Preliminary estimation of age-at-length of yellowfin from the WCPO

Based on otolith annual increment counts

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IATTC Workshop on age and growth of BET and YFT in the Pacific Ocean
25 January 2019

Objectives

Conduct preliminary analysis on suitability:

- Otoliths - daily & annual age
- Fin spines - verify the annual counts in otoliths of small fish

Develop a reference collection and protocols

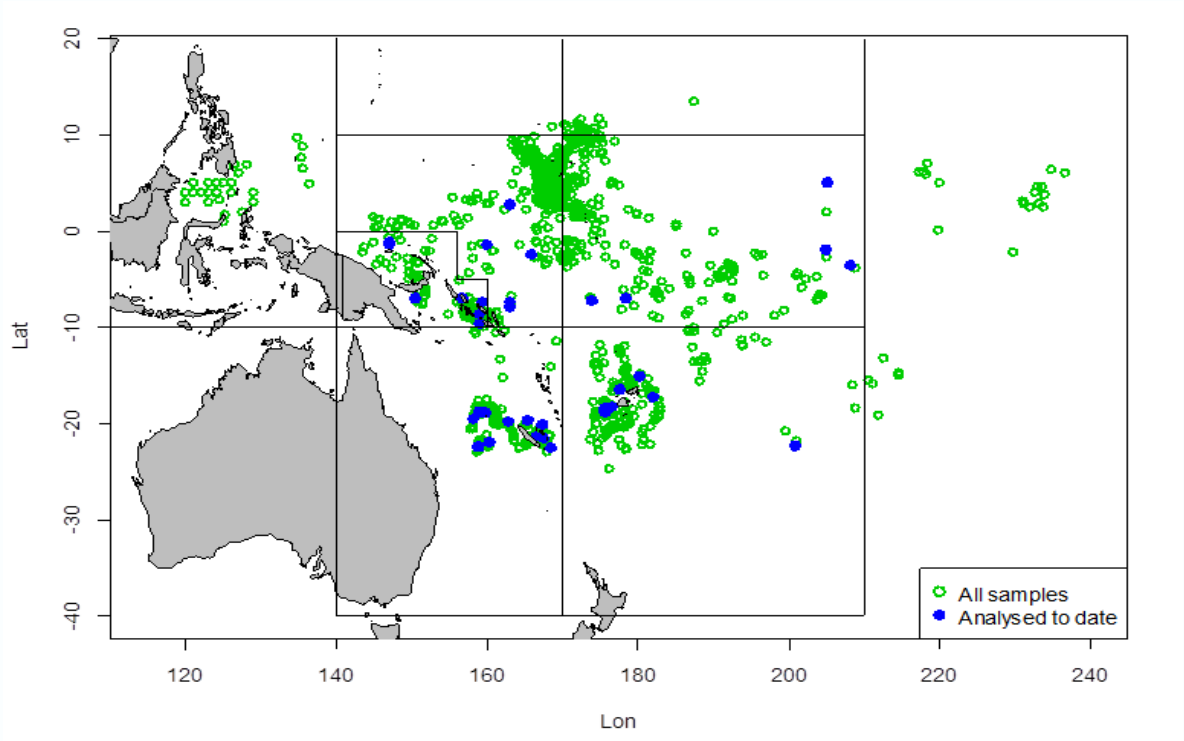
Prepare and read 1500 otoliths – annual ageing

