



# Fishing the Past: Archaeological Fish Remains Reveal Connections Between Humans and the Environment

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## Fishing the Past: Archaeological Fish Remains Reveal Connections Between Humans and the Environment

- Coastal archaeology
- Fish Remains
- What they can tell us about fish
- What they can tell us about people



## Coastal Archaeology – Shell Middens

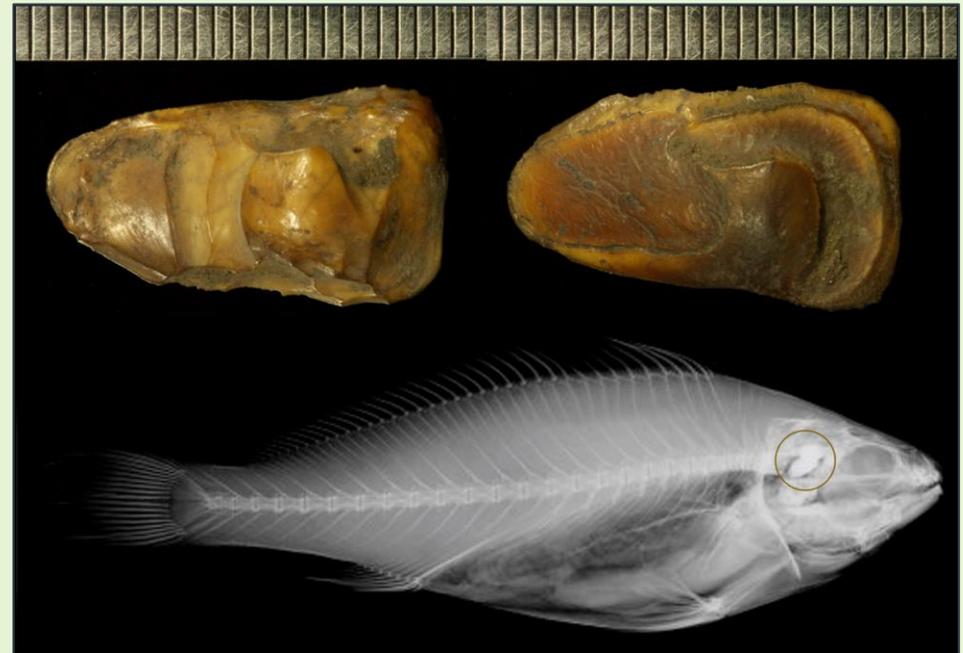


- Shell middens are accumulations of shell produced by Aboriginal people collecting, and usually cooking shellfish.
- Often contain evidence of cooking.

- Sometimes they contain animal bones, fish bones, stone tools and Aboriginal burials.
- Edible species - what are people eating and are they targeting certain species?



# Archaeological Fish Remains

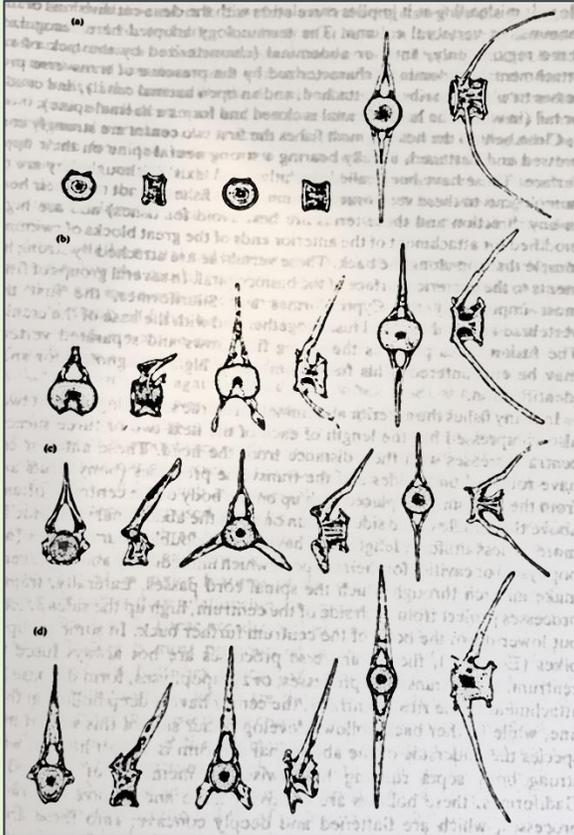


## What can ancient fish remains tell us about fish?



- Species
- Size
- Age at death
- Season of death
- Habitat and life history
- When the fish died
- Past population structures

