Mapping Intertidal Reefs on Lord Howe Island

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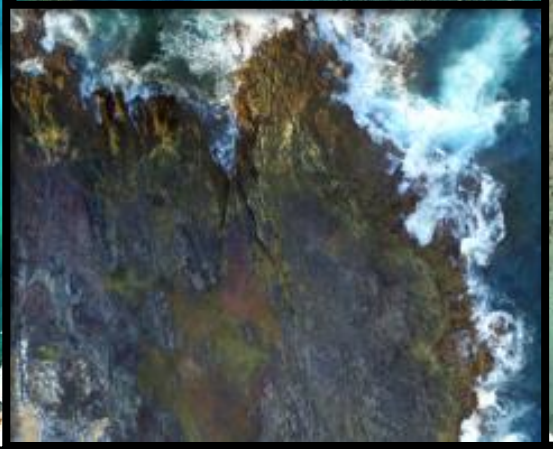
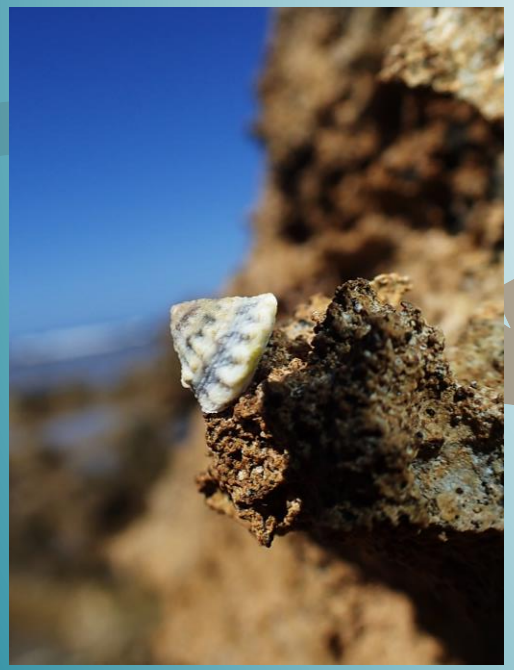
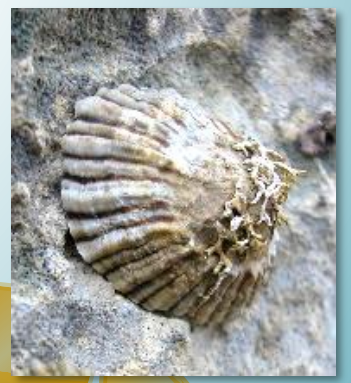


Intertidal reefs on remote islands have high conservation value

- Unique and diverse assemblages
- Many endemic species (examples shown)





The distribution of intertidal reef biodiversity in a World Heritage listed marine park

- Using habitats as surrogates to infer patterns of biodiversity
- Multiple reef types

