Effects of eco-engineering interventions on subtidal fish and fouling communities at Sydney Harbour

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UNSW CMSI Centre for Marine Science & Innovation

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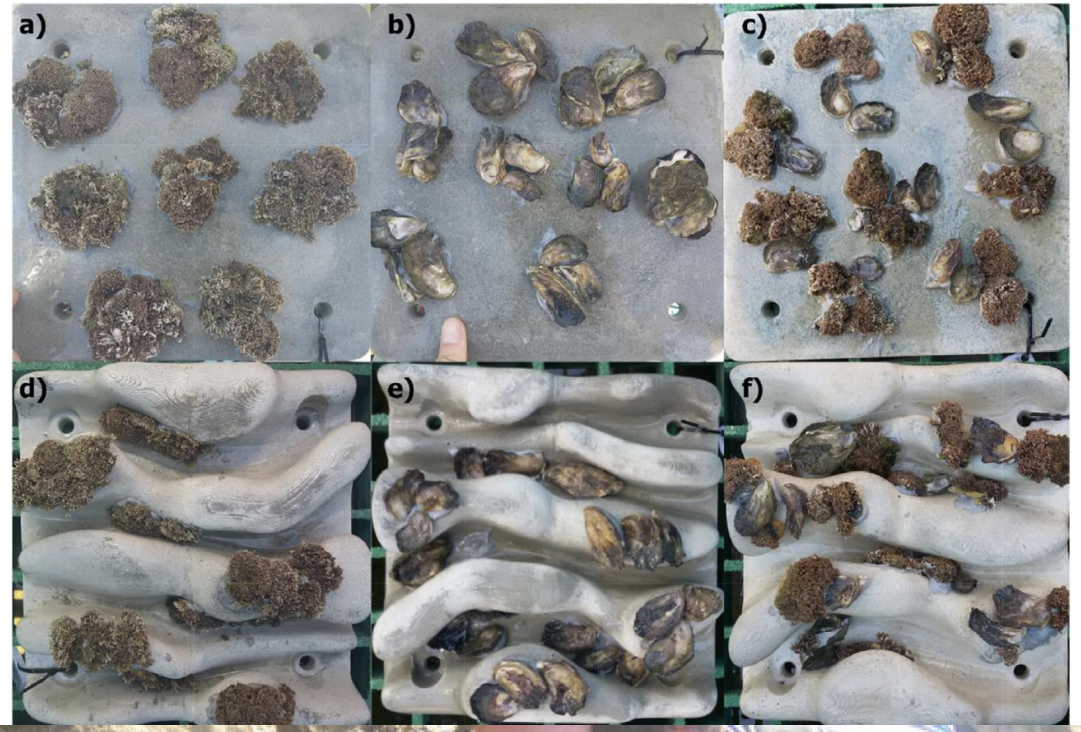
Eco-engineering

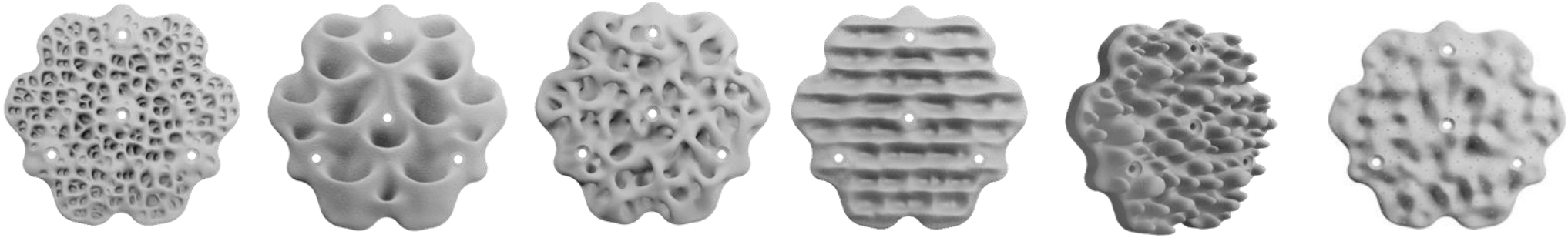


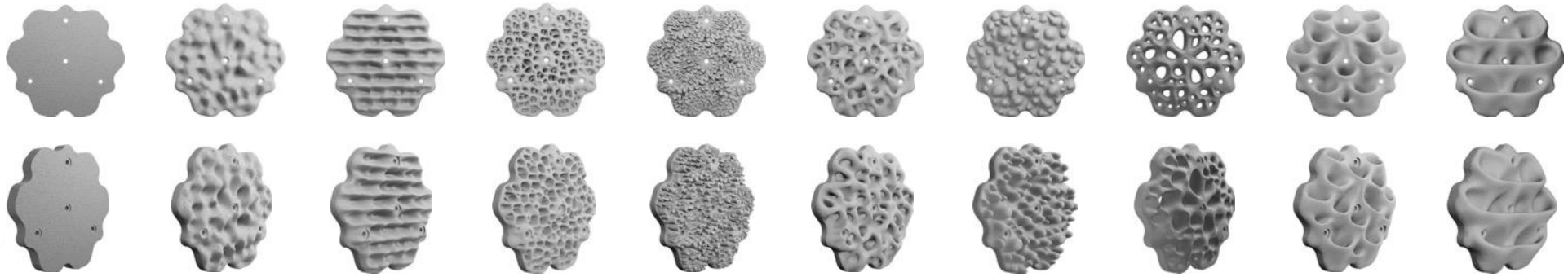
ECOSTRUCTURE

Climate Change Adaptation through Ecologically-Sensitive Coastal Infrastructure

Inspired by nature

REEF DESIGN LAB





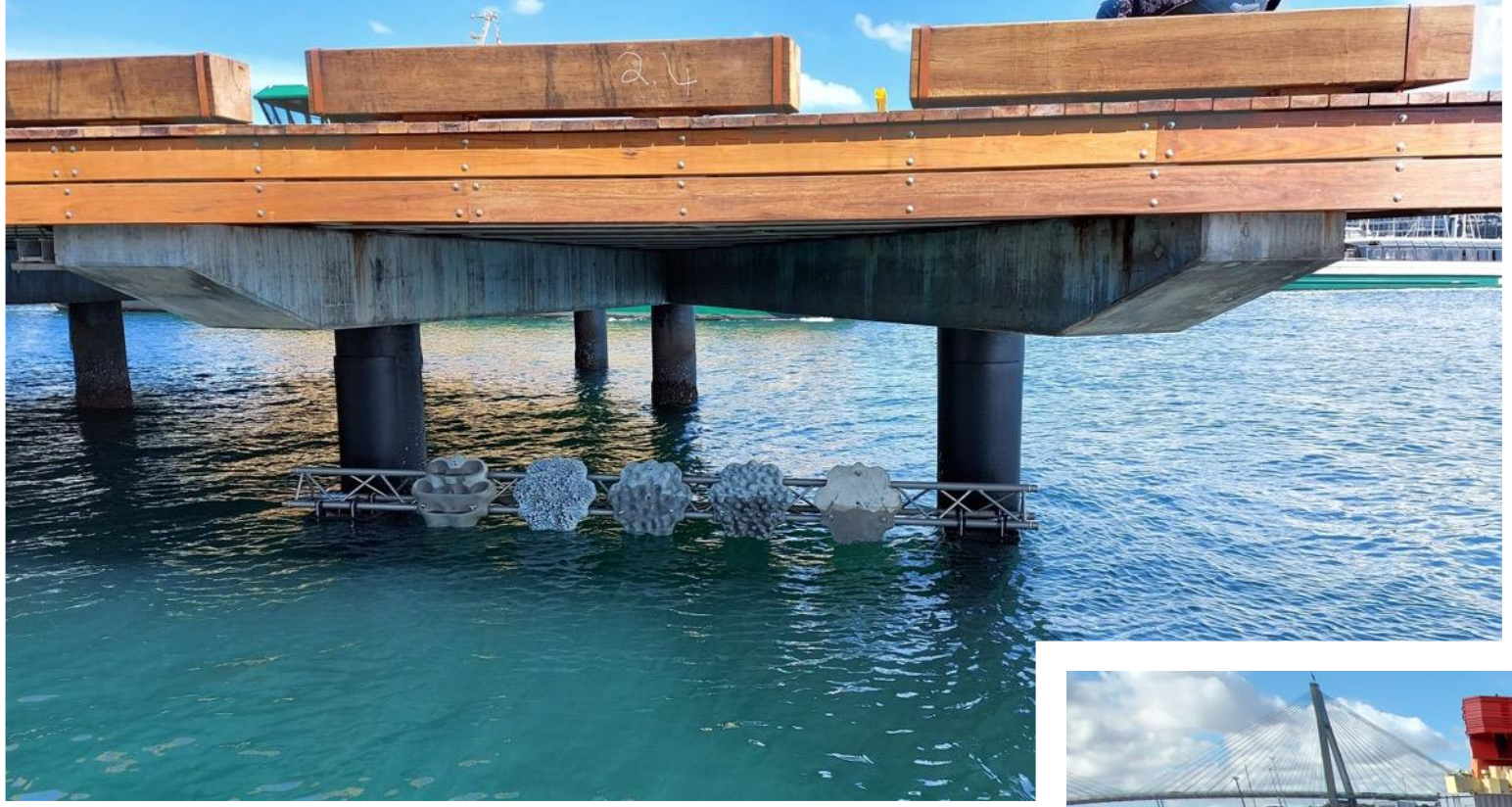
Full wall

Barangaroo

Baseline monitoring (2014 & 2018)

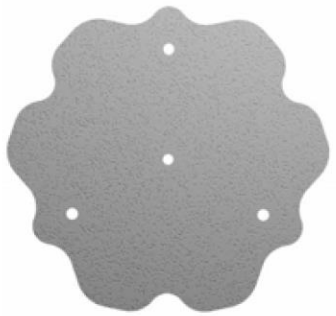
- No intertidal habitat and associated marine species at South Barangaroo
- No native kelps *Ecklonia radiata, Padina elegans and Sargassum linearifolium* at South Barangaroo
- No fish were observed at South Barangaroo
- 22 taxa in total were described on the Barangaroo pilings

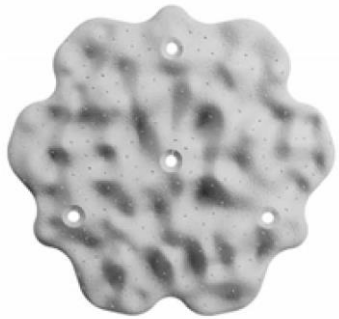
Barangaroo South, Watermans Cove, November 2020

