

INTERTIDAL MONITORING AT LUNDY MARINE NATURE RESERVE, OCTOBER 1991

By

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INTRODUCTION

The Lundy Marine Nature Reserve contains a variety of interesting and rare biological communities, with several species at or near the northern-most limit of their distribution. In the intertidal zone the slate shores, found in the south-east corner of the island, are particularly rich, and have been the focus of most intertidal studies on Lundy since Professor L.A. Harvey described them in 1951. The rest of the island is dominated by steep granite shores, but also offers boulder shores and numerous intertidal caves.

The monitoring programme established by Dr K Hiscock in 1984 was designed to provide a basis for following change in a variety of intertidal communities and assessing longevity, growth rates, mortality and recruitment in species suspected of being long-lived. Sites include the rockpools at Devil's Kitchen, an intertidal cave on Rat Island and intertidal cup corals at Devil's Kitchen and north of Gannet's Rock. Intertidal monitoring has been carried out subsequently (Hiscock 1986a & b) under contract to the Nature Conservancy Council in 1985 and 1986. Other than a re-survey of the Devil's Kitchen cup coral site in 1989, no intertidal monitoring has been performed since 1986. In the interim period the development of a road between The Landing Beach and The Cove on the southeast part of the island has been in progress and shale waste from construction has covered intertidal areas. The sites monitored in October 1991 are indicated in figs 1 & 2 (adapted from Hiscock 1984).

DEVIL'S KITCHEN ROCKPOOLS

A detailed survey of rockpool communities at Devil's Kitchen shore was carried out by Hiscock (1984) and seven rockpools were selected for monitoring. Over the years that this site has been monitored, considerable seasonal variation has been evident, particularly in relation to abundance of green algae, but also to the filamentous red alga *Ceramium rubrum*, and possibly egg masses of the worm *Eulalia*. In October 1991 more green algae was recorded than in the spring of 1984 and 1986, although less than in the summer of 1985. The abundance and diversity of species in three out of the seven rockpools was greater in 1991 than recorded previously.

RAT ISLAND CAVE COMMUNITY

In 1984 a cave on Rat Island was chosen for monitoring purposes on the grounds of its interesting fauna and accessibility. Particular attention was directed towards the anemones present in the cave. Two stainless steel screws were placed into the wall of the cave 2.5m apart, such that a string transect line could be stretched between them to bisect the densest colonies of anemones. In 1984, 1985 and 1986 photographs were taken along the transect line and numbers of anemones counted. As in previous years, the screws in the cave were located and a piece of string stretched between them to form a frame of reference for taking photographs. Sequential photographs 22 x 15cm were taken along the line. Transparencies were later analysed to count the number of anemones and to compare each frame with photographs taken in 1985 and 1986; this was done using two projectors to project comparable images next to each other. The community present included the anemones *Metridium senile*, *Sagartia elegans* and *Actinia equina*. Their numbers are indicated in Table 1 along with records from previous years. Neither the anemone *Sagartiogeton* spp. nor the cup coral *Corynactis viridis* were found despite specifically searching for these species; they were recorded in 1984.

As shown in Table 1, there were far fewer *Sagartia elegans* and *Metridium senile* although *Actinia equina* numbers had increased substantially and it was noticeable that

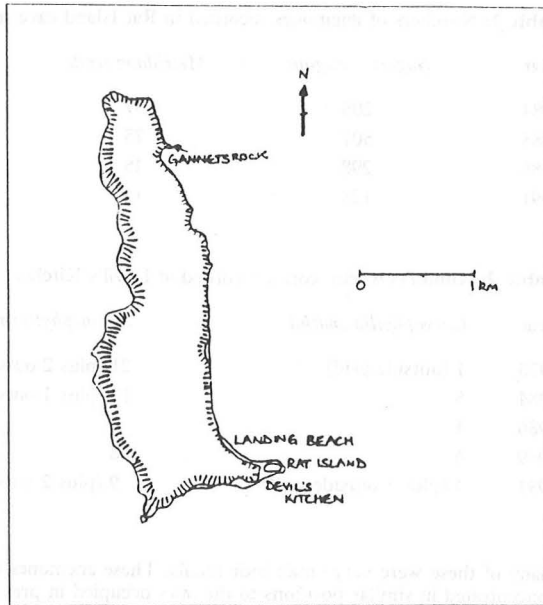


Figure 1: Map of Lundy showing intertidal monitoring sites (adapted from Hiscock 1984).

