# Evaluations of daily and annual increment counts from otoliths of yellowfin tuna captured in the eastern tropical Pacific

**Kurt Schaefer and Daniel Fuller**

**Inter-American Tropical Tuna Commission**

Bigeye and Yellowfin Tuna Age and Growth Workshop, La Jolla, California USA, 23-25 January 2019

# Introduction

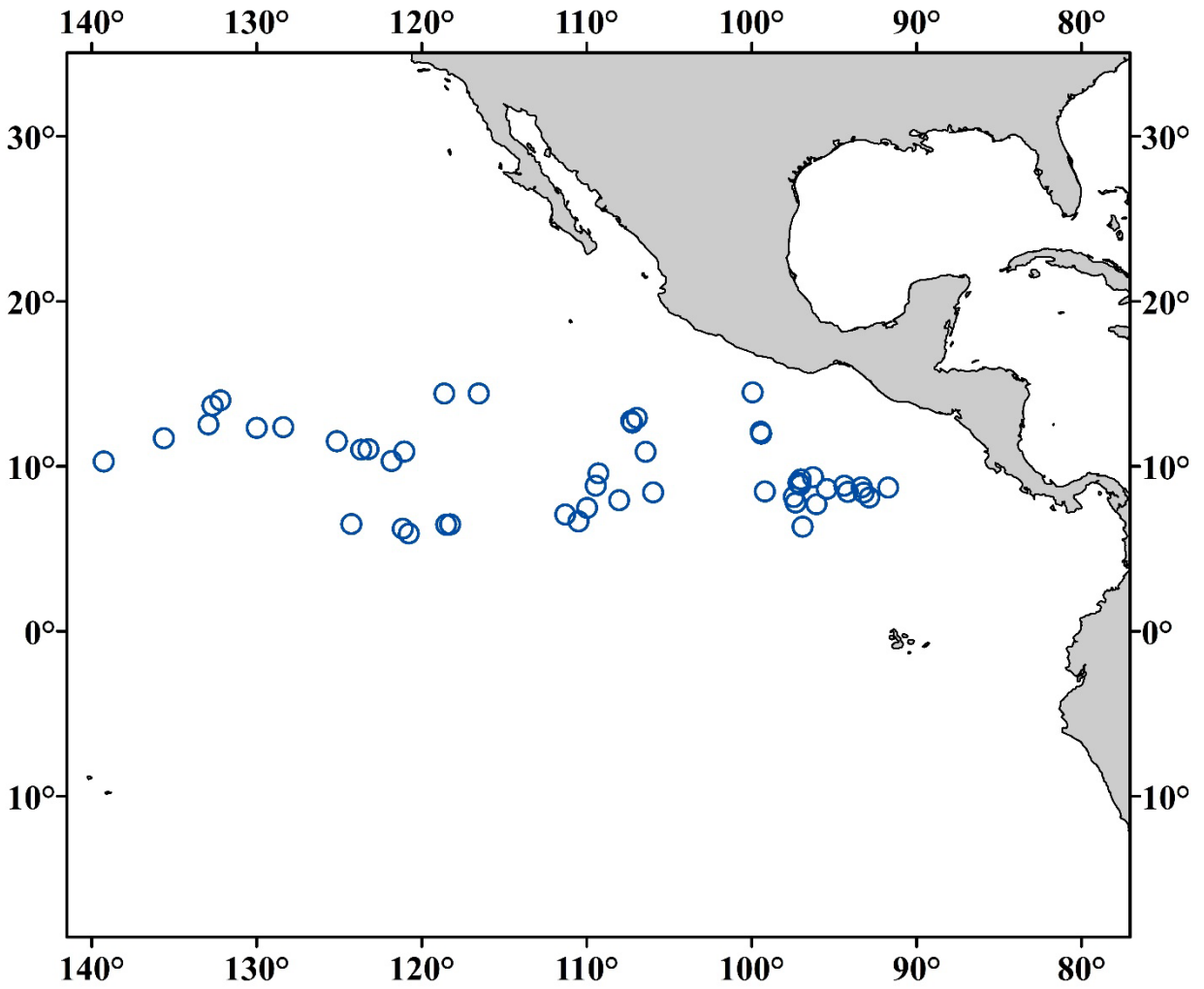
- An investigation of age at length estimates, provided by FAS, from counts of annual zones in otoliths from YFT (80-157 cm) captured in the EPO was undertaken to compare to age at length estimates derived from daily increment counts from paired otoliths
- Building on the collaborative efforts undertaken to evaluate discrepancies between the BET growth models for the EPO and WCPO it seems prudent to compare and evaluate the age at length estimates, obtained from counts of daily and annual increments for YFT prior to undertaking a large aging effort using annual increments
- The objectives of this investigation are to evaluate age estimates derived from daily and annual increment counts from 67 otolith pairs

