

Patterns and processes in the population replenishment of scleractinian corals

Are coral populations recruitment limited?

Are recruits derived mostly from local or distant adult stocks?

Can coral populations withstand one or more consecutive years of recruitment failure?

Dr. Morgan Pratchett

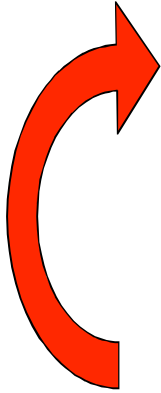
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Are coral populations recruitment limited?

Acropora millepora



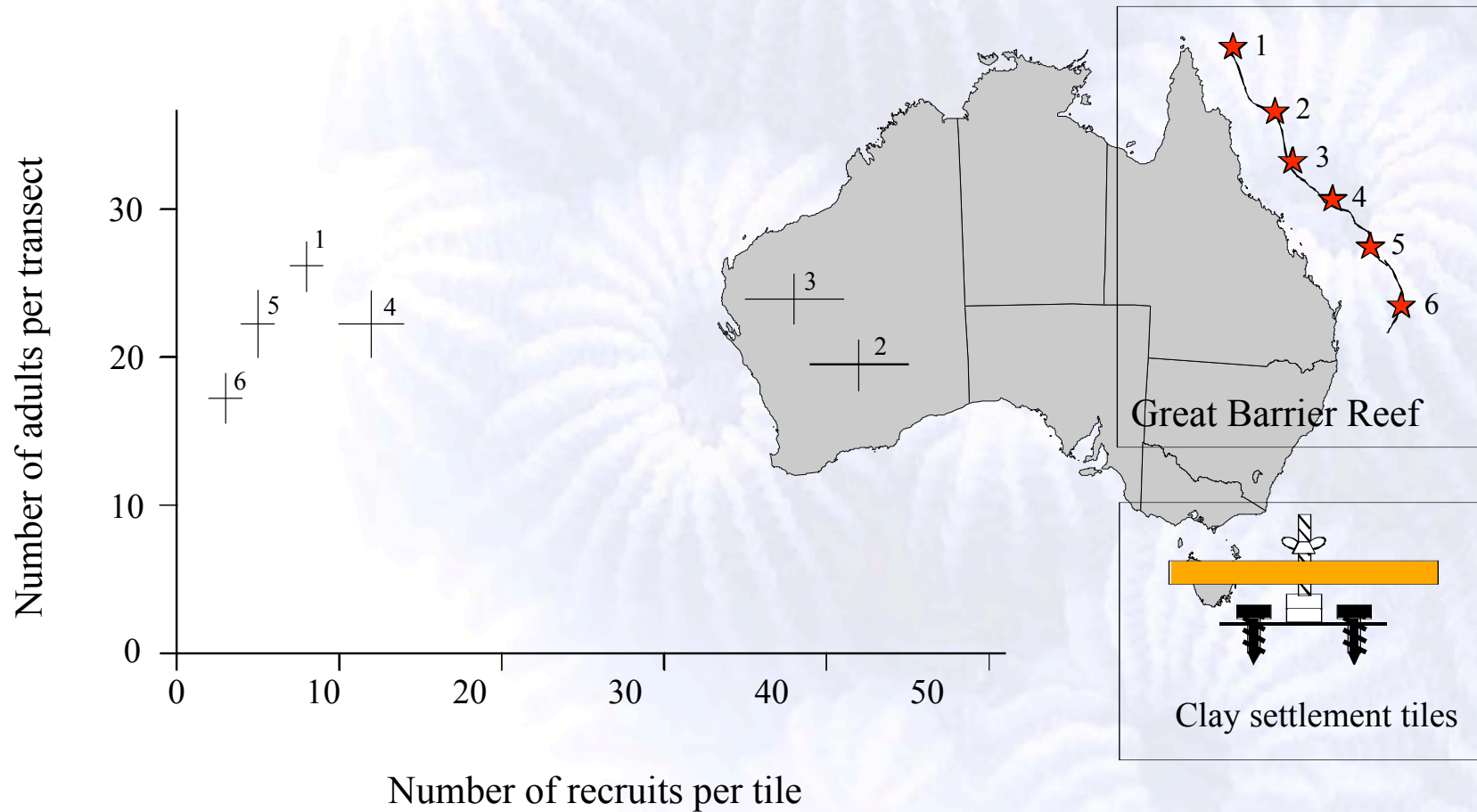
Acropora
larvae

Adult Abundance



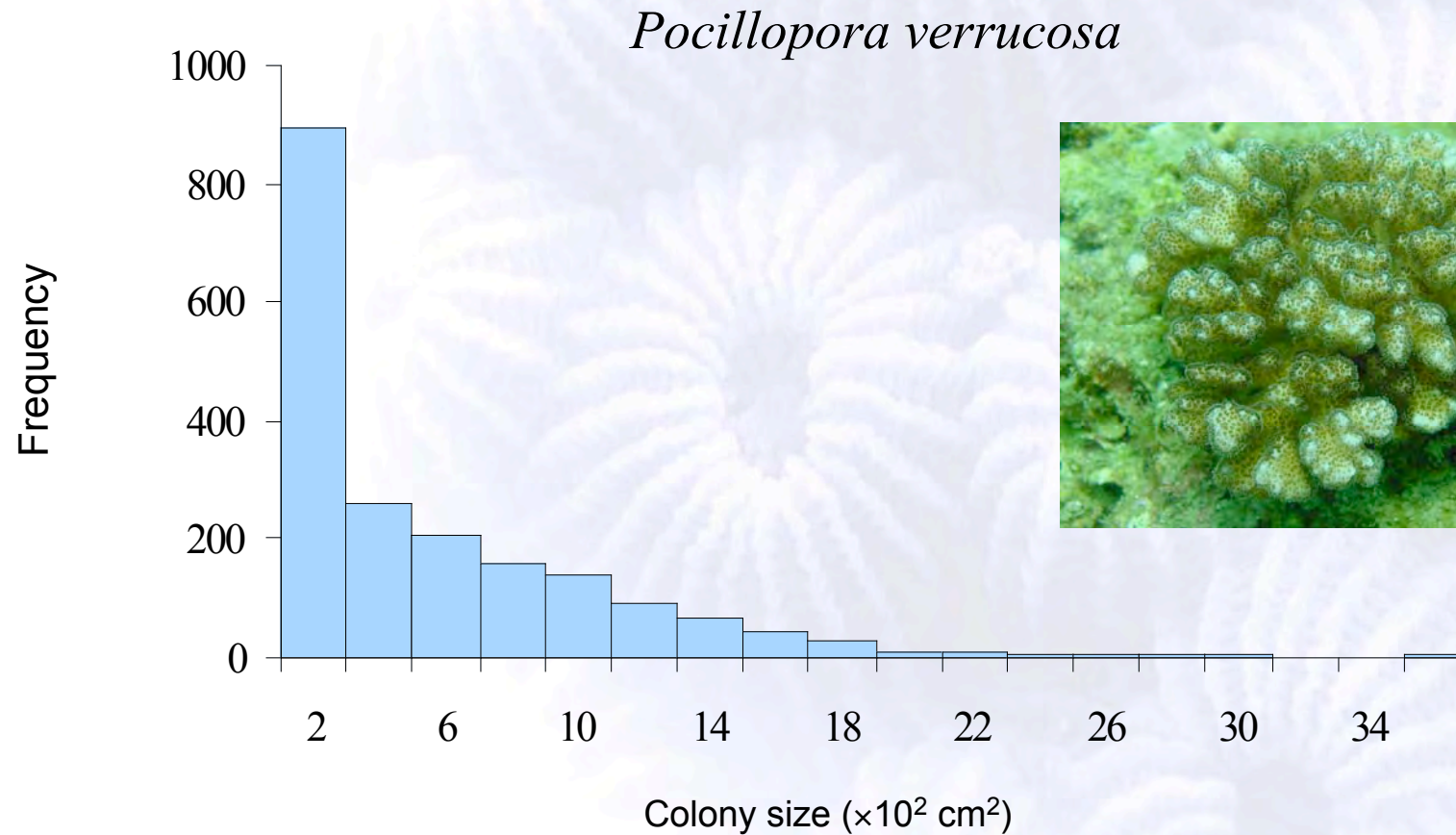
Density of recruits

Are coral populations recruitment limited?



