Specifications of the South African Hake 2017 Reference Case Assessment

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Introduction

This paper gives full algebraic specifications of the 2017 South African hake Reference Case assessment. The data used as inputs to the Reference Case are listed in Appendix A. Parameter estimates are also included. The Reference Case results are given in Appendix B.

The Statistical Catch-at-Length model

The model used is a gender-disaggregated Statistical Catch-at-Length (SCAL), which is fitted directly to age-length keys (ALKs) and length frequencies. The model also assesses the two species as two independent stocks and is fitted to species-disaggregated data as well as species-combined data. A distinction is made between the west and the south coasts, with hake movement surrogated using the "areas-as-fleets" approach. "Fleet" below therefore refers to a combination of gear type (offshore trawl, inshore trawl, longline and handline) and area (west and south coasts). The general specifications and equations of the overall model are set out below, together with some key choices in the implementation of the methodology. Details of the contributions to the log-likelihood function from the different data considered are also given. Quasi-Newton minimisation is used to minimise the total negative log-likelihood function (implemented using AD Model Builder™, Otter Research, Ltd. (Fournier *et al*. 2011)).

1 Population Dynamics

1.1 Numbers-at-age

The resource dynamics of the two populations (*Merluccius capensis* and *M. paradoxus*) of the South African hake are modelled by the following set of equations.

Note: for ease of reading, the 'species' subscript *s* has been omitted below where equations are identical for the two species.

$$N^g_{y+1,0} = R^g_{y+1} \tag{1}$$

$$N^g_{y+1,a+1} = \left(N^g_{ya} e^{-M^g_a/2} - \sum_f C^g_{fya} \right) e^{-M^g_a/2} \qquad \text{for } 0 \le a \le m-2 \tag{2}$$

$$N^g_{y+1,m} = \left(N^g_{y,m-1} e^{-M^g_{m-1}/2} - \sum_f C^g_{f,y,m-1} \right) e^{-M^g_{m-1}/2} + \left(N^g_{ym} e^{-M^g_m/2} - \sum_f C^g_{fym} \right) e^{-M^g_m/2} \tag{3}$$

where

N^g_{ya} is the number of fish of gender g and age a at the start of year y[1];

R^g_y is the recruitment (number of 0-year-old fish) of fish of gender g at the start of year y;

m is the maximum age considered (taken to be a plus-group);

M^g_a denotes the natural mortality rate on fish of gender g and age a; and

[1] In the interests of less cumbersome notation, subscripts have been separated by commas only when this is necessary for clarity.

C_{fya}^{g} is the number of hake of gender *g* and age *a* caught in year *y* by fleet *f*.

A penalty is added to the negative log-likelihood to prevent $N_{y,a}^{g}$ from going below 10 for a<=10, and below 1 for a>=11.

1.2 Recruitment

The number of recruits (i.e. new zero-year old fish) at the start of year *y* is assumed to be related to the corresponding female spawning stock size (i.e., the biomass of mature female fish). The underlying assumptions are that female spawning output can limit subsequent recruitment, but that there are always sufficient males to provide adequate fertilisation. The recruitment and corresponding female spawning stock size are related by means of the Beverton-Holt (Beverton and Holt 1957) or a modified (generalised) form of the Ricker stock-recruitment relationship. These forms are parameterized in terms of the "steepness" of the stock-recruitment relationship, *h*, the pre-exploitation equilibrium female spawning biomass, $K^{♀,sp}$, and the pre-exploitation recruitment, R_0 ,with a 50:50 sex-split at recruitment being assumed:

$$R_y^g = \frac{4hR_0 B_y^{♀,sp}}{K^{♀,sp}(1-h)+(5h-1)B_y^{♀,sp}} e^{(\varsigma_y - \sigma_R^2/2)} \tag{4a}$$

for the Beverton-Holt stock-recruitment relationship and

$$R_y^g = \alpha B_y^{♀,sp} \exp\left(-\beta\left(B_y^{♀,sp}\right)^{\gamma}\right) e^{(\varsigma_y - \sigma_R^2/2)} \tag{4b}$$

with

$$\alpha = R_0 \exp\left(\beta\left(K^{♀,sp}\right)^{\gamma}\right) / K^{♀,sp} \qquad \text{and} \qquad \beta = \frac{\ln(5h)}{\left(K^{♀,sp}\right)^{\gamma}\left(1-5^{-\gamma}\right)}$$

for the modified Ricker relationship (for the true Ricker, γ=1) where

ς_y reflects fluctuation about the expected recruitment in year *y*;

σ_R is the standard deviation of the log-residuals, which is input ($\sigma_R = 0.45$ and is taken to decrease linearly from this value to 0.1 over the last five years to statistically stabilise estimates of recent recruitment).

Note: $e^{(\varsigma_y - \sigma_R^2/2)}$ is included only for the years for which the residuals are estimated, i.e. 1985 to 2017.

$B_y^{♀,sp}$ is the female spawning biomass at the start of year *y*, computed as:

$$B_y^{♀,sp} = \sum_{a=1}^{m} f_a^{♀} w_a^{♀} N_{ya}^{♀} \tag{5}$$

where

w_a^g is the begin-year mass of fish of gender *g* and age *a*;

f_a^g is the proportion of fish of gender *g* and age *a* that are mature (converted from maturity-at-length, see equation 46); and

$$R_0 = K^{♀,sp} / \left[\sum_{a=0}^{m-1} f_a^{♀} w_a^{♀} e^{-\sum_{a'=0}^{a-1} M_{a'}^{g}} + f_m^{♀} w_m^{♀} \frac{e^{-\sum_{a'=0}^{m-1} M_{a'}^{g}}}{1-e^{-M_m^g}}\right] \tag{6}$$

For the Beverton-Holt form, *h* is bounded above by 0.98 to preclude high recruitment at extremely low spawning biomass, whereas for the modified Ricker form, *h* is bounded above by 1.5 to preclude extreme compensatory behaviour. *The Reference Case uses the modified Ricker form to model recruitment*.

1.3 Total catch and catches-at-age

The fleet-disaggregated catch by mass, in year y is given by:

$$C_{fy} = \sum_{g}\sum_{a=0}^{m} \tilde{w}^{g}_{fy,a+1/2}\ C^{g}_{fya} = \sum_{g}\sum_{a=0}^{m} \tilde{w}^{g}_{fy,a+1/2}\ N^{g}_{ya} e^{-M^{g}_{a}/2} F_{fy} S^{g}_{fya} \qquad (7)$$

where

C^{g}_{fya} is the catch-at-age, i.e. the number of fish of gender g and age a, caught in year y by fleet f;

F_{fy} is the fished proportion of a fully selected age class by fleet f in year y.

F_{fy} is independent of g for all fleet except the longline fleet, for which male proportions are available. Therefore for the longline fleet:

$$F^{g}_{fy} = C^{g}_{fy} \Big/ \sum_{a=0}^{m} \tilde{w}^{g}_{fy,a+1/2}\ N^{g}_{ya} e^{-M^{g}_{a}/2} S^{g}_{fya} \qquad (8)$$

where $C^{g}_{fy} = L^{g}_{fy} C_{fy}$

with L^{males}_{fy} given in Table 1 below.

Table 1: Male proportion in the longline catches. For years prior to 2000 and post 2010, the 2000-2010 average is used.

	West coast		South coast	
	M. paradoxus	*M. capensis*	*M. paradoxus*	*M. capensis*
2000	0.35699	0.09755	0.46030	0.29340
2001	0.05378	0.13431	0.52645	0.38234
2002	0.26296	0.13852	0.46030	0.36548
2003	0.22694	0.22288	0.46030	0.31665
2004	0.12542	0.10752	0.46030	0.26581
2005	0.05788	0.14946	0.46030	0.16476
2006	0.04562	0.10308	0.28792	0.27210
2007	0.03721	0.34383	0.46030	0.29340
2008	0.22329	0.29265	0.34573	0.27928
2009	0.22402	0.33734	0.61493	0.21179
2010	0.05378	0.13431	0.52645	0.38234

Note: a penalty is added so that $F_{fy} < 0.95$ and another so that $\sum_{f} S^{g}_{fya} F_{fy} < 1$ for each age.

$$S^{g}_{fya} = \sum_{l} S^{g}_{fyl} P^{g}_{a+1/2,l} \qquad (9)$$

S^{g}_{fya} is the commercial selectivity of gender g at age a for fleet f and year y;

S^{g}_{fyl} is the commercial selectivity of gender g at length l for year y, and fleet f, normalised to have a maximum of 1;

$$\tilde{w}^{g}_{fy,a+1/2} = \sum_{l} S^{g}_{fyl} w^{g}_{l} P^{g}_{a+1/2,l} \Big/ \sum_{l} S^{g}_{fyl} P^{g}_{a+1/2,l} \qquad (10)$$

$\tilde{w}^{g}_{fy,a+1/2}$ is the selectivity-weighted mid-year weight-at-age a of gender g for fleet f and year y;

w^{g}_{l} is the weight of fish of gender g and length l;

$P^{g}_{a+1/2,l}$ is the mid-year proportion of fish of age a and gender g that fall in the length group l (thus $\sum_{l} P^{g}_{a+1/2,l} = 1$ for all ages a).

The matrix P is calculated under the assumption that length-at-age is log-normally distributed about a mean given by the von Bertalanffy equation, i.e.:

$$\ln l_a \sim N\left[\ln\left(l_\infty\left(1-e^{-\kappa(a-t_0)}\right)\right);\left(\frac{\theta_a}{l_\infty\left(1-e^{-\kappa(a-t_0)}\right)}\right)^2\right] \tag{11}$$

where θ_a is the standard deviation of length-at-age *a*, which is estimated directly in the model fitting for age 0, and for ages 1 and above a linear relationship applies:

$$\theta_a = \begin{cases} \theta_0 & \text{for } a = 0 \\ \left((a-1)\frac{\theta_{14}-\theta_1}{13}+\theta_1\right) & \text{for } 1 \le a \le m \end{cases}$$

with species and gender-specific θ_0, θ_1 and θ_{14} estimated in the model fitting procedure. A penalty is added to ensure that θ_a is increasing with age, i.e. $\theta_{14} > \theta_0$.

1.4 Exploitable and survey biomasses

The model estimate of the mid-year exploitable ("available") component of biomass for each species and fleet is calculated by converting the numbers-at-age into mid-year mass-at-age and applying natural and fishing mortality for half the year:

$$B_{fy}^{ex} = \sum_g \sum_{a=0}^{m} \tilde{w}_{fy,a+1/2}^{g} S_{fya}^{g} N_{ya}^{g} e^{-M_a^g/2}\left(1-\sum_f S_{fya}^{g} F_{fy} \Big/ 2\right) \tag{12}$$

The model estimate of the survey biomass is given by:

$$B_y^{surv} = \sum_g \sum_{a=0}^{m} \tilde{w}_a^{g,surv} S_a^{g,surv} N_{ya}^{g} e^{-M_a^g \frac{t^{surv}}{12}}\left(1-\frac{t^{surv}}{12}\sum_f S_{fya}^{g} F_{fy}\right) \tag{13}$$

where

t^{surv} is the month (on average) in which survey *surv* took place (1, 7, 9 and 4 for summer, winter, spring and autumn surveys respectively),

$S_a^{g,surv}$ is the survey selectivity of gender *g* for age *a*, converted from survey selectivity-at-length in the same manner as for the commercial selectivity (equation 9);

$\tilde{w}_a^{g,surv}$ is the survey selectivity-weighted weight-at-age *a* of gender *g* for survey *i*, computed in the same manner as for the commercial selectivity-weight-at-age (equation 10) and taking account of the timing of the survey ($\tilde{w}_{y,a}^{g,surv}$ from $P_{a,l}^{g}$ if t^{surv} is less or equal to 6 and from $P_{a+1/2,l}^{g}$ otherwise).

1.5 Initial conditions

It is assumed that the resource is at the deterministic equilibrium that corresponds to an absence of harvesting at the start of the initial year considered, i.e., $B_1^{g,sp} = K^{g,sp}$, and the year *y*=1 corresponds to 1917 when catches commence.

2. MSY and related quantities

The equilibrium catch for a fully selected fishing proportion *F** is calculated as:

$$C(F^*) = \sum_g \sum_a \tilde{w}_{a+1/2}^{g} S_a^g F^* N_a^g (F^*) e^{-\frac{(M_a^g + S_a^g F^*)}{2}} \tag{14}$$

where

S_a^g is the average selectivity across all fleets, for the most recent five years:

$$S_a^g = \frac{\sum_{y=2012}^{2016}\sum_f S_{fya}^g F_{fy}}{\max\left(\sum_{y=2012}^{2016}\sum_f S_{fya}^g F_{fy}\right)} \tag{15}$$

where the maximum is taken over ages;

and $\tilde{w}_{a+1/2}^g$ is the average selectivity-weighted weight-at-age, for the most recent five years:

$$\tilde{w}_{a+1/2}^g = \frac{\sum_{y=2012}^{2016}\sum_f \tilde{w}_{f,y,a+1/2}^g F_{fy}}{\sum_{y=2012}^{2016}\sum_f F_{fy}} \tag{16}$$

and with

$$N_a^g\left(F^*\right) = \begin{cases} R_0\left(F^*\right) & \text{for } a = 0 \\ N_{a-1}^g\left(F^*\right)e^{-M_{a-1}^g}\left(1 - S_{a-1}^g F^*\right) & \text{for } 0 < a < m \\ \dfrac{N_{m-1}^g\left(F^*\right)e^{-M_{m-1}^g}\left(1 - S_{m-1}^g F^*\right)}{\left(1 - e^{-M_m^g}\left(1 - S_m^g F^*\right)\right)} & \text{for } a = m \end{cases} \tag{17}$$

where

$$R_0\left(F^*\right) = \frac{\alpha B^{♀,sp}\left(F^*\right)}{\beta + B^{♀,sp}\left(F^*\right)} \tag{18a}$$

for a Beverton-Holt stock‒recruitment relationship, and

$$R_0\left(F^*\right) = \alpha B_y^{♀,sp}\left(F^*\right)\exp\left(-\beta\left(B_y^{♀,sp}\left(F^*\right)\right)^\gamma\right) \tag{18b}$$

for a modified Ricker stock-recruitment relationship.

The maximum of $C\left(F^*\right)$ is then found by searching over $F*$ to give F_{MSY}^*, with the associated female spawning biomass given by:

$$B_{MSY}^{♀,sp} = \sum_a f_a^{♀} w_a^{♀} N_a^{♀}\left(F_{\text{MSY}}^*\right) \tag{19}$$

3. The likelihood function

The model is fit to CPUE and survey biomass indices, commercial and survey length frequencies, survey age-length keys, as well as to the stock-recruitment curve to estimate model parameters. Contributions by each of these to the negative of the log-likelihood (- ℓnL) are as follows[2].

3.1 CPUE relative biomass data

The likelihood is calculated by assuming that the observed biomass index (here CPUE) is log-normally distributed about its expected value:

$$I_y^i = \hat{I}_y^i e^{\varepsilon_y^i} \quad \text{or} \quad \varepsilon_y^i = \ln\left(I_y^i\right) - \ln\left(\hat{I}_y^i\right) \tag{20}$$

[2]Strictly it is a penalised log-likelihood which is maximised in the fitting process, as some contributions that would correspond to priors in a Bayesian estimation process are added.

where

I_y^i is the biomass index for year *y* and series *i* (which corresponds to a specified species and fleet);

$\hat{I}_y^i = \hat{q}^i \hat{B}_{fy}^{ex}$ is the corresponding model estimate, where $\widehat{B}_{fy}^{ex}$ is the model estimate of exploitable resource biomass, given by equation 11;

$\hat{q}^i$ is the constant of proportionality for biomass series *i*;and

ε_y^i from $N\left(0,\left(\sigma_y^i\right)^2\right)$.

In cases where the CPUE series are based upon species-aggregated catches (as available pre-1978), the corresponding model estimate is derived by assuming two types of fishing zones: z1) an "*M. capensis* only zone", corresponding to shallow-water and z2) a "mixed zone" (see diagrammatic representation in Figure 1).

The total catch of hake of both species (*BS*) by fleet *f* in year *y* ($C_{BS,fy}$) can be written as:

$$C_{BS,fy} = C_{C,fy}^{z1} + C_{C,fy}^{z2} + C_{P,fy} \qquad (21)$$

where

$C_{C,fy}^{z1}$ is the *M. capensis* catch by fleet *f* in year *y* in the *M. capensis* only zone (z1);

$C_{C,fy}^{z2}$ is the *M. capensis* catch by fleet *f* in year *y* in the mixed zone (z2); and

$C_{P,fy}$ is the *M. paradoxus* catch by fleet *f* in year *y* in the mixed zone.

Catch rate is assumed to be proportional to exploitable biomass. Furthermore, let γ_C be the proportion of the *M. capensis* exploitable biomass in the mixed zone ($\gamma_C = B_{C,fy}^{ex,z2} \big/ B_{C,fy}^{ex}$) (assumed to be constant throughout the period for simplicity) and ψ_{fy} be the proportion of the effort of fleet *f* in the mixed zone in year *y* ($\psi_{fy} = E_{fy}^{z2} \big/ E_{fy}$), so that:

$$C_{C,fy}^{z1} = q_C^{i,z1} B_{Cfy}^{ex,z1} E_{fy}^{z1} = q_C^{i,z1}\left(1-\gamma_C\right) B_{C,fy}^{ex}\left(1-\psi_{fy}\right) E_{fy} \qquad (22)$$

$$C_{C,fy}^{z2} = q_C^{i,z2} B_{C,fy}^{ex,z2} E_{fy}^{z2} = q_C^{i,z2} \gamma_C B_{C,fy}^{ex} \psi_{fy} E_{fy} \qquad \text{and} \qquad (23)$$

$$C_{P,fy} = q_P^i B_{P,fy}^{ex} E_{fy}^{z2} = q_P^i B_{P,fy}^{ex} \psi_{fy} E_{fy} \qquad (24)$$

where

$E_{fy} = E_{fy}^{z1} + E_{fy}^{z2}$ is the total effort of fleet *f*, corresponding to combined-species CPUE series *i* which consists of the effort in the *M. capensis* only zone (E_{fy}^{z1}) and the effort in the mixed zone (E_{fy}^{z2});

$q_C^{i,zj}$ is the catchability for *M. capensis* (*C*) for biomass series *i*,and zone *zj*; and

q_P^i is the catchability for *M. paradoxus* (*P*) for biomass series *i*.

It follows that:

$$C_{C,fy} = B_{C,fy}^{ex} E_{fy}\left[q_C^{i,z1}\left(1-\gamma_C\right)\left(1-\psi_{fy}\right) + q_C^{i,z2}\gamma_C \psi_{fy}\right] \qquad (25)$$

$$C_{P,fy} = B_{P,fy}^{ex} E_{fy} q_P^i \psi_{fy} \qquad (26)$$

From solving equations 25 and 26:

$$\psi_{fy} = \frac{q_C^{i,z1}\left(1-\gamma_C\right)}{\left\{\dfrac{C_{C,fy} B_{P,fy}^{ex} q_P^i}{B_{C,fy}^{ex} C_{P,fy}} - q_C^{i,z2}\gamma_C + q_C^{i,z1}\left(1-\gamma_C\right)\right\}} \qquad (27)$$

Note: a penalty is included so that $0 < \psi_{fy} < 1$.

and:

$$\hat{I}_y^i = \frac{C_{fy}}{E_{fy}} = \frac{C_{fy} B_{P,fy}^{ex} q_P^i \psi_{fy}}{C_{P,fy}} \tag{28}$$

Zone 1 (z1): *M. capensis* only	Zone 2 (z2): Mixed zone
M. capensis: biomass (B_C^{z1}), catch(C_C^{z1})	*M. capensis*: biomass (B_C^{z2}), catch(C_C^{z2}) *M. paradoxus*: biomass (B_P), catch(C_P)
Effort in zone 1 (E^{z1})	Effort in zone 2 (E^{z2})

Figure 1: Diagrammatic representation of the two conceptual fishing zones.

Two species-aggregated CPUE indices are available: the ICSEAF West Coast and the ICSEAF South Coast series. For consistency, *q*'s for each species (and zone) are forced to be in the same proportion:

$$q_s^{SC} = r q_s^{WC} \tag{29}$$

The contribution of the CPUE data to the negative of the log-likelihood function (after removal of constants) is then given by:

$$-\ln L^{CPUE} = \sum_i \sum_y \left[\ln\left(\sigma_y^i\right) + \left(\varepsilon_y^i\right)^2 / 2\left(\sigma_y^i\right)^2 \right] \tag{30}$$

where

σ_y^i is the standard deviation of the residuals for the logarithms of index *i* in year *y*.

