

Effect of environmental changes on Shark Bay invertebrate fisheries

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Shark Bay Workshop

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Australian Government

Fisheries Research and
Development Corporation

National Research
FLAGSHIPS

Wealth from Oceans



CSIRO



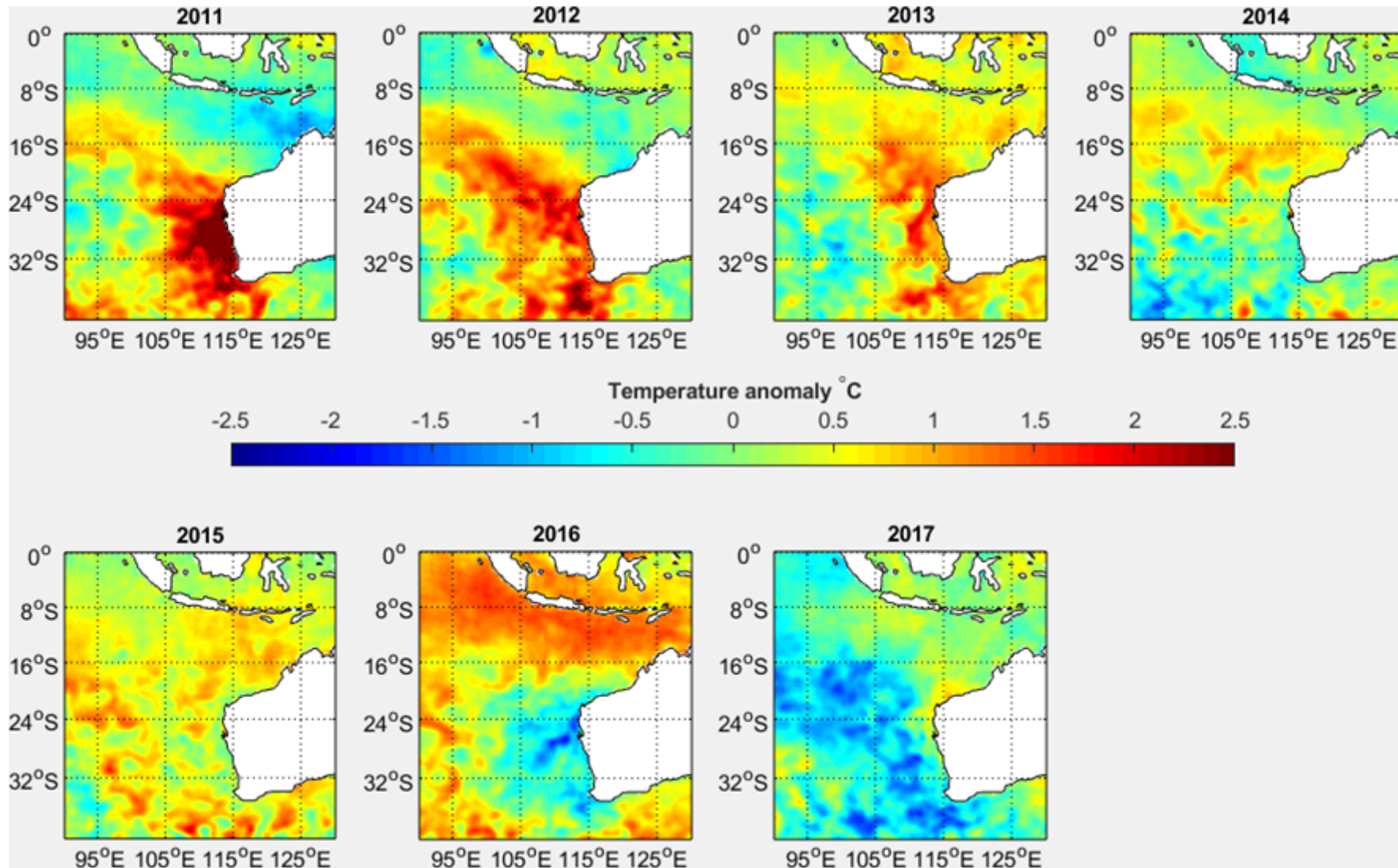
Department of
Primary Industries and
Regional Development



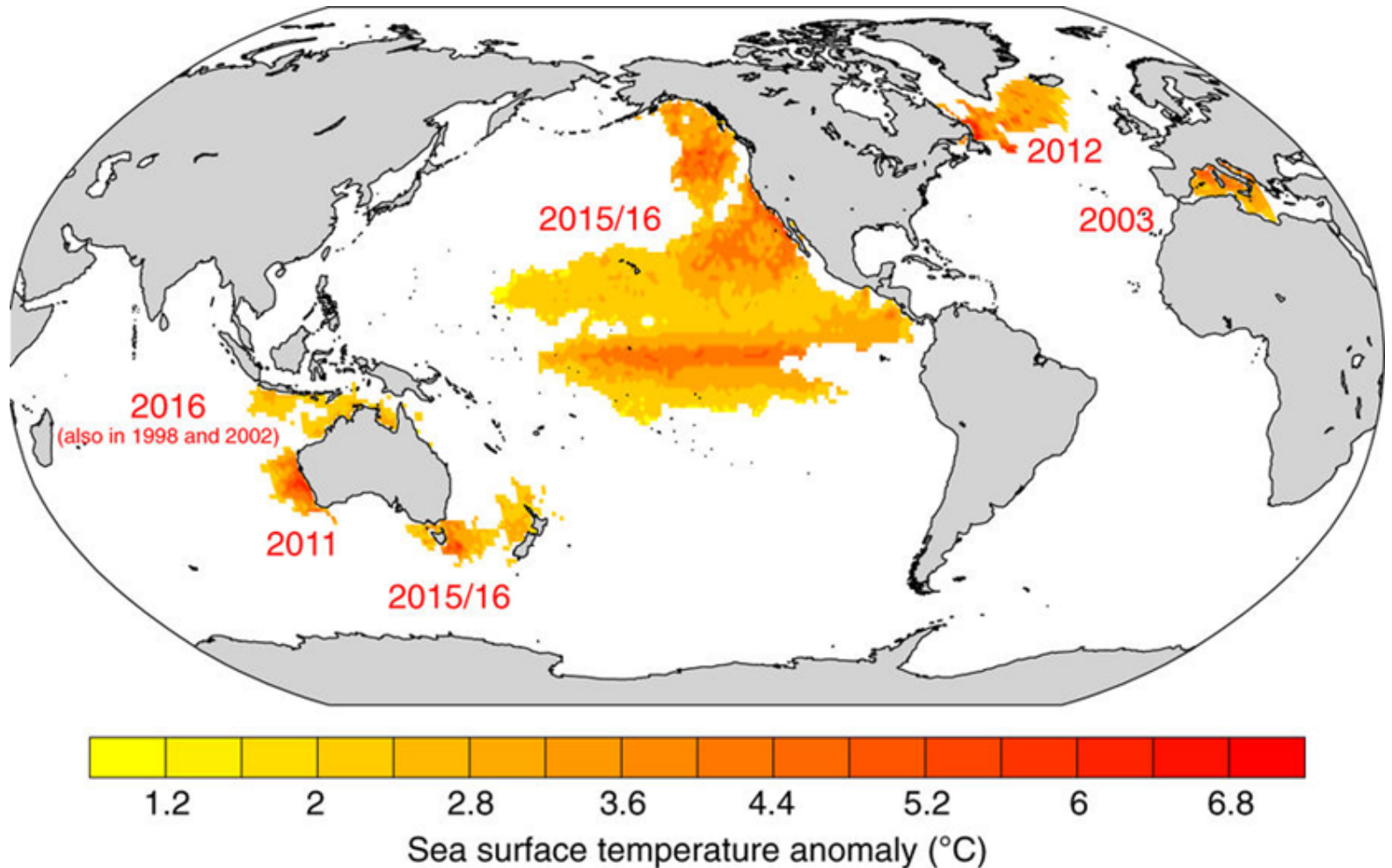
Overview

- Environmental factors affecting fisheries
- Marine heatwave 2010/11
- Key invertebrate fisheries
 - Scallops
 - Blue swimmer crabs
 - Prawns
- Annual surveys
- Future research

