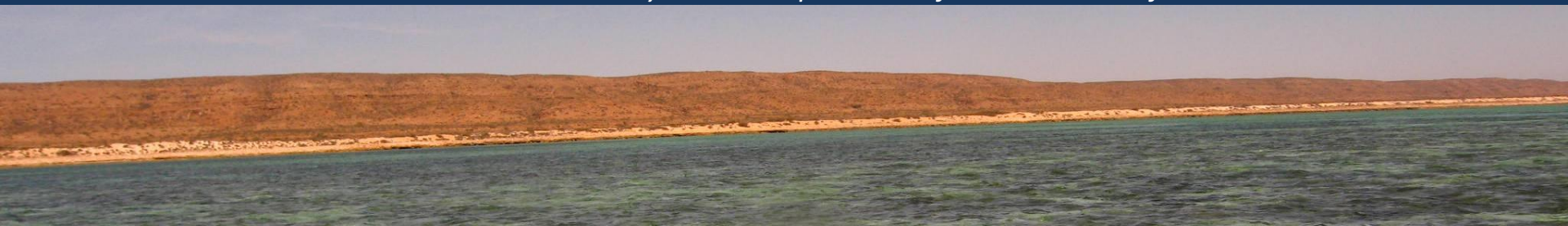
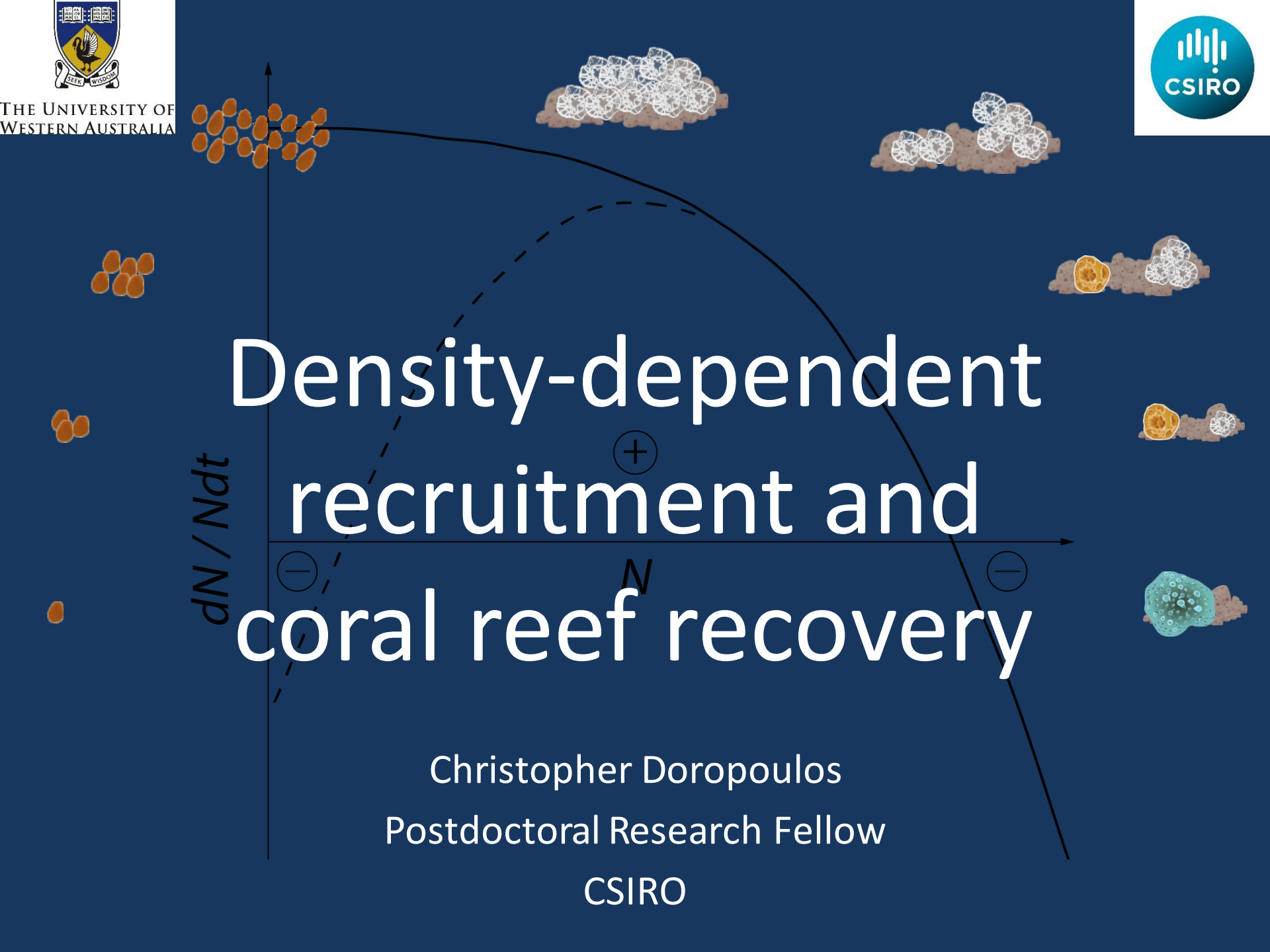
Pilbara Marine Conservation Partnership

Managing the conservation values of coral reef ecosystems in the Pilbara/Ningaloo region

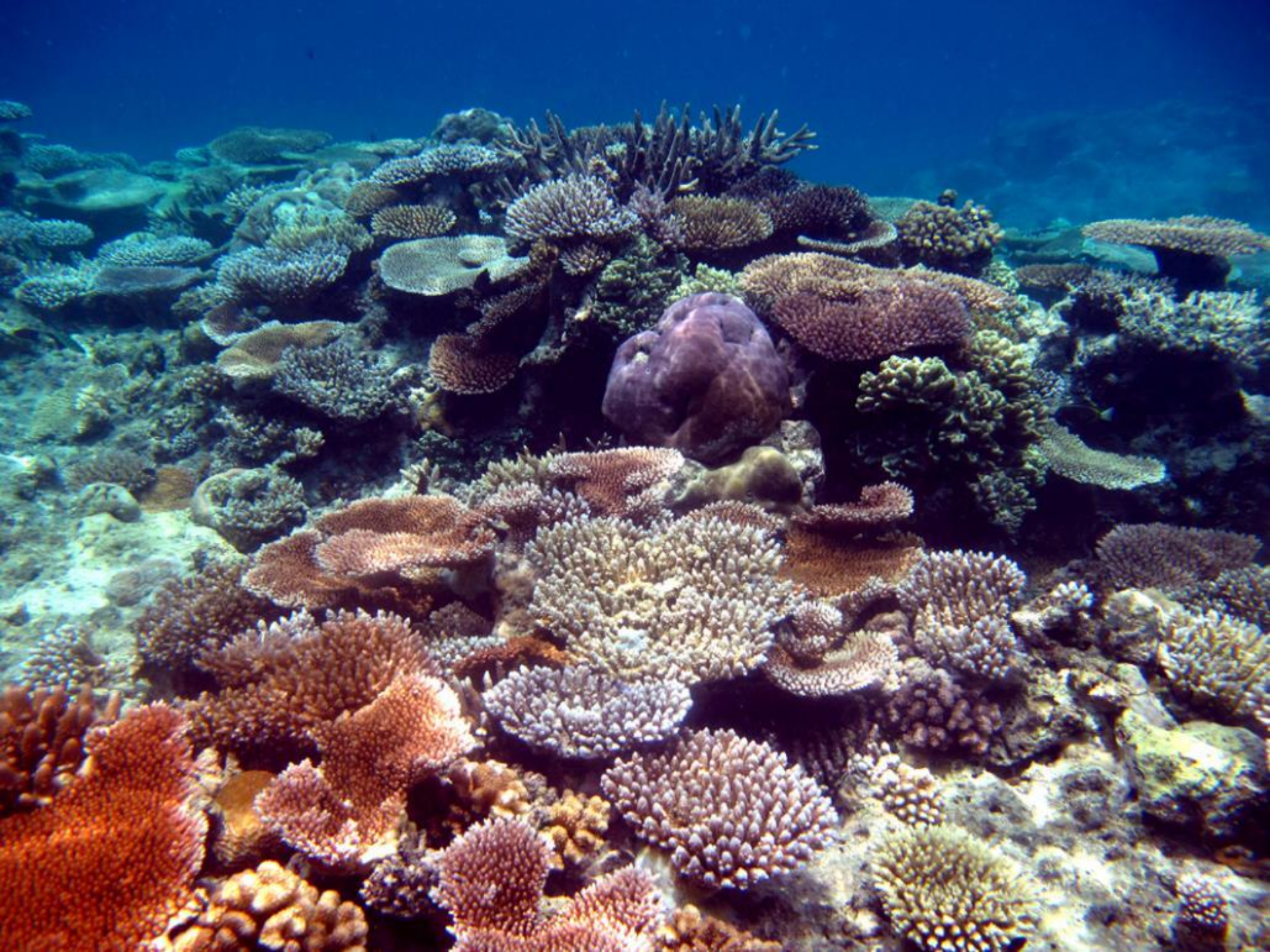
This project is funded by the Gorgon Barrow Island Net Conservation Benefits Fund, which is administered by the WA Department of Parks and Wildlife.





