Annex 3: Spatial persistence analysis

By: Tiit Raid, Danai Mantopoulou-Palouka, Igor Isajlovic

06 May 2019

A spatial cluster analysis had been carried out in the STECF EWG 17-15 to group the MEDITS hauls that belonged to the same sampling station up to 2016 (STECF 2017). The grouped hauls of that cluster were provided to the EWG 17–15. A new R-script was developed to assign each of the 256 MEDITS hauls of 2017 to a sampling station using k-nearest neighbor algorithm (Altman, 1992). An R script of EWG 17-15 was used to calculate the persistence of "high" values of standardized abundance for each fraction of the population: those above the 50th percentile threshold when only non-zero values are included. The 50th percentile threshold was calculated on an annual basis and following the GSA aggregation adopted in the stock assessment carried out for each stock.

Once the standardized abundance was calculated for each haul, the persistence was calculated as the number of years (hauls) within each sampling cluster with values above the 50th percentile threshold divided by the total number that each particular sampling cluster had been sampled, obtaining a persistence (probability) value ranging from 0 to 1 for each stock.

The same methodology was applied in the SOLEMON data that were provided to the STECF EWG 19–02, to group the hauls into sampling stations and to calculate the high density persistence areas.

The number of hauls where the persistence (probability of occurrence of both adults and juveniles above 50%) was applied as an estimate of the areas where spatial overlapping of juveniles and adults is expected to be high.

EWG 19-02 however suggests that in order to make distribution maps better the 75% threshold might be more appropriate to apply in order to distinguish the areas of "high "persistence.

R scripts as well as the essential files for replicating the analysis described above can be found in the STECF EWG 19–02 ftp (https://stecf.jrc.ec.europa.eu/web/ftp/ewg1902)

References

Altman N.S. (1992) An Introduction to Kernel and Nearest-Neighbor Nonparametric Regression. The American Statistician 46: 175-185.

Scientific, Technical and Economic Committee for Fisheries (STECF) (2017) Mediterranean Stock Assessments - Part 2 (STECF-17-15). Publications Office of the European Union, Luxembourg, ISBN 978-92-79-67494-5, doi:10.2760/90316, JRC111820