Supplementary material

‘Superbull’ males: what role do they play and what drives their appearance within the *Doryteuthis gahi* Patagonian Shelf population?

Jessica B. Jones<sup>A,B,C,G</sup>, Graham J. Pierce<sup>A,D,E,F</sup>, Paul Brickle<sup>A,C</sup>, Zhanna N. Shcherbich<sup>B</sup> and Alexander I. Arkhipkin<sup>A,B</sup>

<sup>A</sup>School of Biological Sciences, University of Aberdeen, Zoology Building, Tillydrone Avenue, Aberdeen, AB24 2TZ, Scotland, UK.

<sup>B</sup>Fisheries Department, Falkland Islands Government, PO Box 598, Stanley, FIQQ 1ZZ, Falkland Islands.

<sup>C</sup>South Atlantic Environmental Research Institute, PO Box 609, Stanley Cottage, Stanley, FIQQ 1ZZ, Falkland Islands.

<sup>D</sup>Centro de Estudios do Ambiente e do Mar, Universidade de Aveiro, PT-3810-193 Aveiro, Portugal.

<sup>E</sup>Departamento de Biologia, Universidade de Aveiro, PT-3810-193 Aveiro, Portugal.

<sup>F</sup>Instituto de Investigacións Mariñas (Consejo Superior de Investigaciones Científicas), Eduardo Cabello 6, E-36208 Vigo, Spain.

<sup>G</sup>Corresponding author. Email: jjones@fisheries.gov.fk
Fig. S1. Random intercepts for each level of maturity for the smoothed effect of age (Model 9, Table 2).
Fig. S2. Estimated smoothing curve from Model 5, Table 2 for chlorophyll-a (mg g$^{-1}$) and shaded point-wise 95% confidence intervals. Expected degrees of freedom given in smoothing term.
Fig. S3. Residuals of Model 4 plotted against location of sample collection.
Fig. S4. Abundance and distribution by year of super-bull male squid >25-cm dorsal mantle length from the first fishing season using kernel density estimation.
Fig. S5. Abundance and distribution by year of super-bull male squid >25-cm dorsal mantle length from the second fishing season using kernel density estimation.
Fig. S6. Abundance and distribution by year of normal-sized male squid <25-cm dorsal mantle length from the first fishing season using kernel density estimation.
Fig. S7. Abundance and distribution by year of normal-sized male squid <25-cm dorsal mantle length from the second fishing season using kernel density estimation.
Fig. S8. Model validation graphs for the optimal generalised additive mixed model (Model 9, Table 2). (A) Q-Q plot; (B) residuals v. linear predictor; (C) histogram of residuals; and (D) response v. fitted values.