Density-dependent recruitment and coral reef recovery

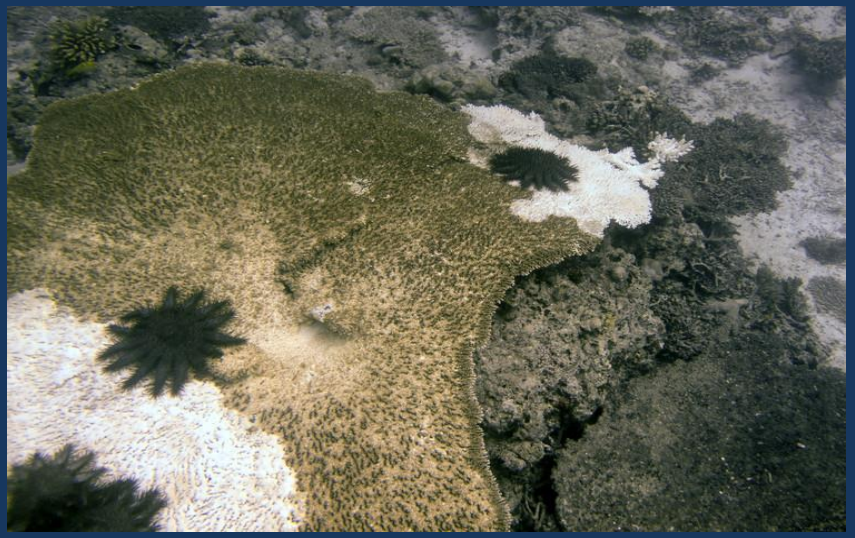
Christopher Doropoulos
Postdoctoral Research Fellow
CSIRO



Coral reef disturbances in the Pilbara

Bleaching

Cyclones



Pests (COTS, *Drupella*)

Sedimentation

REEF RECOVERY…?

CORAL RECRUITMENT!

