

Investigating the Applicability of Ichthyoplanktonic Indices in Better Understanding the Dynamics of the Northern Stock of the Population of Atlantic Hake *Merluccius merluccius* (L.)

Paula Alvarez ^{1,*}, Dorleta Garcia ² and Unai Cotano ¹

¹ AZTI, Marine Research, Basque Research and Technology Alliance (BRTA), Herrera Kaia, Portualdea z/g, 20110 Pasaia, Spain;

² AZTI, Marine Research, Basque Research and Technology Alliance (BRTA), Txatxarramendi Ugarteia z/g, 48395 Sukarrieta, Spain;

* Correspondence: palvarez@azti.es

Eggs and larvae distribution

Hake eggs distribution: Figure S1 shows the spatial distribution of stage 1 eggs (eg1, number per 10 m²) during the main spawning peak for hake in the Bay of Biscay (BoB) for each study year. The peak of spawning took place always between March or April. Time series of eg1 abundance in the BoB shows a high variability of abundance from 1995 to 2019. In 1995, 2013, and 2016 the presence of hake eg1 and their densities were clearly higher than those recorded in the rest of the years (1998, 2001, 2004, 2007, 2010, 2019).

Hake eg1 occurred in moderate to low numbers in the Bay of Biscay from the southeast corner of the BoB to the shelf edge (Figure S1). Concentrations reached up to 400 eggs/10 m² with the highest concentrations being found within the 200m contour line. Small numbers were also found on the shelf of France.

Hake larvae distribution. The distribution of 921 hake larvae identified in March and April during the surveys is shown in Figure S2. In this time series, there was high variability in the presence and abundance of larvae, with the prominence of 2013 being striking. In 1995, 2010, and 2016 the presence of larvae and their densities were moderate and evidently lower than those recorded for the years 1998, 2001 and 2004.

Hake larvae were mainly found on the shelf between 100–200m isobaths. In those years when the presence of hake larvae was relevant some areas of aggregation were observed in the center and in the north of the French shelf, always linked to shelf break or close to it.