Homoscedasticity of residuals for CPUE series is customarily assumed[3], so that $\sigma_y^i = \sigma^i$ is estimated in the minimisation process. To correct for possible negative bias in estimates of variance (σ^i) and to avoid according unrealistically high precision (and so giving inappropriately high weight) to the CPUE data, lower bounds on the standard deviations of the residuals for the logarithm of the CPUE series have been enforced: for the historical ICSEAF CPUE series (separate West Coast and South Coast series) the lower bound is set to 0.25, and to 0.15 for the recent GLM-standardised CPUE series, i.e.: $\sigma^{ICSEAF} \geq 0.25$ and $\sigma^{GLM} \geq 0.15$.

In the case of the species-disaggregated CPUE series, the catchability coefficient q^i for biomass index *i* is estimated by its maximum likelihood value, which in the more general case of heteroscedastic residuals is given by:

$$\ln \hat{q}^i = \frac{\sum_y \left(\ln I_y^i - \ln \hat{B}_{fy}^{ex}\right) \big/ \left(\sigma_y^i\right)^2}{\sum_y 1 \big/ \left(\sigma_y^i\right)^2} \tag{31}$$

In the case of the species-combined CPUE, $q_C^{WC,z1}$, $q_C^{WC,z2}$, q_P^{WC}, *r* and γ_C are estimated directly in the fitting procedure.

[3]There are insufficient data in any series to enable this to be tested with meaningful power.

3.2 Survey biomass data

Data from the research surveys are treated as relative biomass indices in a similar manner to the species-disaggregated CPUE series above, with survey selectivity function $S_a^{g,sum/win}$ replacing the commercial selectivity S_{fya}^{g} (see equation 13 above, which also takes account of the timing of the survey).

An estimate of sampling variance is available for most surveys and the associated σ_y^i is generally taken to be given by the corresponding survey CV. However, these estimates likely fail to include all sources of variability, and unrealistically high precision (low variance and hence high weight) could hence be accorded to these indices. The contribution of the survey data to the negative log-likelihood is of the same form as that of the CPUE biomass data (see equation 30). The procedure adopted takes into account an additional variance $(\sigma_A)^2$ which is treated as another estimable parameter in the minimisation process, i.e:

$$-\ln L^{Survey} = \sum_i \sum_y \left[\ln\left(\sqrt{(\sigma_y^i)^2 + (\sigma_A)^2} \right) + (\varepsilon_y^i)^2 / 2\left((\sigma_y^i)^2 + (\sigma_A)^2 \right) \right] \qquad (32)$$

This procedure is carried out enforcing the constraint that $(\sigma_A)^2$ >0, i.e. the overall variance cannot be less than its externally input component.

In June 2003, the trawl gear on the *Africana* was changed and a different value for the multiplicative bias factor q is taken to apply to the surveys conducted with the new gear. Calibration experiments have been conducted between the *Africana* with the old gear (hereafter referred to as the "old *Africana*") and the *Nansen*, and between the *Africana* with the new gear ("new *Africana*") and the *Nansen*, in order to provide a basis to relate the multiplicative biases of the *Africana* with the two types of gear (q_{old} and q_{new}). A recent calibration analysis based on "Model 1" (see Table 1, "Model 1" of Smith *et al.*, 2013) provided the following estimates:

$\left(q^{new}/q^{old}\right)^{capensis} = 0.652$ with SE=0.073 and

$\left(q^{new}/q^{old}\right)^{paradoxus} = 0.883$ with SE=0.082.

The following contribution is therefore added as a penalty (or a log prior in a Bayesian context) to the negative log-likelihood in the assessment:

$$-\ln L^{q-ch} = \sum_i \left(\ln q_{new} - \ln q_{old} - \Delta \ln q \right)^2 \Big/ 2\sigma_{\Delta \ln q}^2 \qquad (33)$$

A different length-specific selectivity is estimated for the "old *Africana*" and the "new *Africana*", see section 4.1.2 below. The commercial vessel recently used in place of the *Africana* is assumed to have the same q and same selectivity as the *Africana* with the new net.

For the surveys, the q's are estimated directly in the model fitting procedure.

3.3. Commercial proportions at length

Commercial proportions at length from the offshore trawl fleet cannot be disaggregated by species and gender as the data collected did not distinguish these. The model is therefore fit to the proportions at length as determined for both species and gender combined. The catches made by the inshore trawl fleet are assumed to consist of *M. capensis* only, and species and sex information is available over the 2000-2010 period for the longline fleet.

The catches at length are computed as:

$$C_{fyl}^{sg} = \sum_{a=0}^{m} N_{sya}^{g} F_{sfy} S_{sfyl}^{g} P_{s,a+1/2,l}^{g} e^{-M_{sa}^{g}/2} \left(1 - \sum_f S_{sfya}^{g} F_{fy} \Big/ 2 \right) \qquad (34)$$

Where appropriate, the catches at length are summed over species and gender.

The predicted proportions at length are computed as:

$$\hat{p}_{fyl} = \sum_s \sum_g C^{sg}_{fyl} \Big/ \sum_s \sum_g \sum_{l'} C^{sg}_{fyl'} \qquad (35a)$$

for species- and sex-aggregated series (offshore trawl data),

$$\hat{p}^s_{fyl} = \sum_g C^{sg}_{fyl} \Big/ \sum_g \sum_{l'} C^{sg}_{fyl'} \qquad (35b)$$

for sex-aggregated series (inshore trawl data and some longline data), and

$$\hat{p}^{sg}_{fyl} = C^{sg}_{fyl} \Big/ \sum_{g'} \sum_{l'} C^{sg'}_{fyl'} \qquad (35c)$$

for sex-disaggregated series (2000-2010 longline data).

The commercial proportions at length are grouped into 2cm length classes.

Due to the sex-imbalance of some of the catch data, some of the sex-disaggregated catch proportions are very small for all lengths for a particular gender (e.g. males *M. paradoxus* in the west coast longline catches). To deal with these small numbers, the "*sqrt(p)*" method is used to compute the contribution to the CAL data to the negative of the log-likelihood function instead of the Punt-Kennedy method (Punt and Kennedy, 1997) used previously. The formulation mimics a multinomial form for the error distribution by forcing a near-equivalent variance-mean relationship for the error distributions.

$$-\ln L^{\mathrm{CAL}} = 0.1 \sum_y \sum_l \left[\ln\left(\sigma^i_{len}\right) + \left(\sqrt{p^i_{yl}} - \sqrt{\hat{p}^i_{yl}}\right)^2 / 2\left(\sigma^i_{len}\right)^2 \right] \qquad (36)$$

where

the superscript '*i*' refers to a particular series of proportions at length data which reflect a specified fleet, species and sex (or combination thereof); and

σ^i_{len} is the standard deviation associated with the proportion at length data, which is estimated in the fitting procedure by:

$$\hat{\sigma}^i_{len} = \sqrt{\sum_y \sum_l \left(\sqrt{p^i_{yl}} - \sqrt{\hat{p}^i_{yl}}\right)^2 / \sum_y \sum_l 1} \qquad (37)$$

In the case of sex-disaggregated CAL data, the standard deviation is computed for each gender separately.

The initial 0.1 multiplicative factor in equation 34 reflects a somewhat arbitrary downweighting to allow for correlation between proportions in adjacent length groups. The coarse basis for this adjustment is the ratio of effective number of age-classes present to the number of length groups in the minimisation, under the argument that independence in variability is likely to be more closely related to the former.

Use of the *sqrt(p)* formulation has the advantage that the CAL data do not need to be grouped into minus and plus groups.

3.4. Survey proportions at length

The survey proportions at length are incorporated into the negative of the log-likelihood in an analogous manner to the commercial catches-at-age, using the *sqrt(p)* formulation (equation 34).

$p^{g,surv}_{syl} = \dfrac{C^{g,surv}_{syl}}{\sum_g \sum_{l'} C^{g,surv}_{syl'}}$ is the observed proportion of fish of species *s*, gender *g* and length *l* from survey *surv* in year *y*; and

$\hat{p}^{g,surv}_{syl}$ is the expected proportion of fish of species *s*, gender *g* and length *l* in year *y* in the survey *surv*, given by:

$$\hat{p}^{g,surv}_{syl} = \frac{\sum_a S^{g,surv}_{sl} P^g_{s,a,l} N^g_{sya} e^{-M^g_{sa}\frac{t^{surv}}{12}} \left(1 - \frac{t^{surv}}{12} \sum_f S^g_{fya} F_{fy}\right)}{\sum_g \sum_{l'} \sum_a S^{g,surv}_{sl'} P^g_{s,a,l'} N^g_{sya} e^{-M^g_{sa}\frac{t^{surv}}{12}} \left(1 - \frac{t^{surv}}{12} \sum_f S^g_{fya} F_{fy}\right)} \qquad (38)$$

All juveniles fish (<21cm) are assumed to be of unknown sex, so that the numerator in equation 38 above is also summed over g and similarly for surveys for which sex-disaggregation is not available. The expected proportions are computed using the begin-year age-length matrix for the summer and autumn surveys, and the mid-year age-length matrix for winter and spring surveys.

The survey proportions at length are grouped into 2cm length classes.

3.5. Age-length keys

Under the assumption that fish are sampled randomly with respect to age within each length-class, the contribution to the negative log-likelihood for the ALK data (ignoring constants) is:

$$-lnL^{ALK} = -w \sum_i \sum_l \sum_a \left[A^{obs}_{ial} ln\left(\hat{A}_{ial}\right) - A^{obs}_{ial} ln\left(A^{obs}_{ial}\right)\right] \qquad (39)$$

where

w is a downweighting factor to allow for overdispersion in these data compared to the expectation for a multinomial distribution with independent data; this downweighting factor is somewhat arbitrarily set to 0.01 to avoid these data overriding trend information in the indices of biomass;

A^{obs}_{ial} is the observed number of fish of size class *l* that have been read as of age a for ALK *i* (a specific combination of survey, year, species and gender);

$\hat{A}_{ial}$ is the model estimate of A^{obs}_{ial}, computed as:

$$\hat{A}_{ial} = W_{il} \frac{\tilde{C}_{ial}}{\sum_{a'} \tilde{C}_{ia'l}} \qquad (40)$$

where

$$\tilde{C}_{ial} = N^g_{sya} \tilde{P}_{a,l} S^i_l e^{-M^g_{sa}\frac{t^i}{12}} \left(1 - \frac{t^i}{12} \sum_f S^g_{fya} F_{fy}\right) \qquad (41)$$

S^i_l is the selectivity-at-length *l* for ALK *i*,

t^i is the month (on average) in which the ALK was sampled ($= t^{surv}$ (equation 13) for surveys and =6 for commercial)

$W_{i,l}$ is the number of fish in length class *l* that were aged for ALK *i*,

$\tilde{P}_{a,l} = \sum_a Y(a'|a) P_{a,l}$ is the ALK for age a and length *l* after accounting for age-reading error,

with

$Y(a'|a)$ the age-reading error matrix, representing the probability of an animal of true age a being aged to be that age or some other age a'.

$\tilde{P}_{a,l}$ takes account of the timing of the age-length sampling (from $P_{a+1/2,l}$ for commercial samples and survey samples if t^{surv} is greater than 6 and from $P_{a,l}$ otherwise).

Note: All aged animals less than 21cm in length are assumed to be juveniles, i.e. of unknown gender. Outliers, defined as the data points lying outside the mean ± 3s.d. for each age (mean and s.d. calculated across all years and surveys) have been discarded.

The age-length information is grouped into 2cm length classes.

Age-reading error matrices have been computed for each reader and for each species. When multiple readers age the same fish, these data are considered to be independent information in the model fitting.

3.6 Stock-recruitment function residuals

The stock-recruitment residuals are assumed to be log-normally distributed. Thus, the contribution of the recruitment residuals to the negative of the log-likelihood function is given by the penalty function:

$$-\ln L^{SR} = \sum_{s}\left[\sum_{y=y1}^{y2} \varsigma_{sy}^{\ 2} \Big/ 2\sigma_R^2\right] \tag{42}$$

where

ς_{sy} is the recruitment residual for species *s*, and year *y*, which is assumed to be log-normally distributed with standard deviation σ_R and which is estimated for year *y1* to *y2* (see equation 4) (estimating the stock-recruitment residuals is made possible by the availability of catch-at-age data, which give some indication of the age-structure of the population); and

σ_R is the standard deviation of the log-residuals, which is input.

The stock-recruitment residuals are estimated for years 1985 to 2017, with recruitment for other years being set deterministically (i.e. exactly as given by the estimated stock-recruitment curve) as there is insufficient catch-at-age information to allow reliable residual estimation for earlier years. A limit on the recent recruitment fluctuations is set by having the σ_R (which measures the extent of variability in recruitment) decreasing linearly from 0.45 in 2013 to 0.1 in 2017 (or more generally over the last five years of the assessment), thereby effectively forcing recruitment over the last years to lie closer to the stock-recruitment relationship curve.

4. Model parameters

4.1 Estimable parameters

The primary parameters estimated are the species-specific female virgin spawning biomass $\left(K_s^{\female sp}\right)$ and steepness (h_s) and γ (for the modified Ricker curve used in the Reference Case, see equation 4b) of the stock-recruitment relationship. The standard deviations σ^i for the CPUE series residuals (the species-combined as well as the GLM-standardised series) as well as the additional variance $\left(\sigma_A^i\right)^2$ for each species and survey *q*'s are treated as estimable parameters in the minimisation process. Similarly, in the case of the species-combined CPUE, $q_C^{WC,z1}$, $q_C^{WC,z2}$, q_P^{WC}, ρ and γ_C are directly estimated in the fitting procedure.

The species- and gender-specific von Bertalanffy growth curve parameters (l_∞, κ and t_0) are estimated directly in the model fitting process, as well as the θ_0 , θ_1 and θ_{14}, values used to compute the standard deviation of the length-at-age *a*.

Stock-recruitment residuals ς_{sy} are estimable parameters in the model fitting process. They are estimated separately for each species from 1985 to the present, and set to zero pre-1985 because there are no catch-at-length data for that period to provide the information necessary to inform estimation.

All the estimable parameters apart from the selectivity parameters are listed in **Table 2**, with the bounds enforced and their values as estimated for the Reference Case.

The following parameters are also estimated in the model fits undertaken (if not specifically indicated as fixed).

4.1.1 Natural mortality:

Natural mortality (M_{sa}) is assumed to be age-specific and is calculated using the following functional form (the selection of the specific form here is based on convenience and is somewhat arbitrary):

$$M_a = \begin{cases} M_2 & \text{for} \quad a \le 1 \\ \alpha^M + \dfrac{\beta^M}{a+1} & \text{for} \quad 2 \le a \le 5 \\ M_5 & \text{for} \quad a > 5 \end{cases} \tag{43}$$

M_0 and M_1 are set equal to M_2 $(=\alpha^M + \beta^M/3)$ as there are no data (hake of ages younger than 2 are rare in catch and survey data) which would allow independent estimation of M_0 and M_1 .

When *M* values are estimated in the fit, a penalty is added to the total –lnL so that $M_2 \geq M_5$:

$$pen^M = (M_5 - M_2)^2 / 0.01^2 \qquad \text{if } M_2 < M_5 \tag{44}$$

For the Reference Case, the following values are fixed: $M_2 = 0.75$ *and* $M_5 = 0.375$ *for both species and genders.*

4.1.2 Survey fishing selectivity-at-length:

The survey selectivities are all modelled by a double normal shape as recommended by the International Panel (Smith *et al*., 2013). Thus the selectivity-at-length for each species, sex, gear and survey is estimated by the following functional form:

$$S_l = \begin{cases} \exp\left(-\dfrac{(l-l_{\max})^2}{2\sigma_{Left}^2}\right) & \text{for } l \leq l_{\max} \\ \exp\left(-\dfrac{(l-l_{\max})^2}{2\sigma_{Right}^2}\right) & \text{for } l > l_{\max} \end{cases} \tag{45}$$

where σ_{Left} , σ_{Right} and $l_{\max}$ are estimable parameters.

For the surveys, different selectivities can potentially be estimated for all of the following “effects”:

a. Species (*M. paradoxus*/*M. capensis*),
b. Coasts (West coast/South coast),
c. Seasons (Summer/Winter/Spring/Autumn),
d. Gear (*Africana* old/new gear), and
e. Gender (males/females).

Note that selectivity is always 1 for $l=l_{max}$ except for females *M. paradoxus* on the South Coast, for which the maximum female selectivity is always set at an estimable proportion of the maximum of 1 for the males.

To select an appropriate combination, several runs have been carried out, estimating the selectivities including one or more different effects. The final run selected involves maintaining the same parameters for each sex and gear across other effects, except for estimating a fixed multiplicative change to the σ_{Right} parameter if sex is female (Δ_{fem}) and also if new gear is used (Δ_{gear}). This multiplicative change is species and coast dependent, i.e.:

$$\sigma_{Right,f,g} = \begin{cases} \sigma_{Right} & \text{if } f = \text{old gear, and } g = \text{males} \\ \sigma_{Right}\Delta_{fem} & \text{if } f = \text{old gear, and } g = \text{females} \\ \sigma_{Right}\Delta_{gear} & \text{if } f = \text{new gear, and } g = \text{males} \\ \sigma_{Right}\Delta_{fem\Delta_{gear}} & \text{if } f = \text{new gear, and} g = \text{females} \end{cases} \tag{46}$$

with σ_{Right}, Δ_{fem} and Δ_{gear} estimated separately for each for each species and coast combination.

Selectivities-at-length are converted to selectivities-at-age using the begin-year age-length matrix for the summer and autumn surveys, and the mid-year age-length matrix for winter and spring surveys.

4.1.3 Commercial fishing selectivity-at-length:

As for the survey selectivities, the commercial fishing selectivity-at-length for each species and fleet, S_{sfl} , is estimated in terms of a double normal curve.

Periods of fixed and changing selectivity have been assumed for the offshore trawl fleet to take account of the change in the selectivity at low ages over time in the commercial catches, likely due to the phasing out of the (illegal) use of net liners to enhance catch rates.

Two selectivity periods are also assumed for the longline fleet.

On the South Coast, for *M. paradoxus*, the female offshore trawl selectivity (only the trawl fleet is assumed to catch *M. paradoxus* on the South Coast) is scaled down by a factor taken as the average of those estimated for the South Coast spring and autumn surveys. Although there is no gender information for the commercial catches, the South Coast spring and autumn surveys catch a much higher proportion of male *M. paradoxus* than female (ratios of about 7:1 and 3.5:1 for spring and autumn respectively). This is assumed to reflect a difference in distribution of the two genders which would therefore affect the commercial fleet similarly.

4.2 Input parameters and other choice for application to hake

4.2.1 Age-at-maturity:

The proportion of fish of species *s*, gender *g* and length *l* that are mature is assumed to follow a logistic curve with the parameter values given in **Table 3**:

$$f_{sl}^{g} = \left(1 + e^{\frac{l_{50}^{s,g} - l}{\Delta^{s,g}}}\right)^{-1} \quad (45)$$

Maturity-at-length is then converted to maturity-at-age as follows:

$$f_{sa}^{g} = \sum_{l} f_{sl}^{g} P_{a,l}^{g} \quad (46)$$

with maturity at age 0 set to 0.

4.2.2 Weight-at-length:

The weight-at-length for each species and gender is calculated from the mass-at-length function, with values of the parameters for this function listed in **Table 4**:

$$w_l = \alpha l^{\beta} \quad (47)$$

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Table 2: Parameters estimated in the model fitting procedure, excluding selectivity parameters, with bounds enforced and values as estimated for the Reference Case.

Estimable parameter	Bounds enforced	Reference Case estimates				
			M. paradoxus		*M. capensis*	
$\ln(K^{♀}_{s})$	(3.5; 9)		6.304		5.229	
h_s	(0.2; 1.5)		1.249		1.500	
γ_s	(0; 1)		0.316		0.344	
$\zeta_{s,1985\text{-}2016}$	(-5; 5)					
$(\sigma_{A,s})^2$	(0; 0.5)		0.176		0.133	
$\sigma_{\text{ICSEAF CPUE}}$ - WC	(0.25; 1)	0.250				
$\sigma_{\text{ICSEAF CPUE}}$ - SC	(0.25; 1)	0.250				
$\sigma_{\text{GLM CPUE}}$ - WC	(0.15; 1)		0.150		0.185	
$\sigma_{\text{GLM CPUE}}$ - SC	(0.15; 1)		0.162		0.268	
ICSEAF CPUE						
$q_C^{WC,z1}$	(0; 10)				0.365	
$q_C^{WC,z2}$	(0; 10)				0.199	
q_P^{WC}	(0; 10)		0.022			
r	(0; 10)	0.145				
γ_C	(0; 1)				0.097	
Survey $\ln(q)$			Old gear	New gear	Old gear	New gear
WC summer	(-5; 2)		0.365	0.246	-0.171	-0.568
WC winter	(-5; 2)		0.092		-0.088	
SC spring	(-5; 2)		-0.085	-0.186	-0.110	-0.513
SC autumn	(-5; 2)		-0.571	-0.709	0.080	-0.332
Age-length dbn			Males	Females	Males	Females
θ_0	(0.1; 100)		2.236	2.291	3.162	2.721
θ_1	(0.1; 100)		4.041	4.770	3.861	4.942
θ_{14}	(0.1; 100)		12.830	6.256	13.416	7.042
L_5	(30; 60)		47.097	53.375	51.681	53.858
$\ln(\kappa)$	(-20; 2)		-18.404	-19.718	-18.614	-19.710
t_0	(-10; 0)		-1.737	-1.061	-0.799	-0.744

Table 3: Female maturity-at-length ogive (equation 44) parameter estimates (from Singh *et al*. 2013).

	l_{50} (cm)	Δ (cm)
M. paradoxus	41.526	2.979
M. capensis	53.825	10.144

Table 4: Length-weight relationship estimates (from Singh 2013).

