AN UNDERWATER SURVEY OF THE KNOLL PINS

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Introduction

For some time now Atlantic College has been thinking of establishing some sort of long term underwater project. With the waters of the immediate vicinity being so inhospitable eyes were cast further afield and naturally alighted on Lundy. Keith Hiscock from the Marine Laboratory at Menai Bridge informed us of the activities underway to establish a marine reserve around the island. Thus, a project was formulated to investigate the distribution of substrates and marine communities in the nearshore area, as a background to the management of the area. This paper describes the first part of the project which was carried at the Knoll Pins in early September 1973.

The project made use of the interest and enthusiasm generated by the Marine Science course at the College to provide the personnel, and the rigid hull inflatables operated by the Inshore Rescue Service of the College to provide transport. Initial trips in March and July '73 were of an exploratory nature. We decided to make detailed survey of one site and chose the Knoll Pins because:

1. they were on the sheltered side of the island
2. they were frequented by divers
3. they made obvious marks at low tide
4. they were an immediate challenge to re-locate at high tide
5. they appeared to be small enough to be covered in detail in the two week period we had as our observation time.

Previous studies of the Knoll Pins have been confined to general survey of Hiscock (1970) and Hiscock (ed.) (1971). Algal species have been recorded by Irvine et al. (1972).

Aims and Methods

The aim of the project was to describe the Knoll Pins accurately both topographically and biotopographically, and present a comprehensive 'divers guide to the Knoll Pins'.

Three rigid hull inflatables about 20ft. in length belonging to the Atlantic College Inshore Lifeboat Corps were used. A dive marshall remained in a boat anchored at the Pins for the duration of a dive. At any one time as many as three pairs of divers could be working in the water. Information was recorded by the diver on a checklist prepared before entering the water. The depths were measured in feet using capillary depth gauges, and converted to metres later. The orientation of the transects was recorded with a diving compass and the measurements are given in degrees from magnetic north. All the information was collected by the marshal from the divers as each surfaced. The two other boats were used for ferrying divers and equipment back and forth between the landing beach and the Pins. Thus fluency and continuity were maintained for the day's diving.

48 diving pairs with a total of 22hrs. 22mins. diving time collected all the data presented in this paper. Preliminary investigations at other sites accounted for a further 6 pairs with a total time of 2hrs. 42mins. Of the 12 divers involved only 2 were responsible for the collection of faunistic data.

The transect lines were taken radially from two main centres on the Pins. Each transect was described in detail and the data used to prepare the contour map (Fig. 2) and the rock profiles (Fig. 3).

The technique used was a development of one learnt from Peter Hunnam at Dale Fort Field Centre. Transect lines 150ft. long and marked at 5ft. intervals were laid from the emergent part of the Pins to their base. One pair of divers

would lay the line on descent and record the depths of the marks on ascent, after this another pair of divers would go down with a checklist of 52 of the more common species and record their presence at the first occurrence. On the way down as the most shallow occurrence and on the way up for the deepest occurrence, in either case a band approxiately 10ft. each side of the line was investigated. The transect ropes were left tied around the top of the Pins and moved to a new bearing under water. All the data was recorded on acetate sheets and handed to the dive marshall on surfacing.

From information recorded earlier in the year we were aware of the following underwater features: a North Pin, a chasm between it and the Outer Pin, a saddle between the Inner and Outer Pins and a shoulder (not very obvious) extending from the Inner Pin towards the shore, which helped us decide the bearings for our transects. Thus we laid our transect lines on either side of a feature and then down the middle of it. This enabled us to map out the three dimensions and obtain an accurate picture of each feature.

After the day's diving was completed all the information was correlated and recorded. Profiles were drawn up and after we had a few of them we started to draw the contour map which was continually revised. This process of continuous assessment pointed out the areas of most interest and enabled us to be systematic in our investigation. It was rather like doing a jigsaw puzzle, choosing which bit would be the most useful to supply next and then going to look for it.

Topographical Results

The Knoll Pins lie at map reference SS142466 on the National Grid. At Mean Low Water Springs the Inner Pin dries 4m. and the Outer a little more than one metre. The distance from the Inner Pin to shore is 130 m. measured on the O/S 6-inch map.

The Pins could be enclosed in a rectangular area of seabed about 85 m. west to east and 65 m. north to south. The Outer Pin with its North Pin attached accounts for approximately two thirds of the total area. The distance between the Inner and Outer Pins is 30 m. They are joined by a saddle which extends down to 12 m. below the top of the Inner Pin on a bearing 060°.

