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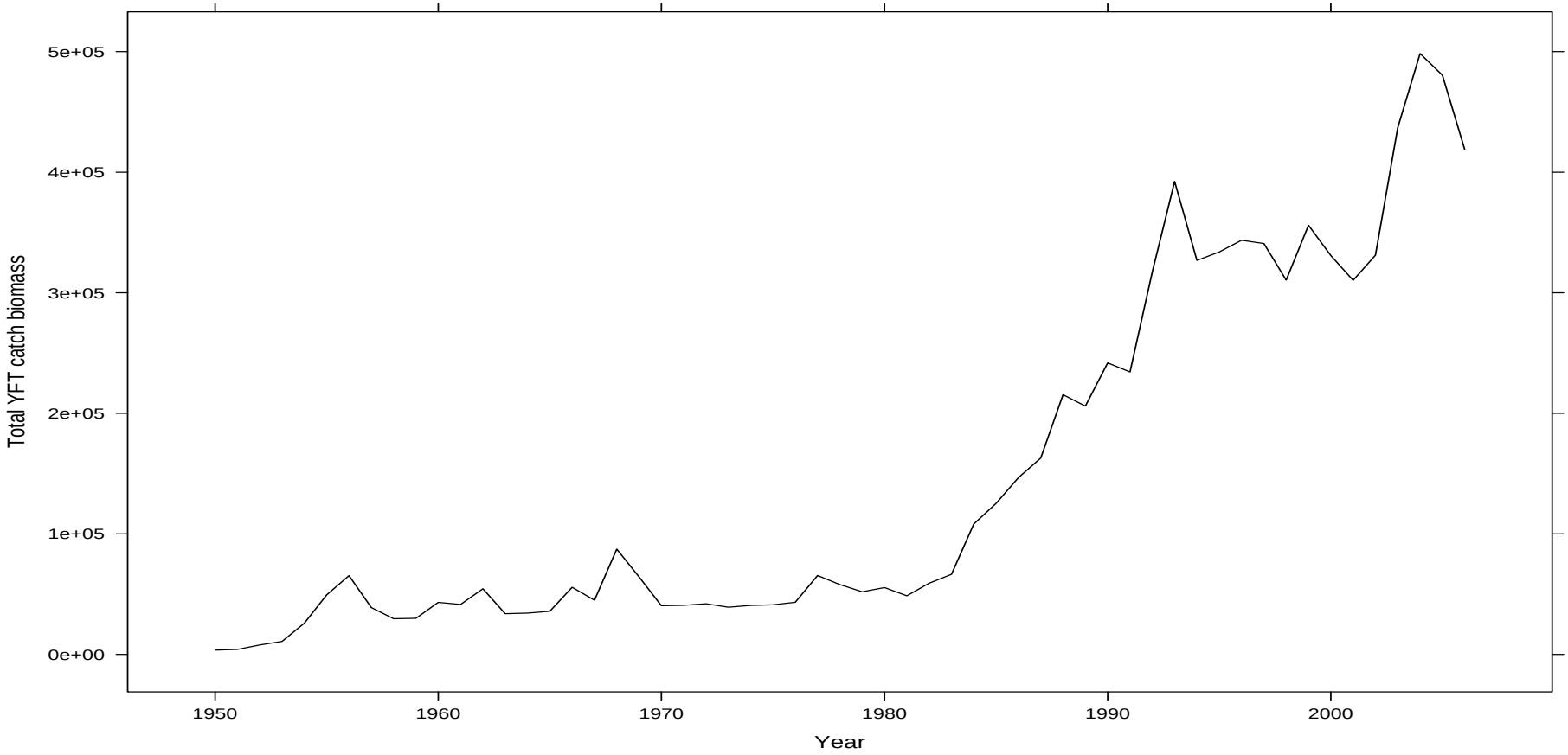
