ENVIRONMENTAL PROTECTION

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South West Region

TWO YEAR AESTHETIC SURVEY OF BEACHES IN THE SOUTH WEST (1990 AND 1991)

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TWO YEAR AESTHETIC SURVEY OF BEACHES IN THE SOUTH WEST (1990 AND 1991)

1. Introduction

1.1 The principal objective of the survey was to assess the aesthetic impact of crude sewage discharges on popular beaches around the coastline of the South West.

1.2 A standard method of assessment was used to record the type and quantity of visual debris on beaches around the region. Records were kept of the weather conditions prevailing at the time of the surveys.

1.3 The results of the first year's, or preliminary, survey were used to refine the methods adopted during the second year's, or main, survey.

1.4 During both surveys, opportunity was taken to assess the popularity of each beach by a rapid count of numbers of people on the beach and in the water on each sampling occasion.

1.5 In the South West, 133 bathing waters are regularly monitored in accordance with the requirements of the EC Directive Concerning the Quality of Bathing Water. The aesthetic impact of crude sewage discharges was assessed at all these sites along with a further 71 popular beaches in the region (Figure 1). Two of these beaches were only monitored in 1990 and 4 only monitored in 1991. On each visit, a single continuous assessment of aesthetic quality was made along the entire beach which may have one or more identified bathing water monitoring points.

2. Methods

2.1 Sites were surveyed between July and September in 1990 and 1991. Beaches were visited on an average of 5 occasions each summer. During the preliminary survey there was some variation in the frequency of visits. This was more a reflection of observer bias and site accessibility rather than according to the pre-determined schedule.

2.2 Preliminary Aesthetic Survey (July to September 1990)

2.2.1 Each site was monitored according to a modified Garber Index (Garber, 1960). The entire length of each beach was surveyed along the high water mark and at the water's edge. The relative amounts of the following types of sewage related debris was recorded at each sampling position: intact faeces, grease/scum, sewage debris, contraceptives/tampons, sanitary towels, noxious sewage odour.

2.2.2 Physico-chemical observations as required by the EC Bathing Water Directive were also made by recording the presence or absence of parameters (sea colour, mineral oils, surface active substances and phenol) at the water's edge. For the sake of simplicity, these data are not reported here, but will be used in appraisals of bathing water quality on a site by site basis.

2.2.3 Observations of weather conditions were made at the top of the beach away from the water edge, in order to reflect the prevailing conditions at each site. This was particularly important for wind direction measurements where the intention was to record prevailing conditions, not the "sea breezes". Again, the data will be used for appraisals on a site-by-site basis and will be supported by knowledge of tidal conditions prevailing at the time of each site visit.

2.3 Main Aesthetic Survey (July to September 1991)

2.3.1 The Garber Survey method used for the preliminary survey was not entirely objective. The method was further standardised for the 1991 survey and, where possible, direct counts of sewage related debris were made along each monitoring line. Where this was not possible (for example, to record grease/scum or noxious sewage odour) a degree of subjectivity had to be retained.

2.3.2 The intention was to categorise each beach according to the degree of aesthetic contamination. The following categories were adopted:

A. Sites free from any sewage related debris (Score = 0), including grease/scum and sewage odour;

B. Sites with trace quantities of sewage related debris (Score = >0 and <1) and/or grease/scum and sewage odour;

C. Sites with intermittent quantities of sewage related debris (Score = >1 and <9) and/or grease/scum and sewage odour; and

D. Sites with objectionable quantities of sewage related debris (Score = >9) and/or grease/scum and sewage odour.

2.3.3 For grease/scum and noxious sewage odour observations were recorded according to the percentage of sampling area actually covered; for example, 0 = 0% (absent), 1 = 1-10% (trace amount), 2 = 11-50% (intermittent amount) and 3 = >50% (objectionable amount).

2.3.4 The sampling areas for the 1991 survey were extended to include 5 metres either side of any monitoring line (for example the high water mark and at the waters edge).

2.3.5 The preliminary (1990) survey took no account of the relative size of each monitored beach. The following strategy was adopted for the main survey:

(a) For a beach less than 500m long, observations and counts were made over 100m sections, with each section continuing on from the previous one; and

(b) For a beach between 500m and 1km in length, continuous sections of 200m were assessed; and

(c) For a beach greater than 1km in length, continuous sections of 500m were assessed.

The type and amount of sewage related debris was recorded for each section.

Table 1 shows the recording form used for the main survey.

2.3.6 Observations, physico-chemical parameters and weather conditions were recorded during the main survey as in the preliminary survey. The data will be used for appraisals on a site by site basis.

2.3.7 Foam was always recorded in the grease/scum category regardless of whether it was algal or sewage derived.

2.4 Beach Usage Survey

2.4.1 Counts were made of people on the beach and in the water on each beach visit during the preliminary (1990) and the main (1991) surveys.

2.4.2 Of the people in the water, distinctions were made between those swimming, windsurfing, surfing or engaged in some other activity and whether they were in the shallows, at the water's edge or were further offshore. In the nearshore area, people standing in the water who were wearing swimsuits and who were paddling (or about to, or returning from swimming) were also included in the swimming category.

2.4.3 Inevitably, there are errors in counting, especially when large numbers of people are present at a particular beach. Such beaches were given less detailed coverage in comparison with less popular locations. As a result, numbers counted at very popular resorts are viewed as good approximations. In such instances, the number of people on each beach and in the water were determined to within ± 20%.

3. Results and Discussion

3.1 Aesthetic Survey

3.1.1 Appendix I gives details of the total numbers of objects found per unit length (100m sections) on each date for each beach. Sorting the data in this way produces a "score" for each beach over the whole survey. The "score" is the average number of objects per unit length for each beach over the whole survey (i.e. all 5 survey dates).

3.1.2 Appendix II gives the cumulative frequencies of the observations of grease/scum and noxious sewage odour recorded during all five surveys.

3.1.3 Having sorted the data as detailed above, the beaches were grouped into the categories described in paragraph 2.3.2.

Tables 2-5 and Figures 2 and 3 show the results of this exercise.

Each table of results from the main survey indicates the category (A-D) each beach fell into after the preliminary survey. Also indicated is whether or not a beach had been cleaned prior to each survey being carried out.

