Validating an ageing method for the Antarctic toothfish (*Dissostichus mawsoni*)

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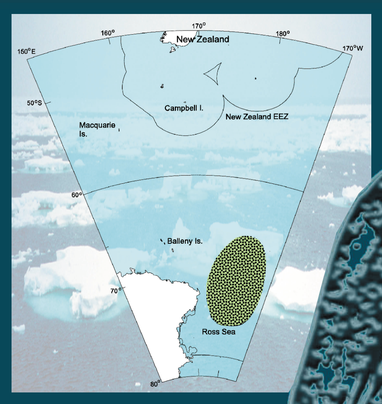
The Ross Sea fishery for Antarctic toothfish

- A longline fishery occurring from January to May in the northern Ross Sea (stippled yellow area)
- The fishery began in 1998 with landings of 41 t; landings in the 2002 season were 1358 t

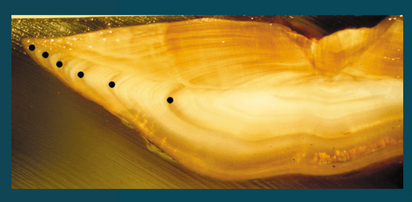


The aim of this research

- To validate an ageing method for Antarctic toothfish using newly available data from juvenile and adult fish

Why is age determination important?

- Knowledge of age is essential for the rational management of any fish species
- A fast-growing, short-lived species can generally be exploited at a higher rate than a slow-growing, long-lived species
- Fish are usually aged by counting translucent zones in transverse sections through their crystalline otoliths ("ear stones"), as shown for a 6-year-old hoki

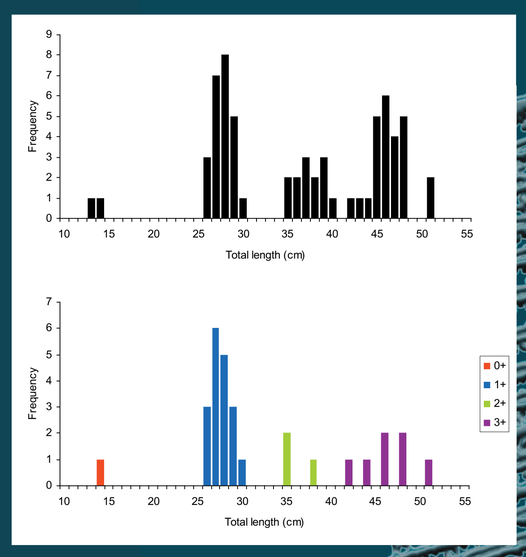


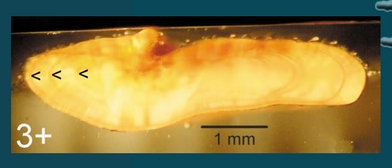
- One zone is generally formed each year, but as this is not always the case it is essential to validate zone periodicity

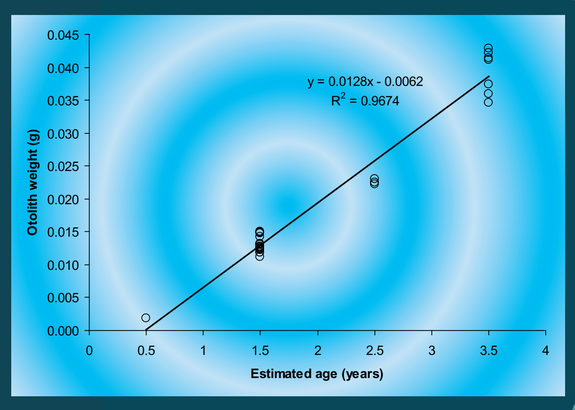
Data from juvenile fish

- Otoliths were available from a sample of juvenile toothfish exhibiting four distinct length modes at 14, 28, 37, and 46 cm (postulated to be consecutive year classes), from a South Shetland Islands trawl survey
- Otolith zones were counted without reference to fish length
- Counts of 0, 1, 2, and 3 zones were recorded, and the count incremented by 1 in otoliths from each consecutive mode
- Otolith weight was linearly related to estimated age (and such a relationship holds for most correctly aged fish species)

