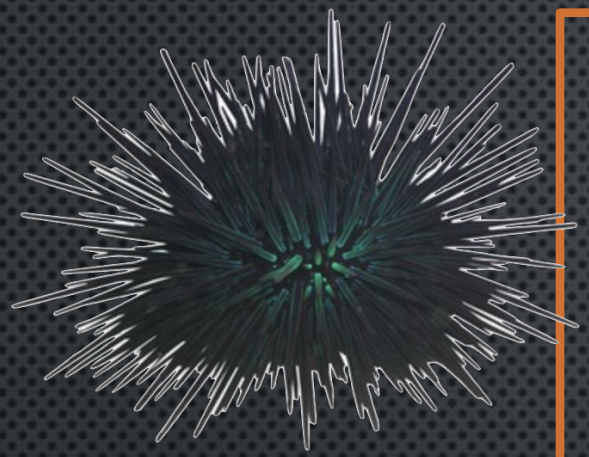
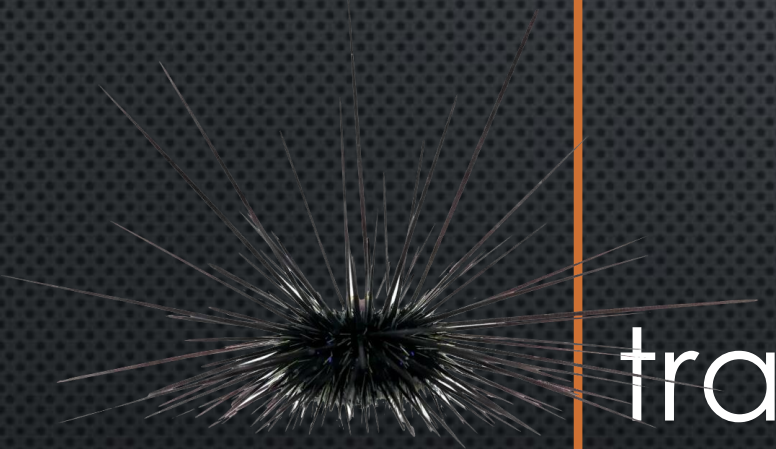


The population size structure and densities of sea urchins in the biogeographic transition zone of east Australia



THE UNIVERSITY OF SYDNEY

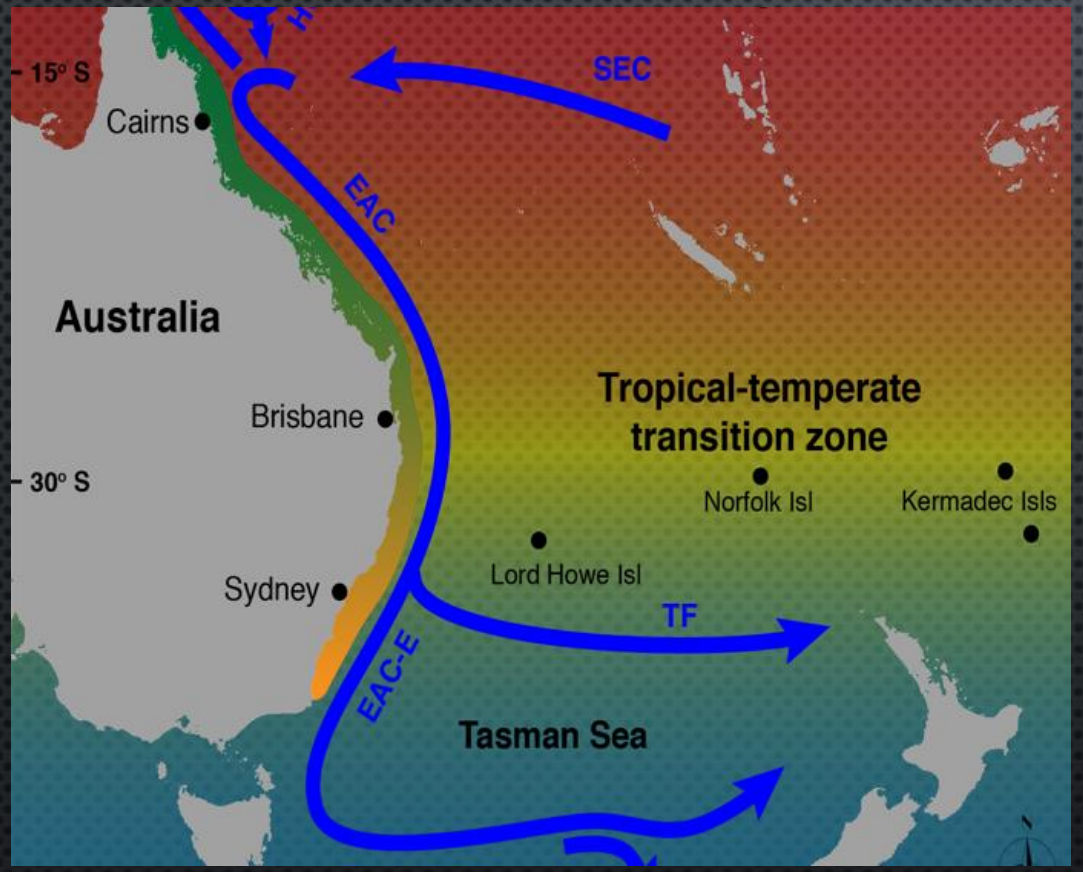
Emily McLaren
Dr. Brigitte Sommer
Prof. Maria Byrne

East Australian Current

HOTTER & FASTER

Lough JM, Hobday AJ (2011) Mar Freshwater Res 62:984. | Muhlfeld CC et al. (2014) Nature Clim Change 4:620–624. | Suthers IM et al. (2011) Deep Sea Research Part II