	α (gm/cm$^{\beta}$)	β
M. paradoxus:		
Males	0.007750	2.977
Females	0.005700	3.071
M. capensis:		
Males	0.006750	3.044
Females	0.005950	3.075

Appendix A: Reference Case data

Table App.A.1a: Species-disaggregated catches (in thousand tons) by fleet of South African hake from the south and west coasts for the period 1917-1978.

	M. paradoxus Offshore	*M. capensis* Offshore
	WC	WC
1917	-	1.000
1918	-	1.100
1919	-	1.900
1920	-	0.000
1921	-	1.300
1922	-	1.000
1923	-	2.500
1924	-	1.500
1925	-	1.900
1926	-	1.400
1927	-	0.800
1928	-	2.600
1929	-	3.800
1930	-	4.400
1931	-	2.800
1932	-	14.300
1933	-	11.100
1934	-	13.800
1935	-	15.000
1936	-	17.700
1937	-	20.200
1938	-	21.100
1939	-	20.000
1940	-	28.600
1941	-	30.600
1942	0.001	34.499
1943	0.001	37.899
1944	0.002	34.098
1945	0.004	29.196
1946	0.011	40.389
1947	0.021	41.379

	M. paradoxus Offshore		*M. capensis* Offshore		*M. capensis* Inshore
	WC	SC	WC	SC	SC
1948	0.059	-	58.741	-	-
1949	0.113	-	57.287	-	-
1950	0.275	-	71.725	-	-
1951	0.662	-	88.838	-	-
1952	1.268	-	87.532	-	-
1953	2.558	-	90.942	-	-
1954	5.438	-	99.962	-	-
1955	10.924	-	104.476	-	-
1956	19.581	-	98.619	-	-
1957	34.052	-	92.348	-	-
1958	51.895	-	78.805	-	-
1959	76.609	-	69.391	-	-
1960	100.490	-	59.410	-	1.000
1961	104.009	-	44.691	-	1.308
1962	109.596	-	38.004	-	1.615
1963	129.966	-	39.534	-	1.923
1964	126.567	-	35.733	-	2.231
1965	159.704	-	43.296	-	2.538
1966	154.109	-	40.891	-	2.846
1967	139.973	7.086	36.727	7.100	3.154
1968	113.890	13.958	29.710	13.950	3.462
1969	131.023	18.982	34.077	18.948	3.769
1970	113.124	11.876	29.376	11.847	4.077
1971	160.384	15.078	41.616	15.037	4.385
1972	193.694	23.382	50.239	23.314	4.692
1973	125.292	36.232	32.490	36.124	5.000
1974	97.674	45.496	25.326	45.357	10.056
1975	71.165	33.783	18.452	33.680	6.372
1976	114.268	26.005	29.626	25.925	5.740
1977	81.260	18.515	21.068	18.457	3.500

Table App.A.1b: Species-disaggregated catches (in thousand tons) by fleet of South African hake from the south and west coasts for the period 1978-present. For 2017, the catches are taken as the 2017 TAC with the same proportion by species and fleet as in 2016.

	M. paradoxus				*M. capensis*					
	Offshore		Longline		Offshore		Inshore	Longline		Handline
	WC	SC	WC	SC	WC	SC	SC	WC	SC	SC
1978	107.701	4.937	-	-	19.812	2.648	4.931	-	-	-
1979	101.890	3.575	-	-	31.633	3.345	6.093	-	-	-
1980	105.483	3.676	-	-	28.045	2.784	9.121	-	-	-
1981	95.330	1.767	-	-	25.601	3.719	9.400	-	-	-
1982	88.933	5.057	-	-	24.417	6.300	8.089	-	-	-
1983	74.173	7.034	0.126	-	20.260	5.482	7.672	0.104	-	-
1984	86.045	5.718	0.200	0.005	25.210	5.217	9.035	0.166	0.011	-
1985	98.283	12.694	0.638	0.091	26.788	7.322	9.203	0.529	0.201	0.065
1986	107.907	11.539	0.753	0.094	25.898	4.427	8.724	0.625	0.208	0.084
1987	96.162	10.536	1.952	0.110	21.363	5.148	8.607	1.619	0.243	0.096
1988	83.606	8.664	2.833	0.103	22.976	5.852	8.417	2.350	0.228	0.071
1989	85.298	9.039	0.158	0.010	21.961	9.873	10.038	0.132	0.022	0.137
1990	84.969	13.622	0.211	-	18.668	9.169	10.012	0.175	-	0.348
1991	89.371	15.955	-	0.932	17.079	6.119	8.206	-	2.068	1.270
1992	86.777	22.368	-	0.466	16.510	4.094	9.252	-	1.034	1.099
1993	105.114	12.472	-	-	12.951	1.789	8.870	-	-	0.278
1994	106.287	8.588	0.882	0.194	17.580	2.464	9.569	0.732	0.432	0.449
1995	102.877	5.395	0.523	0.202	18.020	1.755	10.630	0.434	0.448	0.756
1996	110.460	11.080	1.308	0.568	18.715	2.209	11.062	1.086	1.260	1.515
1997	103.035	13.651	1.410	0.582	14.119	2.185	8.834	1.170	1.290	1.404
1998	113.083	11.703	0.505	0.457	14.570	2.450	8.283	0.419	1.014	1.738
1999	89.147	13.435	1.532	1.288	14.614	1.912	8.595	1.272	2.856	2.749
2000	97.417	9.920	2.706	3.105	20.285	3.610	10.906	2.000	1.977	5.500
2001	101.990	11.016	2.045	0.370	15.606	5.141	11.836	1.750	1.347	7.300
2002	91.720	15.445	4.469	1.585	13.211	3.140	9.581	2.391	2.546	3.500
2003	95.143	21.107	3.305	1.252	10.233	3.926	9.883	2.526	3.078	3.000
2004	86.916	30.746	2.855	1.196	11.315	4.024	10.004	2.297	2.731	1.600
2005	87.540	25.051	3.091	0.472	7.727	4.195	7.881	2.773	3.270	0.700
2006	83.840	22.133	3.241	0.485	9.657	2.494	5.524	2.520	3.227	0.400
2007	96.332	15.825	2.512	3.021	12.537	1.420	6.350	2.522	2.522	0.400
2008	88.290	14.940	2.255	0.809	11.085	2.567	5.496	1.937	1.893	0.231
2009	69.716	13.269	2.410	1.069	10.783	2.431	5.639	2.828	2.520	0.265
2010	70.156	17.863	2.045	0.370	9.738	1.649	5.472	1.750	1.347	0.275
2011	76.744	20.447	2.522	0.140	15.505	1.543	6.013	3.521	3.047	0.186
2012	82.361	19.350	4.358	0.306	11.978	1.776	3.223	2.570	1.737	0.008
2013	75.403	32.693	6.056	0.060	7.699	0.642	2.920	2.606	1.308	0.000
2014	75.071	46.779	6.879	0.008	7.852	0.662	2.965	2.123	0.315	0.002
2015	80.214	35.304	5.223	0.021	10.035	0.476	3.077	2.935	0.064	0.001
2016	95.308	20.840	2.806	0.001	11.730	0.653	3.973	4.360	0.002	0.001
2017	95.616	20.907	2.815	0.001	11.768	0.655	3.986	4.374	0.002	0.001

Table App.A.2: GLM standardized CPUE data for *M. paradoxus* and *M. capensis* (Glazer, pers. comm.).

	GLM CPUE (kg min^{-1})			
	M. paradoxus		*M. capensis*	
Year	West Coast	South Coast	West Coast	South Coast
1978	9.36	2.11	1.63	3.15
1979	9.27	2.08	2.65	3.45
1980	8.61	3.07	2.37	3.89
1981	8.57	2.00	2.42	3.77
1982	8.45	2.55	2.08	3.73
1983	9.08	2.77	2.79	4.62
1984	9.26	2.99	2.92	5.33
1985	10.84	4.31	3.24	6.47
1986	9.45	4.19	2.65	5.39
1987	7.79	3.72	2.34	4.92
1988	7.70	3.08	2.08	5.24
1989	8.30	3.03	2.22	5.63
1990	8.93	4.48	1.89	6.71
1991	9.68	4.41	2.34	6.08
1992	8.46	5.17	2.86	5.55
1993	8.63	4.28	2.69	3.98
1994	9.21	3.46	3.42	5.41
1995	8.06	2.68	3.55	5.10
1996	8.75	3.78	4.11	4.67
1997	7.82	4.31	3.54	3.44
1998	8.72	3.63	4.06	3.98
1999	7.08	4.15	3.74	3.89
2000	6.30	3.16	3.51	4.30
2001	5.08	3.11	2.39	3.13
2002	4.88	2.68	2.30	3.50
2003	5.85	3.65	1.95	3.93
2004	4.88	2.89	1.75	3.13
2005	4.85	2.50	1.24	2.82
2006	5.21	2.70	1.34	1.96
2007	6.45	2.80	1.30	1.90
2008	7.08	3.02	1.72	2.97
2009	7.04	3.78	3.04	5.53
2010	7.70	4.15	2.57	4.20
2011	7.31	4.87	3.14	5.06
2012	6.31	4.16	2.59	2.76
2013	6.36	4.25	2.48	3.12
2014	6.73	4.03	1.94	2.21
2015	8.83	3.59	2.09	2.07
2016	9.10	3.83	2.27	2.76

Table App.A.3: Survey abundance estimates and associated standard errors in thousand tons for *M. paradoxus* for the depth range 0-500m for the South Coast and for the West Coast (Fairweather, pers comm.). Values in bold are for the surveys conducted by the *Africana* with the new gear, while underlined values are for the surveys conducted by the *Andromeda* and in 2016 by the *Compass Challenger*.

	West coast				South coast			
Year	Summer		Winter		Spring (Sept)		Autumn (Apr/May)	
	Biomass	(s.e.)	Biomass	(s.e.)	Biomass	(s.e.)	Biomass	(s.e.)
1985	168.989	(37.765)	290.281	(63.295)	-	-	-	-
1986	202.334	(37.745)	147.378	(21.667)	11.280	(3.111)	-	-
1987	284.434	(54.165)	180.158	(39.047)	16.381	(3.033)	-	-
1988	138.534	(20.303)	252.121	(71.246)	-	-	28.293	(8.673)
1989	-	-	434.092	(142.716)	-	-	-	-
1990	307.615	(87.841)	205.704	(43.607)	-	-	-	-
1991	331.177	(81.633)	-	-	-	-	27.570	(8.153)
1992	225.755	(33.711)	-	-	-	-	25.036	(6.650)
1993	340.079	(51.427)	-	-	-	-	162.375	(81.691)
1994	333.499	(56.259)	-	-	-	-	108.179	(38.369)
1995	317.104	(76.709)	-	-	-	-	70.890	(39.330)
1996	474.270	(92.744)	-	-	-	-	68.859	(19.929)
1997	543.615	(96.043)	-	-	-	-	121.707	(51.507)
1998	-	-	-	-	-	-	-	-
1999	542.830	(110.541)	-	-	-	-	263.256	(59.439)
2000	-	-	-	-	-	-	-	-
2001	-	-	-	-	16.668	(7.159)	-	-
2002	251.820	(32.690)	-	-	-	-	-	-
2003	386.321	(63.565)	-	-	**98.434**	(42.249)	185.345	(82.188)
2004	**271.540**	(55.710)	-	-	**70.001**	(22.156)	**39.822**	(22.153)
2005	**296.065**	(42.409)	-	-	-	-	**26.691**	(6.017)
2006	316.247	(57.332)	-	-	68.507	(18.283)	34.868	(5.843)
2007	**407.377**	(77.222)	-	-	**66.267**	(21.966)	**102.195**	(53.688)
2008	**238.143**	(37.018)	-	-	**25.661**	(8.324)	**33.034**	(9.340)
2009	**310.760**	(27.768)	-	-	-	-	**45.030**	(15.551)
2010	576.848	(88.202)	-	-	-	-	46.938	(12.160)
2011	**380.185**	(128.013)	-	-	-	-	**21.054**	(6.531)
2012	**405.865**	(59.099)	-	-	-	-	-	-
2013	136.260	(25.116)	-	-	-	-	-	-
2014	269.482	(37.492)	-	-	-	-	62.925	(24.802)
2015	207.583	(24.057)	-	-	-	-	111.411	(51.852)
2016	312.876	(33.250)	-	-	-	-	94.177	(51.731)
2017	319.024	(58.766)	-	-	-	-	-	-

Table App.A.4: Survey abundance estimates and associated standard errors in thousand tons for *M. capensis* for the depth range 0-500m for the South Coast and for the West Coast (Fairweather, pers. comm.). Values in bold are for the surveys conducted by the *Africana* with the new gear, while underlined values are for the surveys conducted by the *Andromeda* and in 2016 by the *Compass Challenger*.

	West coast				South coast			
Year	Summer		Winter		Spring (Sept)		Autumn (Apr/May)	
	Biomass	(s.e.)	Biomass	(s.e.)	Biomass	(s.e.)	Biomass	(s.e.)
1985	102.929	(18.888)	159.198	(18.982)	-	-	-	-
1986	113.154	(23.474)	115.218	(19.733)	96.768	(10.737)	-	-
1987	75.438	(9.709)	83.050	(10.306)	137.008	(13.057)	-	-
1988	66.365	(9.930)	48.046	(9.574)	-	-	154.548	(23.984)
1989	-	-	294.740	(67.495)	-	-	-	-
1990	400.142	(97.102)	156.337	(22.507)	-	-	-	-
1991	67.565	(9.656)	-	-	-	-	276.607	(25.274)
1992	95.401	(11.892)	-	-	-	-	124.495	(13.600)
1993	93.613	(14.390)	-	-	-	-	144.551	(12.379)
1994	124.497	(37.845)	-	-	-	-	153.790	(20.310)
1995	193.292	(24.270)	-	-	-	-	222.464	(31.245)
1996	87.969	(9.866)	-	-	-	-	222.176	(23.144)
1997	252.606	(42.721)	-	-	-	-	163.163	(17.274)
1998	-	-	-	-	-	-	-	-
1999	188.624	(31.362)	-	-	-	-	171.946	(13.330)
2000	-	-	-	-	-	-	-	-
2001	-	-	-	-	117.590	(20.093)	-	-
2002	105.093	(16.130)	-	-	-	-	-	-
2003	73.020	(12.518)	-	-	**73.604**	(9.142)	117.538	(17.192)
2004	**194.294**	(30.714)	-	-	**96.933**	(13.936)	**92.796**	(11.318)
2005	**63.363**	(11.498)	-	-	-	-	**68.672**	(5.302)
2006	73.655	(17.255)	-	-	92.831	(8.998)	116.298	(11.931)
2007	**73.230**	(9.306)	-	-	**67.937**	(6.553)	**65.935**	(5.303)
2008	**52.577**	(7.069)	-	-	**87.836**	(9.723)	**102.169**	(9.681)
2009	**140.437**	(26.486)	-	-	-	-	**111.191**	(10.832)
2010	162.402	(34.891)	-	-	-	-	170.261	(33.235)
2011	**89.095**	(23.574)	-	-	-	-	**105.424**	(10.688)
2012	**84.746**	(8.331)	-	-	-	-	-	-
2013	30.383	(4.575)	-	-	-	-	-	-
2014	219.756	(60.342)	-	-	-	-	63.389	(6.415)
2015	65.086	(9.178)	-	-	-	-	76.059	(6.873)
2016	115.058	(30.400)	-	-	-	-	83.197	(6.600)
2017	69.289	(14.486)	-	-	-	-	-	-

Table App.A.5a: West coast commercial offshore trawl, species combined, sex-aggregated, catch-at-length data given as proportions (Fairweather, 2017). Here and below, the blue bars represent the sizes of the proportions, with the shortest bar representing the lowest proportion in the matrix and the longest bar representing the highest proportion.

West coast offshore trawl, species combined

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47
1981	0.006	0.026	0.059	0.119	0.168	0.159	0.120	0.086	0.065	0.047	0.031	0.023	0.019	0.013	0.011
1982	0.003	0.025	0.076	0.120	0.153	0.166	0.130	0.093	0.059	0.046	0.028	0.018	0.015	0.012	0.012
1983	0.000	0.005	0.018	0.054	0.088	0.104	0.126	0.127	0.110	0.087	0.065	0.044	0.034	0.028	0.024
1984	0.000	0.003	0.009	0.057	0.113	0.127	0.139	0.111	0.092	0.082	0.062	0.036	0.029	0.025	0.023
1985	0.000	0.000	0.001	0.004	0.015	0.043	0.115	0.146	0.132	0.119	0.096	0.071	0.052	0.036	0.029
1986	0.000	0.000	0.002	0.008	0.029	0.050	0.094	0.136	0.147	0.134	0.111	0.075	0.050	0.033	0.026
1987	0.000	0.000	0.004	0.027	0.071	0.119	0.140	0.137	0.107	0.072	0.058	0.046	0.039	0.036	0.029
1988	0.000	0.000	0.009	0.036	0.107	0.141	0.157	0.129	0.102	0.074	0.050	0.038	0.028	0.020	0.017
1989	0.000	0.003	0.018	0.055	0.115	0.158	0.161	0.122	0.088	0.065	0.045	0.033	0.026	0.020	0.017
1990	0.000	0.001	0.005	0.013	0.058	0.106	0.131	0.141	0.127	0.115	0.081	0.055	0.042	0.030	0.023
1991	0.000	0.001	0.006	0.022	0.049	0.077	0.092	0.099	0.088	0.088	0.075	0.066	0.063	0.052	0.041
1992	0.000	0.002	0.010	0.041	0.092	0.122	0.124	0.107	0.082	0.068	0.053	0.045	0.036	0.031	0.032
1993	0.000	0.001	0.003	0.015	0.041	0.075	0.095	0.085	0.071	0.069	0.073	0.064	0.065	0.063	0.066
1994	0.000	0.000	0.001	0.005	0.027	0.077	0.118	0.131	0.080	0.080	0.069	0.053	0.042	0.042	0.044
1995	0.000	0.003	0.019	0.035	0.054	0.071	0.122	0.118	0.119	0.109	0.085	0.048	0.032	0.036	0.023
1996	0.000	0.004	0.017	0.043	0.057	0.096	0.116	0.121	0.110	0.097	0.082	0.062	0.042	0.031	0.021
1997	0.000	0.003	0.018	0.040	0.060	0.096	0.130	0.118	0.111	0.097	0.080	0.052	0.036	0.033	0.021
1998	0.000	0.002	0.012	0.028	0.045	0.073	0.112	0.119	0.120	0.109	0.088	0.060	0.043	0.039	0.025
1999	0.000	0.002	0.011	0.026	0.044	0.076	0.116	0.117	0.115	0.103	0.084	0.056	0.040	0.037	0.025
2005	0.000	0.000	0.008	0.068	0.172	0.170	0.150	0.116	0.064	0.042	0.026	0.020	0.024	0.021	0.022
2006	0.000	0.001	0.008	0.038	0.075	0.116	0.146	0.144	0.137	0.095	0.041	0.031	0.024	0.022	0.019
2007	0.000	0.000	0.002	0.015	0.062	0.115	0.157	0.167	0.141	0.099	0.048	0.028	0.022	0.022	0.020
2008	0.000	0.000	0.000	0.004	0.023	0.060	0.111	0.155	0.129	0.107	0.085	0.044	0.050	0.043	0.029
2009	0.000	0.001	0.008	0.024	0.050	0.095	0.103	0.122	0.103	0.072	0.047	0.043	0.047	0.036	0.036
2010	0.000	0.002	0.002	0.005	0.018	0.067	0.131	0.137	0.112	0.090	0.063	0.045	0.043	0.045	0.047
2011	0.000	0.005	0.002	0.002	0.014	0.056	0.101	0.125	0.117	0.112	0.087	0.060	0.052	0.044	0.041
2012	0.000	0.003	0.007	0.015	0.028	0.080	0.117	0.096	0.097	0.088	0.067	0.063	0.061	0.050	0.047
2013	0.000	0.003	0.005	0.010	0.026	0.060	0.090	0.099	0.087	0.075	0.064	0.066	0.058	0.055	0.055
2014	0.000	0.001	0.004	0.015	0.071	0.106	0.131	0.124	0.104	0.060	0.055	0.040	0.033	0.039	0.044
2015	0.002	0.005	0.017	0.033	0.097	0.165	0.138	0.102	0.100	0.088	0.050	0.028	0.027	0.021	0.027
2016	0.001	0.001	0.010	0.023	0.041	0.129	0.215	0.193	0.110	0.048	0.033	0.026	0.025	0.025	0.021

