ningaloo outlook

BHP CSIRO

Building knowledge of character and processes on deep reefs – results from 2017

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Ningaloo Outlook – A partnership between BHP and CSIRO

WESTERN COASTAL/OCEAN & ATMOSPHERE
www.csiro.au

CSIRO

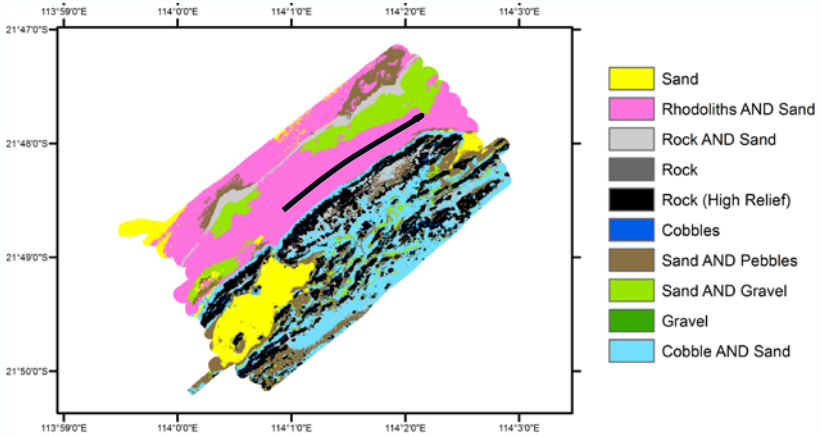
Ningaloo Outlook is a BHP-CSIRO Industry-Science Marine Research Partnership investing A$5.4 million over five years to gather new knowledge on the Ningaloo reef and its important ecological values

Overview

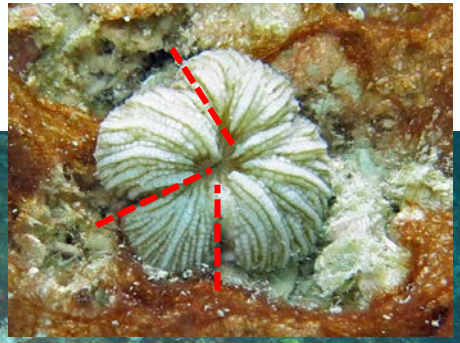
- Characterise Deepwater Benthic Assemblages
  - Map substrata
  - Classify communities
  - Novel assemblages: *Cycloseris*
- Understand and Quantify Ecological Processes on Deep Reefs
  - Recruitment
  - Variability

Novel assemblage - *Cycloseris distorta*

- 2.7km long bed, average 90m wide in depths 38-42m
- Density 51 m^{-2} but >100 m^{-2} in places
- Up to 12 million individuals
- Goldilocks Zone?



fragmentation



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Magic Mushrooms

A Coral Reef good news story….

- Total media coverage: 1.4M (13 separate TV clips, running nationally over two days)
- Total social media: 28,637 (Facebook 7,053, LI 11,072 Twitter 10,512); likely higher as ABC shared story on Facebook and Twitter
- feature news story of the day in Qantas lounges across Australia.

Ecological processes - Recruitment

Can deep reefs act as refugia for shallow reef areas?