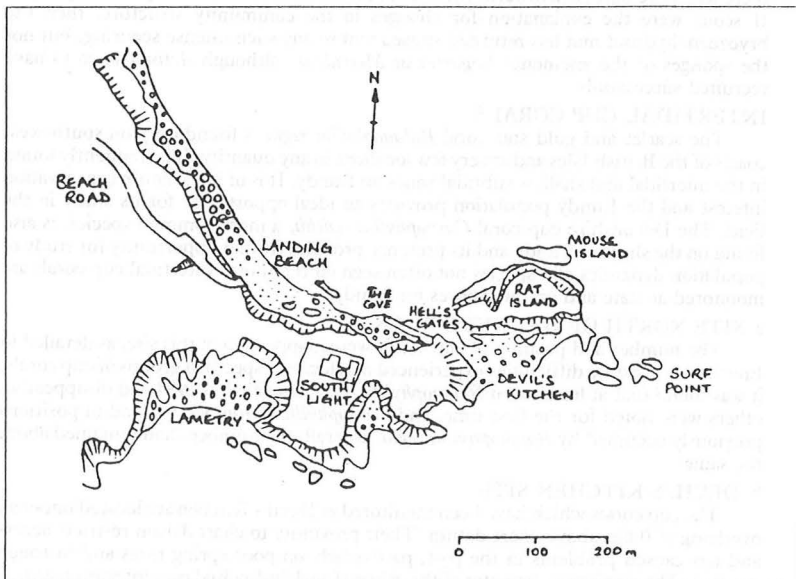


Figure 2: The southeast part of Lundy (adapted from Hiscock 1984).

Table 1: Numbers of anemones recorded in Rat Island cave transect.

Year	<i>Sagartia elegans</i>	<i>Metridium senile</i>	<i>Actinia equina</i>
1984	205	37	8
1985	507	75	4
1986	298	48	5
1991	123	14	38

Table 2: Numbers of cup corals recorded at Devil's Kitchen site.

Year	<i>Caryophyllia smithii</i>	<i>Balanophyllia regia</i>
1970	1 (outside grid)	21 (plus 2 outside grid)
1984	5	17 (plus 1 outside grid)
1986	4	13
1989	4	8
1991	4 (plus 1 outside grid)	9 (plus 2 outside grid)

many of these were very small individuals. Those anemones that were present were concentrated in similar positions to the ones occupied in previous years.

The community present in the cave is characteristic of one present in areas subject to occasional scour. However, many of the anemones seem to have disappeared and there was more bare rock towards the back of the cave and fewer, less expansive sponges. If scour were the explanation for changes in the community structure, then the bryozoan/hydroid mat has returned subsequent to any such intense scouring, but not the sponges or the anemones *Sagartia* or *Metridium*, although *Actinia* seem to have recruited successfully.

INTERTIDAL CUP CORALS

The scarlet and gold star coral *Balanophyllia regia* is found only on south-west coasts of the British Isles and at very few locations in any quantity. It is frequently found in the intertidal and shallow subtidal zones on Lundy. It is of high nature conservation interest and the Lundy population provides an ideal opportunity for its study in the field. The Devonshire cup coral *Caryophyllia smithii*, a more common species, is also found on the shore at Lundy and its presence provides further opportunity for study of population dynamics of a species not often seen on the shore. Intertidal cup corals are monitored at slate and granite shores on Lundy.

