

Modelling stock dynamics and removal strategies for *Centrostephanus rodgersii*

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Aim of modelling Centro stock dynamics



AIM IS TO UNDERSTAND CHANGES IN BIOMASS

- Location, depth, time

TO INFORM REMOVAL OPTIONS

- Fishing, culling, quickliming, other
- Where, when, how often, \$, ..?

AND IDENTIFY KEY AREAS OF UNCERTAINTY

- Test different scenarios
- Recommend further data collection

What do we already know?

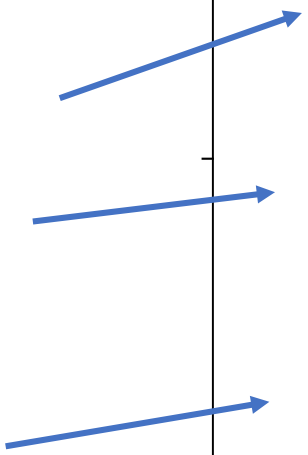
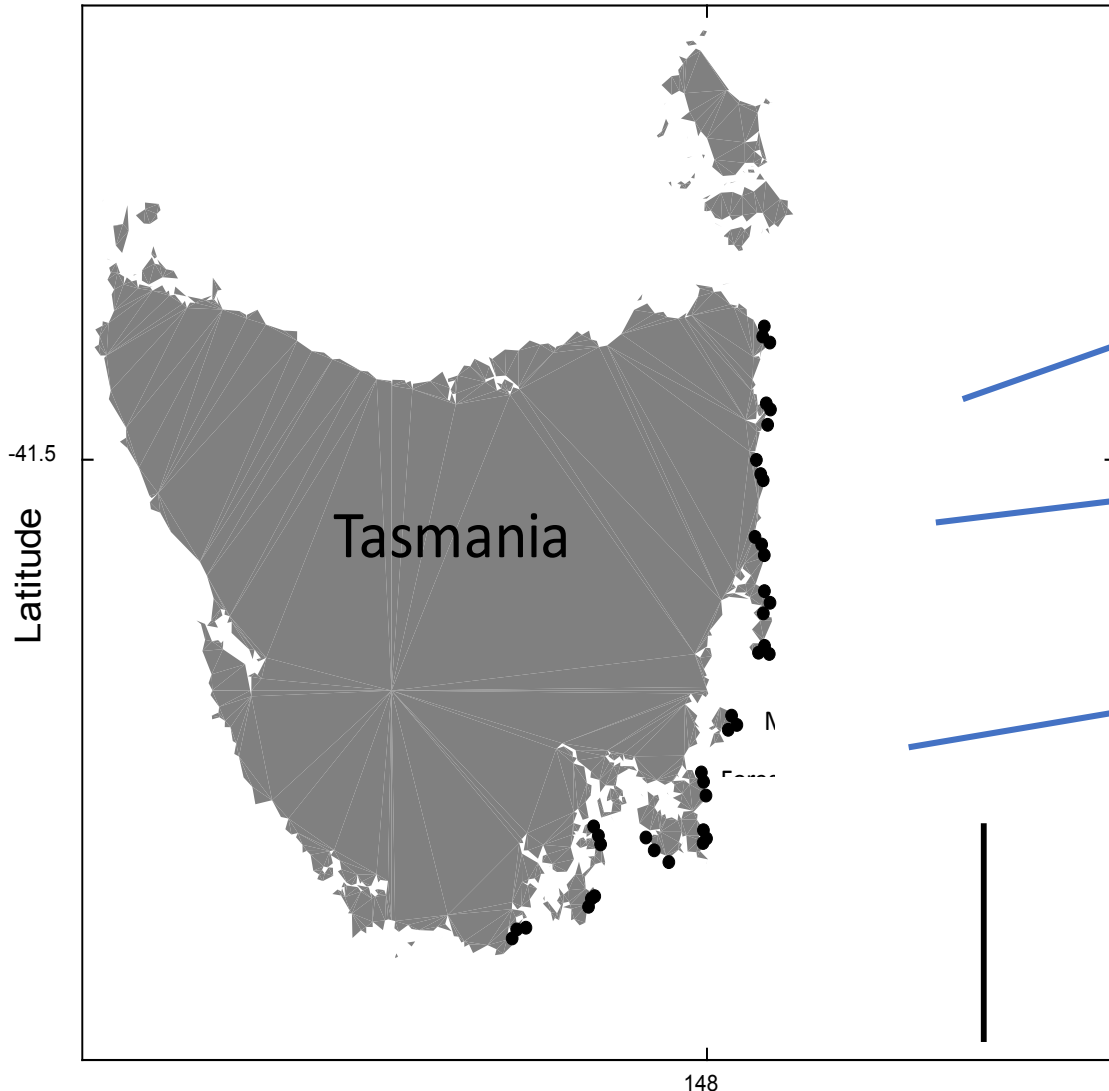
- Culling experiments
- Surveys of biomass & barrens
- Catch and effort from fishery
- Growth, movement, morphology
- Genetics, modelling, oceanography
- and many other studies



