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Pilbara Marine Conservation Partnership

Managing the conservation values of coral reef ecosystems in the Pilbara/Ningaloo region

This project is funded by the Gorgon Barrow Island Net Conservation Benefits Fund, which is administered by the WA Department of Parks and Wildlife.

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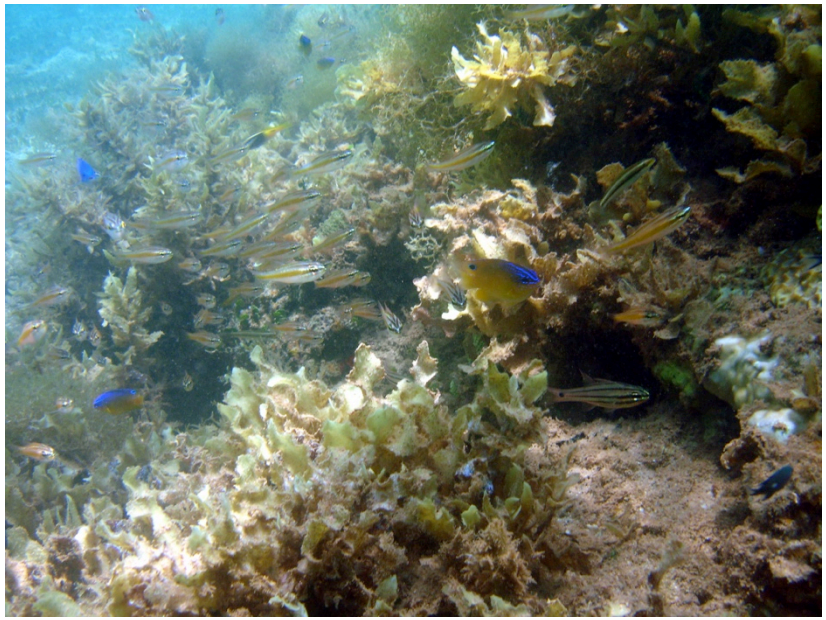
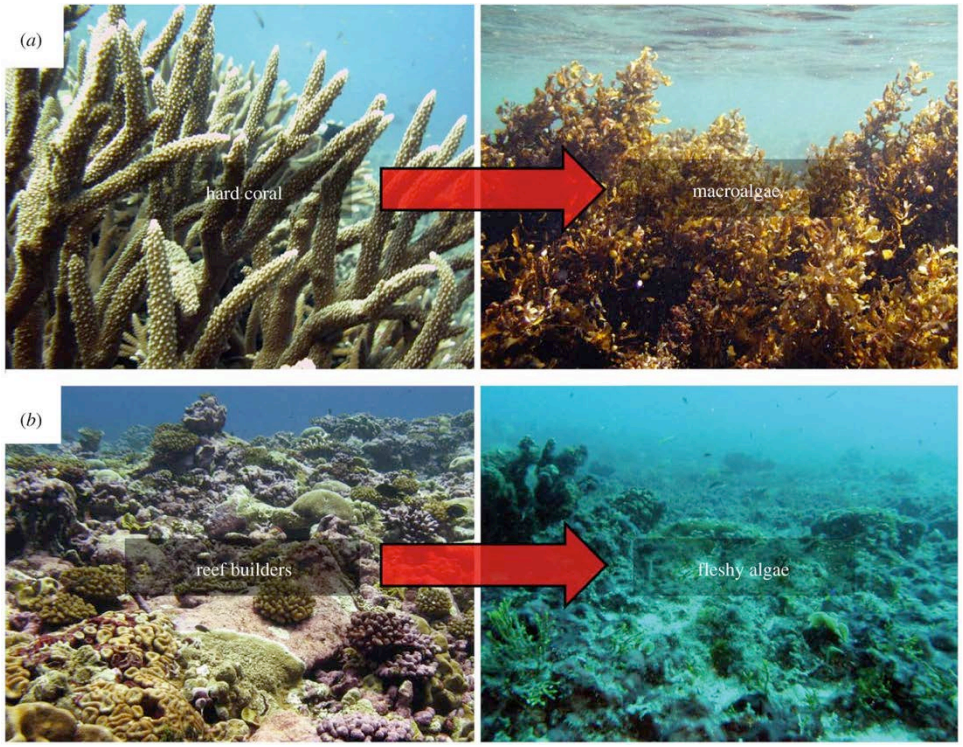
Macroalgae on shallow reefs

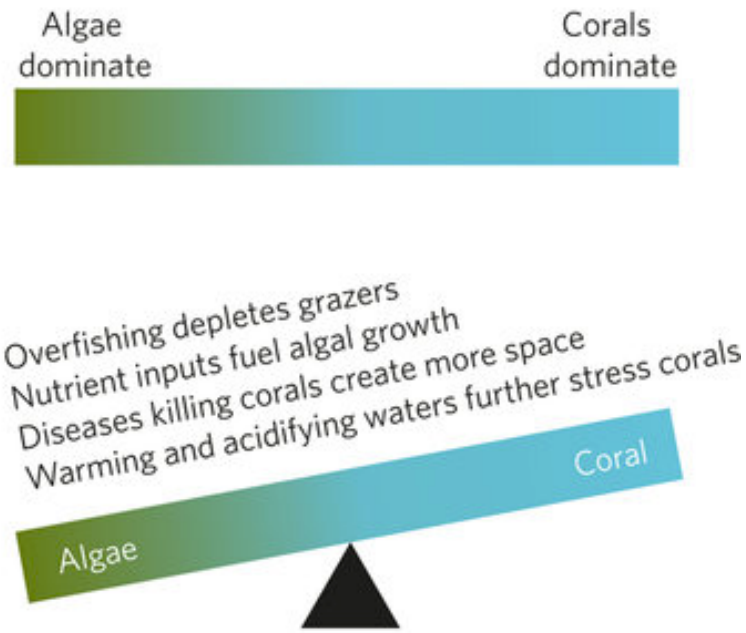


Ylva Olsen, Dan van Hees, Lydiane Mattio, Gary Kendrick

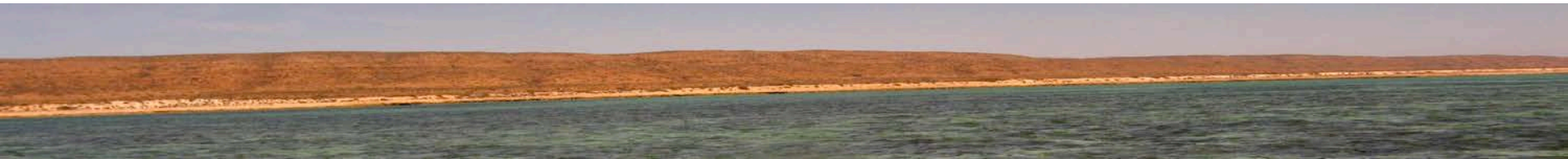
University of Western Australia

Balance between macroalgae and coral





Smith et al 2016 (Proc Royal Soc B)



