

Supplementary Figures

Navigating sustainability and health trade-offs in global seafood systems

Authors: James PW Robinson, Angus Garrett, Juan Carlos Paredes Esclapez, Eva Maire, Robert WR Parker, Christina C Hicks, Nicholas AJ Graham

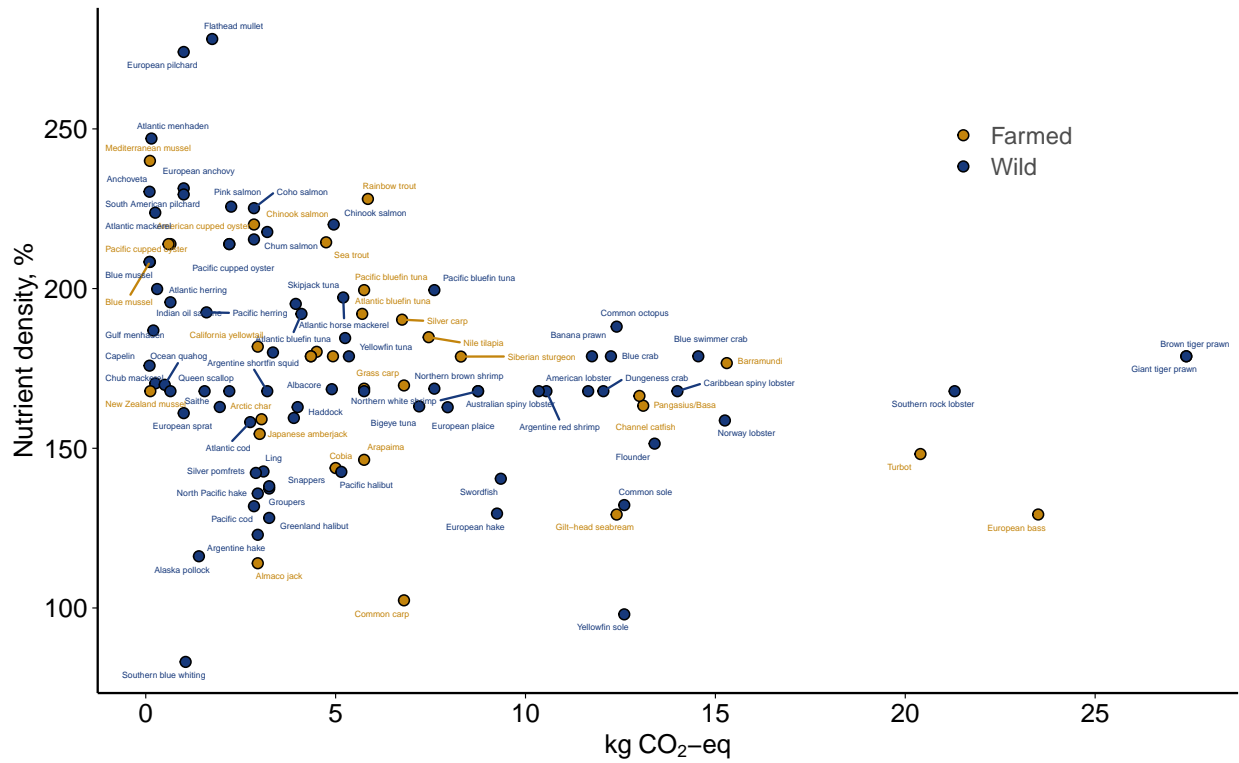


Fig. S1. Nutritional value and carbon footprint of seafood species Points are kg CO₂-eq of each species and its corresponding the nutrient density (%). Nutrient density is the summed contribution of a 100g portion to recommended intakes of five nutrients (calcium, iron, selenium, zinc, omega-3 fatty acids) (recommended daily intakes for adults (18-65 years old)).