→ Length modes represent year classes (aged 0.5, 1.5, 2.5, and 3.5 years, respectively), and one zone forms annually in juvenile otoliths

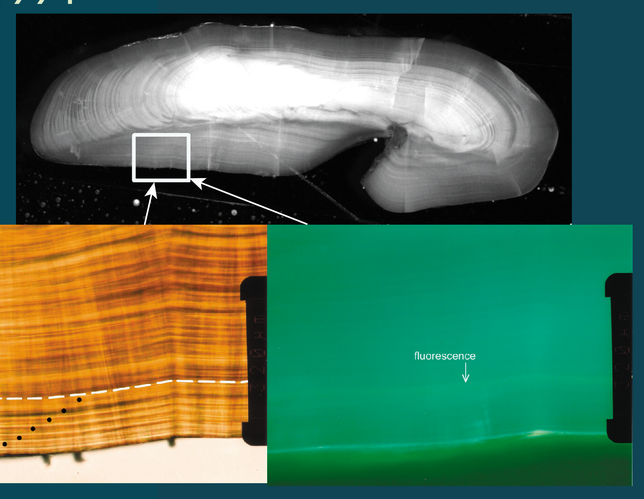






Data from recaptured tagged fish

- Antarctic toothfish have been tagged and released at McMurdo Sound in most years since 1972
- Many had been injected with the antibiotic oxytetracycline, which causes fluorescence in the otolith material deposited at the time of the injection
- Otoliths were available from six injected fish recaptured at least a year after tagging
- The pictured example shows otolith sections from a fish tagged in November 1987 and recaptured in November 1994

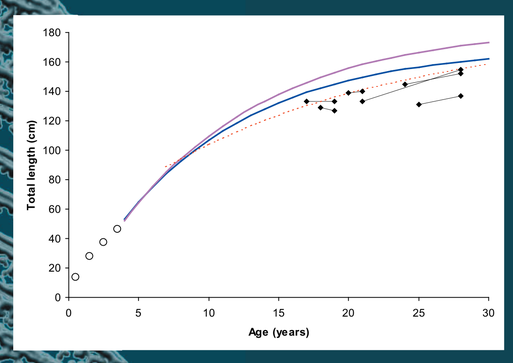


- 7 zones had formed outside the fluorescent marker

→ One translucent zone is formed annually in the otoliths of adult Antarctic toothfish, so counting these zones is a valid method to age this species

Antarctic toothfish growth

- Growth curves calculated from fish aged 4-39 years from the longline catch. On average, females (pink) reach a larger size-at-age than males (blue)

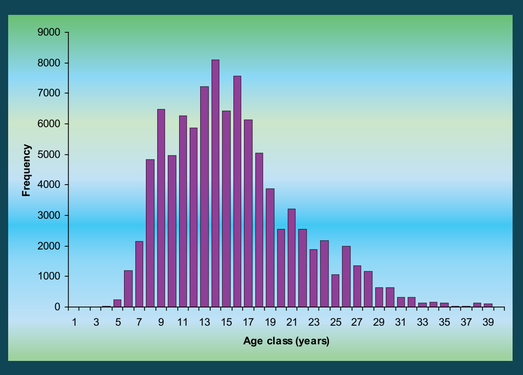


- The estimated juvenile lengths-at-age (open circles) match well with the adult growth curves
- Growth rates by the six tagged fish appear "below average", though they match more closely a curve (red) calculated from unsexed McMurdo Sound fish only

→ Do Antarctic toothfish in McMurdo Sound have a slightly slower growth rate than those in the northern Ross Sea?

Age composition of the fishery

- The NZ longline catch appears to comprise mainly adult fish aged 8 to 25 years



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