

EA - South West Box 6

**DEVON AREA
INTERNAL REPORT**



**ENVIRONMENT
AGENCY**

**WOOLACOMBE BEACH -
TRACER SURVEY.**

**SEPTEMBER 1996
DEV/WQ/4/96**

**Author: A. LOXTON
INVESTIGATIONS TECHNICIAN**

**G R Bateman
Area Manager (Devon)**

170



ENVIRONMENT AGENCY

Information Services Unit

Please return or renew this item by the due date

Due Date

WOOLACOMBE BEACH - TRACER SURVEY

1. INTRODUCTION

Woolacombe beach is situated in North Devon, and has a major importance to the region as a popular beach for both surfers and tourists. The beach is approximately 3.2 Km long and is sampled at two sites, Woolacombe (village) at the north end and Woolacombe (Putsborough) at the south end of the beach.

At the north end of the beach there is a sewage outfall discharging treated effluent from Woolacombe STW. Swimming, surfing and diving also takes place in the vicinity of the outfall which lies outside the specified area of the Designated Bathing Water.

In 1995, Woolacombe (Putsborough) failed the EC Bathing Waters Directive and Woolacombe (village) passed this directive but did not achieve its European Blue flag award. This award takes into account the EC bathing waters guideline (G) levels which are set lower than the mandatory levels (imperative "I" values).

2. TERMS OF REFERENCE

2.1 OBJECTIVES

A request was received from Devon Area Survey Officer to determine if the discharge from Woolacombe STW, comes onto Woolacombe beach in a tidal cycle during light north - westerly winds.

2.3 PROJECT TEAM

T Cronin (Project Leader)
A Loxton (Project Manager, Author)

3. METHOD

1. Continuous injection of *B. Globigii* (biological tracer) into Woolacombe STW outfall. The injection site is located at the pumping station just to the north of Woolacombe (village) beach (Figure 1). The discharge is gravity fed and the pumping station is approximately 400m from the end of the pipe. A time of travel study had not been carried out but it was estimated to be 15 minutes.
2. Background samples were taken from the beach and offshore (positions fixed by GPS) before the *B. Globigii* was injected.
3. Nine sampling runs were carried out at 5 beach sites and 15 offshore sites (positions fixed by GPS). All sampling runs started at Putsborough.
4. All samples were analysed for *B. Globigii* and salinity.



5. A spring and a neap tide survey were undertaken.

4. RESULTS

4.1 HISTORIC RESULTS

All the data for the routine bathing water samples for Woolacombe (village) and Woolacombe (Putsborough) beaches can be seen in Appendix I.

Analysis of the routine data for Woolacombe (Putsborough) beach shows that both total and Faecal coliform levels are usually well below the mandatory levels set by the Bathing Water Directive, except on the two occasions in 1995 that caused it to fail the Directive. The results from the 1996 bathing water samples (up to 10/09/96), show that the total and Faecal coliform and Faecal streptococci levels have been consistently very low. All samples not only being well below the mandatory levels but also below the guideline levels set by the EC. At present there is no mandatory level set for Faecal streptococci.

Analysis of the routine data for Woolacombe (village) beach, shows that total and faecal coliform levels are usually below the mandatory levels set by the Directive except on one occasion in 1995. This one exceedance of the mandatory level together with exceedances in the guideline level for Faecal streptococci resulted in its failure to retain its Blue flag. The results from the 1996 bathing water samples (up to 10/09/96), show that although the levels for total and Faecal coliform are below the mandatory levels they are close to the guideline levels.

4.2 INVESTIGATION RESULTS

SPRING TIDE TRACER SURVEY - 18/07/96

The results for the background run and the nine sampling runs for the spring tide survey are shown in Appendix II. For each sampling run, the *B. Globigii* result has been plotted next to the sampling position (Appendix II).

The wind direction and speed during the day are shown in Table 1 (Appendix III). The *B. Globigii* titre values and injection rate are shown in Tables 2 and 3 respectively (Appendix III).

NEAP TIDE TRACER SURVEY - 22/08/96

During the neap tide survey, beach samples only were taken, the boat sampling was cancelled due to a severe weather forecast and strong wind warning.

The background results from the neap tide survey are high (Appendix IV). The results from this neap tide survey can not be treated as accurate because of the high background levels recorded on the day. The cause of these high levels is unknown. The only survey that had used *B. Globigii* in the area prior to our survey was at Ashford STW on the 9th August 1996.

Plots showing the sampling positions and corresponding B. Globigii result are shown in Appendix IV.

The wind direction and speed during the day are shown in Table 1, the B. Globigii titre values and injection rate are shown in Tables 2 and 3 respectively (Appendix V).

5. DISCUSSION

The results for the spring tide survey show that B. Globigii was found at Woolacombe (village) beach (site 5), and offshore of this location, from run 8 (High Water -2hrs).

These B. Globigii values can be related to the Faecal coliform no. /100ml by making several assumptions about the quality of the effluent and its flow rate to determine if the levels recorded could result in an exceedance of the mandatory level for Faecal coliforms. These assumptions are detailed below and they are used by the Environment Agency in the assessment of new schemes.

Woolacombe STW is a secondary treated works, assume that the number of Faecal coliform for Woolacombe STW is $3.0 * 10^5$ /100ml.

The consented dry weather flow for Woolacombe STW is 27.78 ltr/sec

Therefore, the Faecal coliform loading rate for Woolacombe STW is $8.3 * 10^7$ ltr/sec

Spring tide survey - Average B. Globigii titre value is $1.18 * 10^{10}$ /100ml

- Assume B. Globigii injection rate to be 1 ltr/hr

(This assumption was made because B. Globigii was not found at the outfall location until 1035 (GMT), and from this time the flow was on average 1 ltr/hr).

Given the above assumption for the injection rate the B. Globigii loading rate is $3.28 * 10^7$ ltr/sec

Therefore, given the above assumptions the ratio of Faecal coliform to B. Globigii during the spring tide survey is **2.5 : 1**

If the B. Globigii levels recorded at site 5 are multiplied by this ratio the levels are still below the mandatory levels ("I" values) for Faecal coliforms but they are near and do exceed the guideline (G) values for Faecal coliforms (Appendix VI).

No B. Globigii was found at the south end (Putsborough) of Woolacombe Beach.

During the spring tide survey the winds were generally light all day but offshore.

The effluent flow was generally at a consistent level during the spring tide survey, with a doubling of this level in the morning from 0800 to 1000 (GMT).

The discharge from the works is usually continuous. There is the ability to use the pumping station as a storage tank when problems are experienced at the works or increases in flow are expected with the resulting stored effluent being released gradually. During the neap tide survey this storage facility was in operation because of the expected flow increase as a result of the Radio 1 Roadshow being at Woolacombe on the previous day. The effluent flow during the neap tide survey was at least three times the maximum flow during the spring tide survey. It is unfortunate that the neap tide survey results can not be used because the flow during the day was probably nearer to its maximum daily flow rate consent (152.13 ltr/sec).

Both dogs and horses have been seen on the beach and it is possible that the exceedances in the mandatory levels were the result of animal faeces on the beach especially as the samples with the high levels of Total and Faecal coliform had a high value for Faecal streptococci. Also, dog faeces were photographed on the beach during the neap tide survey (photographs 1 and 2).

A bacteriological study of the Woolacombe stream and its impact on the beach was carried out in April and August 1996 (Report No. DEV/E/18/96).

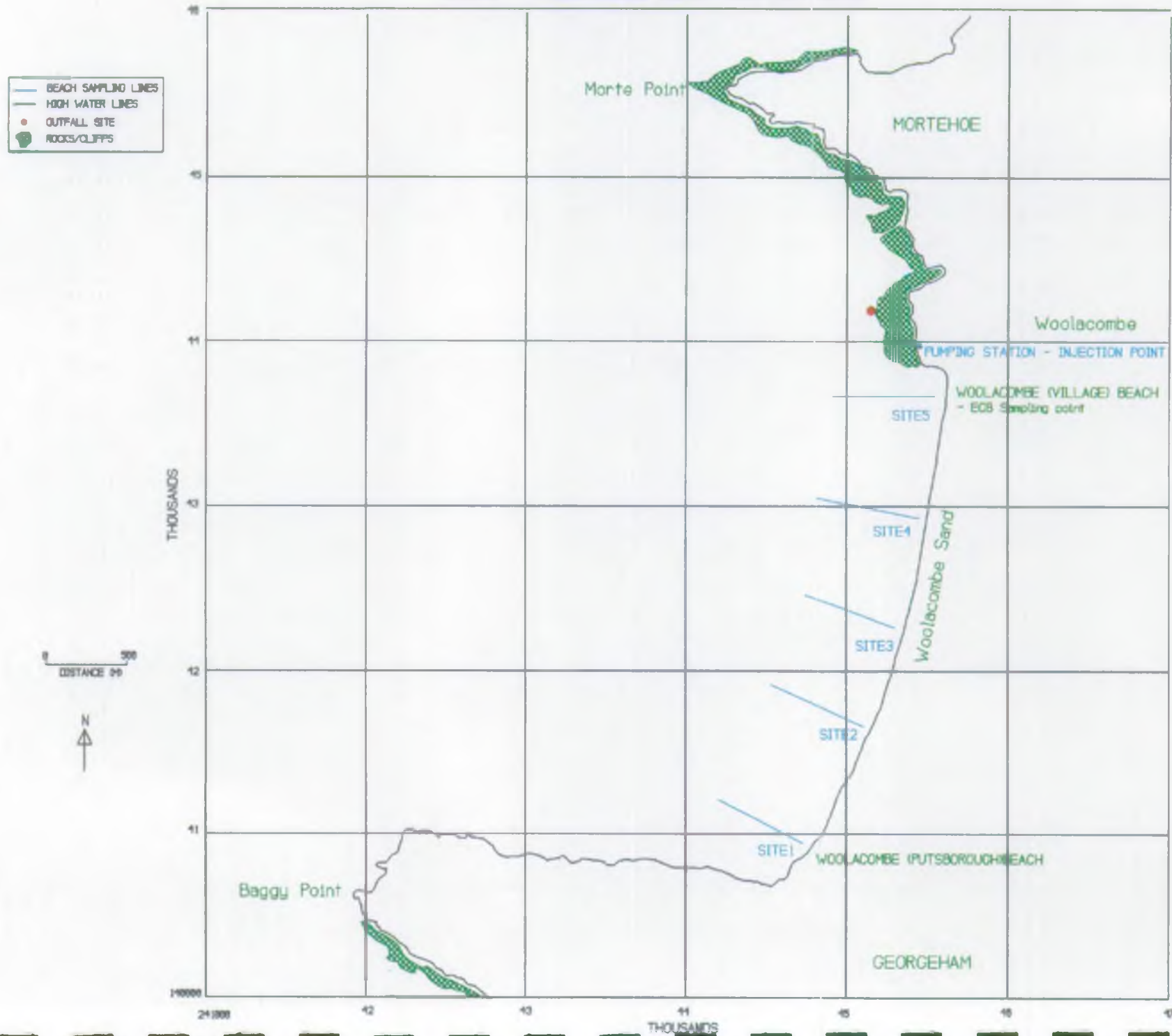
6. CONCLUSION

1. *B. Globigii* was found on the beach on three successive runs which when "converted" were below the "I" values for Faecal coliforms.
2. Elevated levels of *B. Globigii* were, as expected, found around the outfall.
3. *B. Globigii* was found at a number of offshore locations which when "converted" were above the "I" values for Faecal coliforms.
4. There is not enough evidence to say that Woolacombe STW was not and could not be the cause of the high bacteria levels recorded at either Woolacombe (village) or Woolacombe (Putsborough) beaches.

7. RECOMMENDATIONS

1. Repeat of both the spring and neap tide surveys during onshore winds (north-westerly).
2. Use of dye and / or drogues to determine the tidal currents in the area. The nearest tidal information is for Morte point where there is a tidal race.
3. The owners of the beach (Parkin Estates and Mr Tucker) enforce the dog ban and perhaps extend it to cover horses.
4. SWWS Ltd to consider implications of swimmers, surfers and divers using the waters for recreational purposes in the vicinity of the outfall.

FIGURE 1: WOOLACOMBE BEACH SAMPLING SITES





PHOTOGRAPH 1: Dog faeces on beach



PHOTOGRAPH 2: Looking up the beach towards Black Rock and Putsborough from the site of the dog faeces

APPENDIX I

ENVIRONMENT AGENCY - SOUTH WEST REGION
 BATHING WATER : WOOLACOMBE (VILLAGE) BEACH
 NGR OF SAMPLING LOCATION : SS 4562 4370

URN OF SAMPLING LOCATION : ECB1061

Date Printed: 20/09/96

SAMPLE DATE DD/MM/YY	SAMPLE TIME HR:MM	TIME OF HIGH TIDE HR:MM	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI	pH	ENTERO VIRUSES	TRANSPARENCY	SALMONELLA	COLOUR	MINERAL OILS	SURFACE-ACTIVE SUBSTANCES	PHENOLS
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF	NO/100ml	UNITS	PFU/10 LITRES	METRES	CODE	CODE	CODE	CODE	CODE
08/05/96	11:15	11:05	5	5	5	5	< 1			> 1		0	0	0	0
18/05/96	11:20	7.24	14	10	< 1	< 1	< 1			> 1		0	0	0	0
22/05/96	13:30	9.40	21	17	12	11	3			> 1		0	0	0	0
29/05/96	11:35	16.05	46	28	11	7	2			> 1		0	0	0	0
06/06/96	13:05	10.05	23	21	16	14	162	8.1		> 1	0	0	0	0	0
13/06/96	12:20	17.10	5	5	5	4	5			> 1		0	0	0	0
26/06/96	11:35	14.15	270	162	73	73	26			< 1		0	0	0	0
04/07/96	12:00	9.15	44	44	22	22	23			< 1		0	0	0	0
11/07/96	12:10	15.56	2	1	3	3	1			> 1		1	0	0	0
16/07/96	15:20	7.24	56	39	27	24	5			> 1		0	0	0	0
24/07/96	11:15	12.15	360	252	155	93	26	8.1		> 1	0	0	0	0	0
01/08/96	15:30	8.05	36	36	13	13	10			> 1		0	0	0	0
07/08/96	11:25	12.35	370	296	220	132	6			> 1		0	0	0	0
11/08/96	12:30	17.00	5	5	4	4	2			> 1		0	0	0	0
21/08/96	11:25	10.45	100	90	55	55	210			> 1		0	0	0	0
24/08/96	12:15	13.00	86	34	23	23	39			> 1		0	0	0	0
10/09/96	11:35	17.37	13	12	5	5	< 1			> 1		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (VILLAGE) BEACH
NGR OF SAMPLING LOCATION : SS 4562 4370
 Date Printed: 21/03/96

