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MARINE ESTATE MANAGEMENT AUTHORITY

# Experimental research combined with monitoring oyster reef restoration

NSW OYSTER REEF RESTORATION PROJECT

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# Oyster reefs

Oyster reefs are important habitat for biodiversity and the ecosystem services e.g. filtration

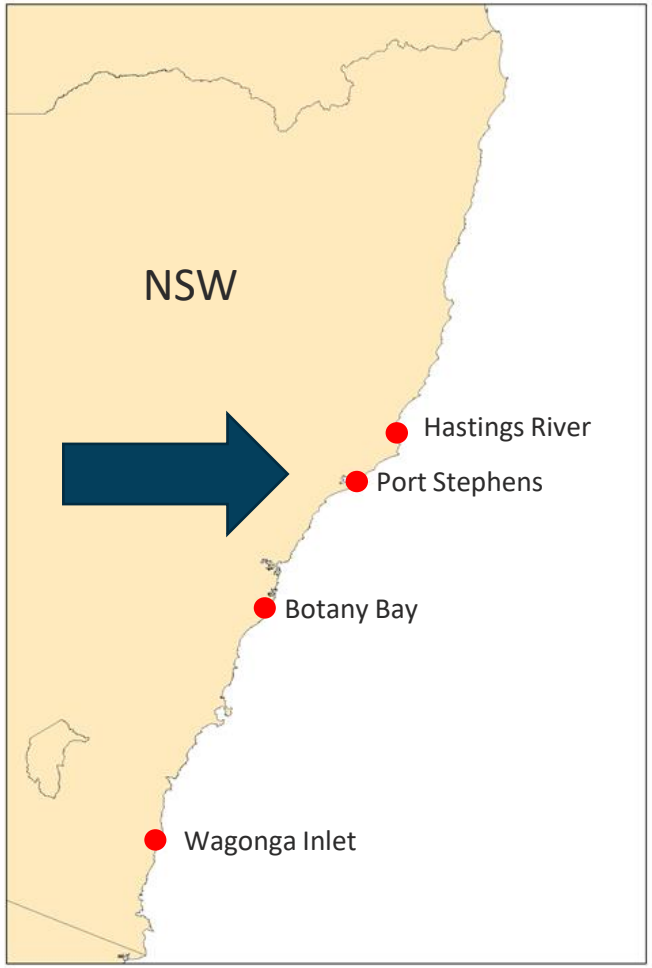
Oyster reefs were once abundant & wide-spread, but lost due to overharvesting, disease and declining water quality.

With the end to many stressors, oyster reef restoration is expanding globally

NSW first large-scale Sydney Rock Oyster Reef restoration project in Port Stephens in 2020

Important to experimentally test if oyster reef restoration is successful for invertebrates, fish and overall ecological functioning

# Oyster reef restoration in NSW




**Port Stephens**

- Sydney rock oyster reefs
- Stage 1 2020 & Stage 2 2021
- DPI collaboration with TNC Reef Builder

**Wagonga Inlet**

- Sydney rock and Angasi oyster reefs
- SRO completed June 2022, Angasi due early 2023
- DPI Collaboration with Eurobodalla Shire Council & TNC Reef Builder

**Botany Bay**

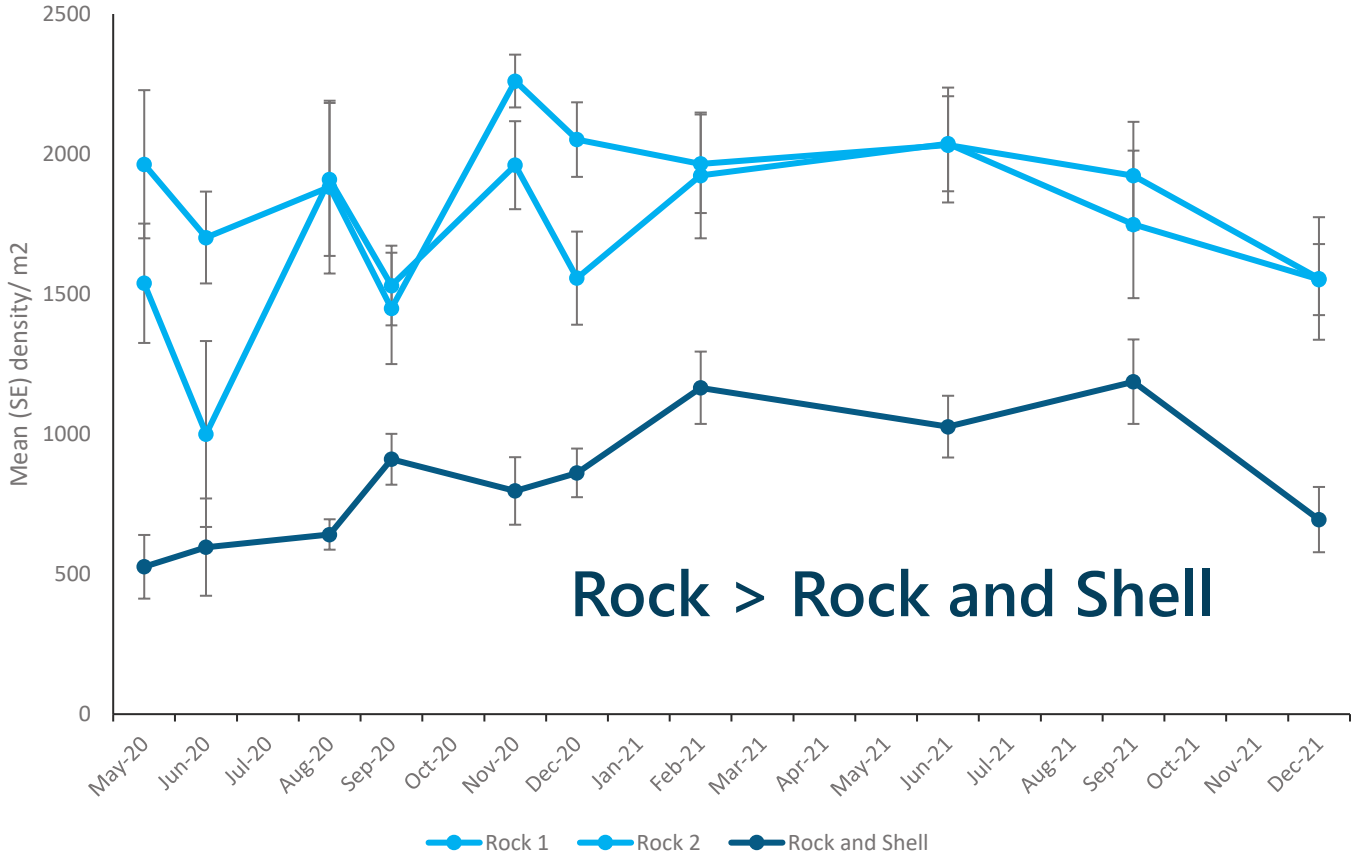
- Sydney rock and Angasi oyster reefs
- Planned for 2023
- DPI collaboration with TNC Reef Builder & FHRP with Greater Sydney LLS