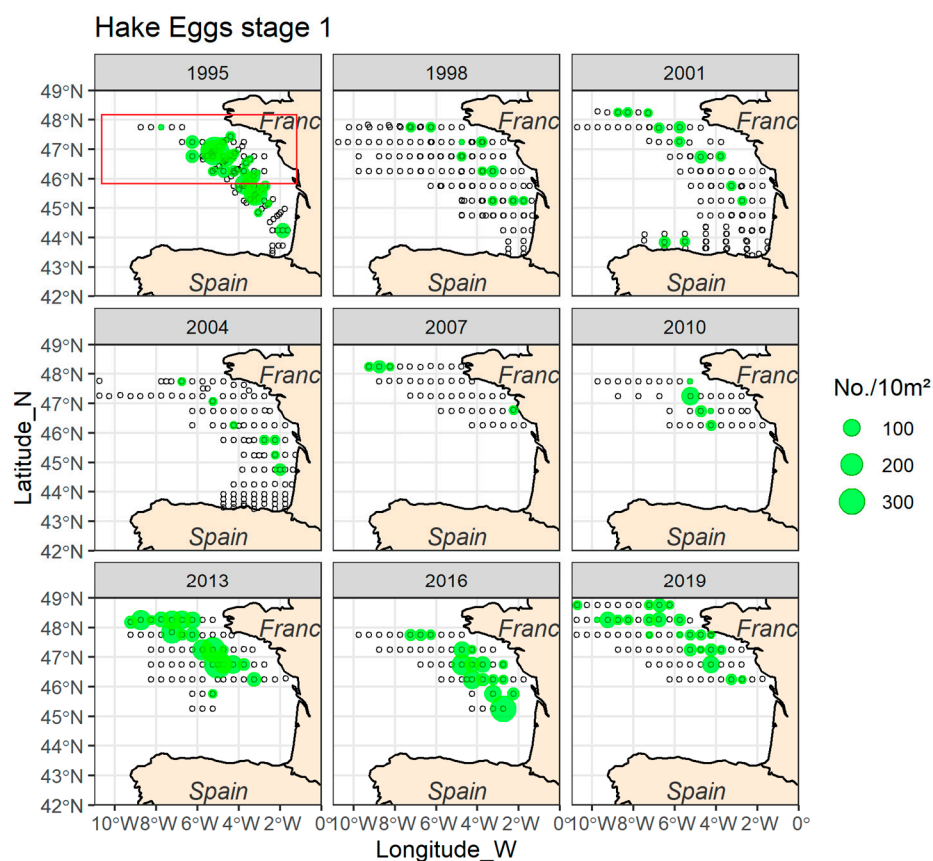


Figure S1: Times series of hake eggs in stage 1 (number/10 m²) in the Bay of Biscay from 1995 to 2019. Dot sizes are proportional to egg abundance. Crosses indicate stations with no eggs. The square shows the standard area selected to estimate the production of hake eggs.

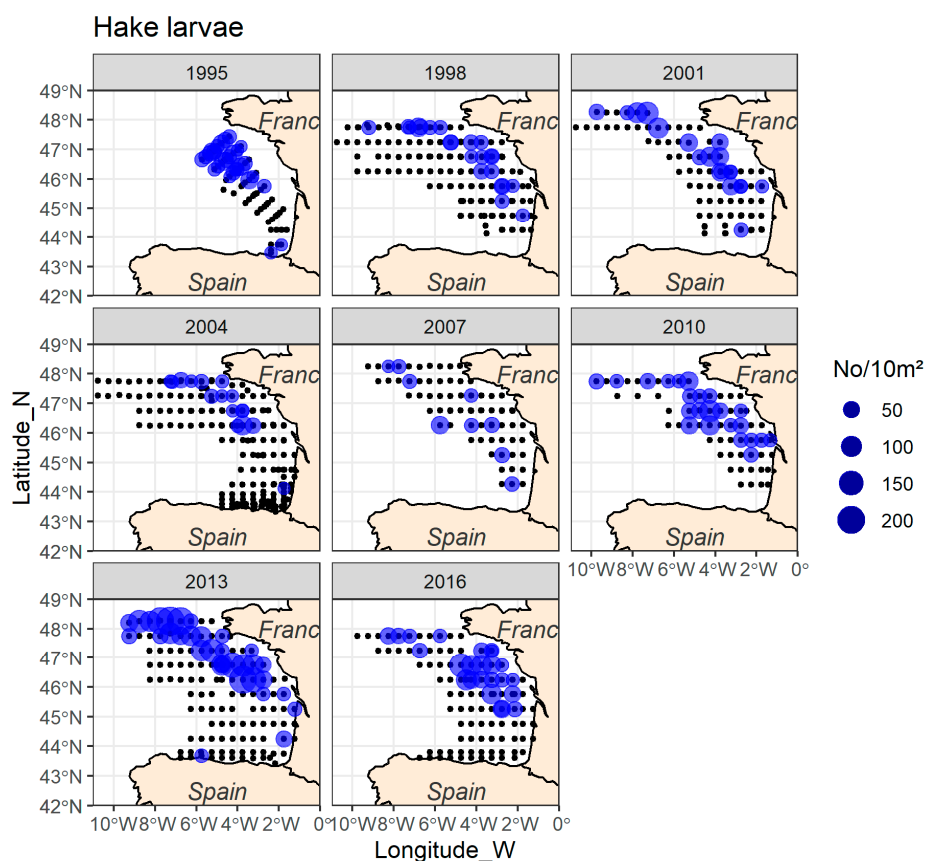


Figure S2: Times series of hake larvae (number/10 m²) in the Bay of Biscay from 1995 to 2016. Dot size are proportional to larvae abundance. Crosses indicate stations with no larvae.