SAMPLE DATE DD/MM/YY	SAMPLE TIME HR:MM	TIME OF HIGH TIDE HR:MM	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
03/05/95	12:10	8.31	17	9	1	1	200			> 1		0	0	0	0
10/05/95	11:25	14.40	3	3	4	4	3			> 1		0	0	0	0
20/05/95	11:20	10.50	16	16	4	< 1	1			> 1		0	0	0	0
31/05/95	12:50	8.10	3	3	< 1	< 1	< 1			> 1		0	0	0	0
08/06/95	11:10	14.10	11	9	6	5	1			> 1		0	0	0	0
18/06/95	11:30	10.40	50	40	31	31	10			< 1		0	0	0	0
22/06/95	11:20	14.25	5	4	3	3	2			> 1		0	0	0	0
06/07/95	11:25	12.00	90	70	67	54	110	8.1		> 1	0	0	0	0	0
23/07/95	14:10	16.19	37	37	31	31	1			> 1		0	0	0	0
03/08/95	13:50	10.50	13	12	20	16	12			> 1		0	0	0	0
08/08/95	16:40	16.45	3900	3120	2200	2200	650			> 1		0	0	0	0
13/08/95	12:00	8.20	100	90	40	40	30			< 1		0	0	0	0
18/08/95	12:55	11.35	30	20	20	20	< 10	8.2		> 1	0	0	0	0	0
23/08/95	12:50	17.00	250	225	30	30	20			> 1		0	0	0	0
04/09/95	11:55	14.15	60	60	50	30	10			< 1		0	0	0	0
07/09/95	13:10	17.38	50	20	20	10	30			< 1		0	0	0	0
12/09/95	11:51	8.40	60	40	40	40	50			< 1		0	0	0	0
18/09/95	12:40	12.45	30	30	< 10	< 10	< 10			> 1		0	0	0	0
22/09/95	11:10	5.10	420	420	410	410	110			> 1		0	0	0	0
30/09/95	13:25	10.30	60	60	50	40	20			> 1		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (VILLAGE) BEACH
NGR OF SAMPLING LOCATION : SS 4562 4370

Date Printed: 21/03/96

SAMPLE DATE	SAMPLE TIME	TIME OF HIGH TIDE	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
10/05/94	11:30	6.40	5	5	4	3	12	8.1		> 1		0	0	0	0
17/05/94	11:35	10.40	6	5	3	2	1	8.1		> 1		0	0	0	0
26/05/94	11:35	7.45	250	200	150	120	37	8.2		< 1		0	0	0	0
05/06/94	13:25	16.15	11	9	1	1	< 1	8.2		> 1		0	0	0	0
14/06/94	11:20	9.48	< 1	< 1	< 1	< 1	< 1	8.1		> 1		0	0	0	0
21/06/94	14:05	17.00	50	50	64	64	12	8.1		< 1	0	0	0	0	0
30/06/94	11:35	11.15	4	3	4	< 1	< 1	8.1		> 1		0	0	0	0
07/07/94	11:35	5.35	< 1	< 1	2	2	< 1	8.0		> 1		0	0	0	0
11/07/94	11:30	8.35	27	27	30	30	33	8.0		> 1		0	0	0	0
16/07/94	13:30	11.55	23	18	14	13	42	8.1		> 1		0	0	0	0
25/07/94	13:20	8.20	18	16	8	7	7	8.1		> 1	0	0	0	0	0
01/08/94	11:45	12.55	270	243	110	77	21	8.1		> 1		0	0	0	0
10/08/94	11:45	8.35	17	17	3	2	7	8.1		> 1		0	0	0	0
17/08/94	11:55	15.10	40	30	21	17	24	8.1		< 1		0	0	0	0
26/08/94	11:45	9.25	170	136	100	90	54	8.1		> 1		0	0	0	0
30/08/94	11:45	12.15	210	189	190	190	1300	8.1		> 1		0	0	0	0
07/09/94	12:20	8.05	30	30	15	15	12	8.0		> 1		0	0	0	0
14/09/94	12:50	14.49	160	144	140	70	30	8.1		< 1		0	0	0	0
21/09/94	11:30	7.30	23	18	12	7	5	8.0		> 1		0	0	0	0
30/09/94	12:20	14.25	840	756	210	210	110	8.1		> 1		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (VILLAGE) BEACH
NGR OF SAMPLING LOCATION : 88 4562 4370
 Date Printed: 21/03/96

SAMPLE DATE	SAMPLE TIME	TIME OF HIGH TIDE	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
11/05/93	11:10	10.10	< 10	< 10	< 10	< 10	< 10	8.3		< 1		0	0	0	0
20/05/93	12:00	5.50	< 10	< 10	10	10	< 10	8.3		< 1		0	0	0	0
27/05/93	12:50	10.40	60	30	50	50	< 10	8.4		> 1		0	0	0	0
06/06/93	11:15	8.05	20	10	< 10	< 10	< 10	8.2		> 1		0	0	0	0
15/06/93	11:30	15.15	270	135	190	171	70	8.1		< 1		0	0	0	0
17/06/93	14:30	17.10	250	150	160	43	30	8.1		> 1		0	0	0	0
22/06/93	11:25	8.05	10	< 10	< 10	< 10	< 10	8.1		> 1	0	0	0	0	0
01/07/93	13:25	16.45	160	80	140	28	20	8.1		> 1		0	0	0	0
08/07/93	11:25	9.25	30	20	10	10	10	8.1		> 1		0	0	0	0
12/07/93	11:15	11.55	30	20	30	20	30	8.1		> 1		0	0	0	0
17/07/93	11:45	17.20	10	10	50	50	< 10	8.1		> 1		0	0	0	0
26/07/93	11:15	11.45	250	200	120	96	90	8.1		> 1	0	0	0	0	0
02/08/93	11:20	6.40	40	40	40	20	< 10	8.1		> 1		0	0	0	0
11/08/93	13:10	11.50	140	140	170	170	10	8.1		< 1		0	0	0	0
18/08/93	11:55	6.55	1200	1200	1600	1600	20	8.1		< 1		0	0	0	0
27/08/93	13:50	13.40	10	< 10	< 10	< 10	< 10	8.1		> 1		0	0	0	0
31/08/93	12:00	17.54	40	30	40	40	< 10	8.1		< 1		0	0	0	0
06/09/93	10:45	9.25	60	50	40	20	10	8.1		> 1		0	0	0	0
15/09/93	11:30	5.50	240	240	170	170	70	8.1		> 1		0	0	0	0
22/09/93	11:12	10.55	50	40	30	< 10	10	8.1		< 1		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (VILLAGE) BEACH
NGR OF SAMPLING LOCATION : SS 4562 4370

Date Printed: 21/03/96

SAMPLE DATE	SAMPLE TIME	TIME OF HIGH TIDE	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
10/05/92	11:10	12.50	23	23	32	32	30	8.2		0		0	0	0	0
19/05/92	11:20	8.20	26	23	20	20	14	8.2		0		0	0	0	0
29/05/92	12:40	16.50	51	46	18	14	2	8.2		0		0	0	0	0
05/06/92	11:10	9.40	3	3	6	6	2	8.1		0		0	0	0	0
14/06/92	11:40	6.00	5	5	8	8	4	8.0		0		0	0	0	0
18/06/92	12:35	8.40	0	0	0	0	0	8.3		0		0	0	0	0
23/06/92	11:20	11.45	1	1	0	0	12	8.1		0	0	0	0	0	0
30/06/92	12:05	6.27	19	17	29	29	14	8.1	< 1	0		0	0	0	0
09/07/92	13:00	14.05	10	10	1	0	3	8.1		0		0	0	0	0
16/07/92	12:25	7.50	3	1	0	0	1	8.1		0		0	0	0	0
25/07/92	12:15	14.12	25	25	15	14	11	7.8		0		0	0	0	0
03/08/92	11:58	9.50	97	58	78	78	34	7.8		0		1	0	1	0
10/08/92	12:00	17.10	23	18	11	9	14	8.1		0		0	0	0	0
14/08/92	12:10	7.20	620	441	152	137	96	7.9		0		0	0	0	0
19/08/92	12:06	9.51	77	69	58	58	41	7.7	4	0		0	0	0	0
01/09/92	11:35	10.10	230	230	119	119	45	8.0		0		0	0	0	0
05/09/92	12:15	12.55	46	46	31	31	38	7.9		0		0	0	0	0
14/09/92	11:27	7.50	40	40	46	41	40	8.0		0	0	0	0	0	0
21/09/92	11:05	13.15	17	17	10	10	9	8.1		0		0	0	0	0
30/09/92	11:23	9.00	38	34	25	23	20	7.9		0		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

ENVIRONMENT AGENCY - SOUTH WEST REGION
 BATHING WATER : WOOLACOMBE (PUTSBOROUGH) BEACH
 NGR OF SAMPLING LOCATION : SS 4475 4085 URN OF SAMPLING LOCATION : ECB1060
 Date Printed: 20/09/96

SAMPLE DATE DD/MM/YY	SAMPLE TIME HR:MM	TIME OF HIGH TIDE HR:MM	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
08/05/96	10:55	11.05	24	17	7	3	3			< 1		0	0	0	0
18/05/96	11:00	7.24	5	4	4	3	8			< 1		0	0	0	0
22/05/96	13:55	9.40	10	8	5	4	2			> 1		0	0	0	0
29/05/96	11:15	16.05	30	18	13	9	1			> 1		0	0	0	0
06/06/96	13:40	10.10	6	5	6	4	< 1	8.1		> 1	0	0	0	0	0
13/06/96	12:40	17.10	< 1	< 1	< 1	< 1	< 1			> 1		0	0	0	0
13/06/96	12:41									< 1					
26/06/96	11:10	14.15	< 1	< 1	< 1	< 1	< 1			< 1		0	0	0	0
04/07/96	11:25	9.15	5	5	8	8	13			< 1		0	0	0	0
11/07/96	11:40	15.56	< 1	< 1	< 1	< 1	< 1		< 1	> 1		0	0	0	0
16/07/96	15:00	7.24	< 1	< 1	< 1	< 1	1			> 1		0	0	0	0
24/07/96	11:00	12.15	2	2	2	1	1	8-1		> 1	0	0	0	0	0
01/08/96	13:05	8.05	2	2	8	7	2			> 1		0	0	0	0
07/08/96	11:00	12.35	27	22	14	8	2			> 1		0	0	0	0
11/08/96	11:45	17.00	< 1	< 1	1	1	< 1			> 1		0	0	0	0
21/08/96	11:00	10.45	4	3	2	2	25			> 1		0	0	0	0
24/08/96	12:40	13.00	3	3	1	1	< 1			> 1		0	0	0	0
10/09/96	11:40	17.37	4	3	1	1	< 1			> 1		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (PUTSBOROUGH) BEACH
NGR OF SAMPLING LOCATION : 88 4475 4085

Date Printed: 21/03/96

SAMPLE DATE	SAMPLE TIME	TIME OF HIGH TIDE	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS. CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
03/05/95	11:40	8.31	4	3	1	1	10			> 1		0	0	0	0
10/05/95	11:10	14.40	< 1	< 1	1	1	1			> 1		0	0	0	0
20/05/95	10:55	10.50	100	100	150	150	1			> 1		0	0	0	0
31/05/95	13:20	8.10	< 1	< 1	< 1	< 1	1			> 1		0	0	0	0
08/06/95	11:00	14.10	1	1	< 1	< 1	< 1			> 1		0	0	0	0
18/06/95	11:05	10.40	600	540	500	500	210			> 1		0	0	0	0
22/06/95	11:00	14.25	< 1	< 1	< 1	< 1	< 1			> 1		0	0	0	0
06/07/95	11:00	12.00	20	20	2	2	1	8.1		< 1	0	0	0	0	0
23/07/95	14:40	16.19	5	5	< 1	< 1	1			> 1		0	0	0	0
03/08/95	14:20	10.50	24	24	7	7	< 1			> 1		0	0	0	0
08/08/95	17:05	16.45	4400	4400	3400	3400	2100			> 1		0	0	0	0
13/08/95	11:30	8.20	< 10	< 10	< 10	< 10	10			> 1		0	0	0	0
18/08/95	11:50	11.35	20	20	10	10	10	8.1		> 1	0	0	0	0	0
23/08/95	11:40	17.00	30	20	10	10	< 10			< 1		0	0	0	0
04/09/95	11:25	14.15	10	10	30	30	10			0		0	0	0	0
07/09/95	13:35	17.38	10	< 10	20	20	40			< 1		0	0	0	0
12/09/95	11:20	8.40	20	20	< 10	< 10	10			> 1		0	0	0	0
18/09/95	13:00	12.45	14000	14000	7900	2370	2800			> 1		0	0	0	0
22/09/95	11:00	5.10	50	50	30	30	20			> 1		0	0	0	0
30/09/95	13:50	10.30	< 10	< 10	< 10	< 10	< 10			> 1		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (PUTSBOROUGH) BEACH
NGR OF SAMPLING LOCATION : SS 4475 4085
 Date Printed: 21/03/96

SAMPLE DATE DD/MM/YY	SAMPLE TIME HR:MM	TIME OF HIGH TIDE HR:MM	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
10/05/94	11:10	6.40	20	18	13	13	6	8.1		> 1		0	0	0	0
17/05/94	11:15	10.40	11	11	12	12	< 1	8.1		> 1		0	0	0	0
26/05/94	11:10	7.45	48	48	31	31	18	8.2		< 1		0	0	0	0
05/06/94	13:15	16.15	< 1	< 1	< 1	< 1	< 1	8.2		> 1		0	0	0	0
14/06/94	11:00	9.48	< 1	< 1	1	1	< 1	8.1		> 1		0	0	0	1
21/06/94	14:30	17.00	600	300	140	28	63	8.1		0	0	0	0	0	0
30/06/94	11:15	11.15	1	1	< 1	< 1	< 1	8.0		> 1	0	0	0	0	0
07/07/94	11:10	5.35	2	2	2	1	< 1	8.0		> 1		0	0	0	0
11/07/94	11:05	8.35	< 1	< 1	3	3	2	8.0		> 1		0	0	0	0
16/07/94	14:00	11.55	< 1	< 1	1	1	1	8.1		> 1		0	0	0	0
25/07/94	14:25	8.20	3	3	1	1	< 1	8.1		> 1	0	0	0	0	0
01/08/94	11:20	12.55	< 1	< 1	< 1	< 1	< 1	8.1		> 1		0	0	0	0
10/08/94	11:25	8.35	220	198	79	79	90	8.1		< 1		0	0	0	0
17/08/94	11:30	15.10	7	7	1	1	3	8.1		< 1		0	0	0	0
26/08/94	12:05	9.25	3	2	8	2	2	8.1		> 1		0	0	0	0
30/08/94	11:25	12.15	1	1	2	1	< 1	8.1		> 1		0	0	0	0
07/09/94	11:35	8.05	20	20	21	21	20	8.1		> 1		0	0	0	0
14/09/94	13:10	14.49	230	230	260	260	80	8.1		< 1		0	0	0	0
21/09/94	11:05	7.30	41	37	26	26	8	8.0		> 1		0	0	0	0
30/09/94	12:40	14.25	19	19	6	6	33	8.0		> 1		0	0	0	0