# Materials and Methods

- The methodologies employed by each laboratory for obtaining counts of daily and annual increments, and the resulting age at length estimates, were described in previous presentations
- A direct comparison was conducted of the otolith daily versus annual increment counts, adjusted to decimal ages, for 67 YFT (80-157 cm) captured in the EPO primarily between about 6°N-16°N and 92°W-140°W, during January 2009 to November 2012.
- In the above comparison, where the annual increment zone counts were adjusted to decimal ages, the algorithm of Farley (2017) was used to account for universal birthdate and otolith edge type as described previously. While this hasn't been fully vetted for YFT, especially in the EPO, considering spawning occurs year round in the area of interest, the assumption of a July 1 birthdate seems reasonable

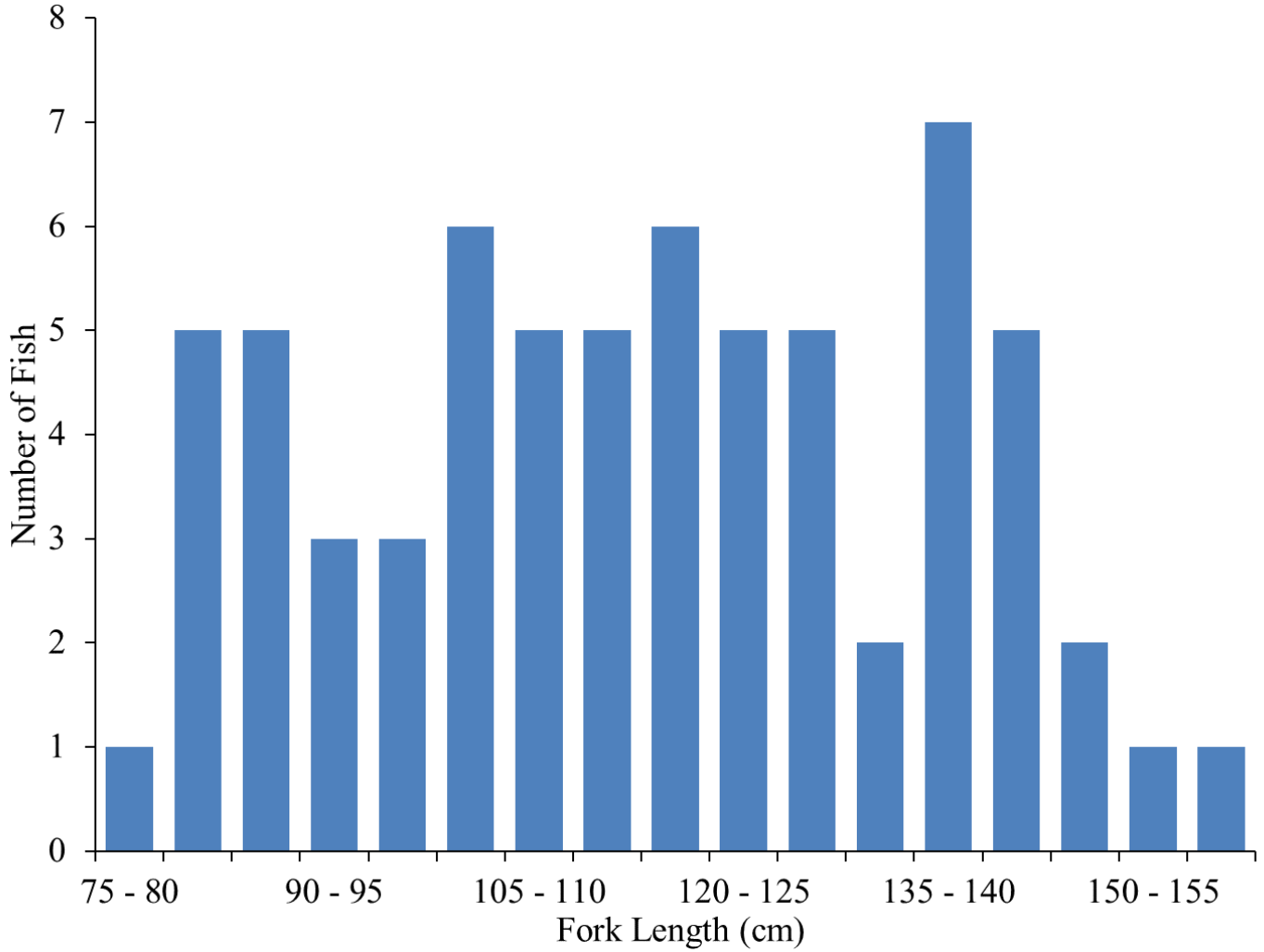
# Materials and Methods

Yellowfin tuna otolith sample locations



# Materials and Methods - Sampling

Length Frequency distribution for the 67 otolith pairs read by FAS and IATTC