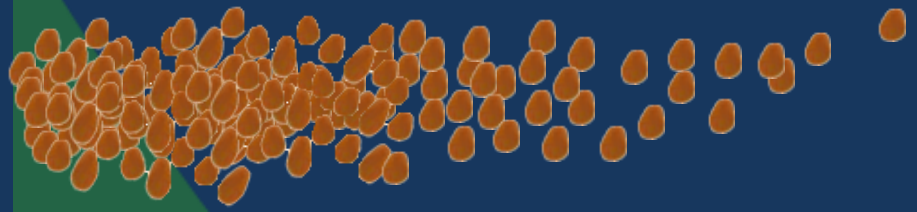
THE UNIVERSITY OF WESTERN AUSTRALIA

Coral recruitment ecology

CSIRO

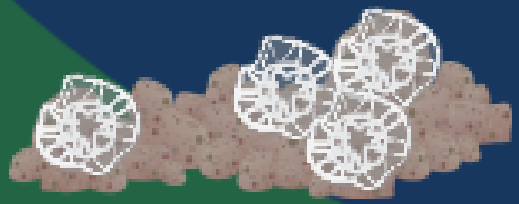
Recruitment bottlenecks

1. Larval survival and dispersal



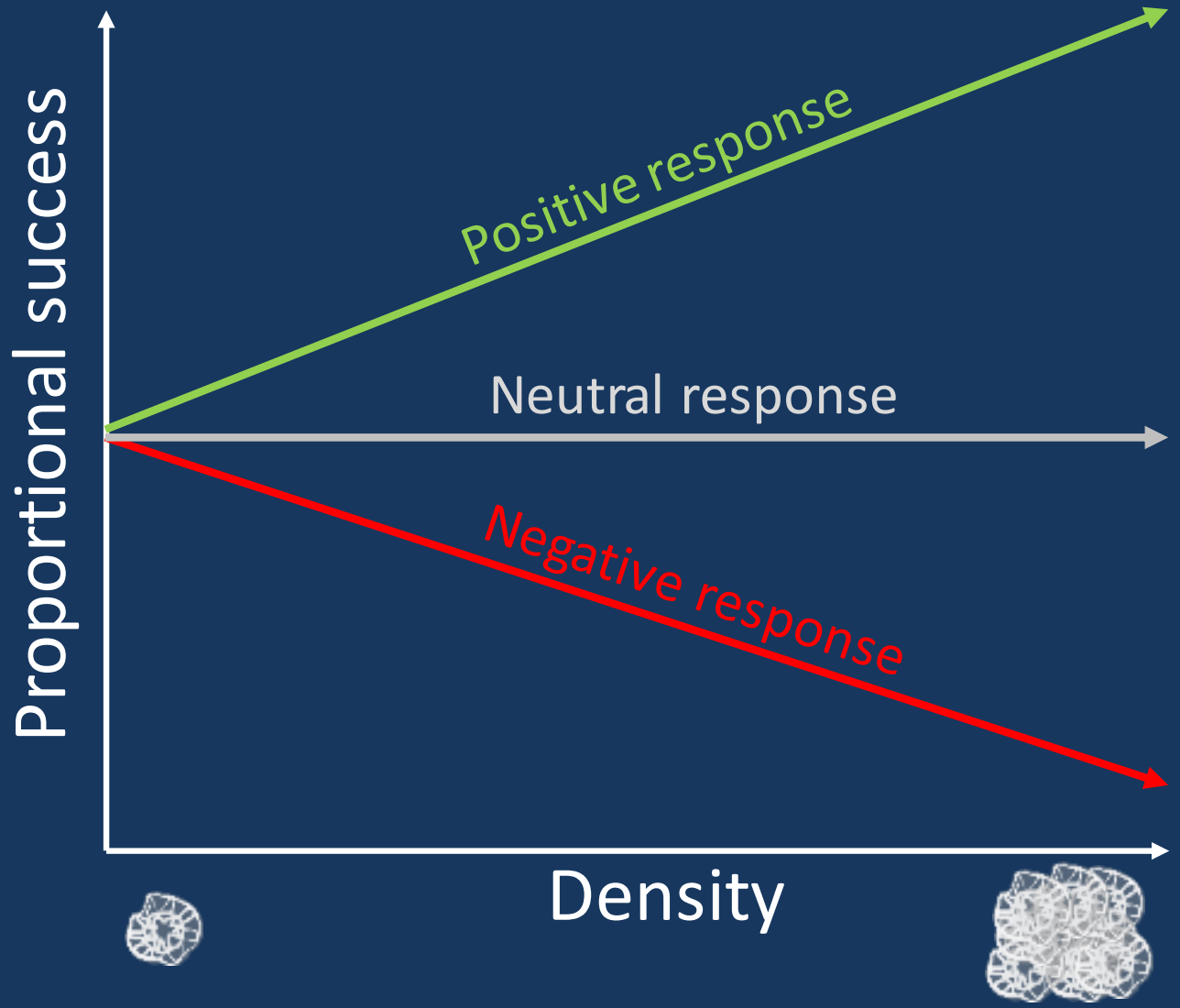
Predation
Competition
Disease

2. Larval settlement



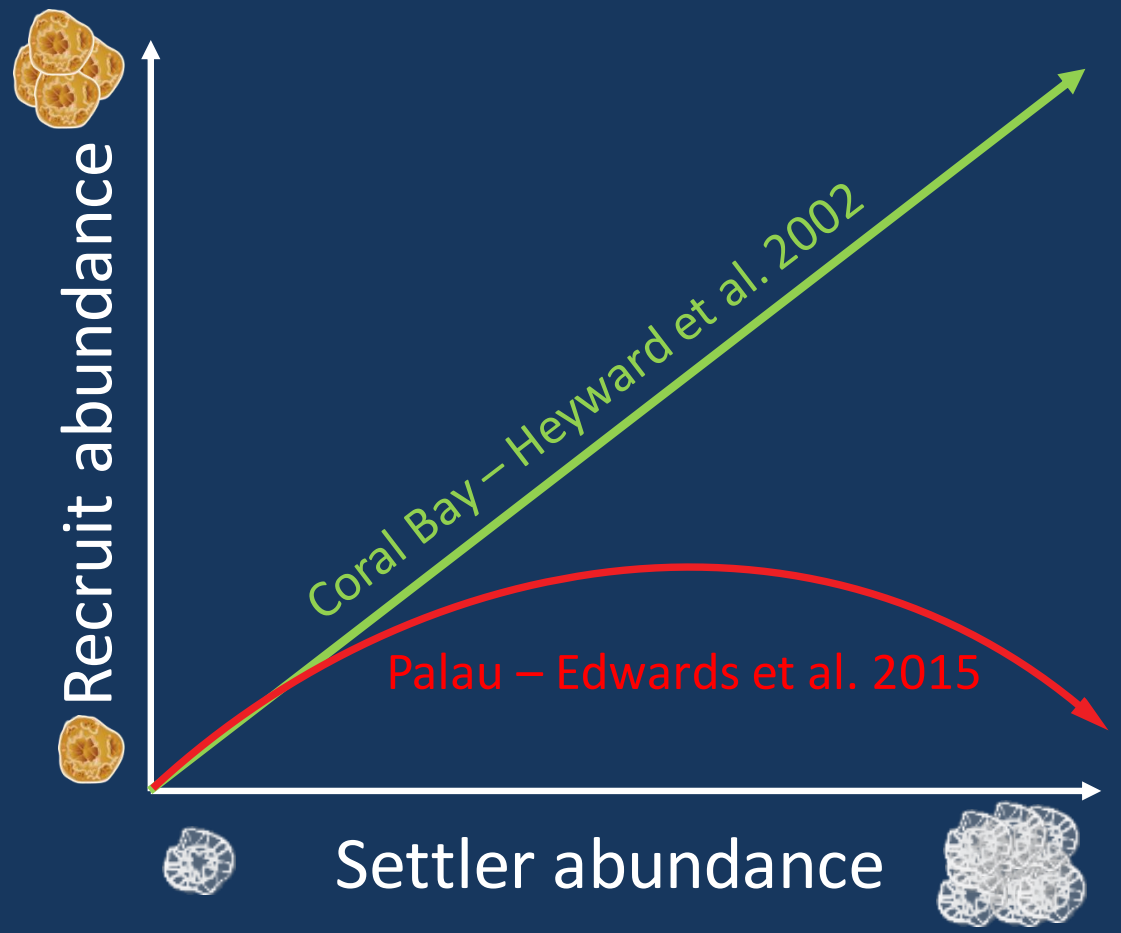
3. Recruit survival and growth

How much is enough? Density-dependent recruitment



State-of-knowledge: depauperate!

1. Larval survival – negative relationship (1 study)
2. Settlement – no information
3. Post-settlement survival – contrasting outcomes (2 studies)



Aim

What are the density-dependent thresholds determining recruitment success and reef recovery?

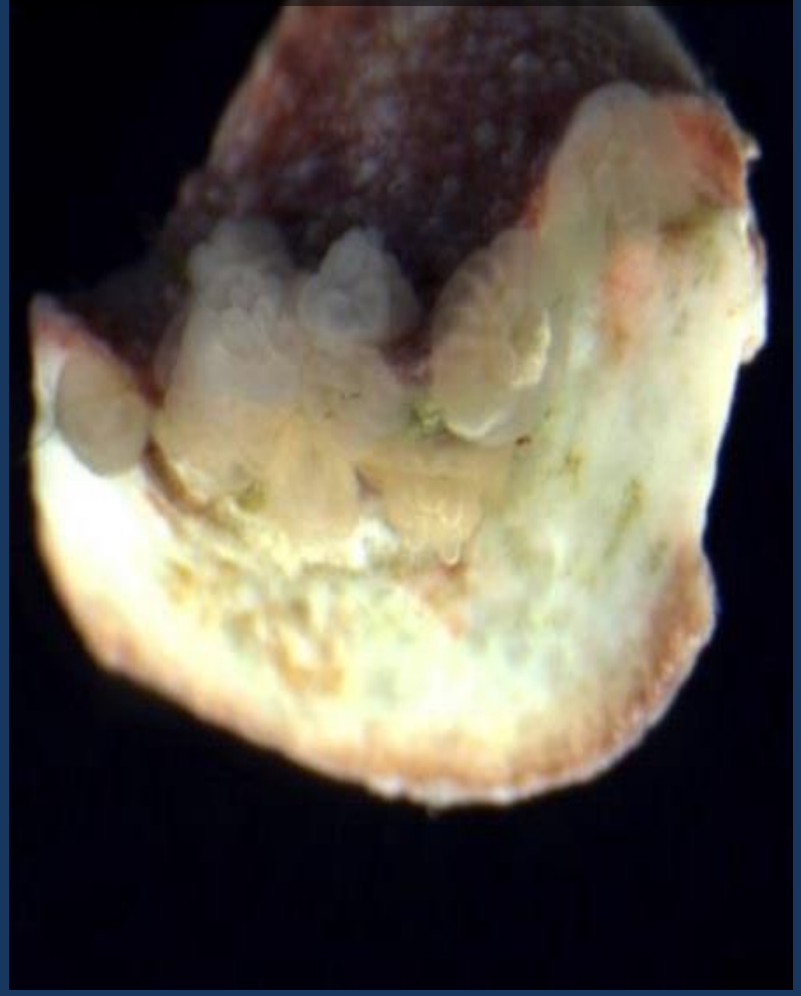
1. Larval survival
2. Larval settlement
3. Post-settlement survival

