ICES Annual Science Conference 2012 | Joint ICES/PICES Session I | ICES CM code: I:23

Representation of the use of marine space by commercial fisheries in Marine Spatial Planning

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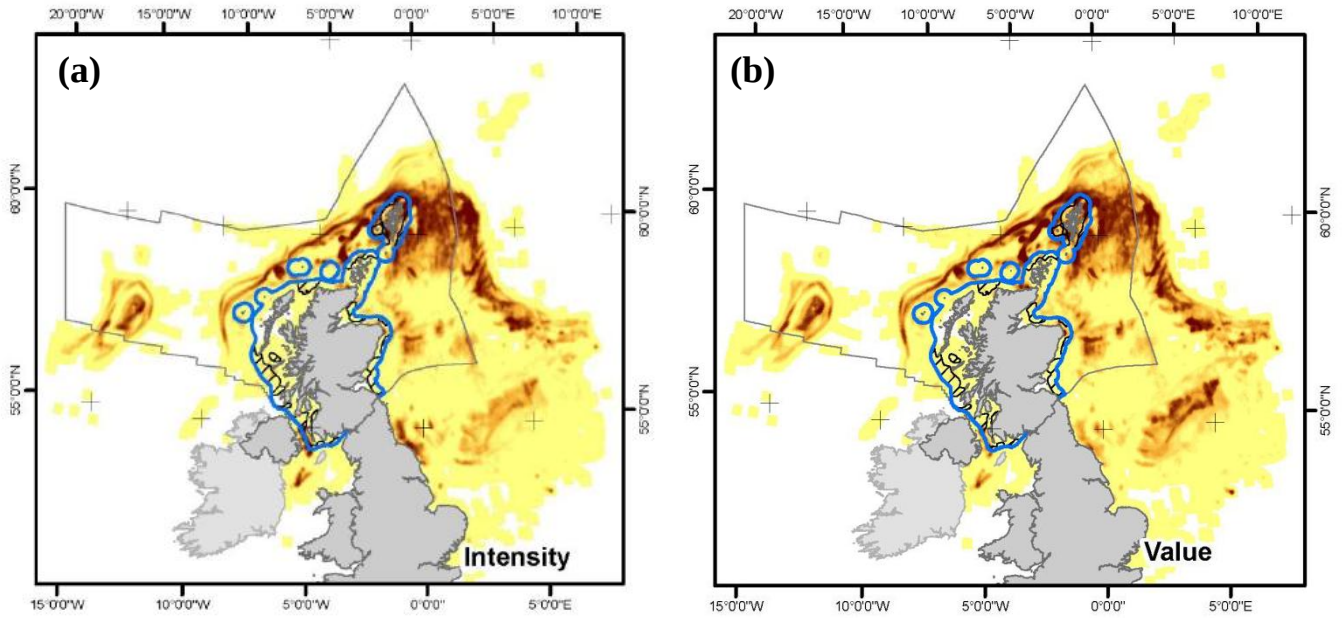
Successful marine spatial planning requires that the underlying data and process of marine activities can gain the confidence of a wide range of stakeholders. Fishers are major users of our seas, and therefore are of particular importance in marine planning consideration. Appropriate representation of fisheries in marine planning systems needs to take account of the spatial variability in landings and fishing practices. An understanding of the year to year stability of fisheries patterns can avoid over-reliance on data from short periods that may not accurately reflect longer term patterns.

Generally, EU Member states can obtain information relating to the spatial distribution of fishing activity by logbooks and Vessel Monitoring System (VMS) data. These data are complementary and their coupling has already proven powerful. While logbooks provide useful information on several aspects of fishing, data are considered to be of low spatial resolution. The most reliable source of spatially explicit fishing vessel data is still the EC Vessel Monitoring System which provides information on the exact location and identification of all vessels ≥15m overall length.

In this study, anonymised VMS data for all the UK vessels for years 2007-2011 landing into UK ports were combined with landings information. Fishing activity was identified by applying a simple speed threshold (Lee *et al.* 2010). Weights and values have been allocated to VMS pings applying a sophisticated approach which uses ICES rectangles divisions and weights on points according to time (Holmes *et al.* 2011). A collection of weight and value rules separated the data into groups representing key sectors of the Scottish fishing fleet such as crab, lobster, squid, nephrops (mobile and static), demersal (mobile - see Fig. 1a; and static), scallop, pelagic, mackerel and herring fisheries.

Figure 1: (a) Amalgamated spatial variability of demersal fisheries (mobile gears) in the UK for years 2007-2011. (b) The same data weighted by the value of landings.



Non-parametric density analysis was selected over the commonly used quadrate count to develop GIS layers describing annual distribution of fisheries. A Gaussian kernel density estimation with a data-driven bandwidth selection approach (smoothed cross-validation) had been used resulting in high quality contour maps which form a better estimate of the spatial extent of fishing activity and the underlying structure. Several years' data have been amalgamated and effectively showed spatial patterns in high-resolution for both intense and infrequently fished areas throughout that period. These layers have also been weighted by landings (tonnes) and value (cash value in GBP) to represent the most productive and economically important areas respectively (Fig. 1b).

In conclusion, a clear understanding and representation of the spatial distribution of marine fisheries in Scottish waters was achieved, removing many of the problems associated with the traditional gridded presentations. Spatial patterns coming from this study were validated to be consistent with the underlying biology of the species. Areas important to the fishing industry at a national level were identified to inform the Marine Spatial Planning process in Scotland.

References

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