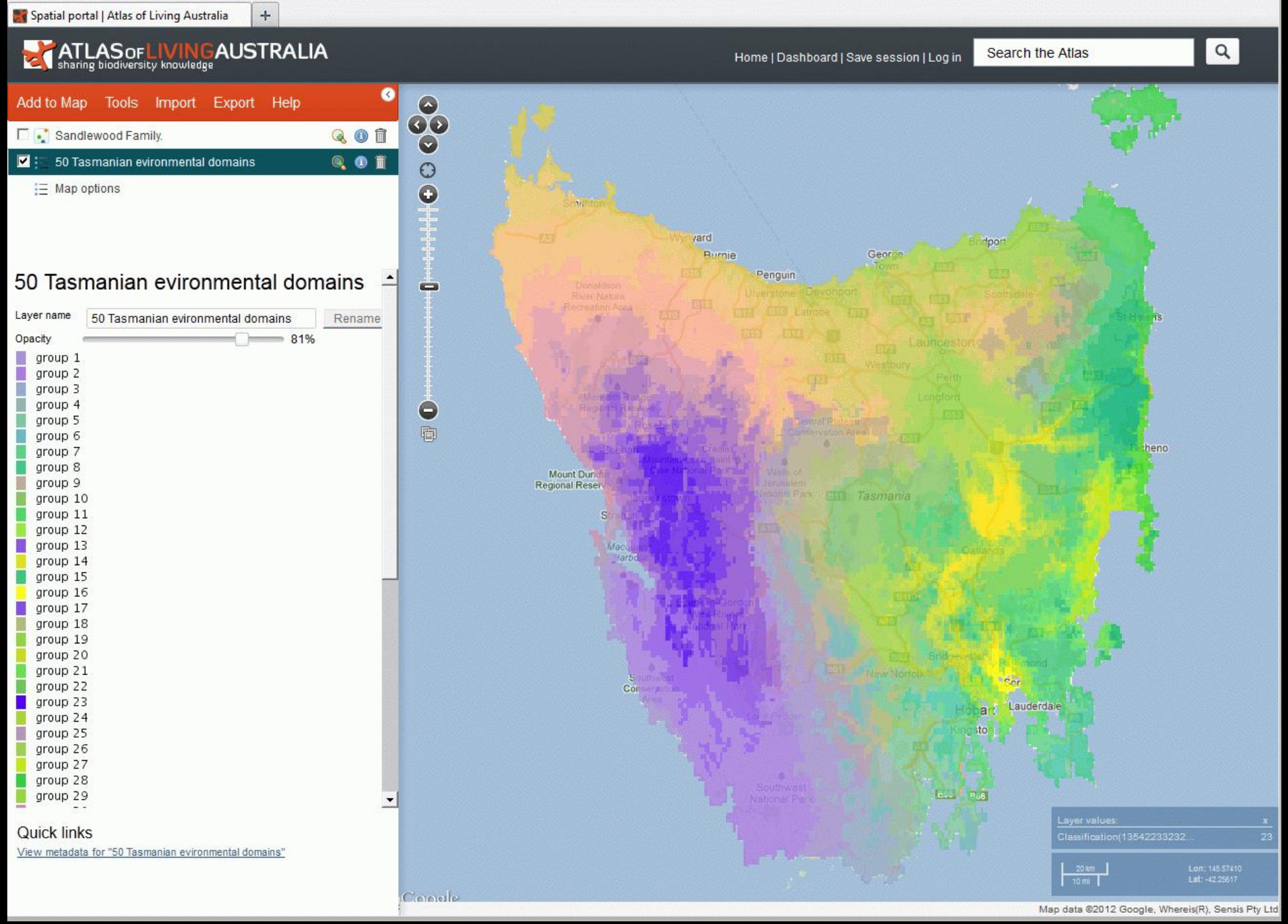
Legend

class	count
Tasmanian Central Highlands	394
Tasmanian Southern Ranges	57
Tasmanian South East	37
Ben Lomond	15
Tasmanian West	8
Tasmanian Northern Slopes	7
Tasmanian Northern Midlands	3