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (PUTSBOROUGH) BEACH
NGR OF SAMPLING LOCATION : S8 4475 4085

Date Printed: 21/03/96

SAMPLE DATE DD/MM/YY	SAMPLE TIME HR:MM	TIME OF HIGH TIDE HR:MM	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI	pH	ENTERO VIRUSES	TRANSPARENCY	SALMONELLA	COLOUR	MINERAL OILS	SURFACE-ACTIVE SUBSTANCES	PHENOLS
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF	NO/100ml	UNITS	PFU/10 LITRES	METRES	CODE	CODE	CODE	CODE	CODE
11/05/93	10:50	10.10	10	10	< 10	< 10	< 10	8.3		< 1		0	0	0	0
20/05/93	11:30	5.50	20	20	10	10	< 10	8.3		< 1		0	0	0	0
27/05/93	13:10	10.40	50	50	< 10	< 10	< 10	8.4		> 1		0	0	0	0
06/06/93	10:45	8.00	< 10	< 10	20	20	< 10	8.2		> 1		0	0	0	0
15/06/93	11:05	15.15	110	44	160	160	30	8.1		> 1		0	0	0	0
17/06/93	14:50	17.10	40	30	10	< 10	10	8.1		> 1		0	0	0	0
22/06/93	11:05	8.05	10	10	50	50	10	8.1		> 1	0	0	0	0	0
01/07/93	14:20	16.45	< 10	< 10	< 10	< 10	< 10	8.1		> 1		0	0	0	0
08/07/93	11:05	9.25	10	10	< 10	< 10	10	8.1		> 1		0	0	0	0
12/07/93	10:55	11.55	< 10	< 10	< 10	< 10	< 10	8.1		< 1		0	0	0	0
17/07/93	11:20	17.20	< 10	< 10	< 10	< 10	< 10	8.1		> 1		0	0	0	0
26/07/93	10:55	11.45	30	20	40	< 10	< 10	8.1		> 1	0	0	0	0	0
02/08/93	10:55	6.40	< 10	< 10	20	10	< 10	8.1		> 1		0	0	0	0
11/08/93	13:30	11.50	< 10	< 10	< 10	< 10	< 10	8.1		> 1		0	0	0	0
18/08/93	11:12	6.55	40	40	< 10	< 10	10	8.1		< 1		0	0	0	0
27/08/93	14:20	13.40	< 10	< 10	10	10	< 10	8.1		> 1		0	0	0	0
31/08/93	11:20	17.54	10	10	20	20	10	8.1		< 1		0	0	0	0
06/09/93	12:20	9.20	< 10	< 10	< 10	< 10	< 10	8.1		> 1		0	0	0	0
15/09/93	11:00	5.50	100	100	190	171	50	8.1		< 1		0	0	0	0
22/09/93	10:50	10.55	60	60	60	30	< 10	8.1		< 1		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
BATHING WATER : WOOLACOMBE (PUTSBOROUGH) BEACH
NGR OF SAMPLING LOCATION : SS 4475 4085
 Date Printed: 21/03/96

SAMPLE DATE DD/MM/YY	SAMPLE TIME HR:MM	TIME OF HIGH TIDE HR:MM	TOTAL COLIFORMS NO/100ml		FAECAL COLIFORMS NO/100ml		FAECAL STREPTOCOCCI NO/100ml	pH UNITS	ENTERO VIRUSES PFU/10 LITRES	TRANSPARENCY METRES	SALMONELLA CODE	COLOUR CODE	MINERAL OILS CODE	SURFACE-ACTIVE SUBSTANCES CODE	PHENOLS CODE
			PRESUMPTIVE MF	CONFIRMED MF	PRESUMPTIVE MF	CONFIRMED MF									
10/05/92	10:45	12.50	8	6	2	1	2	8.2		0		0	0	0	0
19/05/92	10:55	8.20	27	27	22	22	0	8.3		0		0	0	0	0
29/05/92	13:05	16.50	1	1	7	6	3	8.2		0		0	0	0	0
05/06/92	10:50	9.40	16	16	12	12	34	8.1		0		0	0	0	0
14/06/92	11:20	6.00	3	3	6	6	5	8.0		0		0	0	0	0
18/06/92	13:00	8.40	1	0	1	1	1	8.3		0		0	0	1	0
23/06/92	10:55	11.45	24	24	27	27	0	8.1		0	0	0	0	0	0
30/06/92	11:30	6.27	9	9	17	17	12	8.0	1	0		0	0	0	0
09/07/92	13:20	14.05	1	1	0	0	1	8.0		0		0	0	0	0
16/07/92	11:48	7.50	8	6	6	6	4	8.0		0		0	0	0	0
25/07/92	11:47	14.12	0	0	0	0	0	7.8		0		0	0	0	0
03/08/92	11:20	9.50	67	67	71	71	21	7.9		0	1	0	0	0	0
10/08/92	11:30	17.10	6	6	1	1	0	8.1		0		0	0	0	0
14/08/92	11:26	7.20	23	21	12	11	2	7.9		0		0	0	0	0
19/08/92	11:21	9.51	5	4	4	4	0	7.8	1	0		0	0	0	0
01/09/92	11:10	10.10	330	264	113	102	11	7.9		0		0	0	0	0
05/09/92	12:45	12.55	3	2	0	0	1	7.8		0		0	0	0	0
14/09/92	11:00	7.50	55	55	19	15	3	8.0		0	0	0	0	0	0
21/09/92	10:45	13.15	12	11	11	10	1	8.1		0	0	0	0	0	0
30/09/92	10:57	9.00	34	31	32	32	12	7.9		0		0	0	0	0

MF = MEMBRANE FILTRATION

KEY : 0 - ABSENT 1 - PRESENT

APPENDIX II

WOOLACOMBE SPRING TIDE SURVEY - 18/JUL/96

BEACH AND OFFSHORE SAMPLING RESULTS

RUN 1 - BACKGROUND

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			630	<1	35.0
SITE 2			640	1	35.3
SITE 3			645	3	35.1
SITE 4			650	<1	35.1
SITE 5			659	<1	34.9
OFFSHORE 1	243740.2	133626.3	654	<1	35.0
OFFSHORE 2	242525.0	136580.8	700	<1	34.9
OFFSHORE 3	241757.6	139517.0	706	<1	34.9
OFFSHORE 4	241776.1	140958.3	709	<1	34.9
OFFSHORE 5	243462.8	141233.1	715	1	34.9
OFFSHORE 6	244496.4	140956.6	719	<1	35.0
OFFSHORE 7	244692.7	141245.6	721	<1	35.0
OFFSHORE 8	244602.7	141333.5	722	<1	35.0
OFFSHORE 9	244661.2	142000.6	726	<1	35.0
OFFSHORE 10	245106.5	144323.2	732	<1	35.0
OFFSHORE 11	245012.3	144341.2	733	<1	35.0
OFFSHORE 12	244540.7	144982.2	736	<1	35.0
OFFSHORE 13	243631.7	145393.2	738	<1	35.0
OFFSHORE 14	243105.9	143457.0	742	<1	34.9
OFFSHORE 15	244943.0	142213.6	747	<1	35.0

RUN 2

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			800	<1	35.0
SITE 2			805	<1	35.1
SITE 3			810	<1	34.8
SITE 4			815	<1	34.9
SITE 5			820	<1	34.9
OFFSHORE 1	244830.1	144498.1	757	<1	35.0
OFFSHORE 2	244790.9	141231.6	758	<1	35.0
OFFSHORE 3	244832.6	141588.7	800	<1	35.0
OFFSHORE 4	244964.3	141559.3	802	<1	35.0
OFFSHORE 5	245160.3	142032.2	804	<1	35.0
OFFSHORE 6	245128.4	142057.1	805	<1	35.0
OFFSHORE 7	245202.2	142833.2	807	<1	35.0
OFFSHORE 8	245354.3	142822.2	809	<1	34.8
OFFSHORE 9	245477.0	143514.7	812	<1	34.9
OFFSHORE 10	245422.6	143535.7	813	<1	35.0
OFFSHORE 11	245179.4	144070.2	815	<1	35.0
OFFSHORE 12	245070.3	144092.4	817	<1	35.0
OFFSHORE 13	244695.4	145008.3	820	<1	35.0
OFFSHORE 14	243591.4	145357.6	823	<1	35.0
OFFSHORE 15	243041.8	143338.4	828	<1	34.9

WOOLACOMBE SPRING TIDE SURVEY - 18/JUL/96

BEACH AND OFFSHORE SAMPLING RESULTS

RUN 3

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			900	<1	35.1
SITE 2			905	<1	35.1
SITE 3			910	<1	34.7
SITE 4			915	<1	35.2
SITE 5			920	<1	35.0
OFFSHORE 1	244726.8	141241.9	903	<1	35.0
OFFSHORE 2	244712.8	141254.5	904	<1	35.0
OFFSHORE 3	244785.9	141568.1	906	<1	35.0
OFFSHORE 4	244910.4	141558.3	907	<1	35.0
OFFSHORE 5	244992.2	141962.4	909	<1	35.0
OFFSHORE 6	245050.0	142120.3	910	<1	35.0
OFFSHORE 7	245084.8	142816.6	915	<1	35.0
OFFSHORE 8	245244.5	142842.6	916	<1	35.0
OFFSHORE 9	245342.2	143486.1	918	<1	34.9
OFFSHORE 10	245284.9	143549.8	919	<1	34.9
OFFSHORE 11	245197.9	144083.7	922	<1	34.9
OFFSHORE 12	245182.4	144102.4	924	<1	35.0
OFFSHORE 13	244642.7	145102.6	926	<1	35.0
OFFSHORE 14	243649.2	145385.4	928	<1	34.9
OFFSHORE 15	242913.1	143293.7	938	<1	34.9

RUN 4

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			1015	<1	35.1
SITE 2			1020	<1	35.1
SITE 3			1025	<1	34.5
SITE 4			1030	<1	35.1
SITE 5			1037	<1	34.9
OFFSHORE 1	244657.4	141288.1	1015	<1	35.1
OFFSHORE 2	244641.3	141315.9	1014	<1	35.1
OFFSHORE 3	244667.8	141681.1	1017	<1	35.0
OFFSHORE 4	244793.0	141645.1	1018	<1	35.1
OFFSHORE 5	244966.1	142125.1	1021	<1	34.8
OFFSHORE 6	244951.7	142138.5	1022	<1	35.0
OFFSHORE 7	245031.1	142911.3	1024	<1	35.0
OFFSHORE 8	245091.0	142904.6	1025	<1	35.0
OFFSHORE 9	245223.4	143492.3	1028	<1	34.9
OFFSHORE 10	245212.2	143549.7	1031	<1	34.9
OFFSHORE 11	245113.9	144079.0	1033	<1	34.9
OFFSHORE 12	245162.6	144197.6	1035	1600.0	33.4
OFFSHORE 13	244621.8	145030.6	1037	<1	34.9
OFFSHORE 14	243666.4	145389.9	1040	<1	34.9
OFFSHORE 15	242890.3	144431.1	1053	<1	34.9

WOOLACOMBE SPRING TIDE SURVEY - 18/JUL/96

BEACH AND OFFSHORE SAMPLING RESULTS

RUN 5

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			1145	<1	35.0
SITE 2			1150	<1	35.0
SITE 3			1155	<1	35.0
SITE 4			1200	<1	35.1
SITE 5			1205	<1	34.9
OFFSHORE 1	244380.9	141365.6	1142	<1	35.0
OFFSHORE 2	244515.2	141331.2	1144	<1	35.0
OFFSHORE 3	244657.9	141640.4	1147	<1	35.0
OFFSHORE 4	244662.0	141687.4	1148	<1	35.0
OFFSHORE 5	244747.2	142107.8	1149	<1	35.0
OFFSHORE 6	244844.0	142096.1	1150	<1	35.0
OFFSHORE 7	244973.6	142844.3	1153	<1	35.0
OFFSHORE 8	244949.5	142870.9	1154	<1	35.0
OFFSHORE 9	245047.7	143575.1	1156	<1	35.0
OFFSHORE 10	245095.3	143584.0	1157	<1	34.9
OFFSHORE 11	245081.0	143950.8	1201	220	32.6
OFFSHORE 12	245090.3	144197.1	1202	1500	34.6
OFFSHORE 13	244628.8	145107.2	1206	3	35.0
OFFSHORE 14	243653.2	145449.6	1209	<1	35.0
OFFSHORE 15	242712.7	143081.7	1313	<1	35.0

RUN 6

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			1315	<1	35.0
SITE 2			1320	<1	35.0
SITE 3			1325	<1	35.0
SITE 4			1330	<1	35.1
SITE 5			1335	<1	35.0
OFFSHORE 1	244364.3	141339.9	1312	<1	35.0
OFFSHORE 2	244472.3	141339.7	1313	<1	35.0
OFFSHORE 3	244641.6	141680.8	1315	<1	35.0
OFFSHORE 4	244675.5	141690.8	1316	<1	35.0
OFFSHORE 5	244752.0	142101.6	1318	<1	35.0
OFFSHORE 6	244818.3	142090.1	1319	<1	35.0
OFFSHORE 7	244975.3	142842.7	1322	<1	35.0
OFFSHORE 8	244977.0	142867.0	1323	<1	35.0
OFFSHORE 9	245023.2	143601.3	1326	<1	35.0
OFFSHORE 10	245069.4	143614.8	1327	<1	35.0
OFFSHORE 11	245134.3	144207.6	1333	27	34.9
OFFSHORE 12	245098.9	144208.6	1334	<1	35.0
OFFSHORE 13	244623.3	145124.8	1337	22	35.0
OFFSHORE 14	243658.9	145484.3	1340	<1	35.0
OFFSHORE 15	242847.0	143001.2	1345	<1	34.9

WOOLACOMBE SPRING TIDE SURVEY - 18/JUL/96

BEACH AND OFFSHORE SAMPLING RESULTS

RUN 7

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			1445	<1	35.0
SITE 2			1450	<1	35.1
SITE 3			1455	<1	35.1
SITE 4			1500	<1	35.1
SITE 5			1505	<1	35.0
OFFSHORE 1	244489.2	141279.1	1443	<1	35.0
OFFSHORE 2	244517.9	141281.2	1444	<1	35.0
OFFSHORE 3	244614.9	141622.7	1446	<1	35.0
OFFSHORE 4	244695.4	141602.0	1447	<1	35.0
OFFSHORE 5	244787.8	142051.5	1449	<1	35.0
OFFSHORE 6	244846.2	142056.1	1450	<1	35.1
OFFSHORE 7	244963.4	142790.3	1454	<1	35.0
OFFSHORE 8	245022.4	142804.4	1455	<1	35.0
OFFSHORE 9	245052.7	143437.4	1457	<1	35.0
OFFSHORE 10	245102.5	143474.3	1458	<1	35.0
OFFSHORE 11	245141.3	144200.5	1503	4200	34.8
OFFSHORE 12	245106.3	144189.0	1504	909	35.0
OFFSHORE 13	244599.2	145158.6	1507	<1	35.0
OFFSHORE 14	243741.3	145470.1	1511	<1	35.0
OFFSHORE 15	243056.0	142870.6	1517	<1	35.0