February-March temperature anomalies



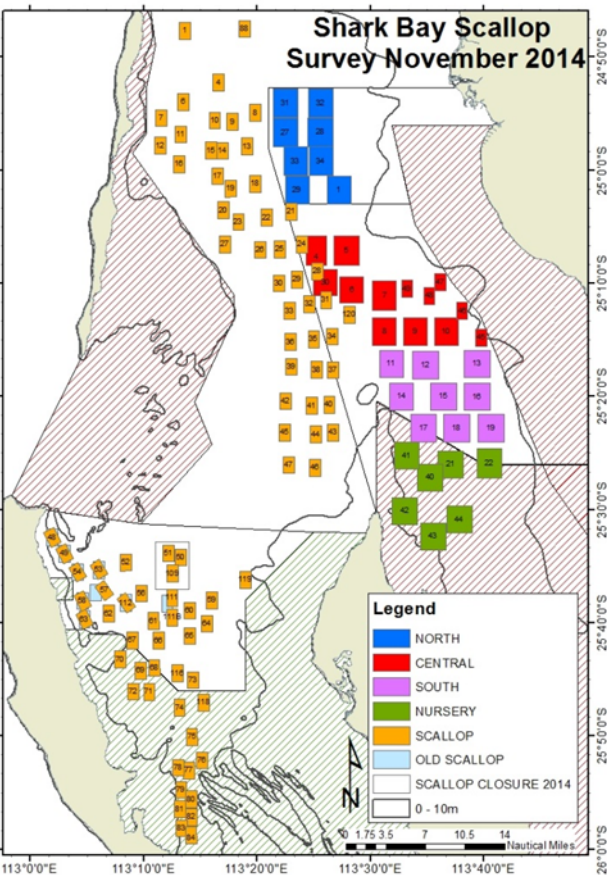
Marine Heatwaves



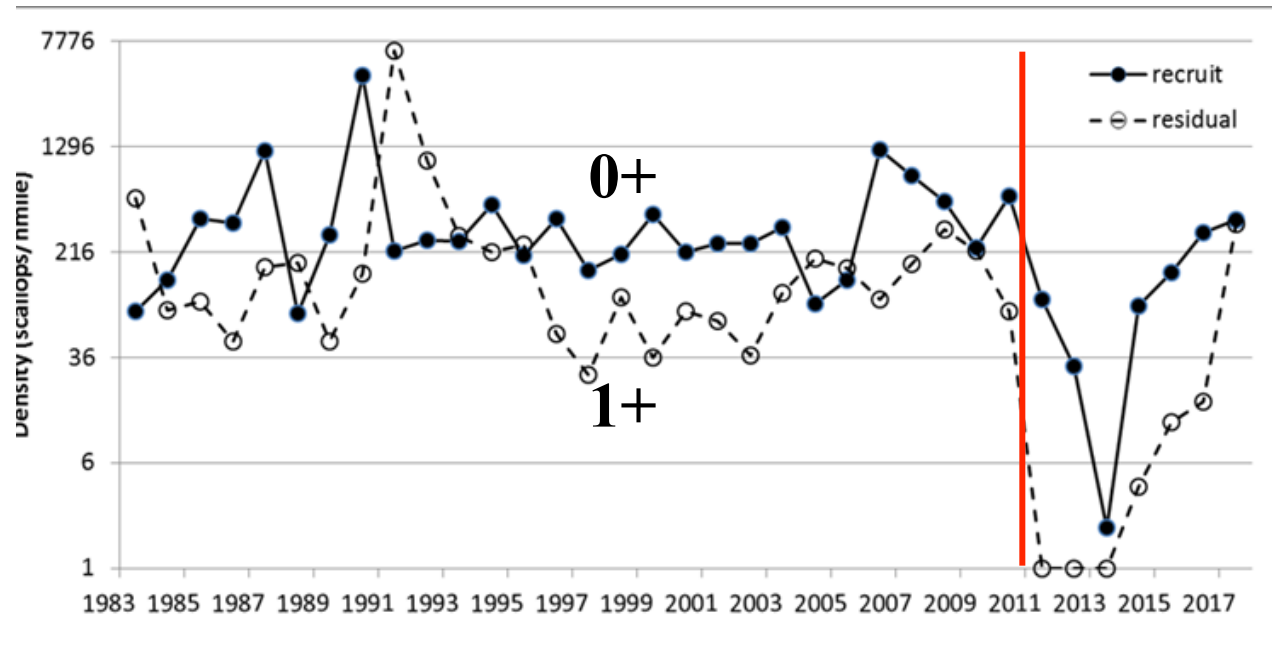
(Frölicher and Laufkötter, 2018)