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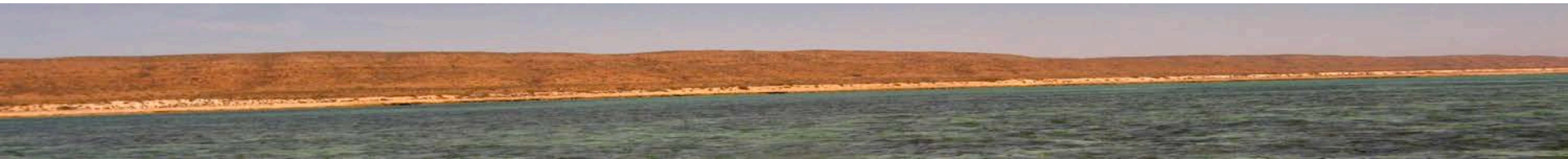
PMCP - Macroalgae on shallow reefs

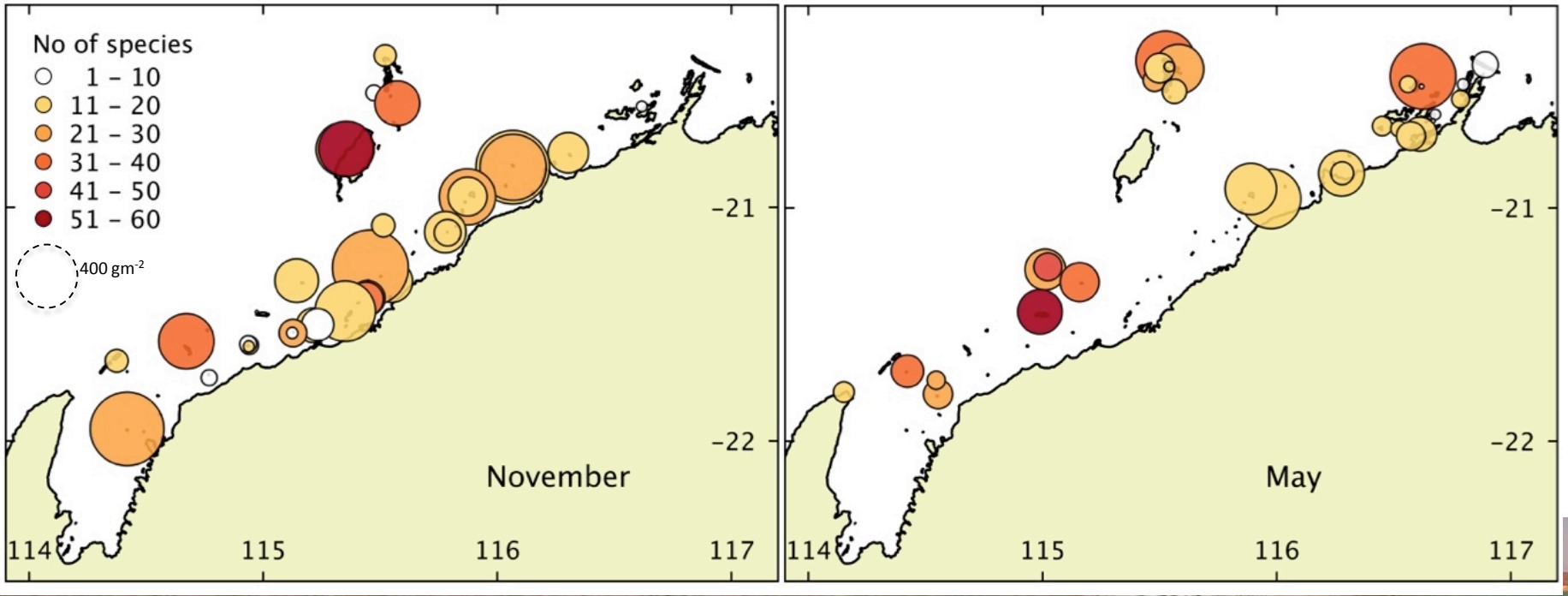
1. Characterization of macroalgal communities
2. Environmental and biotic drivers
3. Balance between grazing and growth



Pilbara Macrophyte distribution

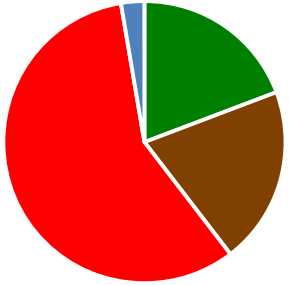
	Nov-13	May-14	Overall
Number of sites	34	41	75
Total # species	153	137	187
Species per site ± SE	18 ± 1.7	18 ± 1.9	18 ± 1.3
Median Biomass*	122	49	77
Mean Biomass* ± SE	179 ± 29	94 ± 17	132 ± 17
Max biomass*	574	430	574

*Biomass in g dry weight m^{-2}

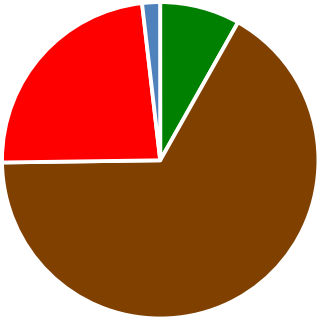


Macrophyte diversity and abundance

Species richness

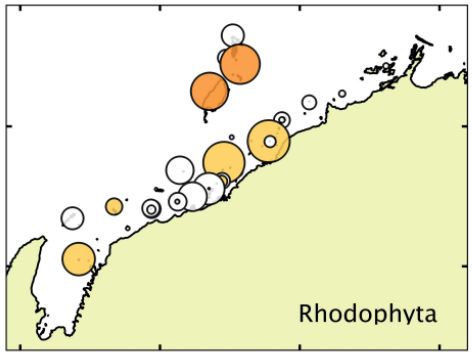


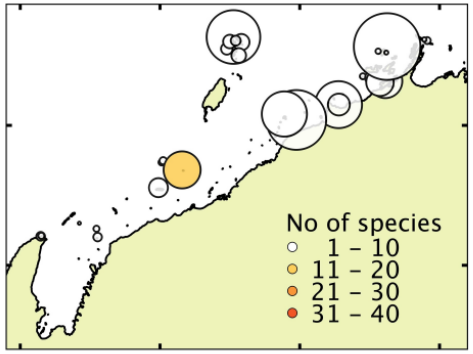
Biomass (g dw/m^2)



