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Fishes in the CLLMM and foodweb

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Chris Bice, Luciana Bucater, Jason Earl, Greg Ferguson, George Giatas, Scotte Wedderburn and Brenton Zampatti

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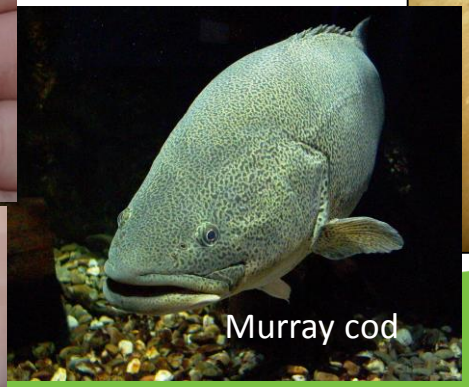
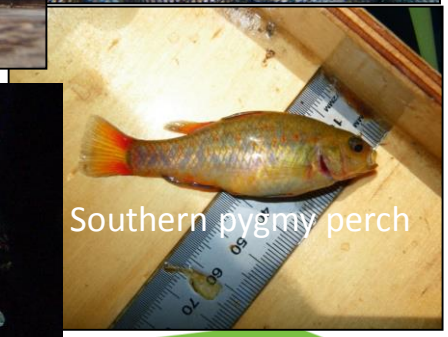
Fishes in the CLLMM





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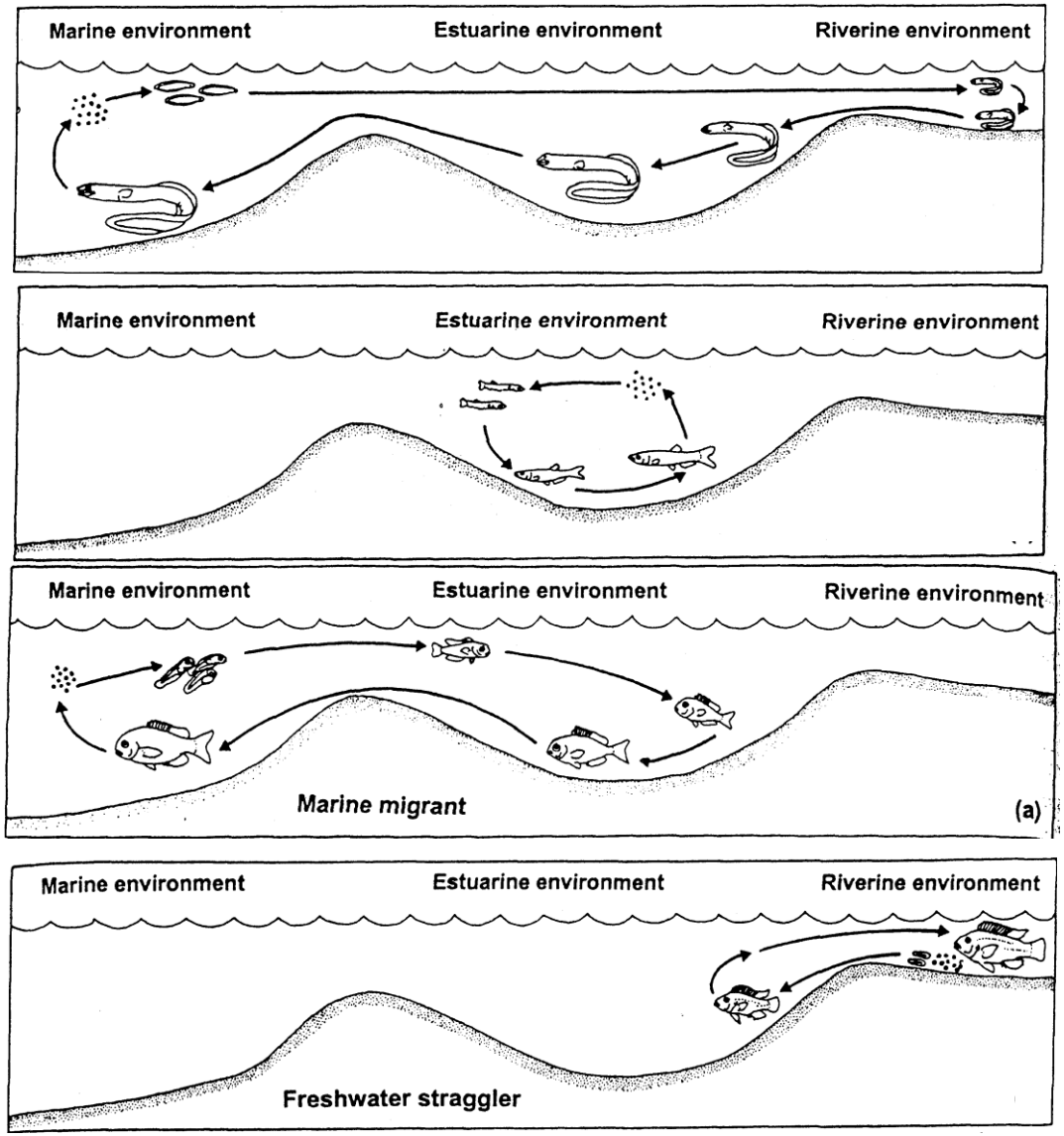
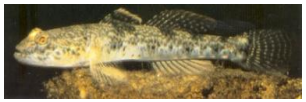
Fish functional groups