Close | Apply



Number of species	South Australia	Macquarie Island	Australian Capital Territory	New South Wales	Queensland	Western Australia	Northern Territory	Victoria	Tasmania	Total species
Marine National Park								732		732
Commonwealth Land Managed for Conservation	1268									1268
Nature Recreation Area									2956	2956
National Park	7435		3185	23261	30989	16687	6490	15383	9053	64807
Heritage River	6			13				3288		3289
National Park (Scientific)					1573					1573
Proposed National Parks Act park or park addition								296		296
Forest Reserve	2034				4870				3694	9246
Permanent Park Preserve				3274						3274
Botanic Gardens (Commonwealth)			842							842
Wilderness Zone - Schedule 5, National Parks Act								27		27
Coastal Reserve							1048			1048
Nature Park (Aboriginal)							315			315
Private Nature Reserve									501	501
Nature Conservation Reserve				31				4397		4400
CCA Zone 2 Aboriginal Area				1266						1266
National Park (Recovery)					2482					2482
Wilderness Zone			1629	21						1630
CCA Zone 3 State Conservation Area				2471						2471
Natural Catchment Area								301		301
Game Reserve	1839							1	1028	2549
National Park (Commonwealth)			1626	229			6606			8011
Nature Park							1991			1991
Protected Area	820			4568	667	97	954			6254
Regional Park				2376						2376
5(1)(g) Reserve						2579				2579
State Reserve									3543	3543
Other								1646		1646
Wilderness Park	10							1097		1097
Conservation Covenant							500		2708	3153
Remote and Natural Area - not scheduled (see comment)								431		431


Spatial portal | Atlas of Living Australia
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Sandlewood Family.
50 Tasmanian evironmental domains
Map options
50 Tasmanian evironmental domains
Layer name
50 Tasmanian evironmental domains
Rename
Opacity
81%
group 1
group 2
group 3
group 4
group 5
group 6
group 7
group 8
group 9
group 10
group 11
group 12
group 13
group 14
group 15
group 16
group 17
group 18
group 19
group 20
group 21
group 22
group 23
group 24
group 25
group 26
group 27
group 28
group 29
Quick links
View metadata for "50 Tasmanian evironmental domains"
Burnie
Penguin
Launceston
Tasmania
Hobart
Lauderdale
New Norfolk
Layer values:
Classification(13542233232...
23
Lon: 145.57410
Lat: -42.25517
Google
Map data ©2012 Google, Whereis(R), Sensis Pty Ltd

Issues with the Current Environmental Data Infrastructure

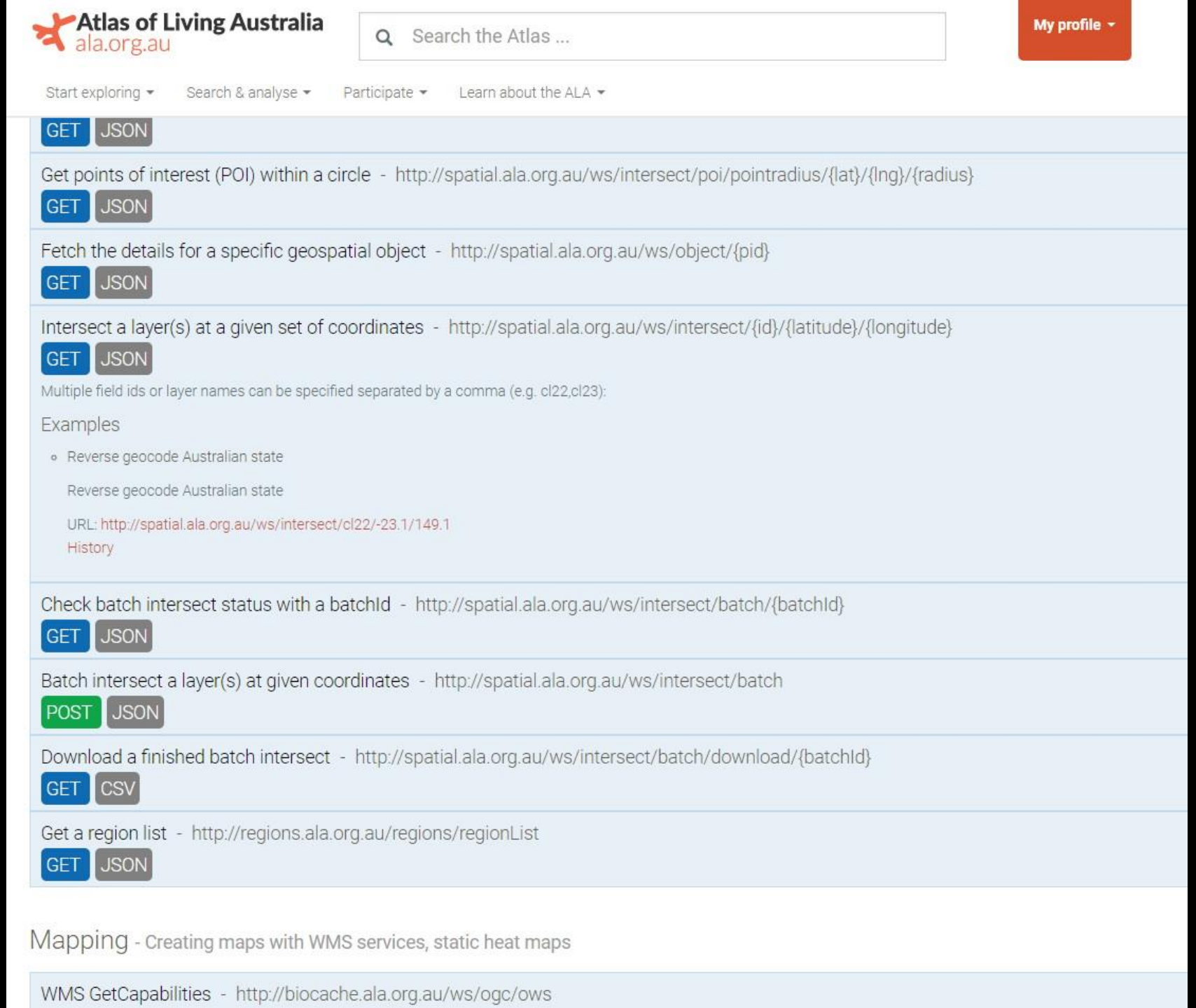
- Effort to locate, process and maintain environment layers
  - 79 suppliers: formats and spatial/temporal resolutions, grid alignment
  - Classifying
  - Ensuring consistent, comprehensive and accurate metadata 😐
- Manual (pull) detecting updates, deprecate or replace
- Environmental data is not a key ALA focus

