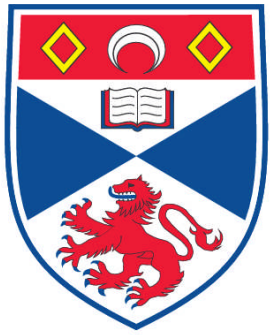
PHYSICAL, BIOLOGICAL AND CULTURAL FACTORS INFLUENCING THE FORMATION, STABILISATION AND PROTECTION OF ARCHAEOLOGICAL DEPOSITS IN U.K. COASTAL WATERS

VOLUME II

Ben Ferrari

A Thesis Submitted for the Degree of PhD
at the
University of St. Andrews



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PHYSICAL BIOLOGICAL AND CULTURAL FACTORS INFLUENCING THE FORMATION, STABILISATION AND PROTECTION OF ARCHAEOLOGICAL DEPOSITS IN UK COASTAL WATERS

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(Appendices and Figures)

Sport Divers and Archaeology

In 1992 70,000 divers undertook 1.5 million dives around the coast of the UK.[1] In order to gain data relevant to consideration of the potential impact of this level of diving activity, two questionnaires were distributed. Questionnaire 1 dealt with general issues regarding diver activity and the attitude of divers towards archaeological material on the seabed. Questionnaire 2 was designed to collect data on the removal of material from the seabed.

[1] *Diver* (Editorial, Feb 1993)

1 Introduction

Results obtained from questionnaire 1 and 2 are presented below. A separate study of advertising in *Diver*[2] magazine was also conducted to examine changes in the nature of diving as a hobby in the period between 1968 and 1990. From 1968 until 1978 the magazine was known as *Triton* and appeared bi-monthly. For this period 2 issues per year were examined. From 1978 onwards it was known as *Diver* and appeared on a monthly basis; 3 issues per year were examined (April, August and December). This gave a sample of 57 issues covering 22 years. The number of advertisements relating to specific categories of equipment or activity were counted. The total for each year was divided by the number of issues investigated, giving a mean score. This was intended to mitigate the effects of seasonal variation.

Wreck Location Equipment

This category included such items as magnetometers, echo-sounders, metal detectors and decca navigators (an electronic position fixing aid). Such equipment allows wider areas to be searched more quickly with accurate position fixing. Equally, it can facilitate the location of material which might not be detected by visual searches in poor conditions.

Dry-suits

The superior insulation offered by these suits allows longer periods to be spent under water in relative comfort as compared to wet suits.

Facilities

Advertisements for dive shops and diving schools were noted in order to investigate availability of training and equipment.

Location

Advertisements for charter boats and holidays were noted in order to consider broad patterns of diving activity.

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[2] Both of the nationally organised diving clubs offer monthly magazines to their membership. Subscription to *Diver* is included in the annual membership fee of the BSAC. It is also sold through newsagents. Annual circulation of *Diver* magazine is *circa* 50,000 (*Diver*, Editorial, Sept 1991).

Not every dive shop will necessarily advertise in the magazine at any one time and a variety of factors will determine whether an advertisement for a particular piece of equipment will appear. The results obtained, therefore, must be used with caution to infer trends.

Early sport divers often had to make do with army surplus or home-made gear. Figure 149 and 150 indicate that a range of equipment is now available from a considerable number of outlets. Figure 150, however, also shows a dramatic rise in the availability of foreign diving holidays. Thus, although figure 151 indicates a steady rise in the membership of the British Sub-aqua Club (BSAC), any consequent rise in actual diving activity need not be entirely UK based.

An increase in availability of equipment directly related to wreck location has evident implications in terms of the potential impact of sport diving activity on archaeological deposits (see fig. 149). However, other items of equipment could also have been selected for study. The availability of rigid-hulled inflatables could be used as an indication of increased mobility on the part of dive clubs with a greater range of sites thus becoming available (*Diver*, Feb 1991, 20-26; *Diver*, Mar 1991, 62-5). Equally, while wreck location equipment might facilitate increased disturbance of deposits, a growth in sales of photographic equipment could be used as evidence of the popularity of other, less intrusive activities. These results will be discussed further below.

2 Questionnaire 1

A copy of this questionnaire appears as section 2.5 of this appendix. Forms were distributed at the 1988 BSAC Crystal Palace Diving Show. This is an annual event and is the largest national diving-oriented gathering of the year. The show includes demonstrations, trade stands and special interest stands.

The questionnaires were distributed from the Nautical Archaeology Society (NAS) stand. This was located among other non-trade stands in a gallery above the main arena. Groups represented included travel firms, book sellers and a club whose entire display consisted of pieces of brass taken from wrecks. It was thus felt that those visiting the gallery would represent a wide range of interests. The NAS stand was in such a position that most visitors to the gallery were likely to walk past it. It might, however, be argued that only people already interested in archaeology would visit the NAS stand and a strongly biased sample would result.

Distribution was paced so that questionnaires would be available throughout both days of the show (March 26th & 27th). A random sampling method was applied. Those distributing forms were asked not to discuss the content of the form until the questionnaire was completed. Effort was made to offer forms to people before they had arrived at the stand. People were asked to fill in the forms on the spot rather than take them away This was intended to prevent divers discussing the content with others. It is acknowledged that potentially more rigorous approaches to sample collection are available. It might also be suggested that having to complete the form in close proximity to a stand dedicated to archaeology might introduce additional bias - respondents may be inclined to supply answers perceived as likely to please or irritate those manning the stand.

380 forms were distributed and 347 were completed. Of these 18 were partially completed.

2.1 The Nature of the Sample Obtained

No attempt has been made to weight the sample to allow for un-returned forms or refusals to accept forms for completion. Some divers offered forms may not have completed them due to extreme views, but there does not appear to be any reliable way in which a model form for such respondents can be established.

Assessment of the sample obtained is hampered by lack of comparative data. No large-scale survey has been conducted to establish the profile of the average diver. Therefore, the sample is reviewed in the light of information resulting from consultation with colleagues, all ex and current sport divers, and prominent members of the diving community.[3]

Questions 12 -14 investigated age, sex and occupation. Questions 9a and 9b related to membership of historic or scientific societies, specifically the Nautical Archaeology Society. Less than 1% of the sample were members of the Nautical Archaeology Society. 8% of the sample belonged to other historical or scientific societies. This does not suggest that the sample was strongly pre-disposed towards a specific interest. Additionally, membership of such societies, particularly non-historical, scientific societies, cannot automatically be equated with empathy for main-stream archaeological views.

85.7% of the sample were male. Despite recent changes, a majority of male divers is believed to be the norm in most clubs:

"...Gone are the patched and torn black wetsuits of yore...Gone, too, is much of the ridiculous macho posturing that once surrounded the sport. Today, thank goodness, the fairer sex...is well represented among our ranks." (*Diver*, Editorial, Oct 1991).

Question 13 related to the occupation of the respondent. Responses were sufficiently limited to render any analysis of doubtful value.

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[3] This latter group includes Mr. McDonald (Journalist, diver and author of diving-related books) Mr. Flinder (ex Chairman of BSAC) Mr. Eaton (editor of *Diver* magazine) and Mr. Collier (owner of a large diving school, *Poole Divers*).

The age profile of the sample is presented in figure 152. The average number of dives undertaken per year is not known. General opinion holds that only a minority of divers exhibit a high level of activity. This may be reflected in the distribution noted in the responses to question 4 (see fig. 153).

Analysis of responses to question 2 (level of diving qualification) suggests that the sample was not dominated by either novice or very advanced divers (fig. 154).

2.2 Analysis of Responses to Questionnaire 1

The data collected is largely susceptible to analysis by simple graphical presentation. In addition, measures of central tendency, primarily arithmetic mean and mode, will be employed in sample description. Measures of dispersion are described in terms of positive or negative skew.

The first section of questionnaire 1 served the dual function of collecting background data on the sample and commencing the questionnaire on ground familiar to the respondents.

Question 1: *Which type of sub-aqua club do you belong to?*

BSAC 62.3%
Sub-Aqua Association 22.5%
University Clubs 4.1%
Other 11.1%

Question 2: *What diving qualification do you hold?*

Bimodal distribution; 3rd class (Sport Diver) & 2nd Class (Advanced Diver)
Mean; 3rd class (Sport Diver)

Responses to question 2 exhibit a bimodal distribution (fig. 154) but this is largely due the presence of the 'Dive Leader' qualification which serves as an intermediate step between 3rd Class and 2nd Class level. A 3rd Class diver is considered to be sufficiently capable and experienced to dive in open-water with a diver possessing a similar or higher qualification. A 2nd Class diver is considered to be sufficiently experienced to supervise activities and take inexperienced divers into the water.

Question 3: *How long have you been diving?*

Mode; 1-5 years. Mean; 1-5 years.
The distribution was markedly positively skewed.

Question 4: *Approximately, how many dives have you done in the past 12 months?*

Bimodal distribution; 'Less than 10' & '50+' dives.
Mean; 21-30

The number of dives undertaken by an individual in a 12 month period will be determined by a wide range of factors including state of health and the weather (fig. 153).

Question 5: *Of the dives you have done in the past 12 months, approximately what proportion were from hard boats?*

Bimodal distribution; 'None' & 'Some.'
Mean; 'Some.'

Questions 5 and 6 were designed to collect data on the type of diving undertaken by those completing forms. Hard-boats are generally larger and more fully equipped than club diving boats. Such vessels are often associated with diving activity at locations beyond the reach of regular club outings. Wreck diving is closely associated with such vessels.

The results of question 5 suggest that only a minority of the sample obtained are very frequent users of hard boats (fig. 155). Those conducting 'most' or 'all' of their diving from such vessels account for 29.7% of the sample.

Question 6

Question 6 asked respondents to indicate how often the participated in specific types of diving activity. Choices of response ranged from 'never' to 'always.' These responses were given a score of 1 to 5 (never = 1, always = 5). The mean and modal responses were calculated and are presented below (see fig. 156):

Drift Dives

Mode; 3 (sometimes) Mean; 2.56

The pattern of responses tended towards a symmetrical distribution with a slight positive skew.

Scenic Dives

Mode; 4 (often) Mean; 3.31

The distribution was negatively skewed.

Wreck Dives

Mode; 4 (often) Mean; 3.18

The distribution was positively skewed.

Research Dives

Mode; 1 (never) Mean 1.55.

The distribution was strongly positively skewed.

Searching For New Wreck

Mode; 1 (never) Mean; 1.79

The distribution was strongly positively skewed.

Dives Below 50m

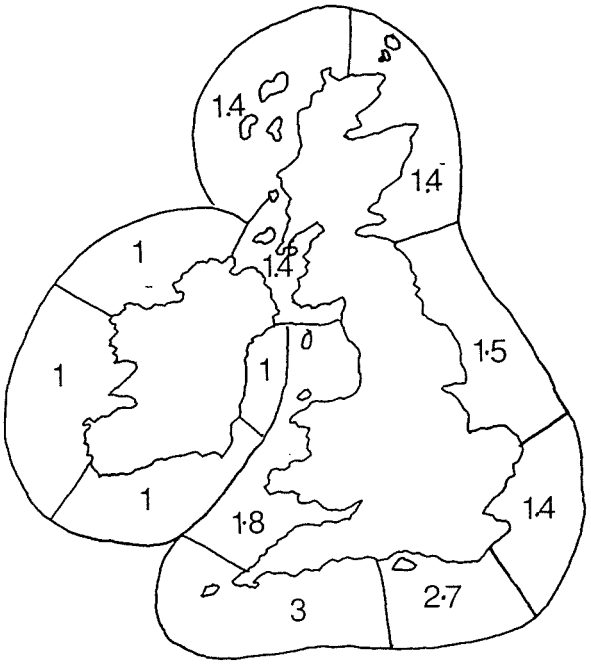
Mode; 1 (never) Mean 1.34

The distribution was very strongly positively skewed.

An analysis of the responses to this question do not indicate that wreck-related diving is necessarily the dominant interest of this sample (see fig. 156). It would also appear that little effort is committed to searching for new wreck. The mean and modal responses for 'dives below 50m' might suggest that this sample of divers generally respect the recommended limit of 50m for air diving.

Question 7

Respondents were asked to mark a diagram showing UK. coastal waters indicating the frequency with which they visited specific areas (see below). A score of 1 indicated that the diver never dived at that location. A score of 5 indicated that general area was the diver's only dive location. The response indicates that the sample is dominated by divers active on the south and south west coasts of England.



Mean Scores

Frequency

Never	1
Rarely	2
Sometimes	3
Often	4
Always	5

2.2.1 Question 8

Questions 8 was designed to elicit responses to a number of general statements relating to archaeological material, its protection and related matters. There were 5 possible responses to each statement. These ranged from 'strong agreement' to 'strong disagreement.' By giving each response a score (strong agreement = 1 *etc.*) mean and modal responses could be calculated for each statement. The statements were deliberately worded to avoid overtly contentious implications which lead to an element of generality. Statements were designed to allow cross checking between responses.

In retrospect it can be seen that there was an unacceptable element of ambiguity concerning responses to statement C; 'I would keep the discovery of a new wreck quiet.' Two people could 'strongly agree' with such a statement for diametrically opposed reasons. A diver keep a discovery secret in order to avoid interference from archaeologists or other divers. Conversely, an archaeologist might also keep a site secret until it was protected. A more expansive format might have reduced the potential for such ambiguities. Yet the relative brevity of the form is regarded as a significant factor in encouraging completion of the questionnaire. The results are summarised in figure 157.

Discussion of Responses to Question 8

A) *I would be interested in working on a scientific archaeological project*

Mode 2 (agree) Mean 1.9

The distribution was positively skewed.

This responses might suggest that interest in wrecks can be channelled constructively. The wording of the statement was intended to emphasise that the project would be academic rather than a 'treasure hunt.' Ambiguity might have been reduced by emphasising that no profit would accrue to the individual through their involvement.

B) *I visit museums and galleries to find out more about maritime history and ships*

Mode 2 (agree) Mean 2.4

The distribution was positively skewed.

The mean and modal responses both suggest a generally positive reaction to this statement.

C) *I would keep the discovery of a new wreck quiet*

Mode 3 (not sure) Mean 2.9

The distribution was broadly symmetrical.

Potential ambiguities in the responses to this question have been discussed above.

D) *A new wreck would be worth going below 50m to explore*

Mode 3 (not sure) Mean 3.12

The distribution tended towards symmetry.

Dives below 50m are formally discouraged, this might encourage under-reporting of such activity. Deep diving is regarded in some circles, however, as legitimate advanced diving practice. The apparently equivocal response to this question may be explicable by a growing acceptance of deeper diving as equipment improves. This result should be compared with question 6 where the sample were asked how frequently they *had actually dived* below 50m in the previous twelve months. The modal response was 'never.'

E) *I would rather photograph and look at something than take it home*

Mode 2 (agree) Mean 2.3

The distribution was positively skewed.

This statement was included as a means of assessing the degree to which 'souvenir' collecting was a prime interest of the sample. The mean and modal responses do not suggest that the removal of material is necessarily a high priority.

F) *Wrecks must be protected from the activities of some divers*

Mode 2 (agree) Mean 1.9

The distribution was positively skewed.

This statement was deliberately juxtaposed with E above. Considered together, the two sets of responses might indicate that, whereas the sample questioned do not perceive themselves as souvenir hunters, they believe that an element of the diving population behaves in a way that is detrimental to wreck sites.

G) *A reward of a % of the value of a wreck would encourage me to report a new find*

Mode 2 (agree) Mean 2.4

The distribution tended towards a positive skew.

This statement was included with the current Australian system of rewarding finders of wreck sites in mind (Lester 1983). The positive responses obtained suggest that a similar system might be supported by divers in the UK; 9 respondents appended comments indicating the size of percentage they would expect (40%-100%). Divers may well favour a reward for a discovery which, otherwise, they might take no further active interest in due to lack of time or expertise. A negative response might be more difficult to account for.

H) *Some modern and metal wrecks should be protected*

Mode 2 (agree) Mean 2.1

The distribution was positively skewed.

The response to this question could be viewed as support for a conservation oriented strategy for shipwreck management (see F above). However, the statement made no mention of *how* the wrecks should be protected. Written comments supplied (see below) might suggest that strategies which prevent free access to sites may not be supported, despite the general level of satisfaction expressed with current legislation (see question 11).

I) *People who discover and work on wreck sites are entitled to the proceeds*

Mode 3 (not sure) Mean (2.9)

The distribution tended towards symmetry.

The statement was deliberately worded to suggest *discovery* and *sale* of material rather than simply the collection of souvenirs from known sites. The intention was to elicit opinion concerning ownership of material found on the seabed. The results obtained do not indicate a clear consensus.

Some respondents may have believed that the question referred to modern wreck material. However the introduction to the questionnaire made it clear that the subject under discussion was historic material and this was re-emphasised when the forms were handed out. It is also possible that some respondents may have believed that the question was a test of knowledge rather than opinion; that is 'are people who discover and work on wrecks *allowed* to keep the proceeds?' If this were the case the results might indicate lack of general knowledge of the relevant legislation (The Merchant Shipping Act 1894) rather than attitudes towards ownership of material found on the seabed. Only 2 comments were received which indicate that the respondent found the question ambiguous - although 3 people appended comments stating that their attitude would vary with the nature of the material. All those who completed forms responded to this statement in some way.

J) *Some historic wrecks are worth preserving*

Mode 1 (strongly agree) Mean 1.4

The distribution exhibited a strong positive skew.

The modal response to this statement might be taken to indicate a measure of support for a conservation oriented policy. The method by which such protection should be achieved was not stated and this response must be considered against the backdrop of potential reactions to specific measures (see H above).

K) *I am interested in learning about the wrecks I dive on*

Mode 2 (agree) Mean 1.7

The distribution was positively skewed.

The response to this statement could be viewed as supportive of the inference drawn from statements A and B. Considered together they might indicate that there is a degree of active interest in archaeological or historical material rather than a prevailing perception of wreck sites as purely an amenity. However, active treasure hunters and metal detectorists may research sites and wrecks extensively in archives and libraries and may also visit museums to view collections. Similarly, treatment of wreck material in a manner deemed totally reprehensible by archaeologists is not necessarily incompatible with deep if undirected 'interest in the past'.

2.2.2 Question 10

Questions 10 and 11 were designed to investigate the degree of familiarity with and sympathy for the Protection of Wrecks Act 1973 (POW; see appendix 3) within the sample. Questions 10 and 11 are also regarded as a useful check on responses to other questions dealing directly with the protection of material on the seabed; notably statements B, D, and F in section 8.

Discussion of Responses to Question 10

Question 10 asked whether the respondent had heard of the Protection of Wrecks Act 1973. The results suggest a moderate level of knowledge of the Protection Of Wrecks Act 1973 (POW) although the fact that 23% of the sample had no knowledge of the POW may, at first, seem alarming. The divers who had not heard of the POW were studied as a sub-group.

	No Knowledge Of POW 1973	Knew About POW 1973
Qualification (Mean)	Novice-3rd Class	3rd-2nd Class
Qualification (Mode)	Novice	2nd Class
Years Diving (Mean)	1-5	1-5 / 6-10
Years Diving (Mode)	Less Than a Year	1-5
Dives in Last 12 Months (Mean)	Less Than 10 / 10-20	21-30 / 31-40
Dives in Last 12 Months (Mode)	Less Than 10	21-30

It would appear that knowledge of the Protection of Wrecks Act 1973 increases with greater experience of, and exposure to, diving. The divers who were unaware of the POW tended to be less well qualified and to have been diving for fewer years and to have undertaken fewer dives in the previous twelve months than those who were familiar with the Act (see figs. 158-9). The apparently large proportion of the sample ignorant of the POW appear likely to become aware of it if they continue diving. There were also some very experienced divers who were ignorant of the POW; one had been diving for 11-15 years. This apparent anomaly can be accounted for by the fact that these divers tended to have very specific scientific interests and were not involved in general sport diving activity.

2.2.3 Question 11

Question 11 gave the respondent a chance to say whether they felt that the POW was a good way to protect important sites. The question was designed to elicit a reaction to prohibitive legislation (that is, restricting access to part of the seabed) and elicited the following response:

77.7%	'yes'
22.3 %	'no' or 'not sure'

This tends to confirm the impression gained from responses to question 8 that this sample is generally supportive of some form of conservation based policy towards some wreck material. How far this result can be used to predict attitudes towards sites that are not officially protected is unclear. Ignorance of the legislation may have prompted an uncritical response. A short paragraph was provided outlining the main provisions of the POW and only 6 divers indicated that they were 'unsure' about the Act on the basis of lack of information. The respondents were also invited to supply written comments - 87% of which were provided by people who replied 'no' or 'not sure'. An analysis of these comments is presented below.

2.2.4 Content Analysis of Written Comments

Quantitative analysis of information supplied by respondents can be augmented by qualitative analysis of written comments. It was originally intended to calculate mean and modal scores for qualification, experience *etc.* for the group of divers who replied 'no' or 'not sure' to question 11 and supplied a written comment. The aim was to compare the results with the sample who expressed satisfaction. However, on examining the stated reasons for opposition to the legislation it became clear that to treat these respondents as a single, identifiable group would be a gross over-simplification. The sub-sample included archaeologists who felt that the 1973 act required greater powers alongside divers who felt that any restriction on their liberty was unacceptable. The approach adopted to content analysis therefore took the form of repeated examination of the written comments with a view to the identification of potentially meaningful themes. Full transcriptions of all written replies appear in section 2.4 of this appendix.

Comments received ranged from the enigmatic 'There could be a better way' to the moral 'The use of force against anyone for any reason other than self defence is immoral.' It was, however, possible to discern a number of groups of loosely related comments.

The first group is characterised by indications of uncertainty about the merits of the Act due to lack of information about its operation. This does not necessarily equate to a fundamental objection to restrictive legislation in general. The second group included replies of both 'no' and 'not sure' to question 11. The respondents appeared to be uncertain or unhappy about aspects of the application and effectiveness of the Act rather than the principal of restricting access. Criteria used for the selection of sites for protection was highlighted as a potential problem area 'It would depend on the wreck, how old, how complete, how much already dived'. Such comments could indicate both the nature of the criteria divers might perceive as relevant and the need to support implementation of the legislation by explaining the criteria that are actually used.

Objections were also registered on the grounds that such legislation might deter reporting of new material 'Restrictions of this kind do not encourage me to report new finds...'. Indeed, the failure of the Act to protect newly discovered wrecks was also considered to be a drawback 'Doesn't cater for unknown wrecks and a lot of damage can be done before they get protected.'

The practical problems associated with enforcement were also noted 'Watch cannot be maintained night and day'. Some comments indicate that the respondent was of the opinion that the Act simply does not work; that is, divers will and do remove material regardless of the status of the wreck. One respondent who answered 'no' to question 11 commented, '...local divers still take artefacts.' Nothing in the supplied comments indicated whether such assertions were assumption, based on hearsay or personal experience.

It was possible to identify a further theme centred around concern about prevention of free access to the seabed as opposed to removal of material. Suggestions that divers were generally responsible enough to be allowed to visit protected sites without doing any damage were evident. Significantly, objections seem to relate to legislation which prevented *all* access, including sightseeing, rather than protective legislation *per se*. The possibility of organised or supervised access to some protected sites was highlighted as a potential compromise 'Perhaps guided tours might be the answer'.

A minority of the comments appear to imply total rejection of protective legislation, for example 'I dive where I like'. Resentment of authority and loss of access to a resource regarded as open to general exploitation was also evident '...it ties you up in red tape and gives control of the wreck to civil servants.'

2.2.5 Divers Who Search for New Wreck Material

The divers who stated in question 6 that they search for new wreck material were analysed as a sub-group. The frequency with which the respondents claimed to search for new wreck material in question 6 was calculated. The modal score was 2 (rarely) the mean was 3 (sometimes). 89.16% of those who search for new wreck material were male, this compares with 78.71% for the other group.

	Search For New Wreck	Do Not Search For New Wreck
Qualification (Mean)	Dive Leader-2nd Class	3rd Class
Qualification (Mode)	3rd Class / 2nd Class	3rd Class
Dives in Last 12 Months (Mean)	31-40	10-20/21-30
Dives in Last 12 Months (Mode)	21-30 / 50+	Less Than 10
% Familiar With POW 1973	90.22	71.89
% Approve of POW	70.65	80.32
% Not Sure	21.74	15.26
% Disapprove	7.61	4.42

These results suggest that divers who search for new wreck material may differ, as a group, from the rest of the sample. Generally, they appear to posses higher qualifications, undertake more dives and be slightly more willing to venture below the recommended maximum depth for air diving. Analysis of responses to question 6 dealing with dives below 50 metres produced a modal score for both groups of 1(never). The mean score for the group who search for new material was 2.2 (rarely) as opposed to 1.13 (never) for those who do not. As a group they exhibit better awareness of legislation relating to the protection of wreck material on the seabed and appear to be less inclined to view it in a positive light.

This last suggestion can be explored further by examining the written responses to question 11 supplied by divers who search for wreck material but were unhappy with the POW 1973.

Within this group, 2 respondents stated that they were unsure of the way in which the POW functions; 3 stated that the legislation was unenforceable and 2 questioned the basis on which sites were assessed; 2 respondents complained that the POW took control of wrecks away from divers and involved 'red tape'. The largest group, 9 divers, were concerned that enforcement of the POW meant loss of access to wrecks. Several made comments which suggest that, although the majority of divers are responsible enough to be allowed to dive on protected wrecks, a vandalistic minority does exist.

Responses to question 8 for each group were tabulated and the results are shown in figures 160 and 161.

Discussion of Responses to Question 8

A) *I would be interested in working on a scientific archaeological project*

Divers who search for new wreck
Mode 2 (agree) Mean 1.81
Divers who do not
Mode 2 (agree) Mean 1.93
Both distributions were positively skewed.
Both groups exhibited very similar, generally positive, responses to this statement.

B) *I visit museums and galleries to find out more about maritime history and ships*

Divers who search for new wreck
Mode 2 (agree) Mean 2.32
Divers who do not
Mode 2 (agree) Mean 2.51
Both distributions were positively skewed.
The responses to this question were again very similar.

C) *I would keep the discovery of a new wreck quiet*

Divers who search for new wreck

Mode 2 (agree) Mean 2.32

Divers who do not

Mode 3 (not sure) Mean 3.11

Both distributions tended towards symmetry.

These results may indicate a slightly greater tendency among divers who search for new wreck to keep any new discovery secret. The potential for ambiguities in responses to this statement have been noted above.

D) *A new wreck would be worth going below 50m to explore*

Divers who search for new wreck

Mode 2 (agree) Mean 3.27

The distribution was slightly positively skewed.

Divers who do not

Mode 3 (not sure) Mean 3.12

The distribution was broadly symmetrical.

Responses to this statement support the suggestion, made on the basis of responses to question 6, that divers who do search for new wreck material may be more willing to dive deeper than 50m than those who do not.

E) *I would rather photograph and look at something than take it home*

Divers who search for new wreck

Mode 2 (agree) Mean 2.41

The distribution was positively skewed.

Divers who do not

Mode 3 (not sure) Mean 2.34

This distribution tended towards symmetry.

This statement was included to assess the level of interest in 'souvenir' collecting among the sample. The divers who search for wreck material appear to be marginally more inclined to leave

material *in situ*. It would be encouraging to be able to infer a notion of 'custodianship' of newly discovered material among such divers.

F) *Wrecks must be protected from the activities of some divers*

Divers who search for new wreck
Mode 2 (agree) Mean 2.01
Divers who do not
Mode 1 (strongly agree) Mean 1.85
Both distributions were positively skewed.
Analysis of responses for both groups revealed positively skewed distributions, this was most marked in the case of divers who do not search for new wreck material. This group appear to be more inclined to regard other divers as a potential threat to wrecks.

G) *A reward of a % of the value of a wreck would encourage me to report a new find*

Divers who search for new wreck
Mode 2 (agree) Mean 2.41
Divers who do not
Mode 3 (not sure) Mean 2.34
The distributions were positively skewed.
There does appear to be a level of support for a scheme involving financial reward for reporting of a new find.

H) *Some modern and metal wrecks should be protected*

Divers who search for new wreck

Mode 2 (agree) Mean 2.27

This distribution was positively skewed.

Divers who do not

Mode 2 (agree) Mean 3.12

This response approximated to a symmetrical distribution.

A level of support for the protection of metal and modern wrecks might be inferred from this result. The distribution of responses from divers who search for new wreck material was clearly positively skewed. Such results must be considered against the background of likely responses to specific strategies for protection rather than be used to infer support for any strategy implemented.

I) *People who discover and work on wreck sites are entitled to the proceeds*

Divers who search for new wreck

Mode 3 (not sure) Mean 2.7

Divers who do not

Mode 3 (not sure) Mean 2.96

Both distributions tended towards symmetry.

There is no clear consensus concerning who should profit from wreck material. Graphic representation of the two distributions reveals additional information.

Although both sets of responses tend towards symmetrical distributions a slight positive skew can be detected in the distribution of responses from the divers who search for new wrecks (see fig. 162). There are also detectable differences at the extremes of opinion. A larger percentage of the divers who search for wreck material 'strongly agree' with the statement. Conversely, a larger percentage of the group who do not search for wreck material 'strongly disagree'. This may indicate a lack of clear opinion in the mainstream of the sample from both groups, with a 'hard core' of confirmed opinion at alternate extremes.

J) *Some historic wreck sites are worth preserving*

Divers who search for new wreck

Mode 1 (strongly agree) Mean 1.35

Divers who do not

Mode 1 (strongly agree) Mean 1.42

In both cases the distribution of responses was positively skewed. The positive skew was more apparent for the divers who search for new wreck material. These results can reasonably be taken to indicate a measure of support for some form of protection for some historic sites.

K) *I am interested in learning about the wrecks I dive on*

Divers who search for new wreck

Mode 1 (strongly agree) Mean 1.45

Divers who do not

Mode 2 (agree) Mean 1.79

Both distributions were positively skewed.

The positive skew was more pronounced for divers who search for new wreck material. These results might indicate that, while there is a level of interest in wreck sites beyond their function as an amenity, those divers active in searching for new wrecks may have a generally higher level of interest.

Summary

Compared to divers who do not search for new wreck material, divers who do may be more interested in learning about the wrecks they encounter, slightly more willing to dive deeper than 50m and slightly less willing to perceive other divers as a threat to wreck material. They may also be more inclined to keep the discovery of a new wreck quiet. A lack of consensus about who should profit from wreck material is evident although differences in attitude could be detected between divers who search for new wrecks and those who do not. A slightly stronger inclination towards the individual's right to profit from wreck material may be detectable in the former group.

2.3 Conclusions

Archaeological heritage managers might take some encouragement from the results of this questionnaire. They indicate a degree of potential sympathy for, and interest in, historic material and its conservation. Yet the question of who, if anyone, should profit from archaeological appears to split the sample with no clear consensus emerging. In addition, based on the written comments supplied, there appears to be a minority of divers who are totally disinterested in the concept of conservation and preservation. They appear to regard material on the sea bed as fair game.

Within the sub-sample of divers who actively search for new wreck material, a degree of sympathy for some form of protection for some material is clear. Dissatisfaction with protective legislation which limits access to sites is also evident. This group emerges as an active, male dominated minority within the general sample. Their potentially greater willingness to dive below 50m is worthy of note as is a slightly greater level of sympathy for the idea that people who discover and work on wreck are entitled to the proceeds.

In a situation where a diver encounters historic or archaeological material on the seabed, the data does not indicate that there will necessarily be significant peer group pressure for it to be left *in situ* or reported and dealt with systematically rather than on a 'finders keepers' basis.

The review of advertising in *Diver* magazine appears to indicate that sport-divers today have increasing access to equipment which will assist in the location of wreck material (fig. 149). It cannot be assumed that it is used exclusively to prospect for previously unknown sites; relocation of known wrecks may be a more frequent use. However, recent articles in the diving press do suggest that prospection is the use to which many divers are keen to put their equipment.[4] This said, magnetometers and echo-sounders are likely to be most effective in the location certain types of site, for example larger, metal vessels. It is certainly not appropriate to suggest that

[4] May the force be with you! *Diver* (Sep 1986).

all elements of the archaeological resource are automatically at greater risk of disturbance.

The review also indicates that dry suits are now readily available to divers and this does have implications in terms of the security of wreck material and diving habits in general (see fig 149). Use of a dry suit allows the average diver to spend more time in relatively cold water. This factor, among others, has also been linked to an increase in deeper diving (Long 1988, 15-17). Material previously protected by depth would seem to be at increased risk of casual depredation - articles in the diving press emphasise a general trend toward deeper diving (*Scottish Diver*, Sep-Oct 1991, 98-101; *Scottish Diver*, Mar-Apr 1991, 30-32).

The manner in which attitudes held by divers are formed has not been investigated in this study. But changes in the structure of the support facilities offered to divers may be significant in this respect. Figure 150 indicates an increase in both dive shops and training schools, particularly since 1982; the distribution of such facilities was not investigated and even coverage for the UK cannot be assumed. Much diver-training is still carried out in local branches of the BSAC and the Sub-aqua Association (SAA).[5] A diver's attitude towards wreck material is likely to be influenced during this (often lengthy) training period.[6] If a novice joins a club dominated by 'wreckers' such a mode of behaviour might be accepted as the norm. One of the major attractions of qualifying through a school lies in the fact that training which might be spread over a year or more in a club environment can be obtained in *circa* two weeks. Thus trainees do not necessarily come under any long term influence (positive or negative) as regards treatment of wreck

[5] There are now more than 1000 branches *Diver*, (Editorial, Feb 1988); Collier, pers.comm.

[6] Collier, pers.comm.

material. Analysis of responses to question 10 would suggest that there is a need to enhance awareness of relevant legislation amongst divers in the early stages of their training. Increasing use of training schools by divers presents an opportunity for such education.

2.4 Written Responses to Question 11

KEY

a) Written comment

b) Occupation
c) Society membership
d) Response to question 11

1) This act relies on people taking on responsibilities and expenses with no assistance - much easier to salvage - the answer. Cannot excavate without permission but offer concrete assistance.

Archaeologist
IFA
Not sure / No

3) Can't be enforced at present.

Student
MAS
Not sure

11) There could be a better way.

Exhibitions manager
*
Not sure

12) No I'm not sure.

Government employee
*
Not sure

13) NO because people will still dive them.

Mech. engineer.
*
Not sure

14) Needs wider powers.

Teacher
*
Not sure

27) Because it stops people diving on wrecks who just want to observe them.

Exploration geologist
*
Not sure

30) An appropriate archaeological standard.

Managing editor
*
Not sure

41) The wrecks are not owned by anyone so anyone can dive on them.

Engineer
*
No

42) Because it is difficult to obtain a licence.

Engineer
*
No

53) Why should only licensed divers dive on wrecks.

Security guard
*
Not sure

56) The sea and what is in it are for everybody.

Student
*
Not sure

76) I feel other divers under supervision should be allowed to dive and photograph such sites.

*
National Geographic Society
Not sure

78) I dive where I like.

Sales Director.
*
No

79) It will push under ground the discovery of new wrecks even more. Wrecks should be available to dive on to all but protected from the minority of divers who pillage. More evidence is likely to be uncovered if more accessible to the majority of divers and the disclosure of finds should be encouraged to be reported.

Professional engineer
*
Not sure.

82) This would limit the experience of divers under supervision.

Instrument artificer
*
Not sure

85) I know very little about the subject.

Animal nutritionist
Hellenic Society
Yes but....

91) But implementation could be difficult.

Oceanographer
MCS
Yes but...

92) It would automatically prevent me from diving the site. I consider myself to be responsible and
would respect a protection order.

Sales engineer
*
No

97) It would depend on the wreck, how old, how complete, how much already dived.

Alarms engineer
*
Not sure

99) Not fully conversant with its operation.

Motor engineer
*
Not sure

101) Restrictions of this kind do mot encourage me to report new finds neither does it encourage me to get involved officially on the site.

Police Officer
*
NO

102) It merely slows down the rate of destruction.

*
County /national societies
*

105) How is act policed?

Contracts administration
*
Not sure

109) It depends on how effectively it is enforced if it is not enforced effectively then it has no effect.

Patent agent
*
Not sure

113) But has problems in standards, who assesses importance of sites.

Archaeologist
*
Yes but..

119) This is not very good if diving access is never allowed.

Engineer
Ex UCS member
*

128) A reasonable start but hard to enforce , only time will tell.

Medical student
*
Not sure

129) This may inhibit access to the whole of a popular dive site and inhibit further finds.

Self employed
*
Not sure

142) Do not know enough about this act.

Drayman
*
Not sure

145) Red tape.

Computer systems manager
*
Not sure

152) By excluding divers completely except for those with a scientific interest, poaching may be encouraged.

Canoeing instructor
*
Not sure

158) This act does not apply in the Republic of Ireland where I do most of my diving.

Pharmacist
*
Not sure

172) The use of force against anyone for any other reason than self defence is immoral.

Surveyor
*
No

174) It depends how far interference goes - I believe that people should be allowed to look, but I know that looking can be destructive.

Electronics order processing
MCS
Not sure

177) I think if it was publicly said do not take anything from the wrecks then nobody would. I.e. St. Abbs, nobody takes anything from there.

Engineer
*
Not sure

180) Newly discovered wrecks would not be protected.

Staff Nurse
*
Not sure

181) Because it ties you up in red tape and gives control of the wreck to civil servants.

Areas manager
*
Not sure

184) Should be used by all divers if found.

Motor sports fitter
*
Not sure

189) Can't police them all.

Army
*
No

191) There is a lot of interest in wrecks and restricting sites to people prevents those with a wish to see the wrecks from doing so. Perhaps guided tours might be an answer.

*
*
Not sure

214) Anyone should be able to look over a wreck.

Sales manager*
*
Not sure

215) Unlicensed divers should be allowed if they wish but under supervision.

Student Marine Biology
R. Biological Society
No

228) It depends on how the projects are administered and under what circumstances interested though inexperienced divers could dive the site.

Doctor
*
Not sure

236) Because local divers still take artefacts.

Service engineer
*
No

246) It would depend on who gave authority for licences and on what basis.

Solicitor
*
Not sure

253) Not sure

Not sure

259) Watch cannot be maintained night and day. Facilities and support are necessarily restricted.

Accountant
MCS
Not sure

261) Depends what specifies criteria for a protected wreck and who gets licence to dive on it.

Social worker
*
Not sure

274) Doesn't seem to offer much protection ,who decides what site etc...

Probation officer
*
Not sure

279) Everyone should be able to dive on them.

Labourer
*
No

283) It might encourage people to dive them simply because they are told not to.

Police Officer
*
Not sure

295) But how do you keep a check on who is diving these sites.

Senior Software Engineer
Mendip Nature Research Committee
Yes but..

296) I believe in look but don't touch. Licensing divers takes away the chance to se some wrecks although it is probably the only way to stop diving scrap merchants.

Bread Van Driver
Mendip Nature Research Committee
Not sure

301) Historical wrecks should be available to the general public as an interesting new site.

Sales Manager
*
Not sure

311) Allows only limited access to the wreck it does not even allow looking.

Doctor
*
No

318) Because it excludes other divers who might be interested from diving a protected wreck.

Commercial diver
*
No

325) Don't know enough about the way it works.

Engineer
*
Not sure

334) Doesn't cater fro unknown wrecks and a lot of damage can be done before they get protected. Also law is difficult to enforce.

Accountant
MCS
Not sure.

341) Rules and regulations discourage many people who might otherwise be encouraged to show an interest.

Computer consultant
*
Not sure

2.5 Questionnaire 1

UNIVERSITY OF ST. ANDREWS

SCOTTISH INSTITUTE OF MARITIME STUDIES

HISTORIC WRECK SURVEY

This survey is part of a study of the different factors which affect artefacts on the seabed. Its purpose is to find out how divers feel about historic wreck sites and the current legislation protecting them.

Your cooperation will ensure that diver's views are accurately represented in the study.

The information that you give will be treated as strictly confidential, and you are not asked to give your name or address. Most questions simply require a tick against the appropriate response but where a longer answer is required please use the space provided.

1) Which of the following types of sub-aqua club do you belong to?
(Tick any to which you belong)

B.S.A.C. Branch
S.A.A.
University Club
Other (Please specify below)

---

2) What diving qualifications do you hold?

None
Novice
Third Class/Sports Diver
Second Class/Advanced Diver
First Class
Other (Please specify below)

---

3) How long have you been diving?

Less than a year
1 - 5 years
6 - 10 years
11 - 15 years
16 - 20 years
Over 20 years

4) Approximately, how many dives have you done in the past twelve months?

Less than 10
10 - 20
21 - 30
31 - 40
41 - 50
Over 50

5) Of the dives that you have done in the past twelve months, approximately what proportion were from hard boats?

None
Very few
Some
Most
All

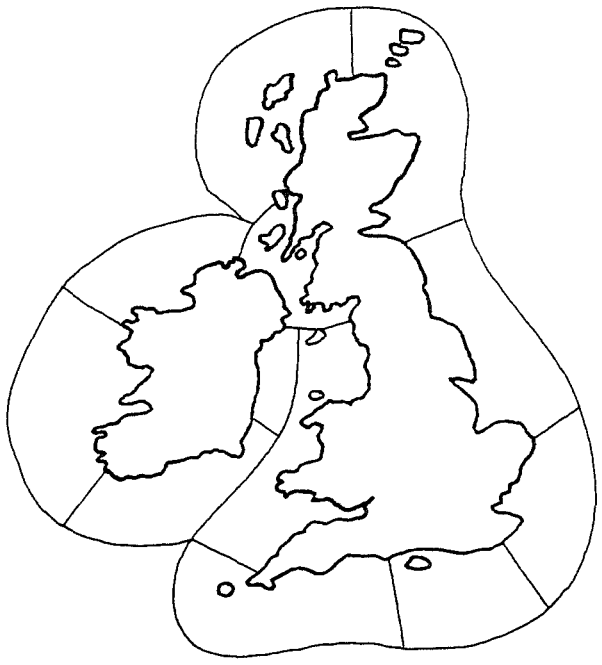
6) Would you please indicate by ticking ONE BOX IN EACH ROW, how often you have undertaken each of the following kinds of dive or activity in the past twelve months of diving.

	Never	Rarely	Sometimes	Often	Always
Drift Dives					
Scenic Dives					
Wreck Dives					
Research/ Scientific					
Searching for new wreck					
Dives below 50 metres					

7) The following numbers correspond to these answers in this question.

1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always

By placing one number in each zone marked on the map below, please indicate how frequently you dive in the various areas around the British Isles. For example, if you never dive off S.W. coast of England you would put a 1 in that zone of the map.



8) Would you please indicate the extent to which you agree/disagree with the following statements by ticking ONE BOX IN EACH ROW.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
I am interested in learning about the wrecks I dive on					
Some Historic wrecks are worth preserving					
People who discover and work on wreck sites are entitled to the proceeds					
Some modern and metal wrecks should be protected					
A reward of a % of the value of a wreck would encourage me to report a new find					
Wrecks must be protected from the activities of some divers					
I would rather photograph and look at something than take it home					
A new wreck would be worth going below 50m to explore					
I would keep the discovery of a new wreck quiet					
I visit museums and galleries to find out more about maritime history and ships					
I would be interested in working on a scientific archaeological project					

9a) Are you a member of the Nautical Archaeology Society?

Yes
No

9b) Are you a member of any other Historical/Archaeological or Scientific society?

Yes
No

If YES please give us its name

---

10) have you heard of the Protection of Wrecks Act 1973?

Yes
No

11) This Act provides for protection from interference for specific wrecks of archaeological or historical importance. Only officially licensed people may dive on the sites, and any work carried out must be to an appropriate archaeological standard.

Do you think that this is a good way to protect important sites?

Yes
Not sure
No

If your answer was NO or NOT SURE, can you say why?

---

12) Sex

Male
Female

13) Occupation (please be as specific as possible)

---

14 Age

Below 18
18 - 25
26 - 35
36 - 45
46 - 55
over 55

THANK YOU VERY MUCH FOR YOUR HELP

3 Questionnaire 2

This questionnaire was designed to gather data which could contribute to the establishment of an index of the material most likely to be disturbed or removed by divers. Such data would, in turn, assist in the development of measures of confidence in observed surface distributions. A copy of the form that was distributed appears as section 3.4 of this appendix. The form was deliberately kept as short as possible. It was assumed that divers would quickly lose interest in a form that was perceived to be both long and which touched on potentially sensitive issues.

The original intention was to distribute the form at the 1989 Crystal Palace Diving Show. This would have ensured an element of continuity in the sample base and the general circumstances of sample collection as compared to questionnaire 1. Unfortunately the NAS stand was in a less prominent position than on the previous occasion. A number of people began to fill in the form and refused to continue once the subject matter became clear. This resulted in completion of very few forms at the show.

Two diving clubs in the Rugby area were then approached directly; Lutterworth (branch 1410) and Rugby (branch 431) with approximately 60 and 80 members respectively.[7] These clubs were chosen because existing contacts facilitated distribution and collection of the forms. 21 people completed forms distributed at club meetings. Publication of the form in the Rugby newsletter did not elicit any response, possibly indicating that those divers who were willing to complete such a form had already done so. Publication of the form in the Lutterworth club newsletter resulted in 23 responses.

[7] I am very grateful to Mr. S. Liscoe for distributing the forms.

3.1 The Sample Obtained

The 46 respondents represent approximately 33% of the total population of the 2 diving clubs targeted. In recognition of the relatively small size of the sample only limited analysis of the results is attempted.

As there was no intention to analyse the results according to age, sex and occupation this information was not collected via this questionnaire. This is not considered detrimental to a preliminary study of this nature but such information should be sought if the method of data collection is to be applied more widely. No attempt has been made to cross reference data obtained from the two questionnaires. The different circumstances surrounding the collection of the two samples would make such comparisons highly problematic.

3.2 Analysis of Responses to Questionnaire 2

Questions 1 and 2 deal with level of qualification and recent activity:

Question 1: *What diving qualification do you hold?*
Bi-modal distribution; 3rd class (Sport diver) & 2nd class (Advanced diver).
Mean; 2.5

Question 2: *How many dives have you done in the last twelve months?*
Bimodal distribution; '10-20' & '50+'
Mean; 3.25

Divers who stated that they had removed material from wreck sites were studied as a separate group and compared to those divers who stated that they had not removed material. The mean qualification for divers who have removed material is 3.08 (Dive leader). The mean for divers who have not removed material is 2.01 (3rd Class / Sports Diver). The mean score for 'dives in the last twelve months' undertaken by divers who have removed material is 3.7 ('21-30' - '31-40'). For divers who have not removed material the mean score is 2.6 ('10-20' - '21-30'). These results might indicate that the group of divers who have removed material have a generally higher level of qualification and have undertaken more dives in the recent past than the divers who have not removed material.

Question 3

Respondents were asked to indicate how likely they would be to disturb various categories of material. The question was designed to elicit a response from every diver who filled in the form. The categories selected were intended to represent a wide range of materials and to differentiate clearly between whole and fragmentary objects. Only 3 forms were returned with this section completed incorrectly.

Criticism could be levelled at the category descriptions. The perceived need for brevity has already been noted. There are many additional material types and specific objects which could have been mentioned and many states in between whole and fragmentary. The scale of 1 to 5 was felt to provide enough scope for the likely range of responses. It would have been preferable to include separate scores for 'removal' and 'disturbance without removal'. However, it was felt that this would have complicated and lengthened a part of the form which already had the potential for provoking a negative reaction from the respondent. The results are summarised in figure 163.