RUN 8

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			1615	<1	35.5
SITE 2			1620	<1	35.4
SITE 3			1625	<1	35.5
SITE 4			1630	<1	35.5
SITE 5			1635	60	35.2
OFFSHORE 1	244619.5	141346.3	1611	<1	34.9
OFFSHORE 2	244648.0	141302.8	1612	<1	35.0
OFFSHORE 3	244734.6	141589.0	1616	<1	35.0
OFFSHORE 4	244792.8	141569.4	1617	<1	35.0
OFFSHORE 5	244878.2	141986.8	1619	<1	35.0
OFFSHORE 6	244945.6	142004.5	1621	<1	35.0
OFFSHORE 7	245041.6	142779.9	1623	<1	35.0
OFFSHORE 8	245121.8	142817.4	1624	<1	35.0
OFFSHORE 9	245221.0	143503.0	1628	41	35.0
OFFSHORE 10	245269.2	143505.8	1629	6	35.0
OFFSHORE 11	245150.5	144190.4	1634	4800	34.7
OFFSHORE 12	245108.3	144199.2	1635	<1	34.0
OFFSHORE 13	244612.5	145135.0	1642	1	35.0
OFFSHORE 14	243802.5	145484.9	1647	<1	34.9
OFFSHORE 15	243267.8	142727.7	1654	<1	34.9

WOOLACOMBE SPRING TIDE SURVEY - 18/JUL/96

BEACH AND OFFSHORE SAMPLING RESULTS

RUN 9

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			1745	<1	35.4
SITE 2			1750	<1	35.8
SITE 3			1755	<1	35.4
SITE 4			1800	<1	35.5
SITE 5			1805	320	34.6
OFFSHORE 1	244679.2	141303.8	1744	<1	35.0
OFFSHORE 2	244808.2	141260.4	1746	<1	35.0
OFFSHORE 3	244965.3	141523.2	1749	<1	35.5
OFFSHORE 4	244960.9	141536.2	1750	<1	35.0
OFFSHORE 5	245053.7	142087.5	1752	<1	35.0
OFFSHORE 6	245134.9	142048.6	1753	<1	35.1
OFFSHORE 7	245242.4	142853.3	1755	<1	35.0
OFFSHORE 8	245311.6	142858.8	1756	1	35.0
OFFSHORE 9	245358.5	143506.1	1758	11	35.0
OFFSHORE 10	245422.7	143524.7	1759	105	35.0
OFFSHORE 11	245194.3	144178.4	1802	51	35.0
OFFSHORE 12	245138.4	144164.5	1803	1336	34.6
OFFSHORE 13	244641.0	145094.6	1813	1	34.9
OFFSHORE 14	243810.7	145488.1	1815	<1	34.9
OFFSHORE 15	243232.8	142653.5	1821	<1	34.9

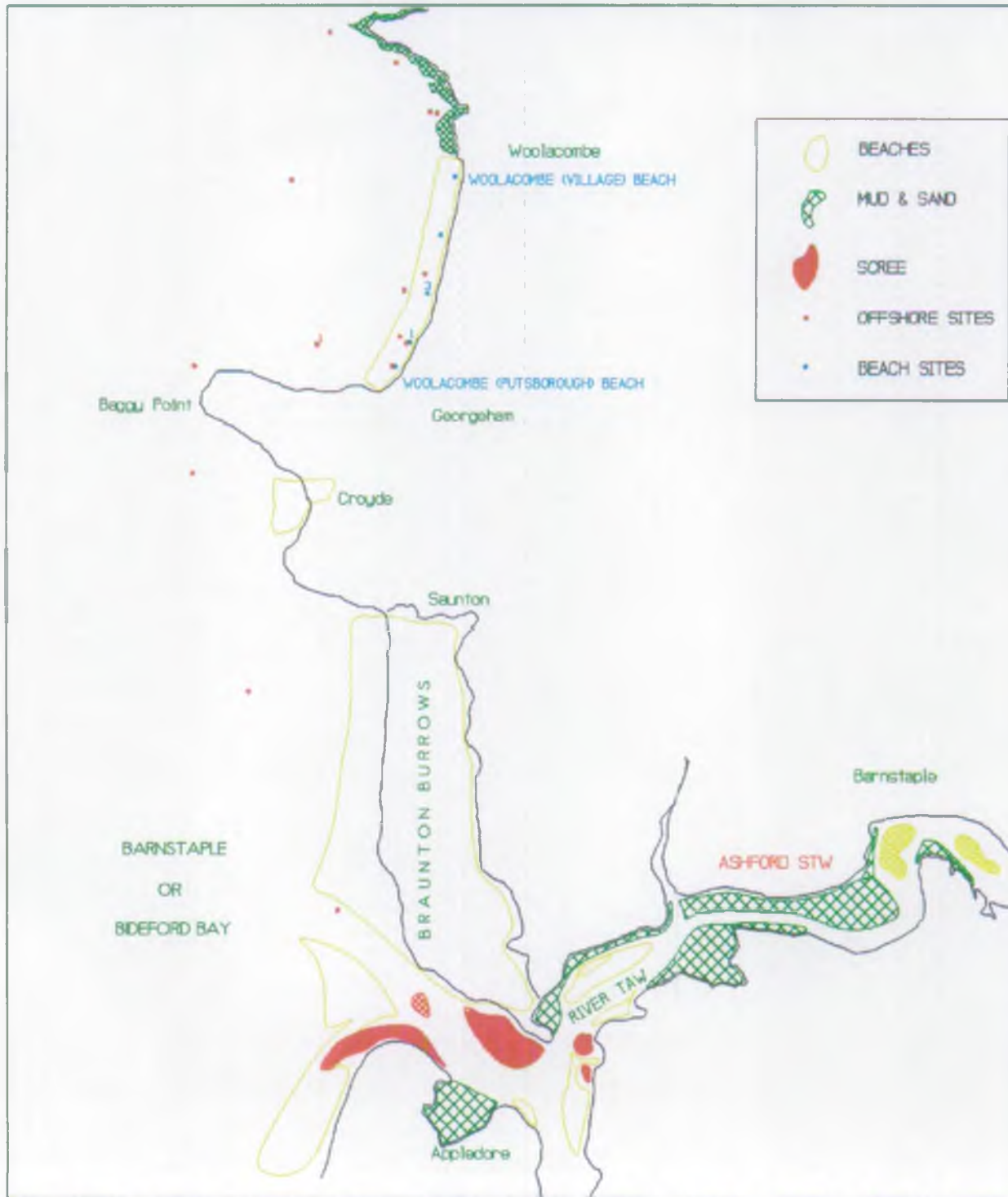
RUN 10

	POSITION		TIME (GMT)	GLOB. /100ml	SALINITY
	Eastings	Northings			
SITE 1			1915	<1	35.4
SITE 2			1920	<1	35.4
SITE 3			1925	<1	35.3
SITE 4			1930	<1	35.6
SITE 5			1935	145	34.7
OFFSHORE 1	244837.7	141208.9	1910	<1	35.0
OFFSHORE 2	244890.9	141196.3	1911	<1	35.1
OFFSHORE 3	245021.3	141503.6	1913	<1	35.3
OFFSHORE 4	245053.7	141521.3	1914	<1	35.0
OFFSHORE 5	245076.3	142031.7	1915	<1	35.0
OFFSHORE 6	245199.0	142034.1	1916	<1	35.0
OFFSHORE 7	245306.2	142615.0	1919	<1	35.0
OFFSHORE 8	245344.8	142616.9	1920	<1	35.1
OFFSHORE 9	245421.0	142502.3	1921	17	35.0
OFFSHORE 10	245522.0	143511.5	1923	14	35.0
OFFSHORE 11	245177.2	144143.9	1925	5	34.9
OFFSHORE 12	245127.3	144178.9	1926	<1	35.0
OFFSHORE 13	244630.0	145110.2	1928	<1	34.9
OFFSHORE 14	243892.2	145474.6	1930	<1	34.9
OFFSHORE 15	242852.9	142852.4	1936	<1	34.9

WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 1 (BACKGROUND)

ALL B. GLOBIGII
RESULTS <1 WHERE
NO VALUE GIVEN

0 1000
DISTANCE (M)

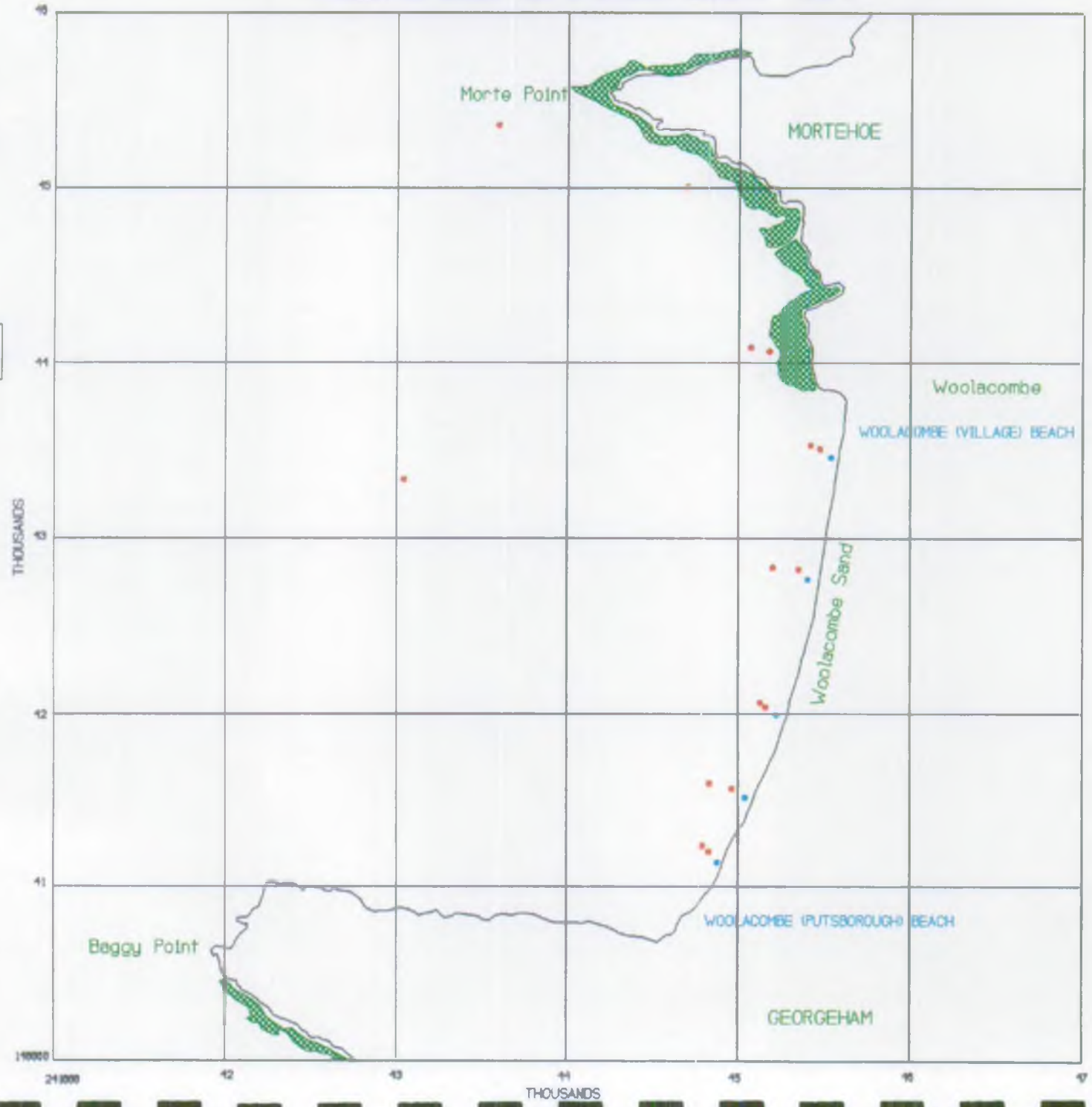


WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 2

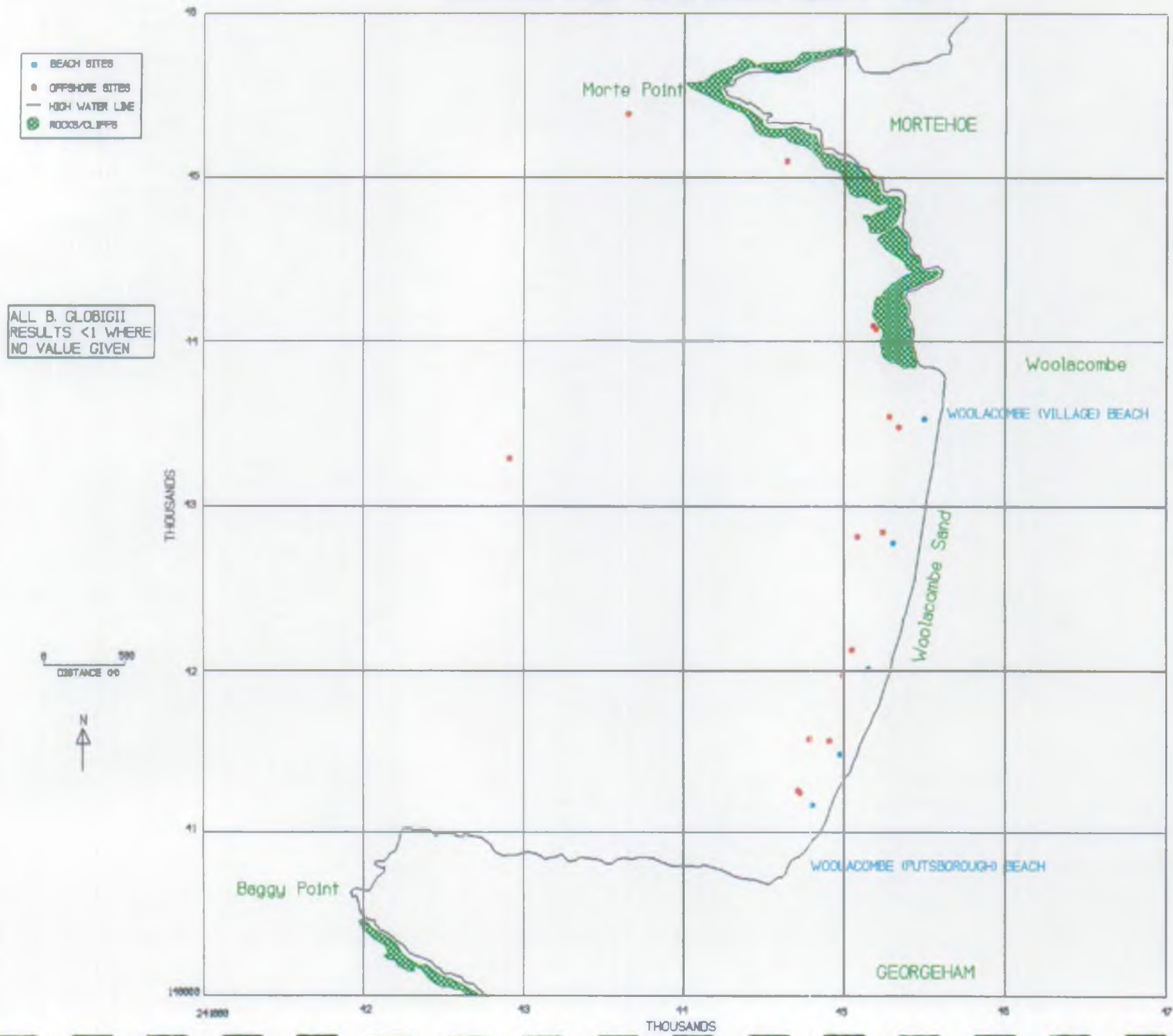
- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- ⊗ ROCKS/CLIFFS