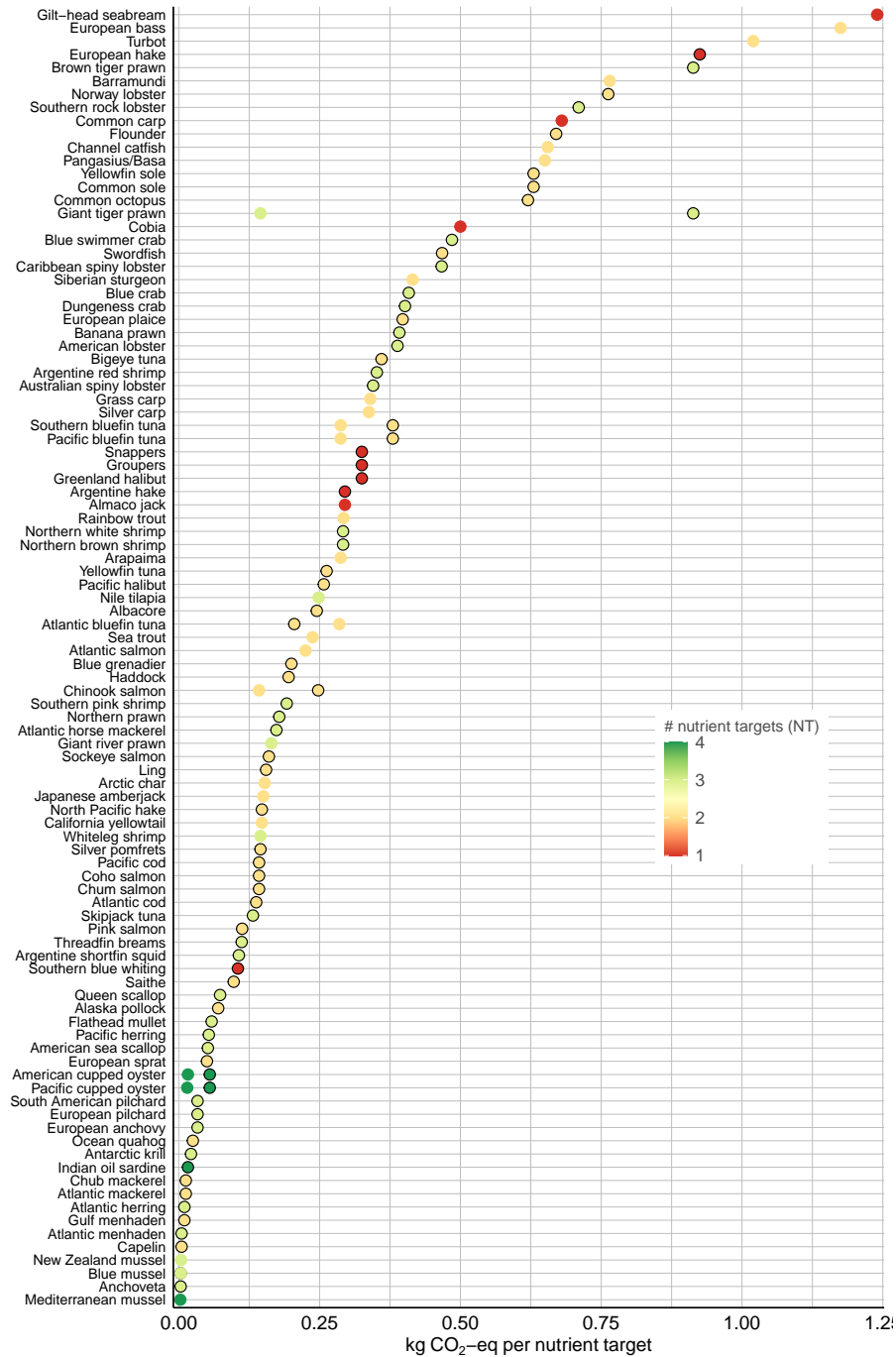


Fig. S2. Carbon emissions per nutrient target for all seafood products in the carbon emissions database Points are the mean kg CO₂-eq per nutrient target for each seafood species, where a nutrient target was the recommended intake (adults 18-65 years old) contained in a 100g portion for 7 nutrients (calcium, iron, selenium, zinc, omega-3 fatty acids, vitamin A). Points are coloured by the number of nutrient targets in a 100g portion. Animal-source foods (beef, chicken, lamb, pork) are included for comparison using CO₂ values from (Clune et al., 2017) and nutrient values from (Widdowson, n.d.).