Prepare and read 150 otoliths – daily ageing

Undertake age validation work

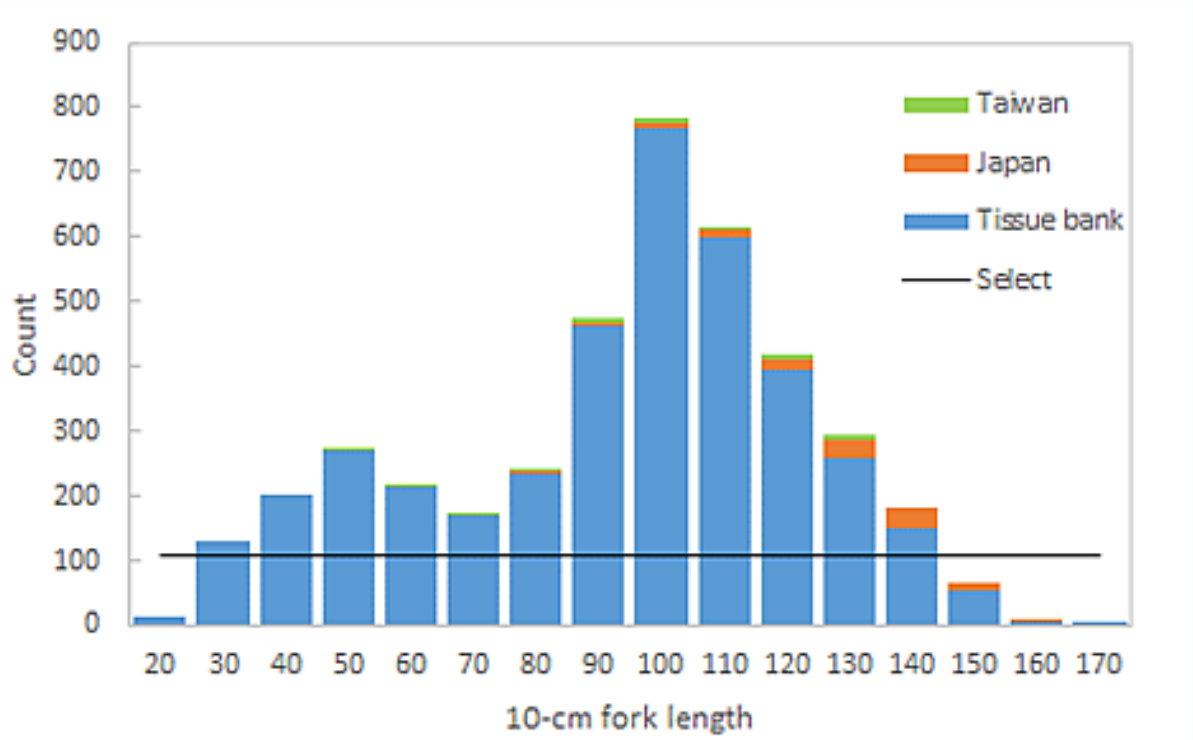
Report to WCPFC SC15

Map of sampling locations



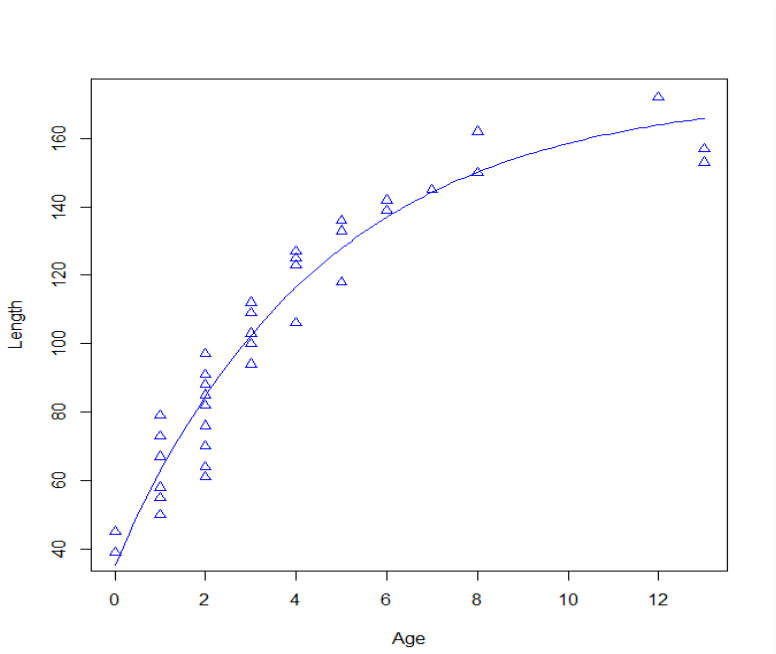
- Over 4,000 available from tissue bank since 2009
- Nearly 3,000 since 2014
- Additional otoliths from Japan & Taiwan
- Selected 40 for trial work

