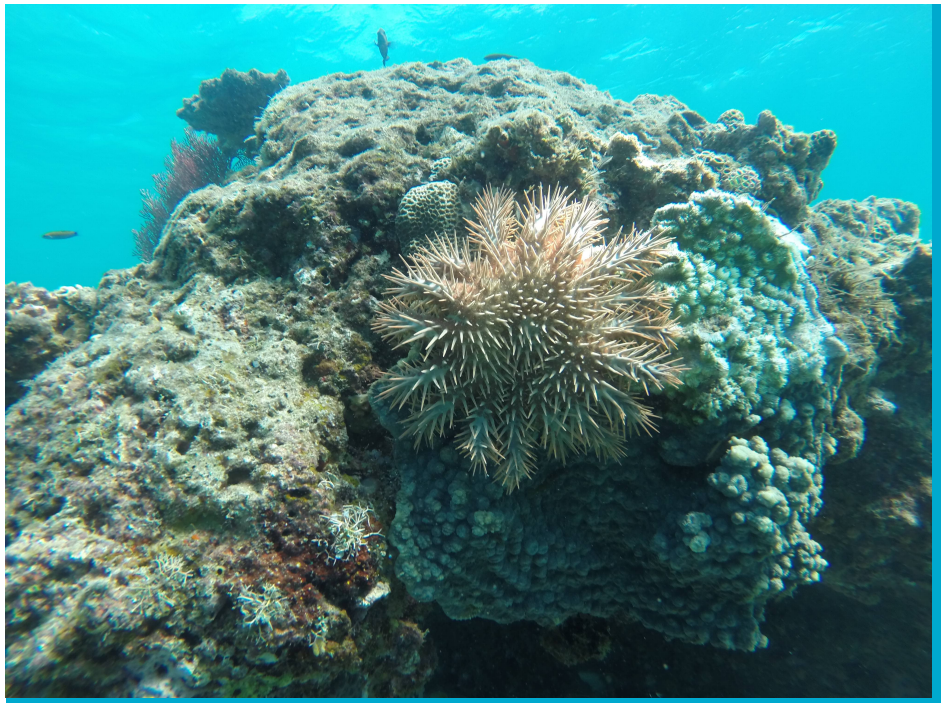

High densities of COTS threatens post-bleaching recovery of coral reefs in North-Western Australia