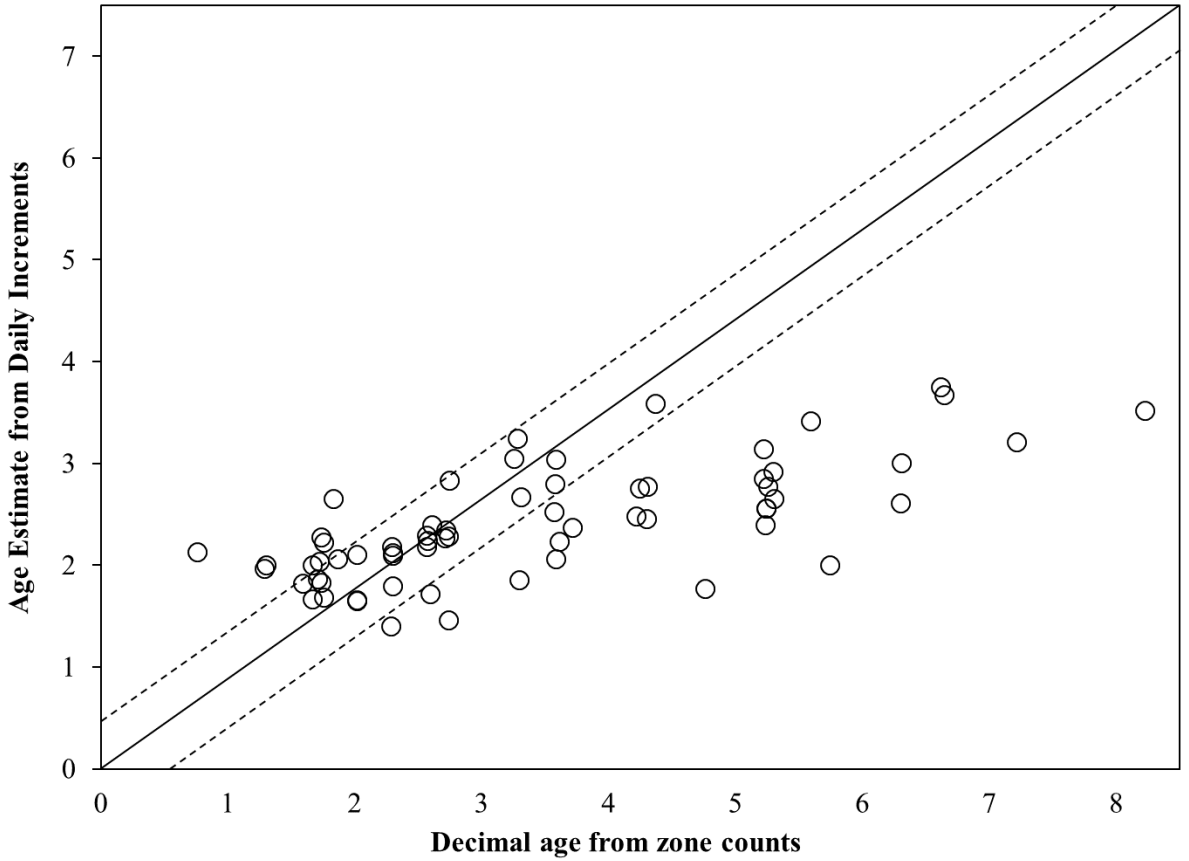


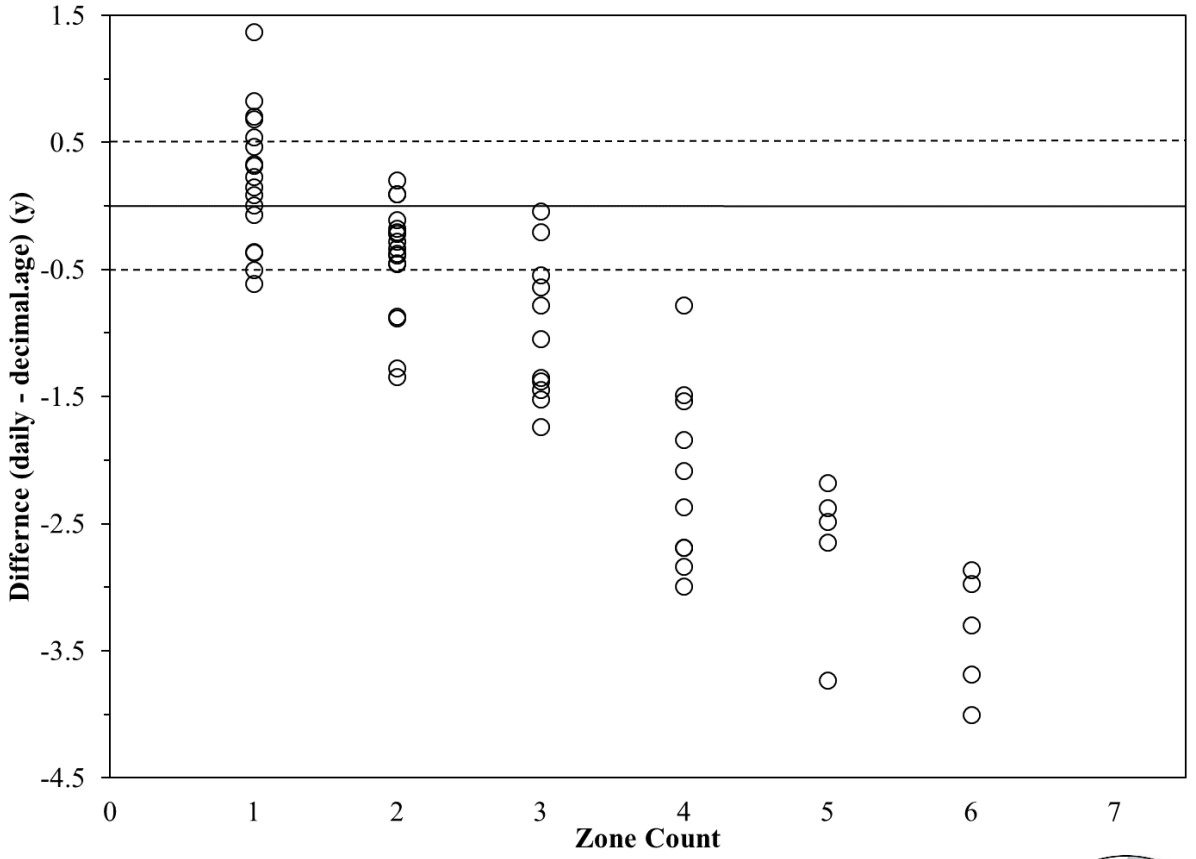
# Results

- Comparisons of daily and decimal ages from zone counts for the 67 YFT otolith pairs, shows mostly similar age estimates for fish at about 2 years of age, but there is some under- and overestimation of decimal ages relative to daily ages.
- For fish with daily age estimates between 2.5 and 4 years there is a high proportion of fish whose ages are overestimated from the decimal ages.

