

# Restocking and atypical climatic conditions markedly influence the abundance of an estuarine resident penaeid

## To stock or not: the estuarine enhancement paradox

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### INTRODUCTION

- Estuaries are highly productive and dynamic environments that are heavily exploited by recreational fishers
- Estuarine-resident species are highly susceptible to positive and negative influences, as stocks not replenished from marine waters
- Four year restocking program for *Metapenaeus dalli* initiated to restore population and reinvigorate recreational fishery

### METHODS

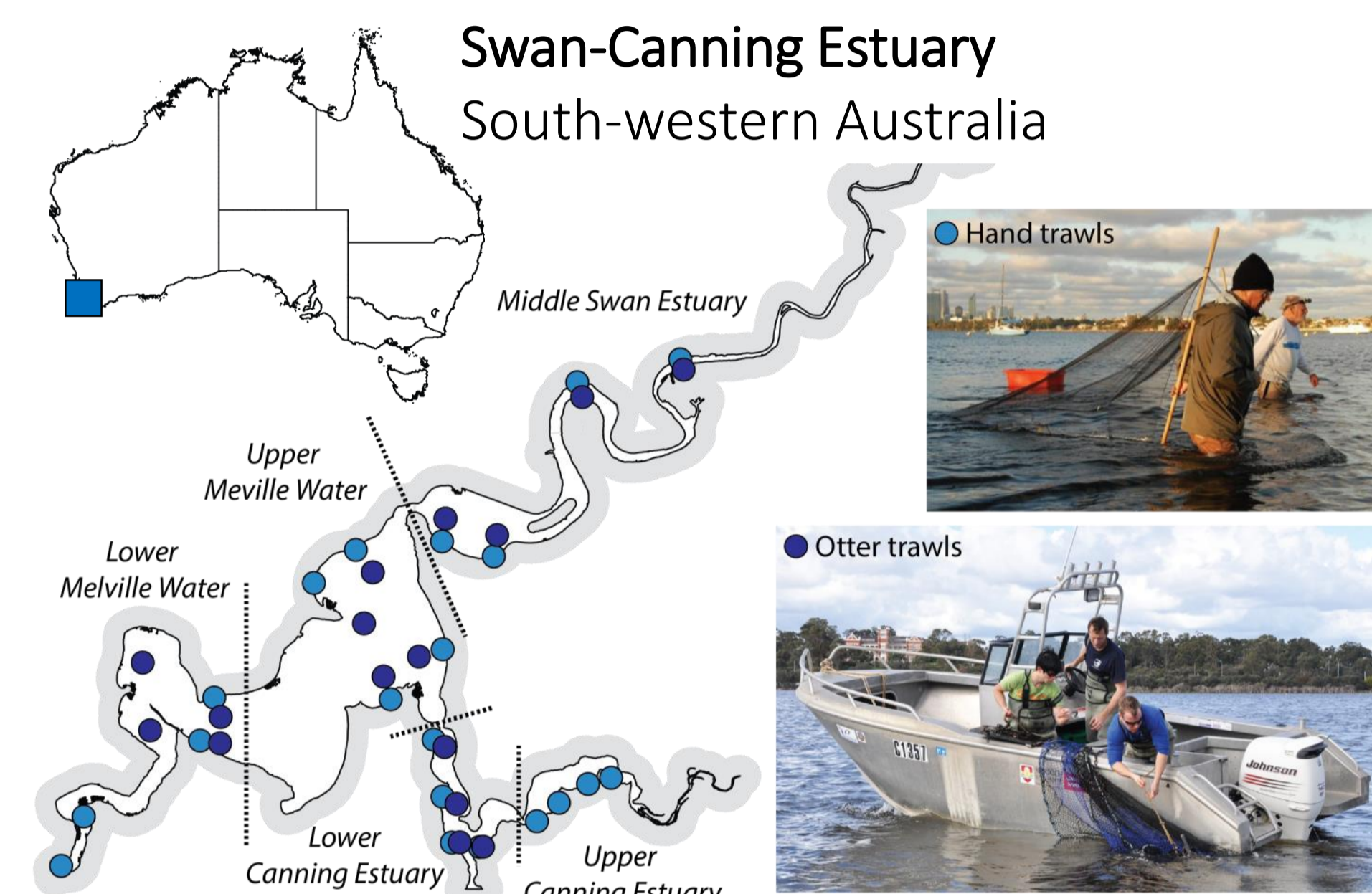
- 4.5 million post-larval *M. dalli* released between 2012/13 & 2015/16
- Monthly monitoring conducted during breeding season (Oct – March) in each of five years between 2013/14 & 2017/18

