

Preliminary evaluation of Seychelles longline length, catch and effort data

Summary of Findings... so far

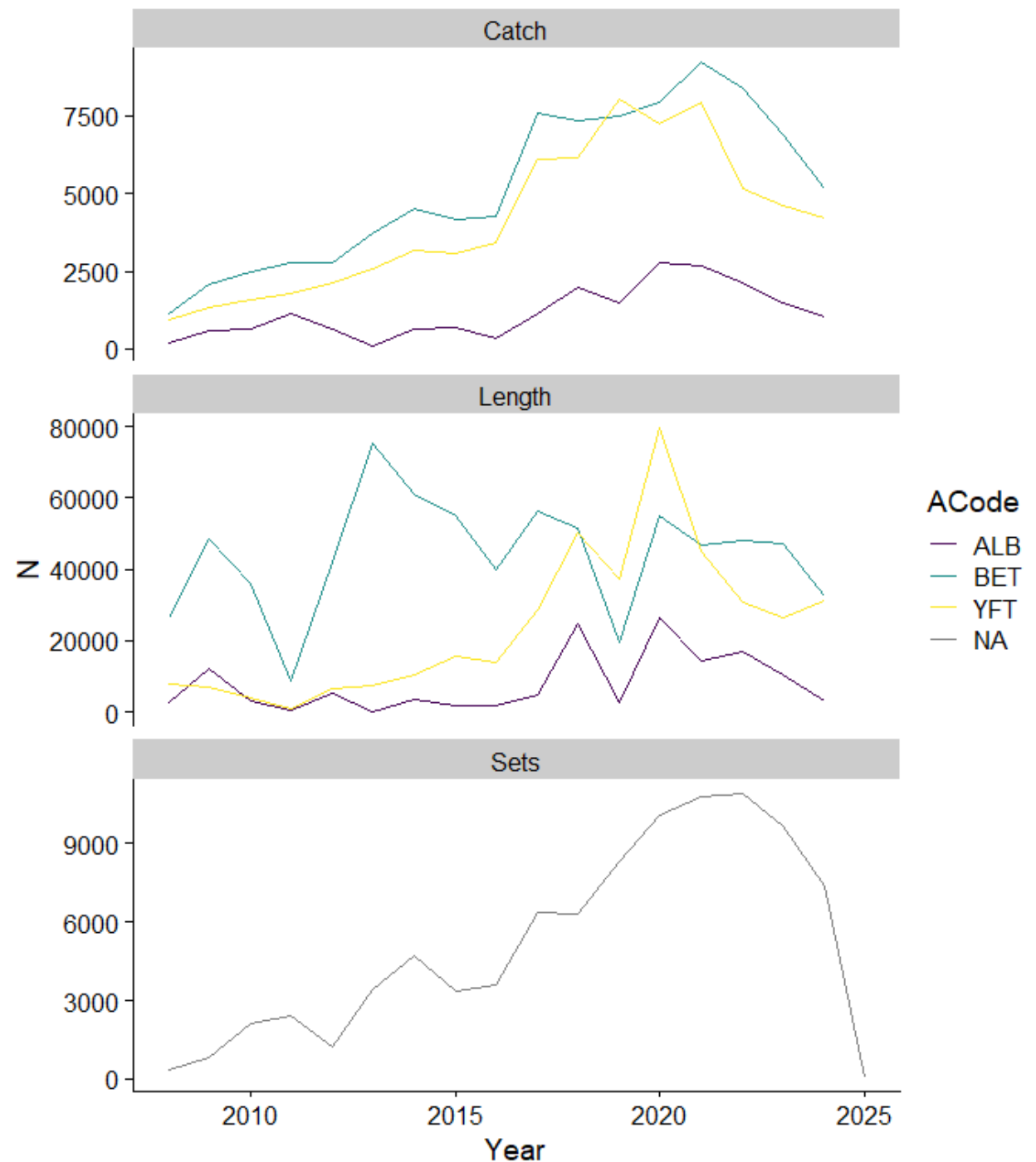
Objectives

- Review the data
- Identify potential data errors and possible corrections
- Focus on length compositions, with the aim of considering these for use in stock assessment
- Preliminary results presented here focus on albacore, yellowfin and bigeye tunas

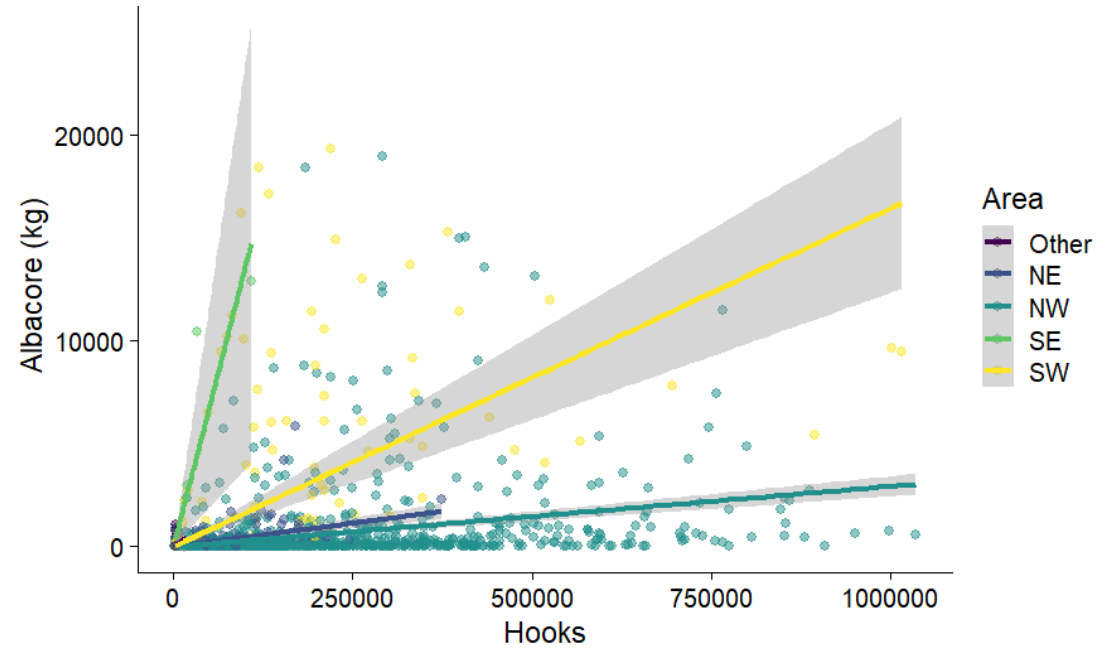
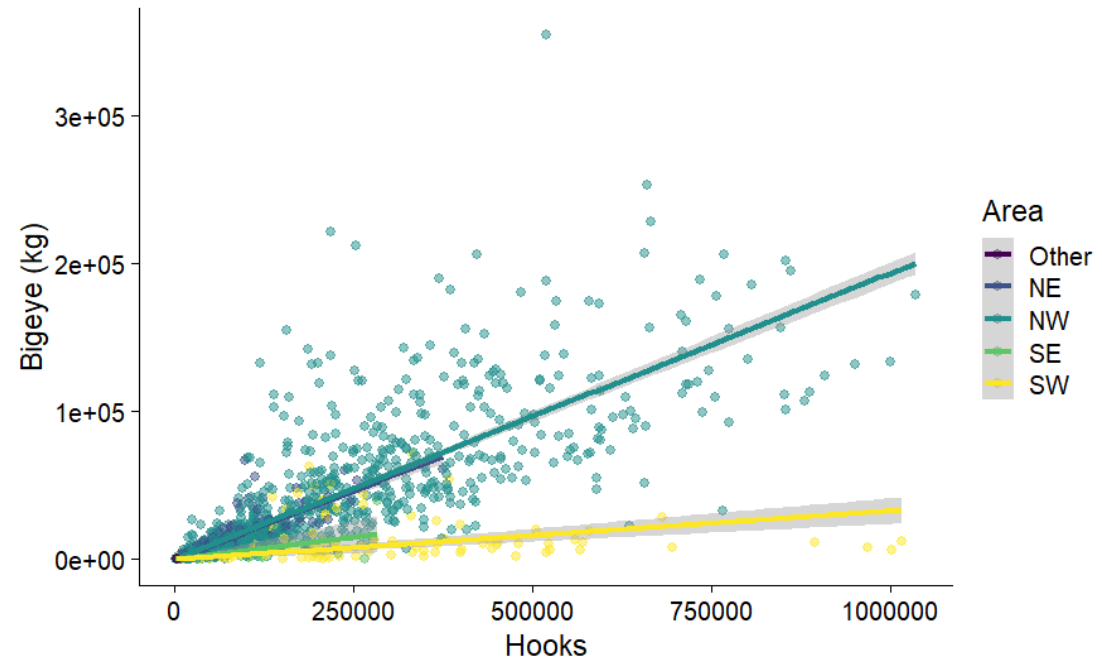
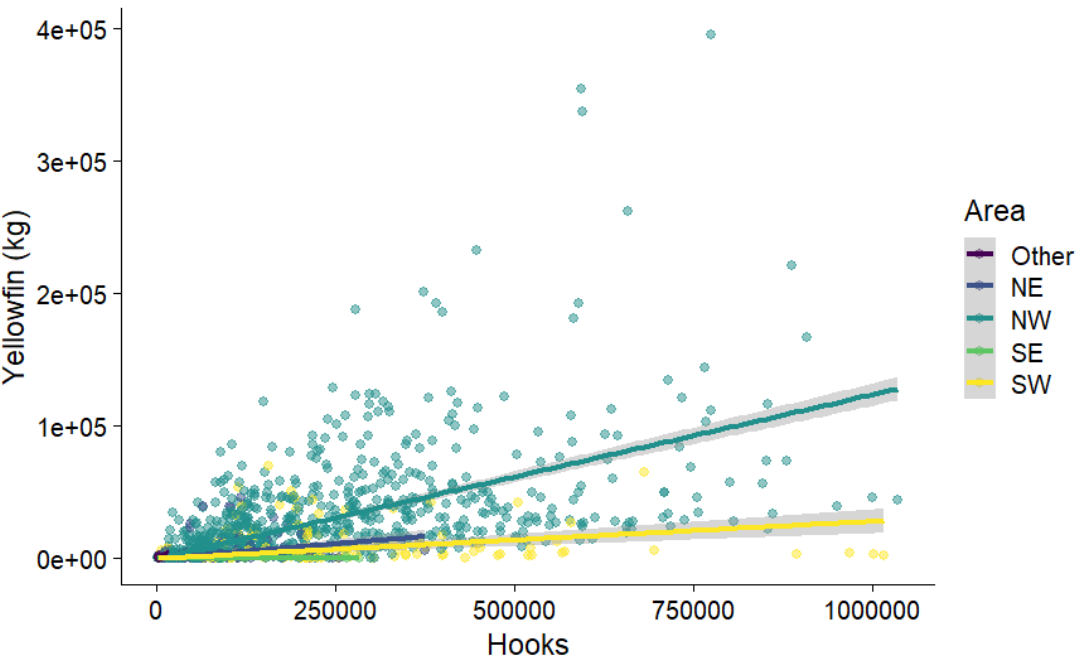
Data Description