Hughes *et al.* (1999) *Nature*

Are coral populations recruitment limited?

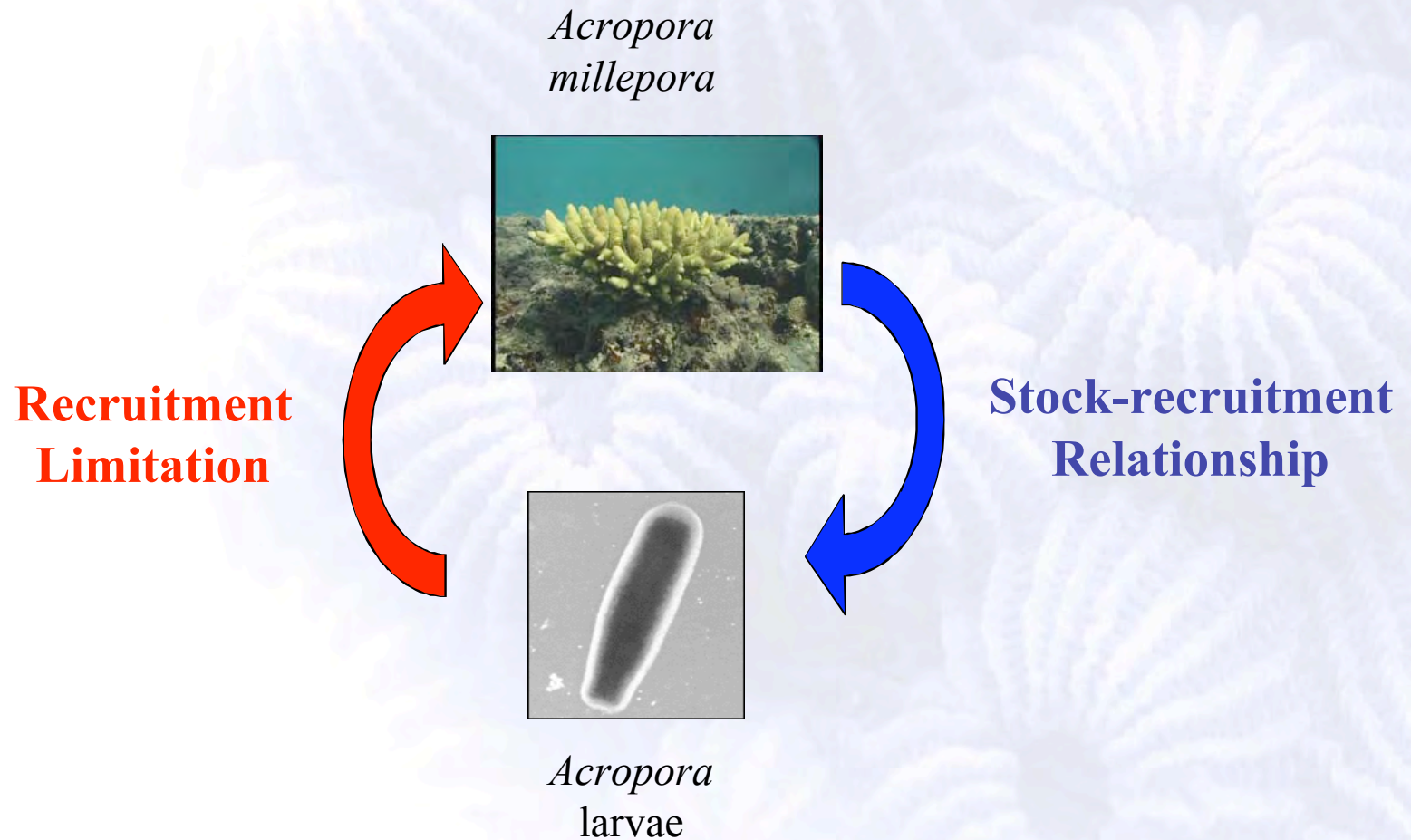


Adjeroud *et al.* (In review) Hydrobiologia

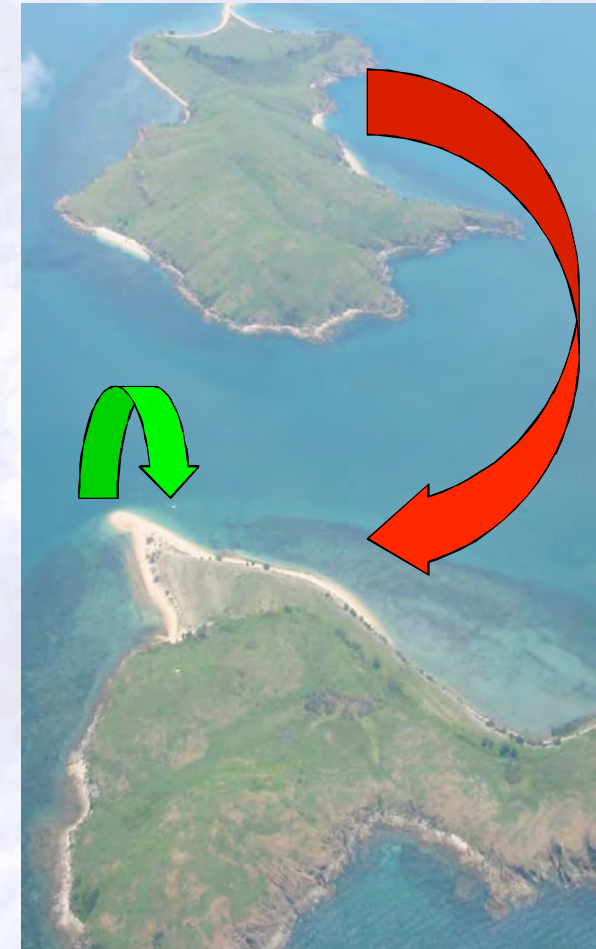
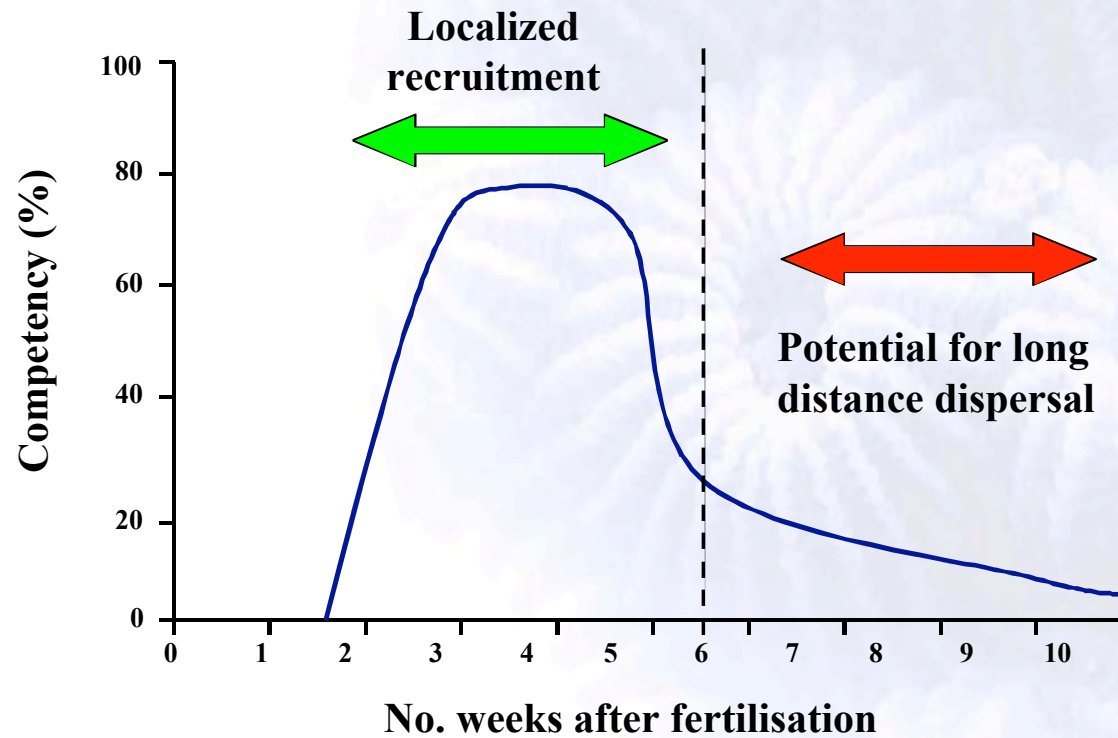
Are coral populations recruitment limited?