Shark Bay scallop recruit survey

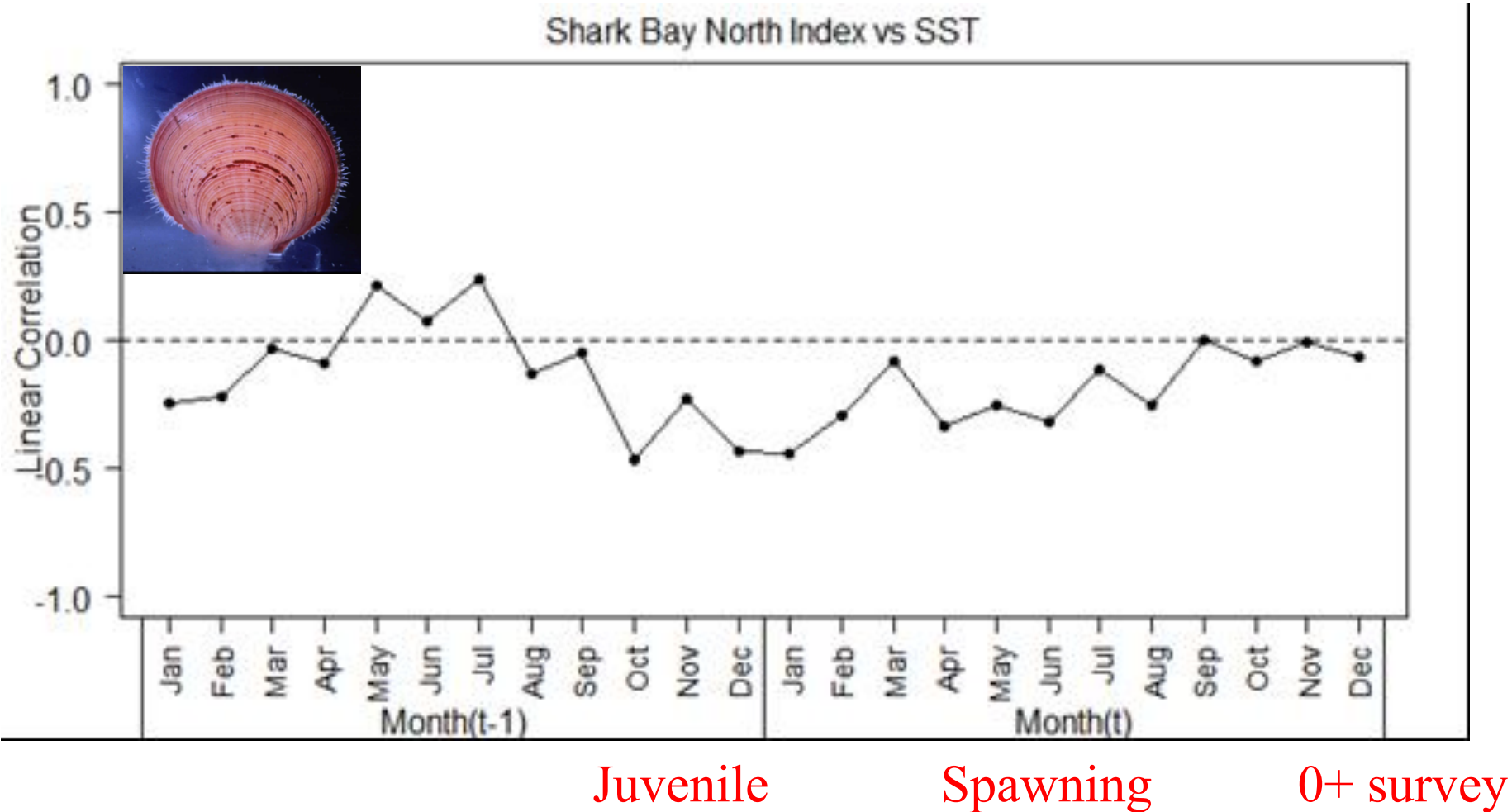
- Recruits (0+) reliable catch predictor 4-6 months ahead
- Poor recruitment 2011-2013 (warm SST)
- Poor spawning stock 2012-14 (fishery closed)