The highest mean score was obtained by the 'coin' category, followed by 'an object made of a precious metal'. The distributions for these categories were strongly negatively skewed. The next most popular categories were the 'complete vessel' options followed by musket/cannon balls.

The lowest score was obtained by 'hull timber'. 'Concretion', 'organic material' and 'wooden object' also received low scores. The distributions for these categories were strongly positively skewed.

A comparison of modal scores for the categories (see fig. 163) appears to reflect the nature of the distributions. There is a clear distinction between types of material 'very likely' to be disturbed and material 'very unlikely' to be disturbed. These results will be discussed further below.

Question 4: *Have you picked up and moved an object without raising it to the surface?*

Never; 26.09 %

Occasionally; 60.87%

Frequently; 13.04%

This question was included to assess the level of general disturbance to a deposit that might be caused by divers who did not actually remove material. The majority of the sample have disturbed material in some way at some time. The precise nature of the disturbance cannot be gauged nor can the distance the material was moved.

Question 5: *Have you ever removed material from:*

a. A 20th century wreck site;

Never 47.83 %

Occasionally 43.48 %

Frequently 8.69 %

b. A pre 20th century wreck;

Never 71.74%

Occasionally 23.91%

Frequently 4.35%

Question 5 commenced the second section of the questionnaire which sought more detailed information concerning the removal of material from a site. The results indicate that, of the sample questioned, only a minority frequently remove material from 20th century wrecks while nearly half have done so on occasion. The results from the pre 20th century wrecks are very different with over 70% stating that they have never removed material from such sites. A smaller percentage of the sample than for 5b claimed to frequently remove material.

Question 6a: *On the last occasion you removed material from a wreck was it:*
20th century; 70.84 %
Pre 20th century; 29.16 %

Information was sought about the most recent occasion on which material was removed from a site by a diver. The intention was to avoid asking respondents to summarise experience.

Responses to question 6a tend to confirm the impression that this sample of divers are most active on pre 20th century wreck sites. Subsequent questions sought specific details concerning the way in which material was removed and the reasons for specific material having been selected.

Question 6b: *Was the object lying exposed or did you have to dig to reach it?*
Exposed; 70.84 %
Part-buried; 20.83 %
Buried; 8.33 %

Question 6c: *Did you use tools or lifting equipment to remove objects?*
Yes; 25 %
No; 75 %

What tools were used?
Hand tools; 66.67 %
Power tools; 11.11 %
Lifting bag; 22.22 %

Question 6d: *Did you use a metal detector?*
Yes; 8.33%
No; 91.67 %

Responses to questions 6b and 6c indicate that most of the material removed was exposed on the surface of the site and that most acts of removal did not involve the use of tools. Of those acts of removal that did involve tools the majority involved only hand tools and less than a quarter involved the use of lifting bags. This might suggest that the material removed by this sample is generally likely to be loose and small enough to be carried to the surface by hand. Question 6d indicates that only a small percentage of the sample employed a metal detector to locate material.

Question 6e: *How did you choose the material to remove?*
I recognised what it was; 62.5 %
It looked interesting; 25 %
Because it might be interesting when it was cleaned; 8.33 %
Other; 4.17 %

These responses indicate that most of the divers who removed material selected the material because they 'recognised what it was.' This does not necessarily indicate precise identification of an artefact type. Rather it may suggest that formed or distinctive objects are more likely to be selected. 29.42% selected objects because they 'looked interesting.' It is difficult to account for what might appear interesting to individual divers.

Question 7: *Did you report the material to the Receiver of Wreck?*
Yes; 8.33 %
No; 91.67 %

Part IX of the Merchant Shipping Act 1894 requires that anything landed from the sea, whether from the seabed or floating on the surface (section 510), must be reported to the Receiver of Wreck (a designated customs officer) who will then administer its disposal (section 518).

The question was deliberately phrased to avoid indicating that divers in fact have a legal obligation to report material to the Receiver; in effect the divers were asked, 'have you broken the law?' Despite this, each diver who claimed to have removed material answered this question. This may indicate contempt for the legislation or ignorance of the implications of a negative response.

A survey conducted to assess the quantity and nature of material brought to the attention of the receivership tends to confirm the impression given by these results that very little of the material removed from the seabed is reported and thus officially 'visible'.[8] The records of the Receiver of Wreck will not therefore provide a useful insight into the nature and impact of casual depredation.

[8] A questionnaire was sent out to every Receiver of Wreck. Slightly over 50% replied. The vast majority claimed not to have processed any historic wreck material. The majority had not processed any material presented by divers (Watson, pers.comm). Instances of archaeological material having been reported to a receiver who was then not willing to implement the relevant procedures are known (Dean & Parker, pers comm).

3.3 Discussion

Responses to question 3 and question 6e appear to show similar trends. The relatively high scores gained by whole or distinctive objects in question 3 seems to tally with the fact that the divers in this sample selected the majority of material for removal on the basis that they recognised what it was. The relatively low score obtained by the 'concretion' category in question 3 is complemented by the low score obtained by the 'it might be interesting when it is cleaned' criteria for selection. Personal experience suggests that concretions are popular items for retrieval, precisely because they might contain something interesting. A preference for easily recognisable souvenirs may account for the high score gained by cannon / musket balls. Such objects are easily recognisable due to shape and have evident associations; they make a 'good' souvenir - even those unfamiliar with ships and diving are likely to know what they are and what they represent.

The low level of use of metal detectors supports the results of question 3 and 6b. Material exposed on the surface and selected on the basis of recognition or interest rather than specific material type would not require such equipment for its location. This result must be contrasted with the fact that metal detectors are becoming increasingly available. It may be that those divers sufficiently active in the removal of material to justify the purchase of a metal detector are unlikely to respond to a form such as this and will therefore not appear in the sample.

The fact that an object is recognisable is clearly not the only criteria for choice however. Perhaps unsurprisingly, coins and objects of precious metal scored the highest in question 3. The possibility of financial gain may clearly be a factor. However, in question 6e only one diver indicated that material had been raised for sale.

Overall, these results might suggest that diagnostic material, that is material which has shape and clear features, is most likely to be removed or simply disturbed without removal by this sample of divers. Those divers who are active in removing material appear to

be a minority. Those active in removing material from historic wreck sites appear to be a minority within that group. However, when considering these observations it is essential to bear in mind the very small size of the sample available for analysis.

The sample obtained with questionnaire 2 may be smaller than that for questionnaire 1 and have required more effort to collect but the responses are, in some respects, easier to analyse. Difficulties encountered in obtaining responses to questionnaire 2 might vindicate the decision to separate questions about general issues (questionnaire 1) and specific questions about the removal of material (questionnaire 2). Responses to questions about the adequacy or otherwise of the present system for the protection of wrecks may be coloured by reactions to questions relating to the removal of material. However, if questionnaires are to be used to gather such data it should be recognised that the divers most active in removing material from sites may be the least willing to respond. Their views may therefore not be adequately represented in any sample. Clearly, the form of the questionnaire must be scrutinised critically. However, questions that are sufficiently innocuous to allow completion of the form by such divers would be likely to be very difficult to interpret in the manner intended. If knowledge is required about the circumstances surrounding removal of specific types of material then direct questions must be asked.

While records held by Receivers of Wreck in the UK do not seem likely to offer useful information, permit systems instigated to regulate diver activity in North America, which include an obligation to report finds, may well provide relevant data. Albright (1985, 146-51) describes the establishment of a permit system in South Carolina directed specifically at sport or 'hobby' divers. Harris (1990, 132-134) reports on the development of the scheme. 'Hobby divers' are granted permits for small-scale recreational, surface collecting of material. Regular reports are obligatory and a manual and educational programme have been instituted to improve the quality of the reports received (which can total 600 a month). A newsletter, the *Goody Bag* is regularly produced to improve communication and publish articles on surveying and identification of objects. It is hoped that the system will eventually encourage a

move away from random collection to promoting controlled survey and sampling. The permit system is regarded as a pragmatic acceptance of the near impossibility of preventing the removal of material.[9] The South Carolina Institute of Archaeology and Anthropology also runs a programme of visiting collectors of artefacts from land sites to record their collections (Charles 1985, 1-35).

[9] Newell, pers.comm.

3.4 Questionnaire 2

The Scottish Institute of Maritime Studies

This survey is part of a study of the different factors which affect artefacts on the seabed. Its purpose is to find out how divers feel about historic wreck sites. Your co-operation will ensure that divers' views are accurately represented in this study. The information you give will be treated as strictly confidential and you are not asked to give your name or address.

Most questions simply require a tick against the appropriate response. ✓

① What diving qualification do you hold? Novice ☐ 3rd Class/Sports Diver ☐

2nd Class/Advanced Diver ☐ Ist Class ☐ Other (please specify).....

② How many dives have you done in the last twelve months? Less than 10 ☐ 10-20 ☐ 21-30 ☐

31-40 ☐ 41-50 ☐ Over 50 ☐

③ How likely would you be to pick up and/or remove any of the following from a **pre 20th Century wreck**?

(Please enter a number from 1 to 5, 1 = very unlikely, 5 = very likely, please enter something in all the boxes).

A piece of pottery ☐ A wooden object ☐ A complete pottery vessel ☐ A coin ☐ Brass fittings ☐

An unidentifiable piece of concretion ☐ Iron fittings ☐ An object made of a precious metal ☐

Musket / cannonballs ☐ Organic material (such as seeds, basket work, leather etc.) ☐

A piece of hull timber ☐ A pewter plate or jug ☐ A fragment of glass ☐

④ Have you picked up and moved an object without raising it to the surface? Never ☐ Occasionally ☐ Frequently ☐

⑤ Have you ever removed any material from:

a) A 20th century wreck site? Never ☐ Occasionally ☐ Frequently ☐

b) A pre 20th century wreck site? Never ☐ Occasionally ☐ Frequently ☐

If you have ever removed material from a wreck, please answer questions, 6 and 7 with reference to the most recent occasion on which you did so.

⑥

a) Was the wreck 20th Century ☐ or pre-20th century ☐

b) Was the object lying exposed or did you have to dig to reach it? Exposed ☐ Part buried ☐ Buried ☐

c) Did you use tools or lifting equipment to remove objects? Hand tools ☐ Power tools ☐ Lifting bag/s ☐

d) Did you use a metal detector? Yes ☐ No ☐

d) How did you choose the material to remove? (You may tick more than one box)

I recognised what it was ☐ It looked interesting ☐ Because it might be interesting when it was cleaned ☐

Other (please specify).....

⑦ Did you report the material to the Receiver of Wreck? Yes ☐ No ☐

Thank you very much for your help!

Fishing Gear Behaviour

All video footage was supplied by Department of Agriculture and Fisheries, Scotland (DAFS), Marine Laboratory in Aberdeen. Copyright remains with this institution. All footage is reproduced with permission and must not be copied or shown in public without written permission from the Marine Laboratory. I am grateful to the Marine Laboratory staff, and to Mr. Main in particular, for making the material available. Techniques used to record gear behaviour are described by Main and Sangster (1978a; 1978b).

The video tape attached to this thesis contains footage from tapes viewed during this study. Editing was performed by the author. Four gear types are presented, a beam trawl, otter trawl ground gear, scallop dredges and a hydraulic dredge modified to collect razor clams. Each section is separated by 15 seconds of blank tape. The commentary presented in this appendix is intended for use alongside the video footage and is mainly concerned with observations on gear performance. The implications of these observations for archaeological material are largely dealt with in the main text of this study and are not repeated here. Information concerning the origin of the footage and notes on the gear concerned were provided by Mr. Main.

1 Beam Trawl

This footage features gear deployed from a vessel bought from Holland and operating out of Bucky, Scotland. The video shows a standard beam trawl rigged for rough ground. Each trawl shown weighs roughly 7 tons in air. Average towing speed is 6 knots.

The video commences with a general view of the beam trawl and then shows the chain mat, a chain lattice which is used to allow the trawl to pass over rough ground without large objects entering the net (see fig. 19). This also serves in place of tickler chains in disturbing bottom dwelling fish which swim up and back into the net.

The video presents a view down the length of the net showing rubbing pieces (made of old rope and used to inhibit abrasion) on the side of the trawl before again focusing on the chain mat.

A general deck view is presented showing the manner in which the trawls are fished, one either side of the vessel, lowered on booms.

A view of the remotely operated camera sled used to shoot the bulk of the footage on this tape. A manned sled and free swimming divers were also used on occasion.

The first underwater shot shows a plan view of the trawl in operation, note the cloud of disturbed sediment trailing back.

The chain mat is shown in operation. Note how close it is to the seabed. The view then moves up towards the beam itself and the headrope.

The camera then pans across to show the parallel trawls in operation. Note the quantity of sediment disturbed by the trawls.

The view shifts to in front of the trawls and shows the closeness of the beam to the seabed (often between 45 and 60cm). The deployment of the stone mat is clearly shown. Both elements are

significant when considering the impact of this gear on upstanding structure. The speed of the trawl (6 knots) is also noteworthy in this respect.

The camera now focuses on the trawl heads.

Note the heavy construction and the additional weights added to keep the gear on the seabed at higher towing speeds. At 6 knots the gear can be trimmed to press relatively lightly on the seabed. Problems arise, however, when sudden halts occur and the beam falls forward. It then tends to dig deeply into the sediment as it is hauled back upright.

The sediment plume created by the trawl heads is obvious but also note that the runners do not penetrate very deeply into the sediment. The beam heads appear to follow the contours of the seabed quite efficiently.

A surface view of the underside of the head showing the robust runners, note how clean they are due to constant abrasion.

This view of the front of the trawl heads demonstrates the slight upturn on the runner which prevents it from digging into the sediment excessively. The track left by these heads was examined and found to vary between an unmeasurable depth and 7cm.

2 Otter Trawl Ground-gear

This footage was taken of a rockhopper trawl in action off Shetland. Attention is focused on the behaviour of the ground gear in contact with obstructions.

The opening shot shows the rubber discs of the rockhopper ground-gear near to the wings of the net (see fig. 20) in operation on a smooth seabed. Note that the discs do not rotate because they are wired together. The net is attached directly to the wire or rope connecting the discs and therefore discs and net move as a unit. This means that the net will not tend to roll over the discs and snag when an obstruction is encountered.

Note how closely the ground gear follows the contours of the seabed.

The camera pans across the net to show the wings and the belly. Note how the discs are larger towards the middle of the ground gear. Again, the closeness with which the gear follows the seabed is evident.

The next view is a general shot of the net, taken through a panel which has been removed for this purpose.

The trawl now moves onto rougher ground.

Note the relative ease with which the trawl passes over minor patches of roughness.

After riding easily over minor obstacles the trawl is seen to pass smoothly across a larger obstruction.

Having passed over one large obstruction with ease, the trawl snags and uproots the next, similarly sized boulder. It appears to behave differently in this case because the boulder presents a different shape to the oncoming net (projecting towards the line of travel rather than offering a sloping face) which causes a snag. It may also

be the case that the second obstruction was less deeply buried than the first and therefore more easily uprooted.

Note the distance for which the obstruction is transported. It is finally left behind because it contacts a smaller obstruction and momentarily presents greater resistance to the trawl. Transport may have been over a greater distance if this had not occurred.

Another obstacle can be seen, initially contacted by the wing of the groundrope. This obstruction is snagged but uprooted and rolled over rather than transported any distance.

Finally, the trawl passes onto smooth ground again. Note how the discs cut the tops off of sand waves.

The ability of this gear to uproot and transport material on the seabed is clear. The fact that the shape as well as the size of the obstruction appears to be influential in determining the result of the impact is seen as significant.

3 Scallop Dredge

This footage was shot off the isle of Islay, Scotland and formed part of the evaluation of two methods of deploying dredges. The first, which provides most of this footage, involves the use of 6 dredges linked by chains and a tow bar (see fig. 39). These dredges are 60cm wide. The second method involves three wider dredges (90-120cm) on a tow bar. The smaller dredges in this case also have spring loaded toothed bars. The experiment found that the smaller sprung loaded dredges were more efficient at keeping close to the seabed, picked up less rubbish and suffered less physical damage than the wider non-sprung variants. Towing speed was 3-4 knots.

The opening shot shows the towing bar and 6 dredges on the side of the boat ready for deployment. The weight of the gear is clear as is the stoutness of the towing bracket employed.

The first underwater shot shows the dredges on a relatively smooth seabed. Note how close to the contours of the seabed they keep. Also note the springing and digging action of the toothed racks which uproot the scallops.

The sediment disturbance and speed of tow are obvious as is the powerful digging action of the gear.

As the dredges enter a rougher area of seabed note how the chains linking them together keep them from flipping over and in fact increase their impact on obstructions encountered by preventing them from riding over as individual units.

The element of brute force inherent in the operation of this gear is made clear by watching it pass over rough ground. The role of the connecting chains in determining the manner in which the dredges influence obstructions is clear.

The substantial nature of the obstructions that can be dislodged and displaced by this gear is demonstrated.

The camera moves round to the front of the dredges. Note the boulder pushed ahead of the bar. Also note the distinctive white impact scars which appear during the transport process. This view also demonstrates the significance of the towing bar and chains in uprooting and impacting material.

The top netting of the dredges was removed to allow a clearer view of the digging action of the gear. Note the aggressive springing action of the bars and the amount of material which is uprooted.

The whole dredge bar comes fast on a obstruction momentarily and is then pulled free by sheer brute force.

A significant indication of the potential for this type of gear to transport material is presented. Note the distance for which the small boulder is transported, trapped between bar and dredge frame before finally rolling out of the side of the dredge. Also note the white impact marks mapped onto it as it is pushed along.

The final views underwater show the unsprung, wide dredges in action. Note that they are also capable of pushing obstructions ahead of themselves for some distance.

A surface view of the towing vessel shows the dredges hauled up and a hammer applied to straightening teeth and removing trapped material. Welding gear and lump hammers are standard equipment on board dredgers due to the heavy wear on gear.

The potential for this gear to damage upstanding structure is evident as is its potential to fragment archaeological material contacted. Perhaps more surprising is the gear's evident ability to transport material over considerable distances. The fact that distinctive impact scars appear to be mapped onto objects so transported is significant.

4 Single Blade Dredge

This dredge, of French design, measures some 1.5m across and, in the UK. is mainly used off the south coast of England. It is only really suitable for fine ground. The buoys on the dredge were fitted to aid in shooting the gear the right way up and would not normally be fitted.

Note the very distinctive 'waggling' action of the dredge as it progresses across the seabed. This is caused by the blade digging into the sediment at either end as it is towed. The sediment disturbance is clearly indicated by the plume behind the gear and the potential for such gear to cause severe damage to upstanding structure is obvious.

5 Hydraulic Dredge

This footage was recorded in Gairloch near to Ullerpool during trials to evaluate a fishery for razor clams employing hydraulic suction heads. The equipment is basically the same as that used for cockle fisheries in the Wash but is set to penetrate deeper into the sediment. The observers sent by DAFS were most unhappy with such equipment being deployed in this way. The trial was officially halted when it became apparent that the fishermen involved had no intention of observing procedures agreed to facilitate a limited test of the equipment.

The opening shot shows the suction head on the surface, note the heavy construction (see fig 40).

The head is then lowered to the seabed and the pumps started. The gear functions by liquefying the seabed with a jet of water and then pumping the sediment, water and fauna to the surface.

Note the amount of sediment disturbed as the gear is activated. The greatest disturbance is created when the gear commences and finishes operations as it is stationary for some time and so digs into one area of seabed in a relatively uncontrolled way. Note the steepness of the edge of the excavation created. Compare this to the slumped sides shown later. It was observed that this rapid slumping initially lead to a severe underestimation of the true depth of disturbance created by this gear type.

The camera follows the track left by the suction head. Note the amount of broken shell which characterises these tracks. This would appear to have implications for damage patterns mapped onto artefacts.

The camera moves into a trench. Note the slumped sides and shell debris. A similar view into a larger excavation also reveals substantial amounts of broken shell and dead fauna.

A diver is shown descending into a depression created by this suction gear. Scale is provided by marked lines. The excavation was over 4m wide and nearly a 1m deep after initial slumping. Note the shallow angle of rest of the sides compared to the near vertical sides created by the suction head in operation.

Another view of a trench and broken shell debris.

The surface view shows the method employed in processing and sorting the catch. It is pumped onto a conveyor belt and picked over. There appears to be abundant opportunity for abrasion and damage to archaeological material treated in this way. Note the amount of broken shell and non-target fauna retrieved by this gear and dumped back into the water. Deployment of this totally unselective gear has clear implications for archaeological material within the sediment disturbed during its operation. Upstanding structure will be damaged and undermined. The potential for smaller objects to be raised to the surface, damaged and transported by this process is clear.

Fishing Activity and the Protection of Wrecks Act 1973.

The Protection of Wrecks Act 1973

An Act to secure the protection of wrecks in territorial waters and the sites of such wrecks, from interference by unauthorised persons; and for connected purposes. [18 July 1973].

Wrecks within the territorial sea of the UK may be designated under the Protection of Wrecks Act 1973 (POW) (DOT 1986) in recognition of historic, archaeological or artistic value (section 1 (1) b). Wrecks may also be designated due to being hazardous *e.g.* through containing a dangerous cargo (POW, section 2).

The statutory instruments used to create designations have generally described the areas of interest through specifying a radius around a specific co-ordinate. However, some designated areas have taken the form of a square (*e.g.* Church Rocks, Teignmouth). The legislation is currently administered by the Department of National Heritage (DNH) the responsibility having been transferred from the Department of the Environment in 1992. Designation orders are made by the Secretary of State.

Under the Act, certain activities within a designated area of seabed are controlled (DOT 1986):

"...a person commits an offence if, in a restricted area, he does any of the following things otherwise than under the authority of a licence granted by the Secretary of State -

(a) he tampers with, damages or removes any part of a vessel lying wrecked on or in the seabed, or any object formerly contained in such a vessel; or

(b) he carries out diving or salvage operations directed to the exploration of any wreck or to removing objects from it or the seabed, or uses equipment constructed or adapted for any purpose of diving or salvage operations; or

(c) he deposits, so as to fall and lie abandoned on the seabed, anything which, if it were to fall on the site of a wreck (whether it falls or not),would wholly or partly obliterate the site or obstruct access to it, or damage any part of the wreck;

and also commits an offence if he causes or permits any of those things to be done by others in a restricted area, otherwise than under the authority of such a licence." (POW, section 1(3))

Before making a designation order the Secretary of State "...shall consult with such persons as he considers appropriate having regard to the purpose of the order" (POW, section 1 (4)). However, emergency designations can be granted with little or no consultation. To date, most applications for designation have come from members of the public.

Under the restrictions described above, archaeological activity is controlled by licence once a site has been designated. Separate licences must be obtained for survey and excavation work and applications are made to the Secretary of State via the DNH. Under the terms of the Act, the granting of such licences should be dependent upon the applicant being competent and properly equipped to carry out any proposed operations in an appropriate manner.

Advice on applications for designation and applications for survey and excavation licences is currently provided to the Secretary of State by the Advisory Committee on Historic Wreck Sites (ACHWS) (Flinder & McGrail 1990). This non-statutory committee is widely regarded as a compromise between interest groups. It is not regarded as an expression of the accepted primacy of archaeological conservation. The first chairman appears to have regarded the function of the Act as providing exclusivity of access to a site and

expressed the opinion that a site not under active investigation did not require protection under the POW.[1]

The Archaeological Diving Unit (ADU) a team of diving archaeologists based at St. Andrews, is currently under contract to the DNH to provides written reports concerning sites proposed for designation. The unit also provides reports on the standard of work being conducted on designated sites. These reports are considered by the ACHWS and inform the advice provided to the Secretary of State via the DNH. The author worked for the ADU for 6 years and much research related to this thesis was undertaken in that period.

Firth (1993, 69-70) reviews general issues related to the POW and its contribution to the management of archaeology underwater in the UK. He highlights a number of areas where substantial improvement is required to achieve a satisfactory regime. The general shortcomings of the existing legislation in the UK and the problems of its enforcement are also reviewed by Dromgoole (1989a & b). Her observations are not repeated here. However, it is noteworthy that the Act has been in force for 20 years but, in that time, there has been no formal statement of the criteria by which sites proposed for designation are judged.

In this appendix incidents fishing activity on and around sites designated under the POW are described. The POW has commonly been understood to prohibit fishing within designated areas, largely due to an intuitive assumption that this constitutes a damaging activity. However, close inspection of the wording of the Act, and study of debates associated with the original passage of the bill through parliament, casts considerable doubt on whether this is actually so.

[1] Dean, pers.comm.

1 HMS *Hazardous*

The remains of the *Hazardous*, a third rate ship of the line lost in 1706 (Owen 1987, 285-7), lie in Brackelsham Bay, West Sussex (fig. 164). Tangle nets have been deliberately set across the site. Lobster pots were also deployed in the area. Several fleets of pots have been physically removed by the team investigating the site.[2] The pots, which remained unclaimed although their location was advertised, were sold to help defray the costs of the project.

The seabed topography is characterised by flat, coarse sand interspersed with extensive areas of gullies caused by erosion in a clay substrate. These gullies are not stable and morphological changes are regularly noted by the divers investigating the site. Lobsters and other shellfish are attracted to the gullies. This appends a certain amount of nuisance value to the designated area.

The fisherman responsible for setting the tangle net was approached by members of the project. He was well aware of the status of the site which is clearly buoyed He simply appears to have ignored the legislation. It is thought that he became aware of the site through coverage of the project in the local press and by observing regular diving activity at that location. Lobster pots are believed to have been set by more than one local fisherman. Members of the team investigating the site believe that the fishermen were also well aware of the status of the site.

[2] Owen, pers.comm.

2 Langdon Bay

The site at Langdon bay lies in close proximity to Dover harbour (fig. 164). Cultural material on the seabed consists of a number of Bronze Age artefacts (Needham & Dean 1987). The seabed is characterised by very shallow sediment cover over fissured chalk bed-rock. The archaeological material is likely to be very vulnerable to disturbance as much of it is exposed on the surface of the seabed.

A trawler was spotted towing through the site on more than one occasion.[3] This incident was reported to the Department of Transport which was at that time (1989) responsible for the POW. Attempts to trace the registration number of the vessel proved fruitless as it turned out that the number displayed was actually registered to another boat entirely.

The licensee of the site is sure that the fisherman involved would have been well aware of the presence and status of the site. The fact that a false registration number was displayed indicates that the vessel was not operating legitimately. Unlike many protected sites, the designated area at Langdon Bay is near to several landmarks and is relatively close inshore compared to other areas where trawling activity occurs. This contravention of the terms of the POW appears to stem from blatant disregard of the legislation.

[3] Moat, pers.comm.

3 Yarmouth Roads

The Yarmouth Roads site consists of the remains of a wooden vessel believed to be a merchantman of Mediterranean origin lost in the mid-16th century (Watson & Gale 1990; see section 7.2.3, 237-8 & fig. 164). A fleet of lobster pots was laid across this site in the autumn of 1986. The person responsible was contacted. He was well aware of the protected nature of the site but claimed that he thought that the pots did not lie across it. The team investigating the site cut the buoy rope of the pots to avoid them being dragged into structure when recovered. This caused a certain amount of tension with the owner of the gear.[4]

[4] Simpson, pers.comm.

4 Studland Bay Wreck

During the winter of 1991 the Studland Bay wreck site (described in section 7.1) was impacted by oyster dredgers. The site is very well known locally and has been the source of much publicity in the local press for a number of years. A prominent yellow buoy marks the centre of the designated area. Mr. Markey, the project supervisor, believes that the significance of the buoy is well known in the area and amongst members of the Poole Bay Fishermen's Association.

After the site had been visited by members of the project in the spring of 1991 and the damage discovered, Mr. Markey, was approached by a local fisherman making vague enquiries about the state of the site. The fragments of information eventually offered confirmed suggestions from other, independent sources that at least two boats from Southampton had been working the area during the short (January-March) Oyster season. 5 or 6 Poole based boats are also thought to have been involved. Mr. Markey believes that the fact that the fisherman waited until it was almost certain that he would have become aware of the disturbance to the site by observing it on the seabed indicates that those responsible were fully aware of what had occurred. If he had been told earlier he could have sought means of protecting the site or could have attempted to gather evidence relating to the individuals involved.

In order to cause the observed damage it is estimated that the boats must have passed within 10m of the substantial site buoy. In conversation instigated by a local fishermen, Mr. Markey was asked, 'what can you expect - that's a part of people's living out there'. The fisherman also showed awareness that an experimental artificial reef within the protected area had been damaged.

The overall impression gained was that the dredging had been done in full awareness of the presence and nature of the site. The designated area, relatively small in relation to the extent of local fishing grounds, is regarded as an imposition. It was further suggested to Mr. Markey that legislation would always be ineffective and that placing obstructions on the seabed which disabled gear was

the only way that fishermen would be prevented from exploiting an area of seabed. It has been suggested that falls in local catches of oysters have made fishermen even less sympathetic than they would normally be towards non fishery-related protected areas.

Mr. Markey has been approached by local fishermen who had heard that active fieldwork on the site was to be stopped. They made it clear that, erroneously, they believed that this would result in the removal of any restrictions on their activities in the area. Reports received by the Archaeological Diving Unit in November 1991 indicate that further fishing activity is likely to have occurred over the site but this cannot be established beyond doubt. Such activity would have taken place after the local fishermen's association and fishing authority had received official communications from the Department of The Environment requesting closer observance of the POW.

Mr. Markey considers that he has a good relationship with many of the local fishermen but that this would not stop them attempting to exploit the seabed in the protected area. He is in no doubt that any fishing related impact will result from deliberate actions. The site was originally found by a fisherman who snagged his gear. Other fishermen have told Mr. Markey that they would not report any further discoveries of material due to the perceived nuisance of protected areas.

Submarine Cables and The Oil and Gas Industry

1 Submarine Cables

The installation of telecommunications cables on land and on the seabed is regulated by the Submarine Telegraph Act 1885 and the Telecommunications Act 1984. The laying of other cables (*e.g.* power cables) is regulated by the Coast Protection Act 1949. Section 11 of the 1984 Act is concerned with cables in tidal waters.

Works are approved by the Secretary of State (Department of Transport) who will usually consult with the Ministry of Agriculture, Fisheries and Food among others. The promoter of the cable laying scheme is expected to consult widely before submitting an application and may contact fishing interests at a local level. Proposals are frequently publicised in *Fishing News*. The environmental effects of cable laying are considered to be minimal and the requirements for Environmental Assessment (DOE 1989) under the European Community Directive (85/337/EEC) do not apply (DOE 1993b, 5.10.4). However, some further regulation to protect fishing interests and the environment generally is being considered (*ibid.*, 9.10.2).

2 The Oil Industry

The following is a brief outline of the major elements of regulation of oil and gas related seabed development.

Production licenses for gas and oil are issued by the Department of Trade and Industry and are subject to regulation by the Petroleum (Production) (Seaward Areas) Act 1988. Separate regulations apply to seaward areas (Seaward Areas, Amendment Regulations 1990) and to landward areas (Landward Areas, Amendment Regulations 1991). However, some sea areas such as estuaries and some coastal waters are treated as part of the landward regime (*e.g.* the Solent and the Solway Firth) and are known as 'watery areas'.

For seaward areas blocks of seabed (average area *circa* 250km^2) are offered through licensing rounds during which applications are invited for exploration licences. Rounds are held on a roughly bi-annual basis. Extensive consideration of environmental issues is required before an application is submitted. Applicants must demonstrate that they have effective environmental policies and both national and local fishing organisations would usually be consulted. For any block which is regarded as sensitive, a licence may be offered subject to conditions. Since the 11th round of licence applications in 1988/9 an Environmental assessment (DOE 1989) has been required at the development stage (production subsequent to exploration) where the development is within 25 miles of the coast or within a sensitive area. Such consultation is the responsibility of the licensee.

The results of the 14th round were announced in 1993 with the award of 110 blocks out of the 484 originally offered. 35 blocks regarded as highly sensitive were not licensed following consultation and a failure to agree on appropriate safeguards (DOE 1993b, 5.8.3). Licenses last for 3 years in the first instance and may be extended on request.

Under the Petroleum and Submarine Pipelines Act 1975 written consent from the Secretary of State is required for any pipeline

construction on the UK continental shelf. The Act sets out inspection procedures for offshore pipelines. Schedule 4 of the Act provides a framework for consultation with interested parties on routing and construction of pipes. Paragraph 6 deals explicitly with the need to accommodate the fishing industry. This legislation, however, in no way obliges the Secretary of State to conform to the requests of interest groups.

As well as implementing a strict code of practice for anchoring *etc.* around installations the oil industry does have recourse, under the Mineral Workings and Offshore Installations Act, 1981, to statutory exclusion zones of 500m around installations. It is an offence to infringe these exclusion zones.

The Fishing Industry

The Current Regulatory Regime

The early years of fishery legislation are described by Johnstone (1905) and Jenkins (1920, 159-192). The minutes and resolutions of the 1914 *Commission On Inshore Fisheries* (RIF, 1914) are also significant in that they identify many problems relating to regulation which were to persist in the inshore fleet.[1] The present regime is characterised by policy making at European Community level and regulation at national level.

The EC Common Fisheries Policy (CFP), agreed in 1983 and reviewed in 1992, regulates access to UK waters.[2] The CFP also determines stock conservation measures through annual regulations agreed by the Council of Ministers. These specify total allowable catches (TACs) and national quotas for major target species. EC Regulation No 3094/86, amended in June 1992, sets out technical measures for stock conservation including minimum mesh size. These regulations cover all waters under the jurisdiction of member states who can also impose unilateral conservation measures.[3] Harrison (1994) reviews current developments in fishery policy at the European and international level. She concludes that consideration of wider (non-fishery) conservation issues is evident in Article 2.1 of the revised CFP. However, reports emanating from

[1] Jenkins (1920, 174-192) provides a useful summary of the Commision's findings and an incisive commentary on the practicality of the consequent reccomendations.

[2] The revised Common Fisheries Policy was issued as Council Regulation No. 3760/92.

[3] For a full account of EC fisheries regulation see Churchill (1987).

UK authorities are considered to propagate the division between conservation in general and fisheries management (*ibid.*, 50-51).

Current policy to maximise productivity within a framework of stock management based on TACs is widely perceived as failing. Formerly, TACs were calculated by scientists from 17 member countries. There is near unanimity amongst fishery scientists on the need to reduce effort. Recent (1992) changes have reduced the input of fishery scientists to determination of TACs. They will no longer make firm recommendations but will offer advice. It has been suggested that this reflects the need for politically expedient measures to be given primacy over TACs designed solely on the basis of conservation science (FN, 5 Jun 1992, 1). There is widespread disdain amongst the fishing industry for EC management of fishery legislation and policy. Various technical conservation measures have been particularly unpopular[4] but such measures now appear to be accepted by the industry as part of stock management efforts (Banks 1994, 54-6).

Local regulation in England and Wales is provided through bylaws made by 12 Sea Fisheries Committees (SFCs) empowered by section 5 of the Sea Fisheries Regulation Act 1966. SFCs, originally created *circa* 1890, are run by local councils. Committee members include a ministerial appointee familiar with the industry, representatives of local authorities and the National Rivers Authority (NRA). They have jurisdiction to 3nm offshore. Upon request it can now be extended to 6nm mainly in order to ensure conservation of shellfish stocks. Bylaws must be confirmed by the appropriate minister and may be framed in order to:

- Restricting or prohibiting the fishing or taking of all or any specified sea fish in specified areas or at specified times.
- Restricting or prohibiting any specified method of fishing
- Regulation, protection and development of fisheries for shellfish.

Under section 81 of the Sea Fisheries Regulation Act 1966 The NRA or a harbour authority can be given SFC powers where a sea fisheries district adjoins or overlaps an estuary. The NRA also has

[4] Lockwood, pers.comm.

obligations to conservation of salmon and migratory trout up to 6nm around the coast of England and Wales exercised through The Sea Fisheries (Conservation) Act 1967.

Section 1 of the Seafisheries (Wildlife Conservation) Act 1992 requires SFCs to take account of the conservation of marine flora and fauna but only in so far as this is compatible with fisheries conservation objectives. The competence of the SFCs is under review with the possibility that they will be given authority to control the use of certain types of gear specifically for environmental rather than stock conservation (DOE 1993a, 8.18). SFCs appear to consider themselves the appropriate body to undertake such regulation.[5] SFC derived restriction of certain gear types to meet the needs of archaeological conservation would seem to be a logical progression.

A similar duality is present in Scottish waters but regulation at local level is not through SFCs. The development of legislation in Scotland from the 19th century to 1970 is summarised in section VII of *The Cameron Report* of 1970 (RSIF 1970). The consultation paper, *Regulation Of Scottish Inshore Fisheries - Report of the Scottish Inshore Fisheries Committee* (Cmnd 4453) December 1981, reviews developments since 1970 and in appendix I and II statutes affecting inshore waters, ranging in date from 1705 to 1981, are described (RSIL 1981).

The 1981 document marks an important watershed in legislative terms. It was published while discussion was continuing concerning the Common Fisheries Policy (CFP) of the EEC which would, in the future, influence any domestic arrangements for regulation. It was not until 1983, following agreement on CFP and the advent of EEC law into inshore fisheries that modified recommendations could be put into effect by the Inshore Fisheries (Scotland) Act 1984. This went out for industry consultation in 1984-5 resulting in the Inshore Fisheries (Scotland) Act 1985. Further consultation papers in 1988-89 provide the background to developments which have resulted in the legislation currently shaping the inshore fisheries regime in

[5] CPP 1992, appendix 6, 304.

Scottish waters, the Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order 1989.

The Secretary of State for Scotland, after consultation with the fishing industry , is empowered to make orders regulating fishing in waters up to 6nm offshore. Current orders include year-round and seasonal restrictions on the use of mobile gear, restrictions on the use of suction dredging for shellfish and seasonal restrictions on lobster and creel fishing in certain areas. In Northern Ireland there are no SFCs but equivalent powers are exercised by the Department of Agriculture for Northern Ireland through the Fisheries Act (Northern Ireland) 1966.

The future course of inshore legislation is unclear. Current discussions are centring around limiting inshore effort by the licensing of vessels under 10m (FN, 11 Oct 1991, 12). A licensing policy is also being considered to control shellfishing effort. Overall, the fishing industry appears to consider the current legislative situation as confusing and occasionally contradictory (FN, 8 Feb 1991, 2). Mr. Simms of the Department Of Agriculture and Fisheries Scotland (DAFS), Inshore Office, concedes that the legislation is occasionally 'opaque'. Industry consensus appears to favour a strictly enforced set of basic rules with severe penalties for transgression (FN, 3 May 1991, Editorial). However, suggestions that abuse of regulations is endemic and severely compromising technical conservation measures are plentiful.[6] This is not to suggest that fishermen are pre-disposed to illegal actions. A not uncommon reason for giving up fishing in recent years is the conflict between the perceived non-viability of operating without breaking major regulations (filing false reports, using undersized mesh, illegal landings) and a deep-seated unwillingness to regard habitual rule-breaking as acceptable practice.[7]

[6] For example FN, 8 Mar 1991, 1; FN, 20 Sep 1991, Editorial; FN, 20 Sep 1991, 26

[7] Lyndsey, pers.comm; FN, 26 Apr 1991, 9.

Tabulated Ceramic Assemblages

Key to Abbreviations

The following abbreviations are used to describe the individual sherds. For reasons explained in section 4.2.2 the Pudding Pan / Pan Sand assemblage described in Table 1 was treated differently to the other assemblages studied. However, the same abbreviation have been used in the tabulation of the results.

FORM	**B**	Body sherd
	BS	Base
	H	Handle
	R	Rim

FABRIC	**AM**	Amphora
	MORT	Mortaria
	SAM	Samian
	S	Stoneware
	TEG	Tegula
	TILE	Tile

COMMENT

The number of fracture planes is given followed by a description of each fracture.

BF	Damage to footring
UN	Number of fractures could not be ascertained
ER	Eroded
LTER	Light erosion
MG	Marine encrustation
S	Staining / discolouration
FB	Fresh break
AB	Angular break
FAB	Fresh angular break

For example: 5 / 3 ER MG / 2 S indicates that the sherd exhibited 5 fractures, 3 of which were eroded and were covered with marine encrustation, 2 of which exhibited only staining.

DATE

R	Roman	(43-410)
EM	Early Medieval	(410-1066)
M	Medieval	(1066-1540)
PM	Post Medieval	(1540-1900)

(RCHME 1993b, 82-3)

X / Y The X and Y dimensions are expressed in centimetres

DIAM CM For the assemblage from Pudding Pan and Pan Sand, the Maximum diameter is provided expressed in centimetres.

SURF **D** Indicates that a clear differentiation between the type of marine encrustation present on separate surfaces of the sherd could be observed.

MARINE GROWTH

This field provides a description of the types of marine growth present and also indicates other features of interest.

B	Barnacles (Fish & Fish 1989, 292-4)
BR	*Bryozoa* (Ryland 1976)
W	*Pomatoceros* (Fish & Fish 1989, 175)
SW	Tube building animal - gritty texture
OYS	Oyster attached
GLZ	Glazed
GLZ	Glazed on both surfaces
GLZI	Glaze on inner surface
GLZO	Glaze on outer surface

Description of two surfaces on the same sherd are separated as follows / .

For example: B / B, BR, W indicates that on one surface of the sherd only barnacles were visible, on the other surface barnacles, *Pomatacoeros* and *Bryazoa* were observed.

TABLE 1 Pudding Pan / Pan Sand Assemblage

VESSEL NUMBER	FORM	COMMENT	DIAM CM
BM 1903 11-15 221	79R	BF - no ER on damage to the footring - damage caused by final impact / raising event?	26.5
BM 1908 7-27 1	79R	Half vessel / BF - LTER / MG cleaned off	27
BM 1908 7-27 4	31R	LTER / pitting-not salt related ?	24
BM 1908 7-27 5	31	Minor pitting only	19
BM 1908 7-27 6	33	BF - ER / pitting on the base / MG on all surfaces	14.5
BM 1908 7-27 7	33	MG on base	13.5
BM 1908 7-27 8	35	BF - ER / MG on base	12
BM 1908 7-27 9	38	BF - ER MG / ER on base	14
BM 1908 7-27 10	38	BF - ER / MG cleaned off	14.5
BM 1910 10-25 24	31R	ER	26
BM 1910 10-25 25	31	BF - ER MG / ER on base	18.5
BM 1910 10-25 26	31	ER /MG	19
BM 1920 11-23 9	36	BF - ER MG / ER on base / MG cleaned off?	27.5
BM 1920 11-23 10	36	BF - ER MG / ER on base / some MG cleaned off / striations on outer surface, chip on rim, ER over striations	19
BM 1920 11-23 11	36	BF - LTER / ER on base / light pitting	19.5
BM 1920 11-23 12	35	BF - LTER / LTER on base	12
BM 1920 11-23 13	36	BF - ER MG	26
BM 1920 11-23 14	35	BF - ER / ER on base	12
BM 1920 11-23 15	79R	Some chipping	28
BM 1920 11-23 16	79	BF - ER MG / ER on base / striations on base	18
BM 1920 11-23 18	79	ER on base	19

BM 1920 11-23 20	79	Broken vessel, ER on fractures	18.5
BM 1920 11-23 21	80	BF - ER MG / salt pitting? / footring completely missing - multiple impact events?	10
BM 1920 11-23 22	C15	BF - LTER MG / ER on base / MG on all surfaces	19.5
BM 1920 11-23 23	46	BF - ER MG / footring completely missing - multiple impact events?	11
BM 1920 11-23 24	31R	Pitting and LTER on base / flaking fabric due to salt?	26
BM 1920 11-23 25	31R	ER on base	24
BM 1920 11-23 26	31R	BF - ER / striation?	23.5
BM 1920 11-23 27	31R	BF - ER / ER on base	24
BM 1920 11-23 28	31R	ER on base	25.5
BM 1920 11-23 29	31R	BF / ER on base	24
BM 1920 11-23 30	31R	BF - ER / ER on base	27
BM 1920 11-23 31	31	BF - ER	18
BM 1920 11-23 32	31	BF - ER MG / ER on base / striations on base	18
BM 1920 11-23 33	31	ER on base	18.5
BM 1920 11-23 34	33	BF - ER MG / ER on base	14
BM 1920 11-23 35	38	BF - ER / ER on base / chipped rim	15
BM 1937 3-16 2	33	Small chip on footring	10
BM 1937 3-16 3	80	ER on base	10
BM 1937 3-16 4	38	BF - ER / ER on base / relict scar on rim / footring almost completely absent - multiple impact events?	15
BM 1937 3-16 5	31R	BF - ER	24
BM 1937 3-16 6	31R	BF - ER MG / MG on base	25
BM 1937 3-16 7	79	BF - ER	17.5
BM 1937 3-16 8	33	BF - ER MG / MG on base	14
BM 1937 12-10 1		Fragment	
BM 1937 12-10 2	31R	Fragment	
BM 1937 12-10 3	AM	Fragment	
BM 1950 5-2 9	38	BF - ER MG	11
BM 1950 5-2 10	31R	BF - ER ? outer surface of vessel ER	24
BM 1733-1901	31R	BF - ER MG / salt pitting and flaking? / footring completely missing - multiple impact events?	25

Appendix 6 **Table 1**

BM 1734-1901	31	BF - ER	18
BM 1735-1907	31	BF - ER / ER on outer surface	18
BM 1736-1901	80	ER and pitting on base	10
BM 1737-1901	46	BF - ER / ER on base	10
BM M1641	31	BF - ER / rim worn	18
BM M1737	33	Fragment / BF - ER	
BM M1738	33	Fragment / BF - ER	
BM M1643 TC	31	BF	18
BM M1650 TC	31R	BF	24
BM M1660 TC	31	BF - ER MG	18
BM M1670 TC	31R	BF - ER MG	27
BM M1671 TC	31R	BF	27
BM M1681 TC	33	BF - ER	11
BM M1752 TC	79	BF - ER / ER on vessel which pre-dates break?	18.5
BM M1753 TC	79	BF - ER / ER on vessel which pre-dates break?	18
BM M1754 TC	79	BF - ER / ER on vessel which pre-dates break?	18
BM M2144 TC	33	BF - ER	11
BM un TC	C15	BF - ER	24
BM un TC	36	BF - ER	26.5
BM un TC	36	BF - ER	24
BM un TC	31R	BF - ER	23
BM un TC	46	ER MG	10
BM un TC	31	BF	18
BM un TC	C15	BF - ER MG	29

TABLE 2 Ryde Middle Bank Assemblage

No.	FORM	FAB	COMMENT	DATE	X	Y	SURF	MARINE GROWTH
5002	BS, B, R		5 / 4 ER MG / 1 FB	R?	16.9	12.6	S?	B, BR, S, SW
5003	B		4 / 2 FB / 2 MG	M	7.2	5.3	D	B / BR, W; GLZB
5004	BS		UN MG	PM	10.4	9.1		B / B, BR; GLZB
5005	BS, B	S?	5 MG	PM	11.5	9.4		B, BR, W / B
5007	B		4 MG	PM	13.1	7.2		B, BR, W; GLZO
5036	H	AM?	2 / 1 ER MG / 1 MG	R	13.1	5.5		B / B, W
5037	B, R		2 ER MG	R	7.1	6.8		B, BR, W, SW
5038	B, R		3 / 1 S / 1 FB	R	9.2	6.9		B; GLZ
5039	BS		7 MG	R	12	10.2		B, BR, SW / B, BR, W; GLZI
5040	B, R		5 MG	R	19.5	11.6		B, BR, W
5041	B		5 / 3 MG / 2 FB	R	8.9	7.8		B, BR / B, BR, W
5042	B, BS		5 MG	R	9.2	7.9		B, BR, W, OYS
5043	B	AM?	5 MG LTER?	R	20.7	13.2		B, BR, W, SW
5044	B		6 / 5 MG / 1 S	R	14.1	11.6		B, BR, SW / B, BR; angular break
5045	B		UN ER / 1 FB?	PM	13.6	8.7		B
5046	B, R	AM?	5 / 2 MG / 2 S/ 2 FB	R	9.1	8.2		B, BR
5047	B		3 MG	PM	12.5	9.1		B / B, BR, W
5048	BS, B, R		3 / 2 MG / 1 FB	PM	17.3	3.2		B, BR, SW / B, BR, W, OYS; GLZI
5049	B, R, BS		4 MG	PM	18.3	13.1		B, BR, W
5050	B, R		2 MG	PM	24.4	10.1		B; GLZI
5051	B		5 MG	PM	13.7	12.5		B, BR / OYS; angular break?
5052	R	S	4 MG	PM	15.9	11.2		B / BR, B; GLZO

5053	B	S	6 / 1 FB / 5 MG	PM	14.9	12.6	D	B, W? GLZO
5054	BS, B		UN ER MG	PM	20	13.2		B, BR / B, BR, W; GLZB
5055	B, R, BS	S	4 / 2 FB / 2MG	PM	16.7	6.4		B; GLZB
5056	B		6 / 5 MG / 1 FB	PM	10.7	8.2		B, BR, SW / B, BR, W
5057	BR, BS	S	5 MG	PM	13.6	12.6		B, BR, W
5058	B, R		4 MG	PM	15.2	10.5		BR, W OYS / B, BR, SW; GLZI
5058	BS, B		UN MG 2 FB?	PM	16.7	4.2		B, BR
5059	B	S	5 / 1 FB / 4 MG	PM	21.2	19		B, W SW; GLZO
5060	BS, B	S	4 MG	PM	10.5	8.5		B / BR, B, W; GLZI
5061	B	S	6 / 4 FB / 2 S?	PM	11.2	11.1		B / W?; GLZO
5062	BS, B		5 / 3 MG / 1 S? / 1 FB?	PM	17	14.2		B, W, OYS; GLZI
5063	B, R		3 MG	PM	9.7	9.6		B
5064		TILE	1 MG	PM	15.9	10.9		B, BR, W, SW, OYS
5066	H		2 ER MG?	PM	8.9	8.8		B, BR; GLZB
5067	B	S	5 / 1 FB / 3 MG / 1 ER MG	PM	15.6	12.2		B / B, BR, W; GLZO
5068	B, BS, R		3 MG	PM	12.4	11.1		B, BR, W; GLZI
5069	BS, B		4 / 2 ER / 2 ER MG	PM	12	6.9		B, SW / B, BR, W; GLZI
5070	B, R		UN ER MG	PM	15.2	11.2		B, SW / B, BR, W
5071	B		6 MG	PM	16	7.4		B, BR, S, SW
5072	B		4 MG	PM	10.5	8.7		B, BR, W
5073	B		6 / 5 LTER / 1 ER MG	PM	9.7	8.1		B, BR, W
5073	B, R	S	4 / 3 MG / 1 FB	PM	11.3	10.5		B, BR, SW / BR, W, OYS; GLZI
5074	B		3 MG	PM	14.2	7.6		B, BR, W
5076	B		UN MG	PM	8.9	7.8		B, BR, SW
5078	B, R	S	3 / 1 S / 2 MG	PM	10	8.2		B, SW / B, BR, W; GLZO
5079	B		5 / 1 FB / 4 MG	PM	11.5	7.6		B, W, SW / B, W
5080	B	S	5 MG	PM	14.1	7.3		B / B, SW; GLZO
5082	B	S	5 / 1 ER / 5 MG	PM	9.4	9.4		B, W, SW?; GLZO
5083	BS, B	S	5 / 1FB / 4 MG	PM	19.6	12.2		BR, B, W; GLZB
5084	B, R		4 MG	M	16	4.4		B, BR, W; 2 fragments, angular break?

