

Cooperative research addresses key questions to facilitate improved management of the English Channel scallop fishery

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Summary

A three year programme of cooperative research (Szostek, 2015) with the UK scallop industry has addressed questions to provide data that can be used to assess the sustainability of the king scallop (*Pecten maximus*) fishery in the English Channel and improve management:

- How has the spatial extent and intensity of scallop dredging altered over the last decade?
- What impact does scallop dredging have on bycatch species and benthic communities within the boundaries of the fishery?
- What is the biological structure of the stocks on which management boundaries should be based?

Collaboration with scallop fishermen and processors was an essential factor in securing access to fishing vessels for sampling trips, gathering local knowledge (LK) from skippers regarding the spatial extent and intensity of historical scallop fishing activity and obtaining scallop tissue samples for genetic analysis.

Introduction

King scallops (*Pecten maximus*) are currently the 3rd most valuable species in UK fisheries, with a first sale value of over £60 million per annum. Scallops are a non-quota species and landings have more than doubled in the last eight years. Forty percent of landings come from the English Channel, however despite the economic importance of this fishery there is a deficit of scientific data for effective management. Existing management measures are not aligned with the biological structure of the stock, or based on robust science.

The programme of research was initiated by the UK scallop industry and funded by members of the UK Scallop Association, the Fishmongers Company and Morrisons retailers. The remit of the work was to gather data required for the Marine Stewardship Council assessment process, and to aid improved management of the fishery. Collaboration with industry played a critical role at each stage of the project.

Materials & methods

Semi-structured interviews conducted with 29 skippers of inshore scallop vessels revealed the spatial extent and relative intensity of the inshore scallop fishery, in the absence of vessel monitoring system (VMS) data. Fishers' data were validated with VMS data for the offshore fleet, from which 19 skippers were interviewed.

An assessment of fishery bycatch was completed by sampling on board commercial fishing vessels during normal fishing activity and combining this with fisheries observer data (provided by CEFAS).

Tissue samples to be used for genetic analysis were obtained from nine scallop fishing grounds across the English Channel by liaising with fishers and processors. Twelve previously developed microsatellite markers (Hold *et al.*, 2012) were used to assess the degree of genetic differentiation between the scallop beds.

To investigate the relative impact of scallop dredging on habitats at the scale of the king scallop fishery the epifaunal species diversity, composition and biomass was assessed at sites subjected to varying levels of dredge fishing (derived from VMS data) while accounting for variation in environmental parameters between sites.

Results and Discussion

The activity and spatial extent of the inshore and offshore scallop fleets indicated that although scallop fishing has occurred across a large proportion of the English Channel, fishing behaviour is sporadic and

is concentrated in areas that are characterised by consistent scallop abundance. Economic and legislative drivers have altered historical fishing patterns in recent years. The data gathered from fishers enabled inshore scallop fishing activity to be mapped across the full extent of the English Channel for the first time (Figure 1).

Bycatch in the English Channel is low compared to other towed mobile fishing gears and compared to other scallop dredge fisheries in the UK. Bycatch composition varies over local and broad spatial scales. The fishery affects a limited number of bycatch species of ecological importance and low biomass of such species were present in dredge samples, indicating that the population impacts of the dredge fishery on these species are likely to be minimal.

Genetic analysis indicates that management boundaries do not align with reproductively independent stocks. Three reproductively distinct populations of scallops have been identified in the English Channel, indicating the largest appropriate management units. Large scale oceanographic currents maintain larval connectivity across much of the English side of the Channel; however complex hydrodynamic processes within Falmouth Bay suggest that larval dispersal is prevented at localised spatial scales in this location. The population in the Baie de Seine is reproductively isolated from the eastern English Channel, however larvae may disperse west, to the Baie St Brieuc and southern Cornwall, via residual currents.

Dredge fishing intensity is not correlated with species richness, species diversity or species composition. However, there is a significant negative correlation between species richness and diversity and increasing tidal bed shear stress (Szostek *et al.*, *in press*). This outcome indicates that it is not possible to demonstrate that there is an effect of scallop dredging within the current spatial limits of the king scallop fishery. This may be because historic dredge fishing could have already altered the benthic communities within the area of the scallop fishery to those that are resilient to scallop dredging, or that fishing disturbance has no impact over and above natural physical disturbance within the fishery.

This programme of collaborative research has provided many tangible benefits to the fishery and strengthened science-industry relationships throughout numerous positive interactions. Important data gaps have been addressed and the research outputs provide a solid foundation on which to design improved management measures which can benefit the scallop stocks, seabed habitats and the industry.

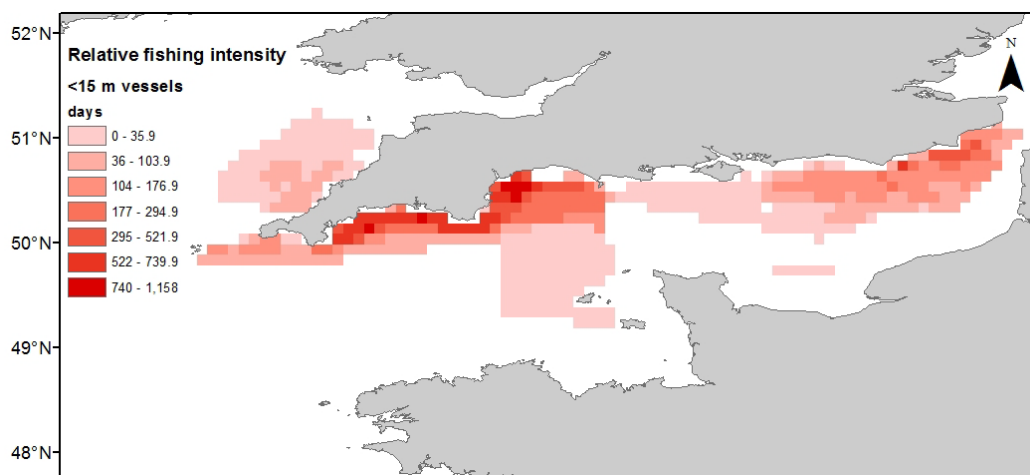


Figure 1: LK data for <15 m LOA scallop vessels in the English Channel displayed as data aggregated at 0.1° grid cells. The data represents the total number of vessel days fishing over a 10 year reference period derived from interviews with 29 fishers. Darker shading indicates higher values of relative fishing intensity.

References

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