### RESULTS

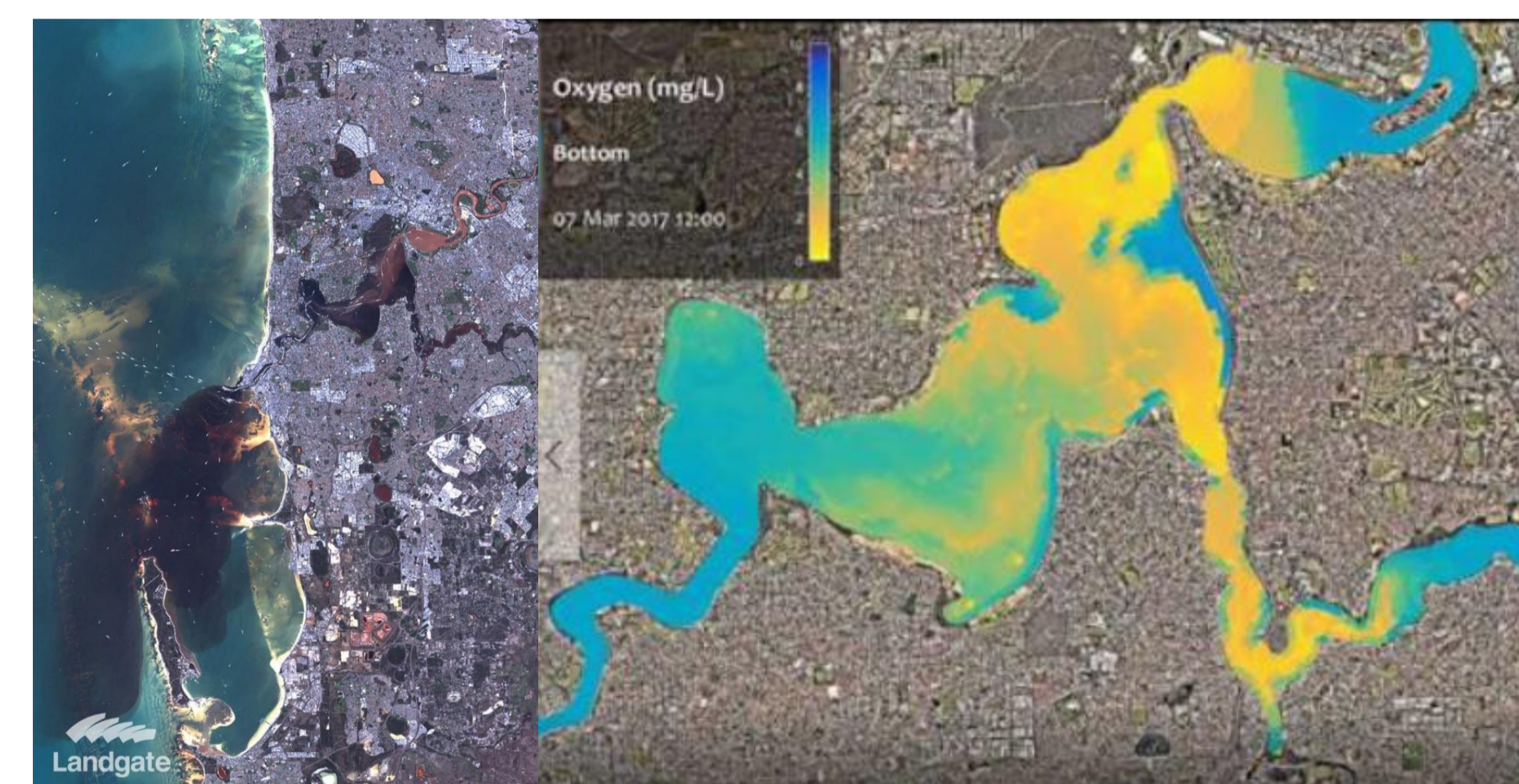
- First three years 
  - Stable salinities, warm water temperatures and high oxygen levels
  - Abundance ↑ by 58 & 109% and egg production ↑ 1,912 & 124% in nearshore and offshore waters, respectively, in 2015/16
- Last two years 
  - Cool winter of 2016 and localized hypoxia, followed by atypical heavy summer rainfall in 2017 and widespread hypoxia
  - 90% ↓ in abundance and 85% ↓ in egg production in 2016/17
  - In 2017/18 *M. dalli* population only 4% of 2012/13 levels
  - Abundance of the co-occurring & marine spawning *Penaeus latisulcatus* remains relatively unchanged over the five years

