

Blue Mussels in the Wash



Helen Vine, English
Nature, Norwich, UK

Development of Blue Mussels on the Wash/ North Norfolk Coast

Introduction

The Wash is the largest embayment in Britain with extensive areas of intertidal and subtidal sandflats. It is an extremely important site for nature conservation and, in 1996 it was put forward as a candidate marine Special Area of Conservation (cSAC), along with the North Norfolk Coast. It is also recognised as being one of the most important wetland sites for birds in Europe and was consequently designated as a Special Protection Area (SPA) in 1989.

Decline of Blue Mussel Beds

In addition to its significance for wildlife, the Wash is regarded as one of the most important shellfish producing areas in England and Wales. At its most recent peak, in 1987, mussel landings were responsible for about 70% of the total landings in the UK. However, in recent years, from approximately the late eighties onwards, the Wash has seen a major decline in the commercial viability of the shellfish stocks with landings of mussels in the Wash falling from 6,800 tonnes in 1989 (76% of UK landings) to only 25 tonnes in 1994 (0.2% of UK landings).

The reductions in landings illustrate the scale of the problem and reflects the run of very low mussel spatfalls experienced in recent years,

which have triggered the decline in the mussel fishery. Research of historical records show that, since the 1920s when records began, there has never been a run of mussel spatfall as poor as for the period 1988 to 1997. Of even greater concern is, prior to 1988, there were only two years with essentially a non-existent spatfall; a year in the 1950s and another in the early 1980s. In contrast, all nine consecutive years from 1988 to 1997 had had negligible spatfall.

The last mussel spatfall of significant size was in 1986. Consequently, mussel stocks in the Wash are at an all time low and the immediate prospect for the Wash mussel fishery is bleak unless the adult beds can be managed effectively for recovery.

Closure of Mussel Fishery

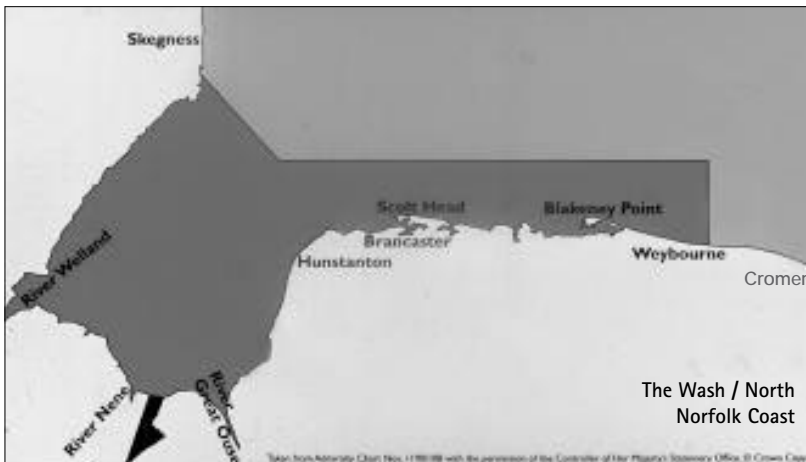
In an attempt to halt the decline, the Eastern Sea Fisheries Joint Committee (ESFJC), who are responsible for managing coastal fisheries in the area, decided to close the whole mussel fishery in 1994 to protect the dwindling adult stock which still remained in the Wash, principally on the Gat Sands. The closure was aimed at retaining a nucleus of adult breeding stock to provide the recruitment potential needed to help stocks recover.

With the growing concern over the health of the Wash and its ability to support sustainable

populations of shellfish, the ESFJC initiated the establishment of the "Wash Forum" in December 1996. The objective of the Wash Forum is to gather together scientists working in the Wash, to discuss and consider the decline in the shellfishery and to investigate the possible causal factors.

Following its initial meeting, the Forum has investigated the state of the fishery in detail and compared its performance with other mussel shell fisheries throughout the UK and in the Wadden Sea. Based on these comparisons, it appears the nature of the decline and the lack of significant spatfalls is unique to the Wash.

It is considered extremely unlikely that any one factor is acting in isolation to bring about the decline of the mussel stocks and further investigations are needed, especially on the factors limiting spat settlement. For, unless the adult beds can be rejuvenated, it is difficult to envisage the fishery prospering in the near future.



New Sublittoral Mussel Beds

The exciting discovery of new sublittoral mussel beds in the autumn of 1997 came as a welcome breakthrough. These beds were located by the ESFJC's research vessel "Surveyor" using its *RoxAnn* 'acoustic ground discrimination gear'.

The use of *RoxAnn* for mapping the biota of the seabed is being pioneered by Bob Foster-Smith and his colleagues at the University of Newcastle. Their work will form the basis for future management of the SAC by creating a detailed picture of the species and habitats of the seabed.

As well as using *RoxAnn* for mapping the fauna

of the seabed, the ESFJC have been trialing the technique for detecting sublittoral mussel beds and have had great success to date. In the autumn of 1997, two areas of sublittoral seed mussels were located. The mussels, when located, measured about 20-25mm in length and were essentially clear of predators at the time but needed to be moved quickly to avoid their loss to starfish and crab predation. The discovery allowed nearly 1,700 t of mussels to be relayed by the Wash fishermen, from the sublittoral beds onto the intertidal beds.

An examination of the relayed mussels in November 1997 showed that the seed had settled well with few losses from the relaying exercise, and the mussels were showing signs of growth. This exercise effectively doubled the mussel stocks in the Wash.

