

Modelling the occurrence of postflexion stages of a marine estuarine-dependent fish in temperate South African estuaries

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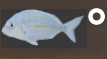
Motivation

Estuaries

 Nurseries for marine fish

 Growth and development

 High variability

 °C, sal, NTU, pH

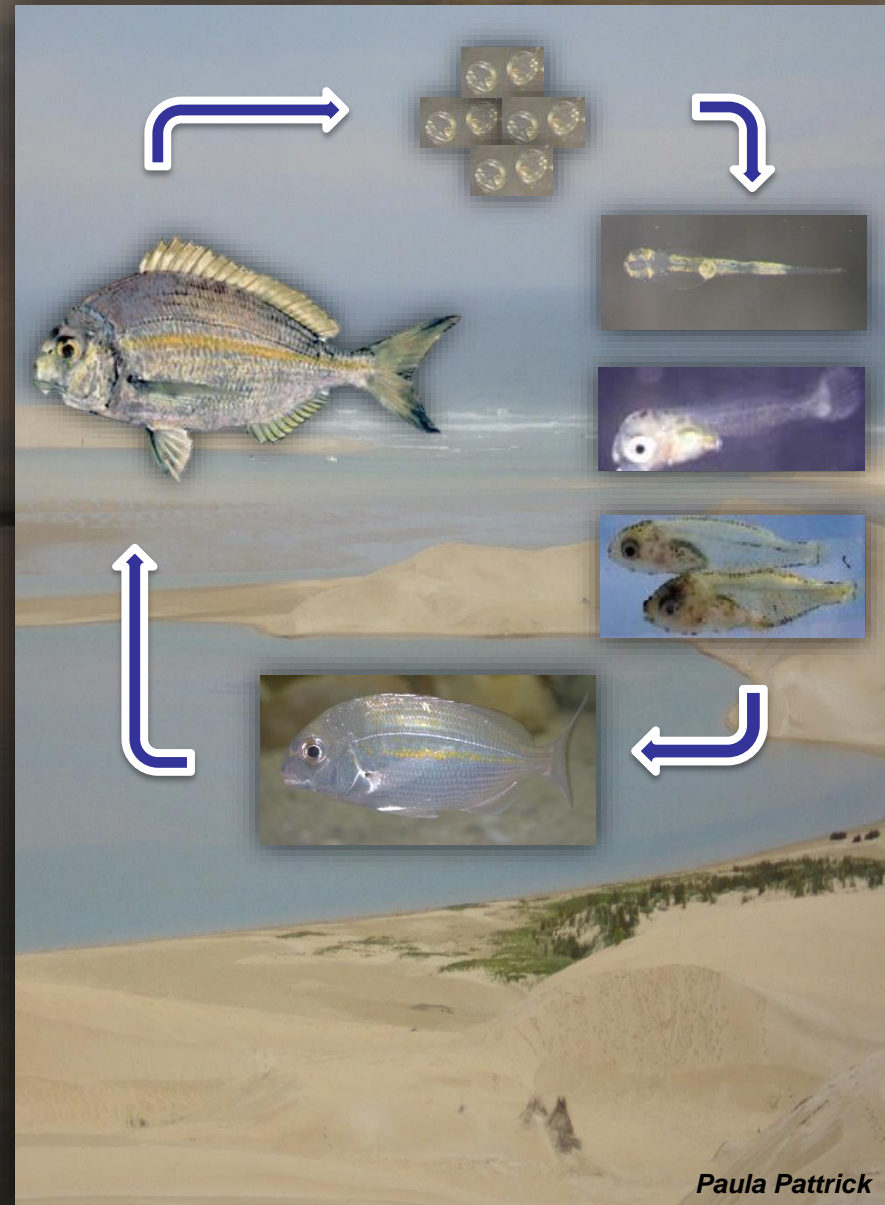
 Environmental change

 Natural


 Anthropogenic

Recruitment

 Lifecycle populations

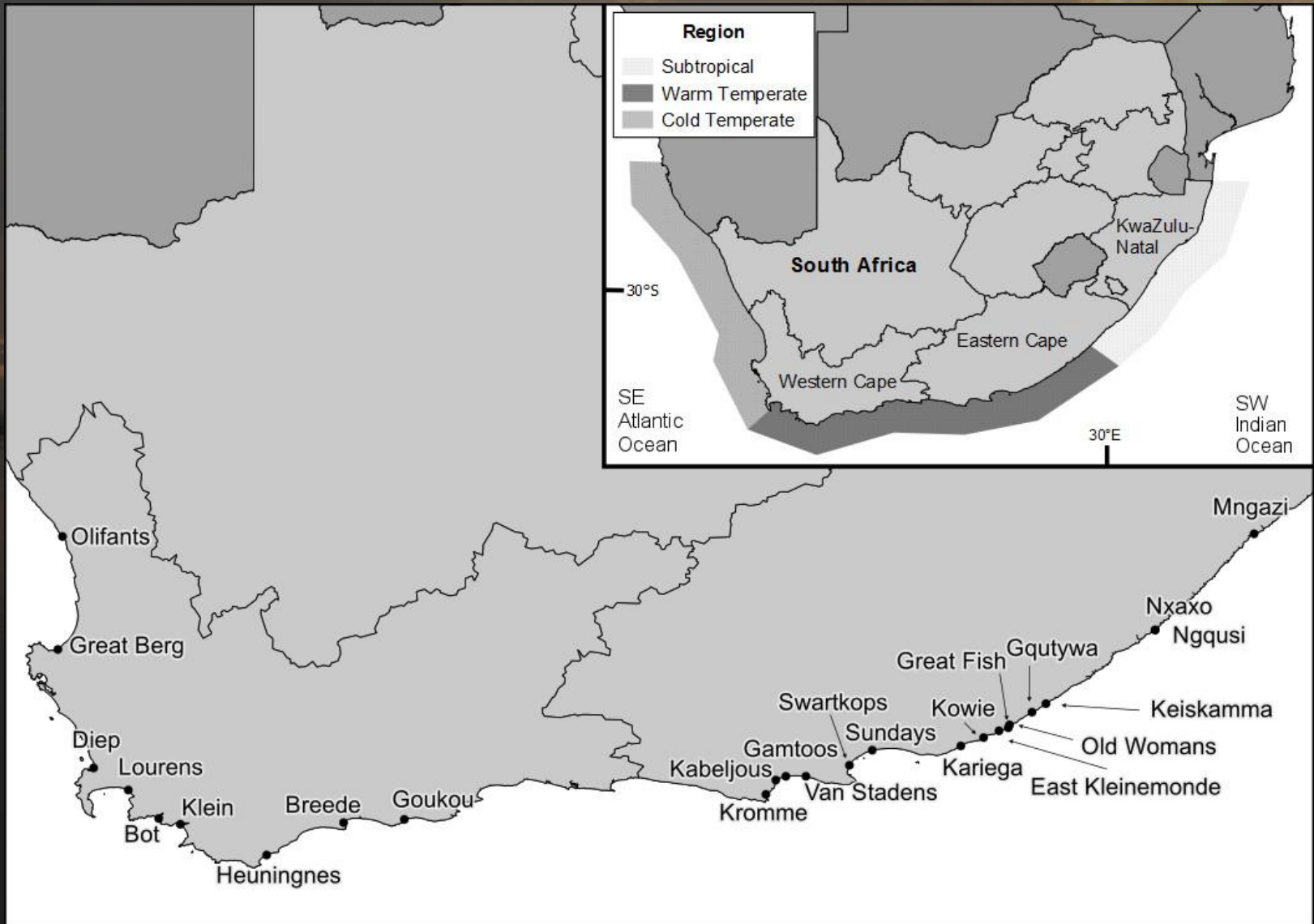


My question

 How is *R. holubi* recruitment related to environmental variables?