### CONCLUSION

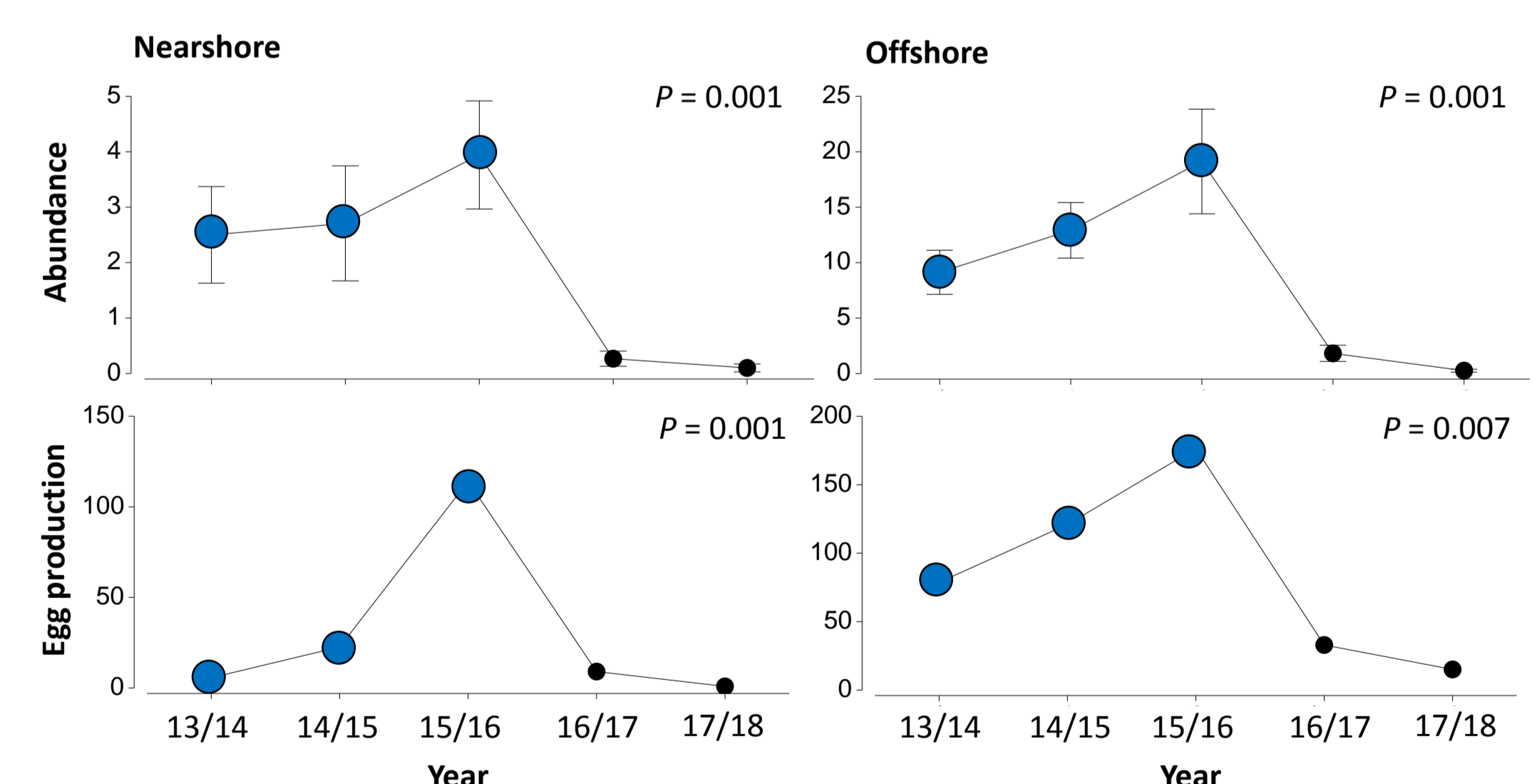
- Trade off for aquaculture-based enhancement of estuarine-resident species, *i.e.* estuarine enhancement paradox
- Remaining in estuary facilitates ↑ catches and egg production ✓
- However, population highly susceptible to deleterious events ✗