**Hastings River**

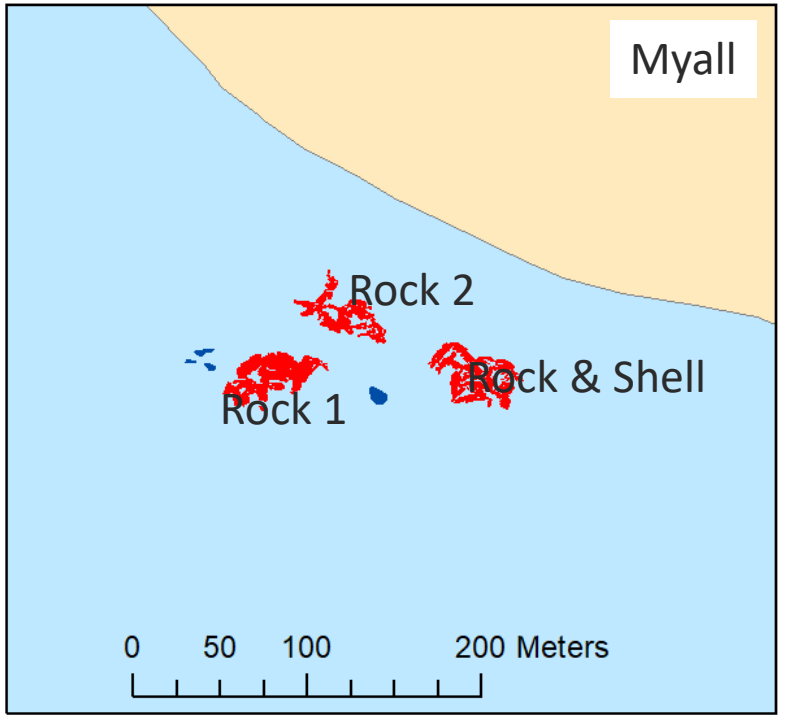
- Sydney rock oyster reefs
- Planned for 2023
- DPI collaboration with Oceanwatch FHRP with North Coast LLS

# Testing methods for restoration

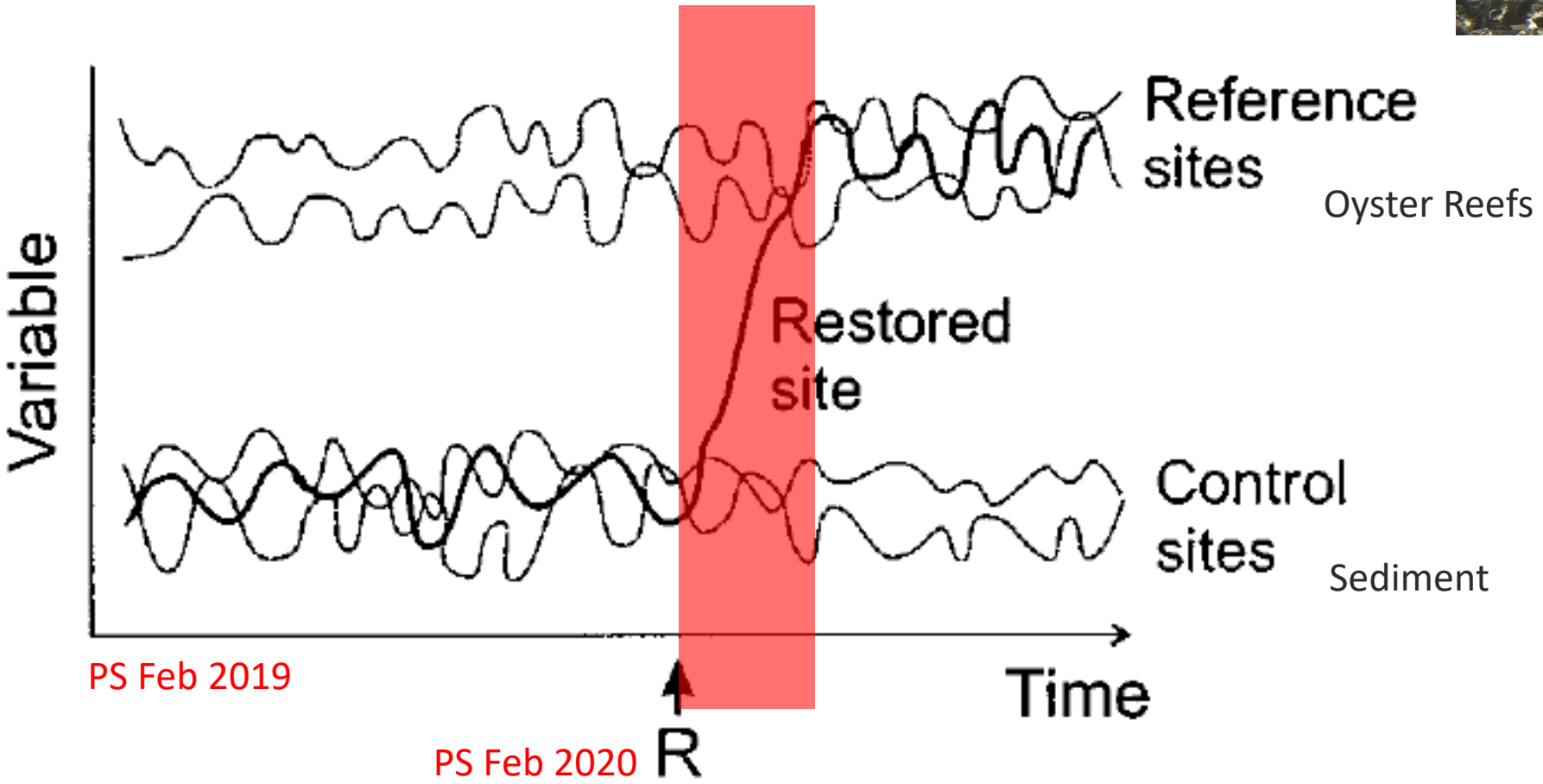
Over **55 Million** BABY OYSTERS naturally recruited in the first **2** years