Otoliths available



Trial work – annual ageing

- 40 otoliths and 40 spines – annual ageing
- 30-172 cm FL
- FAS prepared and read otoliths
- FAS prepared spines, CSIRO examined



#20 172 cm
Count = 12

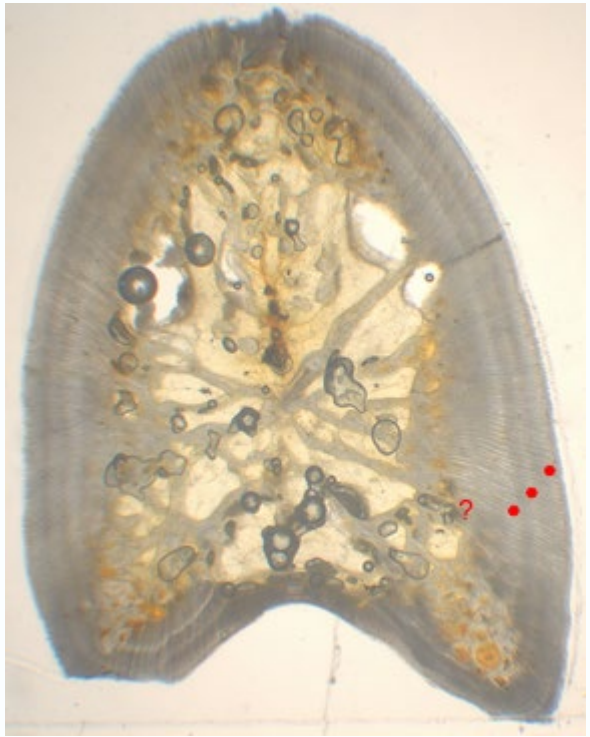
Fin spines

- Spines - bony skeleton
- Vascularised structure, i.e. connected to the circulatory and nervous systems (unlike otoliths)
- Subject to resorption and vascularisation as the fish grows, leading to “loss “ of early increments
- Spines useful to verify otolith 1-3 increments

