Supplement

In terms of model performance, the sea surface temperature (SST) of the ROMS outputs averaged across the domain revealed a mean SST warm bias of 0.83°C in the model compared to MODIS satellite derived SST observations, with a peak difference of 1.14°C occurring in the February months. From South African Observation Network (SAEON) Gully Temperature Probe data at 2 m depth, averaged across 15 stations located between Oyster Bay and Port Alfred (Fig. S1, Red Triangles), surface temperatures in the model exhibited a mean bias of 1.7°C in the summer (DJF) months and 0.4°C in the winter (JJA) months.

Depth-averaged velocities were compared between the ROMS and SAEON ADCP 25 m mooring at Bird Island within Algoa Bay (Fig. S1, Orange Star). Zonal (eastward) and meridional (northward) current component velocities had a correlation of 0.73 and 0.62 respectively. A complex correlation estimates that the phase angle of the model data is rotated 17.1° counter-clockwise relative to the instrumentation data, with a correlation coefficient of 0.84.
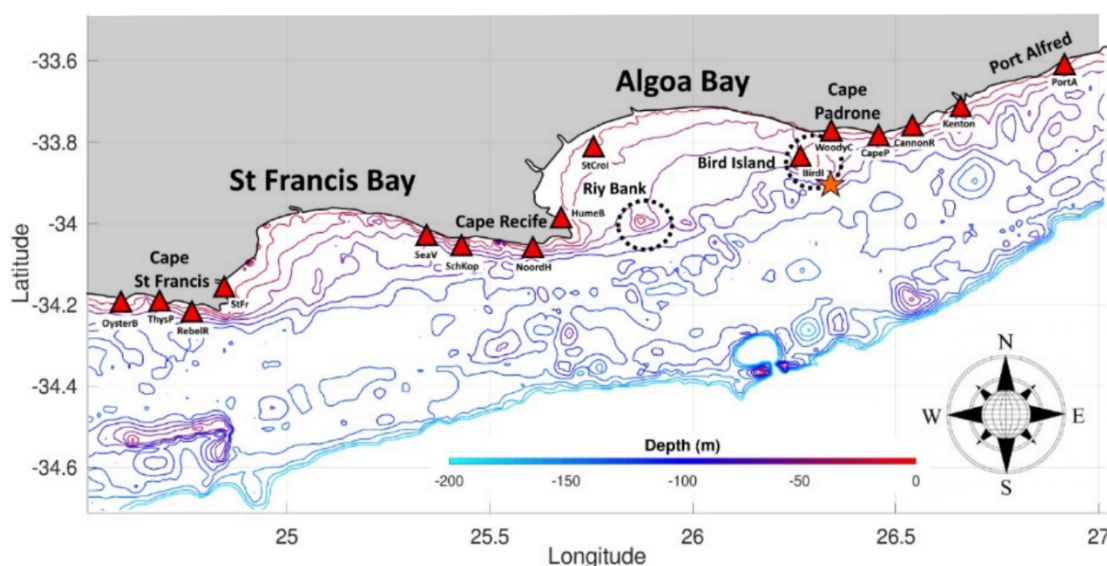

Fig. S1: Locations of the SAEON 2m Gully Temperature Probes (Red Triangles) and Bird Island ADCP (Orange Star) used for the performance assessment of the Regional Ocean Model.