Possible Solutions

- Business as usual
  - It works but…
  - Increasing issues
- Simple standardized web service
  - Decentralized (with centralized discovery)
  - Minimal (user) maintenance
  - Simple yet widely applicable strategy
  - Can’t easily slice and dice
- Hypercube
  - Standardized
  - Centralized
  - Same multi-agency maintenance issues
  - Easy to slice and dice

http://api.ala.or.gu

The ALA is built on 130+ Web Services



An Example

http://spatial.ala.org.au/ws/intersect/cl22/-23.1/149.1


```
[
{field: "cl22",
description: "Queensland, State",
layername: "Australian States and Territories",
pid: "3742606",
value: "Queensland"}
]
```

Example 2

http://spatial.ala.org.au/ws/intersect/el874/-27.476/153.018


```
[
{field: "el874",
layername: "Temperature - annual mean (Bio01)",
units: "degrees C",
value: 20.4}
]
```

Metadata: http://spatial.ala.org.au/ws/layer/918

displayname: "National Dynamic Land Cover",
enabled: true,
uid: "918",
metadatapath: "http://asdd.ga.gov.au/asdd/tech/zap/basic-full.zap?&target=brs-4&syntax=html&cclfield1=all&cclfield2=phrase&cclfield3=any&cclterm1=&cclterm2=dynamic%20land%20cover&cclterm3=&start=1&number=1",
classification1: "Vegetation",
classification2: "",
notes: "",
source_link: "http://www.ga.gov.au/",
licence_link: "",
licence_notes: "No permission to distribute derivative works at this stage - draft dataset",
maxlatitude: -10,
minlatitude: -45.0048,
minlongitude: 110,
maxlongitude: 155.00919,
pid: "",
shape: true,
path_orig: "shape_diva/dlcmv1",
environmentalvalueunits: "class",
displaypath: "http://spatial.ala.org.au/geoserver/gwc/service/wms?service=WMS&version=1.1.0&request

http://spatial.ala.org.au/ws/intersect/batch?points=-22,131,-23,145&fids=cl22,el874

{"waiting": "In queue",
"statusUrl": "http://spatial.ala.org.au/layers-service/intersect/batch/1507012925203",
"progress": 0,
"batchId": "1507012925203",
"fields": 2,
"points": 2,
"status": "waiting"}

{"downloadUrl": "http://spatial.ala.org.au/layers-service/intersect/batch/download/1507013268367",
"progress": 3,
"started": "03/10/17 05:47:48:368",
"finished": "03/10/17 05:47:50:241",
"fields": 2,
"points": 2,
"status": "finished",
"progressMessage": "Finished sampling layer: bioclim_bio1. Points processed: 1"}

Downloaded CSV file

	A	B	C	D	E
1	**latitude**	**longitude**	**State (cl22)**	**Mean Annual Temperature (el874)**	
2	-22	131	Northern Territory	24	
3	-23	145	Queensland	24	
4					
5					

How do we get there?

Ideally, an innovative, bold, forward thinking, wise … national agency (with teeth) as a catalyst to

- Engage a SMALL group of experts & interested souls to
  - Develop a standard web service for points
    - Form of web service (e.g., RESTful…?)
    - Vocabulary for parameters
    - Metadata
  - Suggest a consistent national/regional grid
- Engage with environmental data suppliers
- Ensure consistent metadata
- Provide an environmental data discovery service

- …The model is simple, yet WIDELY applicable!

Thank you

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