- Implications for climate change impacts and reef resilience

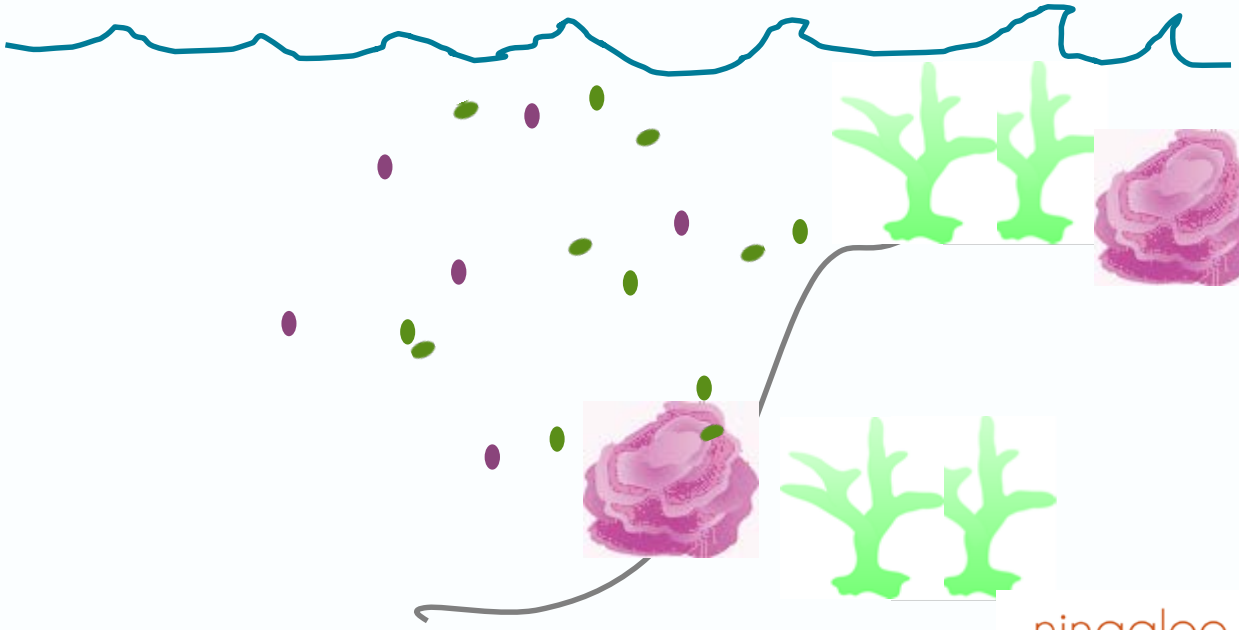
How do recruitment rates on deep reefs compare to those in shallow reefs?

- Will influence ability to recover from disturbances

Recruitment and Deep Reefs as Refugia

For deep reefs to act as refugia, larvae would have to settle across the depth range, resulting in uniform recruit assemblages.

Subsequent differential mortality would then produces differences in assemblages across depths



