Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission

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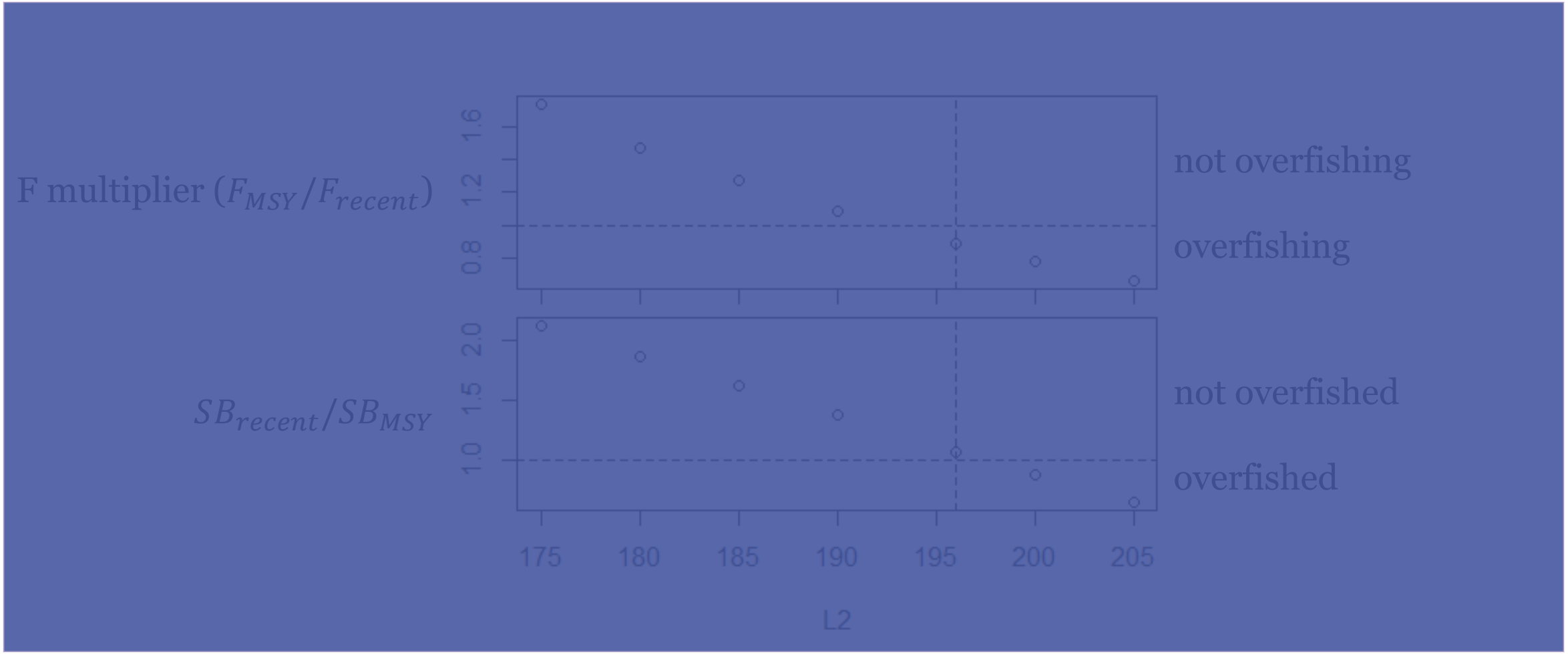
Growth in the EPO assessments

Workshop on age and growth of bigeye and yellowfin tunas in the Pacific Ocean, La Jolla, CA, Jan 23-25, 2019

Outline

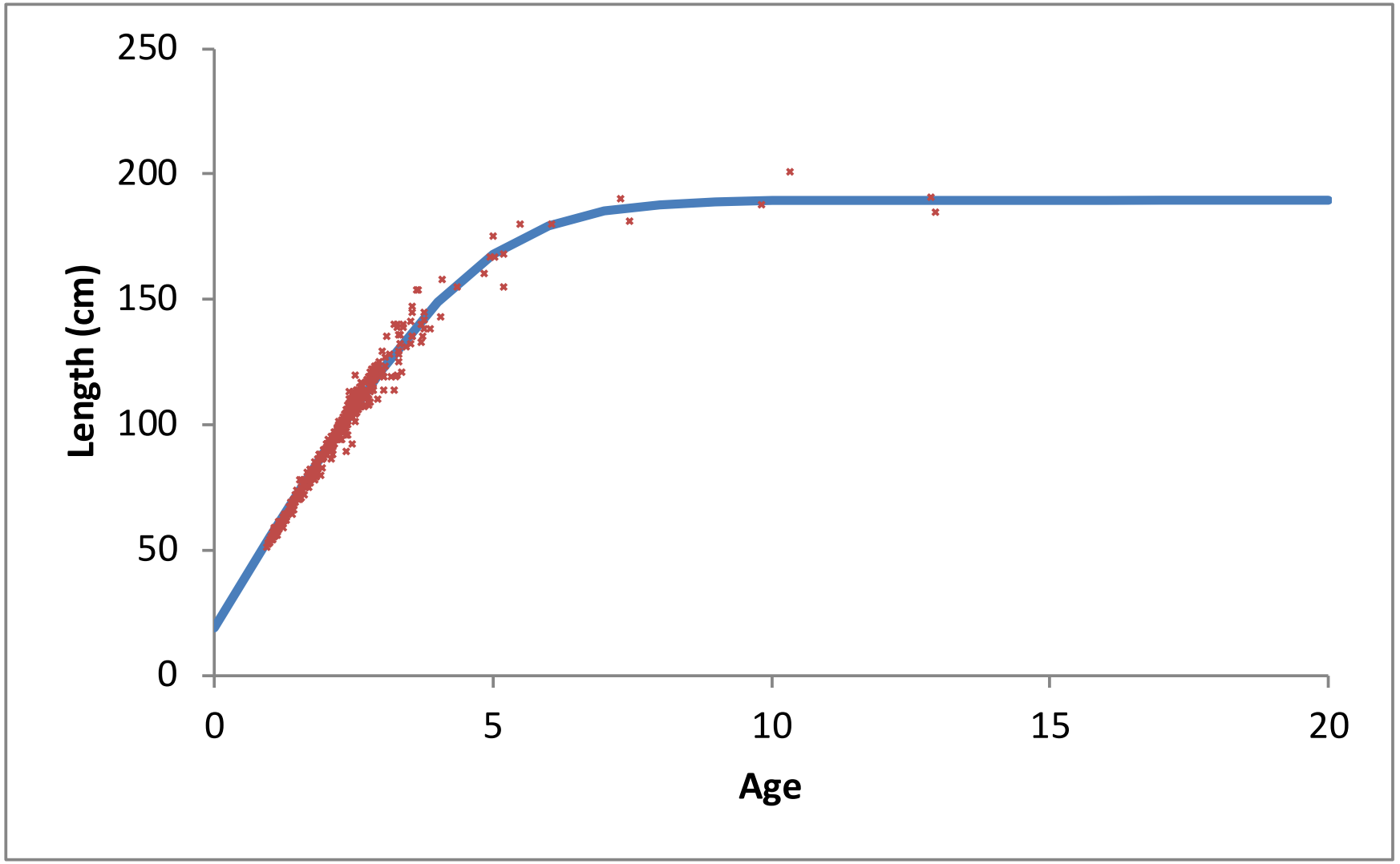
- New growth model
- Consistency with length composition data
- Length or age stratified sampling, selectivity, or availability