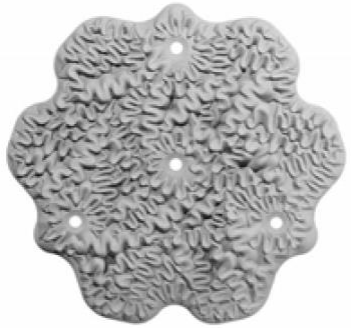

24

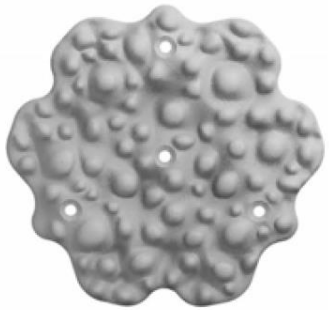
Experimental design

Intertidal


Control

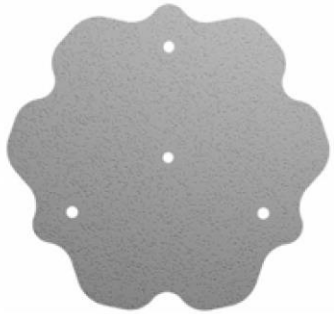

Texture

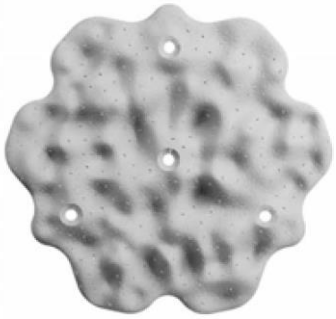

Oyster


Sponge fingers

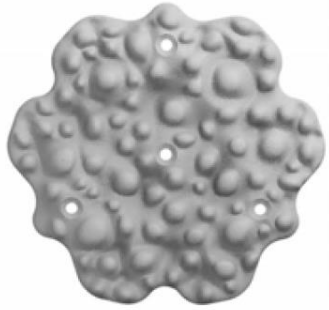

Large rockpool

Subtidal


Control


Texture

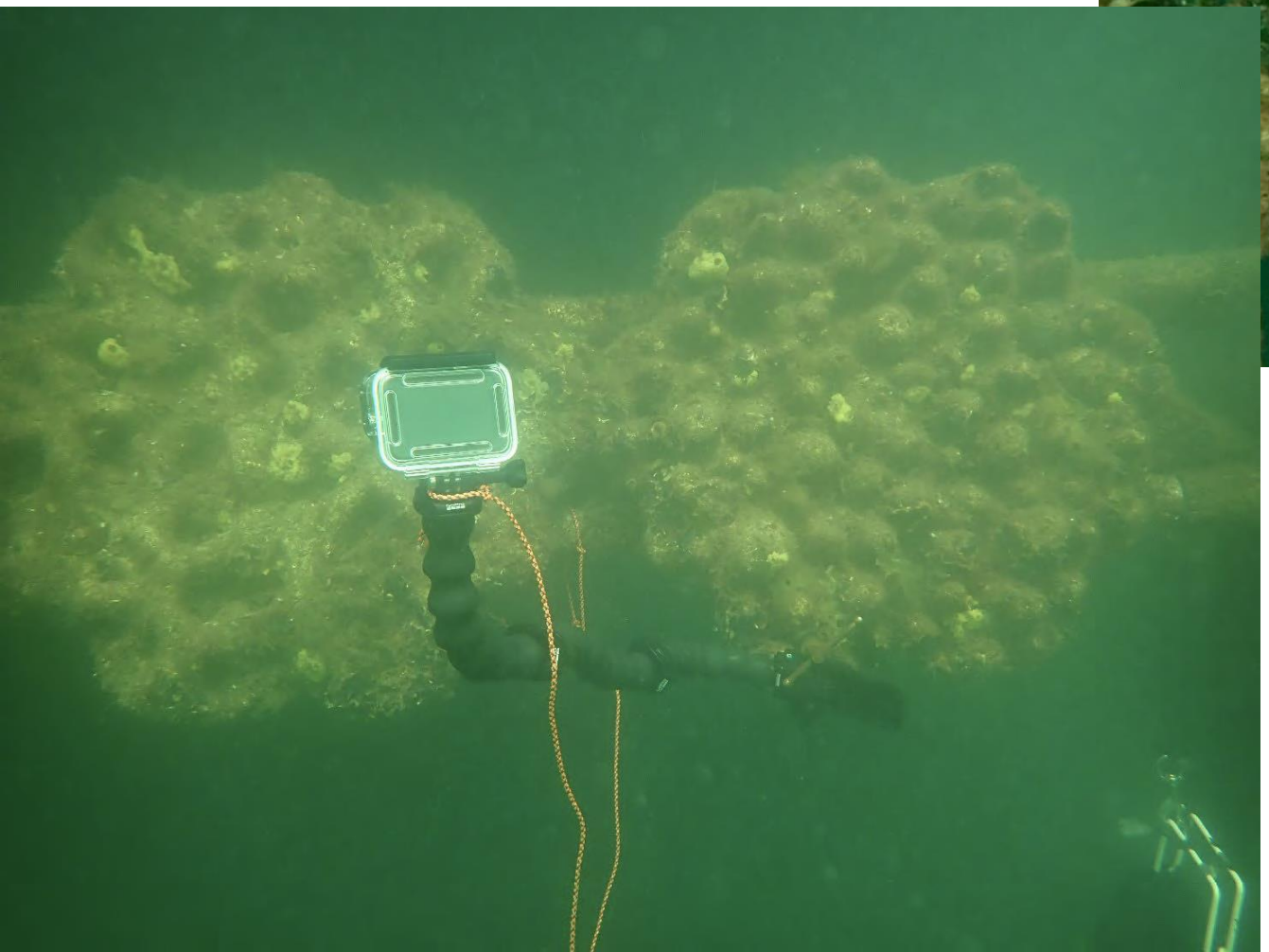

Oyster


Sponge fingers