YFT_25. 76 cm FL. Count = 1 opaque with 2nd forming on edge

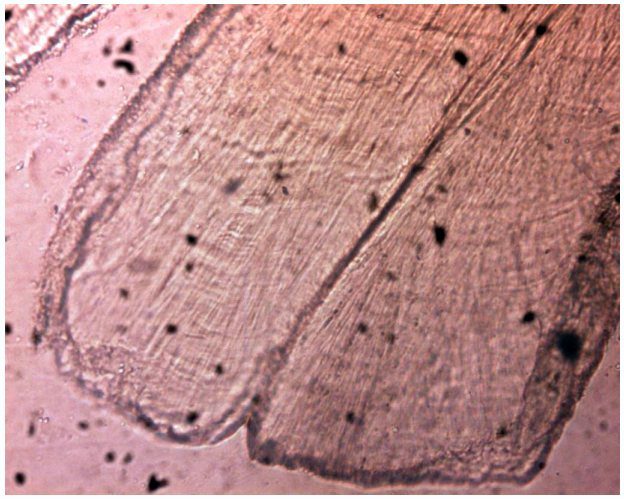
Otolith – spine comparison

YFT_1, 109 cm FL, count = 3

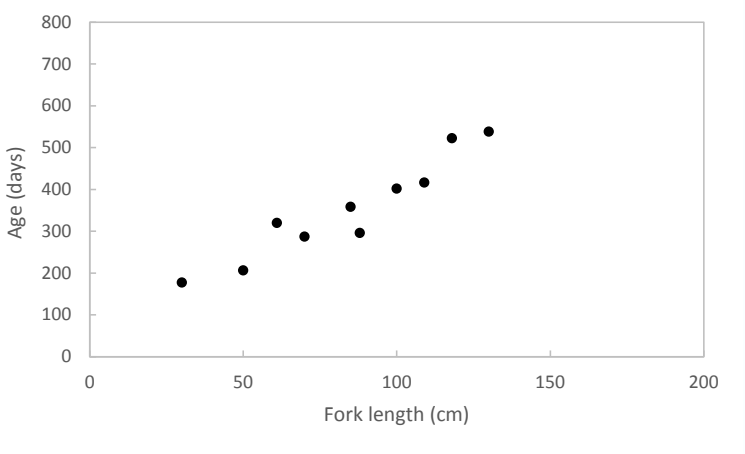


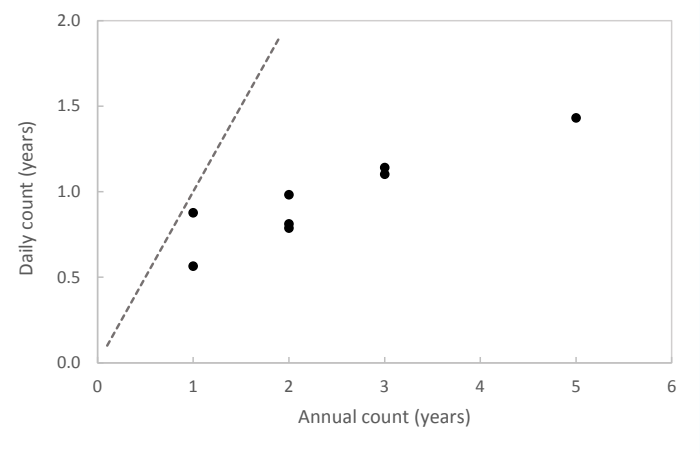
YFT_34, 139 cm FL, count = 6

Daily ageing

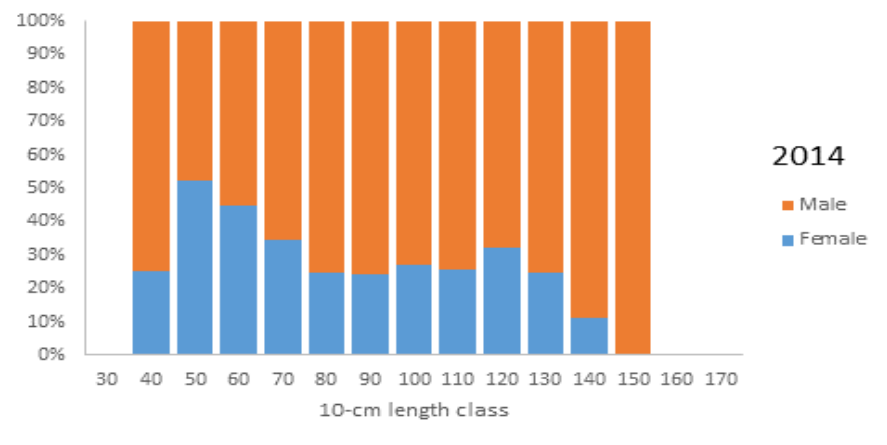


- 10 otoliths – transverse section
  - Locate annual zones (365 days = age 1 yr)
  - Age that divergence occurred with annual age
- Clear increments close to primordium
- Interruption at 150-180 increments
- 1st & 2nd opaque zones occurred before the "365th increment"