# Fish Species



Trout, *Salmo trutta*

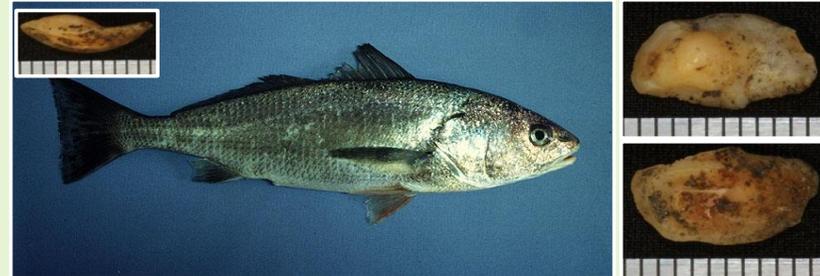
Carp, *Cyprinus carpio*

Whiting, *Merlangius merlangus*

Sea bream, *Pagrus pagrus*



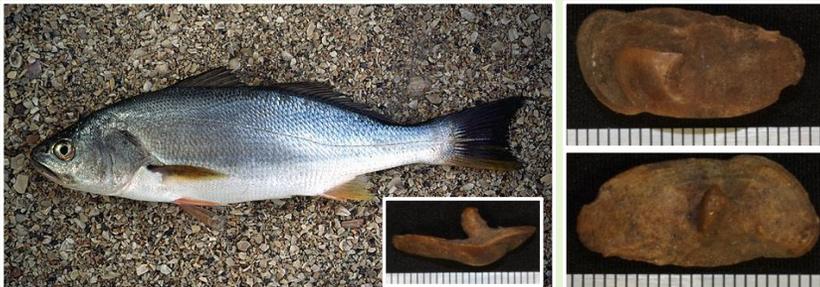
*Sciaena deliciosa* Lorna drum / Corvinilla