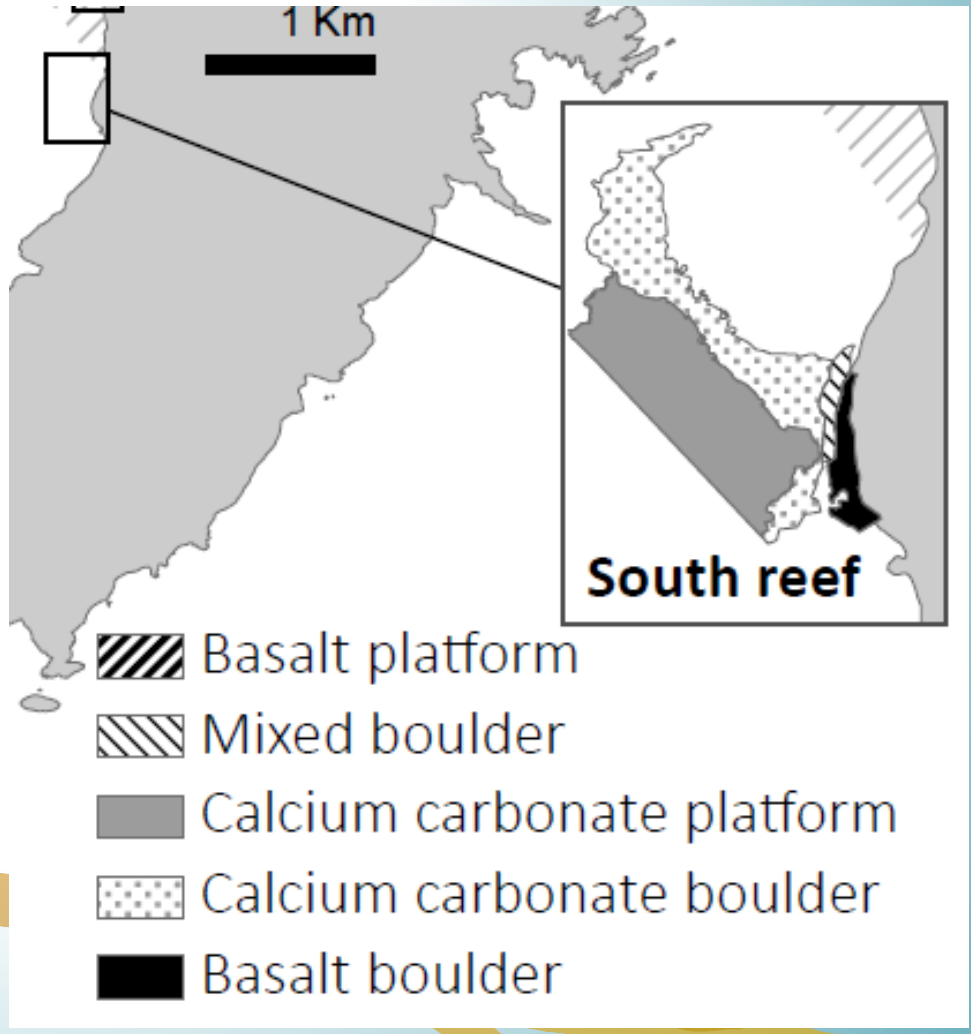
Basalt platforms

Mixed boulder

Calcium carbonate platform

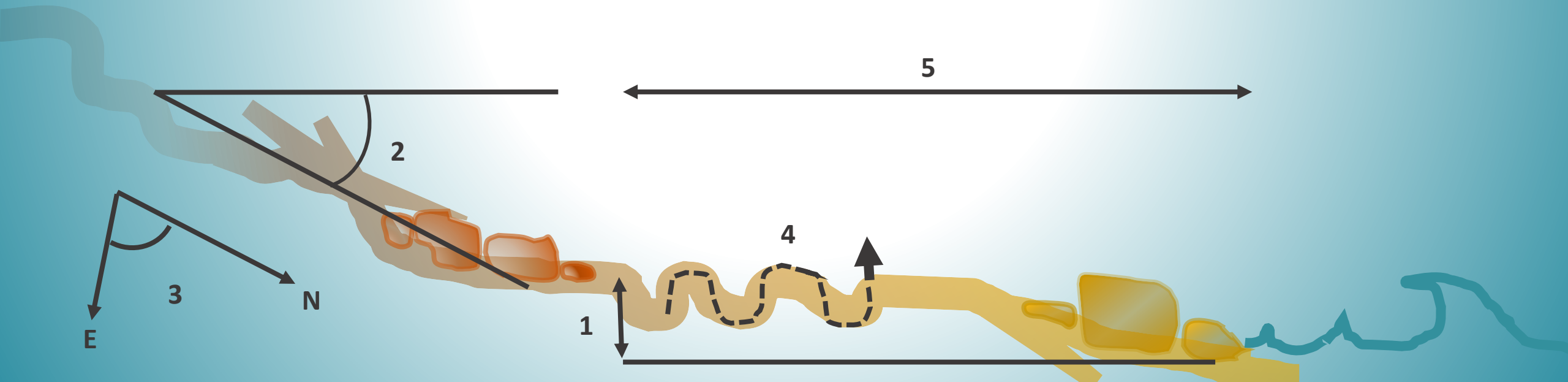
Basalt boulder

Calcium carbonate boulder



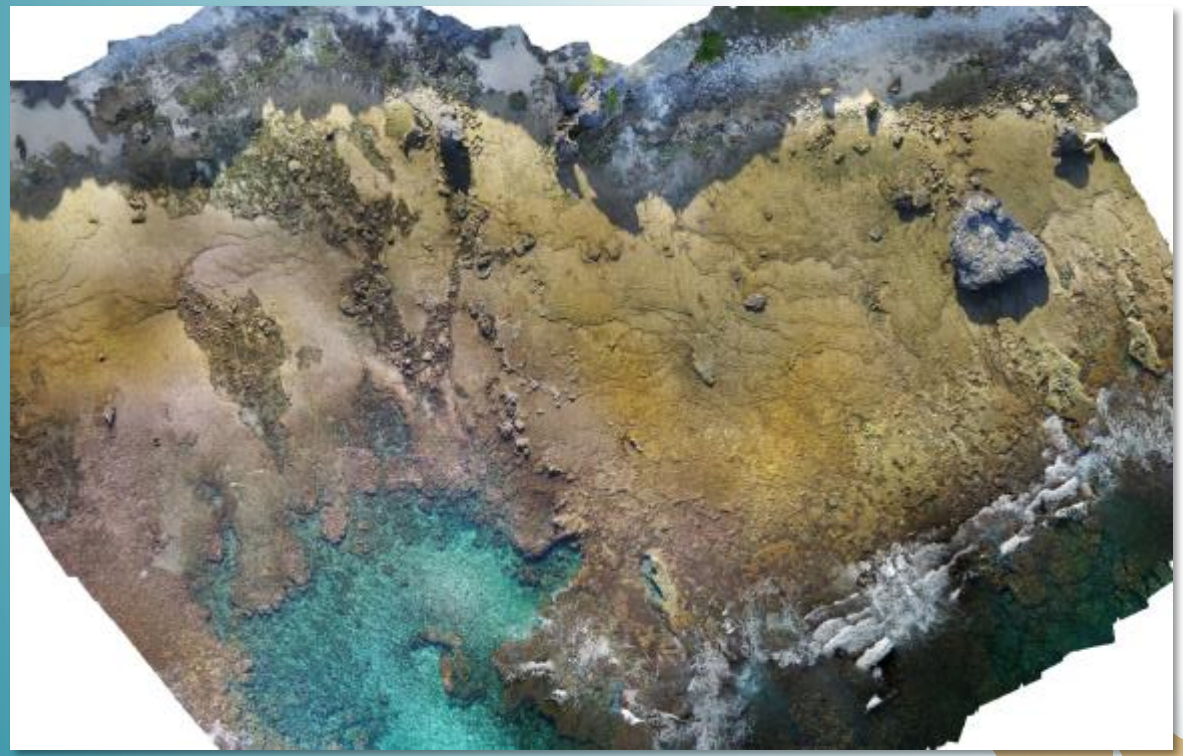
