

Determining movement and environmental history of fish

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Fish of the Coorong and Murray Mouth

Marine

Mulloway
Sea mullet
Australian salmon
Sandy sprat



Diadromous

Common galaxias
Climbing galaxias
Pouched lamprey
Short-headed lamprey
Shortfin eel
Estuary perch
Congoli



Estuarine

Black bream
Greenback flounder
Long-snouted flounder
Yellow-eye mullet
Jumping mullet
River garfish
Smallmouth hardyhead
Bridled goby
Tamar goby
Lagoon goby

Aims

Key fish species

1. Distribution, abundance, age structure
2. Reproductive condition
3. Diets and position in food web
- 4. Movement and environmental history**



Fish movement / environmental history

What environments do fish inhabit at different life stages?

- **juvenile vs. adult**

Do fish need the Murray Mouth to be open?

Do fish need freshwater flows over the barrages?

How will fish respond to changing environment?

Information needed to:

- **maintain fish diversity**
- **long-term stability of populations**
- **ecosystem health**
- **recreational and commercial fishing**

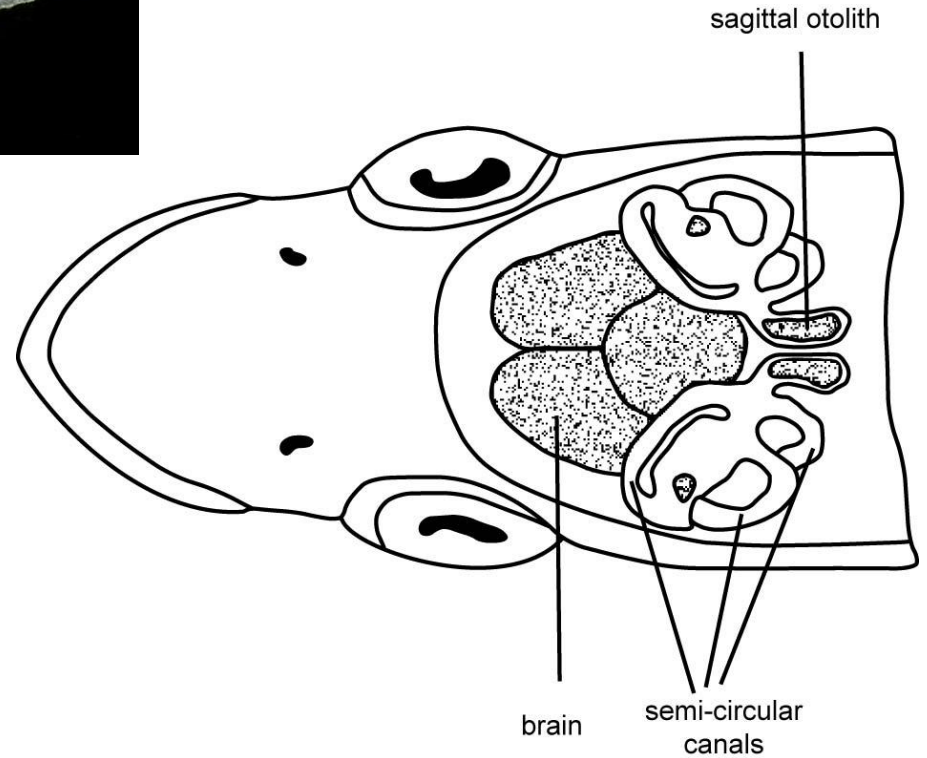
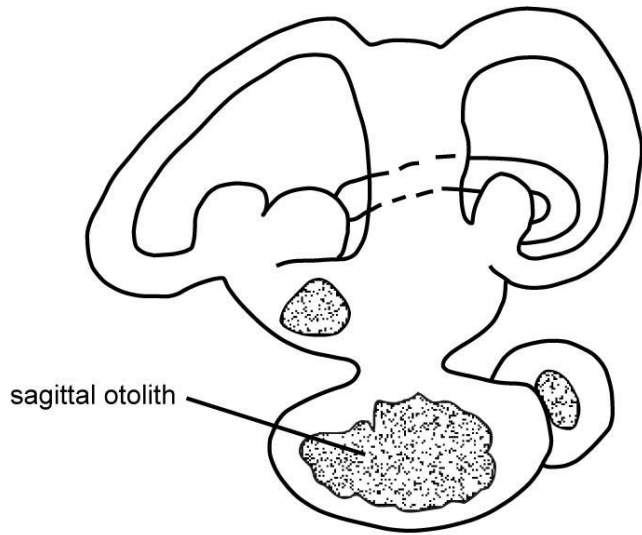
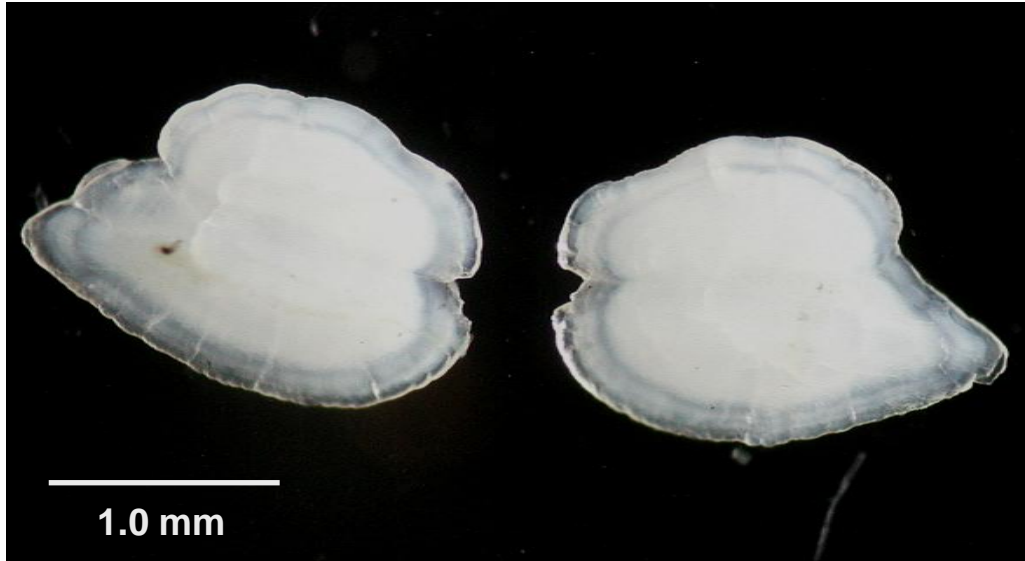
Otolith Chemistry

What is an otolith?

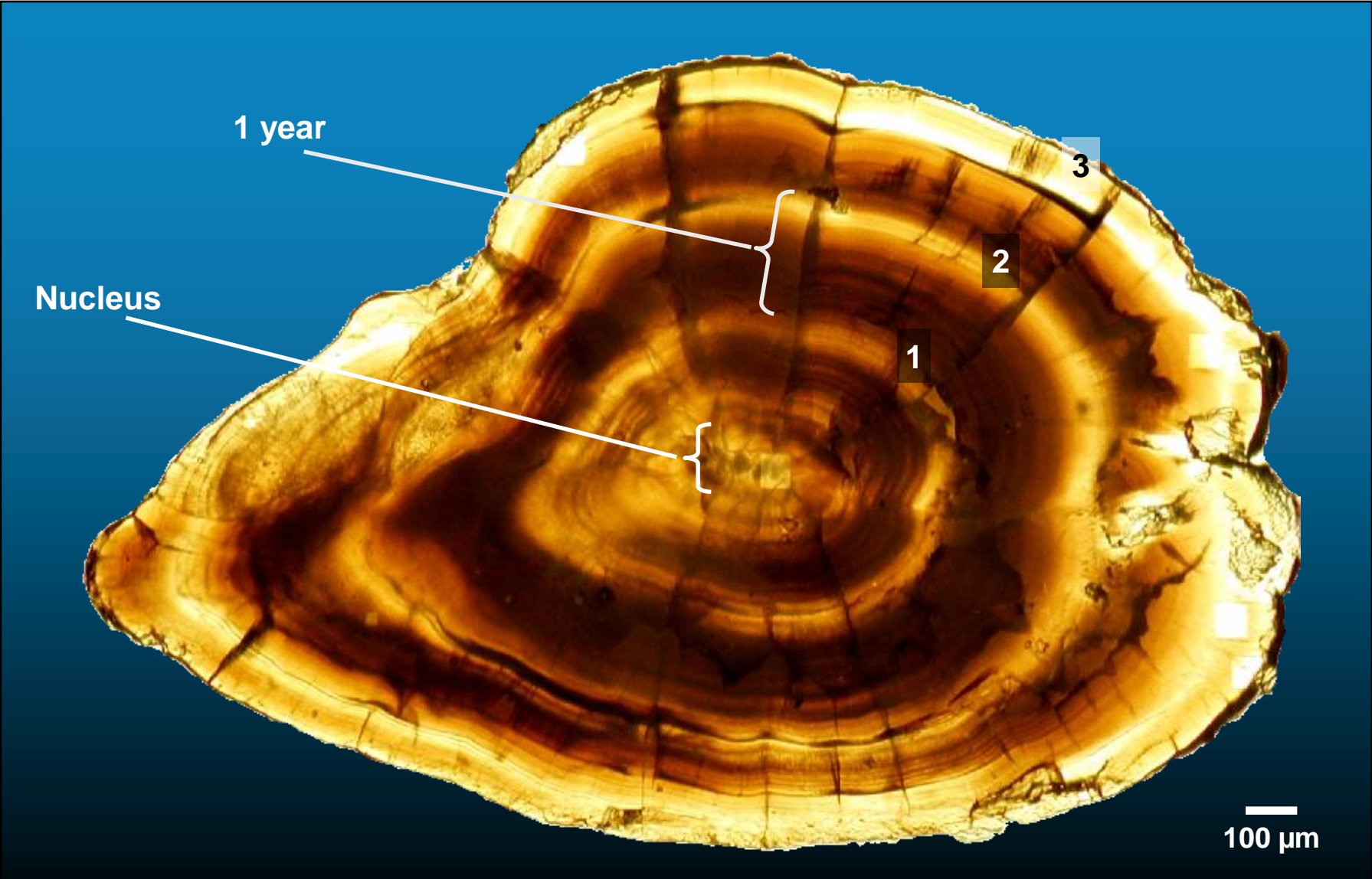
How does otolith chemistry work?