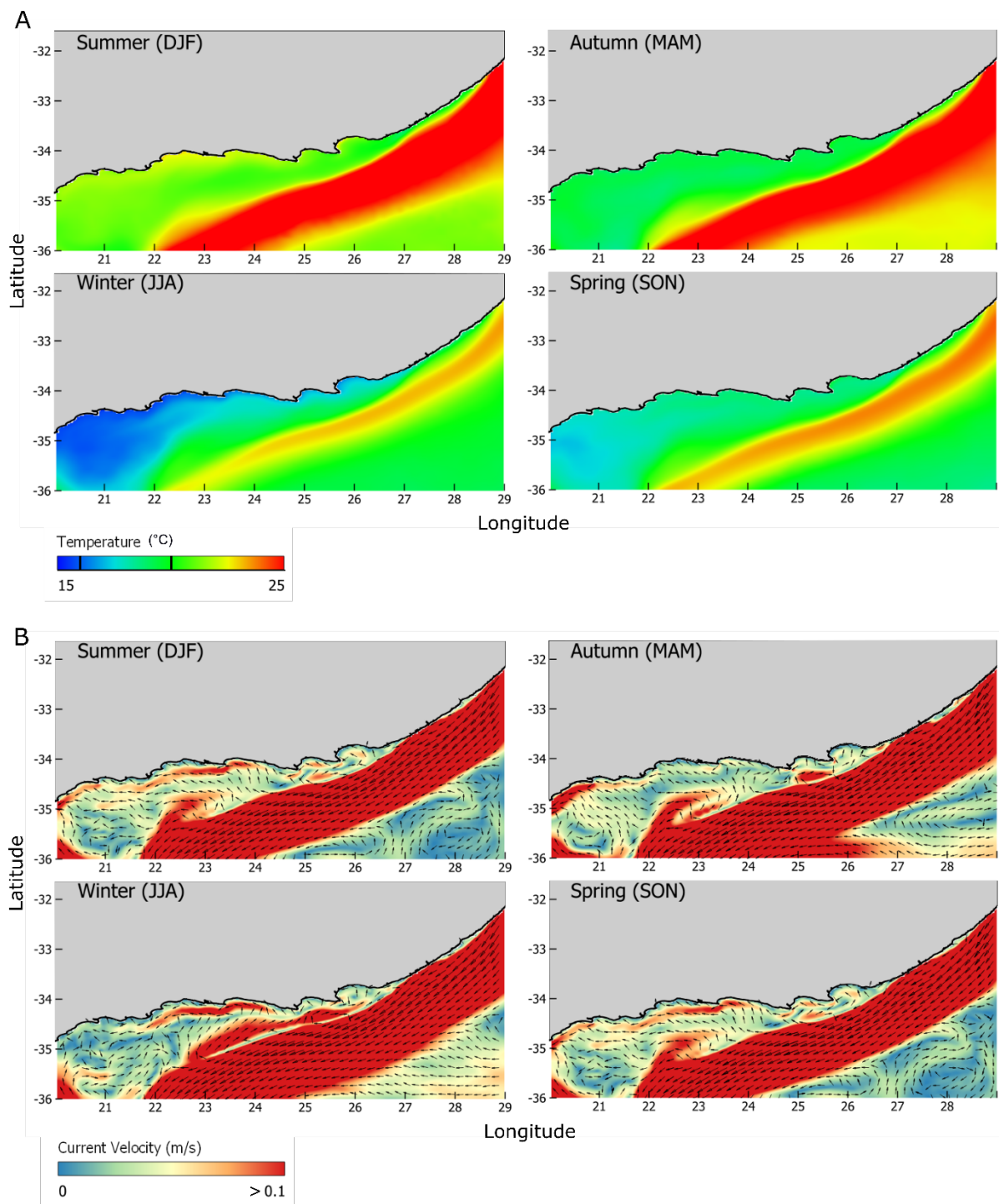
Fig. S2: Averaged seasonal (A) temperature, with M1 and M2 temperature constraints marked with black bars (16–20°C) on temperature scale and; (B) current speed (shading) and direction (arrows) from Regional Ocean Model for five year period (2011–2015) over the Southern Coast study area. Current colour-bar range shows 0 to max 0.1 m/s to clarify coastal velocities.