Figure 1 shows the distribution of substrates. The Pins are presumably granite as this is the only know bedrock for about 1½ miles radius. The bottom around the Pins is mud and sand except around the south half of the Outer Pin and the northwest end of the Inner Pin, both of which are mainly shell gravel. The substrate on the north side of the Inner Pin near the bottom is composed of boulders and bedrock.

There are several interesting features about the Knoll Pins. There is a chasm 4 m. wide, 7 m. deep and about 10 m. long between the Outer and North Pins bearing 060°—240°. North of the Inner Pin is a small rock about 2 m. high just before the base of the Pin. Although it does not show up on the contour map there is a shoulder 3 m. wide and not quite 3 m. higher than the surrounding rock, which extends from the base of the Inner Pin on a bearing 240°, and gradually tapers away from the rock.

One very interesting point about the Pins is that many features lie on a bearing 060°—240°. The chasm already mentioned, the Pins bear 060° from a triangular rock on the shore, the saddle between the Pins, the shoulder on the Inner Pin and finally the Outer Pin extends for a long way out on this line. These may be coincidences or may be due to some geological phenomenon such as a fault line, further studies in nearby areas should help to elucidate this phenomenon.

Biotopographical Survey

There is an extensive kelp forest skirting the Pins to a depth of about 9 m. below Chart Datum sometimes extending down to 11 m. below C.D., Another species found throughout the kelp forest and deeper is the finely branched red alga *Plocamium cartilagineum*. The main animal species found in the kelp were

the sea urchin *Echinus esculentus*, the Devonshire cup coral *Caryophyllia smithi* and the jewel anemone *Corynactis viridis*, all three fairly abundantly. Occasionally the cotton spinner *Holothuria forskali* and the spiny starfish *Marthasterias glacialis* were also observed in the kelp zone.

Table 1 shows the maximum and minimum depths recorded for 18 of the more common species encountered, it also shows their presence on the different transects. There are a few points that can be mentioned about some of these species. Dead mans fingers *Alcyonium digitatum* were found at intervals on most transects and, with one exception nearer the base of the Pins. *Alcyonium couchi* was common in large patches, again, nearer the base. This suggests that both species of *Alyconium* are deep water forms, however, on other shores in Britain *A. digitatum* is found between the tides, so this may suggest that they are confined to the lower regions by competition for space in the kelp forest. *Caryophyllia smithi* and *Corynactis viridis* are abundant at almost all locations. On the south side of the Inner Pin there is a vertical face 18 m. high covered with *Corynactis* of every conceivable colour, and there are great beds of them at other places around the Pins. As might be expected in a fairly extensive study several of the less common species have been recorded for the first time at the Knoll Pins. *Asterias rubens* has been seen several times and was not recorded for the east coast by Hiscock (1970). One specimen of the seven armed starfish *Luidia ciliaris* was found, this species is common off the south coast but had not yet been seen off the east (Hiscock 1970). One patch of *Balanophyllia regia* has been recorded in the chasm at a depth of 14 m., however, this really is a shallow water species not usually found below 7 m., and may have been mistaken for *Sagartia elegans*. Future dives should be able to clarify this point.

The table has led us to propose a list of characteristic species for the Knoll Pins locality. This list may have wider application for east coast rocky habitats, but this will have to await further investigations. The nine species which are practically ubiquitous are: *Axinella polypoides*, *Alcyonium digitatum*, *A. couchi*, *Caryophyllia smithi*, *Corynactis viridis*, *Marthasterias glacialis*, *Echinus esculentus* and *Holothuria forskali*. These species will form the backbone on which our further investigations at the Knoll Pins will be based, so that we can find out more about their adaptation to and occurrence within this habitat.

No detailed analysis has yet been made of the surrounding bottom faunas in the sand/muddy sand areas or the shell gravel. Several species have been casually observed, such as *Pecten maximus*, *Goneplax angulata*, *Sabella penicillus* and *Lanice conchilega* as well as many species of anemone half buried in the ground. A more detailed study of these habitats will enable us to develop our underwater survey technique, and help us to make sensible comparisons between the different habitats of the area.