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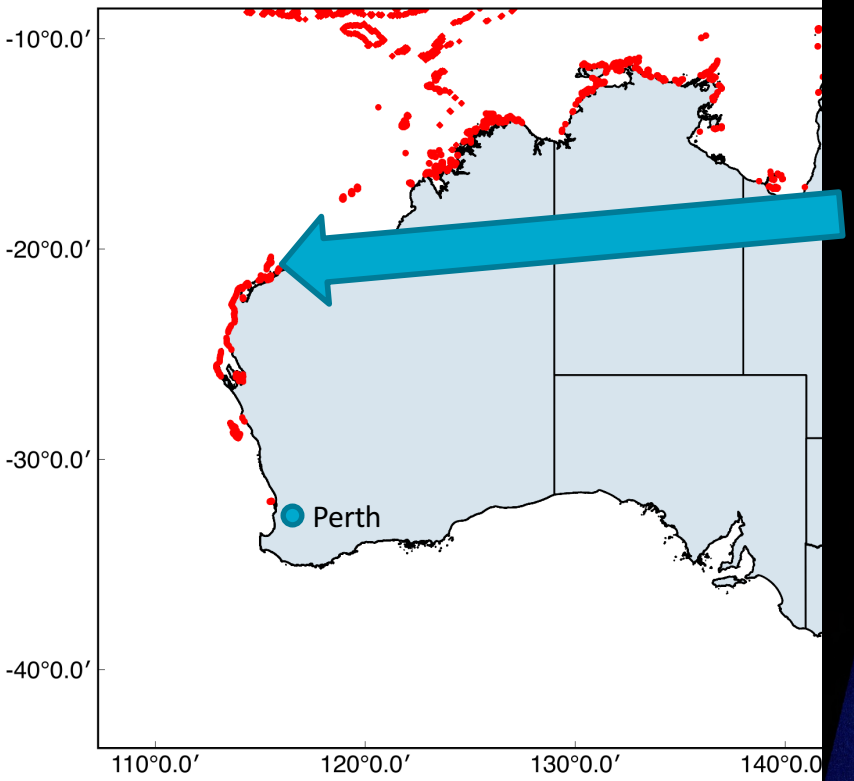
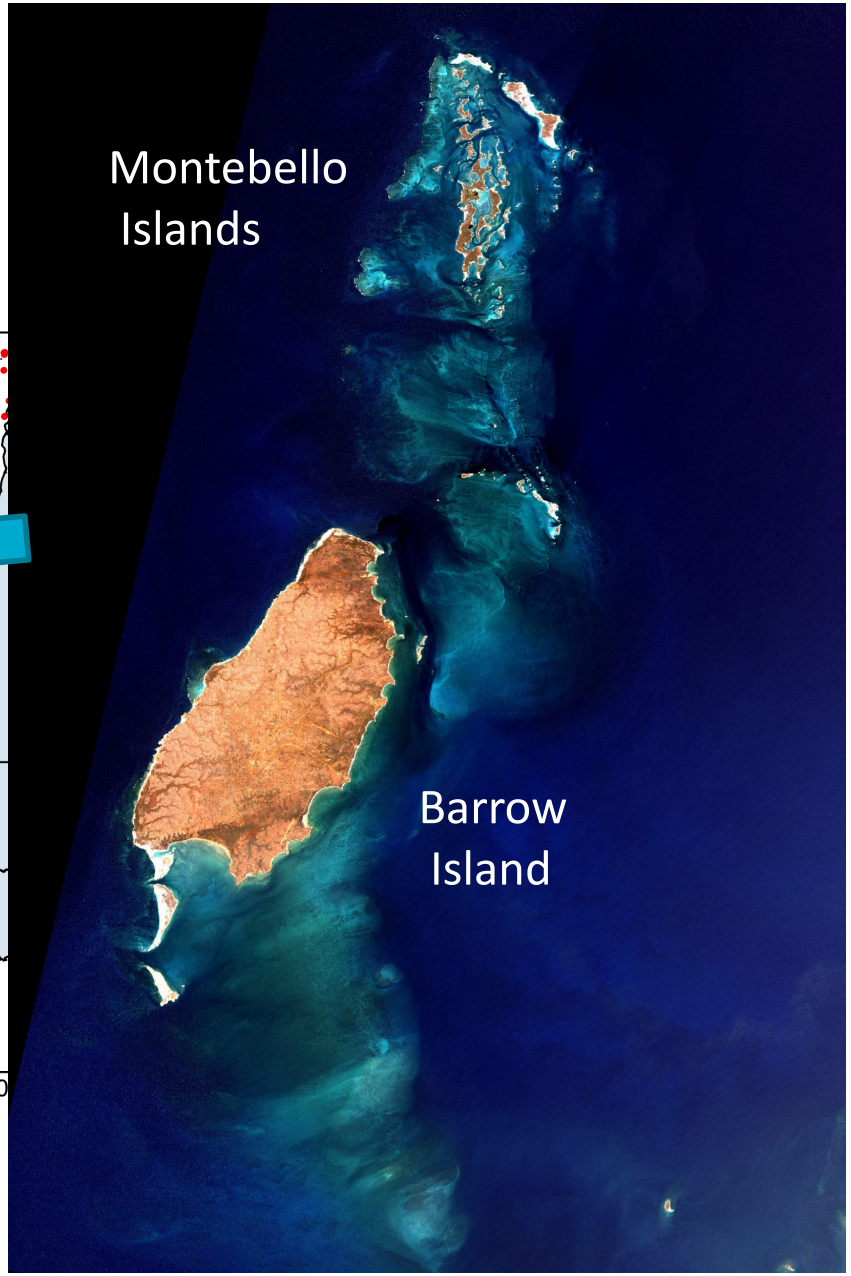
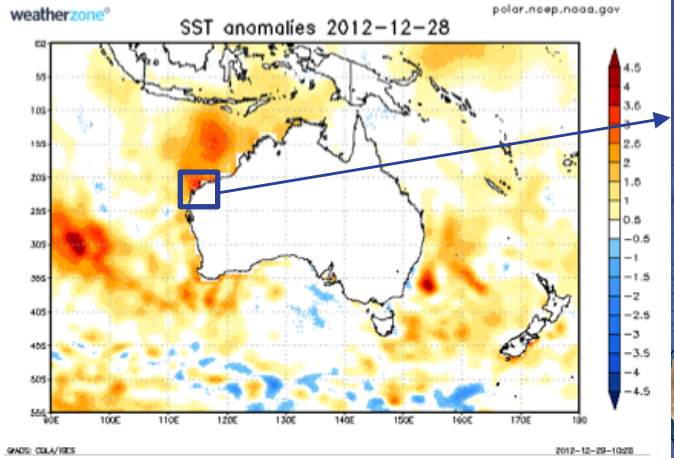
Western Australian coral reefs

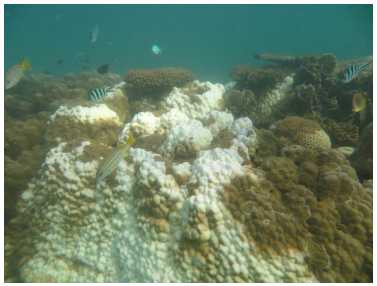


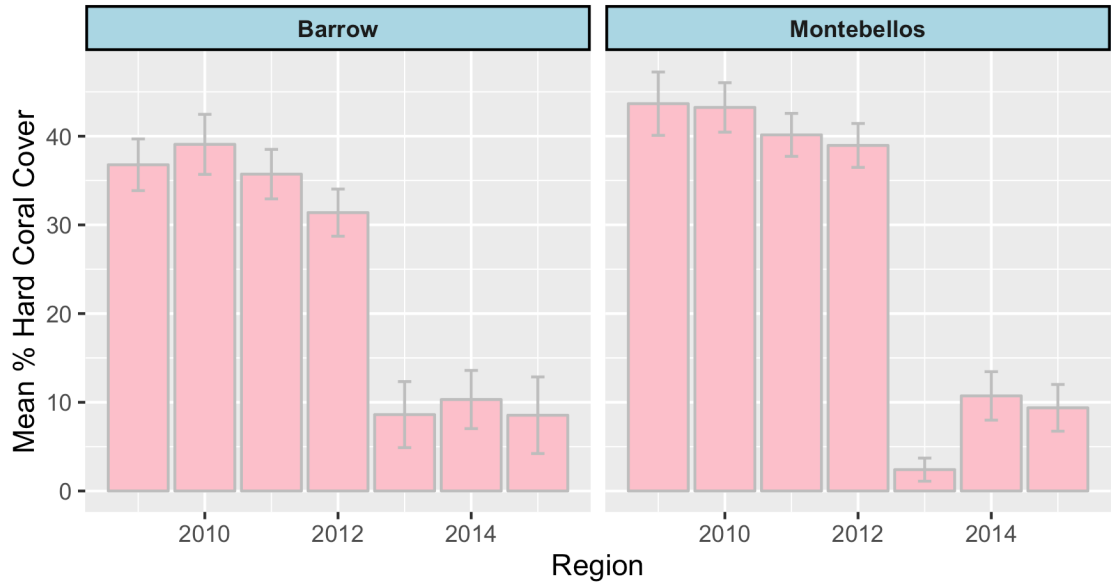


Coral bleaching throughout WA

- Elevated SST during the summers of 2010-11, 2011-12 & 2012-13
- Extensive coral bleaching throughout the Pilbara