Diadromous

Estuarine

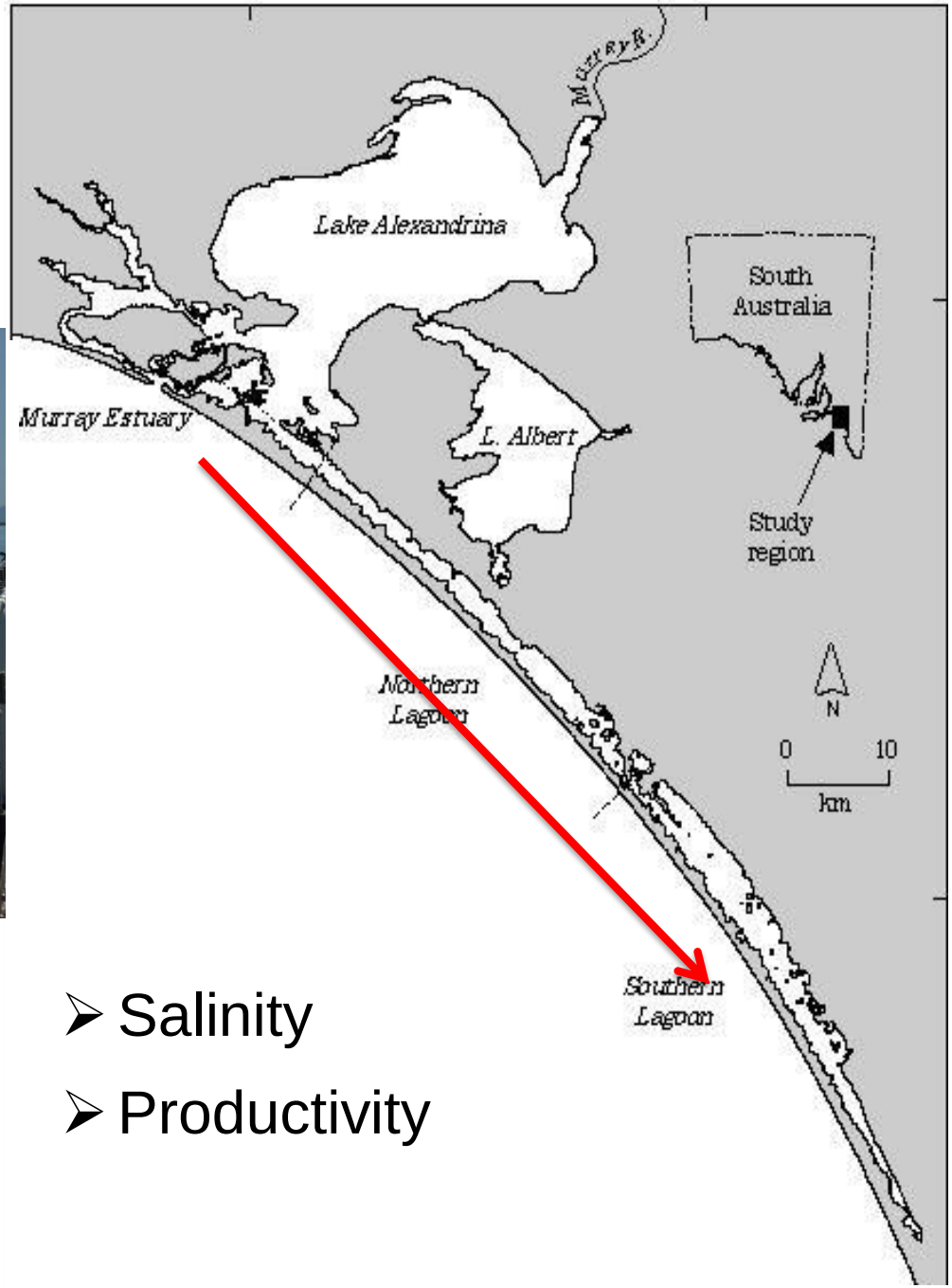


Marine

Freshwater

Adapted from Whitfield 1999

Terminal lakes and dynamic estuarine – lagoonal system



- Lake water levels
- Connectivity
- Salinity
- Productivity

Fish monitoring and studies

Funded by the MDBA TLM Program & Murray Futures CLLMM Program

Lower Lakes

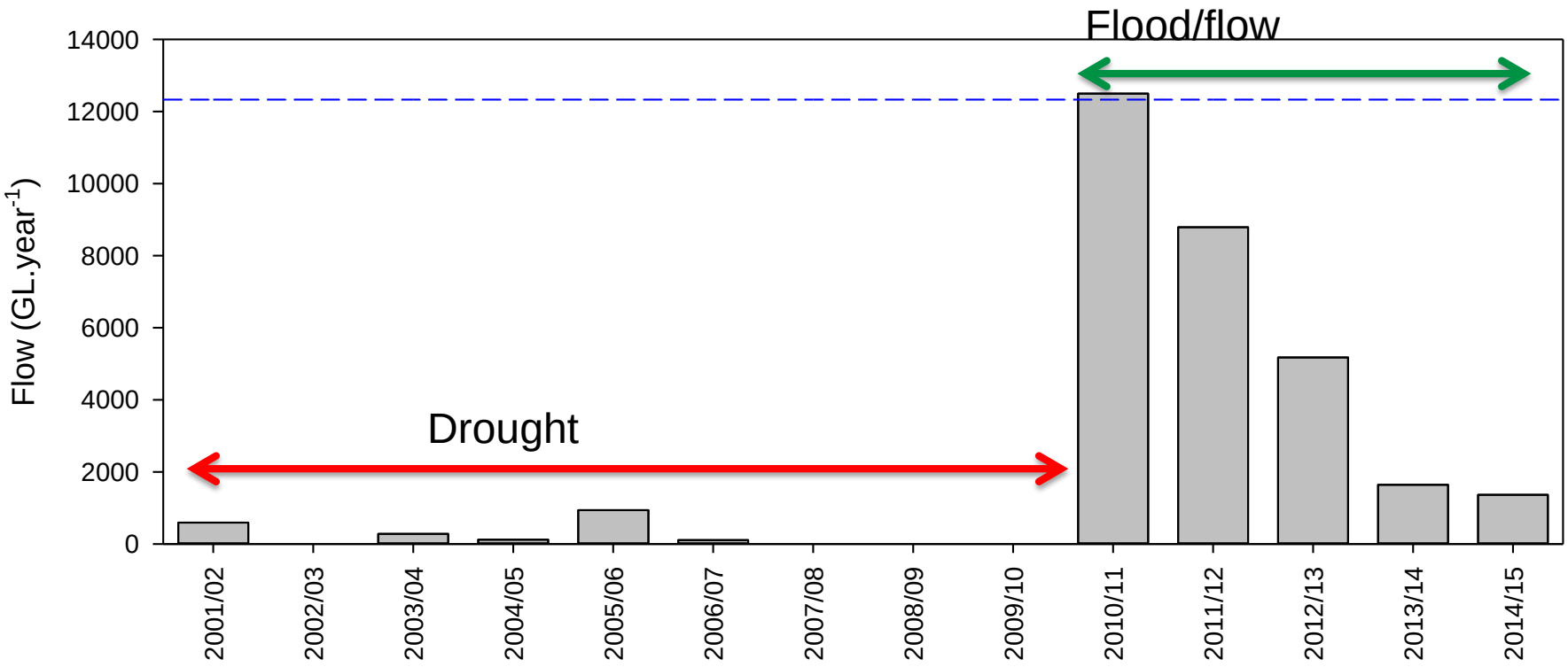
- Small-bodied fish monitoring (e.g. Bice *et al.* 2013; Wedderburn *et al.* 2014a);
- Investigating the large-bodied fish assemblage – fisheries data (Ferguson and Ye 2016);

Murray Estuary & Coorong

- Fish intervention and condition monitoring – research and fisheries data (e.g. Ye *et al.* 2015a, b)
- Fish movement and recruitment – focusing on diadromous species (e.g. Bice and Zampatti 2015);
- Conceptual foodweb models – focusing on fishes (Giatas and Ye 2016).




Annual barrage flow



Flow effects on fish and foodweb?