- Data consisted of individual pelagic set data 2007-2023 for Seychelles registered vessels.
- Landings generally do occur in the Seychelles, so the reports have not been verified.
- There is a vessel registry and 3 other main tables:
 - A3: Trip details consisting of a record for each longline set in a trip. TripLogID represents individual sets, but with more than one record where multiple baits are used.
 - A4: Logbook details consisting of a record for each catch species (weight and number).
 - A5: The lengths (cm) of retained fish caught up to 20 per set.

Number of observations by year



Catch (kg) and effort (hooks) - trips

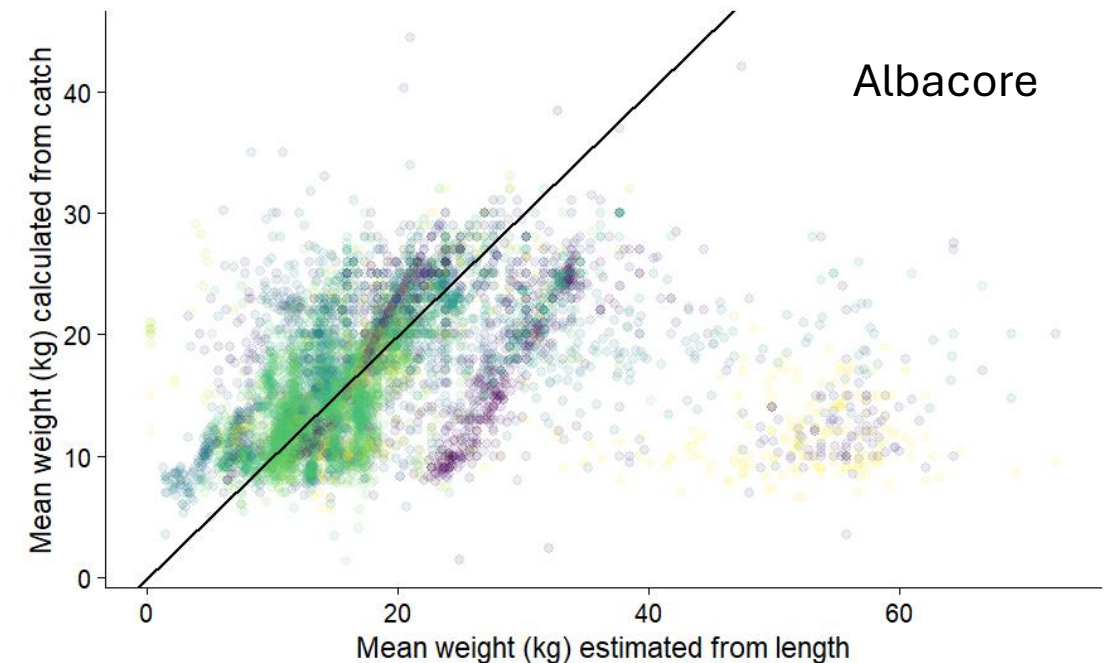
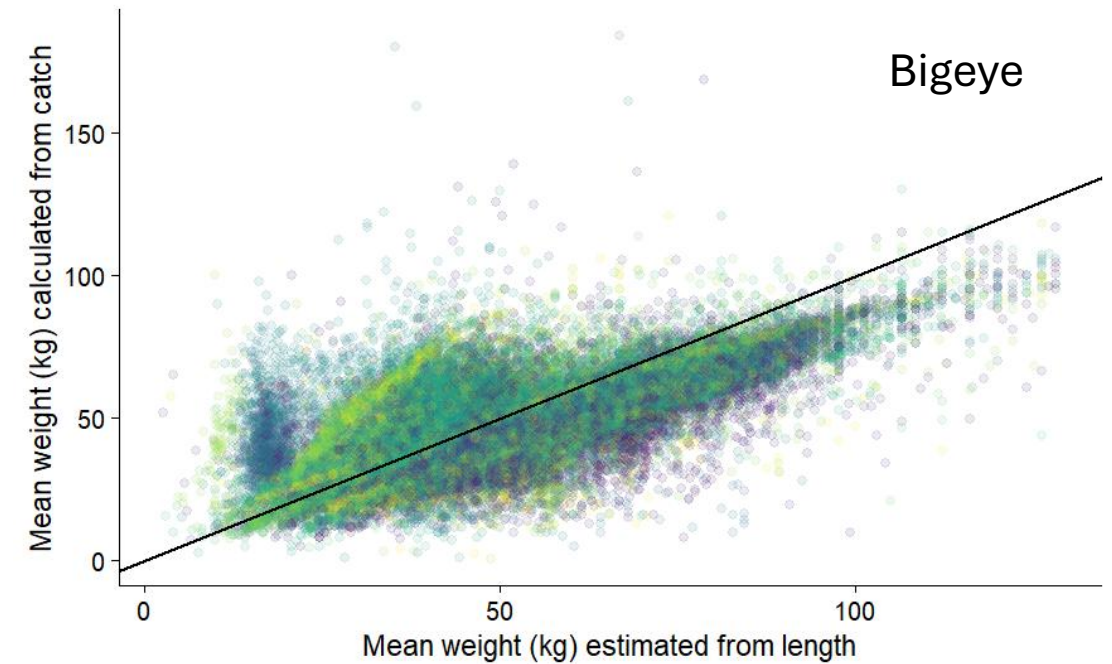
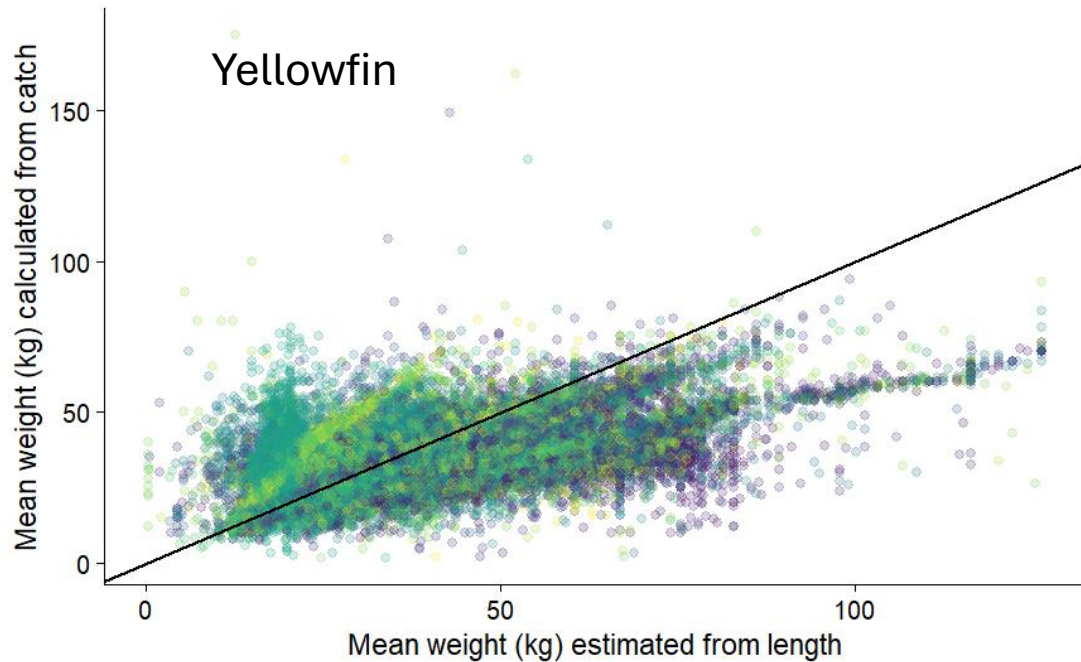