Acropora millepora

Laboratory experiments: internal processes only

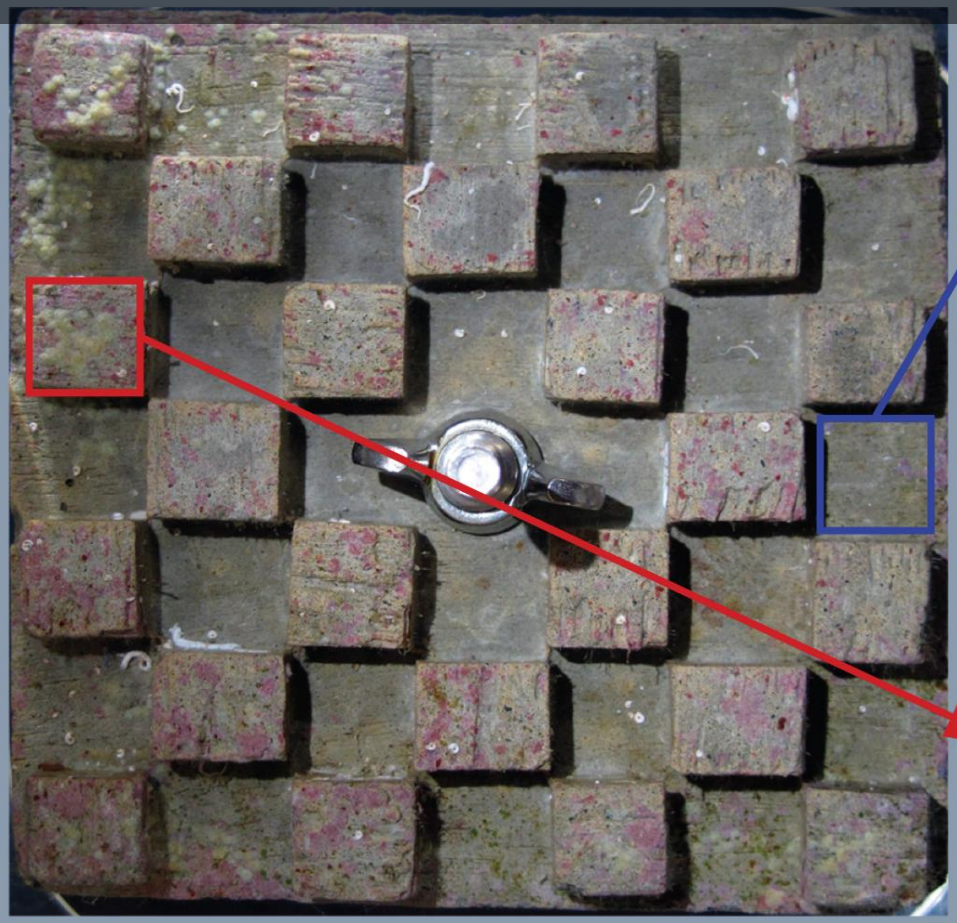
1. Larval survival

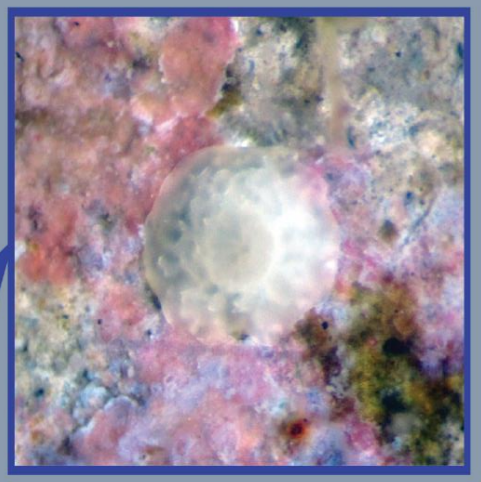
2. Larval Settlement

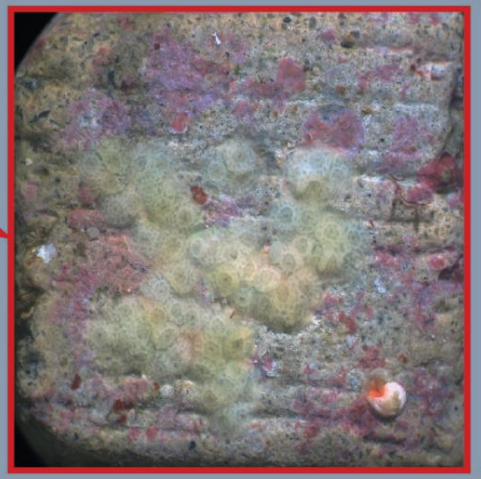


Field experiment: internal x external processes