Length	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1981	0.009	0.007	0.006	0.005	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.001
1982	0.010	0.008	0.006	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
1983	0.020	0.015	0.012	0.009	0.007	0.005	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
1984	0.019	0.014	0.010	0.009	0.008	0.007	0.006	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.001
1985	0.025	0.018	0.017	0.014	0.013	0.011	0.009	0.007	0.006	0.005	0.005	0.004	0.003	0.002	0.001	0.001	0.001
1986	0.019	0.015	0.011	0.009	0.008	0.006	0.006	0.006	0.005	0.005	0.004	0.004	0.003	0.002	0.001	0.001	0.002
1987	0.026	0.019	0.016	0.012	0.010	0.008	0.006	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001
1988	0.015	0.012	0.011	0.009	0.009	0.007	0.007	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.000	0.000	0.001
1989	0.013	0.010	0.008	0.007	0.007	0.006	0.006	0.005	0.004	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000
1990	0.016	0.011	0.010	0.007	0.006	0.004	0.004	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000
1991	0.032	0.024	0.019	0.014	0.014	0.011	0.012	0.011	0.010	0.008	0.007	0.005	0.004	0.003	0.002	0.001	0.002
1992	0.026	0.023	0.023	0.017	0.015	0.011	0.009	0.007	0.006	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.001
1993	0.051	0.038	0.034	0.023	0.019	0.012	0.009	0.006	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001
1994	0.046	0.046	0.041	0.029	0.021	0.012	0.011	0.006	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001
1995	0.013	0.016	0.015	0.014	0.015	0.014	0.010	0.009	0.006	0.004	0.003	0.003	0.001	0.001	0.000	0.000	0.001
1996	0.019	0.011	0.012	0.009	0.009	0.008	0.007	0.005	0.005	0.003	0.003	0.002	0.001	0.001	0.001	0.000	0.001
1997	0.014	0.012	0.013	0.011	0.012	0.010	0.008	0.007	0.005	0.003	0.003	0.002	0.001	0.001	0.000	0.000	0.001
1998	0.017	0.015	0.016	0.014	0.015	0.012	0.010	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.000	0.000	0.001
1999	0.018	0.017	0.018	0.016	0.017	0.015	0.012	0.010	0.007	0.005	0.004	0.004	0.002	0.001	0.001	0.001	0.001
2005	0.016	0.012	0.012	0.011	0.010	0.008	0.007	0.005	0.005	0.003	0.003	0.002	0.001	0.001	0.000	0.000	0.001
2006	0.017	0.015	0.014	0.012	0.010	0.006	0.006	0.005	0.005	0.003	0.003	0.002	0.002	0.001	0.001	0.000	0.001
2007	0.019	0.015	0.014	0.013	0.010	0.007	0.006	0.004	0.004	0.002	0.002	0.002	0.002	0.001	0.000	0.000	0.001
2008	0.026	0.028	0.023	0.019	0.015	0.012	0.009	0.008	0.007	0.004	0.003	0.002	0.002	0.002	0.001	0.000	0.001
2009	0.039	0.037	0.032	0.025	0.019	0.015	0.011	0.011	0.008	0.005	0.003	0.003	0.002	0.002	0.001	0.000	0.001
2010	0.045	0.032	0.031	0.019	0.016	0.012	0.010	0.007	0.007	0.004	0.004	0.003	0.002	0.002	0.001	0.000	0.001
2011	0.036	0.024	0.023	0.019	0.016	0.012	0.012	0.009	0.008	0.005	0.004	0.004	0.003	0.002	0.001	0.001	0.001
2012	0.041	0.033	0.028	0.018	0.015	0.011	0.009	0.007	0.005	0.004	0.003	0.003	0.002	0.001	0.001	0.001	0.001
2013	0.053	0.048	0.040	0.028	0.024	0.015	0.013	0.007	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001
2014	0.041	0.030	0.023	0.018	0.016	0.012	0.008	0.007	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.002
2015	0.025	0.020	0.018	0.013	0.008	0.004	0.004	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
2016	0.022	0.017	0.015	0.014	0.009	0.007	0.004	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000

Table App.A.5b: South coast commercial offshore trawl, species combined, sex-aggregated, catch-at-length data (Fairweather, 2017).

South coast offshore trawl, species combined

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1975	0.000	0.000	0.000	0.002	0.009	0.021	0.046	0.055	0.047	0.056	0.045	0.066	0.068	0.068	0.075	0.067	0.068	0.055	0.055	0.044	0.031	0.024	0.016	0.013	0.013	0.011	0.006	0.006	0.005	0.005	0.005	0.016
1976	0.000	0.005	0.007	0.017	0.036	0.113	0.208	0.166	0.113	0.066	0.033	0.050	0.037	0.033	0.040	0.032	0.018	0.008	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
1977	0.000	0.000	0.000	0.002	0.003	0.015	0.045	0.050	0.058	0.072	0.073	0.078	0.068	0.061	0.042	0.036	0.030	0.026	0.026	0.022	0.022	0.024	0.018	0.011	0.009	0.061	0.044	0.035	0.045	0.021	0.001	0.002
1978	0.000	0.003	0.007	0.027	0.063	0.138	0.157	0.138	0.104	0.077	0.052	0.040	0.032	0.026	0.027	0.020	0.016	0.014	0.010	0.007	0.007	0.007	0.004	0.005	0.003	0.002	0.003	0.002	0.002	0.001	0.002	0.004
1979	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.013	0.036	0.053	0.056	0.048	0.050	0.049	0.063	0.079	0.081	0.063	0.069	0.058	0.050	0.040	0.034	0.027	0.029	0.020	0.019	0.014	0.010	0.008	0.007	0.018
1980	0.000	0.000	0.004	0.017	0.052	0.084	0.113	0.111	0.101	0.077	0.070	0.060	0.053	0.045	0.037	0.030	0.027	0.019	0.015	0.014	0.014	0.010	0.009	0.008	0.007	0.005	0.005	0.004	0.003	0.002	0.002	0.004
1981	0.000	0.001	0.006	0.021	0.041	0.098	0.119	0.107	0.107	0.071	0.078	0.065	0.055	0.041	0.039	0.030	0.025	0.020	0.016	0.012	0.012	0.009	0.006	0.005	0.003	0.003	0.003	0.002	0.001	0.001	0.001	0.002
1982	0.001	0.004	0.012	0.025	0.054	0.097	0.108	0.092	0.078	0.058	0.055	0.055	0.045	0.037	0.036	0.036	0.030	0.027	0.024	0.022	0.021	0.019	0.015	0.012	0.009	0.007	0.006	0.005	0.004	0.003	0.002	0.003
1983	0.000	0.001	0.003	0.019	0.046	0.076	0.081	0.090	0.108	0.094	0.080	0.053	0.045	0.039	0.042	0.037	0.036	0.031	0.023	0.019	0.017	0.015	0.012	0.010	0.007	0.005	0.003	0.003	0.002	0.002	0.001	0.002
1984	0.001	0.002	0.013	0.031	0.096	0.126	0.142	0.106	0.075	0.055	0.056	0.043	0.042	0.034	0.026	0.021	0.018	0.019	0.017	0.014	0.011	0.010	0.008	0.007	0.007	0.006	0.004	0.003	0.002	0.002	0.001	0.002
1985	0.000	0.000	0.001	0.004	0.025	0.063	0.112	0.117	0.104	0.101	0.086	0.060	0.047	0.034	0.029	0.028	0.025	0.026	0.023	0.020	0.017	0.013	0.013	0.013	0.009	0.007	0.007	0.006	0.004	0.003	0.001	0.004
1986	0.000	0.000	0.000	0.002	0.011	0.044	0.102	0.100	0.105	0.069	0.083	0.064	0.062	0.050	0.042	0.037	0.029	0.028	0.026	0.024	0.025	0.021	0.016	0.016	0.010	0.007	0.008	0.007	0.004	0.004	0.001	0.003
1987	0.000	0.000	0.001	0.004	0.033	0.084	0.118	0.125	0.090	0.074	0.054	0.037	0.037	0.038	0.038	0.036	0.032	0.029	0.030	0.025	0.023	0.021	0.017	0.012	0.009	0.008	0.007	0.006	0.004	0.003	0.002	0.004
1988	0.000	0.001	0.005	0.026	0.045	0.081	0.102	0.113	0.110	0.070	0.049	0.041	0.043	0.040	0.038	0.036	0.027	0.026	0.026	0.020	0.022	0.019	0.014	0.014	0.009	0.007	0.005	0.003	0.002	0.002	0.001	0.002
1989	0.000	0.002	0.003	0.020	0.084	0.132	0.171	0.130	0.071	0.063	0.047	0.037	0.033	0.023	0.021	0.016	0.020	0.023	0.016	0.017	0.015	0.016	0.012	0.010	0.007	0.004	0.003	0.002	0.001	0.001	0.001	0.000
1990	0.000	0.001	0.004	0.010	0.040	0.073	0.087	0.100	0.092	0.104	0.095	0.076	0.061	0.051	0.040	0.029	0.023	0.022	0.016	0.015	0.011	0.011	0.009	0.008	0.007	0.005	0.004	0.002	0.002	0.001	0.001	0.001
1991	0.000	0.001	0.005	0.020	0.047	0.081	0.108	0.121	0.108	0.100	0.077	0.061	0.051	0.042	0.031	0.023	0.018	0.017	0.014	0.013	0.010	0.010	0.009	0.007	0.006	0.005	0.003	0.003	0.002	0.001	0.001	0.001
1992	0.000	0.001	0.005	0.021	0.048	0.070	0.086	0.106	0.107	0.105	0.089	0.078	0.055	0.043	0.035	0.025	0.019	0.018	0.014	0.014	0.010	0.010	0.008	0.007	0.007	0.005	0.004	0.003	0.002	0.002	0.001	0.002
1993	0.000	0.001	0.004	0.022	0.054	0.088	0.105	0.104	0.098	0.094	0.094	0.068	0.053	0.038	0.033	0.024	0.018	0.017	0.013	0.013	0.010	0.009	0.008	0.006	0.006	0.005	0.004	0.003	0.002	0.001	0.001	0.002
1994	0.000	0.001	0.002	0.013	0.038	0.082	0.116	0.139	0.104	0.098	0.077	0.055	0.038	0.033	0.031	0.027	0.026	0.023	0.018	0.015	0.010	0.011	0.008	0.007	0.007	0.006	0.006	0.004	0.003	0.002	0.001	0.002
1995	0.000	0.001	0.011	0.021	0.044	0.061	0.111	0.133	0.129	0.108	0.073	0.042	0.036	0.040	0.022	0.012	0.012	0.014	0.012	0.019	0.016	0.015	0.015	0.013	0.011	0.009	0.009	0.005	0.004	0.002	0.002	0.002
1996	0.000	0.000	0.002	0.004	0.022	0.050	0.101	0.122	0.142	0.141	0.108	0.080	0.047	0.032	0.023	0.018	0.013	0.015	0.014	0.013	0.010	0.009	0.007	0.006	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.002
2008	0.000	0.000	0.001	0.005	0.014	0.069	0.130	0.161	0.137	0.097	0.053	0.042	0.035	0.035	0.036	0.034	0.031	0.031	0.023	0.018	0.014	0.009	0.006	0.006	0.003	0.003	0.002	0.002	0.002	0.000	0.000	0.001
2009	0.000	0.000	0.000	0.005	0.028	0.073	0.099	0.114	0.096	0.076	0.060	0.053	0.055	0.048	0.044	0.038	0.035	0.039	0.031	0.029	0.015	0.015	0.011	0.007	0.006	0.005	0.004	0.004	0.004	0.001	0.001	0.002
2010	0.000	0.000	0.000	0.001	0.008	0.035	0.083	0.106	0.109	0.086	0.076	0.053	0.052	0.052	0.047	0.043	0.039	0.035	0.032	0.030	0.023	0.023	0.017	0.013	0.010	0.009	0.005	0.005	0.004	0.002	0.001	0.002
2011	0.000	0.000	0.001	0.003	0.009	0.040	0.086	0.119	0.117	0.095	0.071	0.054	0.055	0.050	0.038	0.041	0.037	0.036	0.028	0.026	0.018	0.017	0.014	0.011	0.009	0.008	0.005	0.004	0.003	0.002	0.002	0.002
2012	0.000	0.000	0.000	0.004	0.013	0.036	0.075	0.101	0.101	0.151	0.077	0.056	0.052	0.042	0.042	0.038	0.031	0.033	0.026	0.024	0.019	0.019	0.015	0.012	0.008	0.007	0.005	0.004	0.003	0.003	0.002	0.003
2013	0.000	0.000	0.001	0.006	0.022	0.064	0.126	0.164	0.139	0.088	0.065	0.043	0.038	0.038	0.037	0.011	0.027	0.029	0.018	0.016	0.011	0.007	0.006	0.004	0.004	0.003	0.003	0.003	0.002	0.001	0.001	0.001
2014	0.000	0.000	0.009	0.020	0.079	0.102	0.123	0.135	0.120	0.103	0.041	0.037	0.037	0.030	0.029	0.028	0.023	0.019	0.023	0.012	0.006	0.006	0.004	0.002	0.002	0.002	0.002	0.002	0.001	0.000	0.001	0.001
2016	0.000	0.001	0.014	0.046	0.083	0.113	0.124	0.162	0.152	0.075	0.037	0.025	0.023	0.023	0.020	0.022	0.019	0.014	0.011	0.009	0.006	0.005	0.004	0.004	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000

Table App.A.5c: South coast commercial inshore trawl, *M. capensis*, sex-aggregated, catch-at-length data (Fairweather, 2017).

South coast inshore trawl, *M. capensis*

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1981	0.000	0.000	0.000	0.001	0.003	0.014	0.037	0.070	0.101	0.117	0.119	0.103	0.094	0.075	0.060	0.049	0.036	0.031	0.021	0.017	0.015	0.011	0.008	0.006	0.004	0.003	0.002	0.001	0.001	0.001	0.001	0.000
1982	0.000	0.000	0.000	0.001	0.006	0.031	0.085	0.133	0.144	0.125	0.112	0.088	0.067	0.052	0.038	0.029	0.023	0.016	0.012	0.010	0.007	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000
1983	0.000	0.000	0.000	0.000	0.000	0.004	0.018	0.040	0.066	0.084	0.092	0.097	0.102	0.105	0.096	0.080	0.061	0.046	0.032	0.022	0.015	0.011	0.008	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.000	0.001
1984	0.000	0.000	0.000	0.000	0.001	0.003	0.017	0.050	0.086	0.114	0.132	0.139	0.121	0.083	0.058	0.043	0.035	0.028	0.022	0.018	0.016	0.012	0.009	0.006	0.004	0.002	0.001	0.001	0.001	0.000	0.000	0.001
1985	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.016	0.036	0.055	0.068	0.083	0.100	0.116	0.106	0.097	0.087	0.063	0.045	0.032	0.025	0.020	0.014	0.010	0.006	0.004	0.003	0.002	0.001	0.001	0.000	0.001
1986	0.000	0.000	0.000	0.000	0.001	0.005	0.019	0.048	0.081	0.102	0.096	0.090	0.072	0.067	0.059	0.054	0.055	0.052	0.047	0.042	0.036	0.025	0.017	0.011	0.007	0.004	0.003	0.002	0.001	0.001	0.001	0.001
1987	0.000	0.000	0.000	0.000	0.000	0.003	0.010	0.029	0.061	0.099	0.110	0.136	0.113	0.086	0.065	0.055	0.046	0.040	0.031	0.026	0.025	0.023	0.014	0.010	0.006	0.004	0.003	0.002	0.001	0.001	0.001	0.001
1988	0.000	0.000	0.000	0.001	0.006	0.021	0.051	0.093	0.097	0.093	0.085	0.082	0.081	0.069	0.062	0.052	0.047	0.036	0.031	0.024	0.021	0.019	0.010	0.007	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.001
1989	0.000	0.000	0.000	0.002	0.008	0.024	0.051	0.082	0.097	0.102	0.102	0.099	0.080	0.065	0.055	0.052	0.040	0.032	0.024	0.023	0.018	0.016	0.009	0.006	0.004	0.003	0.002	0.001	0.001	0.000	0.000	0.000
1990	0.000	0.000	0.000	0.001	0.003	0.010	0.024	0.048	0.064	0.075	0.095	0.100	0.111	0.089	0.078	0.068	0.053	0.040	0.032	0.029	0.022	0.016	0.012	0.008	0.005	0.004	0.002	0.002	0.001	0.001	0.000	0.001
1991	0.000	0.000	0.000	0.001	0.003	0.010	0.023	0.043	0.065	0.075	0.075	0.077	0.080	0.085	0.083	0.077	0.067	0.059	0.044	0.039	0.028	0.021	0.015	0.011	0.007	0.005	0.003	0.002	0.001	0.001	0.001	0.001
1992	0.000	0.000	0.002	0.006	0.015	0.035	0.058	0.077	0.082	0.083	0.082	0.074	0.073	0.066	0.063	0.055	0.051	0.043	0.033	0.030	0.023	0.017	0.011	0.007	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001
1993	0.000	0.000	0.000	0.002	0.005	0.014	0.031	0.066	0.070	0.079	0.092	0.111	0.122	0.094	0.070	0.080	0.049	0.034	0.023	0.022	0.019	0.013	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.000	0.000	0.000
1994	0.000	0.000	0.001	0.003	0.010	0.032	0.046	0.073	0.084	0.084	0.077	0.073	0.069	0.061	0.058	0.066	0.052	0.039	0.036	0.035	0.031	0.025	0.017	0.010	0.006	0.004	0.002	0.002	0.001	0.000	0.000	0.000
1995	0.000	0.000	0.000	0.001	0.005	0.015	0.036	0.048	0.079	0.091	0.091	0.093	0.090	0.084	0.072	0.065	0.053	0.040	0.028	0.024	0.020	0.018	0.014	0.011	0.009	0.006	0.004	0.002	0.001	0.000	0.000	0.000
1996	0.000	0.000	0.001	0.002	0.008	0.021	0.062	0.078	0.095	0.130	0.117	0.089	0.092	0.065	0.051	0.048	0.035	0.024	0.019	0.016	0.013	0.012	0.009	0.006	0.004	0.003	0.002	0.001	0.000	0.000	0.000	0.000
1998	0.000	0.000	0.000	0.001	0.004	0.022	0.056	0.082	0.146	0.132	0.105	0.076	0.064	0.063	0.049	0.045	0.037	0.027	0.022	0.015	0.012	0.011	0.007	0.008	0.006	0.004	0.003	0.002	0.001	0.000	0.000	0.000
1999	0.000	0.000	0.000	0.001	0.005	0.014	0.037	0.066	0.078	0.118	0.124	0.098	0.092	0.080	0.066	0.052	0.035	0.034	0.020	0.021	0.012	0.011	0.008	0.008	0.007	0.006	0.005	0.003	0.001	0.000	0.000	0.001
2000	0.000	0.000	0.000	0.000	0.004	0.009	0.029	0.064	0.085	0.108	0.117	0.106	0.096	0.079	0.075	0.059	0.046	0.034	0.022	0.018	0.010	0.010	0.008	0.006	0.005	0.004	0.004	0.002	0.001	0.000	0.000	0.000
2001	0.000	0.000	0.000	0.001	0.004	0.015	0.049	0.095	0.137	0.131	0.109	0.080	0.064	0.046	0.032	0.028	0.028	0.024	0.025	0.028	0.025	0.021	0.019	0.011	0.009	0.007	0.005	0.005	0.001	0.001	0.000	0.000
2006	0.000	0.000	0.000	0.001	0.002	0.017	0.058	0.118	0.167	0.135	0.117	0.070	0.056	0.040	0.030	0.033	0.021	0.024	0.024	0.022	0.019	0.014	0.012	0.006	0.004	0.003	0.003	0.001	0.001	0.001	0.000	0.001
2007	0.000	0.001	0.002	0.008	0.017	0.050	0.083	0.120	0.115	0.109	0.105	0.075	0.053	0.040	0.035	0.032	0.023	0.025	0.020	0.020	0.021	0.015	0.012	0.005	0.003	0.003	0.004	0.002	0.001	0.000	0.000	0.000
2008	0.000	0.001	0.001	0.005	0.017	0.049	0.076	0.082	0.099	0.094	0.091	0.081	0.066	0.051	0.042	0.040	0.032	0.036	0.031	0.030	0.024	0.017	0.014	0.007	0.005	0.004	0.002	0.001	0.001	0.000	0.000	0.001
2009	0.000	0.000	0.002	0.010	0.029	0.062	0.082	0.078	0.082	0.100	0.092	0.076	0.054	0.054	0.049	0.038	0.034	0.032	0.026	0.030	0.023	0.018	0.013	0.007	0.005	0.003	0.002	0.000	0.000	0.000	0.000	0.000
2010	0.000	0.001	0.003	0.012	0.033	0.063	0.094	0.109	0.079	0.086	0.078	0.061	0.052	0.045	0.040	0.035	0.030	0.037	0.027	0.030	0.022	0.017	0.017	0.011	0.006	0.004	0.003	0.001	0.001	0.001	0.000	0.001
2011	0.000	0.001	0.003	0.010	0.025	0.060	0.081	0.093	0.090	0.101	0.105	0.081	0.058	0.048	0.039	0.034	0.031	0.028	0.024	0.024	0.018	0.015	0.010	0.007	0.005	0.003	0.002	0.001	0.001	0.000	0.000	0.000
2012	0.000	0.001	0.003	0.010	0.024	0.051	0.089	0.110	0.100	0.082	0.080	0.075	0.058	0.053	0.046	0.034	0.024	0.027	0.021	0.025	0.018	0.019	0.018	0.006	0.007	0.005	0.005	0.001	0.002	0.002	0.001	0.001
2013	0.000	0.000	0.000	0.002	0.011	0.030	0.067	0.112	0.107	0.099	0.095	0.080	0.061	0.056	0.047	0.036	0.031	0.026	0.024	0.024	0.020	0.019	0.013	0.010	0.007	0.006	0.004	0.004	0.002	0.002	0.001	0.002
2014	0.000	0.000	0.000	0.004	0.015	0.030	0.060	0.079	0.099	0.084	0.090	0.098	0.078	0.055	0.043	0.039	0.023	0.028	0.028	0.027	0.019	0.016	0.014	0.013	0.013	0.008	0.010	0.007	0.005	0.007	0.004	0.007
2015	0.000	0.001	0.006	0.016	0.036	0.079	0.110	0.108	0.097	0.077	0.072	0.072	0.048	0.047	0.040	0.034	0.028	0.028	0.028	0.023	0.019	0.010	0.007	0.006	0.003	0.002	0.001	0.001	0.000	0.000	0.000	0.000
2016	0.000	0.000	0.001	0.006	0.031	0.089	0.131	0.126	0.112	0.105	0.068	0.058	0.043	0.037	0.034	0.031	0.025	0.023	0.020	0.016	0.013	0.009	0.006	0.004	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.001