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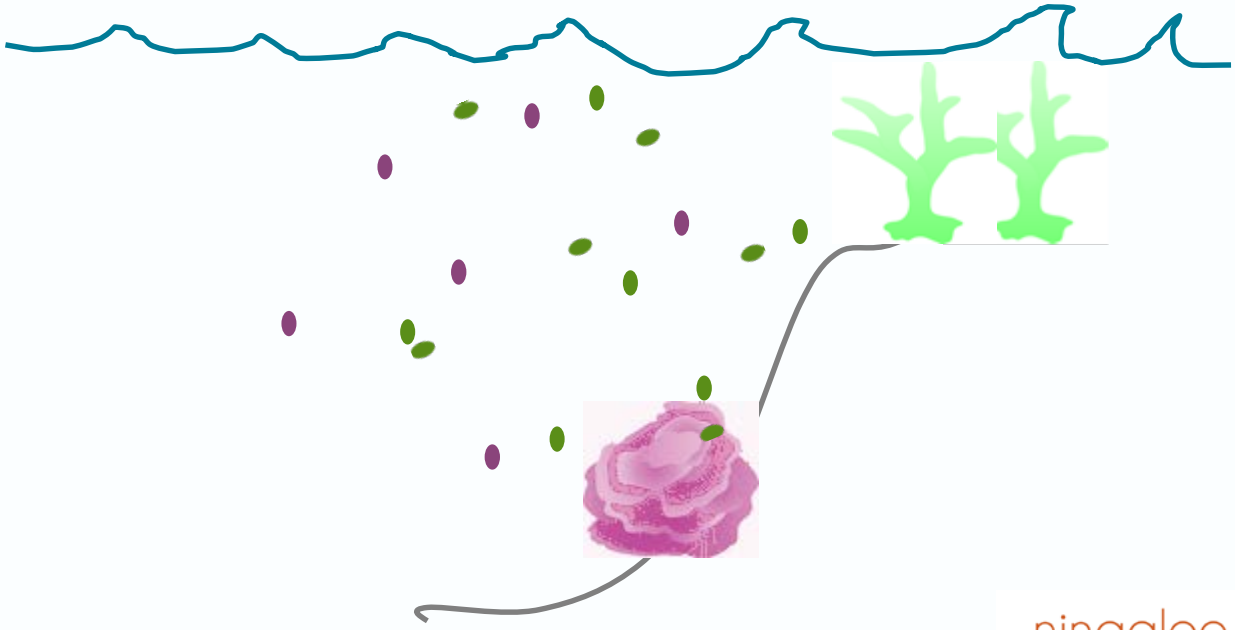
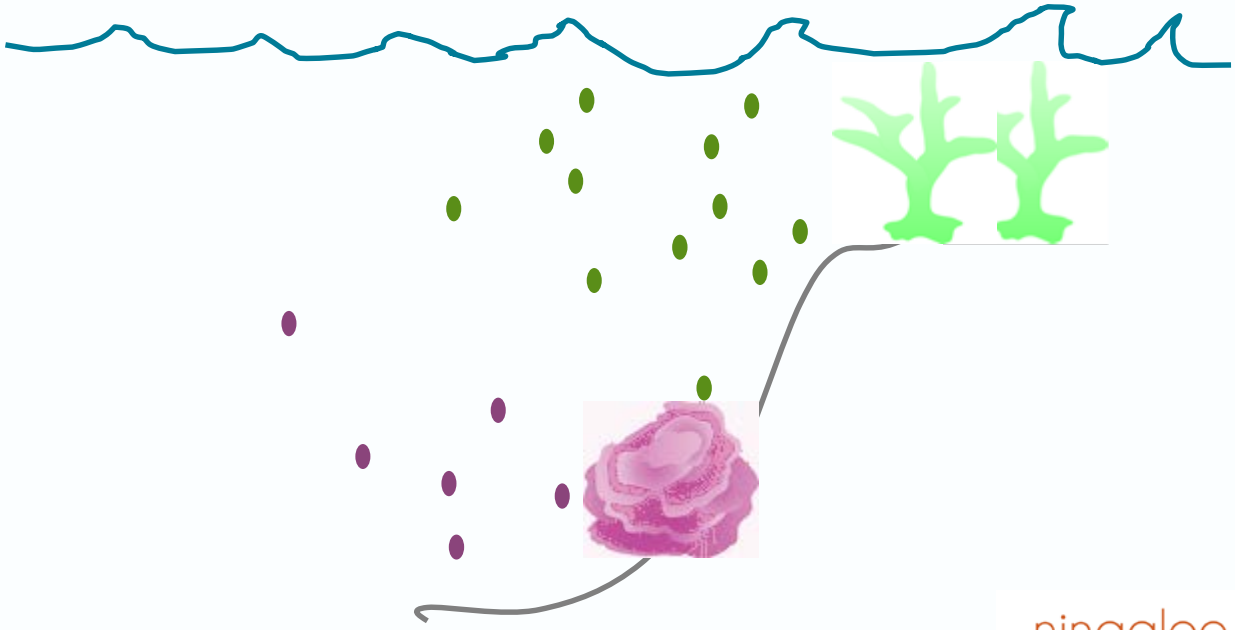