Kelp holdfast


Kelp Transplanted

Monitoring



At each depth

Fouling: n = 8

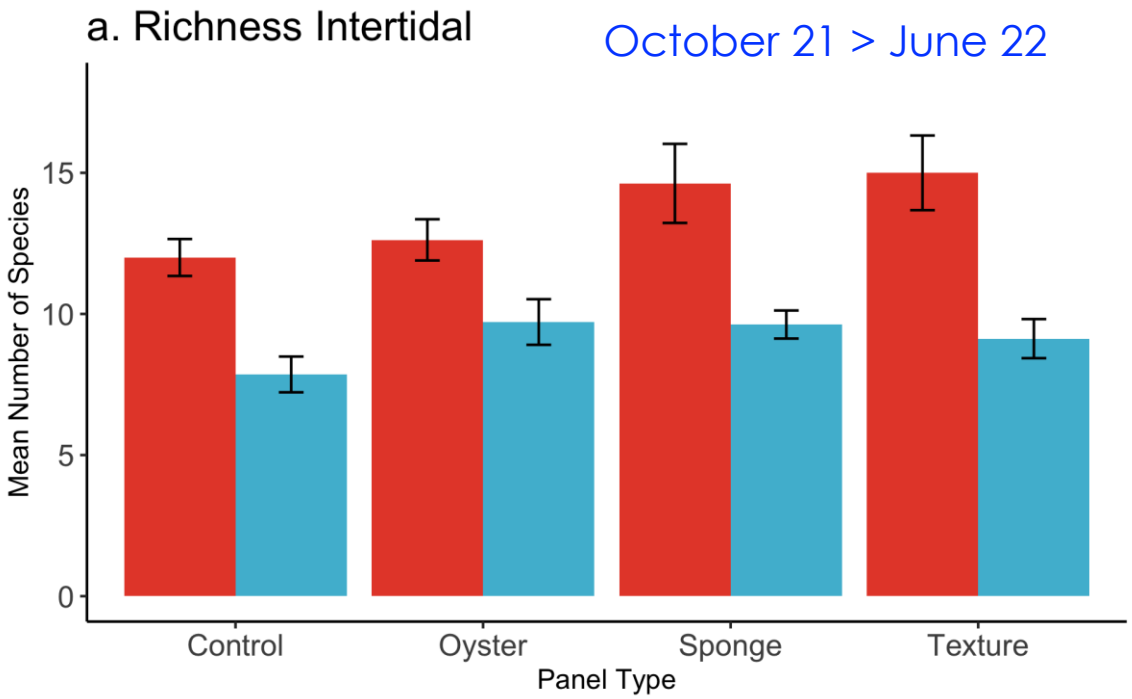
Fish: n = 4

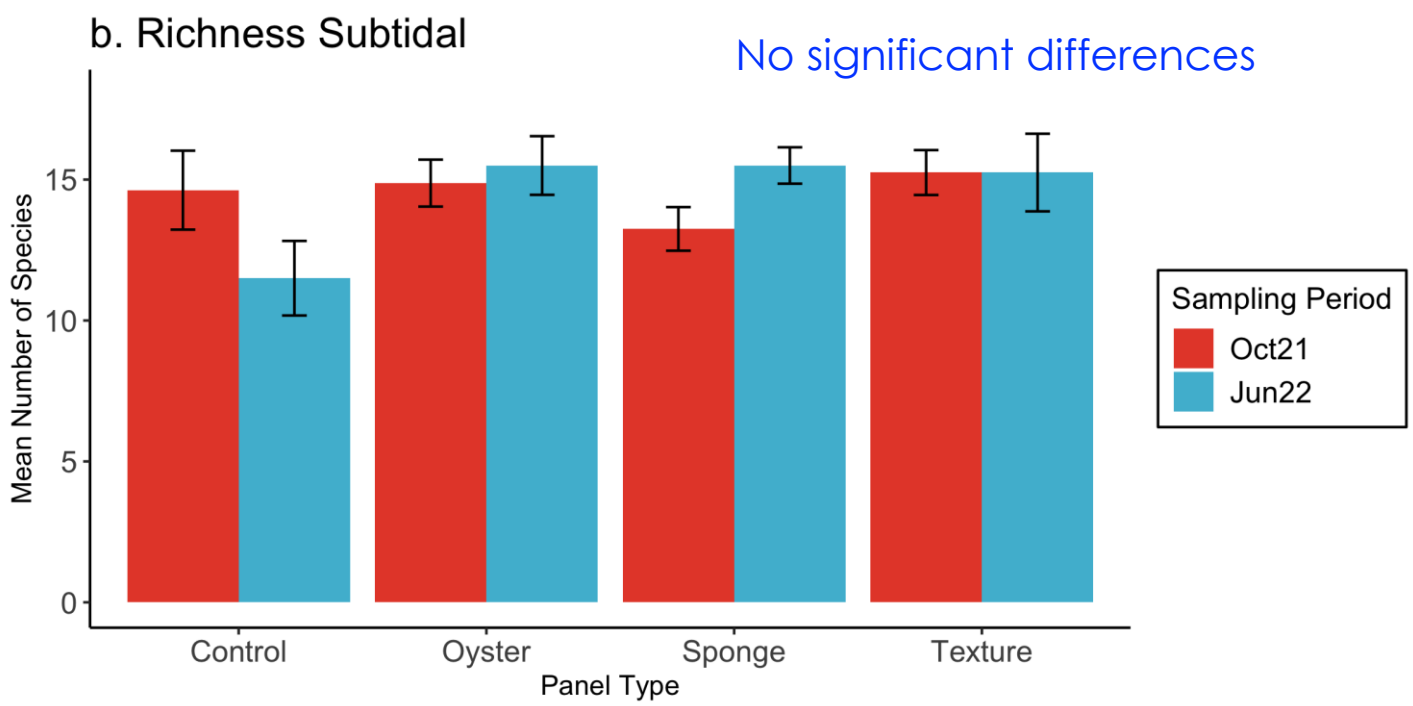
2 Sampling times

Fouling assemblages

More than 100 spp found; 80 spp in the intertidal and 85 spp in the subtidal

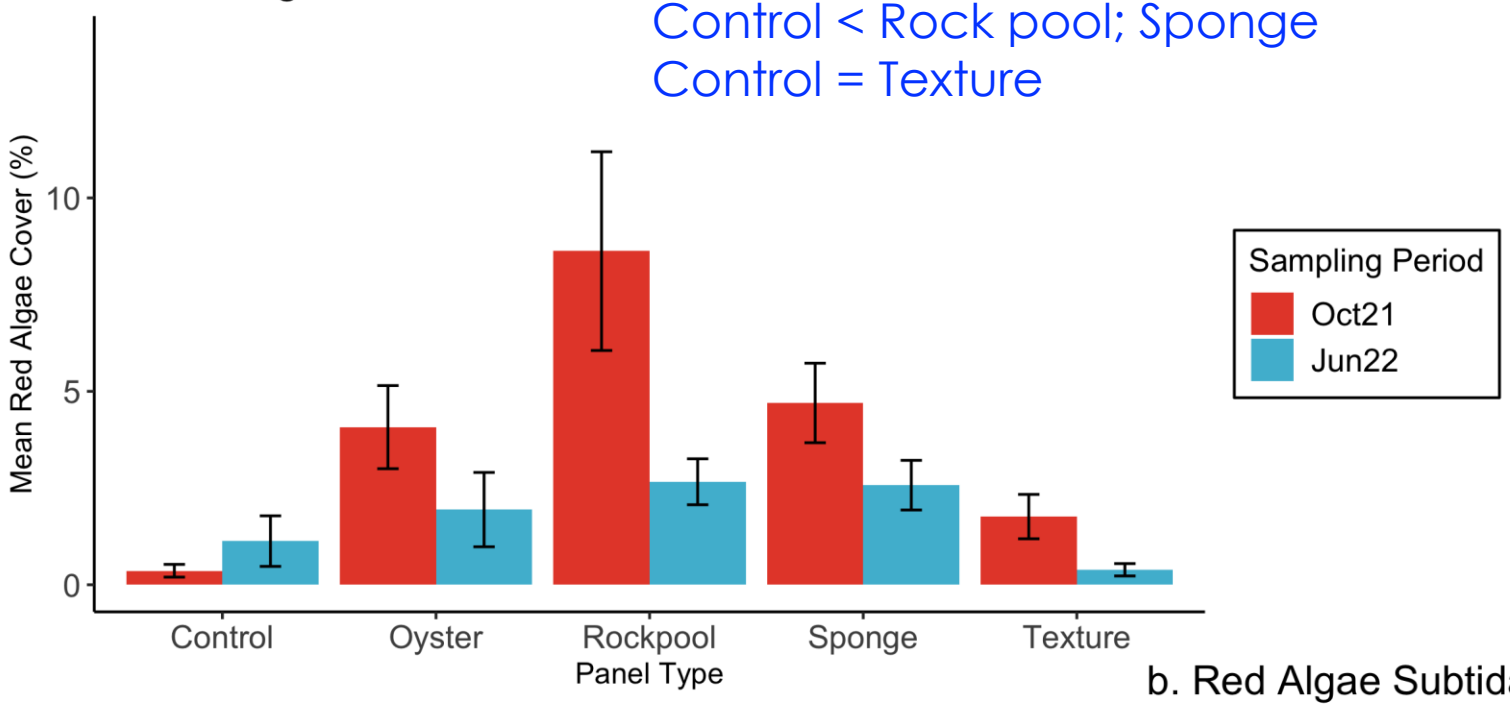
Barnacles, brown algae and red algae most abundant