Other habitat variables influencing biodiversity

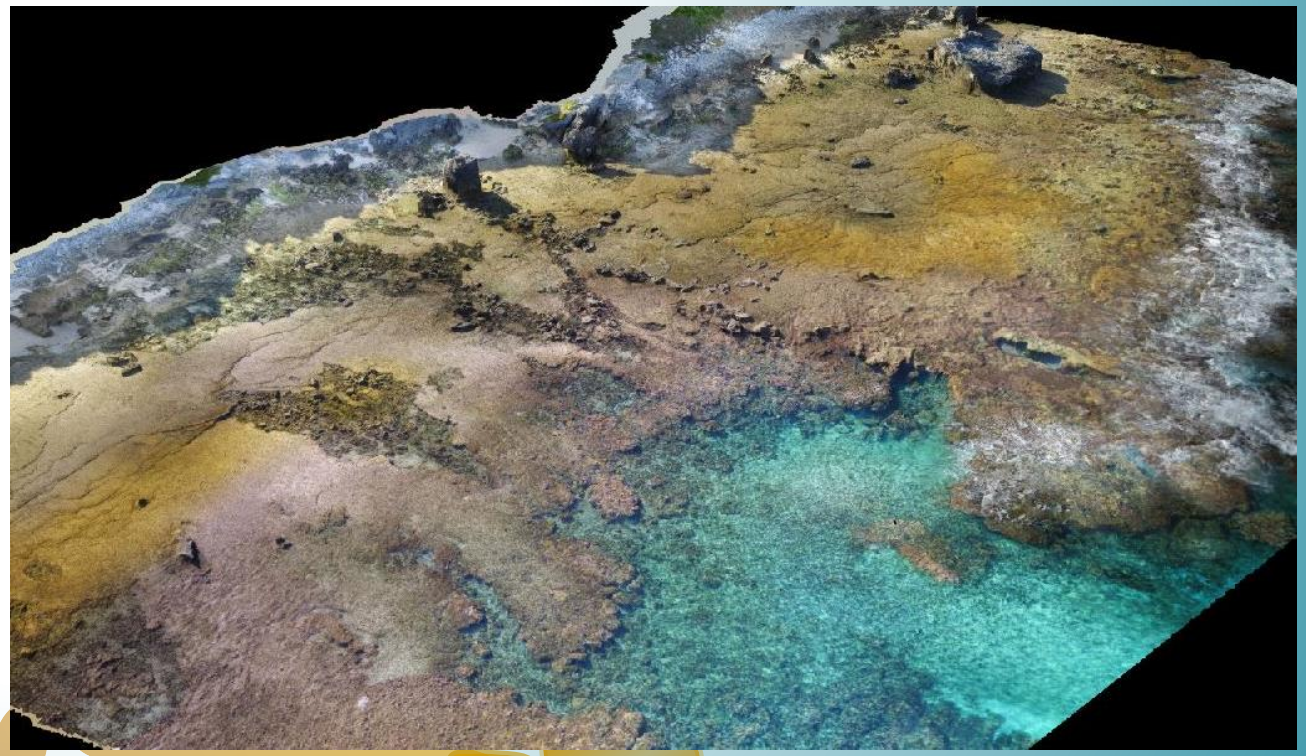
- Reef elevation (above sea level) [1]
- Reef slope [2]
- Reef aspect (which direction the reef surface faces) [3]
- Reef complexity (rugosity) [4]
- Distance to the seaward edge [5]