**Rock > Rock and Shell**



# Monitoring = Testing for environmental change




Oyster Reefs

- Invertebrates
- Fishes
- Filtration

Sediment

Chapman 1999

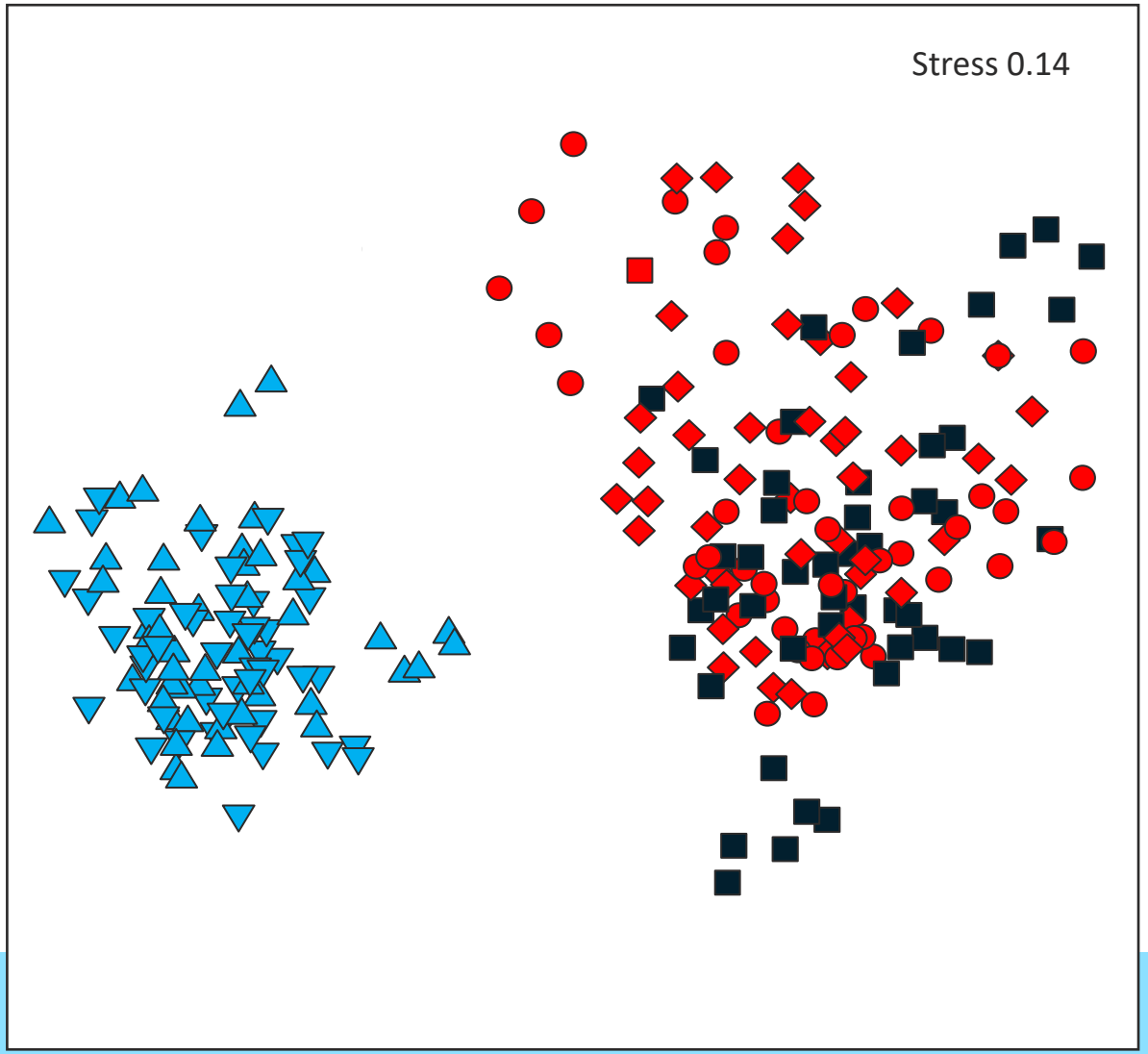
Comprehensive MONITORING PROGRAM developed and implemented