3.1.4 177 of the 202 monitored beaches (in 1991) fell into categories A-C. Of these, at only 8 sites was no sewage related debris (including grease/scum and sewage odour) recorded on any occasion.

3.1.5 25 of the monitored beaches fell into the most polluted category, i.e. category D. Category D beaches included many areas where the greatest numbers of tourists may be expected during the summer season.

3.1.6 Figure 4 shows the numbers of each type of debris recorded on each beach. Appendix III shows some examples of the debris found on different beaches. At the majority of beaches, sanitary towels were the largest single contributory parameter to total sewage related debris present on the beach. This may be a reflection of both the ease of detection and the quantities of such material discharged from crude outfalls.

3.1.7 Beach cleaning of one degree or another (either by a person picking up items along the strandline or a tractor removing the whole strandline) was observed at many beaches on one or more occasions. Tables 2-5 indicate this. However, it can be seen that the cleaning did not always have much effect on the overall aesthetic appearance of the beach.

3.1.8 The date of the survey appeared to have limited impact on the aesthetic quality of the beaches. It was expected that less sewage related debris would be recorded during the later surveys (towards the end of September) once the majority of tourists had gone home. However, there appeared to be little improvement in the amounts recorded, even at the category 4 beaches. This may indicate that sewage related debris can have a long retention time on a beach (especially at the high water mark).

3.2 Beach Usage Survey

3.2.1 The head counting exercise will assist in appraisal of the degree of popularity of different beaches. Dates and times of counting were not co-ordinated between sites and any direct comparisons must therefore be treated with caution.

3.2.2 Similar exercises were carried out in 1987 and 1989 by making an assessment of usage from aerial photographs taken around the region on certain dates during the summer. All 4 surveys will help to build up an overall picture of the degree of usage of beaches around the region. This will assist the on-going review of bathing waters which may be identified in terms of the EC Directive.

4. Recommendations

4.1 It is recommended that the 1991 survey results are used to assist in the priority rating of crude sewage discharges requiring early improvement through screening or similar process.

4.2 It is recommended that the survey of beach quality be repeated in future years at selected sites as improvements are made to discharges.

4.3 It is recommended that future surveys of beach usage employ the use of aerial photography, as was done during 1987 and 1989.

5. Summary

5.1 A two year survey of the aesthetic impact of crude sewage discharges on beach quality around the region has been completed. Of the 202 sites which were visited during the main (1991) survey 8 sites were found to be free from sewage related debris on all occasions, 25 sites were round to have objectionable amounts of sewage related debris and at the remaining 169 sites, trace or intermittent amounts of sewage related debris were recorded.

5.2 Beach cleaning operations were found to have improved the situation at many sites but were clearly inadequate to remove the problem entirely.

5.3 Levels of beach contamination were broadly maintained from mid-summer through to the end of September.

5.4 The survey has provided valuable information on beach usage and on the aesthetic impact of neighbouring crude sewage discharges according to prevailing conditions of weather and tide.

6. References

Garber, W.F. (1960) Receiving Water Analyses In : International Conference on Waste Disposal in the Marine Environment. First Proceedings.

7. Acknowledgement

I would like to acknowledge the help of Ashley Thompson of Exeter who produced the photographs which are contained in this report.

[EP.WQ]JD_081191_LH_TWO_YEAR_BEACH_SURVEY

TABLE 1

AESTHETIC BEACH SURVEY - SUMMER 1991

SITE NAME :-						USER REFERENCE NUMBER :-								DATE :-	SHEET NO. :-	WEATHER INFORMATION
APPROXIMATE BEACH LENGTH :-						APPROXIMATE SECTION LENGTH :-								TIME (24 HR) :-	TIDE :-	
	PART A					PART B										WIND FORCE :- (0 — 6) (CALM — STRONG BREEZE)
SECTION NO. :-	COLOUR	MINERAL OIL	SURFACE ACTIVE SUBST.	PHENOL	TAR OR FLOATING MATTER	S/L OR M/L	GREASE/ SCUM	NOXIOUS SEWAGE ODOURS	CONTRA-CEPTIVES	TAMPONS/ APPLIC-ATORS	INTACT FAECES	SANITARY TOWELS	SEWAGE DEBRIS	COMMENTS (CONTINUE ON THE BACK OF THIS SHEET IF NEEDS BE)		WIND DIRECTION :- (N,NE,E,SE,S,SW,W,NW)
1 (6)						S/L										
						M/L										
2 (7)						S/L										SEA STATE :- (0 — 6) (CALM/GLASSY — WAVES OF 8Ft)
						M/L										
3 (8)						S/L										SUN STATE :- (0 — 4) (SUN OBSCURED — BRIGHT SUN)
						M/L										
4 (9)						S/L										PART C
						M/L										NUMBER OF PEOPLE IN THE SEA
5 (10)						S/L										NUMBER OF PEOPLE ON THE BEACH / "INSHORE" SWIM / SURF / M/SURF / OTHER / "OFFSHORE" SWIM / SURF / M/SURF / OTHER
						M/L										

TABLE 2

CATEGORY A - Beaches with no contamination along their length

DEVON: (1990 CATEGORY)

Sunny Cove (C)
Woody Bay (B)

CORNWALL:

Mevagissey Beach * (C)
St Levan Beach (A)
Priests Cove (A)
Porthgwidden (D)
Beacon Cove
Bossiney Haven (A)

Notes: * - Mevagissey only visited on one occasion

No beach cleaning operations are known of on these beaches.