Internal consistency

- For each longline set, the retained weight and retained pieces by species
- For the first 20 fish of each species, the lengths are recorded.
- The mean weight of fish can be calculated from the length
 - Mean weight = $\text{sum}(a L^b) / N$
- and from the recorded catch weight
 - Mean weight Retained weight / Retained species

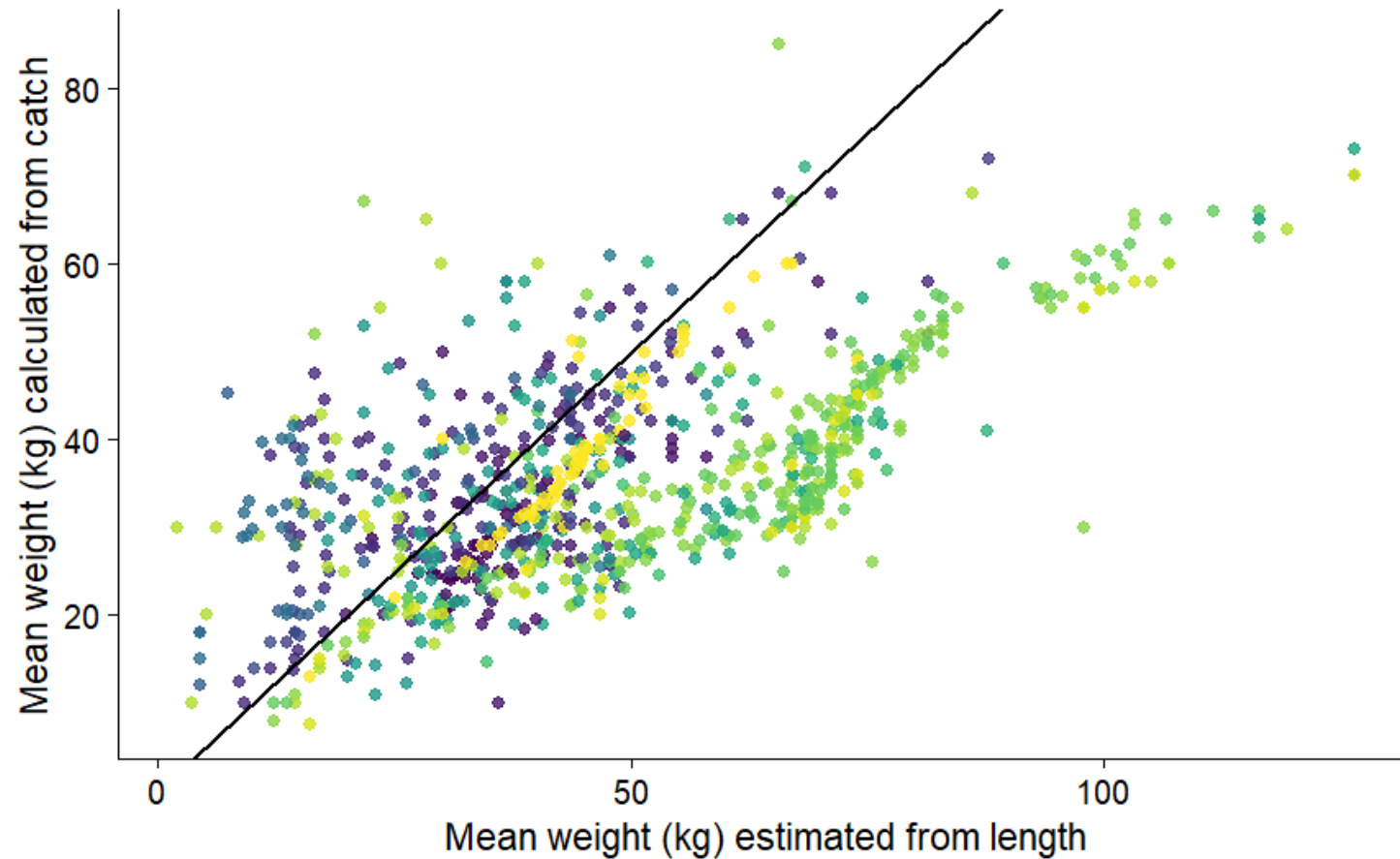
These estimates can be used to identify inconsistencies.