# BEFORE the on-ground works:
# Natural variability in assemblages of oyster reefs

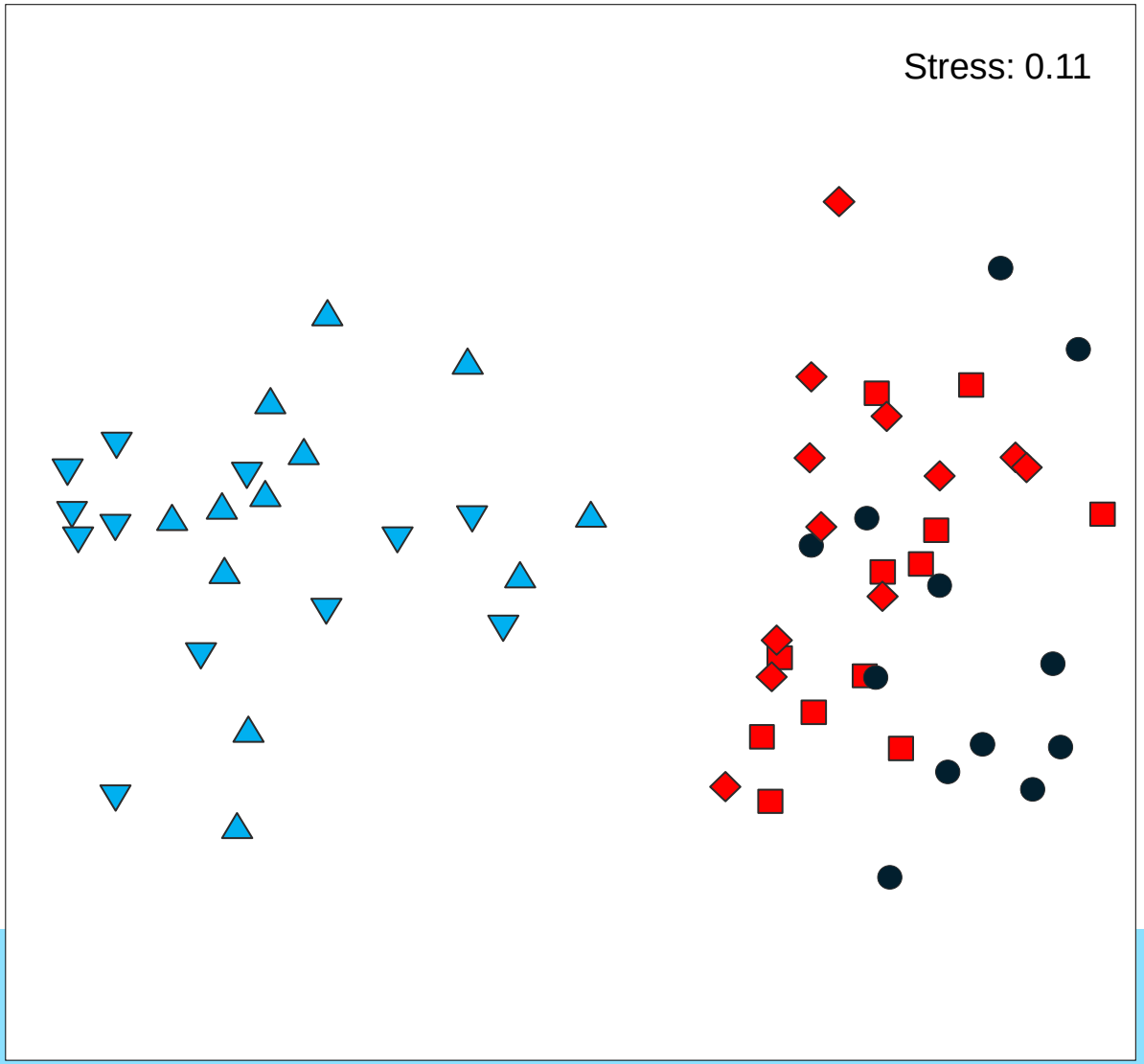
Monitoring with TNC MER

Port Stephens, Wagonga Inlet and Georges River

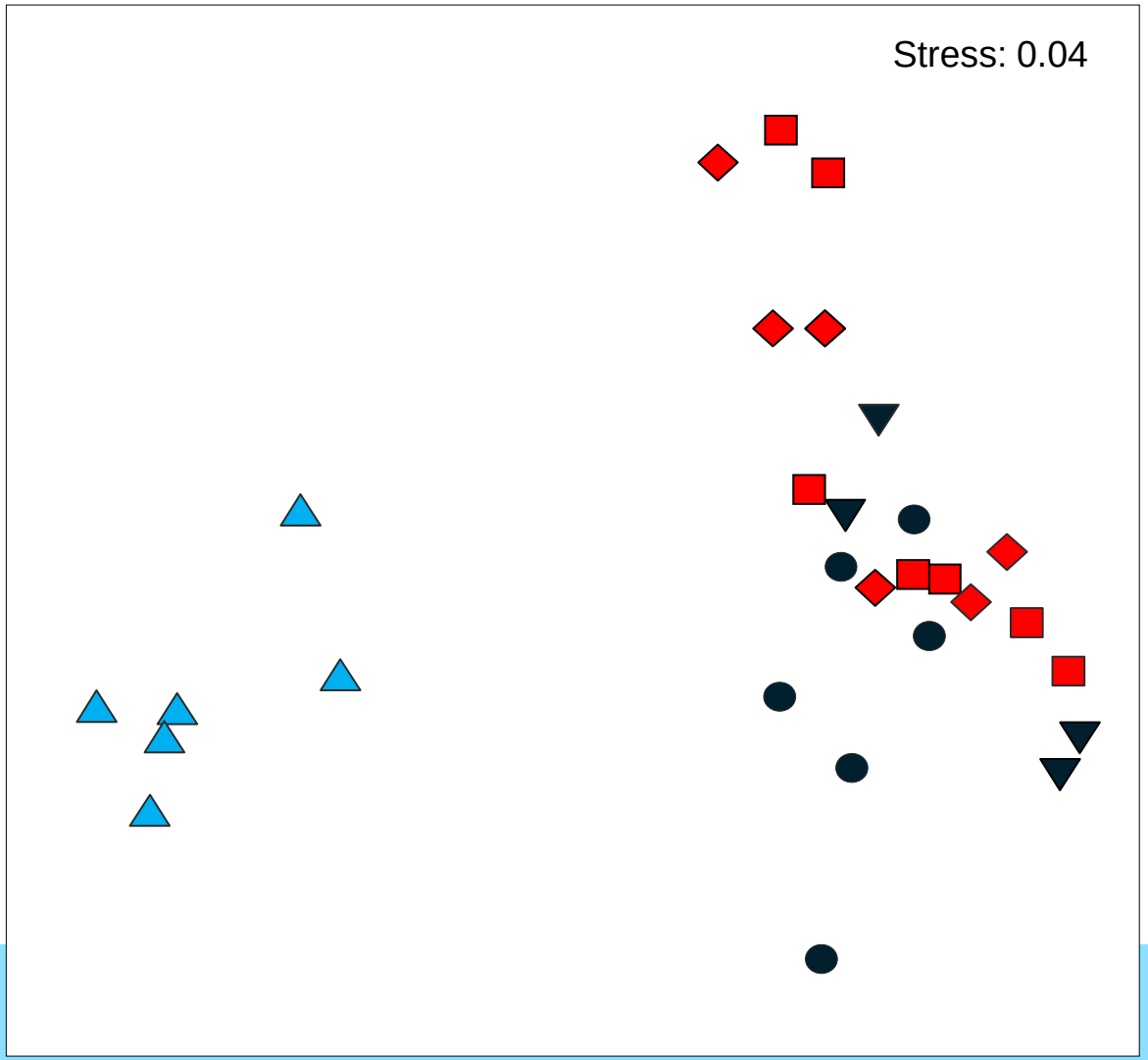
# Port Stephens invertebrate assemblages (>40 taxa)