The tropical-to-temperate biogeographic transition zone



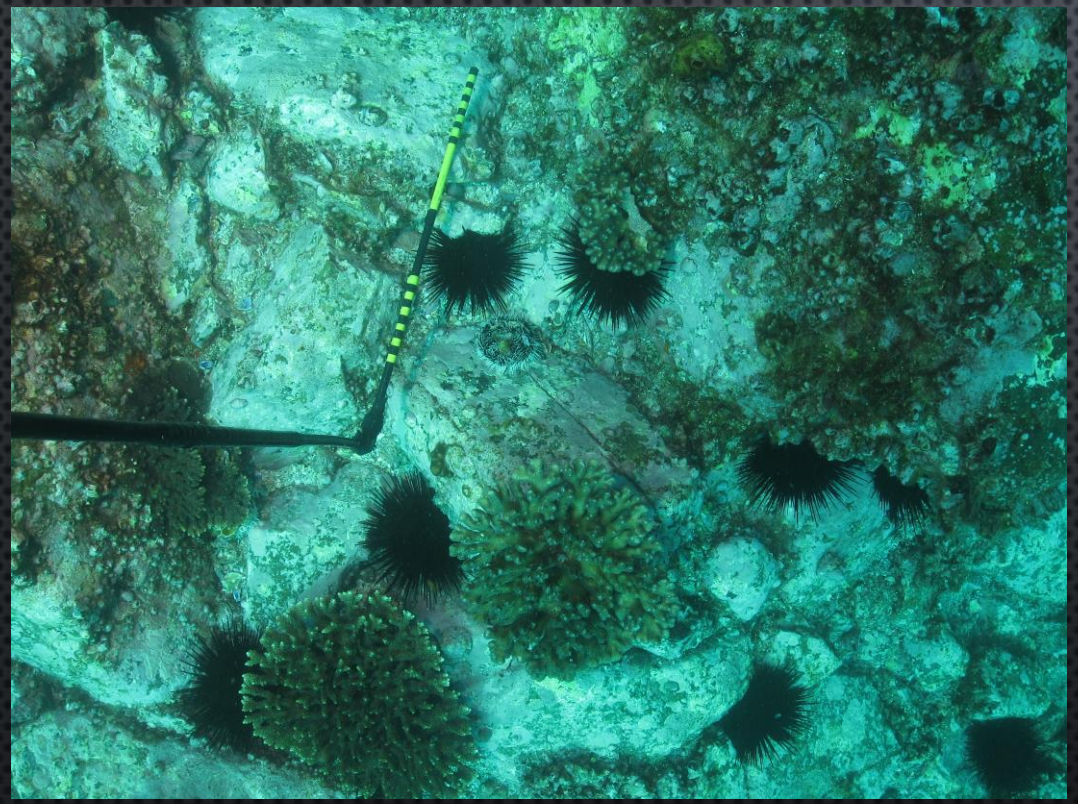
In a warming ocean, we expect to see an increase in warm-water species and a decline in cold-water species.

Poloczanska ES et al. (2016) Front Mar Sci 3:21.

Sea urchins – important herbivores on coral reefs

Hughes TP (1994) Coral Reefs 6.

Sea urchins co-occurring with corals in a subtropical habitat



Coral Reefs (2021) 40:1451–1461
https://doi.org/10.1007/s00338-021-02167-x

REPORT

No evidence for tropicalization of coral assemblages in a subtropical climate change hot spot

Toni L. Mizerek[1,2] · Joshua S. Madin[1,3] · Francesca Benzoni[4] · Danwei Huang[5] · Osmar J. Luiz[6] · Hanaka Mera[7] · Sebastian Schmidt-Roach[4] · Stephen D. A. Smith[8] · Brigitte Sommer[9,10] · Andrew H. Baird[7]

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

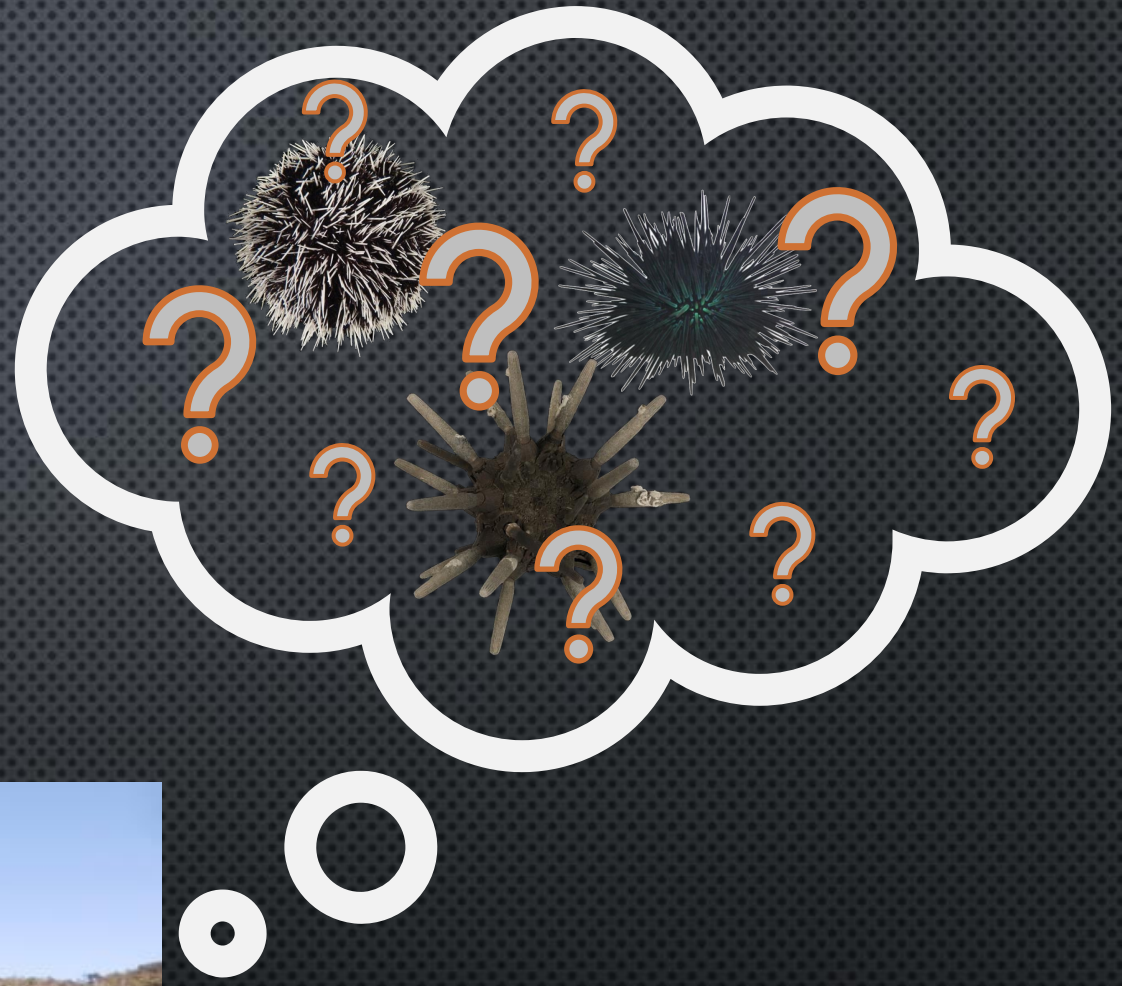
Strong fish assemblage patterns persist over sixteen years in a warming marine park, even with tropical shifts