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Highlights for the Coorong

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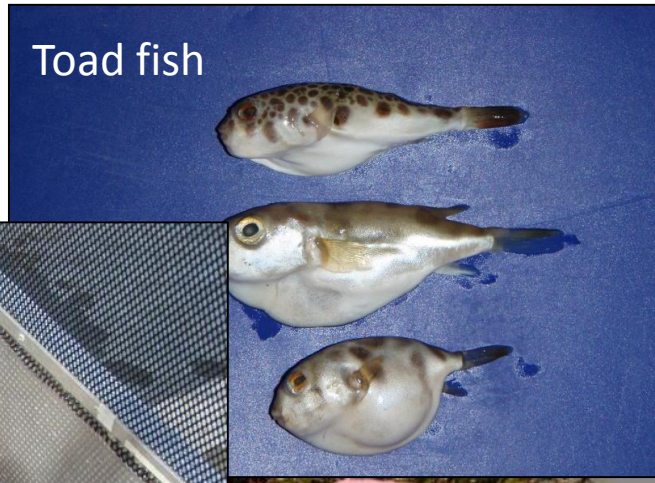
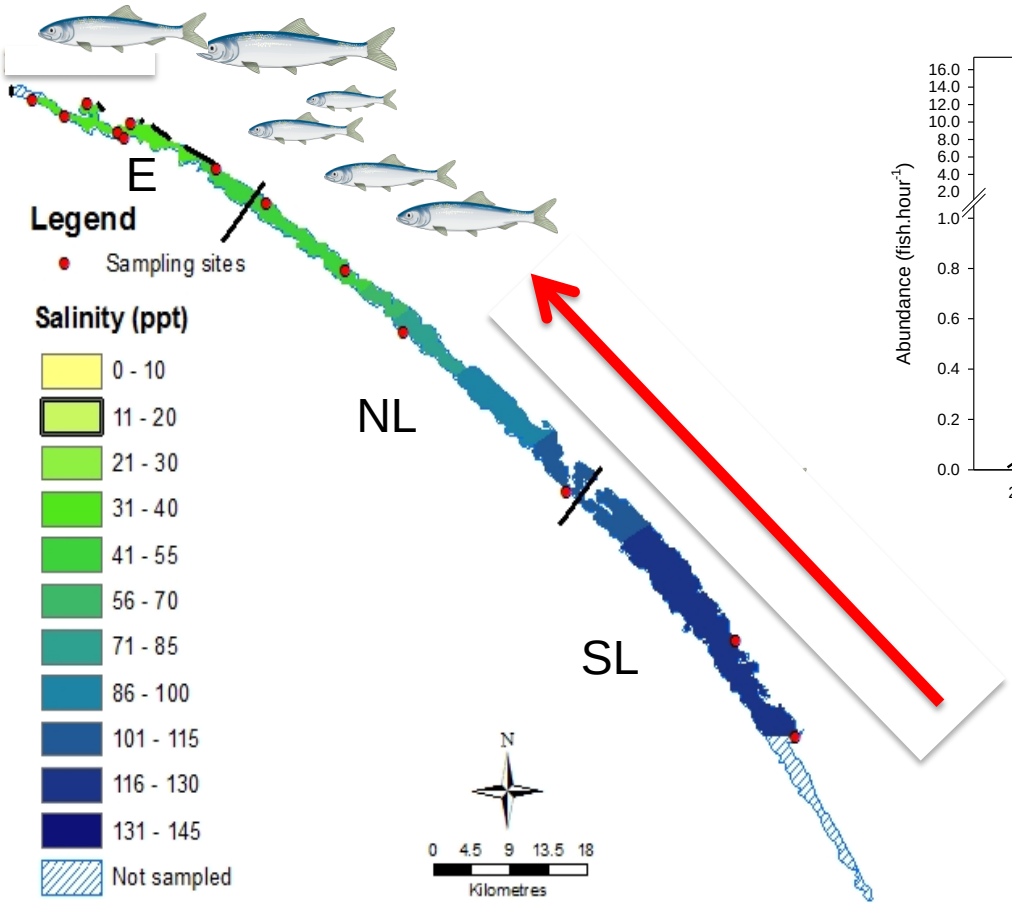
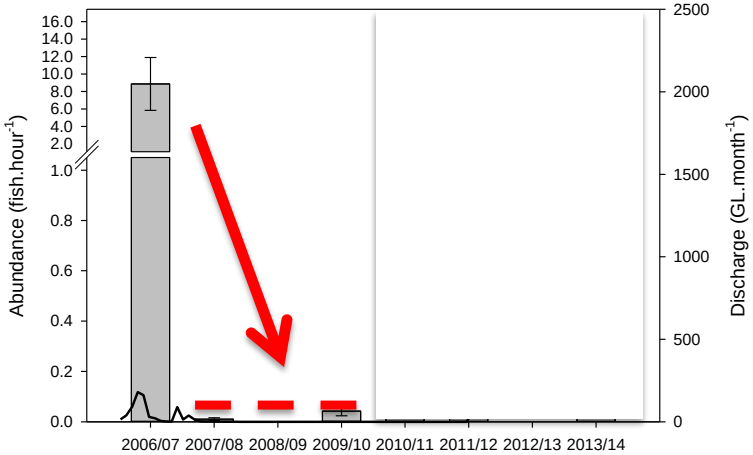
2007–2010 (drought)



Distribution



Recruitment/Abundance



Drought Period

Data: Bice & Zampatti

2010–2013 (flow)

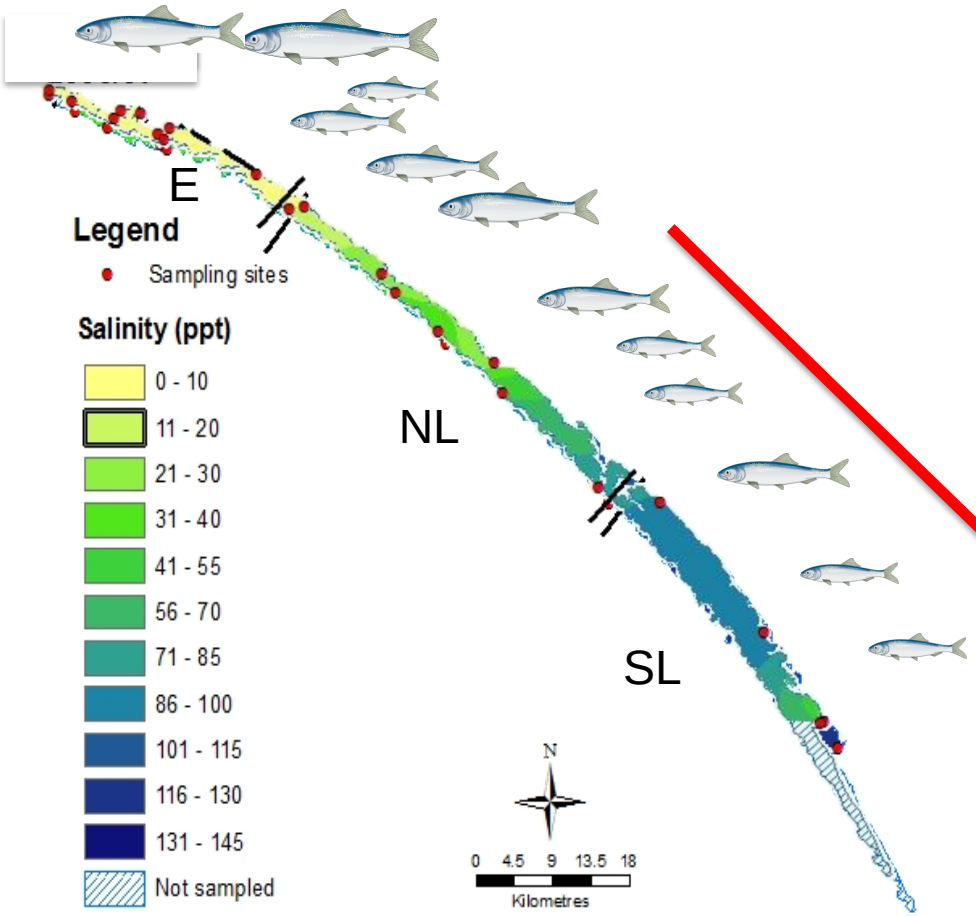
‘Freshwater’

‘Diadromous’

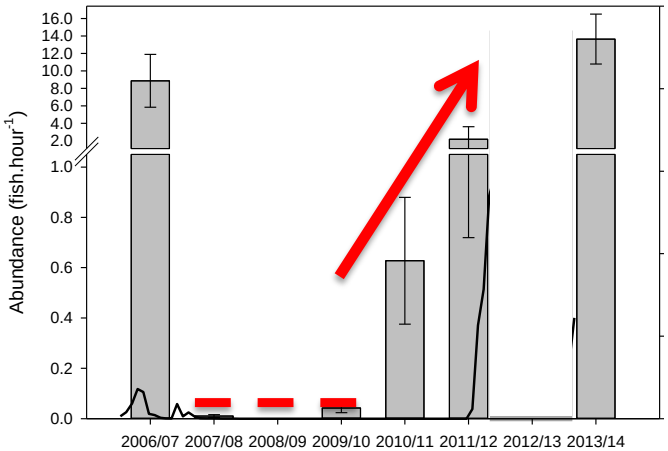
‘Estuarine’

‘Marine estuarine opportunist’