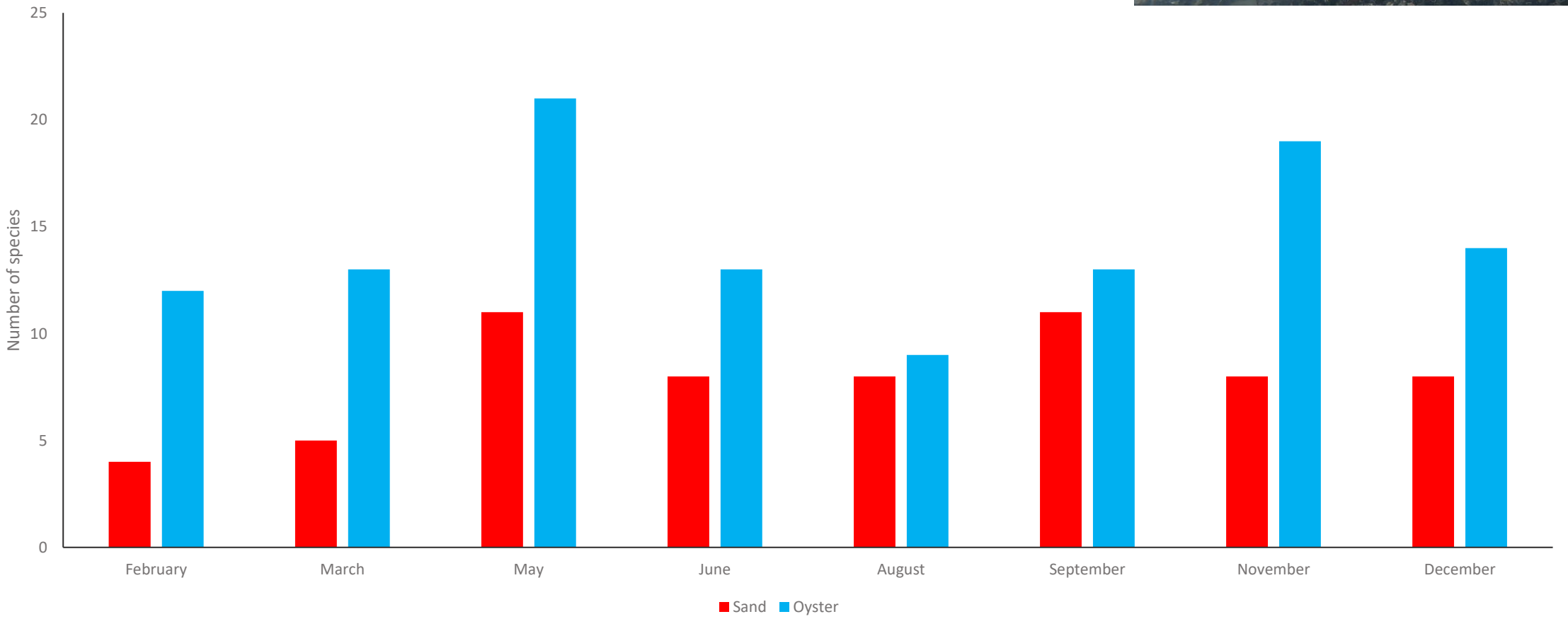

# Wagonga Inlet invertebrate assemblages (>50 taxa)



# Georges River invertebrate assemblages (>20 taxa)




# Diversity of Fishes in Port Stephens (>55 spp)



# Measuring restoration: Methods and experiments

Port Stephens – Stages 1 and 2

Wagonga Inlet (WILS)

**7.5** ha or **11** soccer pitches of SYDNEY ROCK OYSTER REEF created

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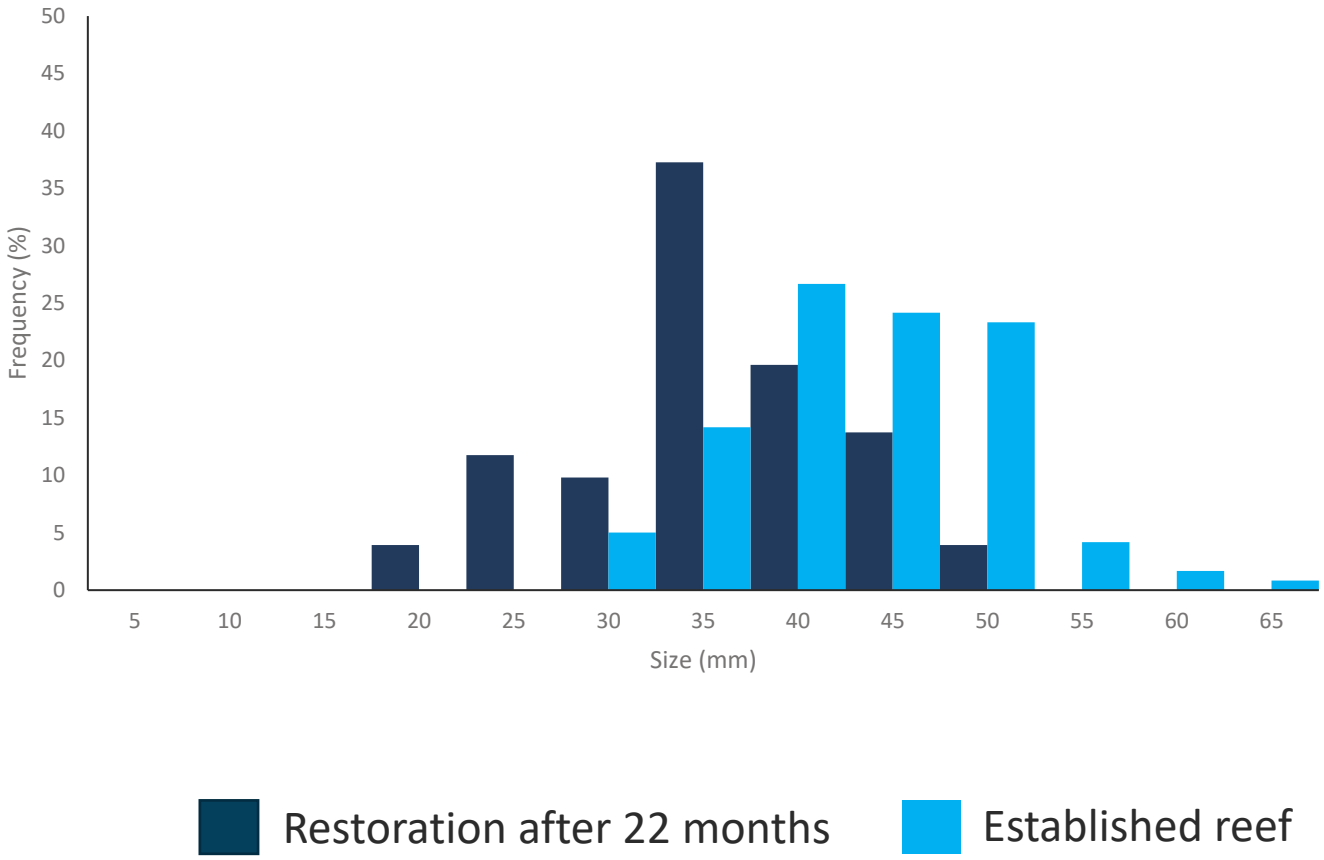
# Sampling density and size of oysters