Drone aerial photography

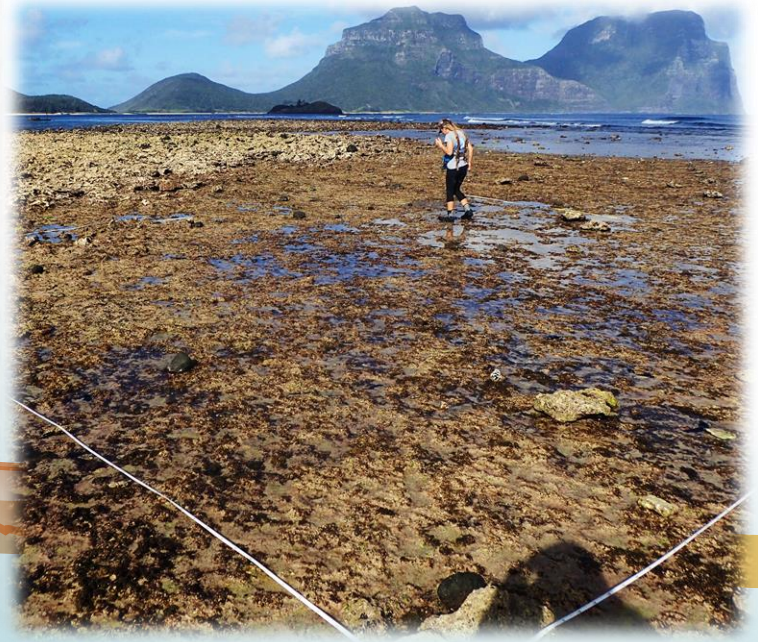
- Using photogrammetry to reconstruct 3D models (digital elevation models) of intertidal reefs
- Enables precise measurements of habitat characteristics





