# ICES Journal of Marine Science

The fisheries history of small pelagics in the Northern Mediterranean.

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# **Supplementary material: Appendix S1**

Appendix S1 Description of the environmental time series.

The time series of the winter (December-March) North Atlantic Oscillation (NAO) index was downloaded from the NCAR (climatedataguide.ucar.edu). This annual station-based index is based on the difference of normalized sea level pressure between Lisbon (Portugal) and Reykjavik (Iceland), whereby the positive phase corresponds to a wetter and milder weather over Western Europe. The winter instead of summer NAO was used, because of its stronger control on the climate of the Northern Hemisphere and its more intense interdecadal variability. The more regional Western Mediterranean Oscillation (WeMO) was obtained from the Group of Climatology from the University of Barcelona (www.ub.edu/gc/English/wemo.htm). This index is defined as the standardized sea level pressure difference between the North of Italy and the Southwest of Spain (Martin-Vide and Lopez-Bustins, 2006). When negative, humid easterly winds cause heavy rainfall on the eastern coast of the Iberian Peninsula. When positive, dry winds are blowing from the West. Monthly values were averaged only for the winter months (December to March to match with the NAO index) to obtain the winter WeMO index, which should for example reflect more pronouncedly the Mediterranean rainfall than the annual index. The WeMO could also reflect local conditions in the NW Mediterranean (SST, salinity, etc.) better than the NAO index (Martín et al., 2012; Martin-Vide and Lopez-Bustins, 2006). A third index is the AMO (Atlantic Multidecadal Oscillation), which is the detrended weighted average of the SST over the North Atlantic (0-70°N). It exhibits positive (warm) and negative (cool) phases, with a difference around 0.5°C (Alexander et al., 2014). We extracted the data from the Earth System Research Laboratory (http://www.esrl.noaa.gov/psd/data/timeseries/AMO/). For SST, multiple long-term datasets are available, that are based on the ICOADS (International Comprehensive Ocean-Atmosphere Data Set) v2.5 data set (HADISST, HADSST3 and ERSST.v3b). We selected ERSST.v3b, as complete data was present for the region from 1865 onwards on a 2°x2° grid. The Northwest Mediterranean (40-44°N, 1-7°W) was selected rather than the Gulf of Lions, to avoid errors due to the statistical interpolation of the temperature data. The series showed good correspondence with satellite data for the Gulf of Lions available during the last years (R²=0.72, p<0.01). Monthly data was downloaded from NOAA (http://www1.ncdc.noaa.gov/pub/data/cmb/ersst/v3b/netcdf/) and averaged per year. Although multiple rivers discharge into the Gulf of Lions, the Rhône is by far the most important one, as its flow is more than 10 times higher than the one of the other foremost rivers together (Aude, Hérault, Orb). Its yearly flow rate was received from the CNR (Compagnie Nationale du Rhône, www.en.cnr.tm.fr). Measurements are from Beaucaire, a station close to the river mouth.

Martín, P., Sabatés, A., Lloret, J., and Martin-Vide, J. 2012. Climate modulation of fish populations: the role

of the Western Mediterranean Oscillation (WeMO) in sardine (*Sardina pilchardus*) and anchovy

(*Engraulis encrasicolus*) production in the north-western Mediterranean. Climatic Change, 110:

925–939.

Martin-Vide, J., and Lopez-Bustins, J.-A. 2006. The Western Mediterranean Oscillation and rainfall in the

Iberian Peninsula. International Journal of Climatology, 26: 1455–1475.