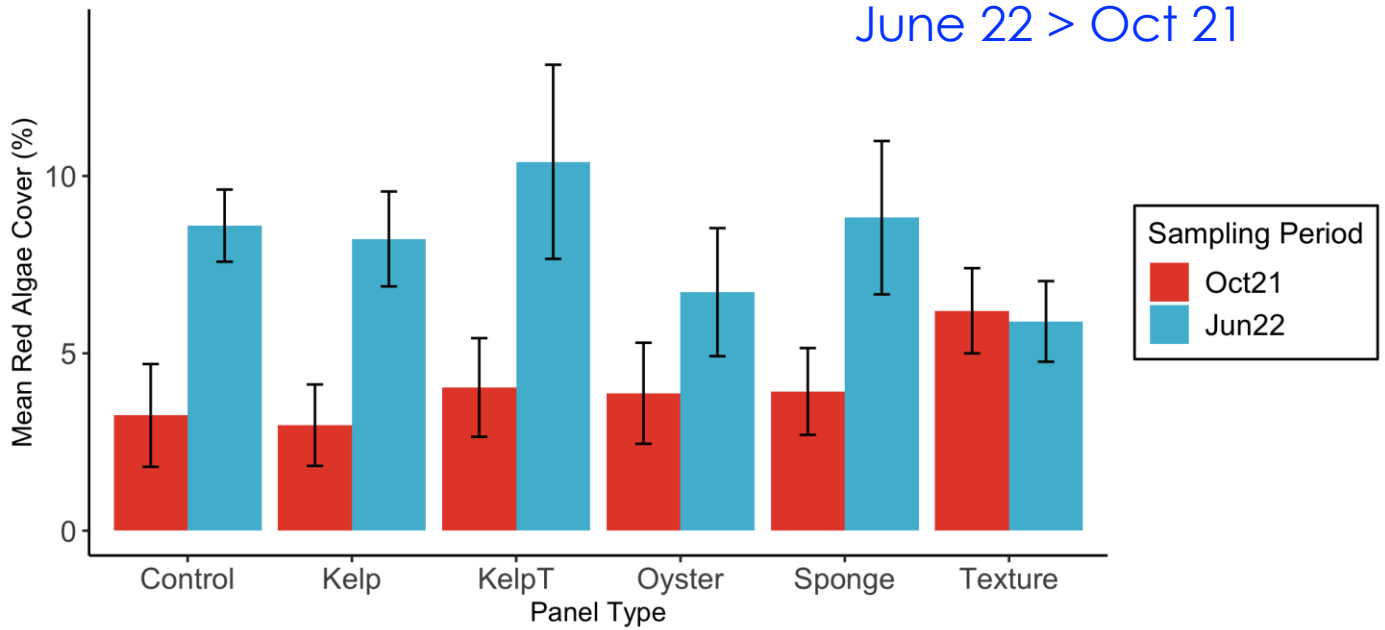
a. Red Algae Intertidal

Control < Rock pool; Sponge
Control = Texture

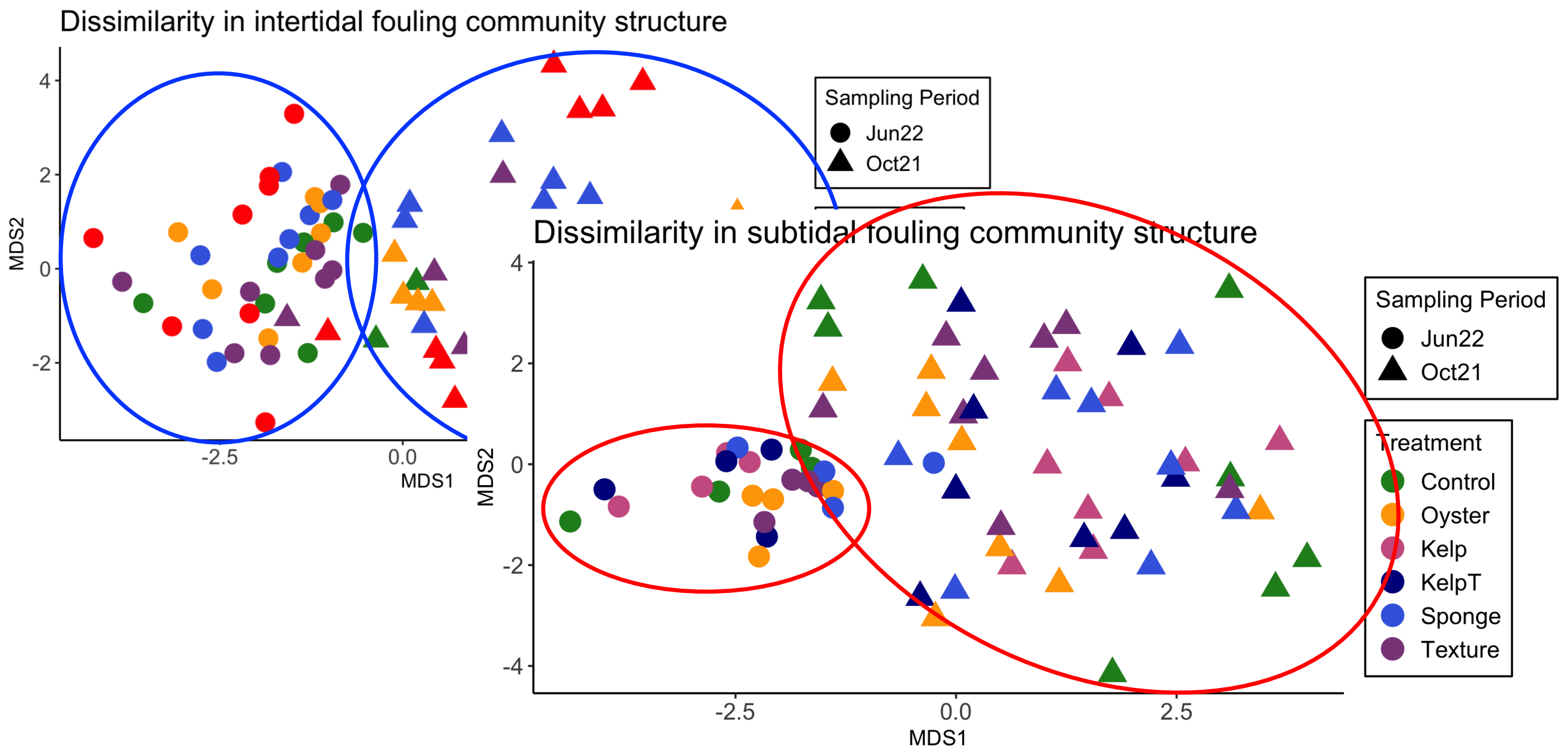


b. Red Algae Subtidal

June 22 > Oct 21



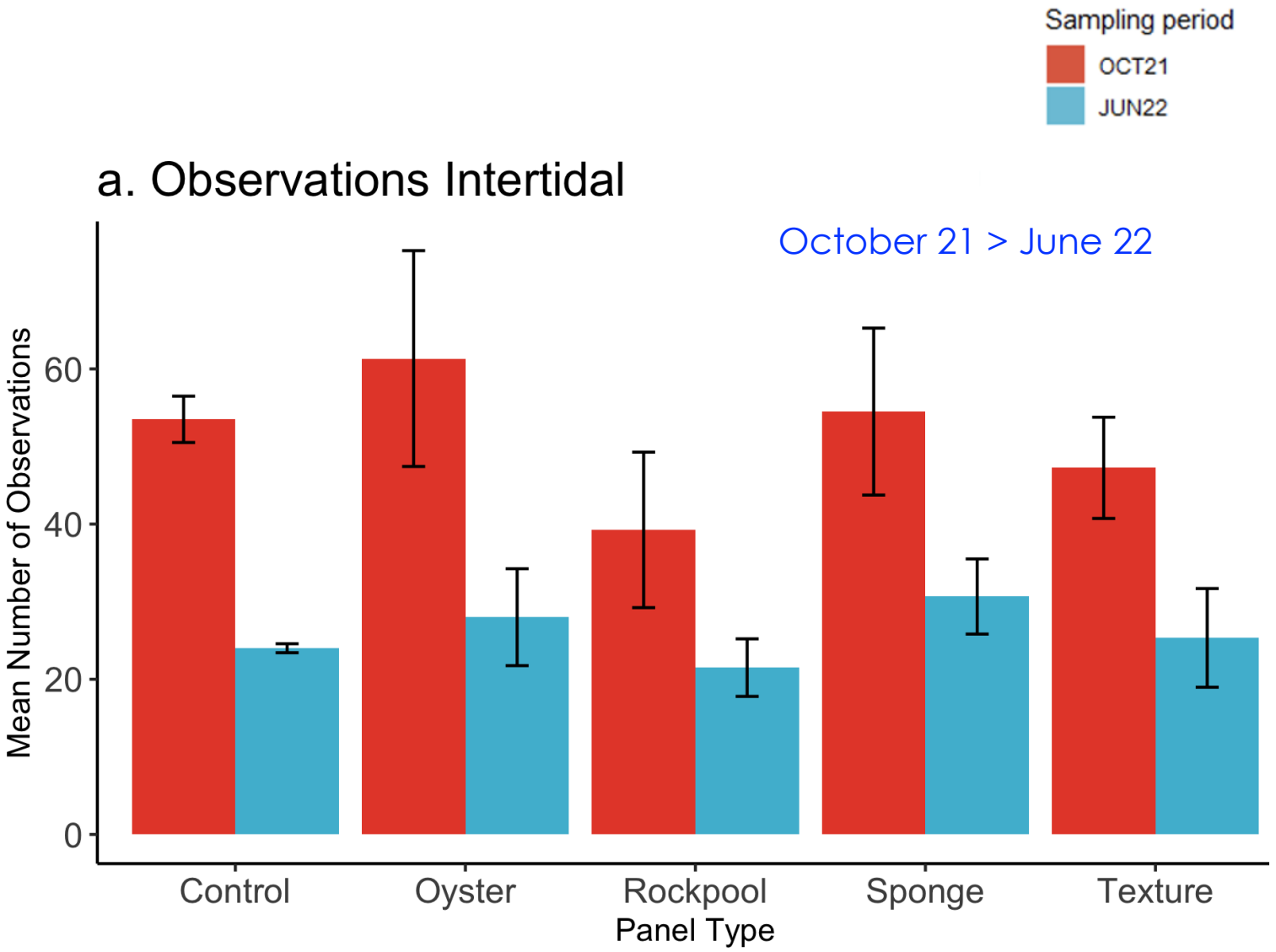
Fouling assemblages



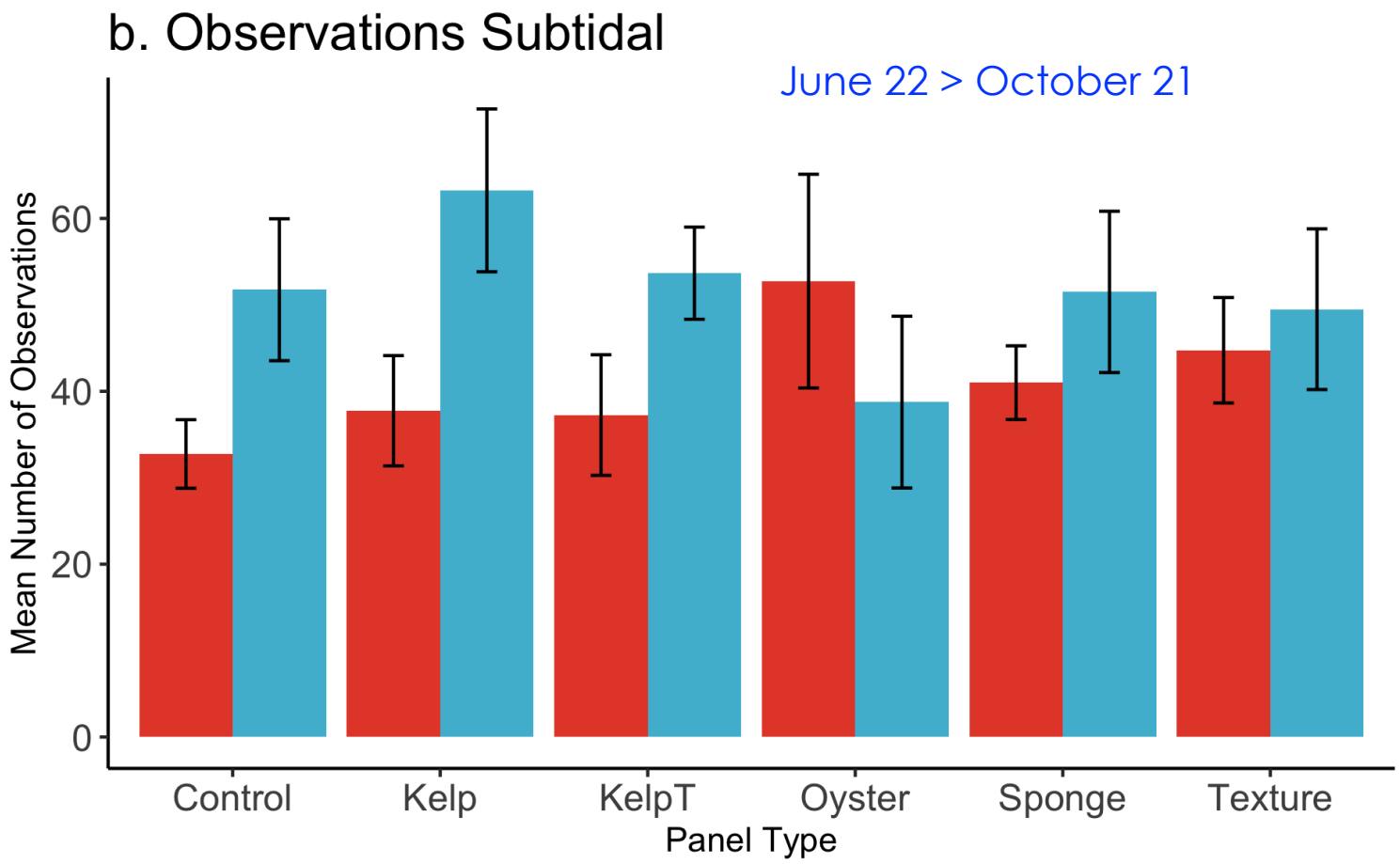
Fish

- Total of 22 species were found; 8 benthonic and 14 pelagic
- *Parablennius intermedius* (Horned Blenny) most abundant and active species at both depths
- Responsible for 50% of all observations and 80% of bites