Coral Species	Mortality	Size	Time	Location	Source
<i>Goniastrea aspera</i>	66.0%	<7cm dia	12 months	Central GBR	Babcock 1985
<i>Platygyra sinensis</i>	74.0%	<7cm dia	12 months	Central GBR	Babcock 1985
<i>Acropora millepora</i>	86.0%	<7cm dia	12 months	Central GBR	Babcock 1985
<i>Pocillopora damicornis</i>	75.3%	<5cm dia	6 months	Southern Japan	Sato 1985
<i>Montipora verrucosa</i>	90.0%	<8cm dia	8 months	Hawaii	Fitzharding 1988

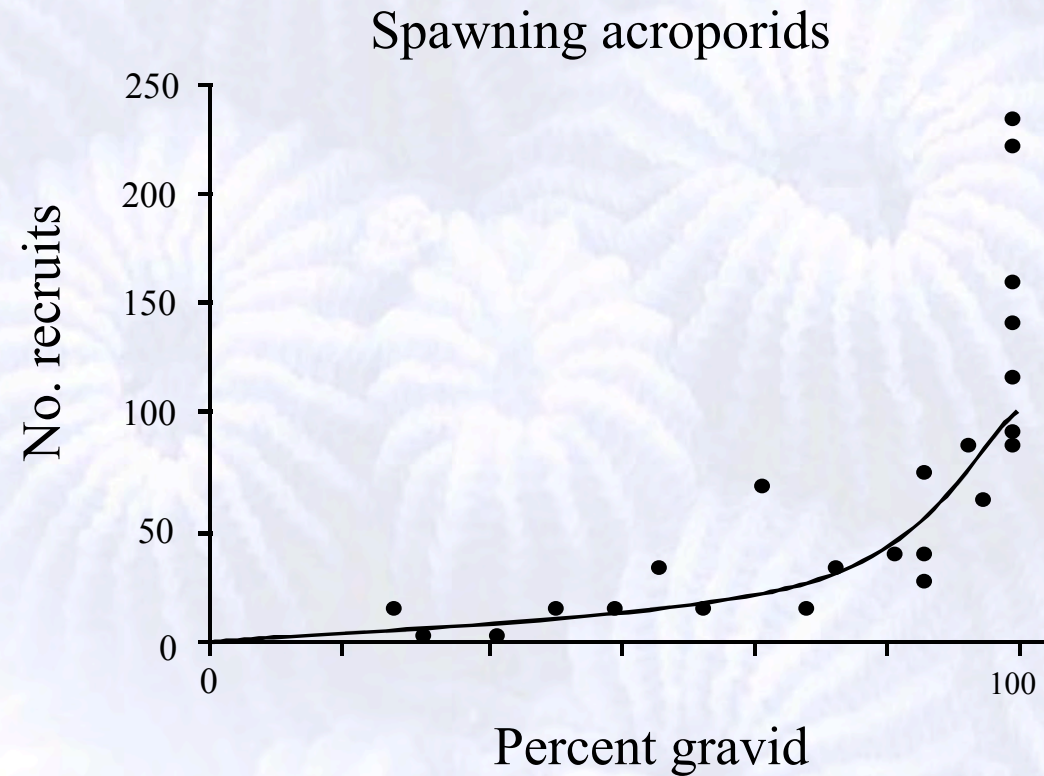
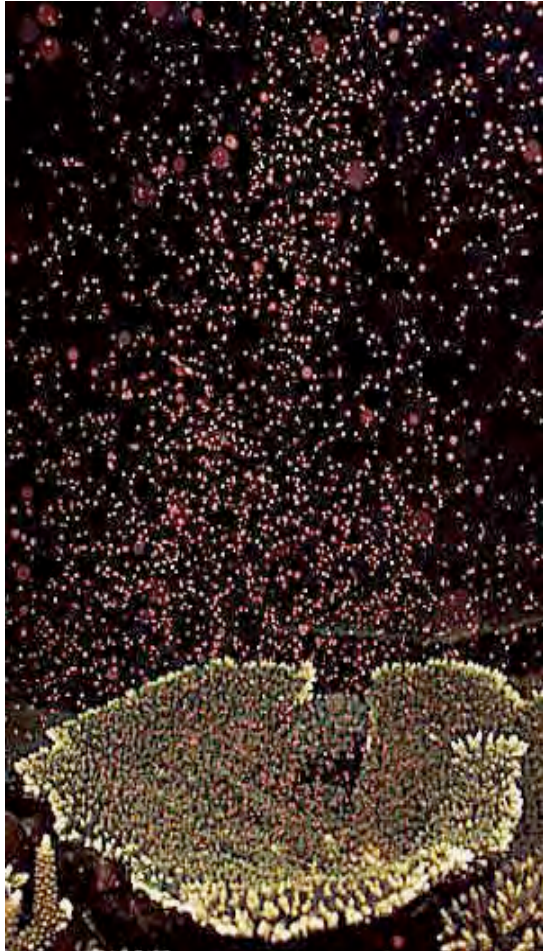
Do corals exhibit stock-recruitment relationships?



