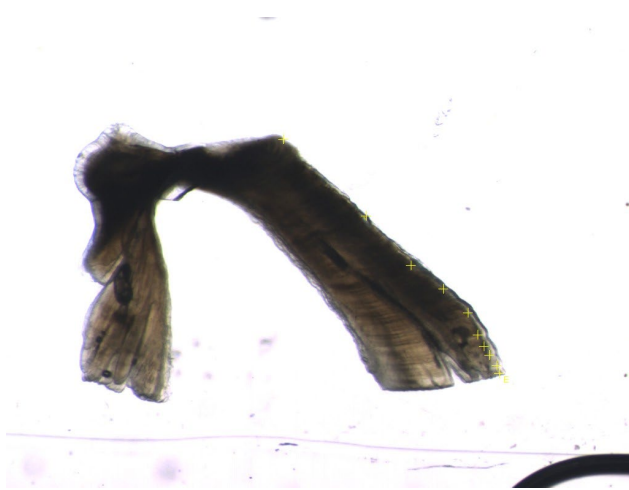




Fish Ageing Services



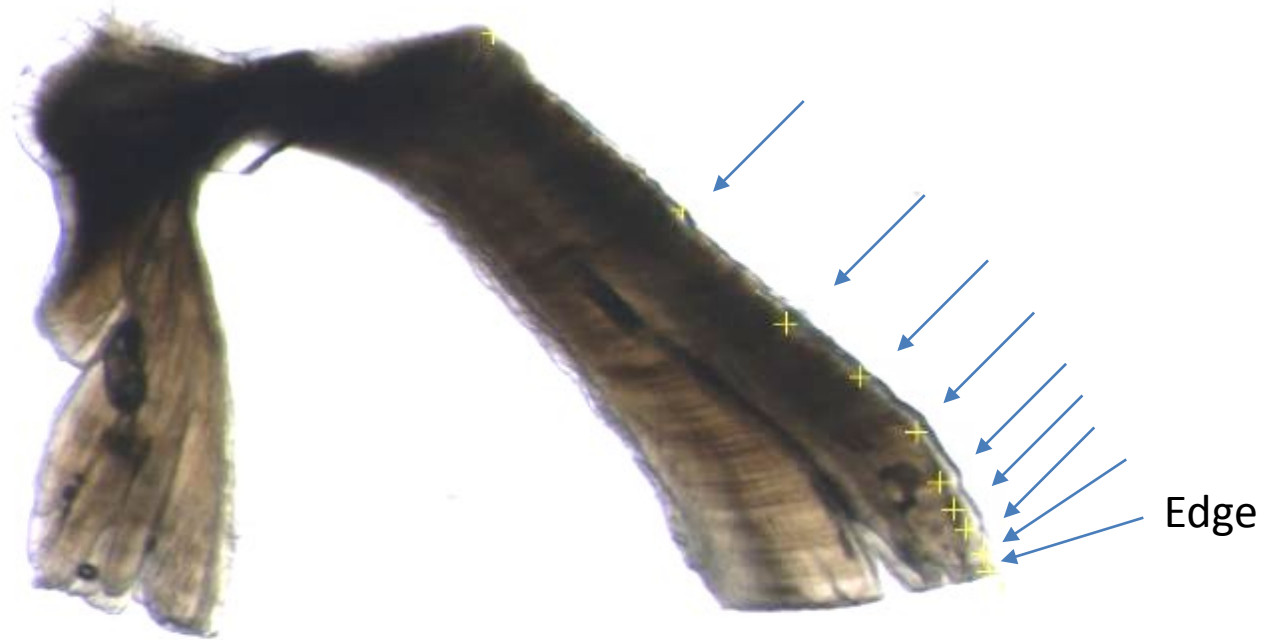
ANNUAL AGEING OF YELLOWFIN TUNA: WHERE ARE WE NOW



Ageing data sets $N = 2$

- 40 otoliths from WPO
- 68 otoliths from EPO – Daily vs annual age evaluation

Some examples - WPO



WPO Sample - B15371

