

Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



Corresponding size-composition data to the indices and catch

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Workshop to improve the longline indices of abundance of bigeye and yellowfin tunas in the eastern Pacific Ocean
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Introduction

- Size-composition calculation:

$$I(l) = \frac{1}{\sum w_x} \sum w_x I(l)$$

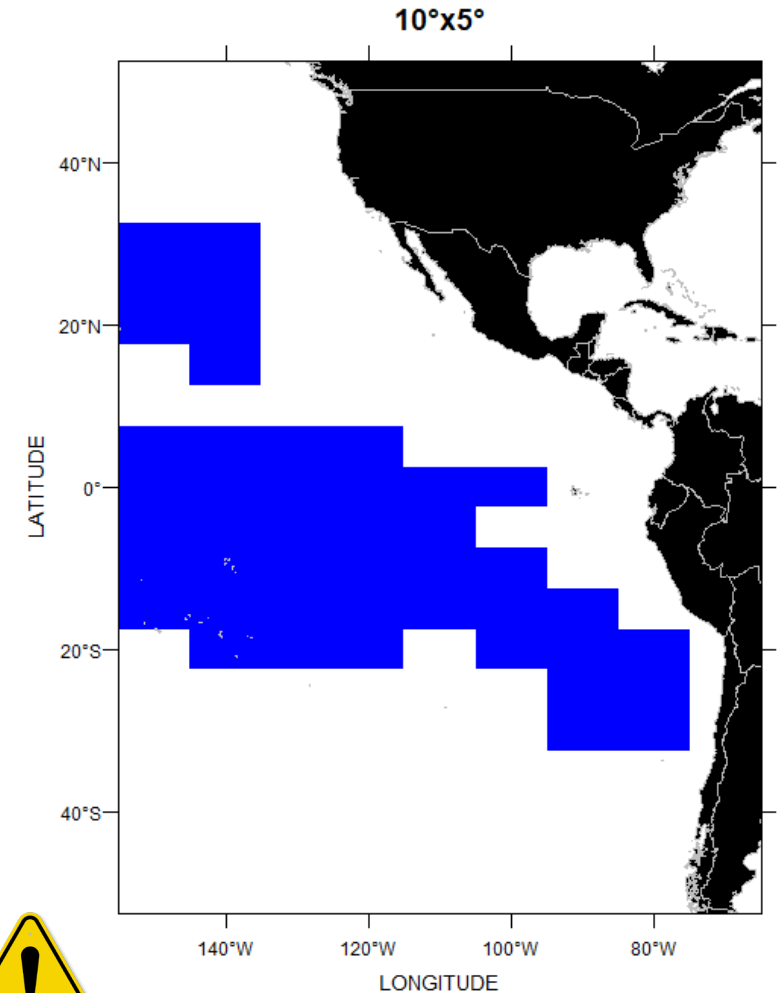
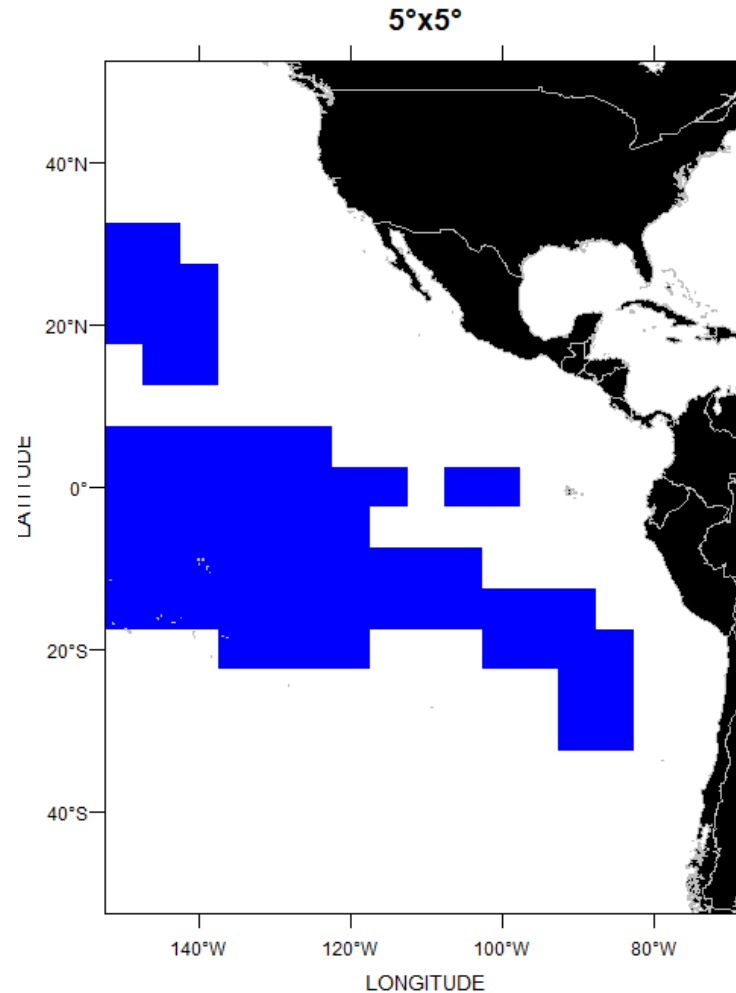
Where x is a cell and w_x can be the aggregated catch of the cell, the CPUE of the cell, the area-corrected relative density of the cell.