Recruitment and Deep Reefs as Refugia

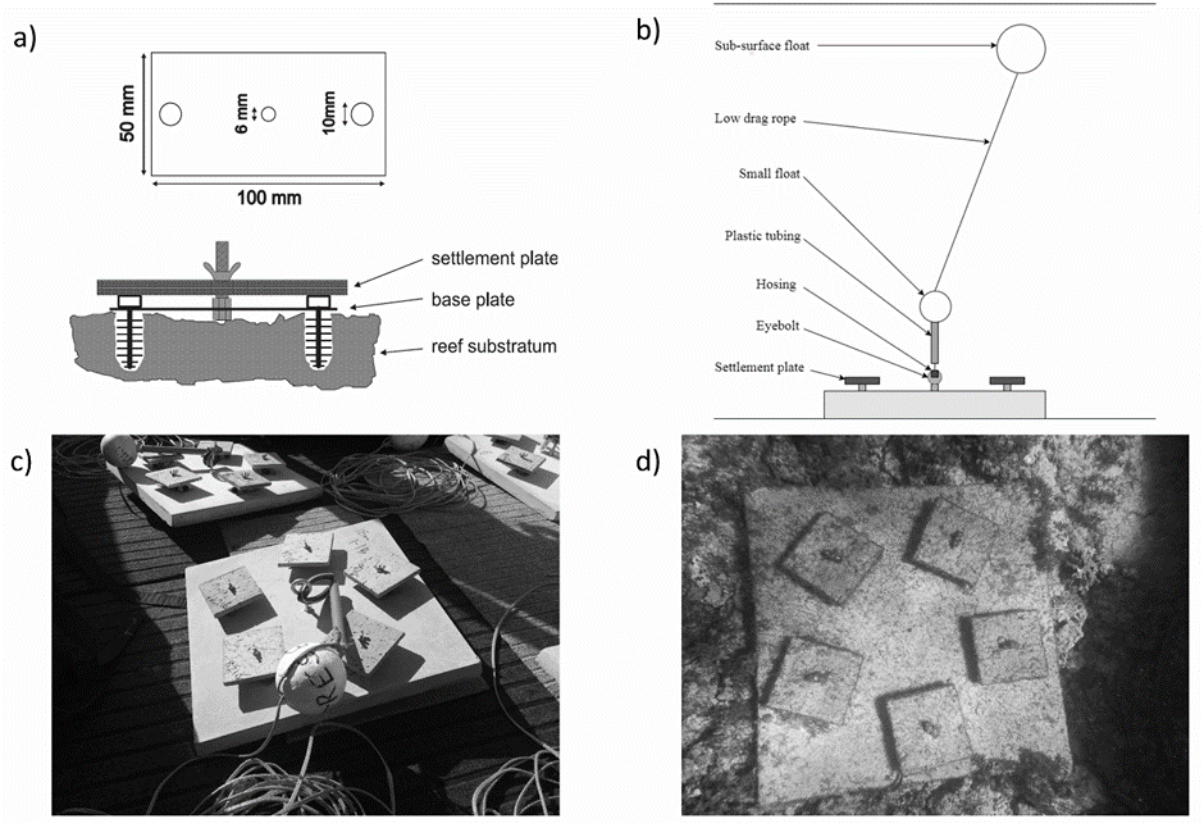
Deep reefs are unlikely to act as refugia, if larvae settle differentially across the depth range, in a pattern similar to adult assemblages.

Differential settlement would then produce differences in coral assemblages across depths