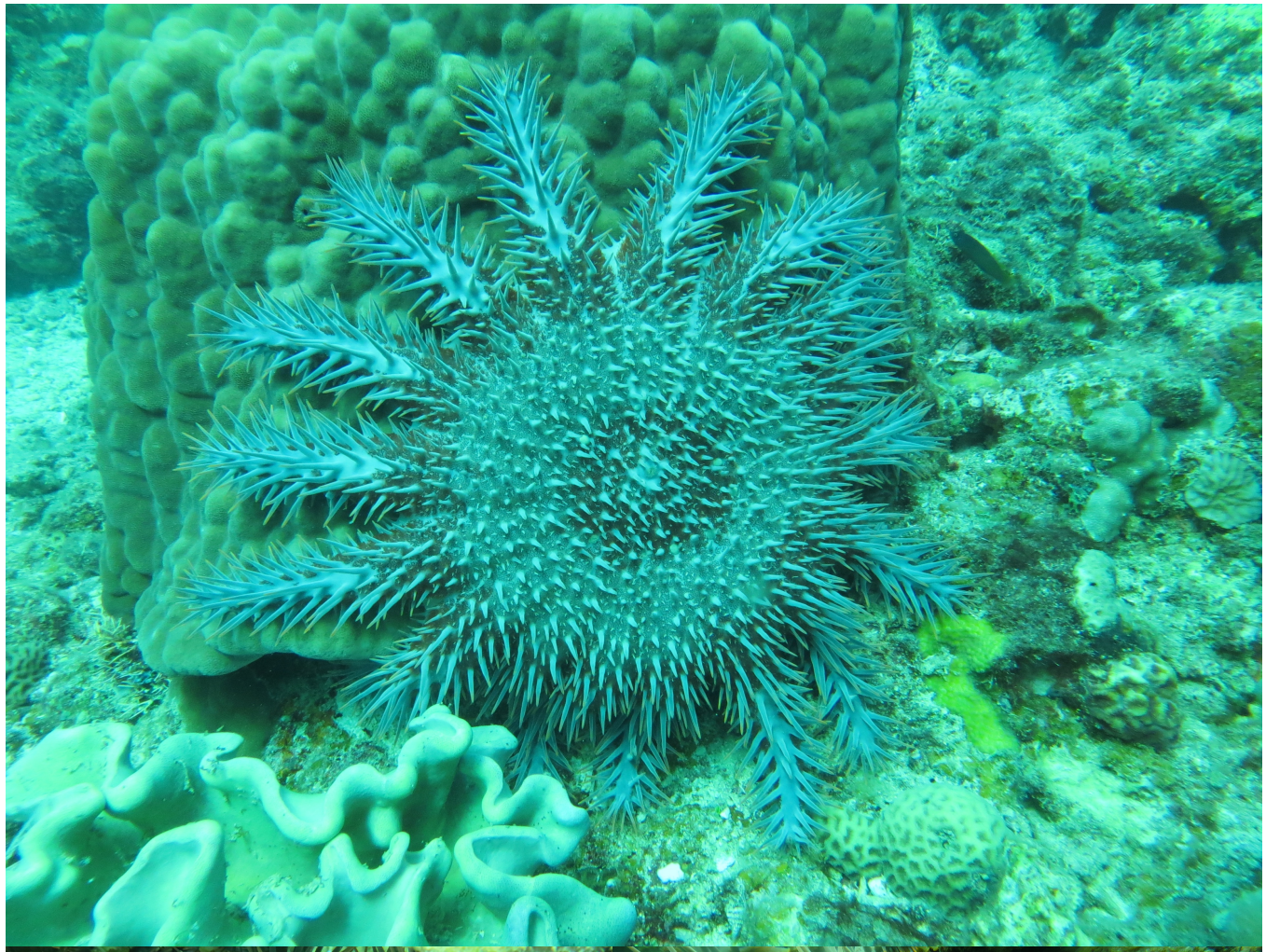


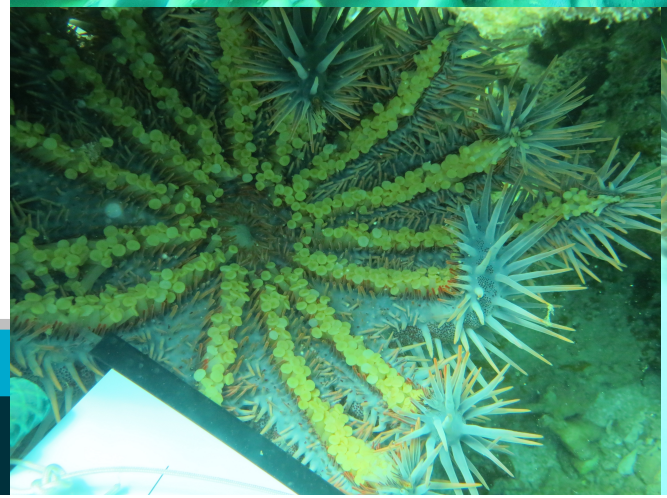


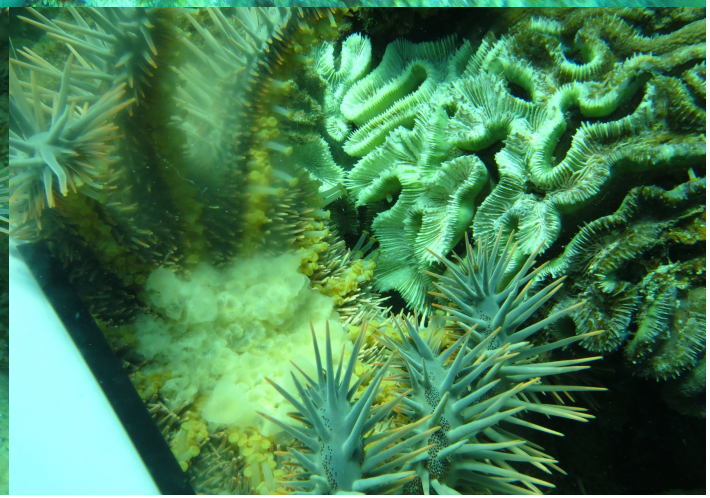


Crown of thorns starfish (COTS)

- Periodic outbreaks
- 15 ha^{-1} (Moran and De'ath 1992)
- What causes outbreaks?
  - Larval survival
  - Post-settlement survival