5085	BR	S?	5 / 4 MG / 1 FB	PM	13.5	9.9		B, OYS / B, BR, W
5085	B	S?	5 / 1 FB / 4 MG	PM	14.2	12.2		B
5086	B	S	5 MG	PM	13.4	12.2		B, BR, W; GLZO; sub -angular break
5087	B	S	4 MG	PM	21.2	12.4		B / B, BR, W; GLZO
5088	B	S	4 MG	PM	15.1	12.4		B, BR; GLZO
5089	B, H	S	3 MG	PM	15.3	9.6		B. BR / B BR, W, OYS; GLZO; sub-angular break?
5090	B, H, R		UN MG ER	PM	9.6	8.5		B, BR, SW, W; GLZI
5092	B		6 MG	PM	10.9	9.5	D?	B, BR, SW, OYS / B, BR, W; GLZI; 2 fragments - secondary damage?
5093	B		5 / 4 MG / 1 ER MG	PM	10.2	9		B, BR, W; GLZO; eroded sub-angular break?
5093	BS, B		5 / 2 S / 2 MG / 2 ER	PM	8.6	8.6		B, BR, W, SW
5094	B	S	4 MG	PM	11.6	11.2	D?	B / B, BR
5096	B		4 / 3 MG / 1 FB	PM	10.3	8.2	S?	B; GLZO
5097	BS	S	4 / 3 MG / 1 FB?	PM	8.1	7.1	S?	B, BR
5098	B		5 / 2 MG / 3 FB	PM	6.7	6.4	S?	B, BR; GLZO
5099	B	S	4 / 3 FB / 1 MG	PM	9.3	7.2	D	B / BR, W; GLZB
5100	B, R	S	3 MG	PM	7.8	5		B, BR / B, W, OYS; GLZB
5101	B	S	4 / 3 MG / 1 FB	PM	9.8	4.3	S?	B, BR
5102	B		6 MG	PM	10.7	4.6		B, W; GLZB
5103	B		4 / 1 S / 3 MG	PM	7.4	5.7	D	B, SW / clean; GLZB
5104	B	S	4 / 2 MG / 2 FB	PM	6.2	6.1		B, W; GLZO
5105	B, R	S	3 MG	PM	6.8	6.2	D?	B, SW / B?; GLZI
5106	B, R		3 MG	PM	7.5	6.8		B, SW / B
5107	B, R		4 MG	PM	11.2	5.9	S?	B
5108	B, R		3 / 1 MG / 1 S / 1 FB	PM	8.9	4.2	D	B, BR, top edge only
5109	BS	S	5 / 2 FB / 1 MG / 2 S MG	PM	5.9	2.1		B, SW
5110	B, R	S?	4 / 1 ER / 2 S / 1 FB	PM	7.7	3.3		B; GLZI; angular break
5111	B, R		3 LTER MG	PM	7.7	7.4		B, BR, W; GLZB

5112	B, R		2 MG	PM	9.9	6.7		B, SW; GLZI
5113	B, R, H		5 / 4 ER MG / 1 FB	PM	21.7	19.2		B, BR, W
5114	BS, B		5 / 1 FAB / 4 MG	PM	16.9	8.2		B, BR; GLZI; angular break
5116	BS, B	S	1 FB	?	9.2	4.5	S?	B, BR
5117	BS, B		4 / 1 FB / 2 MG / 1 ER MG	PM	12.2	4.3		B, BR, W
5118	BS, B		5 / 2 MG / 1 ER / 2 FB	PM	15.7	7.8		B, BR, SW / B, BR, W
5119	BS, B		5 / 3MG / 2 S MG?	PM	16.6	12.1	S?	B,BR; angular break
5120	BS, B		5 / 3 MG / 1 ER MG / 1 FAB	PM	11	9.2		B, SW, OYS, W / B, BR, W, SW; angular break
5121	B		5 MG	PM	21.8	16.6	D	B
5122	B, R		4 / 3 MG / 1 LTER MG	PM	16.1	11.4		DB, BR, W / R, BR; GLZI
5123	B	S	3 / 1 MG / 2 FB?	PM	11.2	10.2	D	B / OYS; GLZO?
5125	B, R		4 / 3 MG / 1 FAB	PM	9.8	6.2		B; angular break
5126	B	S	5 / 3 MG / 2FB	PM	13.2	11.9		B, BR / B, BR, W; GLZO
5127	BS	S	4 MG	PM	16.4	9.4		B, W; GLZO
5128	R, H	S	3 / 1 MG / 2 FB	PM	9.1	7.9		B, BR; GLZO
5130		TEG	4 MG	R	19.5	9.4		B, BR, SW
5131		TILE	1 ER MG	PM	13	12.5	D	B, SW / BR
5132	B		4 / 3MG / 1 ER MG	PM	9.2	6.9	S?	B, BR; GLZO?
5133	B		5 / 2 FB / 1 MG / 1 ER / 1 ER MG	PM	8.2	4.2		B
5134	B	S	3 MG	PM	10.3	9.2	D	B, SW / B; GLZO
5135	B		4 / 2 ER / 2MG	PM	8.5	8.2		B, BR
5136	BS, B		4 MG	PM	8.2	7.4	S?	B, SW; GLZB
5137	B		3 MG	PM	13.4	6.7	D?	B, W / B, BR, W
5138	B		4 MG	PM	9	5.2		B
5139	B	S	4 / 3 MG / 1 FB	PM	10.7	7.5	S?	B, BR; GLZI
5140	BS, B	S	5 FB	PM	10.7	6.5		B, W; GLZO
5140	BS		5 ER	PM	8.2	6.2		Clean
5141	B		4 / 3 MG / 1 FB	PM	7.1	6.7		B, BR / B, BR, W
5142	B, BS		UN MG, ER	R	10	5.1		B, BR; GLZB

5143	B	AM?	5 / 4 MG / 1 ER MG	R	10.3	5.6	D?	W?
5143	B, R	AM?	4 / 1 S / 2 FB / 1 MG	R	15.1	7.8		B, BR, W
5144	B		5 MG	R	13.9	12.8		B, BR, SW / B, BR, W
5144	B		5 / 1 FB / 4 MG	R	14.6	8.9		BR, W
5145		TEG	7 / 6 S, MG / 1 S?	R	12.9	11.2		Clean
5145		TEG	4 / 2 MG / 1 ER / 1 FB	R?	9.1	4.4		B, BR, W / B, BR, SW
5146	B	AM?	4 / 2FB / 2 MG	R	9.8	6.2		B, BR, W
5146	B		4 MG	PM	7.5	4.4		BR, W
5147	B		6 / 3 FB / 3 S LTER	PM	9.6	8.1		Clean; GLZI
5148	BS	AM	UN 1 FB?	R	7.3	3.9	D	B, BR / W
5148	B		4 / 1 FB / 3 MG	PM	10.1	6.4		Traces only
5149	R		UN ER MG	PM	6.6	3.5	D	Clean / B, W
5166	B, R		5 / 2 FB? / 3 MG	M	13.1	6.6		B, BR, SW
5167	B		5 MG	M?	13.9	4.4		SB, BR, W
5168	BS, B		5 MG	PM	11.4	7.2		B, BR, SW
5169	B, R		5? MG	PM	12	4.5		B, BR
5170	B		5 MG	PM?	10.4	6.1		B, W / W
5172	B		5 / 4 MG / 1 ER	?	18.8	8.9		B, BR, SW
5173	B		3 / 2 S / MG / 1 FB?	PM	14.3	4.9		B
5174	BS		4 / 1 MG / 1MG?/ 2 FB	PM	15	13.9		B, BR, SW / B, BR, OYS; GLZI
5175	B, R		2 MG	PM?	16.1	6.1		B, BR, W?; GLZI
5176	BS, B		5 / 1 FB / 4 S	PM	12	10.4		B? BR?
5177	B	S	3 MG	PM	12.2	6.4		SW, B, BR / B, BR, W; GLZB
5178	BS, B	S	4 MG	PM	13.5	9.7		B, BR, SW / B, BR, W; angular break.
5179	BS, B		4 MG	PM	22.4	18.3		B, W, SW / B, W, BR
5180	H		5 / 1 FB / 4 MG	M?	11.1	6.1		B, BR, W
5181	B, R	S	4MG	PM	14.9	9.2	D	B, SW / W, BR;GLZI
5182	BS, B, R		4, S,MG	PM	10.9	7.2		B, BR, SW / BR, W
5183	B		5 / 1 FB / 1 S / 3 MG	PM	13.9	5.8		B, BR, SW / B, BR, W; GLZO
5185	B		3 MG	PM	15.1	10.1		B, BR, SW / B, BR, W;GLZI

Appendix 6 **Table 2**

5186	BS, B	S	5 / 1 FB? / 4 MG	M?	23.2	14.6		SW, B, BR / W, B, BR; GLZO
5186	B, H	S	6 / 1 FB 5 MG	M?	12.6	10.1		B, BR, W
5188	B	S	5 / 3 MG / 1 FB / 1 FAB	PM	10.7	5.2	D	BR, W / SW
5189	BS	S	4 / 1 FB / 1 ER? / 2 MG	PM?	17.2	2.9		B, BR, SW; GLZI
5191	BS, B		4 / 3 MG / 1 FB	PM	13.1	5.5		B
5192	BS, B		6 / 1 ER / 3 MG / 1 FB / 1 FAB	PM?	13.1	9.1		B, BR, W / B, BR; angular break
5193	BS, B	S	5 / 4 S / 1 FB?	PM	11.3	11.2		B, BR, SW / B, BR, W; GLZB
5194	B	S	5 / 1 S / 2 FB / 2 MG	PM	16	9.6	D	BR / B, W; GLZO; angular break
5195	B, R		4 / 3 MG / 1 FB	?	14.2	11.2		B, SW / B , BR, SW
5196	B, R		4 MG	PM	17.9	9.6		B, BR, OYS, W; GLZB
5197	B, R		3 / 2 MG / 1 FB	PM	15.8	10.7		B, BR, W
5198	B, R		6 / 1 FB / 5 MG S	PM	19.9	8.4		B, W, SW / B, BR, W; GLZI
5199	B, R		4 MG	PM	14.2	9.2		B, BR
5201	B		5 / 4 MG / 1 FB?	R	21.4	11.4	S?	B, BR, S, SW / B
5202	B	S	5 MG	PM	8.6	8.5		B, BR, SW / BR, W; GLZO
5203	H		2 MG?	PM	6.1	3.2	D?	B / BR; GLZB
5204	B		6 MG	PM	17.2	15.5		B, BR, W, SW; GLZB
5205	B		6 / 1 ER / 2 MG / 3 S?	PM	9.3	8.2		B, BR
5206	B, R		5 LTER	PM	5.7	4.2		Clean; GLZB
5207		TEG	3? ER MG	R	15.8	5.4		B, BR, W
5208	BS, B, R	SAM	4 / 3 MG / 1 FB?	R	12.1	6.2		B / B, BR
5209	B, R		3 / 2 FB? / 1 MG	PM	6.5	4.2		B, BR / BR
5210	B, R		3 / 1 FB / 2 LTER MG	PM	5.5	4.6		B, SW
5211	B, R		5 MG	?	14.1	6.8		B, W, OYS / B, BR, SW
5212	B, R		4 / 3 MG / 1 ER MG	PM	9.5	8.6		B, BR, W, SW
5214	B		6 / 4 MG / 1 S / 1 FB?	PM	8.5	6.7		B / B. BR
5215	B		5 MG	PM	12.6	7.5		B, BR
5216	B, R		3 / 2 MG / 1 FB	PM	8	6.1		B, BR; GLZB
5217	B		3 / 2MG / 1 ER MG?	PM	10.1	8.7		BR, B / BR
5218	B, R		5 MG	?	10.5	9.1		B, W, SW / W , BR, SW, OYS

5219	B		6 / 2 FB / 4 MG	PM	8.1	7.4		B, BR / B, BR, W; GLZI
5220	R		4 MG	PM	9.6	3.1		B, BR / B, SW
5221	B, R		4 / 1 MG / 2 S / 1 ER S	PM	6.7	5.9		B, SW / BR, B
5222	B, R		6 LTER MG	PM	22.2	10.9		B, BR / B;GLZB
5224	B	S	3 MG	PM	6.4	4.5		B, BR
5225	BS, B		5 MG	?	11.1	4.2		B, BR, W / BR, B; angular break
5226	B, R		3 / 2 S / 1 MG	?	12.2	9.2		B, BR, W?; GLZB
5227	B		5 MG	PM	18.1	14.2		B, BR, W; GLZI
5228	B		4 / 2 FB / 2 MG	PM	7.5	3.4	D	B, BR
5229	B, H	S	5 MG	PM	6.7	4.6	D?	B, BR, S, SW / B; GLZO
5230	B	S	4 / 2 MG / 2 FB	PM	5.1	3.9		B; GLZO
5231	B	S	5 / 3 MG / 2 FB	PM	7.3	6		B, BR; GLZO
5232	B		5 / 3 FB? / 1 S	PM	4.5	3.8	D?	B / BR, W; GLZI
5233	B		4 / 2 MG / 2 FB	PM	6.9	6.6		B, BR, W; GLZI
5234	B		5 / 4 MG / 1 FB?	?	14	10.2		B, BR, SW; GLZB
5236	B		4 / 2 MG / 1 FB	PM	7.4	4.2		B?
5236	B, R		5 / 4 MG / 1 FB?	PM	13.4	8.2		B, BR, W / B, BR, SW
5253	B, R, H		4 / 1 ER MG / 2 ER S / 1 FB?	R	9.7	7.4		B, BR, W?
5254	B, R		5 / 4 LTER MG / 1 MG	PM	18.5	6.7		B, BR, W, OYS / BR; GLZI
5255	B, BS		5 ER MG	PM	17.2	10.4	S?	B, BR; GLZI
5256	B, R		7 / 2 FB / 2 ER MG / 3 MG	M	12	4.6	D	B, BR / W on one edge
5257	BS, B		3-4 / 3 MG S / 1 MG	PM	14.6	7.3		BR, B / BR, W
5258	B, R, H		4 / 1MG S / 1 LTER S / 1 FB	M	14.6	7.7		B, SW / BR, W, B; GLZO; sub-angular break
5259	BS, B		5 / 1 FB / 1 S MG / 3 MG LTER	?	11.6	5.2	S?	B, BR, SW; small eroded angular break
5261	B		4 MG ER	PM	8.8	8.3	S?	B, BR, W, SW
5262	H		5 / 3 ER, MG / 2 MG	M	5.6	3.7		BR
5263	BS		6 / 5 LTER MG / 1 MG	PM	17.5	13.3		B, SW / B, BR, W
5264	B, R		4 / 1 FB / 3 LTER MG	PM	16.4	8.4	S?	B, BR; GLZI

5265	BS, B		7 / 5 LTER MG / 1 FB	PM	14.2	5.4	S?	BR, B, W; GLZB; eroded angular break? 3 fragments - secondary damage?
5266	?		4 MG, ER	PM	6.8	6.4		BR, B; GLZB
5268	B		5 / 4 MG / 1 FB	?	7.4	7.1		BR, B, W / B, BR
5269	B		4 / 2 MG ER S / 2 FB	PM	5.4	1.9		BR, B
5270	B		3 / 2 MG S / 1 FCB	PM	1.9	1.1		BR
5276	B		4 / 3 ER MG / 1 MG	PM	9.2	6.7		B, BR, W
5276	B, BS		UN / 1 FAB ER MG	PM	18.2d	13.1		B, BR, SW, OYS / B, BR, W
5304	B		7 / 3 ER MG / 3 MG / 1 FB	M	18.6	14.6	S?	B, BR, W, SW?; GLZI; 2 chips, 1 angular break?
5305	B, R		6 MG	M	17.1	7.4		BR / B, BR, SW, OYS
5306	B	S	4 MG	PM	9.5	9.1		B, BR, W, SW / BR, W, SW
5307	B, R		4 MG	PM	9.6	9.1	S?	B, BR, SW?
5308	BS, B		5 ER MG	PM	10.6	8.2	S?	B, BR, W; limpet attached
5309	B		4 / 2 MG LTER / 2 FB	PM	12.5	7.2		BR, B / BR, B, W?; GLZI
5310	B	S	5 / 4 MG / 1 FB	?	9.2	7.2		BR, B, W / BR; GLZO
5311	B		4 MG	R?	5.2	7.7		BR, B / BR, B, W
5312	B, R		5 / 4 LER MG / 1 ER MG?	PM	19.1	14	S?	B, BR, W, SW?
5314	B, R	MORT	2 ER	R	11.2	5.2		B
5315	B, R		5 / 3FB? / 2 ER MG	PM	14.2	9.5		B, BR, W, SW; GLZI
5316	B, R	S	5 / 4 MG / 1 S	PM	8.4	7.4	D	B / BR; GLZO
5317	B, BS		7 / 6 MG S LTER / 1 LTER S	PM	10.1	9.6		B, BR, SW / B, BR; GLZI?
5318	BS		4 MG S	PM	14.4	10.6		W, B / W, BR, OYS; GLZB; 1 fresh chip?
5320	BS, B		5 / 4 LTER S / 1 FB	PM	10.1	4.1		B; GLZB
5321	B, R		3 MG	PM	10.7	8.2		B, BR, W; GLZO
5322	B, R		3 MG LTER S	PM	11.2	4.9		B, BR / BR, W
5323	BS, B		4 / S MG / 2 ER MG	PM	8.8	6.5	D	B, BR, W / clean; GLZI
5324	B		4 MG	PM	11.9	8.4		B, BR, W
5326	B, R		4 MG	PM	8.7	4.6		B, BR, SW
5327	B, R		4 S MG?	PM	14.4	8.2		B, BR, W; GLZB

5328	B	S?	4 / 3 MG / 1 FB	?	7.3	6.5		B
5330	B		4 MG	?	6.4	5.9	S?	B, BR, W
5337	B		6 / 1 FB / 1 ER / 4 MG	?	16.6	14.8		B, BR, SW / B, BR, W; two fragments - secondary damage - break is angular
5381	B, R, H	S	7 / 1 FB / 2 S / 4 MG	PM	17.6	13.6		B; GLZO; multiple angular breaks
5382	B, R		5 / 2 MG / 2 S / 2 FB	?	7.6	6.0		B, BR, W / BR, W; GLZB
5383	BS, BR, B		5 MG ER	PM	8.3	6.8		B, BR, S, SW
5384	B		3 MG	PM	14.2	14.2		B, BR, W, OYS; GLZI
5385	B,		4 LTER MG	PM	14.6	11.4	S?	B, BR, W; GLZI
5386	BS		6 MG	PM	9.4	2.2		B, BR, W, SW
5387	B, R		4 / 2 MG / 1 LTER / 1 Clean	M	7.8	6.1		BR, W / B, BR, SW
5388	BS, B		5 / 3 MG / 2 S?	PM	9.2	2.9		B, BR, SW / B, BR, W
5389	B		4 LTER MG	PM	9.4	7.2	S?	B, BR, SW; GLZO?
5390	B, R		3 MG	PM	12	11.6		B, BR, W, SW
5391	B, R		5 / 3 MG / 2 FB	PM	8.1	5.1		B / B, BR, W; GLZB
5392	B		4 MG	PM	8.2	5.2		B, BR, W
5393	B, R		3 ER MG	PM	6.3	6.1		B, W
5394	B		5 MG	?	8.5	5.1		B, BR, W
5395	BS, B, R		4 LTER MG	?	7.2	5.5		B, BR, SW / B, BR
5396	H		2 MG	PM	6.8	3.4		B, BR, W
5397	BS, B		6 / 2 ER MG / 1 ER 3 MG	?	10.1	5.2		B, BR / B, BR, W
5398	BS, B		3 MG	PM	40.6	11.6	D?	B, W / B, BR, SW
5399		TILE	4 MG	?	12.2	6.6		B, BR, W
5400	B		4 / 3 MG / 1 ER MG	PM	13.2	8.6	D	B, SW / clean; GLZO
5401	BS, B		5 / 4MG / 1 S?	PM	11.6	5.1	S?	B, BR, SW?; GLZO
5402	BS, B		3 MG	?	8.5	5.1	S	B, BR, W
5403	BS, B, R		3 MG LTER	PM	16.6	9.4	D	B, SW / BR, W; GLZI
5404	B		6 / 4 LTER / 1 ER S/ 1 FB	PM	11.2	10	S?	B, SW / B, BR, W; GLZB
5405	BS, B	S?	4 MG	PM	9.1	7.4	S?	B, BR, W, SW?
5406	B		5 MG	?	10.4	10.2	S?	B, BR, W

Appendix 6 **Table 2**

5407	B	AM?	5 MG	R	20.1	13.2		B, BR, SW / B, BR, SW

TABLE 3 Southampton Water Assemblage

No.	FORM	FAB	COMMENT	DATE	X	Y	SURF	MARINE GROWTH
1	BS, R	S	5 / 4 MG ER / 1 FB	PM	15.2	9.1		B, BR / BR, W
2	B,H	S	5 / 3 ER MG / 1 LTER MG	M/PM	10.7	8.7	D	B, W / BR, W
3	BS	S	3 MG	M/PM	9.2	7.7		B, W / W, BR; fresh chip on base
4	B, R ,H		5 / 4 ER MG / 1 S	M	9.4	7.7		BR, W, B
5	B, R		3 ER MG	M/PM	17.4	9.3		W, BR: fresh chip on base
6	B		4 / 2 ER S / 2 FCB	M/PM	9.1	8.2		W, BR; OYS ; angular break, impact fracture on base?
7	B, R, H	S	5 / 2 MG / 2 S	PM	12.2	9.7		W, BR
8	B	S	5 / 3 S/ 2 ER	PM	9.4	6.9	D	B / W, BR OYS .
9	B, H, R	S	5 / 2 MG / 2 ER S / 1 ER MG	M/PM	7.8	5.7		B, W, BR / W; eroded and lightly stained angular break
10	B, R		4 / 2 MG ER / 2 MG S	M/PM	10.5	5.3	D	W, BR / B
11	B, R	S	4 / 3 S / 1 MG	PM	8.7	5.1		W, BR
12	H	S	3 / 1 MG / 2 ER MG	PM	7.1	6.5	D	W, BR / B
13	B, R	S	3 MG S	PM	12.4	7.9	D	BR / B
14	BS, B, R	S	3 / 2 MG / 1 MG S	M/PM	12.4	6.2		W / W, BR; OYS
15	B, R	S	3 ER	M/PM	12.4	6.2		W
16	B, R	S	3 MG S	PM	10.7	4.7	D	W / B
17	B, R	S	4 MG S	M/PM	12.4	6.8		B/ W, BR, B
18	B, R	S	3 / 2 S / 1 MG	M/PM	13.2	10.2		B / W, B, BR
19	B, R		4 / 3 MG / 1 S	M	10.4	7.6	D	B / W, BR
20	B		5 / 3 MG S / 1 S / 1 FCB	M/PM	14.7	14.2		W on one edge, B
21	H	S	4 / 1 ER / 3 MG	M/PM	9.2	7.5	D	W / B

22	B	S	3 MG	M/PM	12.1	6.2		W / W ,B; OYS
23	B	S	5 / 3 MG / 2 ER	M/PM	10.1	6.3	D	W / BR
24	B	S	5 / 4 ER S / 1 S	M/PM	6	5.2		B
25	H	S	2 / 1 FCB / 1 S	M/PM	8	5		W, BR
26	H		2 MG S	PM	9.5	4.2		W, BR
27	B	S	5 / 1 ER / 4 S	M/PM	8.9	5.6		- / W ; fresh angular break
28	B	S	5 / 3 MG / 1 ER / 1 S	M/PM	11.2	6.7		W, BR
29	B, R	S	3 / 1 MG 2 / 2 ER / 1 ER MG	M/PM	9.2	3.7		B; eroded angular break
30	B, R	S	5 / 3 MG / 1 ER / 1 S	M/PM	12.5	11.6		W, B / W, BR
31	B, H	S	4 / 2 ER S / 2 MG	M/PM	8.3	7.8	D	B / W
32	B	S	4 / 1 MG / 2 S / 1 FB S	PM	5.7	4.3		BR, W / W
33	H		5 ER S	M	13.7	5.1		No marine growth
34	BS, B	S	5 / 3 MG / 1 ER MG / 1 S	M/PM	16.7	12.2		W / W, B
35	B	S	4 / 3 S / 1 S ER	M/PM	12.6	7.2		B
36	H	S	2 ER S	M/PM	11.2	4.5	D	B, W
37	BS, B	S	4 / 3 S / 1 ER	PM	10.1	9.2		No marine growth; angular break
38	BS, B	S	6 / 4 MG / 2 MG ER	PM	14.2	9.6		B, R
39	BS, B	S	4 / 3 MG / 1 ER S	PM	12.7	8.7		W ; OYS
40	BS	S	6 / 4 ER MG / 1 S / 1 ER	PM	8.2d	2	D	B / W, BR; 7
41	BS, B, R	S	2 / 1 MG S / 1 FB	M/PM	4.5	3.2	D	B / BR
42	H	S	2 S	M/PM	8.9	3		No marine growth
43	B	S	5 / 4 MG / 1 S	PM	7.9	6.2		B, BR, W
44	B	S	5 / 5 MG / 1 ER	PM	10.2	6.2		W, BR; eroded angular break
45	B		5 MG	M/PM	8.4	7.8		W, BR
46	B	S	4 / 1 S / 3 MG	PM	10.5	7.9		W, BR
47	B	S	4 / 3 MG / 1 S	PM	9.7	7.2	D	W, B / BR
48	B, R	S	4 MG	PM	10.1	9.3		W, BR
49	B	S	6 / 5 MG / 1 S	M/PM	8.2	7.5		W, BR / B, BR
50	BS, B, R		3 / 1 MG / 2 S	PM	18.6	7.2		W, BR, B
51	B, R	S	4 / 3 MG / 1 FB S	M/PM	13.1	9.7		W

52	B	S	4 / 2 MG / 1 ER / 1 S	M/PM	9.7	8.5		W, BR
53	B	S	4 / 3 MG / 1 S	PM	10.1	5.2	D	B / W
54	H	S	4 / 3 MG / 1 S	M/PM	9.7	4.7	D	W / B
55	B, R		4 ER	PM	7.9	5.2		No marine growth; eroded angular break
56	R		4 / 3 ER / 1 FB	PM	15.2	4.7		W, BR; OYS
57	B, R		3 / 2 ER / 1 S	PM	7.3	6.9		W, B
58	B, R	S	4 / 3 MG / 1 S	M/PM	10.6	5.1		W, B / B
59	H	S	2 ER	M/PM	10.3	5.7		BR, W
60	B	S	4 / 3 MG / 1 S	PM	7.2	6.6		W, B / W
61	B	S	3 MG	PM	8.1	4.3		O, B, BR
62	B, R		4 S	M/PM	7.9	4.8		W, BR
63	R		3 / 2 MG / 1 S	M/PM	9.2	2.6		W, BR
64	B		4 / 3 MG / 1 S	PM	12.5	5.7		W
65	B		4 1 MG / 3 S	PM	9.8	4.4		BR, W
66	B		5 / 4 ER / 1 MG	PM	5.9	5.3	D	B / W
67	B	S	4 / 2 S / 1 LTER / 1 ER	M/PM	7.7	7.2		BR, W
68	B		5 / 2 MG / 3 S	PM	8.1	5.2	D	B / BR, W
69	B	S	5 / 1 MG / 3 S / 1 FB	M/PM	8.2	4.5	D	B / BR, W
70	B	S	5 / 2 ER / 1 MG / 2 S	M/PM	6.5	5.5		B
71	B	S	4 / 2 MG / 1 S / 1 FB	M/PM	4.9	3.5		B
72	BS, B		5 / 3 ER / 2 S	PM	6.6	4.1		BR
73	Tile		5 / 4 S / 1 LTER	PM	13	12.2		No marine growth
74	BS, B,R		3 / 1 LTER S / 2 FB	PM	11.5	8.9		No marine growth
75	BS, B	S	4 / 3 ER S / 1 S	M/PM	5	3.4		No marine growth
76	B	S	5 / 4 ER S / 1 S	M/PM	8.9	7.5		No marine growth
77	B		4 / 3 MG / 1 S	PM	7.5	6.2		BR, W
78	B,R		4 / 2 ER / 2 S	PM	10	7.2		No marine growth
79	B,R,H		4 / 2 MG, S / 1 ER / 1 S	PM	13	4.7	D	BR / B
80	B,R		4 / 3 MG / 1 FB	PM	18.9	10.11		B, BR / soft marine growth; angular break

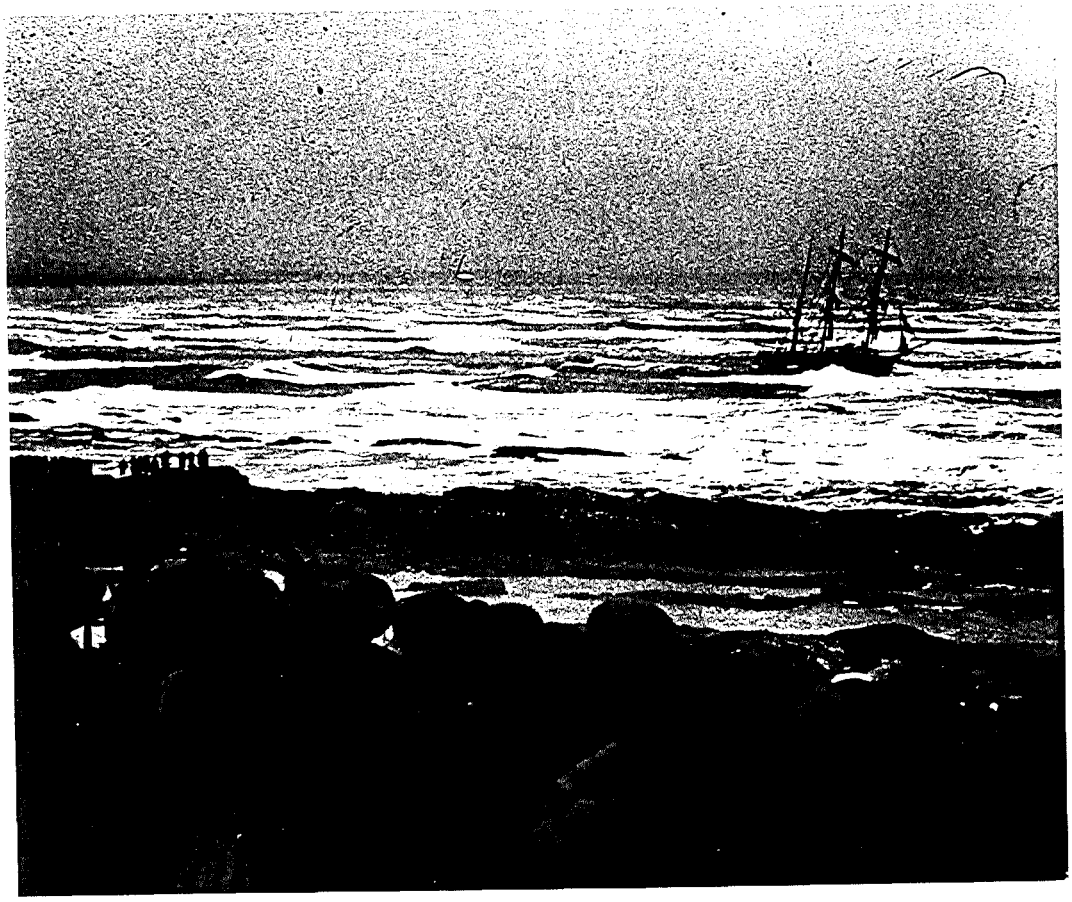
TABLE 4 Yarmouth Roads Assemblage

No.	FORM	FAB	COMMENT	DATE	X	Y	SURF	MARINE GROWTH
5001	B	AM	5 4 MG / 1 MR ER	R	19.1	13.2		W, B, S; eroded angular break
5002	BS, B	SAM	BT ER MG	R	9.4	3		B? / BR, W, B
5003	B, R		5 / 4 MG / 1 FB	M	8.7	5.2		B, BR / B
5004	B		6 MG	PM	18.11	12.4		B / B, BR, W
5005	BS, R		6 / 5 MG / 1 FB	PM	16.7	4.9		B, BR? / BR, W, B
5006	B, R		4 MG / 1 ER?	PM	13.6	6.6		B?, BR?
5007	B, R		4 MG	PM	21.1	15.7		SW, W, BR, B / BR, B
5008	B		4 MG	PM	10.1	5.5	S?	W, BR / W, BR, B
5009	B, R		5 / 4 MG / 1 FB	PM	9.9	6.8		BR, B, W
5010		TILE	4 MG	PM	10.6	9.1		SW, B / BR, B
5011	BS, B		BT MG ER	PM	22.2	5.5	S?	SW, W, B, BR
5020	B		4 / 3 MG / 1 ER MG	?	11.6	10.4		B, BR
5024	B	AM	5 ER	R	21.1	10.1		BR, B; Dressel 20

5025	B, R		3 LTER MG	M	13.1	10.7		W, BR, B
5026	BS, B		4 MG ER	M	12.2	5.8		BR, B, SW / BR, W, B
5027	B	AM	6 MG	R	26.5	16.5	D?	BR, B / BR, W; Dressel 20
5028		TEG	4 ER MG	R	18.2	16.7		W / W, BR, B
5029	H		2 MG LTER	M	6.9	2.1		B
5031	B		5 / 4 MG / 1 FB	?	12	9.3	S?	B, W; OYS
5033		TEG?	4 LTER MG	R?	11	10.5		BR, W, B
5034	B, R		3 MG	?	13	8.9		B, BR, W
5038	B, R		3 / 2 MG / 1 ER MG	R	13.2	9.9		BR, B
5041	B, R	MORT?	3 LTER	R?	20.6	7.9	S?	BR, SW
5047	R		BT MG	PM	4.7	3.4	S?	B, BR, W
5053	H	AM	2 / 1 LTER / 1 MG	R	12.6	4.1	D?	B, W, SW / -
5057		TEG	5 / 4 MG / 1 FCB	R	20.6	16.4		W, B / W, BR; angular break
5058	B		4 / 2 MG / 2 FB?	?	4.3	3.7		B, BR
5060	B	AM	5 MG	R	24.6	17.4		SW, BR, B / BR, B? ; Dressel 20
5061	B		4 ER MG	M	5.9	3.7		B / W, B
5068	B, R	AM	5 MG	R	11.3	5.9		B, BR, W
5071		TEG	5 / 4 MG ER / 1 FB?	R	12.6	9.6		B, BR
5072		TEG	5 MG	R	17.3	10.7		B, BR, W
5074		TEG	6 MG	R	31.2	17.1		B, BR

5075	B, R	MORT	3 MG S	R	8.2	5.5	D?	B, BR/ SW
5079		TEG	5? / 2 MG / 2 LTER MG	R	9.9	8.4		B / B, BR
5080	BS, B		6 / 4 MG / 2 MG LTER	PM	16.7	14.5		B, BR
5081		TILE	5 MG	PM	13.1	11.9		B, W, BR
5082		TILE?	6 MG	?	6.9	5.9	D	B, BR / R?
5094		TEG?	3 MG	R?	9.7	8.1		B, BR
5103		TEG	3 LTER MG	R	13.4	6.6		B, BR
5107	H	AM	2 ER MG	R	10.1	3.9	S?	SW, W, B
5109		TEG	3 MG	R	11.6	8.2	S?	B, BR, W
5110	B, R	TILE	4 / 3 MG / 1 ER MG	PM	11.4	9.2		BR, B, / BR, B, SW?
5111	B	AM	5 / 4 MG / 1 MG LTER	R?	22.3	15.6		B, BR, SW / BR, SW
5113	B, H	AM	5 MG	R	10.6	6.6		B, BR, W
5116		TEG?	5 MG	R?	13.2	11.4		B, BR / B, E, W
5118	B, R		3 ER MG	M	10.1	4.3		BR, B, W / BR, B?
5119	B	TILE?	3 MG	PM?	6.1	3.4		W?
5120		TEG?	4 MG	R?	9.2	7.9		B, W / SW, B; angular greak

List of Figures



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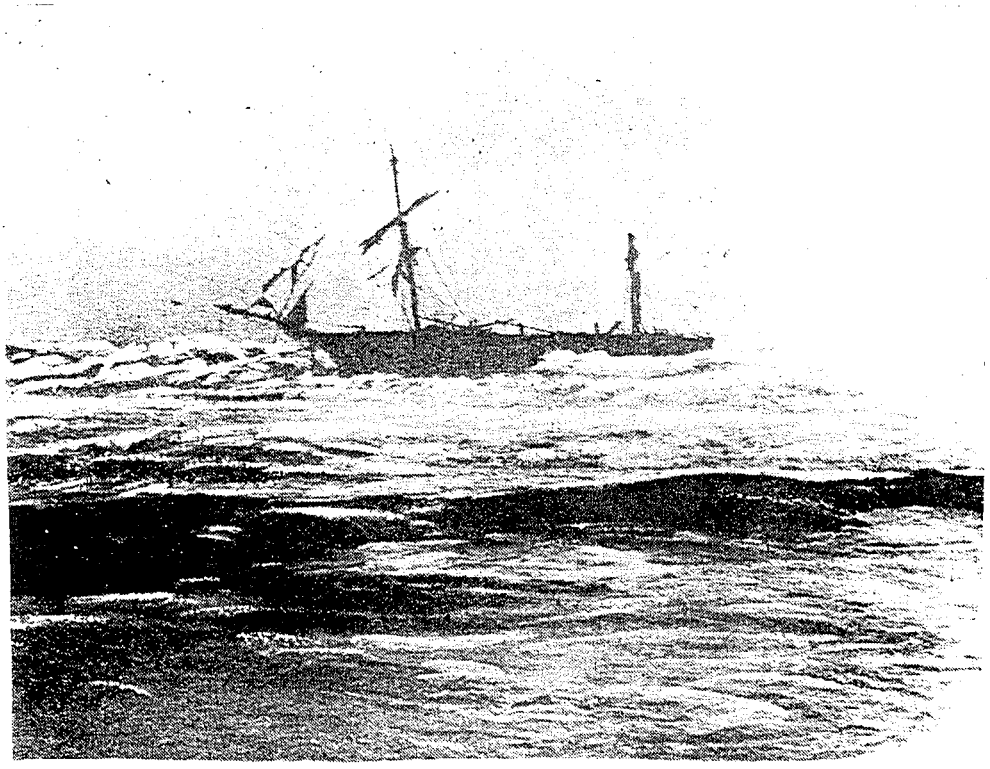