Fish Abundance

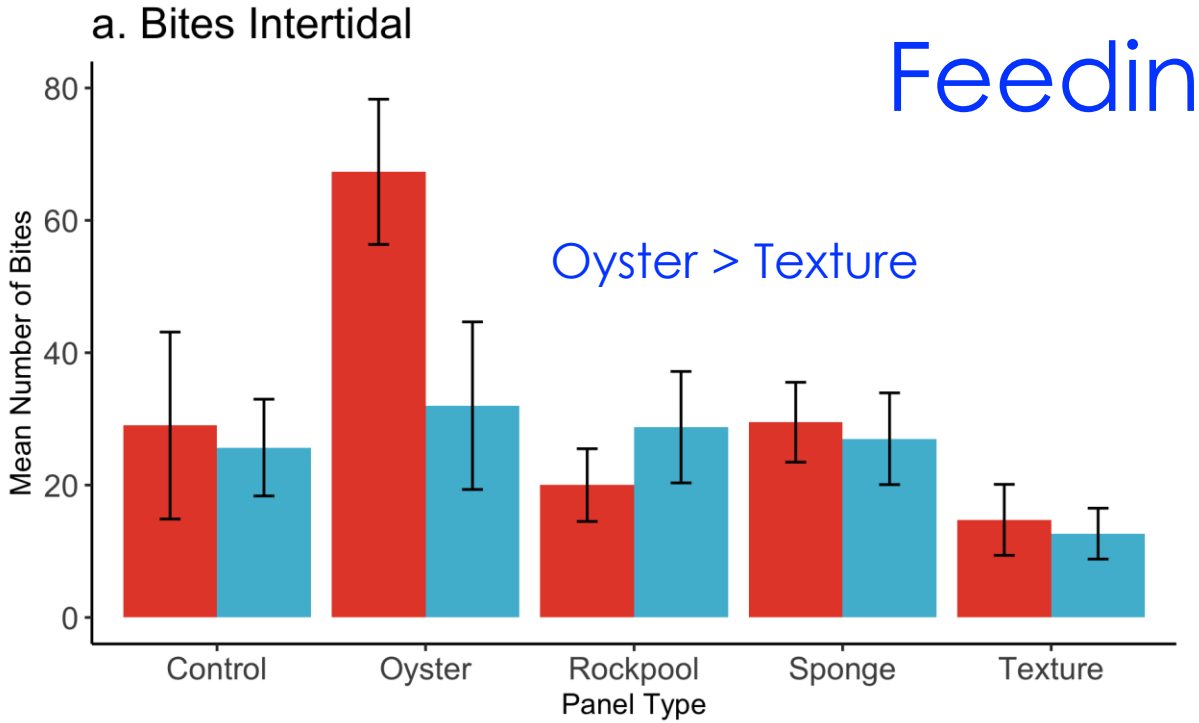


Fish Abundance

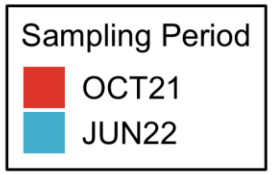


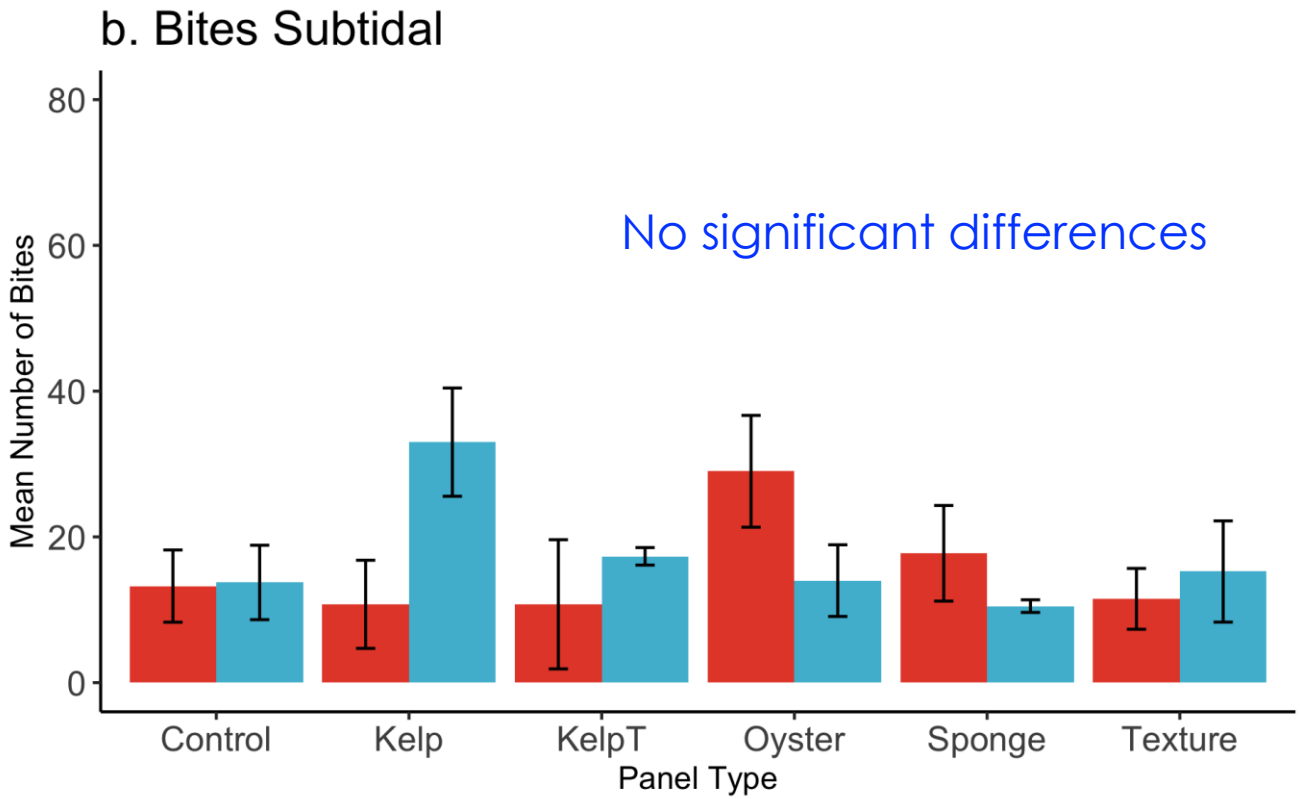
b. *P. intermedius* Subtidal

Feeding activity (number of bites)



Oyster > Texture





No significant differences

SUMMARY

Significant increase in the number of species compared to the baseline

Panel design don’t seem to matter

Further sampling is necessary to unconfound massive rains due to La Niña

PROF MELANIE BISHOP

A/PROF KATHERINE DAFFORN

DR ARIA LEE

ALEX GOAD

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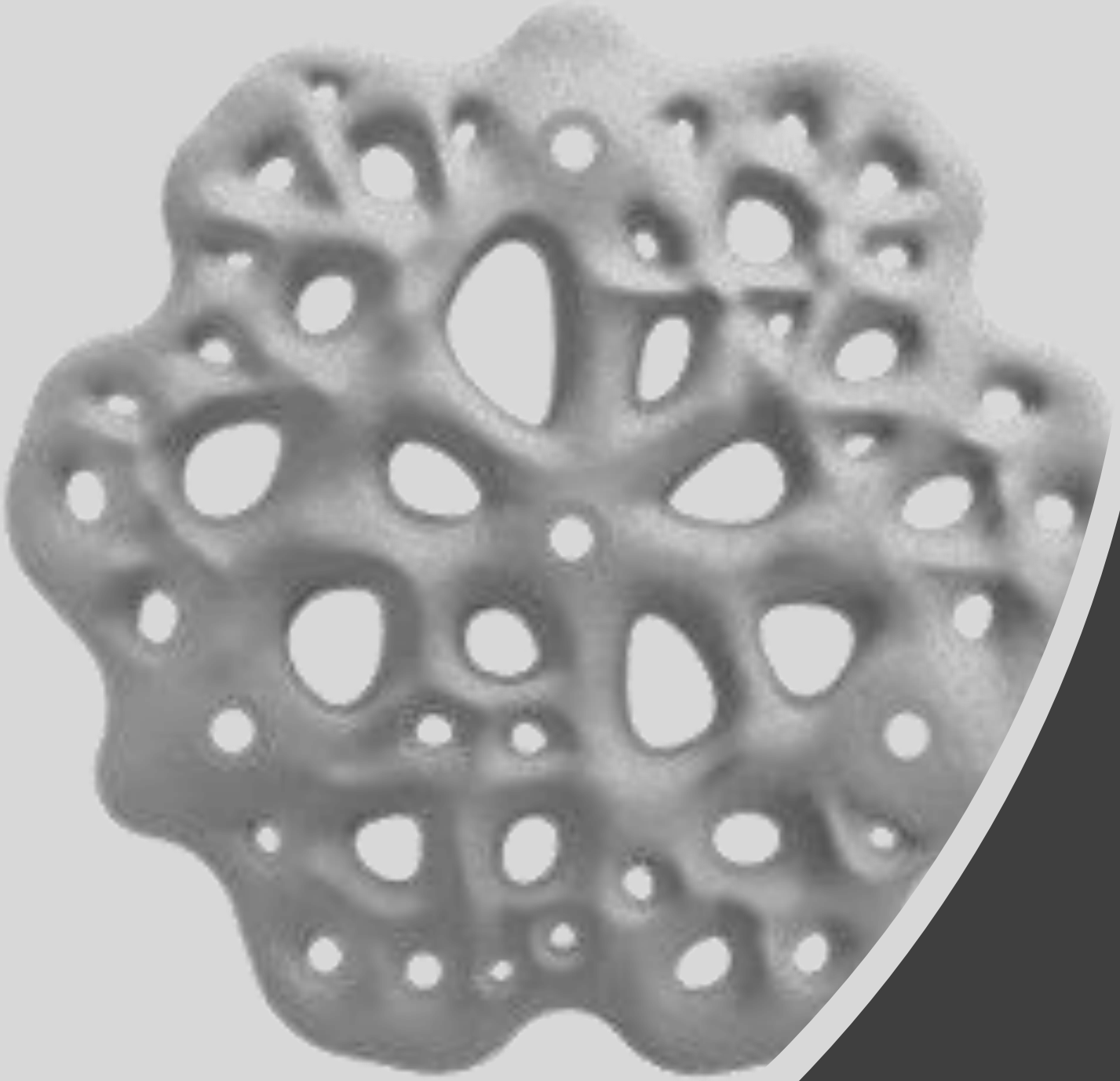
Infrastructure
New South Wales

Honour student: Hanbin Yu



Thank You

Increasing habitat complexity on seawalls: Investigating large- and small-scale effects on fish assemblages

Rebecca L. Morris ✉, M. Gee Chapman, Louise B. Firth, Ross A. Coleman

Increasing microhabitat complexity on seawalls can reduce fish predation on native oysters