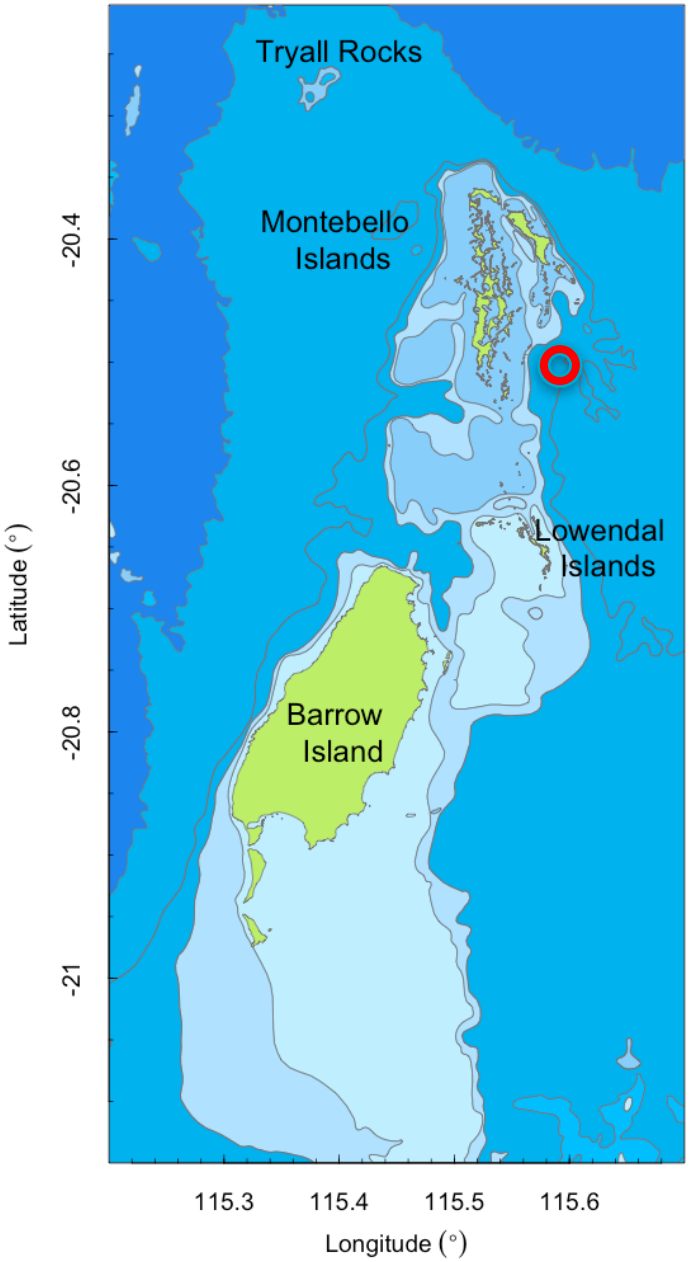






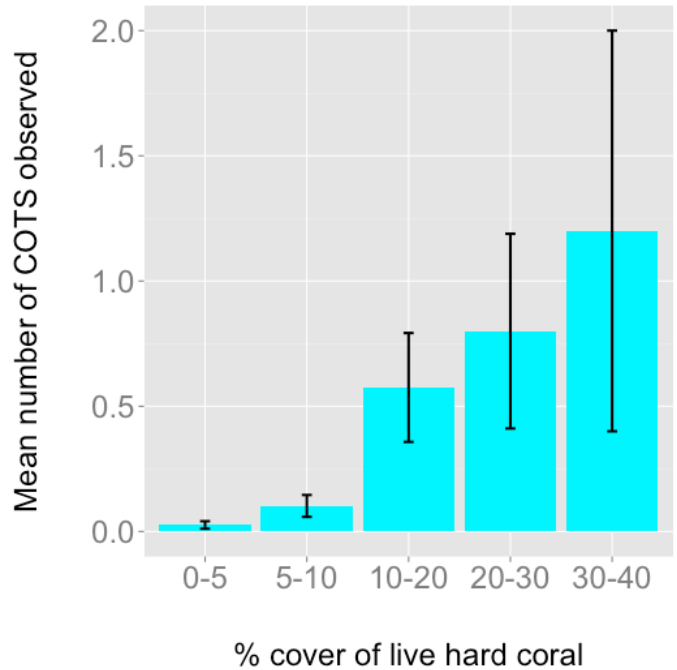
High densities of COTS

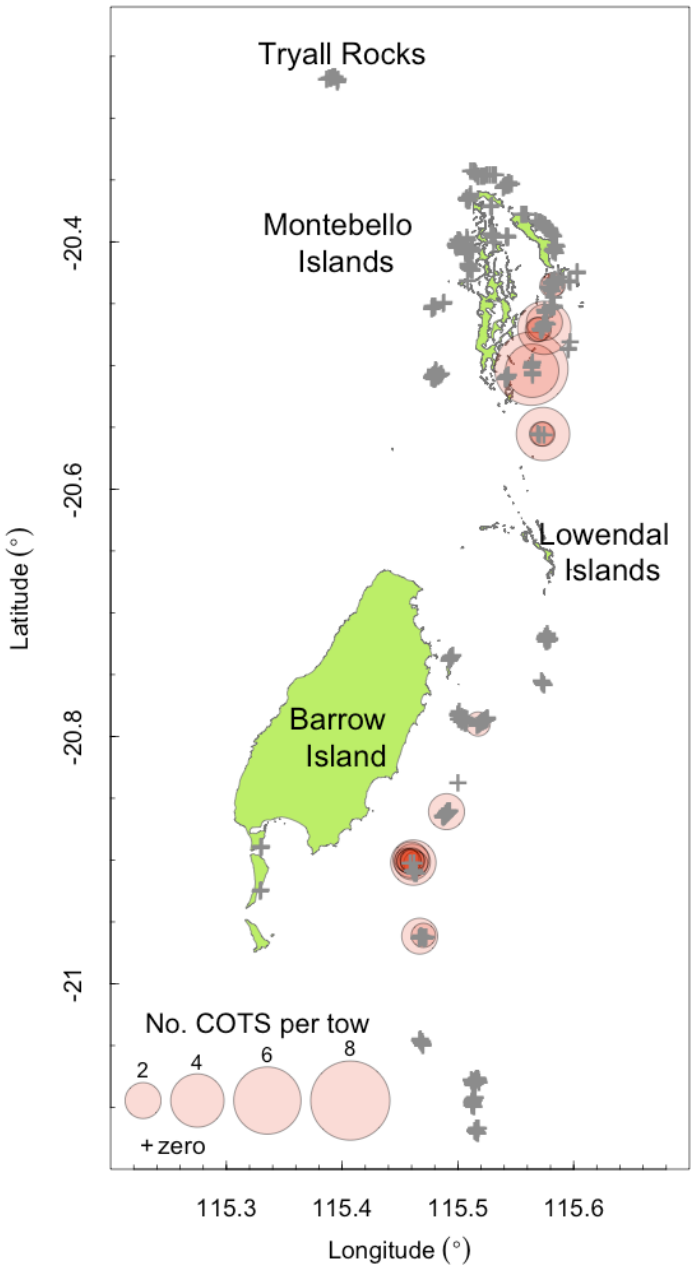
- First recorded in WA in 1970's
- High densities of COTS observed at SE Montebellos during May 2014