TABLE 3

CATEGORY B - Beaches with trace contamination along their length

DEVON: (1990 CATEGORY)	AVERAGE NO. OF COUNTABLE ITEMS PER 100M UNIT LENGTH	BEACH CLEANING
Goodrington Sands (D)	(0.98)	*
Bee Sands (C)	(0.49)	
Great Mattiscombe (B)	(0.8)	
Gammon Head (B)	(0.4)	
Venerick Cove (C)	(0.6)	
Wonwell Beach (B)	(0.5)	
Mothecombe (C)	(0.8)	
Shipload Bay (C)	(0.13)	
Clovelly (C)	(0.77)	
Portledge Beach (A)	(0) - but grease/scum noted on 11% of visits	
Bucks Mills (B)	(0.15)	**
Westward Ho! (C)	(0.69)	
Woolacombe (C) (Village & Putsborough)	(0.56)	
Barricane Beach (C)	(0) - but grease/scum noted on 8% of visits	
Rockham Bay (C)	(0.27)	
Wringcliff (B)	(0.2)	
CORNWALL		
Whitehouse (Fowey) (B)	(0.33)	
Gorran Haven (Vault) (B)	(0.89)	
Portholland (B)	(0.27)	
Church Cove (Lizard) (D)	(0.5)	
Kynance Cove (A)	(0.8)	
Prussia Cove (A)	(0.25)	
Mill Bay Beach	(0) - but grease/scum noted on 3% of visits	
Porthmeor (C)	(0.93)	
Porthminster (B)	(0.13)	
Carbis Bay (C)	(0.2)	
Porth Kidney Sands (C)	(0.05)	
The Towans (C) (Hayle & Godrevy)	(0.52)	
Mother Ivey's Bay (C)	(0.8)	
Tregirls (Camel Est) (C)	(0.12)	
St Georges Well Cove (C)	(0.4)	
Tregadock Beach (C)	(0.6)	

Notes: Beach Cleaning - * indicates cleaned on one occasion out of five
** indicates cleaned on two occasion out of five

TABLE 4

CATEGORY C - Beaches with intermittent contamination along their length

DEVON: (1990 CATEGORY)	AVERAGE NO. OF COUNTABLE ITEMS PER 100M UNIT LENGTH	BEACH CLEANING
Lyme Regis - Church (B)	(2.35)	
Lyme Regis - Cobb (B)	(5.4)	*
Lyme Regis - Monmouth (D)	(1.47)	
Seaton Beach (B)	(1.85)	
Beer Beach (C)	(3.05)	
Branscombe (C)	(1.2)	*
Weston Mouth (C)	(1.88)	
Sidmouth Town (B)	(5.38)	
Jacobs Ladder (C)	(3.48)	
Ladram Bay (C)	(1.80)	
Budleigh Salterton (C)	(1.56)	
Exmouth Beach (D)	(2.6)	*
Dawlish Warren (D)	(2.64)	**
Dawlish Town (C)	(2.58)	*
Coryton Cove (B)	(5.4)	
Holcombe (C)	(1.9)	
Teignmouth Town (D)	(2.83)	*
Shaldon Beach (C)	(2.37)	
Ness Cove (D)	(1.17)	
Maidencombe (C)	(0.55) - but grease/scum noted on 20% of visits	
Watcombe Beach (B)	(4.4)	*
Oddicombe Beach (D)	(3.2)	*
Redgate Beach (B)	(2)	
Meadfoot Beach (C)	(3.07)	
Torre Abbey Beach (C)	(1.37)	*
Livermead Sands	(1.3)	
Hollicombe Beach (C)	(6.6)	
Preston Sands (C)	(3.18)	*
Paignton Sands (C)	(4.77)	*
Broadsands (D)	(4.13)	**
Churston Cove (D)	(2.6)	
Shoalstone Beach (B)	(2)	
St Marys Bay (D)	(8.97)	
Man Sands (D)	(5.92)	
Scabbacombe Sands (C)	(7.8)	
Sugary Cove (A)	(1.8)	
Blackpool Sands (C)	(1.33)	
Slapton Sands (D) (Torcross & Monument)	(1.11)	
Hallsands (C)	(2.9)	
Abrahams Hole (C)	(1.8)	
Ditchend Beach (C)	(0.6) - but grease/scum noted on 11% of visits	
Mill Bay Beach (C)	(3.03)	
Salcombe (North & South) (B)	(2.6)	
Soar Mill Cove (B)	(2.8)	
Hope Cove (C)	(4.67)	

DEVON: (1990 CATEGORY)	AVERAGE NO. OF COUNTABLE ITEMS PER 100M UNIT LENGTH	BEACH CLEANING
Thurlestone Sands (D) (North & South)	(8.26)	
Bantham Sands (C)	(3.3)	*
Bigbury-on-Sea (B) (North & South)	(2.82)	
Challaborough (C)	(3.4)	
Stoke Beach (B)	(1.87)	
Wembury Beach (C)	(3.6)	
Plymouth Hoe East (D)	(4)	*
Plymouth Hoe West (D)	(3.4)	**
Hartland Quay (C)	(0.5) - but grease/scum noted on 13% of visits	
Saunton Sands (C)	(1.63)	
Hele Bay (C)	(2.4)	
Instow (D)	(1.98)	*
Welcombe Mouth (C)	(5)	
Croyde Bay (C)	(4.92)	**
Tunnels Beach (C)	(5.6)	
Capstone (C)	(4.8)	
Lynmouth (C)	(4.8)	
CORNWALL		
Whitsand Bay (C)	(2.63)	
Portwrinkle (C)	(5.93)	
Downderry (C)	(3.93)	
Seaton Beach (C)	(2.1)	*
Millendreath (B)	(2.6)	****
East Looe Beach (C)	(2.2)	
Polperro Beach (B)	(3)	
Lantic Bay (C)	(2.3)	
Polridmouth (C)	(4)	
Polkerris (C)	(6.2)	**
Par Sands (C)	(4.12)	*
Spit Beach (C)	(7)	
Crinnis (C) (Golflinks & Leisure Centre)	(3.2)	**
Porthpean Beach (C)	(6.47)	
Pentewan Beach (C)	(1.35)	
Polstreath (B)	(2)	
Port Mellon Beach (C)	(1.3)	
Little Perhaver (C)	(7)	
Hemmick Beach (B)	(1.26)	
Porthluney (C)	(1.33)	
Portloe Beach (A)	(3.75)	
Pendower (C)	(0.82) - but grease/scum noted on 16% of visits	
Porthcurnick (C)	(4.44)	
Towan Beach (C)	(2.8)	
St Anthony Head (B)	(2.3)	
St Mawes Beach (C)	(3.07)	
Loe Beach - Feock (B)	(0.4) - but grease/scum noted on 20% of visits	