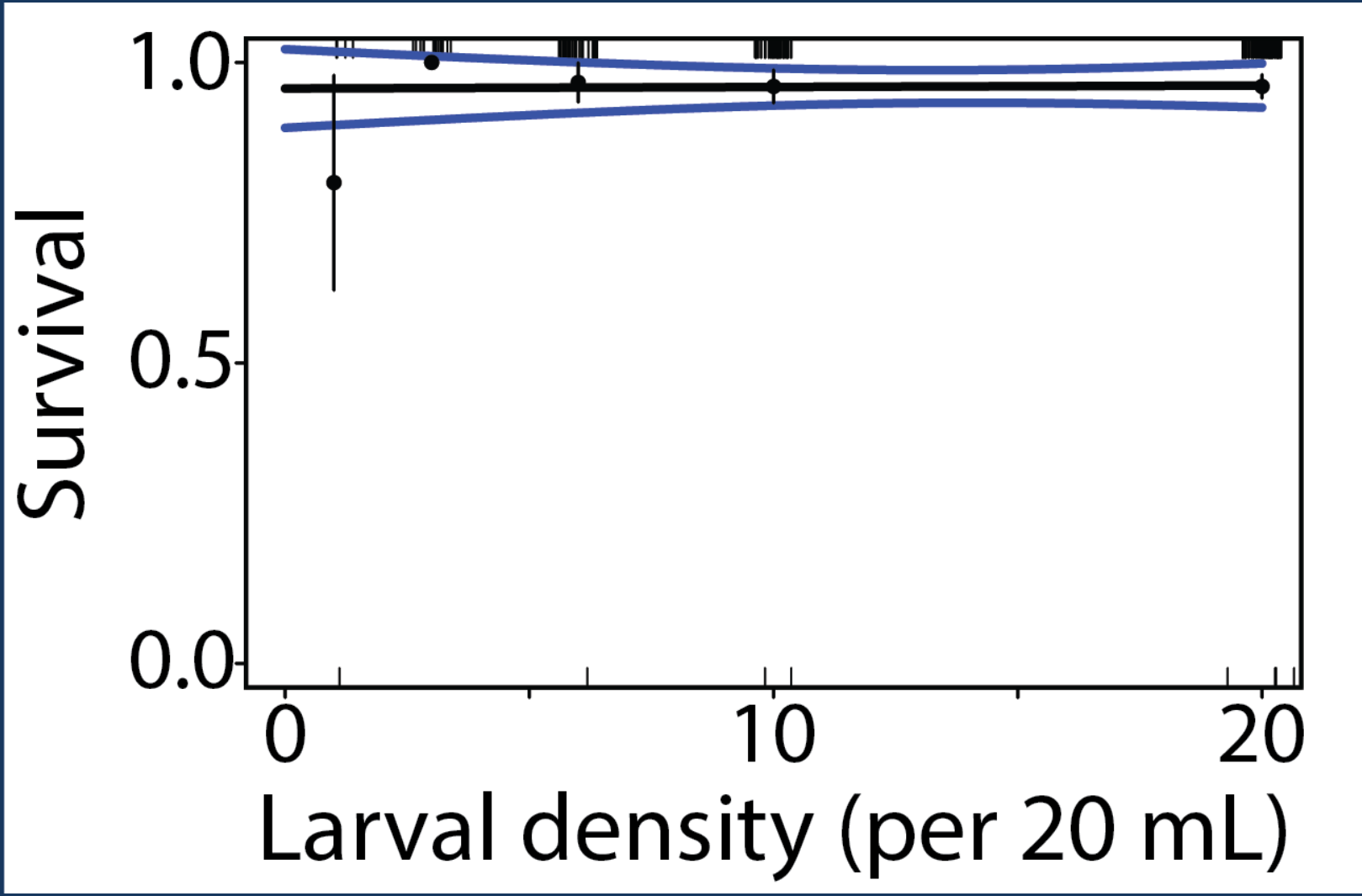
3. Post-settlement survival



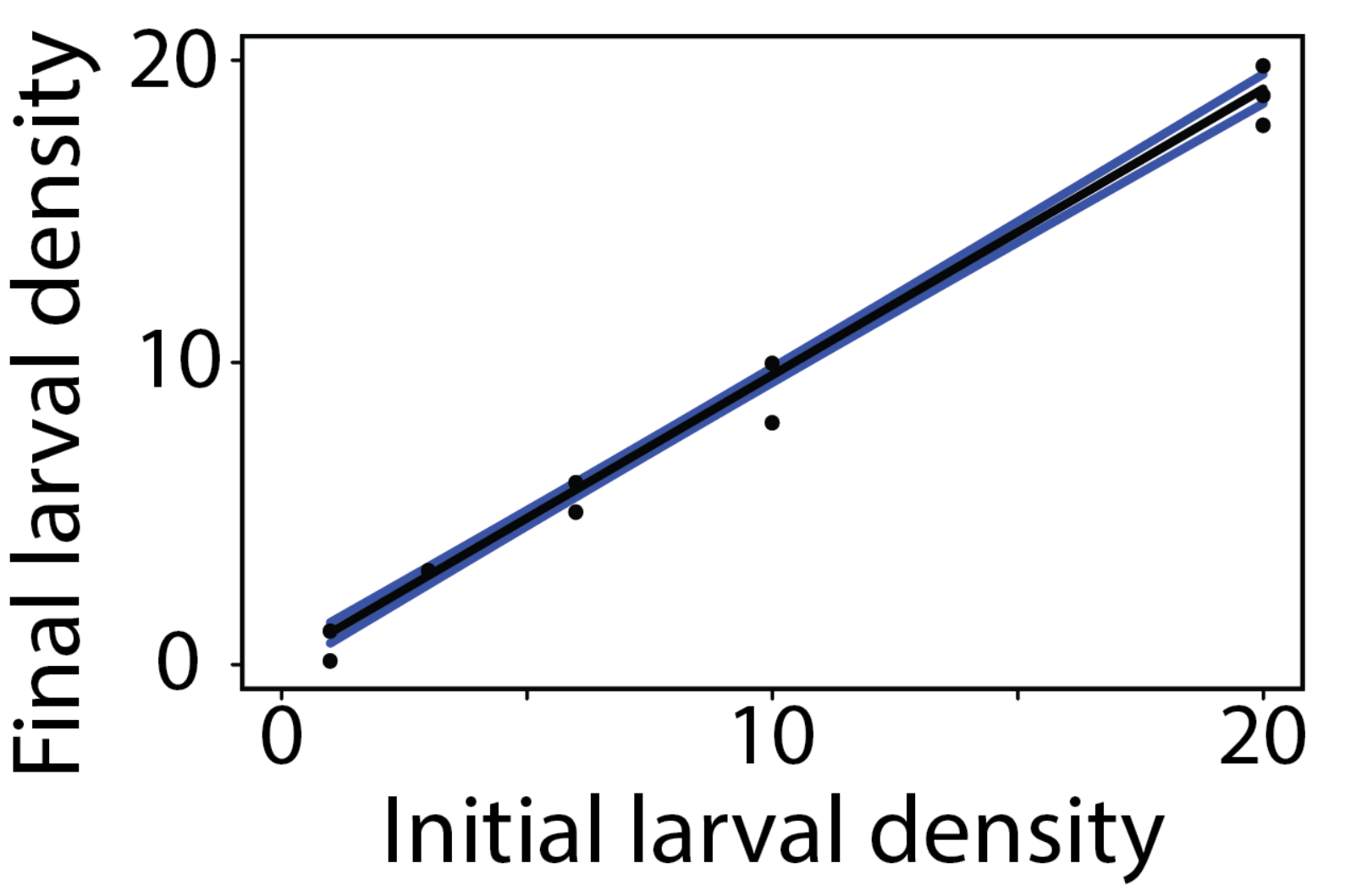




Larval survival



Larval survival



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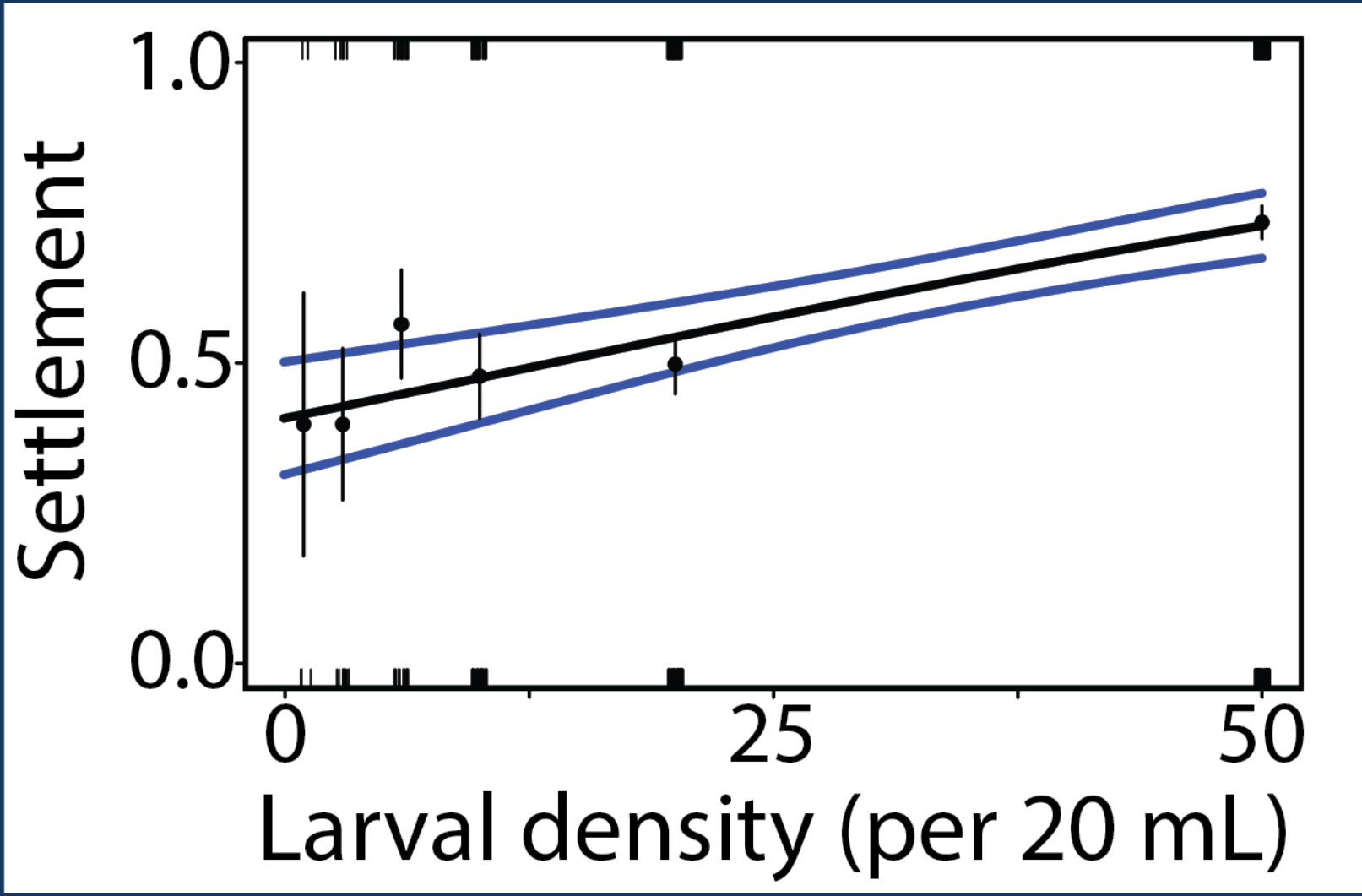
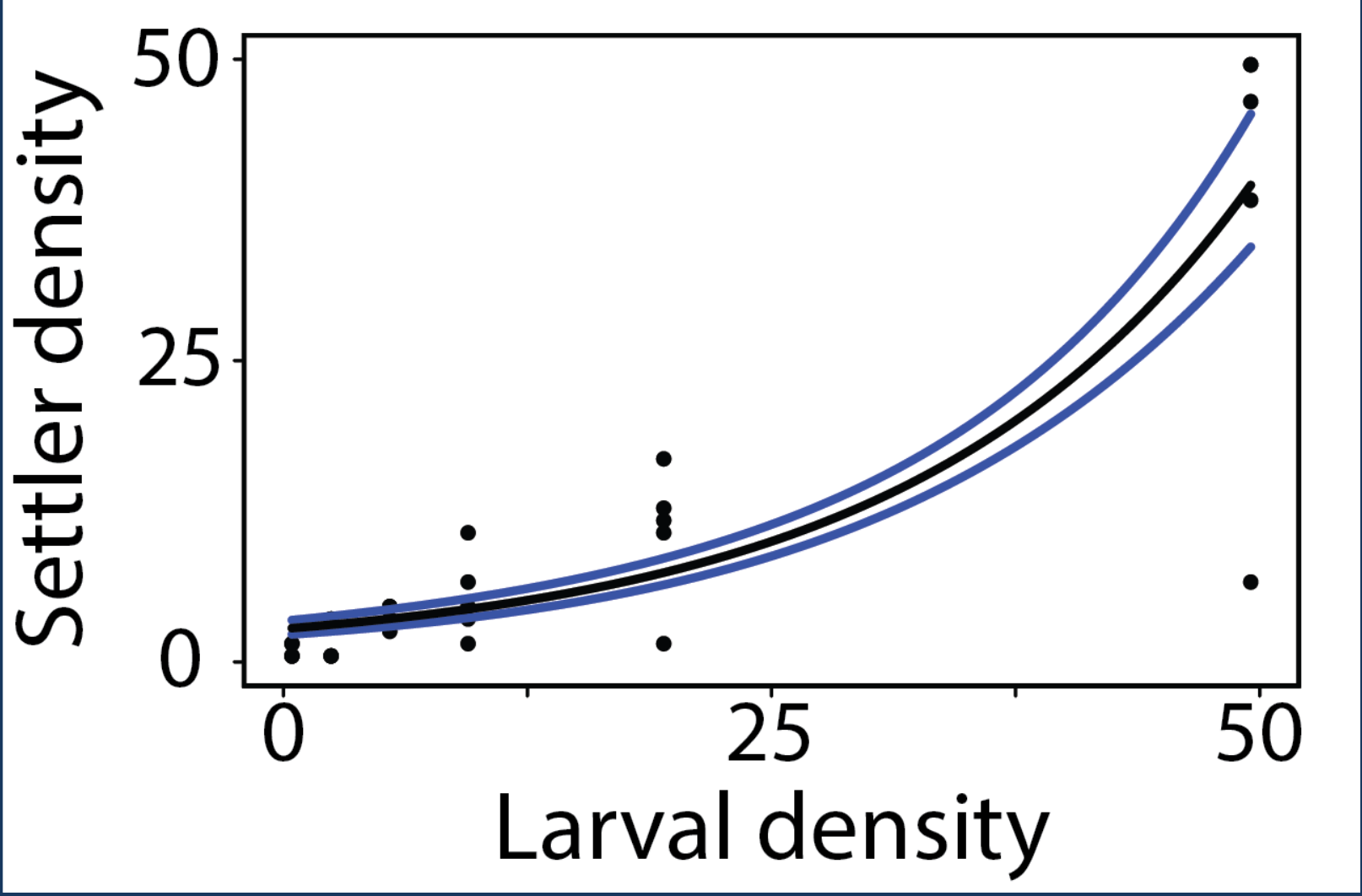
Larval settlement

