



Rocks provide better reef bases than shell for restoration

& update of monitoring oyster reef restoration in Port Stephens



Victoria Cole, David Harasti, Kylie Russell
(NSW DPI Fisheries)

1

NSW Oyster Reef Restoration

- Oyster reefs are important habitat for biodiversity, & ecosystem services e.g. filtration
- Oyster reefs were once abundant & wide-spread, but lost due to overharvesting, disease and declining water quality (see Charlie's talk)
- NSW Department of Primary Industries undertook the State's first large-scale shellfish reef restoration project as an action under the NSW Marine Estate Management Strategy
- Our first ORR project was in PS in 2020
- Results (particularly rock vs shell) have helped guide future ORR (e.g. Wagonga, see Jill's talk)



NSW OYSTER REEF
RESTORATION PROJECT

2

Oyster Reef Restoration Research

1. Quantitative goals for oyster reef restoration
2. Remnant oyster reefs in Port Stephens
3. Determining suitability of types of natural materials for oyster reef restoration
4. Experimentally testing oyster reef restoration
 - a) Oyster reefs as habitat for invertebrates
 - b) Oyster reefs as habitat for fishes
 - c) Ecological functioning of oyster reefs



3

Restoration in Port Stephens

Remnant oyster reefs in Port Stephens are generally either small natural reefs or historic aquaculture

Natural settlement of intertidal Sydney Rock Oysters, *Saccostrea glomerata* - no seeding required

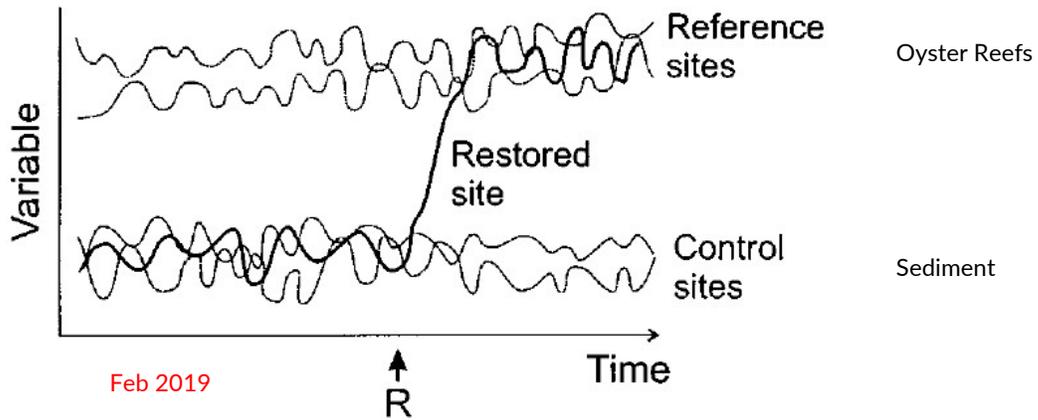
Pre- and post construction monitoring of oysters, invertebrates, and fish

Stage 1 included experiment comparing rock and shell



4

Hypothesised results for a new oyster reef



Chapman 1999

5

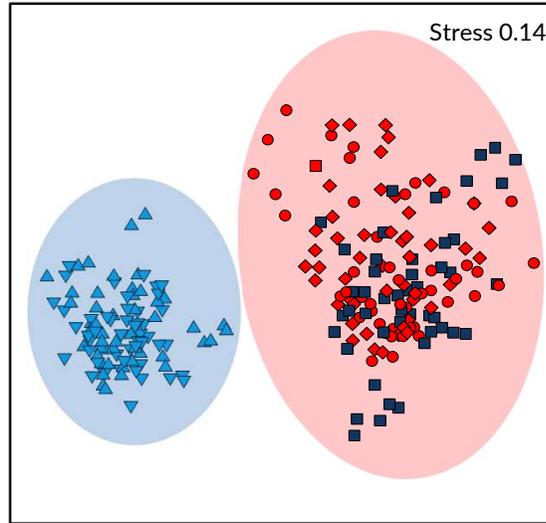


BEFORE the on-ground works

2019 Natural variability in assemblages of oyster reefs

6

Invertebrate assemblages (>40 taxa)