# Results

**Differences between ages estimated from daily and decimal age from zone counts.**



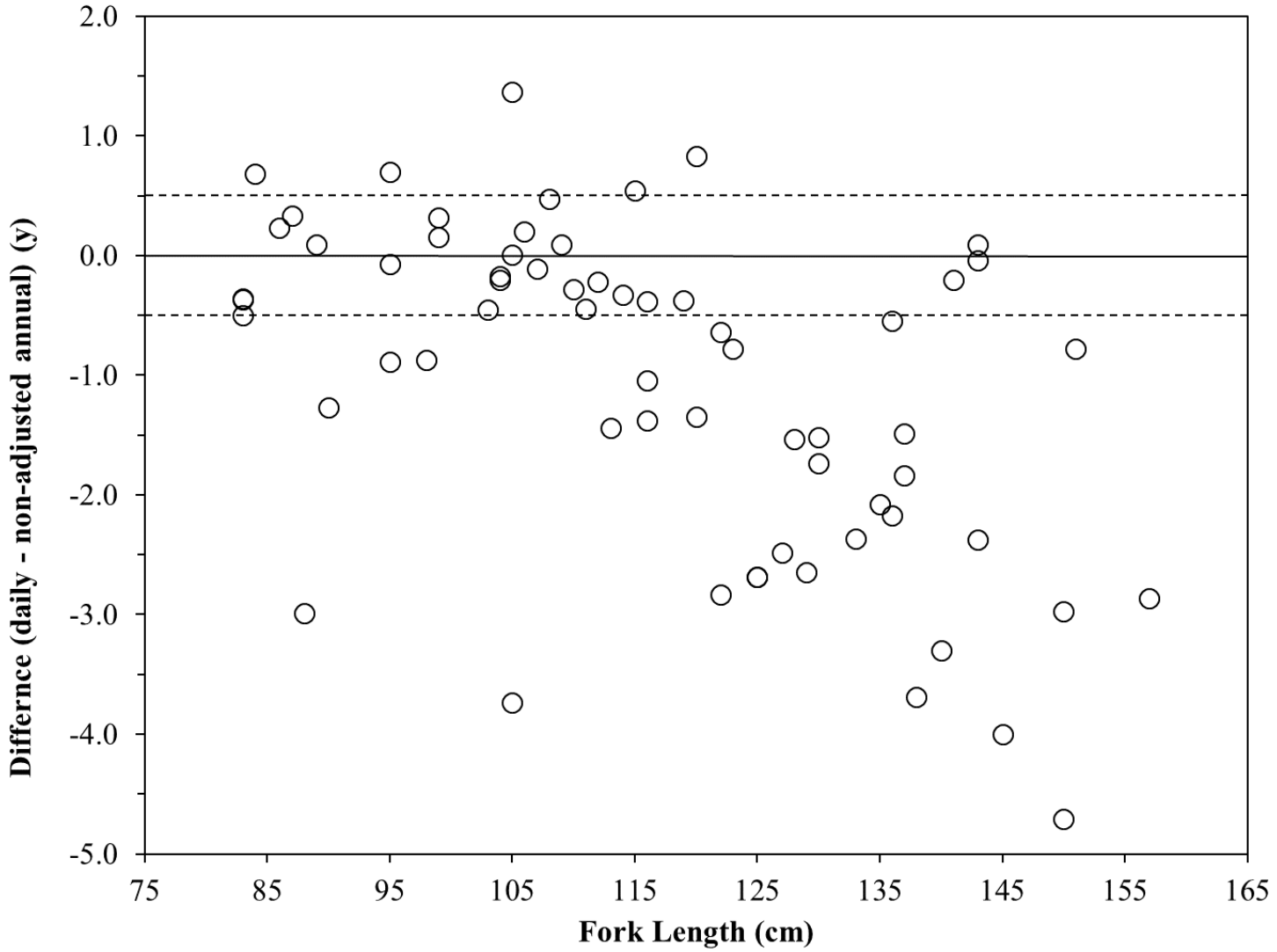



# Results

- For YFT > 120 cm, the adjusted annual age estimates are on average 1.9 years (range: -0.8 to 4.7 years) older compared to the estimated age at length from the daily increment counts.