ALL B. GLOBIGII RESULTS <1 WHERE NO VALUE GIVEN

500
DISTANCE 05



WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 3

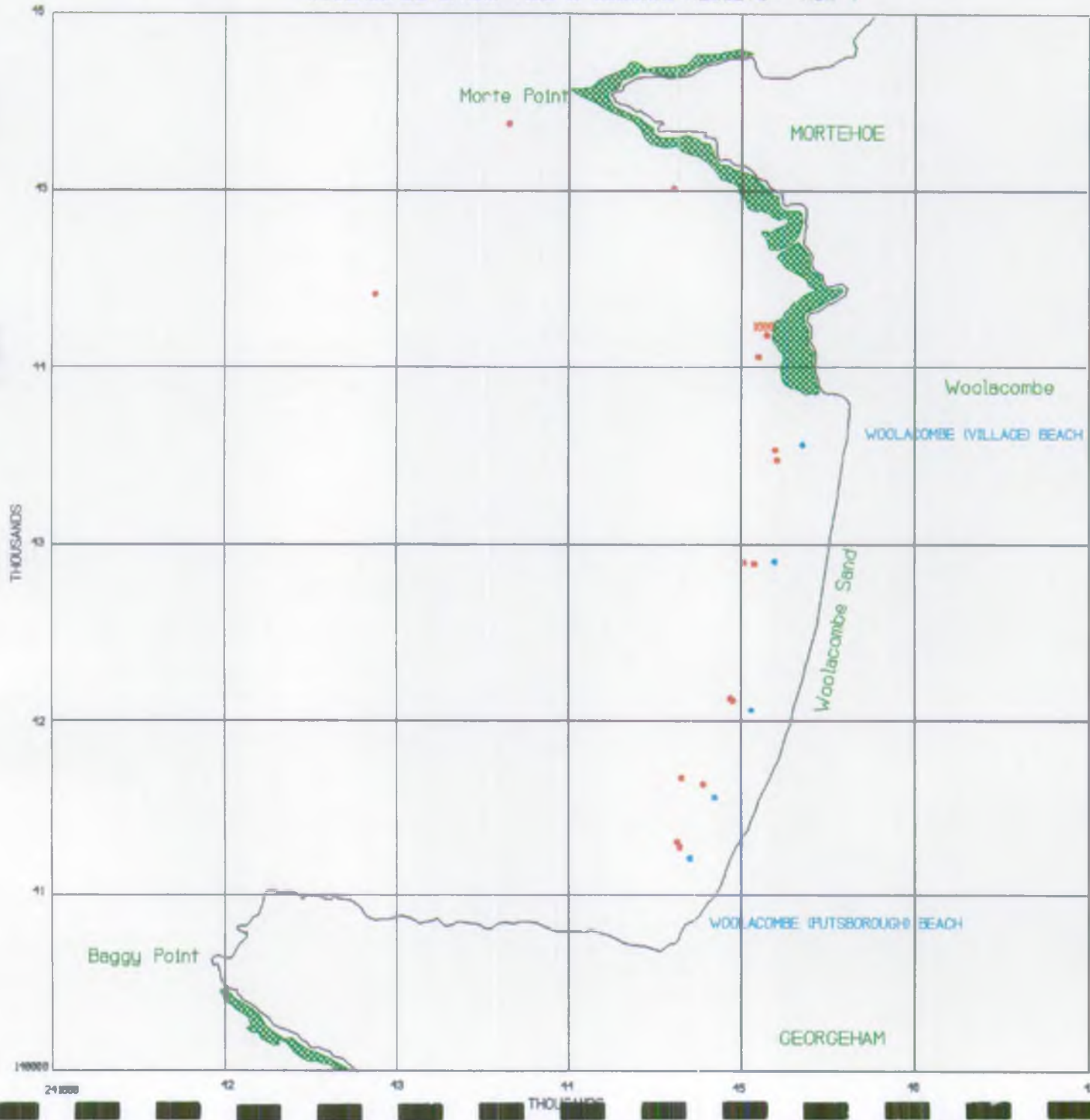


WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 4

- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- █ ROCKS/CLIFFS

ALL B. GLOBIGII
RESULTS <1 WHERE
NO VALUE GIVEN

0 500
DISTANCE 00

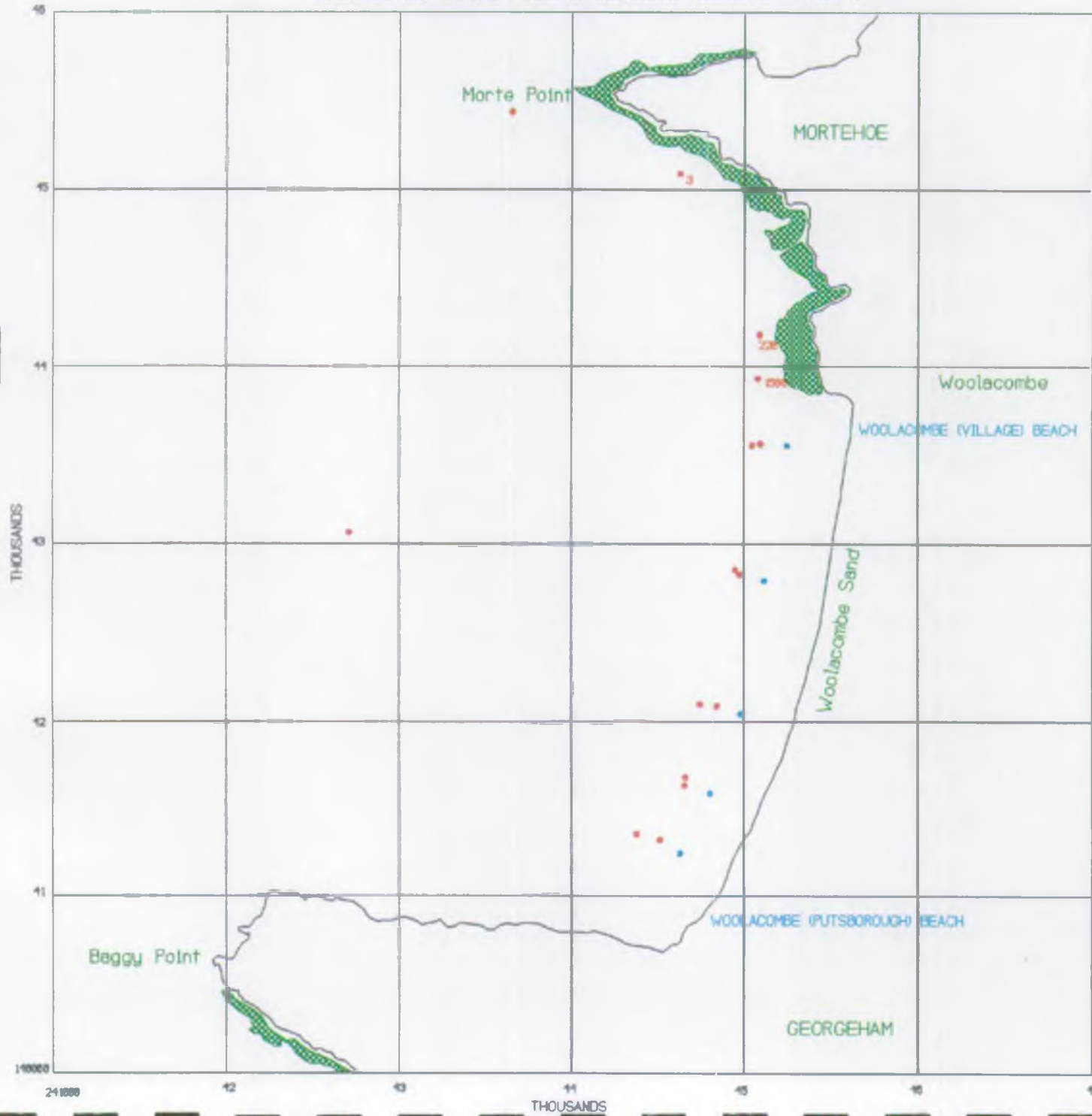


WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 5

- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- ⊗ ROCKS/CLIFFS

ALL B. GLOBIGII RESULTS <1 WHERE NO VALUE GIVEN

0 500
DISTANCE (M)