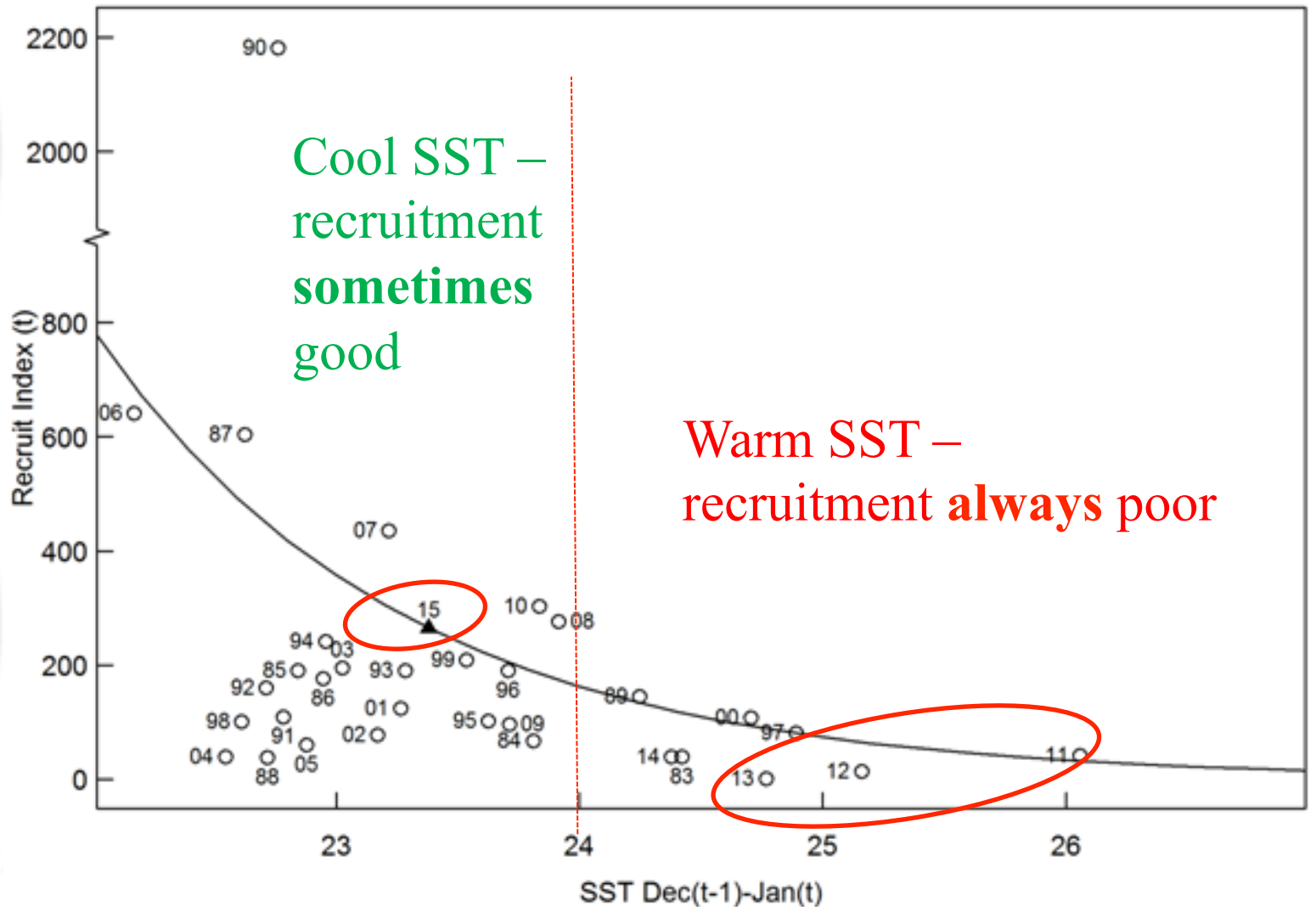
Northern Shark Bay stock



Scallop recruit v. lagged monthly SST: Northern Shark Bay

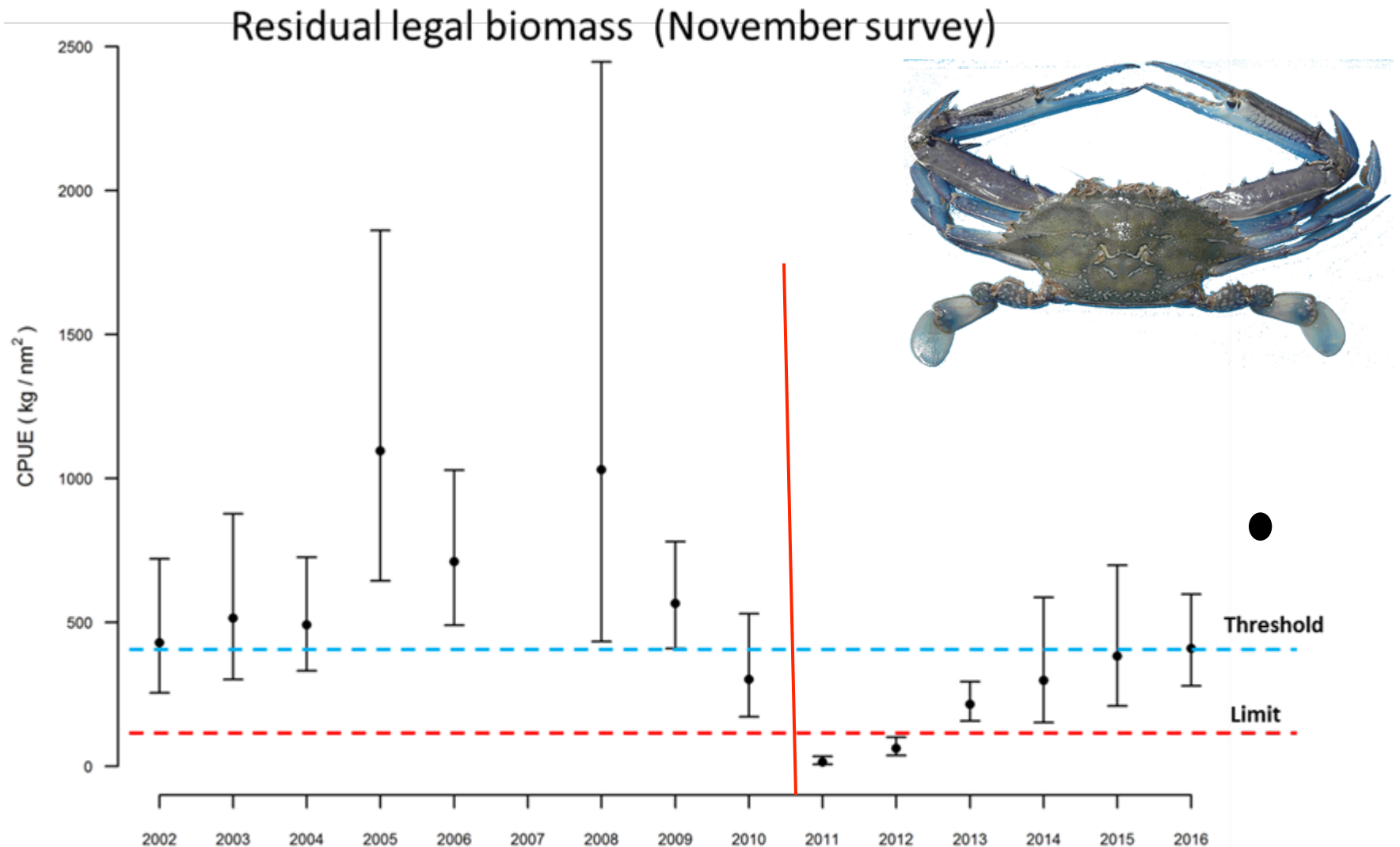