	AVERAGE NO. OF COUNTABLE ITEMS PER 100M UNIT LENGTH	BEACH CLEANING
Gyllyngvase (C)	(6.27)	**
Maenporth (C)	(2.2)	***
Porthallow (C)	(1.9)	
Porthoustock (B)	(3.7)	
Coverack Sands (D)	(1.73)	
Kennack Sands (B)	(1.17)	
Polpeor Cove (B)	(0.6) - but grease/scum noted on 22% of visits	
Gunwalloe Cove (C)	(8.3)	
Porthleven Sands(C)	(1.44)	
Praa Sands (East & West) (C)	(1.91)	
Mounts Bay (D) (Heliport, Chyandour & Little Holgus)	(7.36)	***
Mousehole (B)	(4.6)	
Porthcurno (A)	(1.6)	
Sennen Cove (D)	(0.01) - but grease/scum noted on 11% of visits	
Porthreath (D)	(3.07)	*
Chapel Porth (D)	(7.6)	
Trevaunance Cove (C)	(1.7)	
Holywell Bay (D)	(5.47)	
Porth Joke (C)	(6.1)	
Crantock Beach (C)	(1.82)	
Towan (Newquay) Beach (C)	(2)	
Watergate Beach (D)	(6.51)	*
Mawgan Porth (D)	(7.17)	
Porthcothan (C)	(1.6)	**
Treyarnon Bay (D)	(3.5)	*
Constantine Bay (D)	(6.18)	
Harlyn Bay (C)	(1.07)	**
Trevone Bay (D)	(3.5)	**
Rock Beach (B)	(0.44) - but grease/scum noted on 34% of visits	
Daymer Bay (C)	(1.13)	
Polzeath (D)	(1.15)	****
Widemouth Sand (C)	(2.48)	****
Trebarwith Strand (C)	(3.2)	
Crackington Haven (C)	(5.6)	
Bude - Summerleaze (C)	(2.1)	*****
Bude - Sea Pool	(2.6)	**
Bude - Sandymouth (C)	(3.35)	*
Bude - Crooklets (C)	(1.4)	****

Notes: Beach Cleaning - * indicates cleaned on one occasion out of five
** indicates cleaned on two occasions out of five
*** indicates cleaned on three occasions out of five
**** indicates cleaned on four occasions out of five
***** indicates cleaned on all occasions visted

TABLE 5

CATEGORY D – Beaches with objectionable contamination along their length

DEVON: (1990 CATEGORY)	AVERAGE NO. OF COUNTABLE ITEMS PER 100M UNIT LENGTH	BEACH CLEANING
Sandy Bay Beach (D)	(20.37)	*
Babbacombe (C)	(9.6)	
Beacon Cove (Torbay) (B)	(10)	
Saltern Cove (C)	(10.2)	
Bovisand Beach (C)	(10.2)	
Jennycliff Bay (D)	(102.4)	
Combe Martin (D)	(9.2)	
CORNWALL		
Cawsand Bay (D)	(16.2)	
Readymoney Cove (C)	(9.4)	
Charlestown (D)	(12.73)	
Duporth Beach (D)	(9.87)	
Swanpool Beach (B)	(9.9)	**
Polurrian Cove (C)	(9.4)	
Poldhu Cove (C)	(12)	
Church Cove (C)	(21.4)	
Perran Sands (C)	(9.93)	
Top Tieb (C)	(11.3)	
Penzance (D)	(13.9)	
Wherry Town (D)	(33.8)	
Porthtowan (D)	(70.6)	
Perranporth Sands (D) (Village & Penhale)	(14.65)	*
Fistral Beach (D)	(24.2)	***
Porth Beach (D)	(12.9)	
Bude – Northcott (C)	(18.7)	

Notes:

Beach Cleaning – * indicates cleaned on one occasion out of five visited
** indicates cleaned on two occasions out of five visited
*** indicates cleaned on three occasions out of five visited

Figure 1. Sites Monitored During The Two Year Aesthetic Survey Of Beaches.