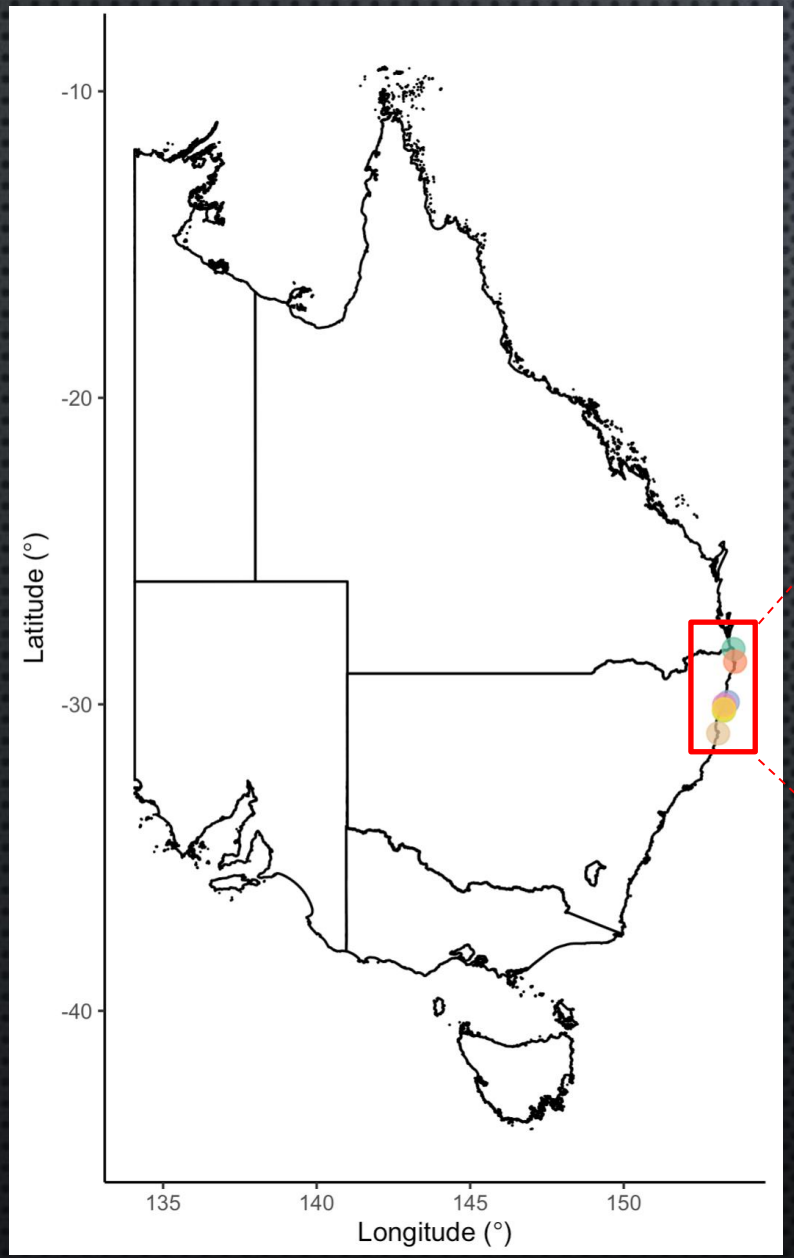
Hamish A. Malcolm[a,*], Renata Ferrari[b,c]

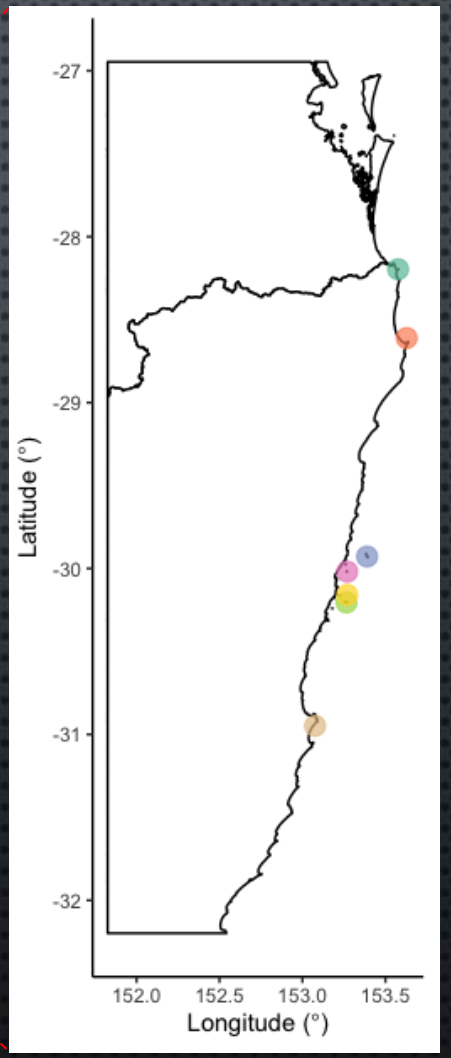
Long-term empirical evidence of ocean warming leading to tropicalization of fish communities, increased herbivory, and loss of kelp

Adriana Vergés[a,b,c,1], Christopher Doropoulos[a,d,e], Hamish A. Malcolm[f], Mathew Skye[a,b], Marina Garcia-Pizá[a,b], Ezequiel M. Marzinelli[a,b,c,g], Alexandra H. Campbell[a,b,c], Enric Ballesteros[h], Andrew S. Hoey[i], Ana Vila-Concejo[j], Yves-Marie Bozec[e,i], and Peter D. Steinberg[a,c,g]

Are the populations of sea urchins in this biogeographic transition zone stable through time?



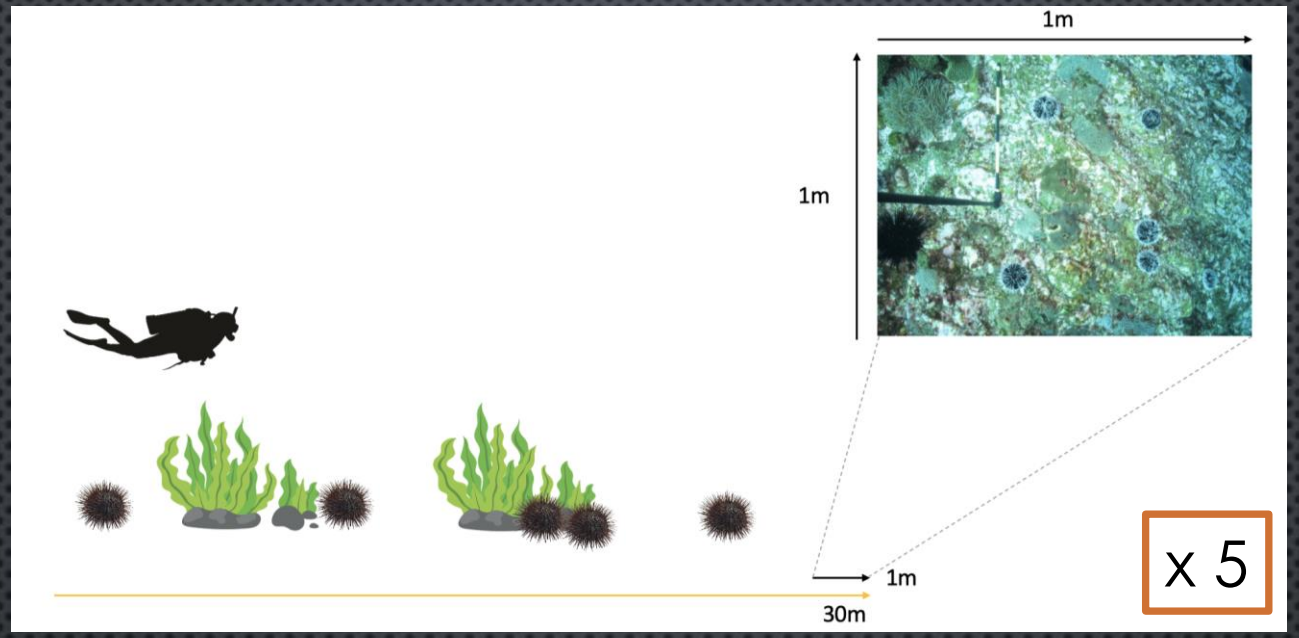




Spanning ~3° latitude and 380 kms

- Cook Island
- Julian Rocks
- North Solitary
- Northwest Solitary
- South Solitary
- Southwest Solitary
- Black Rock