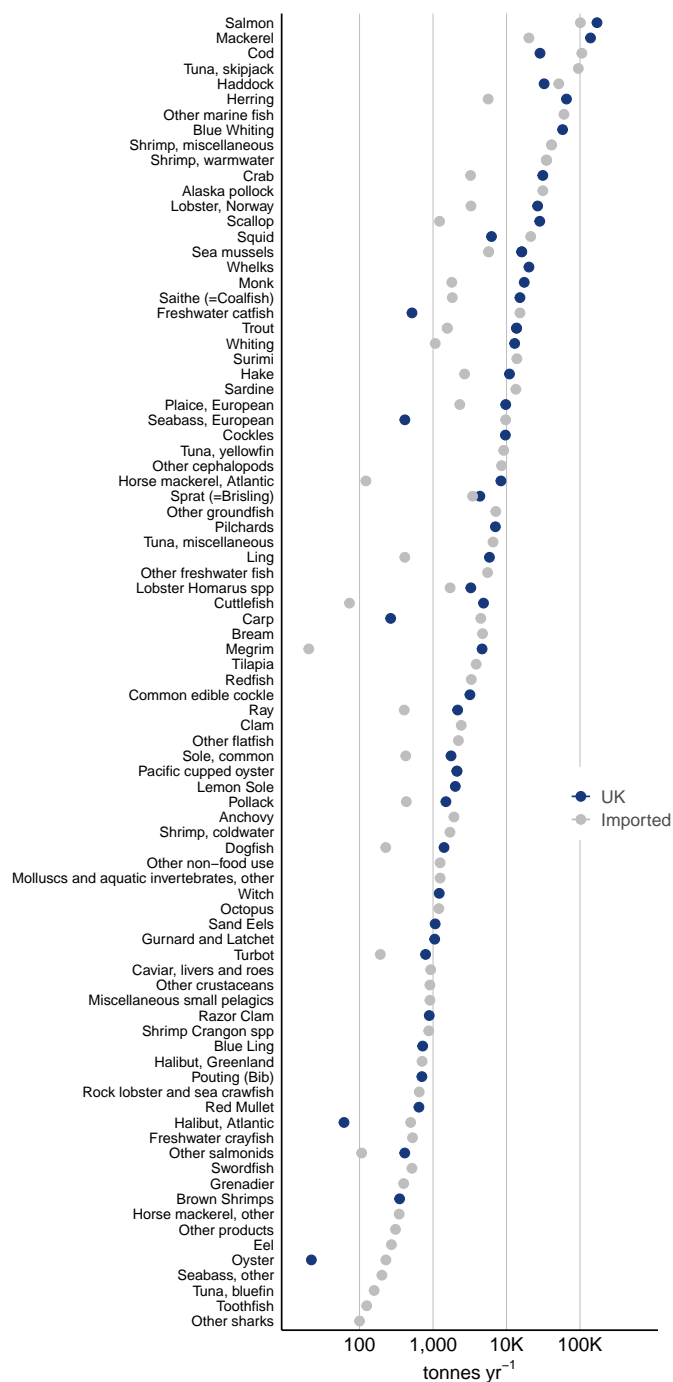


Fig. S3. Seafood available for UK consumers. Points are the estimated UK production (blue, landings and farms) and imported (grey) seafood per year, for all seafood with more than 100 tonnes total production.