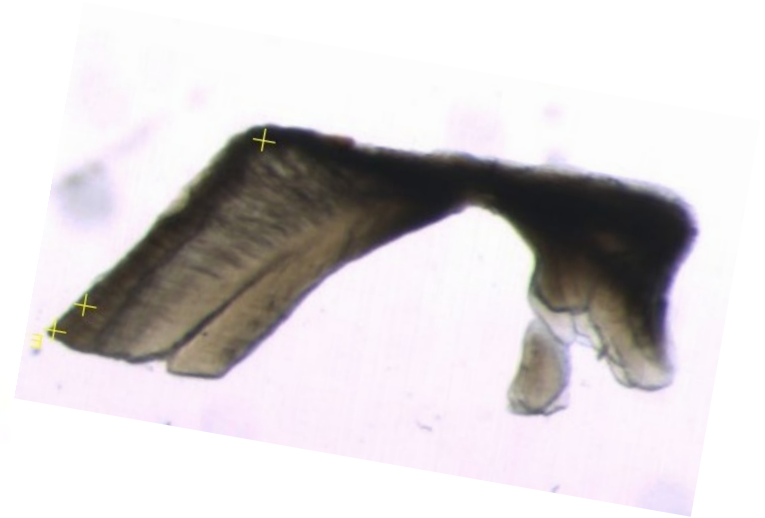
1500mm FL Male - Zone count 8 NT



Some examples - WPO

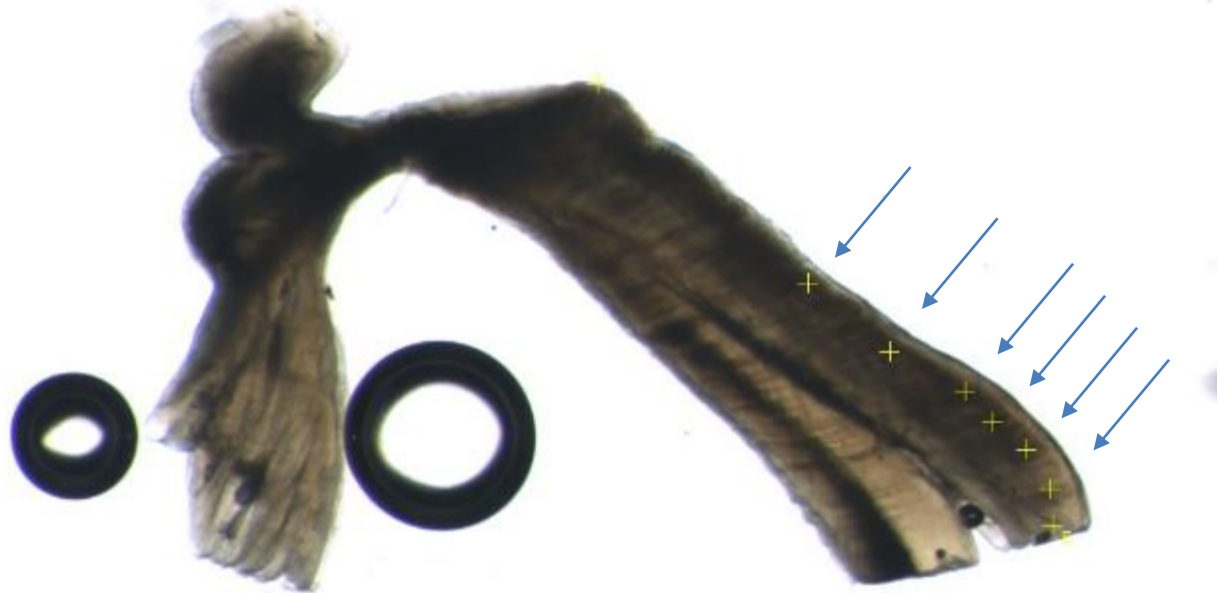


WPO Sample - B17551
1230mm FL - Female
Zone count - 3 WT



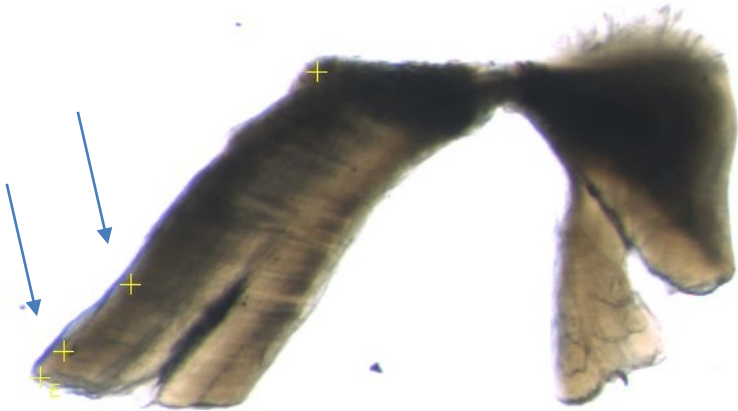
WPO Sample - B17551
580mm FL - Female
Zone count - 1 NT