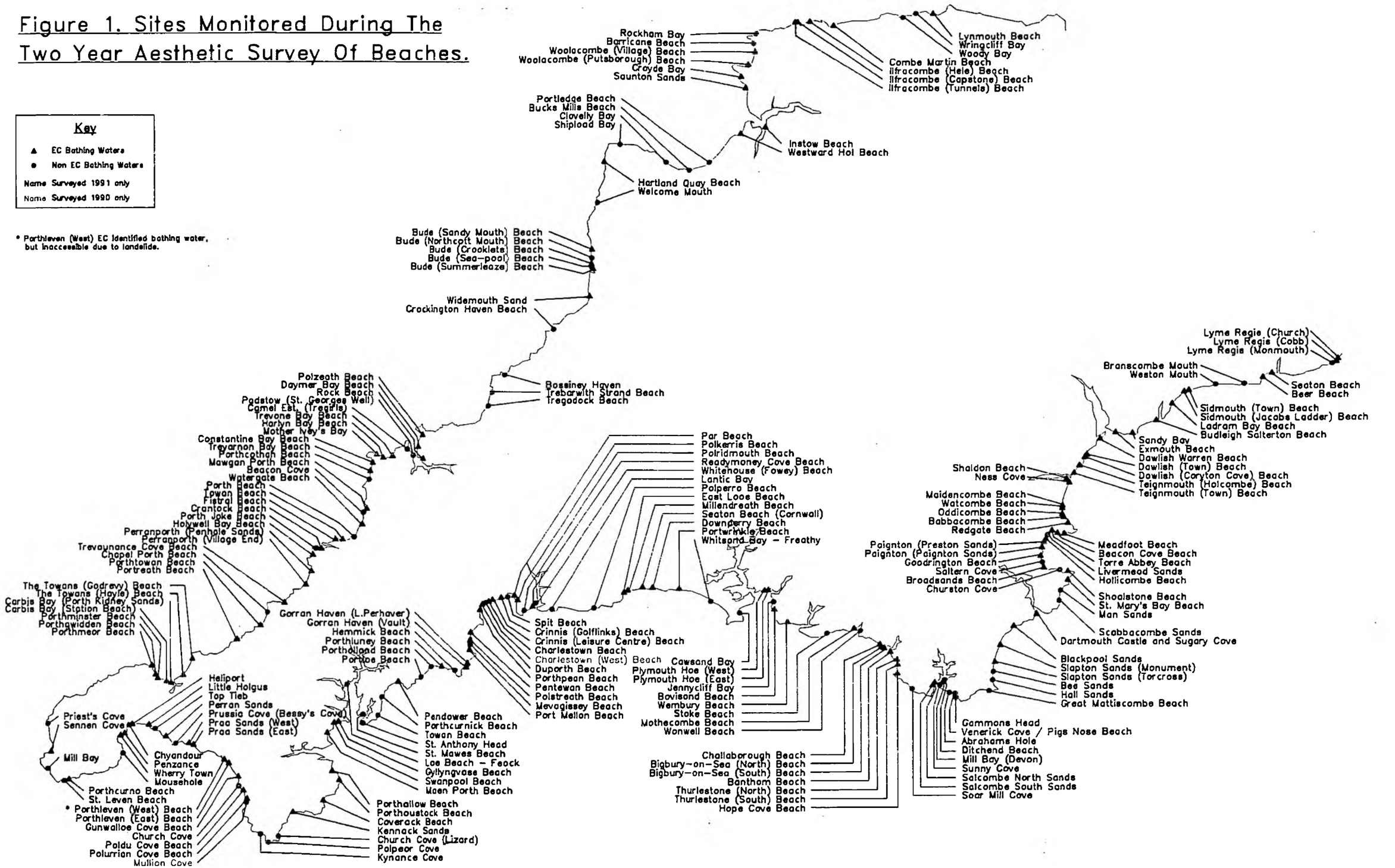
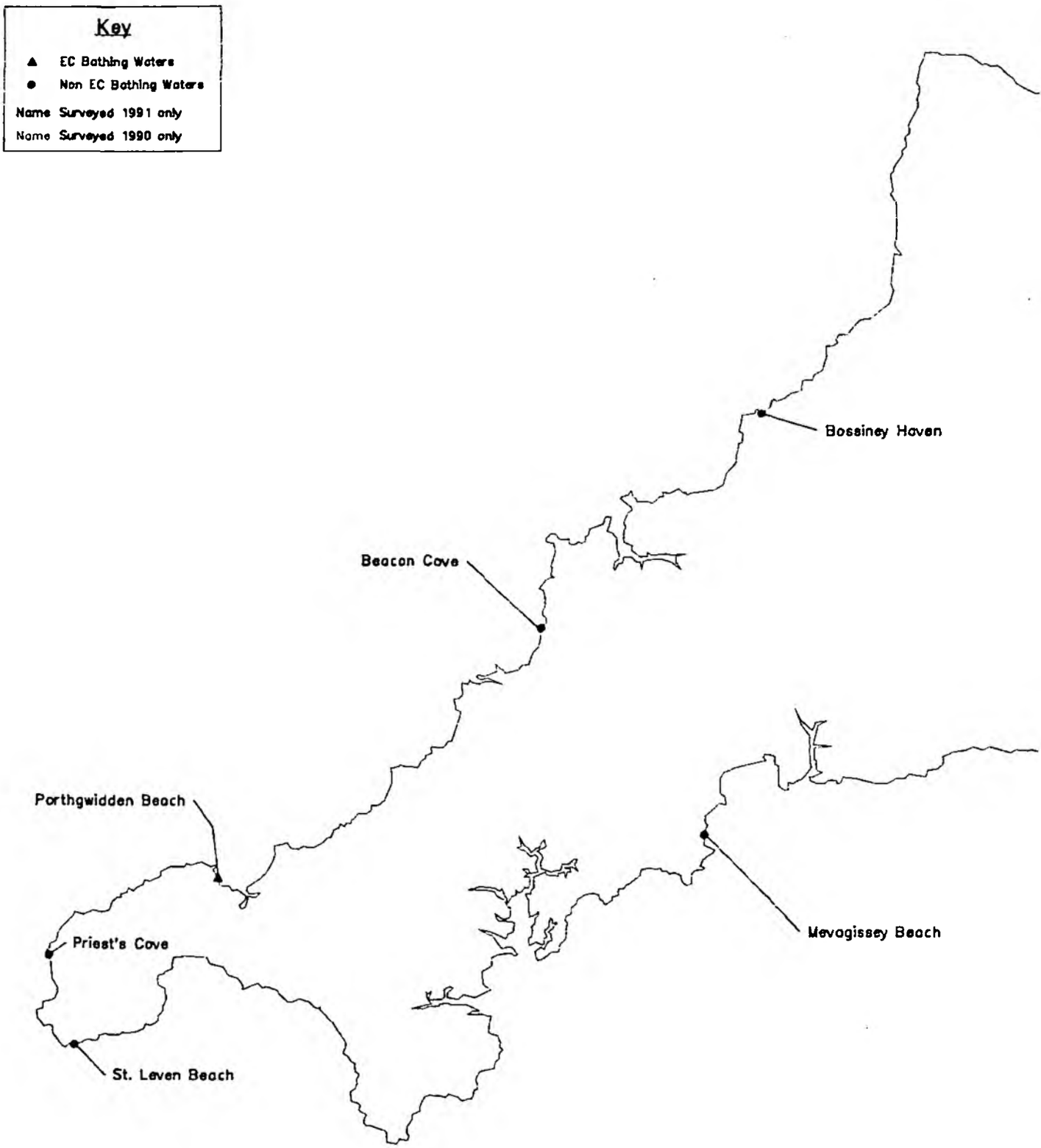