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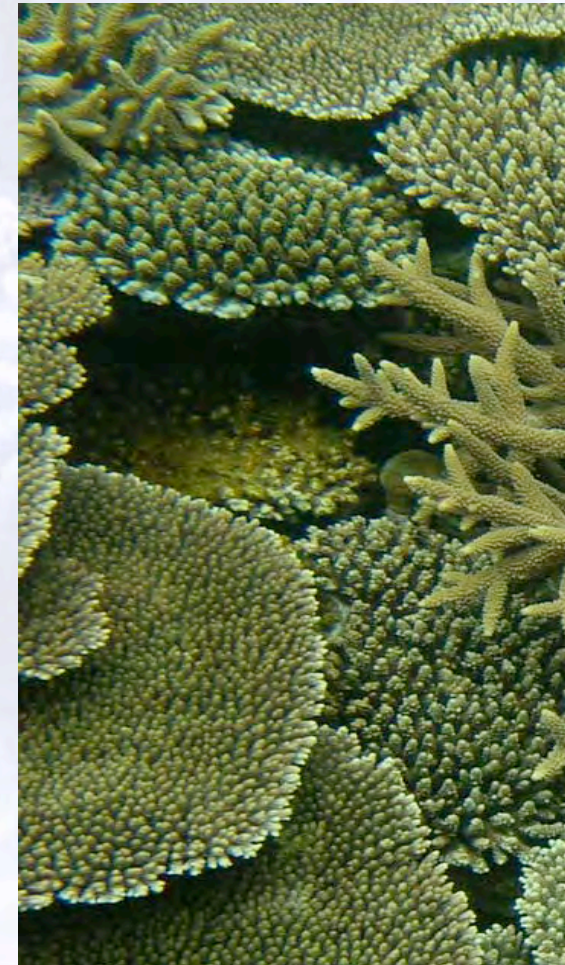
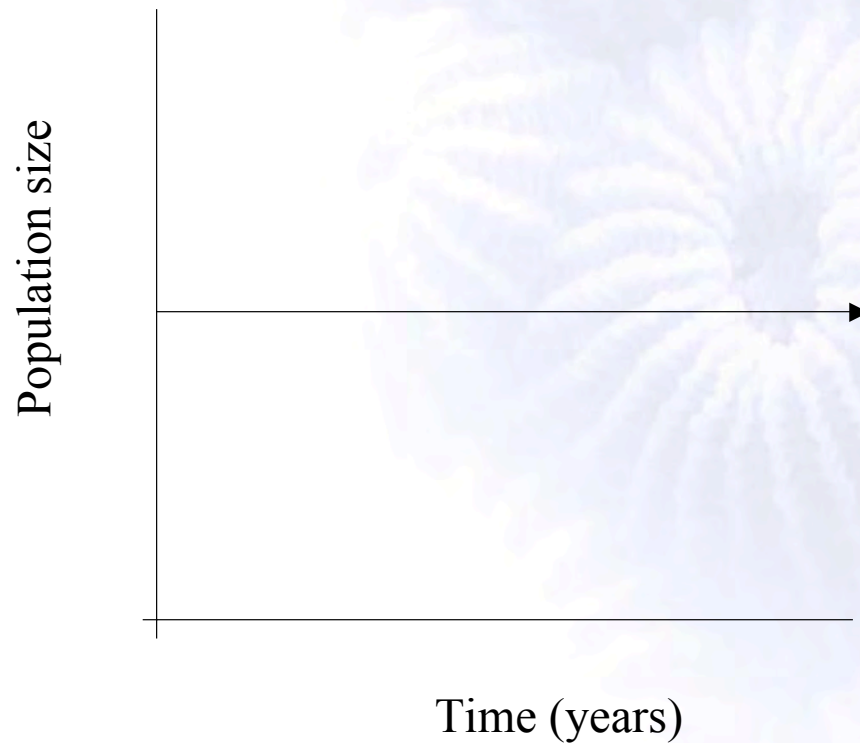


Do corals exhibit stock-recruitment relationships?

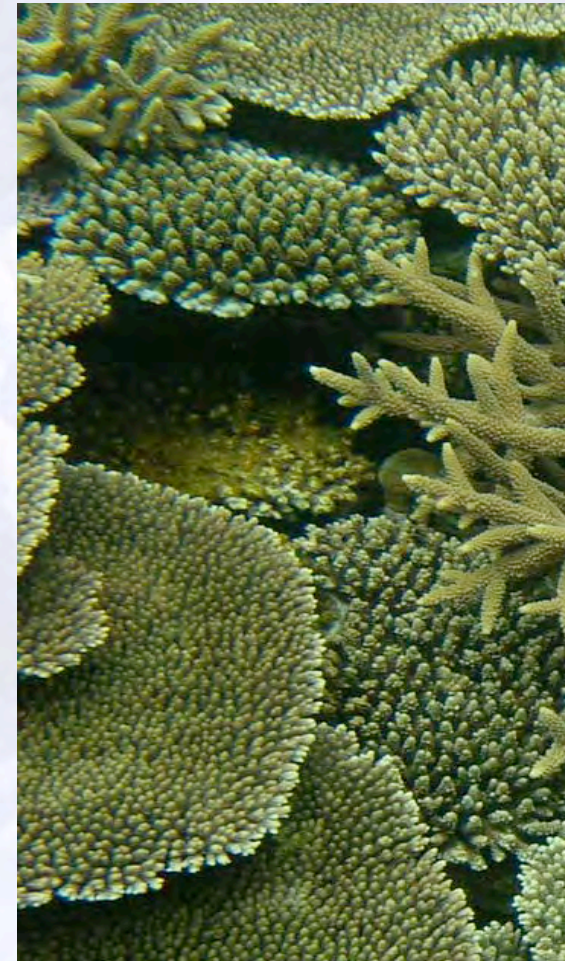
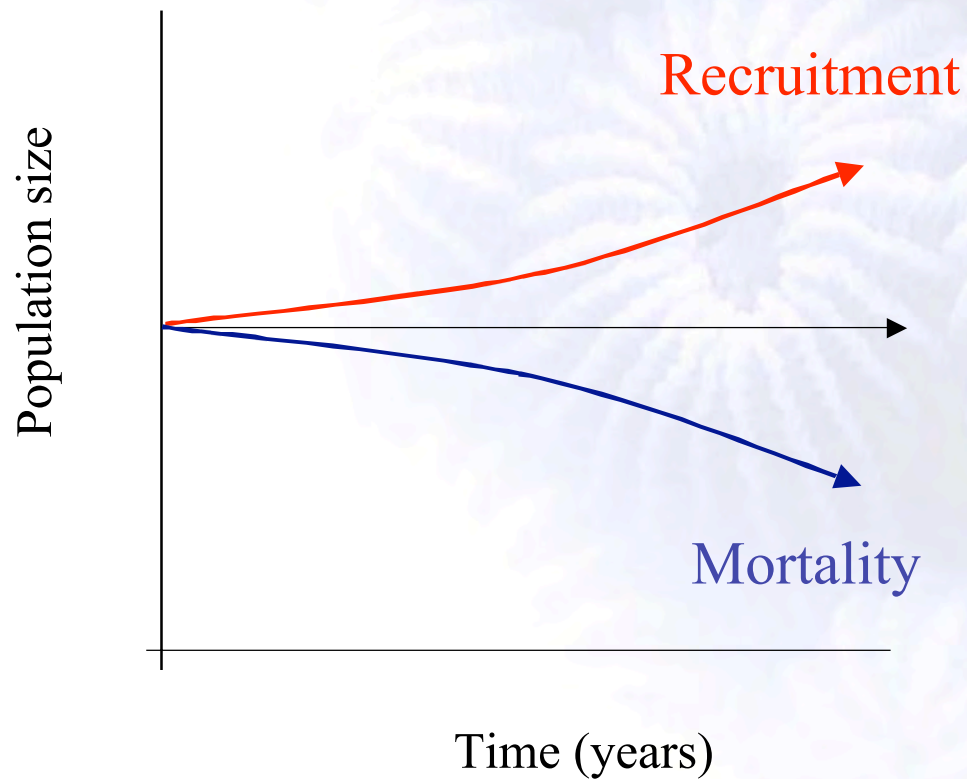