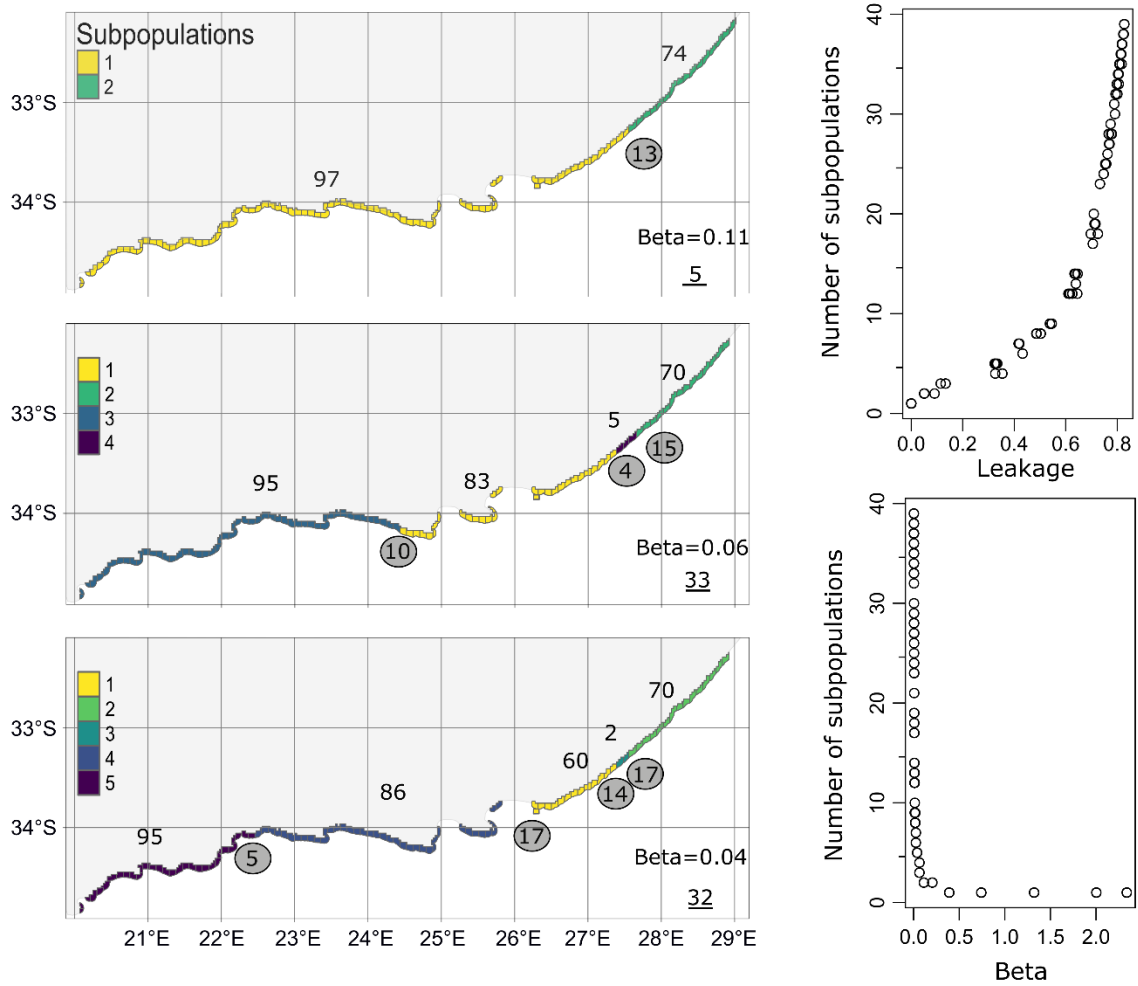
Fig. S3: Information used to determine the final subpopulation structure for *Diplodus capensis* (reported in Fig. 7) along the southern coast of South Africa based on simulated levels of connectivity for the base model configuration (M0) only. Left panels show alternative numbers of subpopulations with underlined value indicating percentage exchange among all subpopulations (leakage), encircled values indicate the mean percentage exchange between two adjacent subpopulations, and open values indicate the percentage of self-recruitment within each coloured subpopulation. Right panels show relationship between subpopulation number and leakage (top) and the beta value (bottom) for base model configuration (M0).