Catch composition : CATCH weighting

Population composition : CPUE weighting

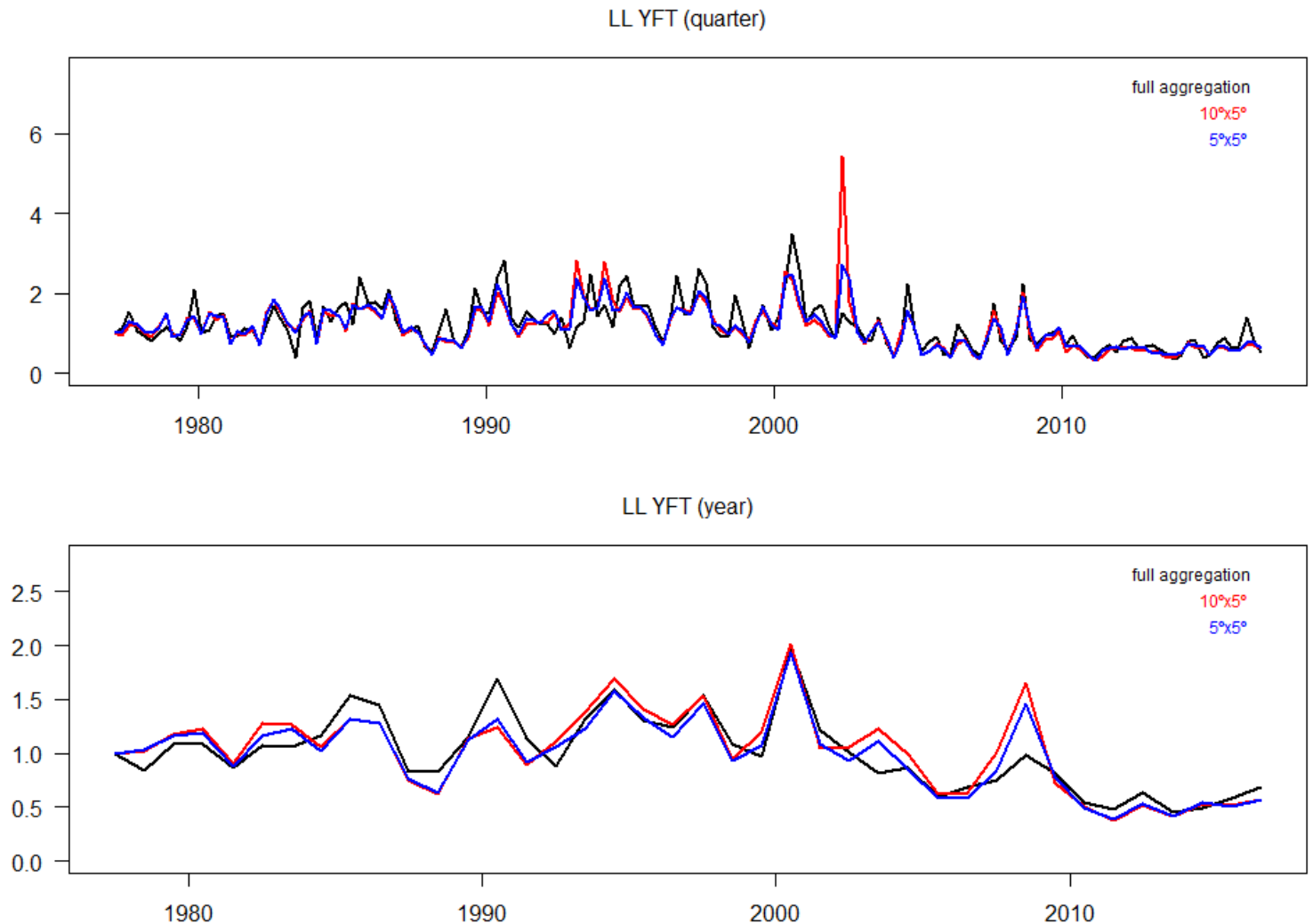
Longline fishing area (40 years: 1977-2016)

- CPUE weighting: Simple CPUE (catch/effort) may fail, problems with “near zero” effort.
- Simple solutions: remove cells with low effort. Problem: different areas for every year/quarter.
- Modelling CPUE may allow to complete the area to the full domain of interest making this step unnecessary. “Near zero” effort most likely to disappear with this approach.