Chlorophyta Phaeophyceae

Rhodophyta Tracheophyta





November May

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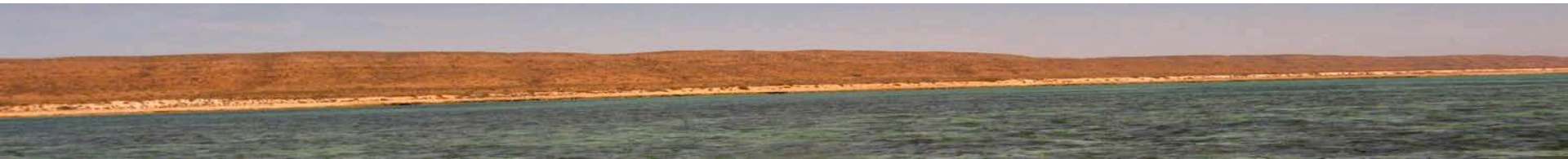
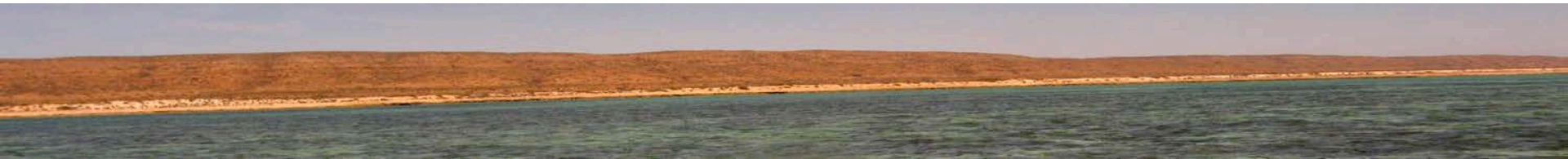


Environmental, geographic and biotic predictor variables

- Measured *in situ* in this study (Coral Reef Health)
  - Cover of hard coral, soft coral, sponges etc
  - Rugosity
  - UVis
  - Sediment characteristics
  - Herbivore abundances
- MODIS Satellite data
  - Water clarity (diffuse attenuation, chlorophyll a)
- Bureau of Meteorology
  - SST
- CARS Coast8
  - Salinity



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Macroalgal community structure