What are otoliths?



Otoliths



Otolith Chemistry



water

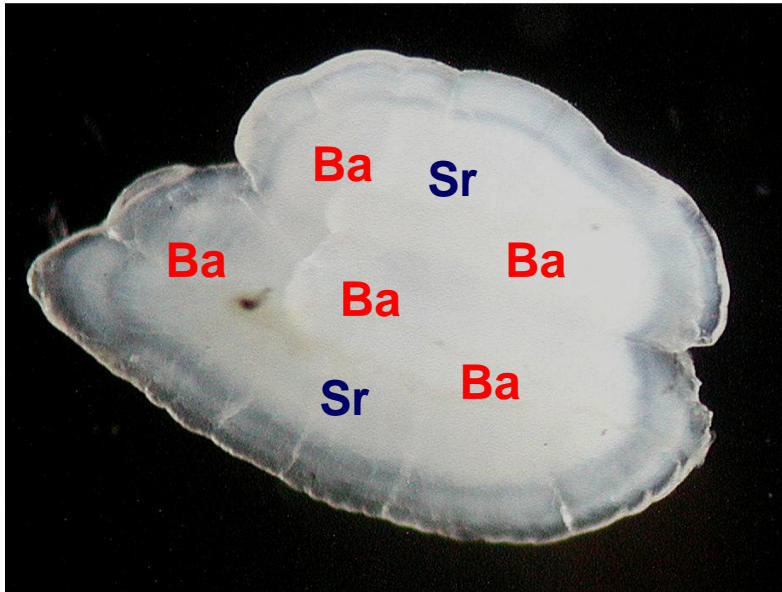


fish

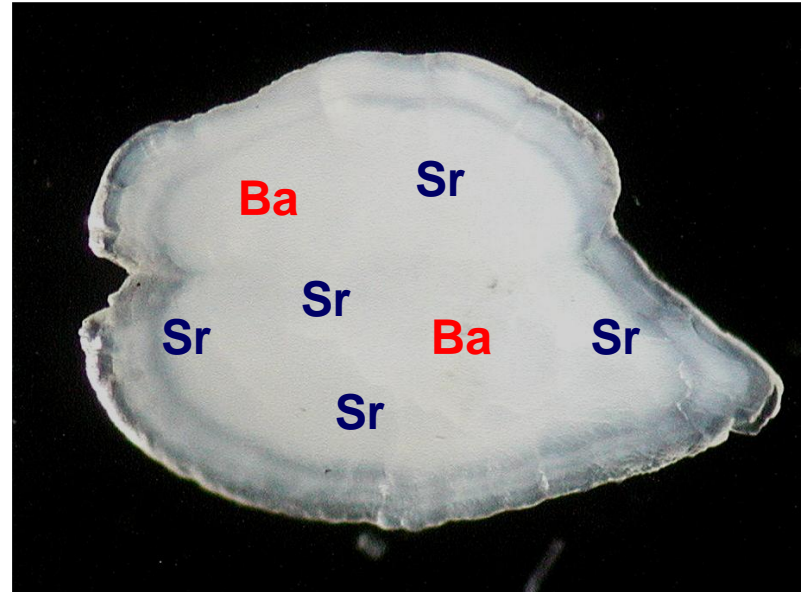


otolith

Otolith Chemistry



Freshwater



Seawater

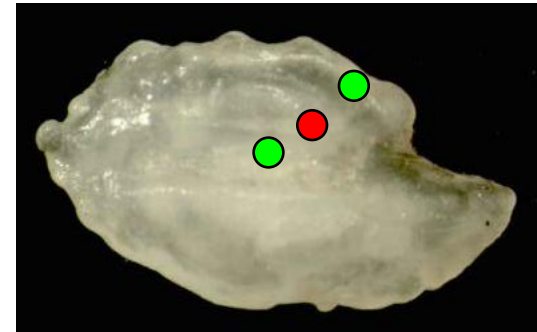
Otolith Chemistry



water



fish



otolith

Objectives

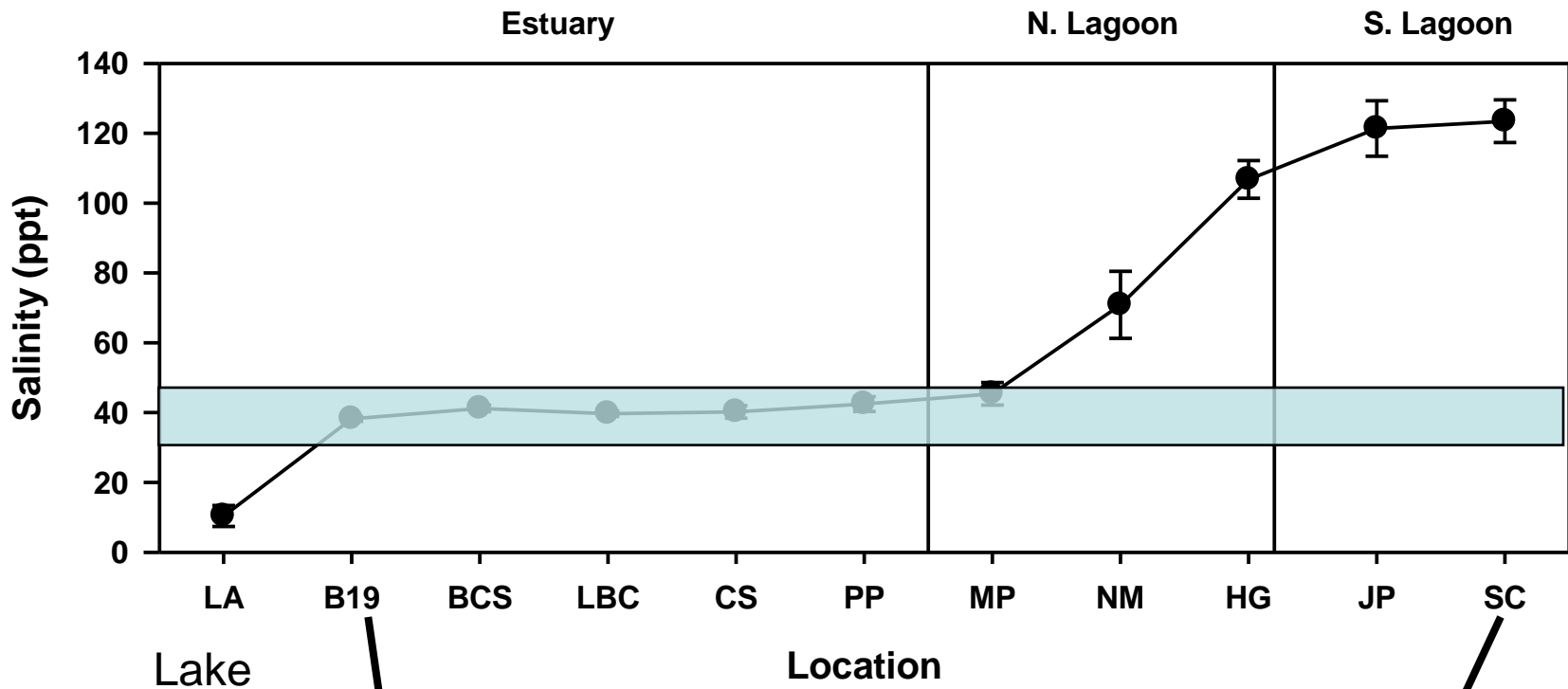
- **Characterise otolith composition**
- **Estimate environmental history and movement of fish within the Coorong**
- **Model response of key fish species to changing environment**