Study Areas



Methodology

Estuarine Occurrence

 WP-2 Plankton net tows

Tidal movement

 Fyke nets

Temperature, salinity, pH, turbidity

 YSI 6600-V2 multiprobe

 Secchi disk




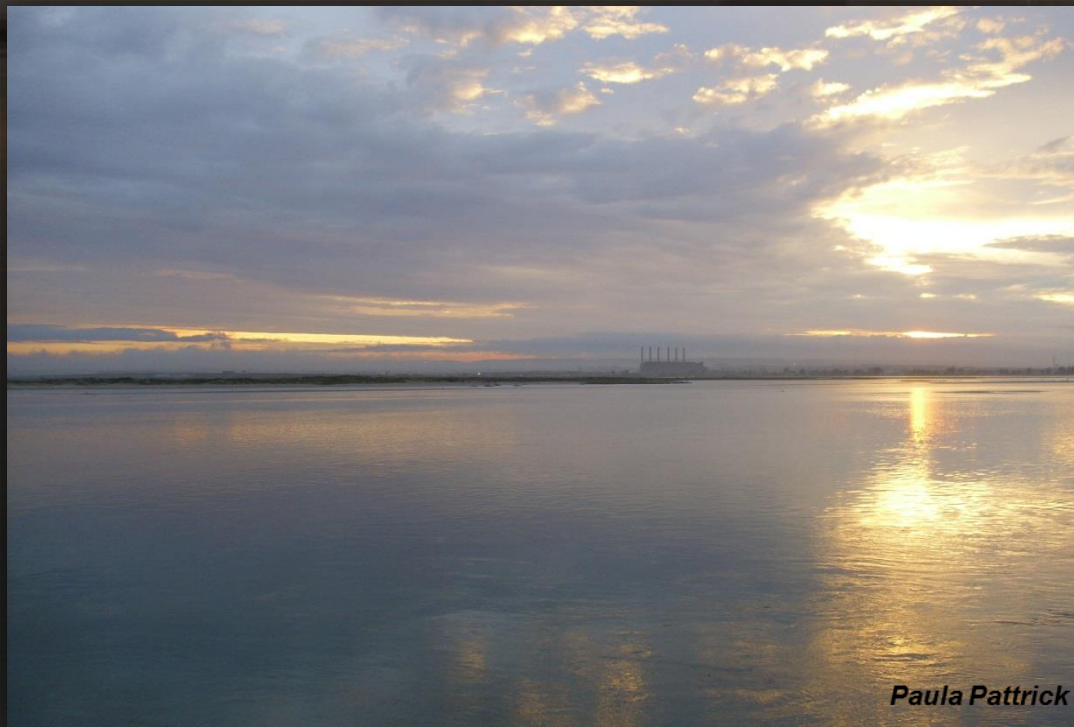
Analyses

 **Estuarine Occurrence**

 **Generalized linear mixed models (GLMMS)**

 **Tidal movement**

 **Partial least-squares regression models**



Environmental drivers of larval occurrence

Region	Factors	Δ AIC	Slope	Z	p
Warm	↓Sal		-0,13	-6,86	<0,005
Temperate	↓Clar		-24,64	-5,05	<0,005
	Sal × Clar	0	2,08	5,38	<0,005
	↓Sal	1,2	-0,07	-4,17	<0,005
Boundary	↑Sal	0	0,25	2,38	0,02
	↓Clar	0,12	-2,68	-0,51	0,61
	↓Temp	1,39	-0,24	-1,92	0,06

Environmental drivers of movement

Larvae					
	Summer	Autumn	Winter	Spring	All
Temperature	x	x	x	✓ (+)	x
pH	x	x	x	x	x
Salinity	x	x	✓ (-)	✓ (-)	✓ (-)
Turbidity	✓ (+)	✓ (+)	x	x	✓ (-)
Juvenile					
	Summer	Autumn	Winter	Spring	All
Temperature	✓ (+)	✓ (+)	x	x	✓ (+)
pH	✓ (-)	x	x	x	x
Salinity	✓ (-)	✓ (-)	✓ (-)	x	✓ (-)
Turbidity	✓ (+)	✓ (+)	✓ (+)	x	✓ (+)