Figure 2. Sites Clear Of Sewage Related Debris



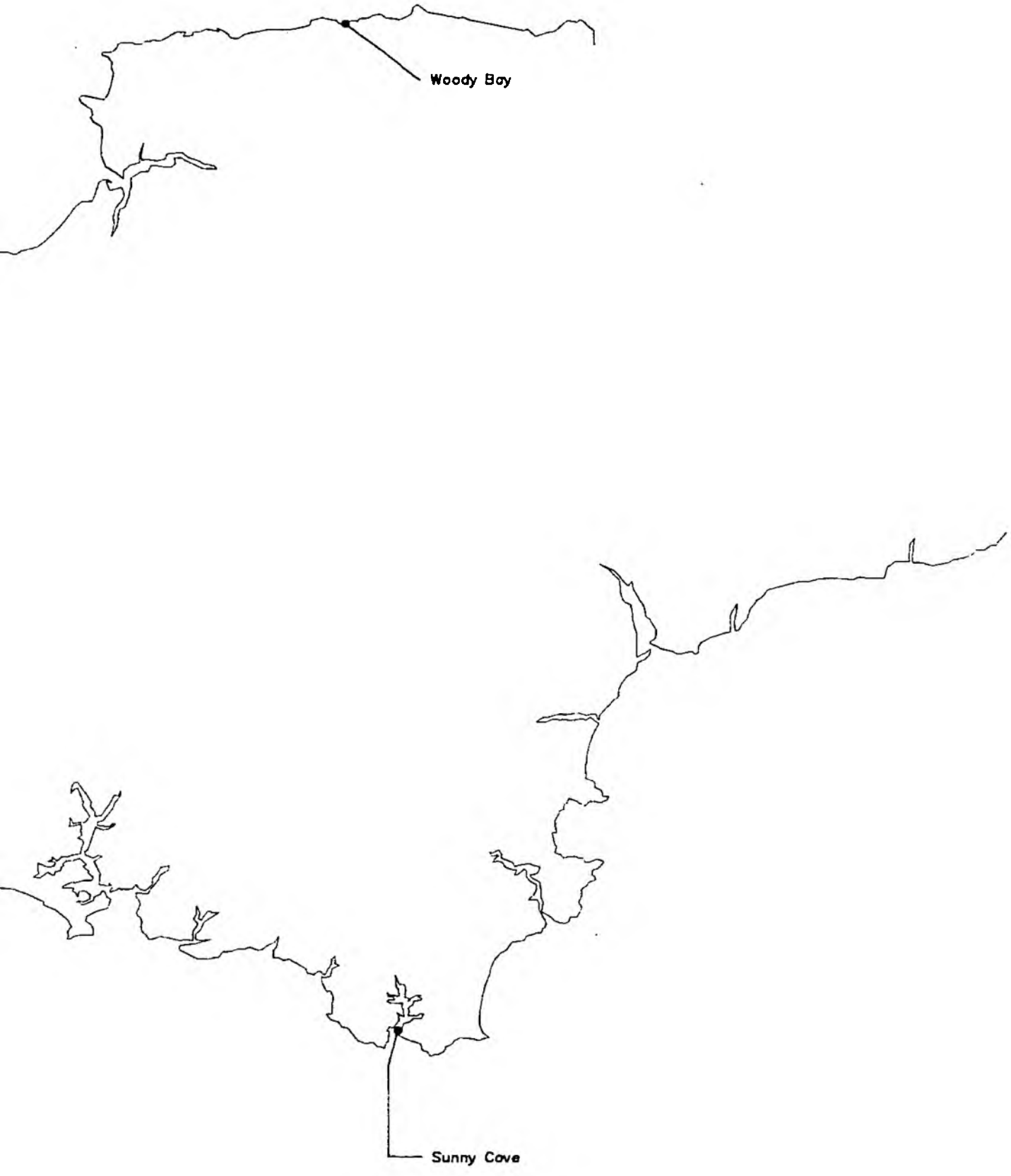
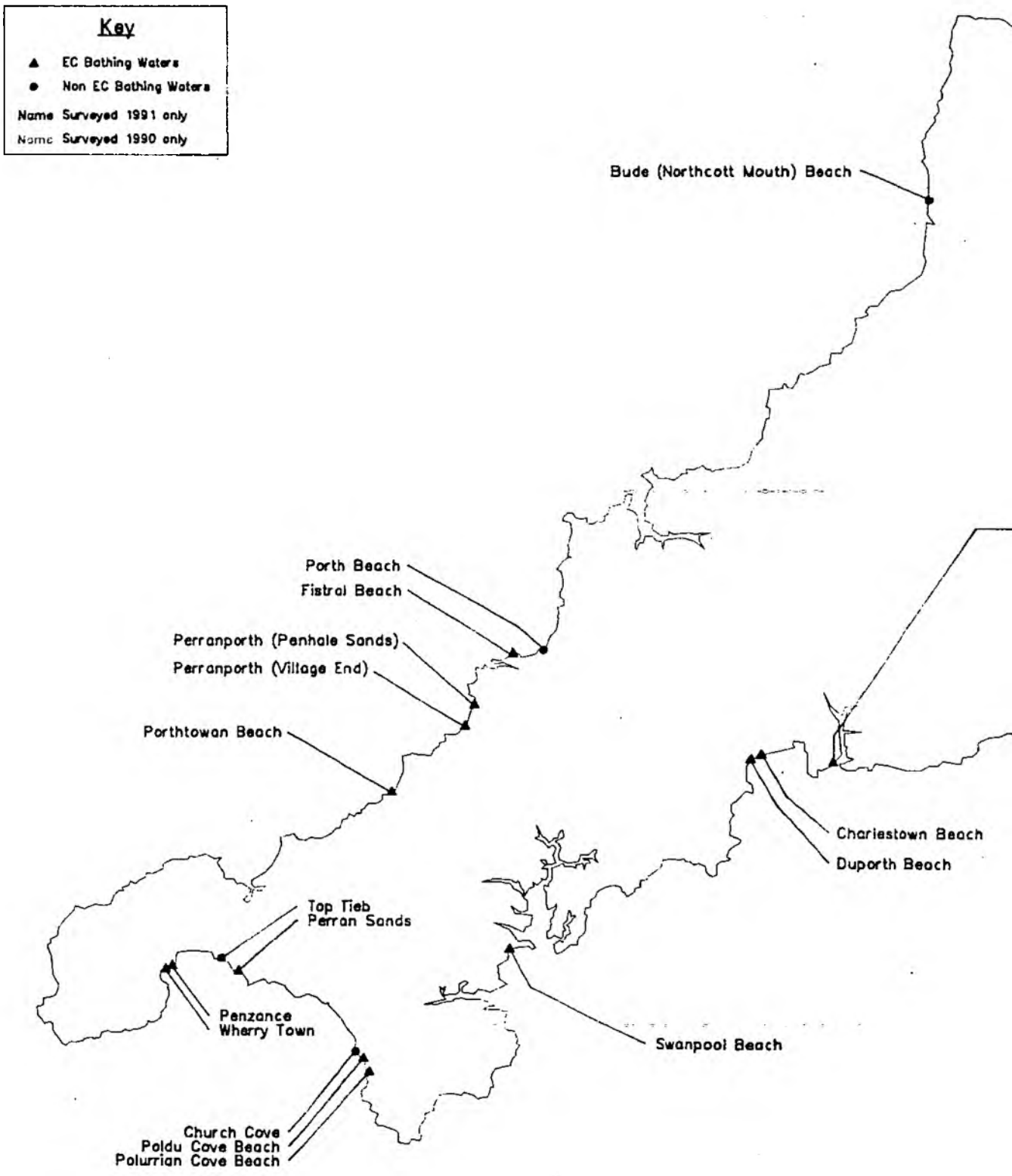

