

Reference points and short-term forecast for WKBANSP 2024: Anchovy in ICES Subdivision 9a South (ane.27.9a Southern component)

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Biological Reference points

The methodology applied was the same decided in WKPELA 2018 (page 286 of WKPELA 2018 report (ICES, 2018)) following ICES guidelines for calculation of reference points for category 1 and 2 stocks and the report of the workshop to review the ICES advisory framework for short lived species ICES WKMSYREF5 2017 (ICES, 2017).

According to the above ICES guidelines and the $S - R$ plot characteristics (Figure 1), this stock component can be classified as a “stock type 5” (i.e. stocks showing no evidence of impaired recruitment or with no clear relation between stock and recruitment (no apparent $S - R$ signal)).

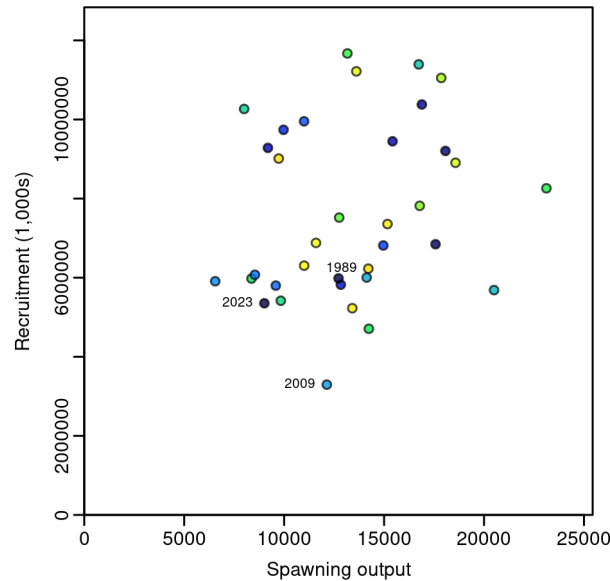


Figure 1: ane.27.9a Southern stock. Stock-recruit curve. Point colors indicate year, with warmer colors indicating earlier years and cooler colors in showing later years.

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According to this classification, B_{lim} estimation is possible according to the standard method and it is assumed to be equal to B_{loss} ($B_{lim} = B_{loss}$). The value of B_{loss} for the 9a South anchovy corresponds to the estimated SSB in 2010 (6552.06 t), hence B_{lim} is set at 6552.06 t. This value of B_{loss} represents 0.39% of the unfished biomass ($B_0 = 1.6865 \times 10^4$ t). In accordance with ICES guidelines, it is recommended to adjust B_{loss} in such cases, assuming $B_{loss} = B_{pa}$. Following ICES guidelines, B_{pa} is calculated as:

$$B_{pa} = e^{(-1.645\sigma)} B_{lim},$$

where $\sigma_{assessment}$ is the estimated standard deviation of $\ln(SSB)$ in the last year of the assessment, accounting for uncertainty in SSB for the terminal year. According to this, $\sigma_{assessment}$ is calculated as:

$$\sigma_{assessment} = \sqrt{\ln \left(1 + \left(\frac{\sigma_{SSB2023}}{\mu_{SSB2023}} \right)^2 \right)} = \sqrt{\ln \left(1 + \left(\frac{919.608}{9011.44} \right)^2 \right)} = 0.1$$

If this value is unknown, a default of $\sigma = 0.20$ can be used, while the suggested value for small pelagic species is $\sigma = 0.30$. Using 0.2 provides an intermediate solution between the estimated value from assessment and the recommended value for small pelagic species, ensuring that B_{lim} is calculated in accordance with the stock's biological characteristics and ICES guidelines.

Then $B_{pa} = e^{(1.645\sigma)} B_{lim} = 0.16 B_{lim} = 0.16 * 6552$. According to this, B_{pa} is set at 5542 t.

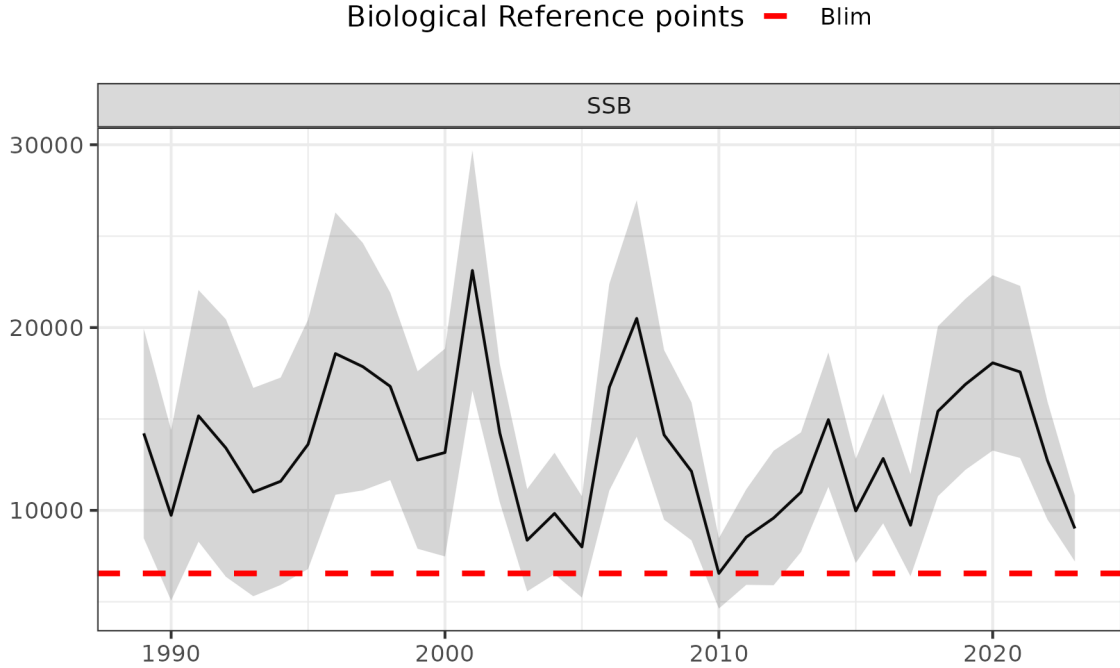


Figure 2: 9a Southern stock. Time series estimated by the model for spawning biomass (in tons) with Biological reference points

Short-term predictions

SS3 includes a forecast module that enables projections for a specified number of years, linked to the model ending conditions, associated uncertainties, and a specified level of fishing intensity. This tool was used to perform the short-term projections.

The initial stock size was estimated from the abundance by ages (0-3) on January 1 of the final assessment year, and the spawning stock biomass (SSB) on April 1. Natural mortality and maturity rates remained constant, while selectivity and weight-at-age were averaged over the last three years.