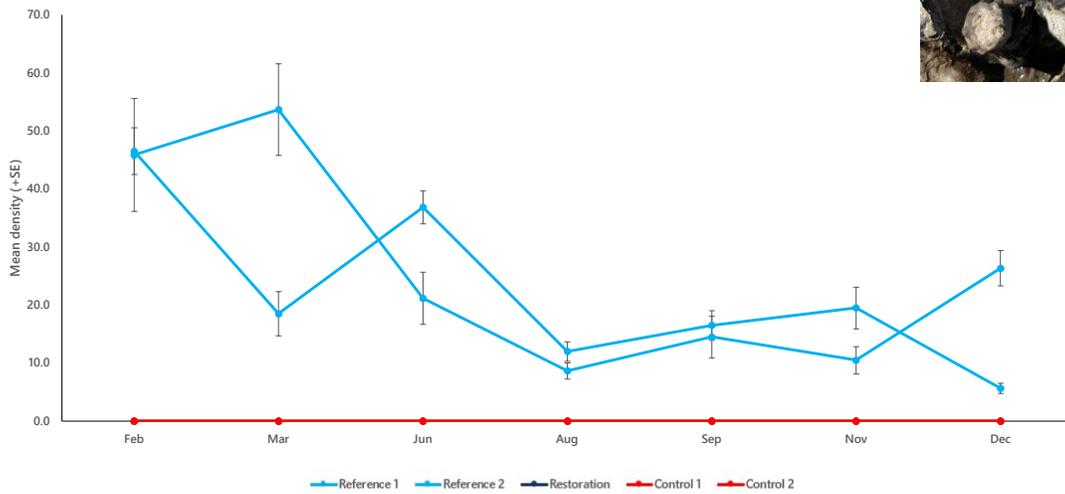


- ▲ Reference 1
- ▼ Reference 2
- ◆ Control 1
- Control 2
- Restoration



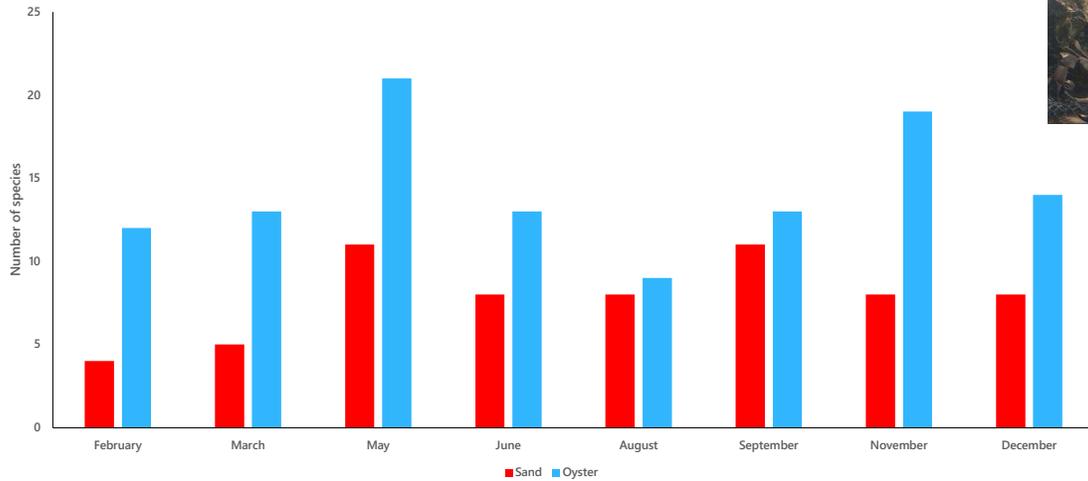
7

Bembicium auratum



8

Control sand versus Reference oyster reefs (>55 spp)