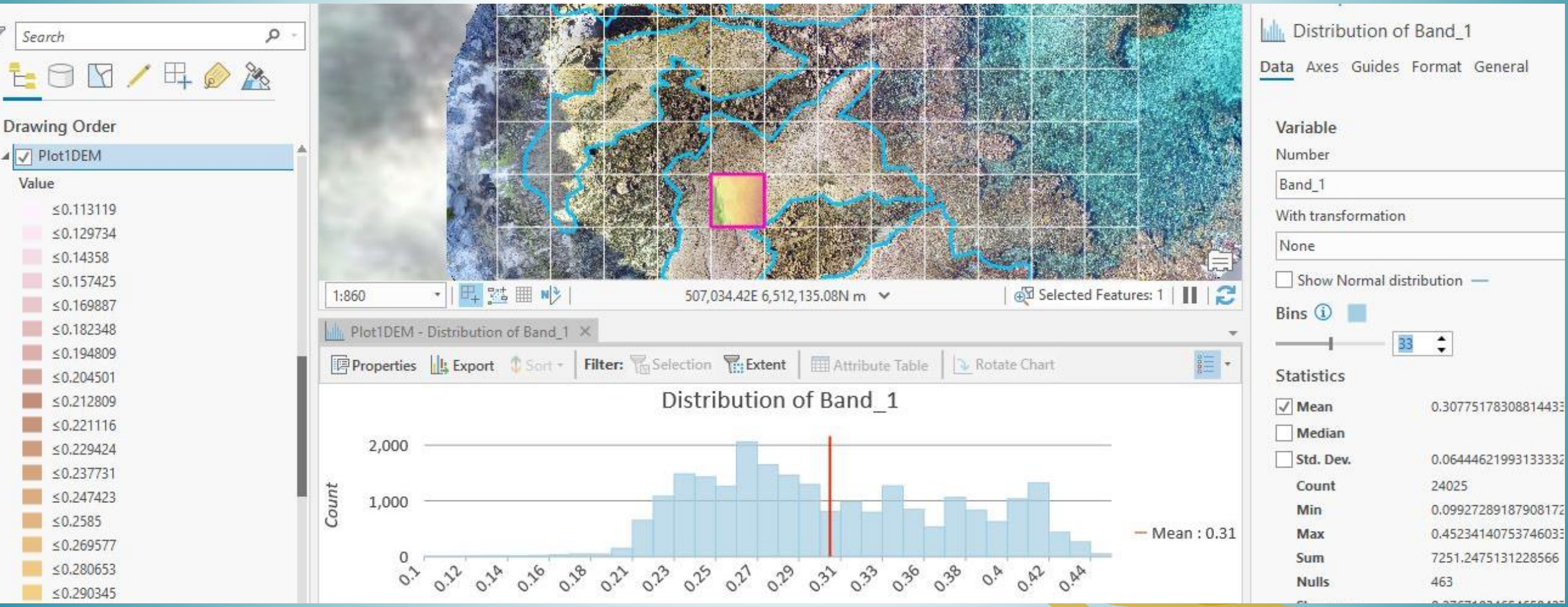
Visual surveys of target organisms

- 10m x 10m plots
- Generated using spatially balanced random sampling, geolocated
- Identity and abundance of solitary macro-invertebrates recorded
- 15,600 square metres of habitat surveyed in total



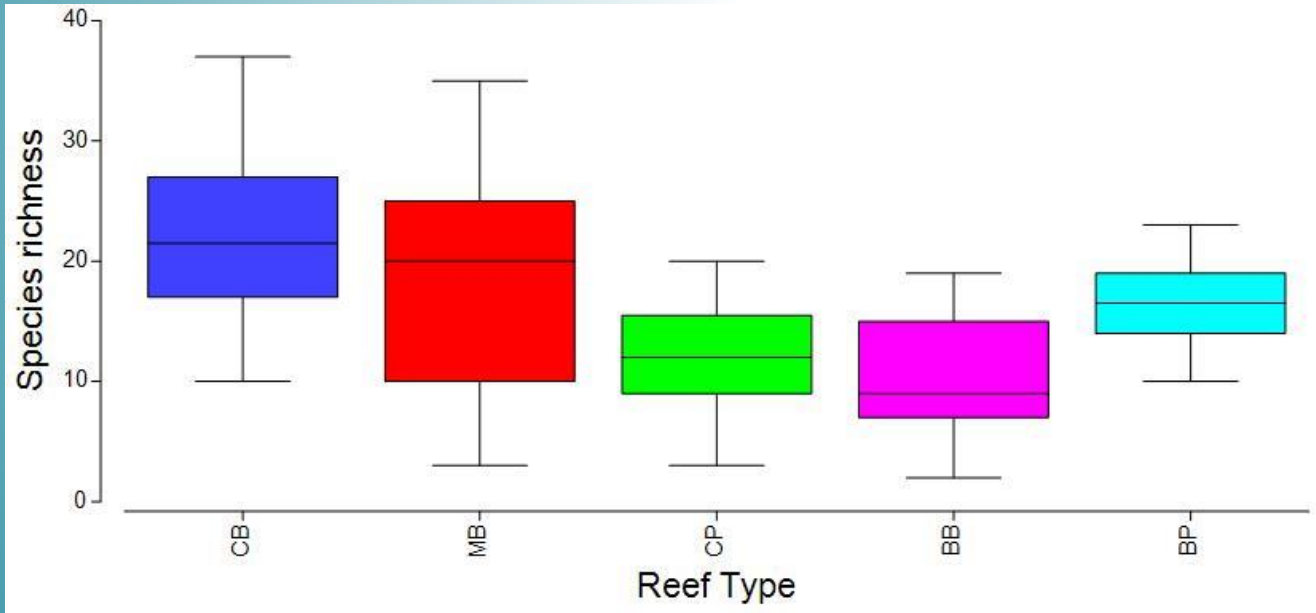
Measuring habitat characteristics of plot in ArcGIS

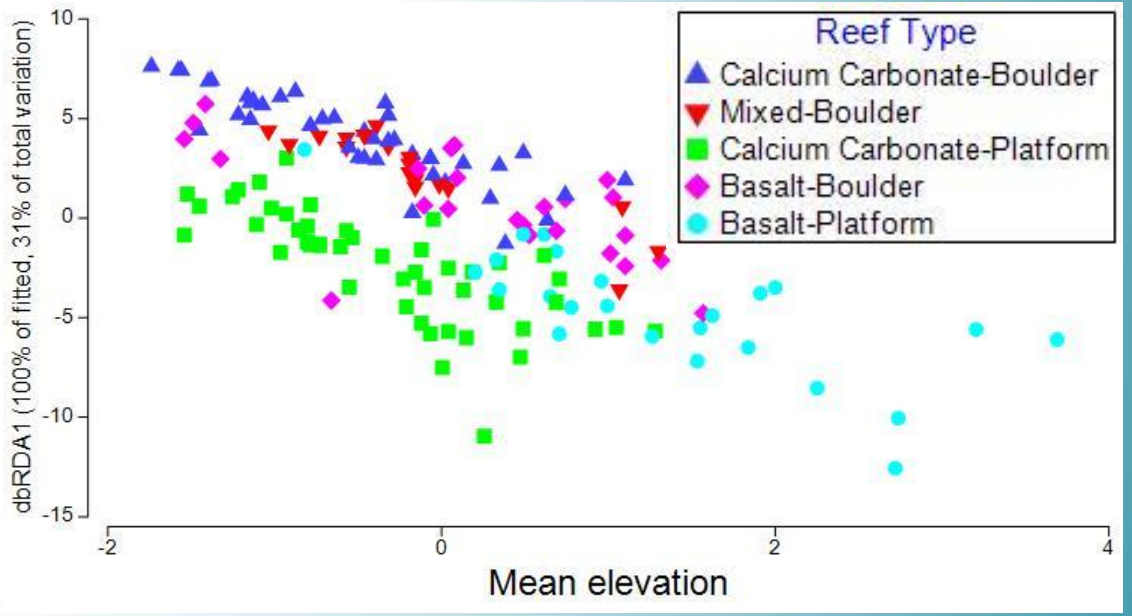
- Measures of central tendency, minimum, maximum and range for each plot