Some examples - EPO

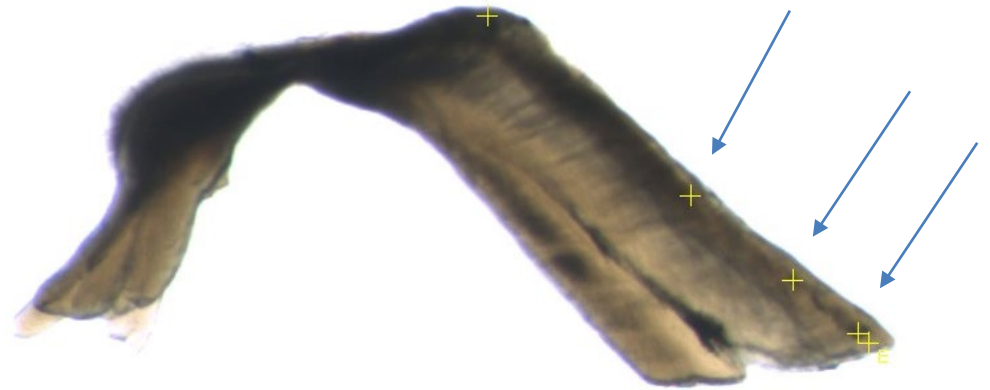


EPO Sample - 1270
1500mm FL
Zone count – 6 WT

Some examples - EPO

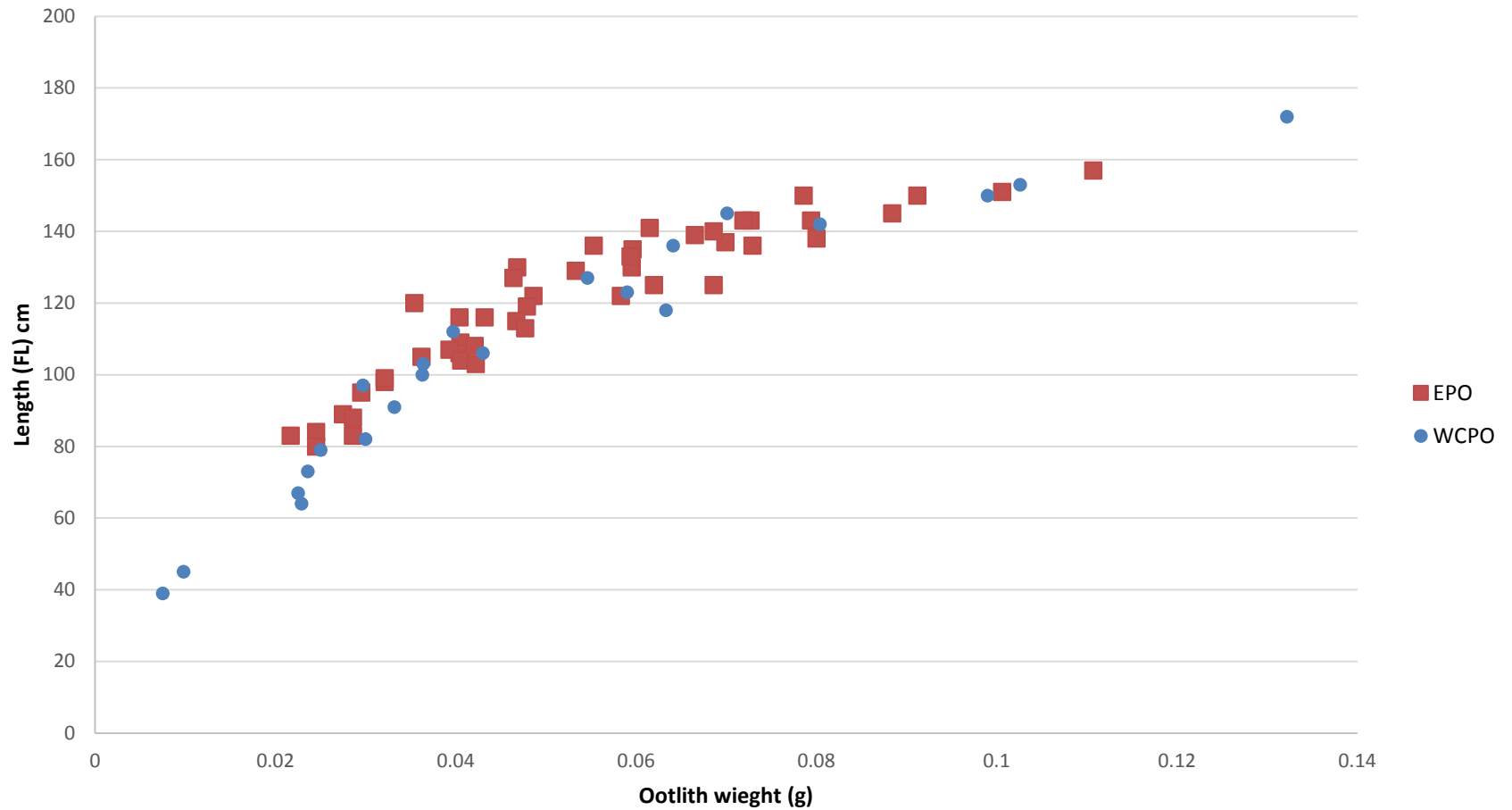


EPO Sample - 895
1060mm FL
Zone count - 2 NT



EPO Sample - 1039
1160mm FL
Zone count - 3 NT

Length – otolith weight



Recent attempts on YFT ageing using annual increments

- **Shih et al. (2014)** First attempt to age yellowfin tuna, *Thunnus albacares*, in the Indian Ocean, based on sectioned otoliths