Catch-based vs Length-based mean weight: sets



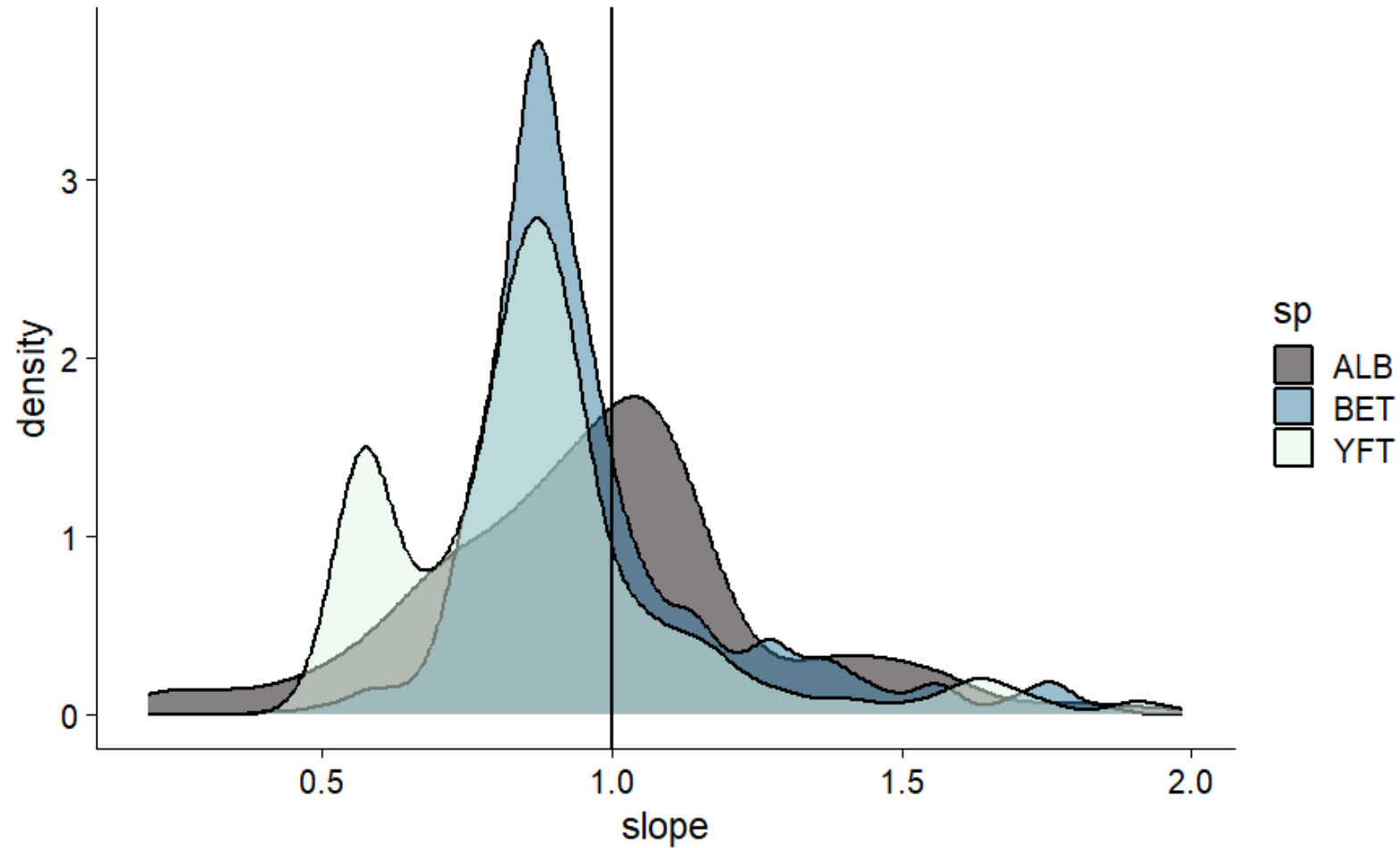
Only sets are used where the number of retained fish and the number of length measurements were equal

Single vessel: yellowfin: sets

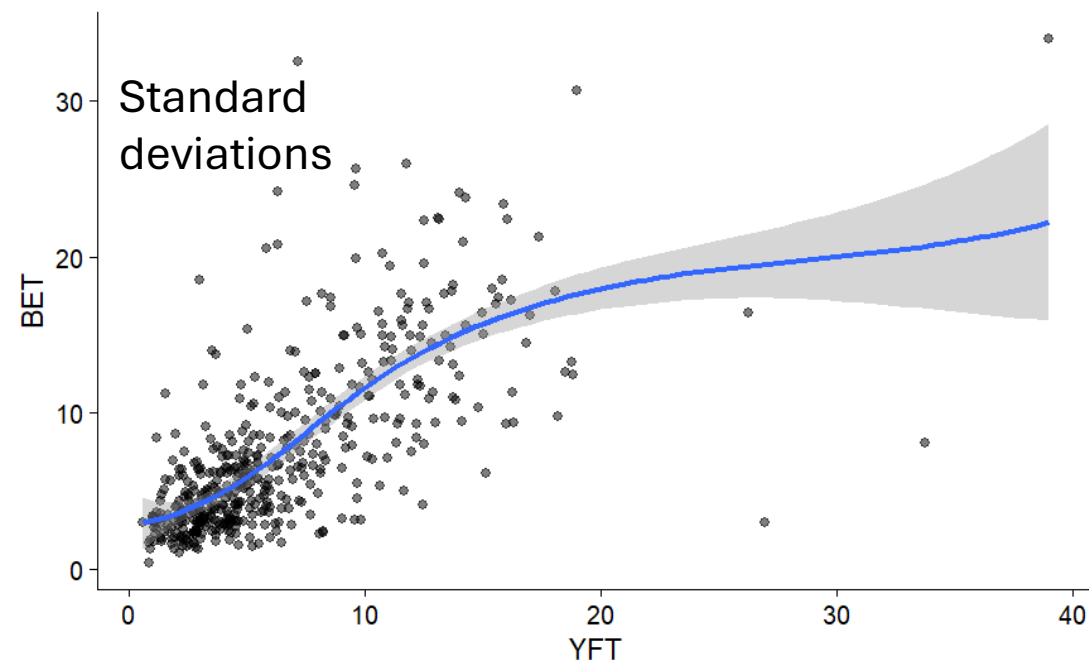
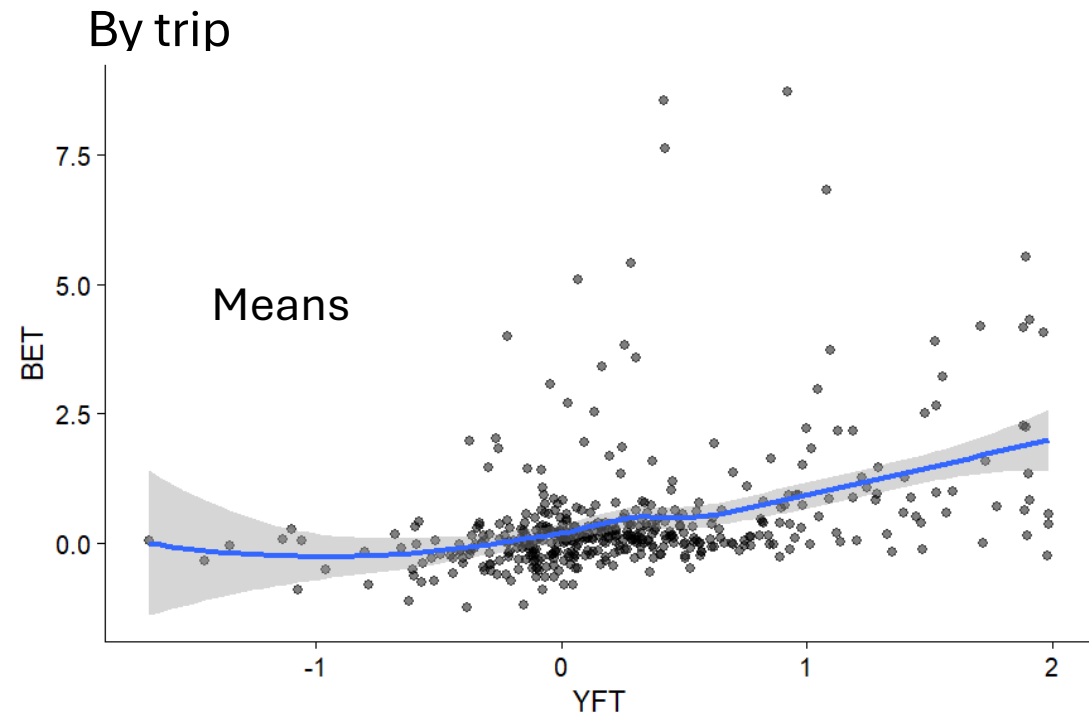
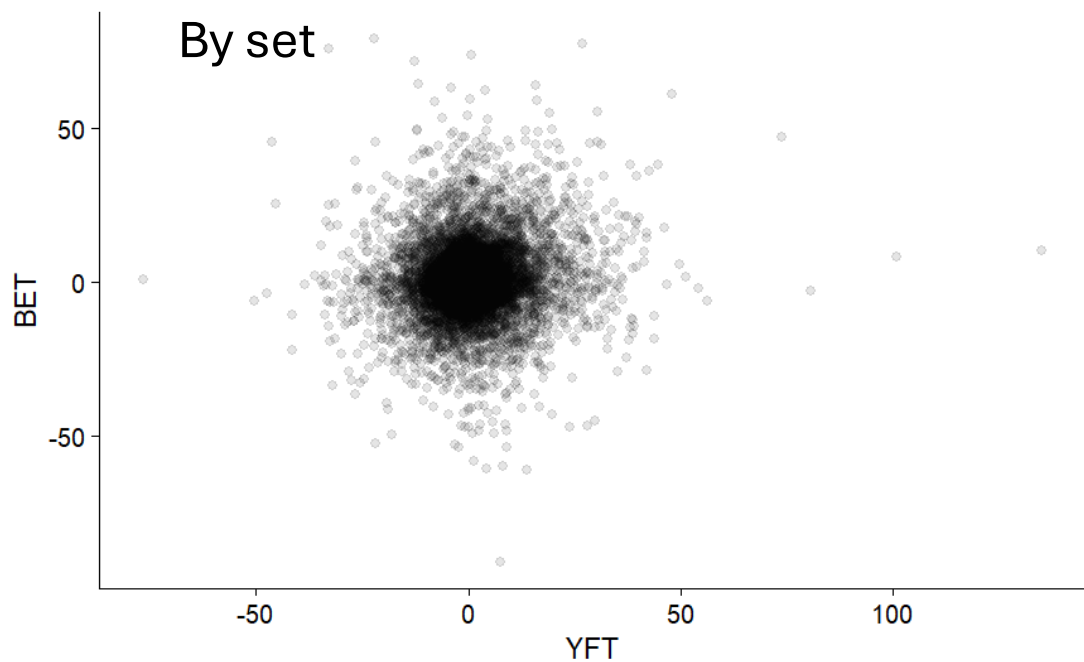


