

## FORAMINIFERA OF THE FAL ESTUARY (CORNWALL), INCLUDING TAXA ASSOCIATED WITH MAERL BEDS

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The Fal Estuary (Cornwall) contains a nationally important accumulation of calcareous red seaweeds commonly referred to as maerl. Maerl beds are often associated with high benthic diversity but there has been little research done on their associated microfaunas. This investigation has studied the foraminifera that are found within samples of maerl and the adjacent sediments. Our samples were preserved and then stained with rose Bengal, in order to ascertain the 'living' (stained) assemblage of foraminifera. Only <1% of the taxa associated with the maerl appeared to be living at the time of collection in October 2012, and the assemblage of foraminifera was a mixture of taxa that are characteristic of open marine environments and those characteristic of estuarine and sea grass communities. The presence of pelagic ostracods and centric diatoms supports the notion that at least some of the high foraminiferal diversity reported from the maerl assemblages is the result of transported material trapped within the intricate maerl habitat. Foraminifera from other areas of the Fal Estuary are typical of saltmarsh, estuarine and near-shore marine assemblages reported elsewhere in South-West England.

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### INTRODUCTION

The designation of Marine Conservation Zones (MCZ) in England is being undertaken by Defra through Natural England (NE) and the Joint Nature Conservation Committee (JNCC). The first two tranches of MCZs were approved in 2013 and 2016, although a further 50+ potential locations have been identified through a nationwide process (Sadri *et al.*, 2011; Lieberknecht *et al.*, 2011; Bureck *et al.*, 2013) to augment an existing network of marine conservation areas around England. Under the Habitats Directive of the European Union (Natura 2000), a number of areas have been listed as Special Areas of Conservation (SAC). One such area is the 6,387.8 ha of the Fal and Helford SAC which encompasses the Helford River, part of Falmouth Bay and the Fal Estuary (Figure 1). This area includes sea inlets, tidal rivers, estuaries, mud flats, sand flats, salt marsh, salt pasture, sand dunes, beaches, machair, cliffs and islets (Figure 2). This SAC is one of the most important ria systems in South-West England, with a central, sinuous, relatively deep (20–30 m) channel (Sheehan *et al.*, 2015). The low fresh water input from a number of small rivers (e.g., Pencuil, Fal, Truro, Carnon, etc.) has allowed the development of a range of fully marine habitats from the extremely sheltered to the wave-exposed, tide-swept open coastline. Of particular importance are the maerl beds that are found on St Mawes Bank and extensive areas of maerl 'gravel' (Sheehan *et al.*, 2015) which extend within an area of the Carrick Roads, Falmouth Bank and Falmouth Bay (Figures 1, 2). These are the largest known maerl beds in South-West England and they provide habitat for an extremely high diversity of algae and a great many infaunal and epifaunal species (Bosence and Wilson, 2003; Peña *et al.*, 2014). The Fal Estuary contains both living and dead maerl deposits,



**Figure 1.** The boundaries of the Fal and Helford Special Area of Conservation.