- 10-day manta-tow survey - Oct 2014
- 2 min tows & 50 m transects when > 3 COTS per tow



COTS survey

- 335 tows (67 km)
- Overall mean: 0.143 COTS/tow (8.9 ha^{-1})
- Hotspots: 186 ha^{-1}

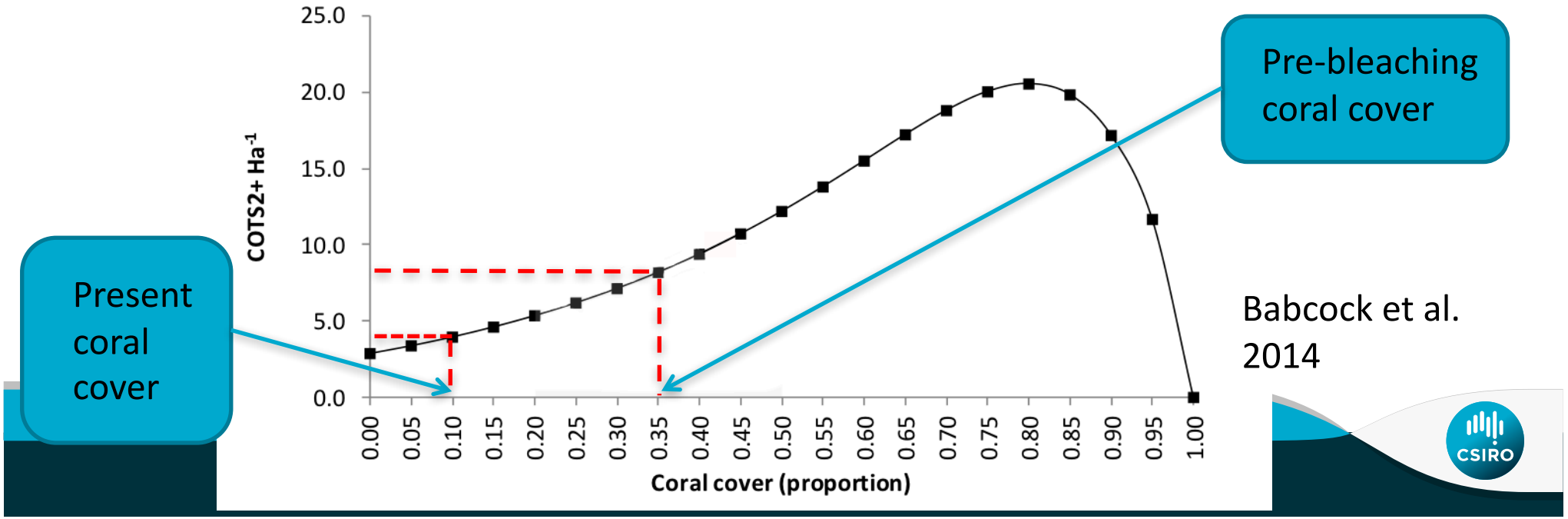




Will corals be able to recover from the bleaching?