The sensitivity of management quantities to L2

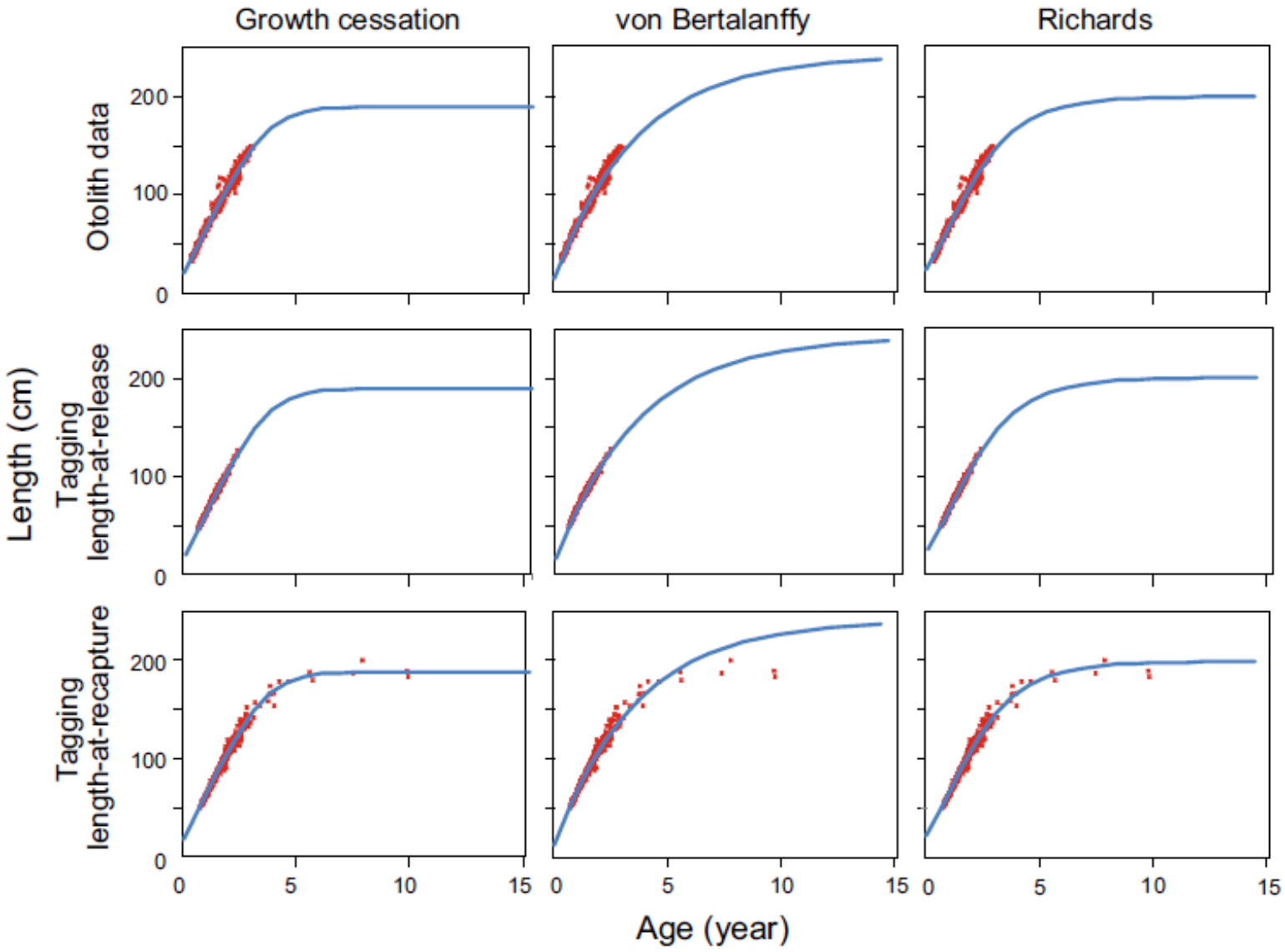


From Haikun

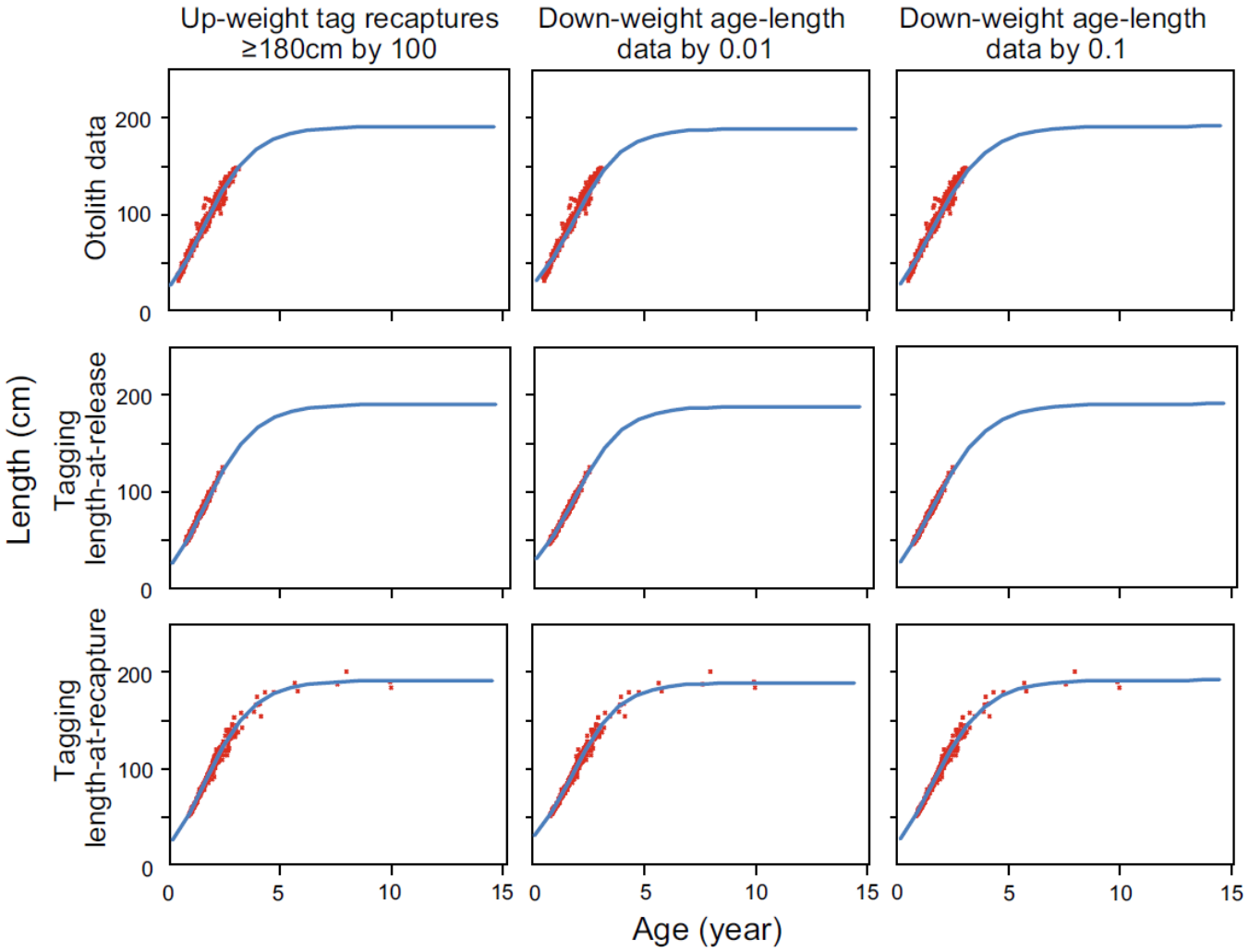
The growth cessation model



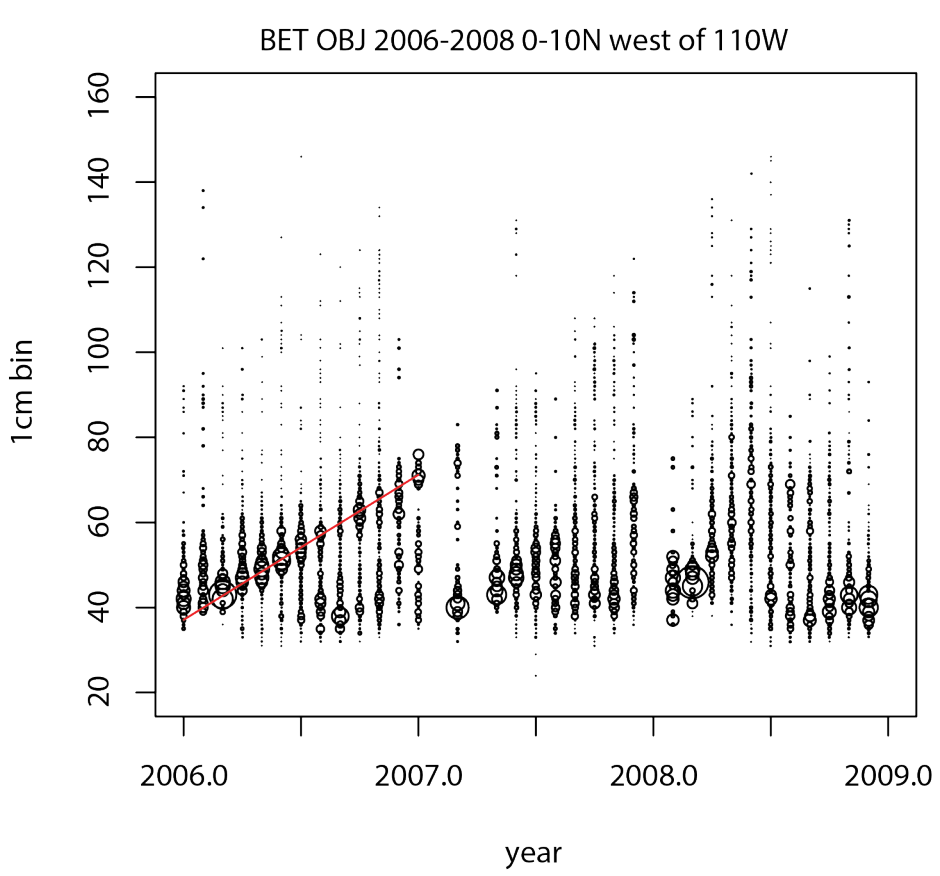
A improved growth curve for EPO bigeye

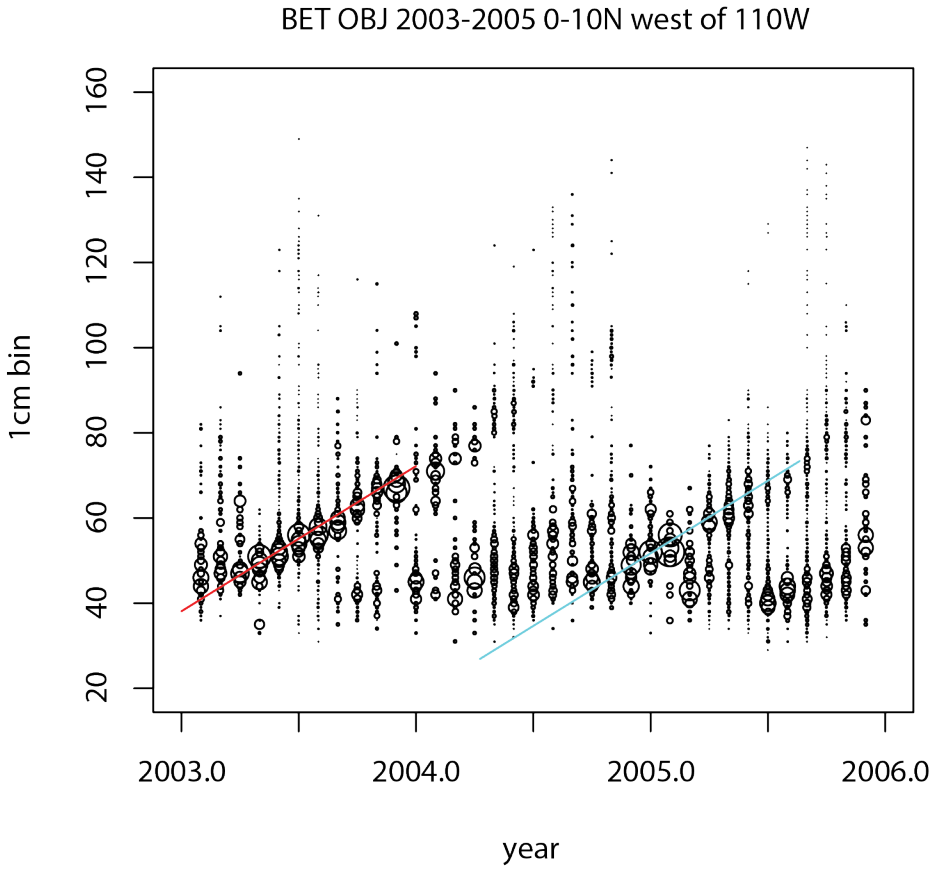


Richards in SS

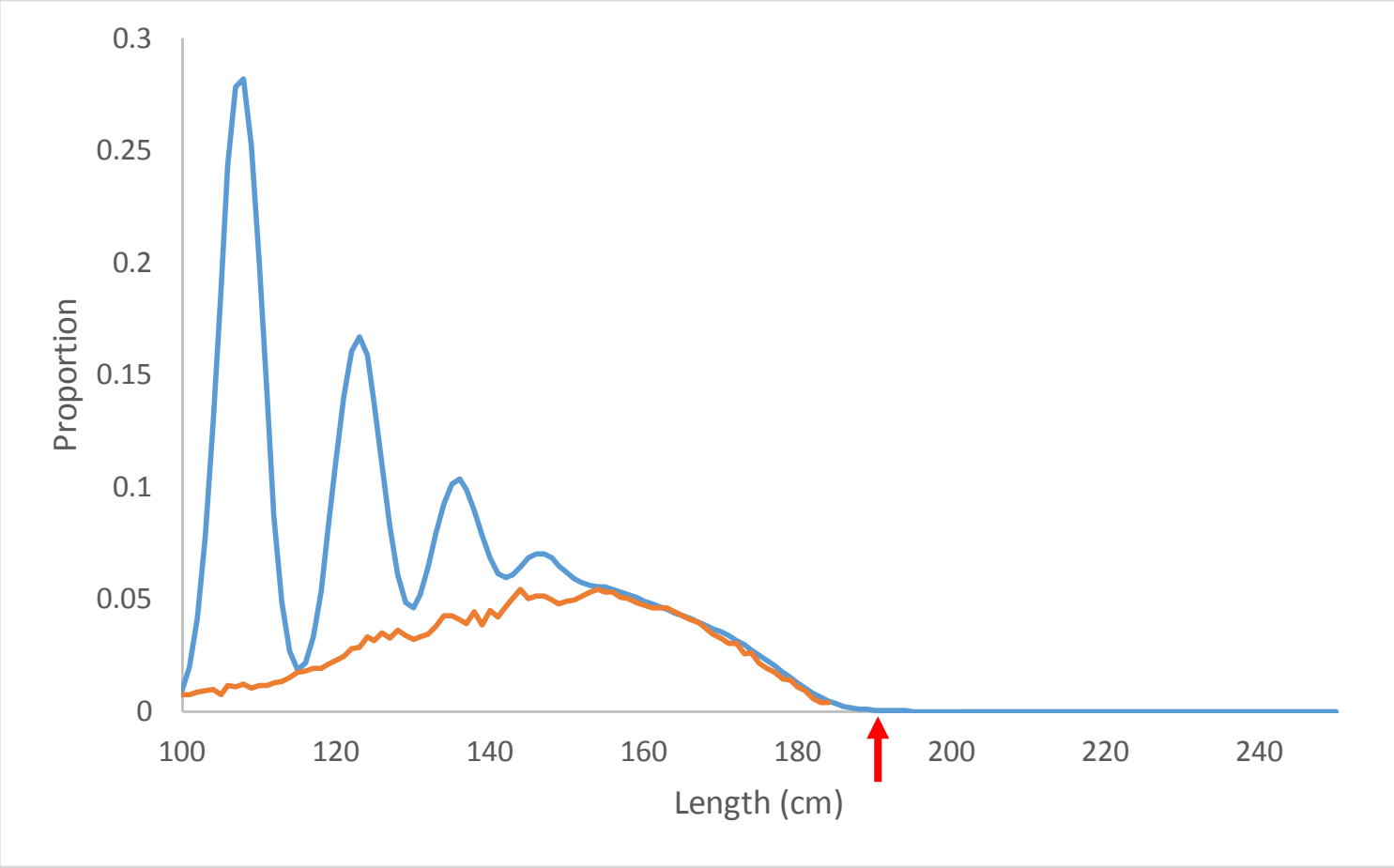


Consistency with length compositions: Floating object

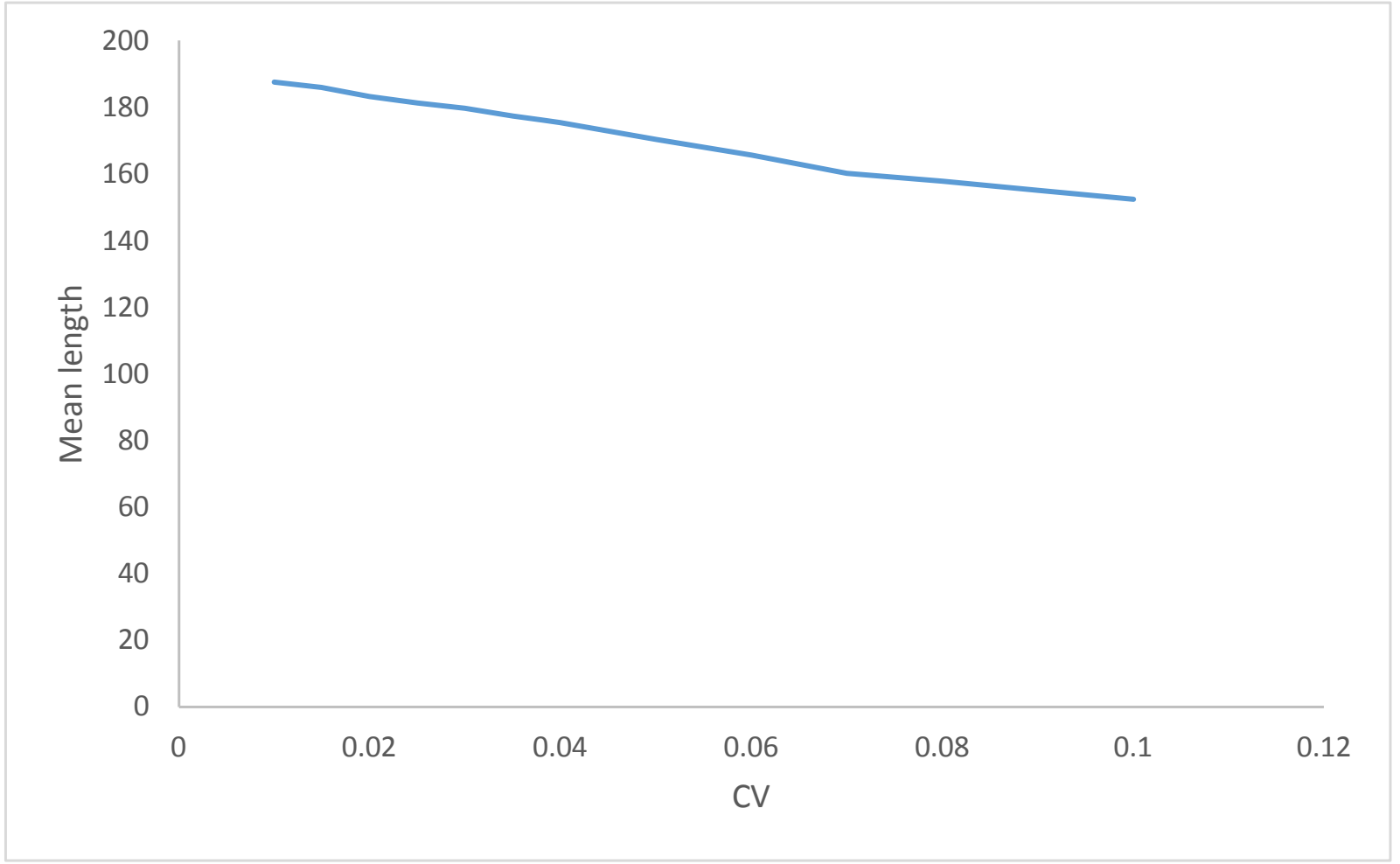