Each point is a single set
Colour by trip

Slope density for:
 $\text{ca_mwt} \sim \text{le_mwt} : \text{trip} + 0$



Catch vs Length-based Mean Weight Slope Residuals

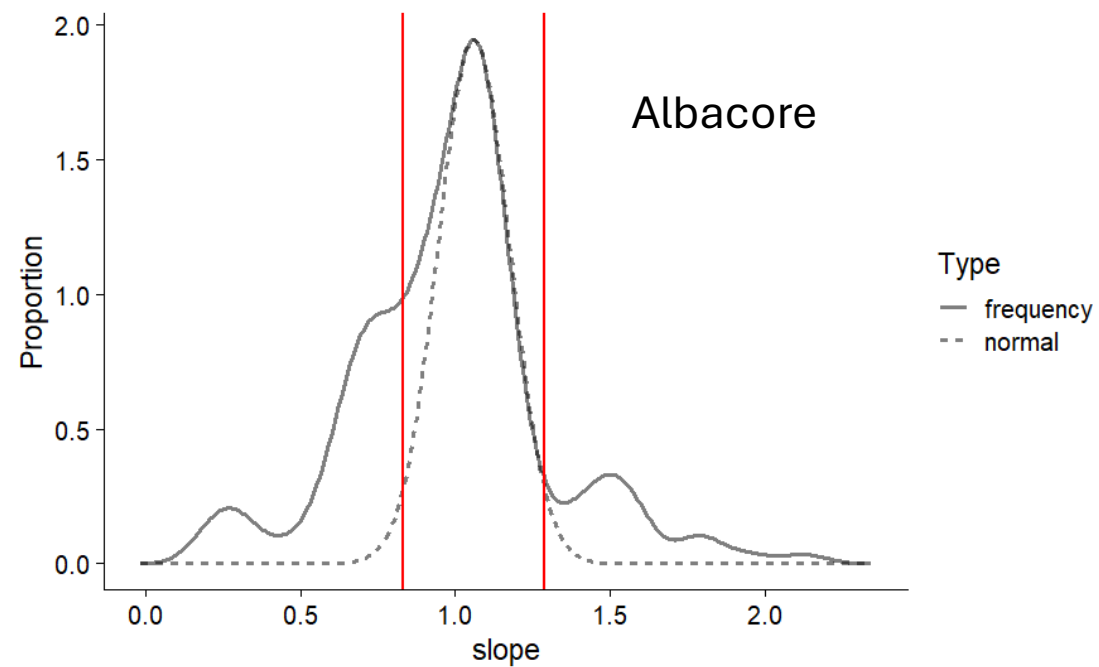
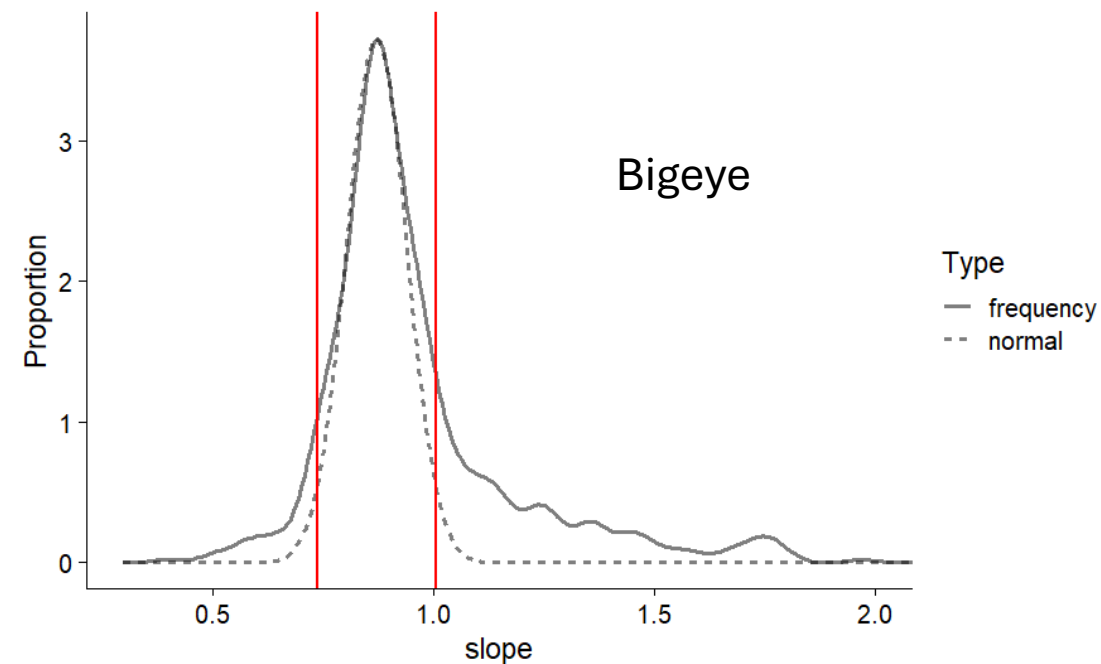
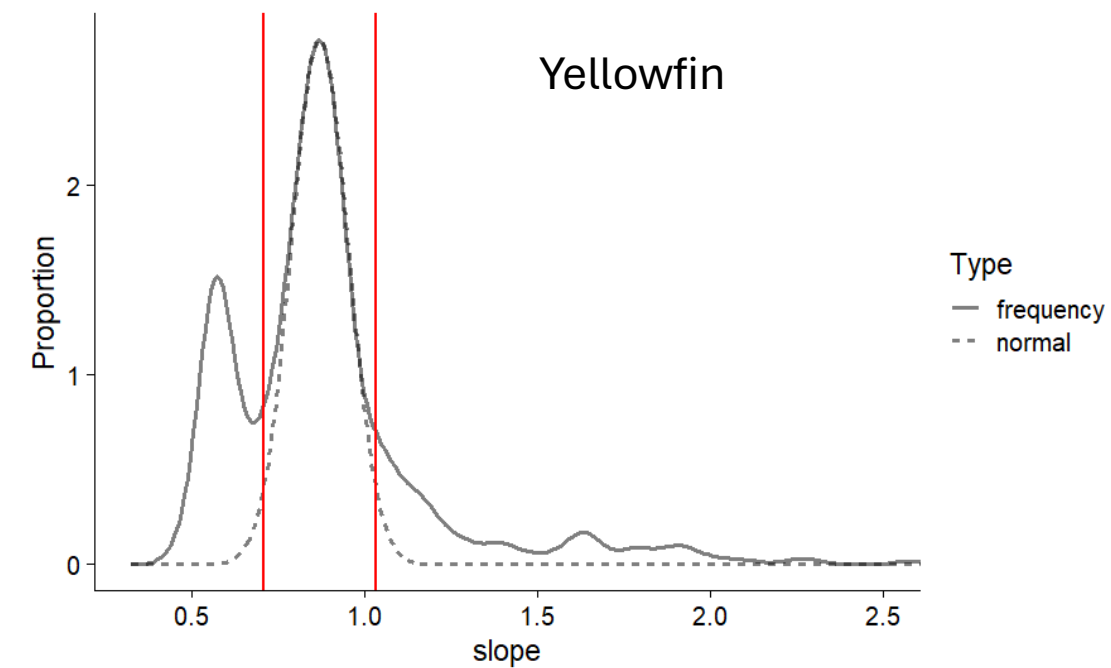