The proximity of the sublittoral mussel seed beds to the Gat Reserve (closed since 1994) is significant and the ESFJC are committed to retaining this nucleus of breeding stock to help

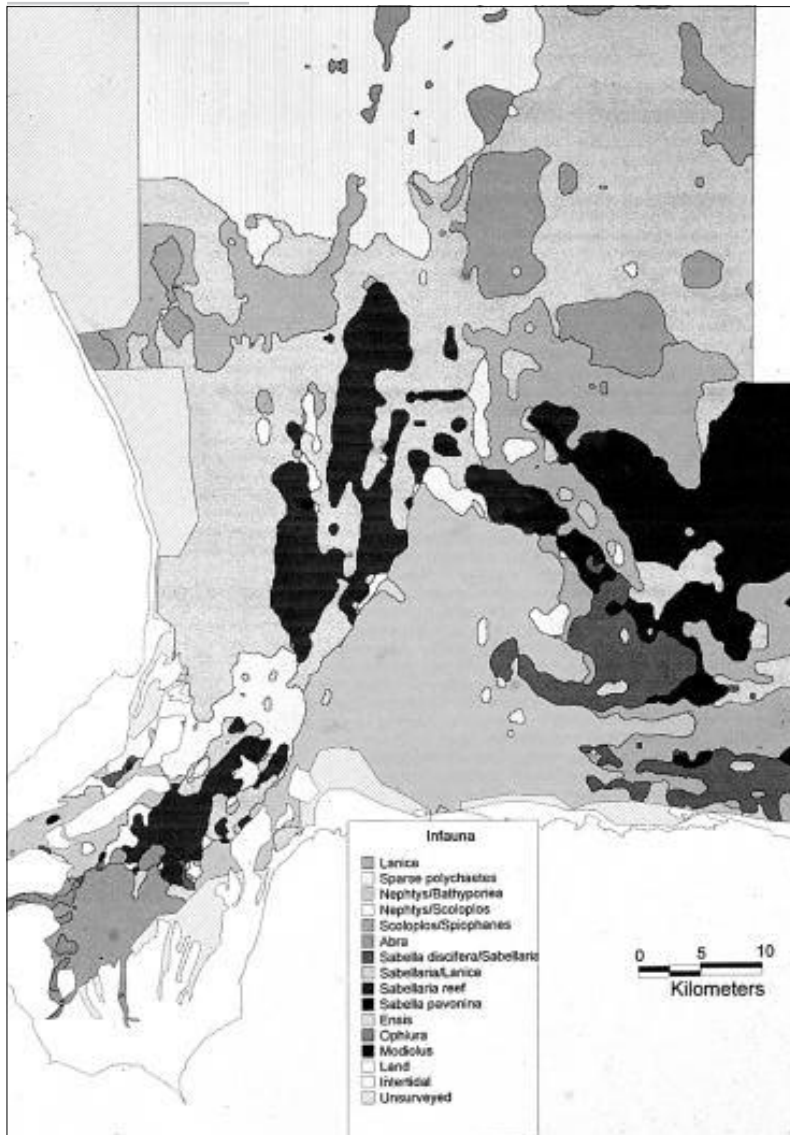
secure the long-term survival of the mussel fishery.

In 1998, more sublittoral mussel beds were located by the crew of "Surveyor" using their *RoxAnn* system and underwater camera, and these mussels were quickly relayed. They were relayed at an even smaller size than the previous year (at 15mm) but appeared to settle

into the muds better than before and have, so far, survived and grown on well. It is hoped, by relaying some of the sublittoral mussel seed onto the Gat Reserve, that the adult beds can be rejuvenated.

Settlement of Blue Mussels

Understanding mussel settlement behaviour is crucial to the investigations. They have a fascinating behaviour with spat development split into two phases: a primary and secondary phase. The spat spend a month in the plankton before settling, as primary spat, on filamentous bryozoans and hydroids. Once the spat have reached a size of approximately 0.5mm, they release themselves back



Distribution of infaunal biota predicted from acoustic and ground truth data.

into the water column. Here, the secondary spat may drift for weeks, or even months, until they find a suitable hard substrate on which to settle, which often includes settling on adult mussel beds. In the Wash, with the almost complete absence of any hard substratum, the existing mussel scalps provide the key settlement substrate for the secondary stage spat. Availability of suitable substrata for settlement and growth may well be one of the key limiting factors for stock rejuvenation within the Wash. This illustrates the need for retaining and rejuvenating the adult stocks to provide the attachment areas for mussel spat.

It is known that sediment type is critical for successful mussel settlement. In addition to the presence of adult mussels, the presence of the bristleworm (*Lanice* spp.) and the peacock worm *Sabella* spp. also appears to encourage the spat

settlement. The ESFJC are currently trialing the use of artificial surfaces for the settlement of mussel spat. The success of this will be greatly enhanced by the dissemination of knowledge from European fisheries, where more research has been carried out on the manipulation of substrate for encouraging settlement. Understanding the role of substrate characteristics for enhancing and encouraging mussel settlement and growth is key to achieving recovery of the intertidal mussel stocks.

While the investigations of the Wash Forum will continue, it is hoped that we may be able to team up with researchers from the Wadden Sea States to share experiences and understanding of blue mussel populations and explore the possibility of joint collaborative studies into mussel spat settlement and ways of rejuvenating adult beds, in the hope of returning the mussel stocks of the Wash to their former levels of the early 1980s.

Helen Vine
 English Nature
 60, Bracondale
 Norwich
 NR1 2BE
 norfolk@english-nature.org.uk