Sex ratio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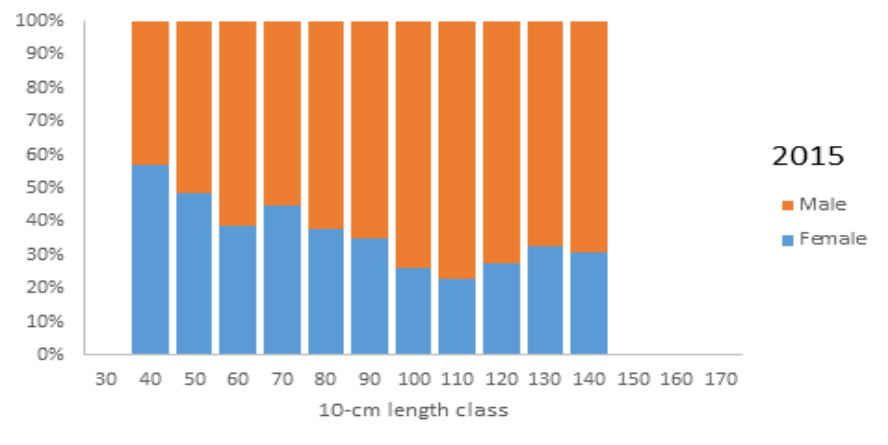
10-cm length class
2014
Male
Female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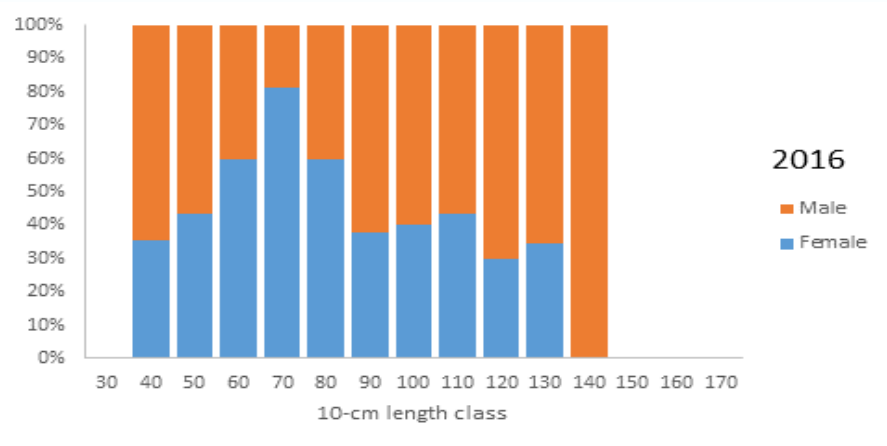
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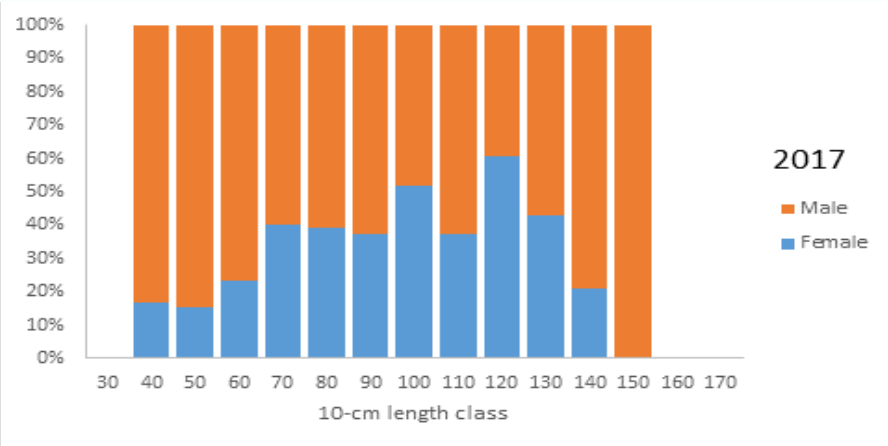
10-cm length class
2016
Male
Female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10-cm length class
2017
Male
Female

Future work

- Inter-laboratory age comparison
- Age validation & corroboration
  - Strontium chloride marked otoliths
  - Edge type & marginal increments analysis
  - Spine analysis to corroborate
- Complete annual ageing work (n=1500)
  - Select otoliths by length and region
- Complete daily ageing work (n=150)
- Develop growth curves
- Use GAMs to investigate spatial variation in age & otolith weight