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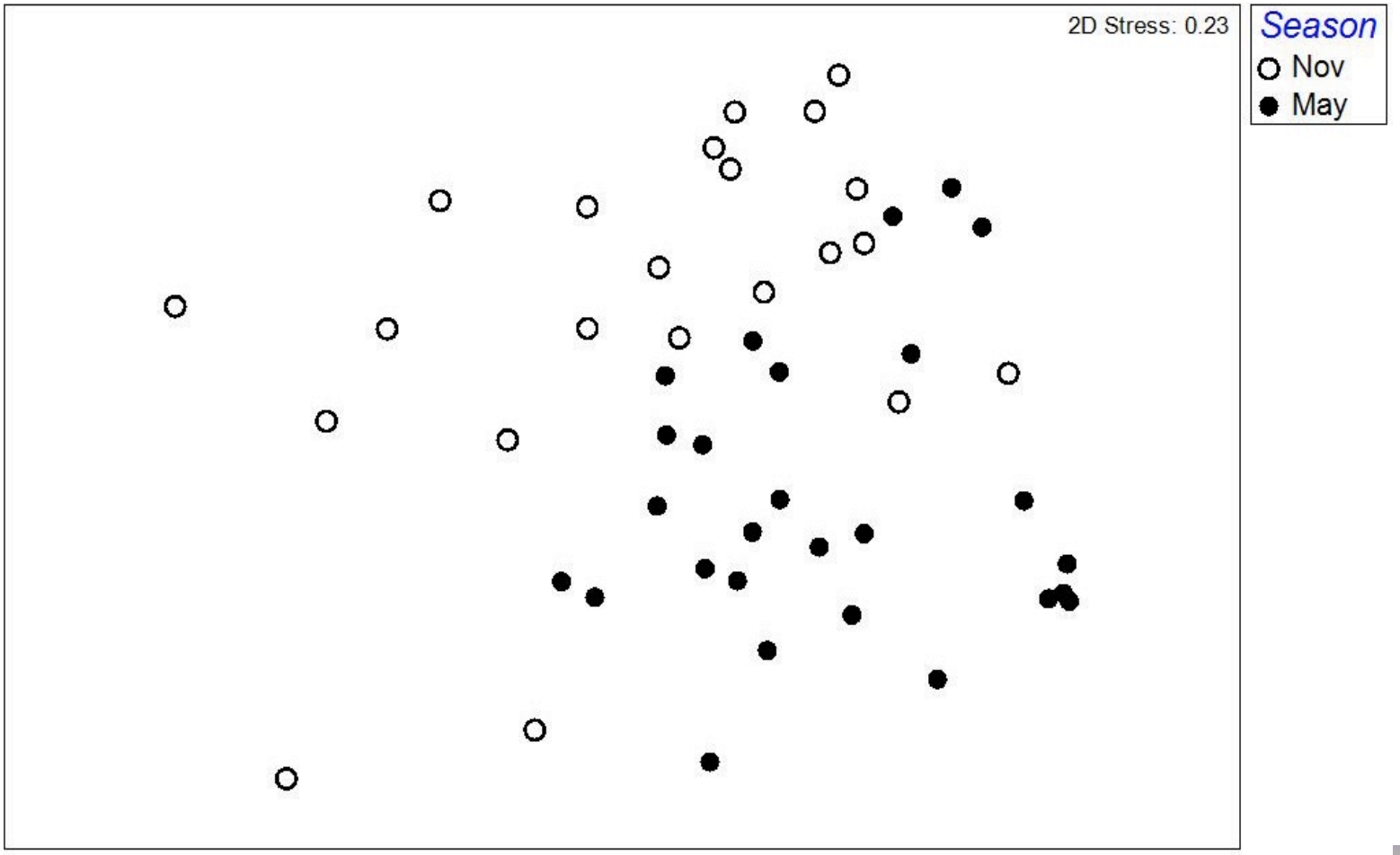
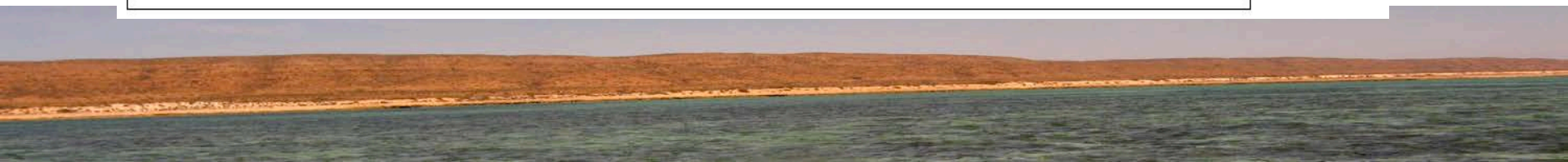
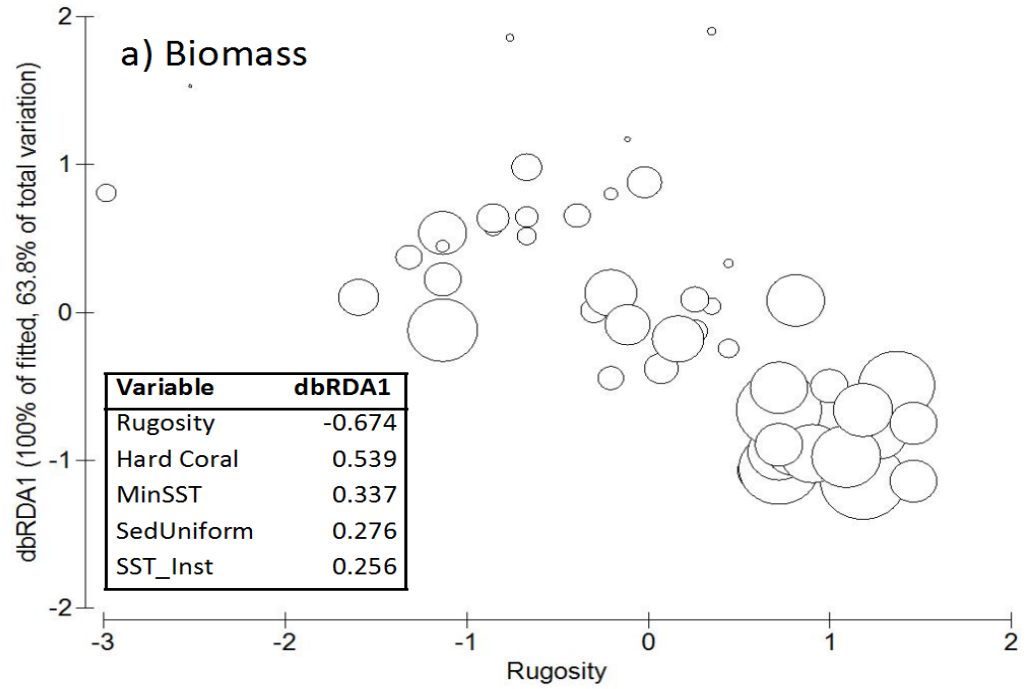
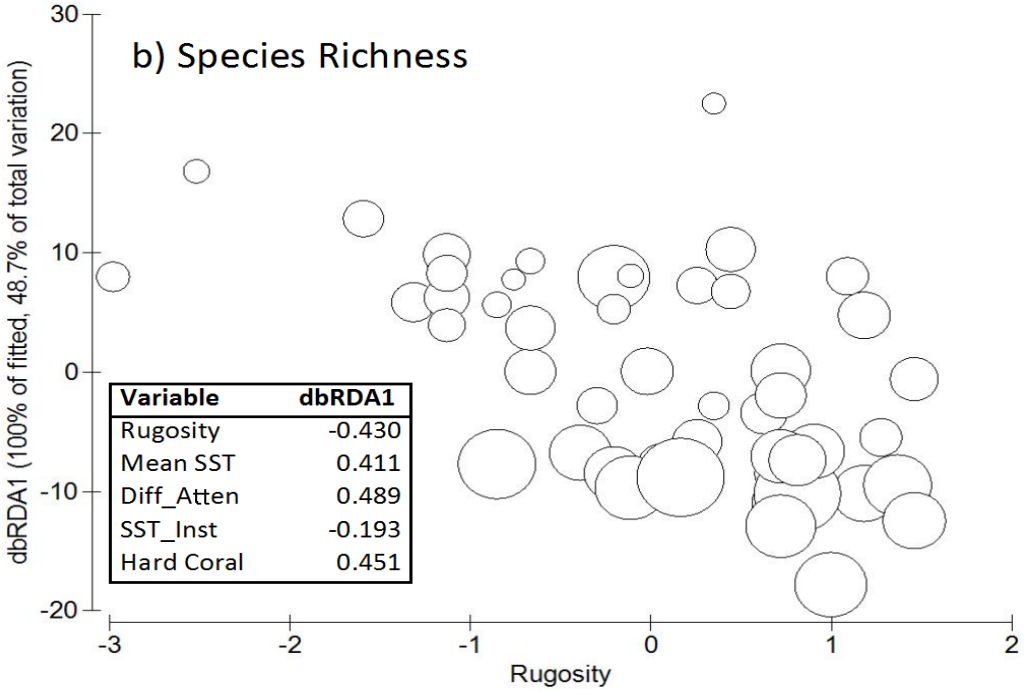