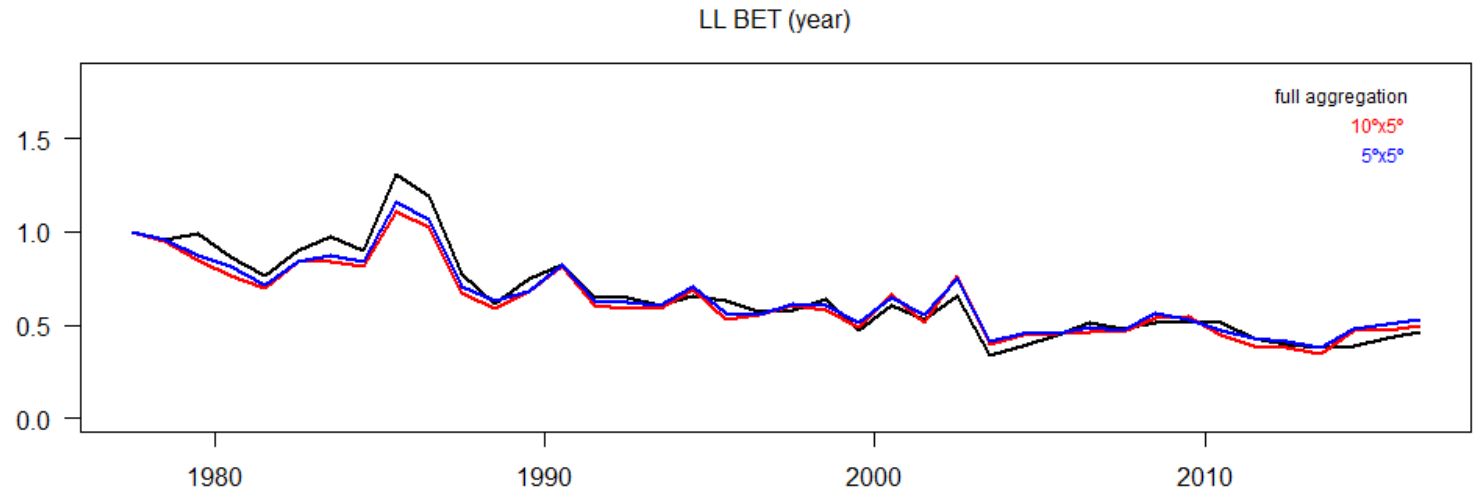
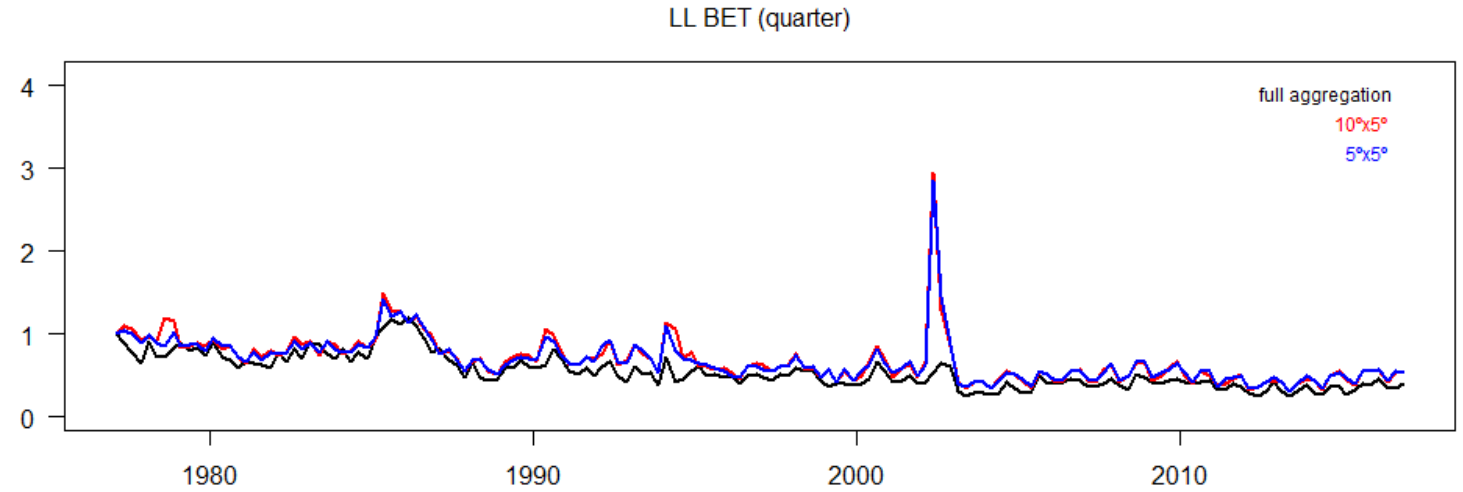


Longline fishing area (40 years: 1977-2016)