Table App.A.5d: West coast longline, species combined, sex-aggregated, catch-at-length data.

West coast longline, species combined

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.006	0.007	0.008	0.010	0.014	0.019	0.027	0.035	0.040	0.044	0.049	0.055	0.068	0.078	0.080	0.084	0.080	0.071	0.061	0.157
1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.002	0.005	0.009	0.018	0.022	0.044	0.042	0.053	0.064	0.057	0.075	0.071	0.076	0.083	0.062	0.069	0.060	0.185
1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.003	0.003	0.005	0.008	0.014	0.021	0.032	0.046	0.058	0.065	0.088	0.083	0.083	0.086	0.075	0.071	0.061	0.052	0.144
1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.003	0.007	0.011	0.015	0.027	0.028	0.046	0.047	0.046	0.060	0.068	0.076	0.072	0.078	0.079	0.070	0.067	0.051	0.145

Table App.A.5e: South coast longline, species combined, sex-aggregated, catch-at-length data.

South coast longline, species combined

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.007	0.012	0.022	0.035	0.055	0.069	0.082	0.082	0.090	0.083	0.079	0.078	0.066	0.060	0.045	0.037	0.026	0.069
1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.002	0.005	0.009	0.018	0.022	0.044	0.042	0.053	0.064	0.057	0.075	0.071	0.076	0.083	0.062	0.069	0.060	0.185
1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.011	0.016	0.031	0.043	0.038	0.048	0.056	0.069	0.075	0.087	0.090	0.093	0.089	0.070	0.059	0.045	0.076
1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.005	0.012	0.017	0.027	0.033	0.043	0.044	0.052	0.064	0.076	0.086	0.089	0.088	0.084	0.077	0.066	0.048	0.085

Table App.A.5f: West coast longline, *M. paradoxus*, sex-disaggregated, catch-at-length data (Somhlaba and Leslie, 2014) (males in blue, females in pink).

West coast longline, *M. paradoxus*

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.004	0.006	0.006	0.006	0.013	0.018	0.034	0.034	0.045	0.072	0.080	0.095	0.104	0.095	0.097	0.085	0.068	0.059	0.042	0.030
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.002	0.003	0.007	0.016	0.020	0.031	0.049	0.074	0.093	0.114	0.110	0.104	0.097	0.089	0.062	0.056	0.040	0.024
2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.003	0.003	0.008	0.013	0.023	0.048	0.075	0.084	0.076	0.080	0.068	0.065	0.056	0.074	0.082	0.064	0.057	0.032	0.031	0.034	0.008	0.016
2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.005	0.006	0.011	0.019	0.029	0.043	0.057	0.069	0.077	0.095	0.106	0.107	0.098	0.084	0.069	0.054	0.040	0.027
2002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.003	0.004	0.008	0.014	0.027	0.028	0.041	0.059	0.070	0.074	0.074	0.071	0.072	0.068	0.088	0.076	0.066	0.061	0.052	0.040
2002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.003	0.008	0.012	0.022	0.030	0.044	0.067	0.078	0.086	0.093	0.092	0.088	0.089	0.082	0.071	0.058	0.046	0.027
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.002	0.004	0.007	0.010	0.016	0.032	0.044	0.055	0.062	0.072	0.082	0.084	0.092	0.093	0.073	0.069	0.065	0.049	0.034	0.025	0.021
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.003	0.005	0.010	0.020	0.033	0.052	0.071	0.090	0.098	0.102	0.094	0.095	0.079	0.069	0.058	0.048	0.037	0.030
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.001	0.002	0.012	0.015	0.020	0.026	0.036	0.051	0.065	0.077	0.097	0.108	0.114	0.101	0.081	0.062	0.043	0.030	0.025	0.014	0.010	0.006
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.007	0.012	0.018	0.029	0.037	0.050	0.061	0.081	0.097	0.106	0.103	0.097	0.083	0.067	0.052	0.038	0.027	0.019	0.012
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.007	0.014	0.019	0.030	0.040	0.054	0.079	0.084	0.107	0.099	0.091	0.086	0.081	0.063	0.045	0.035	0.025	0.013	0.011	0.008	0.005
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.007	0.004	0.006	0.013	0.024	0.037	0.056	0.074	0.091	0.097	0.103	0.101	0.091	0.077	0.064	0.052	0.039	0.030	0.021	0.018
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.005	0.005	0.014	0.018	0.024	0.031	0.049	0.067	0.098	0.121	0.120	0.119	0.103	0.075	0.052	0.036	0.027	0.014	0.006	0.005	0.002	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.006	0.012	0.019	0.030	0.041	0.058	0.073	0.088	0.100	0.109	0.107	0.093	0.078	0.058	0.043	0.031	0.023	0.016	0.011
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.005	0.005	0.013	0.021	0.026	0.056	0.074	0.094	0.086	0.097	0.101	0.046	0.054	0.073	0.035	0.038	0.041	0.051	0.025	0.035	0.010	0.008
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.005	0.009	0.019	0.036	0.060	0.089	0.105	0.113	0.112	0.117	0.093	0.074	0.058	0.042	0.027	0.017	0.012	0.008
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.003	0.014	0.020	0.033	0.044	0.050	0.066	0.073	0.081	0.093	0.096	0.076	0.063	0.052	0.051	0.057	0.023	0.021	0.032	0.028	0.016	0.007
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.005	0.012	0.016	0.032	0.038	0.062	0.079	0.096	0.111	0.112	0.092	0.078	0.062	0.050	0.037	0.034	0.026	0.024	0.017	0.012
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.015	0.009	0.010	0.018	0.039	0.051	0.050	0.061	0.086	0.114	0.101	0.080	0.069	0.062	0.053	0.038	0.034	0.033	0.021	0.016	0.015	0.012	0.008
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.006	0.009	0.020	0.032	0.048	0.073	0.090	0.112	0.109	0.115	0.105	0.079	0.065	0.038	0.031	0.022	0.018	0.013	0.006	0.004
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.003	0.003	0.008	0.013	0.023	0.048	0.075	0.084	0.076	0.080	0.068	0.065	0.056	0.074	0.082	0.064	0.057	0.032	0.031	0.034	0.008	0.016
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.005	0.006	0.011	0.019	0.029	0.043	0.057	0.069	0.077	0.095	0.106	0.107	0.098	0.084	0.069	0.054	0.040	0.027

Table App.A.5g: West coast longline, *M. capensis*, sex-disaggregated, catch-at-length data (Somhlaba and Leslie, 2014) (males in blue, females in pink).

West coast longline, *M. capensis*

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.008	0.023	0.028	0.042	0.055	0.072	0.092	0.092	0.123	0.120	0.095	0.071	0.063	0.043	0.029	0.010	0.010	0.012	0.002
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.005	0.011	0.016	0.020	0.028	0.035	0.047	0.067	0.075	0.077	0.087	0.093	0.090	0.086	0.082	0.071	0.048	0.035	0.021
2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	0.008	0.017	0.017	0.039	0.047	0.075	0.116	0.110	0.134	0.087	0.076	0.064	0.071	0.036	0.034	0.022	0.014	0.007	0.007	0.004
2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.004	0.005	0.011	0.019	0.037	0.060	0.088	0.105	0.091	0.077	0.072	0.073	0.066	0.069	0.052	0.052	0.040	0.043	0.030
2002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004	0.003	0.014	0.029	0.045	0.075	0.124	0.137	0.135	0.124	0.097	0.063	0.057	0.028	0.025	0.010	0.014	0.011
2002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.005	0.009	0.016	0.031	0.057	0.082	0.111	0.133	0.135	0.120	0.097	0.069	0.050	0.035	0.027	0.020
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.003	0.004	0.007	0.018	0.029	0.041	0.059	0.094	0.113	0.121	0.117	0.105	0.085	0.071	0.046	0.035	0.028	0.019
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.004	0.008	0.013	0.021	0.038	0.059	0.078	0.100	0.115	0.119	0.117	0.104	0.082	0.063	0.043	0.031
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.009	0.014	0.015	0.019	0.023	0.035	0.050	0.065	0.093	0.122	0.119	0.107	0.107	0.079	0.046	0.034	0.025	0.012	0.008	0.006	0.004
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.004	0.010	0.017	0.029	0.042	0.054	0.068	0.075	0.086	0.095	0.100	0.100	0.095	0.079	0.065	0.046	0.031
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.004	0.009	0.023	0.038	0.052	0.078	0.103	0.116	0.125	0.116	0.094	0.067	0.053	0.043	0.029	0.017	0.012	0.009	0.007
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.009	0.019	0.029	0.041	0.060	0.082	0.101	0.112	0.110	0.102	0.086	0.070	0.053	0.041	0.034	0.025	0.020
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.026	0.028	0.035	0.006	0.017	0.019	0.021	0.036	0.041	0.042	0.066	0.073	0.095	0.105	0.116	0.105	0.063	0.040	0.022	0.013	0.010	0.005	0.004	0.002
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.005	0.004	0.007	0.012	0.019	0.027	0.029	0.037	0.044	0.057	0.067	0.083	0.102	0.107	0.104	0.094	0.071	0.052	0.031	0.023	0.017
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.003	0.017	0.024	0.031	0.044	0.061	0.056	0.072	0.090	0.071	0.065	0.065	0.055	0.048	0.053	0.055	0.036	0.032	0.041	0.039	0.027	0.009
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.012	0.018	0.029	0.051	0.062	0.040	0.046	0.057	0.062	0.065	0.053	0.047	0.060	0.057	0.076	0.053	0.046	0.055	0.058	0.035	0.017
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.006	0.008	0.012	0.018	0.037	0.053	0.066	0.098	0.104	0.087	0.094	0.065	0.047	0.038	0.047	0.051	0.044	0.029	0.024	0.033	0.034
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.007	0.008	0.018	0.028	0.053	0.048	0.064	0.070	0.103	0.081	0.083	0.065	0.081	0.074	0.050	0.052	0.038	0.038	0.033
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.004	0.007	0.011	0.020	0.024	0.036	0.037	0.048	0.052	0.066	0.074	0.094	0.093	0.093	0.082	0.063	0.048	0.039	0.035	0.026	0.020	0.011	0.010
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.003	0.006	0.008	0.014	0.019	0.030	0.031	0.043	0.054	0.064	0.075	0.097	0.097	0.101	0.092	0.078	0.064	0.044	0.035	0.022	0.010	0.008
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	0.008	0.017	0.017	0.039	0.047	0.075	0.116	0.110	0.134	0.087	0.076	0.064	0.071	0.036	0.034	0.022	0.014	0.007	0.007	0.004
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.004	0.005	0.011	0.019	0.037	0.060	0.088	0.105	0.091	0.077	0.072	0.073	0.066	0.069	0.052	0.052	0.040	0.043	0.030

Table App.A.5h: South coast longline, *M. paradoxus*, sex-disaggregated, catch-at-length data (Somhlaba and Leslie, 2014) (males in blue, females in pink).

South coast longline, M. paradoxus

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
2001	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005	0.005	0.000	0.005	0.005	0.000	0.015	0.031	0.015	0.051	0.071	0.071	0.097	0.051	0.097	0.102	0.026	0.061	0.077	0.051	0.036	0.051	0.026	0.036	0.010
2001	0.000	0.000	0.000	0.000	0.000	0.007	0.007	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.007	0.007	0.014	0.058	0.051	0.058	0.159	0.065	0.065	0.138	0.080	0.080	0.051	0.051	0.036	0.029	0.007
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.053	0.105	0.105	0.158	0.053	0.105	0.158	0.105	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.057	0.114	0.143	0.029	0.086	0.143	0.086	0.000	0.029	0.029	0.029	0.000	0.086	0.057	0.000	0.000	0.029	0.057	0.000	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.007	0.014	0.018	0.034	0.043	0.073	0.082	0.089	0.101	0.106	0.101	0.092	0.076	0.071	0.038	0.027	0.012	0.009	0.005	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.005	0.015	0.019	0.029	0.036	0.056	0.067	0.082	0.089	0.108	0.097	0.108	0.097	0.078	0.046	0.032	0.019	0.011	0.002	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.017	0.017	0.017	0.032	0.046	0.070	0.087	0.133	0.168	0.130	0.078	0.046	0.035	0.029	0.017	0.029	0.017	0.014	0.009	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.024	0.020	0.059	0.078	0.098	0.093	0.117	0.117	0.141	0.083	0.044	0.020	0.024	0.039	0.020	0.005	0.000	0.000	0.000	0.005	0.000
2010	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005	0.005	0.000	0.005	0.005	0.000	0.015	0.031	0.015	0.051	0.071	0.071	0.097	0.051	0.097	0.102	0.026	0.061	0.077	0.051	0.036	0.051	0.026	0.036	0.010
2010	0.000	0.000	0.000	0.000	0.000	0.007	0.007	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.007	0.007	0.014	0.058	0.051	0.058	0.159	0.065	0.065	0.138	0.080	0.080	0.051	0.051	0.036	0.029	0.007

Table App.A.5i: South coast longline, *M. capensis*, sex-disaggregated, catch-at-length data (Somhlaba and Leslie, 2014) (males in blue, females in pink).

South coast longline, M. capensis

Length	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.008	0.023	0.028	0.042	0.055	0.072	0.092	0.092	0.123	0.120	0.095	0.071	0.063	0.043	0.029	0.010	0.010	0.012	0.007
2001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.004	0.007	0.011	0.020	0.024	0.036	0.037	0.048	0.052	0.066	0.074	0.094	0.093	0.090	0.082	0.063	0.048	0.039	0.035	0.026	0.020	0.011	0.010
2002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	0.008	0.017	0.017	0.039	0.047	0.075	0.116	0.110	0.134	0.087	0.076	0.064	0.071	0.036	0.034	0.022	0.014	0.007	0.007	0.004
2002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	0.008	0.017	0.017	0.039	0.047	0.075	0.116	0.110	0.134	0.087	0.076	0.064	0.071	0.036	0.034	0.022	0.014	0.007	0.007	0.004
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004	0.003	0.014	0.029	0.045	0.075	0.124	0.137	0.135	0.124	0.097	0.063	0.057	0.028	0.025	0.010	0.014	0.011
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.005	0.011	0.016	0.020	0.028	0.035	0.047	0.067	0.075	0.077	0.087	0.093	0.090	0.086	0.082	0.071	0.048	0.035	0.021
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.003	0.004	0.007	0.018	0.029	0.041	0.059	0.094	0.113	0.121	0.117	0.105	0.085	0.071	0.046	0.035	0.028	0.019
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.004	0.005	0.011	0.019	0.037	0.060	0.088	0.105	0.091	0.077	0.072	0.073	0.066	0.069	0.052	0.052	0.040	0.043	0.030
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.009	0.014	0.015	0.019	0.023	0.035	0.050	0.065	0.093	0.122	0.119	0.107	0.107	0.079	0.046	0.034	0.025	0.012	0.008	0.006	0.004
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.005	0.009	0.016	0.031	0.057	0.082	0.111	0.133	0.135	0.120	0.097	0.069	0.050	0.035	0.027	0.020
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.004	0.009	0.023	0.038	0.052	0.078	0.103	0.116	0.125	0.116	0.094	0.067	0.053	0.043	0.029	0.017	0.012	0.009	0.007
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.004	0.008	0.013	0.021	0.038	0.059	0.078	0.100	0.115	0.119	0.117	0.104	0.082	0.063	0.043	0.031
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.026	0.028	0.035	0.006	0.017	0.019	0.021	0.036	0.041	0.042	0.066	0.073	0.095	0.105	0.116	0.105	0.063	0.040	0.022	0.013	0.010	0.005	0.004	0.002
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.004	0.010	0.017	0.029	0.043	0.054	0.068	0.075	0.086	0.095	0.100	0.100	0.095	0.079	0.065	0.046	0.031
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.003	0.017	0.024	0.031	0.044	0.061	0.056	0.072	0.090	0.071	0.065	0.065	0.055	0.048	0.053	0.055	0.036	0.032	0.041	0.039	0.027	0.009
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.004	0.009	0.019	0.029	0.041	0.060	0.082	0.101	0.112	0.110	0.102	0.086	0.070	0.053	0.041	0.034	0.025	0.020
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.006	0.008	0.012	0.018	0.037	0.053	0.066	0.098	0.104	0.087	0.094	0.065	0.047	0.038	0.047	0.051	0.044	0.029	0.024	0.033	0.034
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.005	0.004	0.007	0.012	0.019	0.027	0.029	0.037	0.044	0.057	0.067	0.083	0.102	0.107	0.104	0.094	0.071	0.052	0.031	0.023	0.017

Table App.A.6a: *M. paradoxus*, sex-aggregated, survey catch-at-length data (Fairweather, pers. comm.).

West coast summer survey, *M. paradoxus*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1985	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1986	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1988	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1990	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1991	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2005	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

West coast winter survey, *M. paradoxus*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1985	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1986	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1988	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1989	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1990	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

South coast spring survey, *M. paradoxus*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1986	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

South coast autumn survey, *M. paradoxus*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1988	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1992	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2003	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table App.A.6b: *M. capensis*, sex-aggregated, survey catch-at-length data (Fairweather, pers. comm.).

West coast summer survey, *M. capensis*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1985	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1986	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1988	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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West coast winter survey, *M. capensis*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1985	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1986	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1988	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1989	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1990	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

South coast spring survey, *M. capensis*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1986	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2003	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

South coast autumn survey, *M. capensis*

Length	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
1988	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1992	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2003	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2005	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table App.A.6c: *M. paradoxus*, sex-disaggregated, west coast summer survey catch-at-length data (Fairweather and Ross-Gillespie, pers. comm.).