9

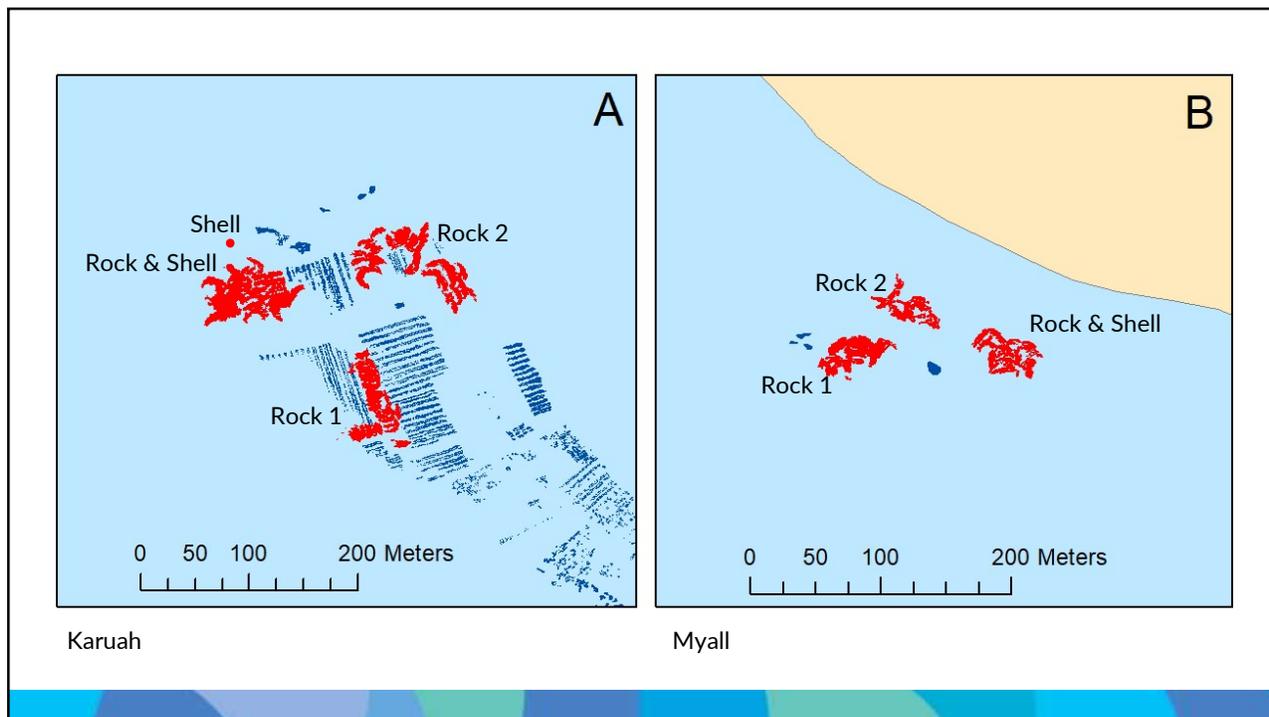


26.5 times MORE REEF
at the Myall River site after
construction

AFTER the on-ground works

Stage 1 – 2020 Measuring restoration &