Sommer B et al. (2014) Ecology 95:1000–1009.

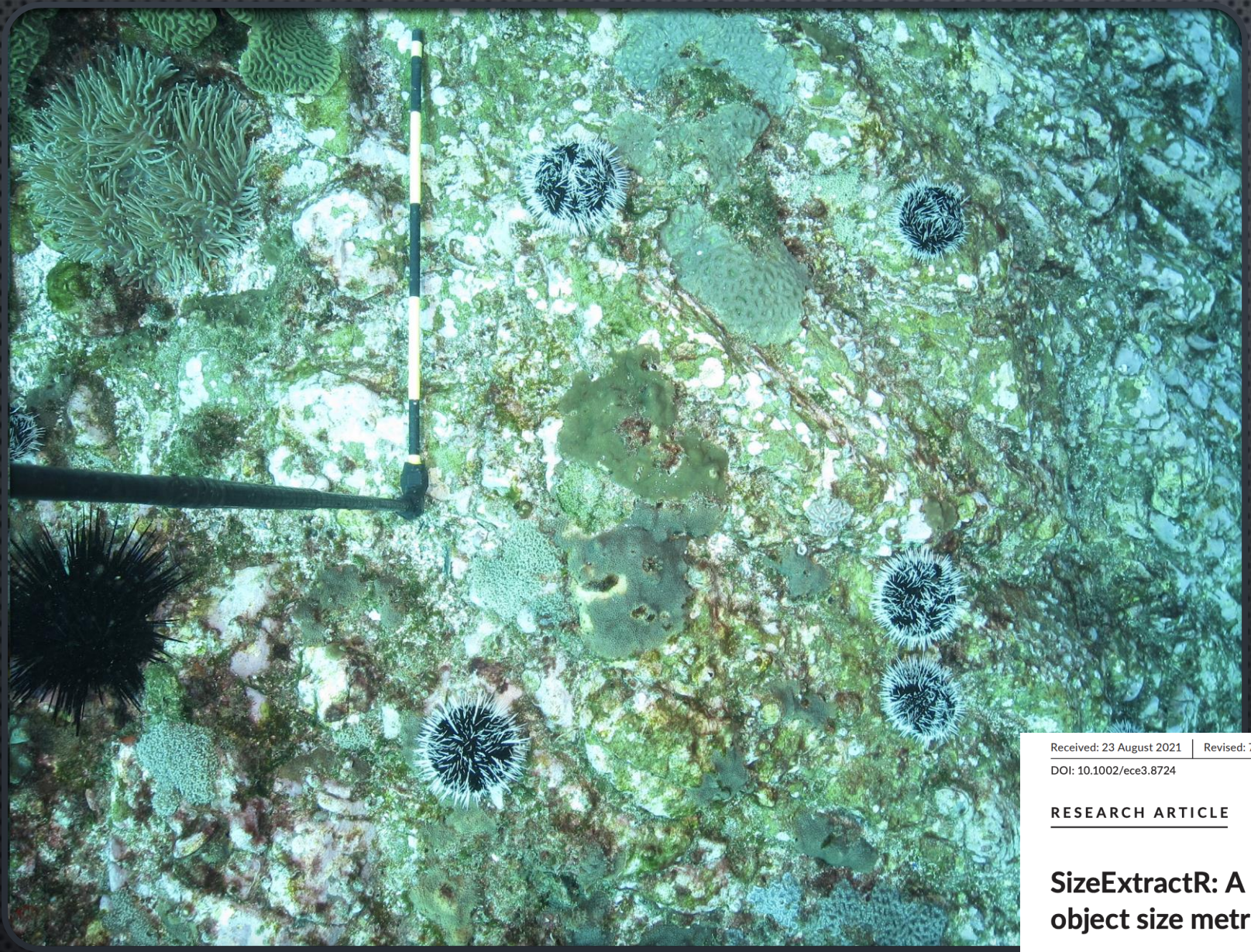


2010

2016

2012

2019



Counts and outlines

Received: 23 August 2021 | Revised: 7 February 2022 | Accepted: 21 February 2022

DOI: 10.1002/ece3.8724

RESEARCH ARTICLE

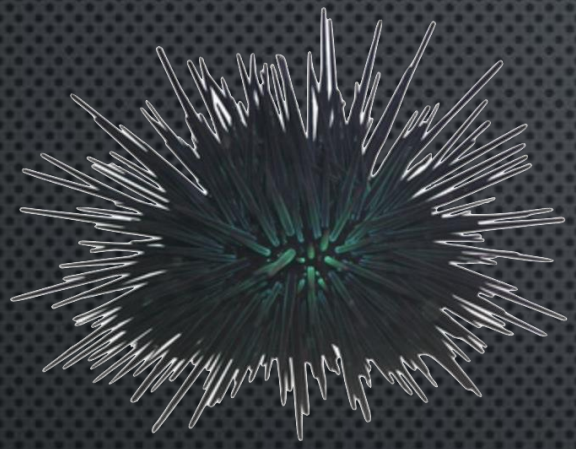
Ecology and Evolution Open Access WILEY

SizeExtractR: A workflow for rapid reproducible extraction of object size metrics from scaled images

Liam Lachs[1] | Fiona Chong[2,3] | Maria Beger[4,5] | Holly K. East[6] | James R. Guest[1] | Brigitte Sommer[7,8]