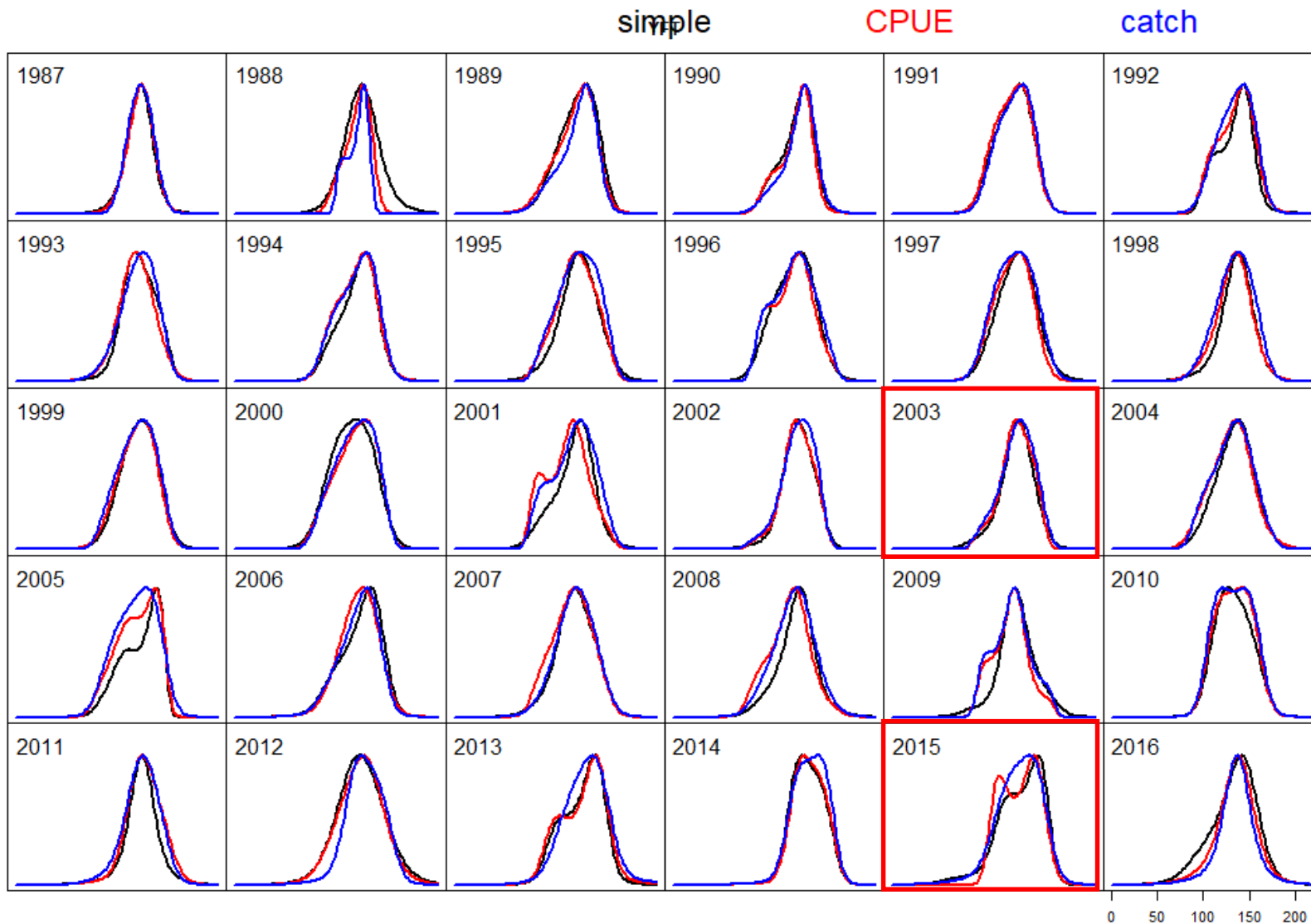
- Problem: spatial resolution, coarse resolutions smooth data (catch and effort). However, for CPUE, the nonlinearity of the “catch/effort” calculation may introduce non-smooth changes when changing resolutions. Gridding is also important.



- Problem: spatial resolution, coarse resolutions smooth data (catch and effort). However, for CPUE, the nonlinearity of the “catch/effort” calculation may introduce non-smooth changes when changing resolutions. Gridding is also important.
- Best to use high resolution data BEFORE non-linear transformations (i.e. CPUE from near-to-raw data).

