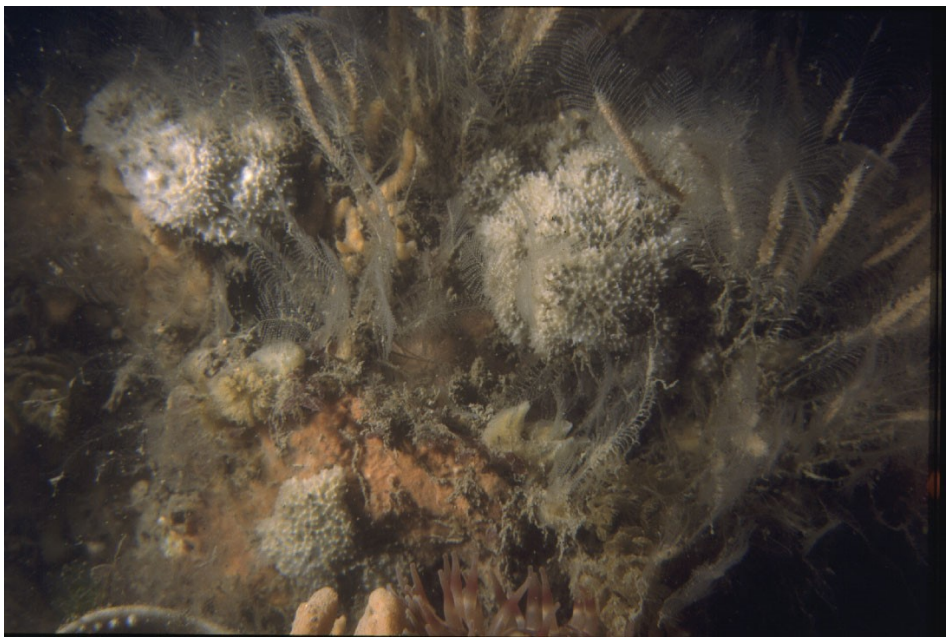
MONITORING OF THE ROCKY SUB-LITTORAL OF MILFORD HAVEN

MAY-JULY 1998

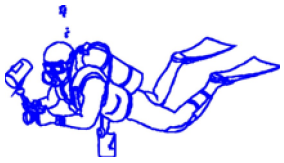


A report to

MILFORD HAVEN WATERWAY ENVIRONMENTAL MONITORING STEERING GROUP

from

Marine Biological Surveys



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APPENDICES

Supplied as materials separate to this volume

EXECUTIVE SUMMARY

This report describes a study to establish a series of monitoring stations on sublittoral hard substrate throughout Milford Haven, and to collect baseline data for these stations. The study was commissioned by the Milford Haven Waterway Environmental Monitoring Steering Group. The requirements of the study were to survey a range of rocky substrate sites throughout Milford Haven, and to establish permanent monitoring stations at these sites. The stations were to be surveyed using standard MNCR Phase II techniques, with quantitative descriptions of the epibenthos recorded within permanent quadrats or transects. The monitoring stations established were required to be easily re-locatable and sufficiently robust that they should survive a minimum of five years. In addition, a photographic and video record was to be compiled of each station. Thirteen possible sites were proposed, from which the survey and monitoring sites were to be selected. These sites ranged from Chapel Rocks at the mouth of the estuary, a wave-exposed, fully saline site where relatively clear water conditions prevail, to Landshipping Quay some 23km upstream, an extremely wave-sheltered site where low salinity and high turbidity conditions prevail. Out of these 13 possible sites, 9 were selected for survey and monitoring. These 9 sites were spread as evenly as practicable throughout the mouth, lower and middle reaches of the estuary.

The field work for this study was conducted during the summer of 1998, between the 16th of May and the 21st of July. A team of four, HSE qualified, diver/biologists was used for all diving operations. Diving operations were conducted from the 5.5m rigid-hulled inflatable (RIB) *Starfish*. The prime means of position fixing was a differential global positioning system (DGPS) using a local differential signal, supplied by Milford Haven Port Authority.

Due to the strong tidal streams prevailing within the Haven, diving operations were limited to relatively short periods of slack water during neap tides. All diving operations were conducted in accordance with HSE Diving Operations at Work Regulations 1997 Approved Code of Practice, Scientific and Archaeological Diving Projects (Health and Safety Commission) and Marine Biological Surveys Diving Regulations.