Shark Bay scallops pre-recruit (0+) v. SST

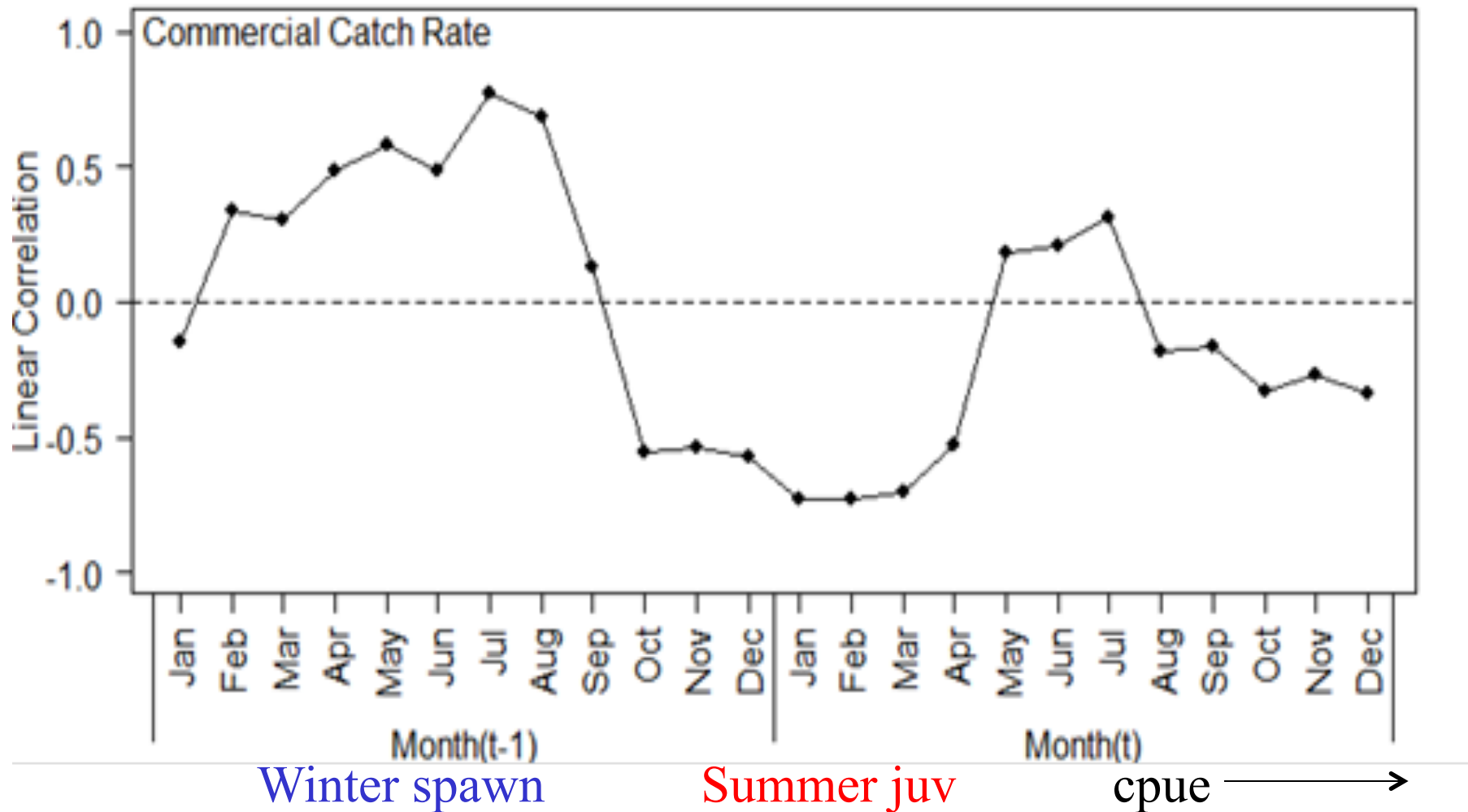


Shark Bay blue swimmer crab

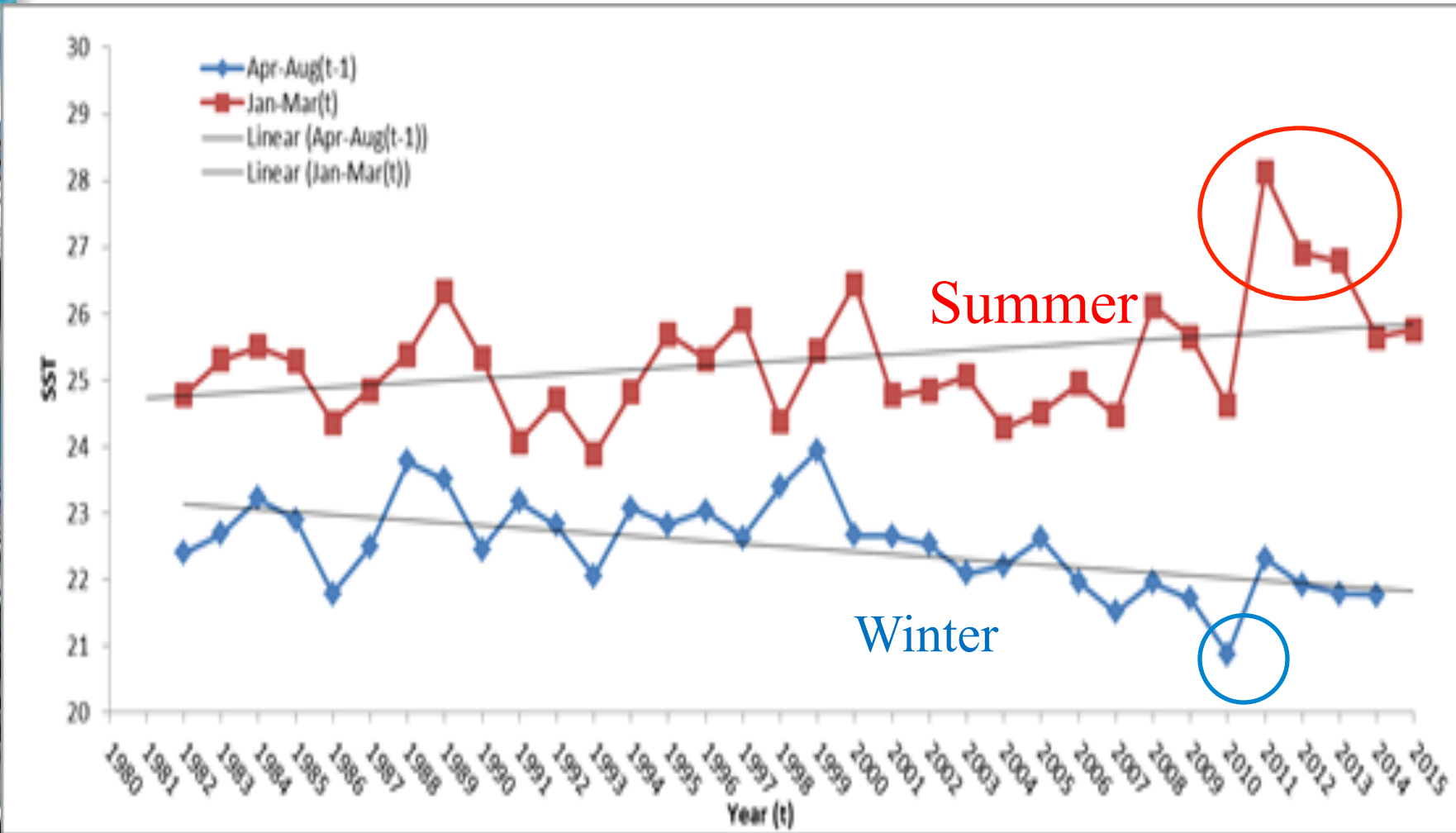