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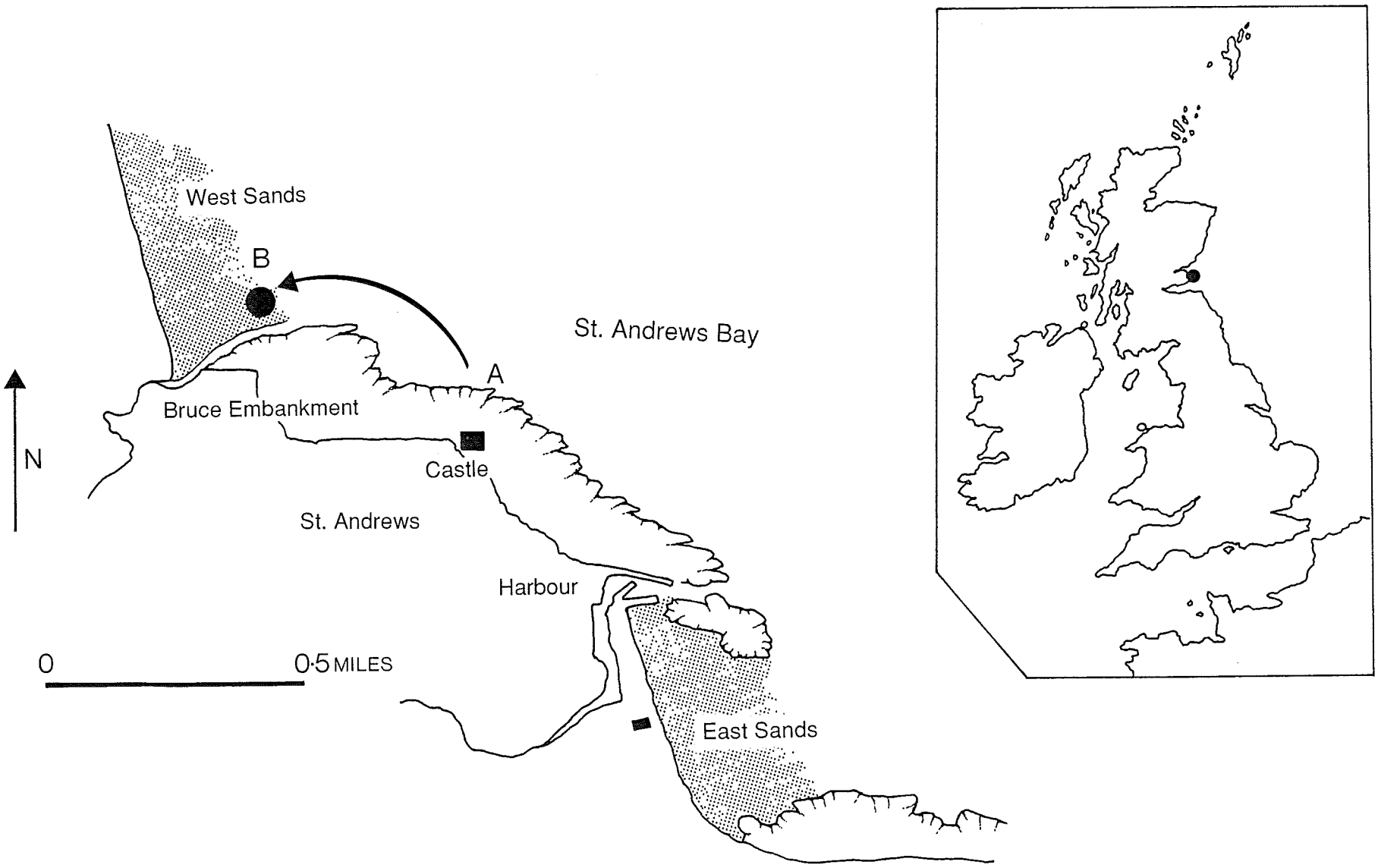
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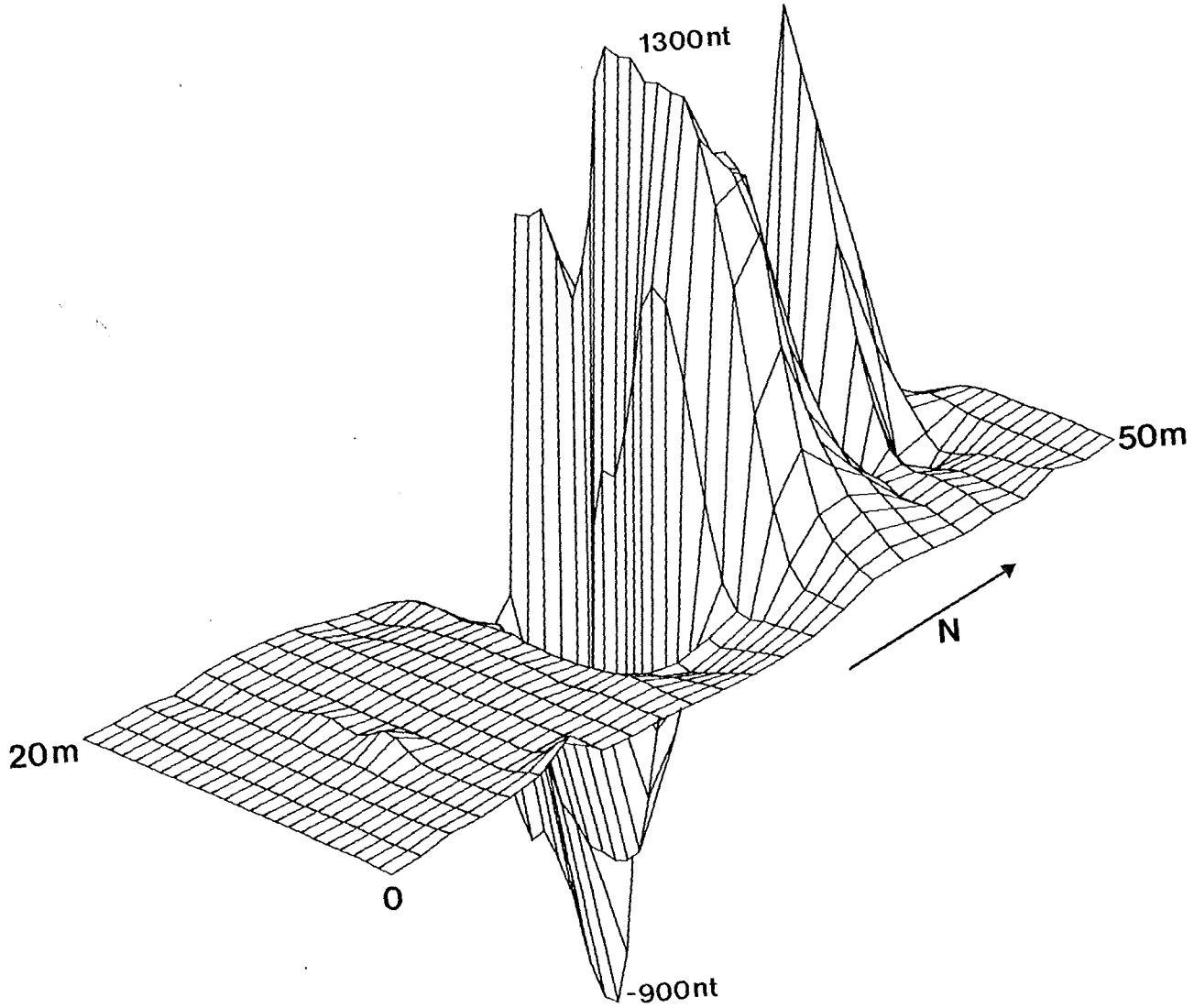
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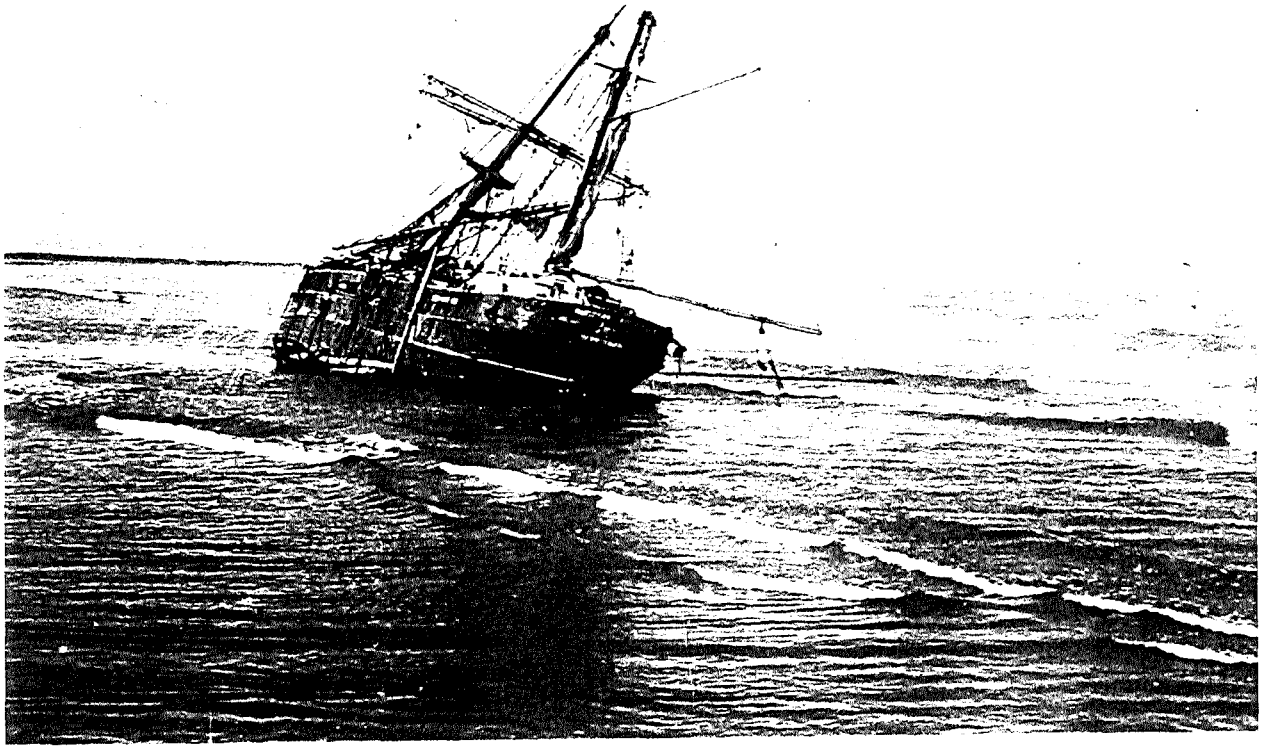

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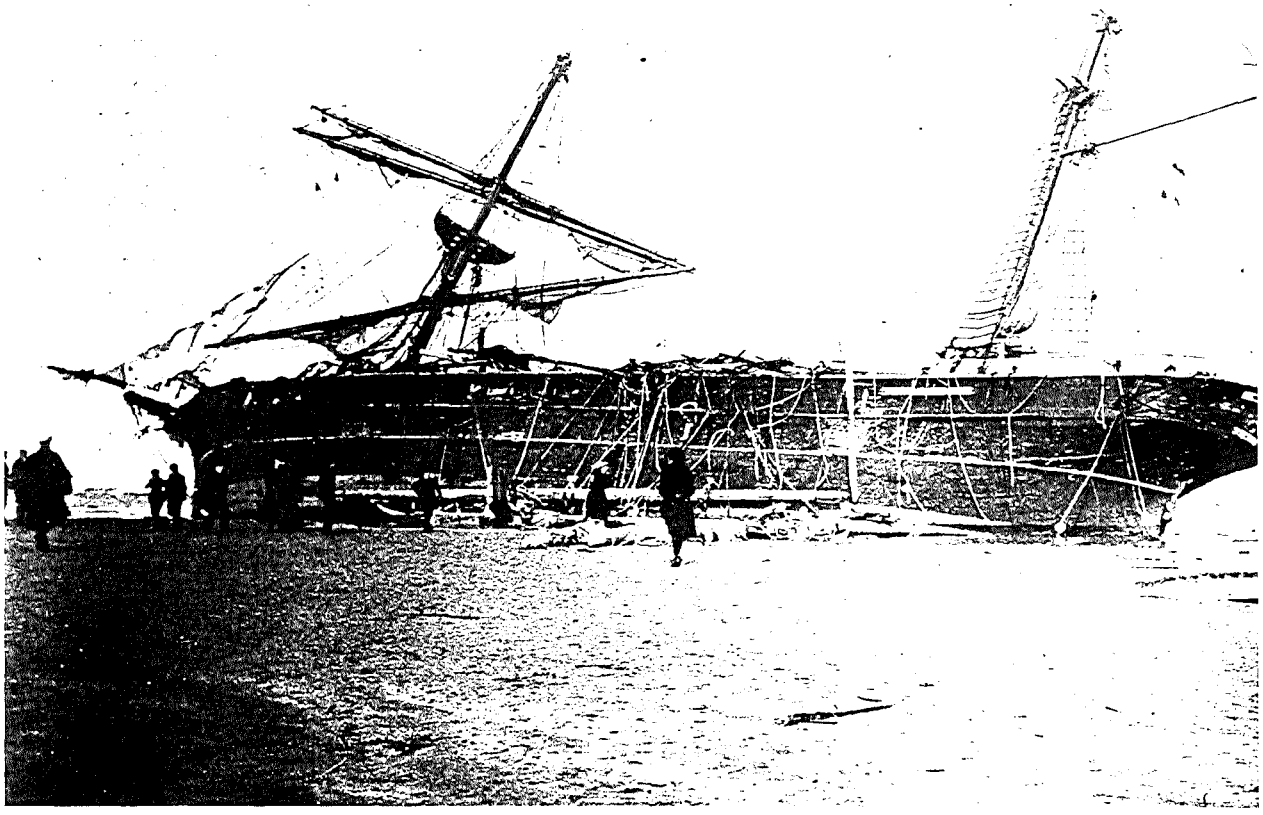

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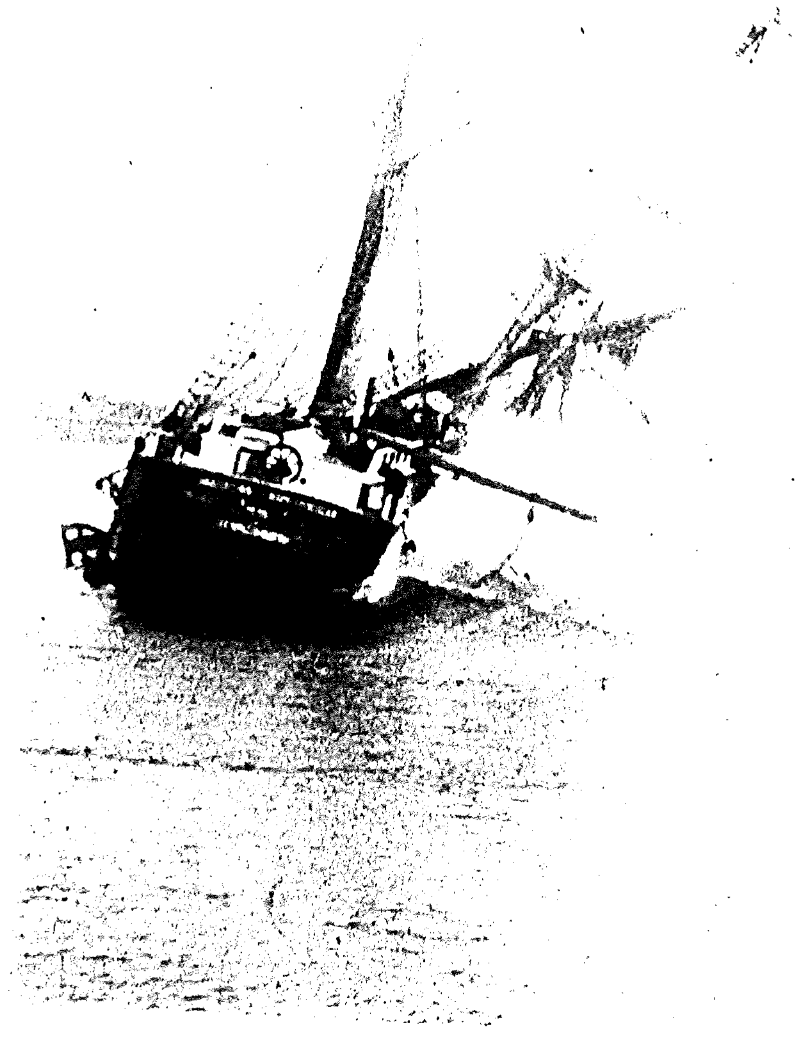

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9

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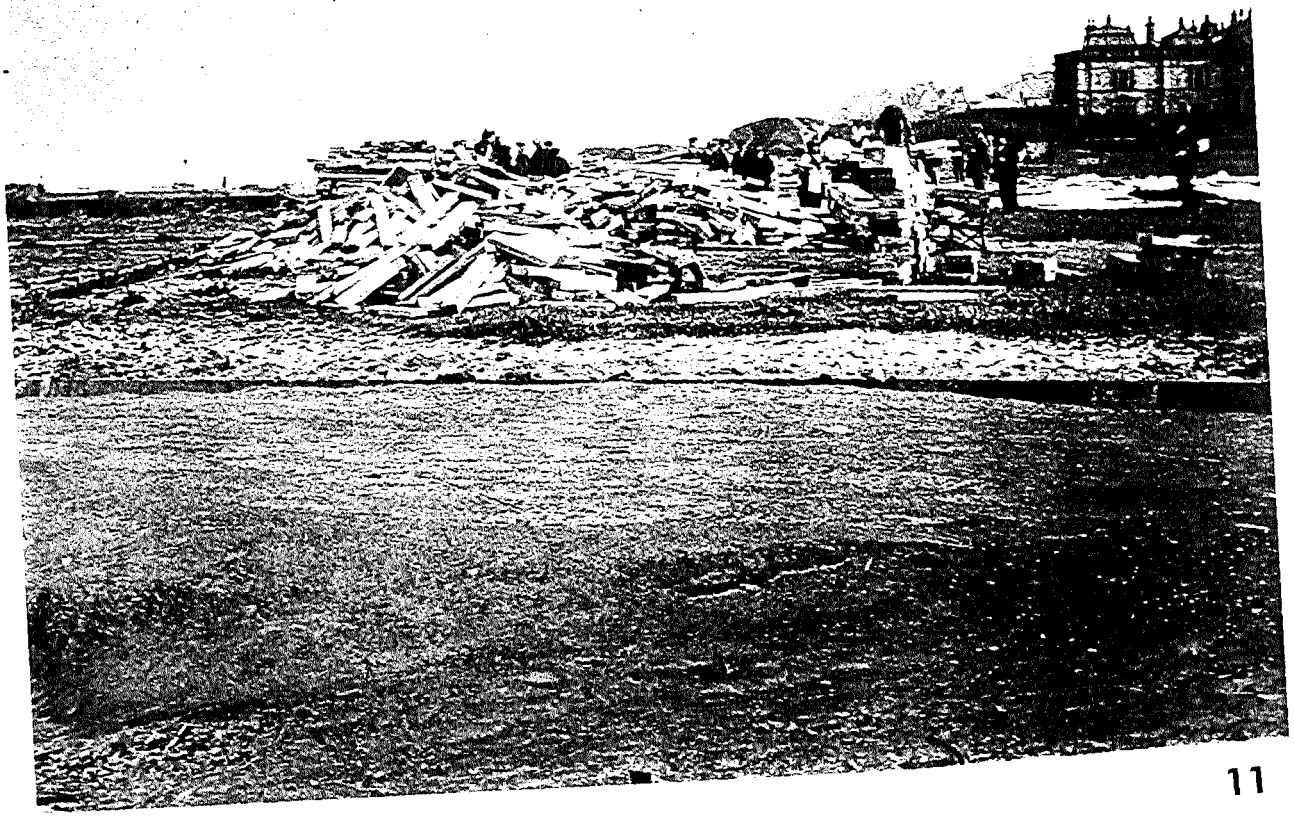

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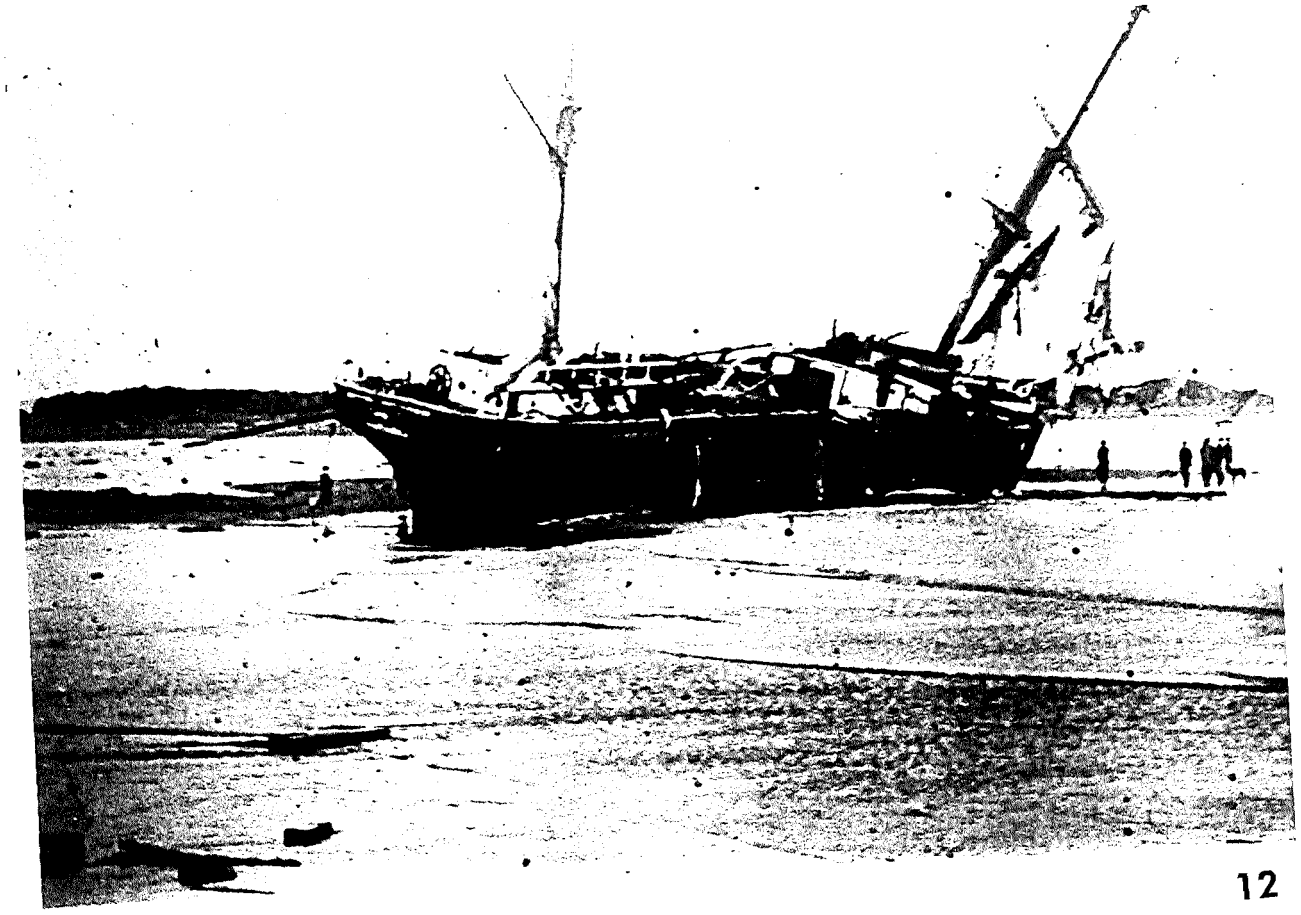

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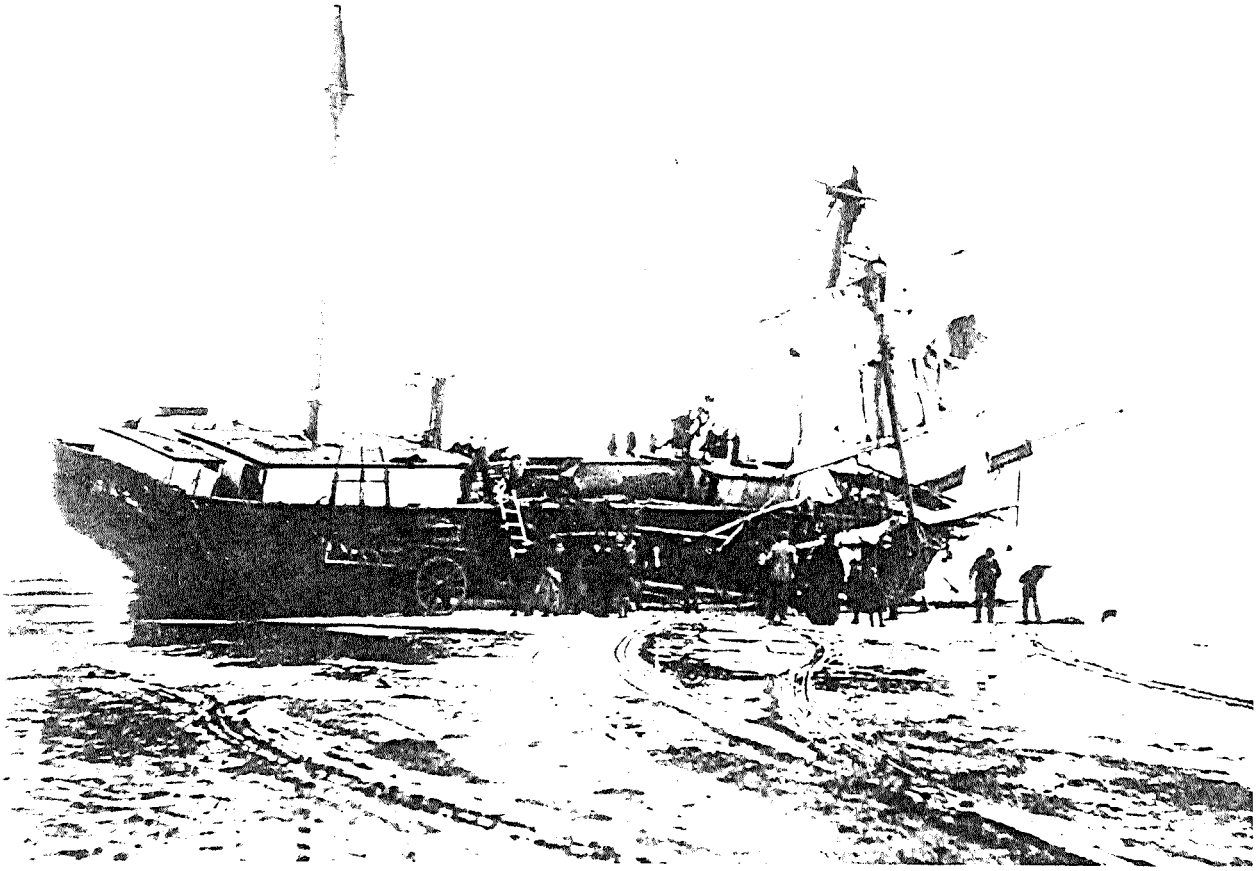

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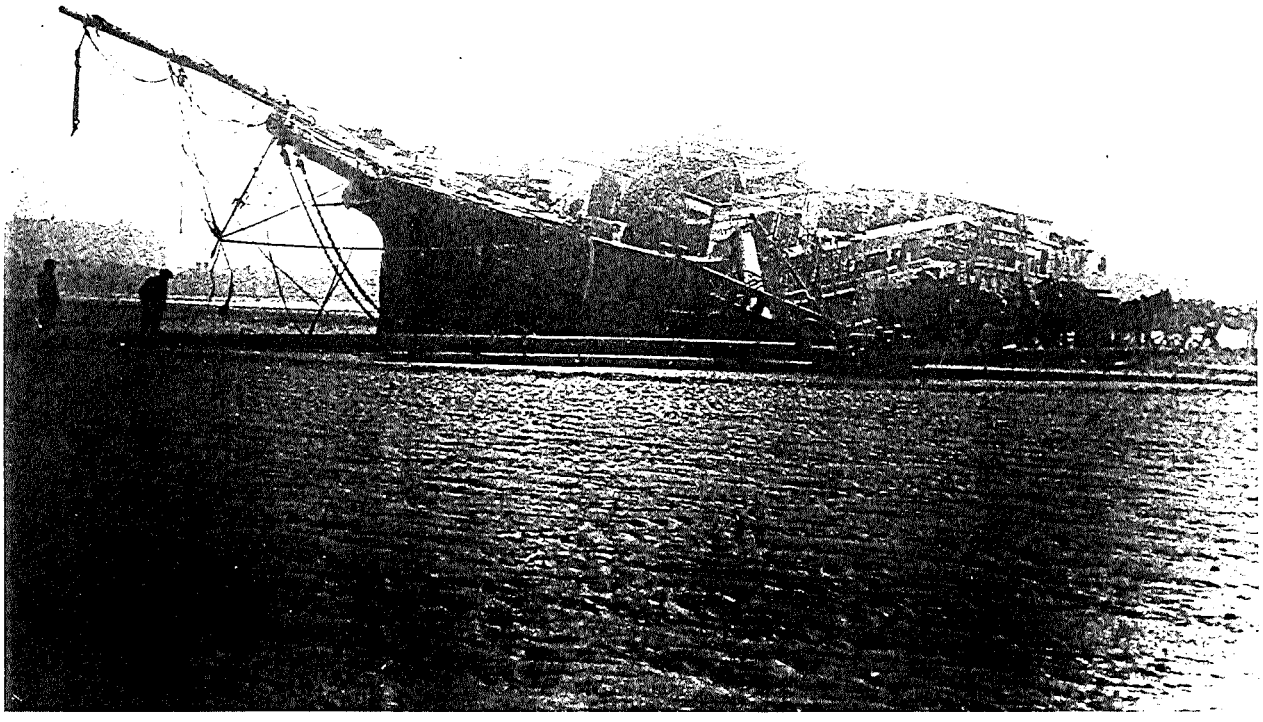

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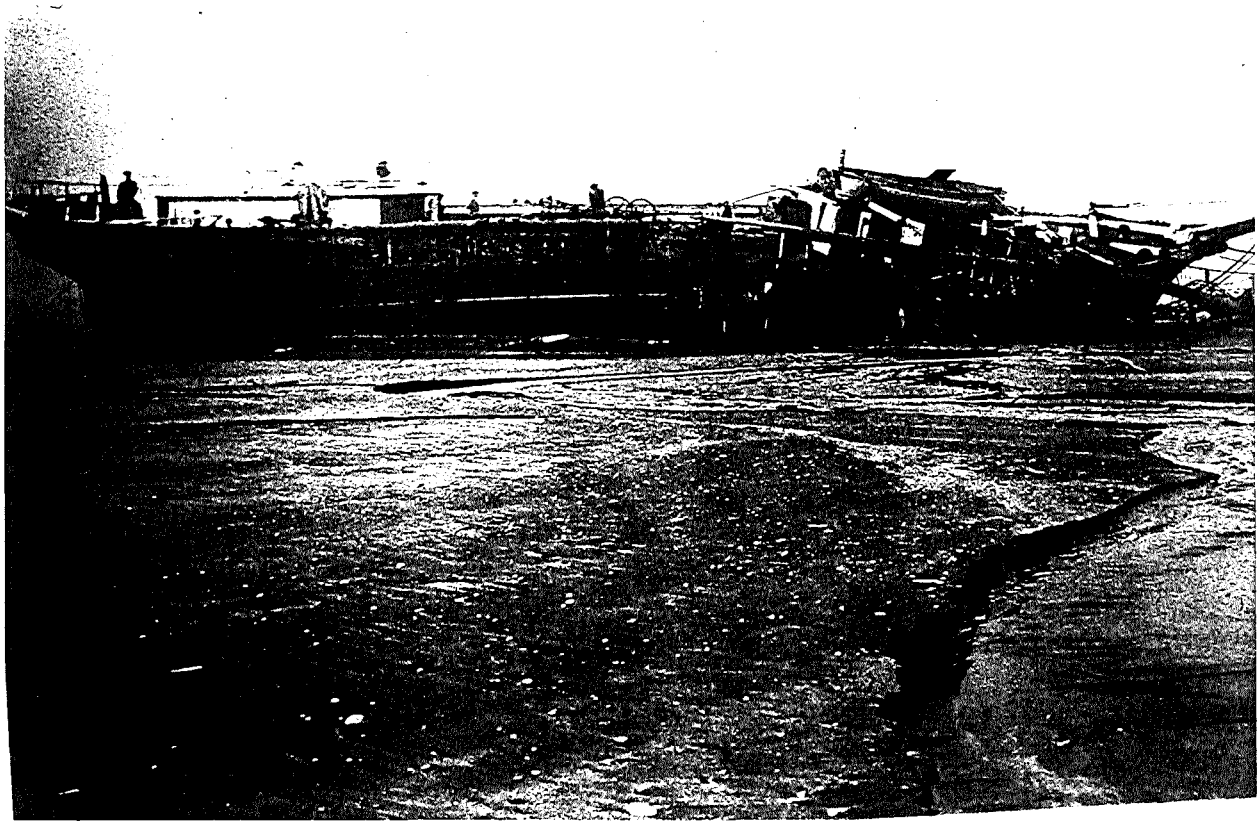

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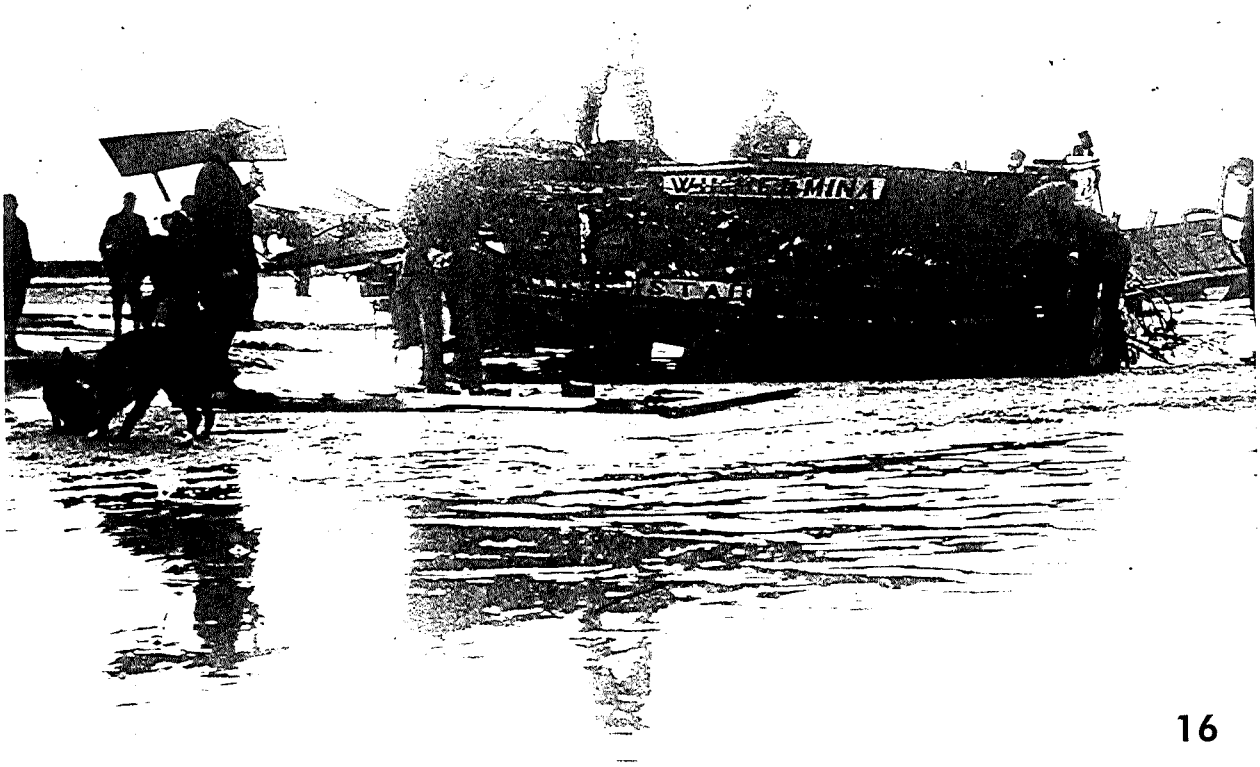

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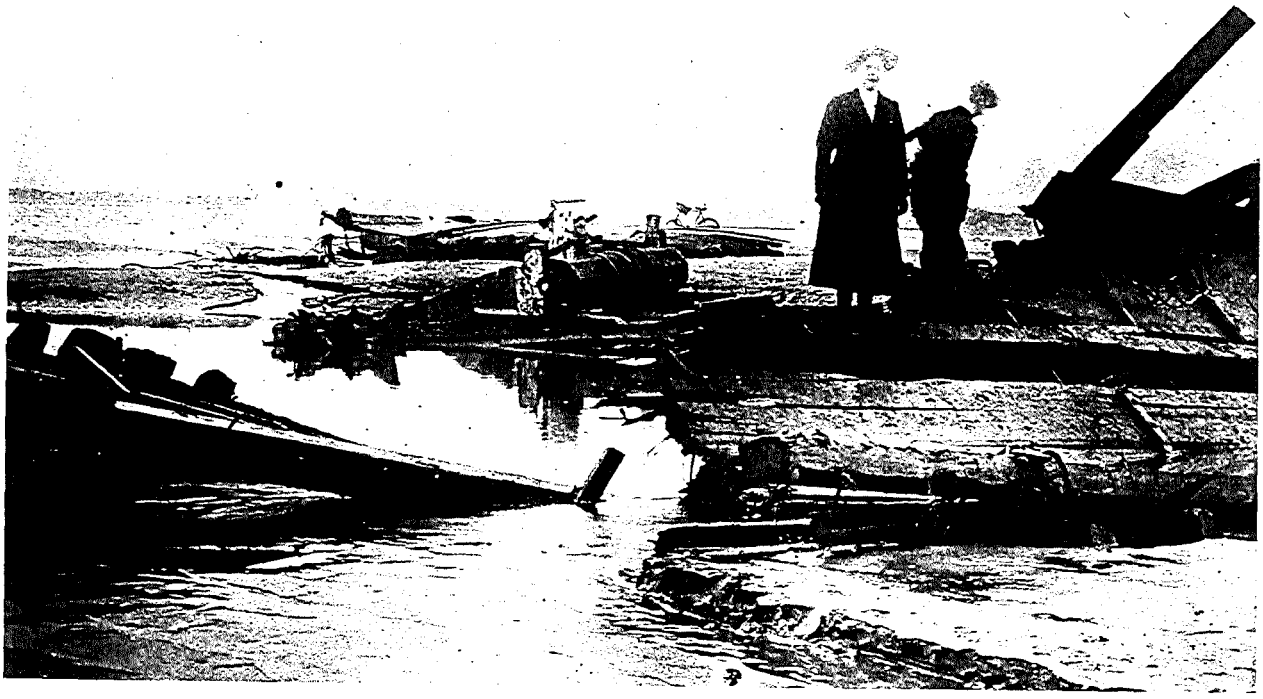

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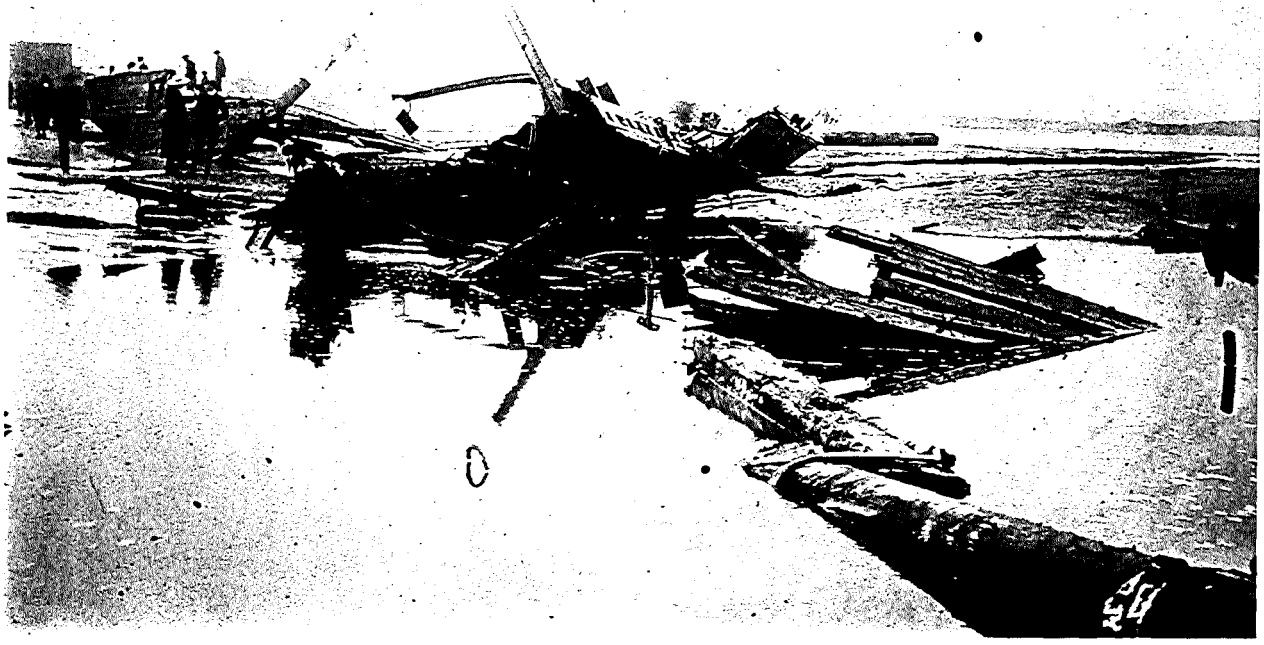
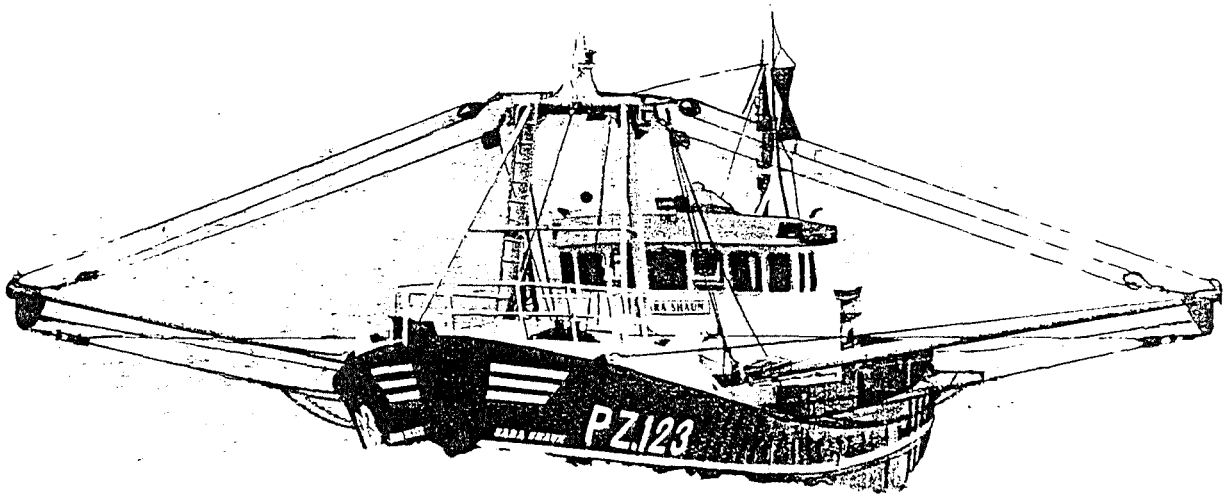
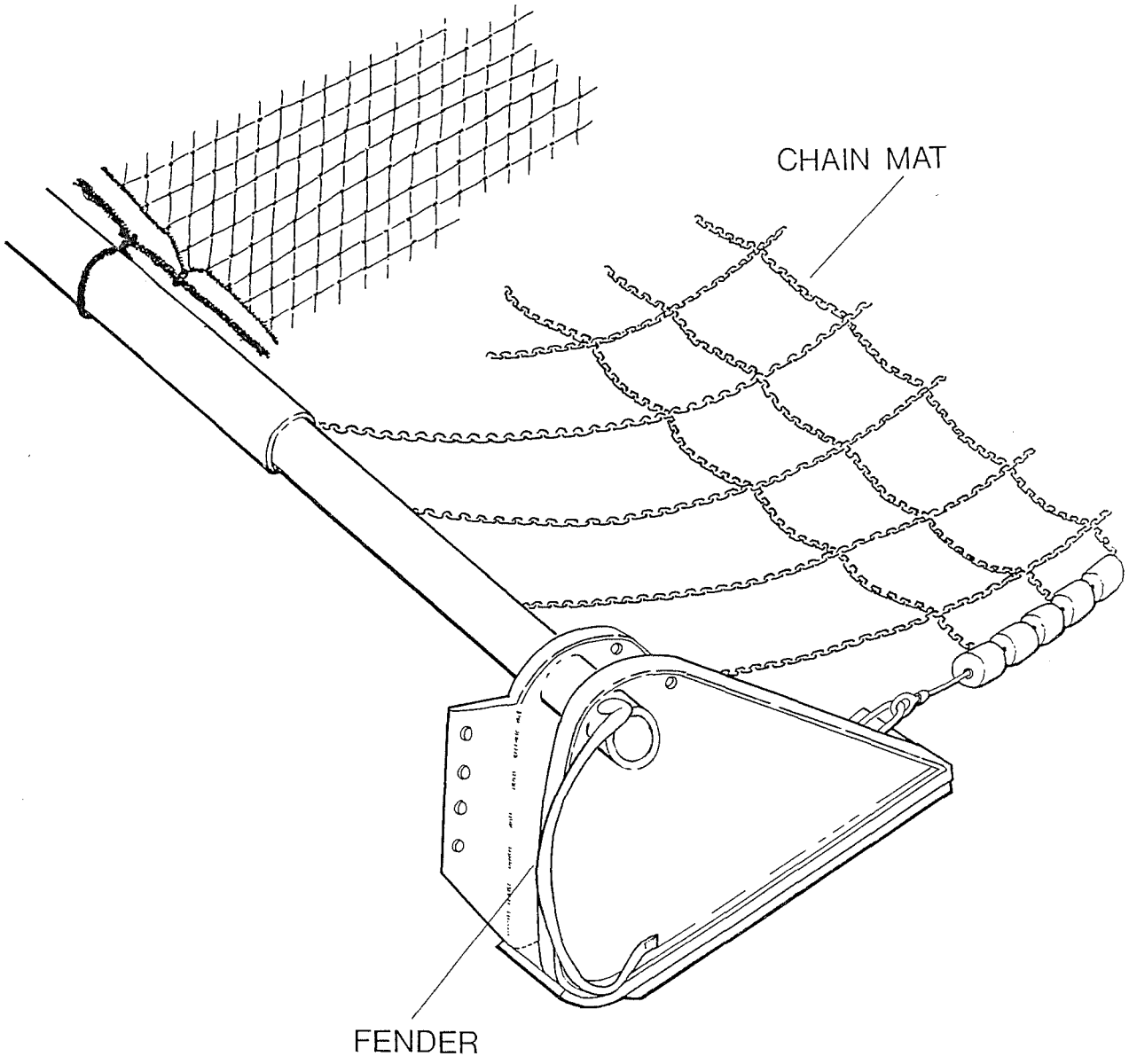
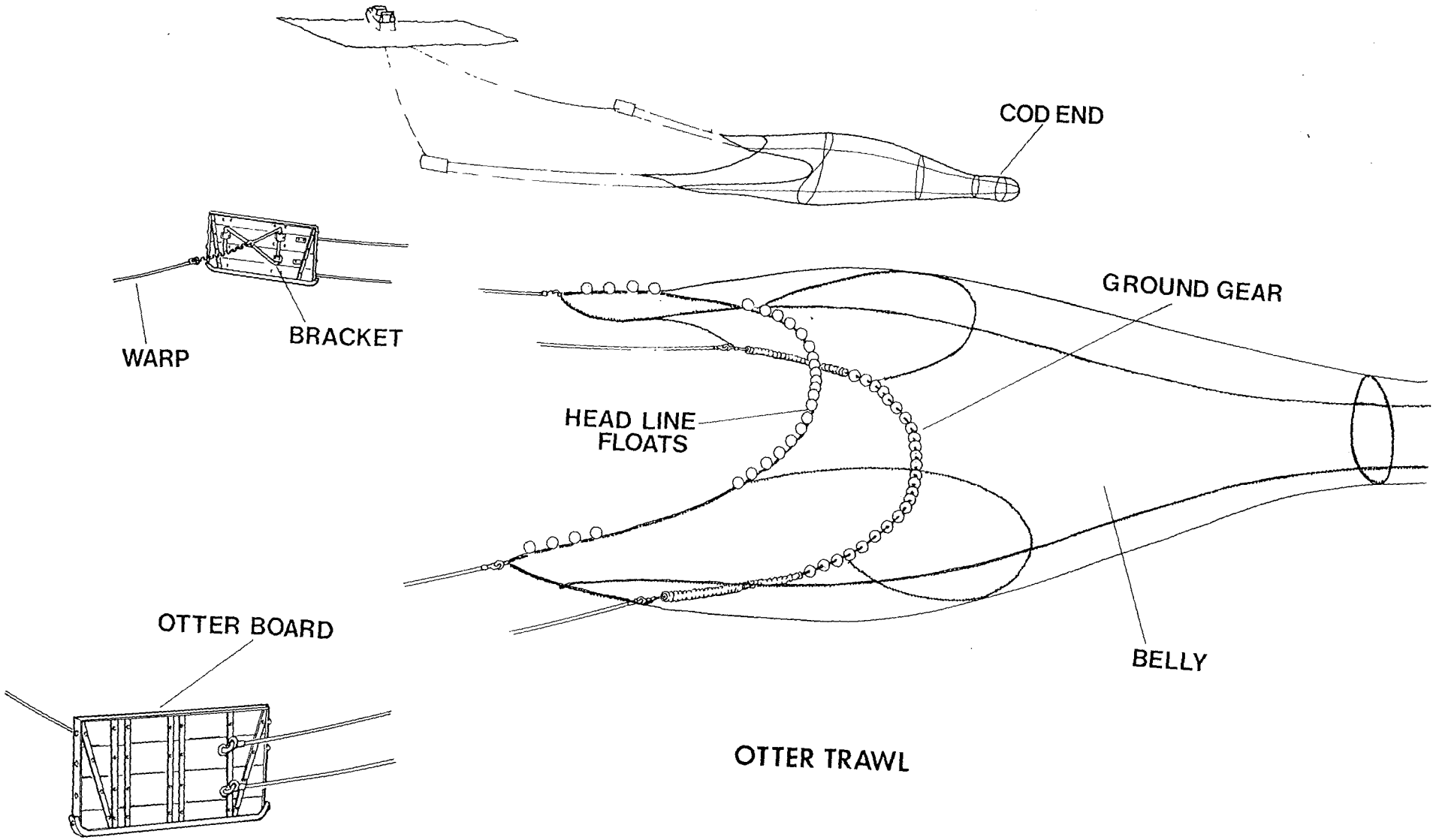