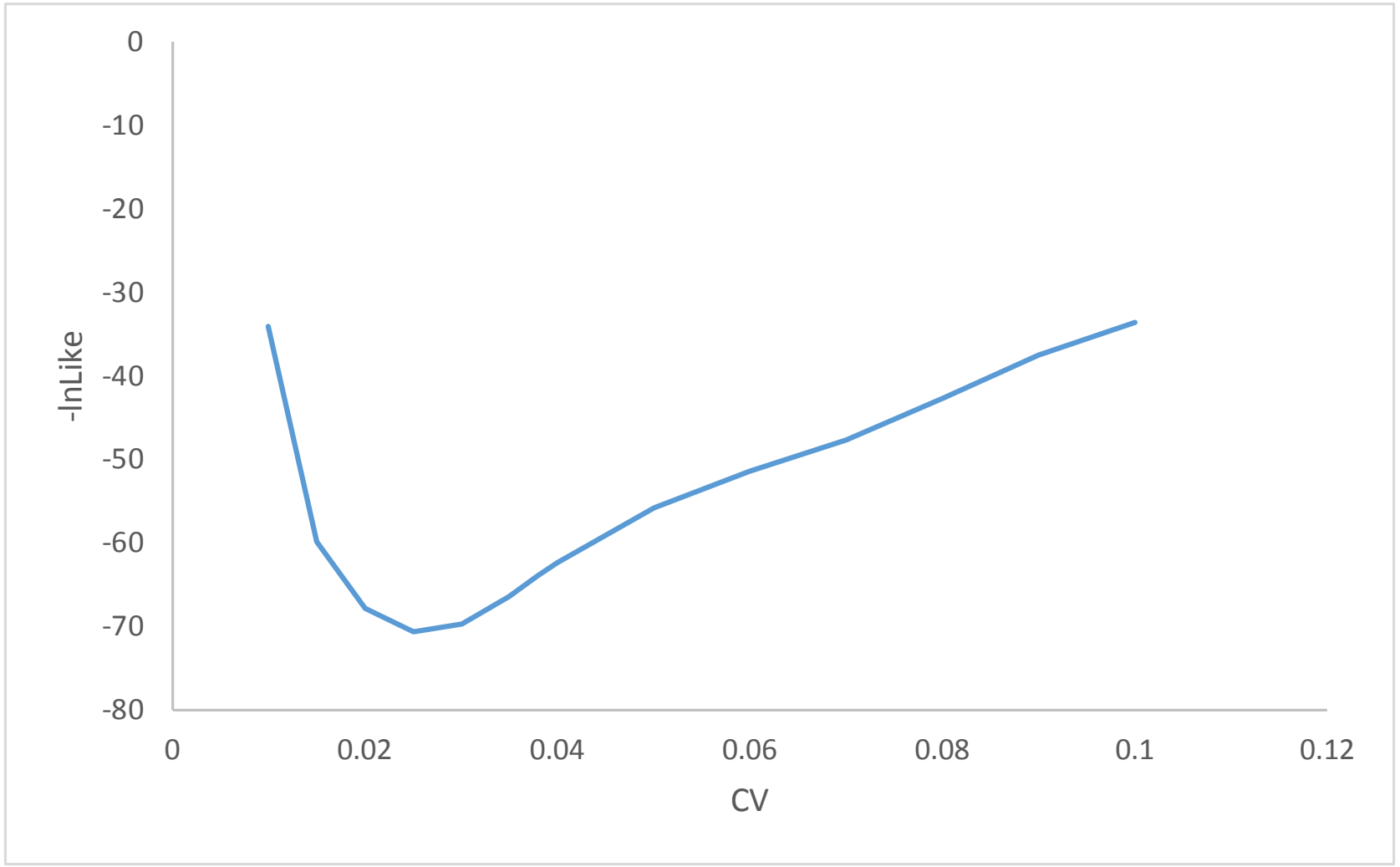
Historical longline length compositions



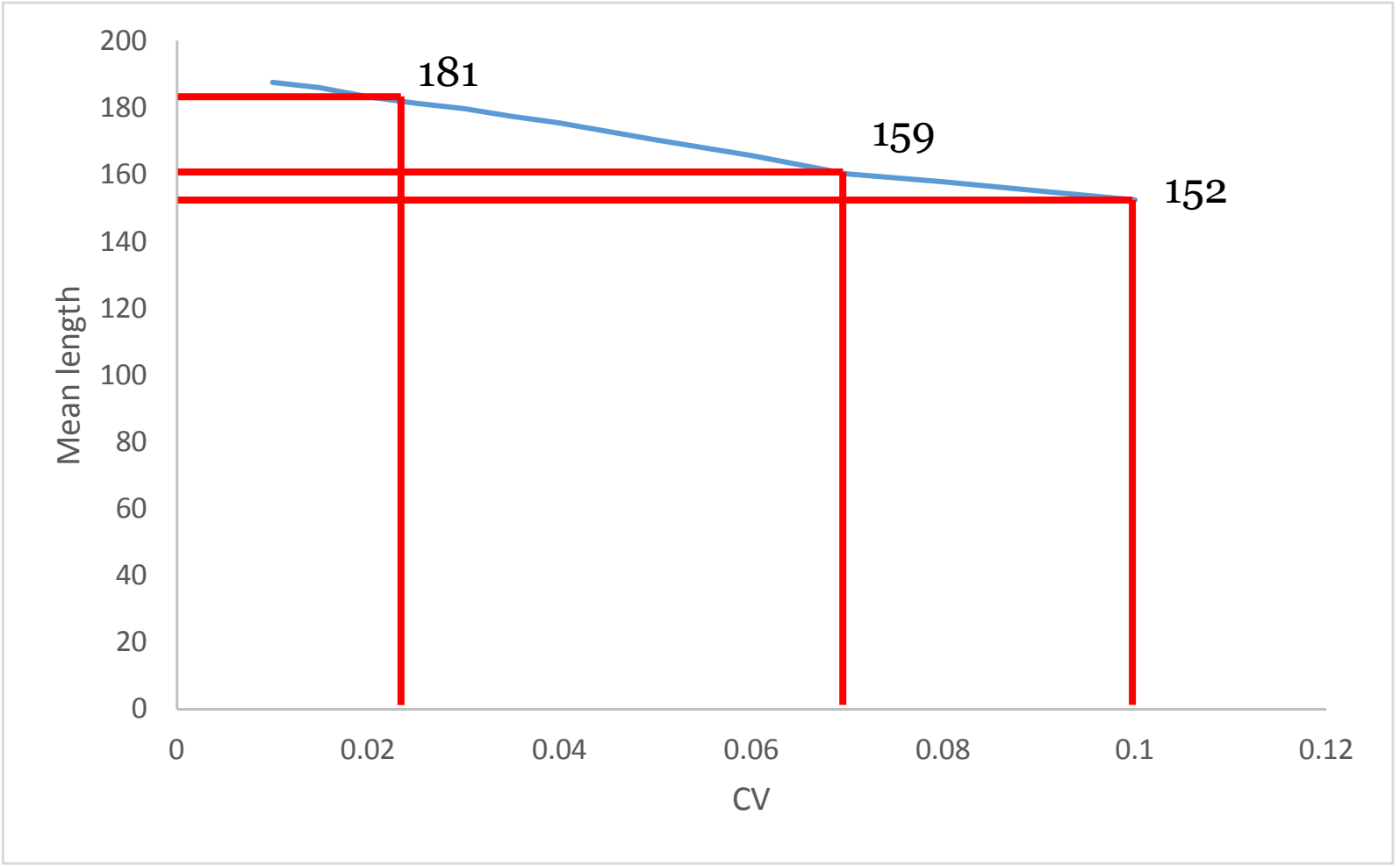
Historical longline length compositions



Historical longline length compositions

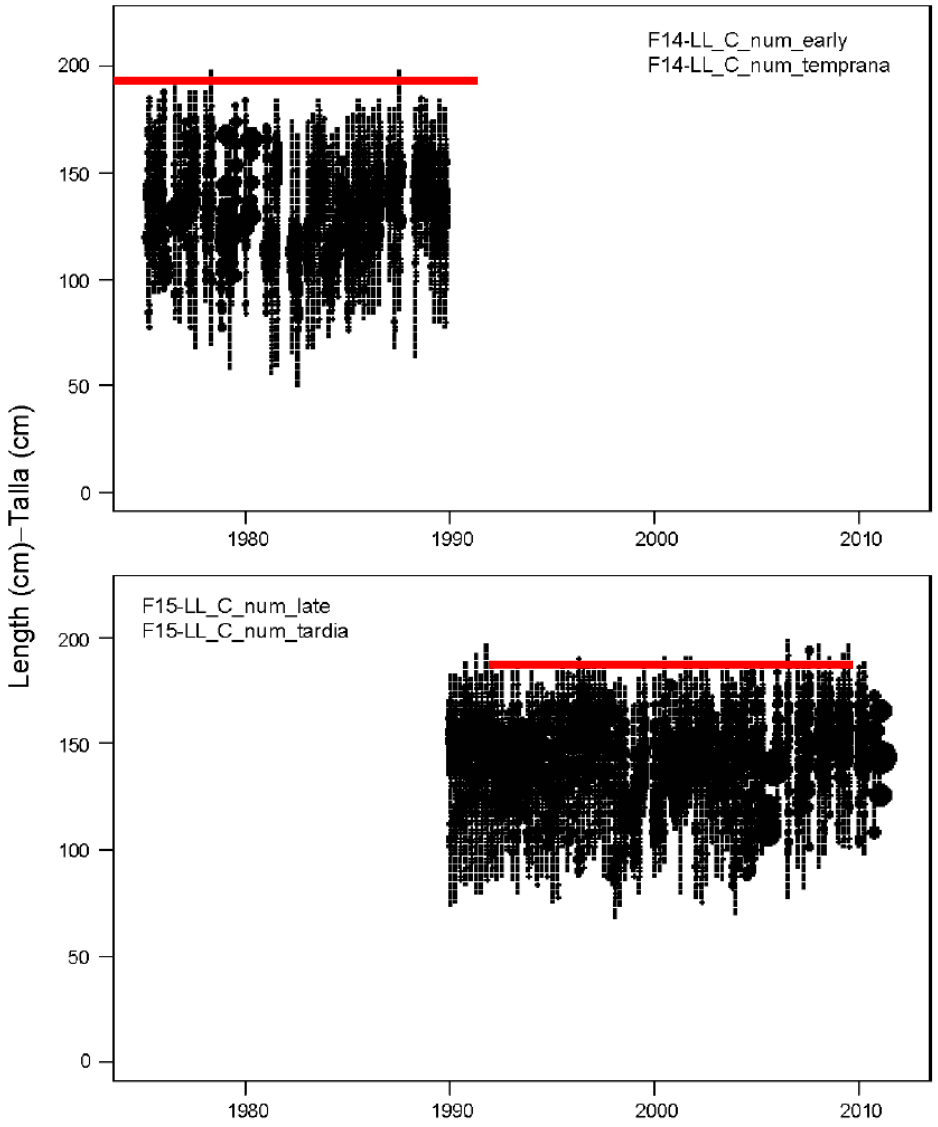


Historical longline length compositions

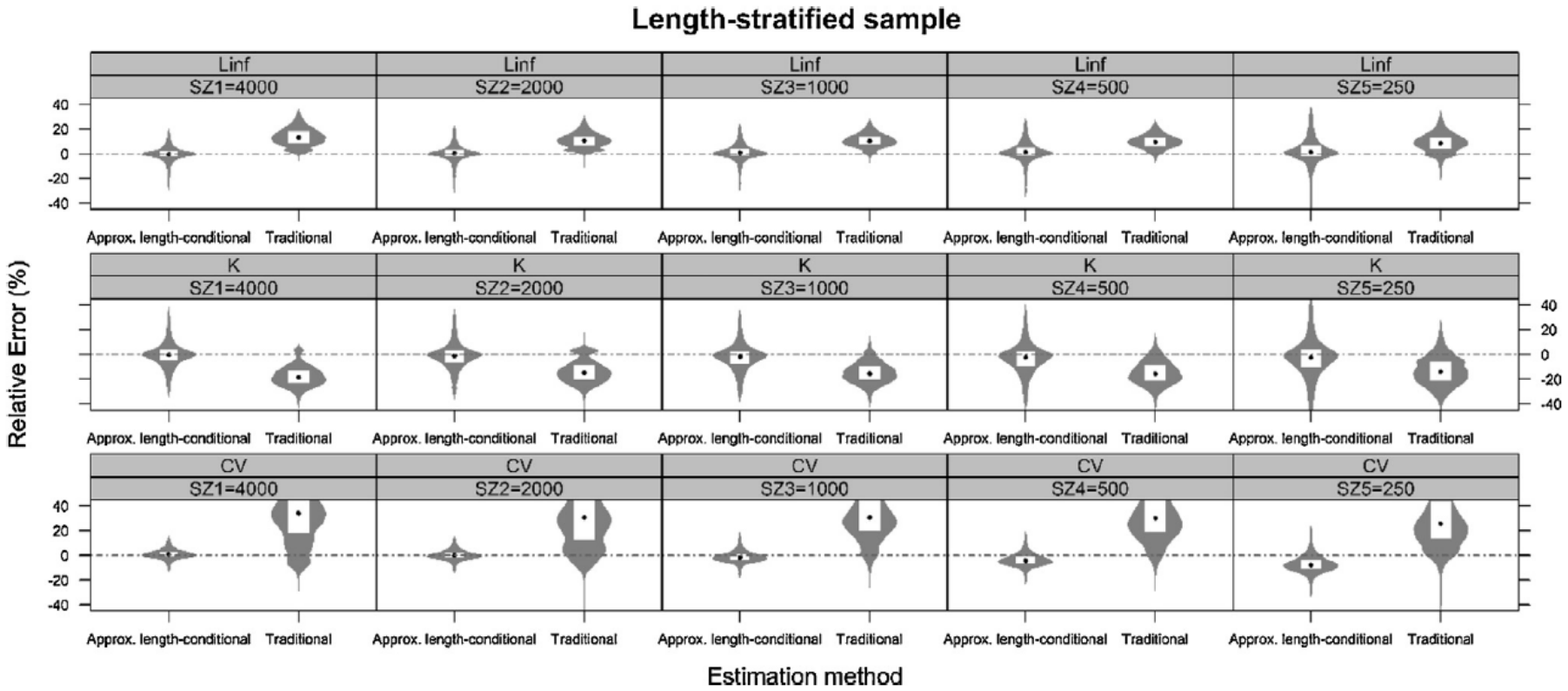


Tagging = 189

Outline


F14-LL_C_num_early
F14-LL_C_num_temprana
F15-LL_C_num_late
F15-LL_C_num_tardia