CSIRO

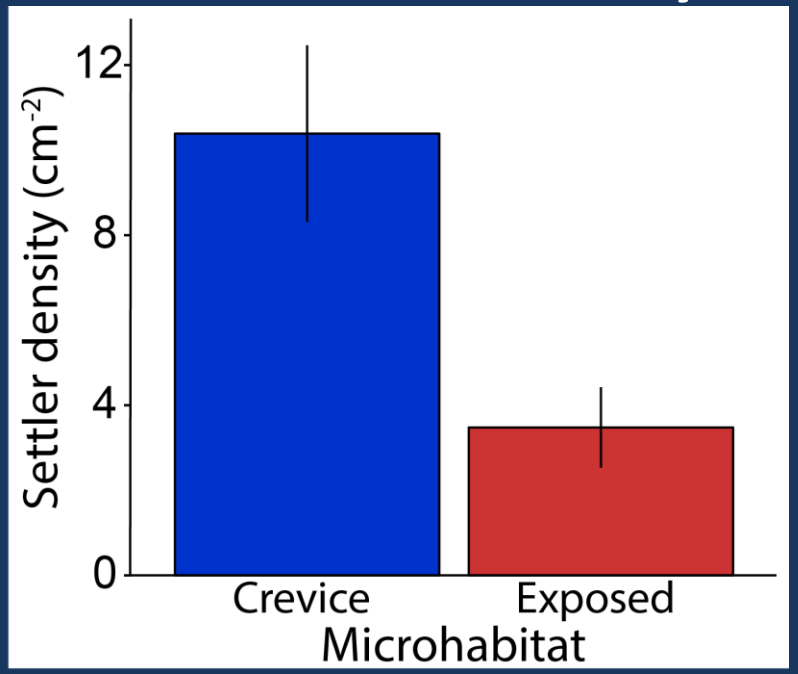


Larval settlement



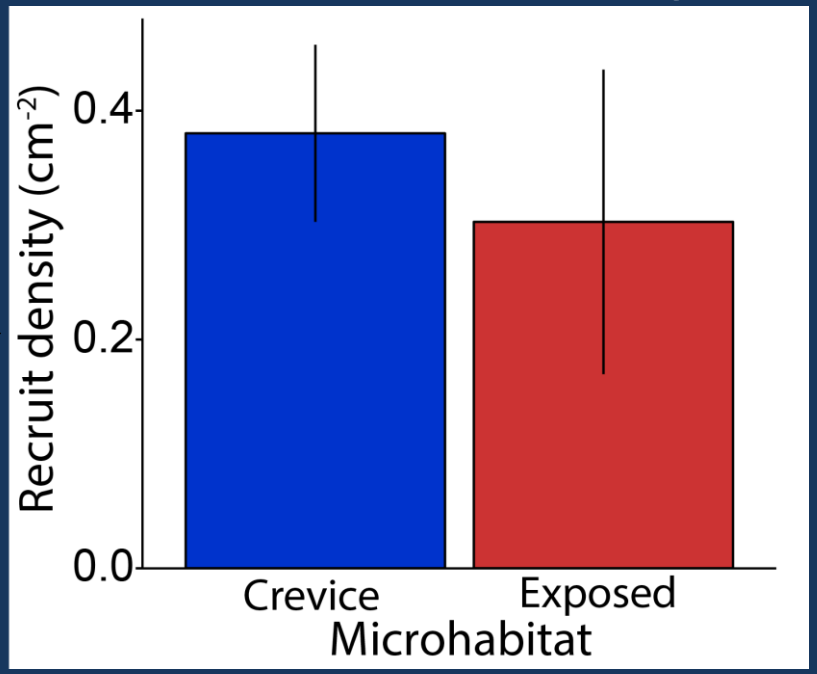
Post-settlement survival

Settler density



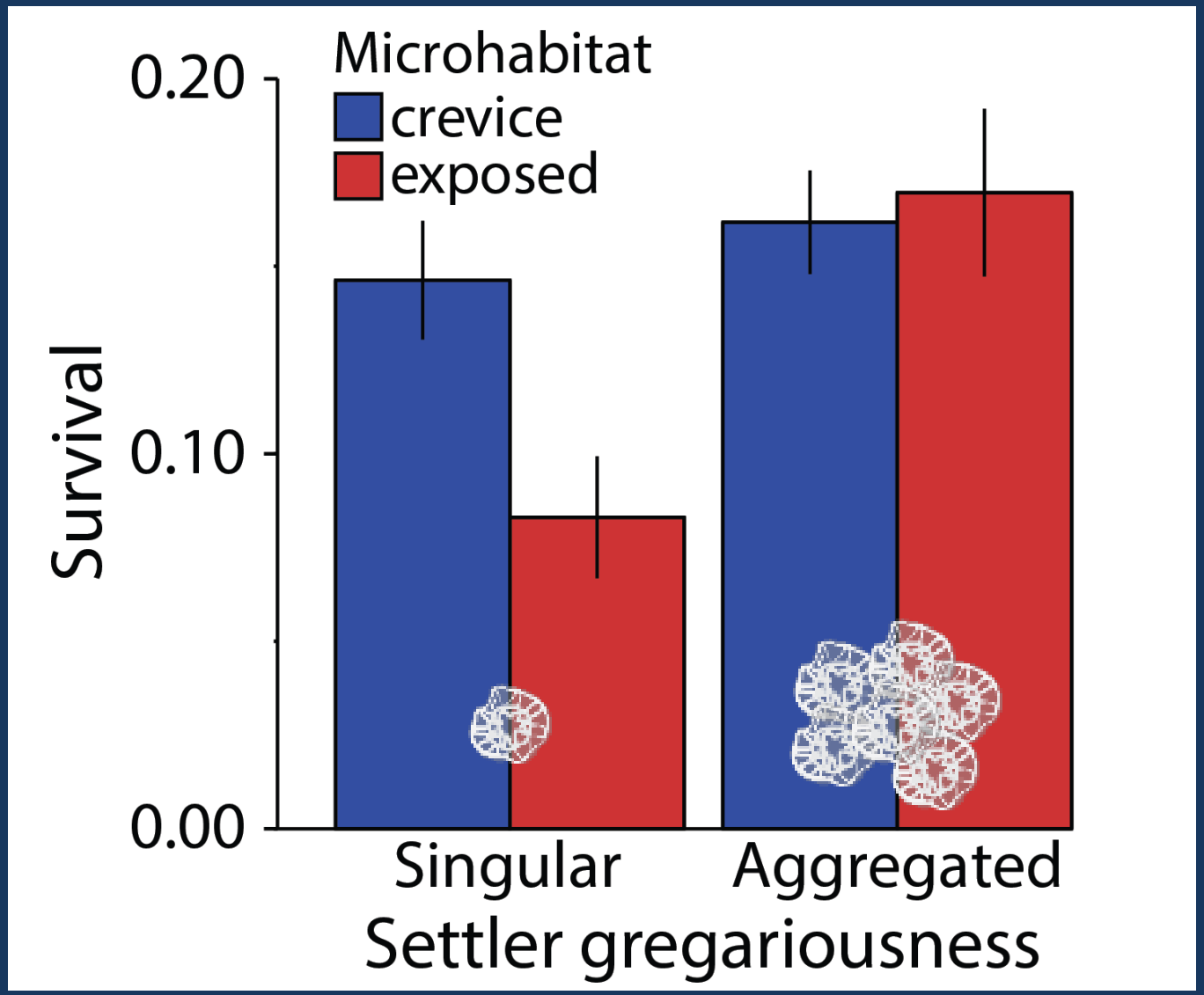
30 days

Recruit density

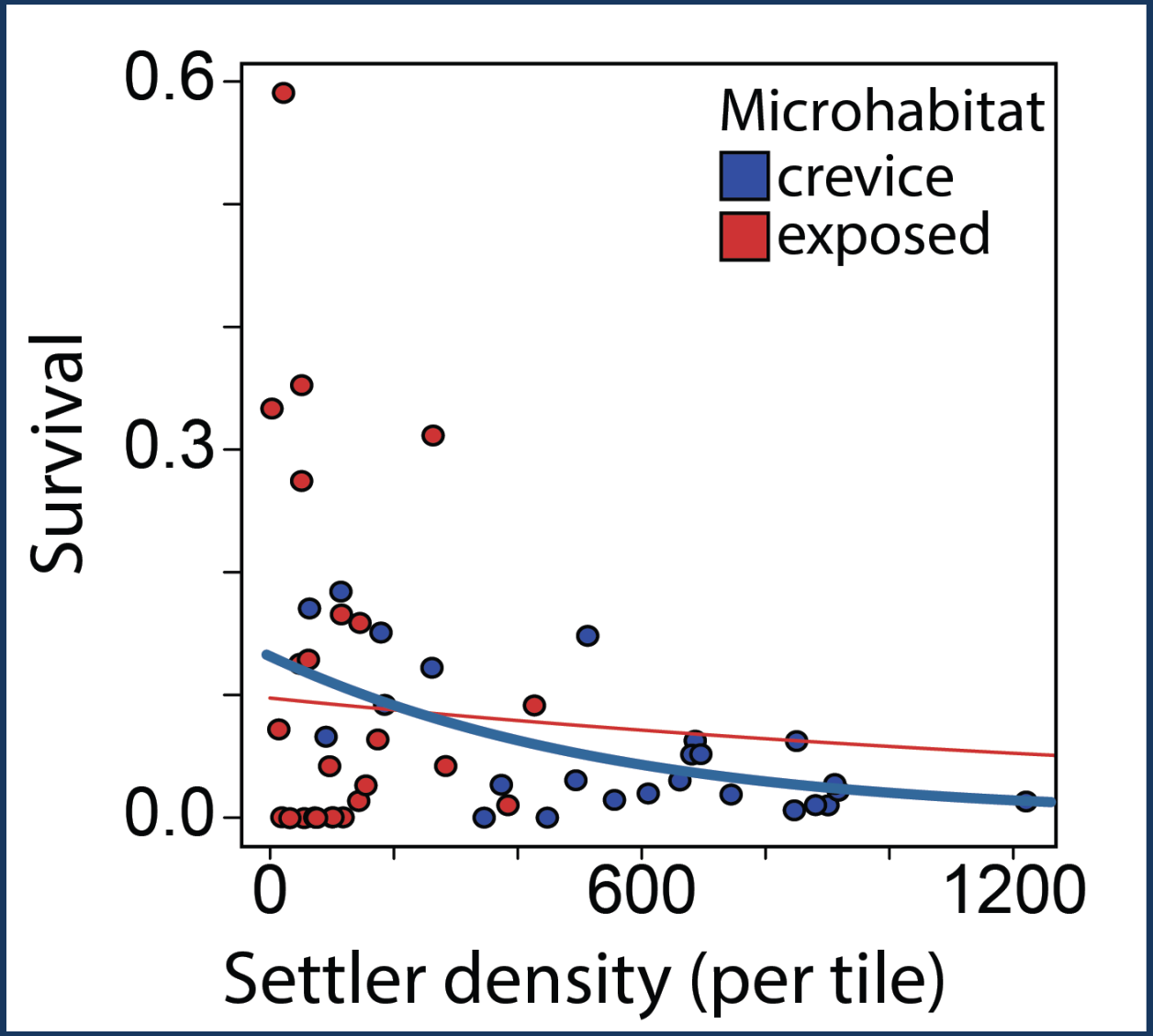


WHY?!