18

MODERN BEAM TRAWL

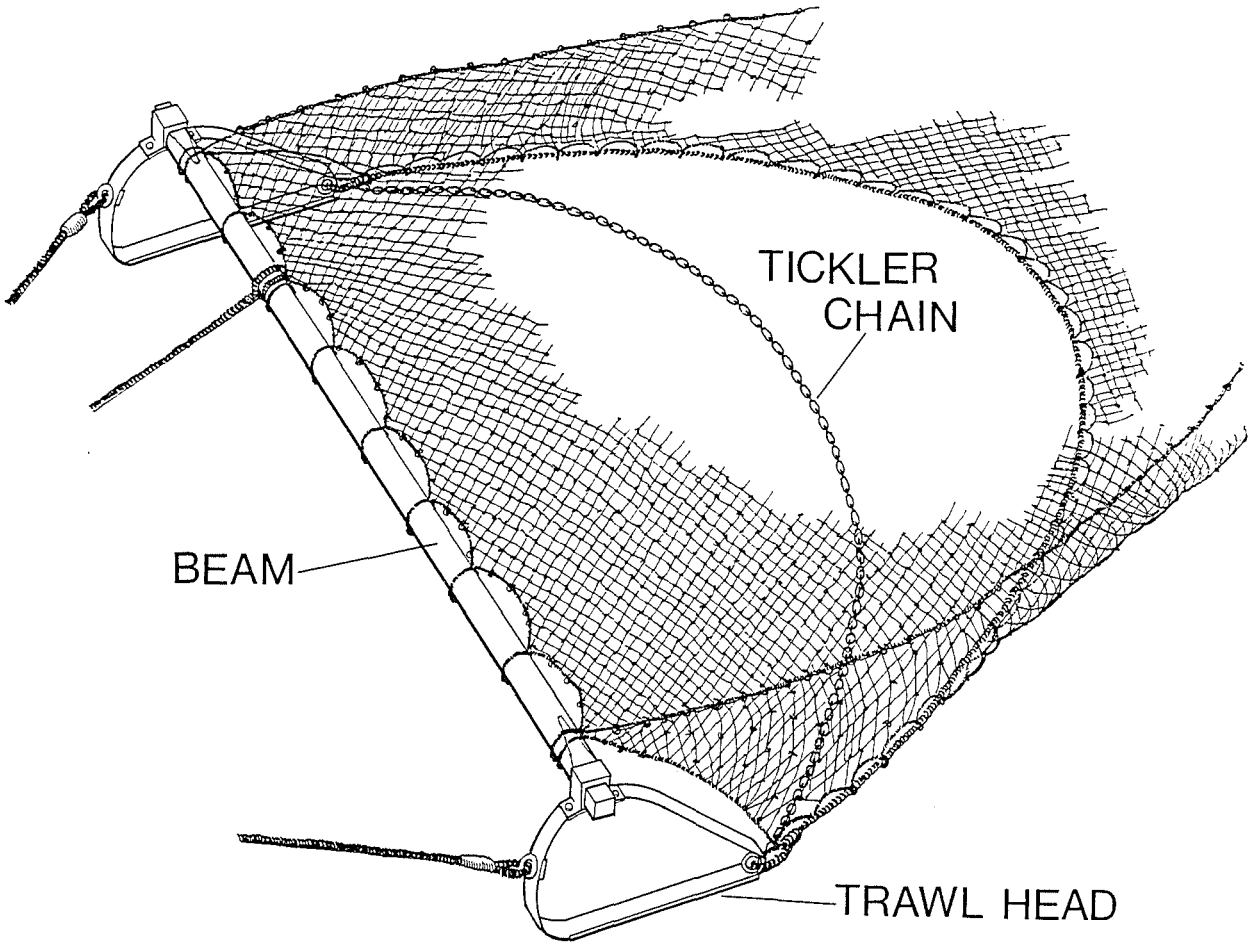





COD END
WARP
BRACKET
GROUND GEAR
HEAD LINE
FLOATS
OTTER BOARD
BELLY

OTTER TRAWL

BEAM TRAWL



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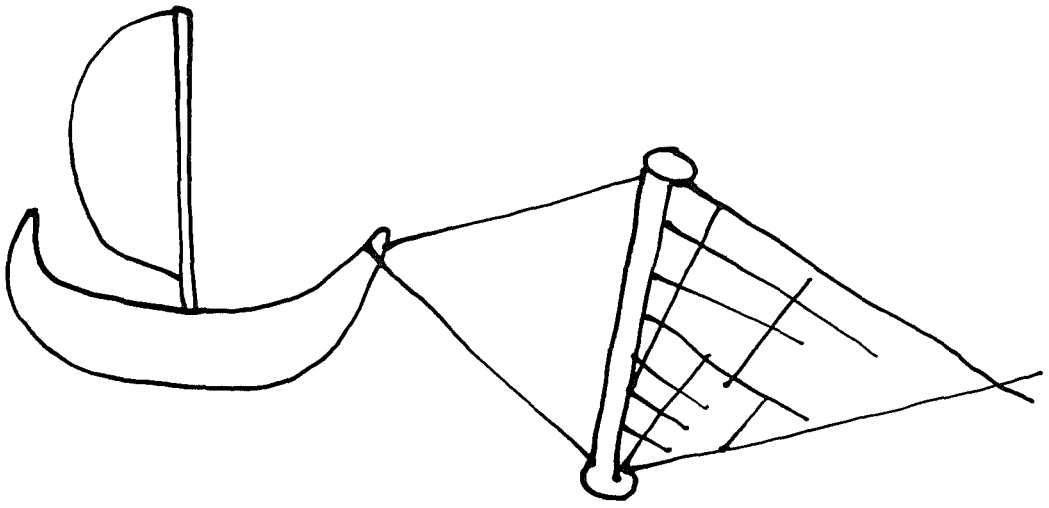
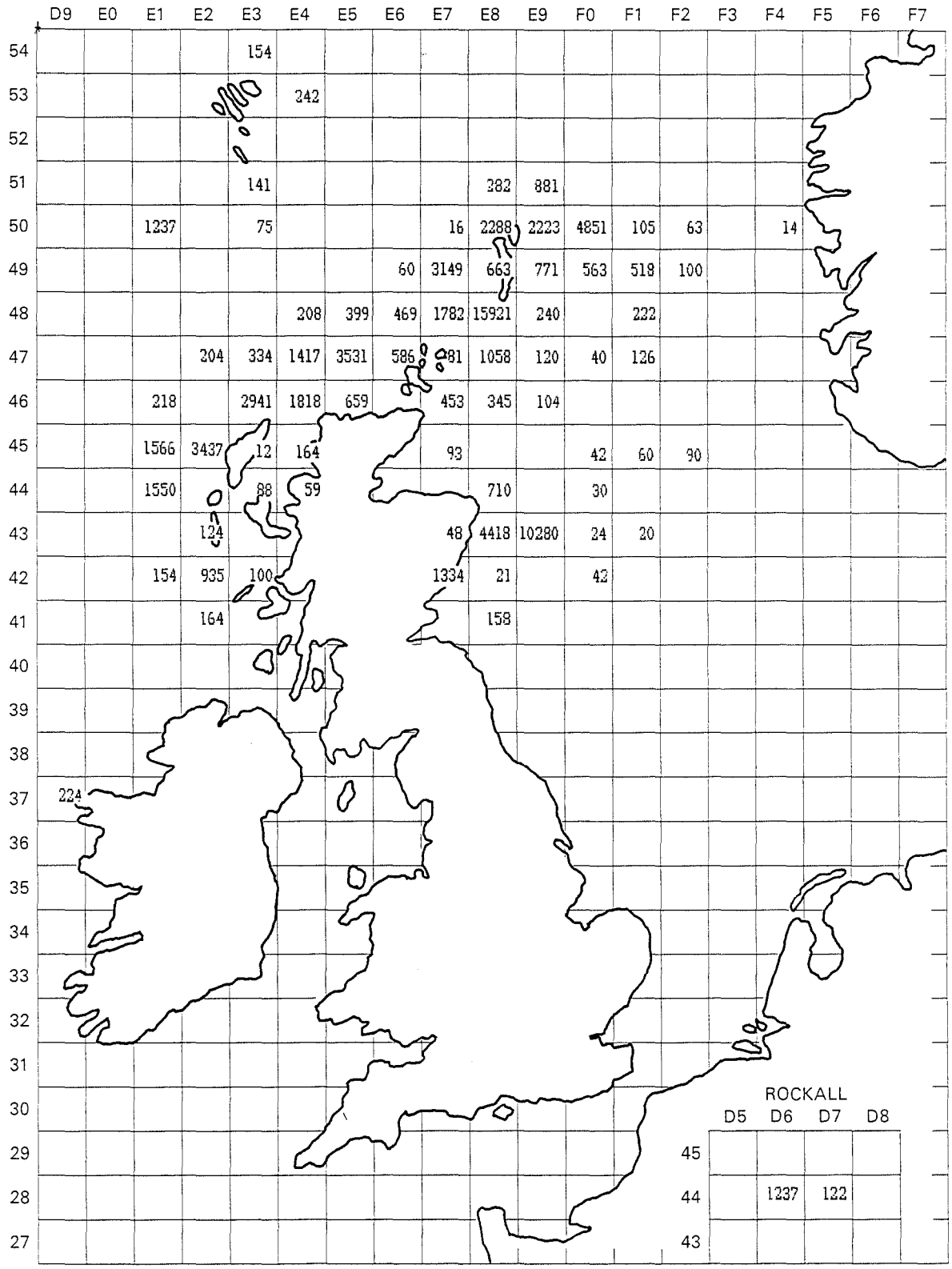


SKETCH OF POSSIBLE
BEAM TRAWL, 1635

22

United Kingdom Vessels Landing in Scotland January 1980 to December 1980

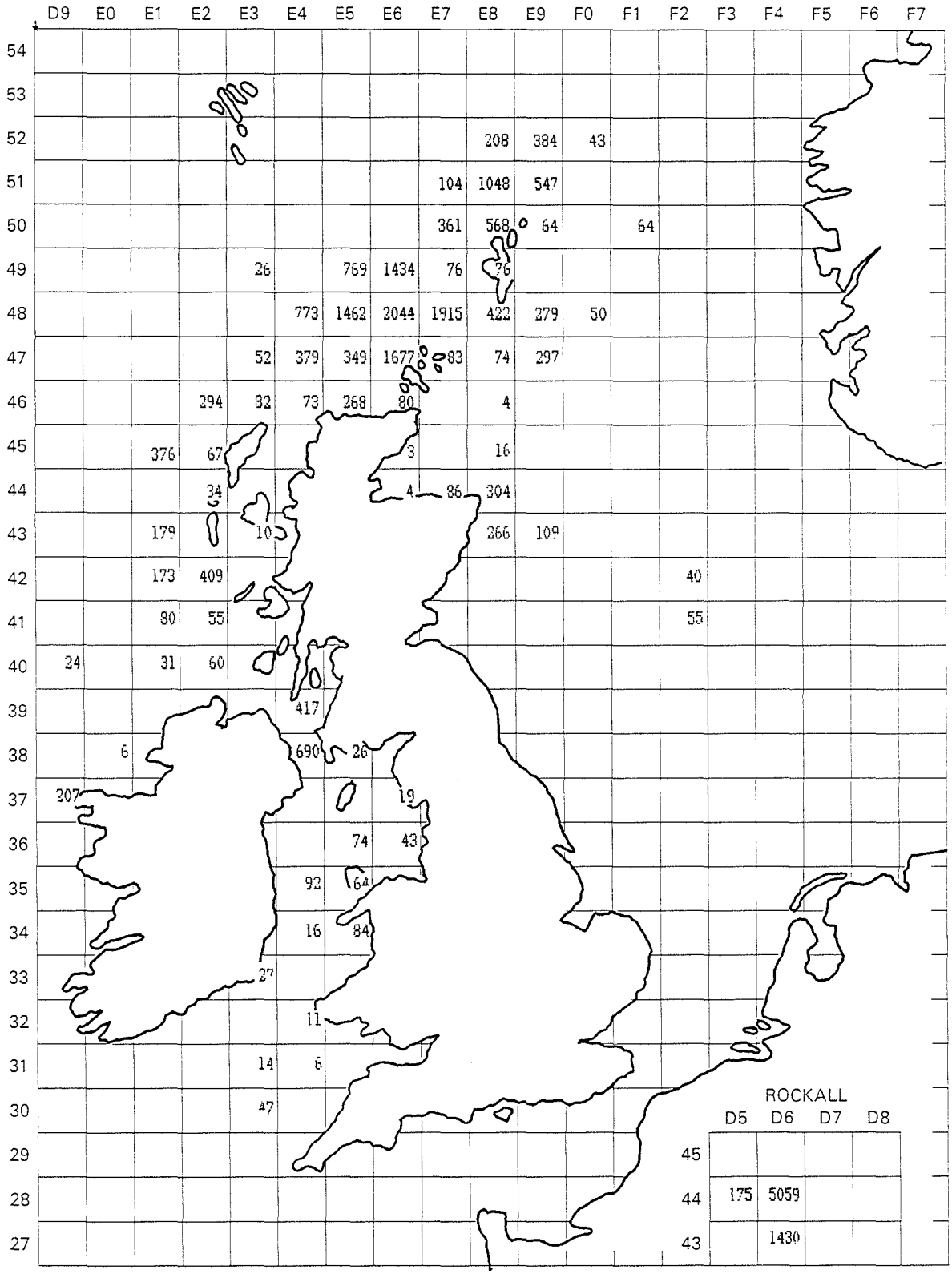
Effort : Hours fishing Units : 1
Gear : Trawl single Demersal



Source : Scientific Database Crown Copyright *Marine Laboratory Aberdeen*
Run date : 07-May-91 !!! Figures outside Map area not displayed !!!

United Kingdom Vessels Landing in Scotland January 1990 to December 1990

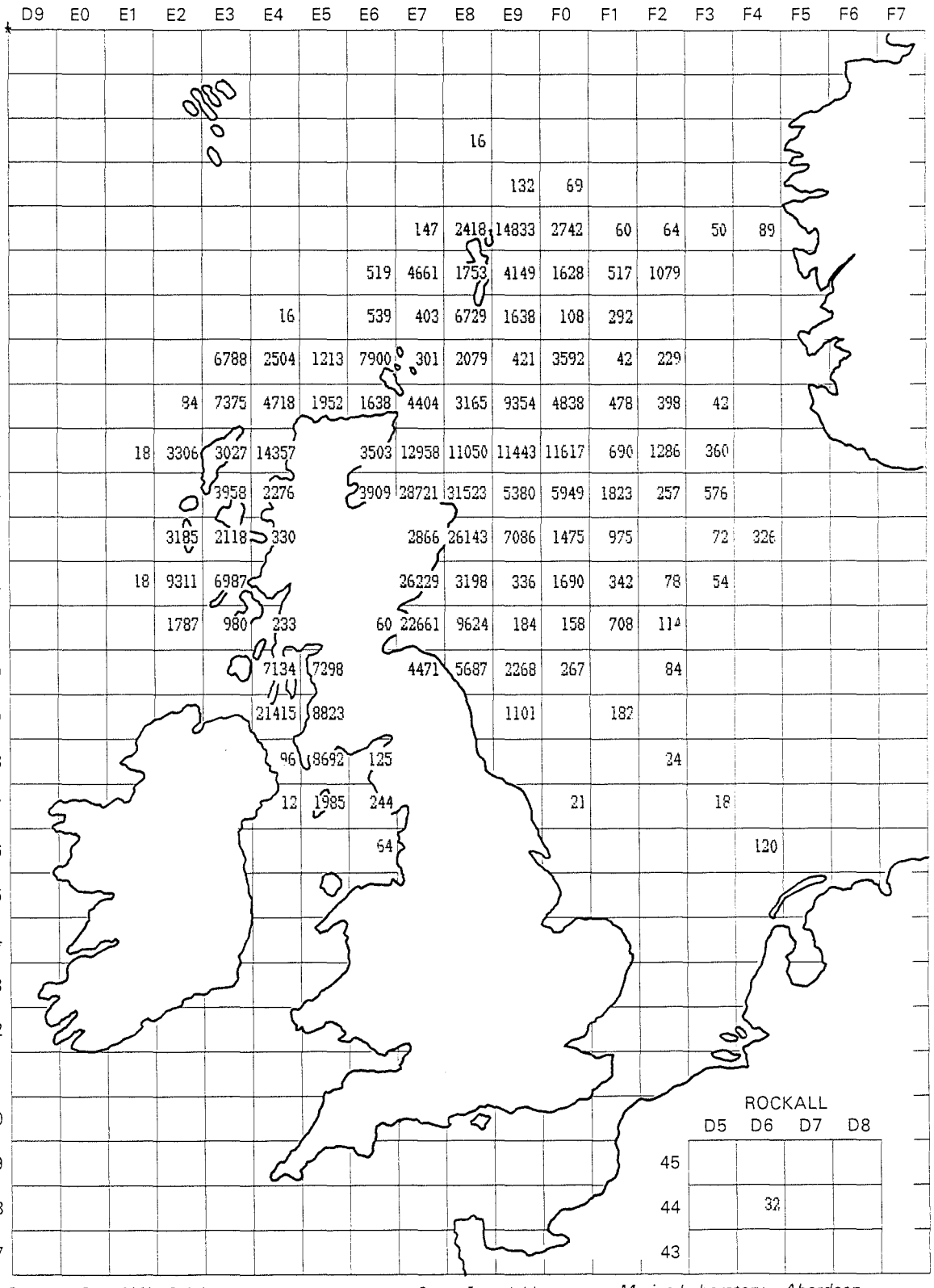
Effort : Hours fishing Units : 1
Gear : Trawl single Demersal



Source : Scientific Database Crown Copyright *Marine Laboratory Aberdeen*
Run date : 07-May-91 !!! Figures outside Map area not displayed !!!

United Kingdom Vessels Landing in Scotland January 1980 to December 1980

Effort : Hours fishing Units : 1
Gear : Light trawl



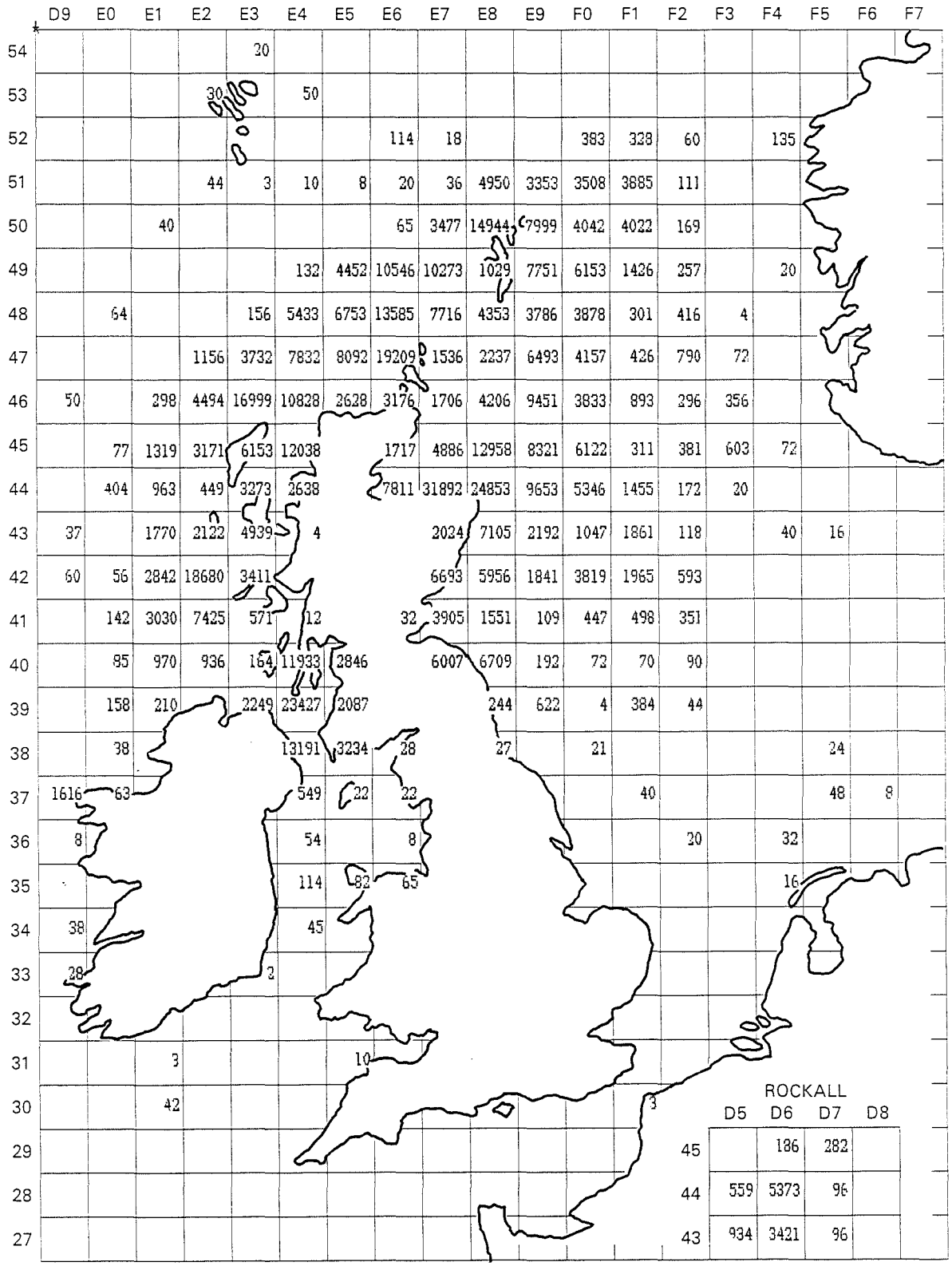
Source : Scientific Database
Run date : 07-May-91

Crown Copyright

Marine Laboratory Aberdeen

United Kingdom Vessels Landing in Scotland January 1990 to December 1990

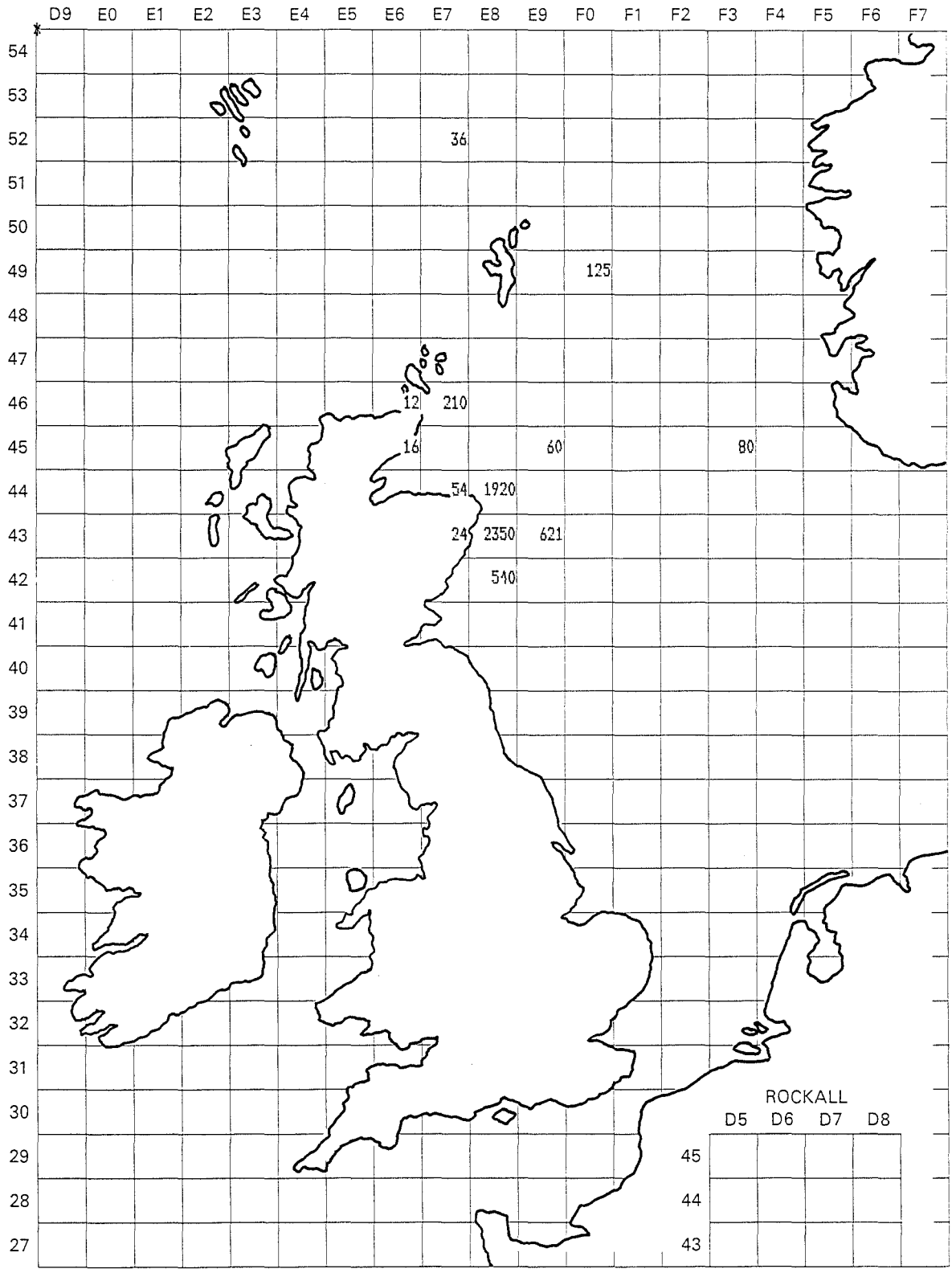
Effort : Hours fishing Units : 1
Gear : Light trawl



Source : Scientific Database Crown Copyright *Marine Laboratory Aberdeen*
Run date : 07-May-91 !!! Figures outside Map area not displayed !!!

United Kingdom Vessels Landing in Scotland January 1984 to December 1984

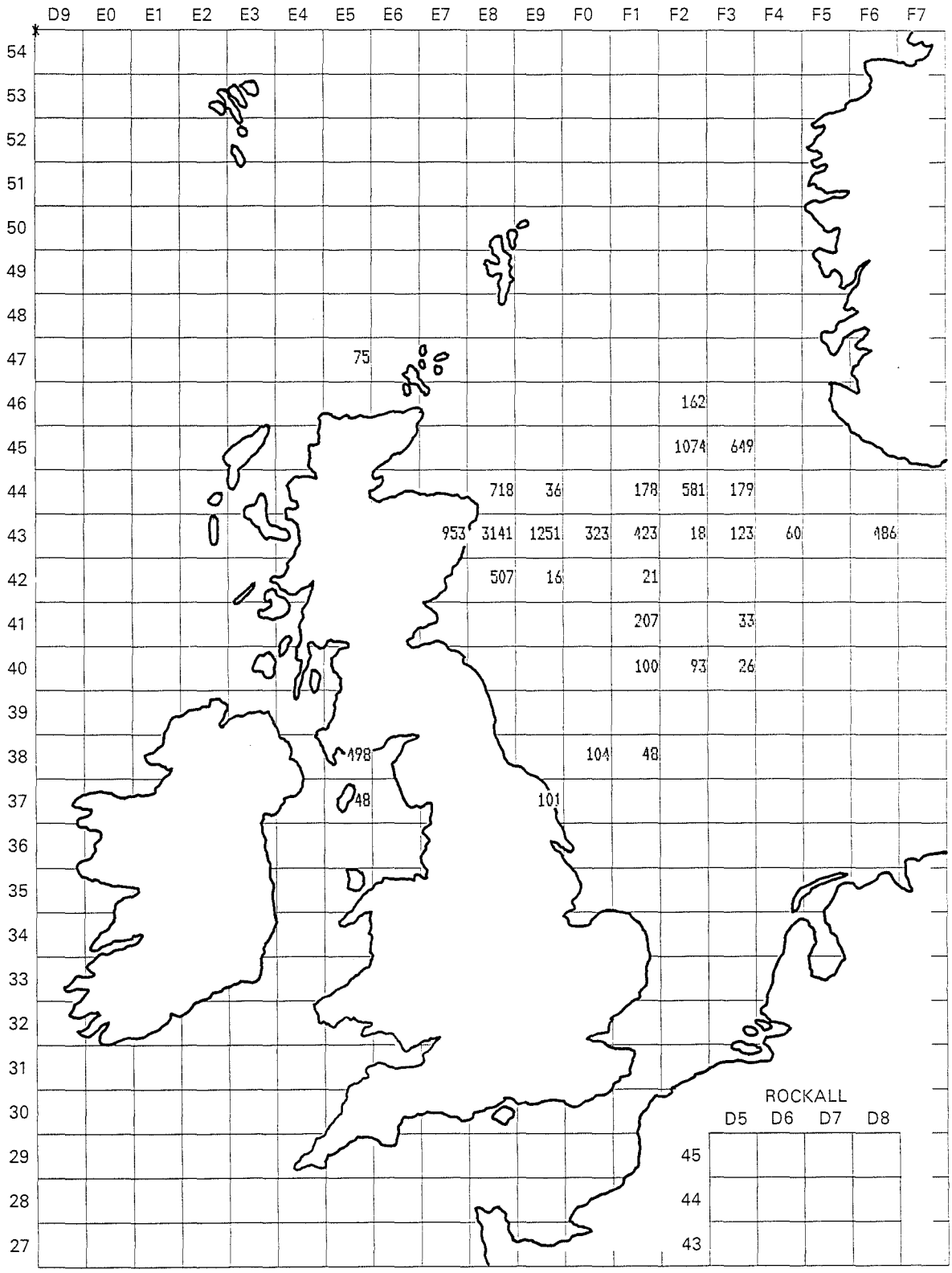
Effort : Hours fishing Units : 1
Gear : Beam trawl



Source : Scientific Database Crown Copyright *Marine Laboratory Aberdeen*
Run date : 09-Feb-90

United Kingdom Vessels Landing in Scotland January 1988 to December 1988

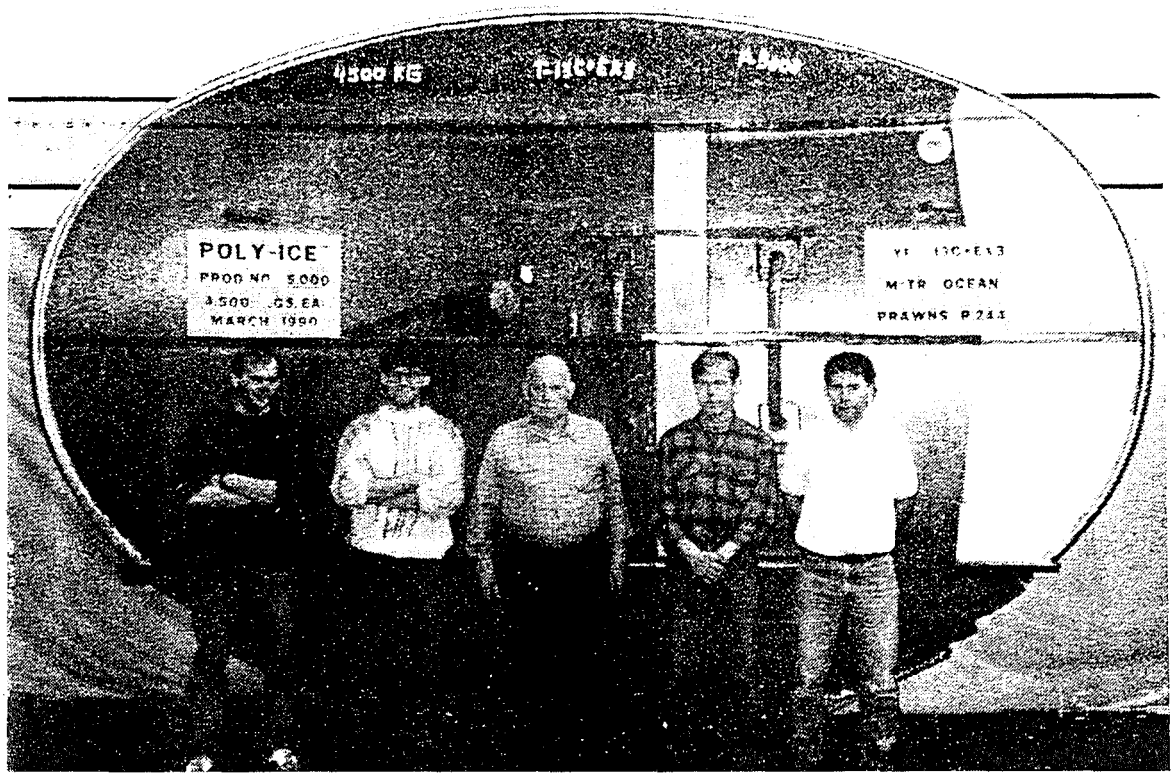
Effort : Hours fishing Units : 1
Gear : Beam trawl



Source : Scientific Database
Run date : 09-Feb-90

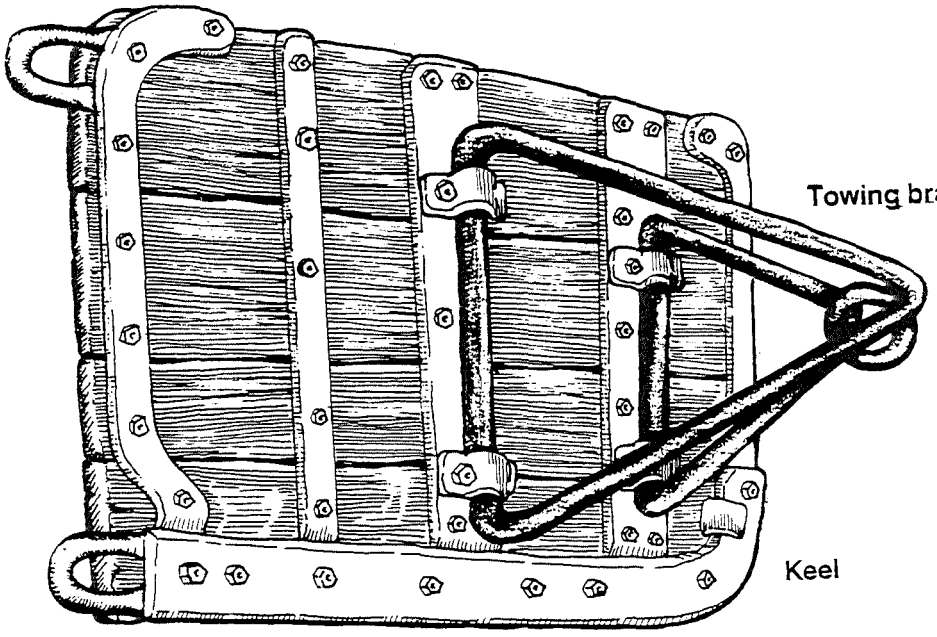
Crown Copyright

Marine Laboratory Aberdeen



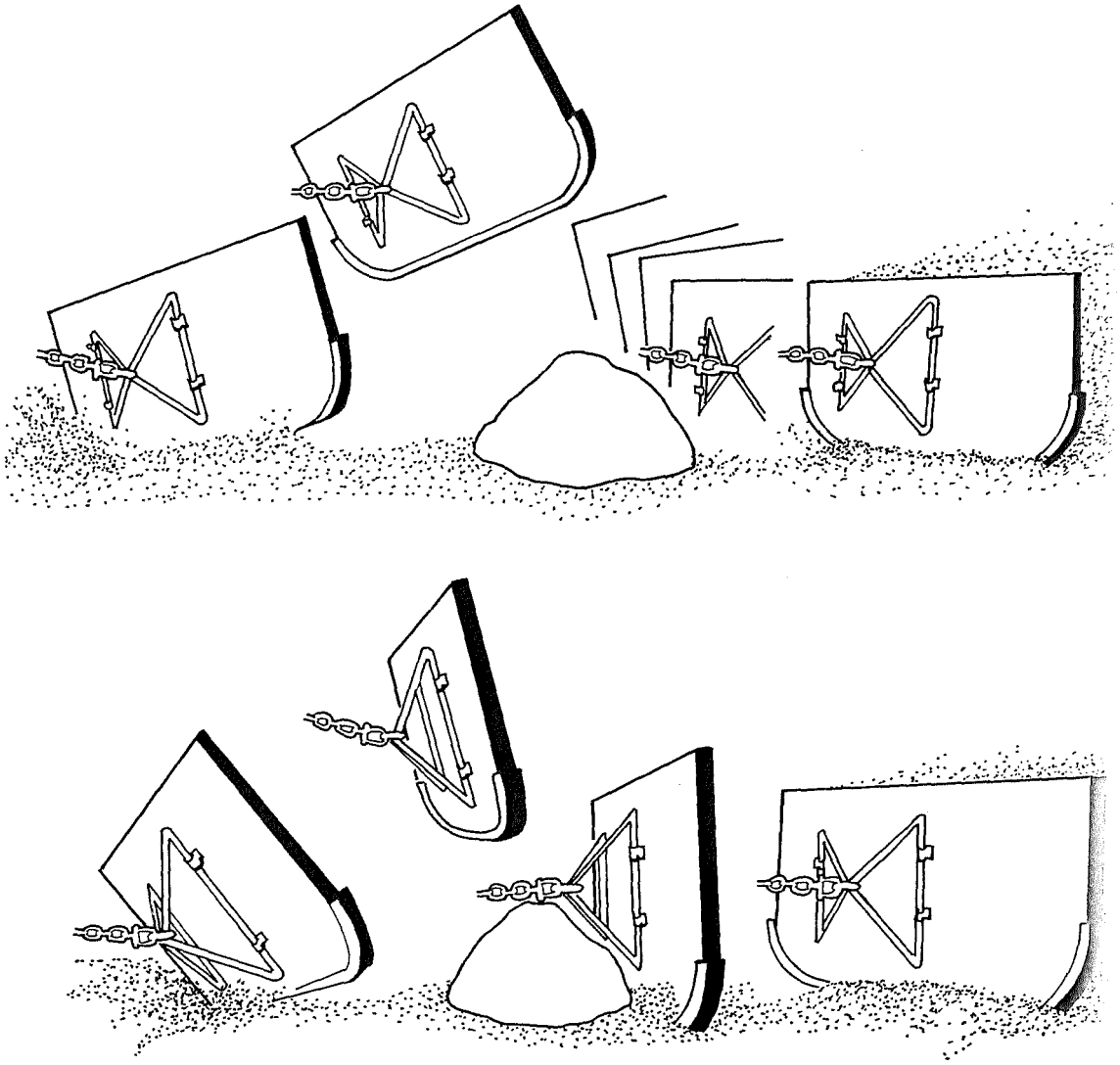
An industrial sized trawl door
(Reproduced with permission from Fishing News,)

29



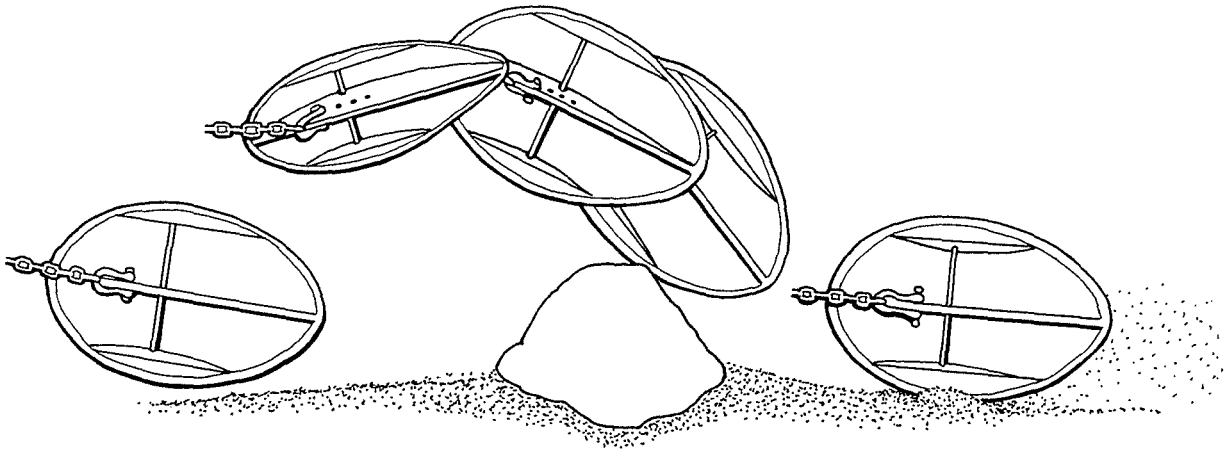
The traditional rectangular flat wooden board

30

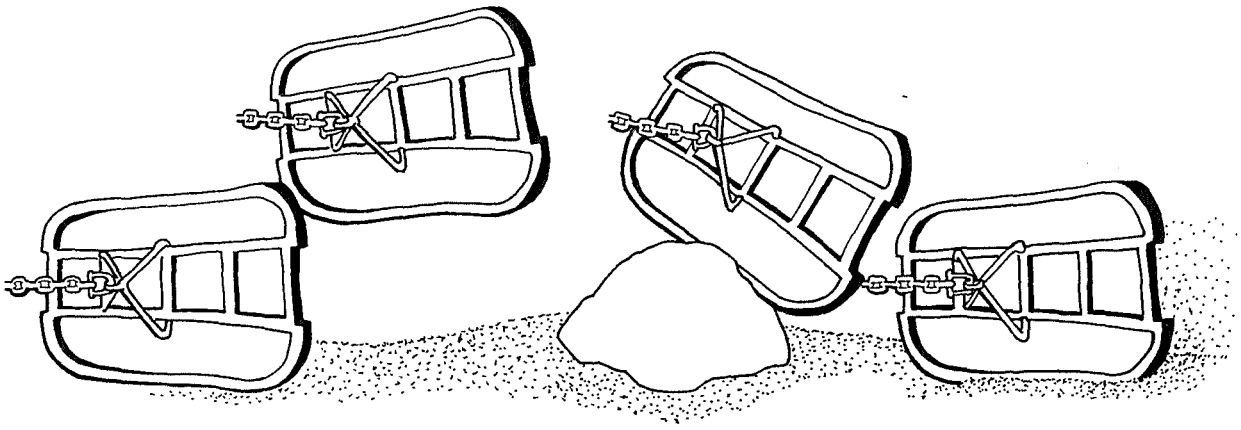


The traditional rectangular flat wooden board can be seen to exhibit a characteristic double impact pattern when striking an obstruction on the seabed. Although the board sometimes lands on its keel the second impact is more often on the leading toe of the keel. (After Main and Sangster and Main p.c.).

Otter board behaviour on impact with obstructions

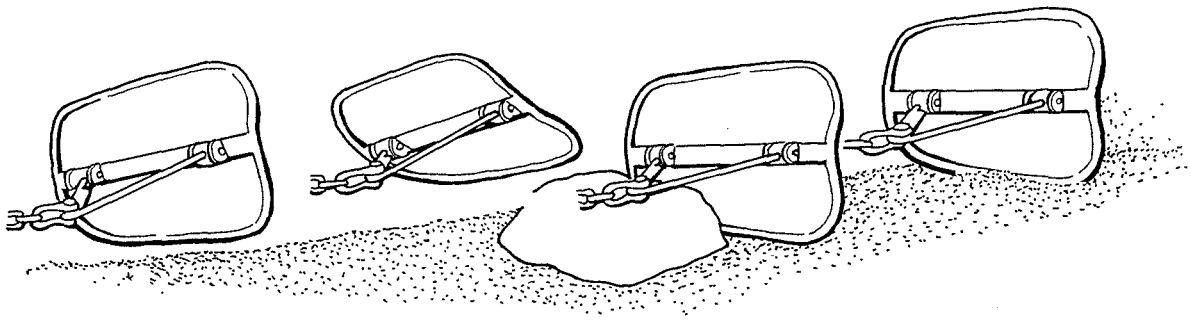


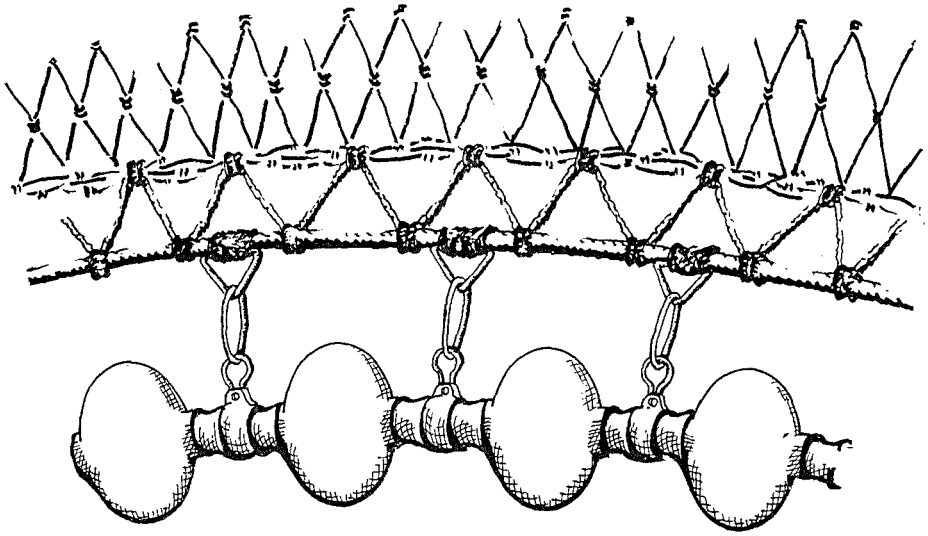
The polyvalent board exhibiting its ability to rise and swivel over an obstruction.



The cambered rectangular board

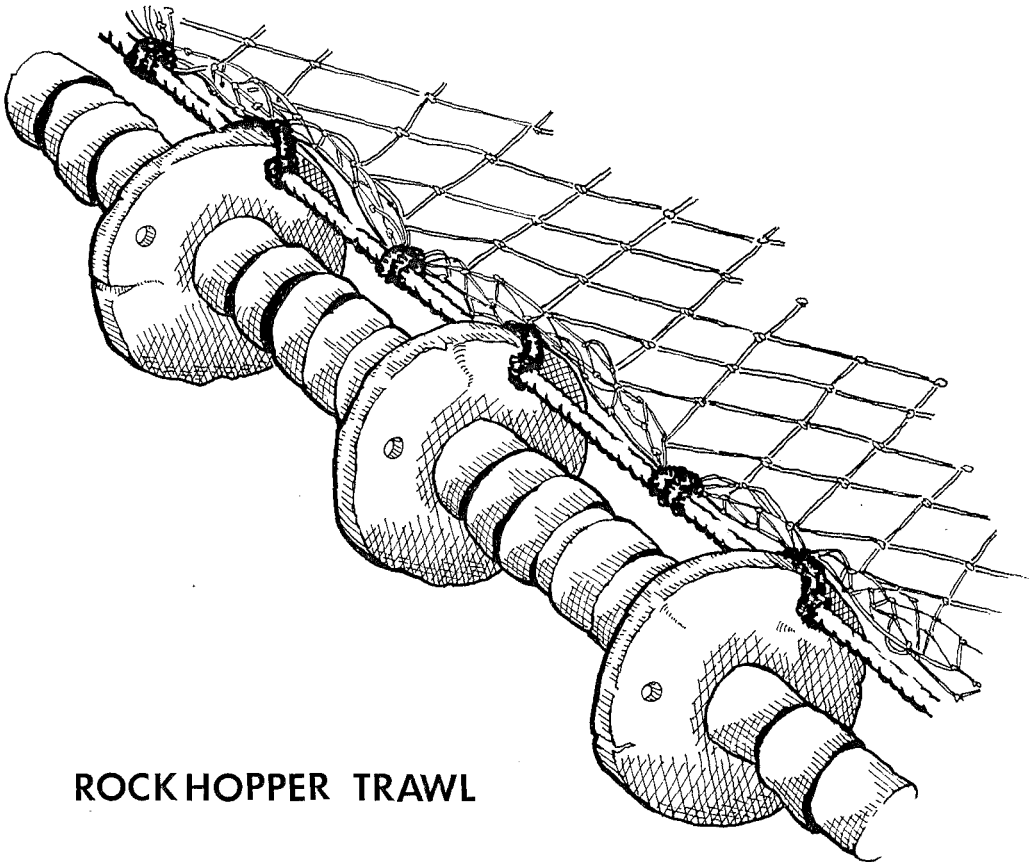
A vee board clearing an obstruction with a relatively light impact by hinging on its towing bracket.
(After Main and Sangster and Main p.c.).