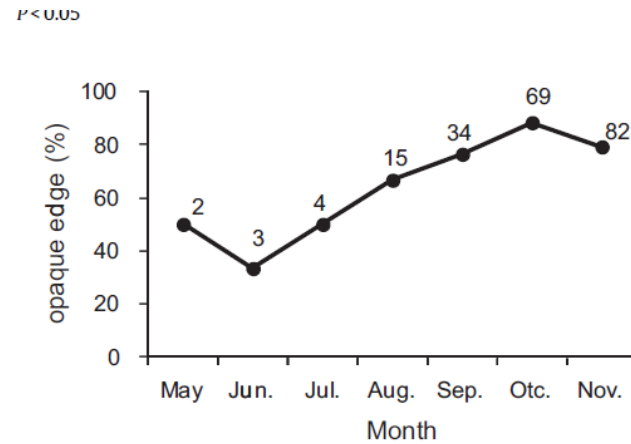
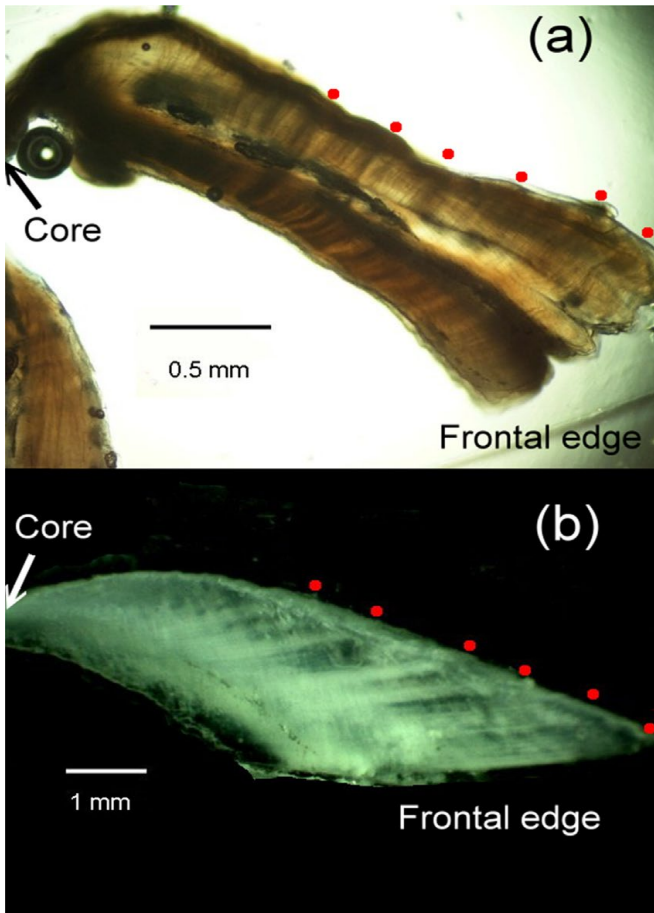