West coast summer survey, *M. paradoxus*

	Year	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
Juveniles	1993	0.001	0.001	0.002	0.008	0.010	0.019	0.051	0.073	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.001	0.004	0.009	0.020	0.046	0.084	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.001	0.002	0.015	0.055	0.144	0.135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.002	0.018	0.030	0.053	0.102	0.141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.001	0.009	0.037	0.051	0.079	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1999	0.000	0.000	0.001	0.005	0.025	0.039	0.053	0.079	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2006	0.000	0.001	0.003	0.012	0.026	0.037	0.045	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.003	0.009	0.016	0.028	0.074	0.107	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.002	0.011	0.015	0.025	0.045	0.055	0.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.002	0.010	0.024	0.047	0.130	0.230	0.158	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.002	0.006	0.014	0.028	0.089	0.168	0.114	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.001	0.010	0.036	0.065	0.086	0.076	0.156	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2012	0.000	0.003	0.004	0.011	0.019	0.047	0.119	0.140	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2013	0.000	0.000	0.003	0.014	0.032	0.034	0.062	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.003	0.020	0.025	0.059	0.135	0.172	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.002	0.006	0.012	0.028	0.085	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.002	0.004	0.017	0.058	0.126	0.184	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2017	0.000	0.001	0.004	0.012	0.033	0.087	0.123	0.113	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Males	1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.058	0.130	0.099	0.054	0.032	0.025	0.013	0.007	0.008	0.008	0.005	0.003	0.004	0.002	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	0.121	0.104	0.061	0.051	0.039	0.027	0.015	0.007	0.003	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.118	0.075	0.047	0.051	0.043	0.030	0.016	0.008	0.004	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052	0.000	0.000	0.000	0.044	0.028	0.019	0.007	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.056	0.043	0.056	0.162	0.058	0.040	0.012	0.008	0.006	0.003	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.068	0.084	0.127	0.085	0.073	0.032	0.014	0.011	0.008	0.007	0.005	0.003	0.003	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.068	0.064	0.076	0.066	0.039	0.012	0.004	0.003	0.002	0.004	0.004	0.003	0.003	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.073	0.067	0.053	0.057	0.033	0.024	0.014	0.009	0.005	0.004	0.004	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.102	0.056	0.045	0.037	0.035	0.020	0.015	0.012	0.008	0.003	0.003	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.044	0.034	0.017	0.009	0.008	0.008	0.006	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.057	0.066	0.051	0.040	0.035	0.018	0.010	0.007	0.005	0.003	0.003	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.099	0.050	0.021	0.012	0.013	0.021	0.019	0.019	0.015	0.015	0.008	0.006	0.004	0.003	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.058	0.081	0.056	0.045	0.031	0.016	0.005	0.005	0.004	0.004	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.106	0.105	0.054	0.042	0.037	0.026	0.013	0.006	0.004	0.004	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.051	0.047	0.067	0.050	0.023	0.012	0.008	0.004	0.003	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.082	0.093	0.090	0.054	0.030	0.015	0.011	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.095	0.074	0.050	0.024	0.019	0.016	0.009	0.006	0.005	0.004	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.059	0.053	0.061	0.051	0.028	0.013	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Females	1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.080	0.092	0.048	0.045	0.024	0.014	0.011	0.006	0.005	0.003	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.047	0.046	0.036	0.030	0.030	0.023	0.018	0.010	0.007	0.004	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.129	0.018	0.016	0.011	0.012	0.010	0.009	0.005	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052	0.072	0.067	0.107	0.067	0.056	0.024	0.016	0.006	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.056	0.080	0.105	0.002	0.058	0.026	0.016	0.008	0.004	0.003	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046	0.037	0.036	0.057	0.021	0.018	0.014	0.006	0.005	0.005	0.006	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.057	0.054	0.072	0.072	0.061	0.034	0.015	0.009	0.007	0.005	0.004	0.004	0.004	0.004	0.003	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.046	0.065	0.064	0.057	0.045	0.028	0.016	0.014	0.008	0.005	0.004	0.002	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.068	0.059	0.029	0.043	0.033	0.022	0.018	0.016	0.010	0.007	0.005	0.003	0.002	0.002	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.039	0.033	0.024	0.012	0.009	0.009	0.009	0.006	0.005	0.004	0.003	0.003	0.002	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.046	0.043	0.042	0.031	0.020	0.012	0.010	0.004	0.005	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.078	0.045	0.021	0.018	0.020	0.013	0.011	0.010	0.008	0.007	0.004	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	2012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040	0.040	0.060	0.038	0.031	0.030	0.015	0.007	0.006	0.004	0.004	0.004	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.058	0.069	0.049	0.030	0.024	0.015	0.006	0.004	0.003	0.002	0.003	0.002	0.002	0.001	0.001	0.003	0.003	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.033	0.055	0.066	0.034	0.021	0.011	0.010	0.007	0.004	0.002	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.053	0.062	0.055	0.058	0.020	0.013	0.009	0.005	0.004	0.003	0.002	0.002	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.087	0.061	0.040	0.029	0.023	0.019	0.011	0.008	0.005	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.040	0.042	0.055	0.044	0.020	0.014	0.008	0.004	0.004	0.003	0.003	0.003	0.002	0.003	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table App.A.6d: *M. paradoxus*, sex-disaggregated, south coast survey catch-at-length data. (Fairweather and Ross-Gillespie, pers. comm.).

South coast spring survey, *M. paradoxus*

	Year	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
Juv.	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.001	0.001	0.001	0.006	0.003	0.002	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Males	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.011	0.022	0.111	0.259	0.253	0.141	0.043	0.012	0.006	0.002	0.002	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.006	0.007	0.028	0.136	0.251	0.193	0.103	0.060	0.027	0.016	0.006	0.007	0.002	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.021	0.009	0.034	0.143	0.205	0.154	0.121	0.099	0.063	0.034	0.013	0.011	0.006	0.003	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Females	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.003	0.005	0.025	0.036	0.032	0.010	0.004	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.000	0.006	0.012	0.018	0.030	0.012	0.008	0.004	0.004	0.004	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.002	0.005	0.004	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.003	0.001	0.006	0.008	0.008	0.004	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

South coast autmn survey, *M. paradoxus*

	Year	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
Juveniles	1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.002	0.034	0.033	0.006	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.001	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.003	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Males	1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006	0.064	0.219	0.251	0.144	0.062	0.027	0.015	0.008	0.004	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.108	0.305	0.199	0.083	0.070	0.040	0.036	0.013	0.012	0.003	0.004	0.004	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.109	0.165	0.138	0.143	0.105	0.073	0.033	0.020	0.008	0.001	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.019	0.094	0.203	0.218	0.126	0.073	0.038	0.018	0.011	0.008	0.005	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.030	0.055	0.098	0.137	0.154	0.134	0.060	0.024	0.011	0.007	0.003	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.080	0.167	0.185	0.168	0.094	0.053	0.034	0.016	0.013	0.008	0.006	0.007	0.003	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.004	0.013	0.055	0.120	0.149	0.095	0.072	0.059	0.055	0.047	0.032	0.019	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.016	0.040	0.047	0.066	0.096	0.119	0.108	0.087	0.071	0.048	0.034	0.020	0.011	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.009	0.014	0.034	0.070	0.100	0.166	0.152	0.110	0.065	0.040	0.024	0.012	0.004	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.005	0.025	0.074	0.096	0.085	0.124	0.111	0.074	0.045	0.030	0.012	0.014	0.012	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.019	0.053	0.082	0.091	0.074	0.064	0.048	0.038	0.019	0.013	0.009	0.003	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.015	0.076	0.109	0.151	0.131	0.074	0.040	0.020	0.013	0.007	0.008	0.008	0.005	0.005	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010	0.030	0.077	0.169	0.151	0.119	0.042	0.027	0.009	0.006	0.004	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.009	0.047	0.140	0.190	0.163	0.101	0.045	0.021	0.004	0.003	0.004	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Females	1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.011	0.029	0.071	0.047	0.013	0.003	0.003	0.002	0.002	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.033	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.001	0.010	0.002	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.002
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.030	0.049	0.046	0.011	0.007	0.001	0.004	0.001	0.005	0.005	0.000	0.000	0.001	0.002	0.002	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.010	0.019	0.020	0.022	0.016	0.002	0.001	0.001	0.002	0.005	0.004	0.009	0.011	0.015	0.014	0.010	0.007	0.004	0.002	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008	0.019	0.032	0.044	0.048	0.045	0.028	0.020	0.012	0.006	0.003	0.003	0.004	0.001	0.000	0.000	0.000
	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.011	0.017	0.011	0.011	0.004	0.003	0.001	0.003	0.003	0.003	0.002	0.002	0.004	0.009	0.013	0.011	0.011	0.007	0.005	0.003	0.004	0.003	0.002	0.001	0.001	0.000	0.002
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.012	0.026	0.027	0.017	0.010	0.011	0.029	0.024	0.008	0.002	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.019	0.014	0.014	0.020	0.017	0.024	0.018	0.018	0.022	0.009	0.010	0.009	0.009	0.004	0.003	0.001	0.002	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.008	0.017	0.033	0.041	0.030	0.017	0.010	0.006	0.001	0.004	0.001	0.002	0.003	0.003	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006	0.022	0.025	0.036	0.041	0.046	0.036	0.016	0.007	0.016	0.004	0.003	0.005	0.005	0.002	0.002	0.002	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.004	0.018	0.051	0.072	0.066	0.035	0.032	0.024	0.011	0.008	0.010	0.010	0.012	0.015	0.022	0.020	0.014	0.014	0.008	0.009	0.005	0.003	0.002	0.002	0.002	0.002	0.001	0.000	0.002
	2014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.010	0.021	0.035	0.062	0.041	0.018	0.012	0.014	0.010	0.011	0.010	0.012	0.012	0.015	0.010	0.006	0.005	0.003	0.002	0.002	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.003
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006	0.025	0.052	0.067	0.071	0.046	0.035	0.015	0.005	0.004	0.002	0.001	0.002	0.002	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.015	0.056	0.058	0.044	0.019	0.010	0.007	0.005	0.004	0.003	0.003	0.003	0.004	0.004	0.005	0.006	0.004	0.003	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table App.A.6e: *M. capensis*, sex-disaggregated, west coast summer survey catch-at-length data (Fairweather and Ross-Gillespie, pers. comm.).

West coast summer survey, *M. capensis*

	Year	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	0
Juveniles	1993	0.000	0.001	0.023	0.090	0.077	0.032	0.011	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.030	0.307	0.028	0.018	0.025	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.001	0.008	0.019	0.044	0.121	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.004	0.046	0.126	0.163	0.069	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.003	0.015	0.011	0.008	0.010	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1999	0.000	0.035	0.372	0.202	0.142	0.107	0.033	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2006	0.001	0.011	0.169	0.116	0.051	0.041	0.121	0.189	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.001	0.005	0.011	0.016	0.011	0.019	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.014	0.099	0.064	0.080	0.077	0.110	0.135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.002	0.029	0.034	0.031	0.029	0.045	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.001	0.008	0.019	0.031	0.045	0.104	0.405	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.010	0.101	0.456	0.235	0.028	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2012	0.000	0.001	0.010	0.025	0.025	0.046	0.121	0.222	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2013	0.000	0.000	0.006	0.442	0.406	0.042	0.029	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.001	0.009	0.021	0.010	0.008	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.001	0.009	0.010	0.124	0.239	0.173	0.121	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.004	0.016	0.063	0.107	0.080	0.033	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2017	0.000	0.001	0.010	0.009	0.005	0.004	0.008	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Males	1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.007	0.016	0.049	0.055	0.052	0.041	0.039	0.029	0.010	0.008	0.007	0.005	0.004	0.007	0.005	0.006	0.002	0.005	0.005	0.002	0.002	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.029	0.033	0.039	0.042	0.037	0.021	0.011	0.005	0.004	0.003	0.005	0.004	0.006	0.005	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.146	0.151	0.088	0.016	0.005	0.003	0.003	0.004	0.002	0.002	0.003	0.002	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.026	0.044	0.038	0.026	0.014	0.011	0.007	0.005	0.005	0.005	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.003	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.054	0.103	0.118	0.081	0.024	0.012	0.005	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.006	0.008	0.006	0.006	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.025	0.011	0.005	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.059	0.095	0.084	0.049	0.030	0.017	0.011	0.005	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.013	0.012	0.015	0.016	0.015	0.010	0.006	0.005	0.005	0.007	0.007	0.010	0.007	0.007	0.005	0.004	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.087	0.078	0.026	0.007	0.002	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.116	0.023	0.012	0.005	0.004	0.002	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.007	0.008	0.009	0.006	0.006	0.002	0.002	0.002	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.068	0.043	0.038	0.017	0.005	0.003	0.003	0.003	0.002	0.001	0.001	0.002	0.003	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.006	0.003	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.186	0.110	0.029	0.005	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.007	0.050	0.011	0.018	0.014	0.014	0.006	0.004	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.040	0.035	0.036	0.030	0.028	0.022	0.013	0.010	0.004	0.002	0.001	0.001	0.002	0.003	0.003	0.003	0.002	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.037	0.073	0.097	0.095	0.049	0.024	0.009	0.007	0.003	0.002	0.005	0.005	0.005	0.004	0.004	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Females	1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.015	0.030	0.051	0.045	0.050	0.043	0.029	0.019	0.009	0.005	0.006	0.010	0.007	0.009	0.007	0.008	0.005	0.005	0.005	0.003	0.003	0.002	0.003	0.003	0.002	0.001	0.001	0.001	0.001
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.014	0.027	0.027	0.029	0.030	0.027	0.017	0.012	0.007	0.004	0.004	0.005	0.007	0.008	0.007	0.006	0.005	0.004	0.004	0.006	0.006	0.006	0.005	0.004	0.003	0.003	0.001	0.001	0.000	0.002
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.105	0.092	0.075	0.037	0.012	0.008	0.006	0.004	0.004	0.003	0.001	0.002	0.002	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.051	0.014	0.007	0.036	0.045	0.037	0.026	0.017	0.016	0.018	0.013	0.006	0.005	0.005	0.004	0.002	0.003	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.002	0.002
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.074	0.115	0.112	0.077	0.036	0.028	0.010	0.007	0.002	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.001
	1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.003	0.003	0.004	0.004	0.004	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.003	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.027	0.045	0.025	0.010	0.006	0.005	0.004	0.003	0.002	0.002	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.070	0.136	0.108	0.071	0.047	0.024	0.010	0.005	0.004	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.031	0.014	0.012	0.014	0.017	0.017	0.015	0.012	0.009	0.010	0.010	0.017	0.018	0.019	0.013	0.010	0.004	0.003	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046	0.156	0.185	0.089	0.025	0.010	0.007	0.004	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.105	0.030	0.020	0.014	0.006	0.005	0.004	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.017	0.019	0.015	0.014	0.012	0.006	0.002	0.001	0.001	0.000	0.000	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001
	2012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.086	0.062	0.077	0.043	0.018	0.007	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.004	0.004	0.003	0.002	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001
	2013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.004	0.006	0.004	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	2014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.185	0.154	0.056	0.019	0.009	0.005	0.005	0.003	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.004
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.010	0.012	0.019	0.024	0.030	0.021	0.016	0.008	0.005	0.003	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.002
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.039	0.053	0.045	0.042	0.034	0.037	0.031	0.016	0.009	0.007	0.003	0.003	0.004	0.008	0.007	0.008	0.004	0.003	0.002	0.002	0.003	0.004	0.004	0.003	0.001	0.001	0.001	0.001	0.000	0.001
	2017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.038	0.062	0.087	0.100	0.052	0.041	0.023	0.011	0.010	0.007	0.006	0.006	0.008	0.007	0.006	0.005	0.004	0.002	0.001	0.002	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.000	0.000	0.000

Table App.A.6f: *M. capensis*, sex-disaggregated, south coast survey catch-at-length data (Fairweather and Ross-Gillespie, pers. comm.).

South coast spring survey, *M. capensis*

	Year	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
Juv.	2006	0.001	0.007	0.027	0.048	0.067	0.041	0.019	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.001	0.006	0.032	0.078	0.183	0.140	0.049	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.001	0.009	0.033	0.095	0.146	0.113	0.051	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Males	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.029	0.030	0.028	0.027	0.020	0.022	0.027	0.037	0.032	0.028	0.020	0.014	0.011	0.009	0.008	0.007	0.008	0.006	0.004	0.004	0.003	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.009	0.015	0.020	0.026	0.028	0.022	0.018	0.017	0.016	0.012	0.011	0.008	0.006	0.006	0.003	0.003	0.003	0.002	0.001	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.007	0.008	0.010	0.012	0.016	0.022	0.025	0.022	0.019	0.018	0.014	0.014	0.011	0.010	0.008	0.008	0.007	0.004	0.004	0.004	0.003	0.002	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Females	2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.023	0.033	0.029	0.025	0.025	0.025	0.030	0.022	0.025	0.022	0.018	0.017	0.012	0.009	0.007	0.005	0.004	0.004	0.003	0.002	0.003	0.003	0.003	0.003	0.002	0.002	0.001	0.001	0.000	0.001
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.011	0.015	0.025	0.032	0.028	0.023	0.016	0.013	0.011	0.009	0.008	0.008	0.006	0.005	0.005	0.003	0.002	0.003	0.002	0.002	0.002	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.007	0.009	0.013	0.054	0.017	0.021	0.027	0.021	0.018	0.012	0.014	0.014	0.012	0.010	0.009	0.006	0.007	0.006	0.004	0.003	0.007	0.003	0.003	0.002	0.001	0.001	0.001	0.001	0.000	0.001