*Trachurus murpyhi* Jack mackerel / Jurel

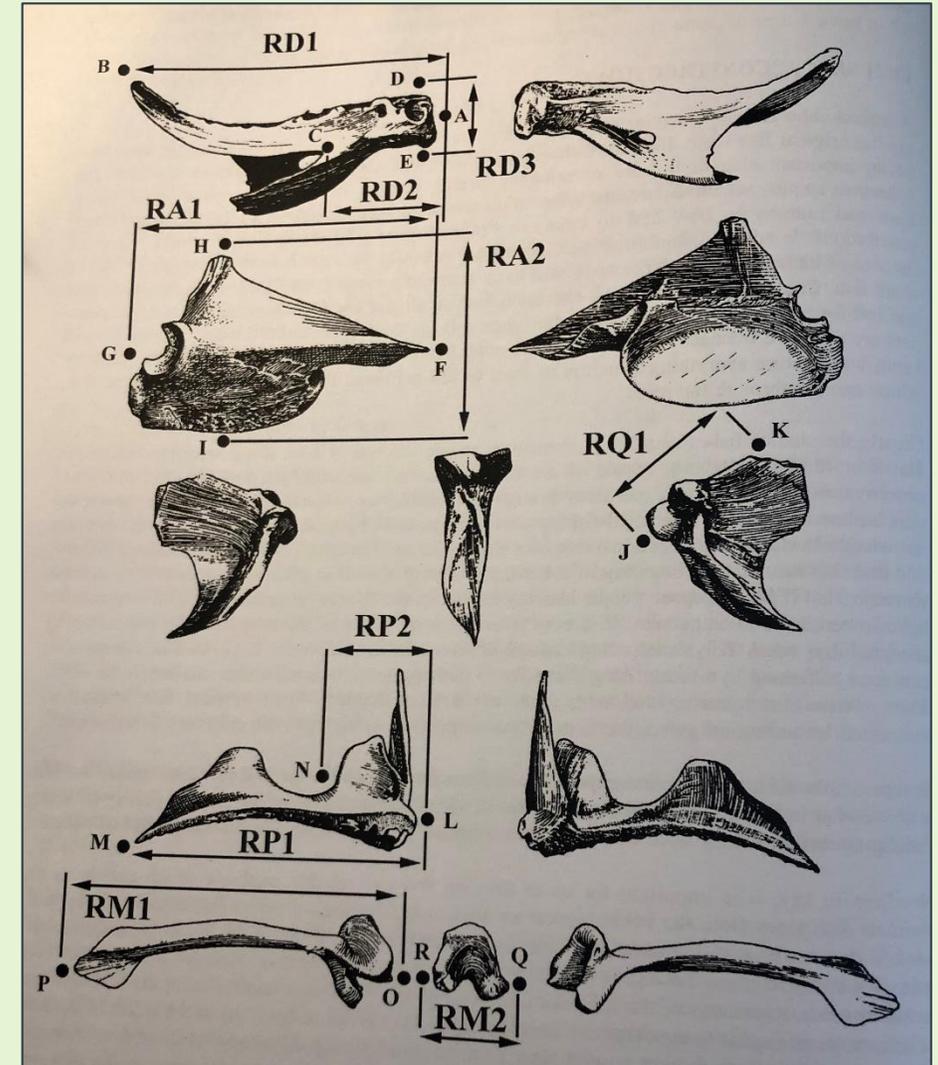
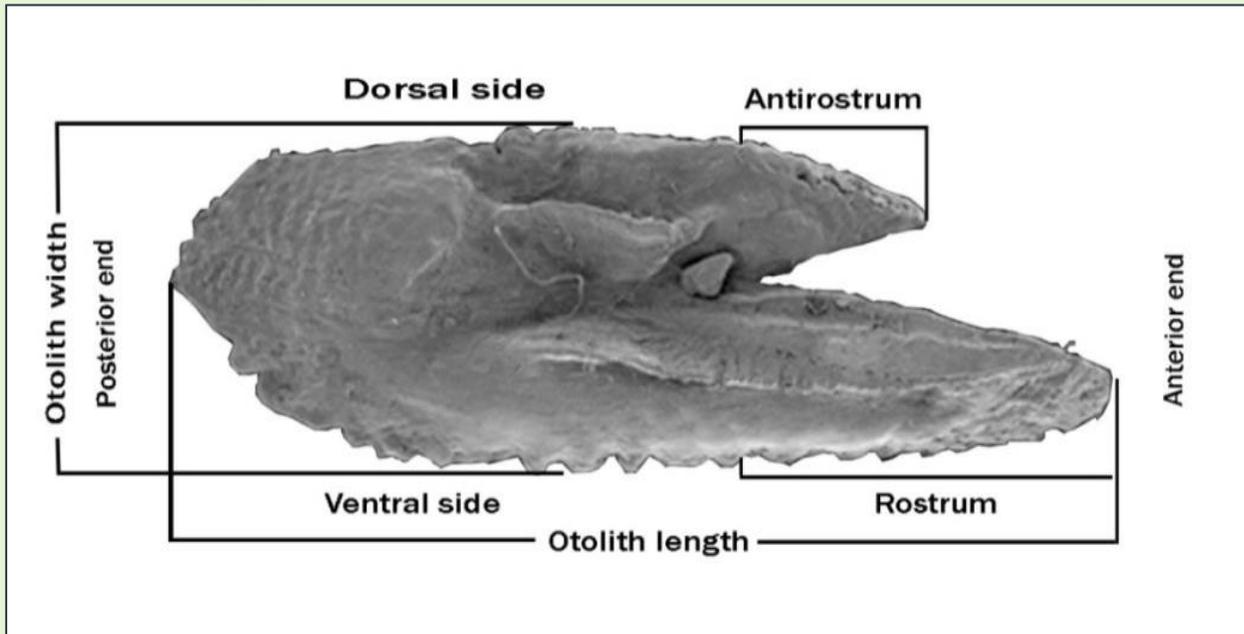