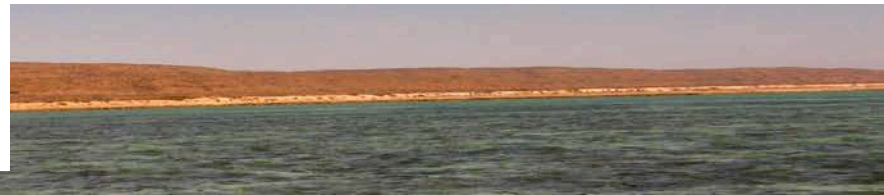


DistLMs

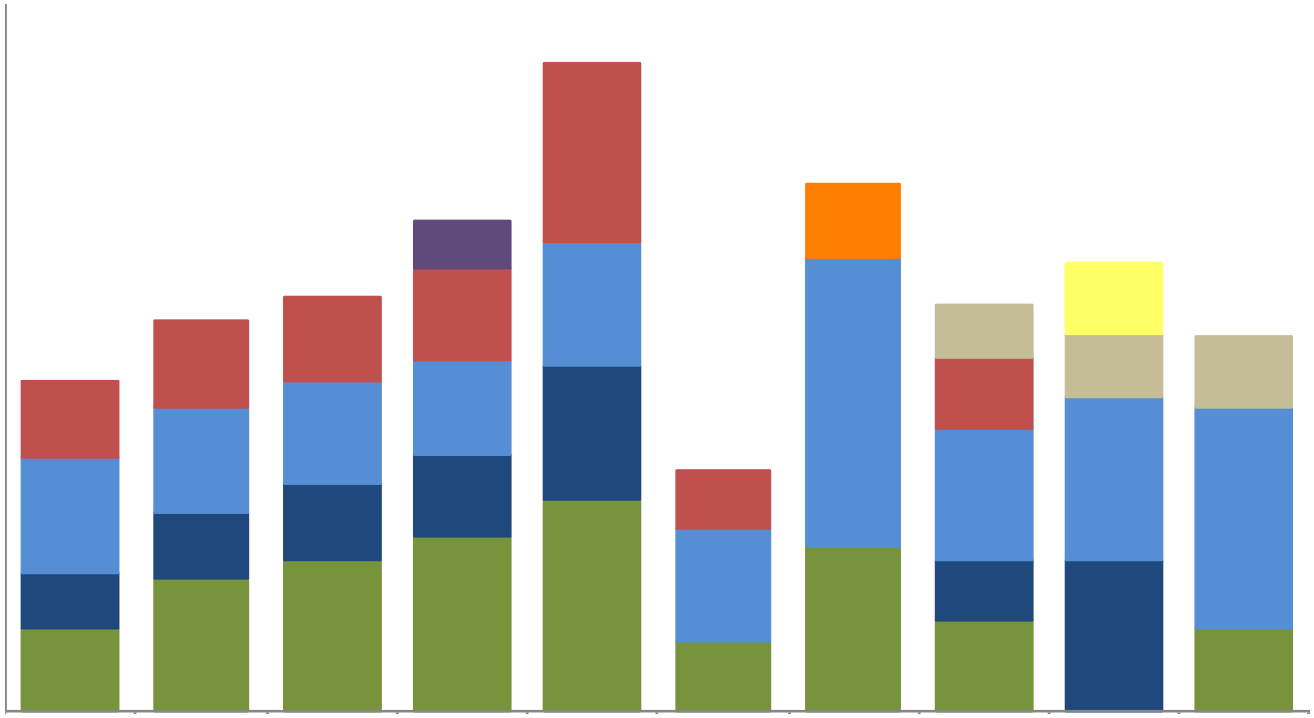




- Tested biomass and species richness of all algae and data set split into different taxonomic groups
- 50-80% of the variability in the data explained
- All models included SST
- Rugosity and hard coral cover were generally important
- Herbivore abundance was included in models for brown and green algae - explained little of the variability



Macroalgal Community Structure DistLMs



roperties
Diffuse Atten
Roving Herbivores
Invert Herbivores

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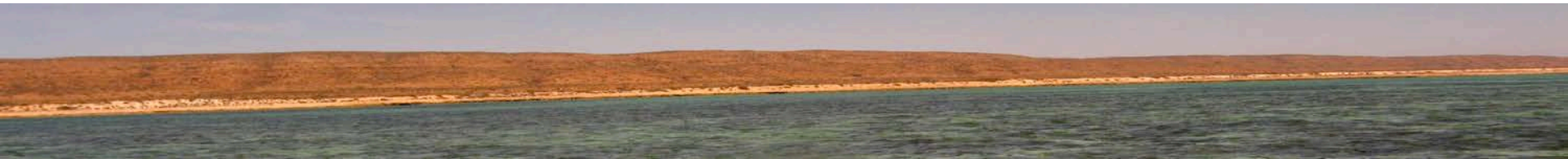
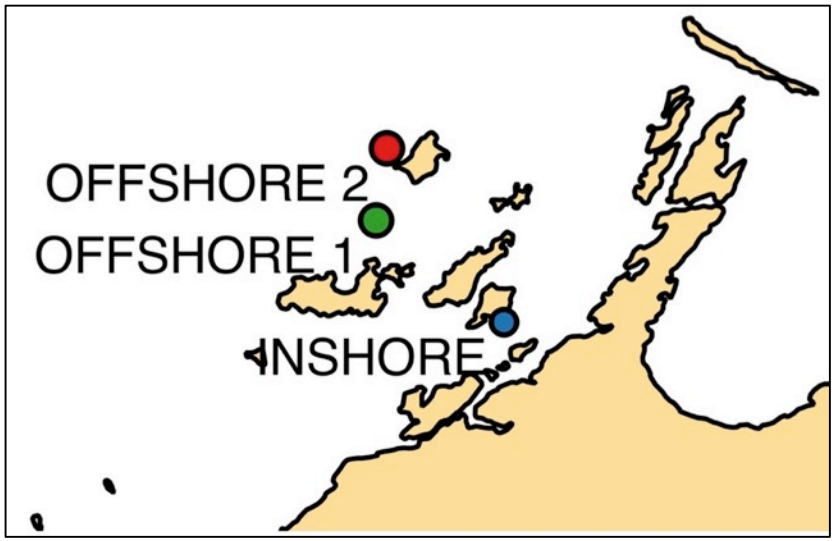


