





MILFORD HAVEN WATERWAY
ENVIRONMENTAL SURVEILLANCE GROUP

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Milford Haven Waterway Environmental Surveillance Group

A Survey of Subtidal Eelgrass (*Zostera marina*) Beds in Milford Haven

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in Milford Haven**

Final Report

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Environmental Surveillance Group**

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Final Report

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Executive Summary

This study was commissioned by the Milford Haven Waterway Environmental Surveillance Group (MHWESG), in August 1999. The study's principle aim was to investigate the presence of *Zostera marina* beds in Milford Haven, in particular the beds known to occur at Littlewick and Longoar Bays (OSNGR SM880050 and SM853064 respectively). These beds were last surveyed in 1986 by Hiscock (1987). In this intervening time, part of the Haven, close to where the Littlewick Bay *Zostera marina* bed lies, was subject to oiling from the *Sea Empress* oil tanker in February/March 1996. Although the study's primary objective was not investigation of any effect of the spill, reference is made as to the possible affect the spill may have had on the *Z. marina* beds.

The eelgrass *Z. marina* is the only flowering plant within the British Isles that grows and produces seed entirely submerged by seawater. Where suitable shallow water substrata exist (typically sheltered muddy sand), the plant grows in extensive beds. It is able to do this by vegetative means, sending out creeping rhizomal roots from the base of each plant, which are capable of producing a number of new shoots along their length. They may also reproduce sexually by producing seeds, but it is uncertain whether seeds from British plants are viable; it appears that their viability is affected by water temperature.

Z. marina beds are of considerable economic and conservation importance. They constitute an important marine habitat, potentially highly productive and supportive of biodiversity. However, they are sensitive and vulnerable to a wide range of anthropogenic activities. *Z. marina* (together with the closely related, but largely intertidal *Z. angustifolia* and *Z. noltii*) are considered nationally scarce in the UK.

Two beds of eelgrass *Z. marina* are present within Milford Haven. The larger of the two is between Littlewick Bay and Gelliswick Bay on the north side of the Haven; the smaller being at Longoar Bay on the east side of Great Castle Head, some 3km west-north-west of the larger bed. The larger bed near Littlewick Bay was the subject of a preliminary survey in 1979, with a further more comprehensive survey in 1986. The present survey was designed to assess what (if any) changes had occurred to the bed in the intervening 13 years. The survey was undertaken from 12th –17th September 1999 using a team of three divers.

The boundary of the Littlewick Bay bed was determined and the density of plants within the bed was investigated by undertaking counts at predetermined stations along six transects across the bed. The size of the plants at each station was measured, together with the amount of any epiphytic cover on the leaves of the plants. Notes were taken of the type of sediment near the sampling stations as well as any conspicuous organisms on the seabed. Samples of sediment were collected from the Littlewick Bay bed for particle size analysis and for hydrocarbon analysis. The survey team was asked to look for the incidence of the 'wasting disease' of *Z. marina* plants, believed to be caused by the slime mould fungus *Labrynthula macrocystis*. In addition, the extent of the smaller eelgrass bed within Longoar Bay was mapped.

The survey and mapping concluded that the extent of the Littlewick Bay bed was very similar to that determined in 1986. The bed was approximately 1,300m long (along an east/west axis), 20m wide at its narrowest and 220m wide at its widest. The area of the bed was approximately 12.20ha. Along all six transects (which were set at approximate intervals of 400m), the density of plants was higher at stations closest to the shore compared with those at the opposite (deeper) end of the transect. Plants were also more dense at the western and eastern ends of the bed as opposed to stations closer to the middle of the bed. The mean plant length for each transect ranged from 54.3cm (Transect 2) to 44.0cm (Transect 5).

Whilst indications of leaf deterioration were found, it has not been possible to confirm whether these signs are a positive indication that the leaves are actually infected by *Labrynthula macrocystis*. *Z. marina* is a deciduous plant that naturally loses its older, outer leaves at the end of the summer. As these leaves gradually wither, turning from a green to a dark brown colour, they take on characteristics that are very similar to that indicative of the wasting disease. Further examination of plants would be necessary for this situation to be clarified.

The outer leaves of plants were found to have a high percentage of epiphyte cover – that is, other algae growing on them. This is a natural occurrence; these leaves were often in a poor condition and would soon have been torn away from the plant. The younger, shorter leaves in the middle of the plant were typically free of such growths. There appeared to be little difference between the amount of epiphyte cover on plants growing close to the inner (shallow) edge of the bed and those growing close to the outer (deeper) edge. There was also little difference in the epiphyte cover between those plants at the western end of the bed (Transect 1) and those at the eastern end (Transect 6).

The seabed amongst the *Z. marina* plants largely comprised muddy sand with occasional pebbles. The fauna was dominated by clusters of the sea squirt *Ascidiella aspersa* attached to shells or pebbles embedded in the surrounding sediment. Another sea squirt *Molgula manhattensis* was also present at most stations where sampling took place. Small protruding tubes of the sandmason worm *Lanice conchilega* were frequently encountered. The snakelocks anemone *Anemonia viridis* was often found attached to leaves of the *Z. marina* plants as well as on the seabed. No algal mats were encountered in the vicinity of any of the transect sampling stations, though there was often a large amount of drift algal material and loose *Z. marina* leaves that covered a large proportion of the seabed. Unfortunately, the poor underwater visibility (typically less than 1m) meant that only a small number of close-up photographs were taken of these organisms.

The particle size analysis of the sediment samples from Littlewick Bay found the sediment composition to be typical of an estuarine environment. The substratum is dominated by a high proportion of fine material, in particular sands and silts. The potential for such a composition to ‘lock up’ contaminants is discussed in relation to the *Sea Empress* oil spill and sources of other contaminants. The hydrocarbon analysis of samples of sediment taken throughout the Littlewick Bay bed found that concentrations of hydrocarbons were low and similar to those found in previous studies. Additionally, the hydrocarbon level appears to be more uniform across the bed in comparison with previous years. Total Scanning Fluorescence analysis found that the composition of the hydrocarbons present was very similar to Forties Crude oil – the cargo of the *Sea Empress*. However, without further, more detailed analysis, it is not possible to directly attribute the levels of hydrocarbons present to a particular source (such as the *Sea Empress*). Considering the location of Littlewick Bay, between two oil jetties and in close proximity to an industrial port, it is concluded that the hydrocarbon levels present are surprisingly low, and that the growth of *Z. marina* is not adversely affected.

In line with the Project Specification, the presence of *Z. marina* plants in Longoar Bay was confirmed, though the bed here was found much smaller and less distinct than the Littlewick Bay bed.

It is recommended that further surveys of both *Z. marina* beds within Milford Haven be undertaken within 3 – 5 years time. In addition, confirmation of the presence or absence of the infective agent *Labrynthula macrocystis* within the beds should be investigated.