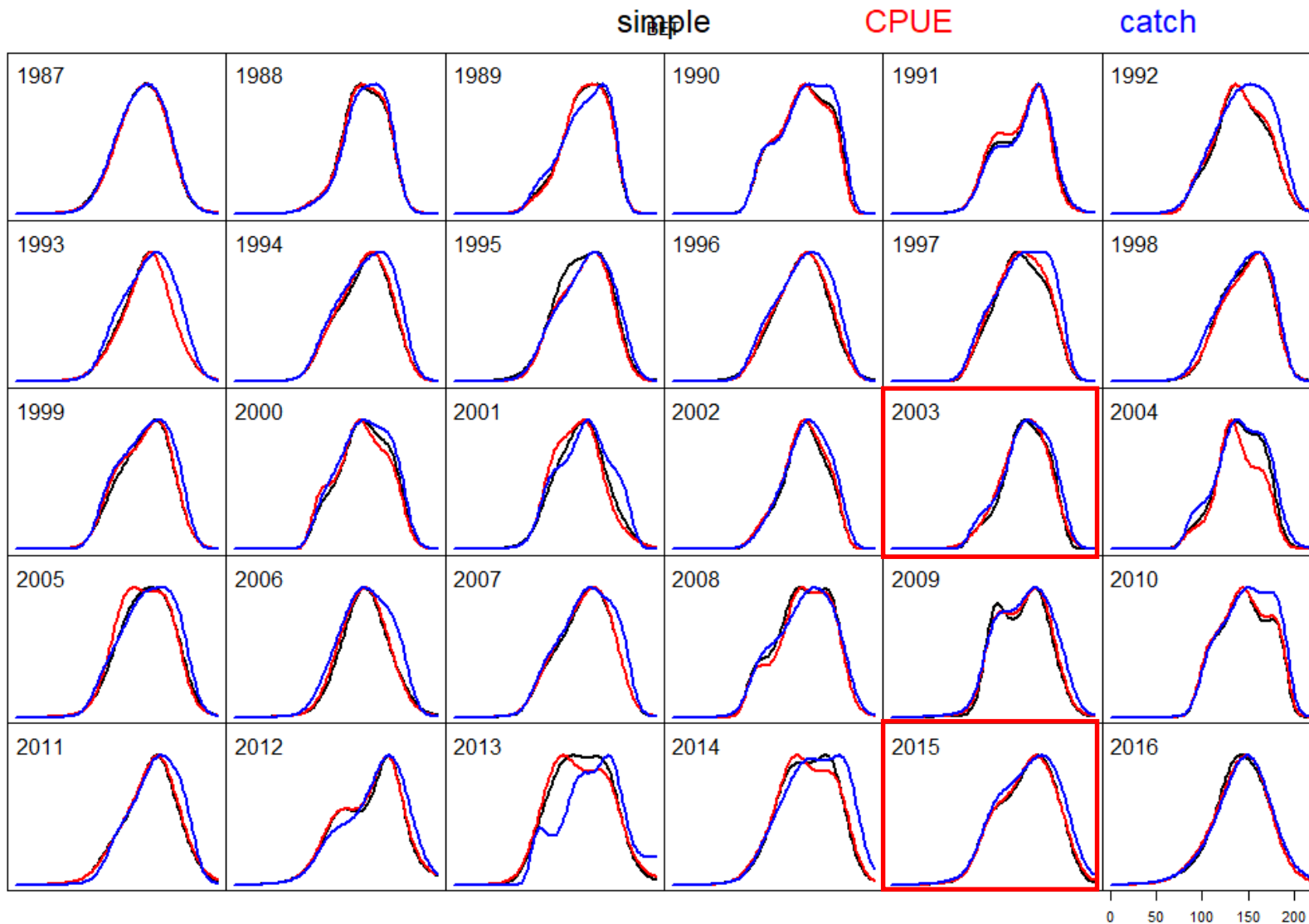


Size-composition: Yellowfin tuna (YFT)



- Comparison of weighting size-composition by catch, cpue.

