

## Higher temperatures: Are fish growing faster? A case-study of Common sole in the Bay of Biscay

Diaz Kelly<sup>1</sup>, Bui Tuan-Anh<sup>2</sup>, De Troch Marleen<sup>2</sup>, Depestele Jochen<sup>3</sup> and Bekaert Karen<sup>3</sup>

<sup>1</sup> Vrije Universiteit Brussel, Boulevard de la Plaine 2, 1050 Ixelles, Belgium  
E-mail: kelly.sharlyn.diaz.diaz@vub.be

<sup>2</sup> Ghent University, Krijgslaan 281, 9000 Gent, Belgium

<sup>3</sup> Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Jacobsenstraat 1, 8400 Oostende, Belgium

*Solea solea*—or Common sole—is a flatfish that inhabits sandy or muddy ocean floor areas in the continental shelf throughout Europe and Africa, including our study area: the Bay of Biscay (FAO, 2015; ICES, 2012). The Bay of Biscay faces pressures such as fishing, shipping, tourism, extraction of species, etc.; another potentially important stressor is climate change. In this area, temperatures are projected to increase by 1.5°C to 3.0°C above historical conditions by 2099 due to climate change (ICES, 2019). These temperature changes can affect fish biological processes such as sexual maturation, community structures, population distribution, and body size and growth (Baudron *et al.*, 2013; Chust, *et al.*, 2011; Mollet *et al.*, 2013). A well-known concept involving the influence of temperature on body growth is the temperature-size rule, which states that organisms inhabiting areas of higher temperatures display faster growth but smaller asymptotic sizes (Lindmark *et al.*, 2022). A useful tool in the study of temperature influence in fish are otoliths, structures found in the inner ear cavity of all teleost fish that develop annuli, or rings, as fish grow (Vitale *et al.*, 2019). These growth rings can be used to determine the animal's age by determining daily, seasonal, or annual growth patterns (Campana & Thorrold, 2001). This study focused on studying the potential correlation of sea bottom temperature on the annual growth of *Solea solea* in the Central and Northern Bay of Biscay by measuring and analyzing the growth rings in otoliths from *S. solea* captured in this area during the period of 1989-2020. This research contributes to the FWO PhD research entitled "Warm and wanted: effects of climate change and fisheries on fish growth".

### Keywords

*Solea solea*; Otolith; Fish Growth; Climate Change; Temperature Size Rule