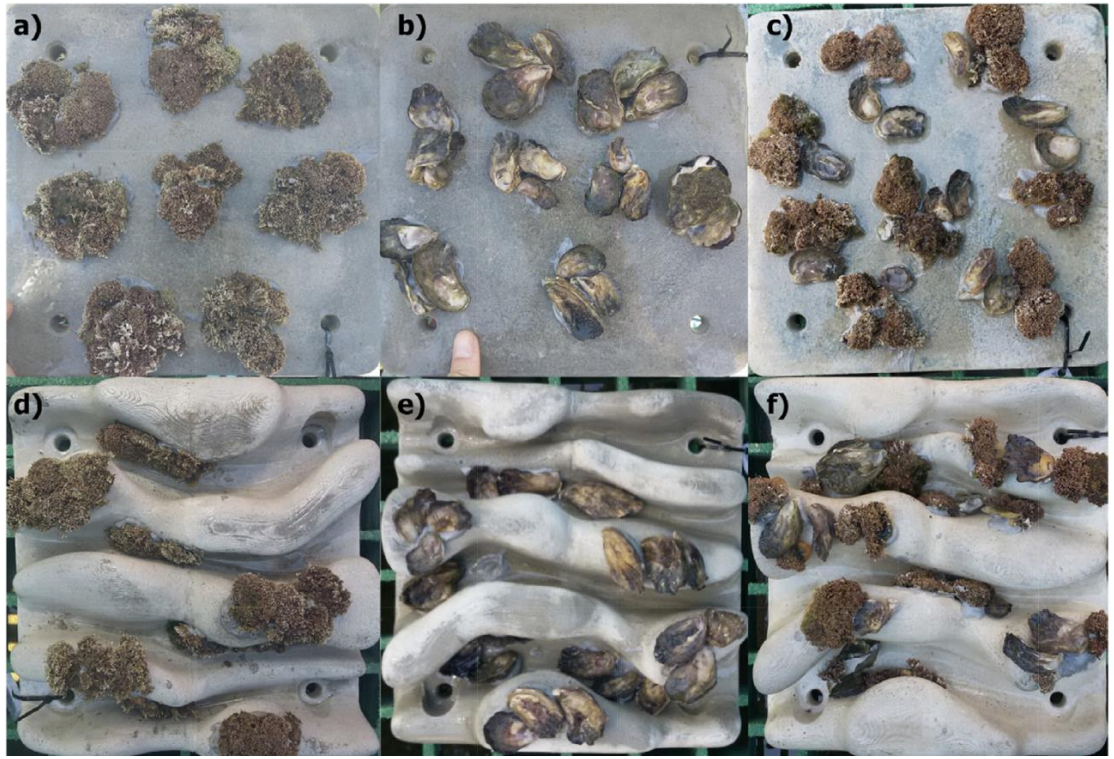
E.M.A Strain[a,*], R.L. Morris[a,b], R.A. Coleman[a,b], W.F. Figueira[a,b], P.D. Steinberg[a,e], E.L. Johnston[a,c], M.J. Bishop[a,d]

Fish-smart seawalls: a decision tool for adaptive management of marine infrastructure

Rebecca L Morris[1†*], Augustine G Porter[1], Will F Figueira[1,2], Ross A Coleman[1], Emily K Fobert[3], and Renata Ferrari[1,2]

Seawall as salmon habitat: Eco-engineering improves the distribution and foraging of juvenile Pacific salmon

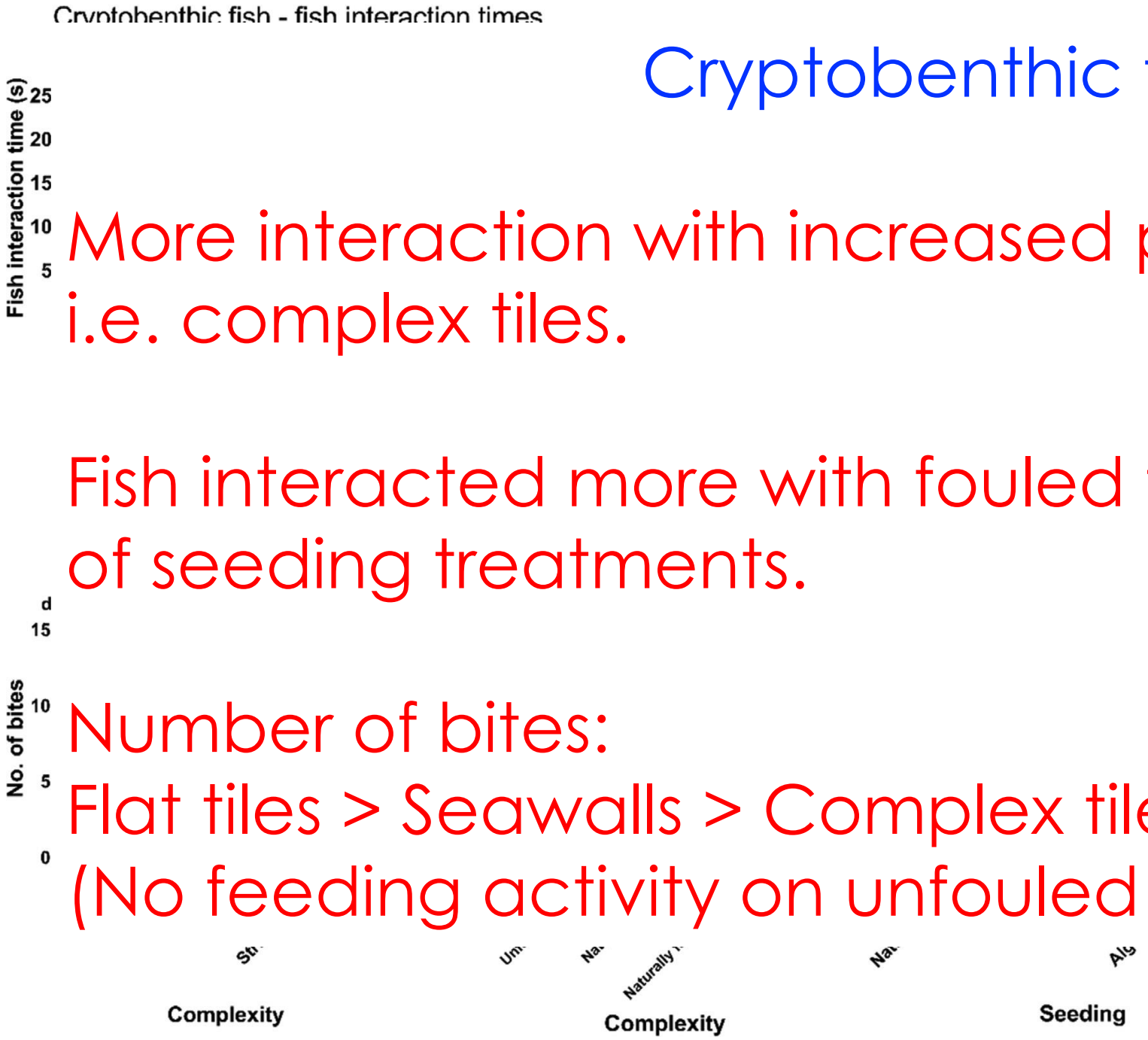
Alexandra C. Sawyer[*,1], Jason D. Toft, Jeffery R. Cordell



After 8 months of deployment

Ushiama et al 2019; Ecol Eng

Cryptobenthic fish



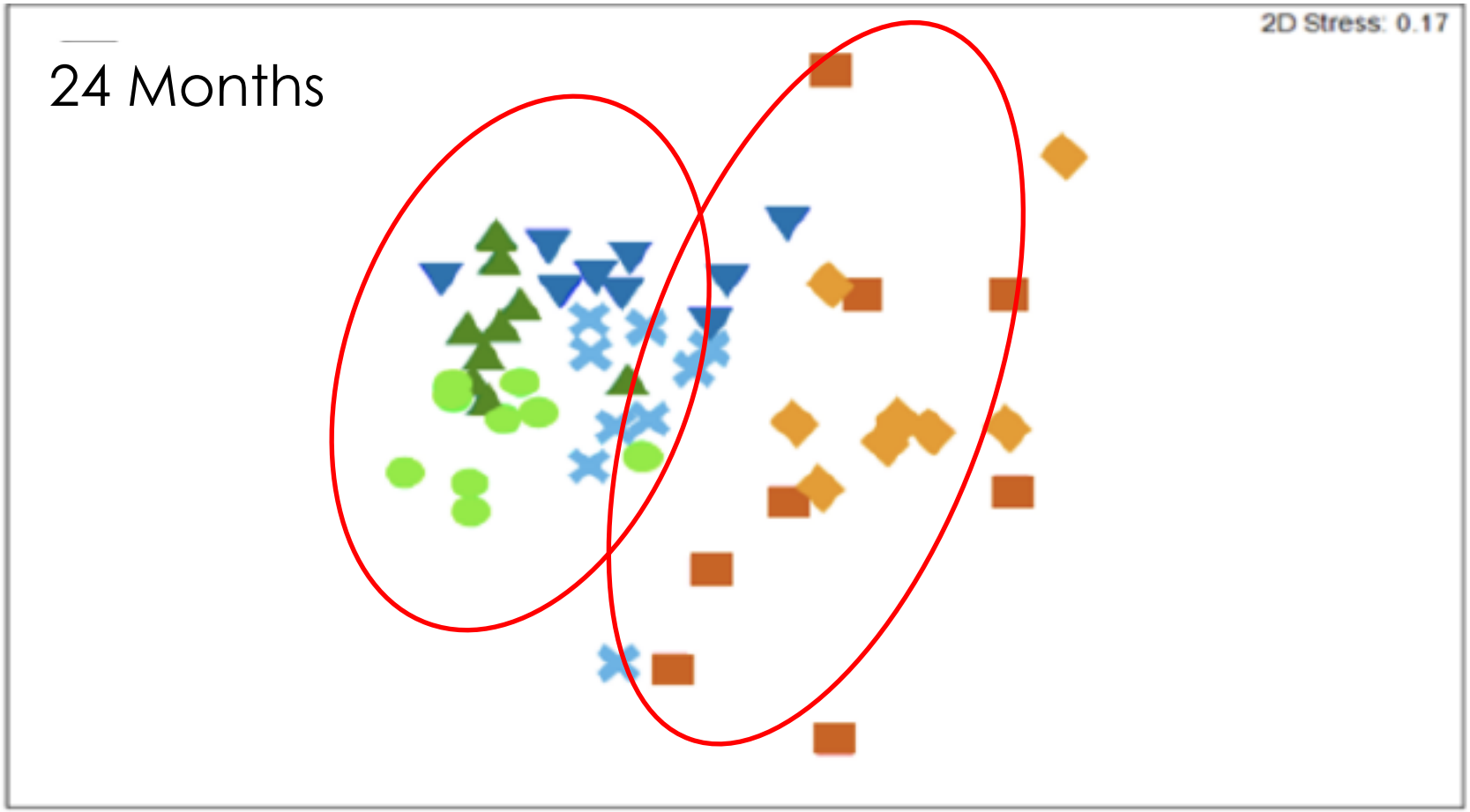
More interaction with increased physical complexity, i.e. complex tiles.

Fish interacted more with fouled tiles, but no effects of seeding treatments.