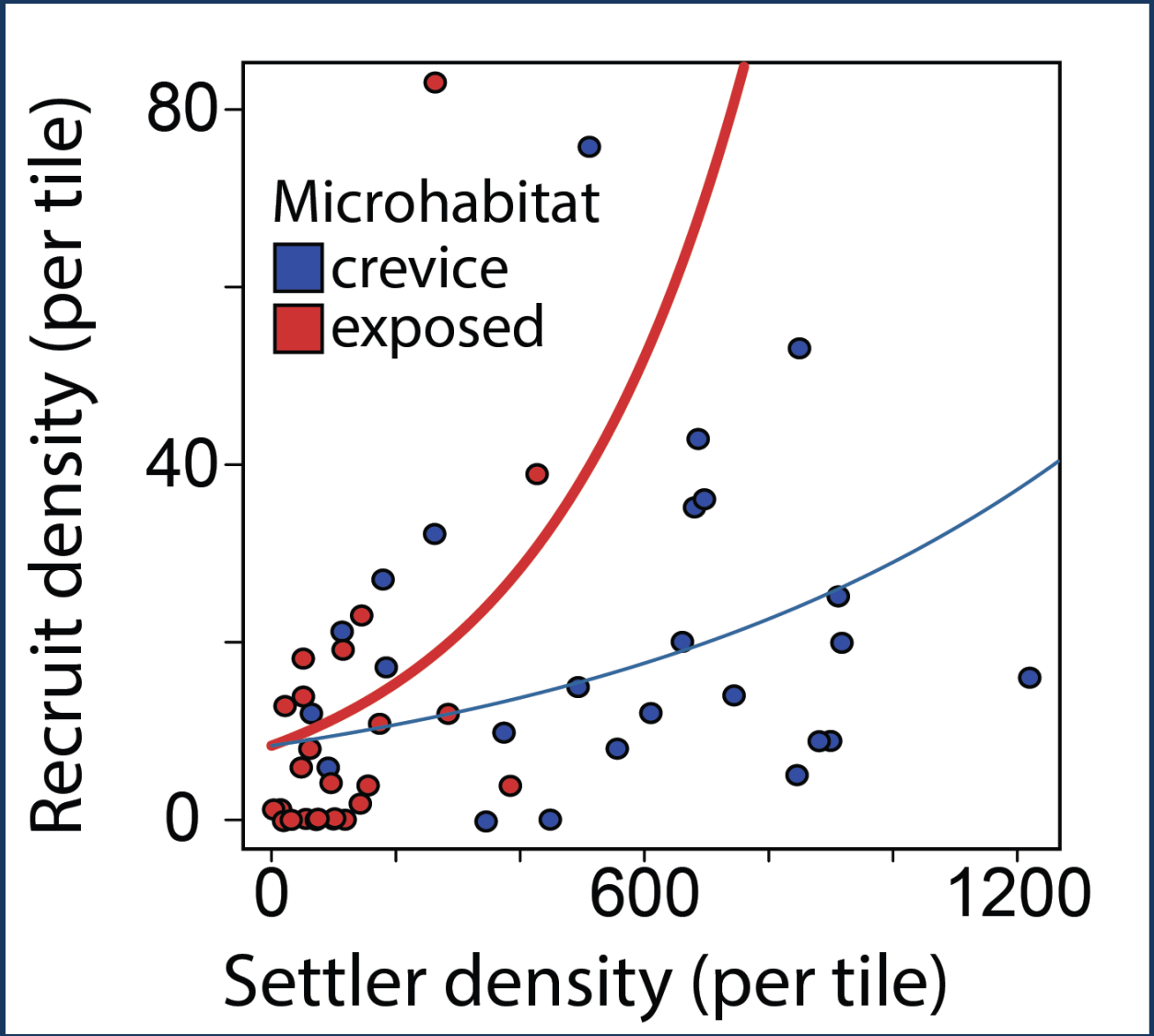
Post-settlement predation



Post-settlement regulation

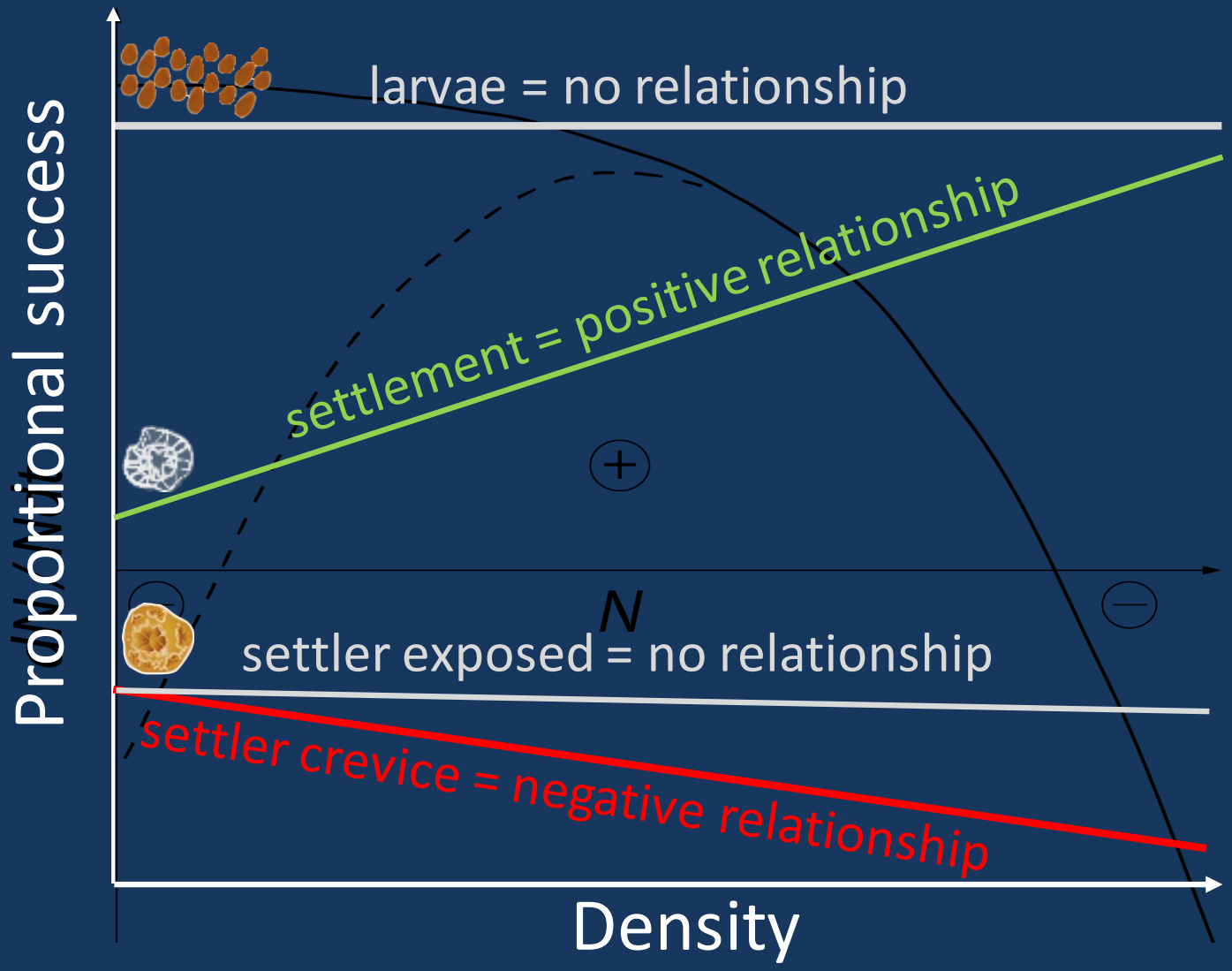


Post-settlement abundance



In summary…

Variety of density-dependent responses during early life-history stages



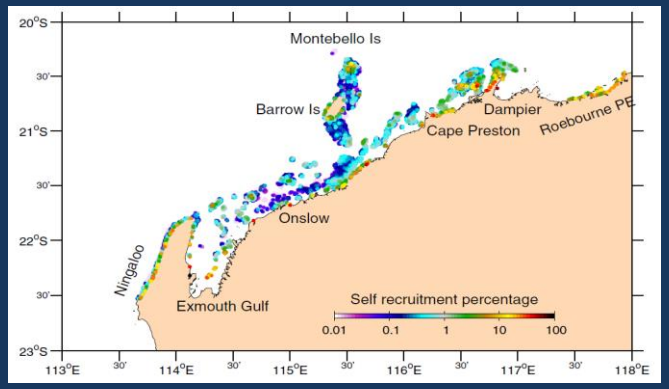
Take home messages

Excessively low or high abundances of larvae or settlers do not contribute to coral recovery

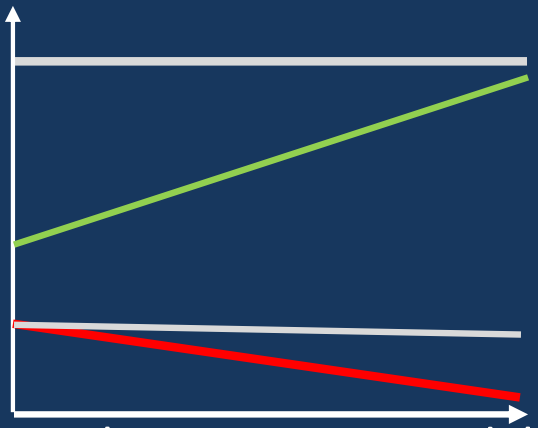
For degraded reefs...
lower thresholds greatest risk to reef recovery

Reef recovery through:
1. Pulses of larvae arriving from nearby reefs
2. Grow corals to juvenile stage, outplant to reefs

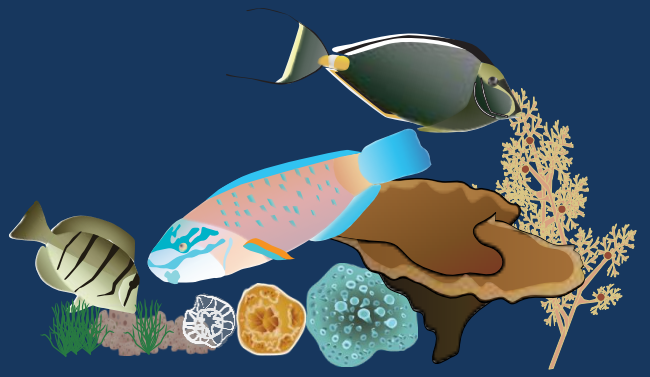