Determining which habitat characteristics best explain diversity

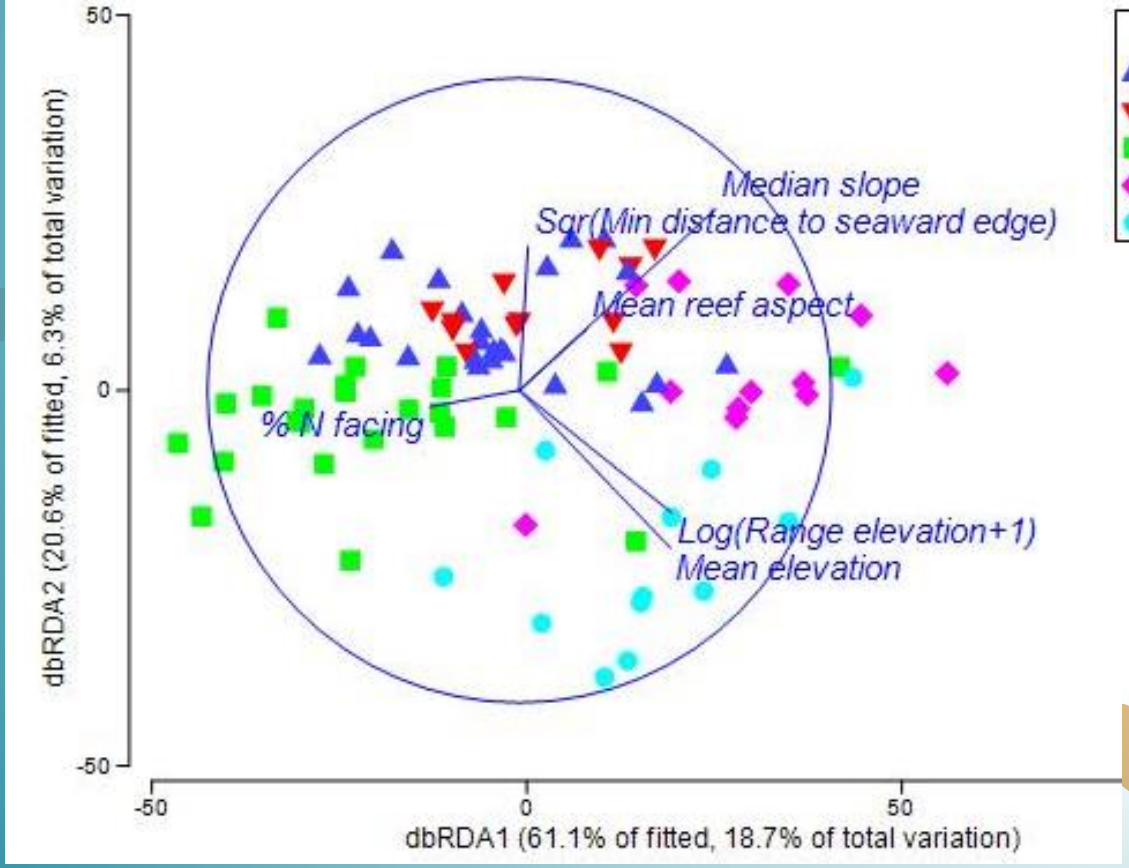
- Examine differences in diversity between reef types
- Regression analysis to determine which reef characteristics explain these differences (i.e. elevation)





Determining which habitat characteristics best explain variation in assemblage structure