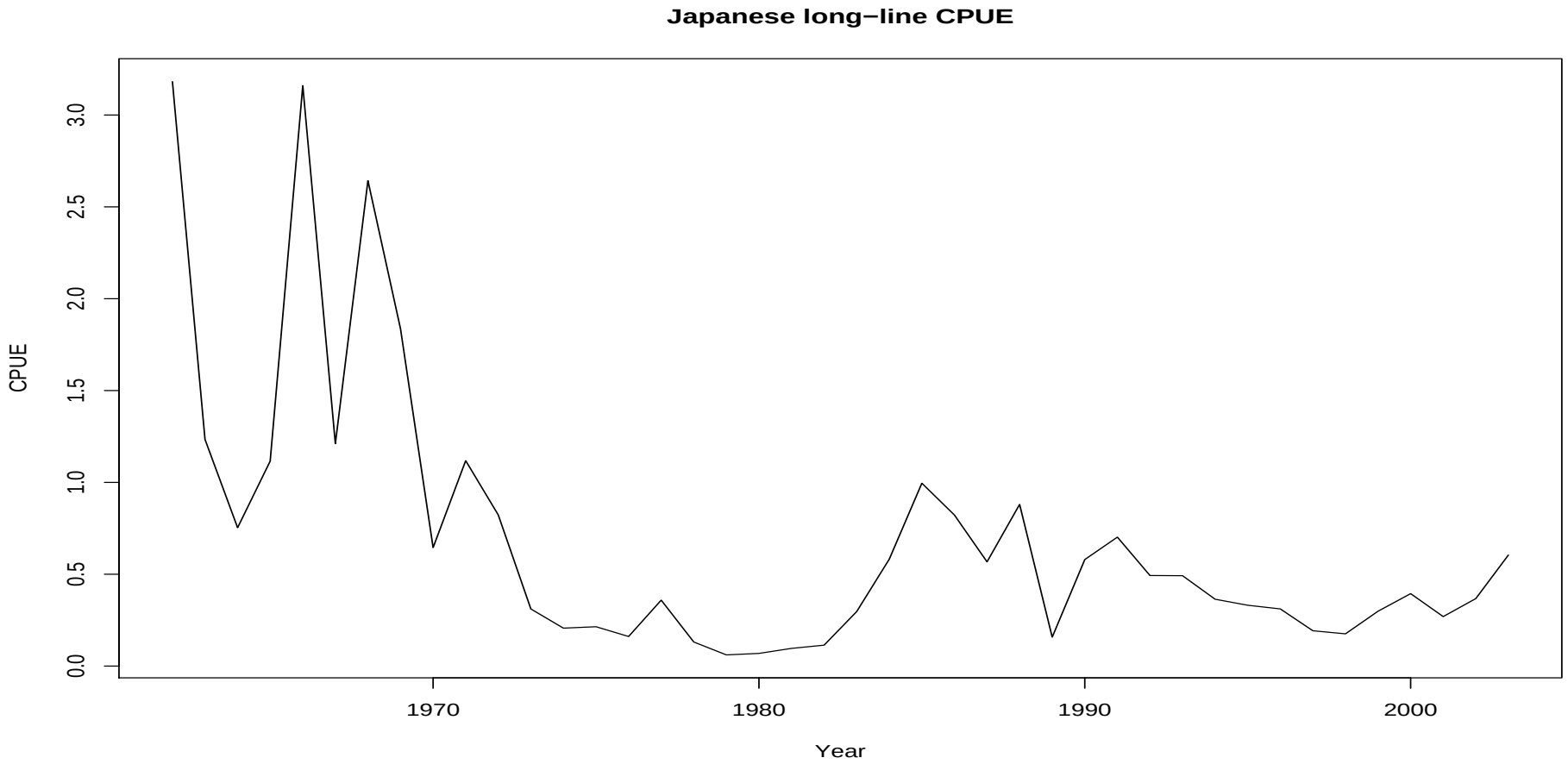
Present status