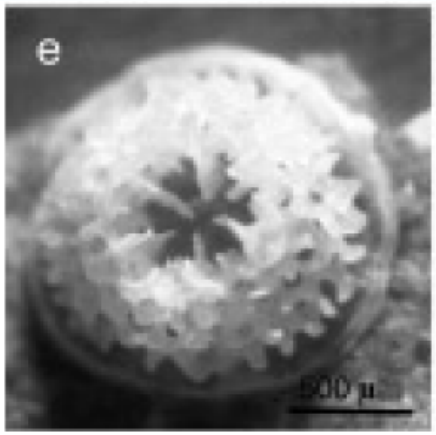


Novel deployment method for deepwater recruitment studies

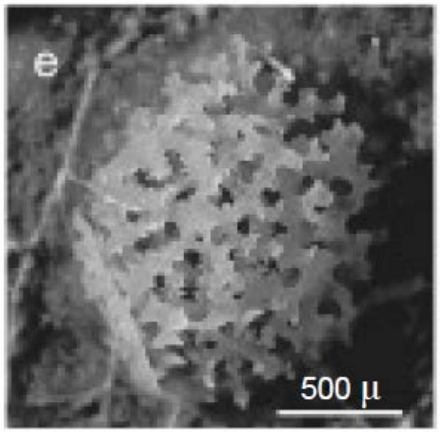
- Number and composition of recruit assemblages do not differ from those on conventionally deployed tiles