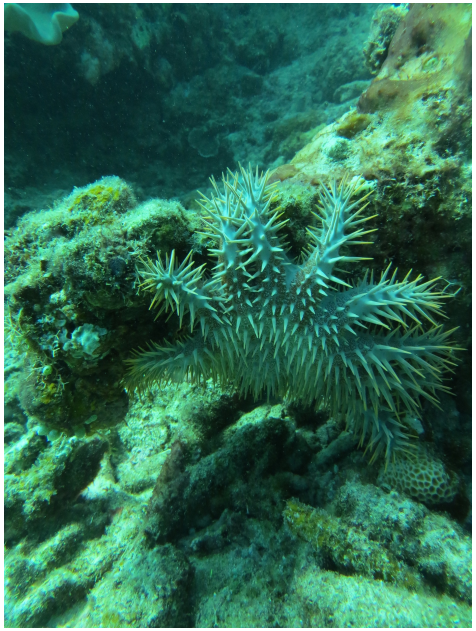
- Outbreak threshold: density of COTS at which the coral growth rate equals the COTS consumption rate
  - 20% coral cover at 10-15 COTS ha^{-1} (Keesing & Lucas 1992)

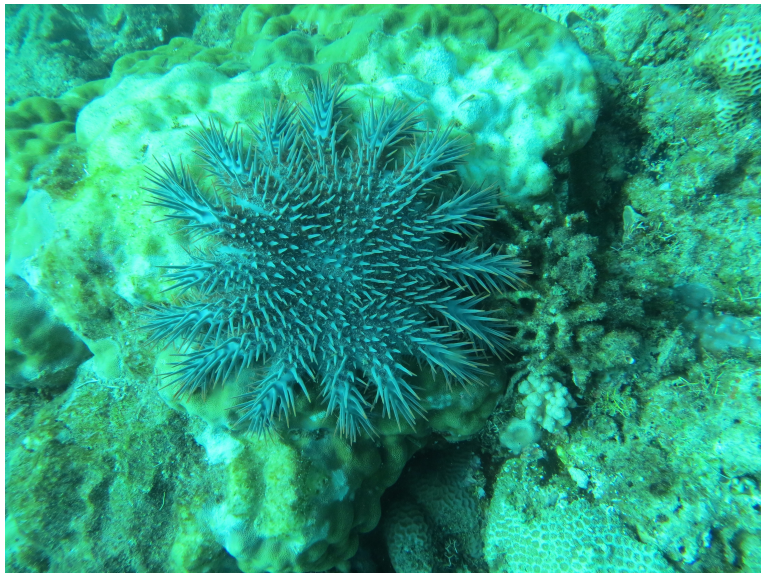
- Bleaching has reduced Barrow/Montes coral from 30-40% to <10% & now COTS focusing on remaining coral

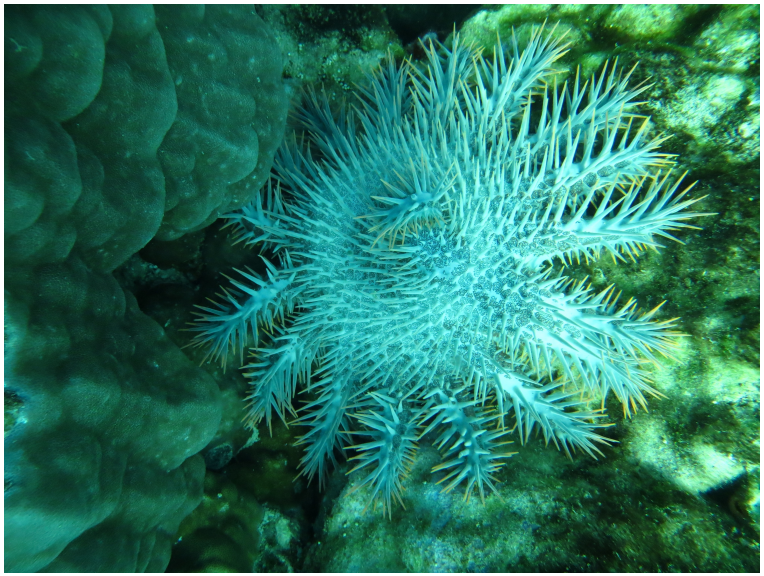


Causes?