Size-composition: Bigeye tuna (BET)

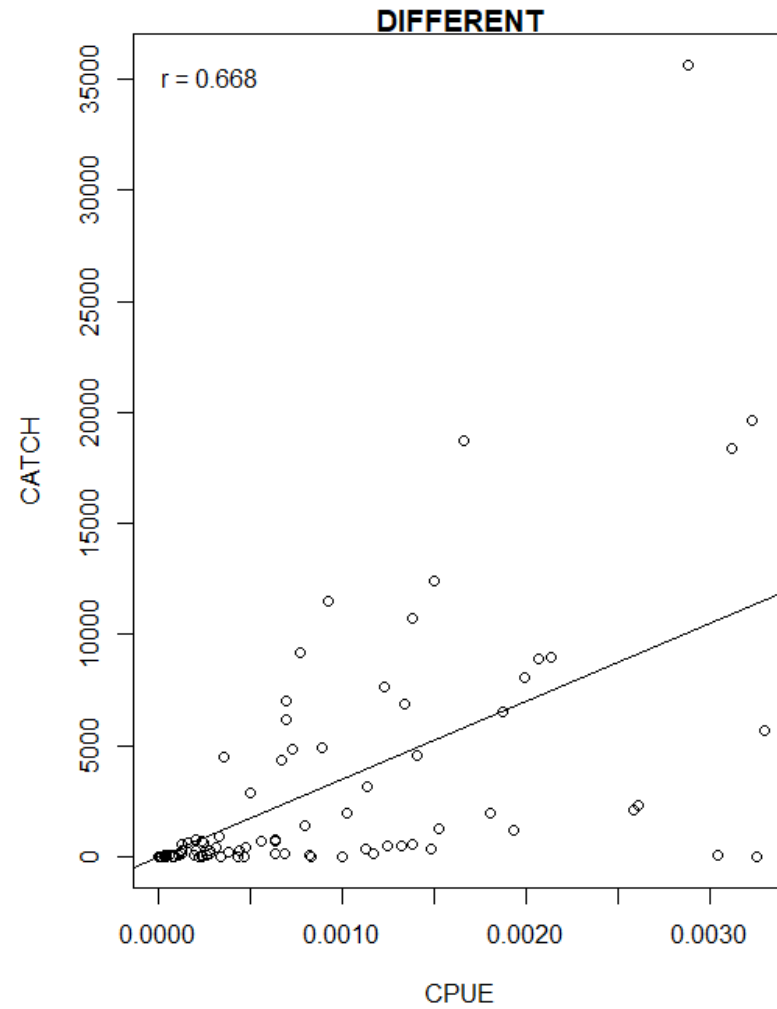
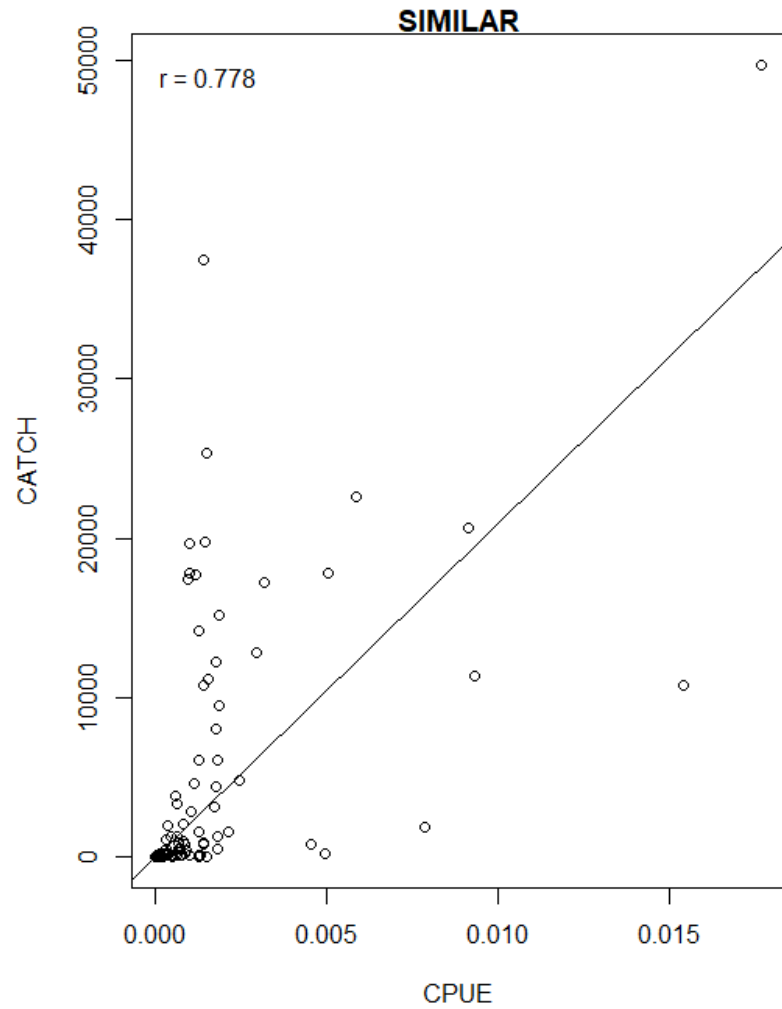