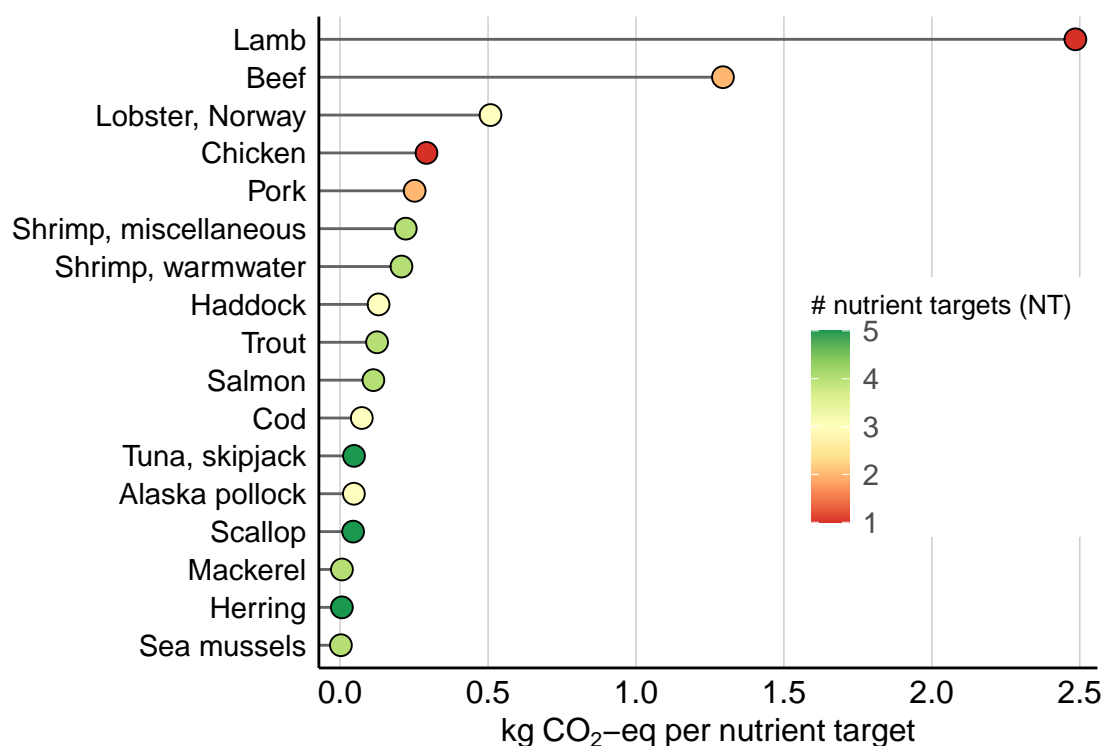


Figure S4. Carbon emissions per nutrient target for UK seafood products, for nine essential dietary nutrients. Points are kg CO₂-eq per nutrient target (averaged across species), coloured by the number of nutrient targets in a 100g portion. Targets were recommended intakes for adults (18-65 years old) of nine nutrients (calcium, iron, selenium, zinc, omega-3 fatty acids, vitamins A, D, B12, folate). Animal-source foods (beef, chicken, lamb, pork) are included for comparison using CO₂ values from (Clune et al., 2017) and nutrient values from (Widdowson, n.d.).