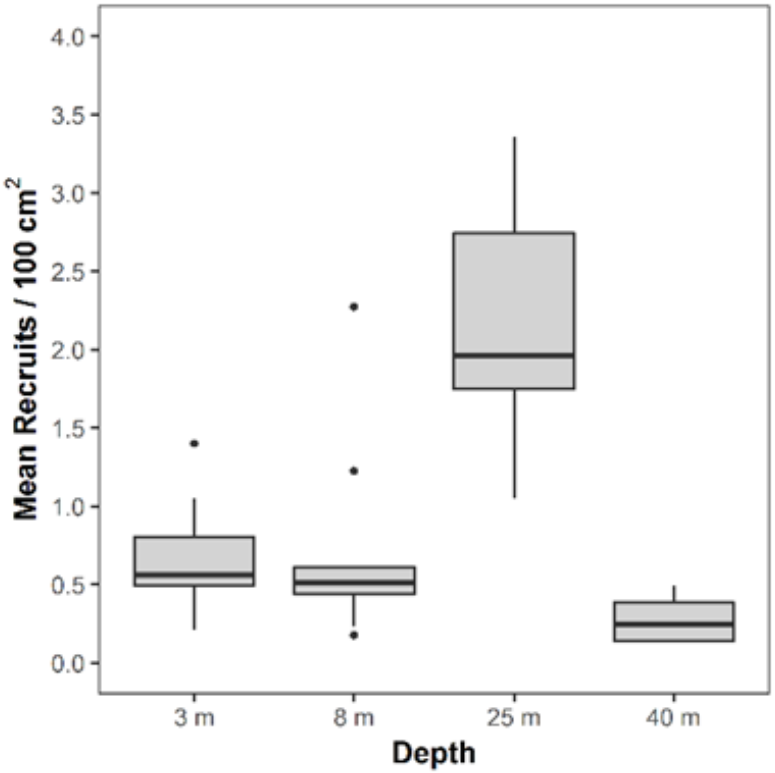
Variation in recruitment with depth

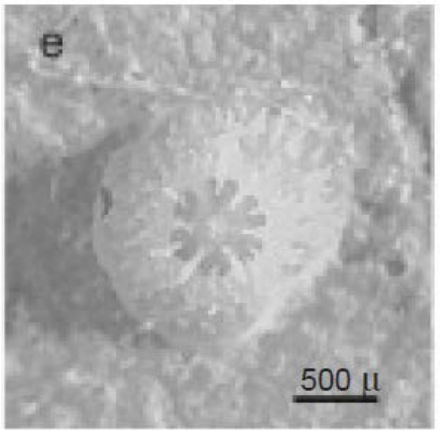


Acroporidae

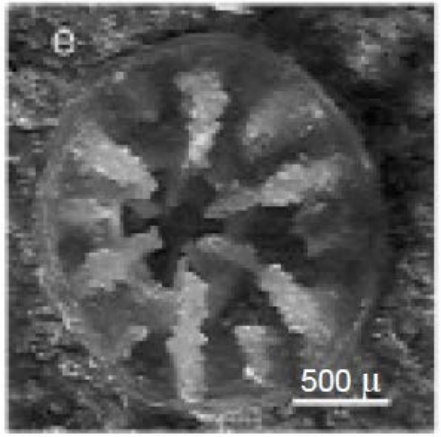


Poritidae





Pocilloporidae



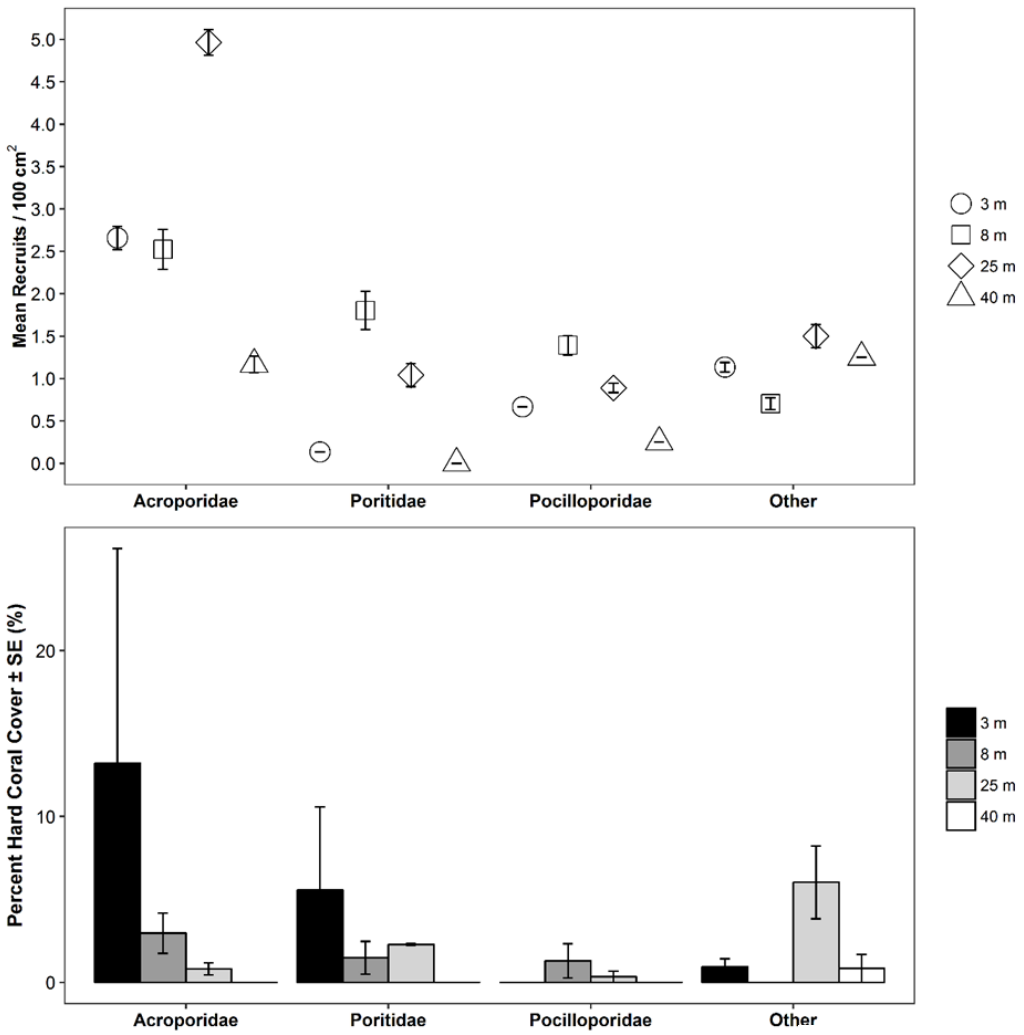
“others”

Recruit composition

- Varied with depth
- A moderate, but significant correlation between recruit assemblage and cover of coral genera was observed