South coast autmn survey, *M. capensis*

	Year	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81+
Juveniles	1993	0.000	0.000	0.000	0.002	0.012	0.030	0.037	0.044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.008	0.014	0.020	0.016	0.014	0.018	0.053	0.021	0.029	0.042	0.050	0.048	0.040	0.035	0.020	0.017	0.012	0.011	0.012	0.009	0.007	0.006	0.003	0.002	0.002	0.001	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.012	0.009	0.011	0.013	0.014	0.012	0.015	0.016	0.023	0.025	0.035	0.040	0.037	0.024	0.020	0.011	0.008	0.008	0.004	0.005	0.006	0.004	0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.004
	1996	0.001	0.002	0.008	0.018	0.024	0.033	0.054	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.021	0.021	0.017	0.019	0.025	0.025	0.025	0.024	0.018	0.017	0.012	0.015	0.017	0.017	0.016	0.018	0.020	0.020	0.015	0.012	0.013	0.007	0.010	0.005	0.003	0.002	0.001	0.001	0.000	0.000
	1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.016	0.012	0.017	0.016	0.019	0.023	0.019	0.019	0.014	0.010	0.008	0.010	0.012	0.016	0.014	0.012	0.012	0.008	0.011	0.015	0.009	0.013	0.007	0.008	0.005	0.003	0.003	0.003	0.002	0.007
	2006	0.000	0.001	0.008	0.010	0.019	0.039	0.051	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.023	0.025	0.023	0.017	0.020	0.026	0.030	0.024	0.017	0.020	0.020	0.014	0.017	0.016	0.016	0.012	0.011	0.010	0.008	0.004	0.005	0.006	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.039	0.034	0.021	0.018	0.020	0.024	0.025	0.034	0.032	0.021	0.015	0.016	0.021	0.016	0.015	0.011	0.013	0.008	0.008	0.007	0.007	0.006	0.003	0.004	0.002	0.001	0.003	0.002	0.001	0.001	0.002
	2009	0.000	0.001	0.002	0.008	0.019	0.045	0.067	0.057	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.016	0.015	0.015	0.011	0.015	0.023	0.024	0.026	0.034	0.040	0.056	0.023	0.018	0.013	0.012	0.012	0.009	0.007	0.007	0.006	0.004	0.004	0.003	0.002	0.001	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.014	0.015	0.011	0.016	0.026	0.027	0.025	0.028	0.031	0.031	0.027	0.025	0.019	0.017	0.015	0.010	0.009	0.008	0.004	0.005	0.005	0.003	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.003
	2014	0.000	0.001	0.002	0.016	0.046	0.050	0.044	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.014	0.007	0.019	0.020	0.023	0.021	0.024	0.021	0.024	0.024	0.025	0.024	0.026	0.027	0.025	0.018	0.019	0.015	0.010	0.013	0.008	0.008	0.010	0.005	0.002	0.003	0.002	0.001	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.011	0.008	0.018	0.021	0.020	0.017	0.016	0.015	0.017	0.018	0.017	0.015	0.015	0.016	0.013	0.010	0.011	0.010	0.007	0.008	0.007	0.005	0.007	0.007	0.005	0.004	0.003	0.002	0.008
Males	1993	0.000	0.000	0.001	0.015	0.045	0.042	0.039	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.018	0.050	0.056	0.054	0.024	0.017	0.055	0.012	0.019	0.024	0.028	0.025	0.019	0.016	0.015	0.015	0.011	0.009	0.007	0.006	0.006	0.003	0.004	0.003	0.001	0.001	0.001	0.001	0.001	0.000
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.016	0.004	0.038	0.038	0.042	0.019	0.008	0.012	0.009	0.014	0.015	0.014	0.012	0.011	0.009	0.008	0.007	0.005	0.005	0.005	0.004	0.004	0.004	0.003	0.003	0.003	0.002	0.002	0.001	0.003
	1996	0.000	0.000	0.000	0.002	0.013	0.026	0.026	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.014	0.022	0.024	0.032	0.031	0.040	0.038	0.034	0.034	0.026	0.021	0.021	0.016	0.017	0.013	0.015	0.010	0.009	0.009	0.007	0.004	0.003	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.018	0.018	0.026	0.025	0.030	0.032	0.035	0.031	0.028	0.029	0.024	0.018	0.014	0.013	0.011	0.007	0.012	0.011	0.010	0.012	0.009	0.006	0.005	0.004	0.003	0.002	0.001	0.001	0.001	0.002
	2006	0.001	0.002	0.015	0.070	0.144	0.137	0.092	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.017	0.012	0.018	0.021	0.022	0.020	0.020	0.018	0.015	0.011	0.011	0.009	0.006	0.005	0.004	0.002	0.004	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.016	0.017	0.015	0.020	0.025	0.024	0.015	0.012	0.016	0.014	0.010	0.009	0.008	0.006	0.006	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
	2009	0.001	0.001	0.002	0.007	0.013	0.027	0.033	0.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052	0.048	0.043	0.034	0.025	0.019	0.016	0.015	0.019	0.026	0.024	0.023	0.017	0.014	0.014	0.010	0.009	0.008	0.005	0.003	0.003	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.038	0.041	0.038	0.027	0.018	0.013	0.016	0.016	0.022	0.025	0.022	0.019	0.015	0.013	0.014	0.012	0.011	0.010	0.006	0.004	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000
	2014	0.000	0.002	0.020	0.066	0.060	0.037	0.023	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.024	0.019	0.017	0.024	0.030	0.046	0.051	0.042	0.025	0.018	0.015	0.016	0.013	0.011	0.008	0.008	0.007	0.005	0.005	0.003	0.002	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.013	0.016	0.018	0.022	0.029	0.039	0.041	0.026	0.019	0.014	0.012	0.012	0.011	0.011	0.009	0.008	0.007	0.006	0.004	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.001
Females	1993	0.002	0.005	0.067	0.144	0.090	0.101	0.063	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.011	0.015	0.013	0.011	0.017	0.018	0.014	0.010	0.009	0.009	0.011	0.012	0.014	0.010	0.009	0.006	0.006	0.004	0.003	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.010	0.009	0.012	0.019	0.021	0.023	0.016	0.014	0.012	0.012	0.012	0.015	0.011	0.014	0.011	0.008	0.009	0.007	0.006	0.004	0.003	0.004	0.004	0.002	0.003	0.002	0.002	0.001	0.001	0.002
	1996	0.005	0.014	0.059	0.042	0.048	0.069	0.045	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.014	0.010	0.009	0.013	0.014	0.017	0.025	0.027	0.031	0.029	0.022	0.021	0.016	0.010	0.010	0.009	0.007	0.006	0.007	0.005	0.005	0.004	0.003	0.002	0.000	0.001	0.000	0.000	0.000	0.000
	1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.009	0.008	0.010	0.012	0.016	0.017	0.020	0.023	0.031	0.031	0.027	0.018	0.015	0.012	0.008	0.007	0.008	0.007	0.008	0.008	0.008	0.006	0.010	0.005	0.006	0.003	0.003	0.002	0.001	0.002
	2006	0.001	0.005	0.010	0.004	0.024	0.069	0.043	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.012	0.017	0.019	0.020	0.022	0.027	0.038	0.048	0.033	0.024	0.018	0.018	0.014	0.014	0.013	0.009	0.007	0.007	0.004	0.004	0.003	0.003	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.018	0.022	0.025	0.026	0.026	0.025	0.034	0.036	0.037	0.024	0.022	0.020	0.018	0.012	0.009	0.011	0.009	0.007	0.006	0.006	0.003	0.002	0.003	0.002	0.002	0.002	0.000	0.001	0.001	0.001
	2009	0.001	0.003	0.065	0.153	0.071	0.028	0.014	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.006	0.013	0.020	0.023	0.029	0.031	0.030	0.027	0.029	0.028	0.022	0.017	0.012	0.010	0.009	0.007	0.006	0.006	0.003	0.003	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.009	0.010	0.014	0.023	0.023	0.023	0.026	0.023	0.024	0.021	0.020	0.016	0.014	0.013	0.009	0.008	0.008	0.008	0.004	0.003	0.004	0.002	0.001	0.002	0.001	0.002	0.001	0.001	0.000	0.001
	2014	0.003	0.060	0.260	0.144	0.027	0.011	0.008	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.009	0.009	0.013	0.013	0.023	0.026	0.027	0.018	0.015	0.008	0.009	0.007	0.008	0.005	0.006	0.004	0.003	0.002	0.003	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.008	0.012	0.010	0.012	0.017	0.025	0.030	0.031	0.022	0.018	0.012	0.010	0.007	0.009	0.006	0.004	0.004	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.001

Appendix B: Reference Case results

Table B1: Estimates of management quantities for the Reference Case.

		2017 RC
	-lnL total	-5244.1
M. paradoxus	K^{sp}	547
	B^{sp}_{MSY}	125
	B^{sp}_{2016}	106
	B^{sp}_{2017}	112
	B^{sp}_{2016}/K^{sp}	0.19
	B^{sp}_{2017}/K^{sp}	0.20
	$B^{sp}_{2016}/B^{sp}_{MSY}$	0.85
	$B^{sp}_{2017}/B^{sp}_{MSY}$	0.89
	MSY	123
M. capensis	K^{sp}	187
	B^{sp}_{MSY}	39
	B^{sp}_{2016}	119
	B^{sp}_{2017}	120
	B^{sp}_{2016}/K^{sp}	0.64
	B^{sp}_{2017}/K^{sp}	0.64
	$B^{sp}_{2016}/B^{sp}_{MSY}$	3.00
	$B^{sp}_{2017}/B^{sp}_{MSY}$	3.04
	MSY	66

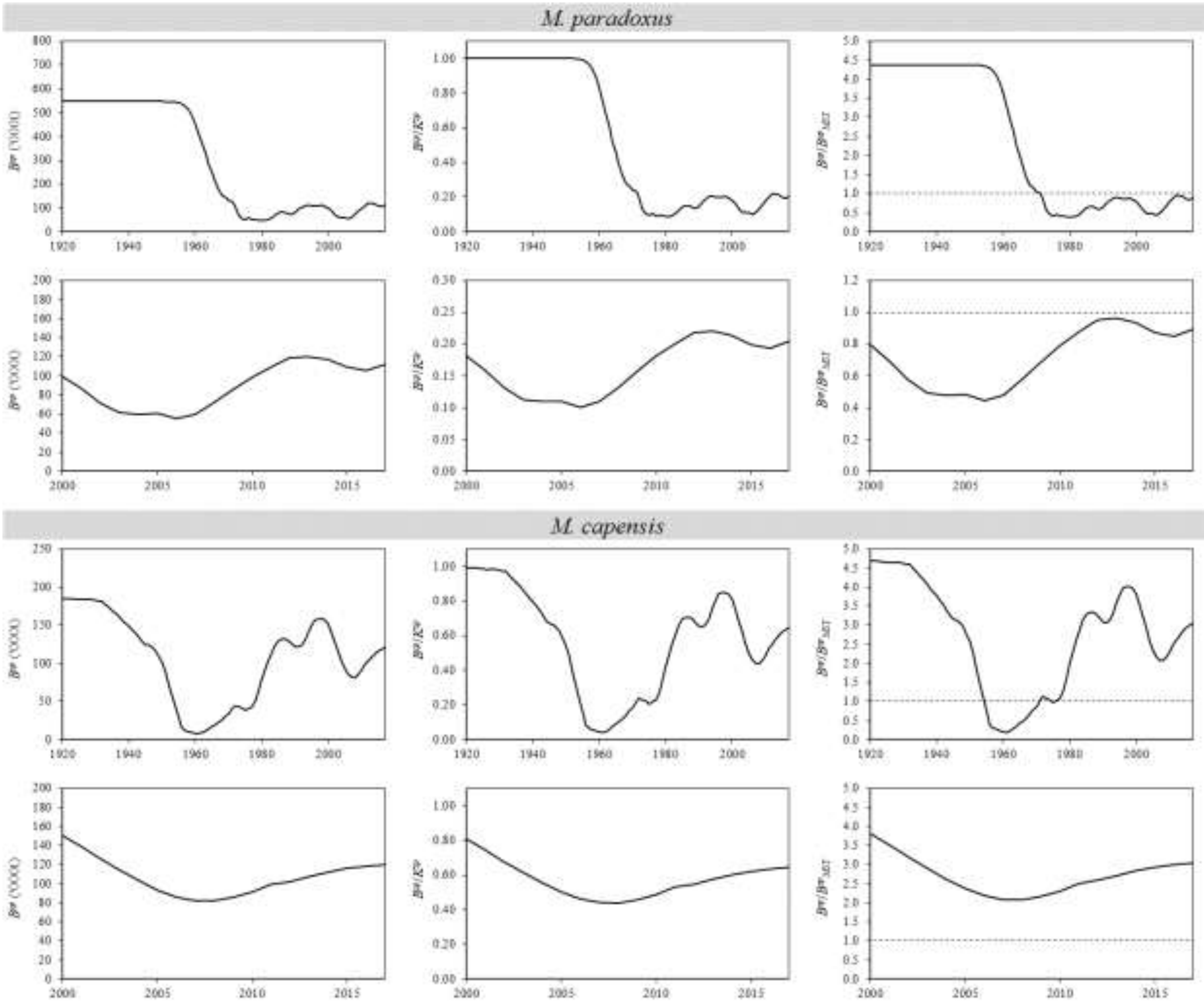

Figure B1: Spawning biomass trajectories (in absolute terms, and relative to pre-exploitation level and B_{MSY}) for the RC. The second and last rows repeat the first and third rows but with a different year range.

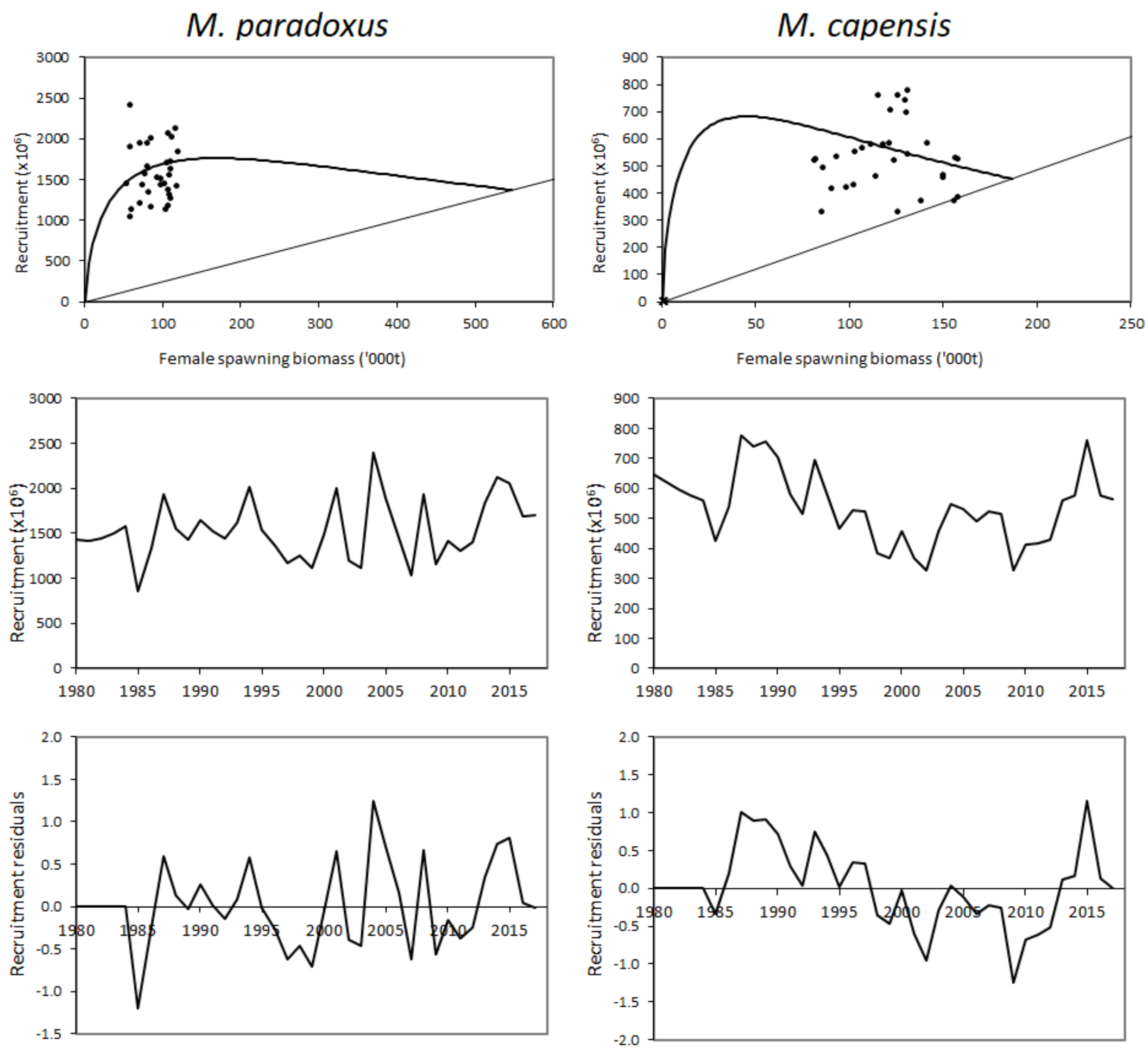

Figure B2: Stock-recruitment curves and recruitment trajectories for the Reference Case.

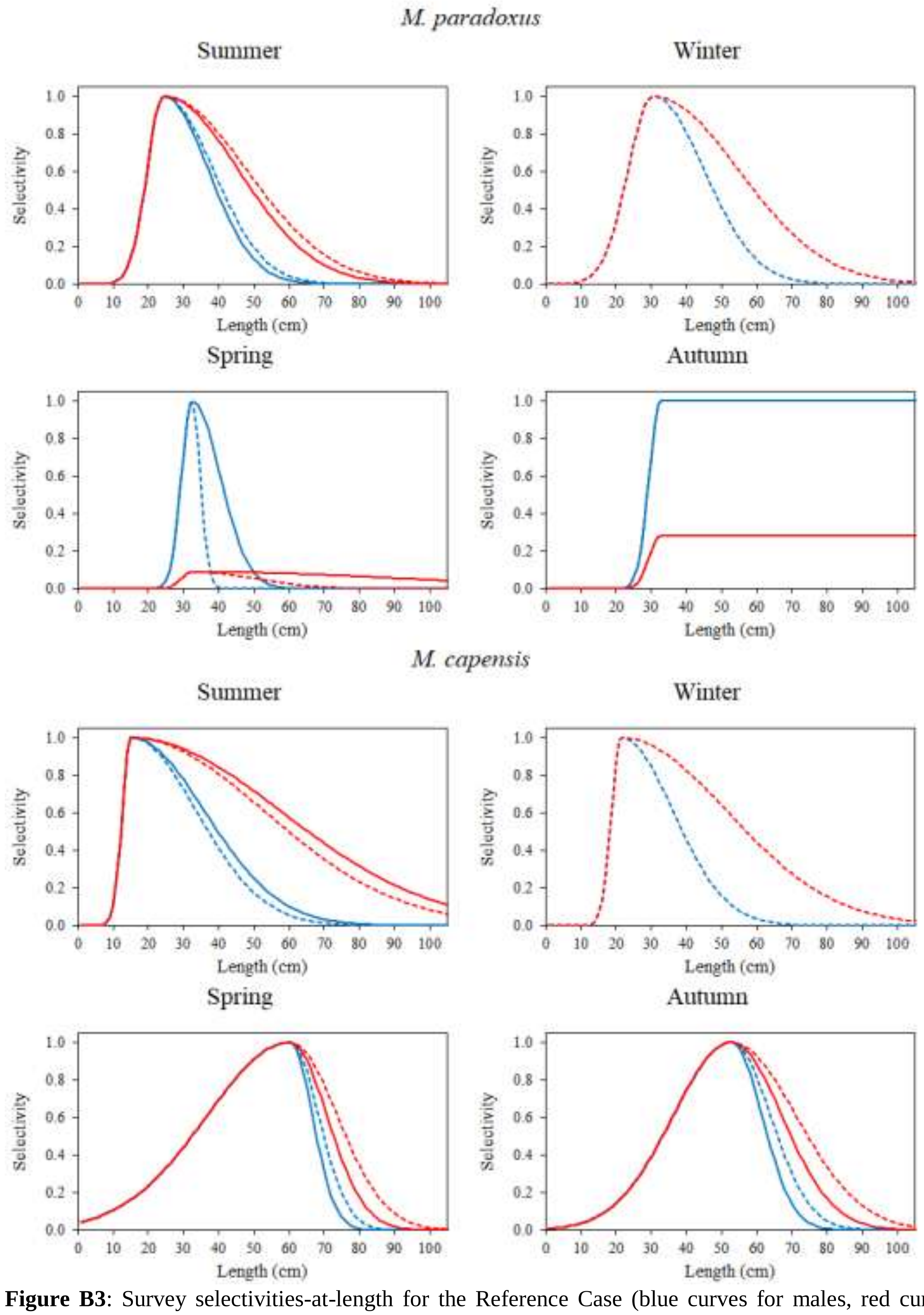

Figure B3: Survey selectivities-at-length for the Reference Case (blue curves for males, red curves for females, dashed curves for old gear and full curves for new gear).

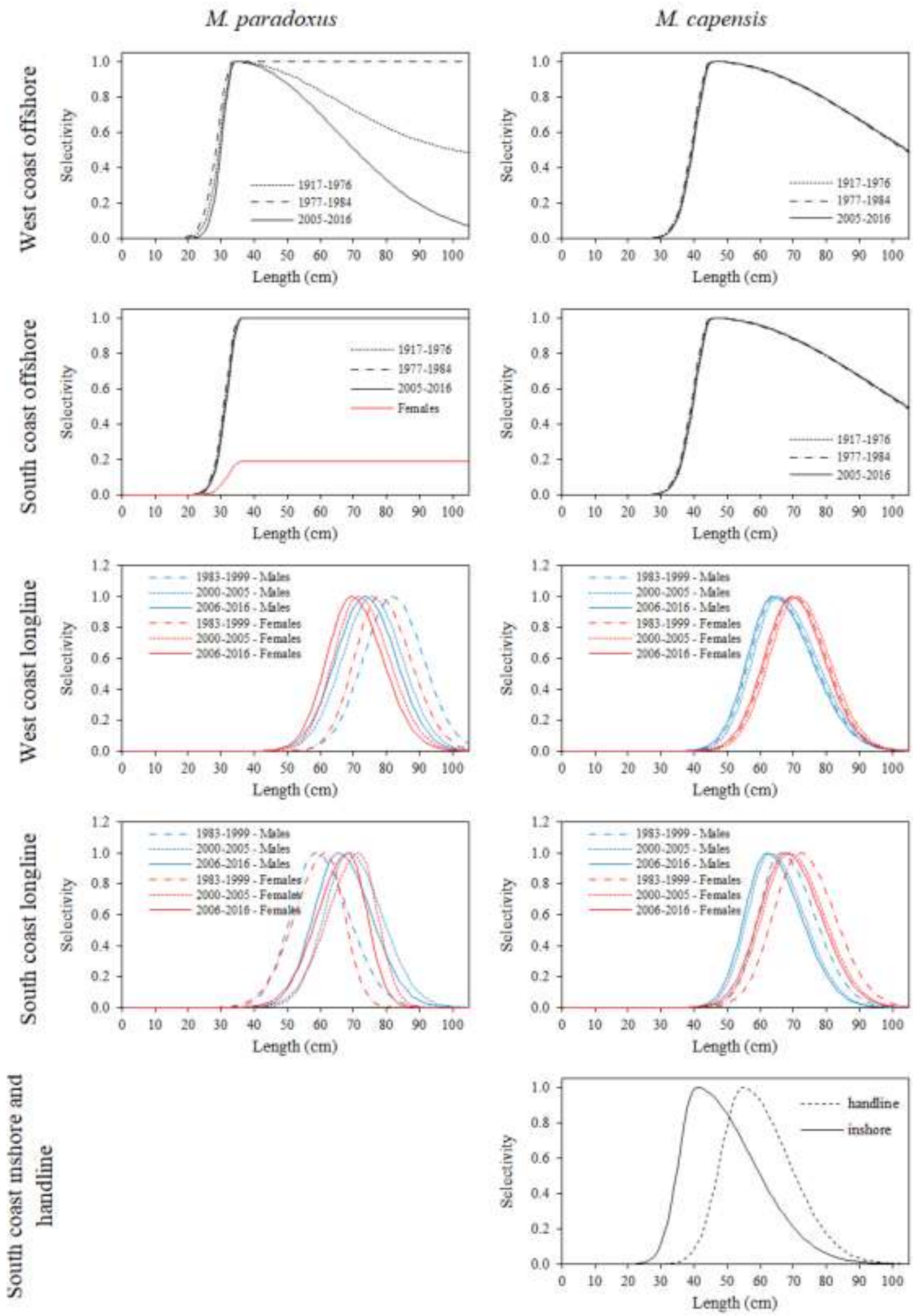

Figure B4: Commercial selectivities-at-length for the Reference Case (black curves for sex-aggregated, blue curves for males and red lines for females).