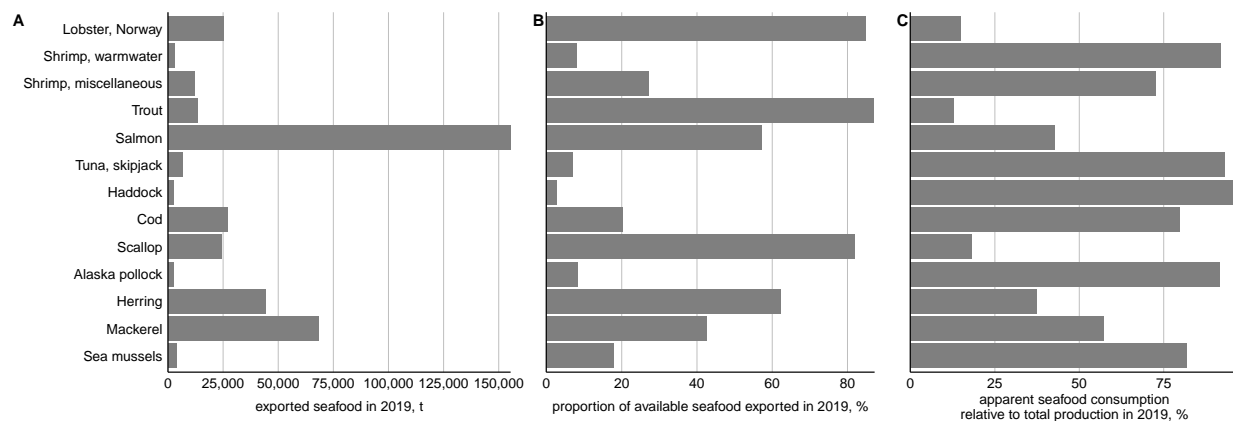


Fig. S5. Seafood exported from the UK in 2019 A) Export volume in tonnes of live weight, B) export volume as a proportion of available seafood, and C) apparent consumption as a proportion to available seafood. Seafood products shown had more than 100 tonnes total production (i.e. those in Fig. 2). Available seafood was the sum of landed, farmed, imported and apparent consumption was available seafood minus exports, using data for 2019.

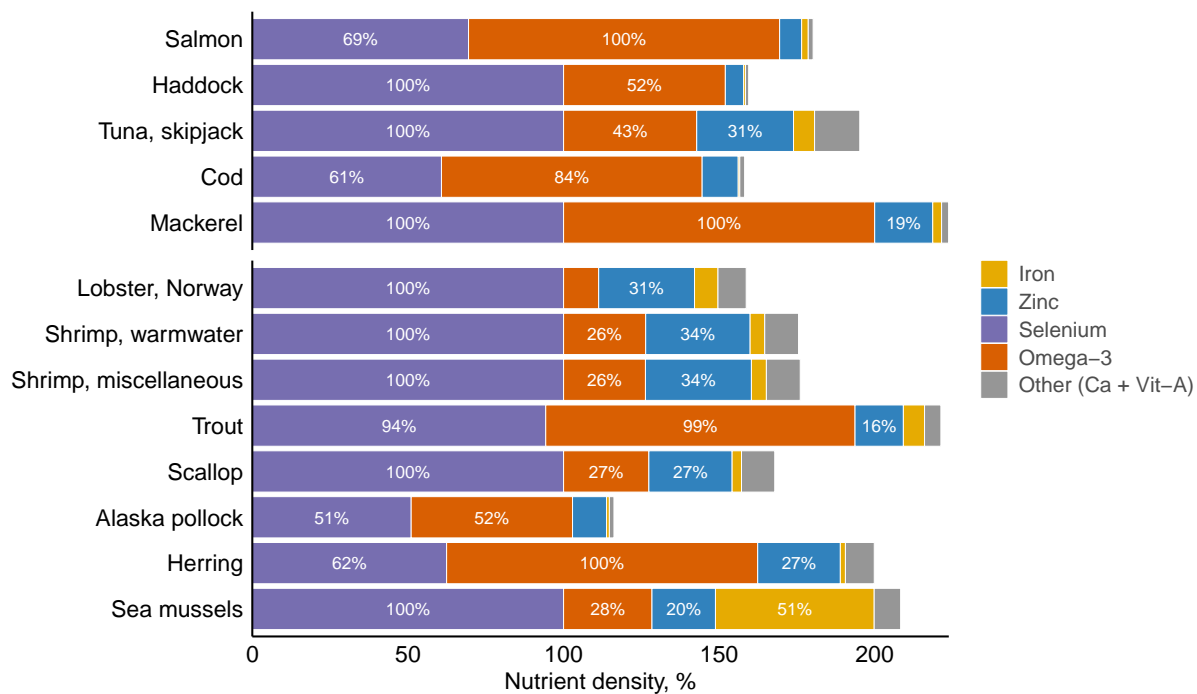


Fig. S6. Nutrient density for major UK seafood products estimated for five nutrients (calcium, iron, selenium, zinc, omega-3 fatty acids). Nutrient density based on recommended daily intakes for adults (18-65 years old), recalculated here for comparison with Fig. 1 (nutrient content of global seafood products).

