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8-39

To account for length-based selectivity, which is implemented only for the British Columbia data, we applied a penalty to the likelihood function as follows:

Equation 1 $$L(D\,|\theta) = \frac{S_{L_i} \prod_i \frac{1}{\sqrt{2\pi}\sigma a_i} e^{-(L_i-\hat{L}_i)/2[\sigma a_i]^2}}{S_{\hat{L}} \int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi}\sigma a_i} e^{-(L_i-\cancel{\hat{L}_i})\,\ell/2[\sigma a_i]^2} \cancel{dl}}$$

Where L_i is the observed length at a given age a_i, $\hat{L}_i$ is the corresponding estimate based on VBGF parameters θ, S is a logistic selectivity function with parameter L_{50}, the length at which 50% of individuals (male or female) are fully selected, set to 52.976 cm (Samuel Johnson, SFU, pers. comm.)

Equation 2 $S_L = \frac{1}{1+\exp(L_{50}-L)}$

As length-based selectivity is assumed constant in both the California Current and Alaskan assessments, S_L for both estimated and observed lengths is set to 1.0 when fitting data points from those regions.

ENTIRE DIST

NO DATA

EVERY POSSIBLE LENGTH

Original format from AEP:

$$L(D\,|\,\theta) = \prod_i \left\{ \underbrace{S_{L_i}^{\text{OBS.}} \frac{1}{\sqrt{2\pi}\sigma a_i} e^{-(L_i-\hat{L}_i)/(2[\sigma a_i]^2)}}_{\text{STD DNORM — A POINT}} \Big/ \underbrace{\int_{-\infty}^{\infty} S_l \frac{1}{\sqrt{2\pi}\sigma a_i} e^{-(l-\hat{l})/(2[\sigma a_i]^2)} dl}_{\text{A BUNCH OF 1S W/O SEL WINDOW DOESNT MOVE}} \right\}$$

CALL EXTERNALLY × AGE

INTEGRATE (TMB)
function
a lower
b upper
n SUBDIVS ($2^{n-1}+1$ EVALS)

JUST ALL AGES

$P(\underline{L}\,|\,a, \hat{L}, \sigma, S_L)$

$P(L^o\,|\,a, \hat{L}^o_{EST}, \sigma, S_L)$

TO DOUBLE CHECK INTEGRAL (DENOM) SHOULD BE 1 W/O SELEX

USUAL

$$\frac{\text{SEL(OBS)} \cdot \text{DNORM(OBS, EST, } \sigma)}{\int \text{SEL(EST)} \cdot \text{DNORM(EST} \quad) \, dl}$$

WILL BE 1 W/O SEL

STORE (MAX 2)

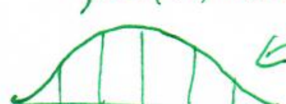
↑ RESCALE EACH TIME

CAN MAKE LOOKUP TABLE @ EACH AGE

$\int$ SEL(S) DNORM(S)

THE THING

AREA OF THING



MANY FUNC CALLS

SDET SAME DAY