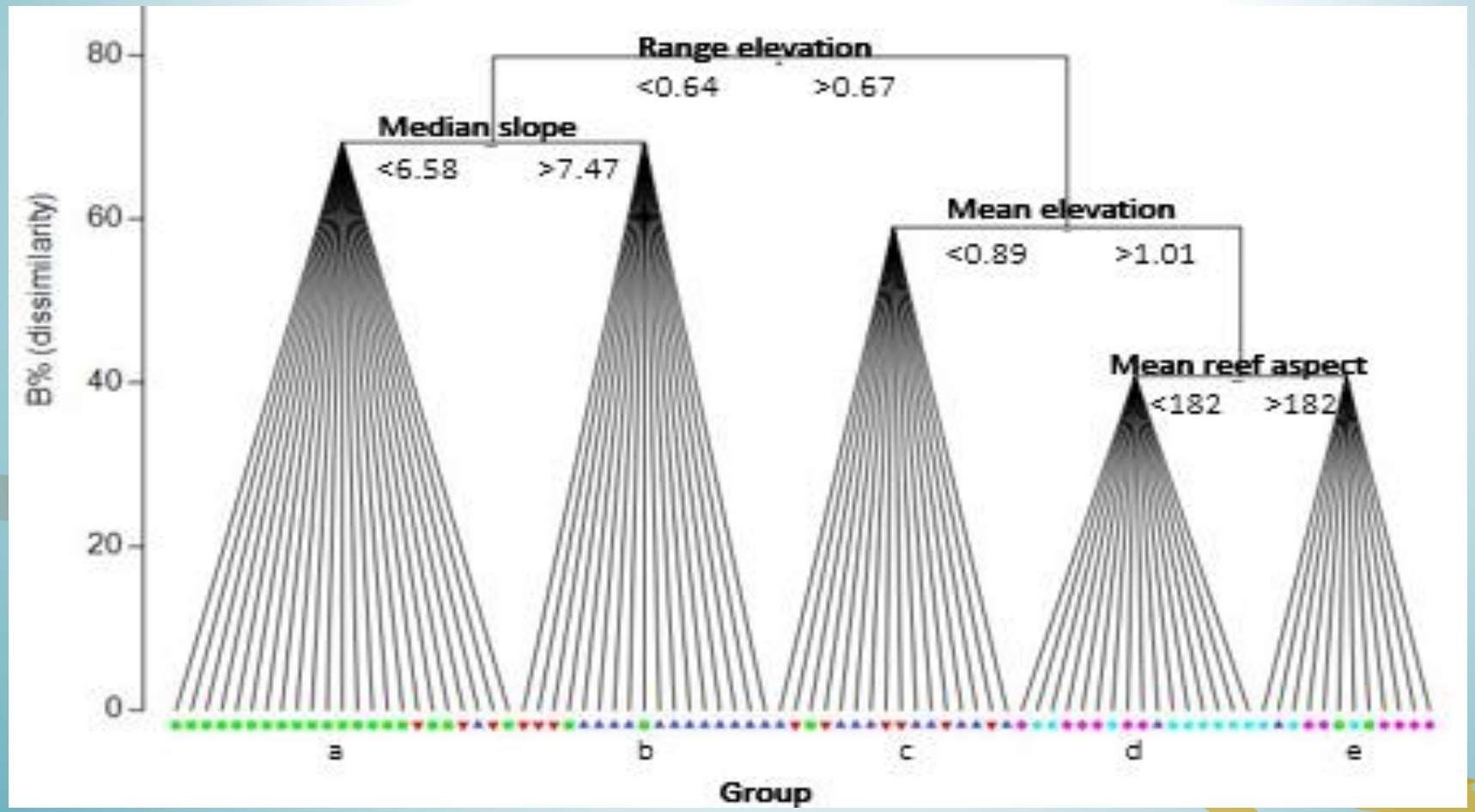
- Distance-based linear analysis to identify which characteristics explain overall patterns
- Identify whether different characteristics explain patterns within each reef type