Hake Juveniles spatial distribution

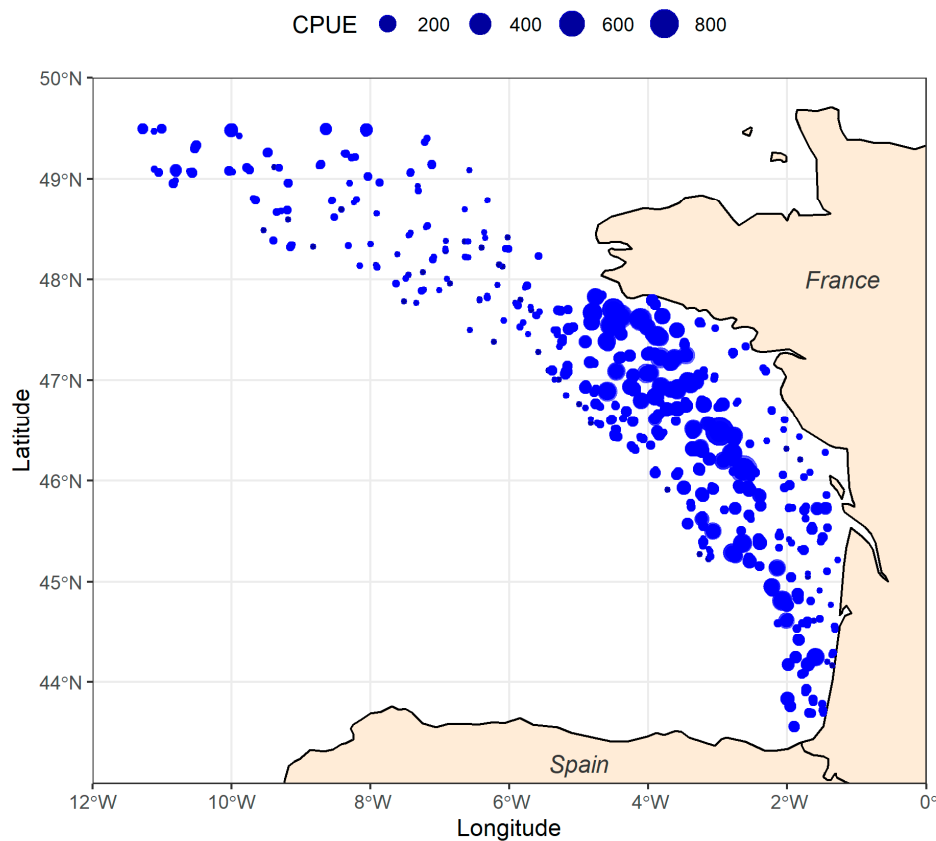


Figure S3: Spatial distribution of the abundance of juveniles of hake (<27 cm length, No indiv./hour) collected during EVHOE surveys for the time series (1996–2016), (Source ICES <https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx>).

Larval length frequency distribution

Figure 4S depicts the size frequency distribution of hake larvae by year as percentage of number by 1 mm SL range. Individuals of 3- and 4-mm SL were the most abundant followed by 5 mm SL. These three ranges accounted for 78 % of the total larvae caught.

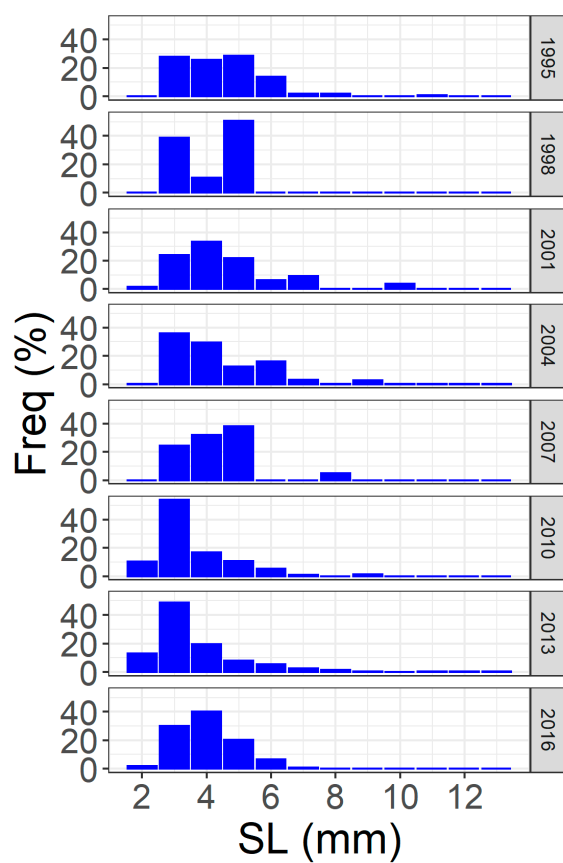


Figure S4. Size frequency distribution (in %) of hake larvae collected from 1995 to 2016 grouped by 1 mm length.