Density and population size structure over time

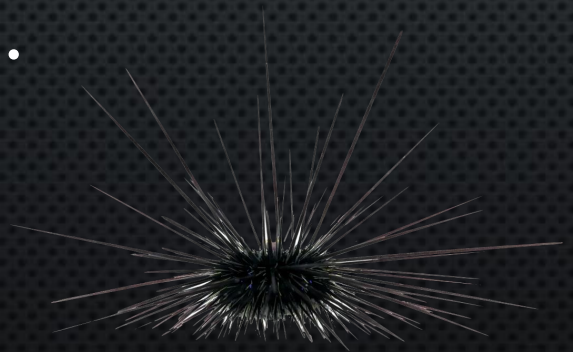
Centrostephanus rodgersii

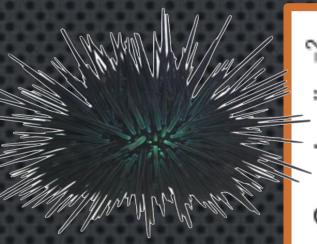


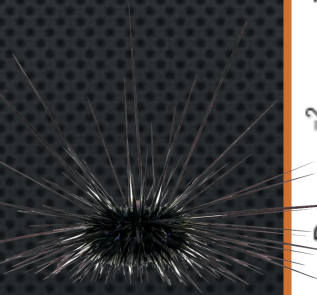
Tripneustes kermadecensis

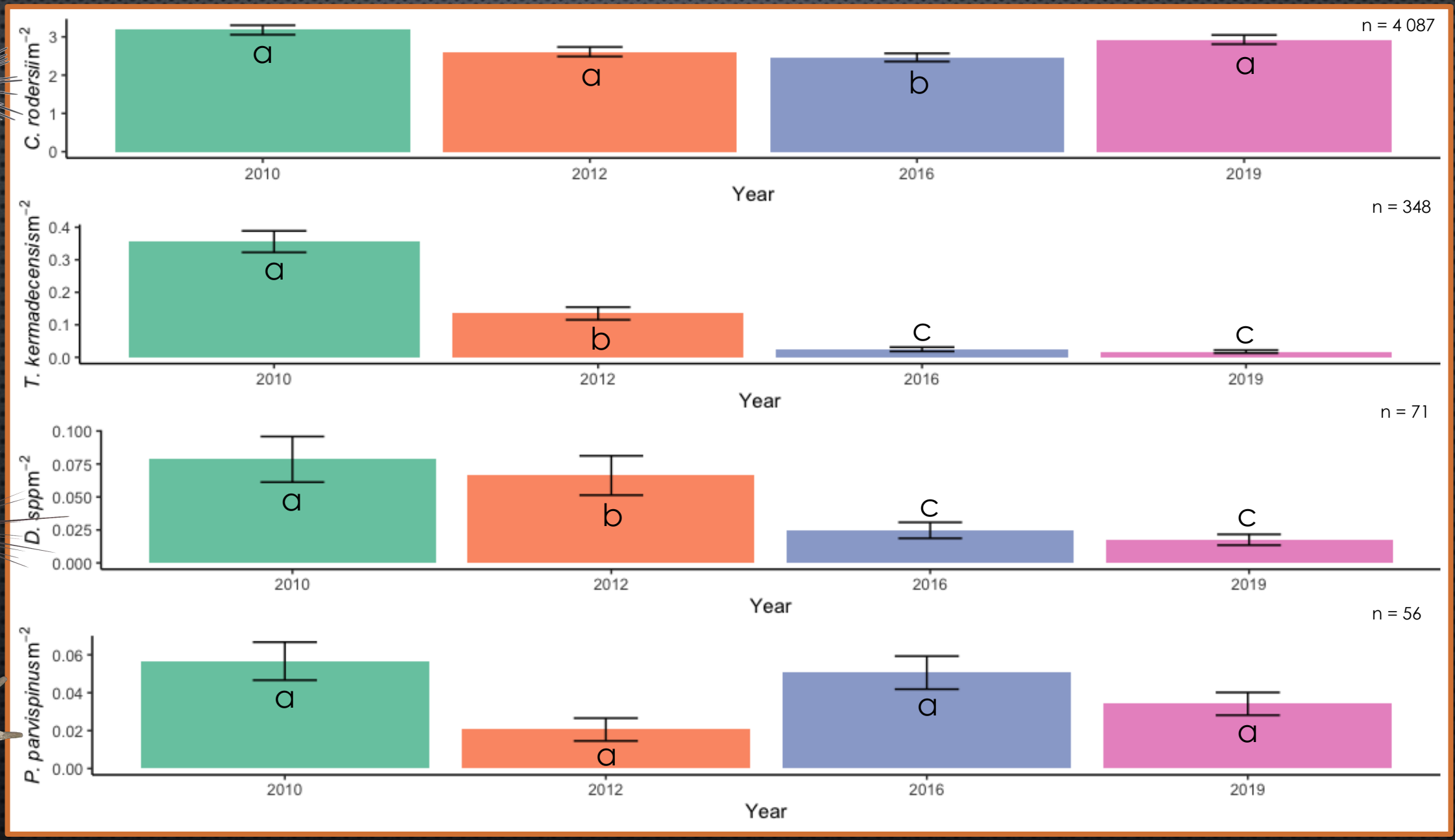
Phyllacanthus parvispinus

Diadema spp.
(*D. savignyi* &
D. setosum)