Acknowledgements

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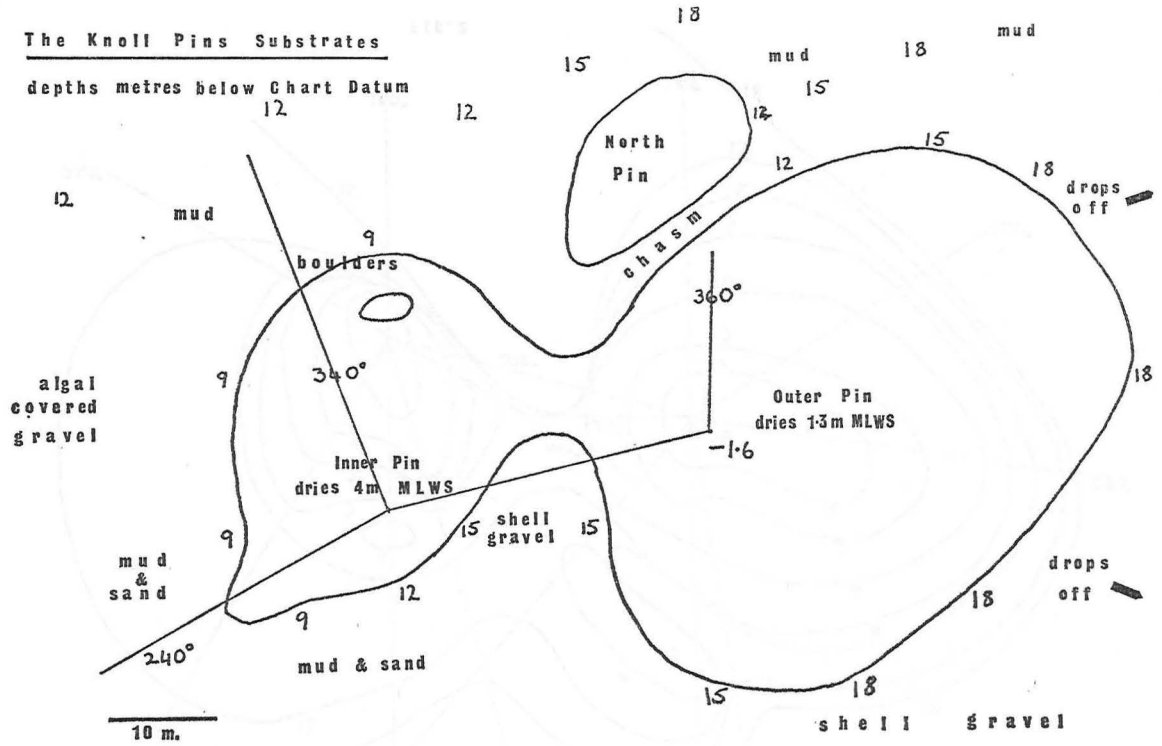

The Knoll Pins Substrates
depths metres below Chart Datum
18
mud
mud
18
15
15
12
12
12
North
Pin
15
12
18
drops
off
12
mud
9
boulders
chasm
360°
algal
covered
gravel
9
340°
Outer Pin
dries 1·3m MLWS
18
-1·6
Inner Pin
dries 4m MLWS
15
shell
gravel
15
9
mud
&
sand
12
drops
off
18
9
240°
mud & sand
15
18
10 m.
shell gravel
shell gravel