Distribution



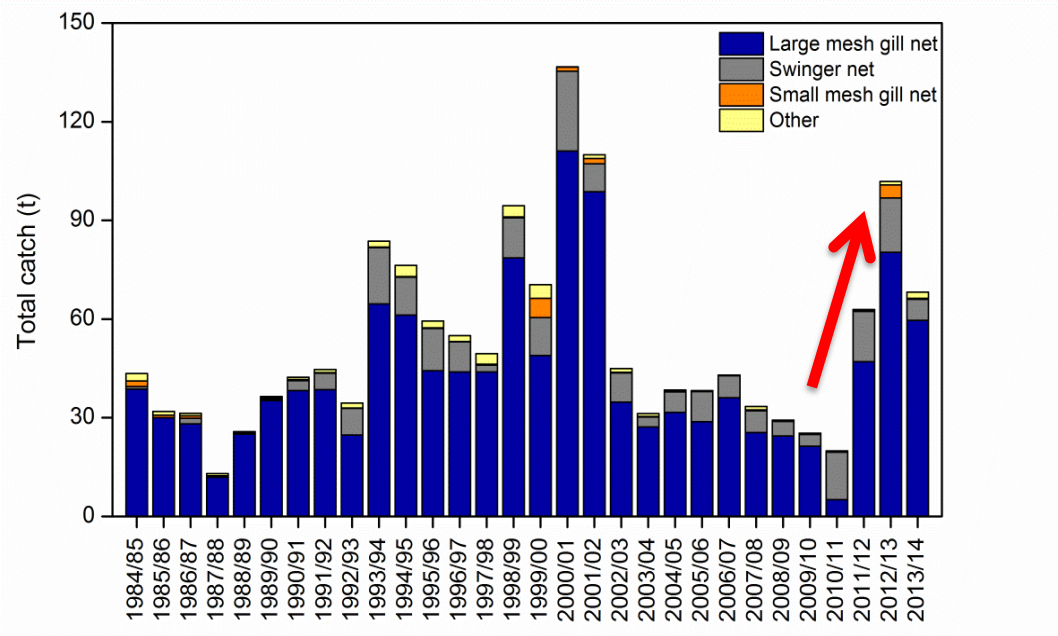
Recruitment/Abundance



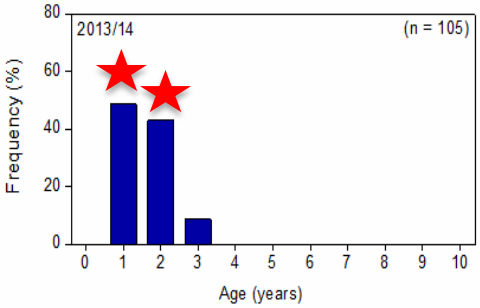
2010–2013 (flow)

Data: Bice & Zampatti

Mulloway production – Coorong estuary



Research sampling (*multi-panel gill nets*)

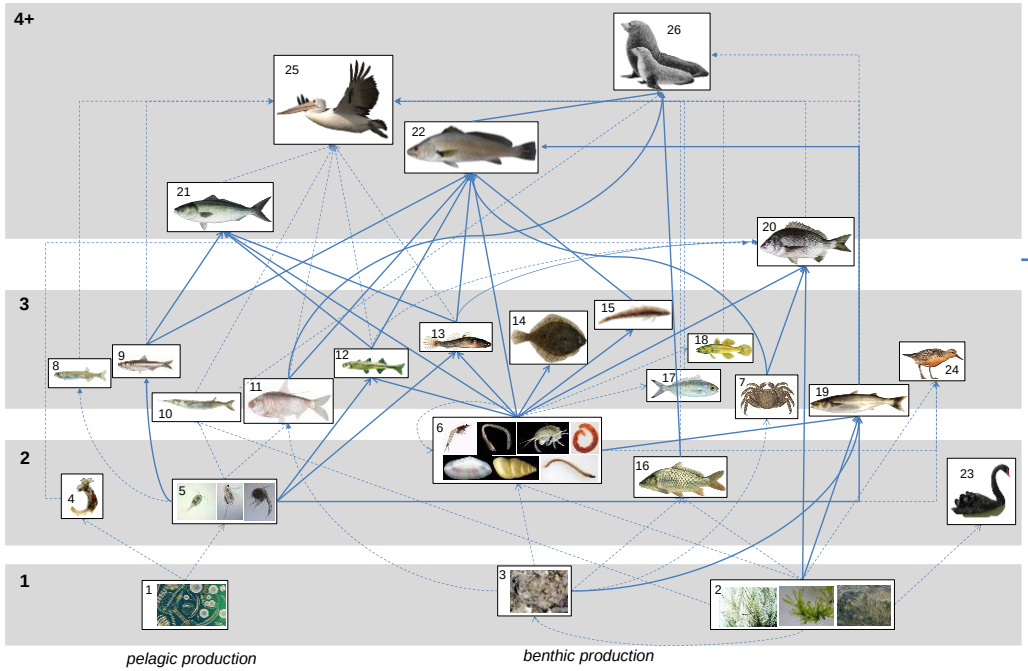


Coorong foodweb model

Giatas and Ye 2016

Low flow
(2003–2010)

ME NL SL

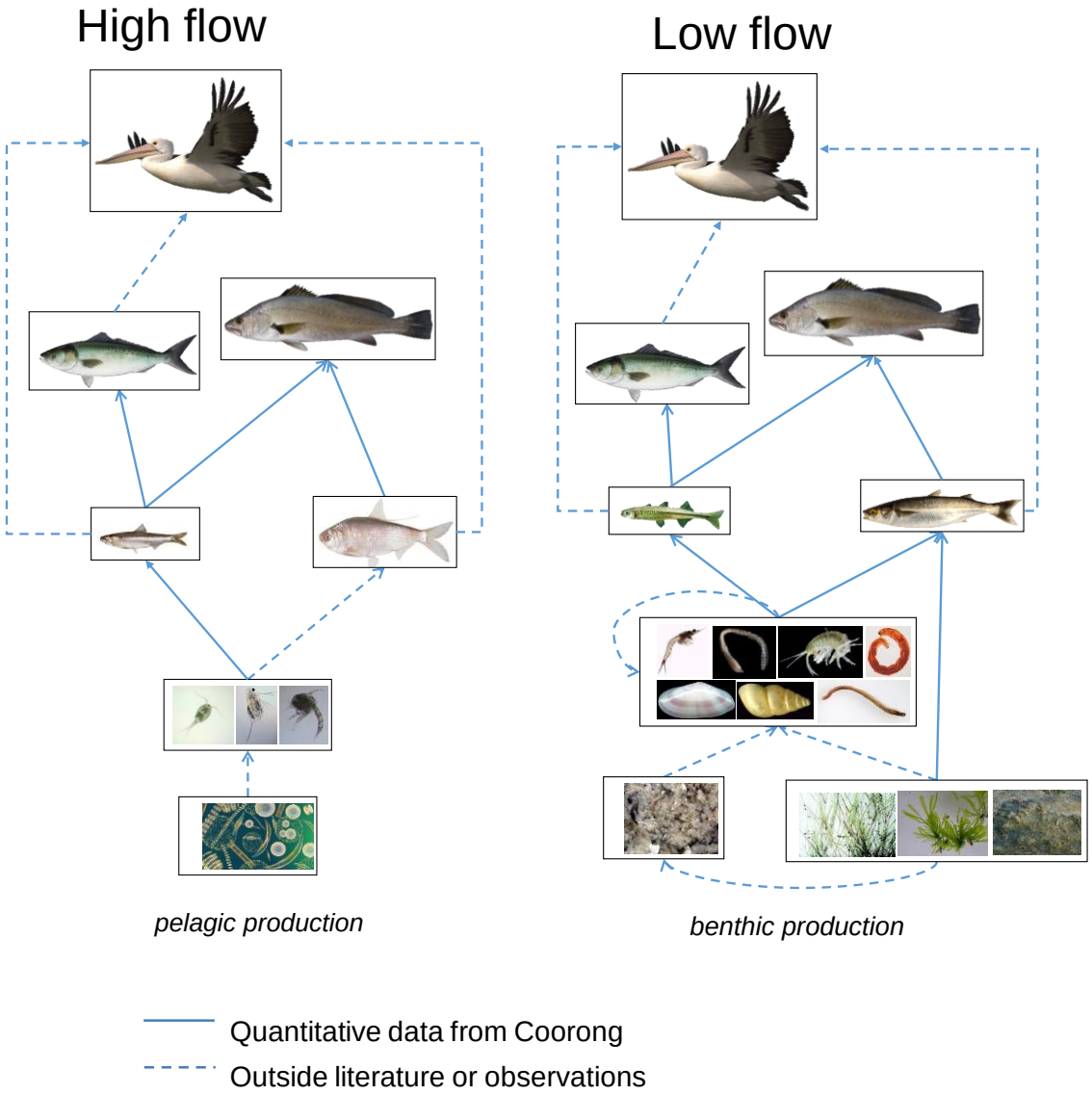


High flow
(2010–2013)

ME NL SL

Foodweb structure *(high vs low flows)*

- Pelagic component of the foodweb dominates in ME and NL during high flows.
- Benthic component dominates during low flows, particularly in NL and SL.
- Decreased foodweb complexity in NL and SL during low flows.