- Comparison of weighting size-composition by catch, cpue.

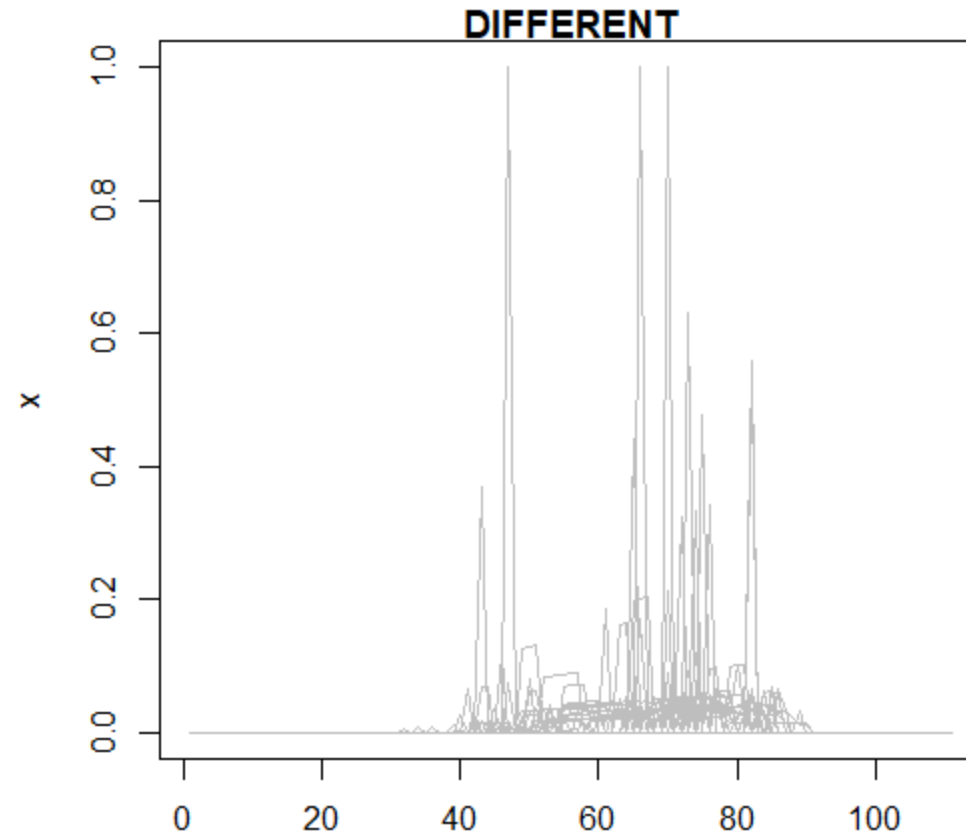
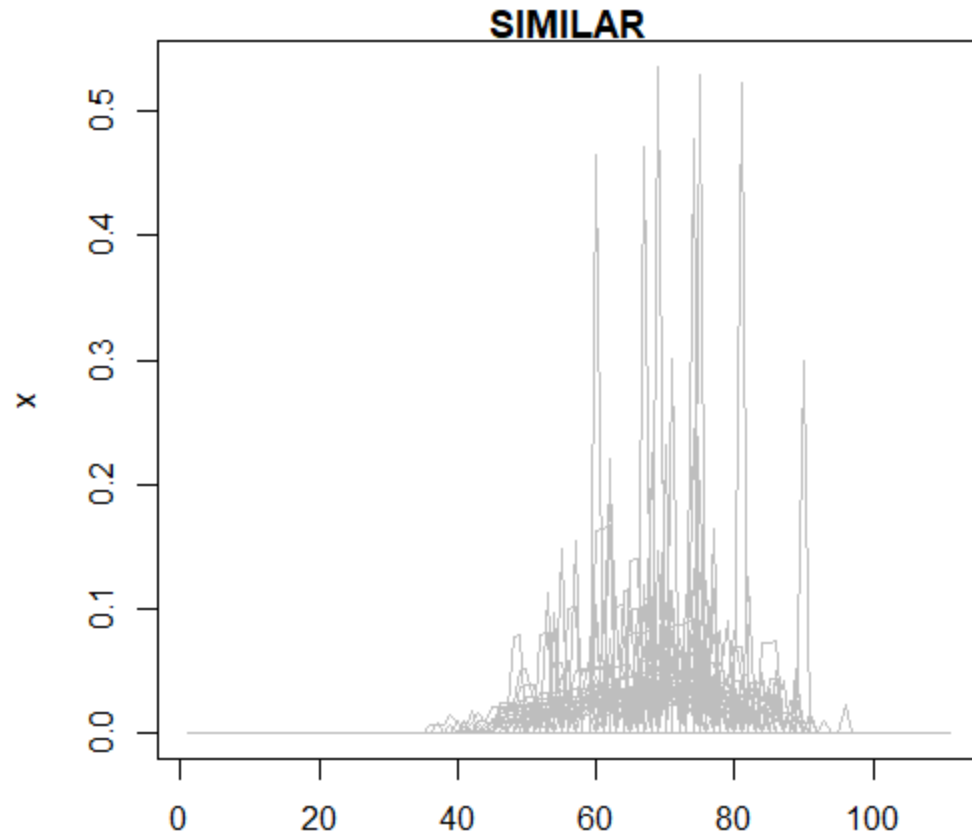
- TWO SOURCES OF DIFFERENCES:
 - spatial variability on CPUE vs. CATCH
 - spatial variability on length composition.
- EXAMPLE 1: no variability in length composition by cell, weighting does not matter (i.e. no ontogenic variability in spatial distribution).
- EXAMPLE 2: same spatial variability in CPUE and CATCH, weighting does not matter (i.e. uniform effort distribution).