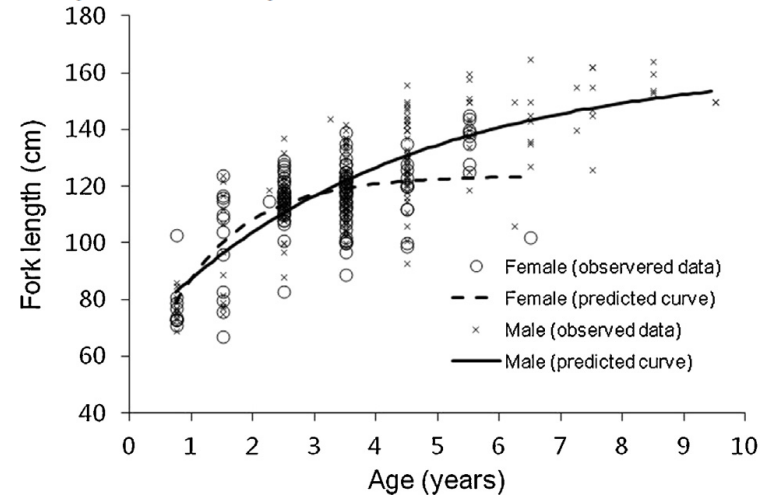
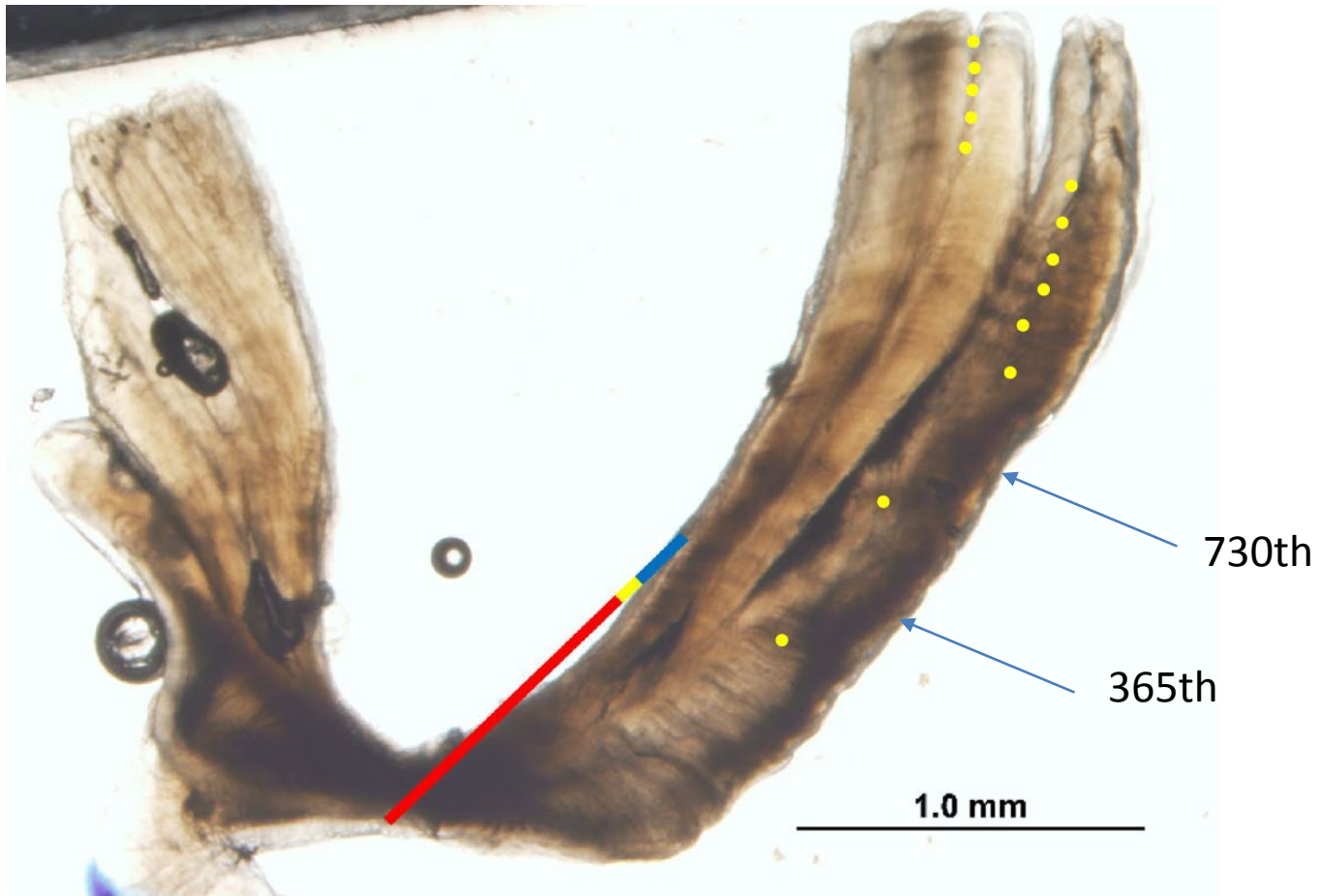