Number of bites:
Flat tiles > Seawalls > Complex tiles
(No feeding activity on unfouled tiles)

Ushiama et al 2019


Partial wall

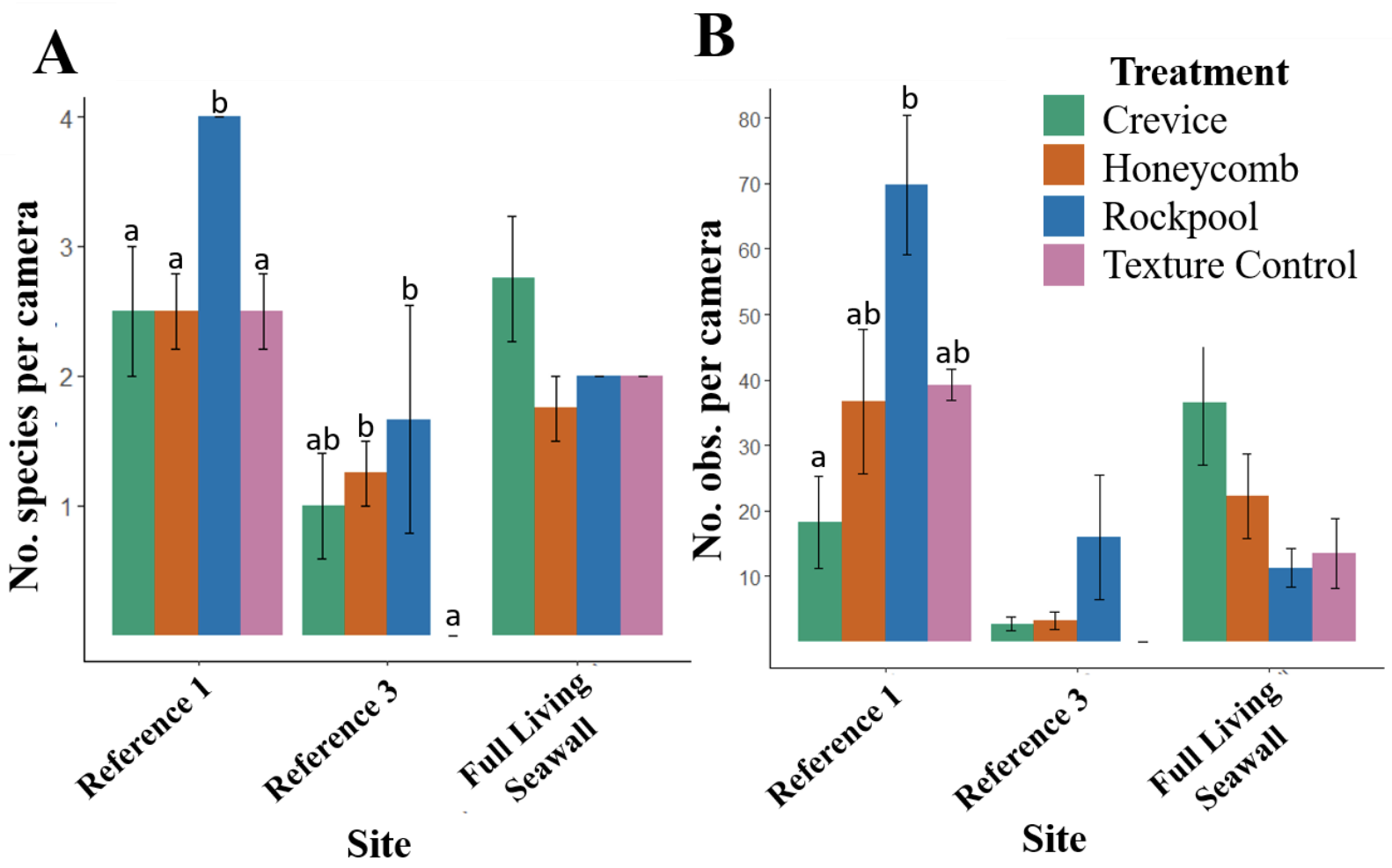


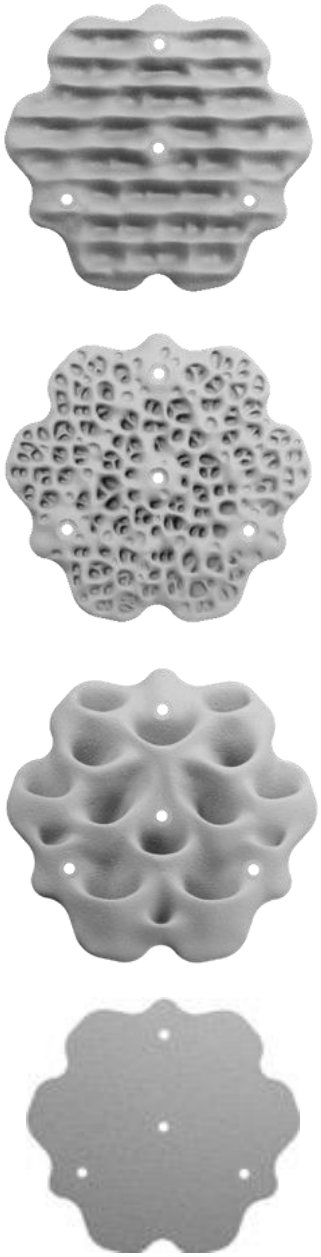
Site

- Reference Site 1
- Reference Site 2
- Control 1
- Control 2
- Full
- Partial

Total of 59 species found throughout the study

Stephanie Bagala



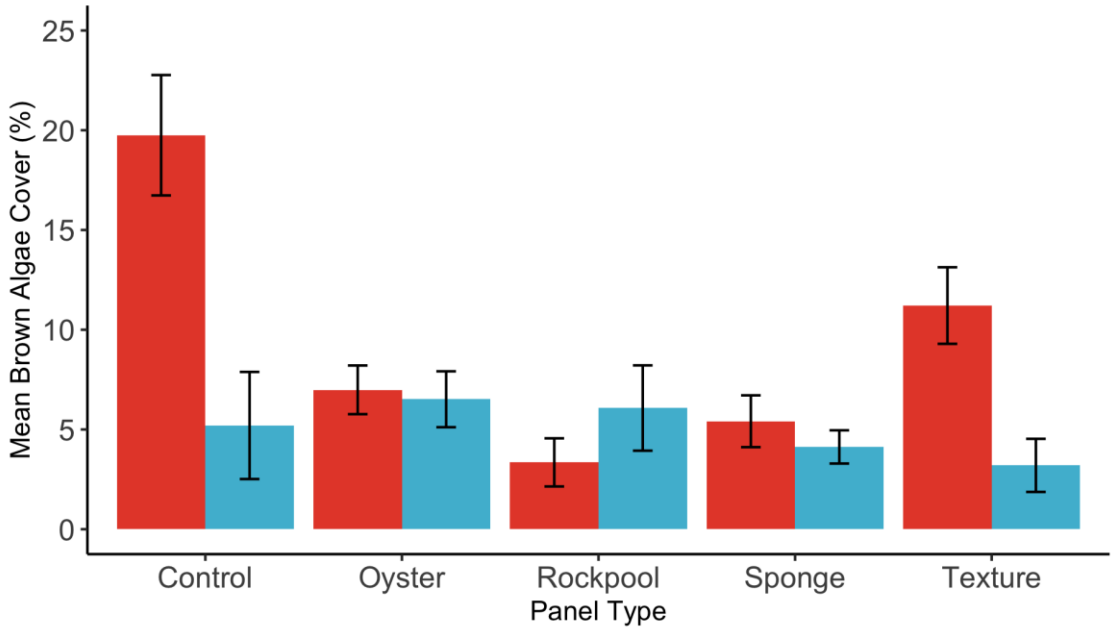


No effect at the patch scale (i.e. panel design)

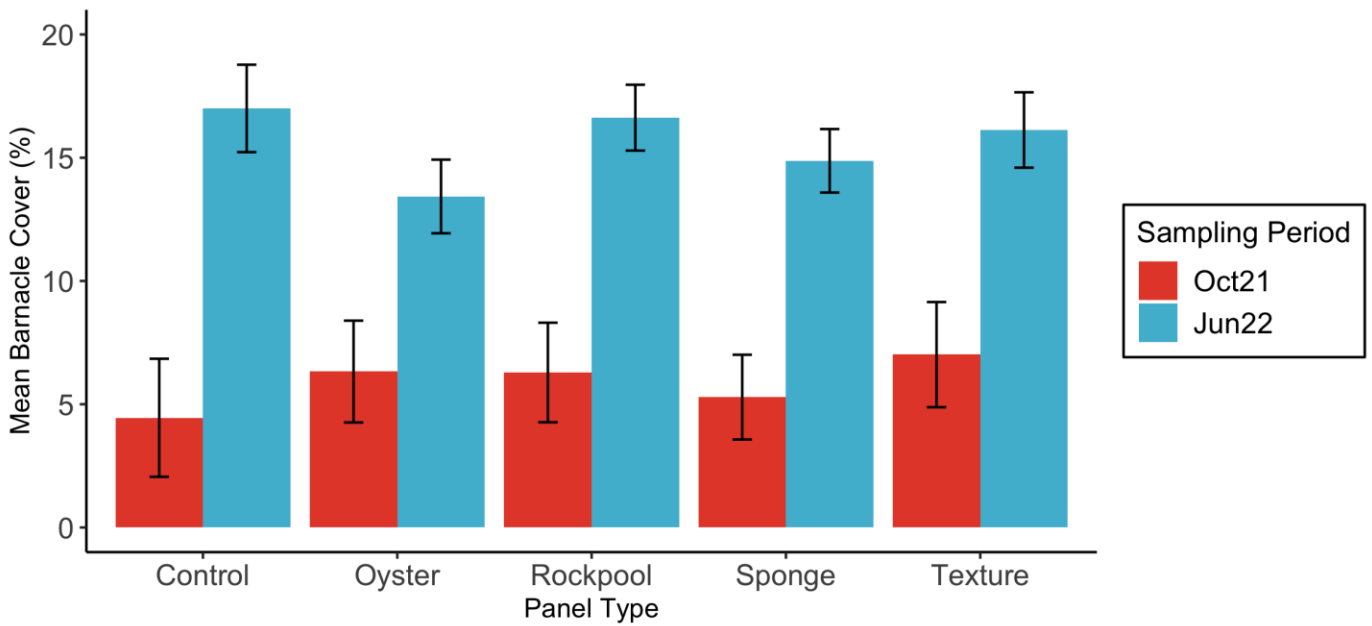
Total 8 species

Oyster blenny (*Omobranchus anolius*)
Horned blenny (*Parablennius intermedius*)
Rotund blenny (*Omobranchus rotundicep*)