Sites were selected from the list of 13 potential sites to provide good spatial coverage within the study area, and to also cover as wide a range of hard substrate community types as possible (excluding the sublittoral fringe and kelp forest). Inevitably practical considerations, in particular weather conditions, also played a part. Exposed sites could not be worked during strong southerly or westerly winds, while upstream sites became more difficult (through reduced visibility) after periods of heavy rainfall. The 9 sites selected for survey and monitoring were: Chapel Rocks; Great Castle Head; Stack Rocks; Pennar Mouth; Dock Yard Bank; Pembroke Ferry; Cosheston Trot; Castle Rocks and Castle Reach. At Chapel Rocks, Pembroke Ferry and Cosheston Trot sites, distinct biological communities were recorded at different depth zones. Consequently two separate stations (one deep, one shallow) were established at each of these sites. Thus in total 12 stations, each comprising four monitoring quadrats, were established.

The position of each station was recorded using DGPS. The location of each station was also marked, generally by anchoring a sub-surface buoy to the seabed. Where it was deemed necessary, redundant markers were also established at set distances and directions from the station.

At each station, suitable positions for the four quantitative monitoring quadrats (each 0.5m^2) were located. The precise location of each quadrat was permanently marked by fixing stainless steel bolts or ring bolts at, or close to, two of the quadrat corners. Where fissures in the rock could be exploited, the marking bolts hammered into these and, where necessary, secured by filling the crevice with resin. Where fissures could not be used, holes were drilled using a pneumatic drill and the bolts secured in these, again using quick-setting resin.

The position of each quadrat was mapped relative to the station marker and any other conspicuous features present.

An aluminium quadrat frame was positioned, in turn, over each quadrat, and the number of individuals or colonies of each species present was counted. Species that could not be identified underwater were collected and identified in the laboratory. Each quadrat was also photographed and videoed.

The general habitat in the vicinity of the station was also surveyed, and the abundances of conspicuous species recorded.

This report details the methods employed, and describes each site and station surveyed. Appendices of the report include:

- diagrams showing the quadrat positions in relation the station markers and general seabed features;
- details of the species recorded at each station and
- microphotographs of sponge samples collected
- photographs and edited video footage of the general habitat at each station and of each quadrat.

Recommendations

The report also includes a number of recommendations, these are summarised below.

1. **Site maintenance is conducted at no greater than two year intervals.**
   Whist every effort has been made to ensure the monitoring stations will survive for five years, it is considered inevitable that there will be considerable deterioration and overgrowth within that timescale. It is therefore suggested that site maintenance is conducted at no greater than two year intervals. It is felt that the additional costs incurred for this increased servicing frequency will be offset by the savings incurred through conducting servicing before it becomes a major problem for station/quadrat location, and the increased confidence in comparisons made between data sets from successive monitoring periods.

2. **Monitoring should be conducted at least biennially.**
   It is assumed that one major benefit from establishing the monitoring programme will be the provision of a benchmark ‘condition’ for each station, against which change, in

particular change following a significant impact, may be measured. However, species assemblages may fluctuate naturally over time, particularly where fast growing, short-lived species dominate. Without a time–series data set of variation under natural conditions, it is difficult to distinguish between 'normal' change in species composition and that due to anthropogenic impacts. With a monitoring interval greater than two years, it is felt that the construction of a useable time-series dataset, and so parameters for change under normal conditions, will take an inordinately long time.

It may be desirable to prioritise monitoring effort, for example six of the sites could be selected for biennial monitoring, the remainder monitored on a more infrequent basis (e.g. every five or six years).

3. There should be a degree of continuity within the monitoring team.

Finally, it is strongly believed that the quality of monitoring data is greatly enhanced if there is a degree of continuity within the monitoring team. This does not necessarily mean that the same contractor should undertake the work, but that at least one team member should participate on successive monitoring exercises. No matter how detailed the descriptions are of site location, methodology and data work up, there will always be numerous small details of held in surveyor's heads rather than described on paper. Ensuring these details remain constant helps to ensure comparisons of datasets are truly comparing 'like for like'. One practical way of ensuring this may be to have an employee of CCW (or other member of MHWEMSG) participate on part of each monitoring programme.