The Coorong - Sample Sites



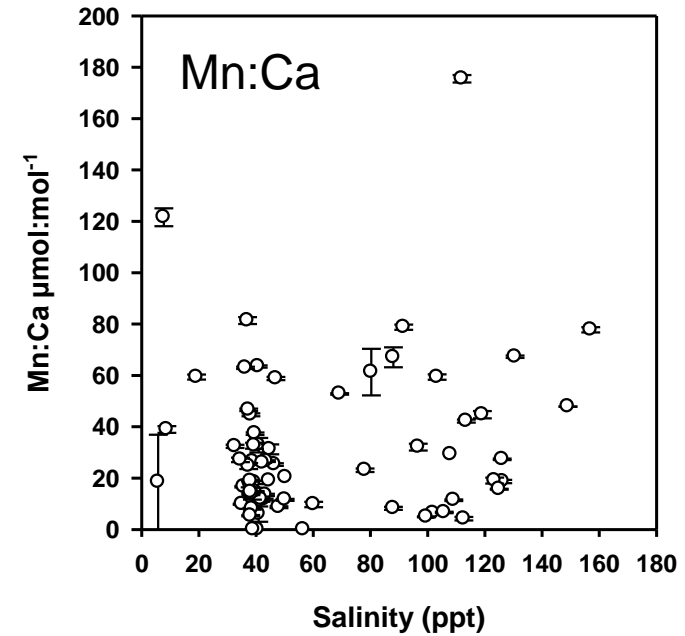
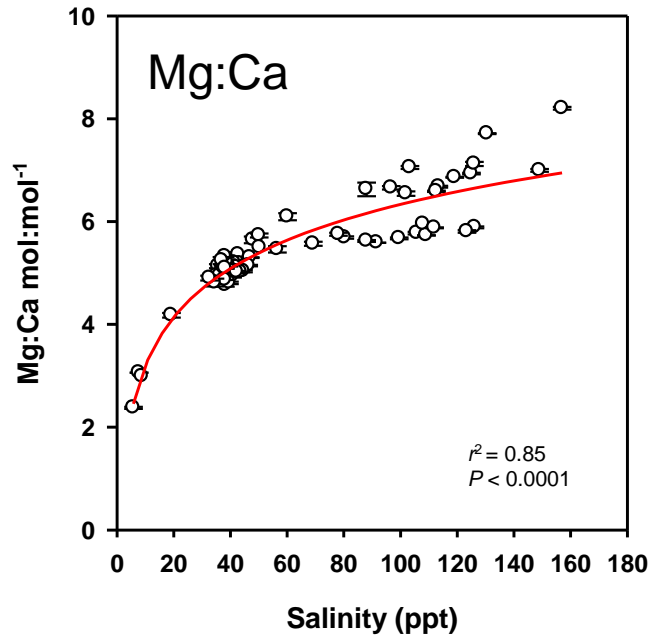
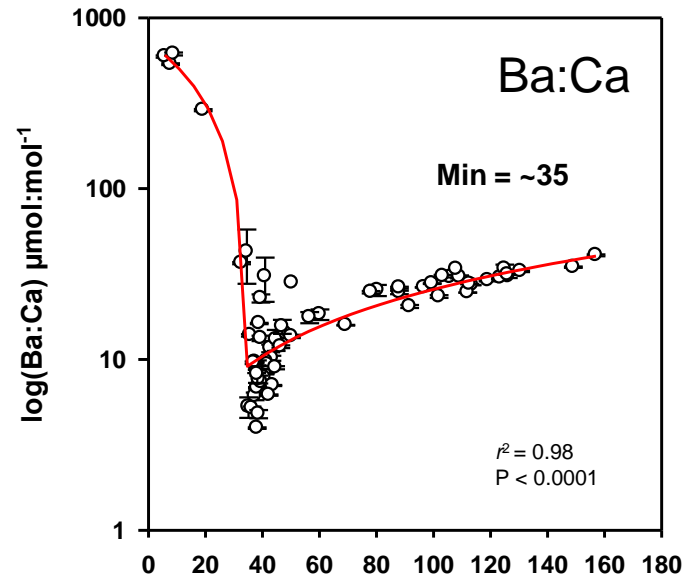
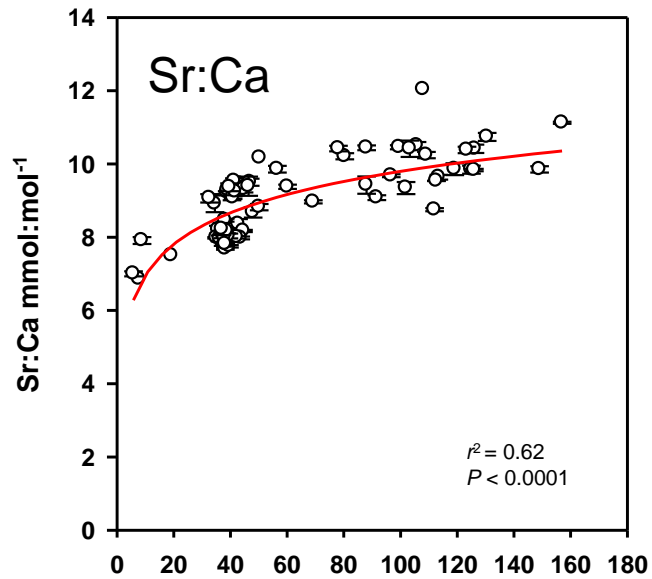
Water quality - Salinity