Trial Data Filtering for Stock Assessment

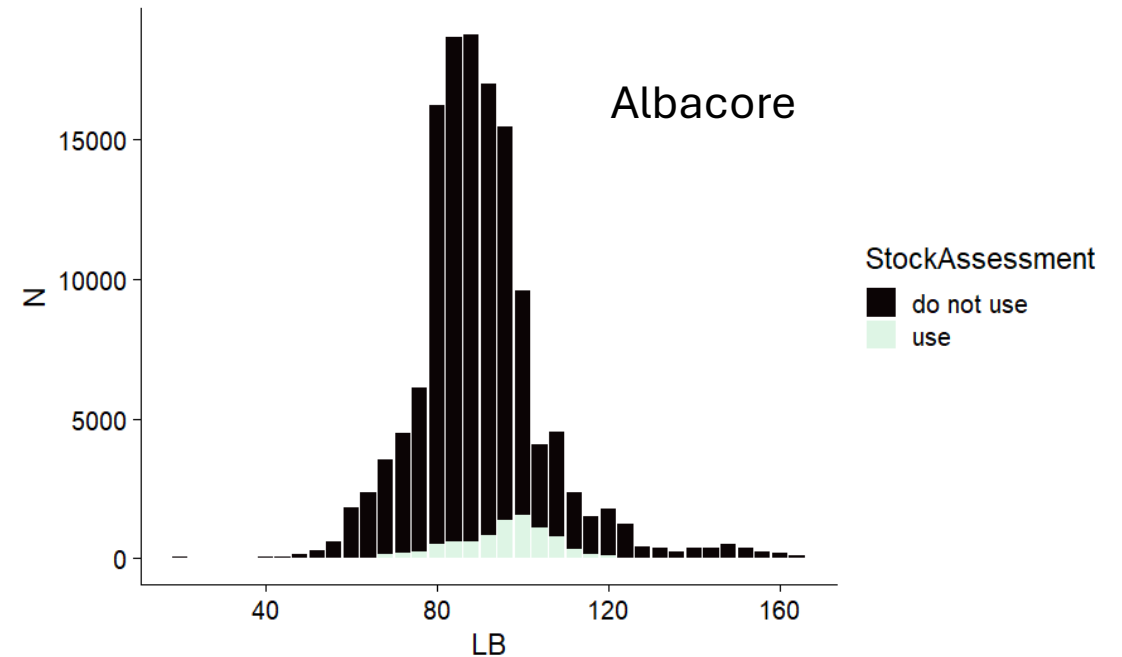
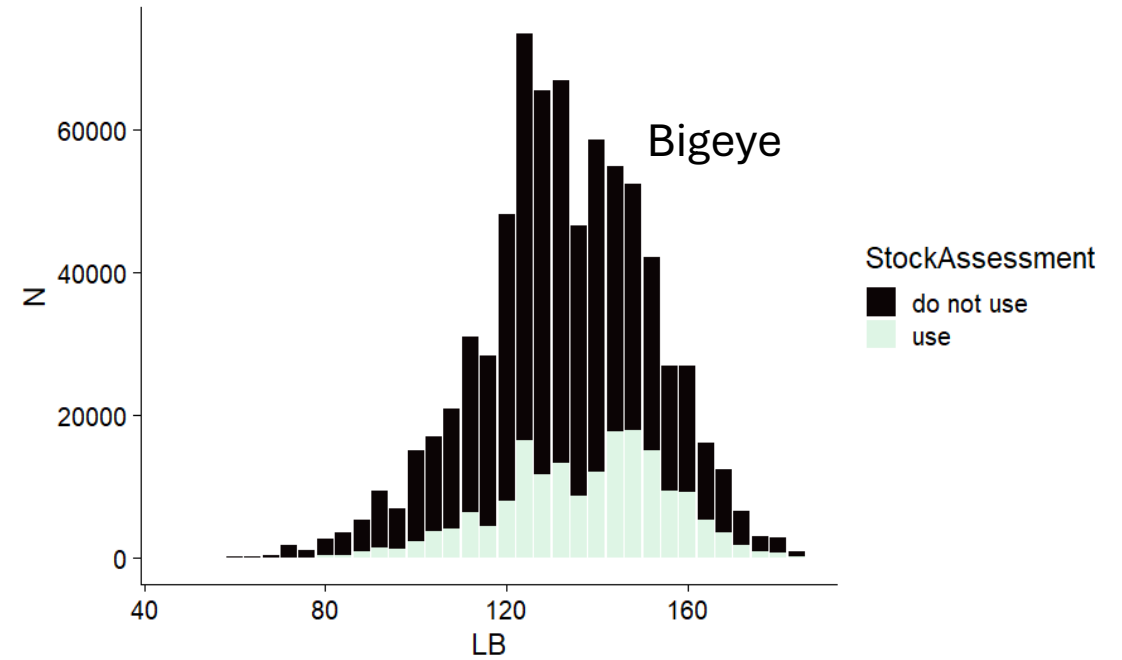
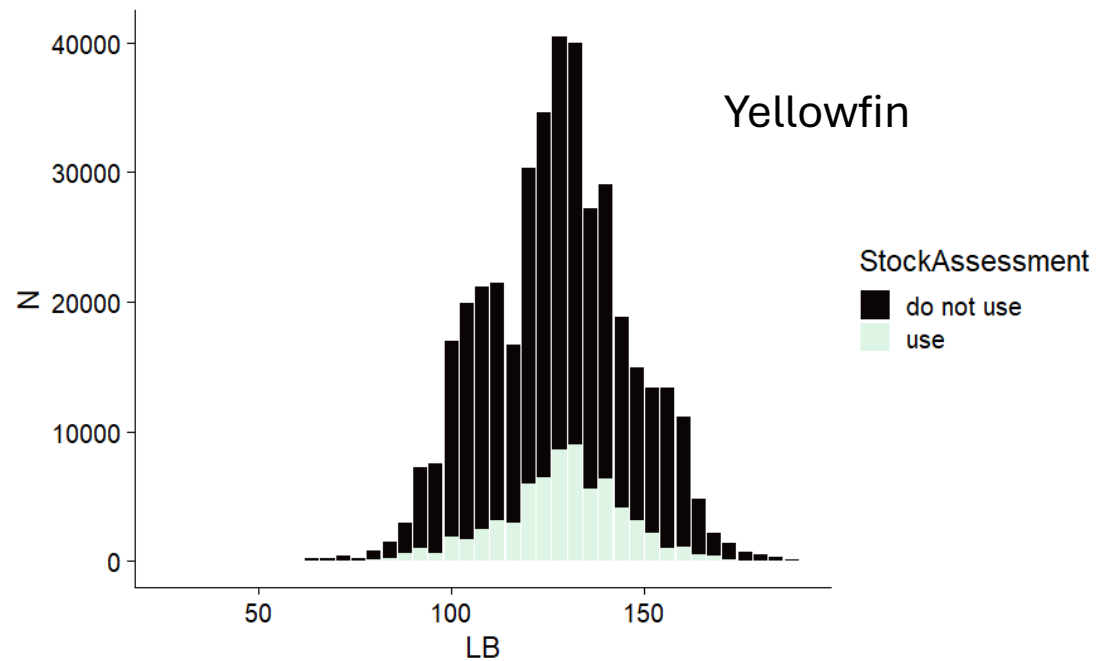
The fitted linear model has the form:- $ca_mwt \sim le_mwt:TripID+0$

1. Globally, filter out **individual sets** that are unlikely (< 50% chance) to be present in the sample if it was normally distributed. For example, for 1000 observations, observations would be removed where the absolute standardised residual is greater than 3.29.
2. Refit the linear model to the filtered data set and extract the slopes.
3. Fit the sd of a normal density to the mode (+/- 10 points around the mode) of the smoothed density of the slopes.
4. Filter out **trips** where the slopes are beyond the 95% quartile range of the normal density around the mode.
5. If no trips are removed in 4 exit, else goto 2.