(RELATE, ρ = 0.378, p = 0.001. DistLM R^2 = 0.444)

- Recruitment not consistent with deep water refugia hypothesis



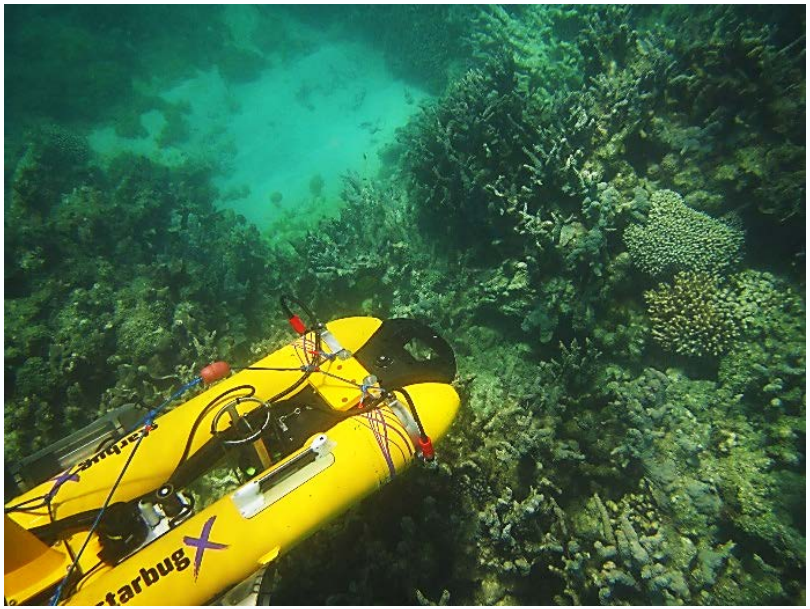
Coral cover – variability

Coral cover is an important metric of reef health

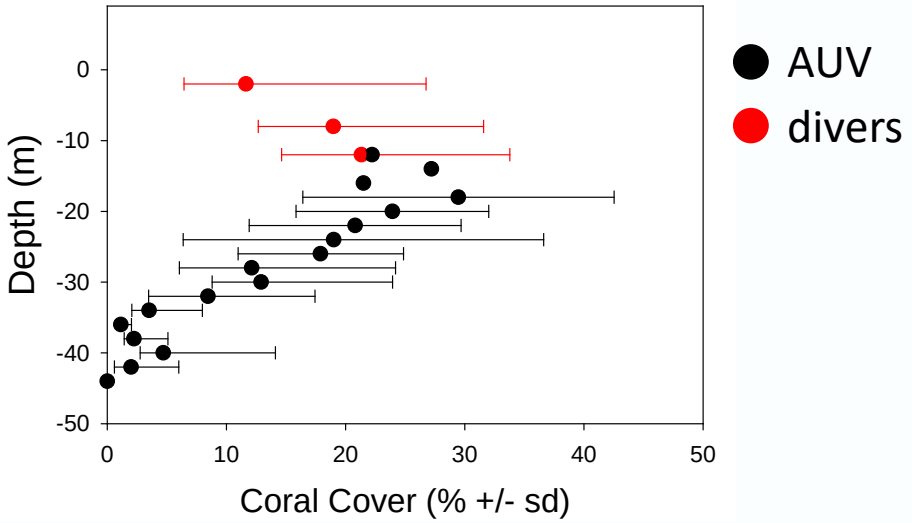
- In shallow water we know it varies because of factors such as cyclone damage, coral bleaching, predators (*Drupella*, *Acanthaster*)
- Is variability lower on deepwater reefs where water temperatures, light and wave energy are lower?