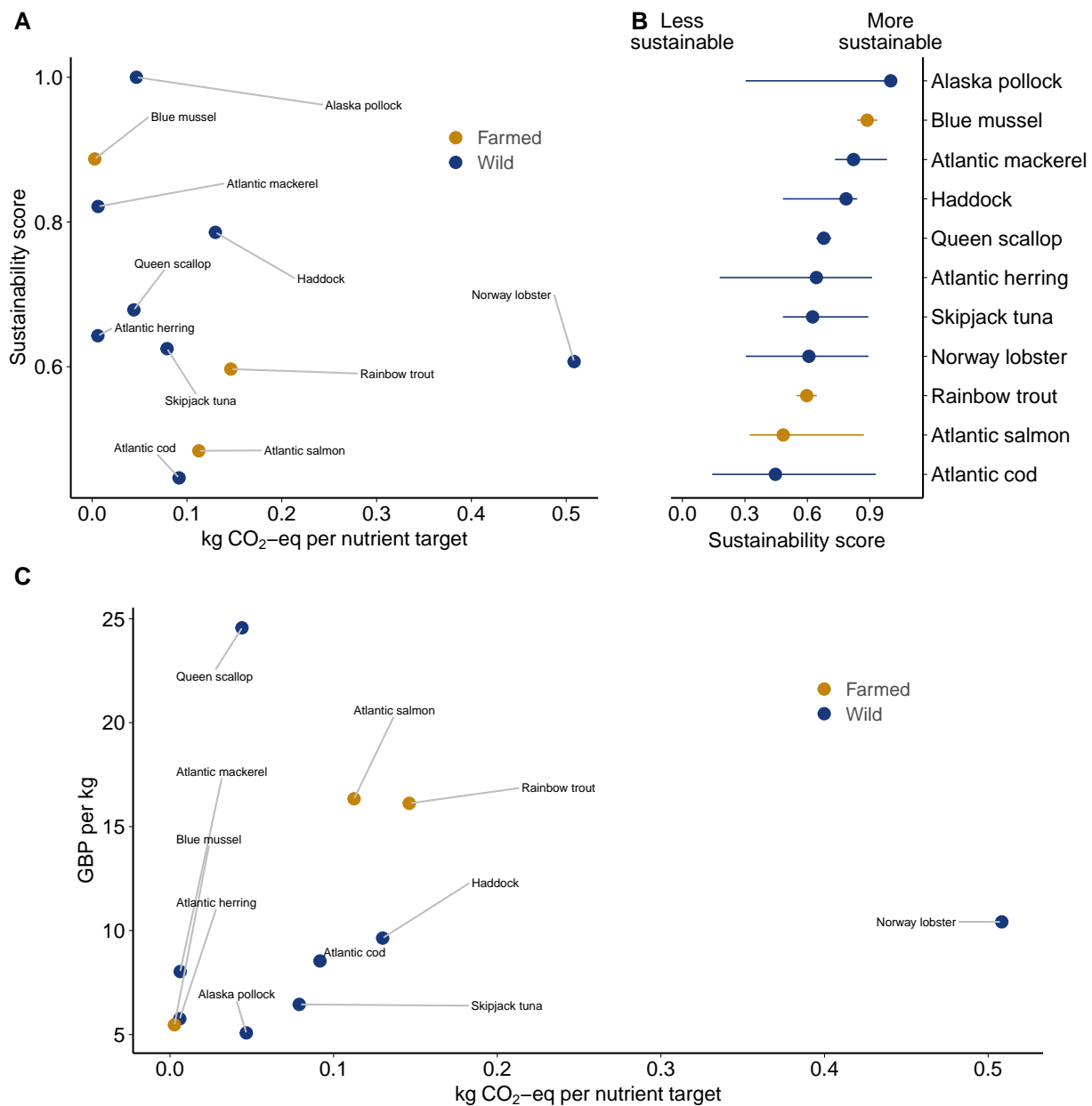


Fig. S7. Sustainability and price of UK seafood products. A) Carbon emissions per nutrient target by sustainability score, where points are the mean sustainability score of each product against the mean kg CO₂-eq per nutrient target. B) is the range in sustainability scores by seafood product and C) is the price per kg (Seafish 2021) against kg CO₂-eq per nutrient target. Sustainability scores were rescaled such that 0 = low sustainability and 1 = high sustainability, and kg CO₂-eq per nutrient