Fig. 2. Monthly frequency of occurrence for opaque zone on the otolith edge of yellowfin tuna (*Thunnus albacares*) in the western Indian Ocean. The number above each plot indicates the sample size.



- Lang et al. (2017) Age and growth of yellowfin tuna (*thunnus albacares*) in the northern gulf of Mexico



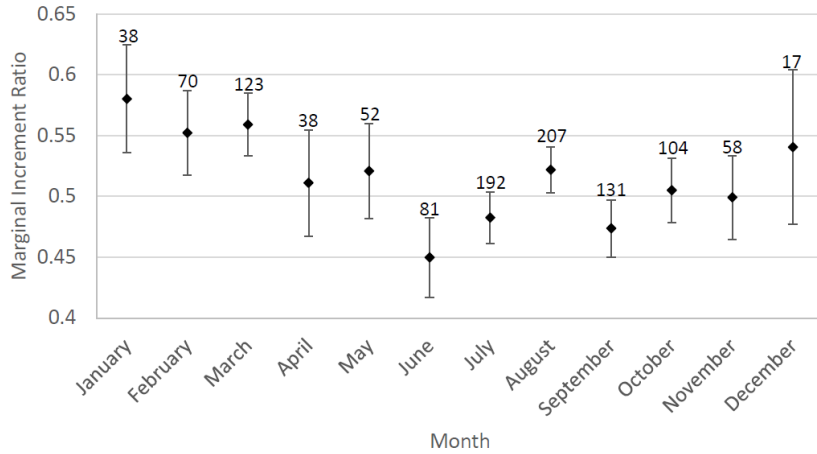


Figure 4. Marginal increment ratio of yellowfin tuna (*Thunnus albacares*) otoliths with standard error bars and sample size displayed per month over each data point.

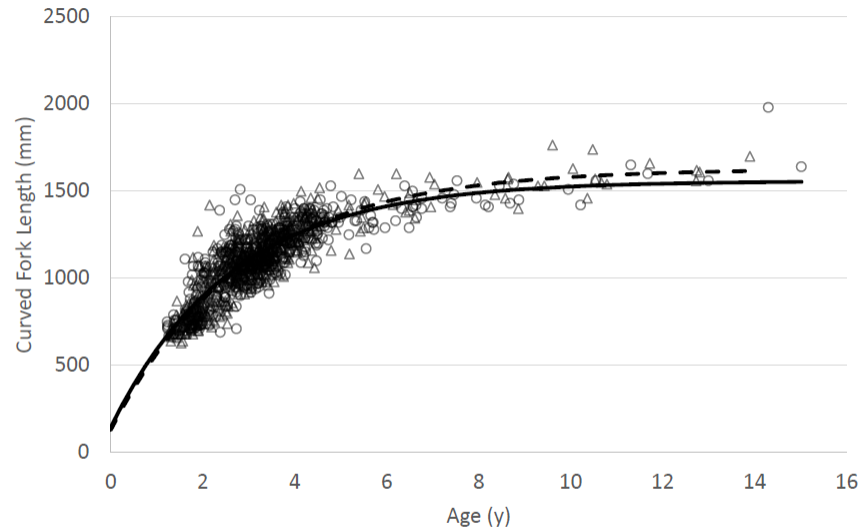


Figure 6. Von Bertalanffy growth curve for yellowfin tuna (*Thunnus albacares*) Males (Δ, dashed line) and Females (○, solid line) in the Gulf of Mexico. Age was estimated from annual increments. The associated Von Bertalanffy equation for Males: $L_t = 1628.4 * (1 - \exp(-0.3461*(t+0.2382)))$ and Females: $L_t = 1558.6 * (1 - \exp(-0.3797*(t+0.2573)))$. L_t = Curved Fork Length at age t .

Work to be initiated

- Preparation comparison –
 - Annual
 - Daily - Frontal and transverse comparison
- Daily counts to verify position of 365th increment and 730th.
 - If possible 1095th
- Daily counts for a sample of fish <60cm to estimate 1sy years growth more precisely
- Annual counts on a larger number of otoliths (N=1500)

Complementary work

- IOCCT
 - Analysis of OTC otoliths from Atlantic YFT (N=30)
 - Validate daily
 - Validate annual
 - Development of ageing methods
 - Daily
 - Annual

Challenges

- First 3 annual opaque and translucent zones are often lacking in definition.
 - Hopefully resolve with workshop
- Presence fine structure around the 2nd inflection.
 - Trying to interpret what is annual and what is not
 - Hopefully OTC samples can resolve this, even though they are from the Atlantic and possibly Indian Oceans.
- Determine zone formation dates
 - Edge analysis on smaller fish may be difficult
 - May need to rely on larger older fish and assume the zone formation is consistent throughout lifecycle.
 - Determine zone formation dates
- Agree on an age adjustment algorithm