ROCK VS SHELL

10

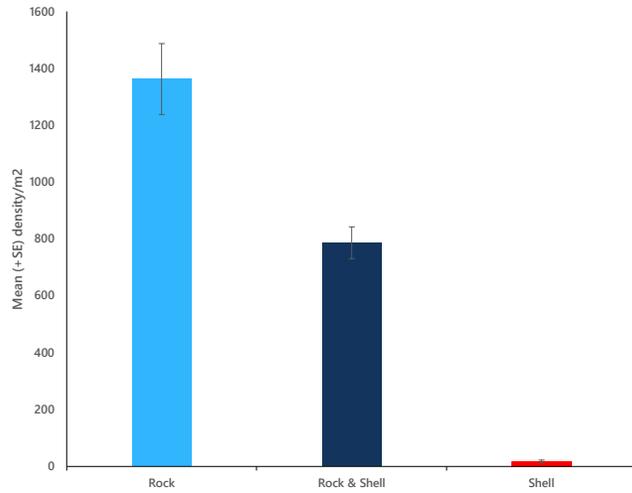


11



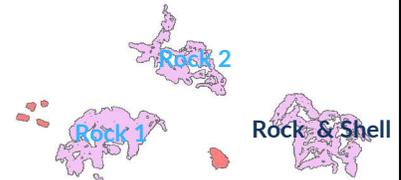
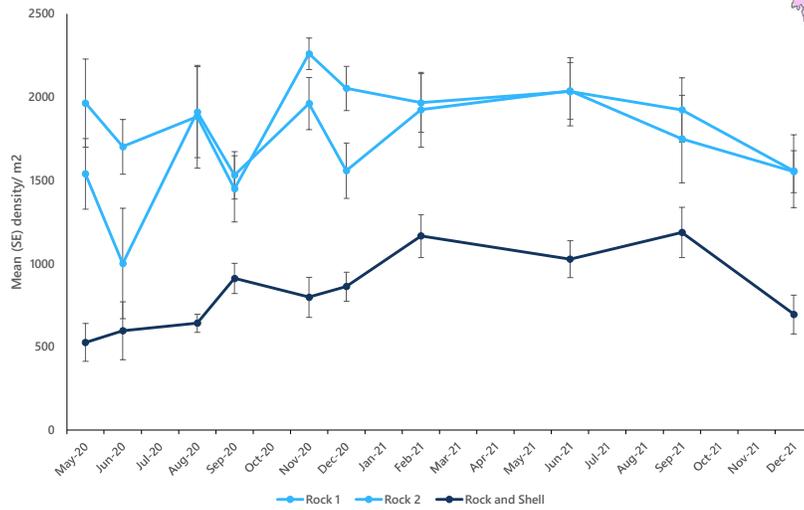
12