Hughes et al. (2000) Ecology

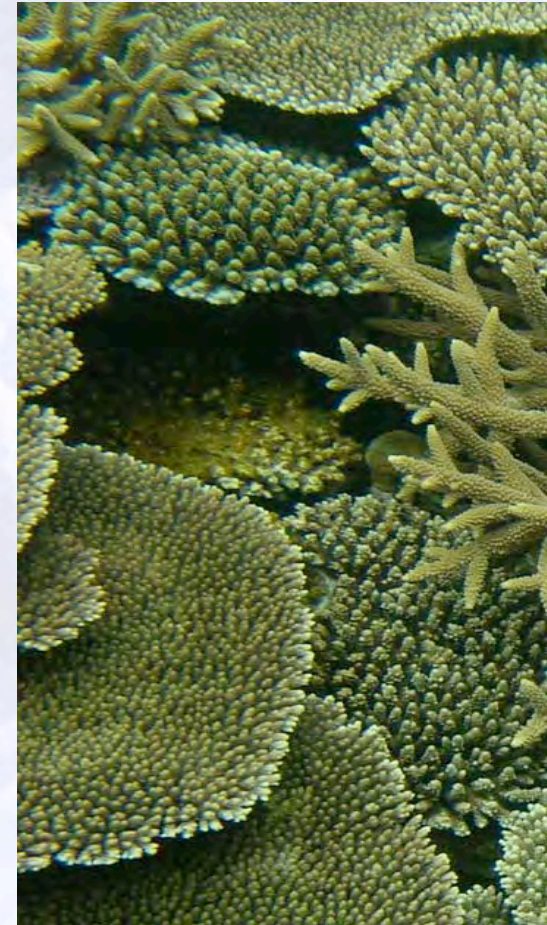
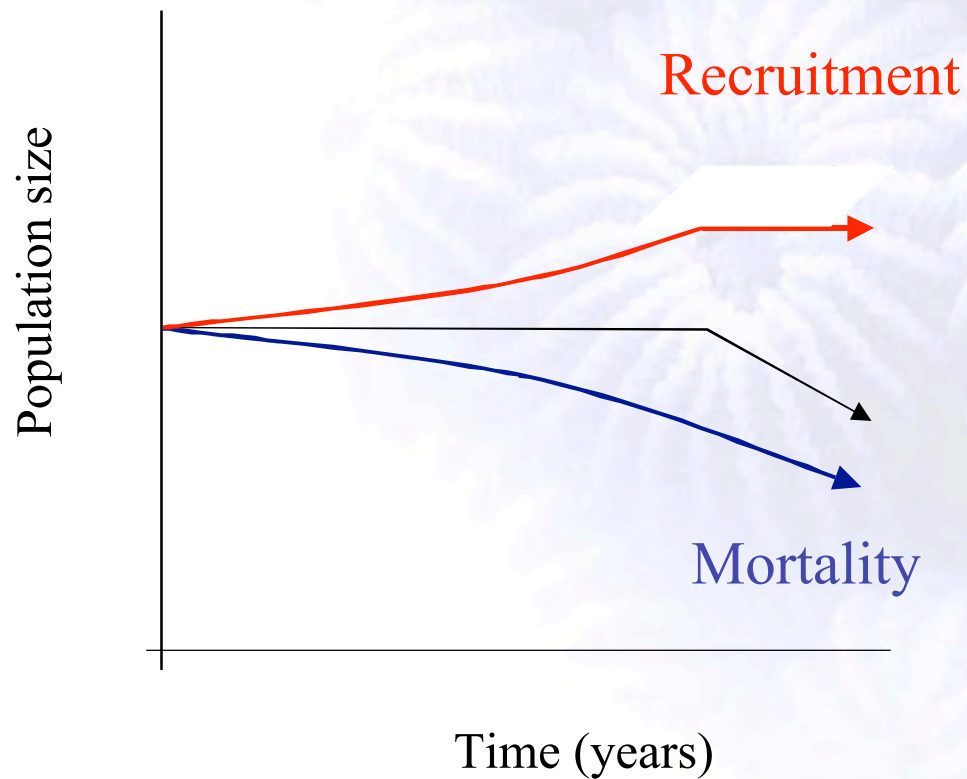
Can coral populations withstand one or more consecutive years of recruitment failure?