North

South

Water chemistry



Key fish species

Small-mouth hardyhead

Yellow-eye mullet

Greenback flounder

Black bream

Congoli

Tamar goby

Mulloway



Small-mouth hardyhead
Atherinosoma microstoma

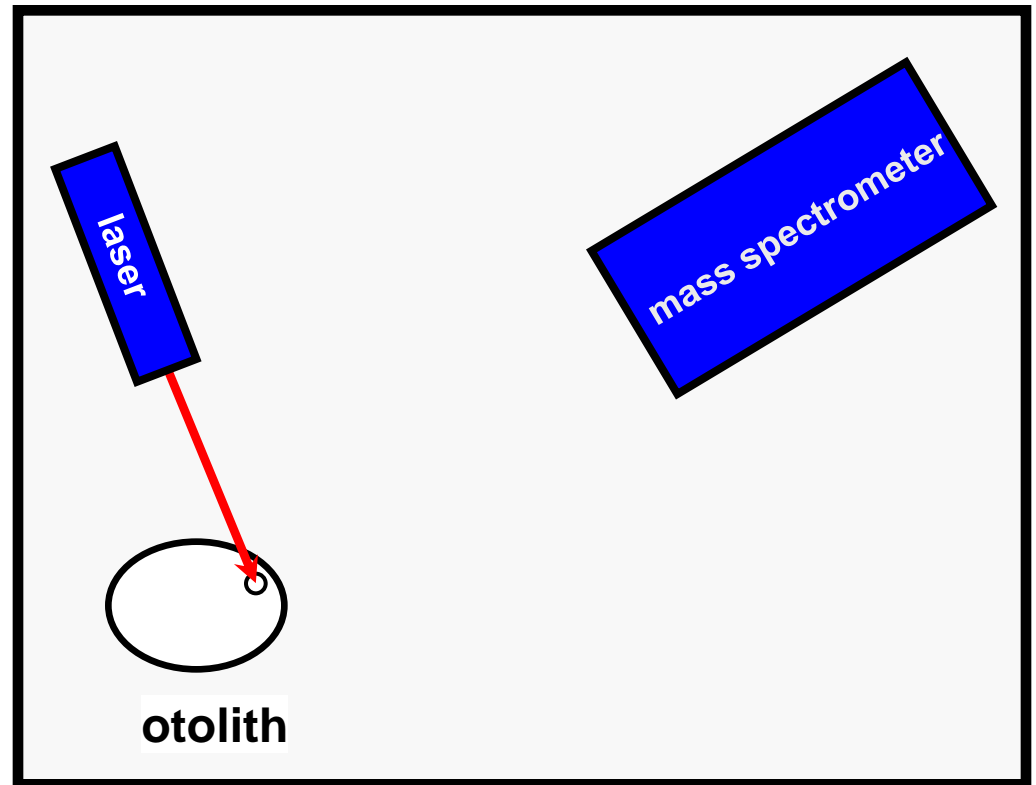
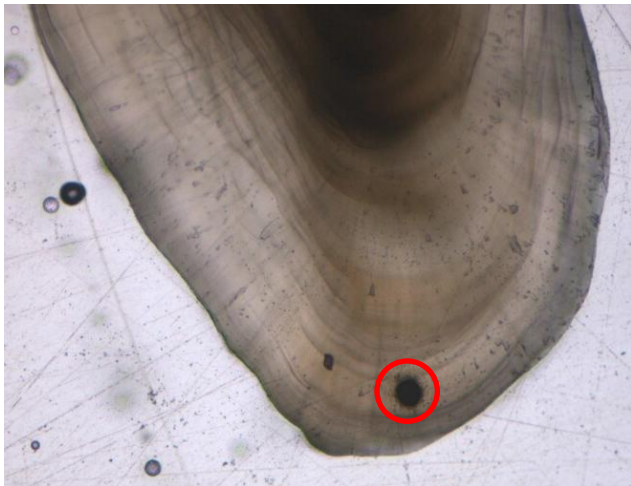
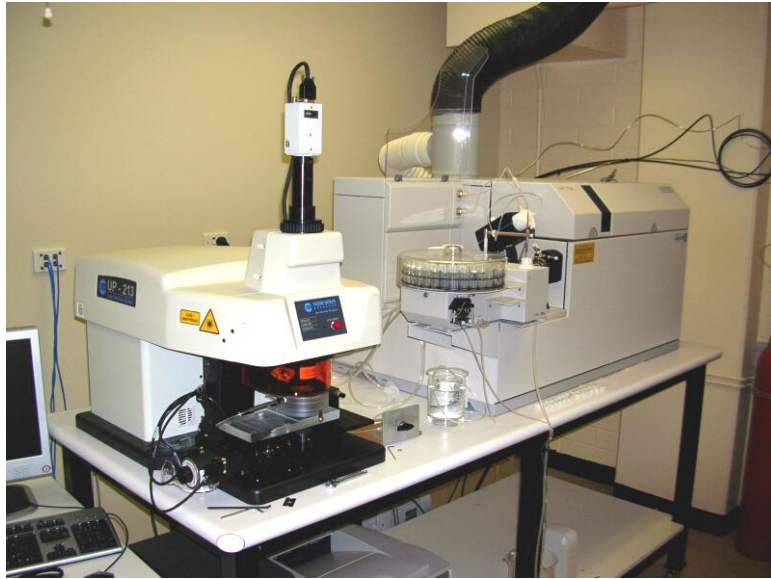
salinity: 36 – 119



Congoli (Tupong)
Pseudaphritis urvillii

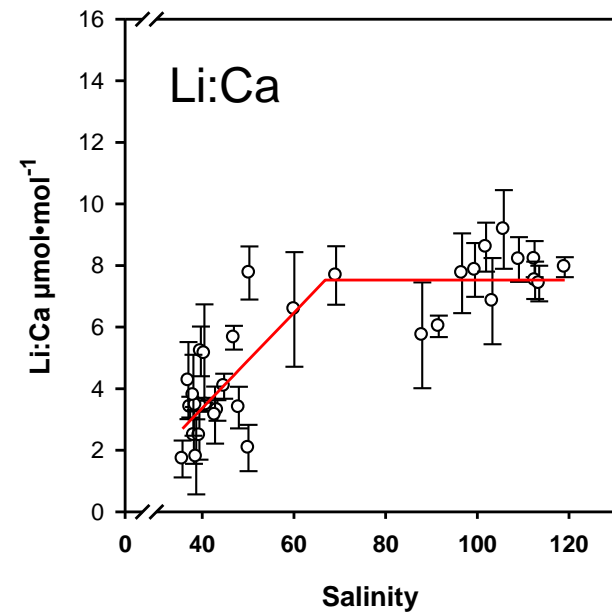
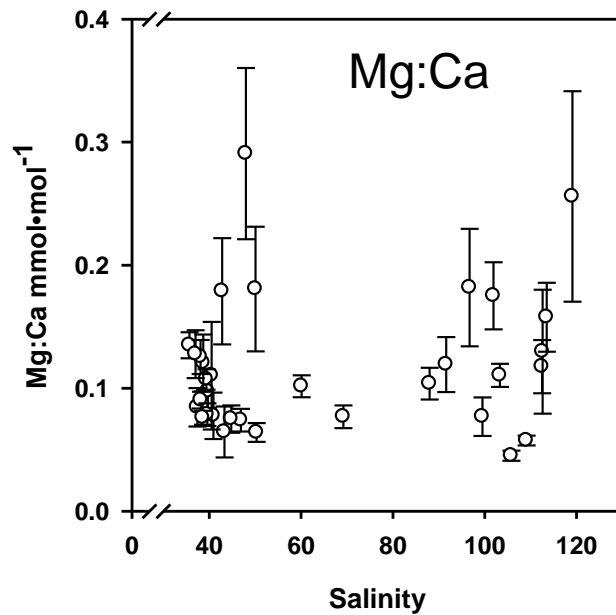
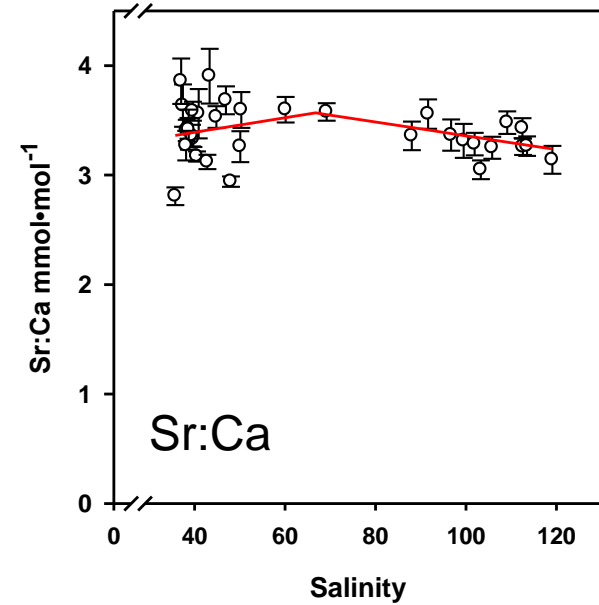
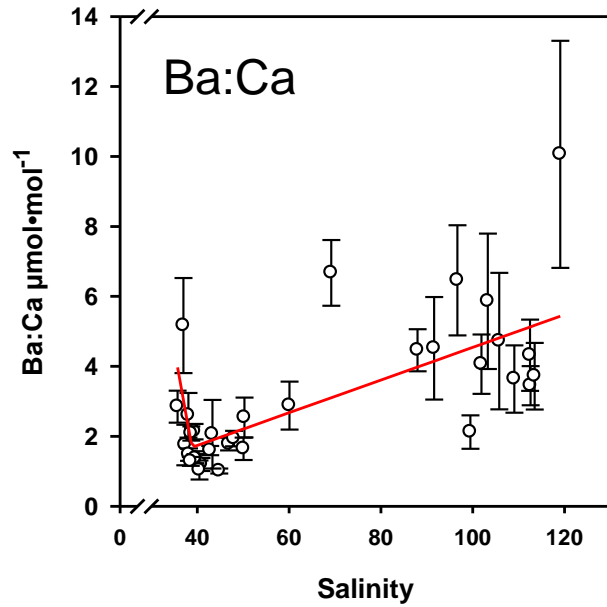
salinity: 6 – 70