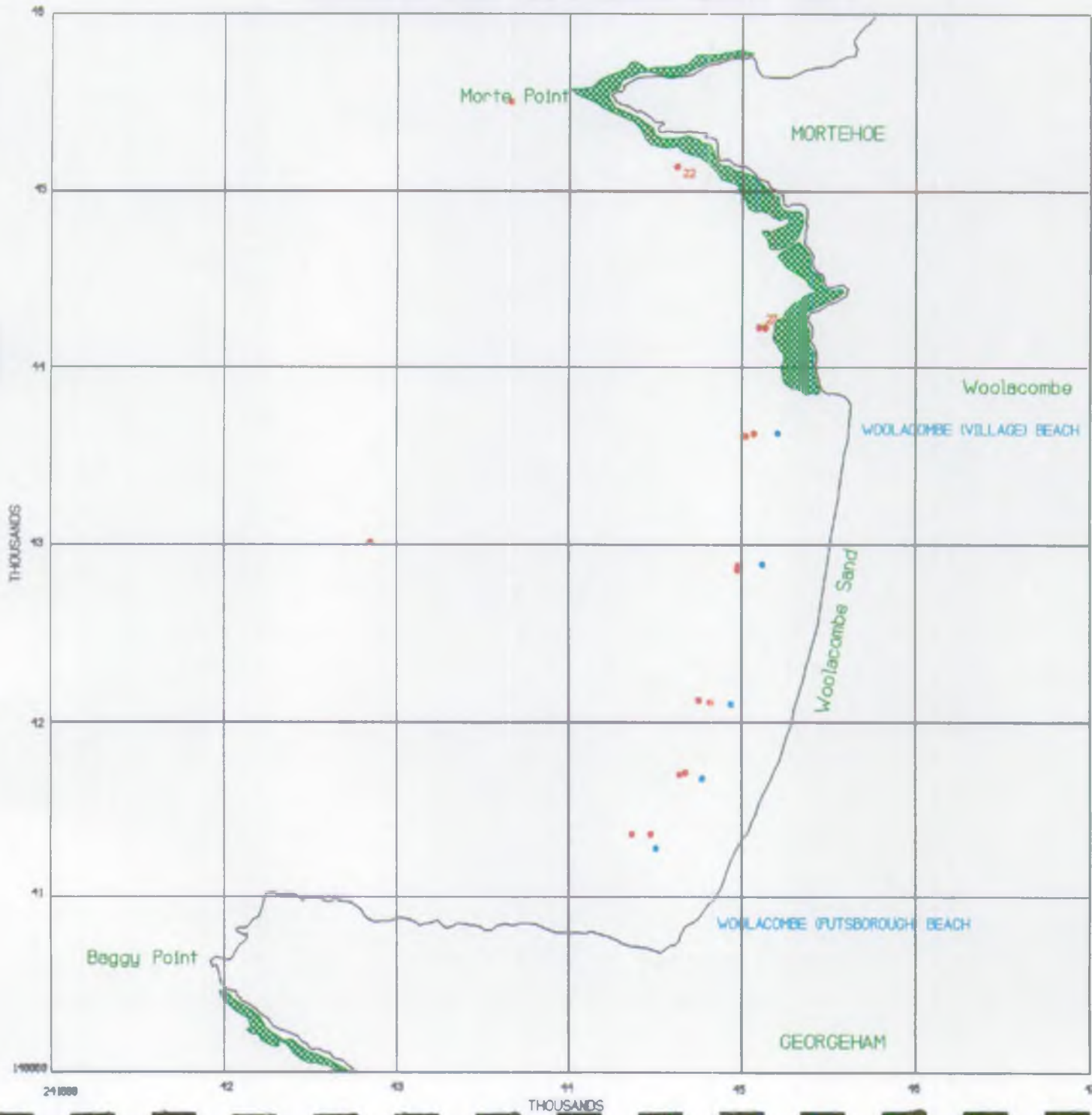


WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 0

- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- ⊗ ROCKS/CLIFFS

ALL B. GLOBIGII
RESULTS <1 WHERE
NO VALUE GIVEN

0 500
DISTANCE 00

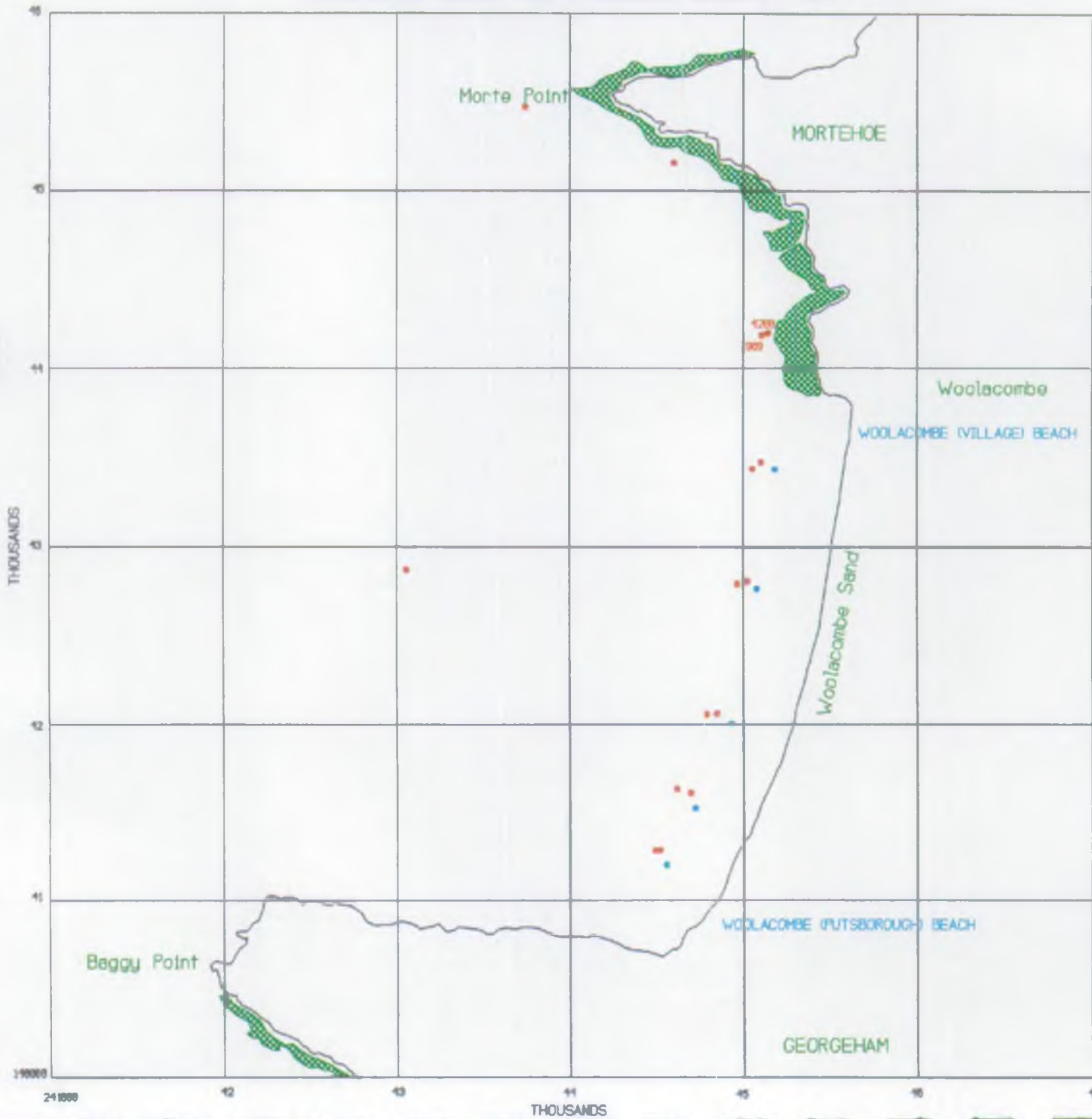


WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 7

- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- ⊗ ROCKS/CLIFFS

ALL B. GLOBIGII
RESULTS <1 WHERE
NO VALUE GIVEN

0 500
DISTANCE (M)

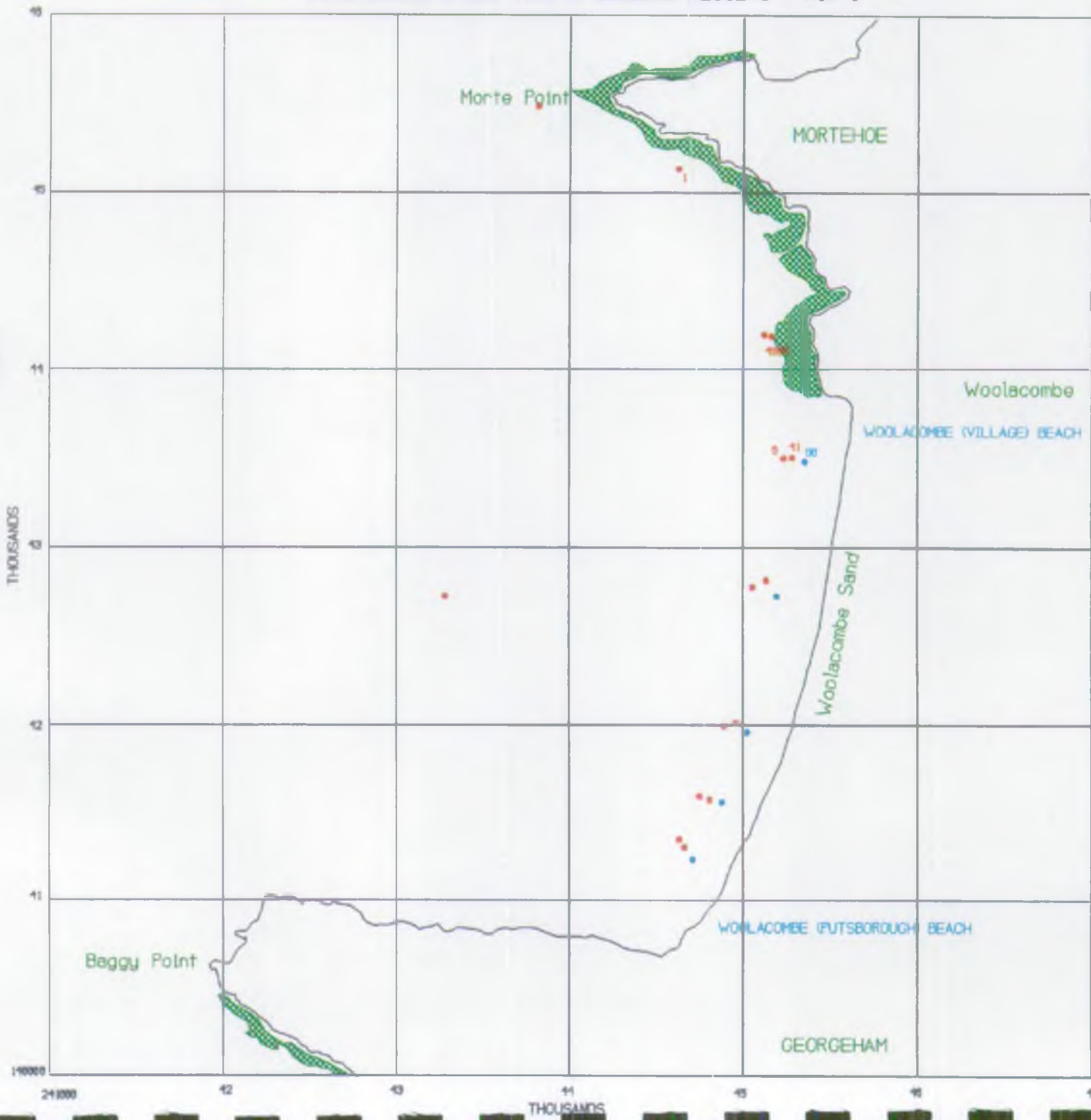


WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 8

- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- ROCKS/CLIFFS

ALL B. GLOBIGII
RESULTS <1 WHERE
NO VALUE GIVEN

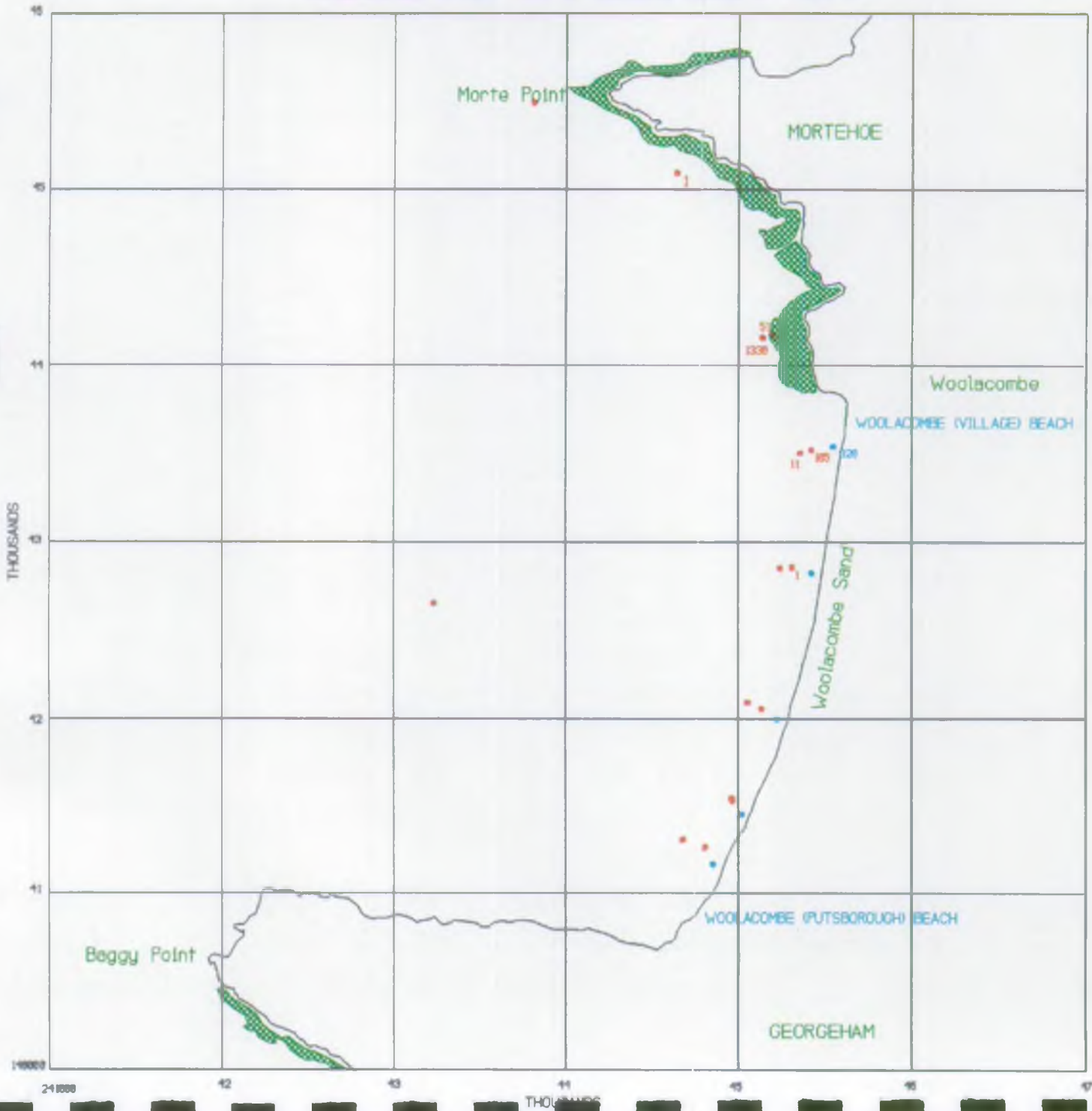
0 500
DISTANCE 00



WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 9

- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- ROCKS/CLIFFS

ALL B. GLOBIGII RESULTS <1 WHERE NO VALUE GIVEN

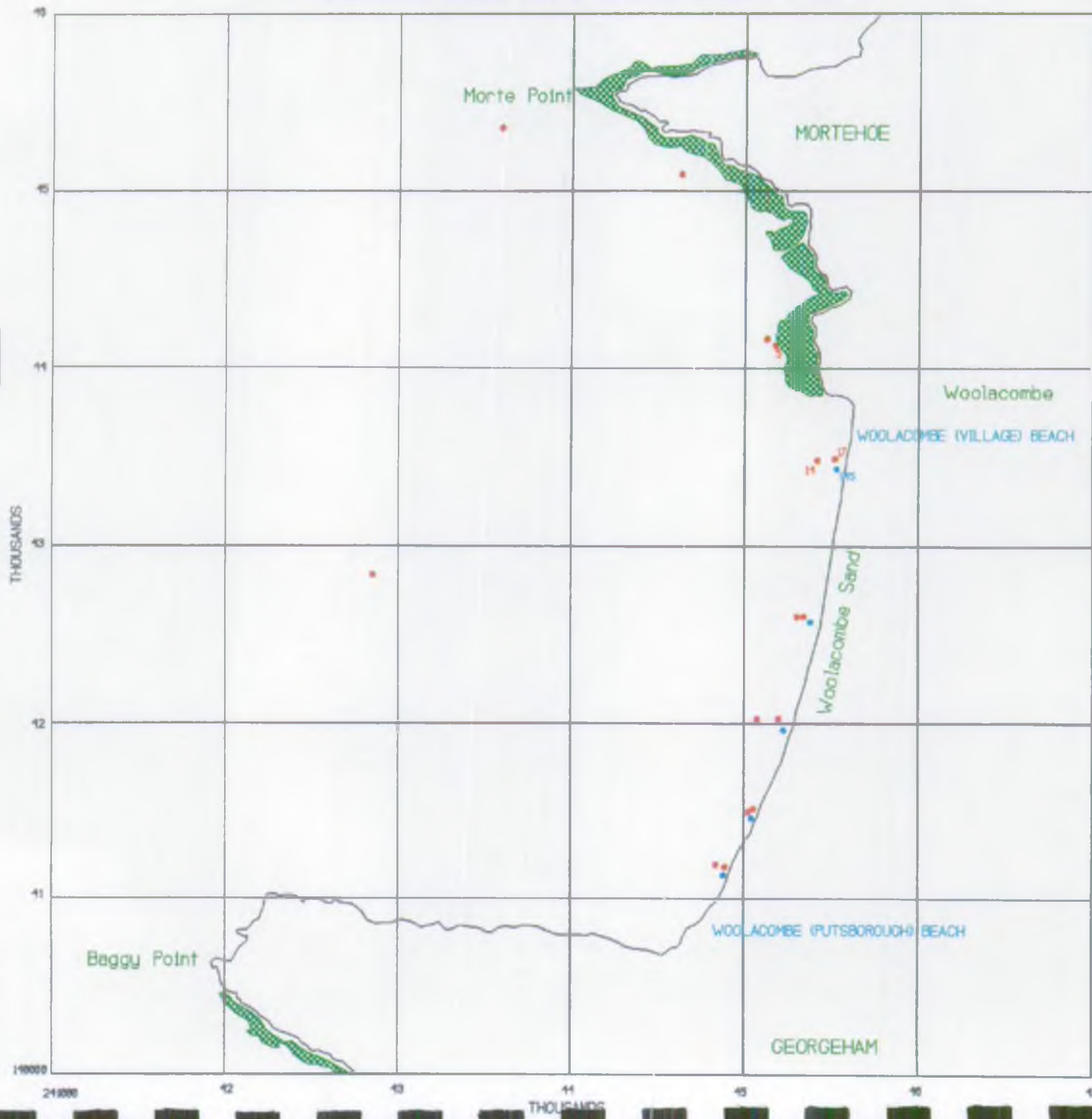


WOOLACOMBE SPRING TIDE B. GLOBIGII RESULTS - RUN 10

- BEACH SITES
- OFFSHORE SITES
- HIGH WATER LINE
- ROCKS/CLIFFS

ALL B. GLOBIGII
RESULTS <1 WHERE
NO VALUE GIVEN

0 500
DISTANCE 00



APPENDIX III

WOOLACOMBE BEACH SURVEY - 18-JUL-96

SPRING TIDE HW (GMT) 0717 1929
 HT 5.0 5.1

TABLE 1 - Wind speed and direction

WEATHER - BRIGHT SUNSHINE, VERY HOT, NIL CLOUD COVER

TIME (GMT)	WIND SP (KTS)	WIND DIRECTION
700	<1.0	E
815	1.0	E
915	1-2	E
1000	<1.0	SE
1200	BREEZE	SW
1235	1.5	SE
1300	2.0	SE
1330	1.0	SE
1400	<1.0	SE
1430	<1.0	SE
1500	<1.0	SE
1530	1.0	NE
1600	2.0	NE
1630	1.5	NE
1700	1.5	NE
1730	<1.0	NE
1800	0.0	-
1830	1.0	SW
1900	2.0	SW