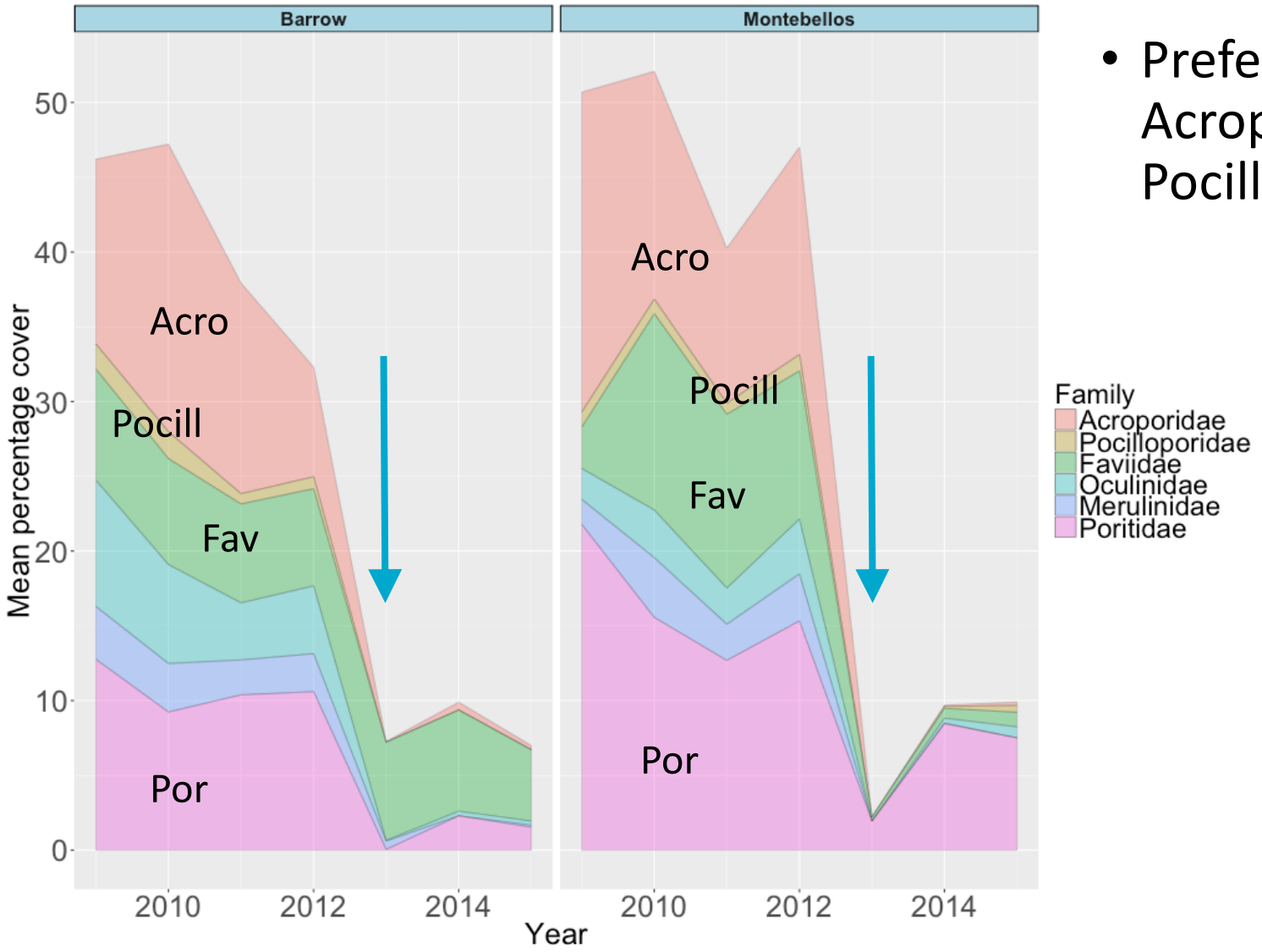
- Low rainfall (except during cyclones)
- Very little agriculture
- Fishing pressure low to moderate
- Aggregation?







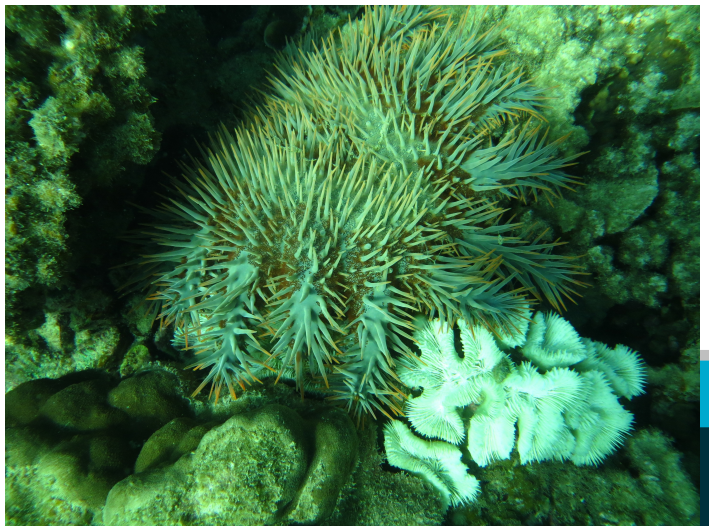
Feeding preferences



- Preferred prey: Acroporidae & Pocilloporidae

Feeding preferences

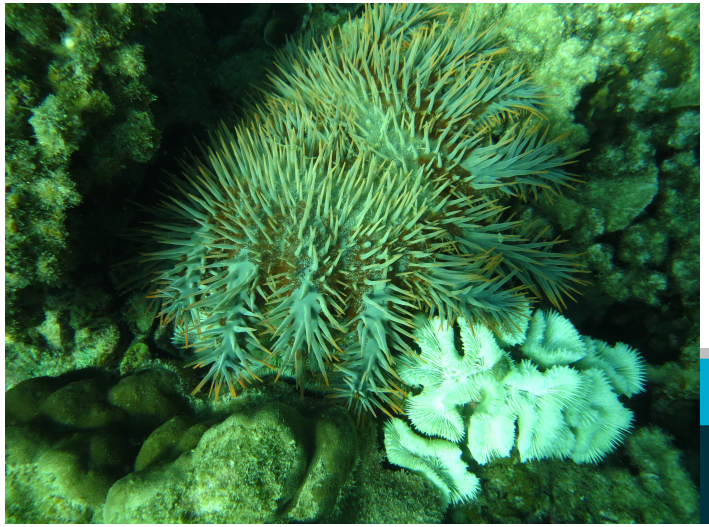
- Feeding COTS:
  - Prey identified
  - 4 nearest colonies
- Chesson's electivity index
- 70% of available corals: Poritidae & Faviidae