a SITE NORTH OF GANNET'S ROCK

The number and position of cup corals were mapped out at this site, as detailed in Eno (1992). Despite difficulties experienced in relocating specified groups of cup corals, it was found that at least seven *Balanophyllia regia* identified in 1984 had disappeared, others were noted for the first time, and *Caryophyllia smithii* were found in positions previously occupied by *Balanophyllia regia*. Overall, the numbers had remained about the same.

b DEVIL'S KITCHEN SITE

The cup corals which have been monitored at Devil's Kitchen are located under an overhang at 0.6m above chart datum. Their proximity to chart datum restricts access and has caused problems in the past, particularly on poor spring tides and in rough weather. The maximum diameter of the calice of each individual present was measured in 1970 and since then in 1984, 1986 and 1989. The position of all cup corals found under the overhang has also been recorded consistently in relation to a grid 50 x 50cm divided

into 10 x 10cm squares. The lower edge of the quadrat is positioned 0.6m above chart datum. Due to the reasons stated above, it was not possible to measure the cup corals at this site in October 1991, although their positions were roughly mapped. Table 2 gives the numbers of cup corals recorded at this site. For details of maximum calice diameter in 1970, 1984, 1985 and 1986 see Hiscock (1984, 1986a & b) and for 1989 see Eno (1992).

As seen in Table 2, the number of cup corals found at this site has declined over the two decades that they have been studied, reaching an all time low in 1989. There has been no change in the numbers of *C. smithii* but *B. regia* numbers have halved since 1970. Records indicate that the maximum calice diameter of cup corals has increased. This suggests that older members of the population are being lost and recruitment is not replacing them at an equivalent rate. Very small individuals were only found in 1970 (Hiscock 1984) and since then the maximum calice diameters have tended to be greater.

CONSTRUCTION OF ROAD FROM LANDING BEACH TO THE COVE

Construction of a road from Landing Beach to The Cove has caused land slides and slippage of slate into the sea. Rock blasted from the cliff face had accumulated as shale on the upper shore. In turn, this material has moved seaward towards a rock platform and gulleys previously known to be rich in a variety of marine life (K. Hiscock, personal communication). The quantity of slate fragments on the shore at Landing Beach and The Cove appears to have increased until about 1989 but has decreased subsequently, although not to pre construction levels, and slate rockpools have been lost.

GENERAL CONCLUSIONS

Within the cave on Rat Island there had been a substantial decrease in the number of anemones *Metridium senile* and *Sagartia elegans* present. This was possibly connected with the construction of a road between Landing Beach and The Cove, which caused much jagged slate to slip into the bay, especially in 1989, which, in times of rough weather, could have had a very abrasive effect within the caves. The otherwise normal appearance of the cave community and recent recruitment of *Actinia equina* suggests that the other anemones and sponges had possibly been lost some time ago. A lack of monitoring between 1986 and 1991 means that it is impossible to confirm whether this hypothesis is true. The production of viviparous young by *Actinia equina* upon collection (Manuel 1981) suggests they are able to recruit rapidly in their immediate vicinity, which may account for their apparently recent success in Rat Island cave.

In October 1991 there was no evidence of shale accumulation at Devil's Kitchen as a result of the road works being carried out at the Landing Beach. It seems unlikely that this shore was affected by the road works. The decline in numbers of *Balanophyllia regia* is a continuation of the trend noted in previous years. The rockpool communities do not appear to have suffered any visible long-term effects and there is no record of what happened between 1986 and 1991.

The stability of communities from year to year on Lundy suggests either long-lived individuals or a balanced mortality and recruitment in populations (Hiscock, in press). The results of monitoring data accumulated over the years suggests that a turnover in the cup coral populations is evident, with evidence of recruitment and loss of both *Caryophyllia smithii* and *Balanophyllia regia* since 1986. However, individuals have also been identified over several years, particularly of *B. regia* suggesting that longevity is an important mechanism too.

An analysis of marine monitoring data from Lundy and the Isles of Scilly is currently being made by Sarah Fowler for English Nature. This will make recommendations for future marine monitoring programmes on Lundy.

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