Key Messages

- Diverse fish assemblages in the CLLMM
  - Flow key driver: lake levels, estuarine salinity, productivity & connectivity
- Freshwater flows
  - Promote diversity, abundance, recruitment and distribution of estuarine-dependent fish species
  - Enhance foodweb function and resilience
- High variability of estuarine system
  - Long-term data needed to support management and policy decisions
  - Consider antecedent conditions and population dynamics

Acknowledgements

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- SARDI staff David Short, Neil Wellman, Juan Livore, David Fleer, Hanru Wang, Arron Strawbridge, Craig Noell and many……

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Condition Monitoring of Threatened Fish Populations in Lake Alexandrina and Lake Albert

Scotte Wedderburn

Thomas Barnes

Australian Government

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Native fishes of the lakes

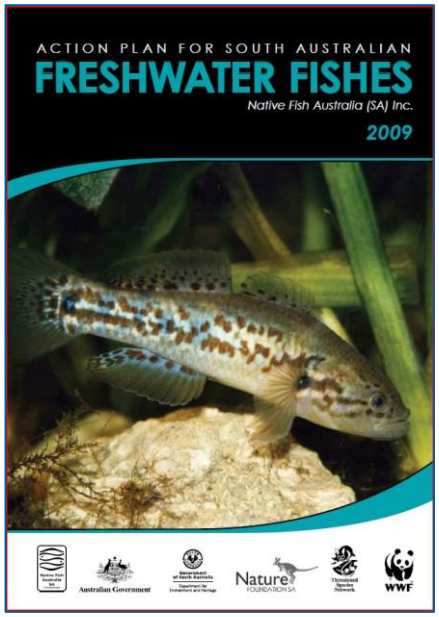
Larger fishes

Golden perch (callop)

Black bream

Bony bream

Congolli



Small-bodied fishes

Murray hardyhead

Southern pygmy perch

Yarra pygmy perch

Unspecked hardyhead

Australian smelt

Murray rainbowfish

Southern purple-spotted gudgeon

Carp gudgeon

Flathead gudgeon

Dwarf flathead gudgeon

Common galaxias

Smallmouth hardyhead

Lagoon Goby

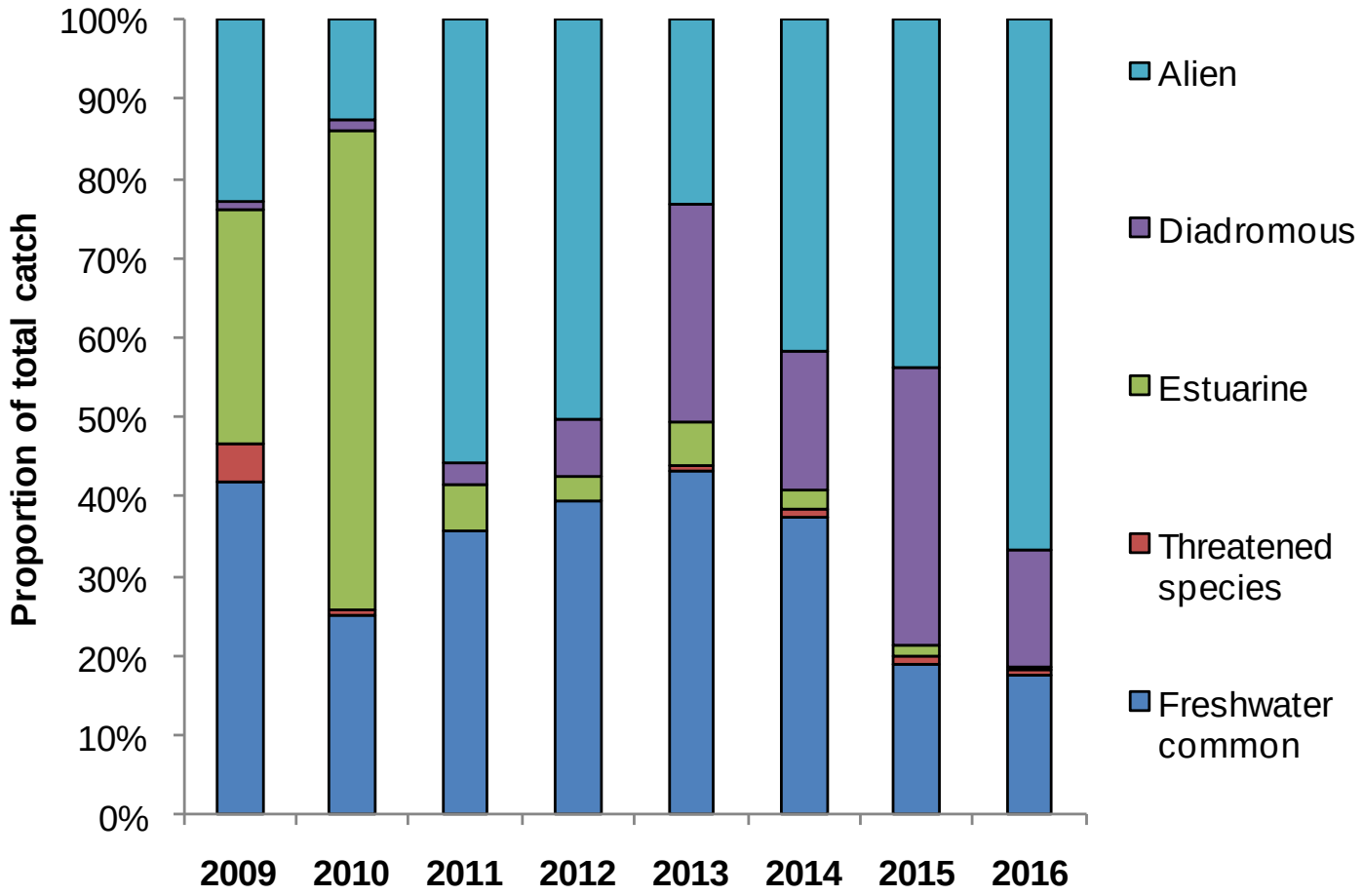
Tamar River goby

Western blue-spot goby

Sandy sprat

Lake water level recession

Fish assemblages: March 2009–2016



Pygmy perches

Extirpated in wild but captive population maintained

Southern pygmy perch

- Small home range
- Well-vegetated habitat
- Distributed EMLR & L. Alexandrina
- ‘Endangered’ in SA