GLOBOGII DOSING WOOLACOMBE - 18-JUL-96

TABLE 2 - B. Globigii injection rate

TIME (GMT)	GLOB. LEVEL (ltr)	COMMENTS
745	25	
840	11	
910	11	RESTART PUMP
1020	10.2	PUMP JAMMED - RESTART.
1220	8.9	PUMP JAMMED - WILL NOT PUMP. REMAINING GLOB. DISCHARGED AS 0.5ltr. EVERY HALF HOUR FROM 1230 TO 1900

TABLE 3 - B. Globigii titre results

TIME (GMT)	GLOB. / μ l
745	1.36E+05
1015	1.13E+05
1400	1.25E+05
1500	1.06E+05
1600	1.08E+05
1830	1.22E+05

APPENDIX IV

WOOLACOMBE NEAP TIDE SURVEY - 22/AUG/96

BEACH SAMPLING RESULTS

RUN 1 - BACKGROUND

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	810	<10	34.8
SITE 2	820	54	34.8
SITE 3	830	9	34.8
SITE 4	840	9	34.8
SITE 5	845	<10	34.8

RUN 2

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	915	9	34.8
SITE 2	920	9	34.8
SITE 3	925	27	34.8
SITE 4	930	<10	34.8
SITE 5	940	<10	34.9

RUN 3

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	1045	99	34.8
SITE 2	1050	9	34.8
SITE 3	1055	9	34.8
SITE 4	1100	9	34.9
SITE 5	1110	<10	34.9

RUN 4

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	1215	<10	34.6
SITE 2	1220	<10	34.6
SITE 3	1225	<10	34.6
SITE 4	1230	<10	34.5
SITE 5	1235	<10	34.7

RUN 5

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	1345	<10	34.3
SITE 2	1350	<10	34.2
SITE 3	1355	<10	34.1
SITE 4	1359	<10	34.2
SITE 5	1405	9	34.3

WOOLACOMBE NEAP TIDE SURVEY - 22/AUG/96

BEACH SAMPLING RESULTS

RUN 6

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	1515	<10	34.6
SITE 2	1520	<10	34.6
SITE 3	1525	<10	34.4
SITE 4	1530	<10	34.3
SITE 5	1535	<10	34.2

RUN 7

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	1645	<10	34.2
SITE 2	1650	<10	34.7
SITE 3	1655	<10	34.5
SITE 4	1700	<10	34.6
SITE 5	1705	<10	34.6

RUN 8

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	1815	<10	34.7
SITE 2	1820	<10	34.7
SITE 3	1825	<10	34.7
SITE 4	1830	<10	34.7
SITE 5	1835	<10	34.7

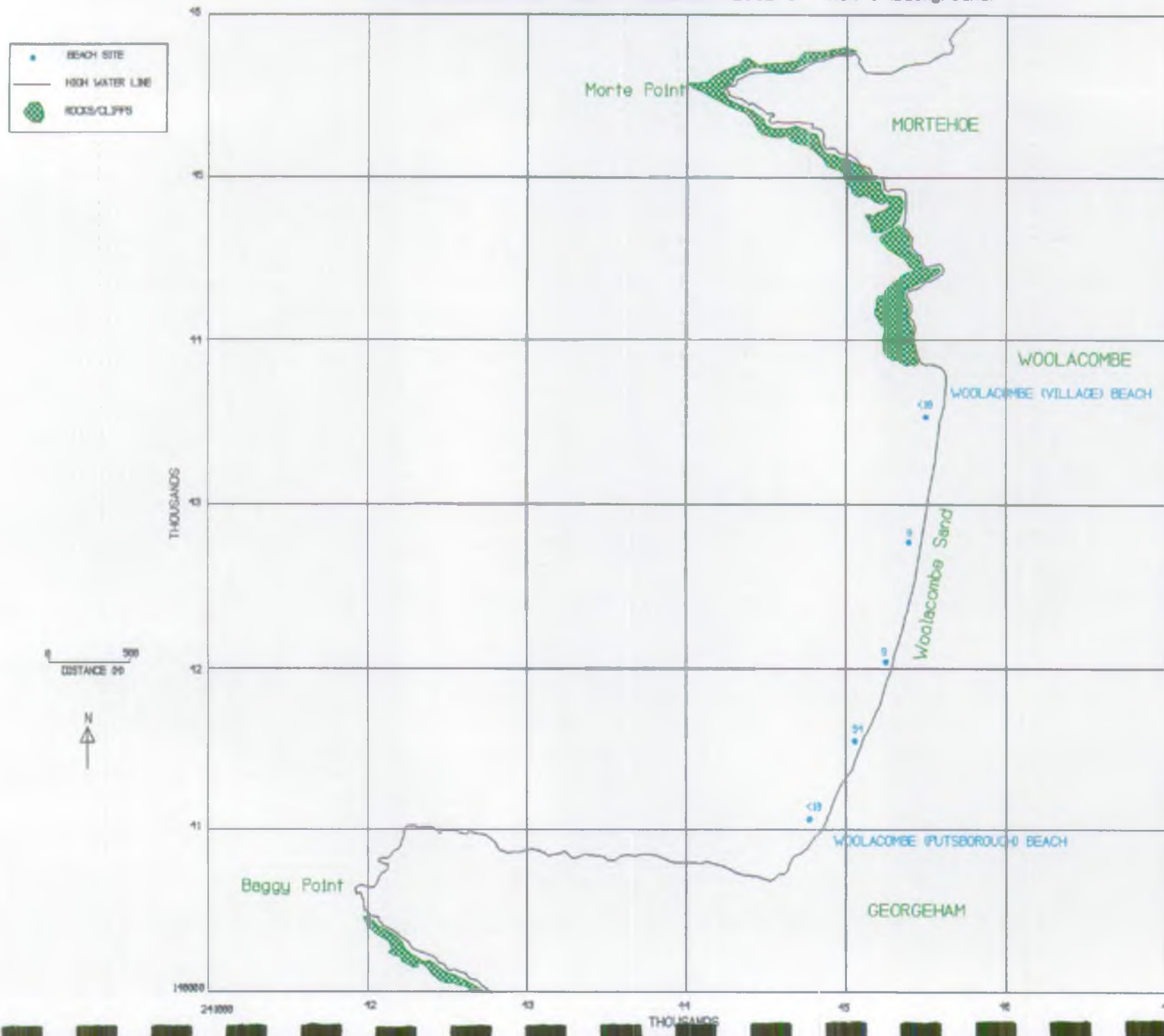
RUN 9

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	1945	<10	34.7
SITE 2	1950	<10	34.7
SITE 3	1955	<10	34.7
SITE 4	1959	<10	34.6
SITE 5	2005	<10	34.7

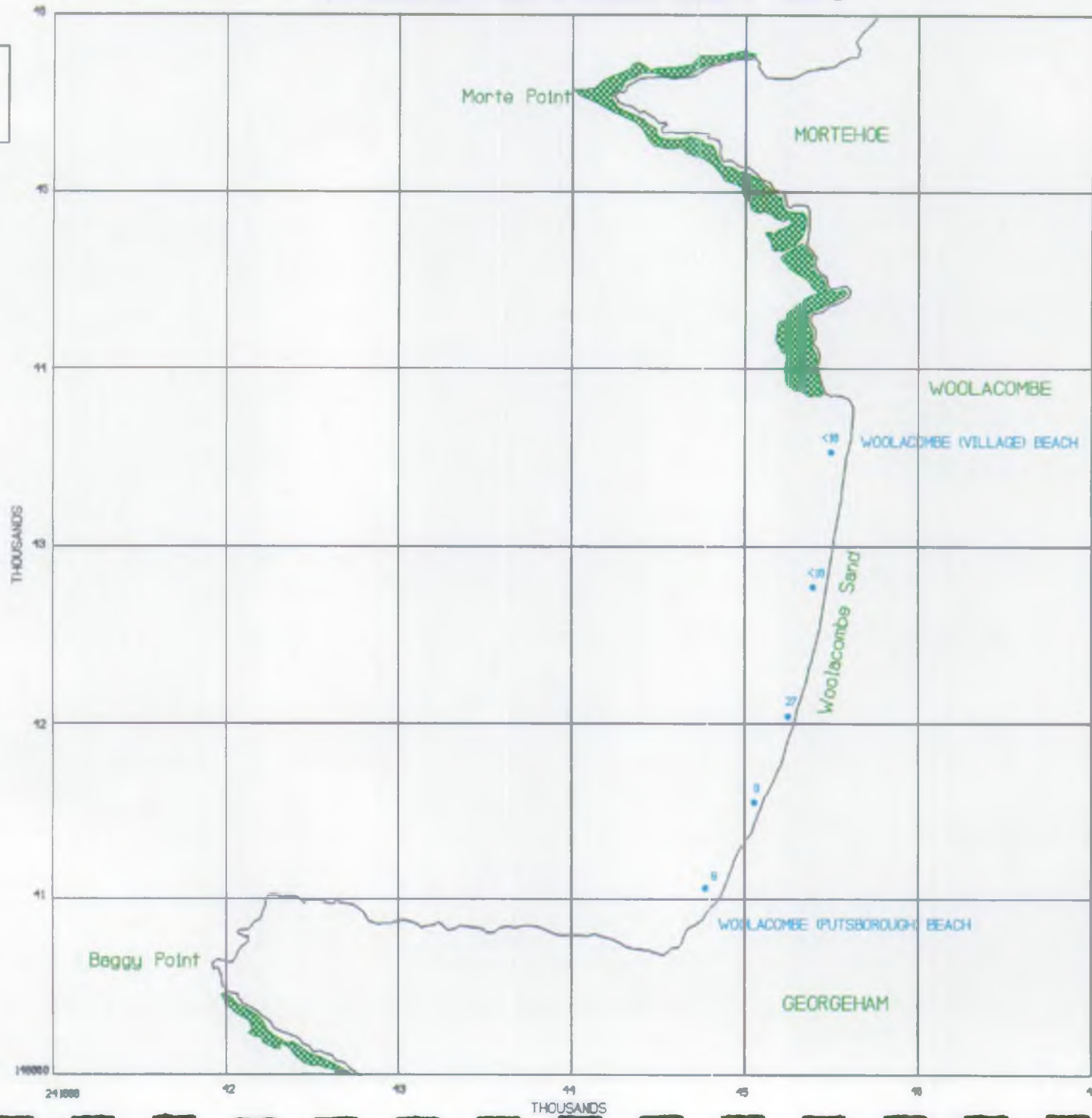
RUN 10

	TIME (GMT)	GLOB. /100ml	SALINITY
SITE 1	2115	<10	34.5
SITE 2	2120	<10	34.7
SITE 3	2125	<10	34.7
SITE 4	2130	<10	34.6
SITE 5	2135	<10	34.7

WOOLACOMBE NEAP TIDE B GLOBIGII RESULTS - RUN 1 (Background)