- With respect to CASAL we have formulated a prototype full historical integrated assessment model for yellowfin
- Initial attempt was to have a single-stock quarterly model, with all gear types and running from 1950 to 2006
- We have quarterly catch-at-size, CPUE (Japanese and Taiwanese long-line)
- Quarterly tagging data releases and associated recaptures **for Seychelles landed purse-seine catches** in 2006

Total catch biomass for YFT

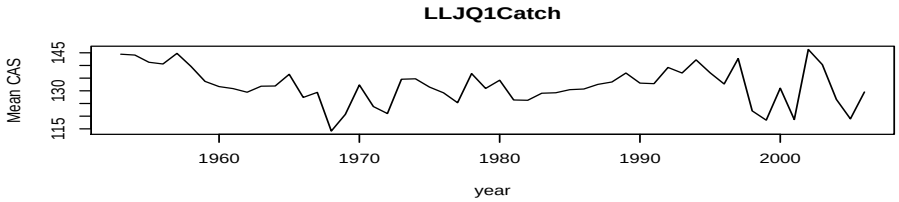


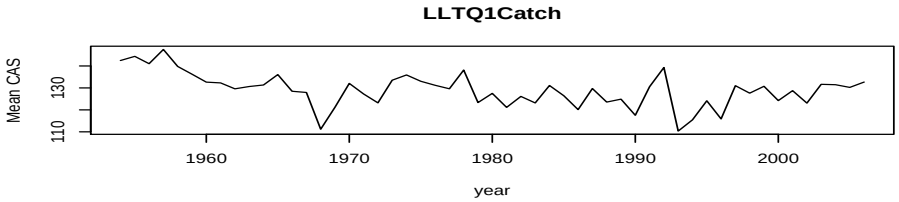
Japanese long-line CPUE for YFT

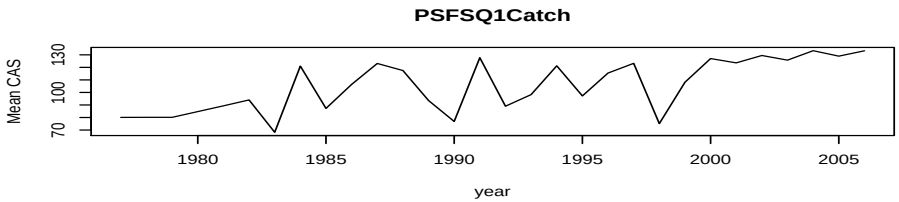


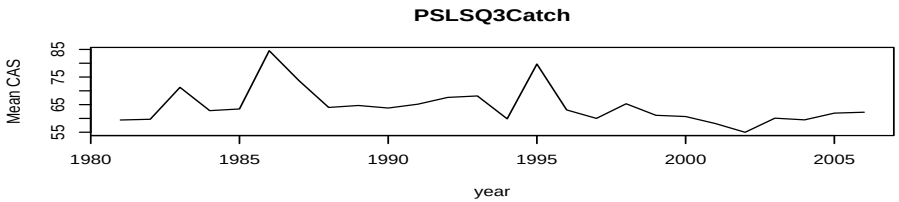
Trends in mean catch-at-size

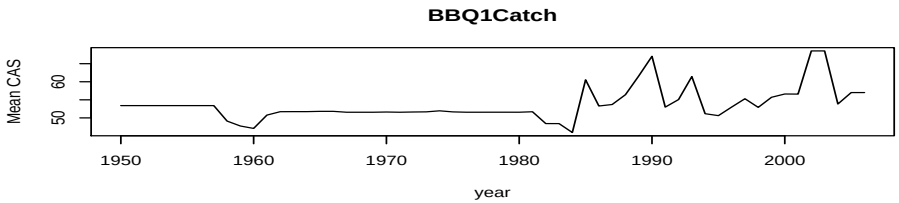
For each gear in the quarter in which most catch was taken:

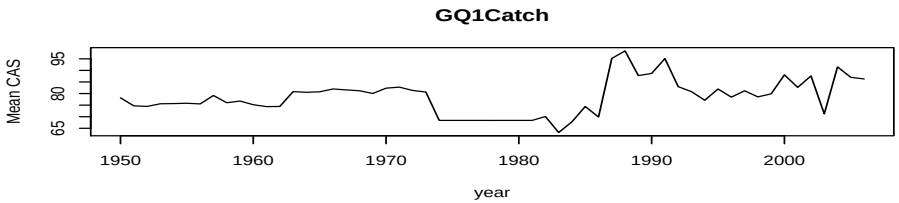


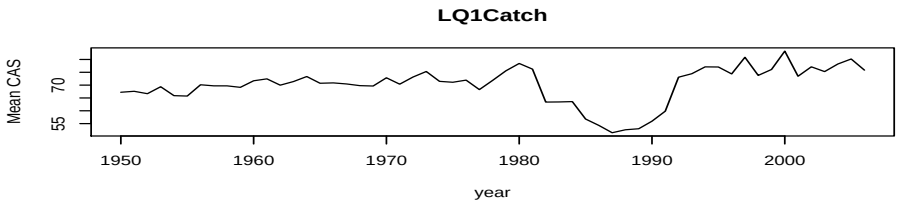












Potential issues with YFT catch-at-size

- Long-line data recently has low sample size
- For the artisanal gear types the catch-at-size data are inferred/estimated not based on truly direct sampling
- Not clear how to weight some of these data sets *a priori* - initial effective sample sizes - given we have no real grasp of variation in reported CAS
- Sheer volume of length frequency information, even for pessimistic assumptions on initial effective sample sizes, means it is the dominant data set in terms of size

CASAL & tagging data

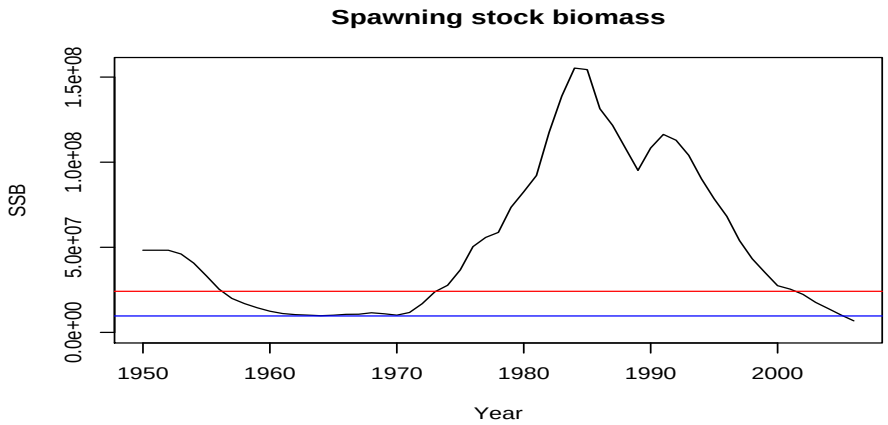
- CASAL can accomodate multiple release and recapture events (by length and/or age)
- In terms of the likelihood each recapture event by length/age class is treated as a binomial event
- Recapture probability is defined in terms of the reporting rate and the ratio of the reference catch and the stock abundance
- Over-dispersion can be applied and we use an iterative re-weighting approach to the secondary weighting (potential process error calculation) of the various data sets
- We can subset the tags into subsets of a given fishery