Yarra pygmy perch

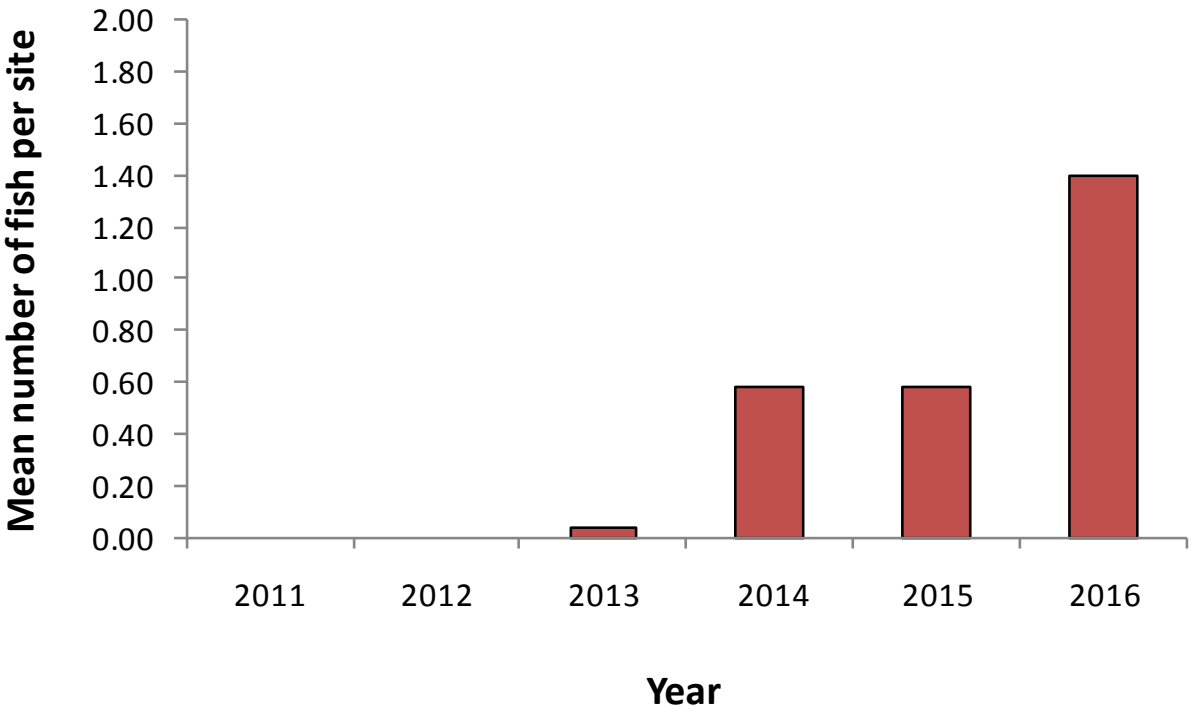
- Distribution in the MDB restricted to Lake Alexandrina
- Genetically distinct population
- ‘Vulnerable’ *EPBC Act 1999*
- ‘Critically Endangered’ in SA

Murray hardyhead

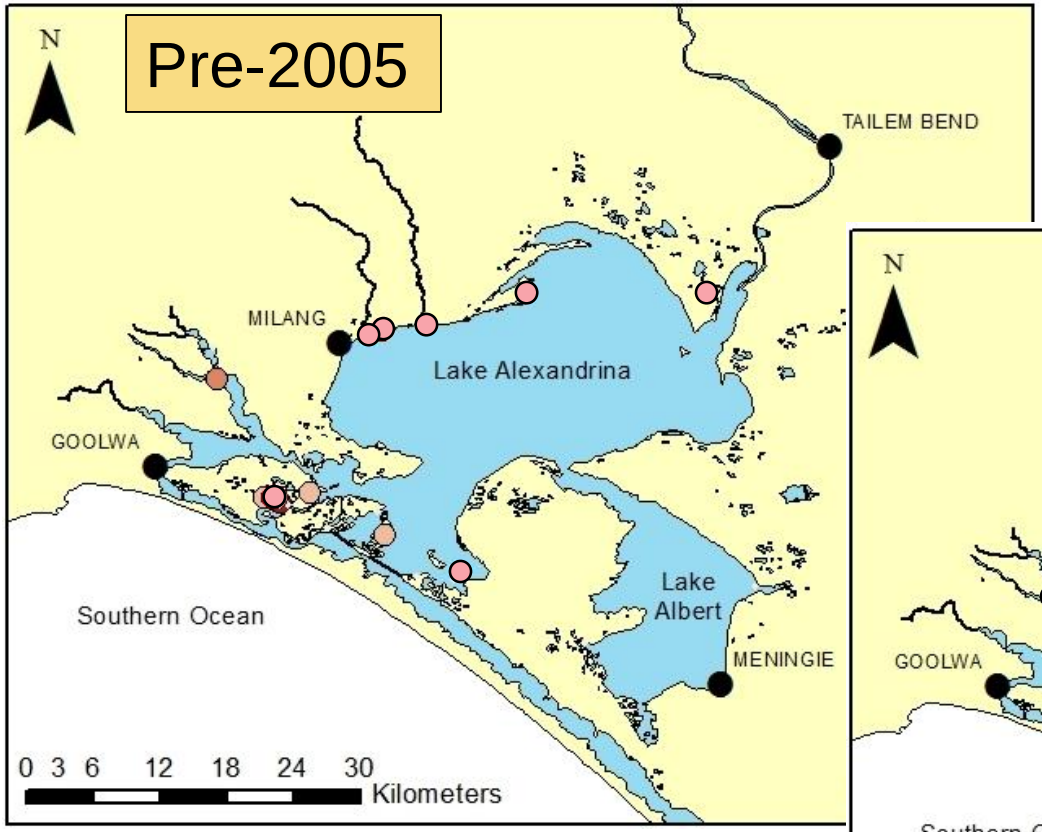
Maintained in drought refugia and captive breeding

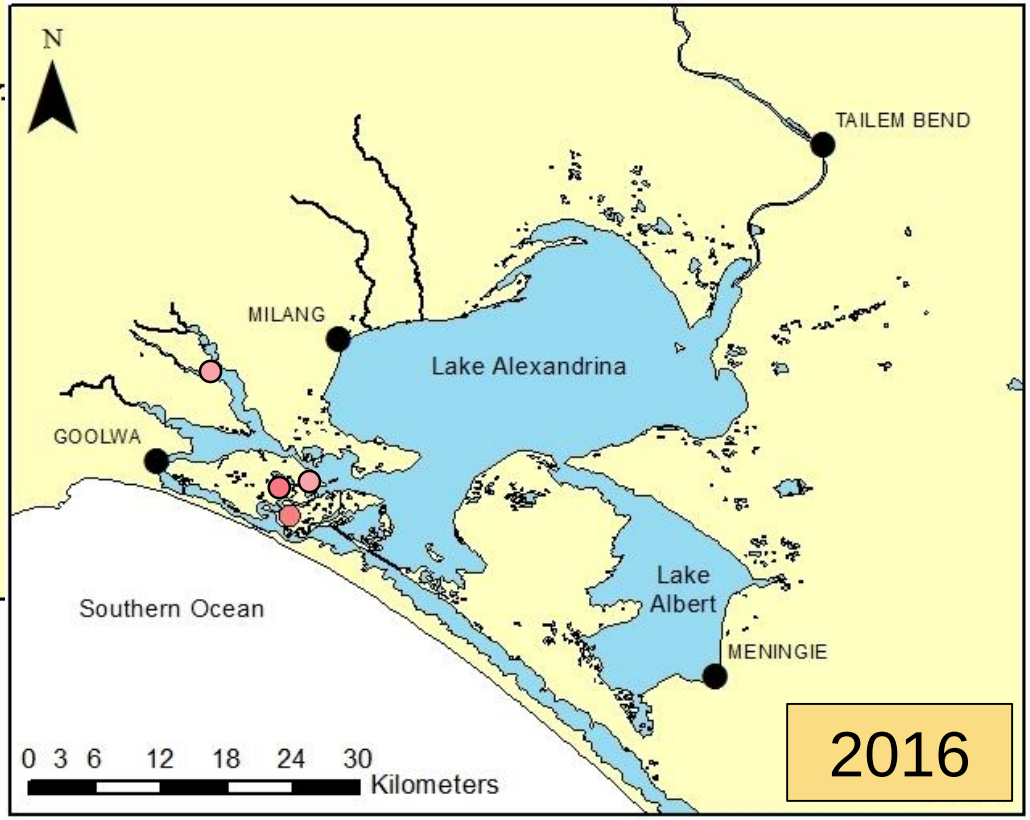
- Annual life cycle
- Distributed from Kerang in Victoria to Lakes
- Lakes population is genetically distinct
- ‘Endangered’ *EPBC Act 1999*