Long-term goals



Larval connectivity model

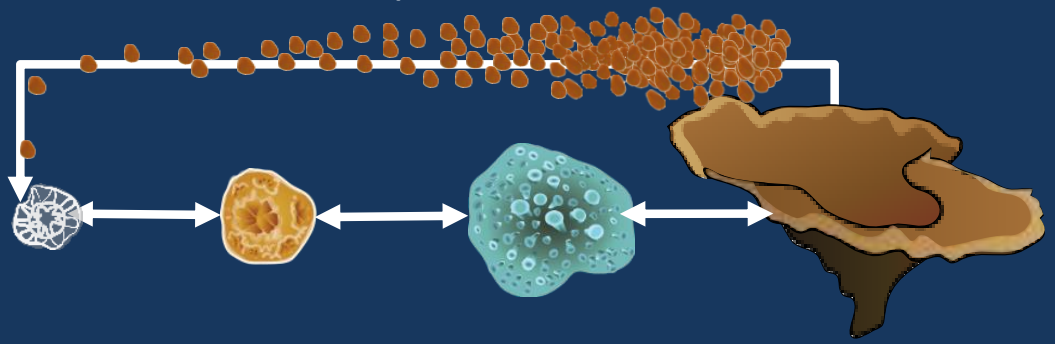


Coral recruitment model

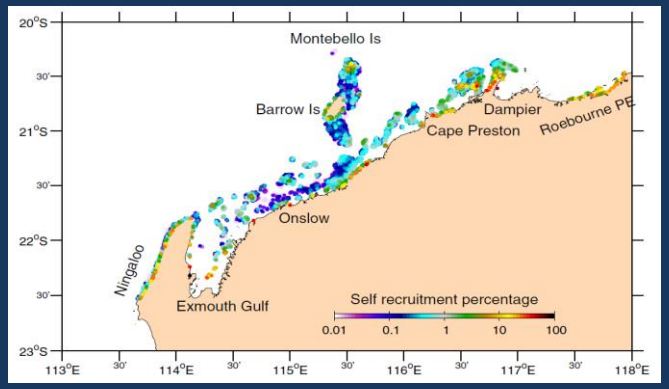


Ecological data

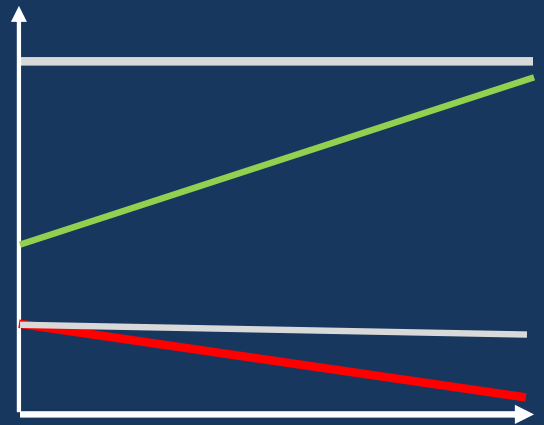
Population model



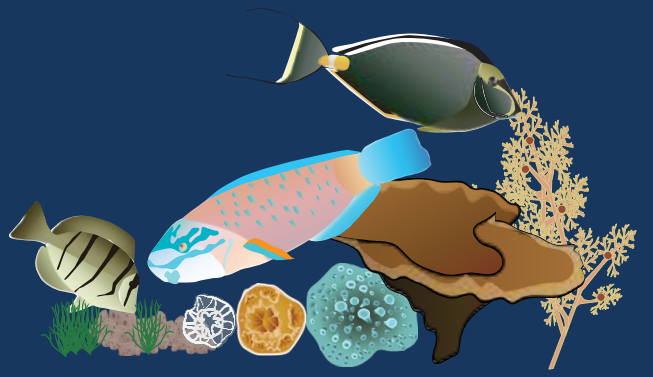
Long-term goals



Larval connectivity model

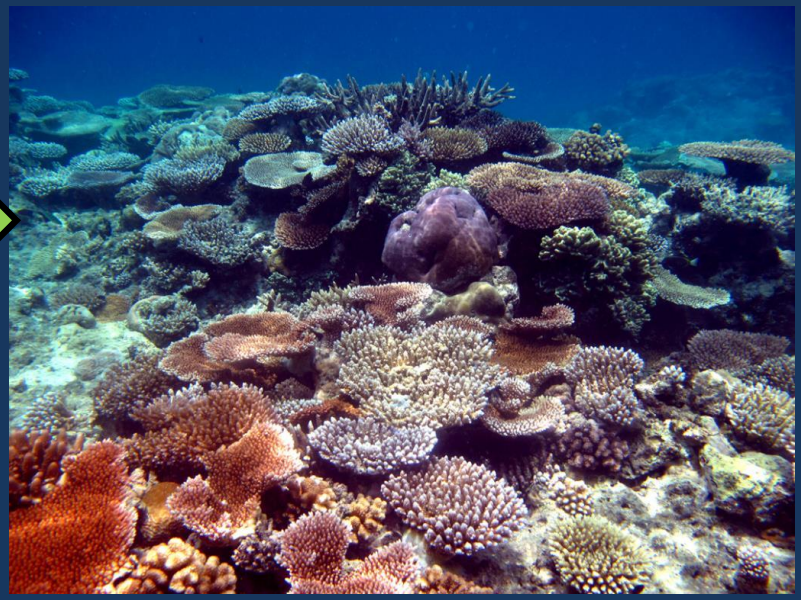


Coral recruitment model



Ecological data

t?



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www.ncb.org.au

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Manuscript advice: Anthony Richardson (CSIRO)

IAN symbol libraries (http://ian.umces.edu/symbols/)

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