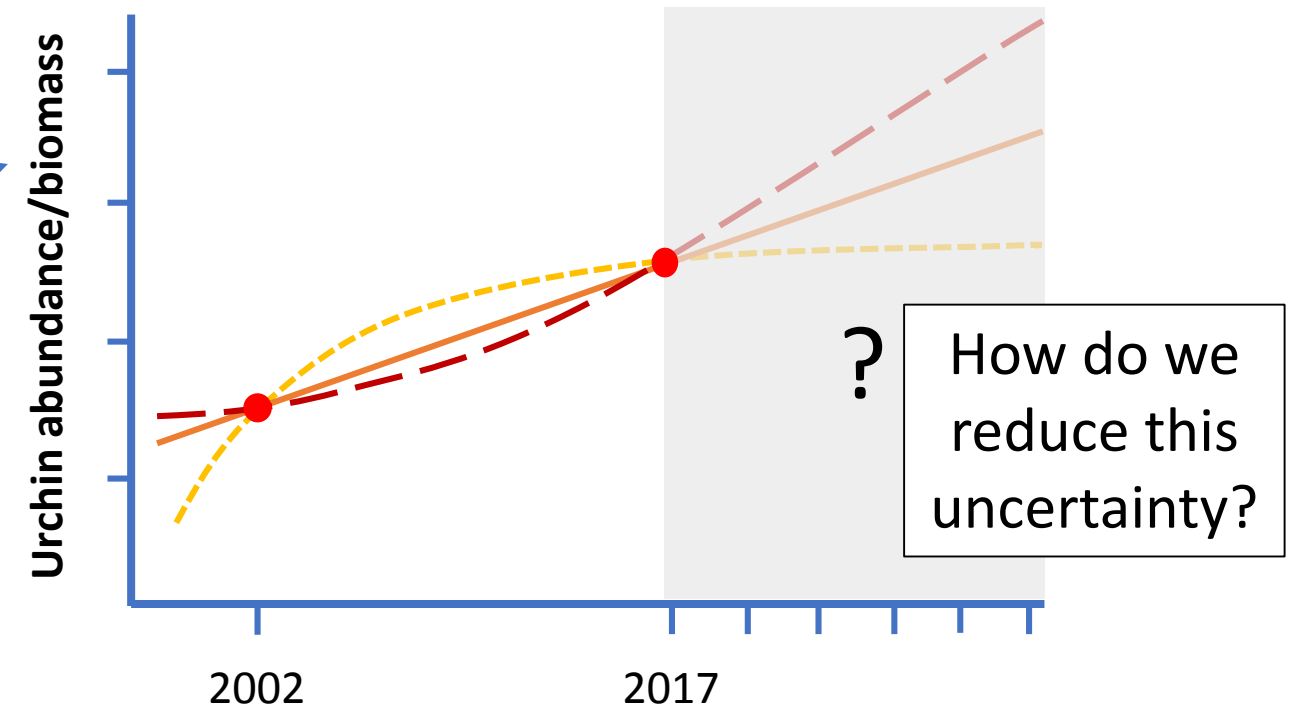
What else do we need?