- Fishery shut for 18 months



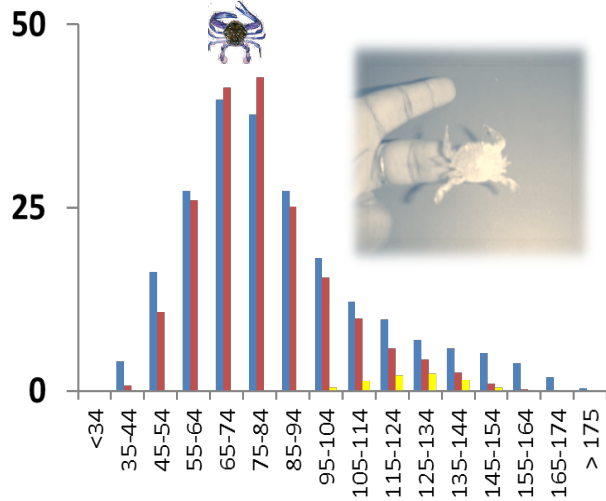
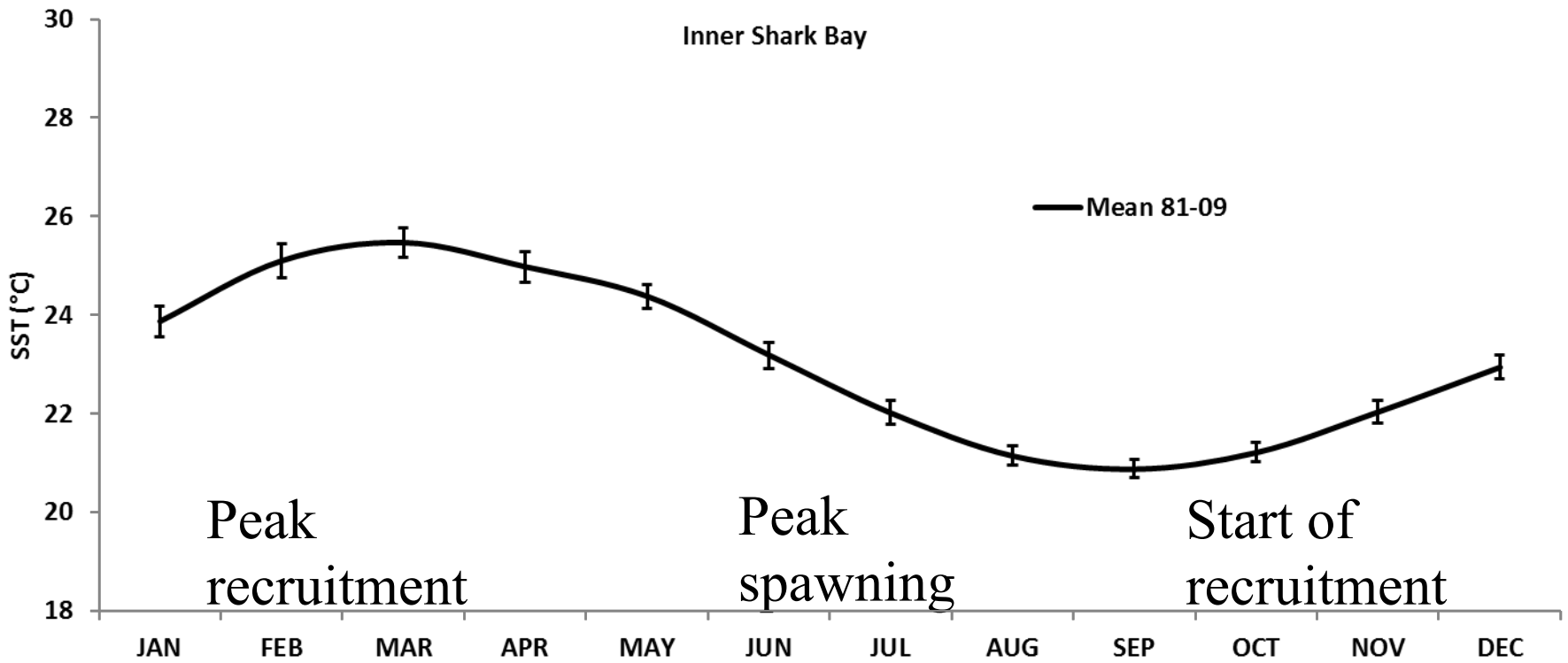
Shark Bay crab cpue v. lagged SST