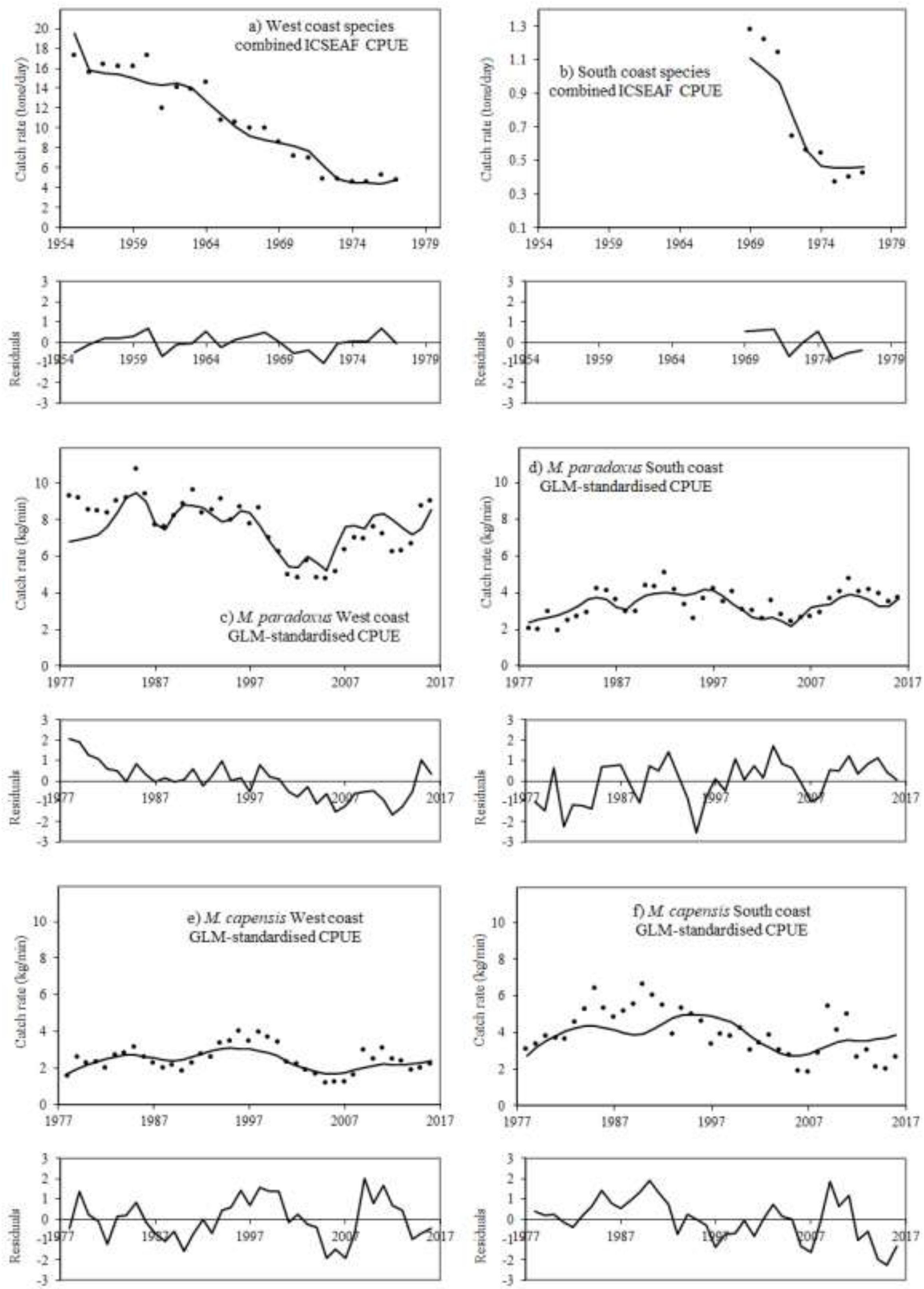

Figure B5: Fits to the CPUE series, with standardized residuals, for the Reference Case.

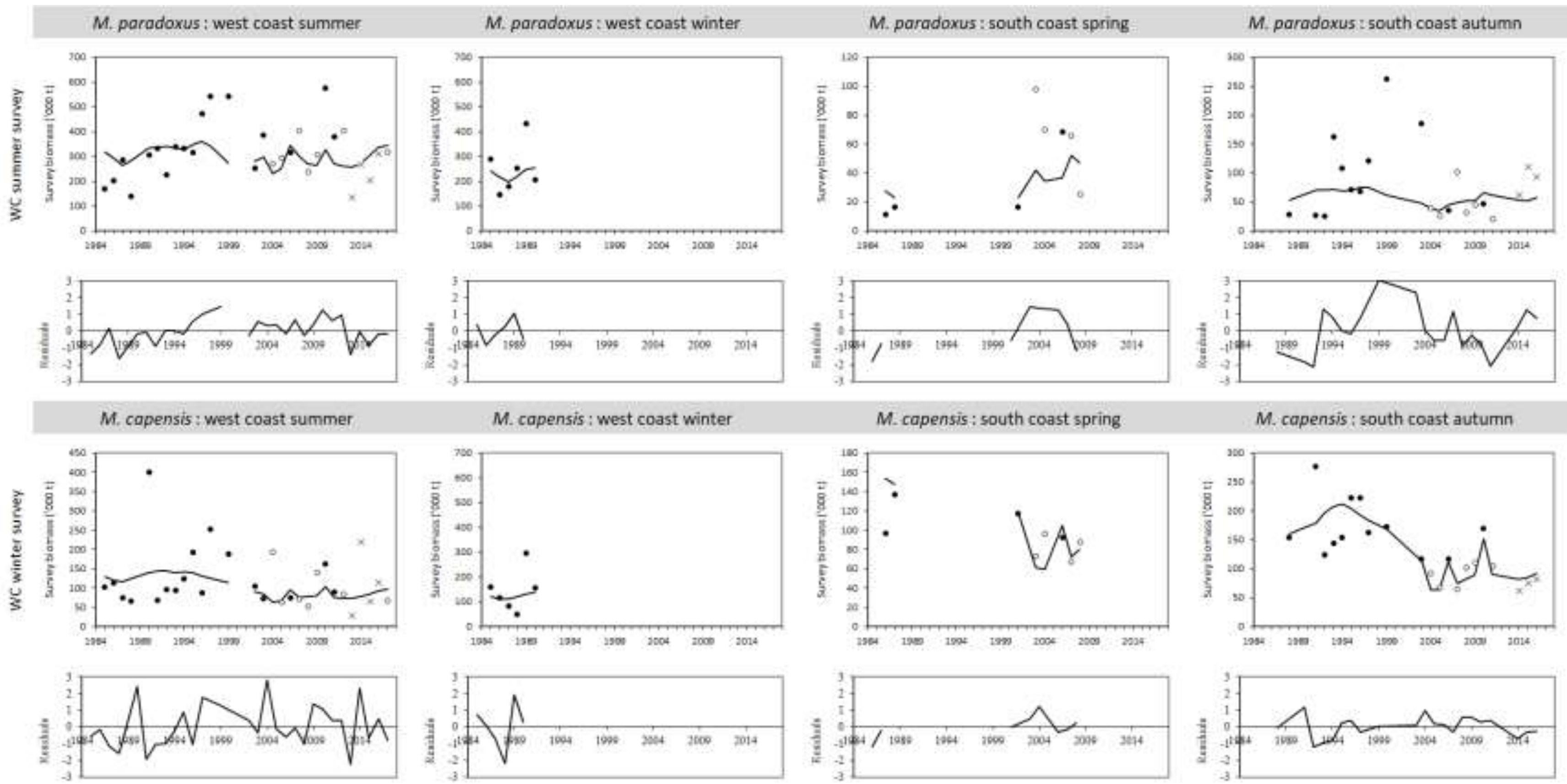

Figure B6: Fits to the survey series for the Reference Case. The full circles show the surveys conducted by the *Africana* old gear (adjusted by the Africana old/new gear calibration ratio), the open circles by the *Africana* new gear and crosses by industry vessels.

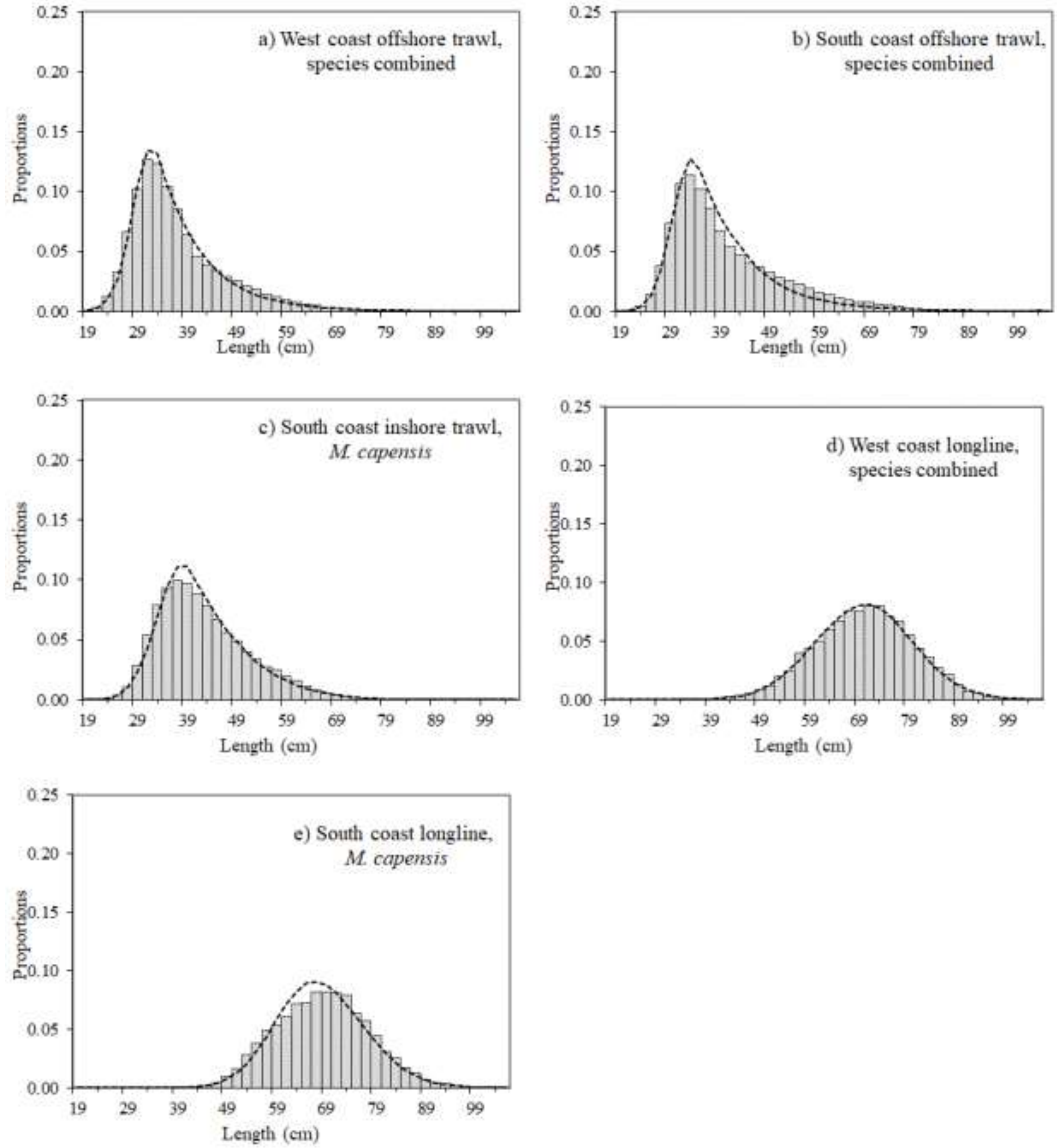

Figure B7: Fits to the commercial sex-aggregated catches-at-length averaged over years for the Reference Case.

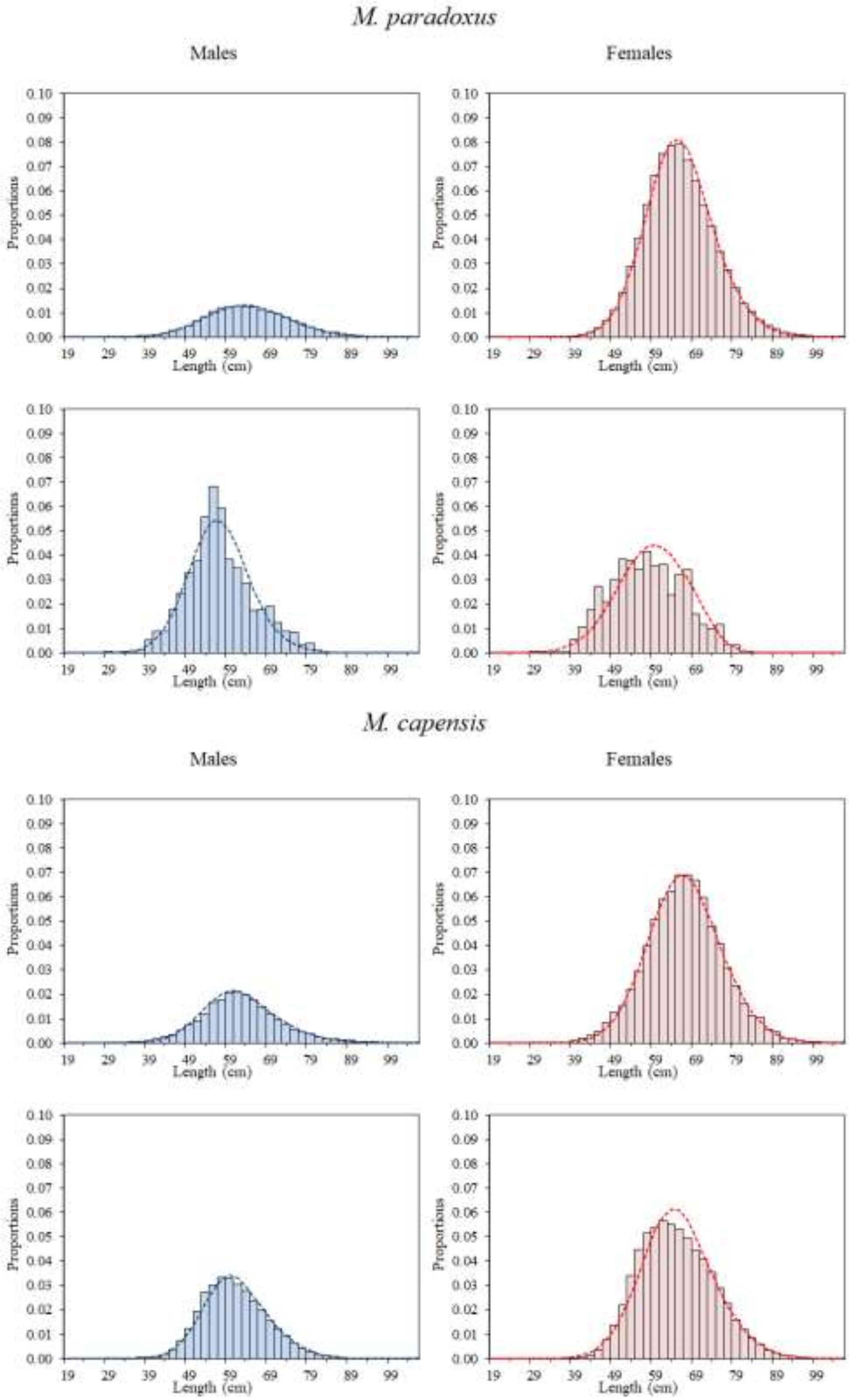

Figure B8: Fits to the commercial sex-disaggregated catches-at-length averaged over years for the Reference Case.

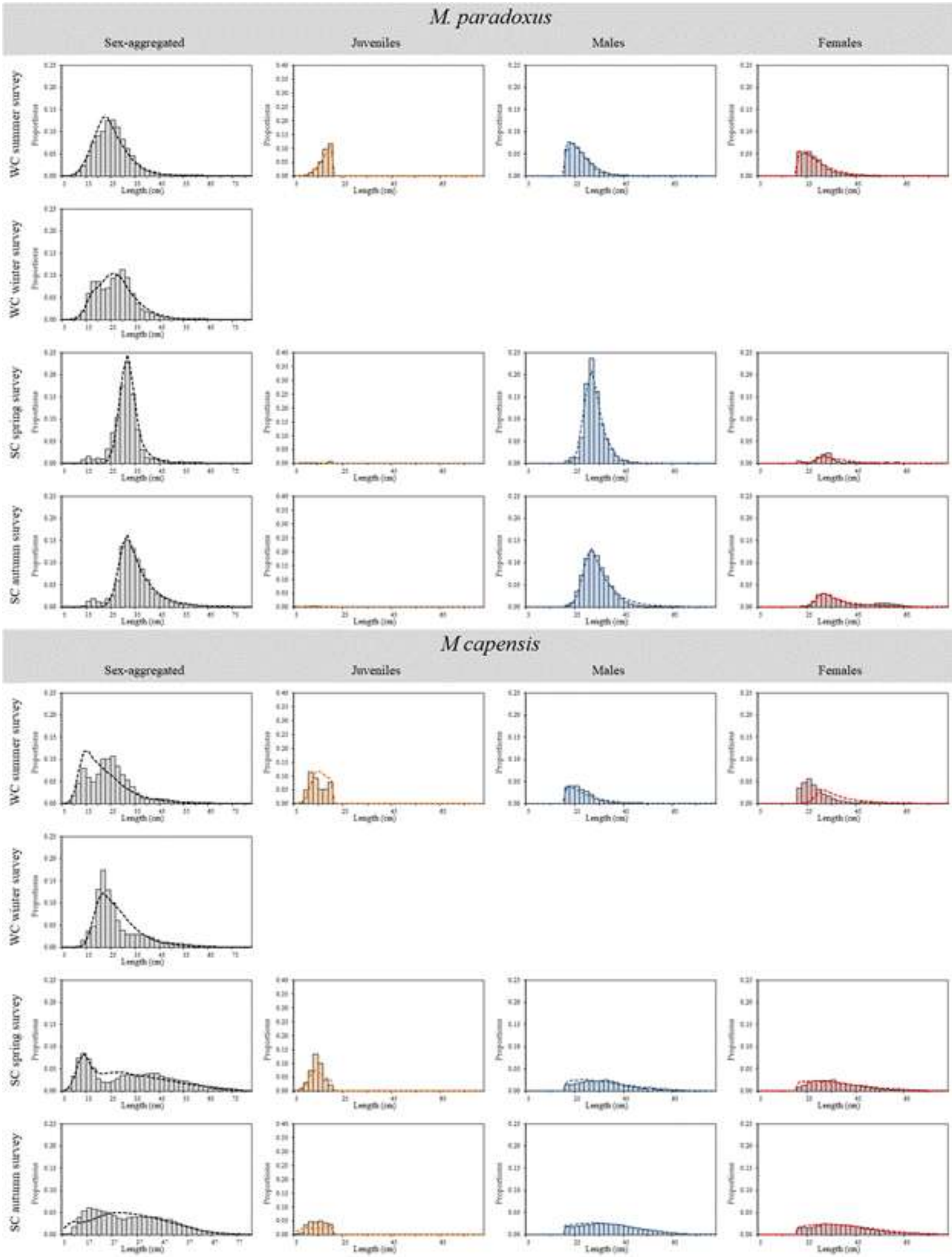

Figure B9: Fits to the survey sex-aggregated and sex-disaggregated catches-at-length averaged over years for the Reference Case.