*Cilus gilberti* Corvina drum



## Fish Size

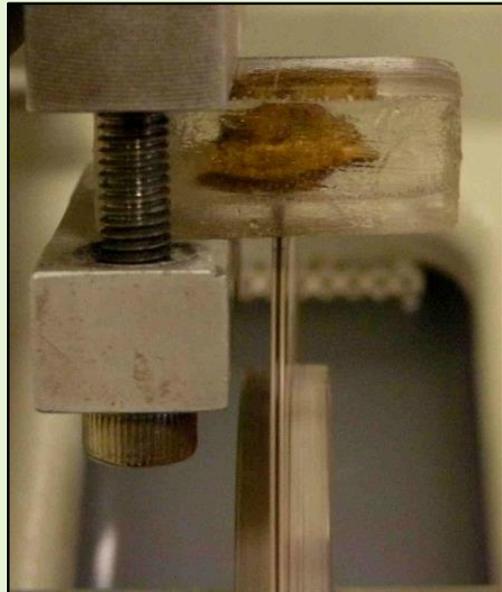
- Fish grow larger the longer they live – capacity dependent on internal and external factors
- Length or weight of otolith and some bones used to determine fish size
- Modern validation
- Broken or degraded remains = underestimates of fish size



## Fish Age at Death

Technique involves counting natural growth rings on the scales, **otoliths**, and numerous bones including vertebrate and fin spines.

*Argyrosomus japonicus*  
(mulloay)  
determined  
to be 13 years  
old



## Season of Death

- Determine the season of death of fish using edge increment analysis

Died toward the end of the warm season

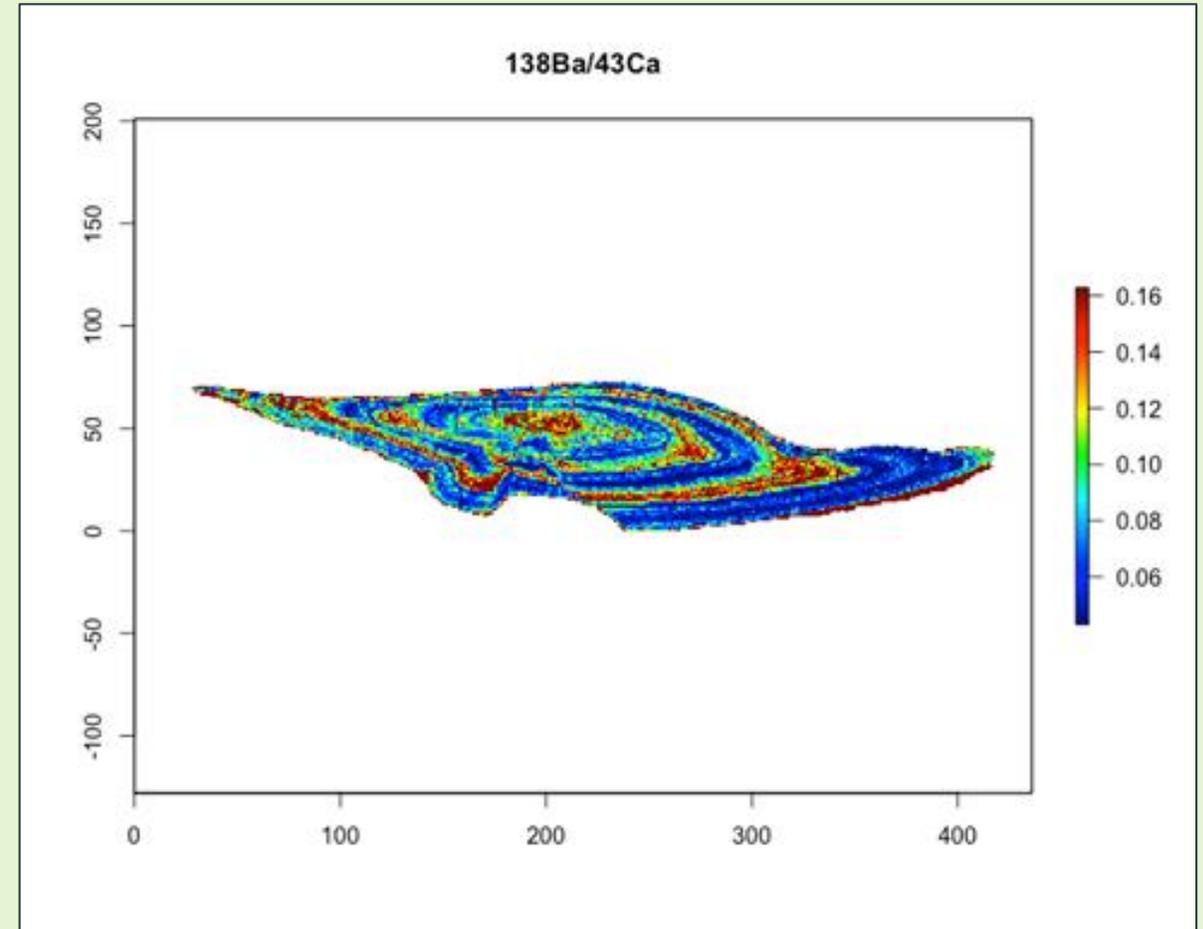
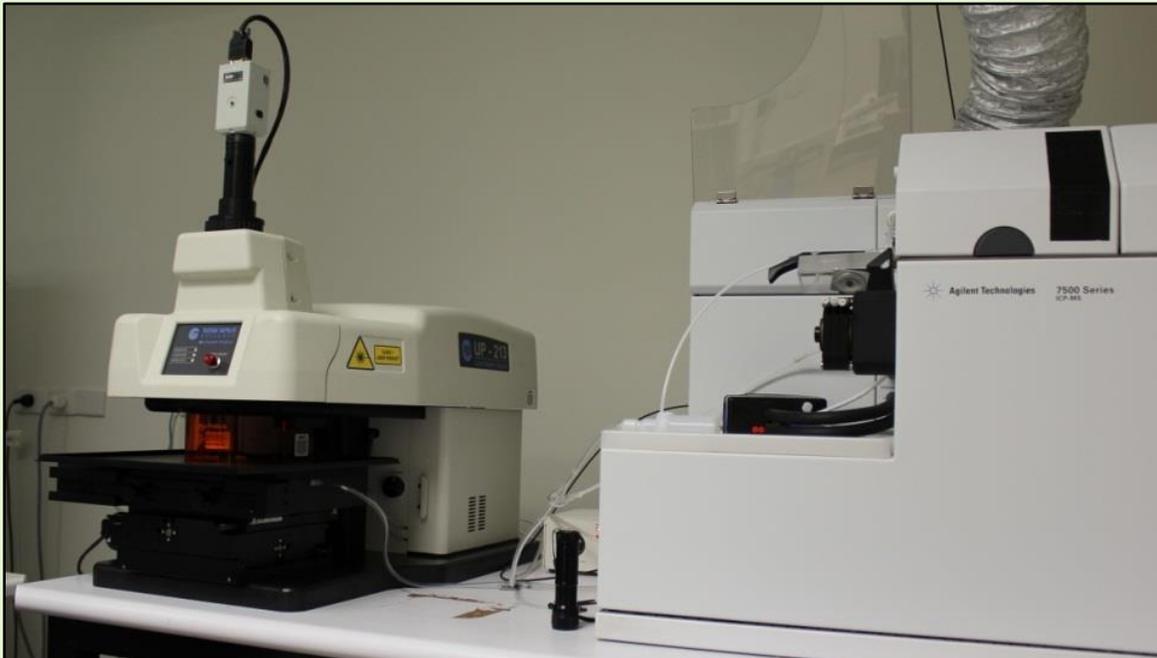