Woody Bay
Sunny Cove

Figure 3. Sites With Objectionable Quantities Of Sewage Related Debris



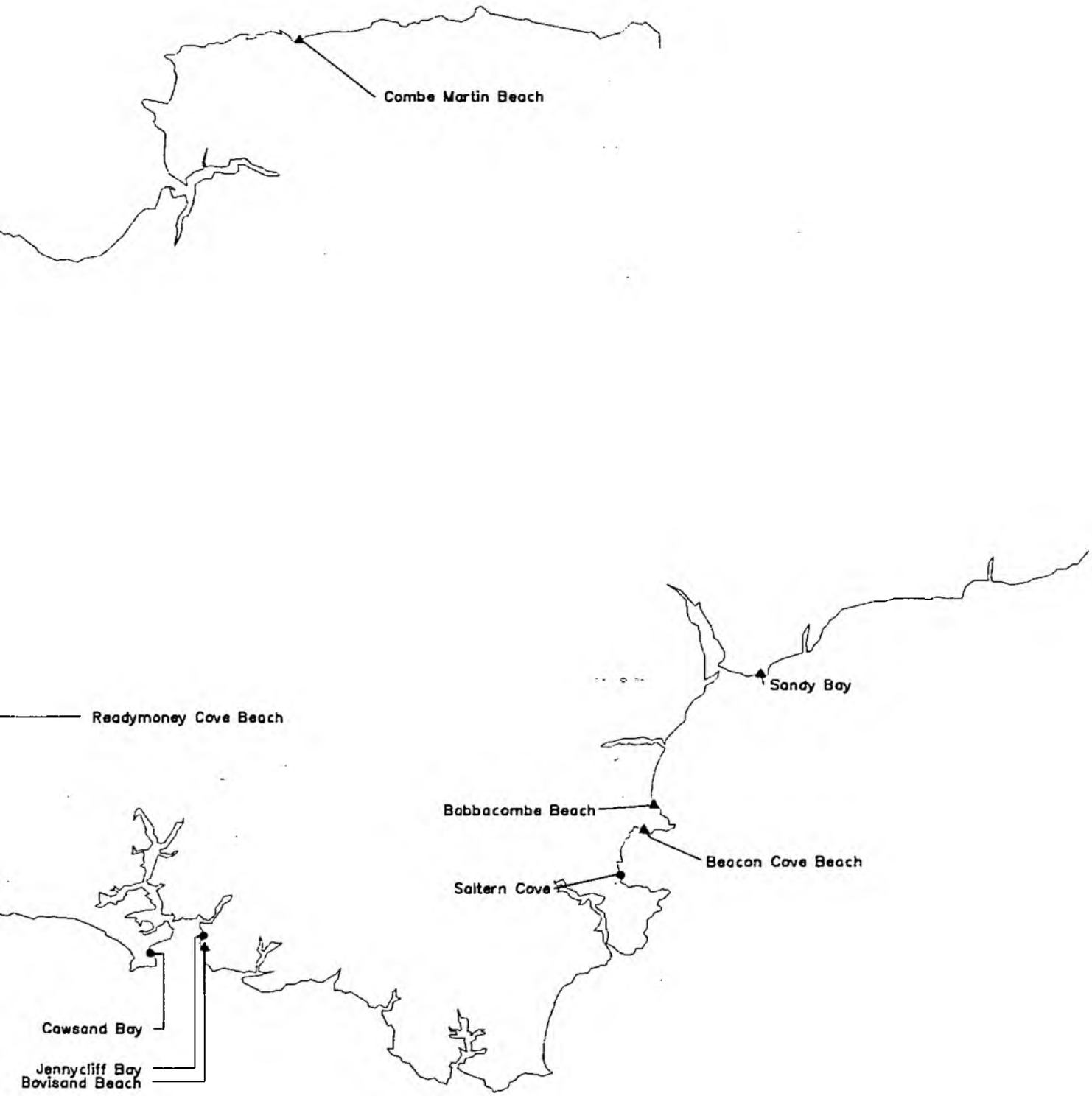

Combe Martin Beach
Sandy Bay
Readymoney Cove Beach
Babbacombe Beach
Beacon Cove Beach
Saltern Cove
Cowsand Bay
Jennycliff Bay
Bovisand Beach

Figure 4. Numbers Of Each Type Of Debris Recorded On Each Beach (Page 1)