Filtering

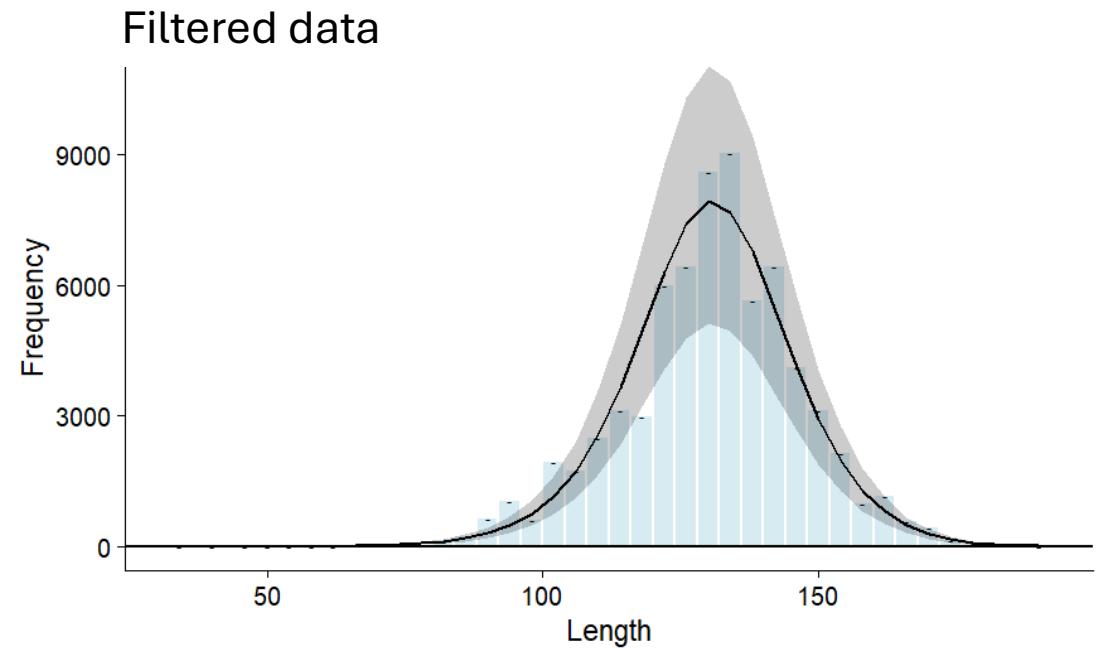
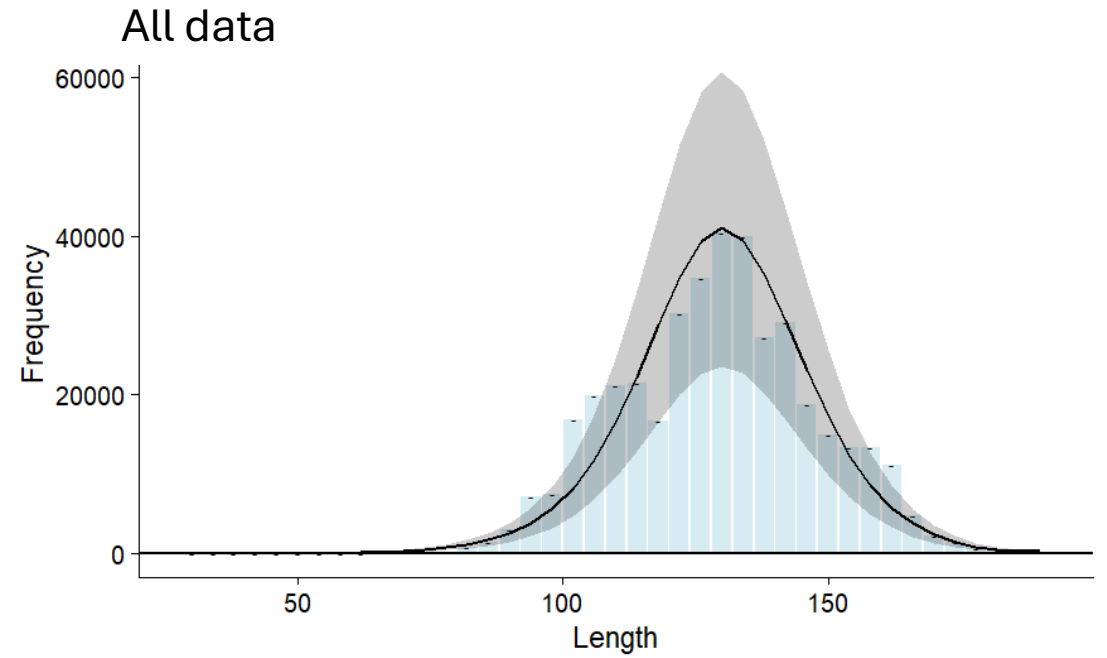


Filtering Impact



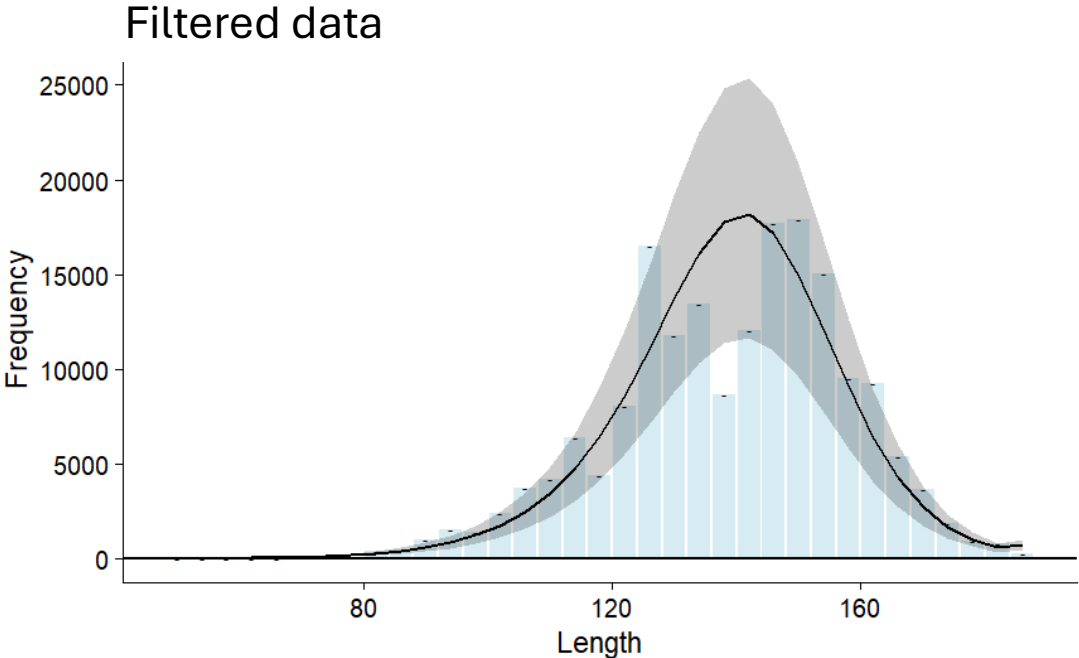
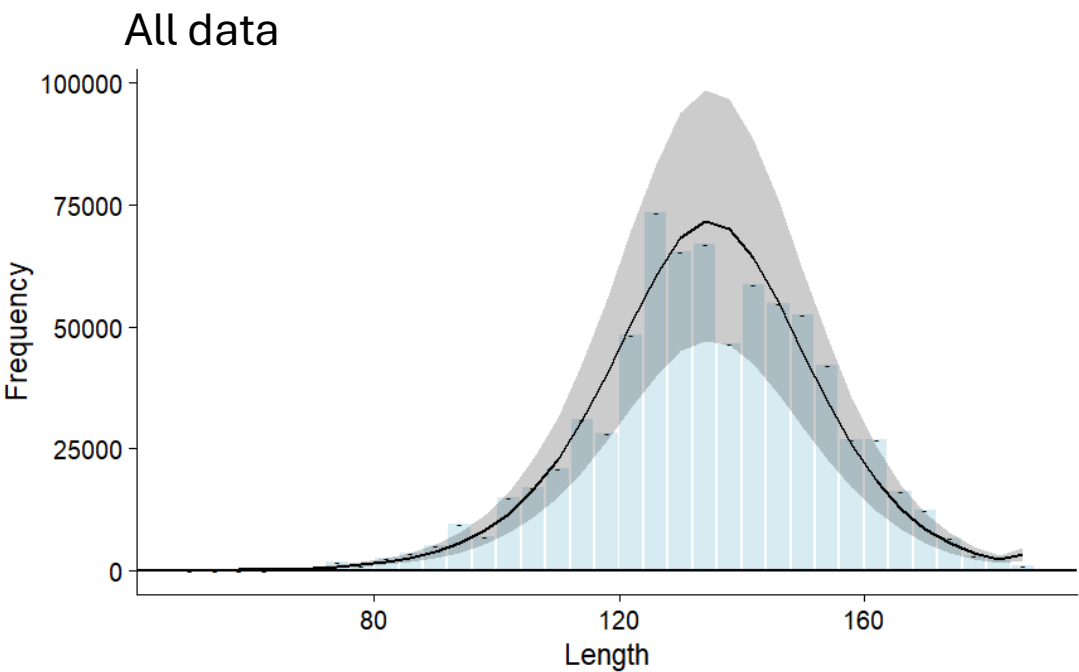
Yellowfin catch curve comparison