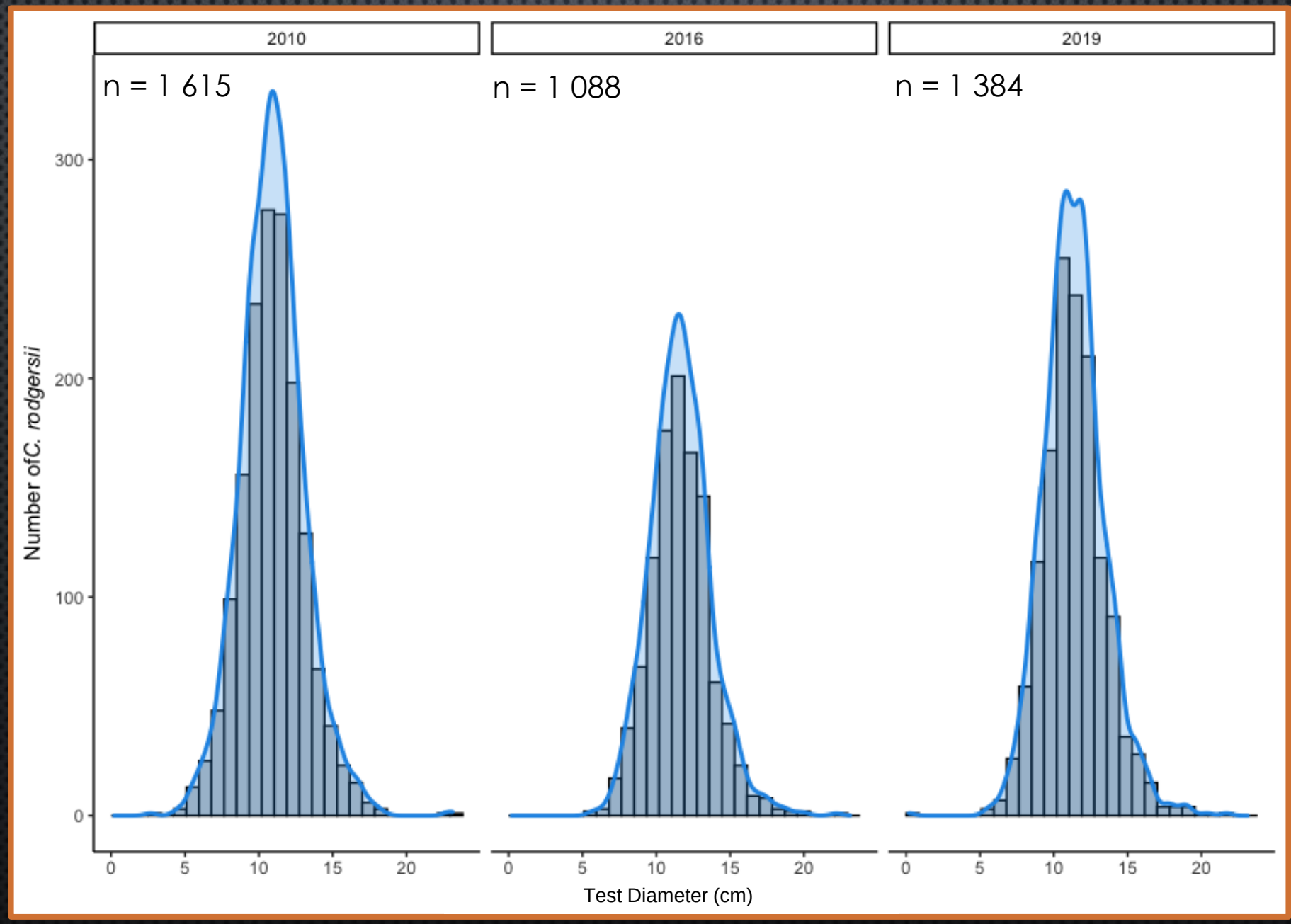




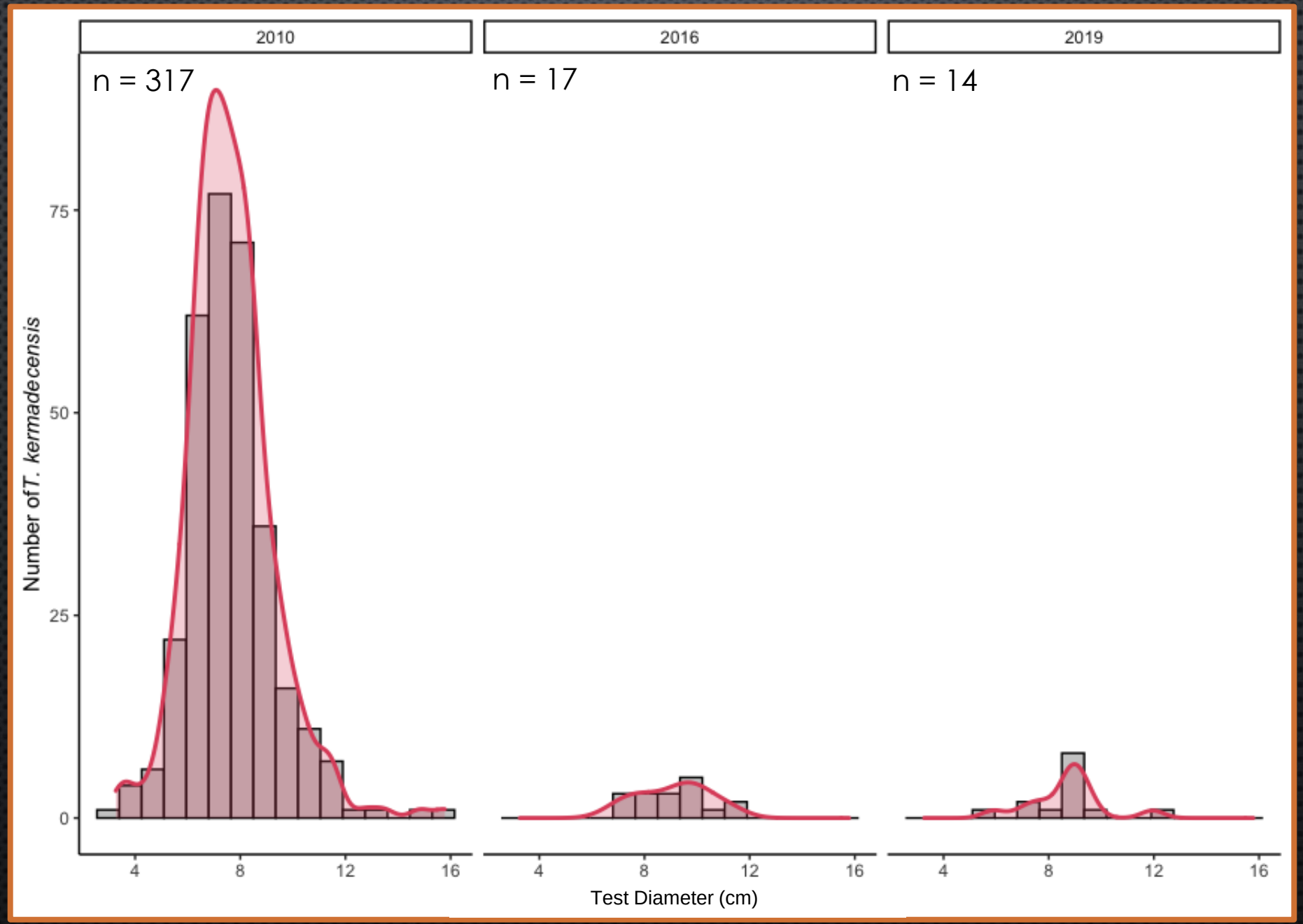



n = 4 087
C. rodersii m⁻²
3
2
1
0
a
a
b
a
2010
2012
2016
2019
Year
n = 348
T. kermadecensis m⁻²
0.4
0.3
0.2
0.1
0.0
a
b
c
c
2010
2012
2016
2019
Year
n = 71
D. sp. m⁻²
0.100
0.075
0.050
0.025
0.000
a
b
c
c
2010
2012
2016
2019
Year
n = 56
P. parvispinus m⁻²
0.06
0.04
0.02
0.00
a
a
a
a
2010
2012
2016
2019
Year