FIG. 1

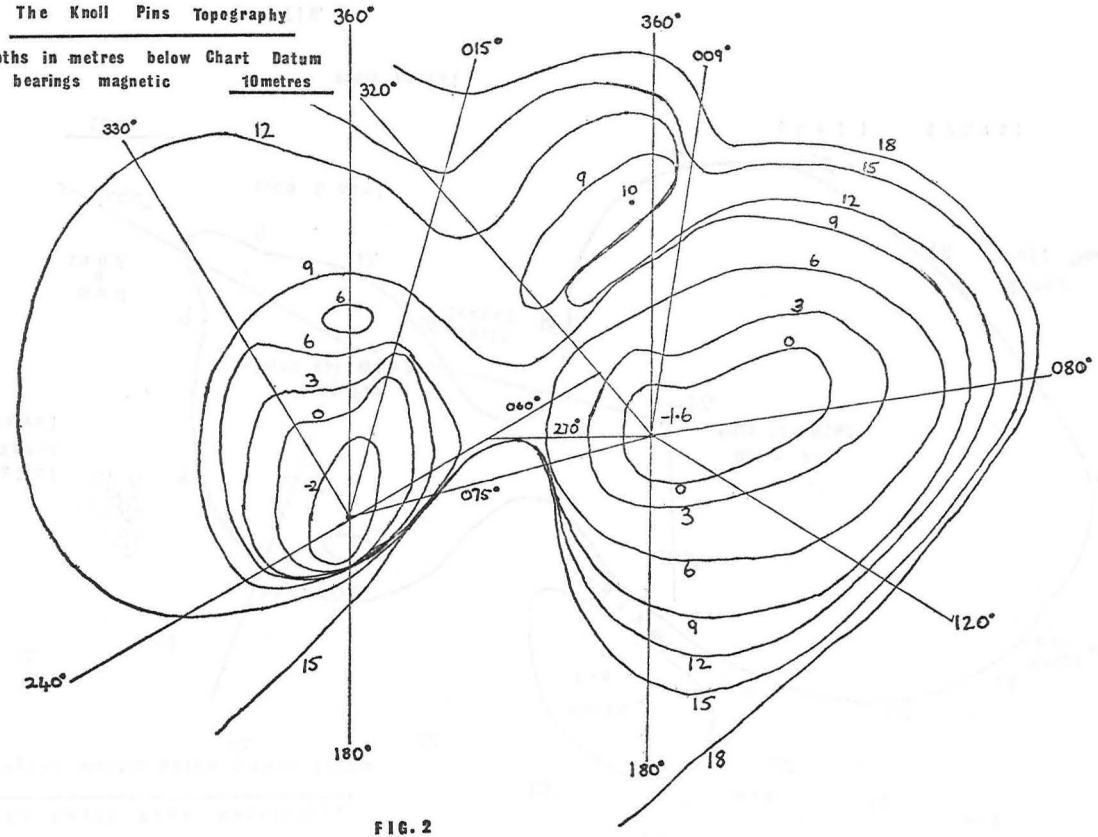

The Knoll Pins Topography
depths in metres below Chart Datum
all bearings magnetic
10 metres
360°
015°
320°
330°
12
9
6
6
3
0
-2
9
10
360°
009°
18
15
12
9
6
3
0
080°
060°
210°
-1·6
075°
0
3
6
9
12
15
18
120°
240°
15
180°
180°

FIG. 2

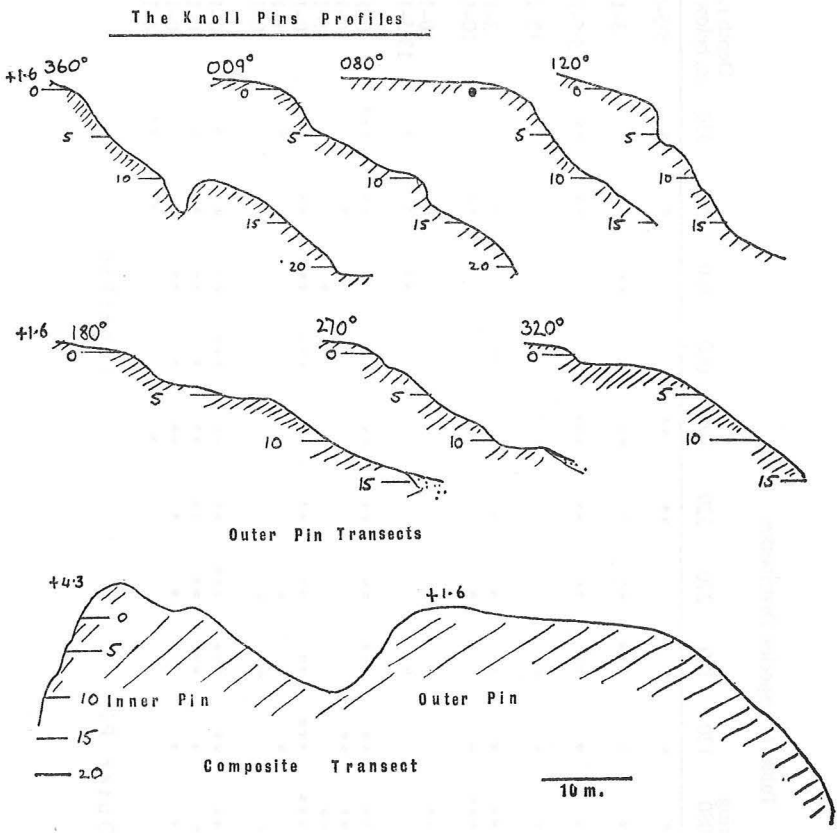
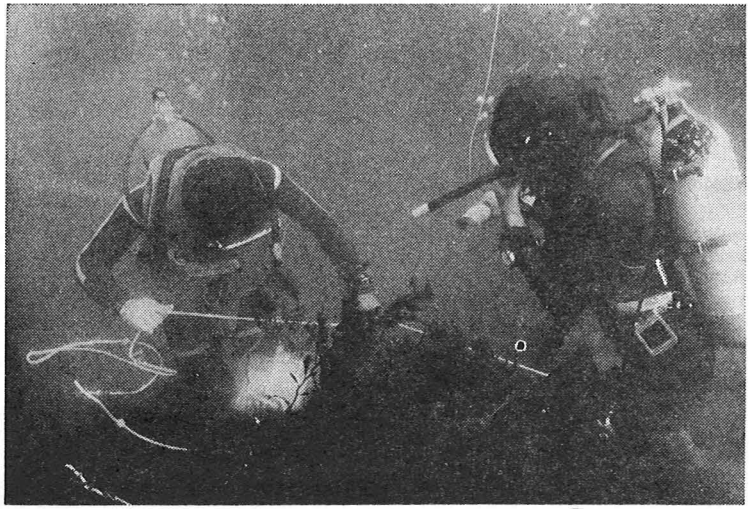

