**Analysis workflow and shapefile creation**

Analysis was run on selected climate modelling and/or species distribution model outputs relevant to each sector of interest (conservation, fisheries and aquaculture). We compared a present day reference period (2006-2025) to each possible 20 year time period between 2026 and 2099 (e.g. 2026-2045, 2027-2046, 2028-2047 etc.) under two different GHG emissions scenarios – RCP4.5 (strong curbs in global emissions toward climate change mitigation, from 2050 onwards, leading to a mean global warming by the end of the century of ~2.4 °C) and RCP8.5 (emissions continue to rise steadily throughout the 21st century, leading to mean global warming ~4.3oC). Maps showing the results were created (see example figure below). Therefore, for each sector and emissions scenario, we had 54 plots, which in the report are strung together as GIFs so that end users can see how the marine environment described in each analysis may change over time.

To create the shapefiles, the plots for each sectoral analysis, for all 20 year time periods between 2026-2069 and both emissions scenarios (25 plots for each RCP, so 50 plots in total) were stacked together (using the “magick” package in R), and areas consistently identified as refugia (areas with no triangles, see plot below) or hotspots (areas with blue triangles) in both RCP4.5 and RCP8.5 were marked using the “draw” function in the terra package. The resulting polygons were stored as shapefiles, which summarise the location of climate refugia and climate change hotspots in the UK EEZ up to 2069, across RCP 4.5 and 8.5. Yellow triangles in left hand panel below are climate change brightspots, where habitat conditions may improve in the time period represented in this analysis (2026 – 2069) compared to our present-day reference period (2006 – 2025). We didn’t make any shapefiles showing these areas as they appeared very rarely, and disappeared quickly.

The text files containing the lat/lon coordinates of all the blue and yellow triangles are in a folder called “shapefile\_source\_textfiles”. Blue triangles have a value of –1, yellow triangles have a value of 1. Climate refugia, which are white areas with no symbols on the plot below, have a value of 0. Co-ordinates of landmasses are NA.

A screenshot of a map

Description automatically generated

Example plot: Changes to benthic habitats of conservation value. Areas with blue triangles are climate change hotspots, areas with no triangles are climate change refugia.