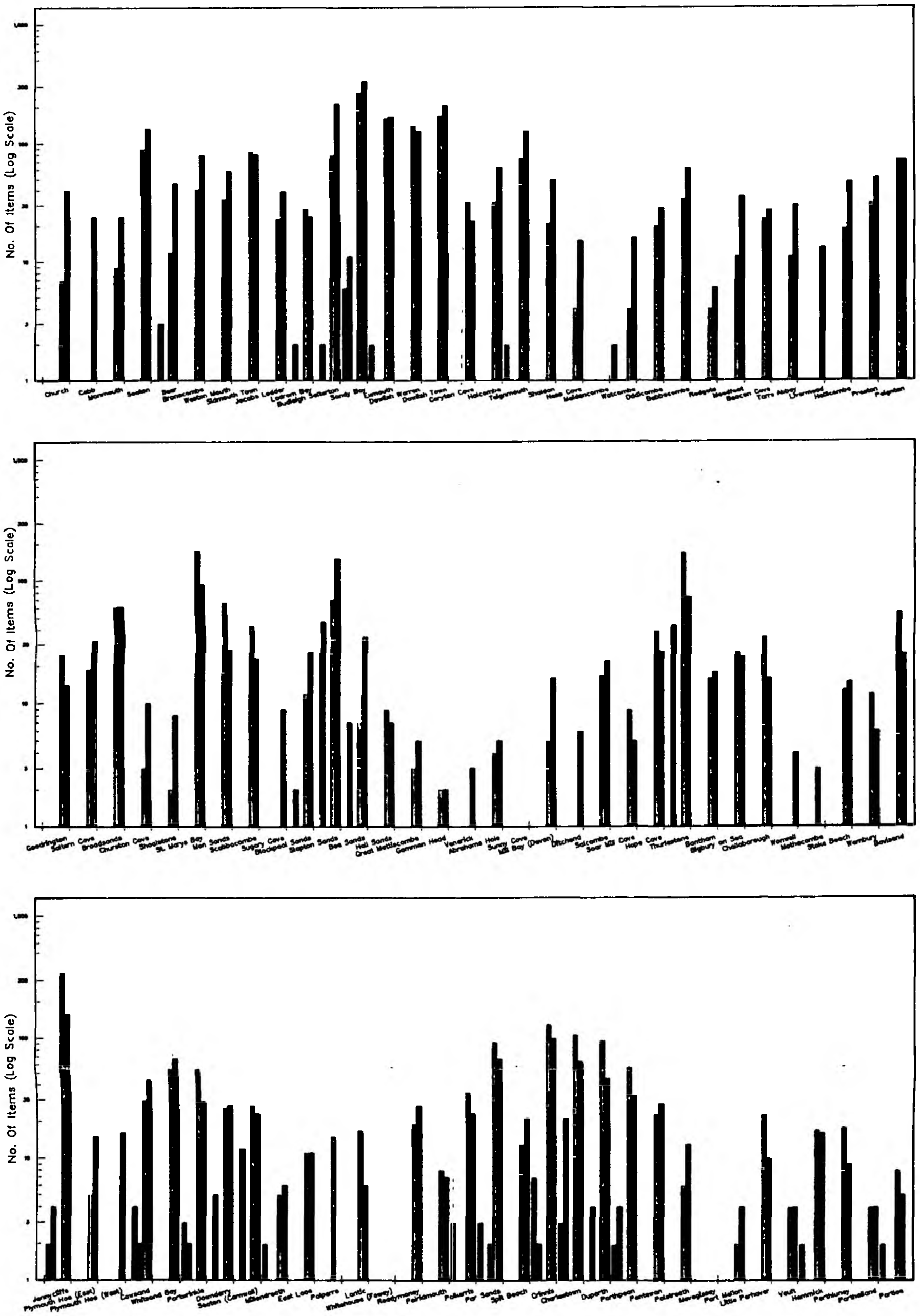
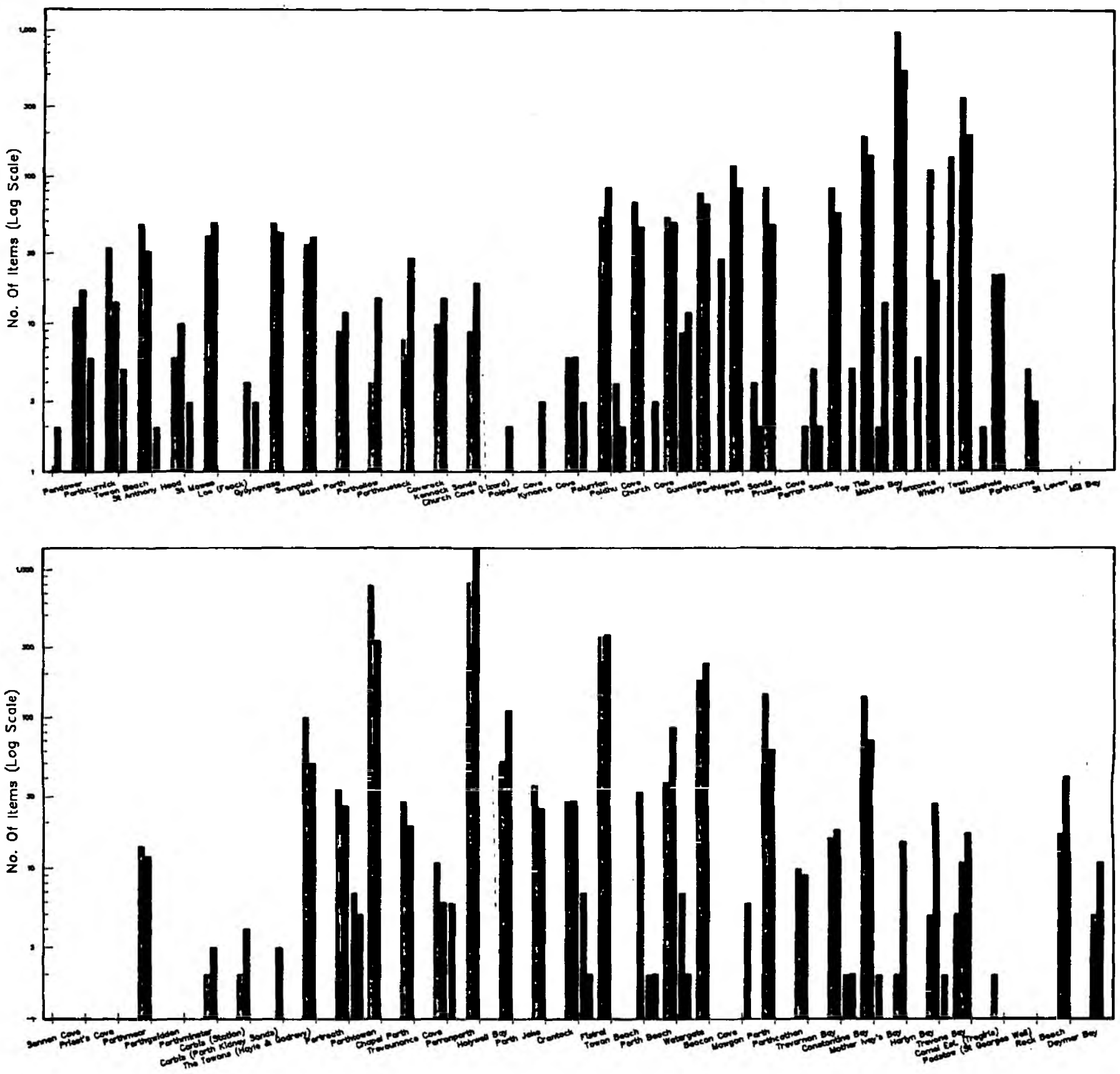


Figure 4. Numbers Of Each Type Of Debris Recorded On Each Beach (Page 2)



Appendices I and II are very bulky and are available on request. Please contact the author of this report.

APPENDIX III