

Examining spatial variation in growth patterns of Irish Sea plaice using an extended double logistic model

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When groups of fish inhabit different environments during early life this may produce variation in pre- and post-settlement growth which is recorded in the otolith, providing a useful marker of larval and juvenile origin. In the present study we describe the early growth of *Pleuronectes platessa* on Irish and Scottish nursery grounds. Plaice were collected throughout August 2009, from five sites in southwestern Scotland and four sites in eastern Ireland. Spatial variation in growth was investigated using otolith increment widths and temperature data. Growth rate over time (increment number), displayed marked individual variation with asymptotic and dome-shaped relationships observed between these variables. These variations, along with the non-independence of measurements within otolith reading and individual fish, necessitated the development of hierarchical double logistic growth models. Temperature effects were investigated in two ways: with growing degree day replacing time and with temperature and time included as explanatory variables. The models were compared to determine the most effective way to describe differences in growth within and between regions. Growth during the larval phase was found to differ significantly between but not within regions. Inferential differences between the methods of temperature inclusion on these regional effects are explored. Variations in growth have implications for survival of plaice. Otolith growth information is useful in stock discrimination, and to assess the influence of environmental factors on growth. Identifying nursery grounds that promote high growth can guide spatial habitat conservation, protecting important sources of recruitment to the adult stock.

Keywords: Irish Sea, survival, stock identification, double-logistic hierarchical growth modelling, temperature mediation.

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