Southern pygmy perch

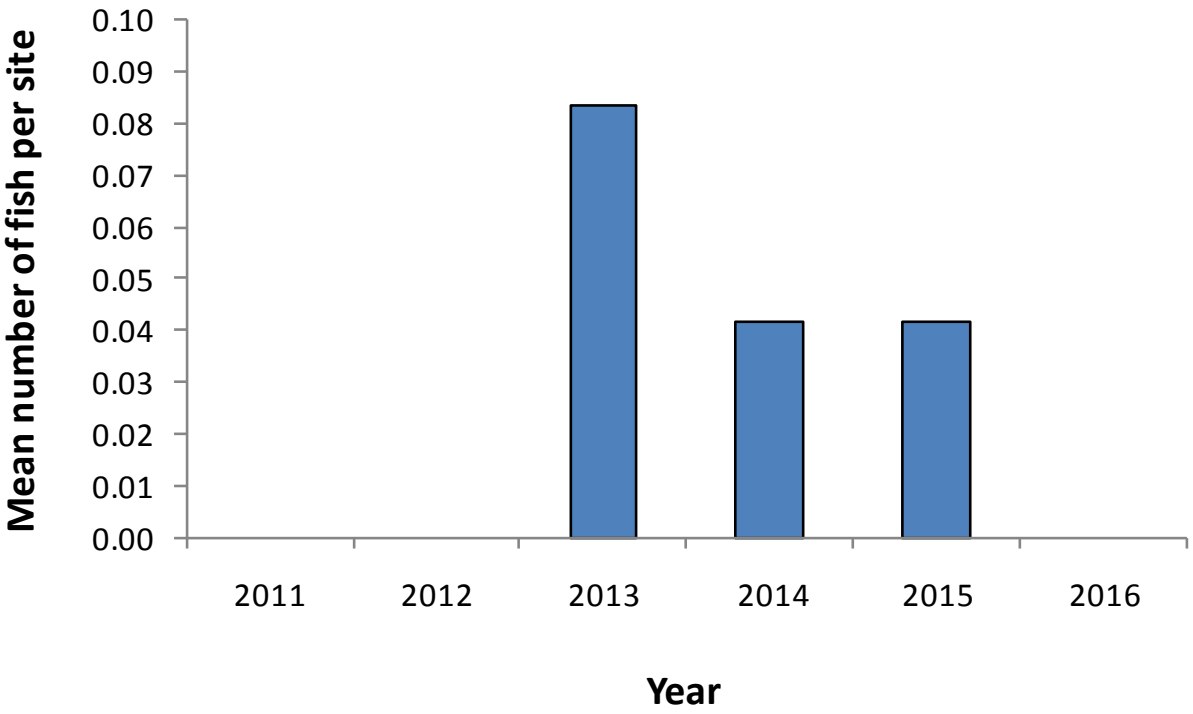


Southern pygmy perch

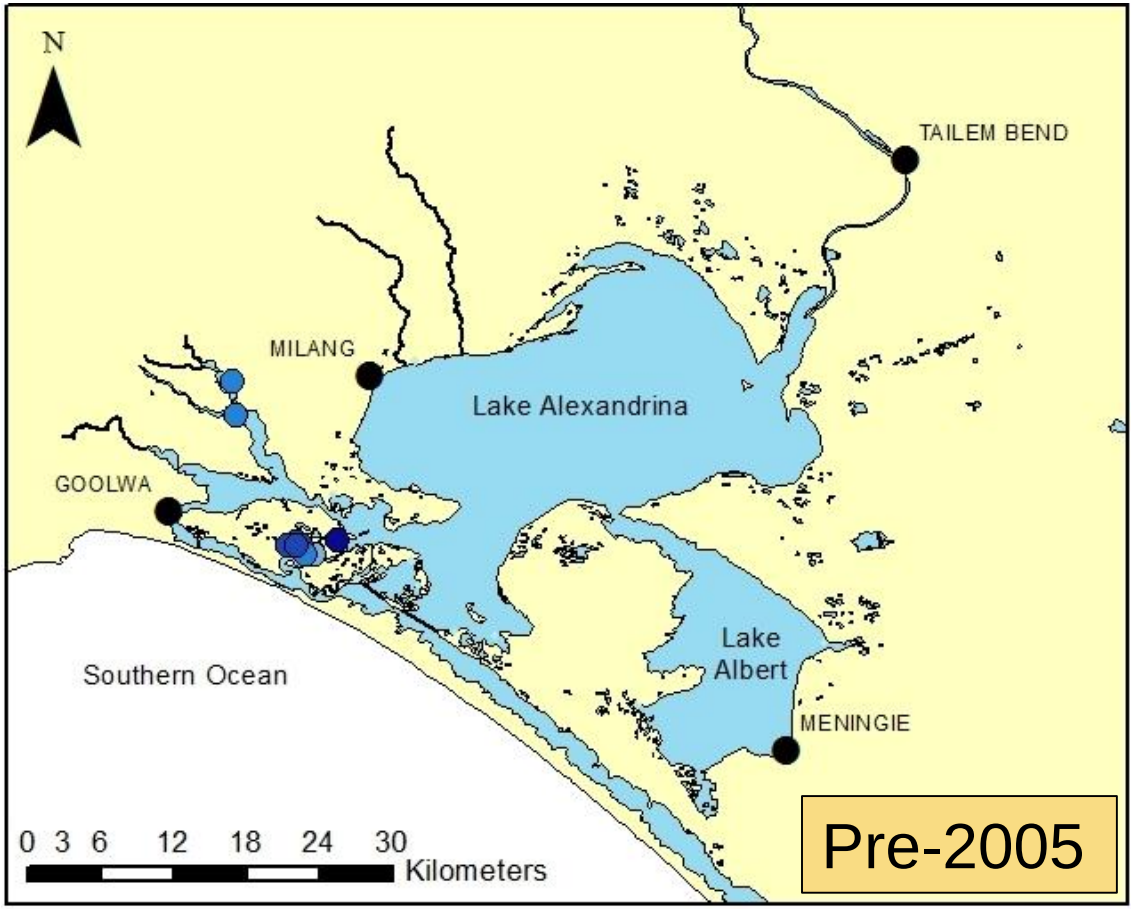




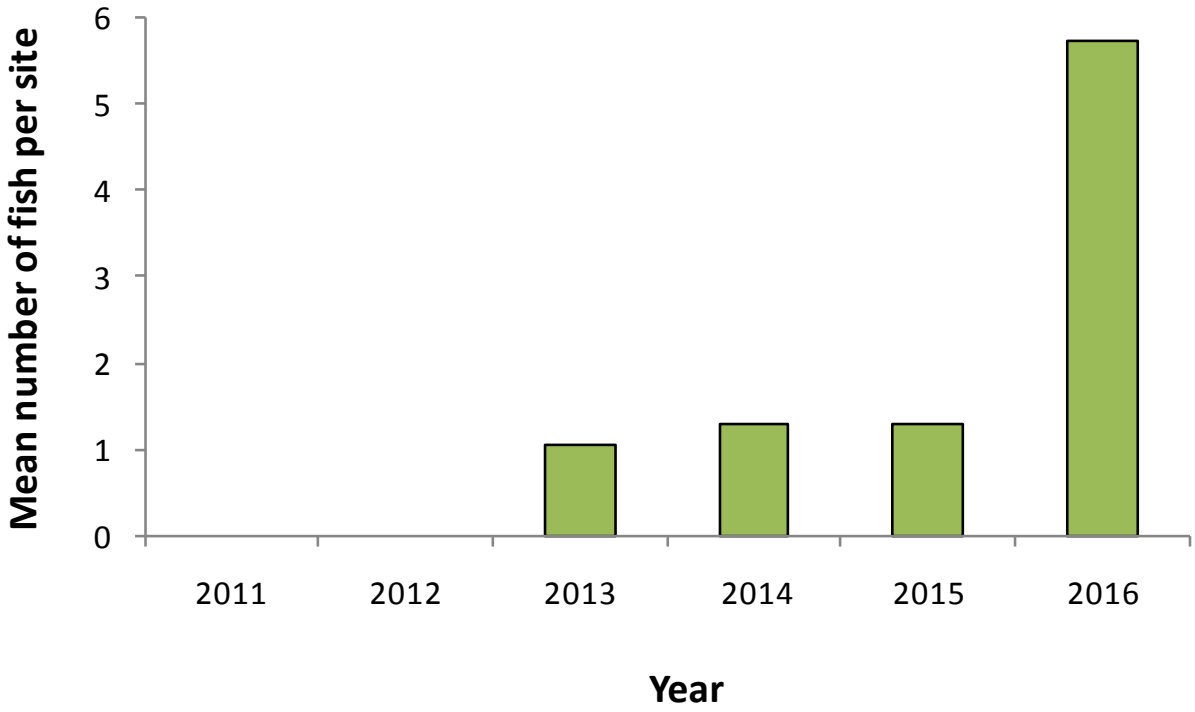
Yarra pygmy perch



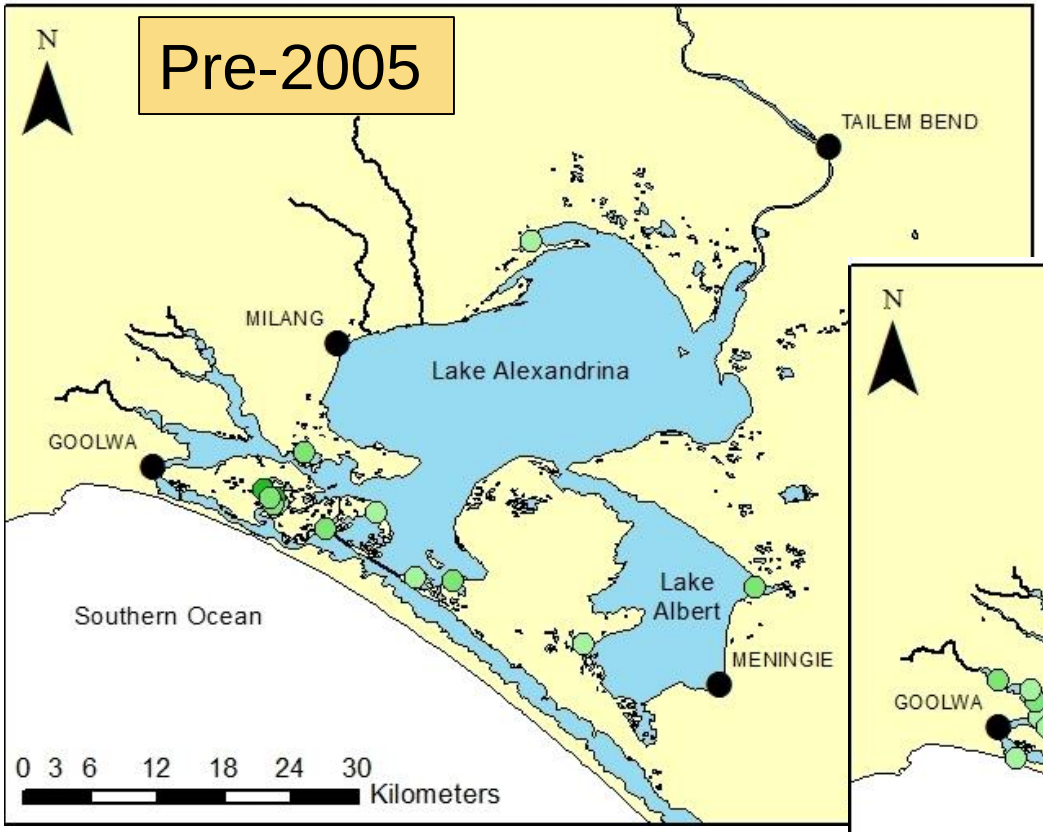
Yarra pygmy perch

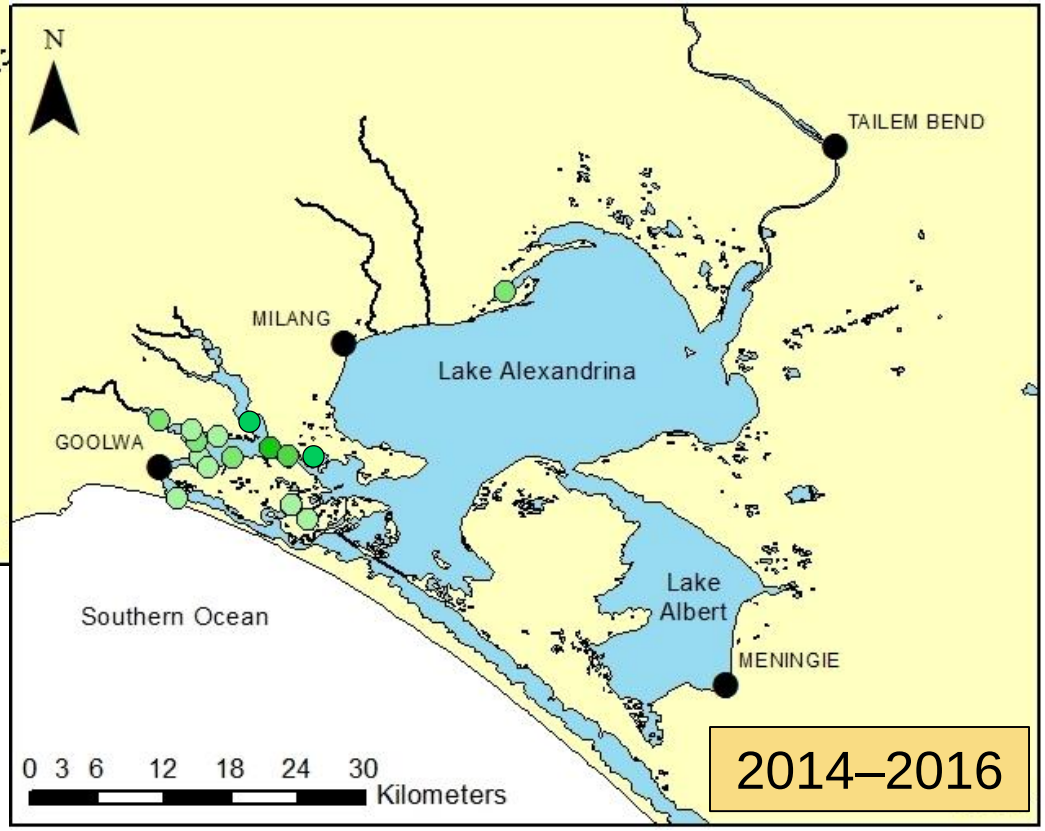


Murray hardyhead



Murray hardyhead





Population recovery

- River flows (volume, timing, duration)
- Water levels in obligate habitats
- Salinity, aquatic plants, alien species
- Zooplankton life cycle (e.g. Rotifera)
- Alien fishes

Eastern gambusia

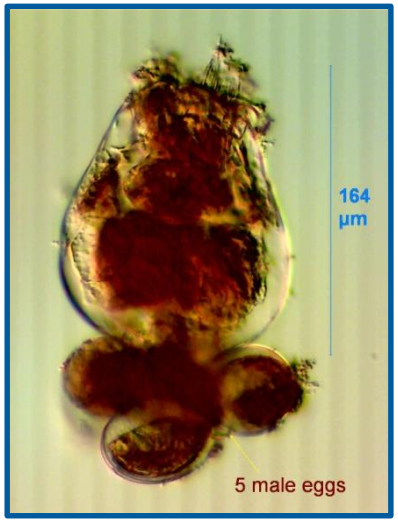


Photo: Russ Shiel

Photo: Luke Pearce

Management of threatened fish populations

- Ongoing monitoring MDBA's *The Living Murray*
- Acknowledge loss of Yarra pygmy perch? (more reintroductions)
- Investigate factors influencing recovery (water levels, alien fishes)
- Drought preparedness
- Drought refugia crucial (prevent extirpation, seeding for recovery, avoid captivity)

Acknowledgements

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