Chemical Analysis

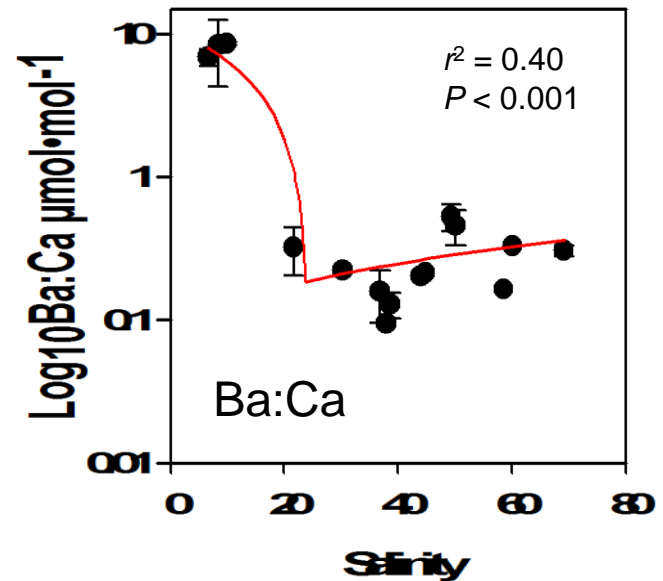
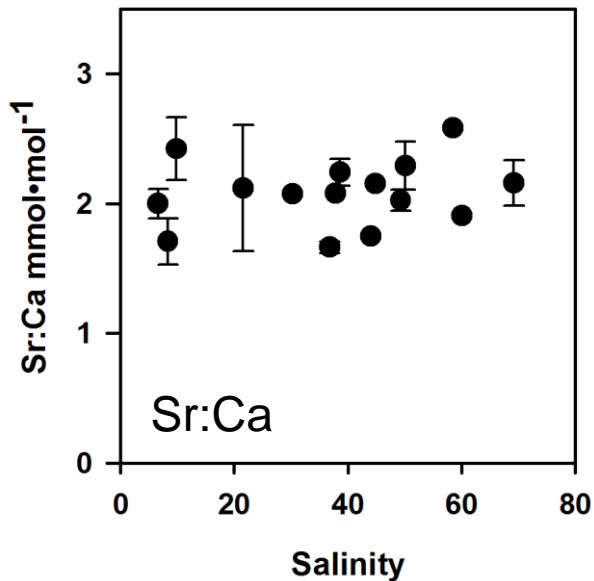
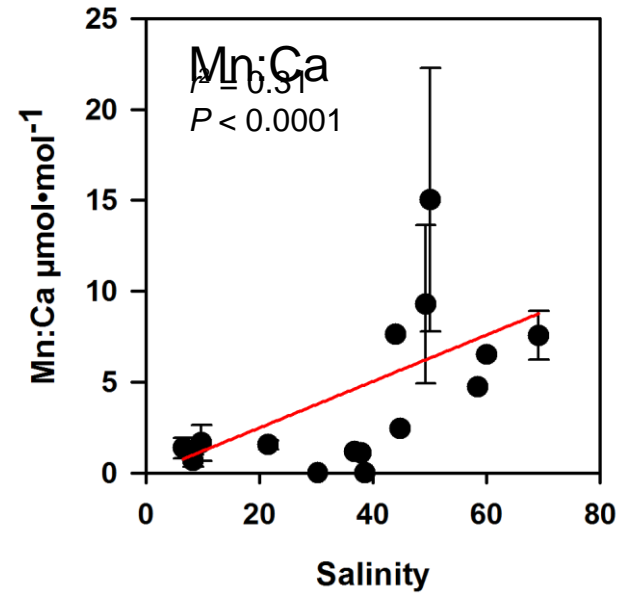
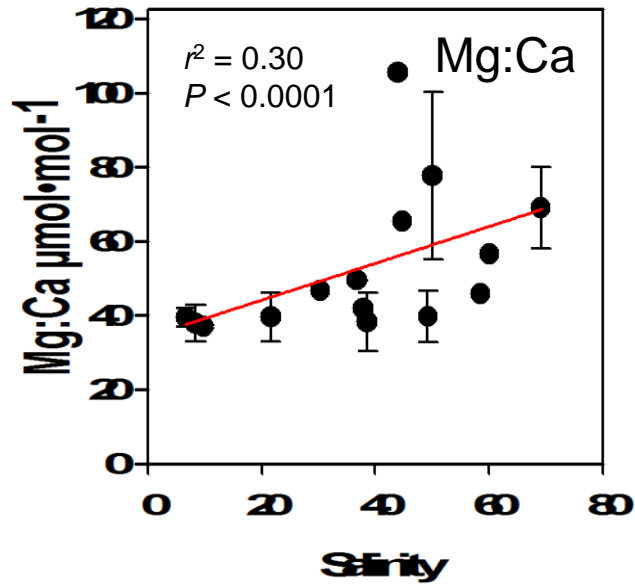