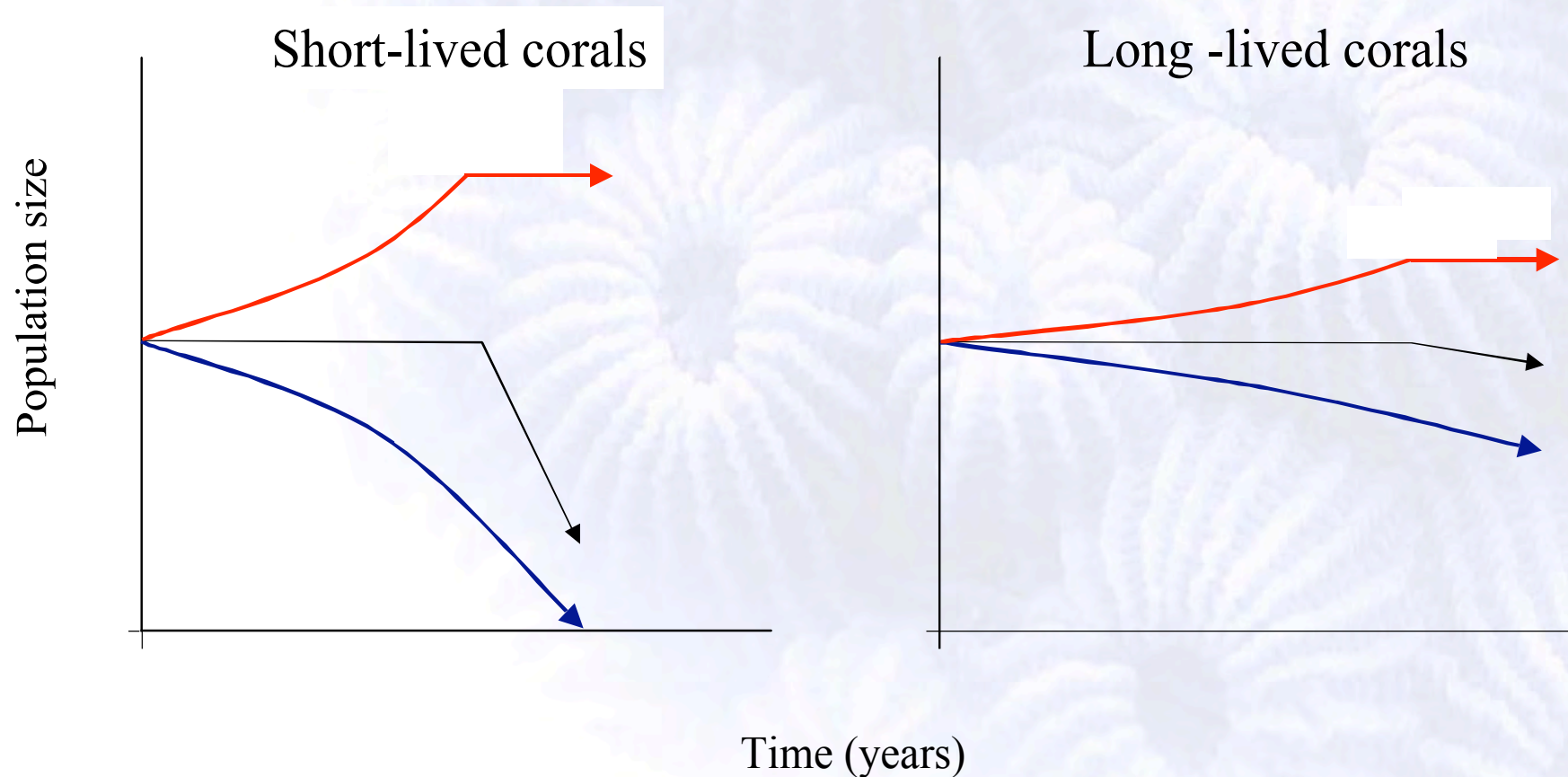
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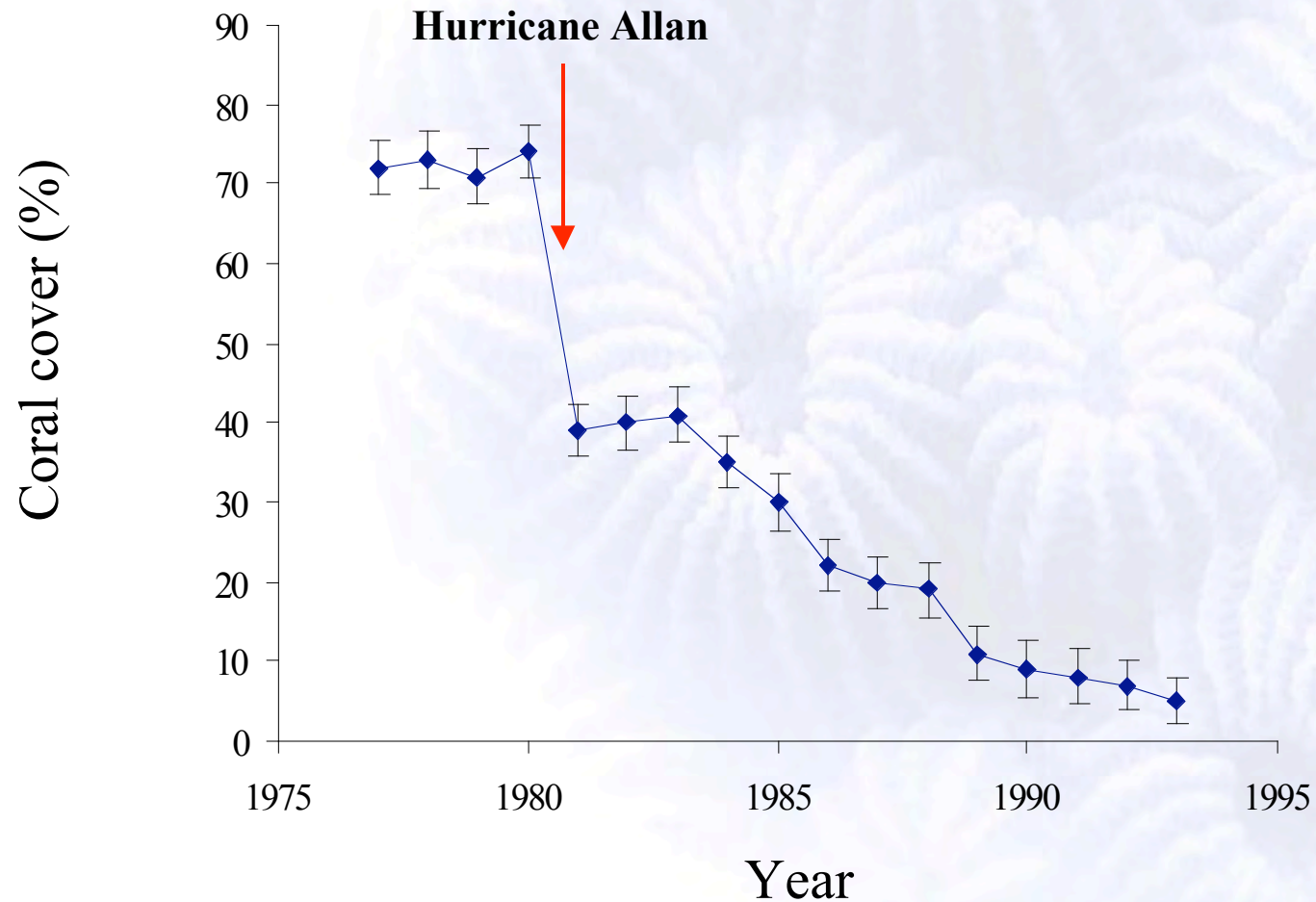
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Hughes (1994) *Science*

Can coral populations withstand one or more consecutive years of recruitment failure?