Length (cm)–Talla (cm)
0
50
100
150
200
1980
1990
2000
2010

Length stratified sampling or selectivity



Evaluation of using random-at-length observations and an equilibrium approximation of the population age structure in fitting the von Bertalanffy growth function

Kevin R. Piner[a,*], Hui-Hua Lee[a], Mark N. Maunder[b,c]

Length or age stratified sampling, selectivity, or availability

Effects of age-based movement on the estimation of growth assuming random-at-age or random-at-length data

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Simulation methods were used to generate paired data from a simulated population that included the age-based process of movement and the length-based process of gear selection. The age-based process caused bias in the estimates of growth parameters assuming random at length, even when relatively few age classes were affected. Methods that assumed random at age were biased by the subsequent inclusion of the length-based process of gear selection. Additional knowledge of the age structure of the sampled area is needed to ensure an unbiased estimate of the growth parameters when using the length-conditional approach in the presence of age-based movement. Estimates of the variability in the length-at-age relationship were better estimated with the length-conditional than the traditional method even when the assumptions of random at length were violated. Inclusion of paired observations of length and associated age inside the population dynamics model may be the most appropriate way of estimating growth.

Key words: age-based growth; gear selection; length-based growth; simulation; von Bertalanffy.

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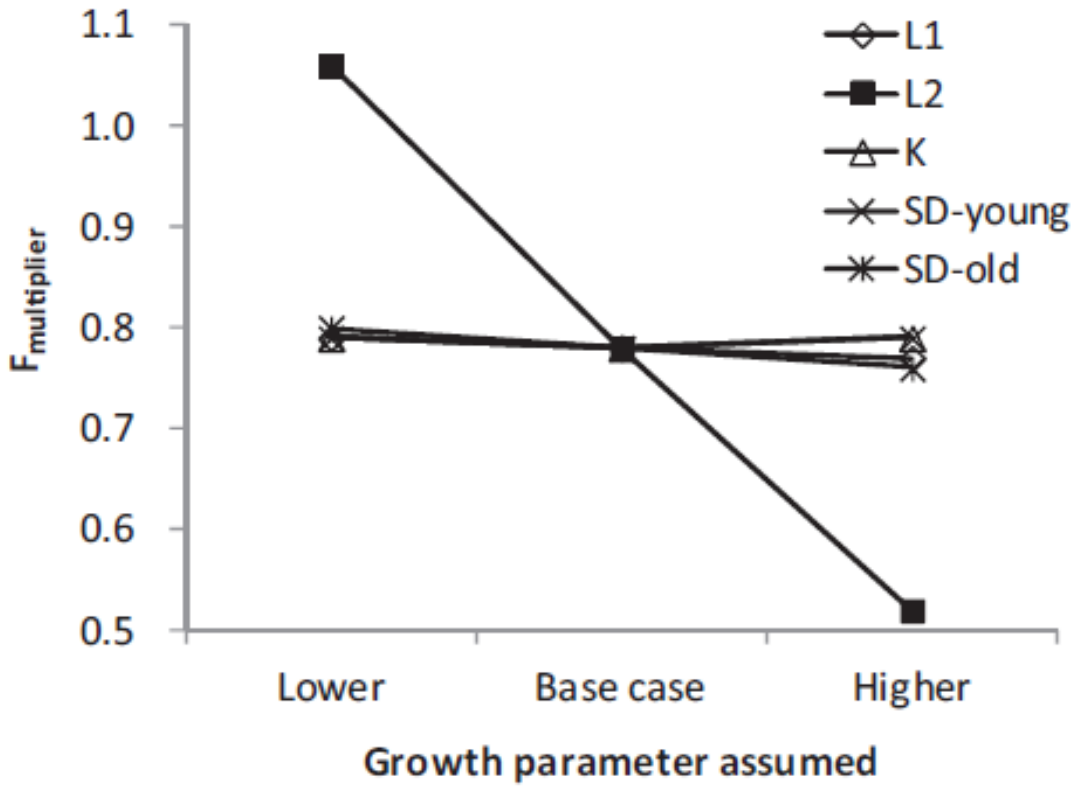
Thank you!