Trends in biomass? Looking forward...



Increase in *C. rodgersii* 2002 to 2017



➡ Recommend regular towed video transects

Is data on a scale that is informative to our needs?

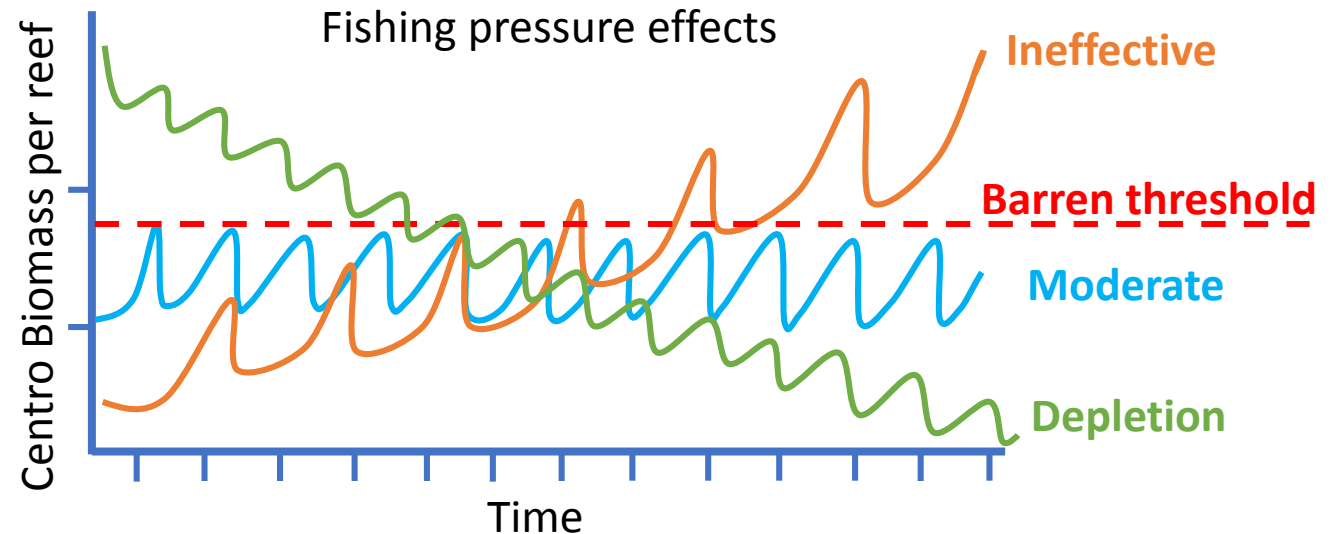


QUESTION: How much fishing effort per reef to DEplete Centro?



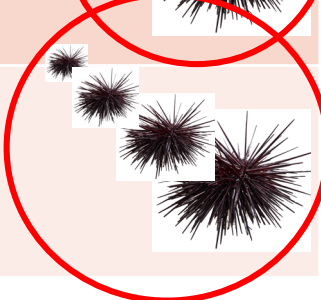
- Current reporting blocks too large
- Large blocks mask spatial shifts in fishing (spatial, depth)

Recommend GPS and depth tracking of divers: fine-scale data

DATA on urchin population recovery/depletion can inform other removal strategies



Modelling direct removal methods for reefs

	COST	DEPTH	REEF TYPE			TARGET SIZE	FREQUENCY TO REPEAT
			Forest	Incipient barren	Extensive barren		
FISHING	\$?	Diveable only	✓	✓	X		REPEAT OFTEN
CULLING	\$\$\$\$	Diveable only	✓	✓	✓		LESS OFTEN
QUICKLIME	\$\$	Any depth	X	X	✓		LEAST OFTEN

Note: robots – untested but a possibility

In summary

Models can help to

- Understand how biomass changes naturally and with removals
- Make forward predictions
- Test different scenarios
- Feedback between model predictions and further data collection is vital