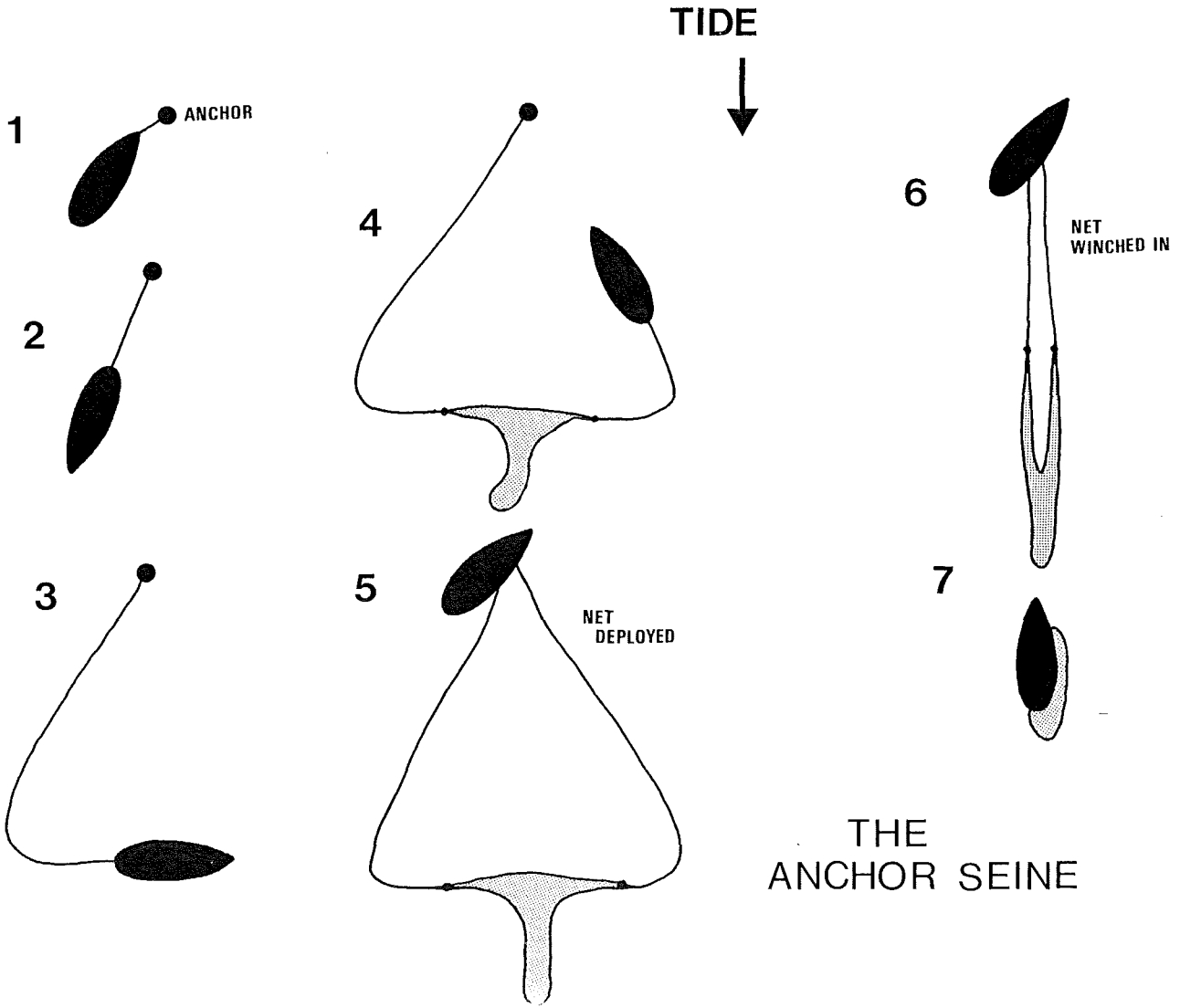
BOBBIN TRAWL

33



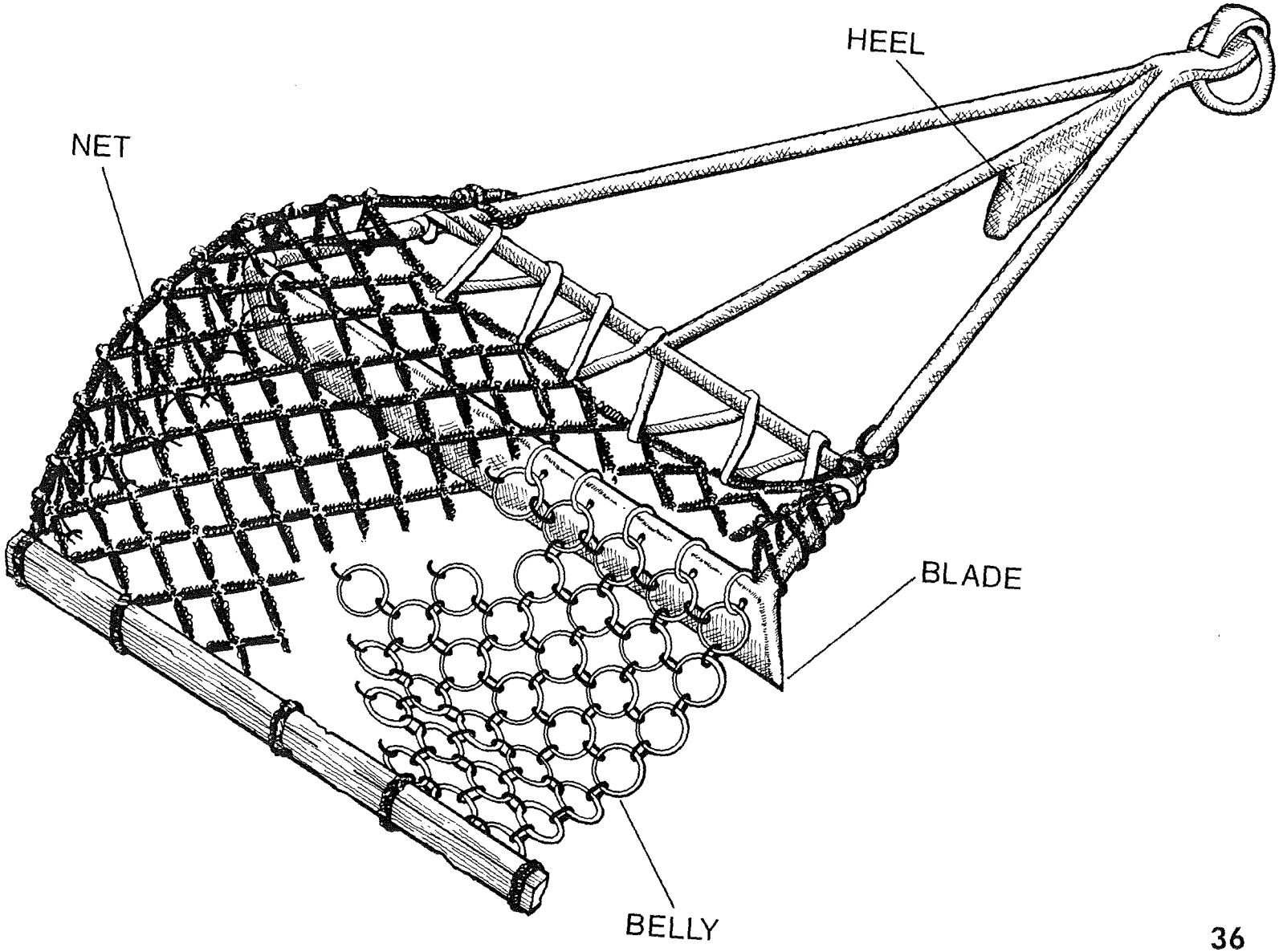
ROCK HOPPER TRAWL

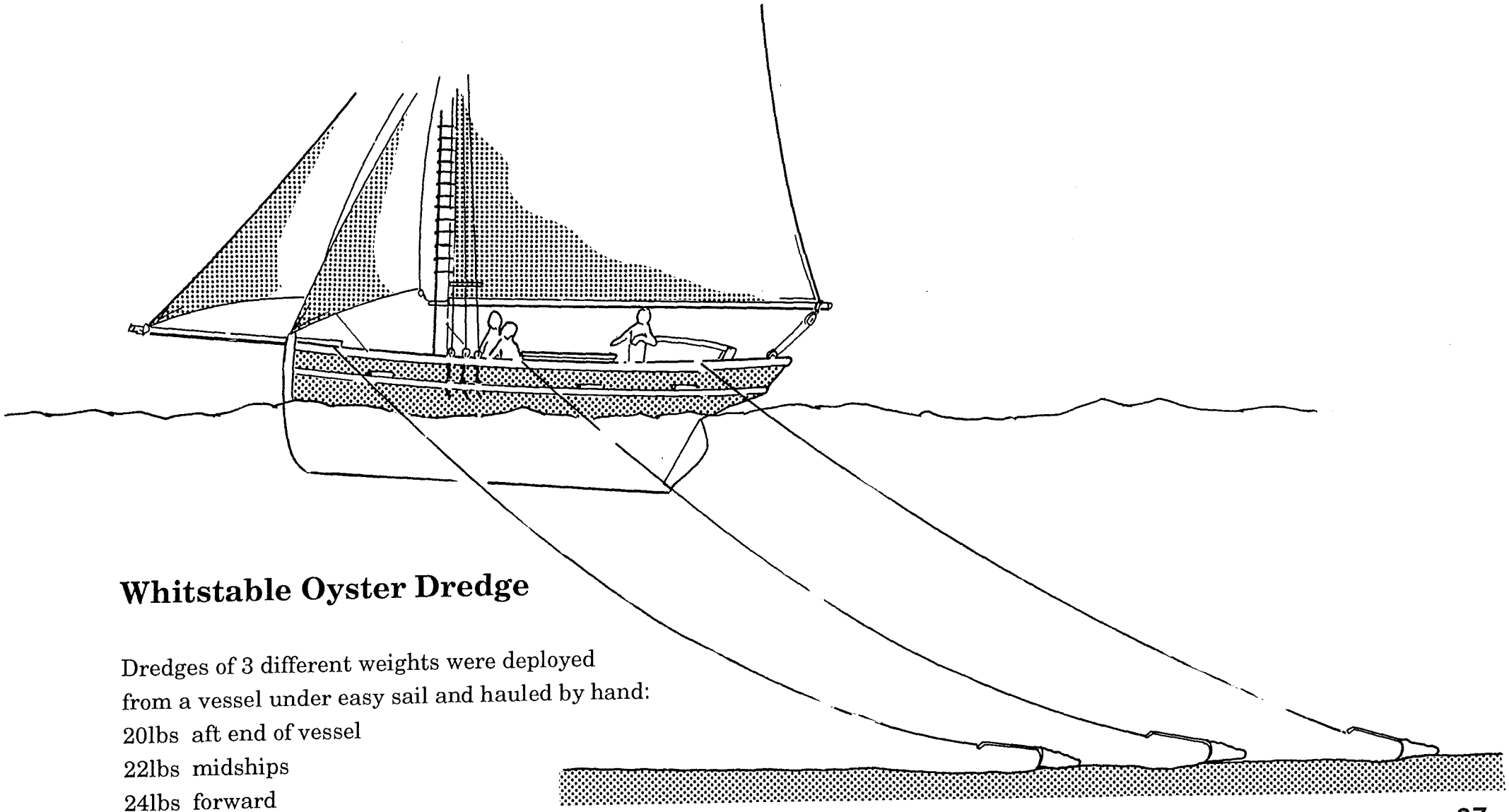
34



THE
ANCHOR SEINE

HAND HAULED DREDGE

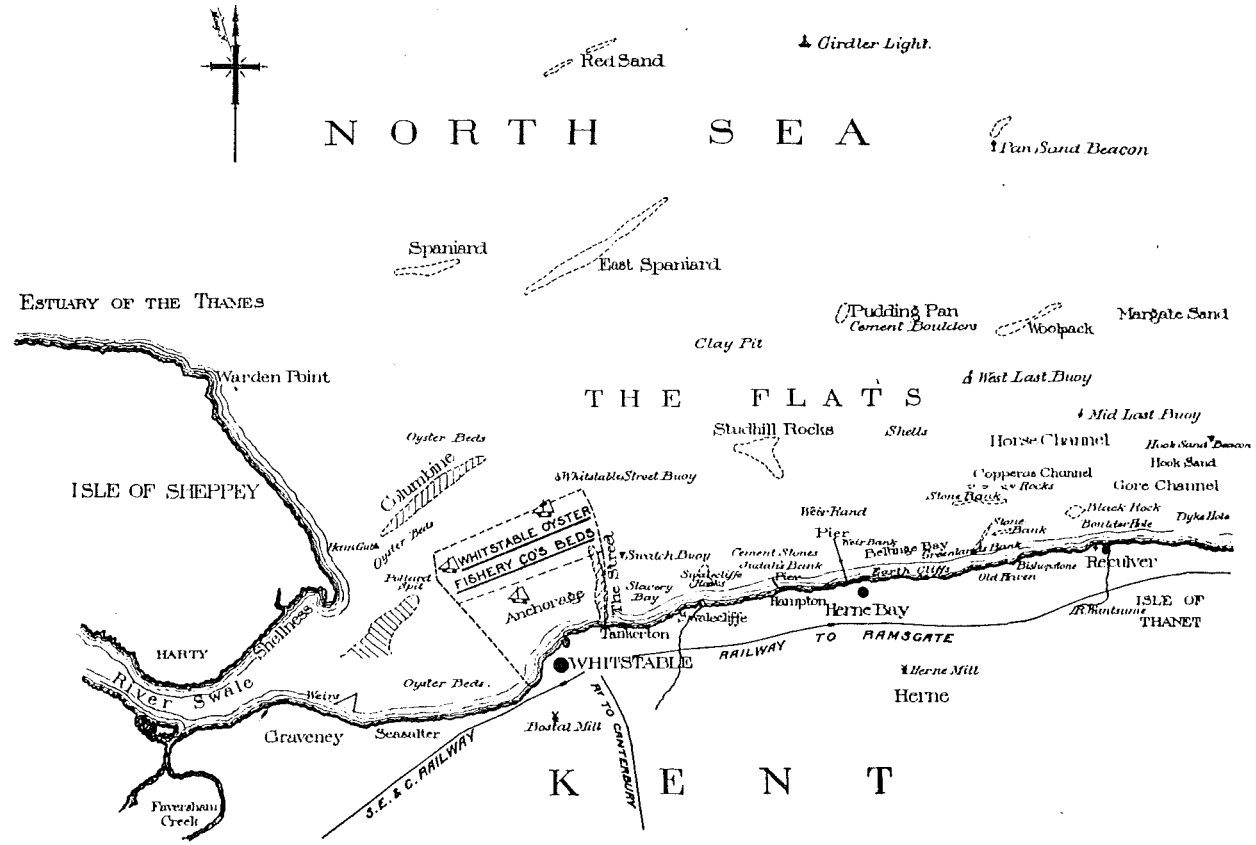


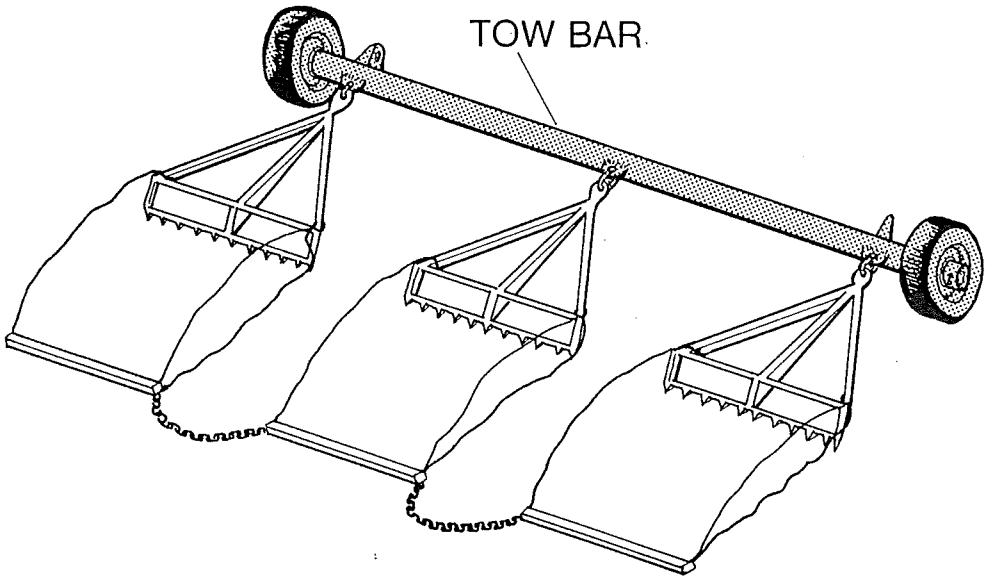


Whitstable Oyster Dredge

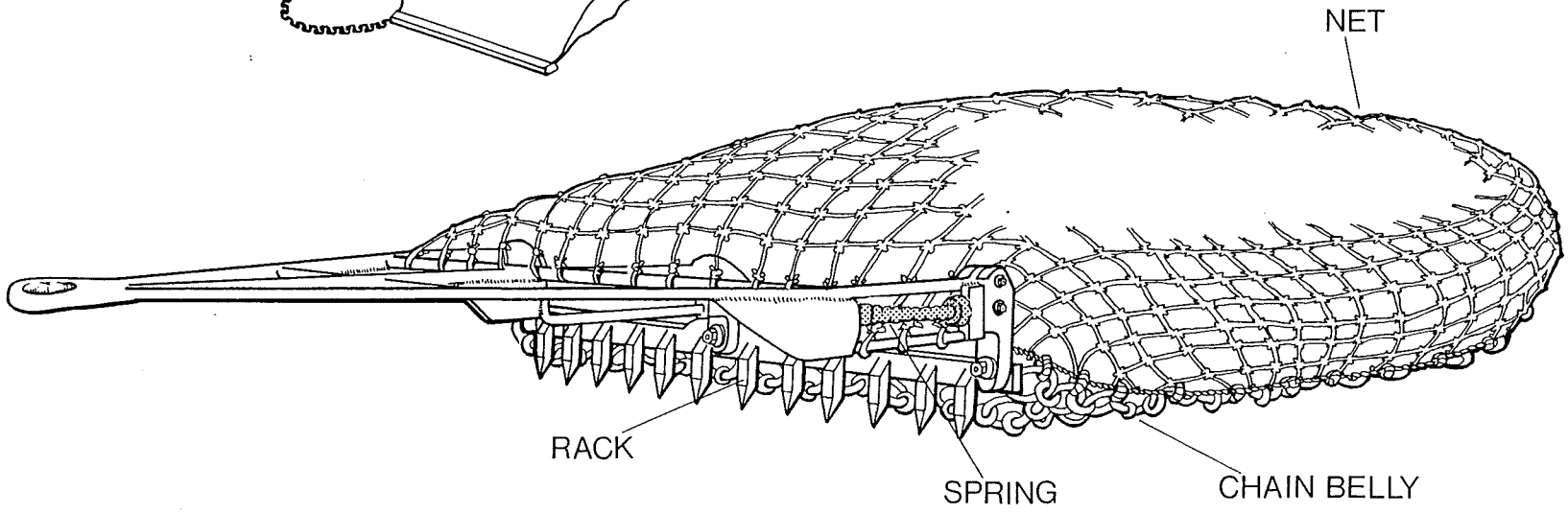
Dredges of 3 different weights were deployed
from a vessel under easy sail and hauled by hand:
20lbs aft end of vessel
22lbs midships
24lbs forward
(after Campbell)

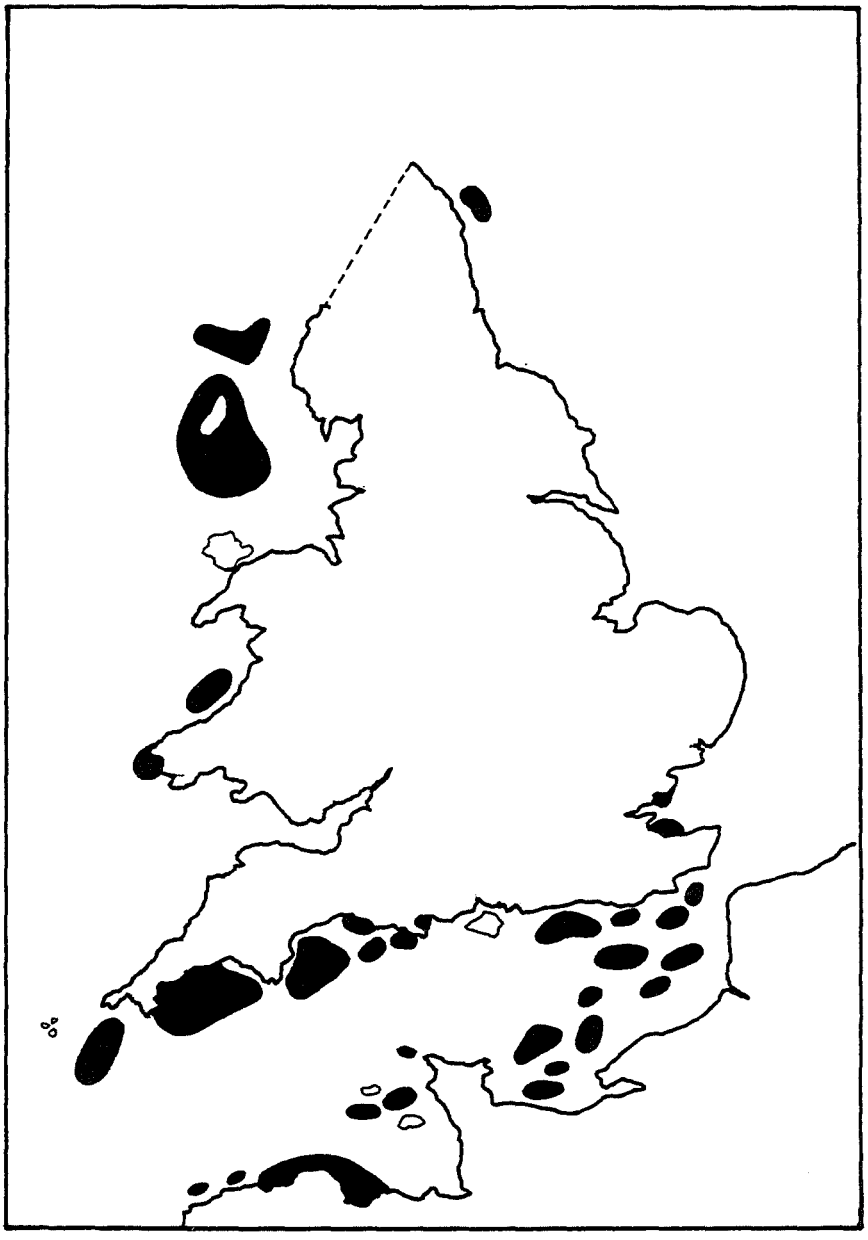
MAP OF
WHITSTABLE OYSTER FISHERY
AND SURROUNDINGS.





SCALLOP DREDGE



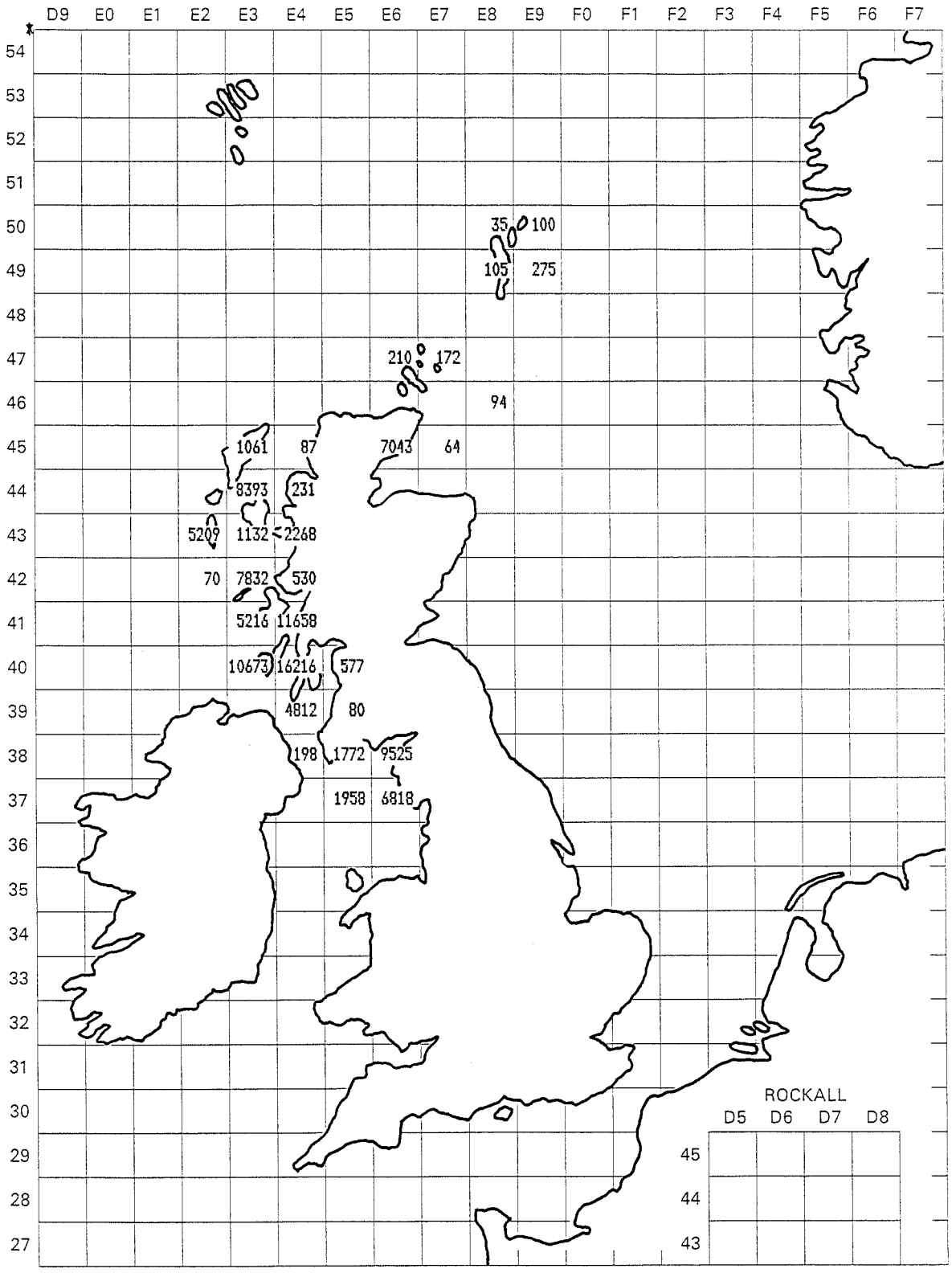


MAJOR SCALLOP GROUNDS

(FN 12 OCT 1990)

United Kingdom Vessels Landing in Scotland January 1984 to December 1984

Effort : Hours fishing Units : 1
Gear : Scallop dredging



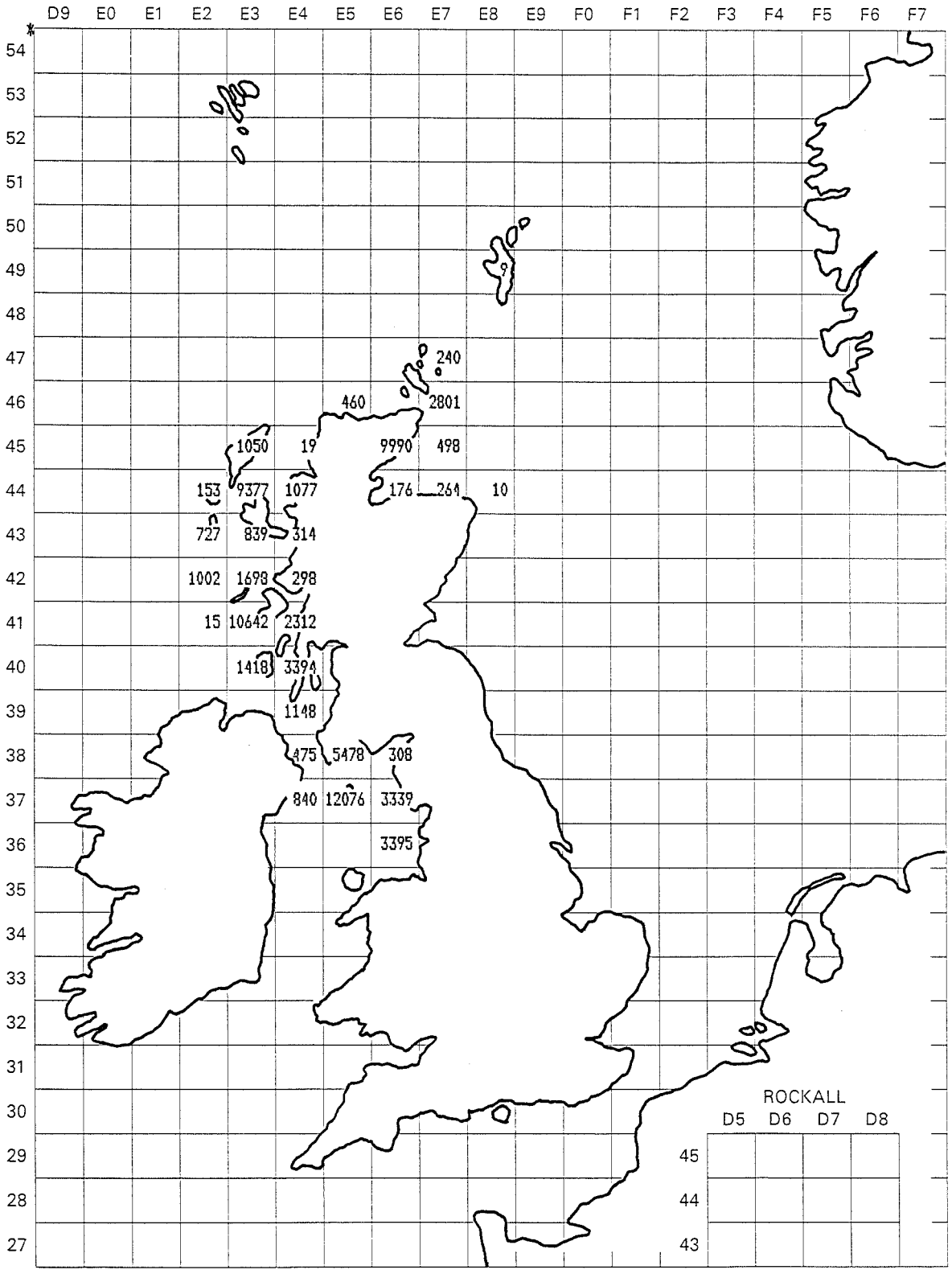
Source : Scientific Database
Run date : 28-May-90

Crown Copyright

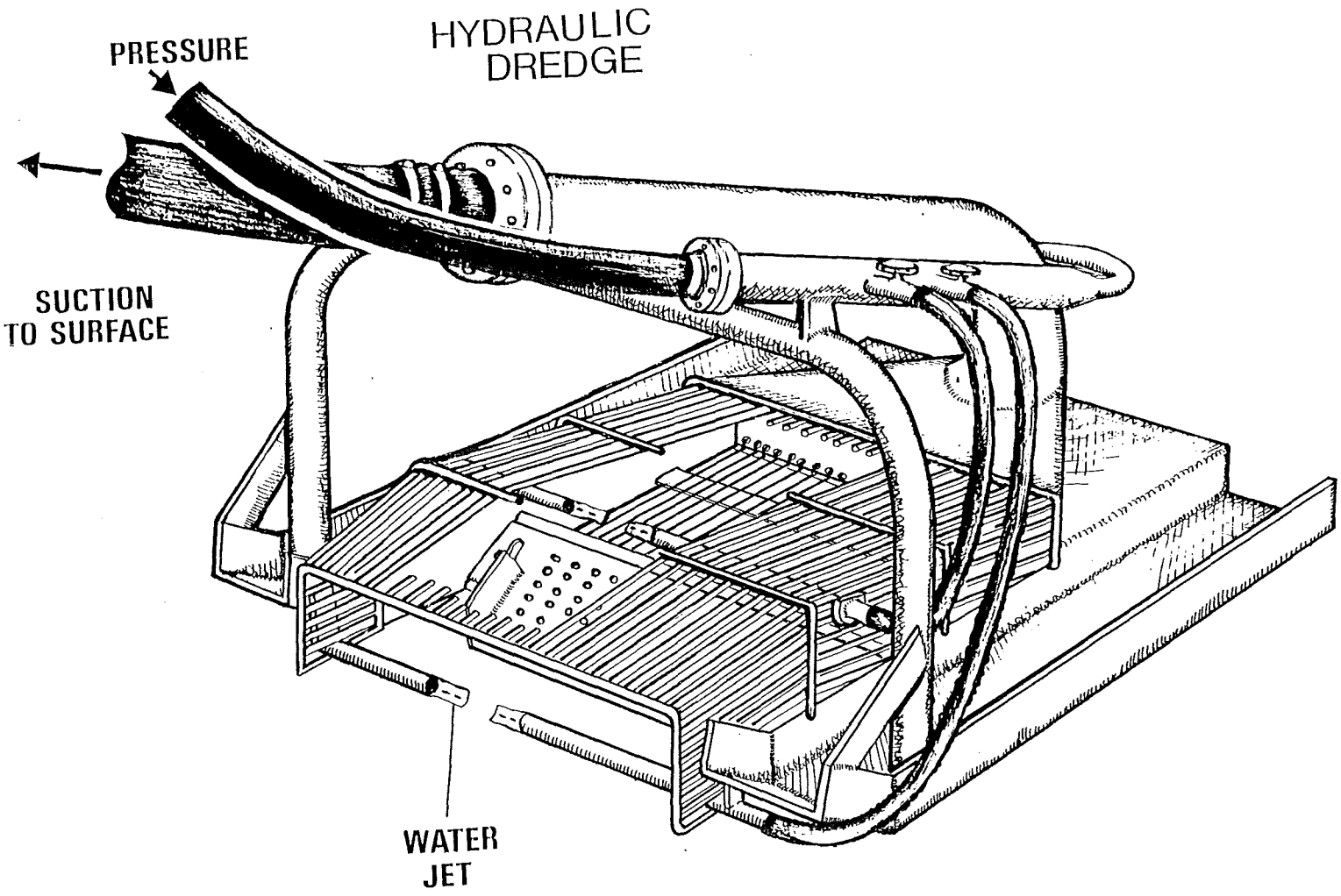
Marine Laboratory Aberdeen

United Kingdom Vessels Landings in Scotland January 1988 to December 1988

Effort : Hours fishing Units : 1
Gear : Scallop dredging

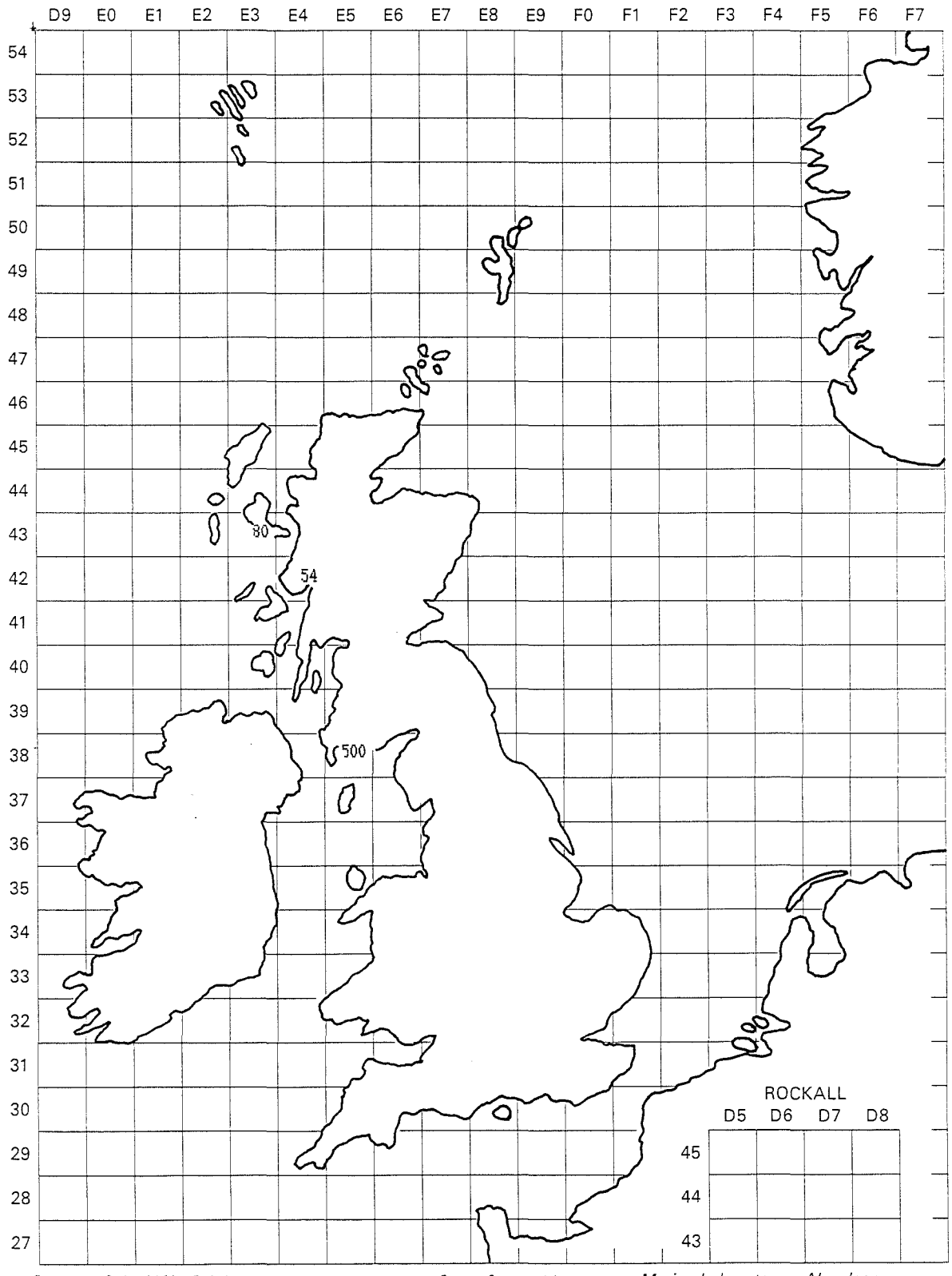


Source : Scientific Database Crown Copyright *Marine Laboratory Aberdeen*
Run date : 28-May-90


HYDRAULIC
DREDGE
PRESSURE
SUCTION
TO SURFACE
WATER
JET

United Kingdom Vessels Landing in Scotland July 1989 to September 1989

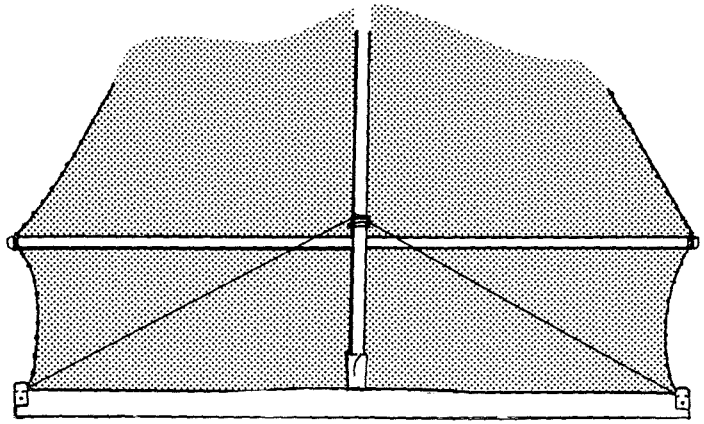
Effort : Hours fishing Units : 1
Gear : Suction dredging