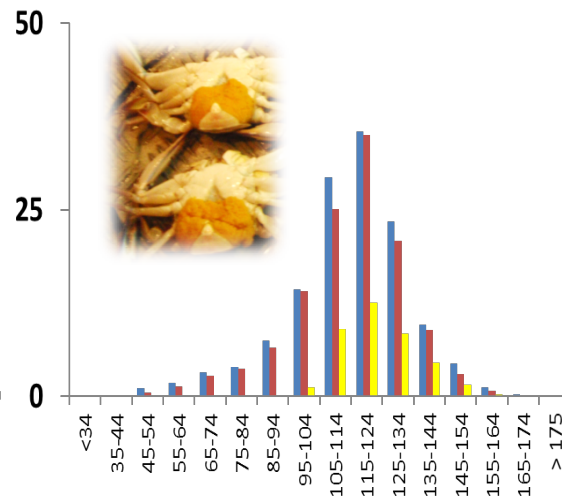
Shark Bay SST trends



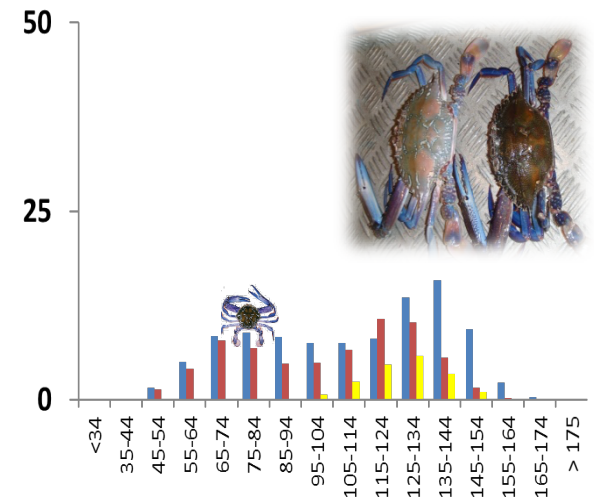
Inner Shark Bay



FEB Survey



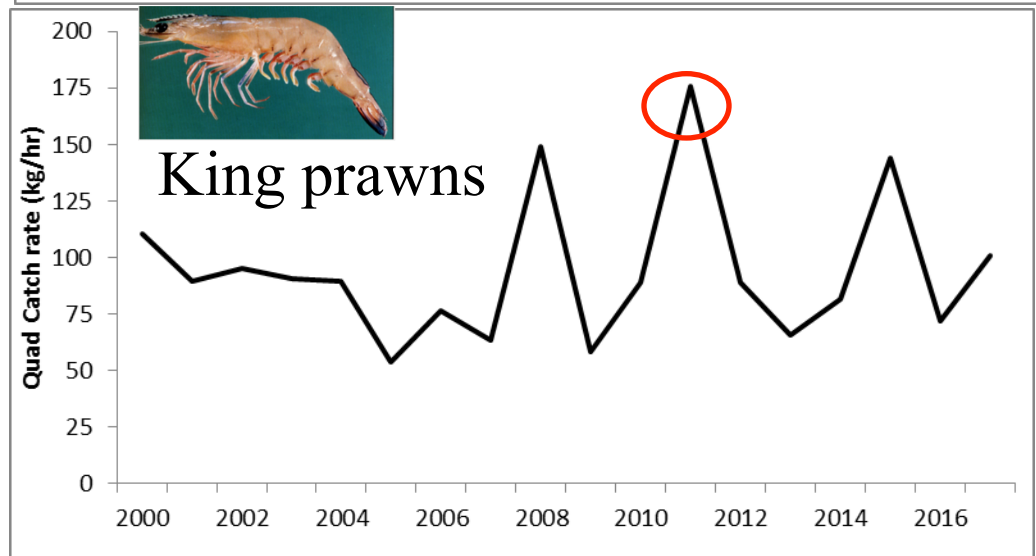
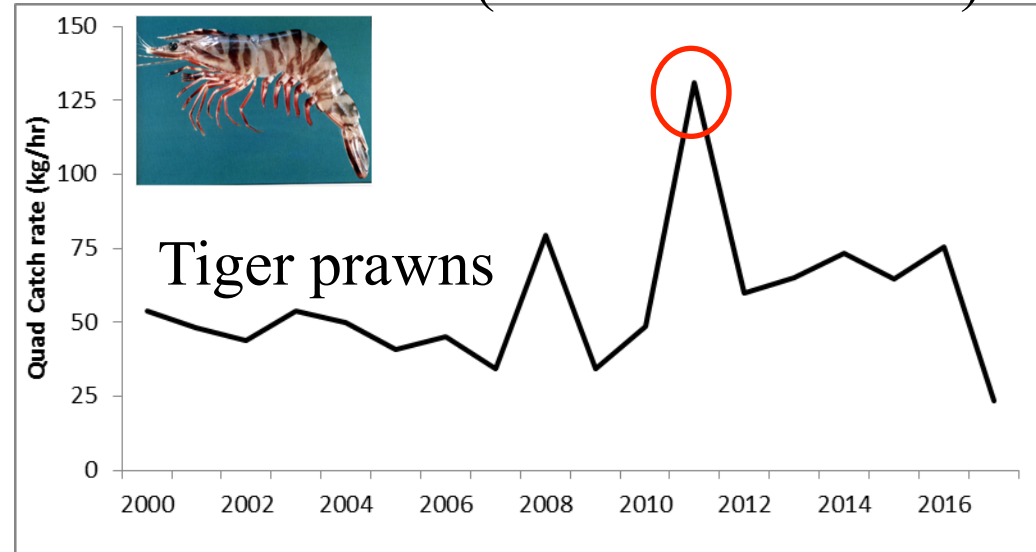
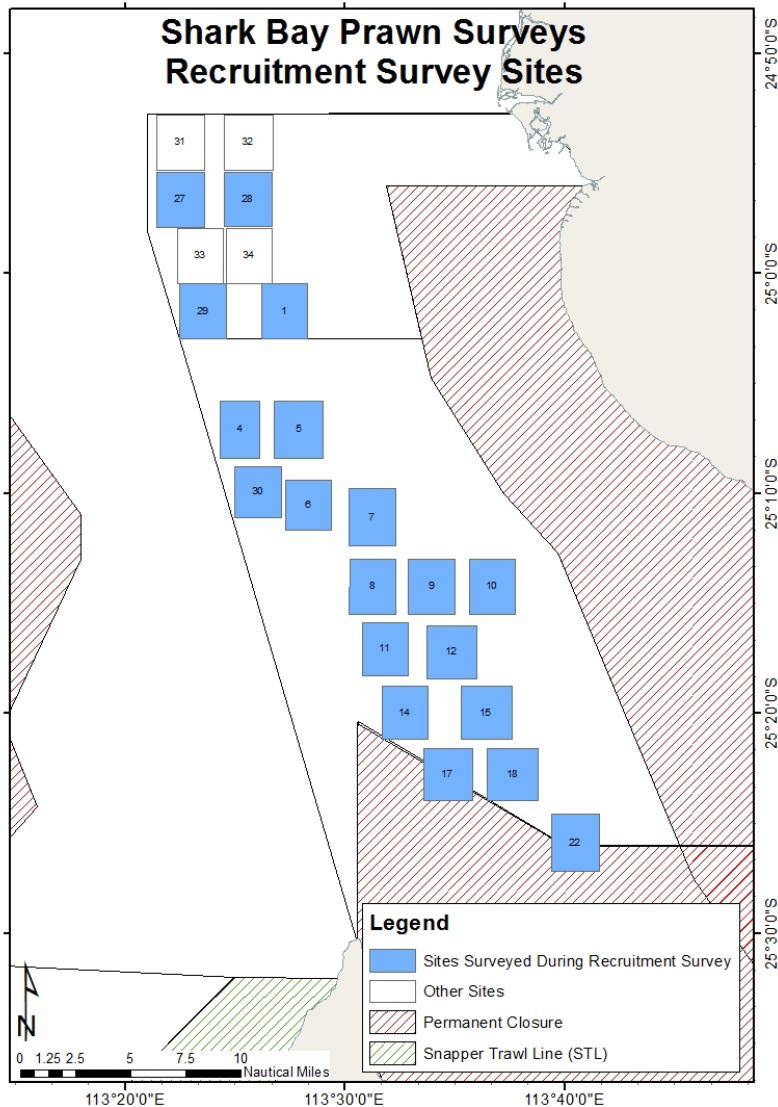
JUN Survey