Laser Ablation ICPMS

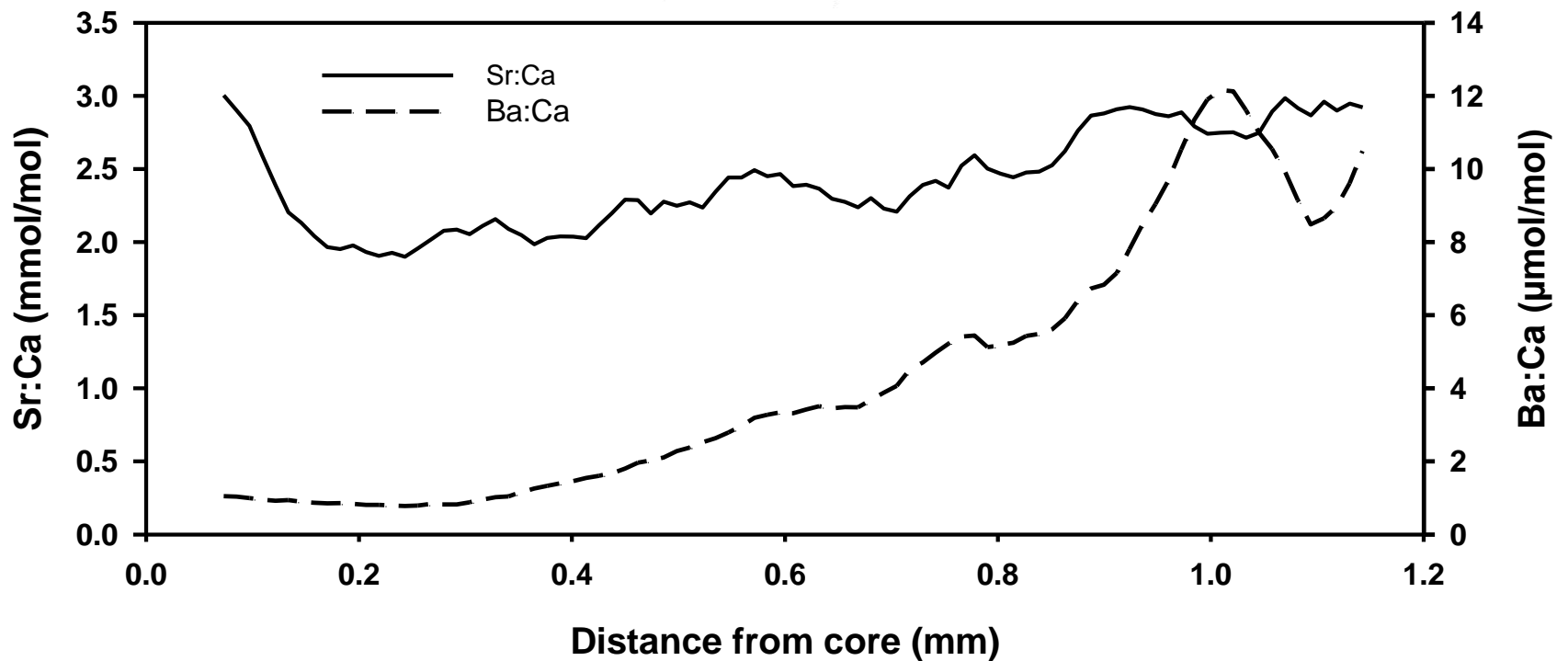
Hardyhead otolith chemistry



Congoli otolith chemistry

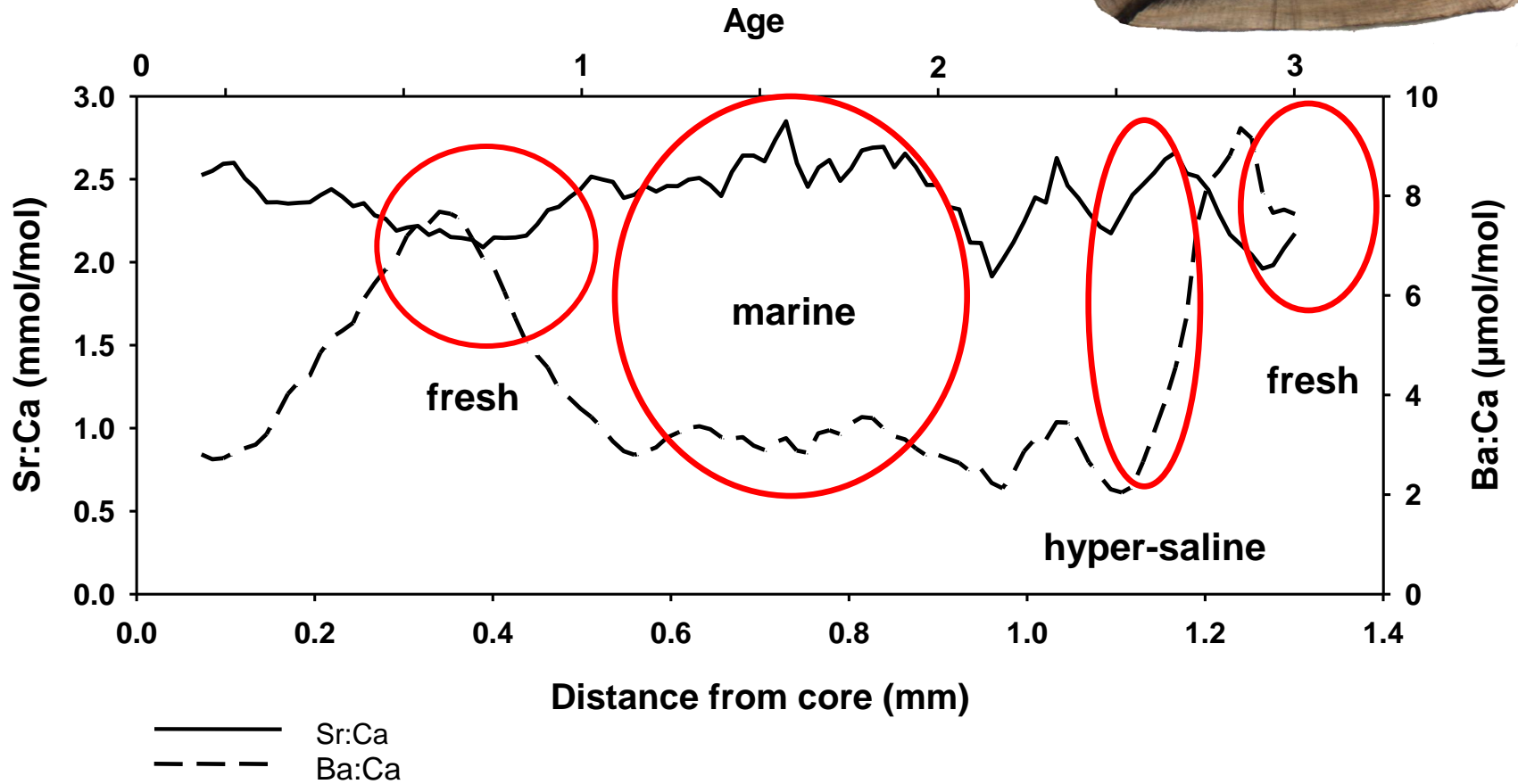


Otolith transects



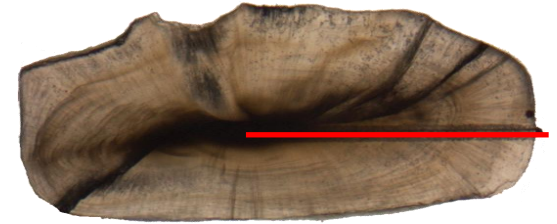
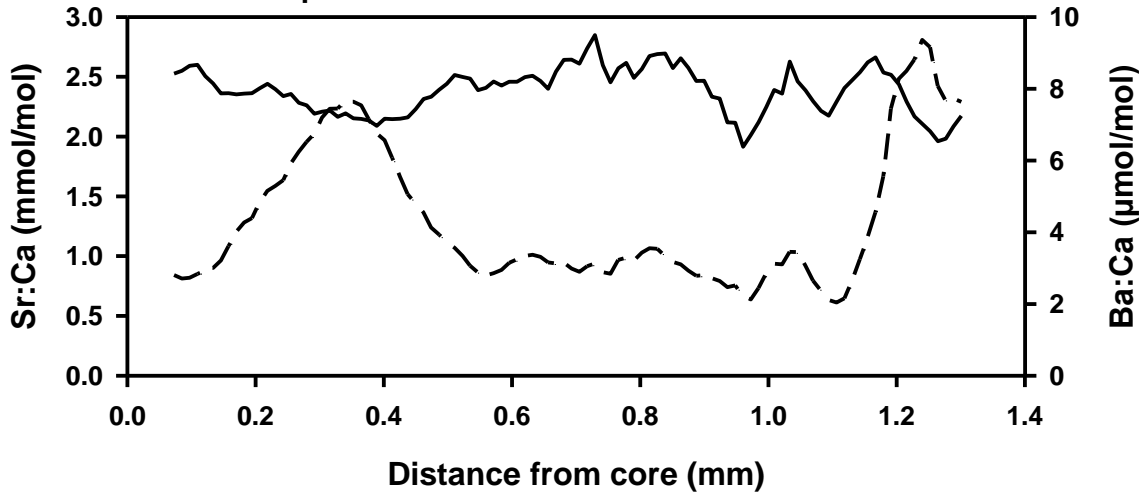
Otolith transects

Yellow-eye mullet – 3 yrs, 300 mm

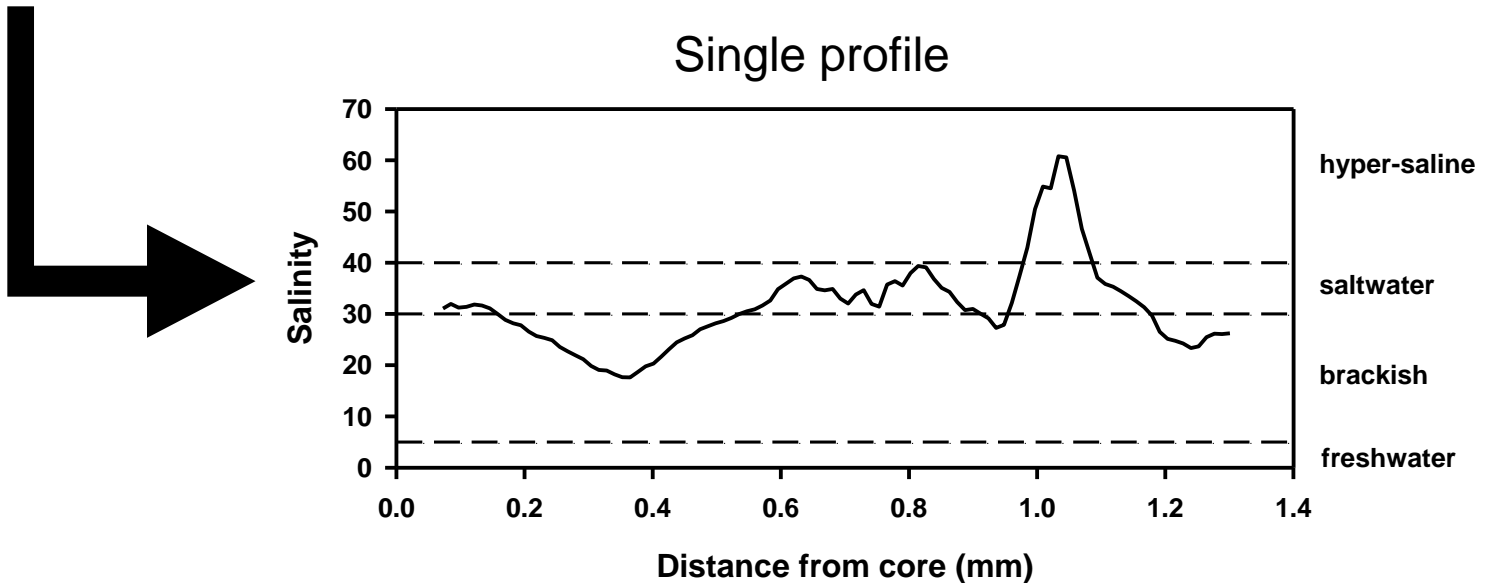


Predict environmental history

Multiple element transects

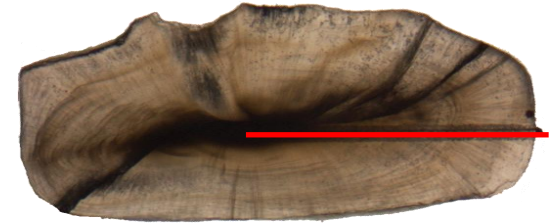
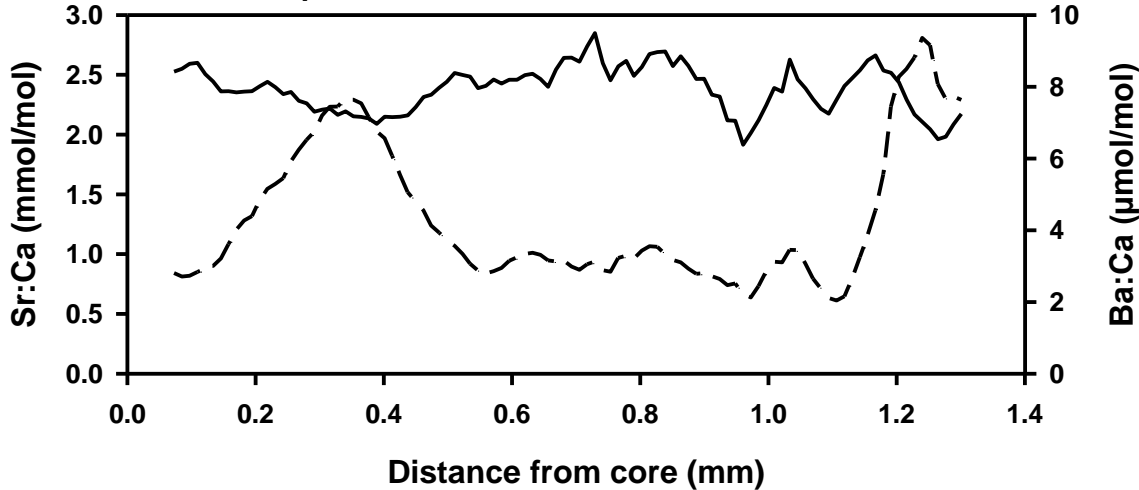