2016 and 2017 deep reef surveys

- Targeted coral cover 20-26 m at Helby, Tantabiddi and Mangrove sites
- 7 transects total, surveyed with StarbugX



2016 coral cover



2016 and 2017 deep reef surveys

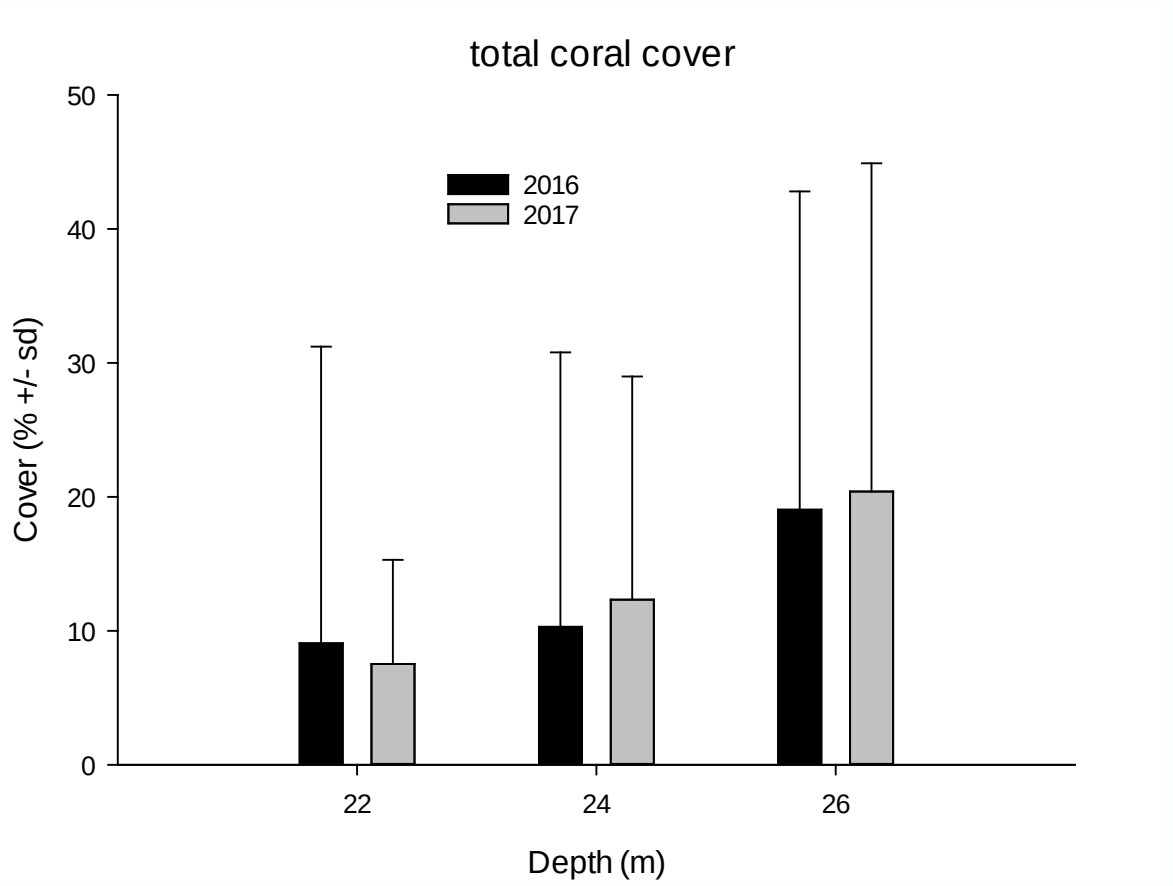
coral cover at 20-26m

2016: 13.6 ±1.5 SE

2017: 12.7 ±1.2 SE

Do deep reefs really provide a refuge?

Can we reduce variance and ability to detect change?



Conclusions

- Patterns of recruitment suggest that deep reefs are not likely to provide a major source of recruits for recovery of impacted shallow reefs

- Coral cover on deep reefs may be more stable than on shallow reefs, but too early to really say……

- There is plenty left to discover!

Acknowledgements

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Theme 1 Question Time