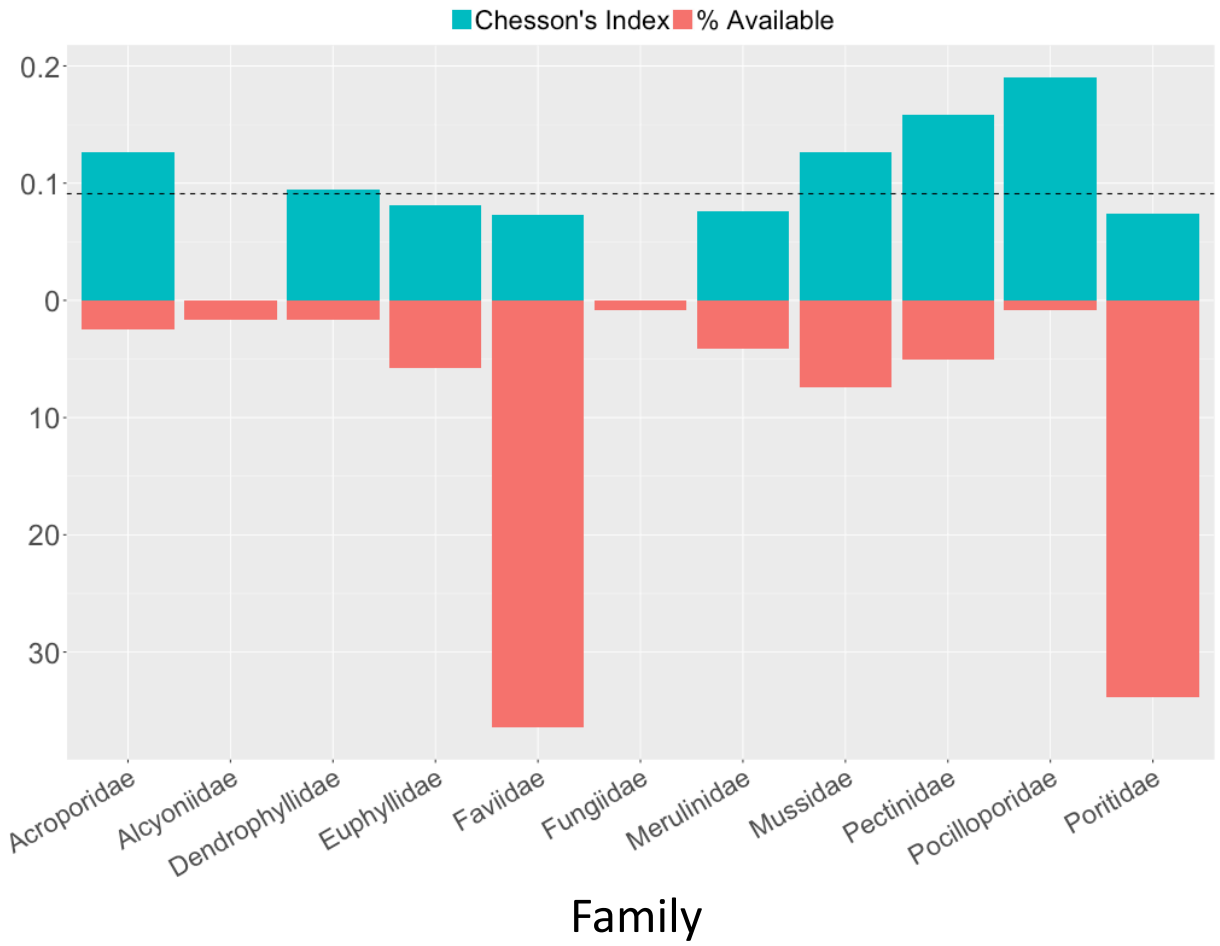


Coral family	Prey %	Available %	Ratio (%P / %A)	Chesson's α
Pocilloporidae	1.9	0.8	2.3	0.190
Pectinidae	9.4	5.0	1.9	0.158
Acroporidae	3.8	2.5	1.5	0.126
Mussidae	11.3	7.4	1.5	0.126
Dendrophyllidae	1.9	1.7	1.1	0.095
Euphyllidae	5.7	5.8	1.0	0.081
Merulinidae	3.8	4.1	0.9	0.076
Poritidae	30.2	33.9	0.9	0.074
Faviidae	32.1	36.4	0.9	0.073
Alcyoniidae	0	1.7	0	0
Fungiidae	0	0.8	0	0
Agaricidae	0	0	0	0

Feeding preferences

- Feeding COTS:
  - Prey identified
  - 4 nearest colonies
- 62% feeding on Faviidae & Poritidae
- Chesson's electivity index
- 70% of available corals: Poritidae & Faviidae





Conclusions

- Corals heavily impacted
  - Bleaching
  - COTS
- Feeding behaviour modified