Community Matrix

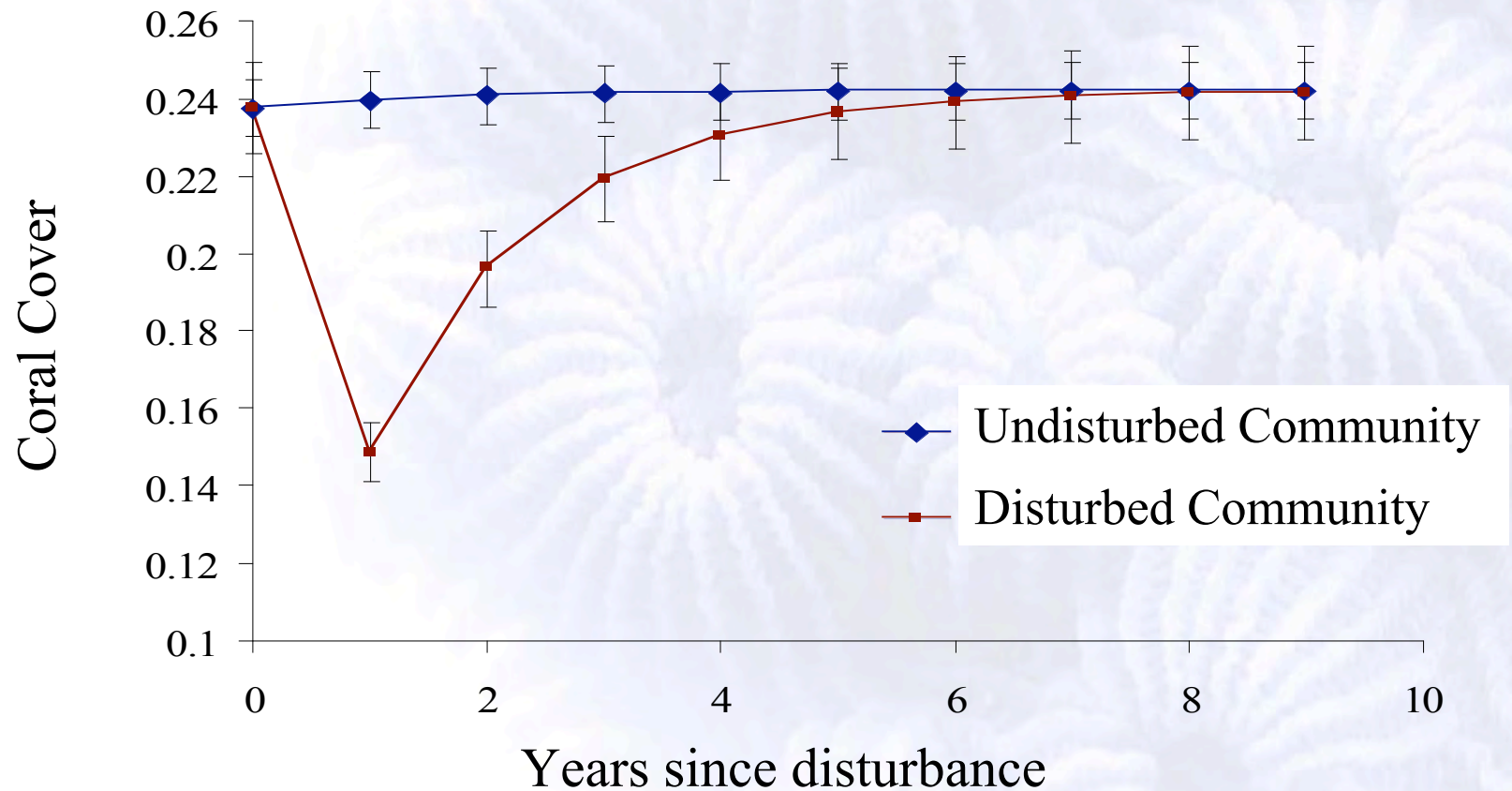
	Encrusting Acropora	Tabular Acropora	Bushy Acropora	Staghorn Acropora	Soft Coral	Algae	Massive Corals	Pocilloporid corals	Free Space
Encrusting Acropora	0.62	0.01	0.01	0.01	0.00	0.05	0.04	0.04	0.02
Tabular Acropora	0.01	0.57	0.00	0.02	0.01	0.01	0.02	0.02	0.01
Bushy Acropora	0.04	0.01	0.59	0.02	0.05	0.07	0.09	0.04	0.05
Staghorn Acropora	0.02	0.01	0.01	0.48	0.04	0.08	0.02	0.04	0.03
Soft Coral	0.00	0.01	0.00	0.00	0.27	0.00	0.00	0.00	0
Algae	0.01	0.01	0.01	0.02	0.01	0.14	0.01	0.01	0.01
Massive Corals	0.00	0.00	0.00	0.00	0.00	0.01	0.42	0.01	0.01
Pocilloporid corals	0.01	0.00	0.01	0.01	0.03	0.01	0.01	0.36	0.01
Free Space	0.30	0.40	0.37	0.44	0.59	0.64	0.39	0.48	0.86



Heron Island
Southern GBR

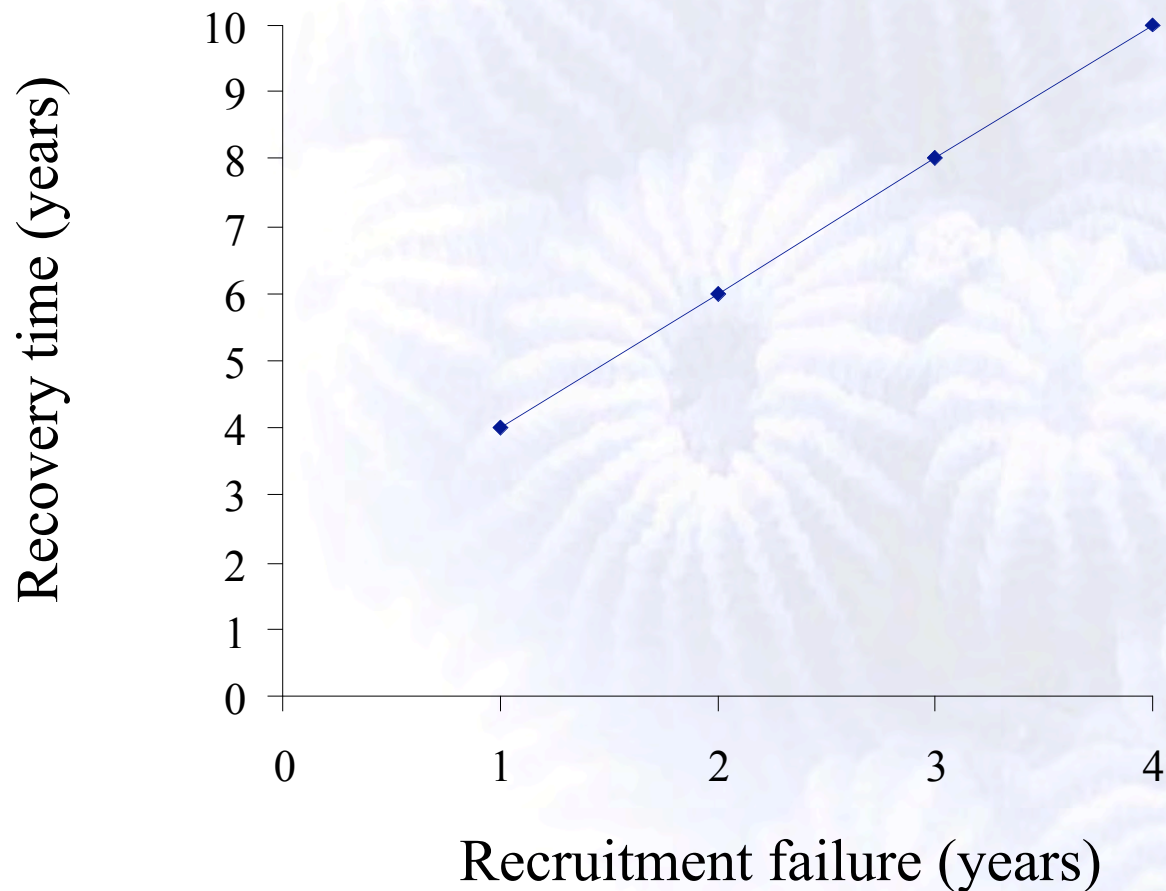
Tanner *et al.* (1994) *Ecology*

Can coral populations withstand one or more consecutive years of recruitment failure?



Based on community matrix in Tanner *et al.* 1994

Can coral populations withstand one or more consecutive years of recruitment failure?



Based on community matrix in Tanner *et al.* 1994

How do these results relate to inshore reefs?