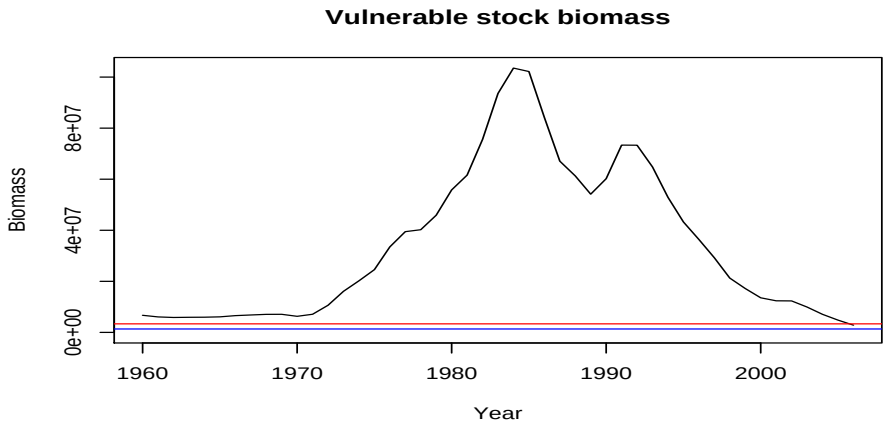
Data, parameters & estimation

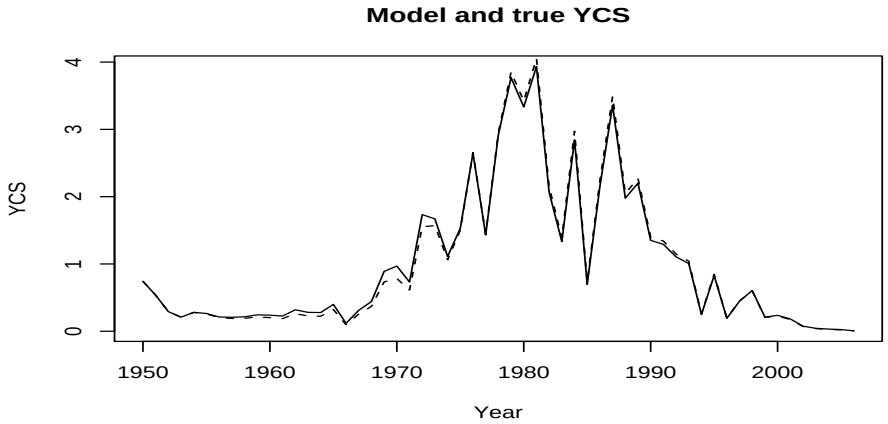
- Tagging information for 2006 - releases quarter 1 and 2, recaptures quarters 3 and 4 respectively to allow 'mixing'
- Using CASAL's automatic optimisation scheme just to obtain point estimates for diagnostic runs
- Estimate virgin biomass (B_0), yearly recruitment deviations and selectivity parameters (with a mixture of selectivity functions assumed so as to be able to accomodate the CAS patterns)
- Iterative re-weighting is used to estimate potential dispersion characteristics for the tagging and length-frequency data

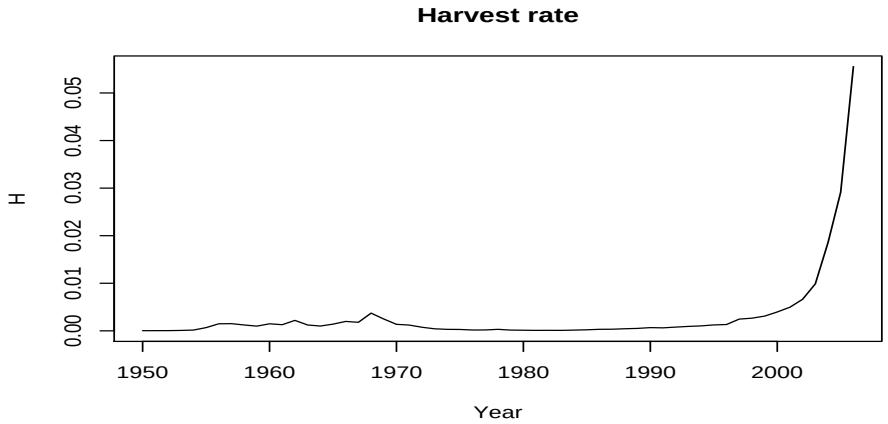
Stock summary

Simple stock dynamic summary:





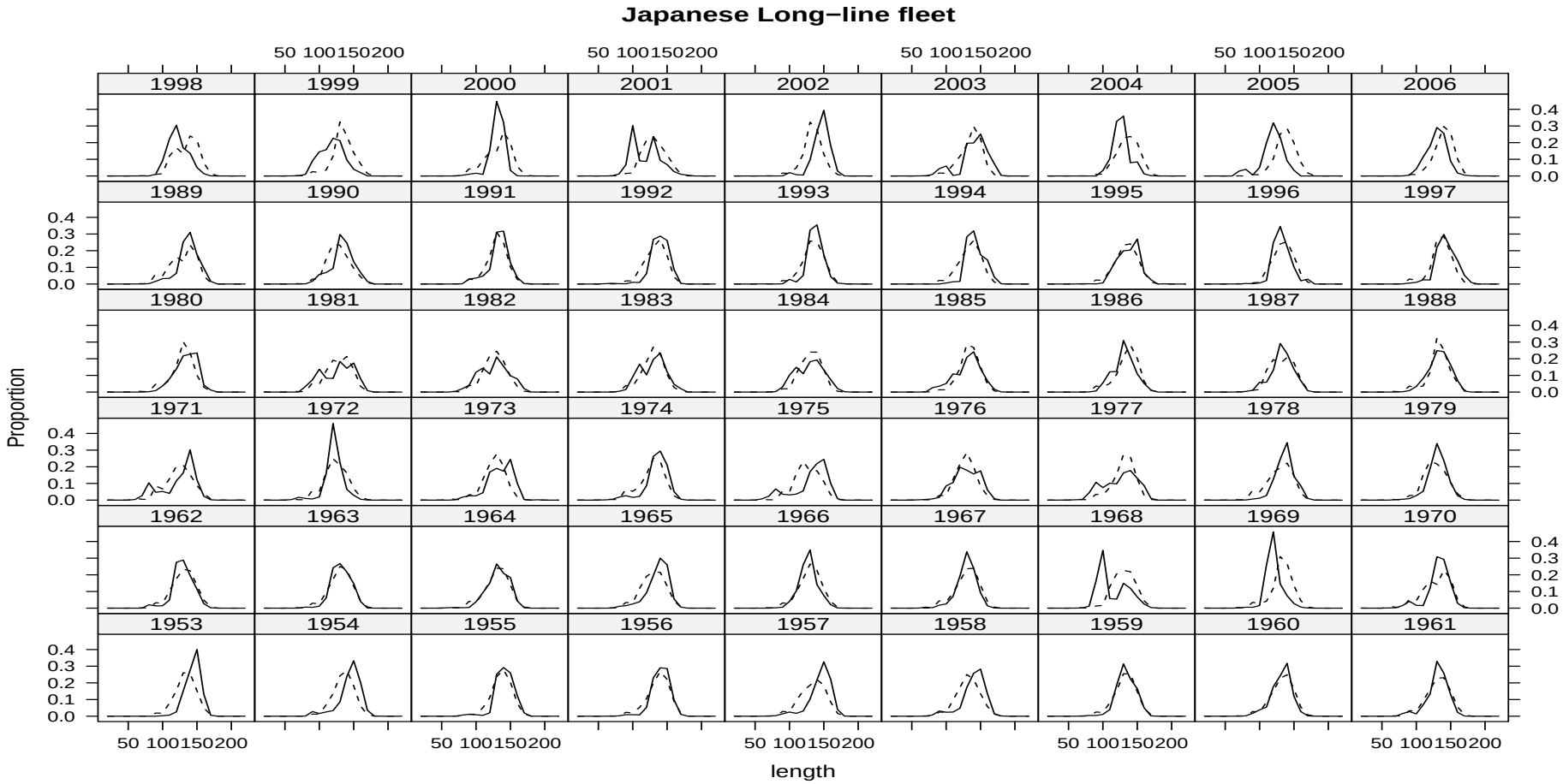




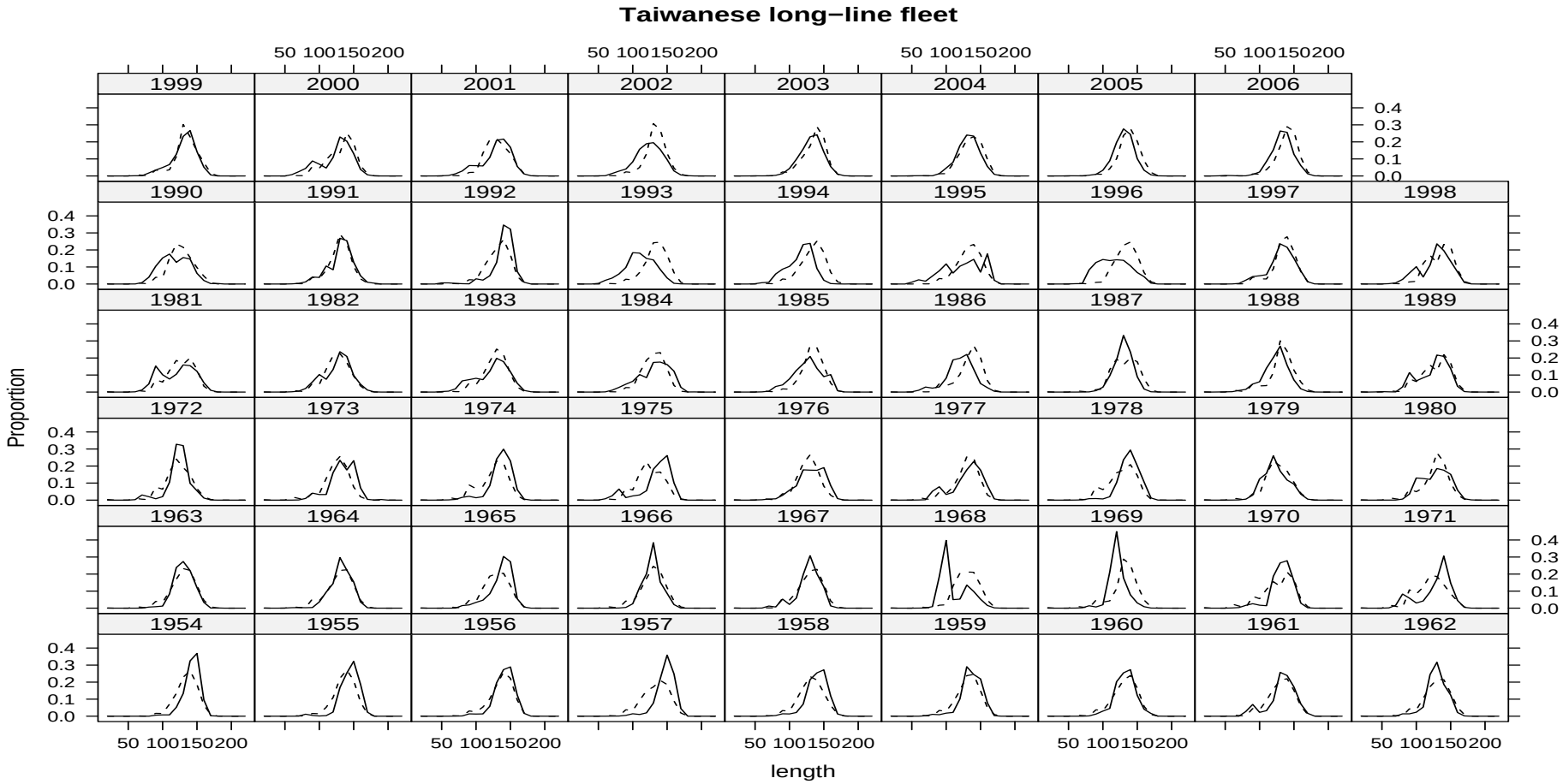
What is going on?

- Extremely puzzling trends!
- Only data that gets fitted well is the Japanese and Taiwanese catch-at-size and the artisanal data that selects longer/older fish
- It would appear recruitment is being used to allow the rapid increase in catches in the 170s to be absorbed without decimating the length frequency of the population and so not fitting the immense amount of long-line CAS
- Population then needs to be rapidly reduced so as to try and fit the tag data in 2006
- Fits to CAS on the shorter-length selecting gears is poor due to the large recruitment period...
- Without tagging data model goes for huge population sizes but hits B_0 upper bounds...

Fits to Japanese long-line CAS



Fits to Taiwanese long-line CAS



Going forward

- Strong differential reliability and understanding of representability of CAS from key elements of the fishery
- Without spatial model tag mortality model is almost certainly wrong - availability to artisanal fleets assumed same as purse-seine fleets given non-spatial model
- Fundamental mismatch between information on initial stock size between the key CAS data and the tagging data