Rock > Shell & Rock > Shell



13

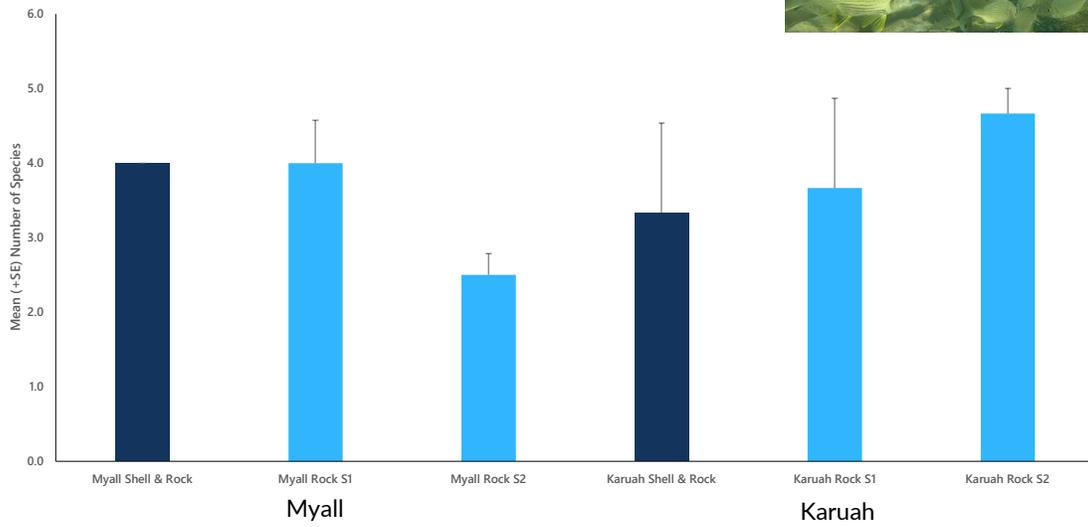
Seasonal consistency of oyster density



Myall

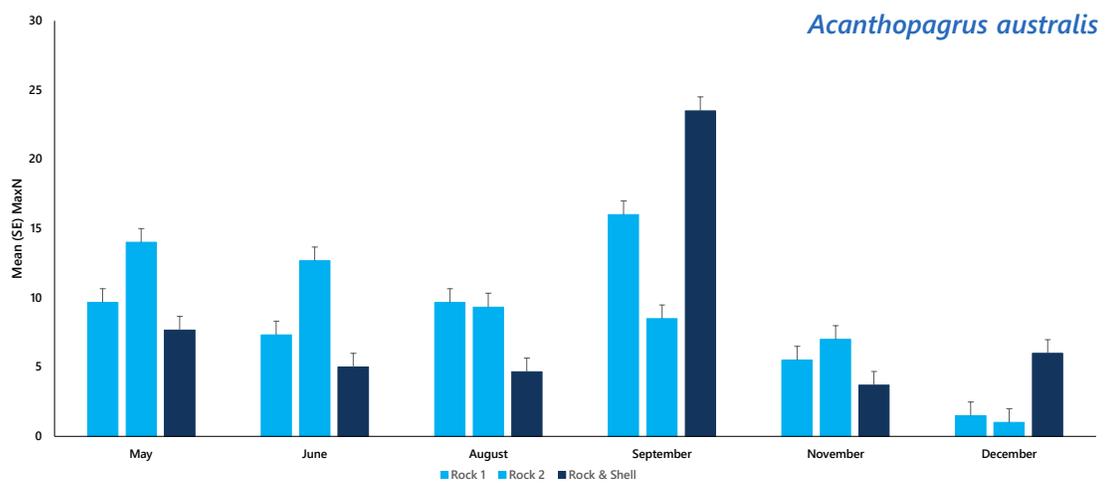
14

Fish biodiversity



15

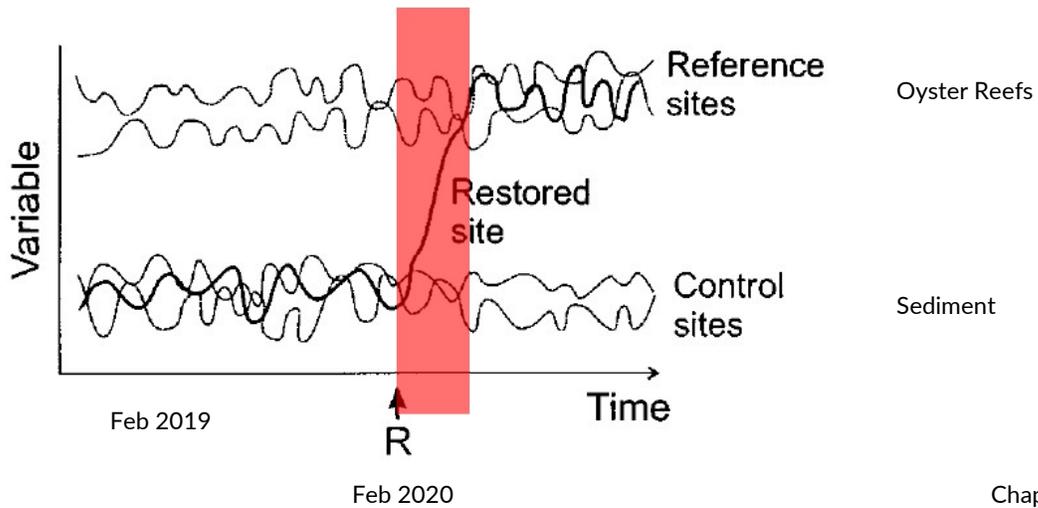
Reefs of rock or reefs of rock and shell for biodiversity