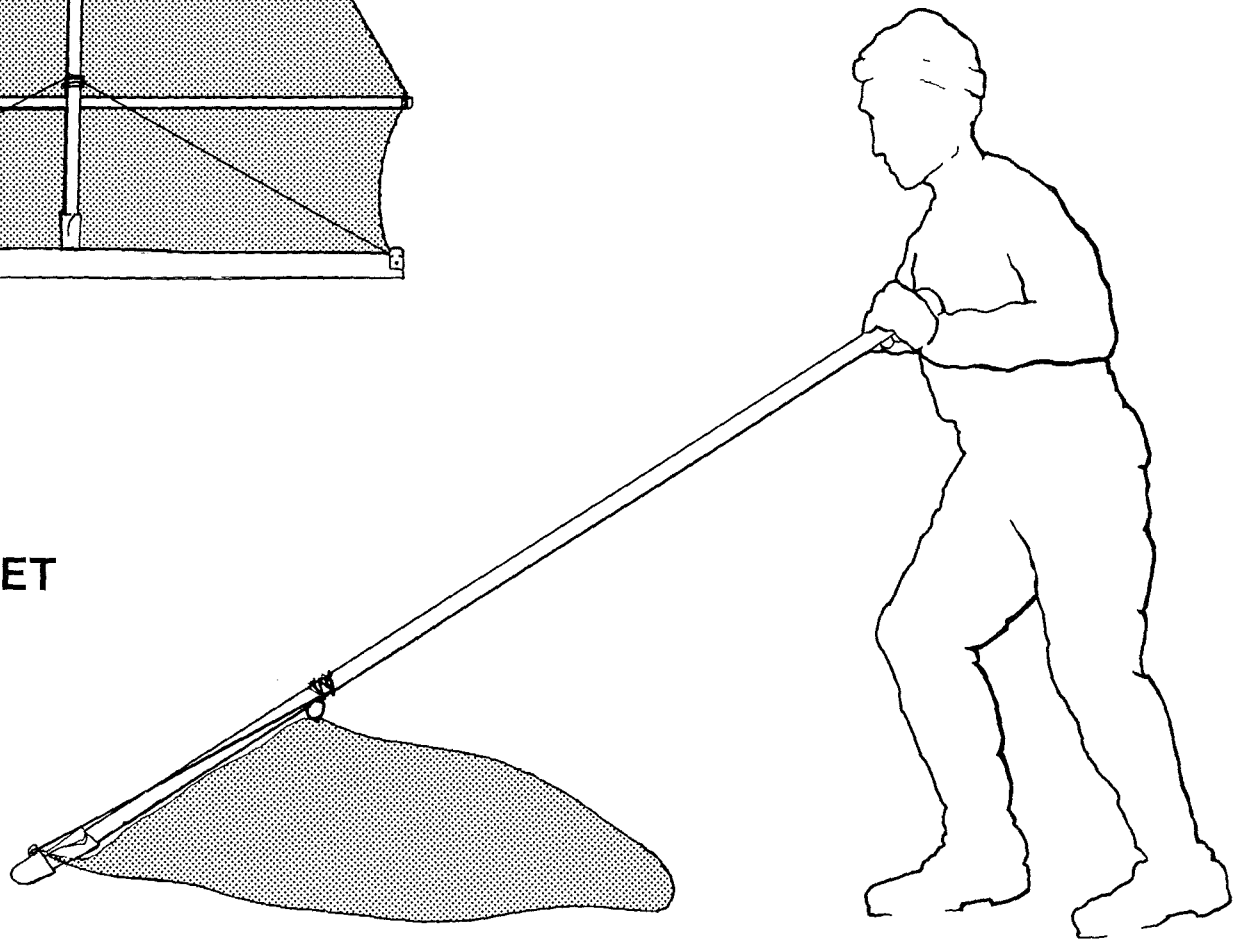


Source : Scientific Database
Run date : 07-May-91

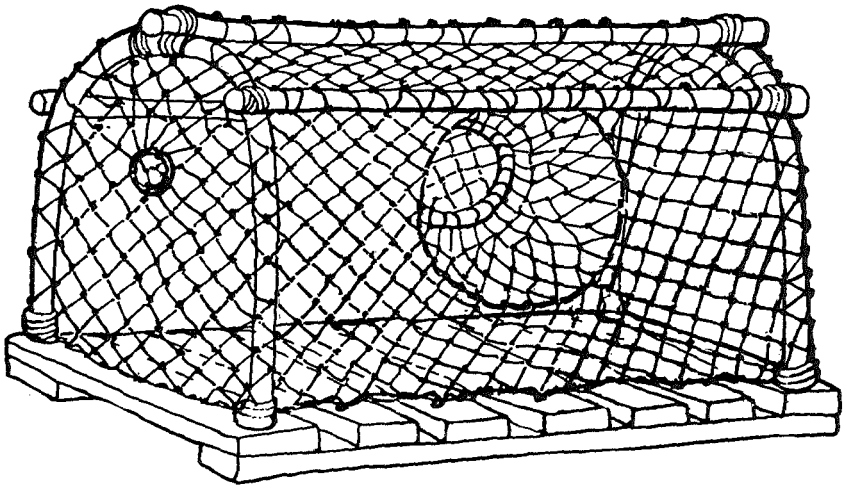
Crown Copyright

Marine Laboratory Aberdeen

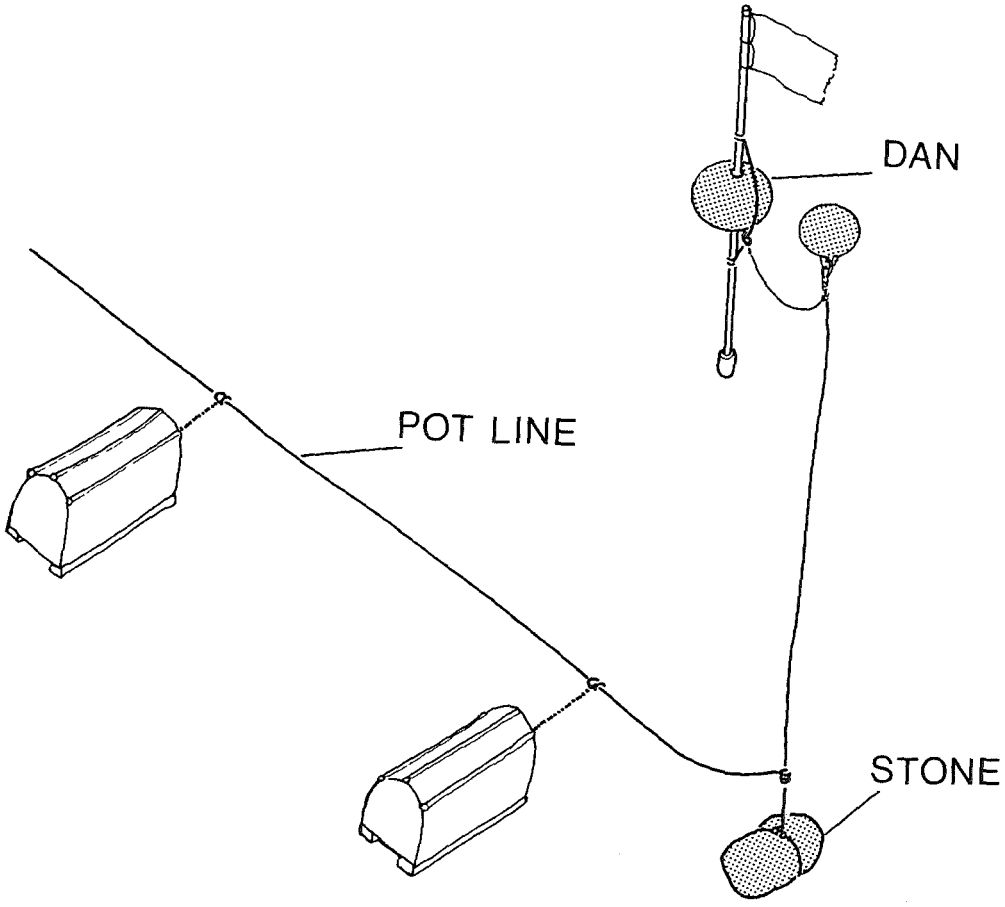




A PUSH NET

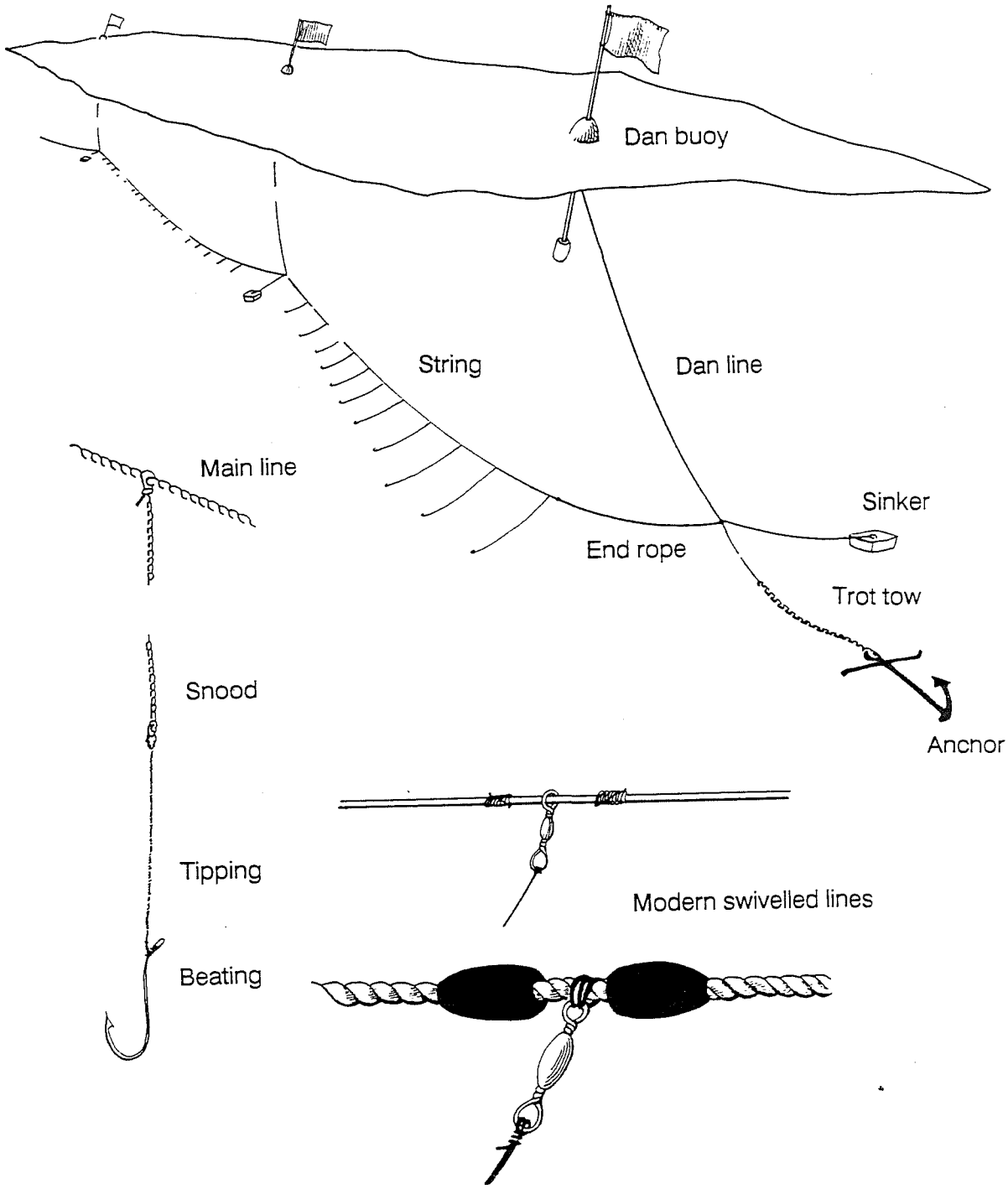


SCOTTISH CREEL



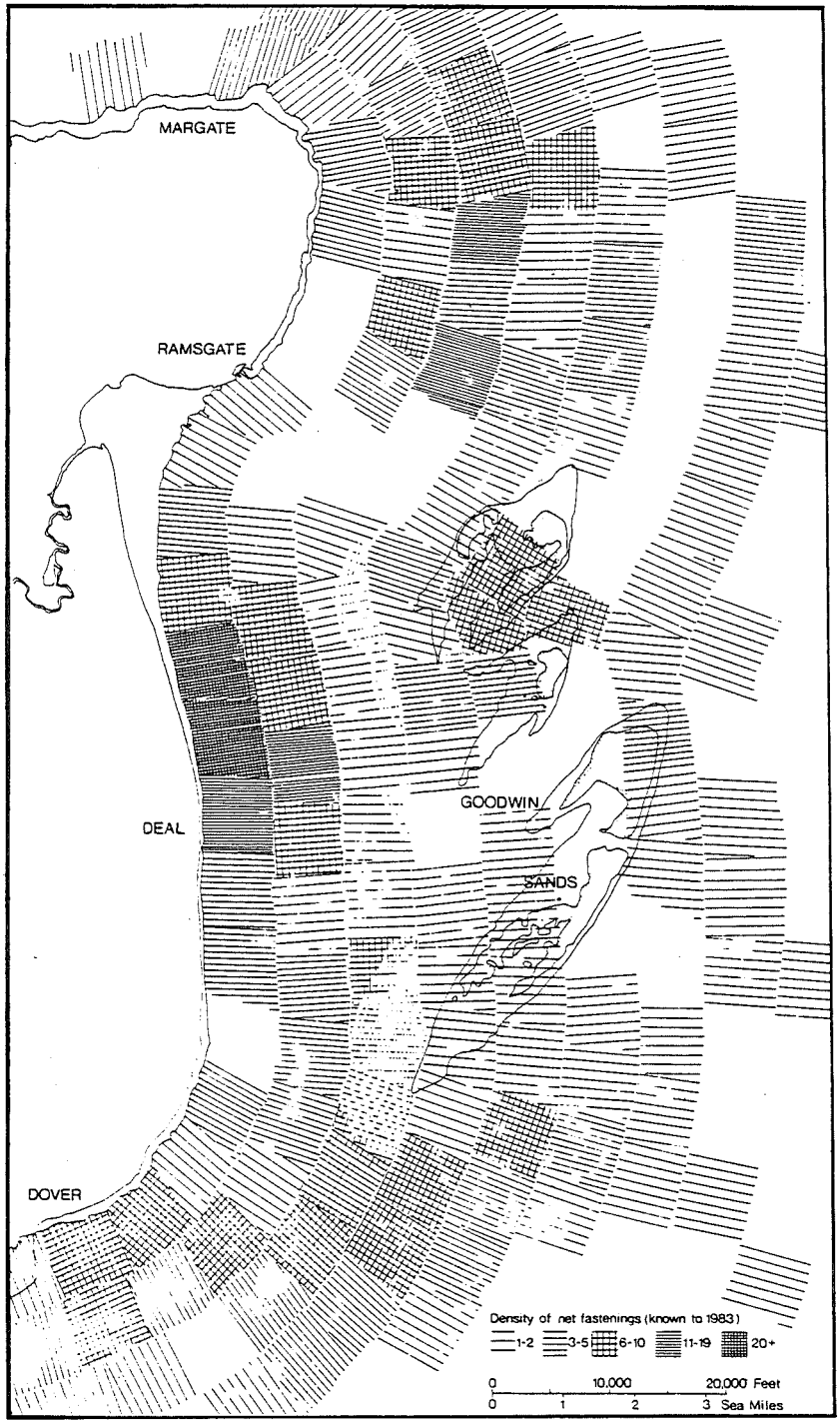
LOBSTER POTTING

A Longline

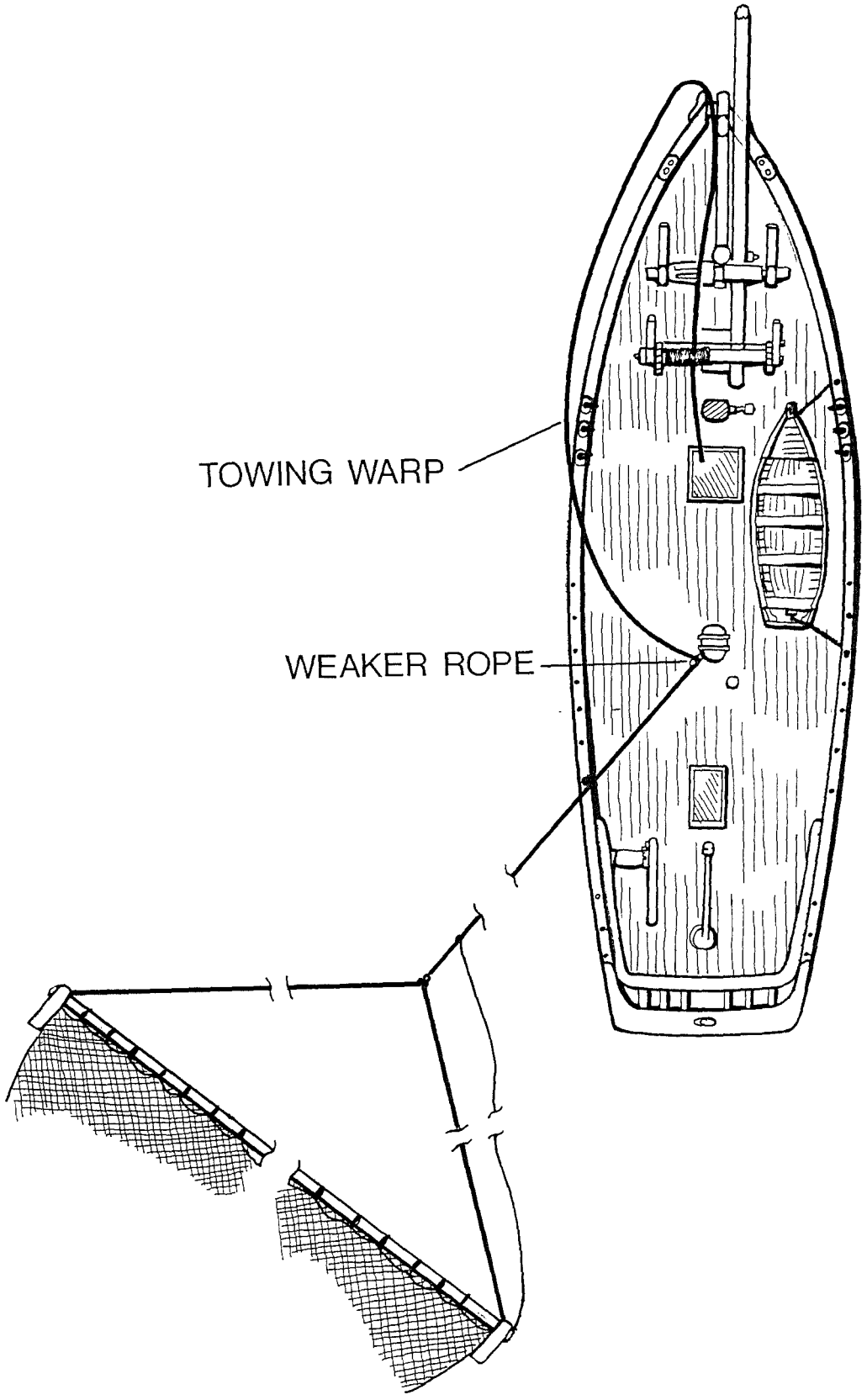


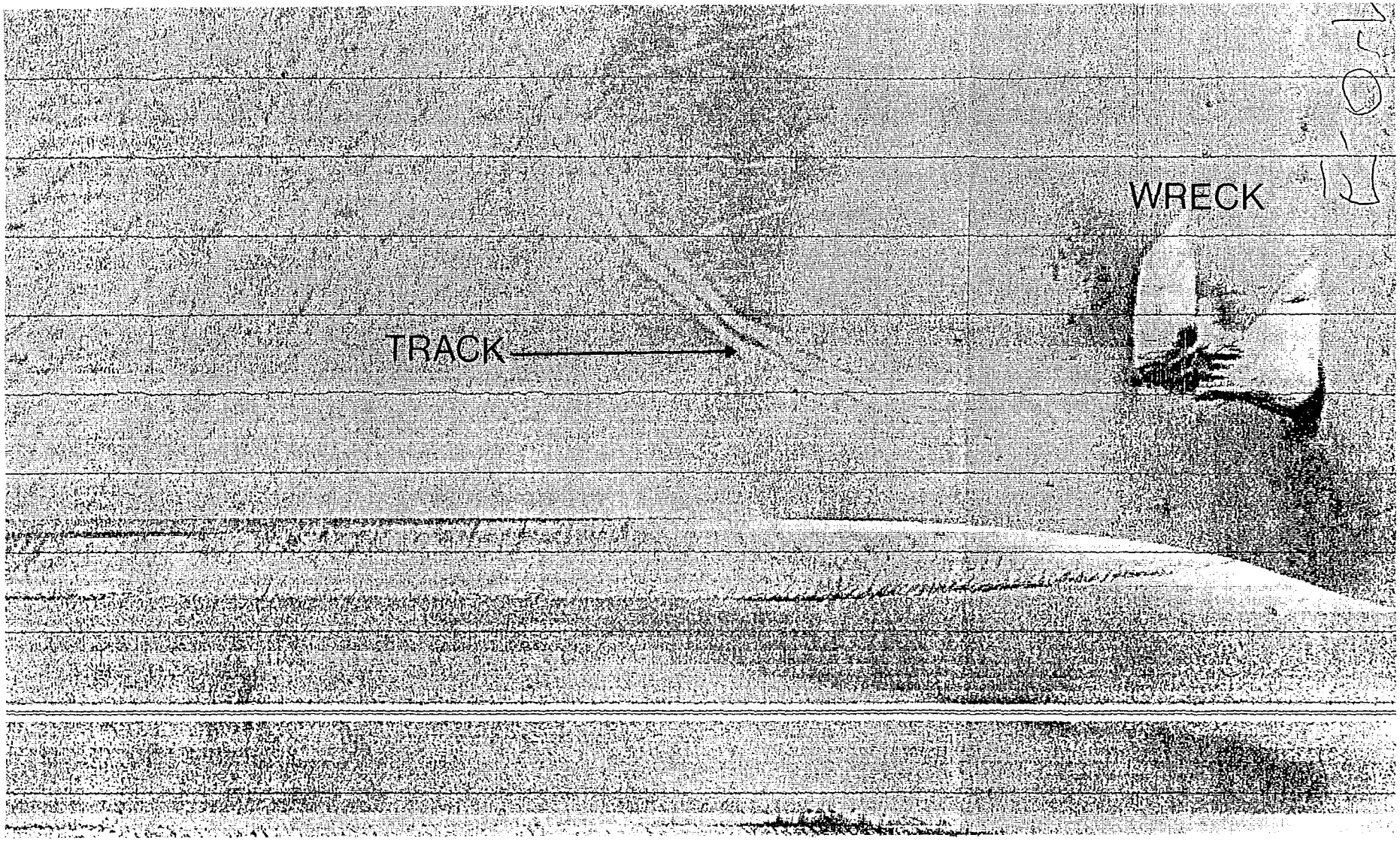
Great lines are now hauled by machine rather than hand, the fish being removed as they come over the side. Mechanisation is also making baiting and shooting of the lines much faster and less arduous. Two forms of line are used , great and small. the great line is larger and used in deeper waters. One vessel may deploy three or four greatlines, each made up of 30 longlines, each of which is in turn made up of six strings as shown above. The total length of gear deployed may reach twelve miles. The small lines are much lighter and used in nearshore waters. Deployment begins with the lowering of the first anchor and dan over the side while the vessel moves slowly ahead.

Net snags in the Thames Estuary
Reproduced with permission from World Archaeology, 16:3, p.315, 1985



BEAM TRAWL



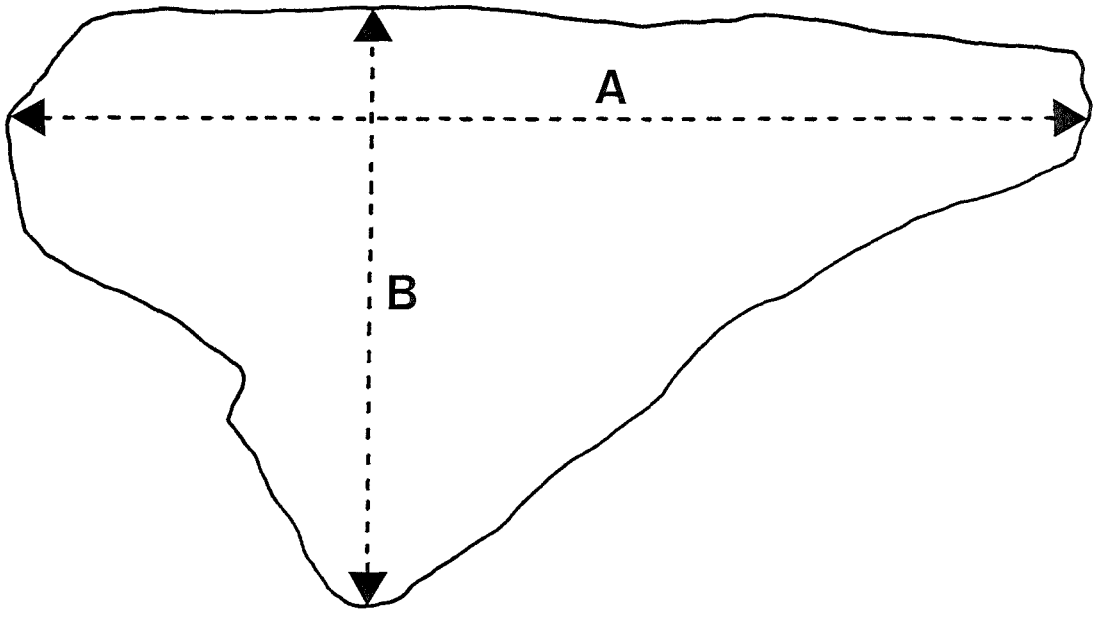

WRECK
TRACK

NO EROSION

EROSION

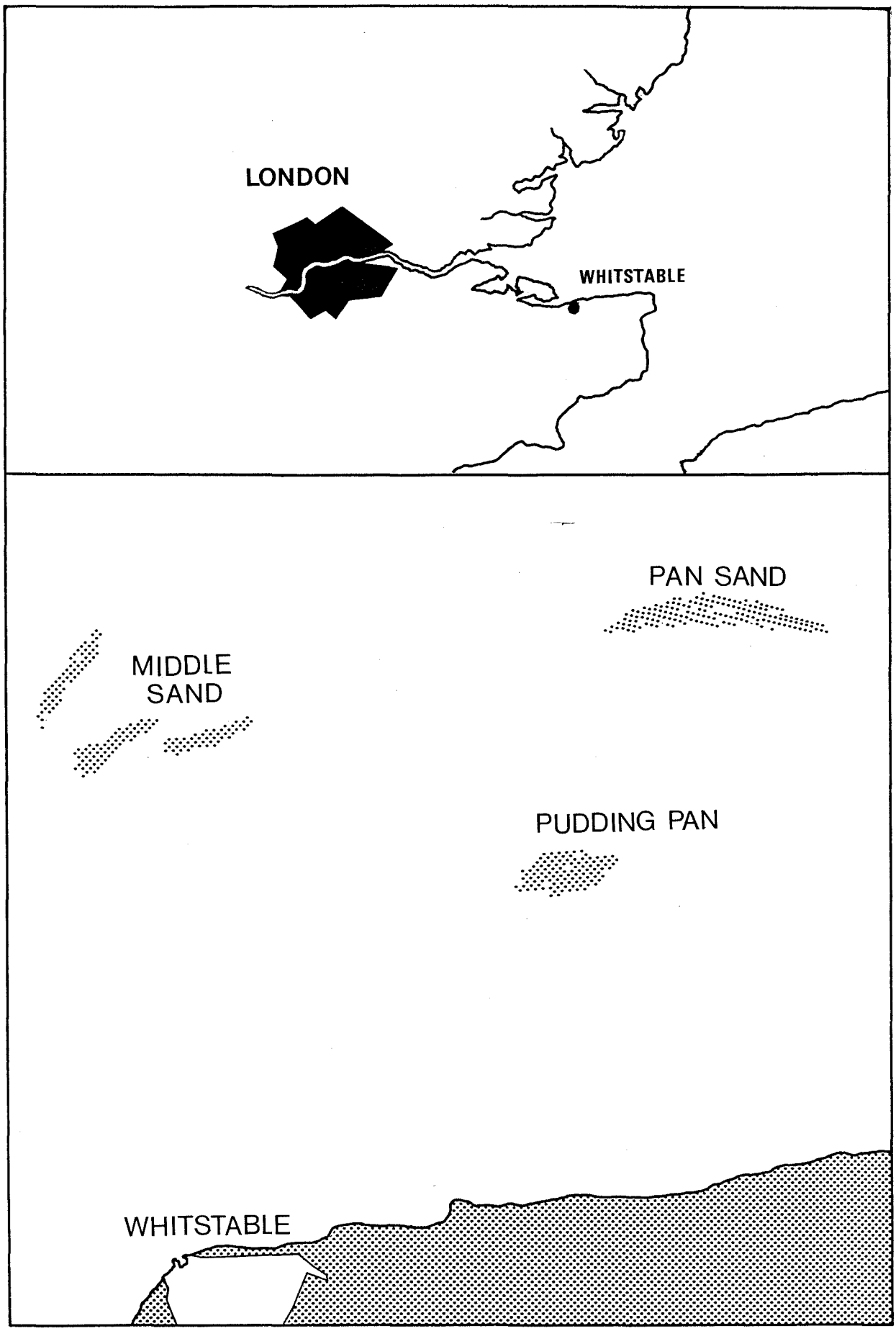
HEAVY EROSION

51

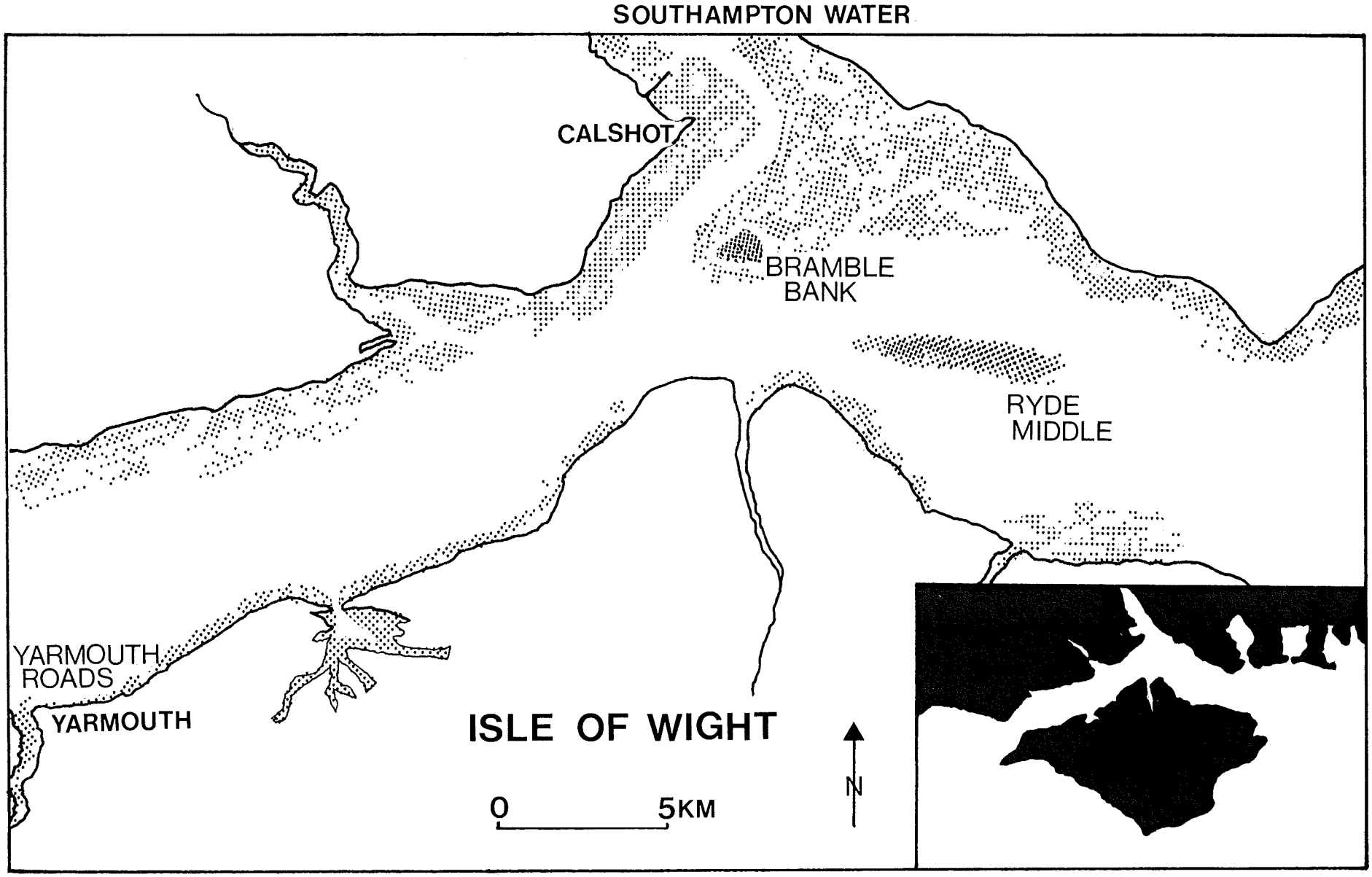


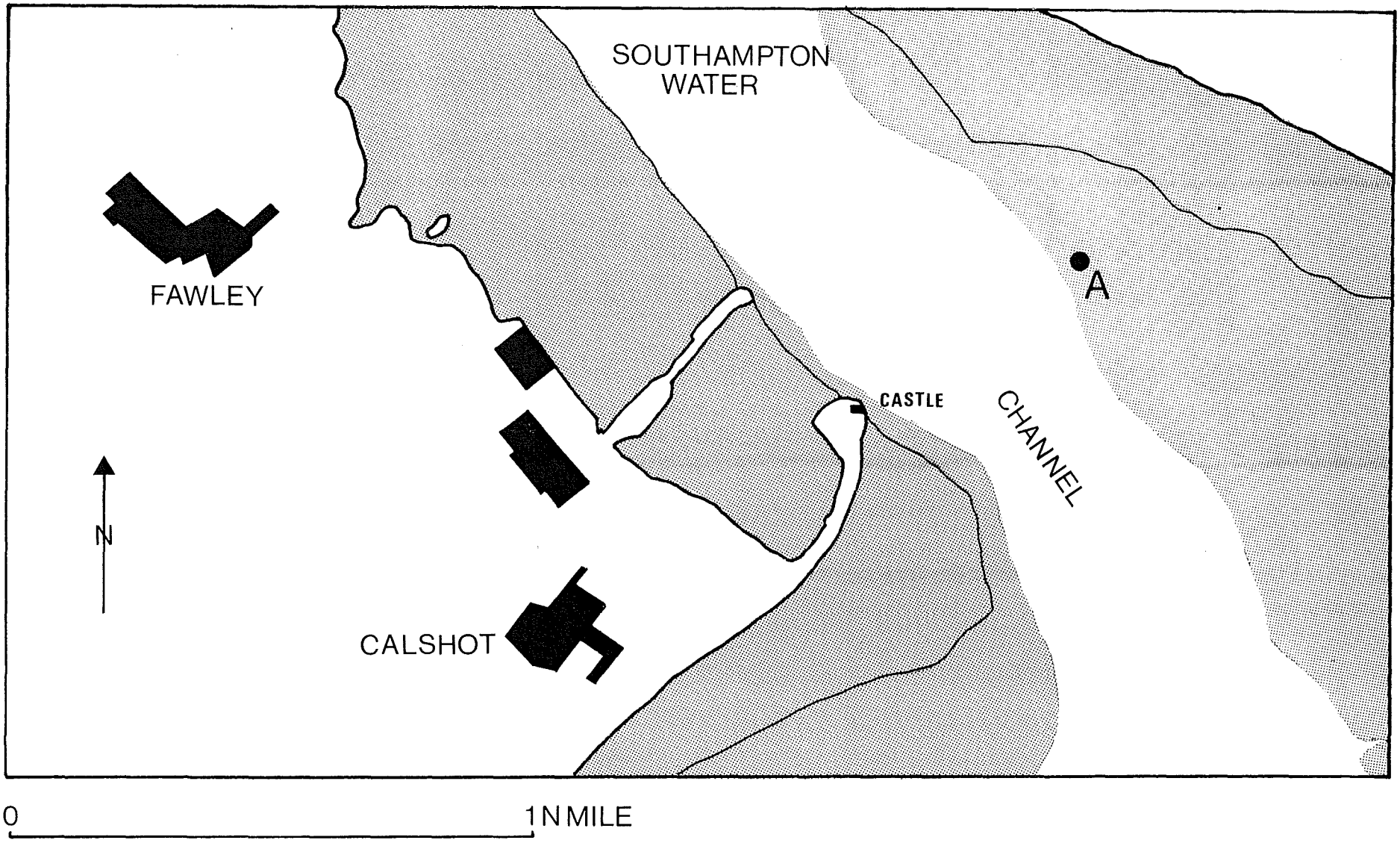
SHERD
DIMENSIONS

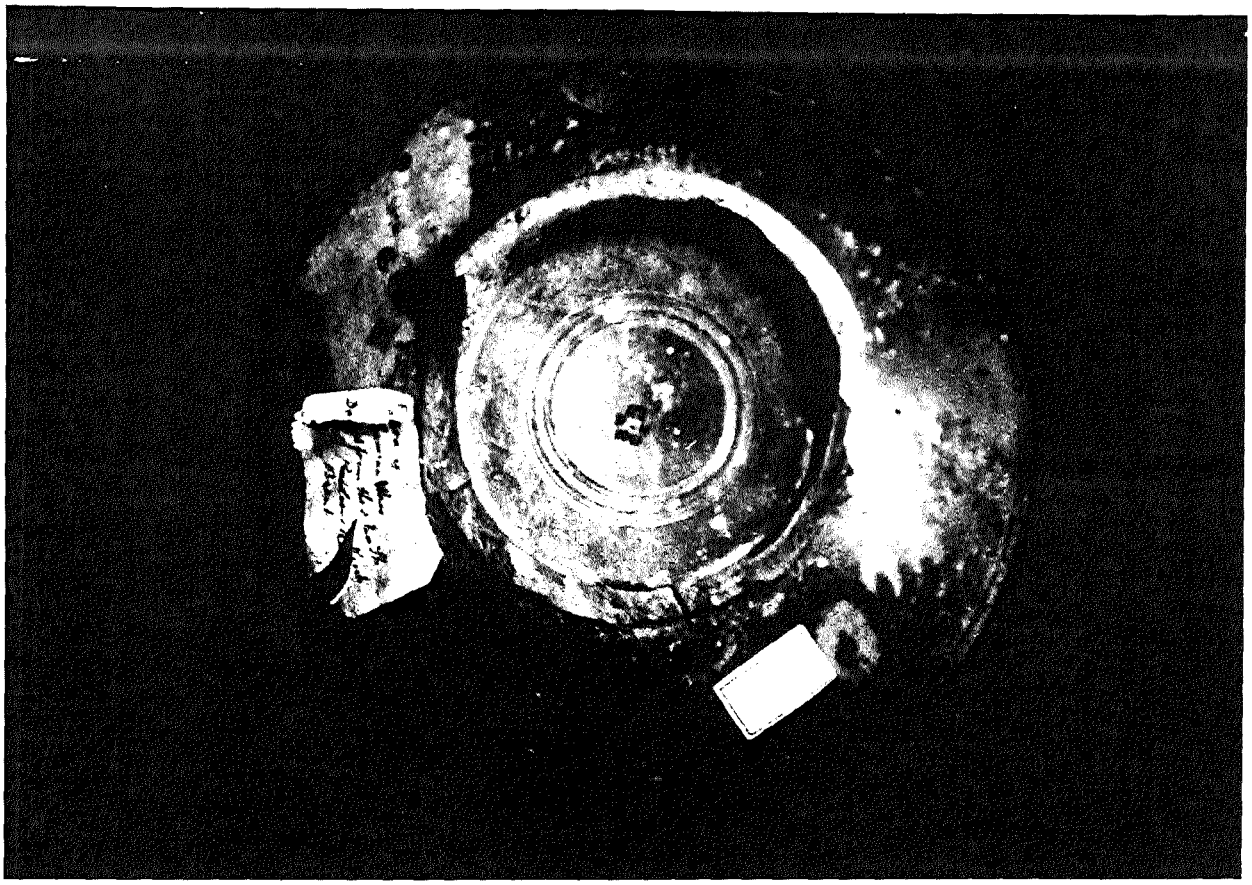
52


LONDON
WHITSTABLE
PAN SAND
MIDDLE SAND
PUDDING PAN
WHITSTABLE
0
10KM
N

PAN SAND


SOUTHAMPTON WATER
CALSHOT
BRAMBLE
BANK
RYDE
MIDDLE
YARMOUTH
ROADS
YARMOUTH
ISLE OF WIGHT
0
5KM
N


SOUTHAMPTON
WATER
FAWLEY
A
CASTLE
CHANNEL
N
CALSHOT
0
1 N MILE



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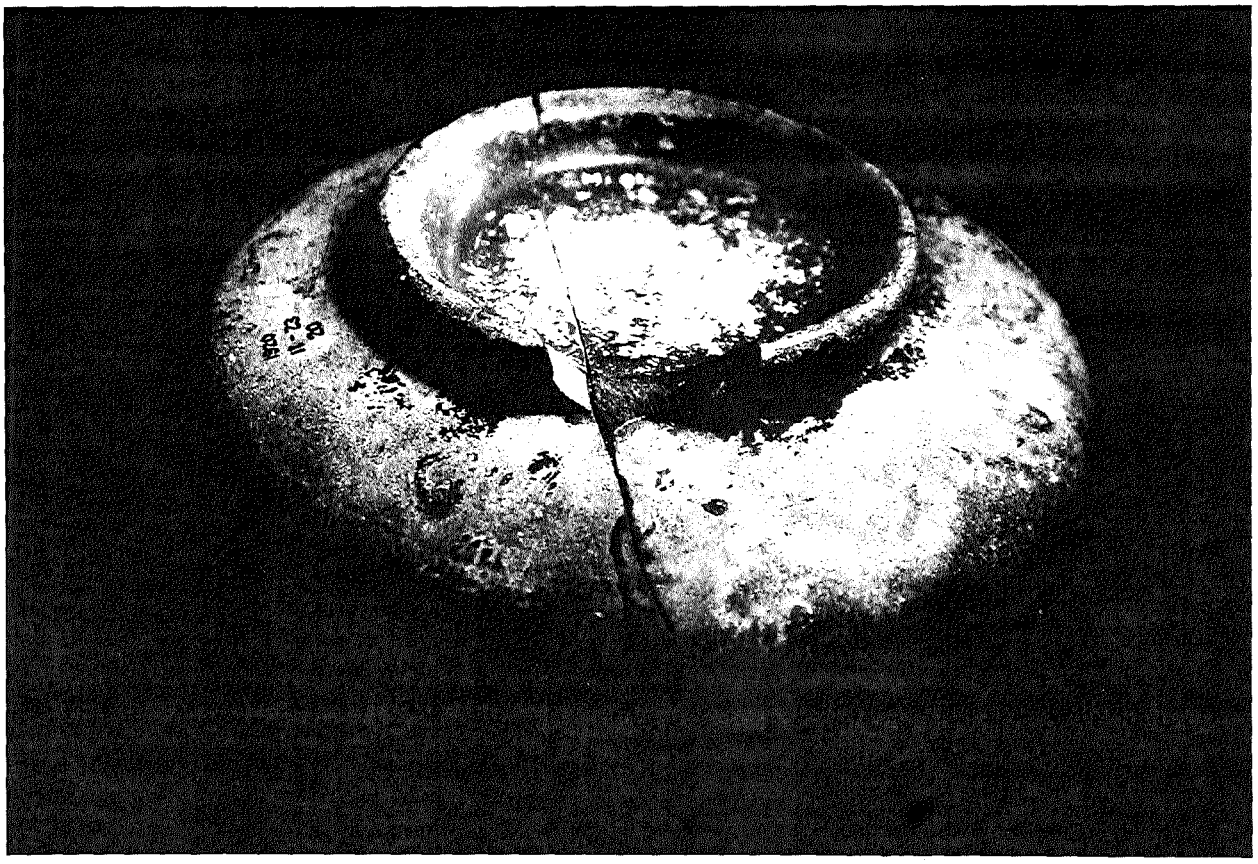
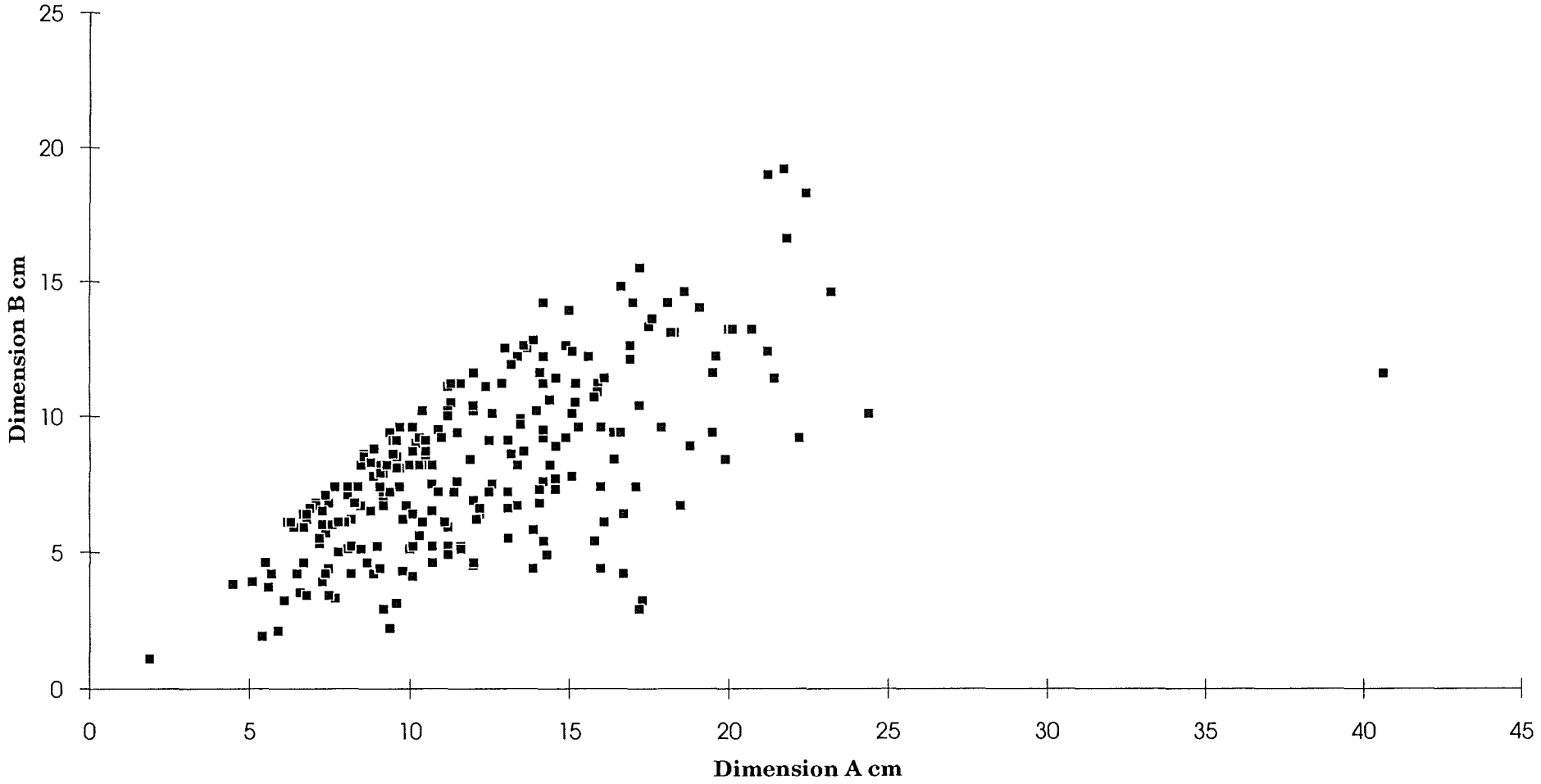
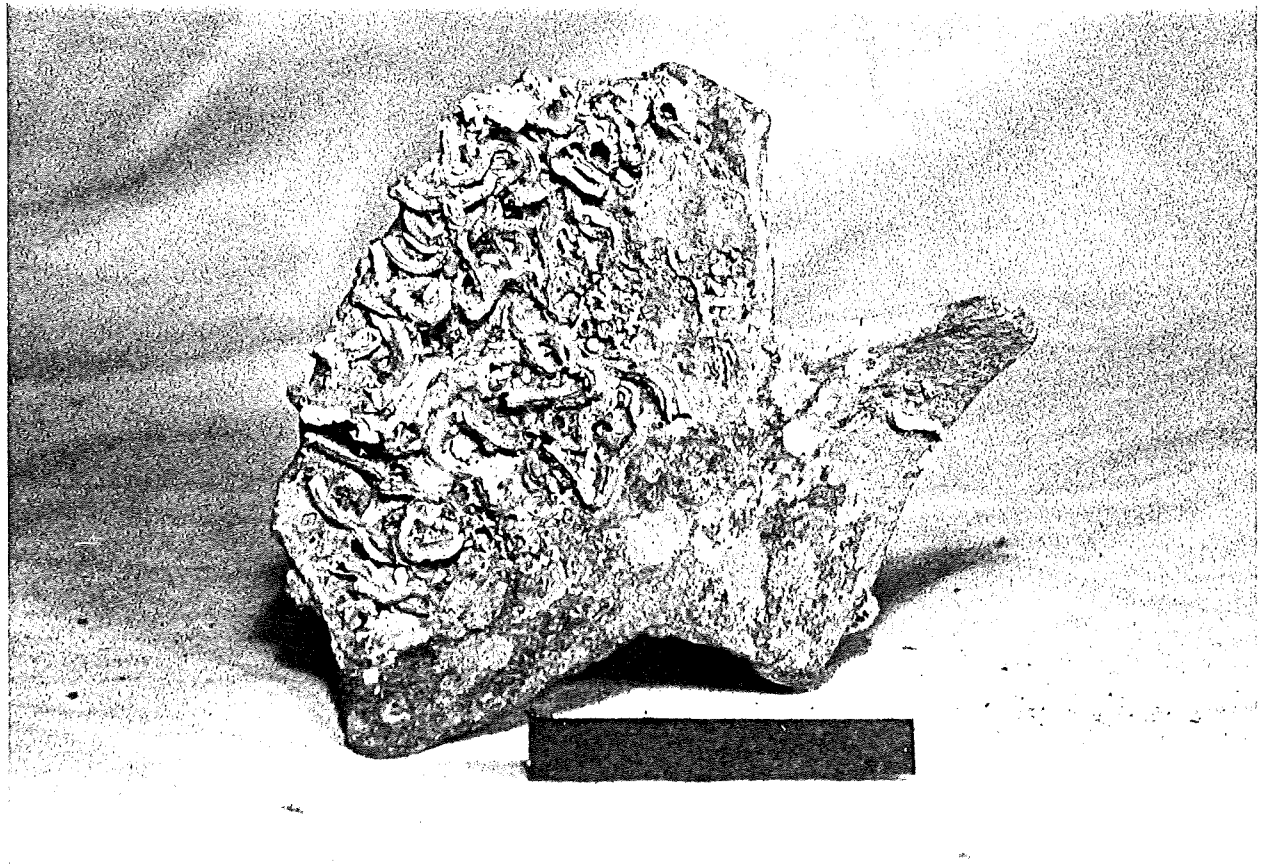