The sensitivity of management quantities to y_2

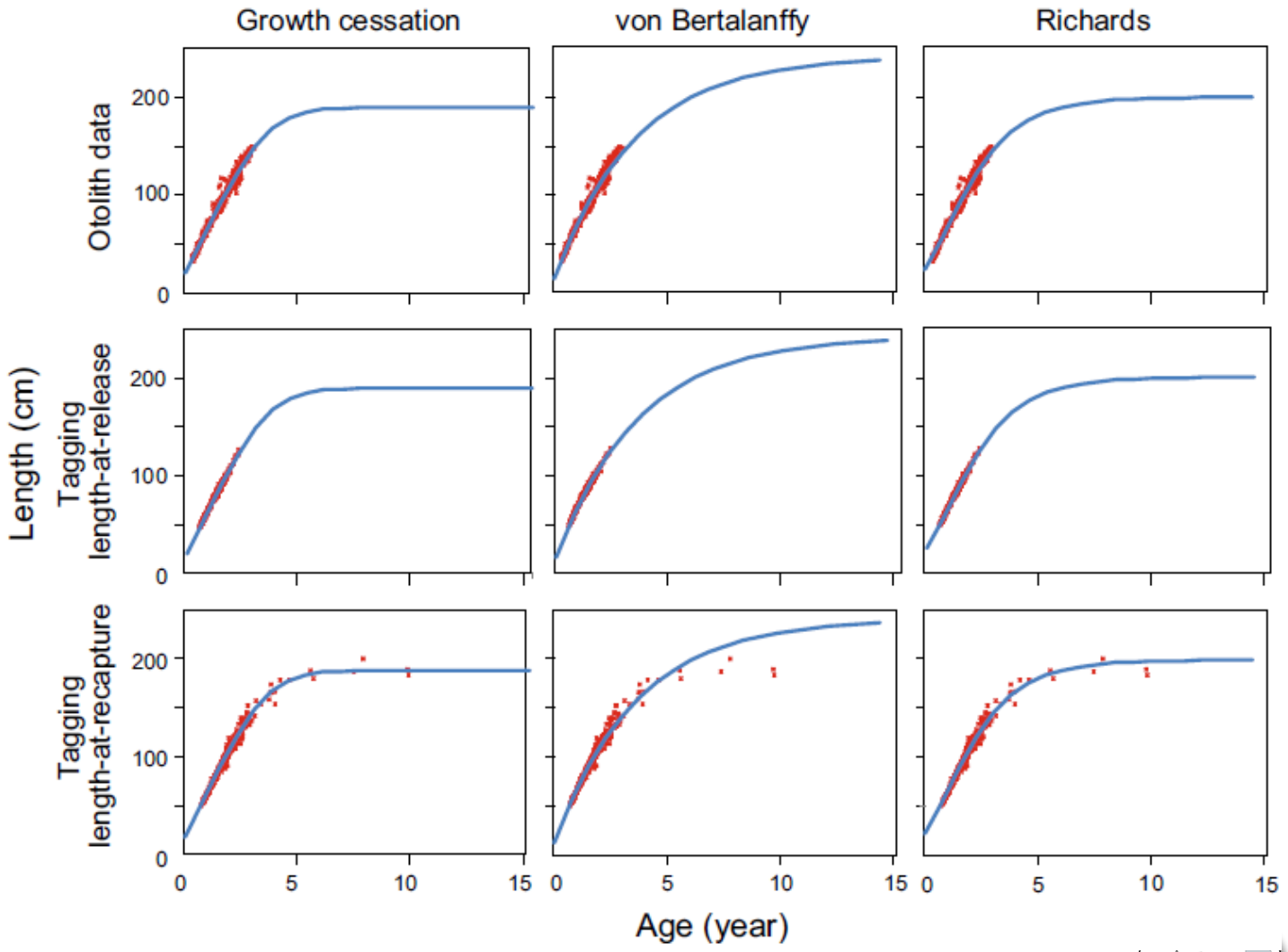
- Zhu et al. (2016): F multiplier (F_{MSY}/F_{recent}) is **most** sensitive to y_2 (L_2 in the figure) in the growth curve



A improved growth curve for EPO bigeye

- The growth cessation model (Maunder et al. 2018): A linear relationship between length and age followed by a near cessation in growth, typically after the onset of sexual maturity.

- The growth cessation model fits data **best.**



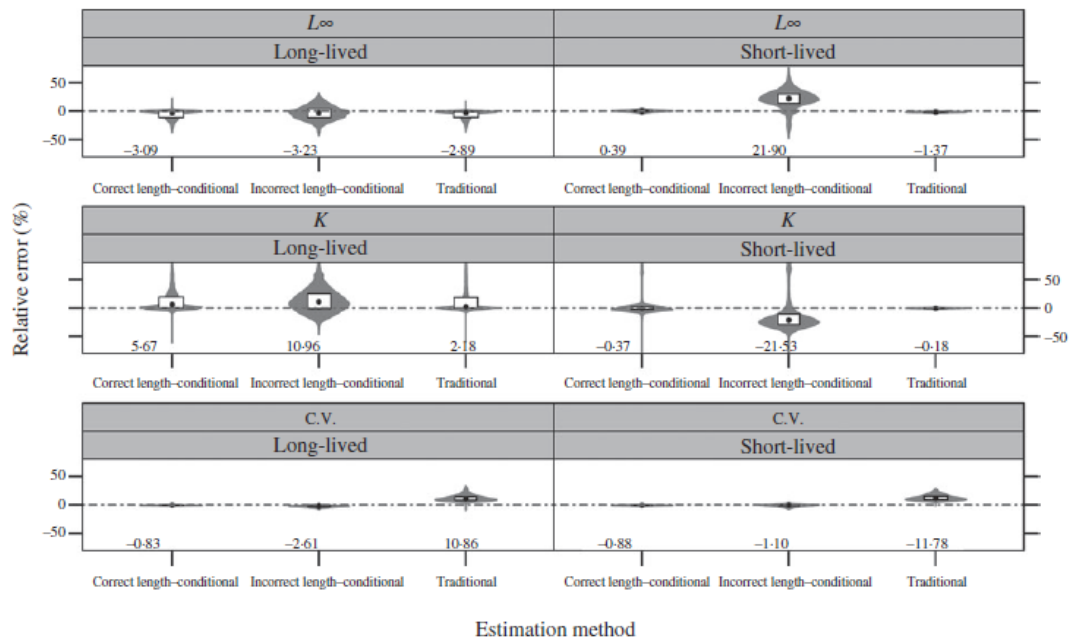


FIG. 3. Comparison of the incorrect length-conditional, correct length-conditional and traditional method estimates of the von Bertalanffy growth parameters (L_∞, K and C.V.). Data used in the estimation methods were taken from non-selective gear and from a juvenile area. Relative error is a characterization of the per cent bias in the estimate from 10 000 simulated dynamics. ●, Median; the height of the box within the violin corresponds to the 25th and 75th percentiles. The width of the violin represents the proportion of iterations with that per cent bias. The median value of the relative error is listed near the x-axis of each corresponding violin plot.