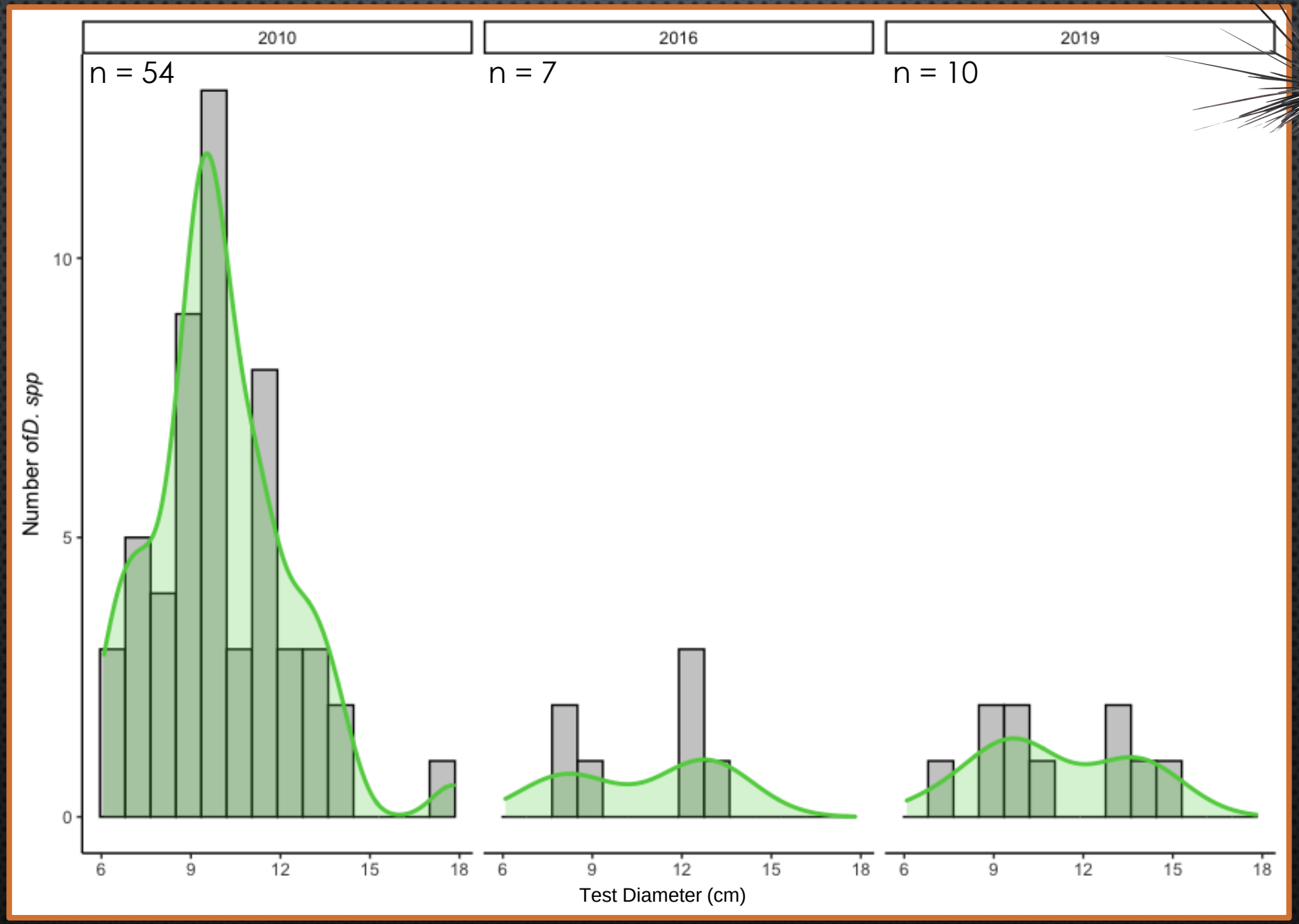
Centrostephanus rodgersii – *temporally stable*



Tripneustes Kermadecensis – population decline across all sizes

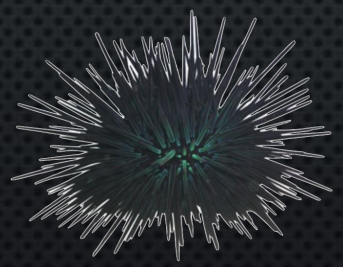
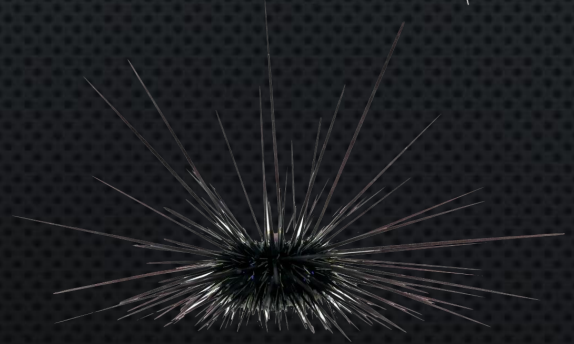


Diadema spp.


2010
2016
2019
n = 54
n = 7
n = 10
Number of D. spp
10
5
0
6
9
12
15
18
Test Diameter (cm)

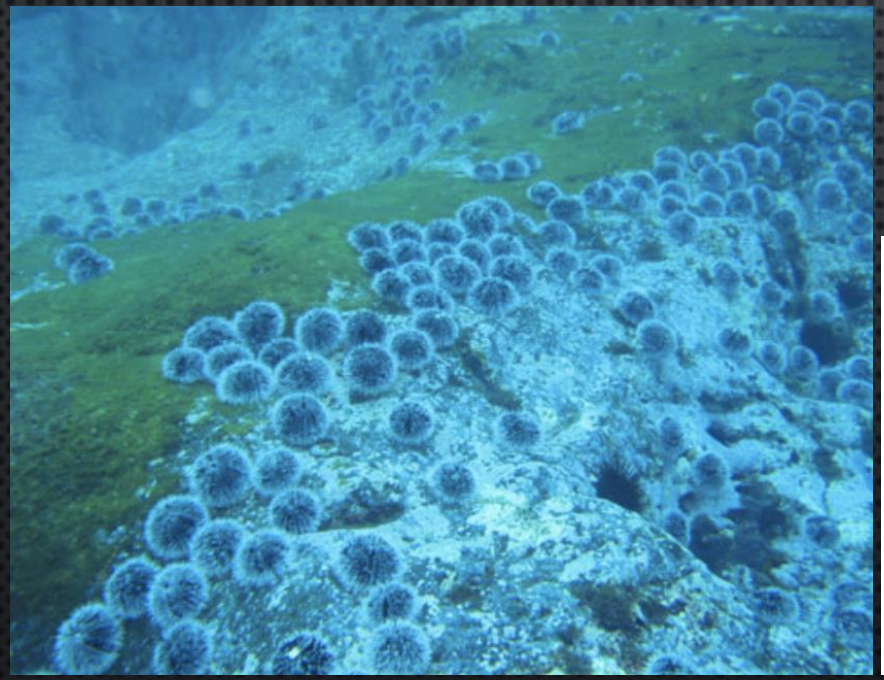
Population dynamics vary among species and zoogeography

- Counter to predictions

Stable	Declining
Centrostephanus rodgersii – subtropical / temperate 	*Tripneustes kermadecensis* – subtropical   Diadema spp. (*D. savignyi* & *D. setosum*) - tropical