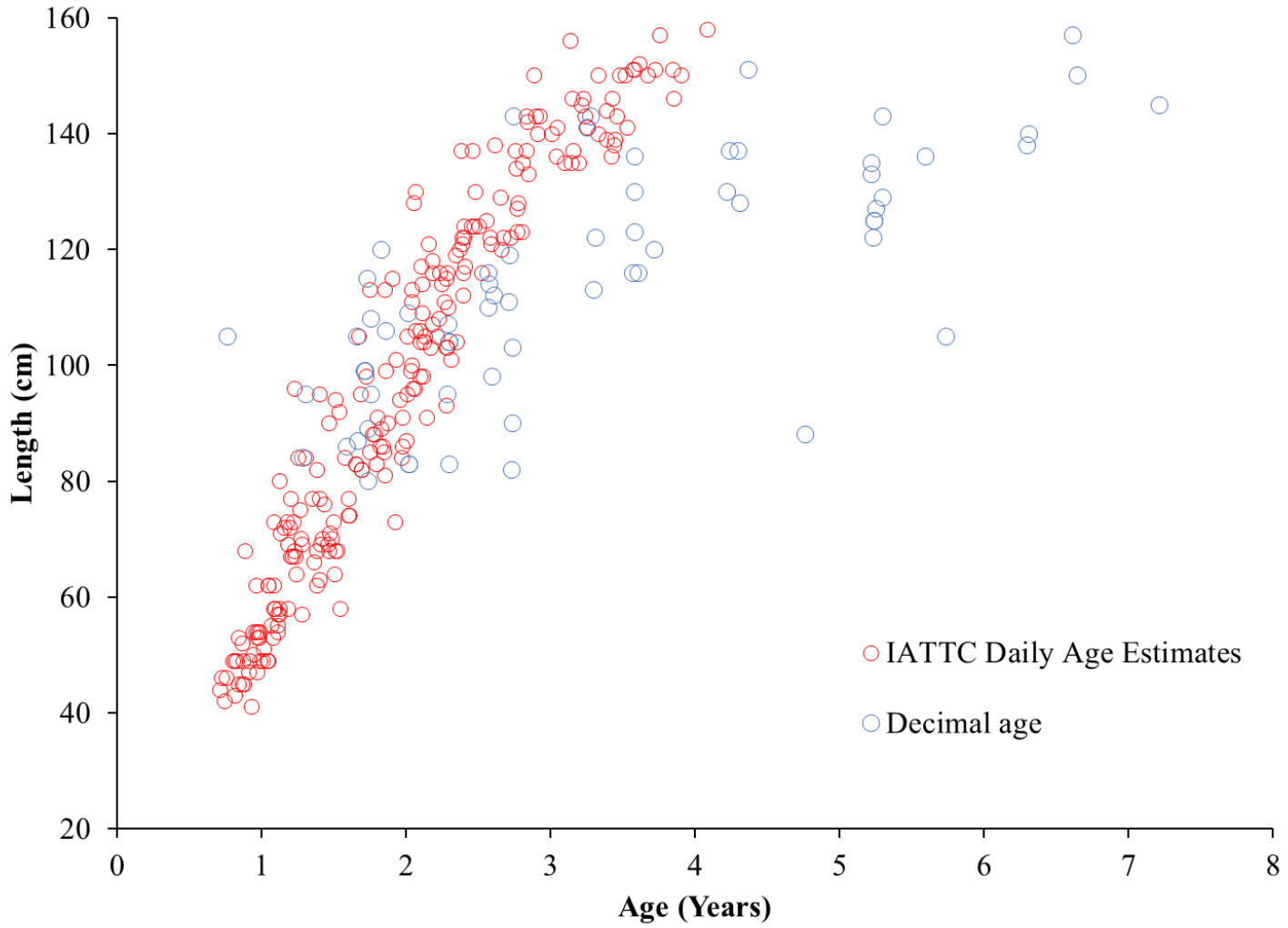
# Results

**Differences between ages estimated from daily and decimal age from zone counts by fork length.**



# Results

Age estimates from daily and decimal age from YFT otoliths from the EPO

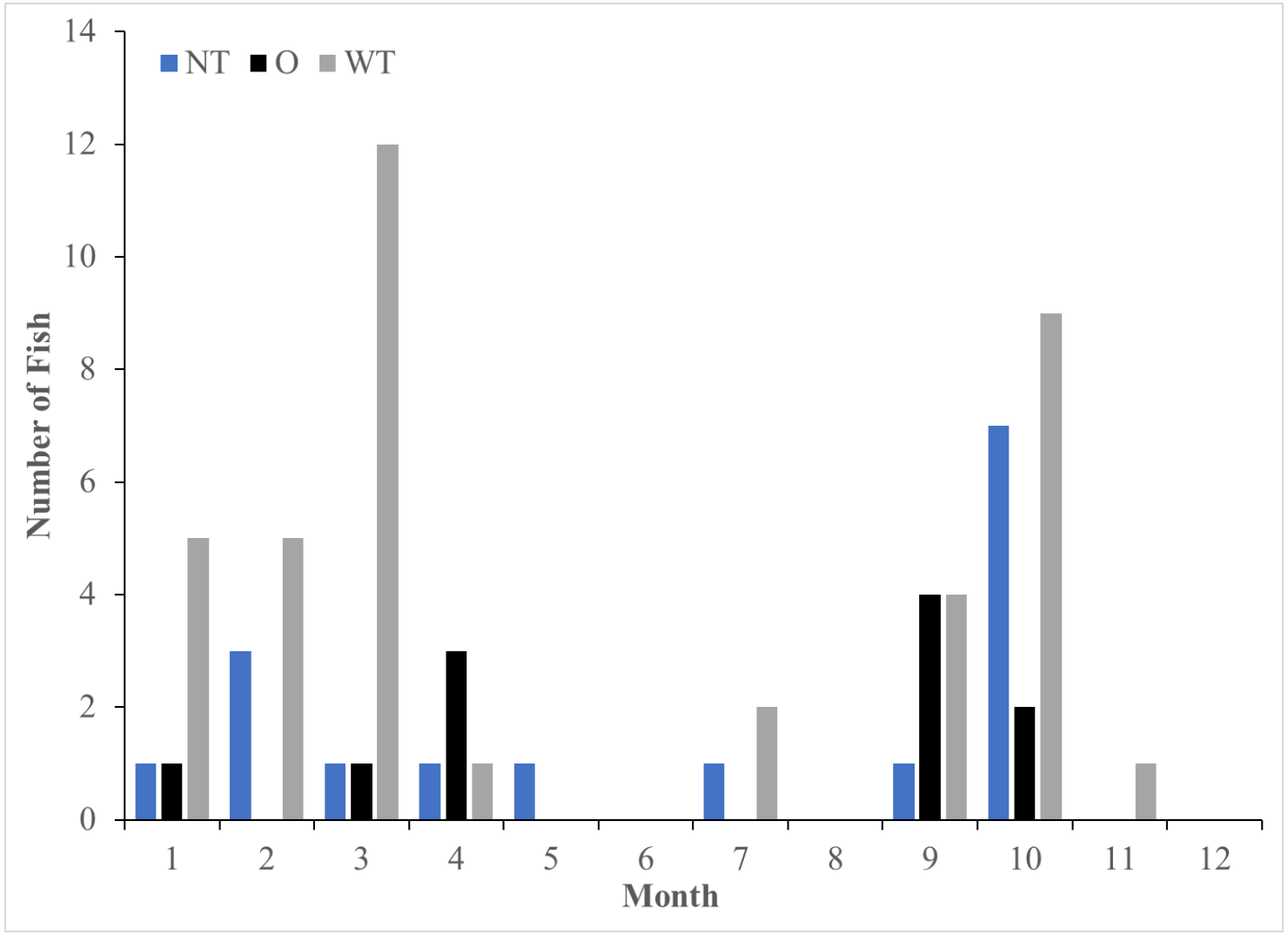


# Conclusions

- There appears to be some fundamental issues in the objective discrimination of annual increments based on the comparative evaluations from 67 pairs of otoliths from YFT 80-157 cm from the EPO.
- Considering this research is in the early stages, and the algorithm to estimate a decimal age may differ from that developed for BET, it is premature to assign much weight to the decimal ages. However, like BET, assumptions associated with that algorithm used for adjustments of zone counts to decimal ages, including monthly periods of increment formation and opaque zone completion, based on marginal increment and edge type analyses, are suspect as are the adjustments of zone counts to decimal ages based on a universal birthdate and catch date.