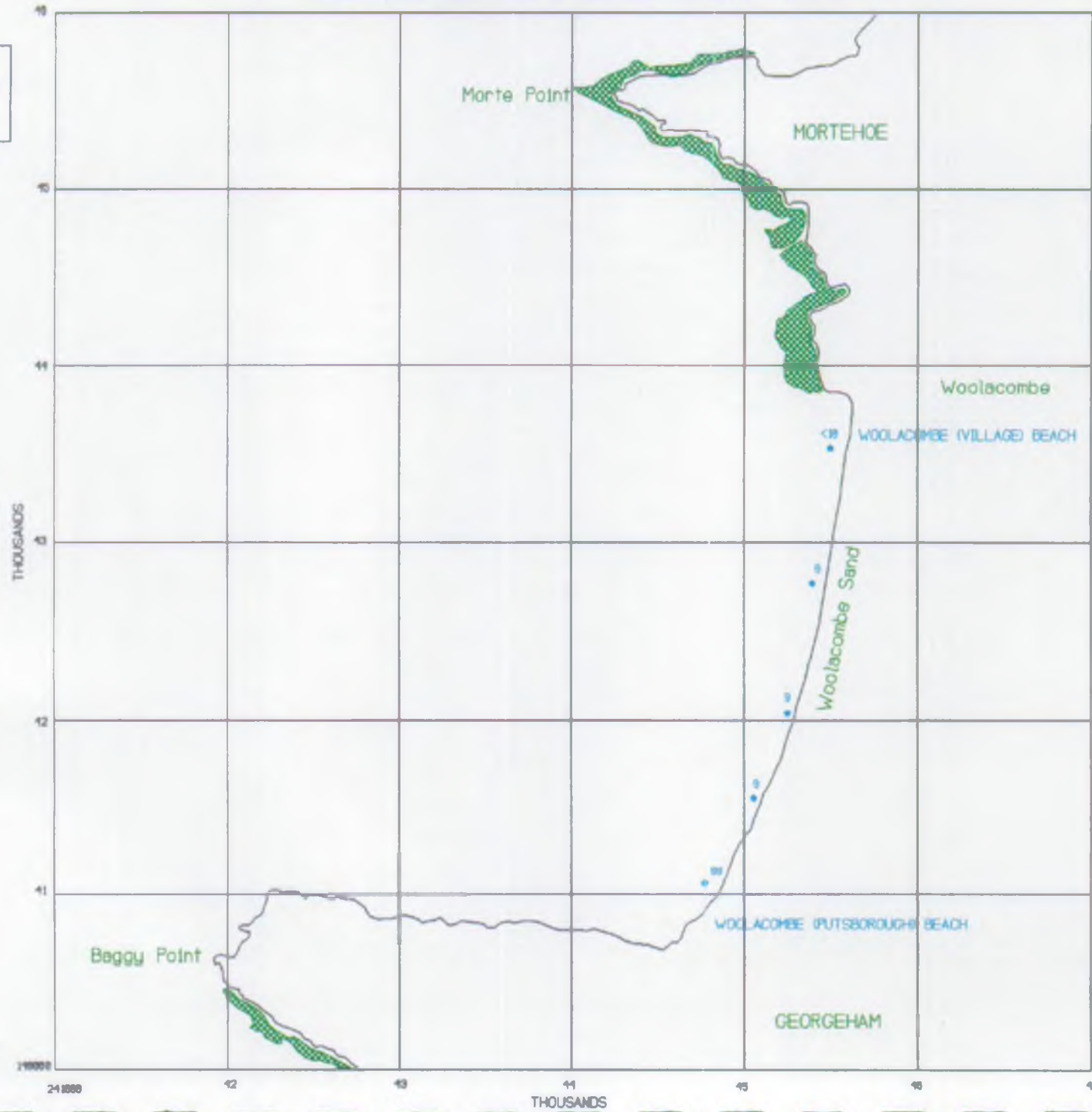


WOOLACOMBE NEAP TIDE B. GLOBIGII RESULTS - RUN 2



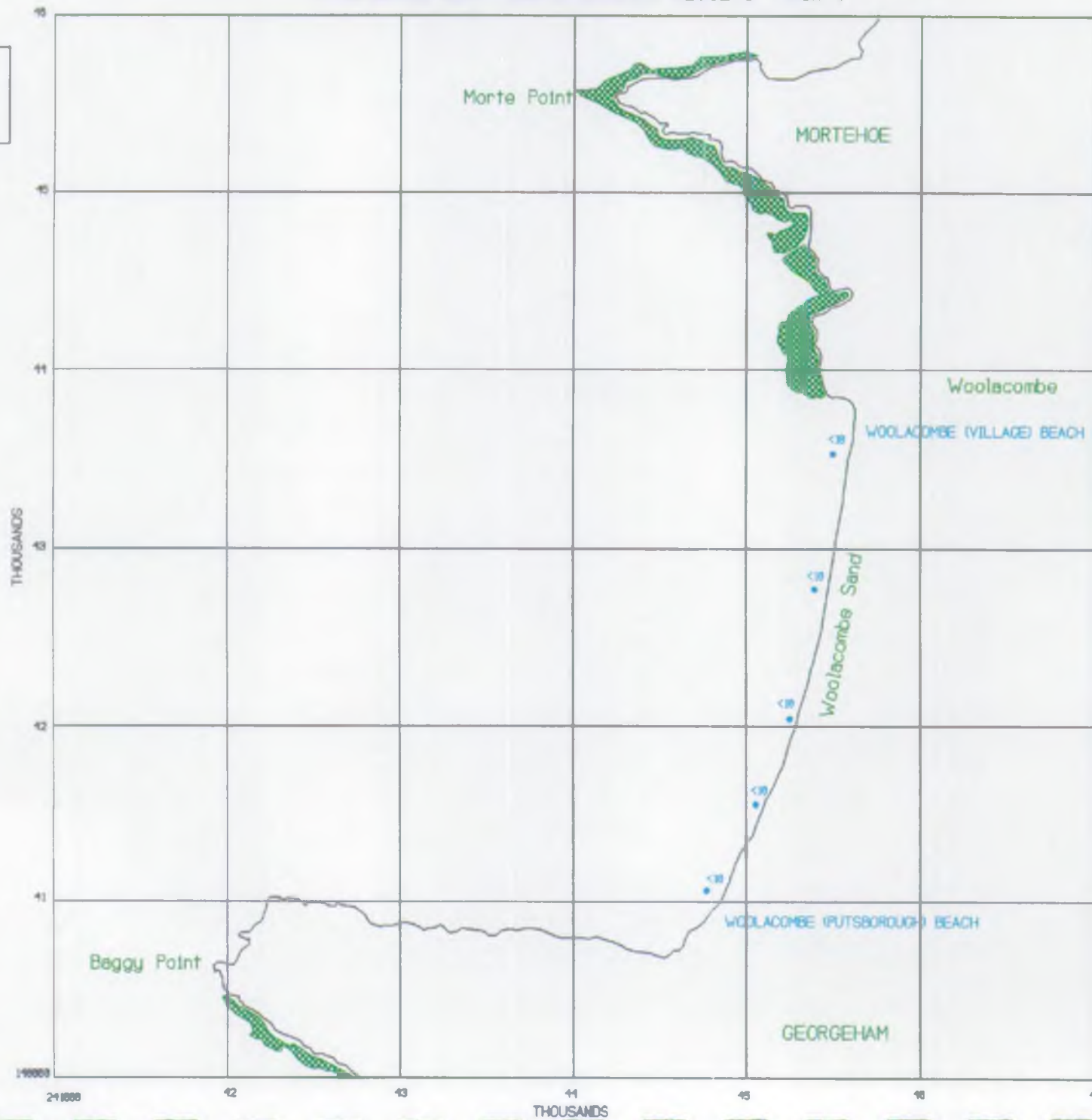
WOOLACOMBE NEAP TIDE B. GLOBIGII RESULTS - RUN 3

- BEACH SITE
- HIGH WATER LINE
- ROCKS/CLIFFS



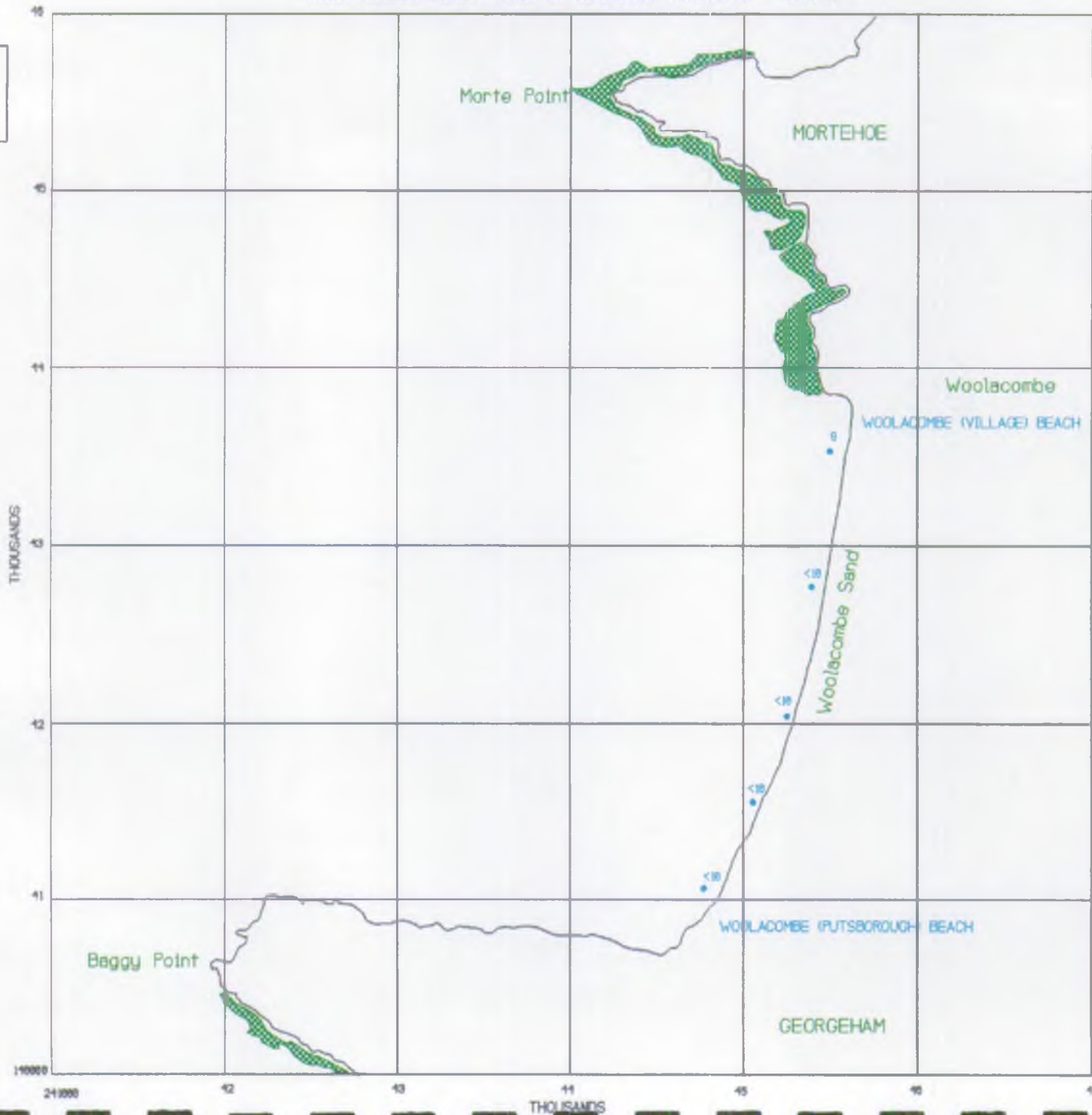
WOOLACOMBE NEAP TIDE B. GLOBIGII RESULTS - RUN 4

- BEACH SITE
- HIGH WATER LINE
- ROCKS/CLIFFS



WOOLACOMBE NEAP TIDE B. GLOBIGII RESULTS - RUN 5

- BEACH SITE
- HIGH WATER LINE
- █ ROCKS/CLIFFS

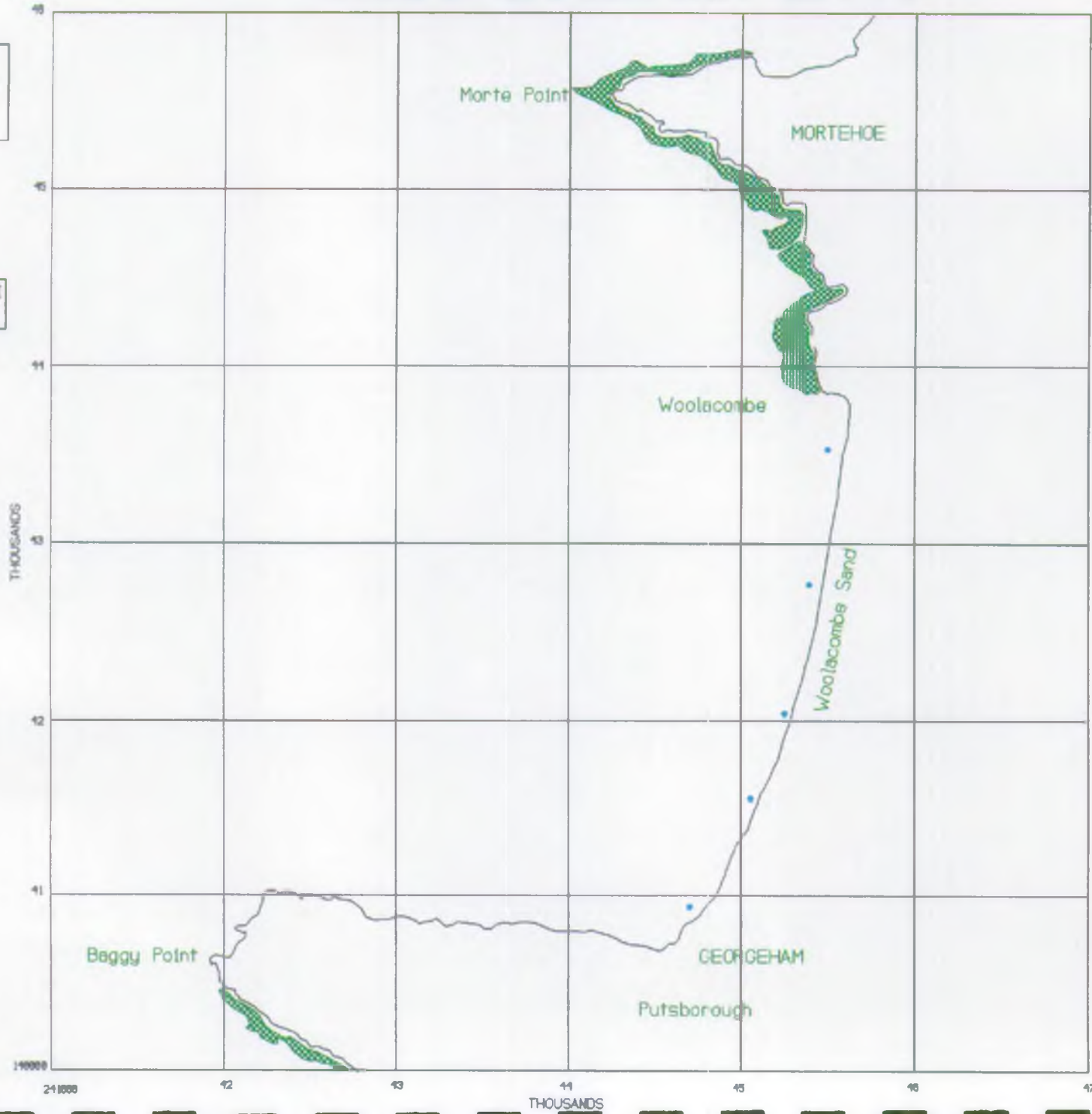


WOOLACOMBE NEAP TIDE B. GLOBIGII RESULTS - RUNS 0 to 10

- BEACH SITE
- HIGH WATER LINE
- █ ROCKS/CLIFFS

ALL B. GLOBIGII RESULTS <10

0 500
DISTANCE 50



APPENDIX V

GLOBOGII DOSING WOOLACOMBE 22-AUG-96

TABLE 2 - B. Globigii injection rate

TIME (GMT)	GLOB. LEVEL (ltr)	COMMENTS
845	25.00	
945	23.00	
1045	22.00	BATTERY FLAT - CONNECT NEW BATTERY
1145	20.25	
1245	18.50	
1345	16.20	
1445	14.50	
1545	12.80	
1645	10.80	
1745	9.00	
1845	7.00	
1945	5.00	
2045	3.80	

TABLE 3 - B. Globigii titre results

TIME (GMT)	GLOB. / μ l
845	1.22E+05
1145	1.32E+05
1445	9.70E+04
1745	9.30E+04
2045	1.35E+05

Appendix VI

EC BATHING WATERS DIRECTIVE

Compliance is generally assessed against the imperative (I) standards for the principal bacteriological parameters total and faecal coliforms. These standards are:

Total coliforms: Max 10,000 per 100ml
Faecal coliforms: Max 2,000 per 100 ml

Bathing waters are allowed a five per cent failure rate in any one year. This means that 19 samples in 20 have to meet the imperative standards for compliance to be achieved.

The principal guidelines (G) standards, which have to be achieved in 80 percent of samples (i.e. 16/20 samples) are:

Total coliforms: Max 500 per 100ml
Faecal coliforms: Max 100 per 100ml
Faecal streps.: Max 100 per 100ml (achieved in 90% of samples)