

Climate Risks to Fishing Species and Effect of Coastal Fisheries

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Description

Fisheries are a source of global food security, but many fish stocks have been overexploited. Corresponding habitat destruction caused by fishing gear has exacerbated global declines in ecosystem health, fish biomass and economic value. Humans and ecosystems are intrinsically linked, so effective management of ocean resources is essential to support human well-being (Millennium Ecosystem Assessment) and to achieve interlinked sustainability objectives defined in the United Nations Sustainable Development Goals. Processes of natural environments supporting human well-being have been described as ecosystem services, which are categorised into provisioning, regulating, cultural and supporting services. To raise the profile of the importance of ecosystem services to human well-being, research programmes and projects have sought to value ecosystem services. Traditionally, measurements of fisheries sustainability have focussed on population-based metrics, such as Maximum Sustainable Yield. However, these methods do not consider the wider ecosystem supporting the fishery. Many fish species rely on multiple habitats across their life cycle. They specifically rely on “essential habitat” that is defined as waters and substrates needed for feeding, growth and reproduction of fish species throughout life. Habitats in which adults are caught provide evidence of habitat use during adult stages, but habitats they rely on during spawning and juvenile stages are equally vital. Spawning areas are those where adults migrate to release eggs, and nursery areas support growth and survival of juveniles. Recently, habitat information has been incorporated into fisheries management to move towards ecosystem-based fisheries management. Benthic habitats are particularly important for fisheries to provide shelter, foraging grounds and breeding grounds for species targeted by commercial fisheries. Here, the term “habitat” refers to physical characteristics of benthic substrates that can be classified using the hierarchical European Nature Information System (EUNIS). Essential life history stages of fish species are supported by multiple dimensions of the marine environment.

Ecopath with Ecosim

Therefore, an understanding of species-habitat associations is central to identifying essential habitats that support life stages of exploited species and are, therefore, of high priority for

management. Commercial fisheries do not operate in isolation of the wider ecosystem. Across the world, marine and coastal habitats are threatened by multiple anthropogenic impacts, including fishing practices. Bottom-towed fishing practices, such as trawling and scallop dredging, cause extensive damage to the seabed. This can create conflict with other fisheries targeting the same habitats through direct damage to target species or indirectly through habitat degradation and disruption of trophic dynamics. Marine Protected Areas (MPAs) and sustainable fisheries are intrinsically linked. MPAs are “clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”. However, legal instruments available to fisheries managers (such as bylaws) that exclude specified fishing métiers from spatial areas are often employed to protect specific features within MPAs. Increasing evidence suggests that MPAs with fishery management measures to exclude bottom-towed gear can both protect and support the recovery of protected features and provide social and economic benefits. Additionally, maintaining or improving the structural integrity of the seabed can enhance the ability of a system to support fishery species. At present, most fisheries bylaws to protect conservation features fall within national networks of MPAs that have limited potential to improve the sustainability of fisheries if habitats that are important to the survival of commercially targeted species fall outside of the MPA boundary of protection. Resource managers must now think beyond MPAs as the sole tool to underpin all demands of society from marine ecosystems and to move towards sustainable use of oceans for a wide range of societal benefits. In addition to food security, fisheries provide jobs and income, through direct market values at the point of landing. Economic valuation applied to ecological systems is proving to be a useful tool to progress debate and discussion as to costs and benefits of fisheries management and conservation. The first-sale wet weight market values at the point of port landings have been used as an indicator of the value of fisheries to coastal communities. However, an ecosystem-based approach to marine management is increasingly recognised in both policy (e.g. Food and Agriculture Organization of the United Nations; and Marine Strategy Framework Directive (MSFD) (European Parliament and Council)) and practice as a tool to link essential habitats inside and outside MPAs.

Fisheries Impact

Our objective was to determine whether coastal habitats supporting the economic value of key fisheries in Jersey and France were protected within existing MPAs. To achieve our objective, we assessed the availability of essential fish habitat that supports the supply of commercially important species, including adult, juvenile and spawning stages. Economic value (landings value [£]) was assumed to be supported equally by all habitats used by each species throughout its life cycle. This is a standard approach in economic and ecological valuation studies for which ecological evidence on the availability and suitability of habitats is insufficient. We also did not wish to highlight the economic value of fishing grounds (adult life history stages) over other areas important for the availability of species to the commercial market, as has been demonstrated previously. The

economic importance of habitats has been identified as a data-deficient area for the Government of Jersey Marine Resources team and management decisions for MPAs are currently focussed on protecting areas of high biodiversity or sensitive habitat but do not take habitat requirements of fishery species into account. An understanding of which habitats in Jersey contributed to the final economic value of a fishery, and whether these habitats are currently covered by spatial management measures that exclude bottom-towed fishing, can be used to better inform decisions in Marine Spatial Planning (MSP). We, therefore, hypothesised that, within the defined fishing area of Jersey's territorial waters, multiple habitats contributed to the final value of exploited species and the value safeguarded for each fishery species by the MPAs differed among habitats.