Single profile

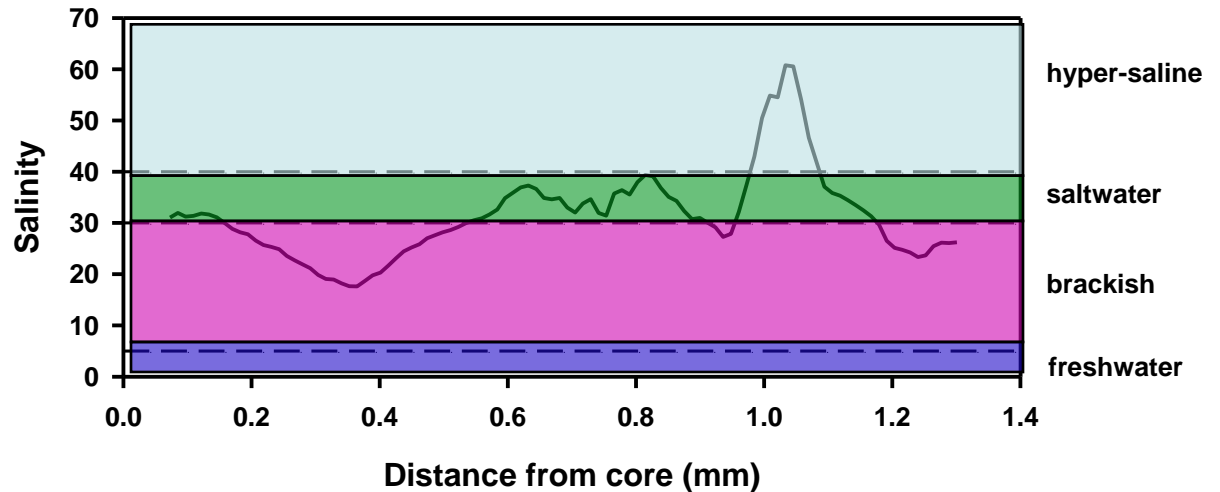


Predict environmental history

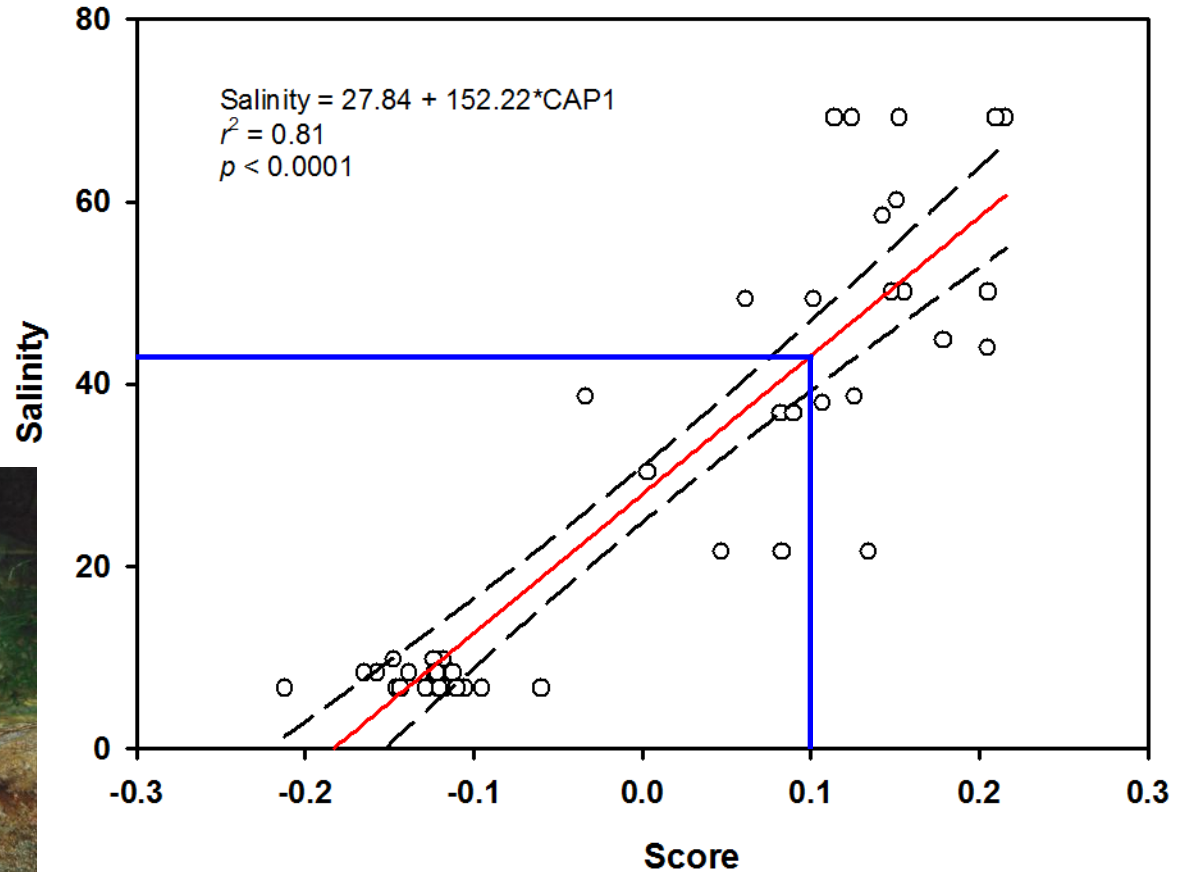
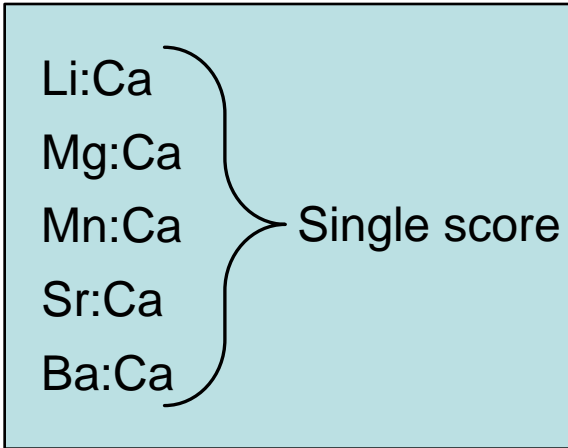
Multiple element transects