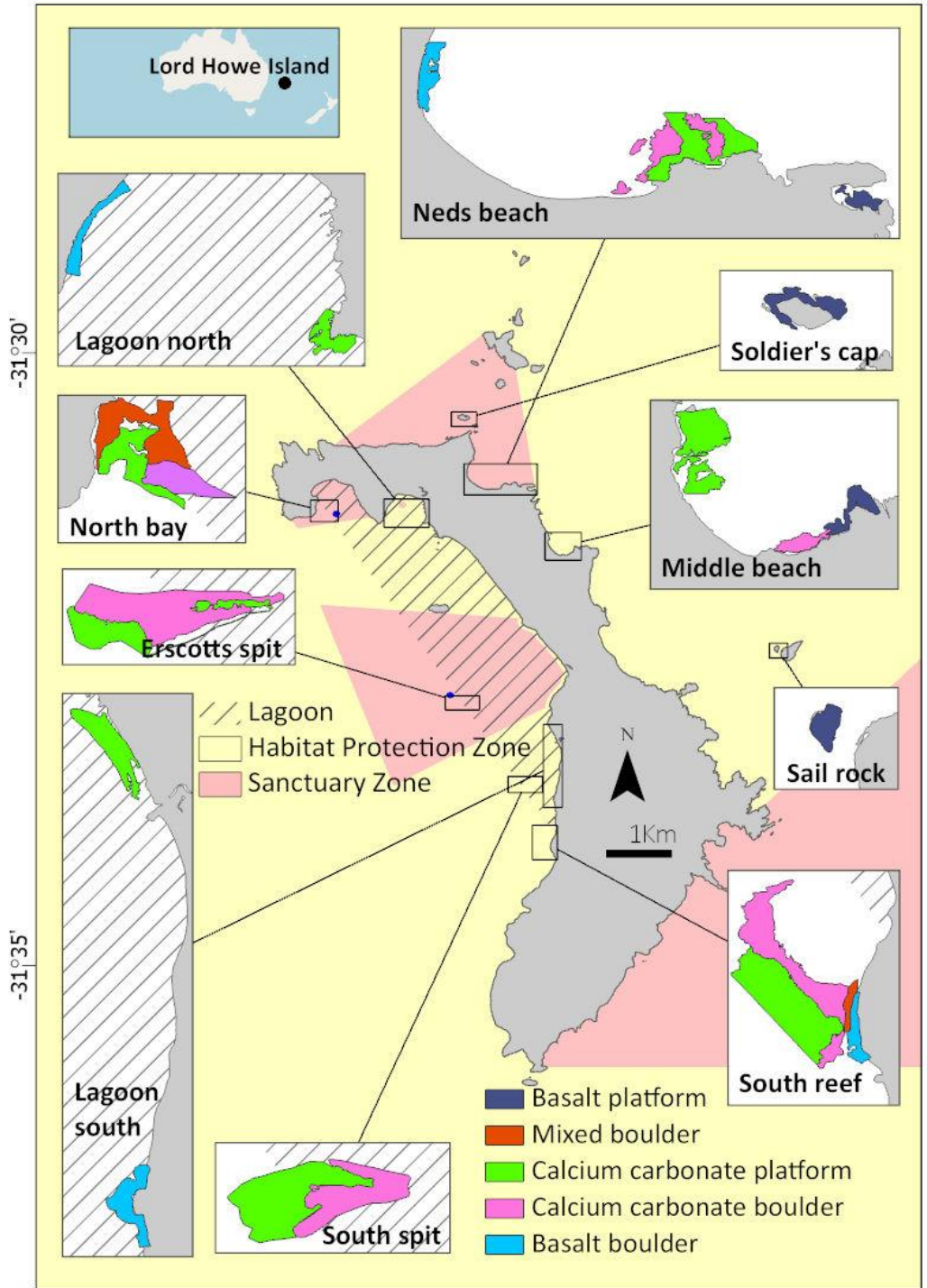
Reef type	BEST selection	
	% variation explained	*Selected variables*
Calcium carbonate boulder	7	Sqr(Min distance to seaward edge)
Calcium carbonate platform	12	Log(Range elevation+1)
Basalt boulder	30	% W facing
Basalt platform	23	% W facing
Mixed boulder	45	Log(Range elevation+1) Mean reef aspect

Developing and testing habitat classification schemes

- Using clustering algorithms
- Test predictive success rates on independent data



Synthesize results to predict patterns of biodiversity throughout the Lord Howe Island Marine Park and inform conservation management



Acknowledgements:

This project has been funded by the Centre for Sustainable Ecosystem Solutions (CSES) – University of Wollongong

In-kind support has been generously provided by:

NSW DPI Marine Parks: Sallyann Gudge, Emma Henry, Joe Nielson, Justin Gilligan
Drone pilot: Bake Thompson
Southern Cross University: Kirsten Benkendorff; Brendan Kellaher
University of Wollongong: Andy Davis; Matt Rees; Heidi Brown
Lord Howe Island Board: REP team
Ulitmate Position Group Pty Ltd
Manly Hydraulics Laboratory
Australian Museum: Stephen Keable (Curator of Marine Invertebrates); Mandy Reid (Curator of Marine Molluscs); Jorge Monter; Ian Loch; Des Beechley; Anne Hoggett; Anna Murray; Don Colgan; Jennifer Caiza
University of Sydney: Mitch Bryson; Maria Byrne
Monash University: Michela Mitchell
South Australian Museum: Andrea Crowther
Museum of Western Australia: Andrew Hosie
LHI Museum: Ian Hutton