Died at the beginning of the warm season/end of cool season



## Habitat and Life History – Trace Element Analysis

- Elements incorporated into otoliths, bones and scales as they grow
- Influenced by salinity, temperature, ambient water chemistry, the bedrock type the water is exposed to, and the physiology of the fish.
- Sr:Ca – temperature (relationship varies between species)
- Ba:Ca – decreases from freshwater to marine waters
- Palaeoenvironmental conditions and seasonality



## Isotope Analysis

- $\delta^{18}\text{O}$  - As water temperatures increase, the uptake of  $\delta^{18}\text{O}$  in fish bones and otoliths decreases.  
- Fish migrations and environmental changes.
- $\delta^{13}\text{C}$  - Metabolic activity  
- Comparisons of  $\delta^{13}\text{C}$  values within and among modern and archaeological remains = informative trends related to ontogenetic change.
- $\delta^{15}\text{N}$  - Increases from lower to higher levels of the food chain.  
- Establishing pre-disturbance ecological benchmarks, or baselines, an essential first step for documenting ecosystem change in response to anthropogenic alterations.



# When the Fish Died – Radiocarbon Dating



## Past Fish Population Structures



- Combined methods = life histories of individual fish
- Large samples sizes = past fish population structures
- Temporal changes – add to historical records
- Baseline data – rehabilitation of native fish stocks
- Populations impacted by Indigenous people
- Archaeological assemblages result of selective process – not direct representations