16

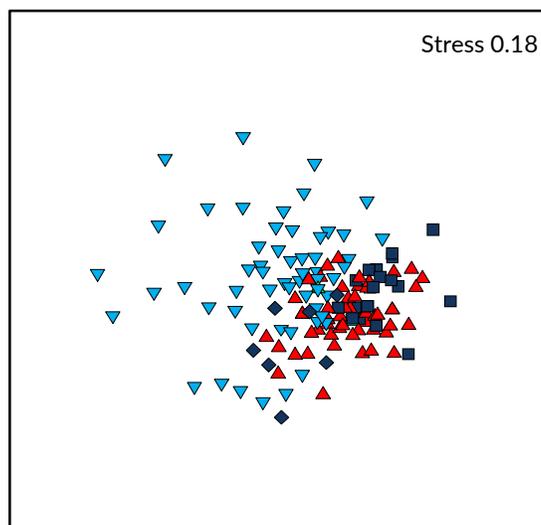
Changing restoration sites


Over **50 Million** baby oysters naturally
recruited after only **9 months**



17

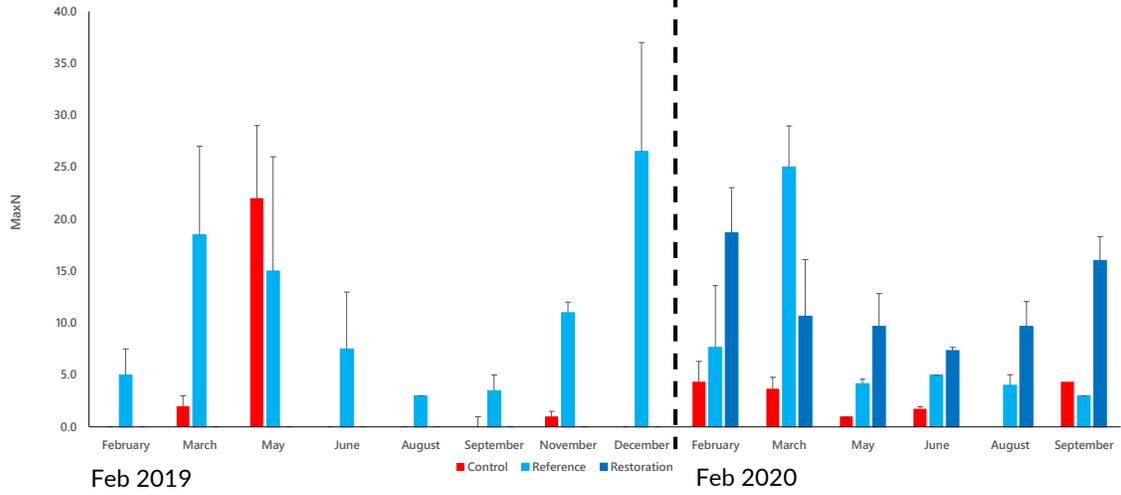
Changing fish assemblages



- ▼ Reference
- ▲ Control
- Restoration before
- ◆ Restoration after 6 months

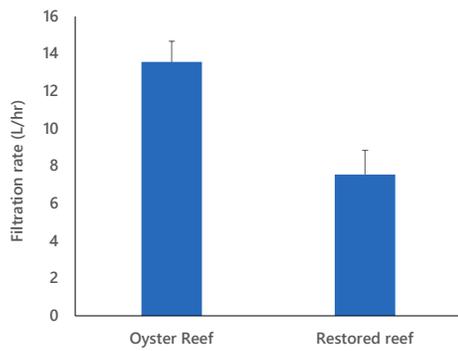
18

Acanthopagrus australis



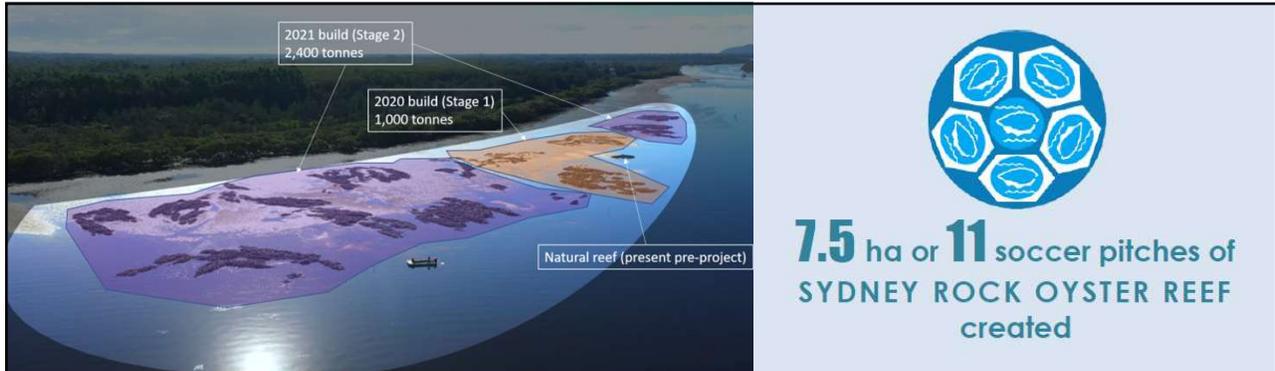
19

Filtration - water quality benefits




400,000 litres of water FILTERED PER HOUR by the new reef
 after just **5** months