Oyster recruits **3/4** the size of wild adult oysters after only **22** months

Over **55 Million** BABY OYSTERS naturally recruited in the first **2** years

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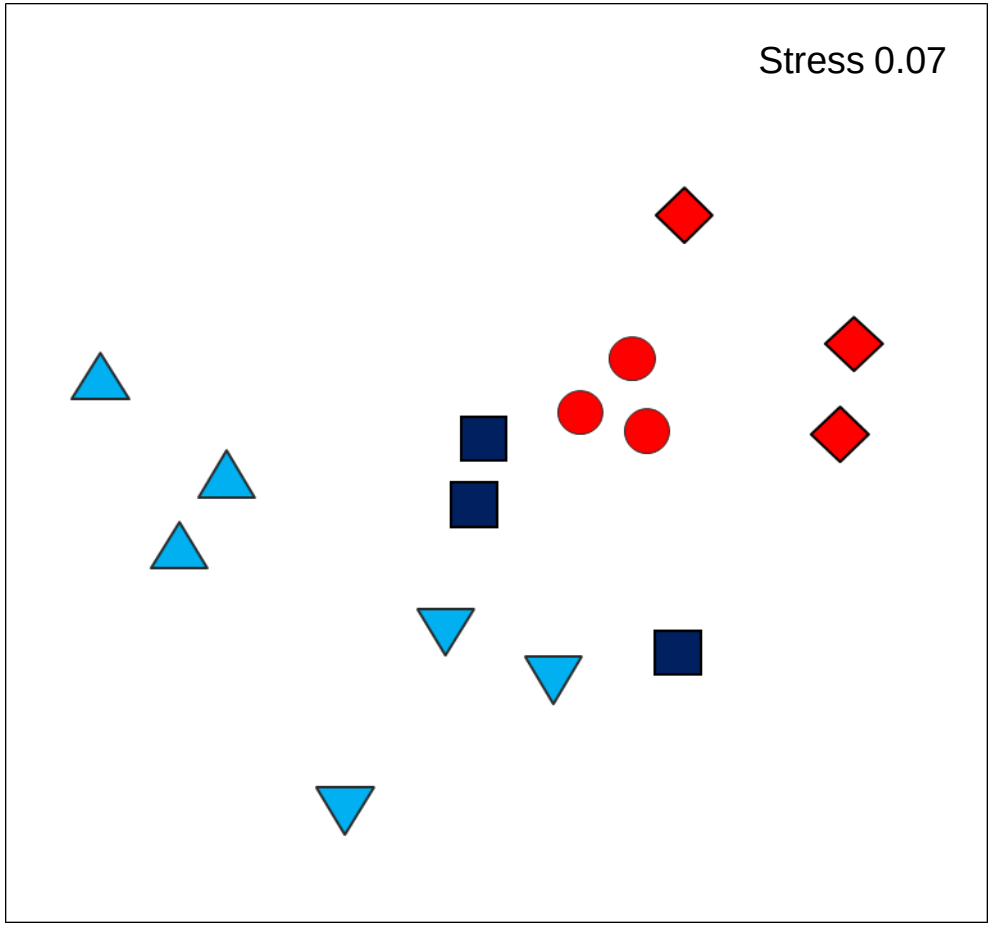
# Assemblages of fish (~ 3 years)