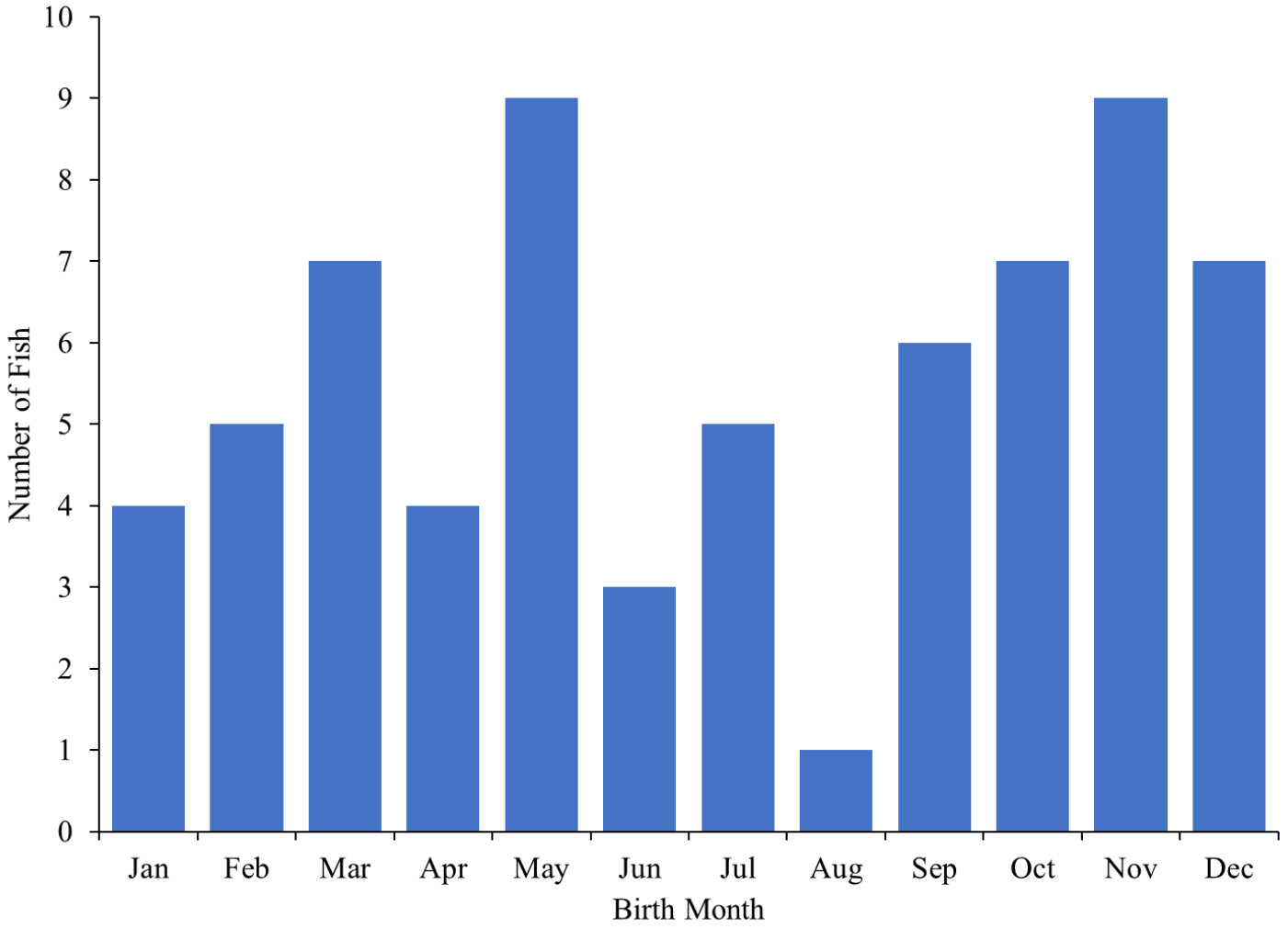
# Conclusions

**Month of edge formation base on edge analyses provided by FAS**



# Conclusions

**Back calculated birth months derived from daily increment counts from 67 YFT**



# Conclusions

- There appears to be a systematic overestimation of ages from the annual zone counts, compounded by the application of the algorithm to adjust edge type, compared to the daily increment counts for fish > 110 cm.

- The sample size is insufficient to draw conclusions about edge type formation, as there are no fish sampled in June, August, and December and only 1 sample collected in May. However, a wide translucent margin was detected consistently in all months sampled without a discernable pattern

# Acknowledgements

IATTC
Fish Ageing Services, Ltd.
SPC OFP
CSIRO


# Questions