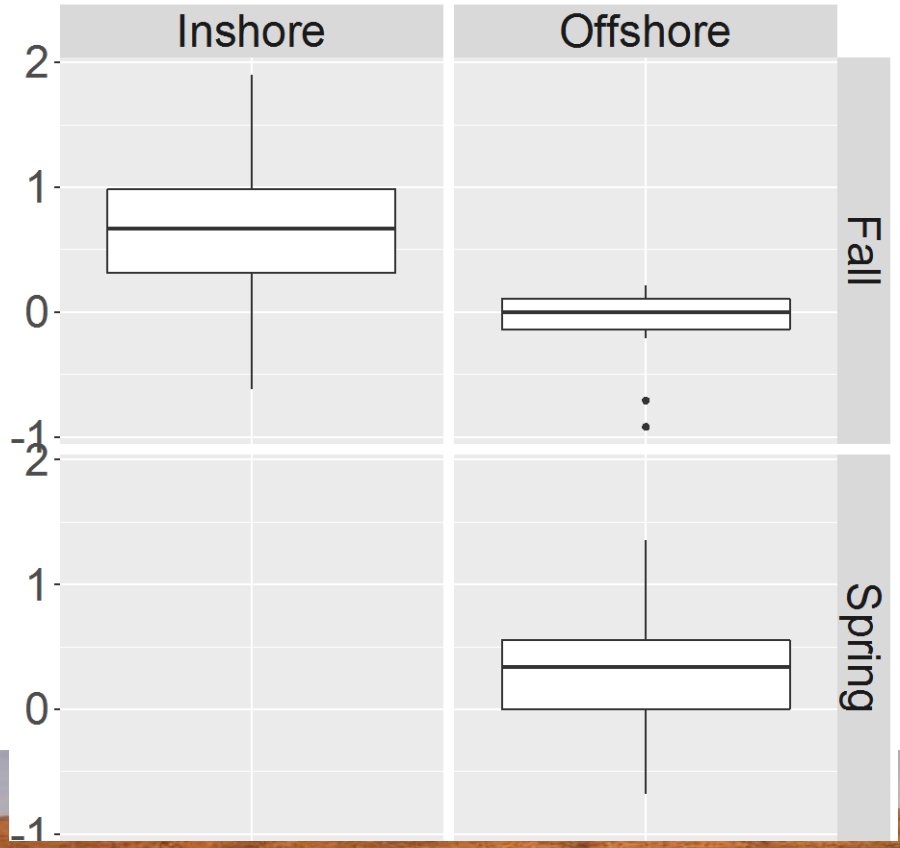
Process studies – Growth and Consumption Dampier Archipelago



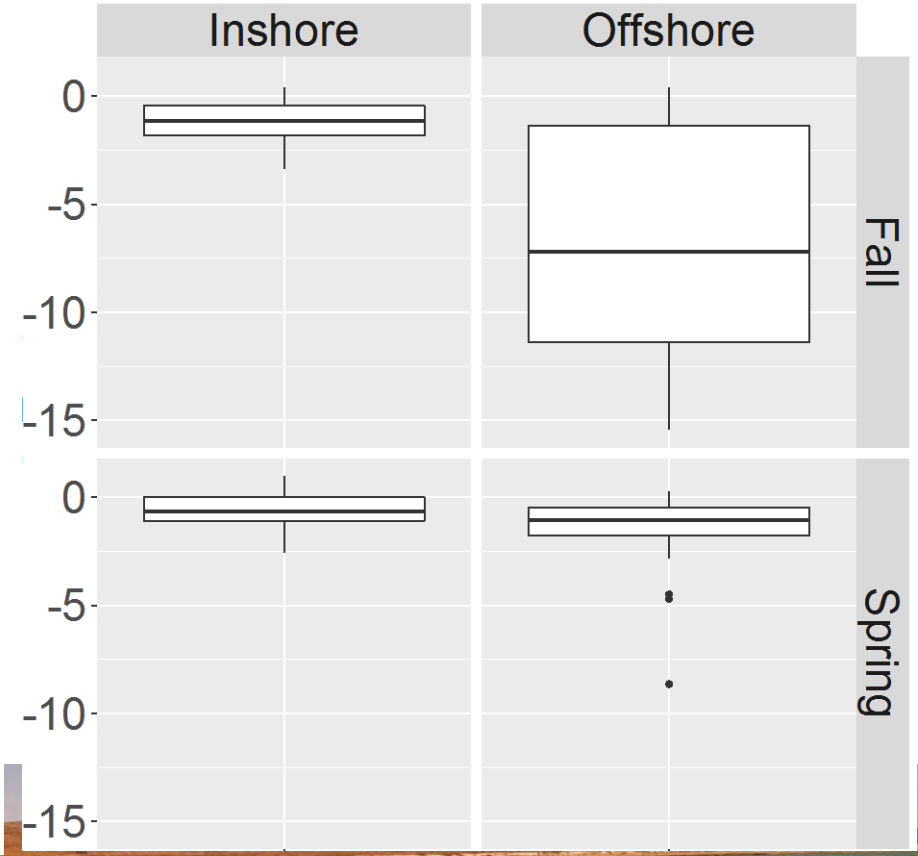
- Process studies in Dampier October 2015 and April 2016
- Growth and grazing of abundant Sargassum spp.
- Compared inshore and offshore sites
  - Differ in exposure (wave height) and temperature
  - But not in depth and light

Sargassum oligocystum

Net Growth (linear; cm day^{-1})

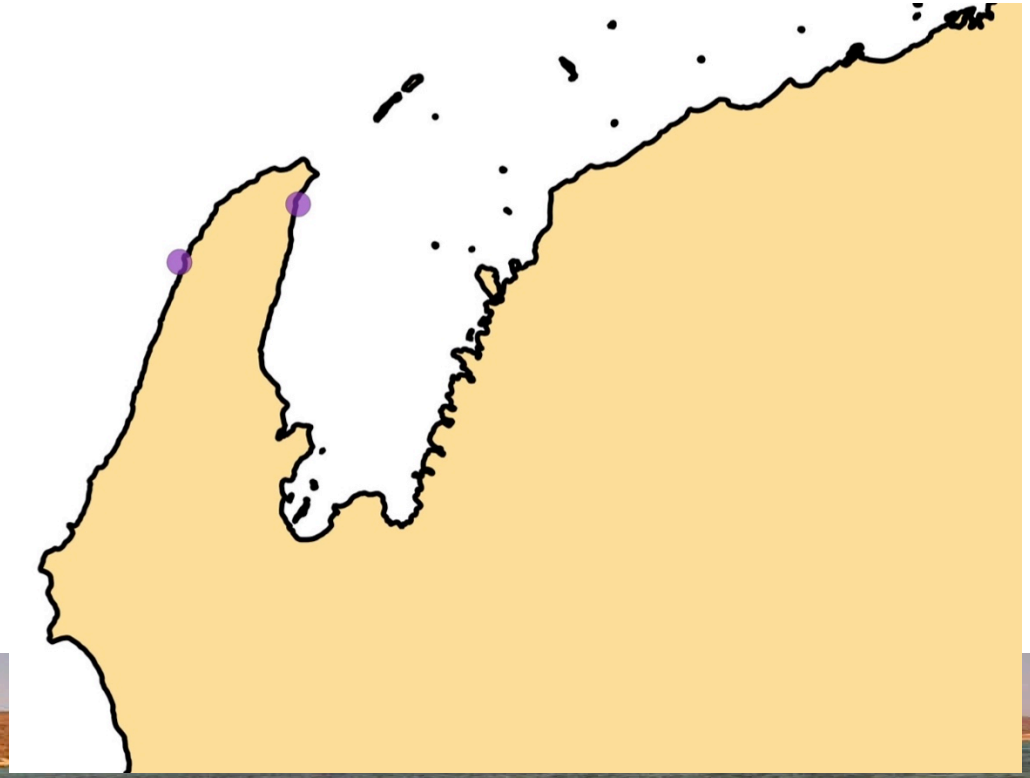


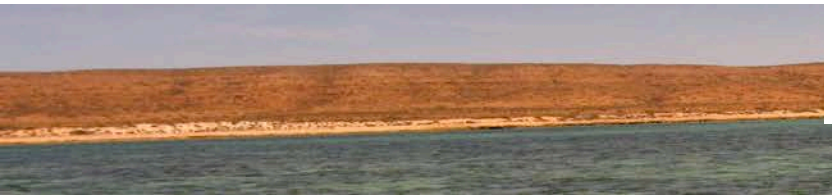
Consumption (g day^{-1})