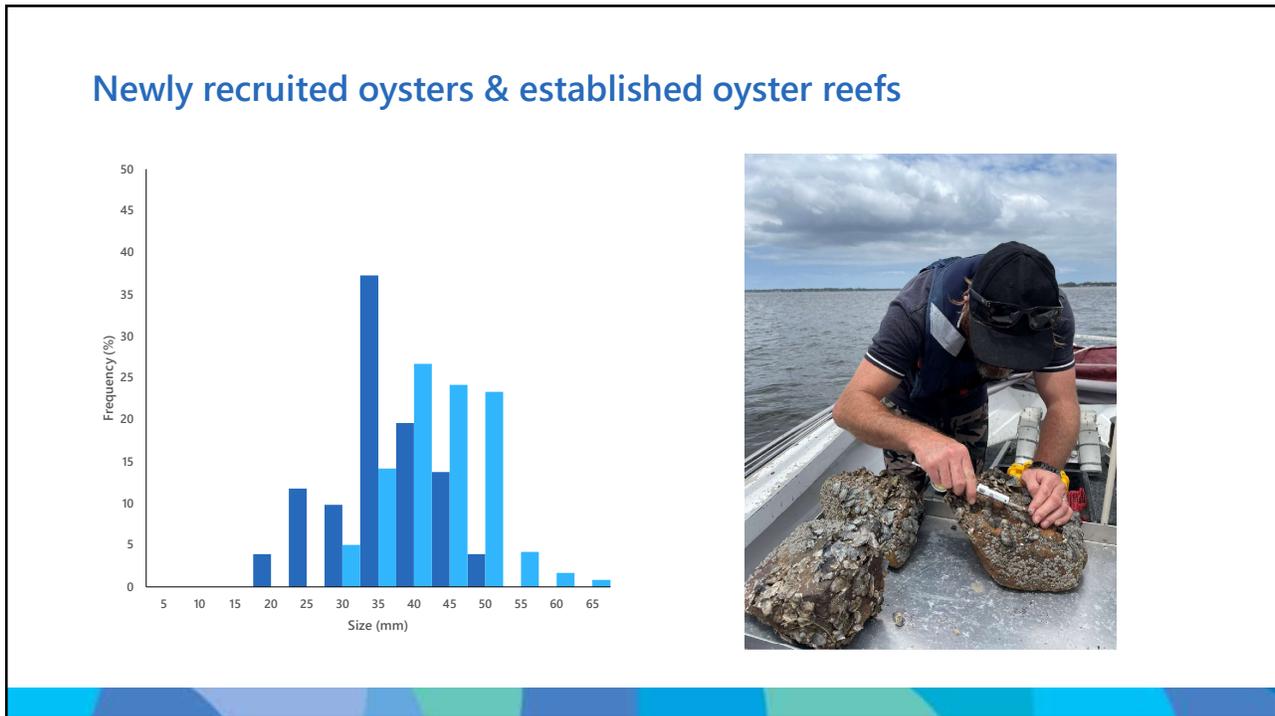
20



AFTER the on-ground works

Stage 2 – 2021 Expansion of the reefs

21



22

New reefs are nursery habitats

50 x more JUVENILE FISH
at NEW REEFS compared to
bare sand habitat



23

Increased biodiversity & filtration



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



34 DIFFERENT FISH SPECIES



Equal to that seen at natural reefs



New habitat for over
8 Million snails
and other invertebrates

24

Field assistance:

Kirk Dahle
Isabelle Thiebaud
Ben Kearney
Gwenael Cadiou
Tristan New
Adam Wiltshire
Angela Russell



3,215+ hours of MONITORING the
new reefs and analysing the results

The Nature
Conservancy 
Australia



**NSW OYSTER REEF
RESTORATION PROJECT**



NSW Marine Estate