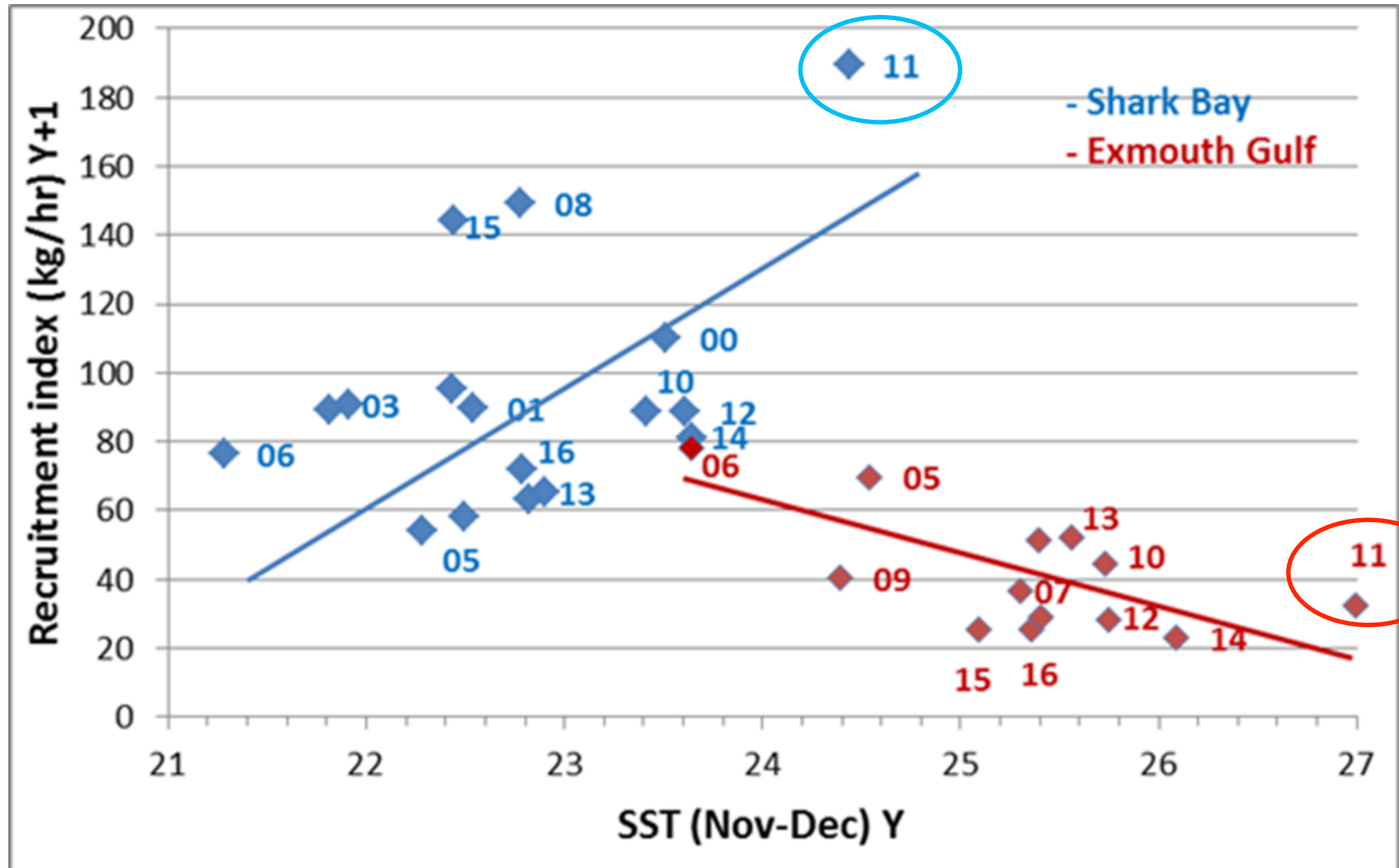
NOV Survey

Shark Bay prawn recruitment survey

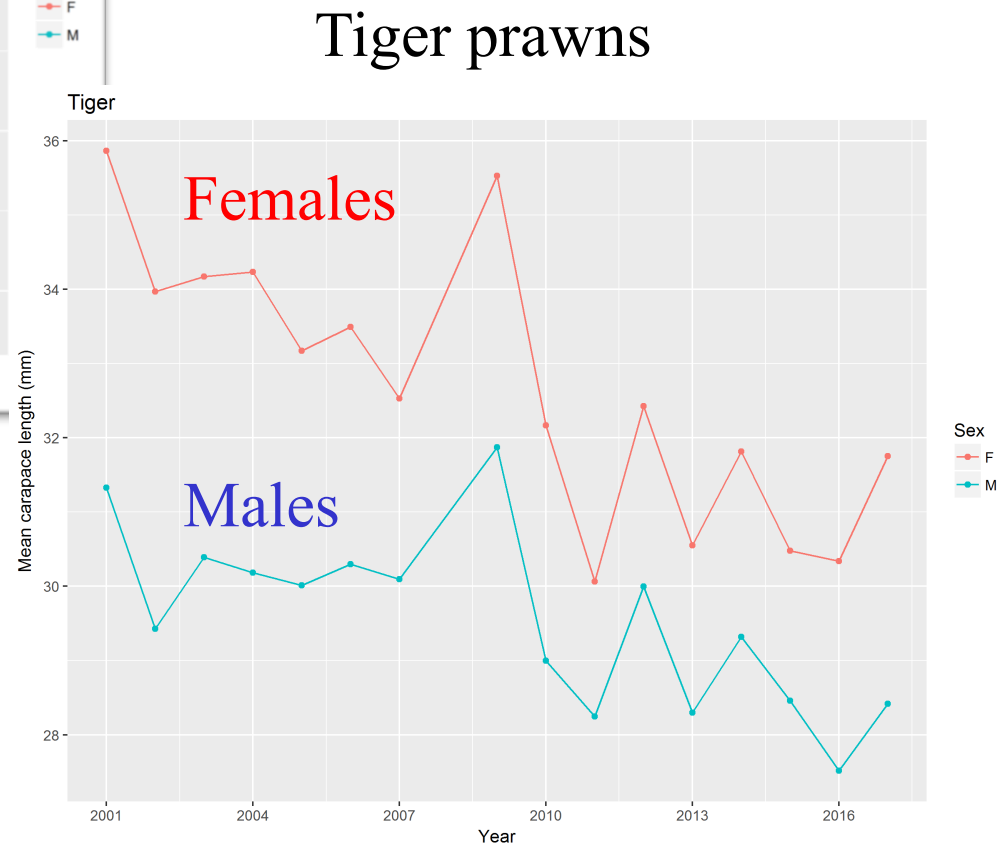
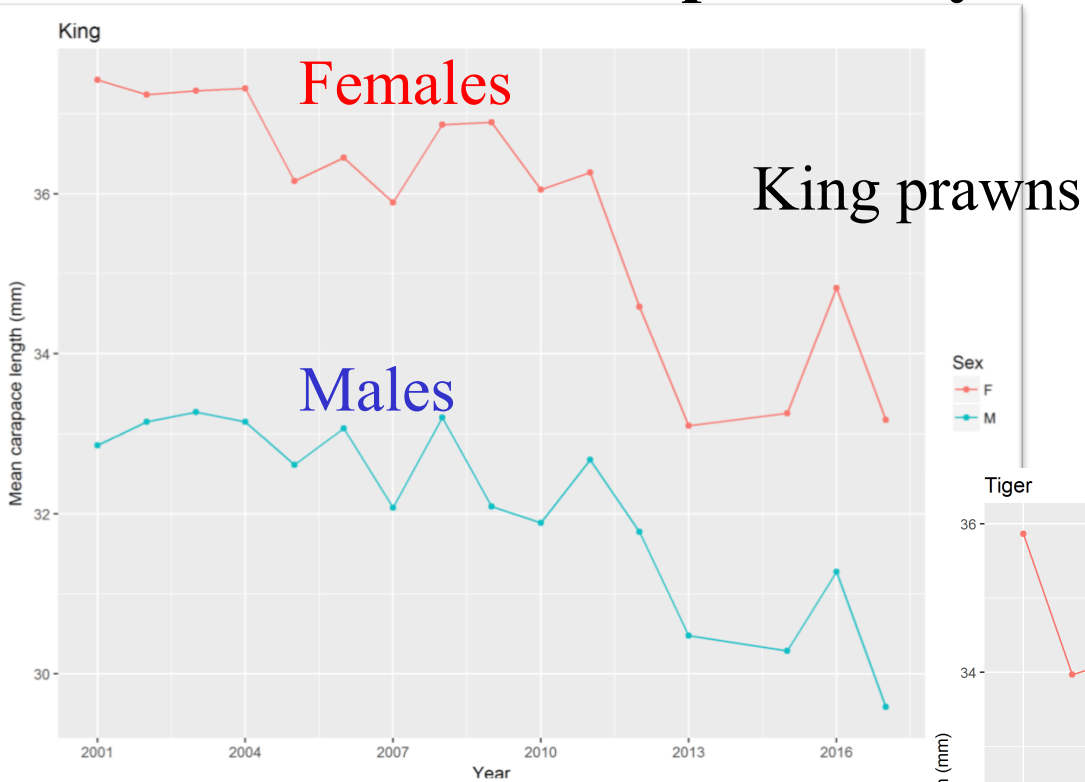
- Positive relationship prawn recruitment v. SST (-ve Exmouth Gulf)



Western king prawns v. water temp



Mean prawn size: male and female king & tiger prawns, March/Apr surveys NCPL (2001-17)



Marine Heatwave: Management/Research

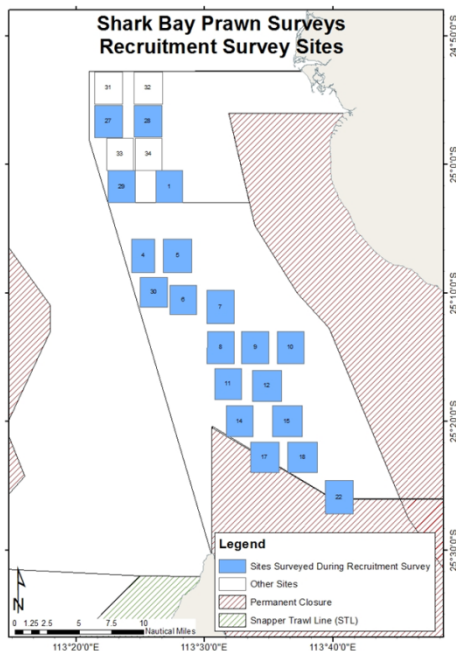
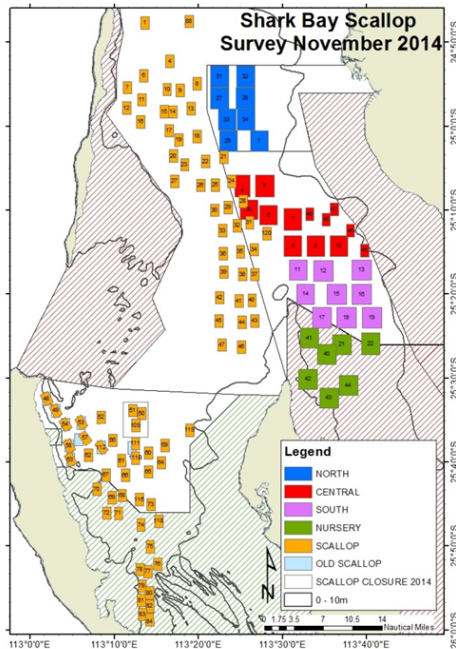
- Understanding cause of variations important
 - If catches decline public assumes overfishing
 - Affects management response
- Early detection important
 - Monitoring environment
 - Monitoring pre-recruits for catch prediction
 - Responsive harvest strategy
 - Monitoring recovery
- Rebuilding strategies
 - Management: closures, reduce catches, etc.



Shark Bay

invertebrate surveys

- RV Naturaliste surveys
 - Feb: crab/scallop/prawn recruitment
 - Jun: crab/prawn spawning stock
 - Nov: scallop recruitment
- Industry prawn vessel surveys
 - Mar/Apr: prawn recruitment
 - Aug/Sep: prawn spawning stock



Key gaps/Future research

- Long-term SST trends (summer/winter)
- Effect of SST on spawning/recruitment/growth
 - Crab, prawn, scallop
- Effect of declining seagrass
 - Tiger prawns, crabs
- Effect of flooding: flushing into deep water
 - Prawns, crabs
- Cause of declining size of prawn recruits
 - Cooler winter trend affecting time of spawning?
 - Decline in autumn spawning?