Importance of environmental factors

 Estuarine Occurrence

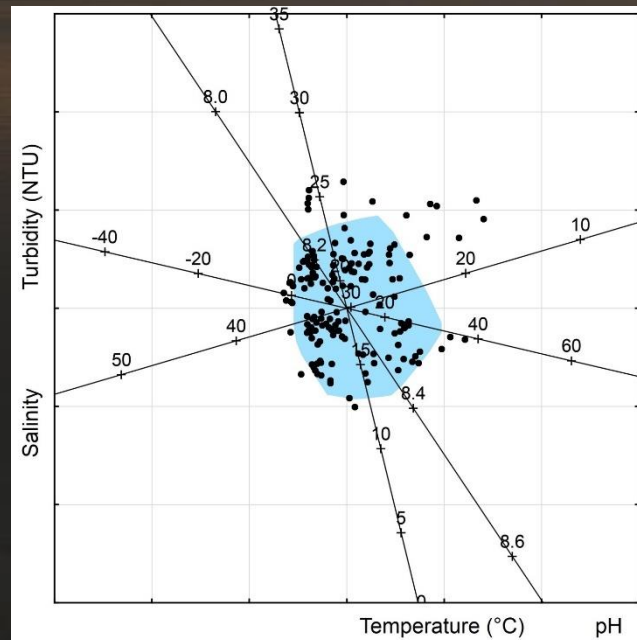
 Generalized linear mixed models (GLMMS)

 Salinity > turbidity > temperature

 Tidal Movement

 Partial least-squares regression

 Salinity > turbidity > temperature > pH



Conclusion

 Recruitment influenced by

 ↓ Salinity

 ↑ Turbidity


 ↑ Temperature


 Consequences

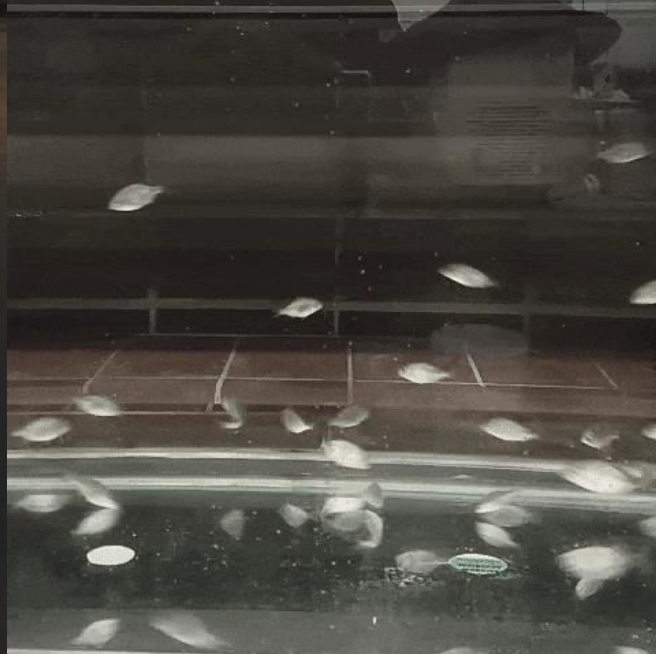
 Environmental change potentially affects recruitment

 Populations could be affected by anthropogenic drivers

Future work

 Assess *R. holubi* *in vitro* and *in situ* growth and development in relation to environmental variables

 Assess *R. holubi* physiological tolerance to environmental change



Acknowledgements

A photograph of a fish, likely a species of surgeon wrasse, resting on a sandy seabed. The fish is positioned horizontally, facing left. The background shows the texture of the sand and some darker, possibly rocky or coral-like structures.

Acknowledgements:

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Pictures

http://www.easterncapesclubdiving.co.za/index.php?page_name=specie&specie_id=65

<http://www.fisheggsandlarvae.com/LIID6%20Rhabdosargus%20holubi.htm>

http://www.oceanclimatechange.org.au/content/images/uploads/tropical_fish_fig1.jpg

<http://www.iucnredlist.org/details/173370/0>

<http://www.ispot.org.za/node/147955>