Parameter	All Data	Filtered Data
Linf	189.920	189.907
M/K	1.481	1.491
F/K	3.473	4.238
Selectivity 50%	126.754	128.470
Selectivity slope	0.108	0.117
SPR	0.203	0.184
YPR	7.956	8.321



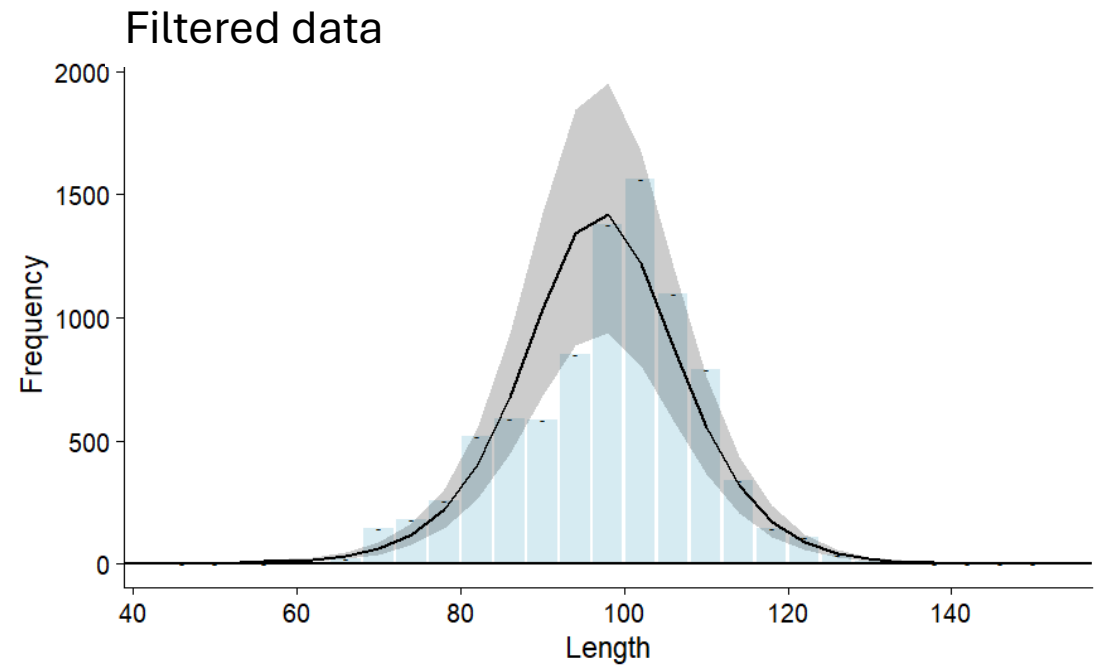
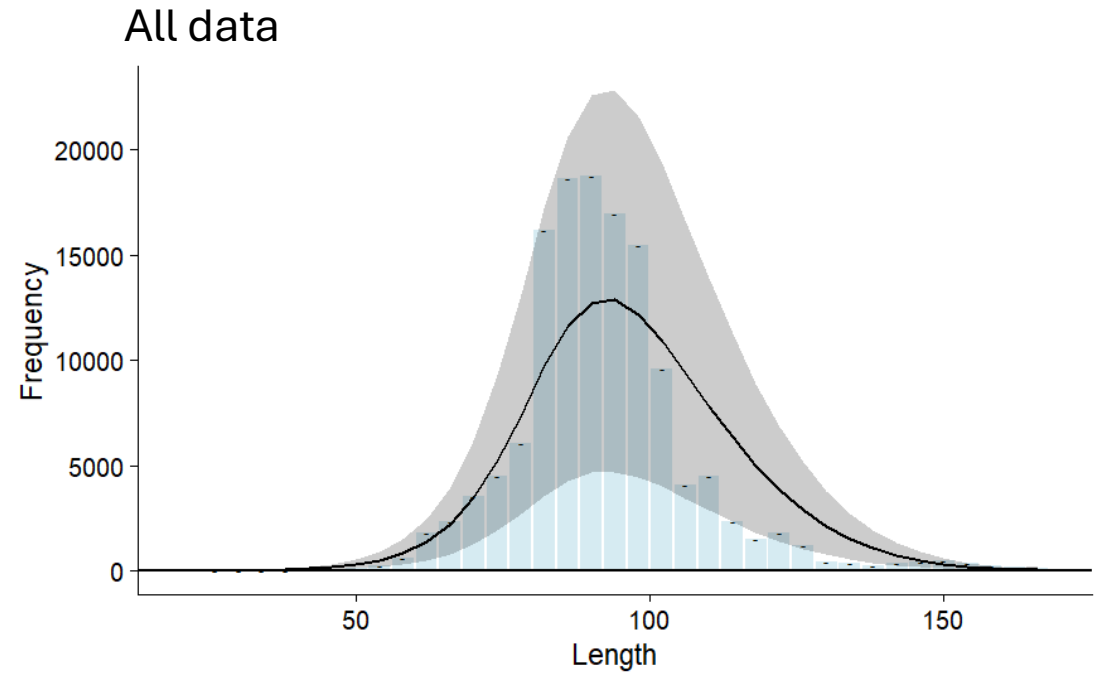
Bigeye catch curve comparison

Parameter	All Data	Filtered Data
Linf	199.912	199.968
M/K	1.492	1.495
F/K	3.681	4.873
Selectivity 50%	131.808	142.421
Selectivity slope	0.099	0.095
SPR	0.188	0.218
YPR	12.230	12.172



Albacore catch curve comparison

Parameter	All Data	Filtered Data
Linf	125.323	124.990
M/K	1.479	1.501
F/K	0.360	2.488
Selectivity 50%	83.554	95.489
Selectivity slope	0.137	0.176
SPR	0.753	0.459
YPR	0.918	2.750



Conclusions and Suggestions

1. Catch and length data are most likely generally not biased but precision is low
2. Need to consider more explanations for observation error vs true change in catch (e.g. time period, location)