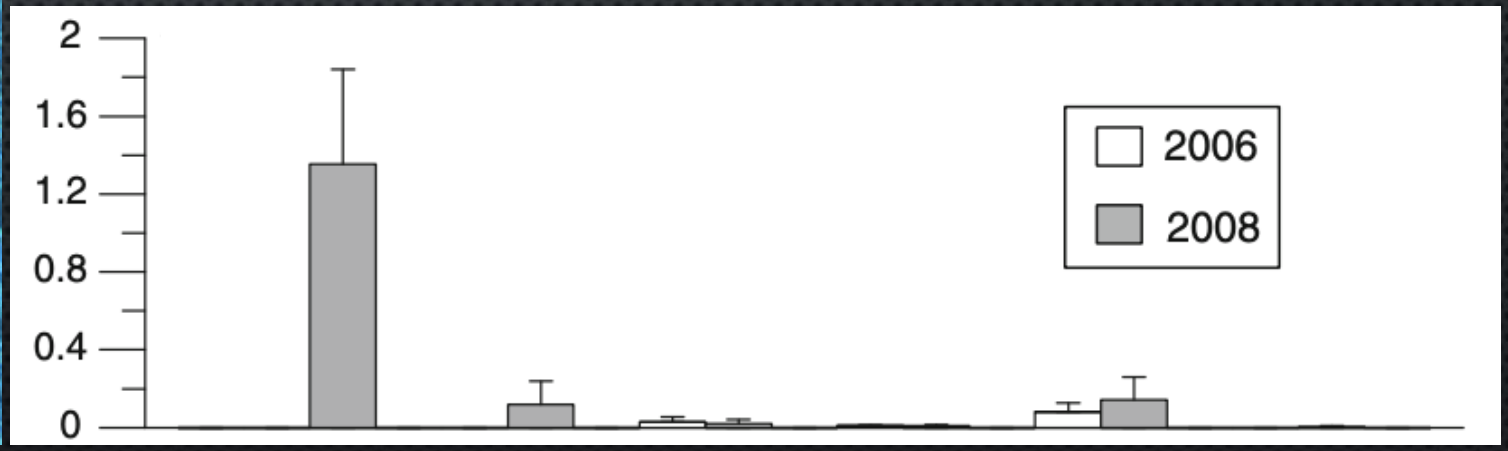
Tripneustes kermadecensis have declined in the transition zone

Boom bust species?



Impacts of a population outbreak of the urchin *Tripneustes gratilla* amongst Lord Howe Island coral communities

J. P. Valentine · G. J. Edgar



Centrostephanus rodgersii in NSW

Large-scale patterns in habitat structure on subtidal rocky reefs in New South Wales

N. L. Andrew[AC] *and A. L. O'Neill*[B]

Contents lists available at ScienceDirect

Marine Environmental Research

journal homepage: http://www.elsevier.com/locate/marenvrev

Decadal dynamics of subtidal barrens habitat

Tim M. Glasby *, Peter T. Gibson

Microscopic assemblages in kelp forests and urchin barrens

M.A. Coleman[a,b,*], S.J. Kennelly[c]

[a] Department of Primary Industries, New South Wales Fisheries, 2 Bay Drive, Coffs Harbour, NSW, 2450, Australia
[b] Southern Cross University, National Marine Science Centre, 2 Bay Drive, Coffs Harbour, NSW 2450, Australia
[c] IC Independent Consulting, 15/1-7 Arthur Avenue, Cronulla, 2230, Australia

MEPS 374:113-125 (2009) - DOI: https://doi.org/10.3354/meps07729

Population dynamics of an ecologically important range-extender: kelp beds versus sea urchin barrens

S. D. Ling*, C. R. Johnson

School of Zoology and Tasmanian Aquaculture & Fisheries Institute, University of Tasmania, Private Bag 5, Hobart 7001, Australia

Oecologia (2008) 156:883–894
DOI 10.1007/s00442-008-1043-9

GLOBAL CHANGE ECOLOGY - ORIGINAL PAPER

Range expansion of a habitat-modifying species leads to loss of taxonomic diversity: a new and impoverished reef state

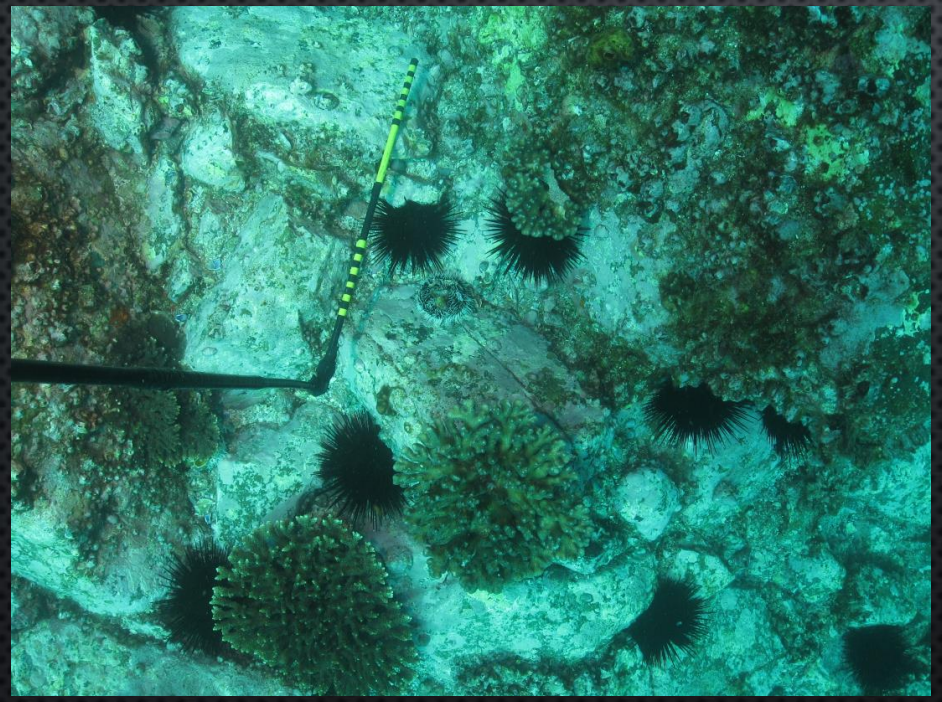
S. D. Ling

Density-dependent feedbacks, hysteresis, and demography of overgrazing sea urchins

S. D. Ling[1], N. Kriegisch, B. Woolley, and S. E. Reeves

Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Tasmania 7001 Australia

Potential competitive release - Diademid urchin positively interacting with coral within its native range in NSW?



To conclude

- Population dynamics vary among species
- Declines in tropical and subtropical echinoids
- In marine protected areas within part of its native range *C. rodgersii* populations are stable

Professor Maria Byrne

Dr Brigitte Sommer

THE UNIVERSITY OF SYDNEY

IMB Integrative Marine Biology

ECOLOGICAL SOCIETY OF AUSTRALIA

MSI CHANGING OCEANS MARINE STUDIES INSTITUTE

This research was supported by the Holdsworth Wildlife Research Endowment (ESA)

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