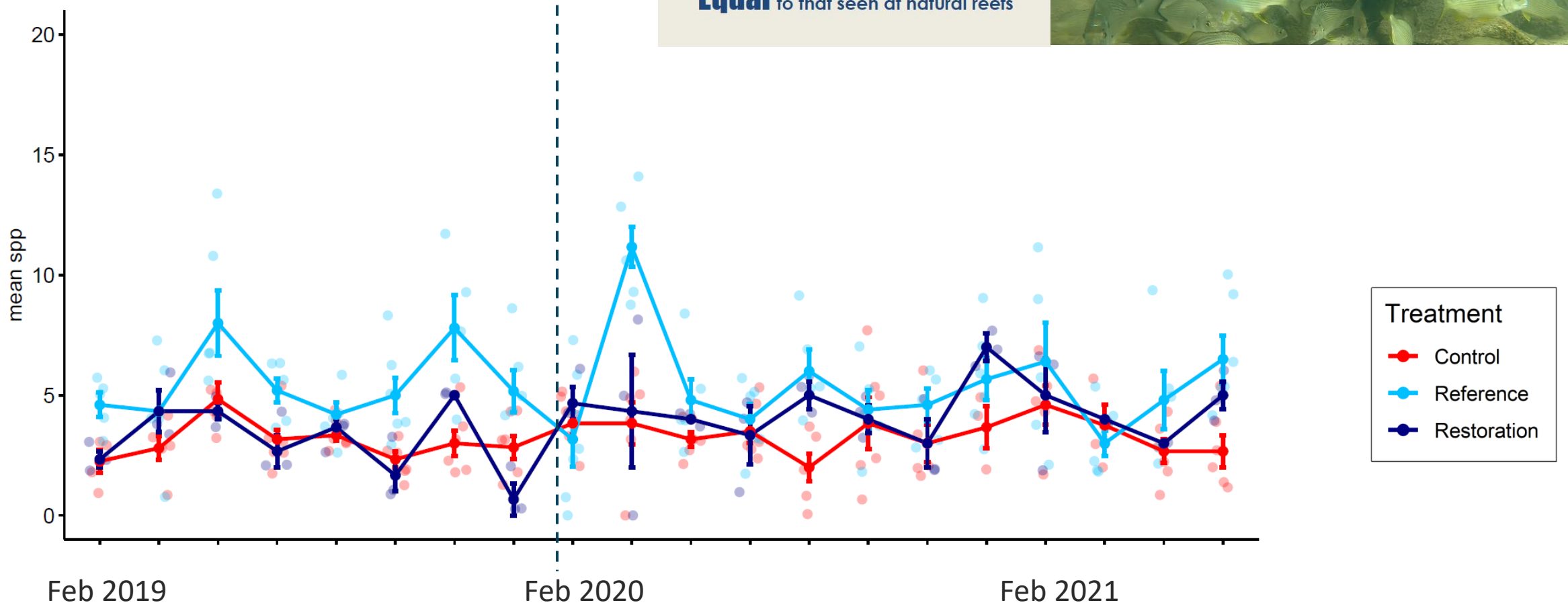



Reference 1
Reference 2
Control 1
Control 2
Restoration

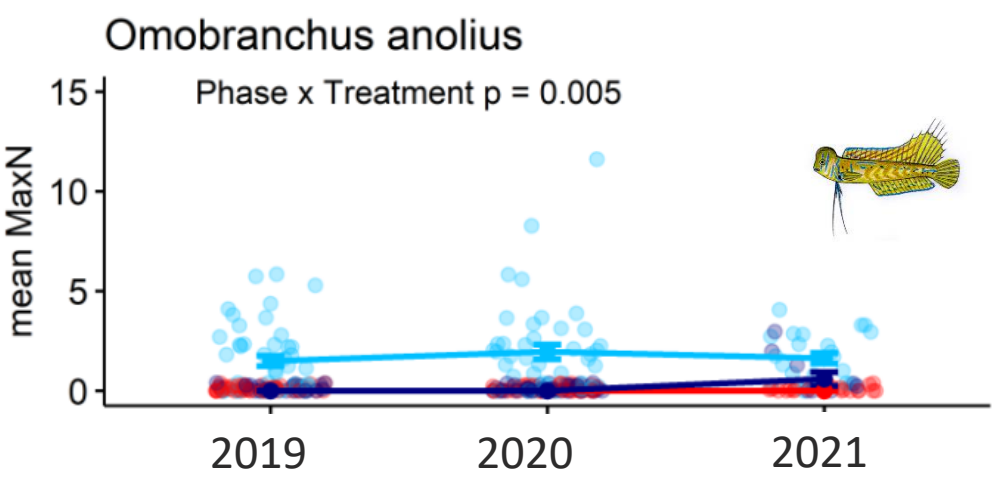
# Diversity of fishes

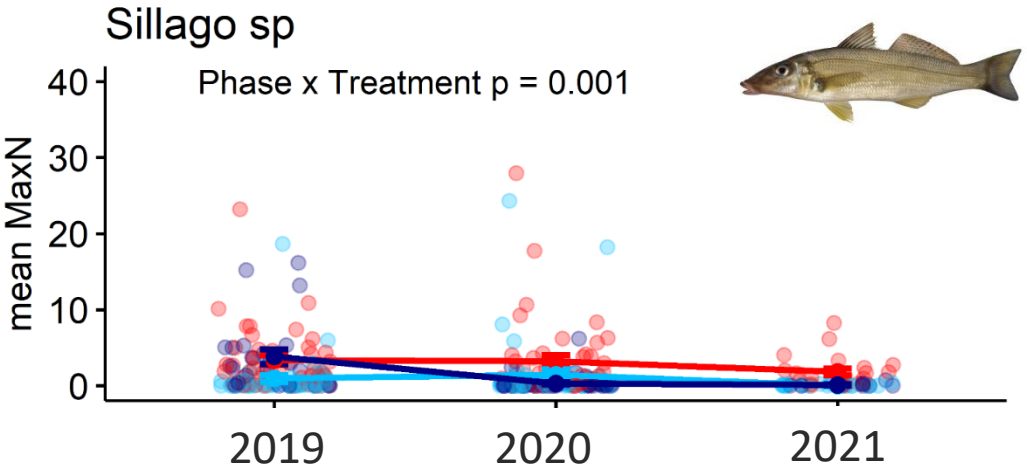
**34** DIFFERENT FISH SPECIES

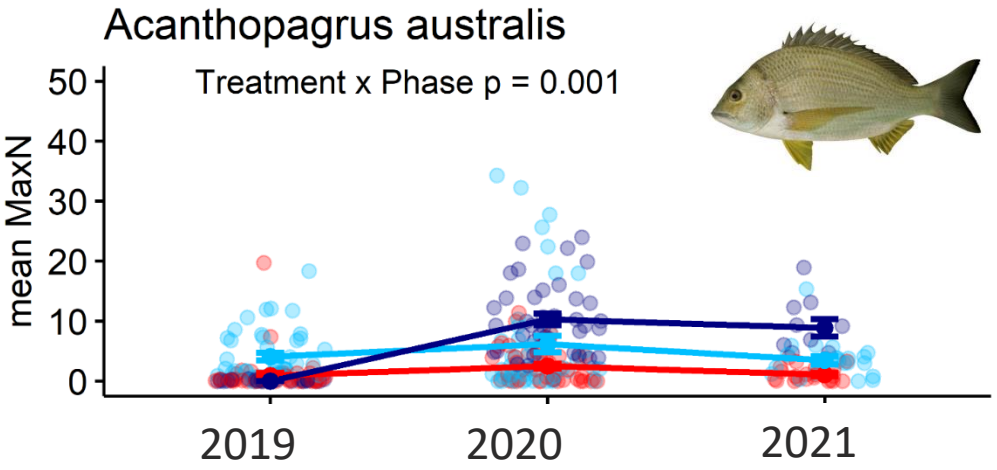
**Equal** to that seen at natural reefs

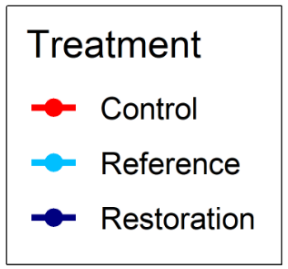


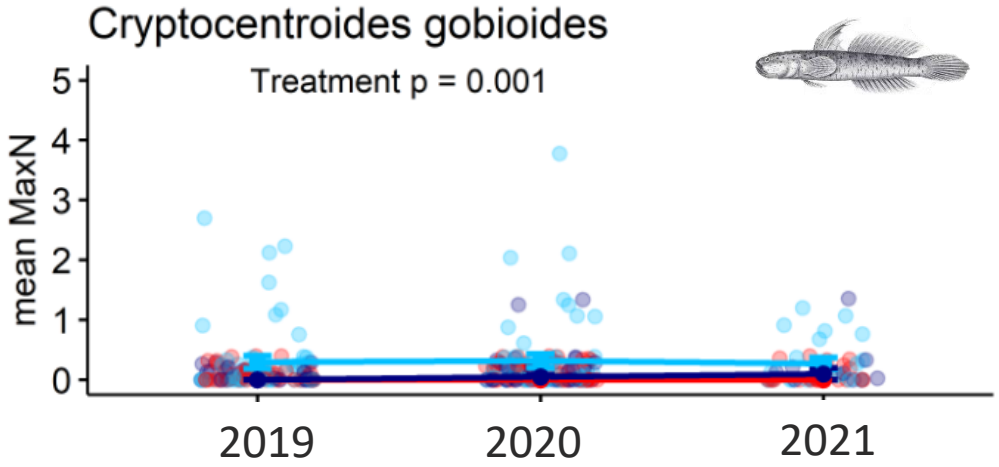
# Fish species



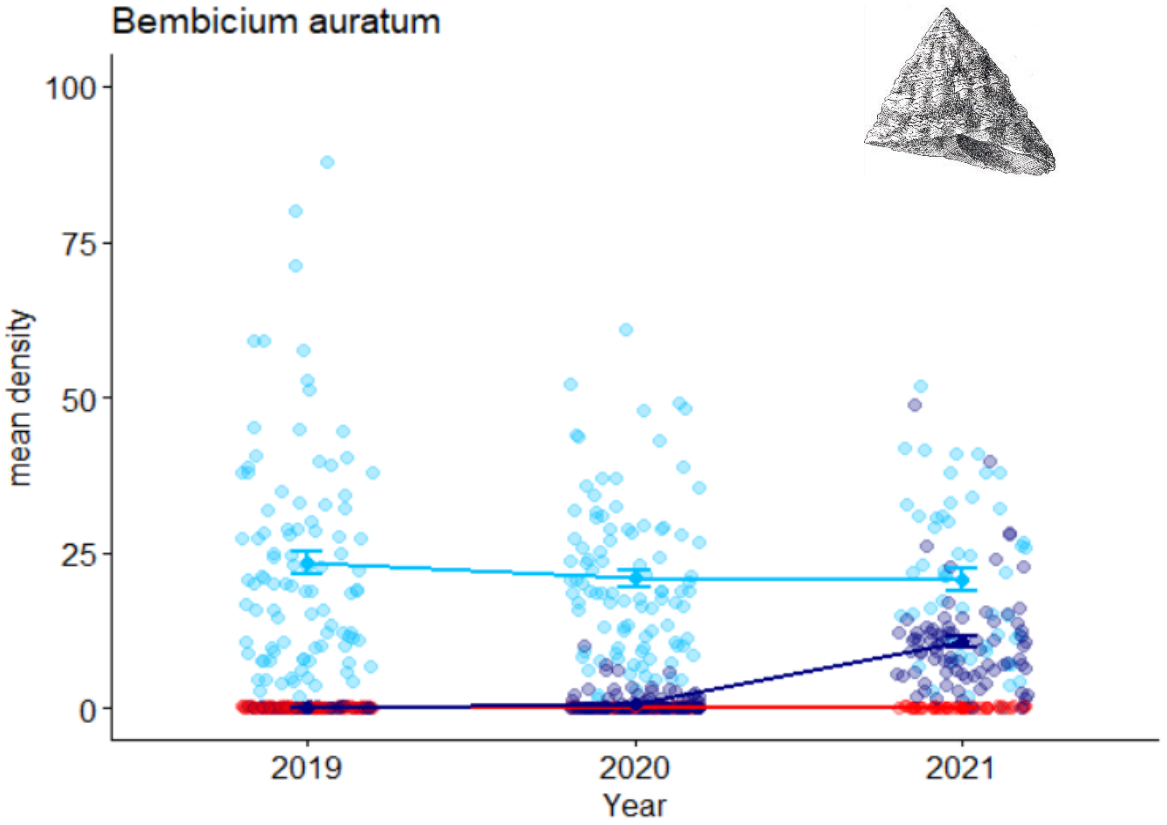



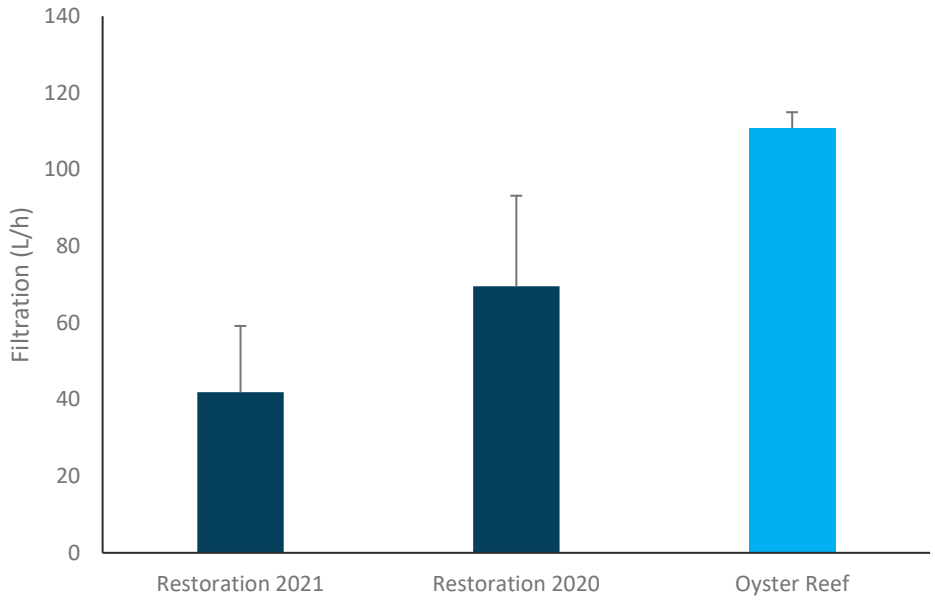



# Invertebrates

New habitat for over
**8 Million** snails
and other invertebrates




# Filtration - water quality benefits




Reefs filtering ~ **7.5 million litres** or **3 Olympic-sized swimming pools** of water AN HOUR

# Summary

Pre-restoration:

Assemblages variable over time, differed among estuaries

Oyster reefs ≠ sediment

Post on-ground works:

Oyster reefs and assemblages continue to develop

Ecosystem services – filtration benefits

Take home:

Excellent opportunity for experimental marine ecologists to:

1. Experimentally test if the millions of dollars spent on the on ground works is successful through rigorous monitoring
2. Do experiments to test new methods to progress success of oyster reef restoration

# Acknowledgements

**3,215+** hours of MONITORING the new reefs and analysing the results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The Nature Conservancy Australia

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https://www.marine.nsw.gov.au/projects/oyster-reef-restoration-research