- *What happens in years with SIMILAR length distributions?*
 - 1) *low variability in length composition by cell*
 - 2) *Catch is highly correlated to CPUE.*
- *What happens in years with DIFFERENT length distributions?*
 - 1) *high variability in length composition by cell,*
 - 2) *Catch is NOT correlated to CPUE. Effort is concentrated in some areas (high catch, high effort, average/low CPUE vs. high catch, low effort, high CPUE).*

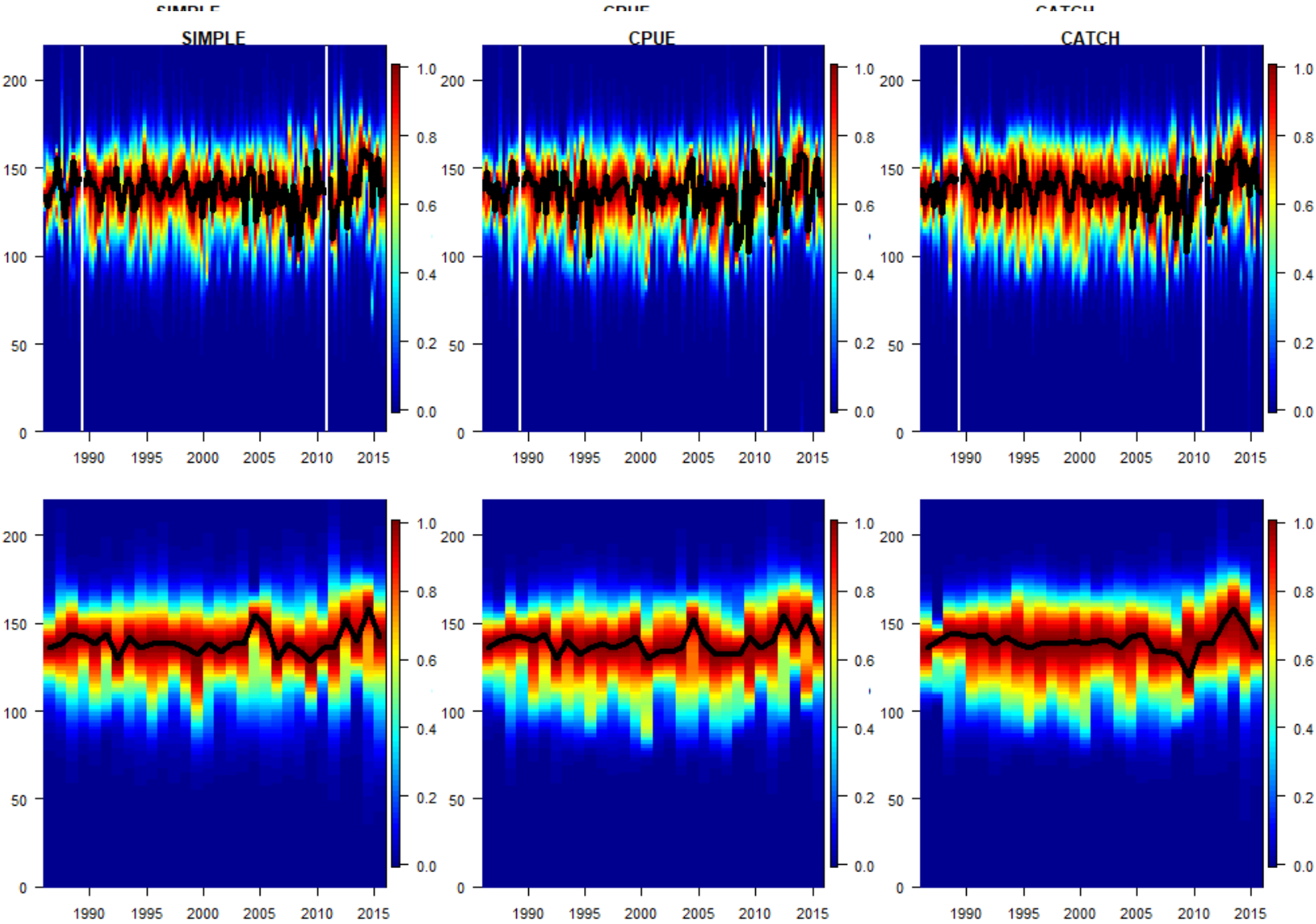
CPUE vs. CATCH



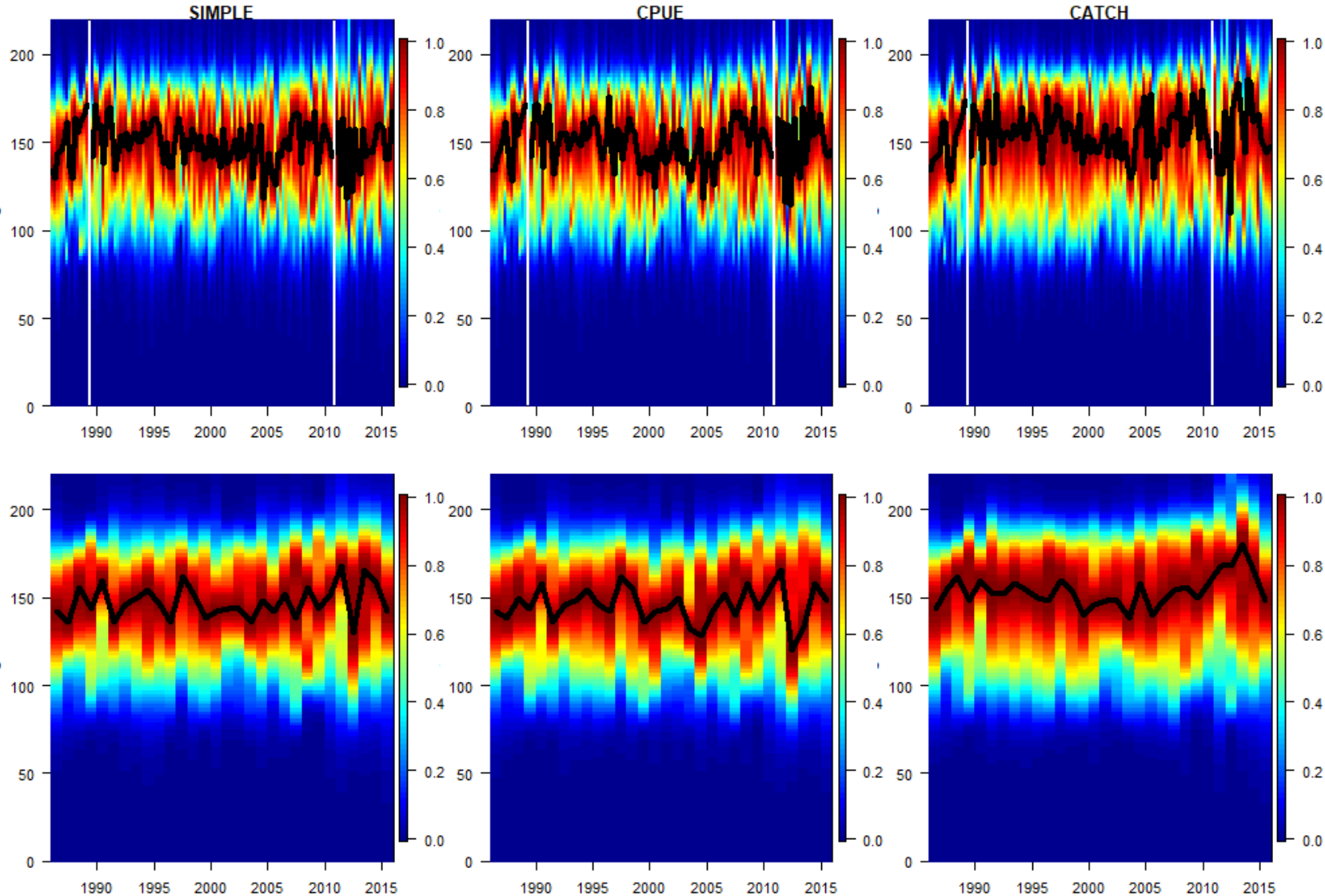
Variability in sample size-composition



Modal length YFT



Modal length BET



Next steps

- Analyze the operational data.

Questions