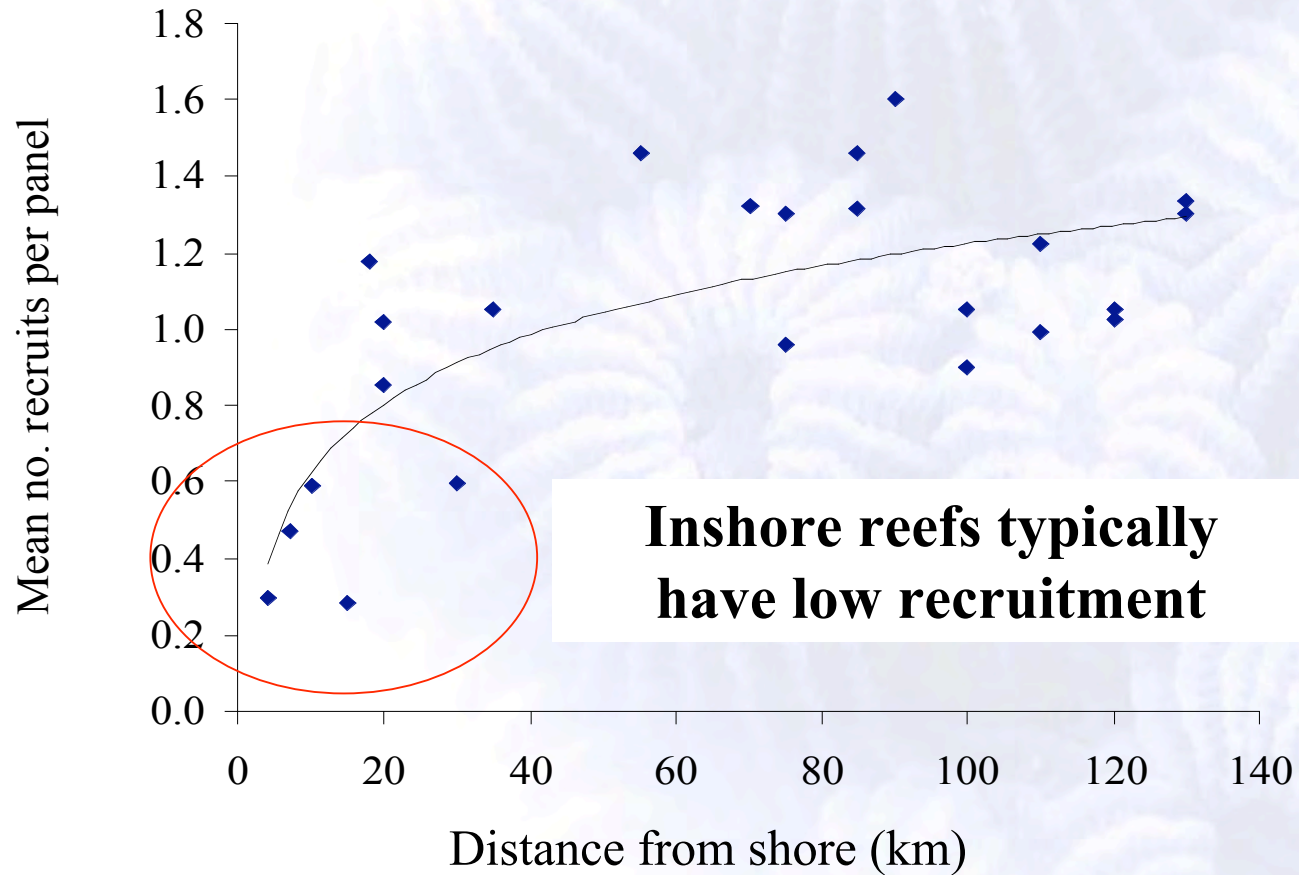


Offshore GBR



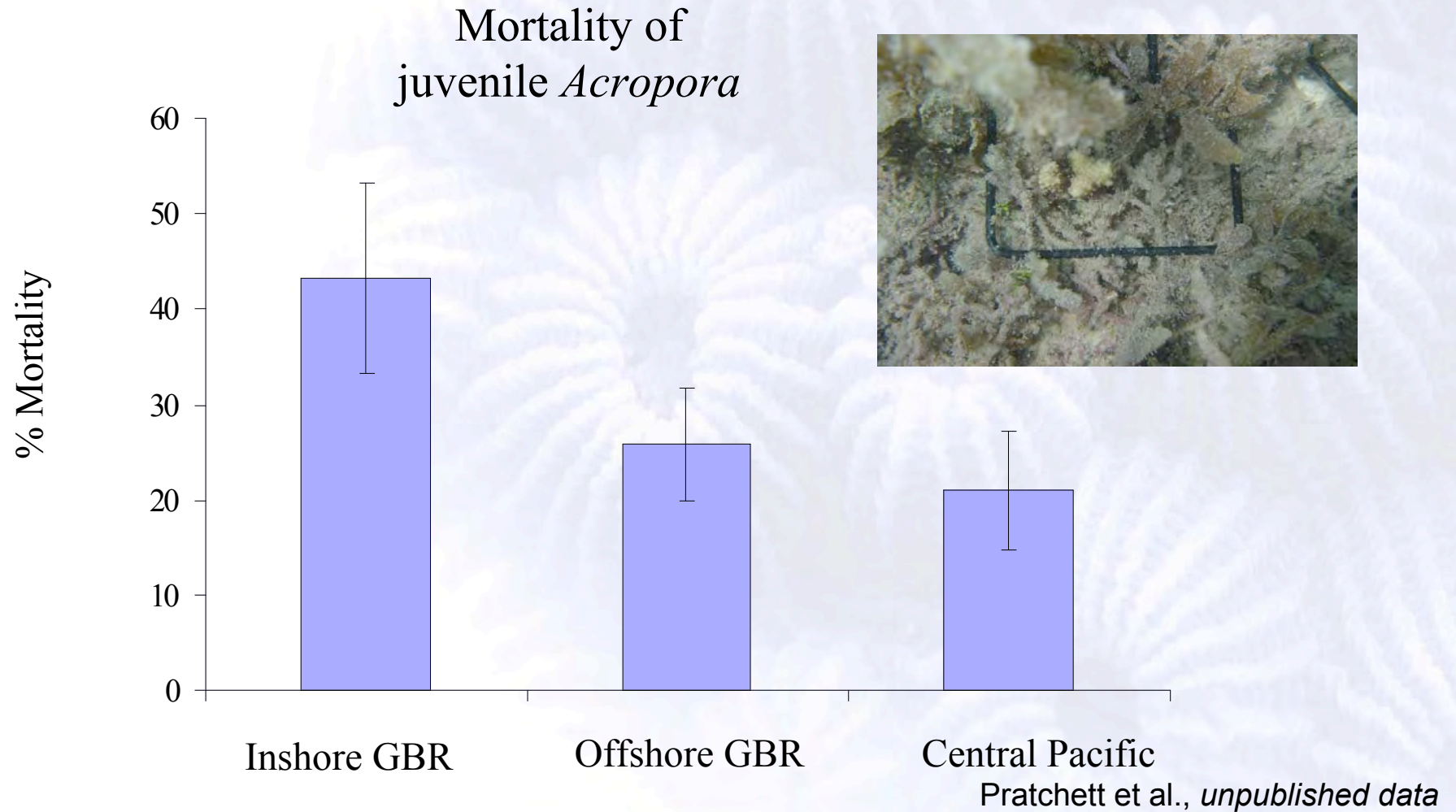
Inshore GBR

How do these results relate to inshore reefs?



Baird & Pratchett, *unpublished data*

How do these results relate to inshore reefs?





Summary

- Coral populations are subject to high mortality and very reliant on recruitment to replenish adult populations
- Life-history strategies vary greatly among coral species, and corals with high turnover rates are much more reliant on population replenishment
- Corals represent “open” populations where the source of new recruits is often unknown. There is however, increasing evidence of strong stock-recruitment relationships at reef scales
- There are two critical stages in the life-cycle of corals that are susceptible to disturbance:
i) the planktonic phase, and ii) the early post-settlement phase. Potential impacts on both these life stages must be considered

Question time

Simpson – When you talk about processes that happen at ‘reef-scales’, what areas are you really taking about?	Pratchett – I mean at a scale of 10s of kilometres – most reefs I work on are around 20km long: obviously the inshore v offshore scale is larger than that.
Forde – Are the inshore reefs as extensive as the offshore systems you deal with?	Pratchett – Yes – while they are not as large, they do represent a wide range of reef types