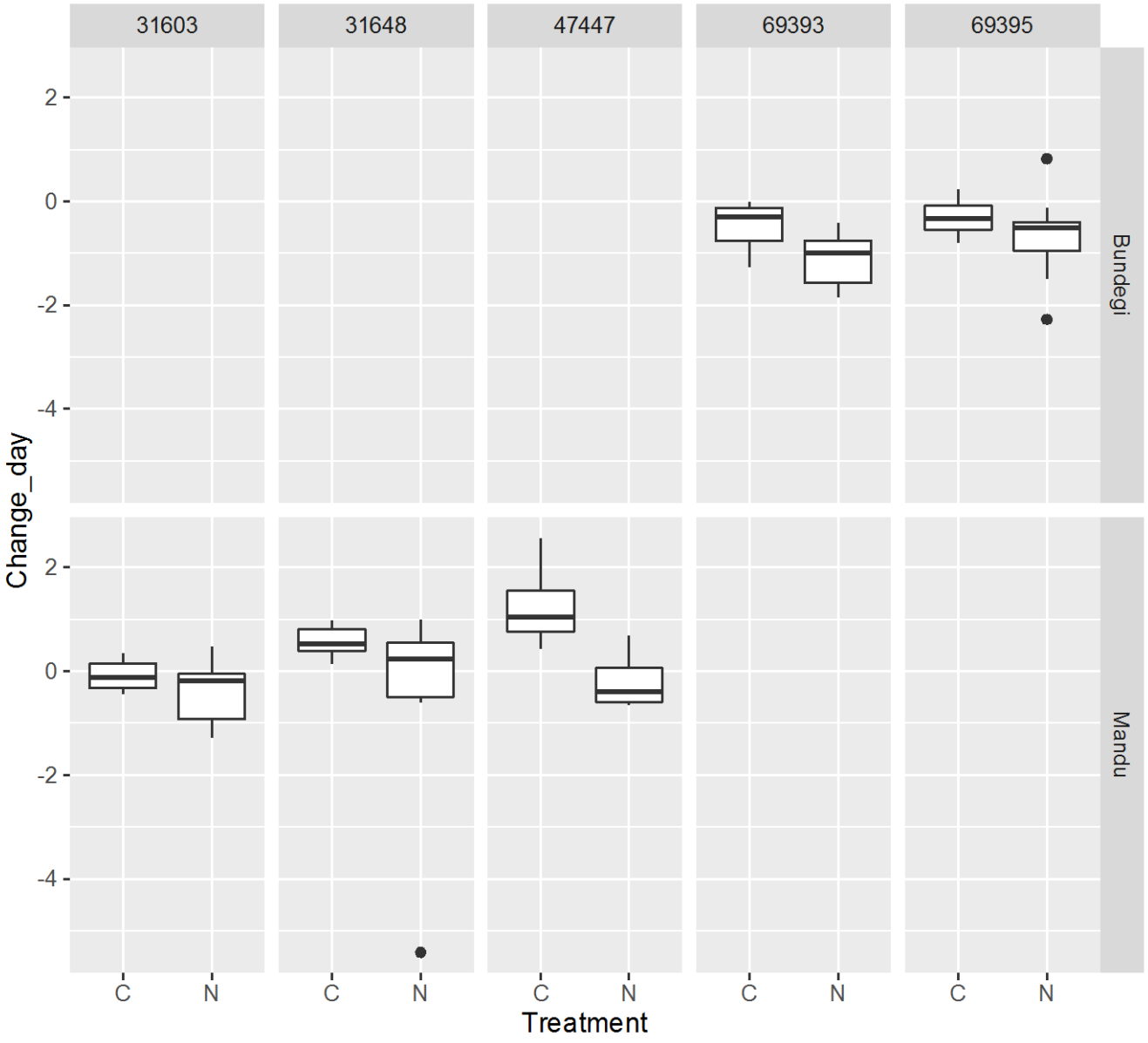
Ningaloo process studies

- Measured growth and consumption at Bundegi and Mandu (and Osprey)
- October 2015 and April 2016
- Methodological issues