Single profile



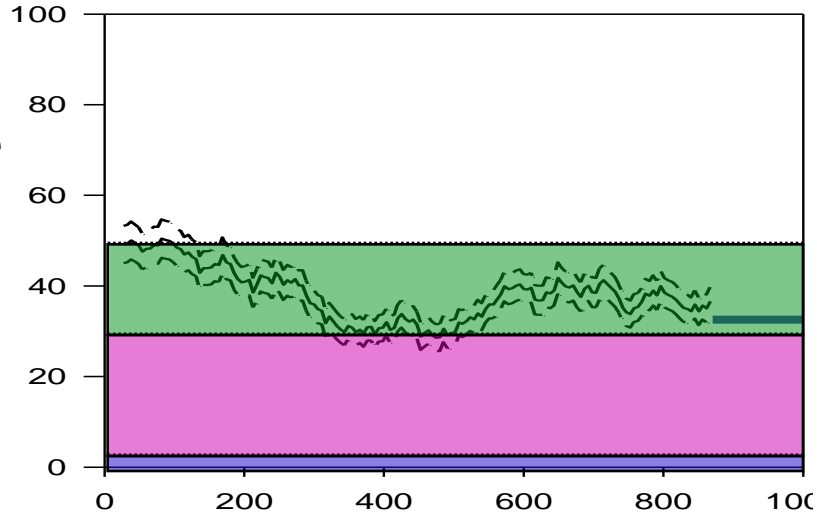
Estimate of salinity history



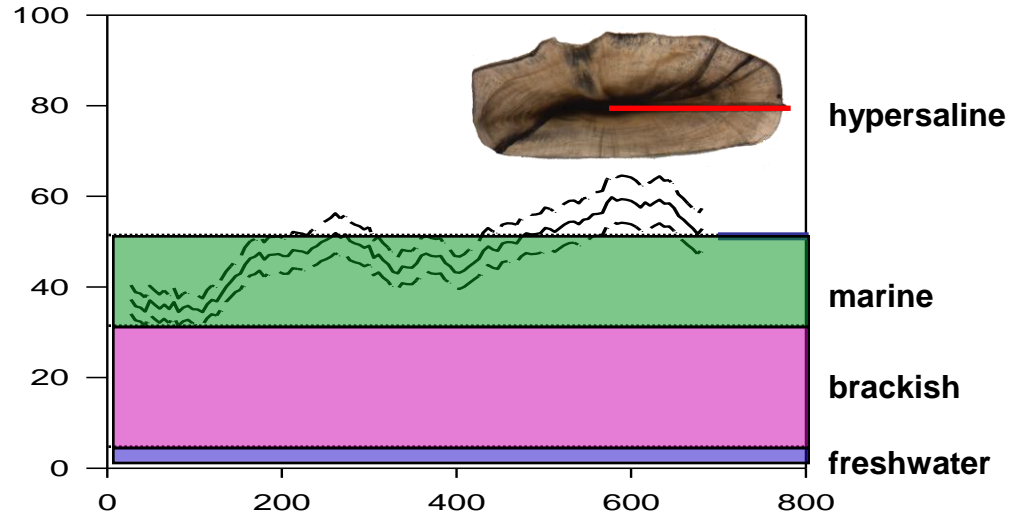
Calculate single score based on multiple elements to then predict salinity

Congoli transects

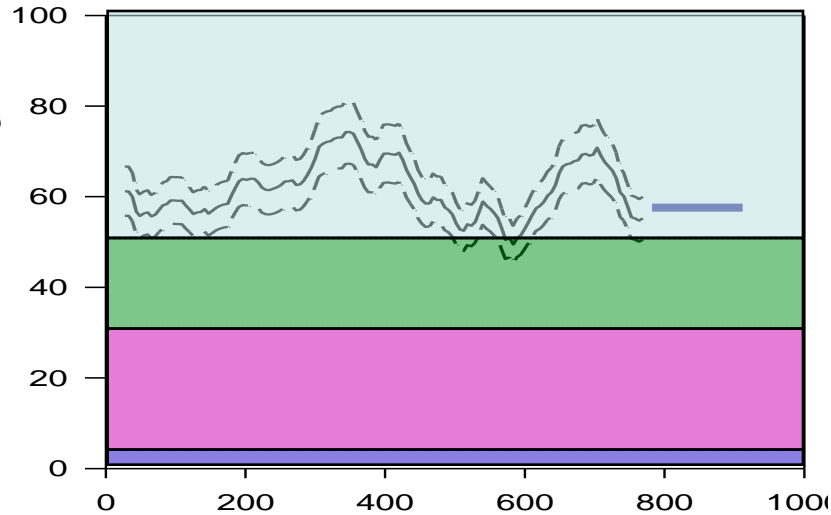
Beacon 19 – 216 mm



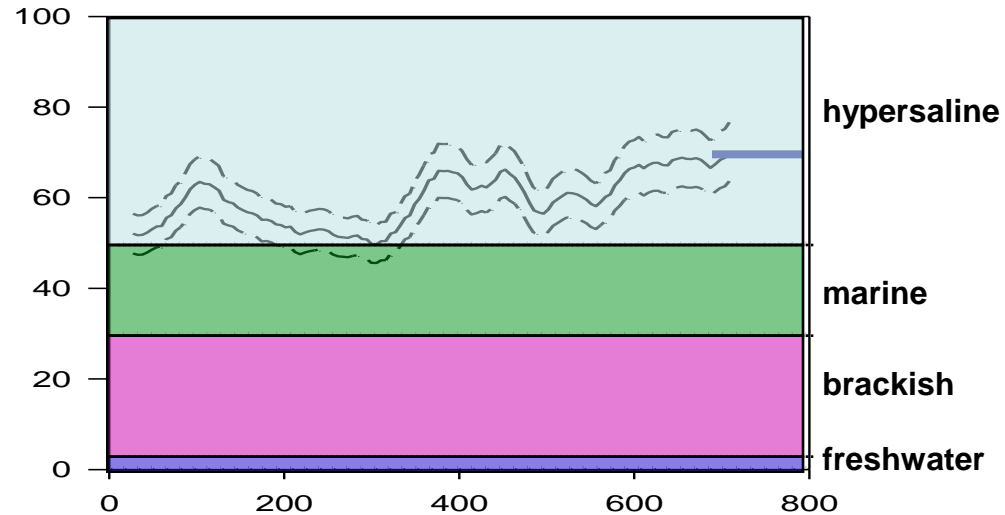
Pelican Point – 165 mm



Mark Point – 175 mm



Noonameena – 170 mm

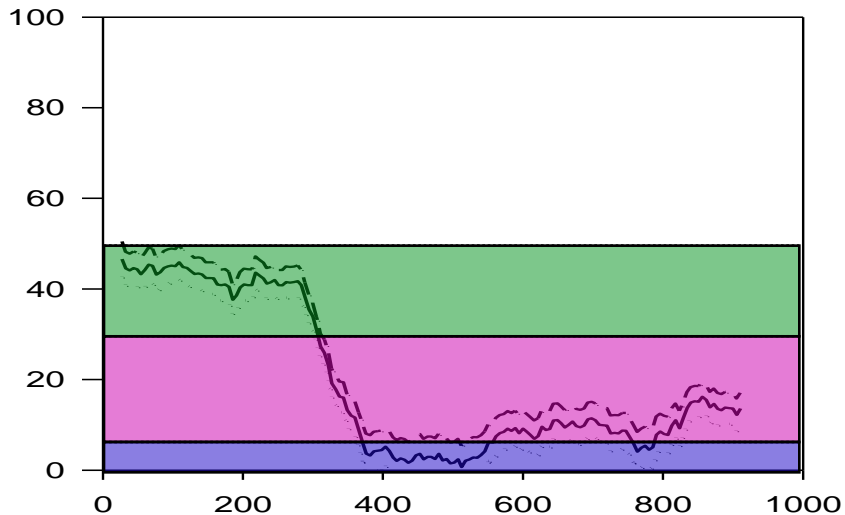


Distance from core (μm)

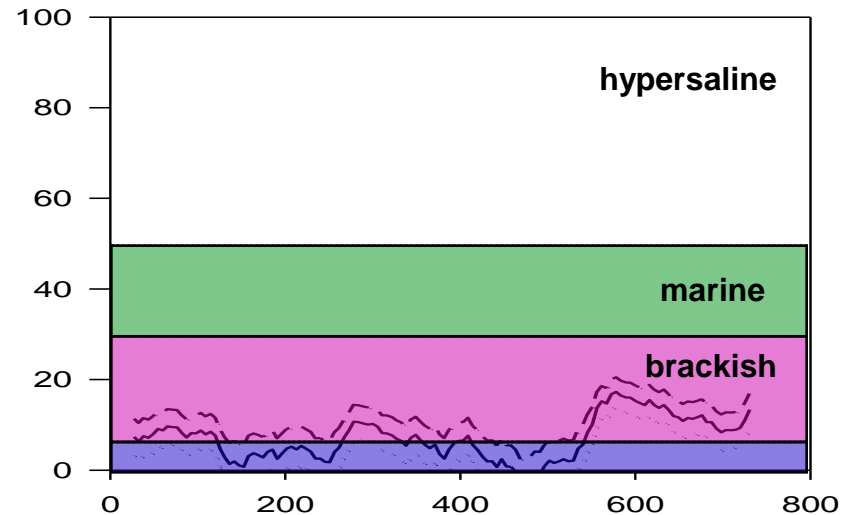
Congoli transects

- Fish collected from brackish water – 6.6 ppt
- Contrasting patterns for fish caught in same area

Mundoo Barrage – 193 mm



Mundoo Barrage – 169 mm



Distance from core (μm)

Summary

- **Determine salinity – otolith chemistry relationship**
- **Estimate past environmental history of fish within the Coorong**
 - **Otolith transects**
 - **Otoliths from historical collections & aboriginal middens**
- **Determine common patterns/strategies**
 - **What habitats are the fish spending time in?**
 - **Are fish using the fish ladders?**
- **Predict response to different management scenarios**
 - **Closure of Murray Mouth?**
 - **Increased flows over barrages?**