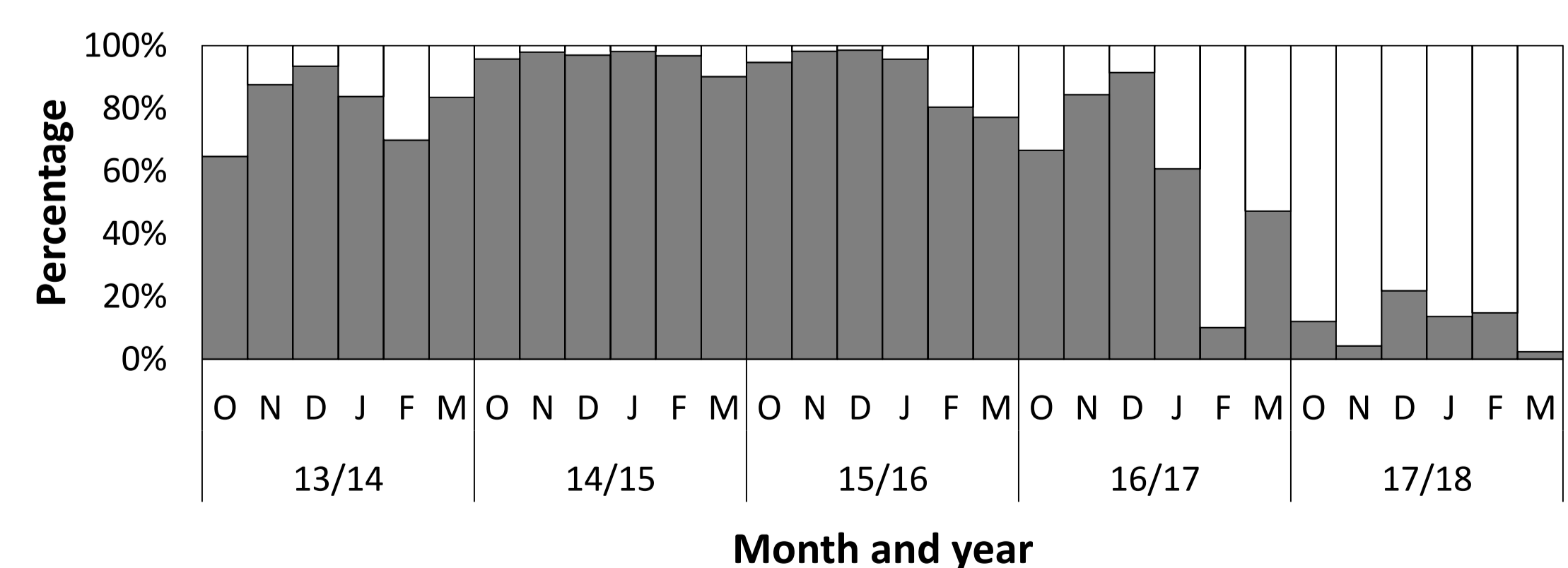
Study location and sampling regime



Hypoxic conditions following the atypical rainfall in Feb 2017. Fig. provided by M. Hipsey, University of Western Australia



Mean *M. dalli* abundance ( $\pm$  95% CI) & total egg prod. 500 m<sup>2</sup>. Blue dots denote years where post-larval stocking occurred



Contribution of *M. dalli* ■ & *P. latisulcatus* □ to all catches

### ACKNOWLEDGEMENTS



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