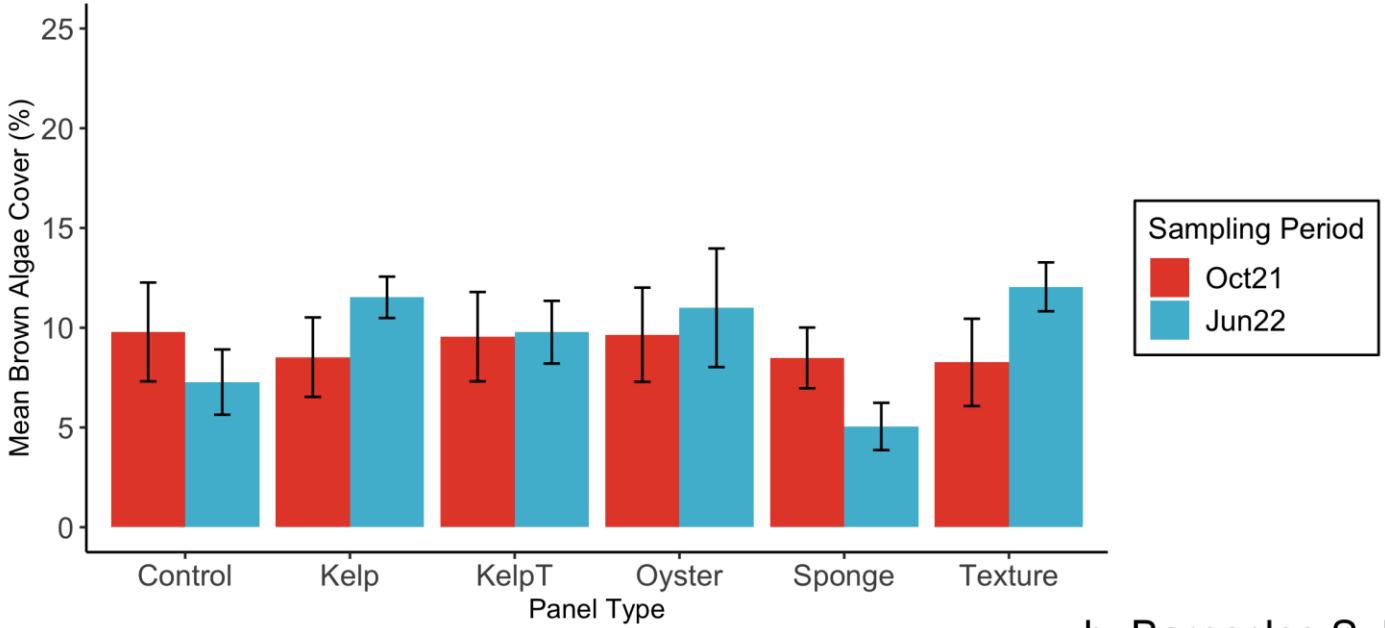
a. Brown Algae Intertidal



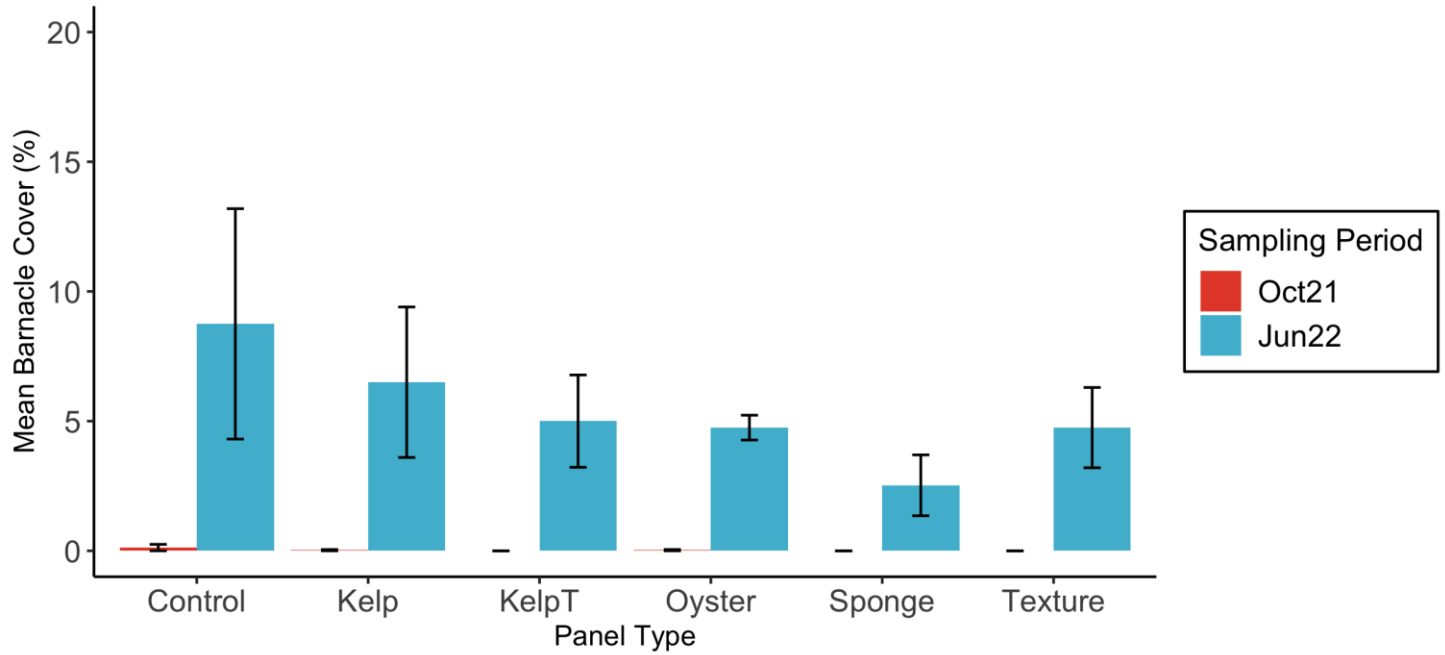
a. Barnacles Intertidal

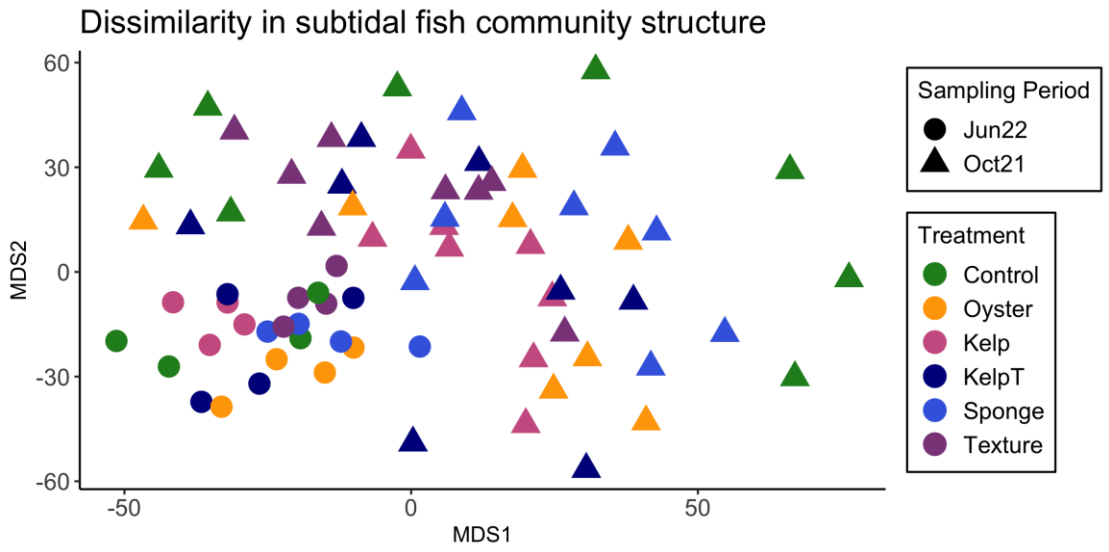


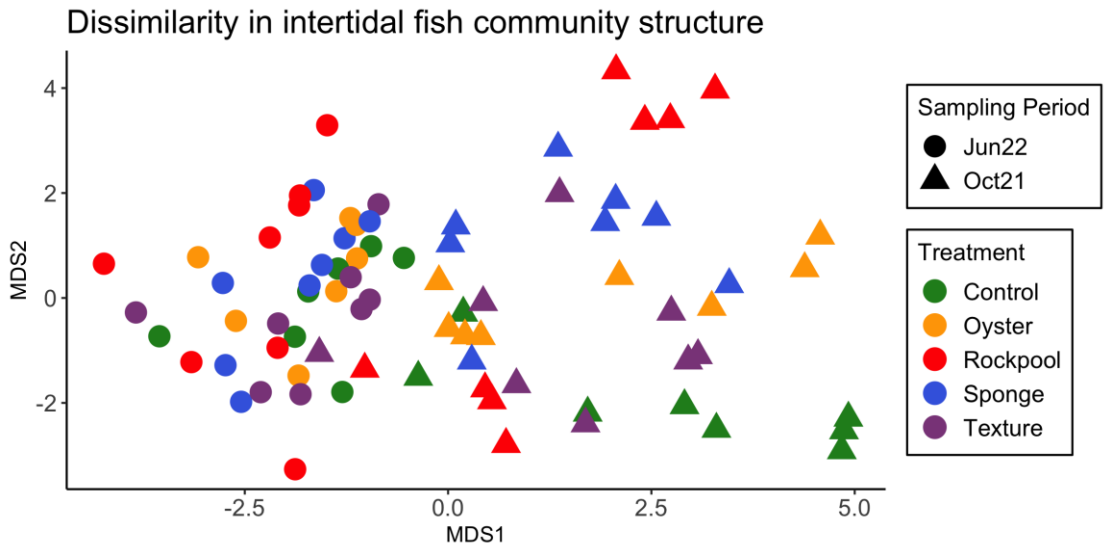
b. Brown Algae Subtidal



b. Barnacles Subtidal




Dissimilarity in subtidal fish community structure
MDS2
MDS1
60
30
0
-30
-60
-50
0
50
Sampling Period
Jun22
Oct21
Treatment
Control
Oyster
Kelp
KelpT
Sponge
Texture


Dissimilarity in intertidal fish community structure
MDS2
MDS1
4
2
0
-2
-2.5
0.0
2.5
5.0
Sampling Period
Jun22
Oct21
Treatment
Control
Oyster
Rockpool
Sponge
Texture