The Knoll Pins Profiles
+1·6
360°
009°
080°
120°
180°
270°
320°
0
5
10
15
20
Outer Pin Transects
+4·3
+1·6
Inner Pin
Outer Pin
Composite Transect
10 m.
360°
015°
180°
240°
330°
Inner Pin Transects

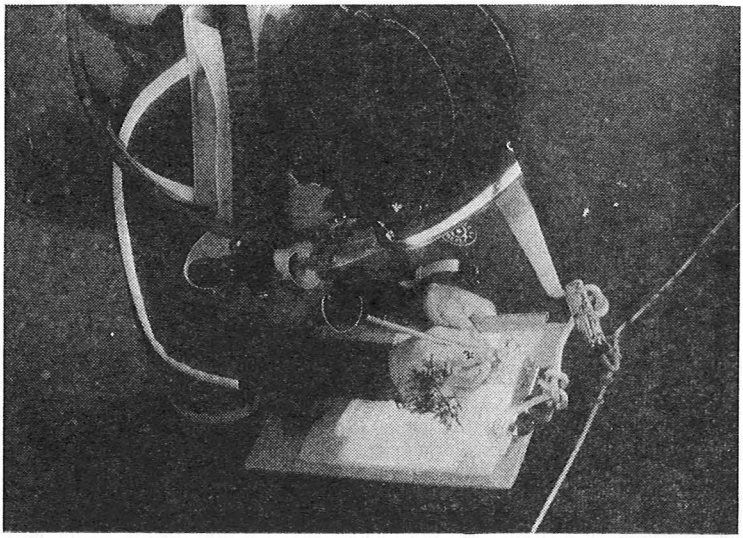
FIG. 3

Table 1. Species Distribution

	Transect bearing 360	080	120	180	270	320	360	060	180	240	330	Depth range m. below C.D
Polymastia sp.	*	*	*	*		**	**			*	*	5·5–17
Cliona celata	**	*	*	***	**	*	**	*	**	**		3–17
Axinella polypides	**	*	*	**	**	**	***			**	**	5·5–18
Axinella infundibuliformis		*	*	*			*					12–15
Alcyonium digitatum	*	**	*	*	*	*		**		*		3–17
Alcyonium couchi	**	***	*		*					**		10–15
Eunicella verrucosa		**		*						*		10–12
Peachia hastata+	**			*					**	*	*	13·5–19
Caryophyllia smithi	**	**	**	***	**	**	**	**		**	***	0–17
Leptopsammia pruvoti	**	**	**							*		6–15
Parazoanthus dixoni	**	**							*			11–17
Corynactis viridis	***	***	***	**	**	**		***	***	**	**	0–18
Pagurus bernhardus			*	*	*						*	11–17·5
Asterias rubens		*		*	*							10–14
Marthasterias glacialis	**	**	**	***	***	**	**	***	**	*	*	0–17
Echinus esculentus	**	*	*	**	**	**	**	*	**	**	*	0–17
Holothuria forskali	*	*	*		*	*	**	*	**	*		0–14
Turritella communis+	*						*			*	**	14–19
	Outer Pin							Inner Pin				

+ were found on bottom deposits only.





The underwater survey of the Knoll Pins being carried out by students of Atlantic College. *Photographs: Keith Hiscock*