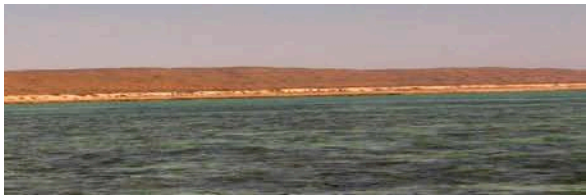




Limitation methodology



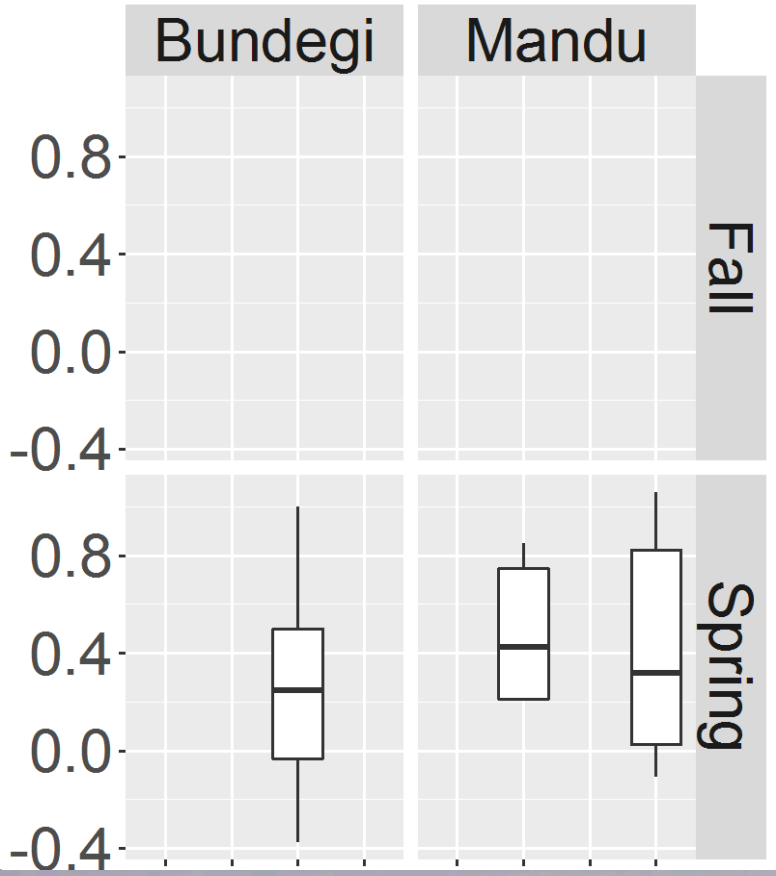
- Controls lost or gained significant biomass
- Erosion?
- Measuring errors?



Ningaloo

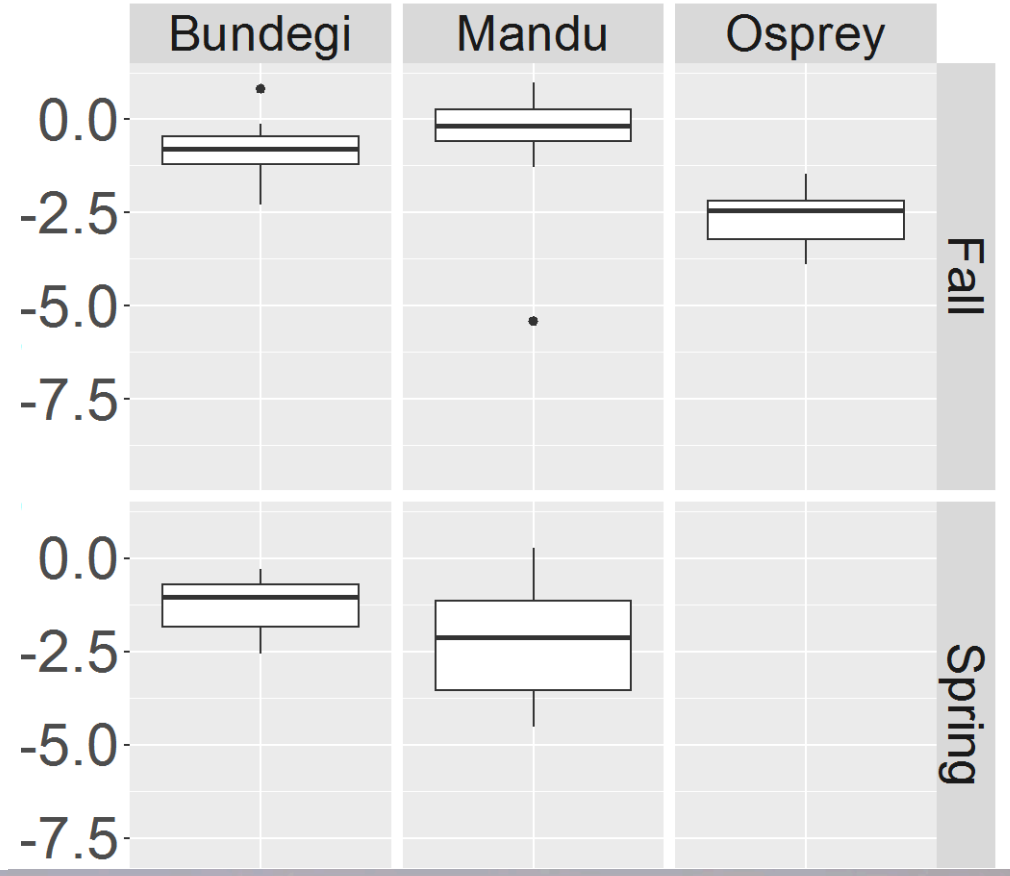
NB Three different Species

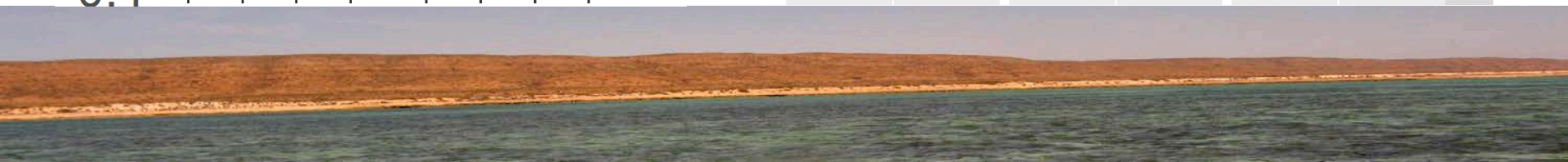
Net Growth (linear; cm day^{-1})



Sargassum Oligocystum

Consumption (g day^{-1})





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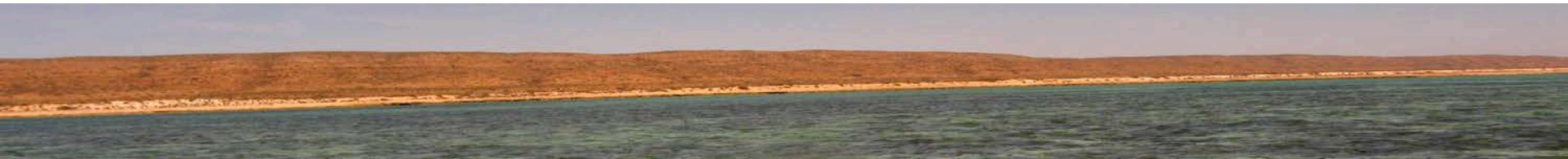
Conclusions

- Pilbara macrophyte communities: high level of diversity, spatial heterogeneity and complexity
- Seasonal pattern, but little spatial structure in data
- Rugosity, hard coral cover, SST and salinity were main drivers
- At Dampier consumption of *Sargassum oligocystum* was high and net growth low offshore in April
- At Ningaloo we had methodological issues and results are difficult to interpret, but no obvious differences among sites or species found



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Acknowledgements

Coral Reef Health group from CSIRO
Caroline Ochieng-Erftemeijer (UWA)

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