target was estimated from recommended intakes of nine nutrients (calcium, iron, selenium, zinc, omega-3 fatty acids, vitamins A, B12, D and folate).

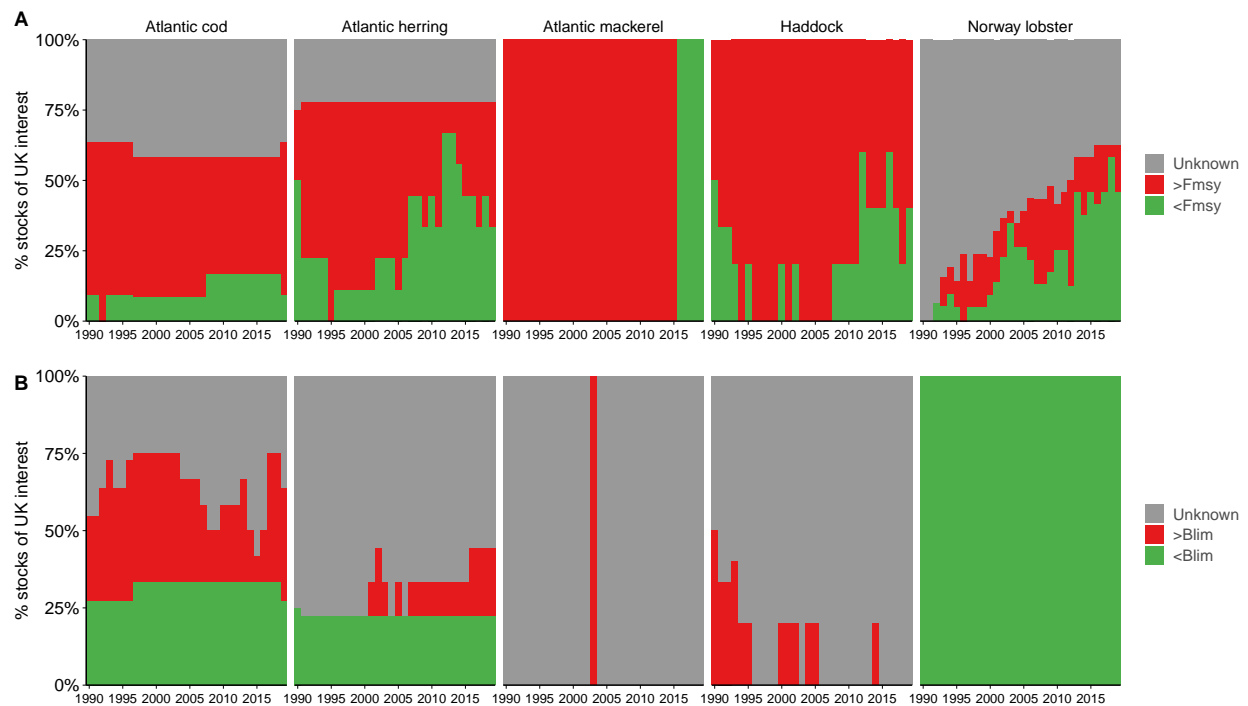


Fig. S8. Pressure and state thresholds for wild fisheries stocks relevant to UK seafood production from 1990-2019. Bars indicate the proportion of stocks that are underfished (green), overfished (red), or data deficient (unknown), according to estimates of fishing mortality (A, F_{MSY}) or spawning stock biomass (B, B_{lim}). Data from CEFAS [REF].