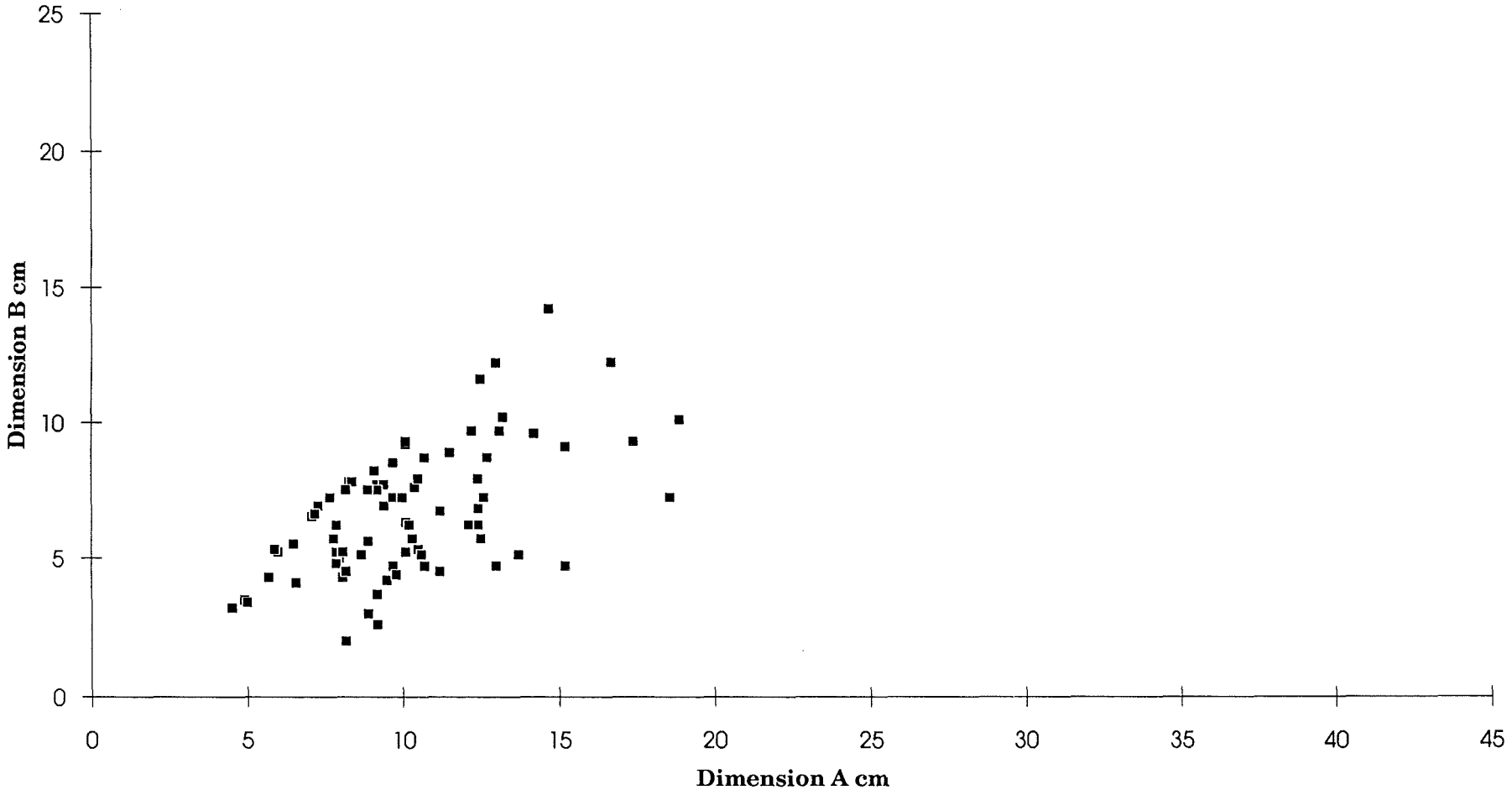
57

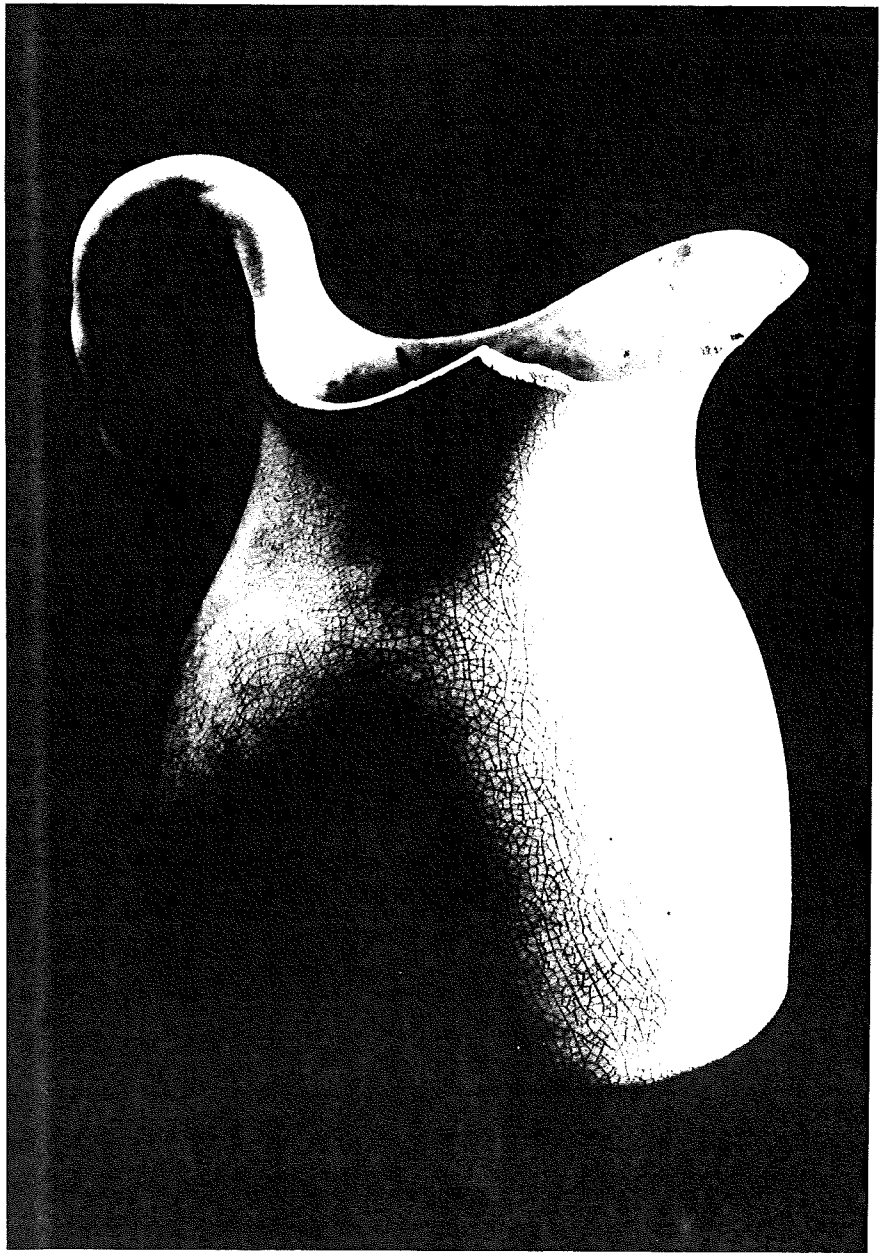
Ryde Middle Assemblage





Southampton Water Assemblage





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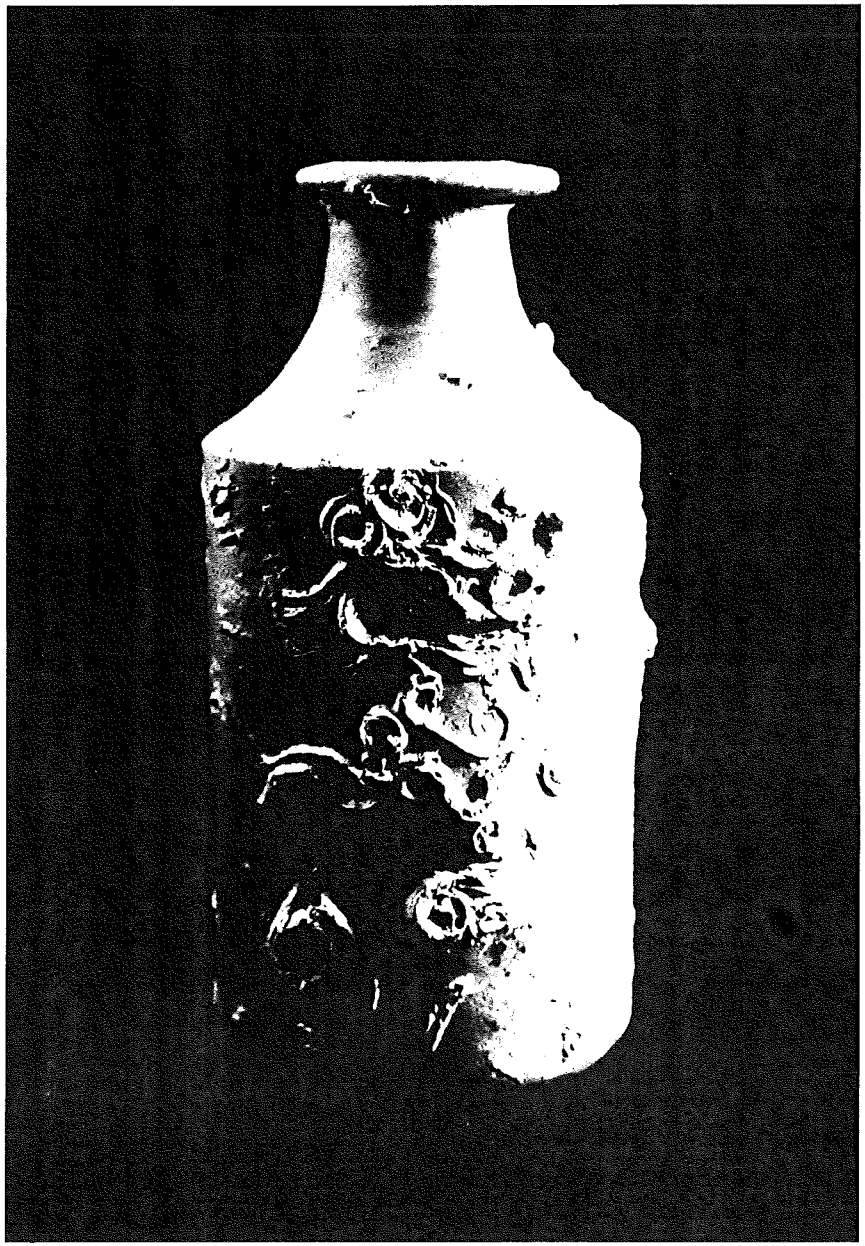

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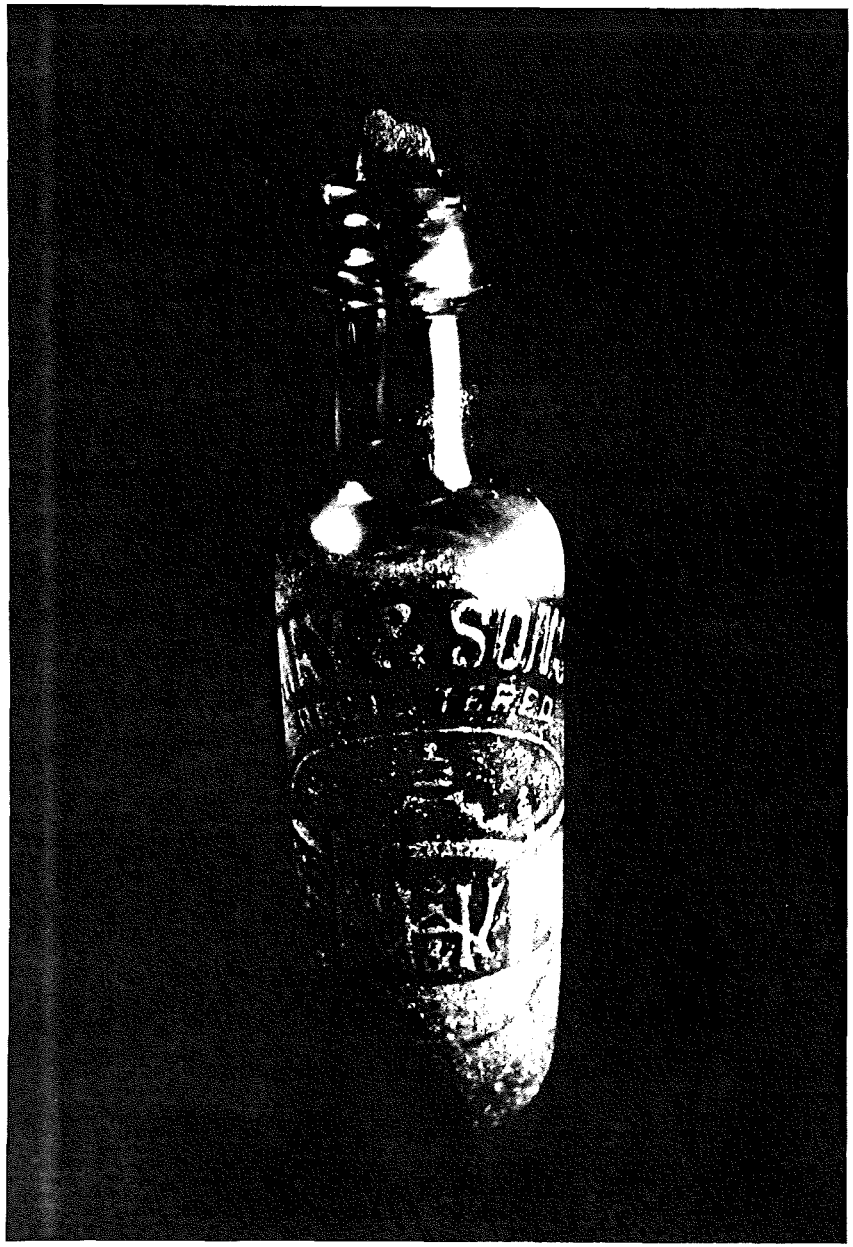
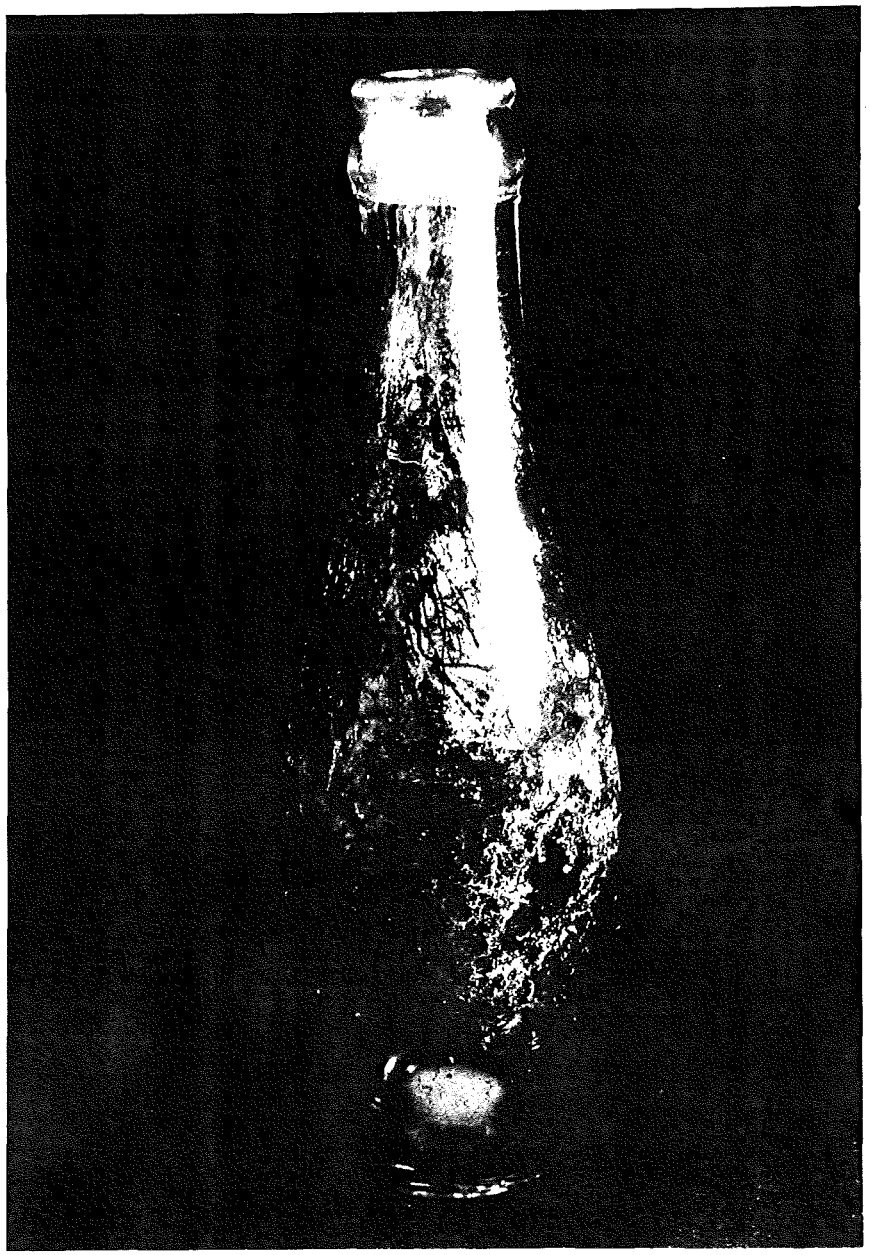
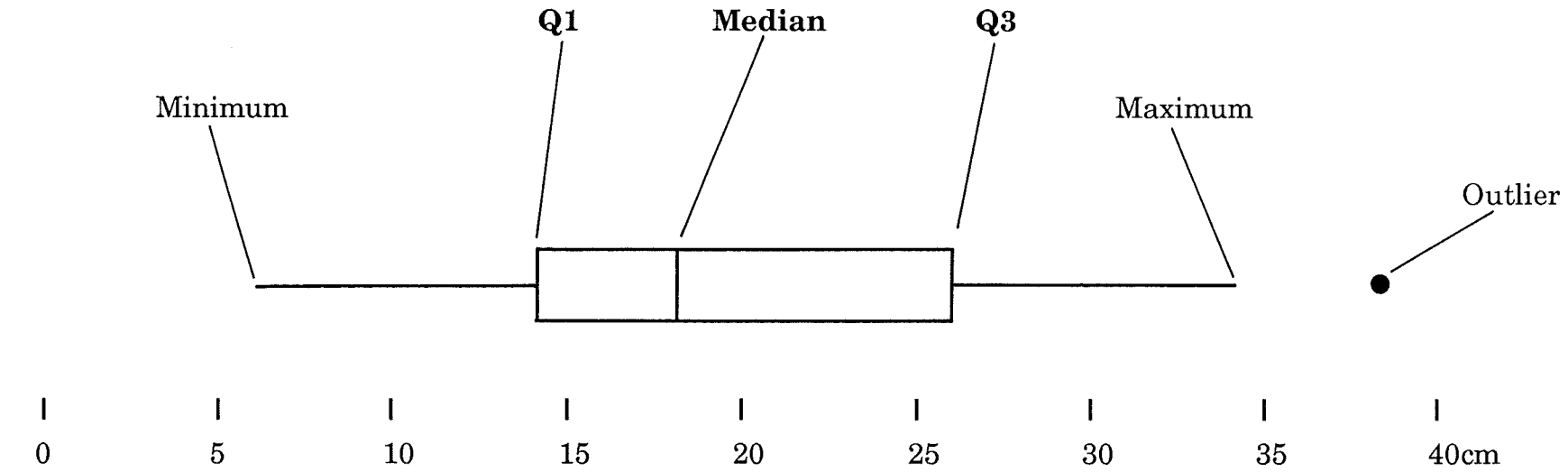


63



64

A Boxplot (or Box and Whisker Diagram)

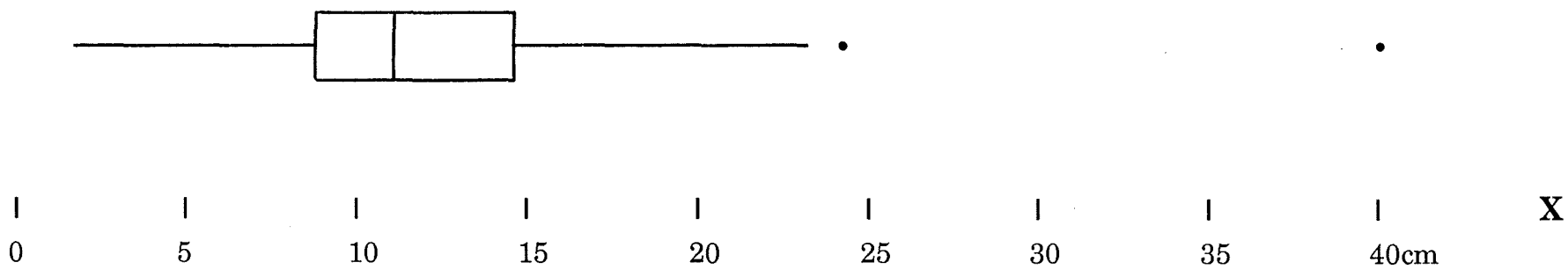


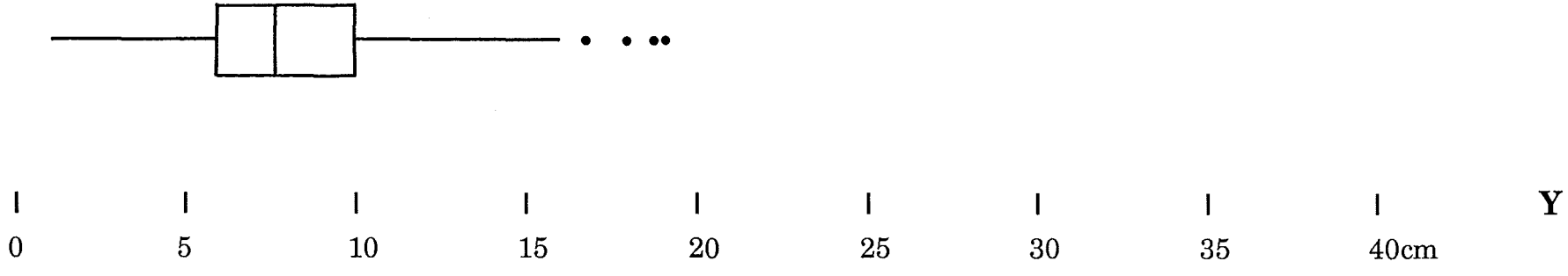
Boxplots are a graphical representation of a distribution. A boxplot divides a distribution according to the inter-quartile range.

On an appropriate scale the Median of a distribution is plotted as is Q1 (25% of the values in the distribution are less than Q1) and Q3 (75% of the values in a distribution are less than Q3). 50% of the distribution lies between Q1 and Q3 - this is referred to as the box. The whiskers run from the edges of the box to the maximum and minimum values (once outliers have been removed) as described below.

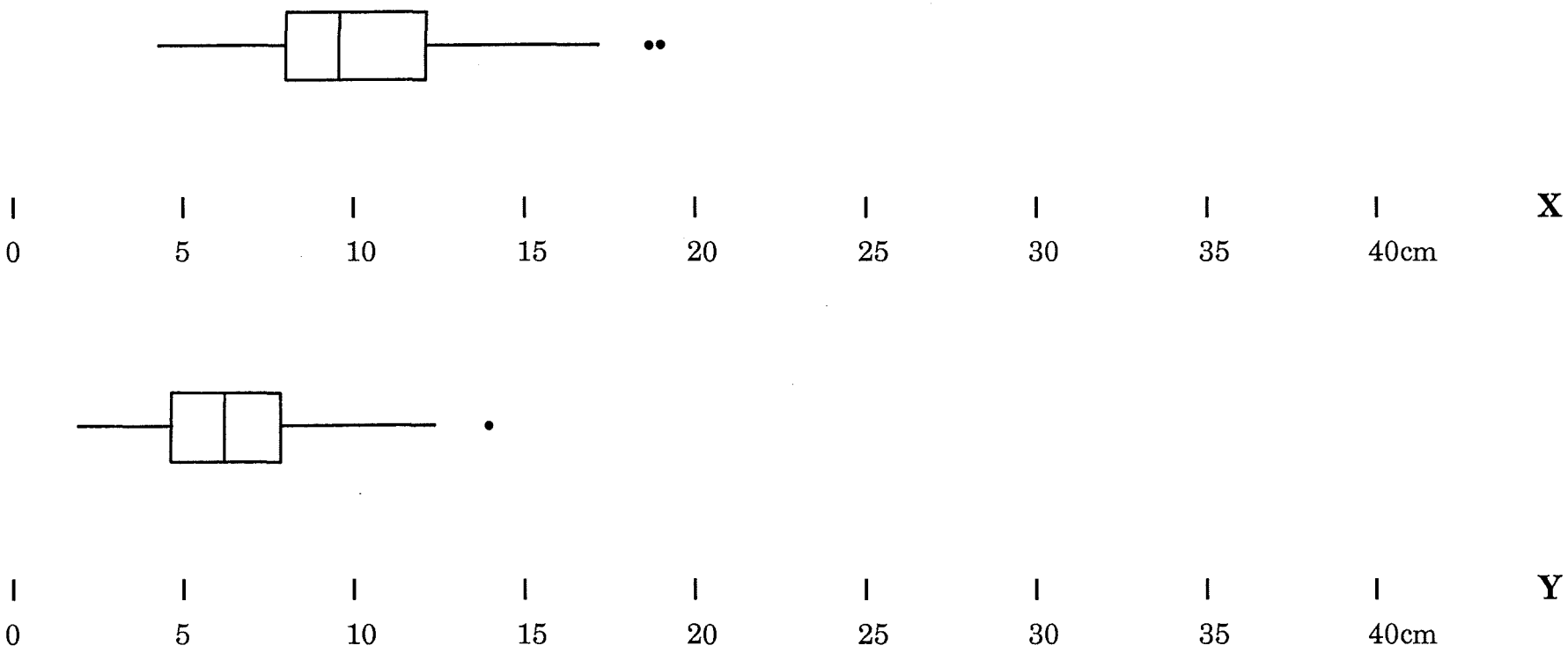
The difference between Q1 and Q2 is the H-spread. At a distance of 1.5 x H-spread from either edge of the box is the inner fence. At a distance of 3 x H-spread from either edge of the box lies the outer fence. Any values falling within these fences are outliers. The minimum and maximum values are established by ignoring all outliers. Longer whiskers denote greater range. An off-centre position for the Median within the box can indicate asymmetry within the distribution (Fletcher & Lock 1991, 47-49)

Sherd Dimensions Ryde Middle Bank Assemblage



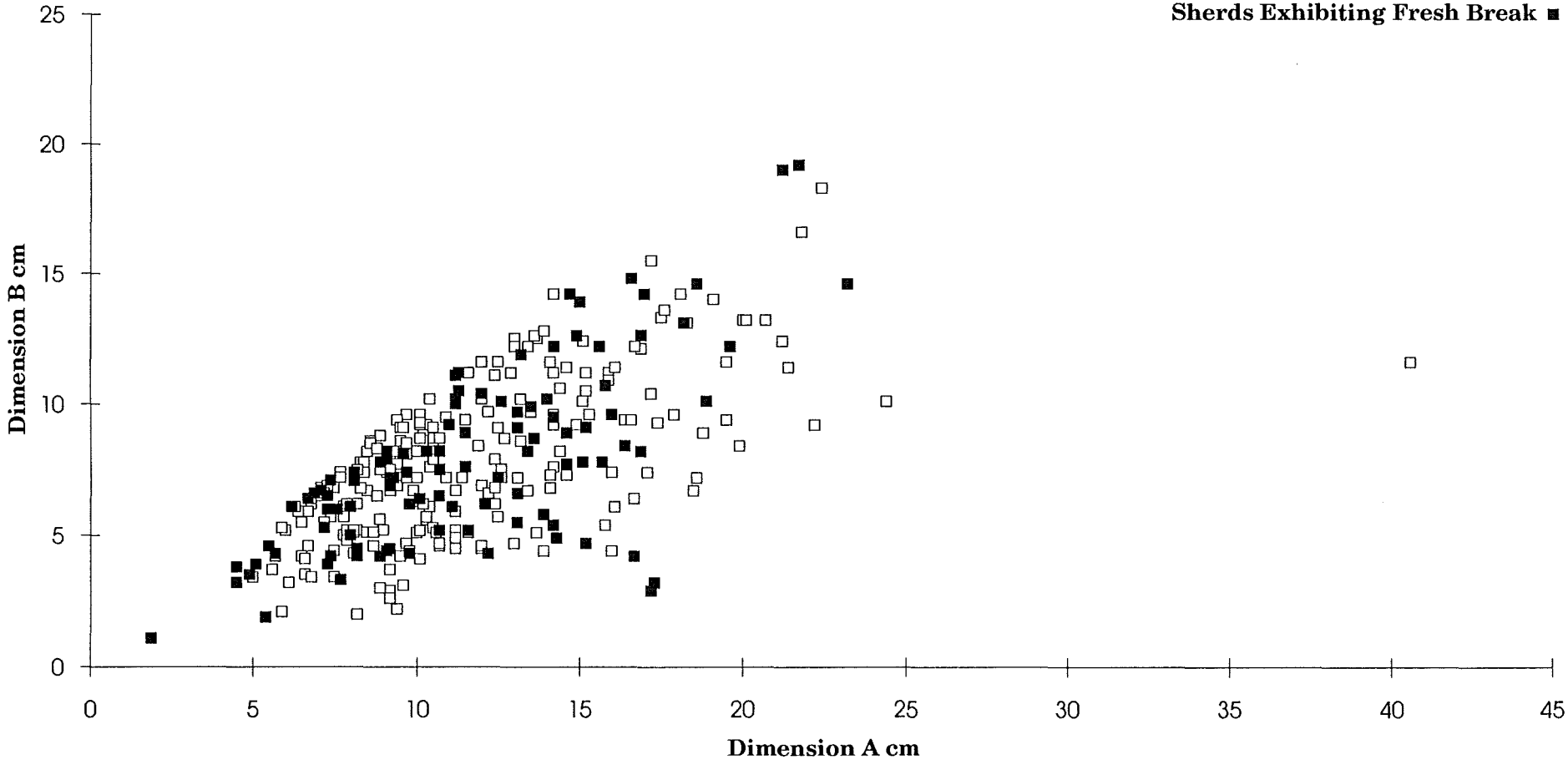


Sherd Dimensions Southampton Water Assemblage

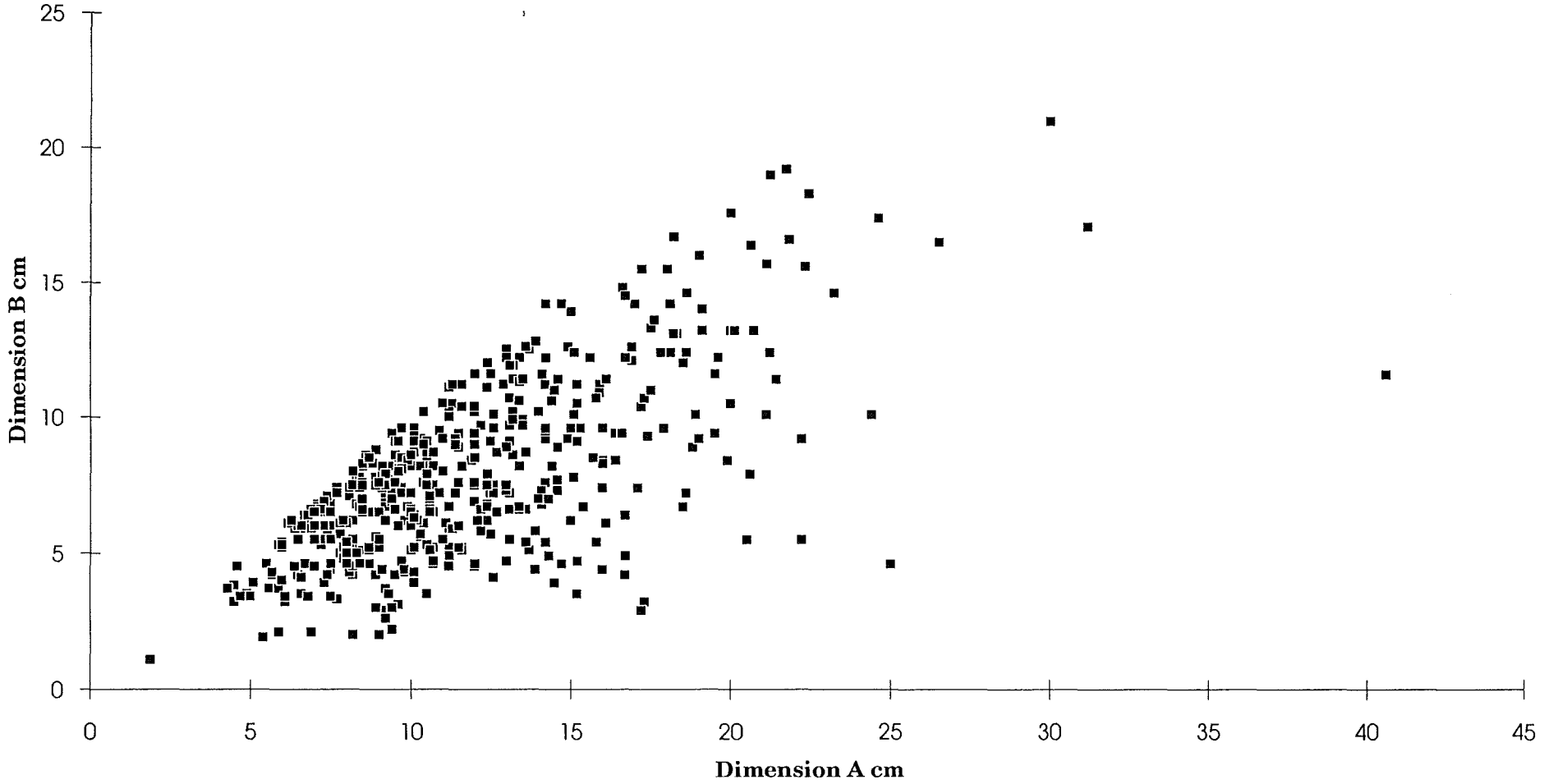


C

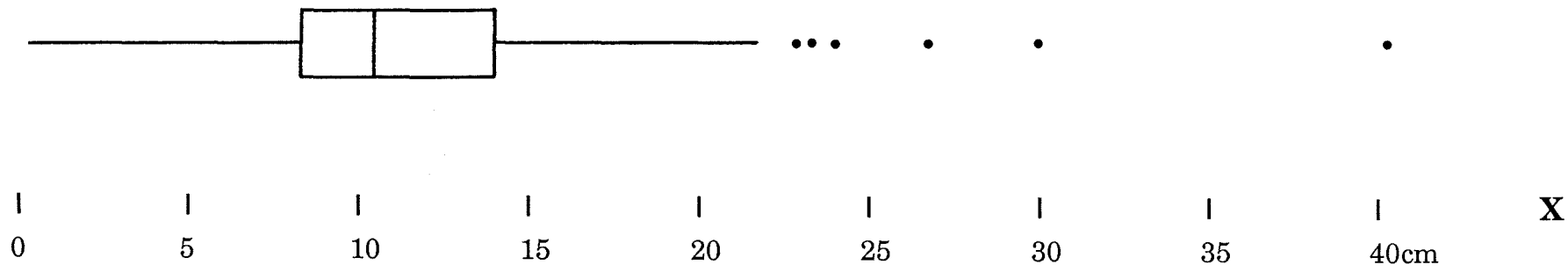
Sherds Exhibiting Fresh Breaks Within The Ryde Middle And Southampton Water Assemblages

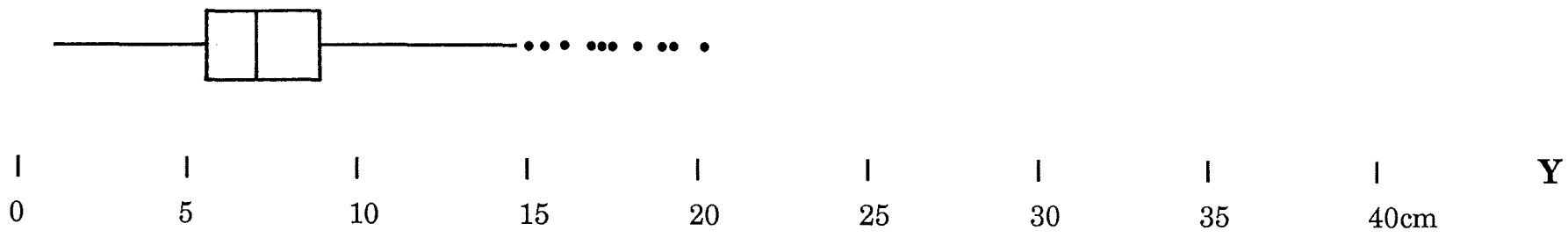


Total Ceramic Assemblage

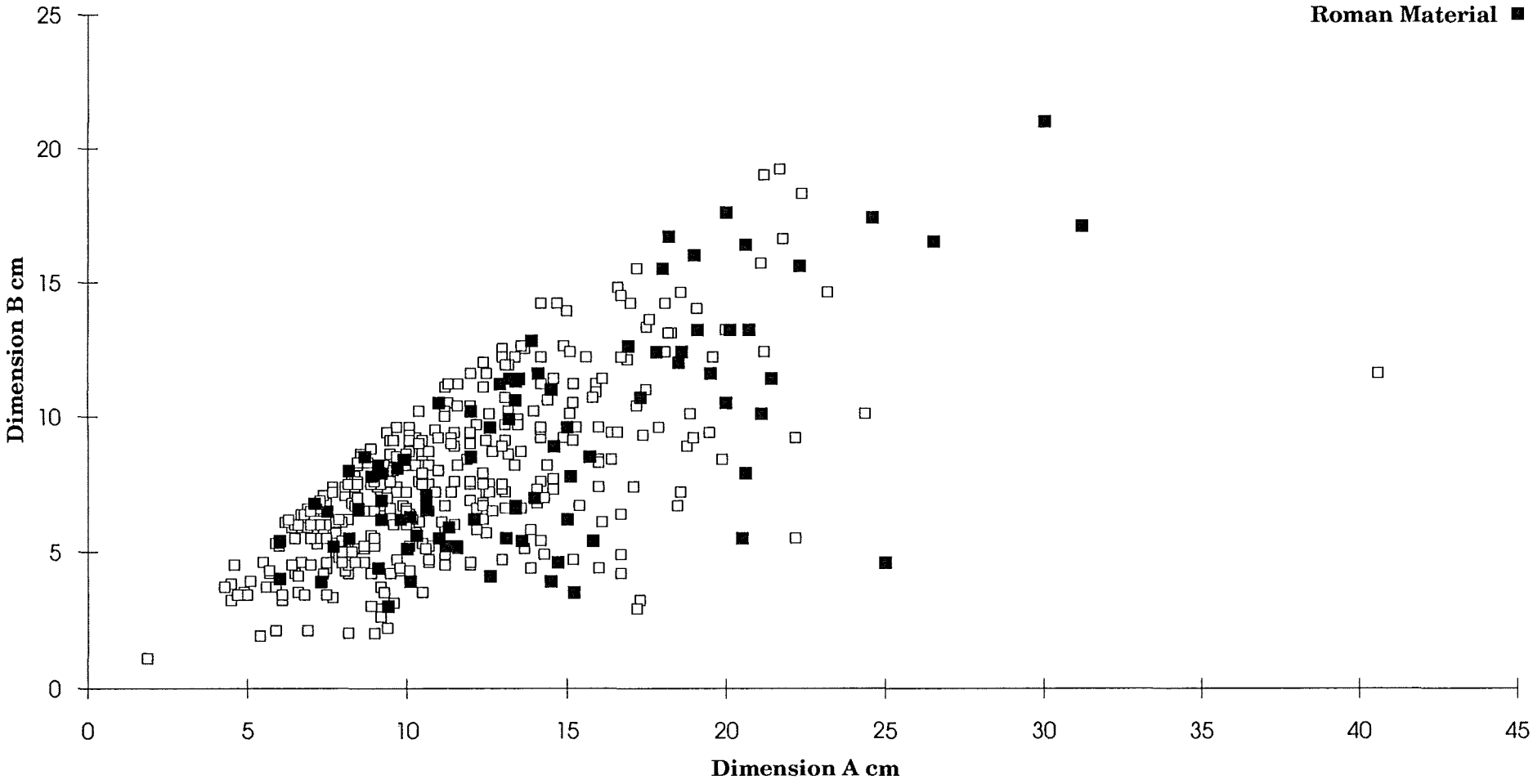


Sherd Dimensions Aggregate Assemblage

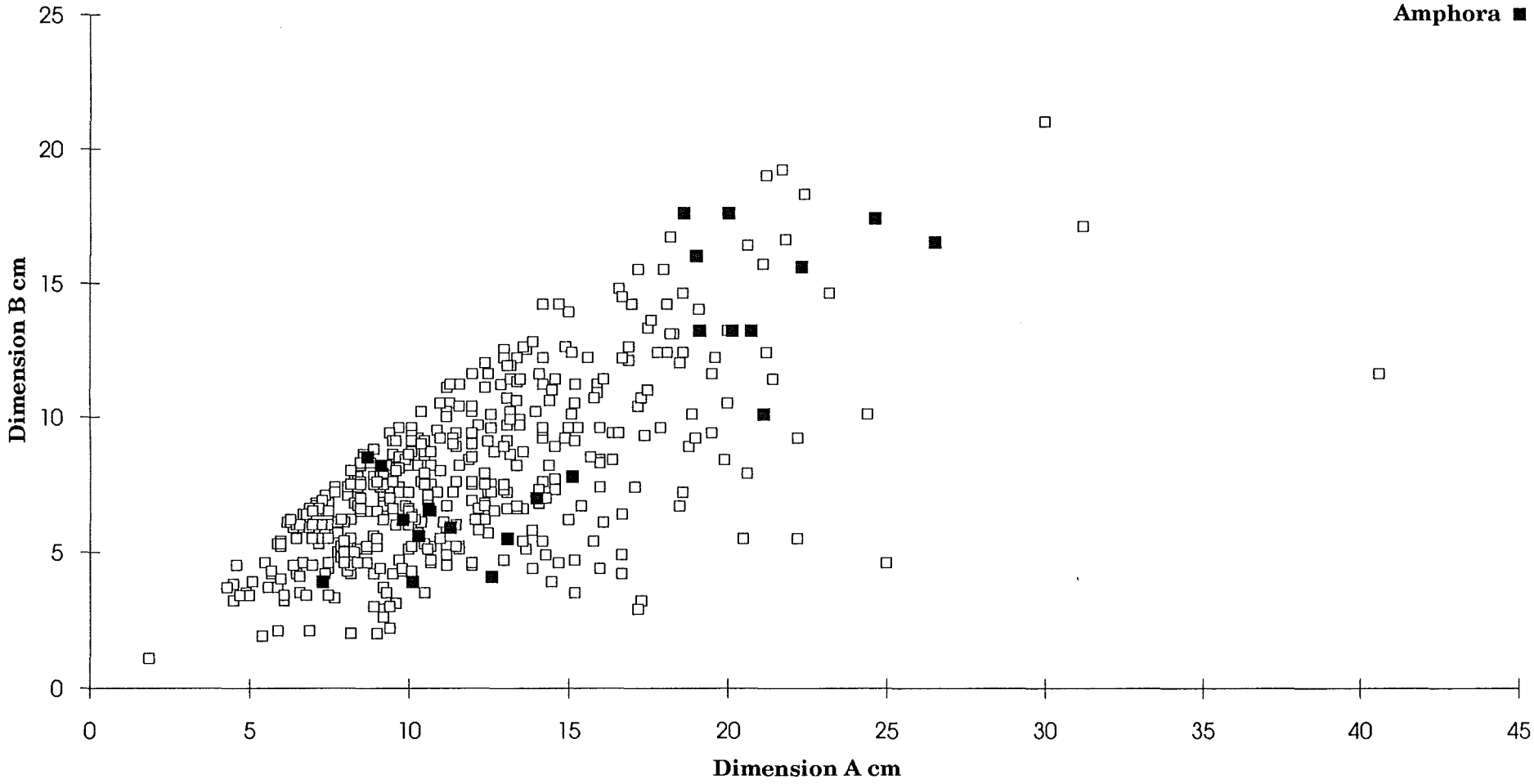




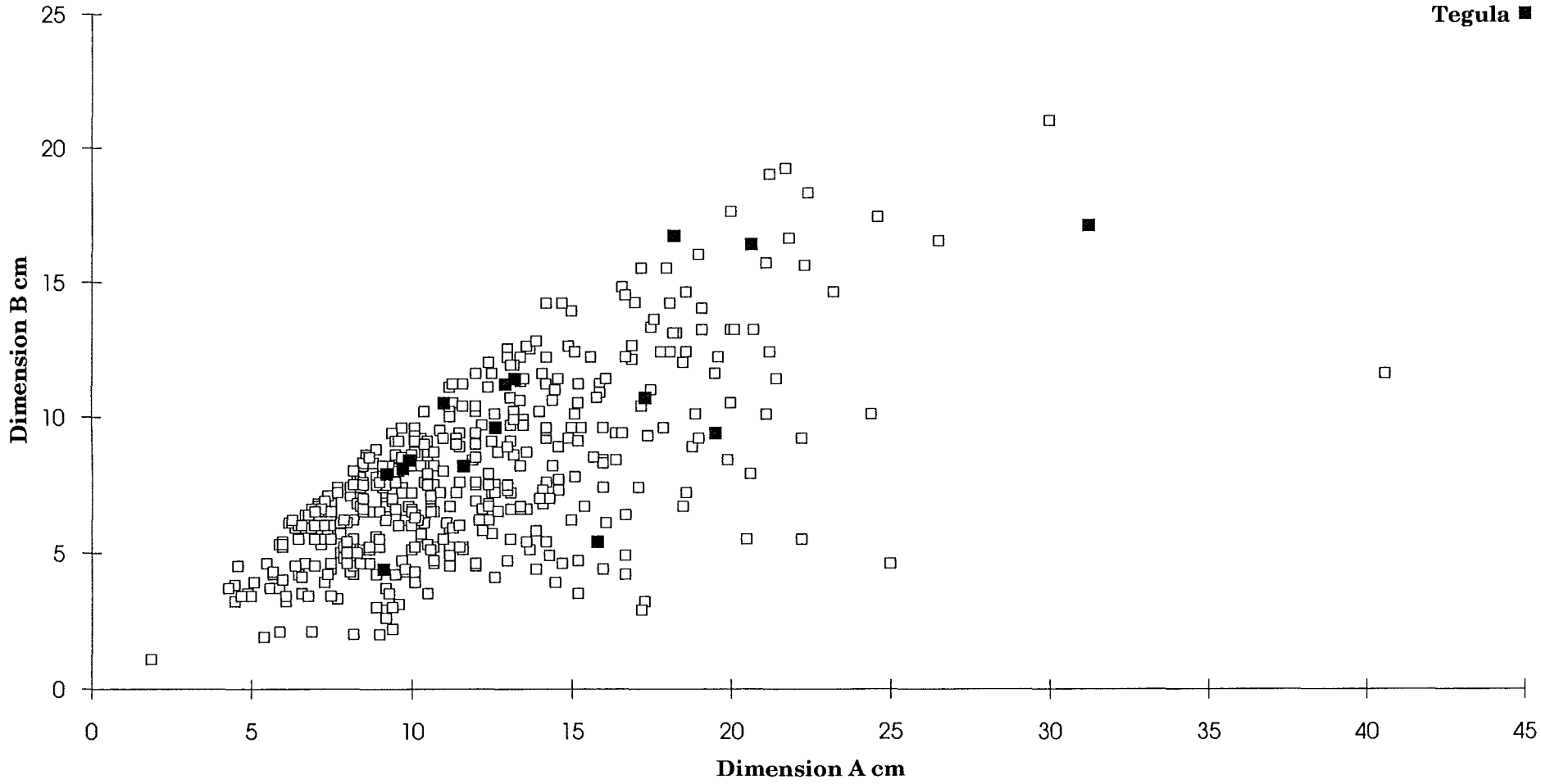
Roman Material Within The Total Ceramic Assemblage

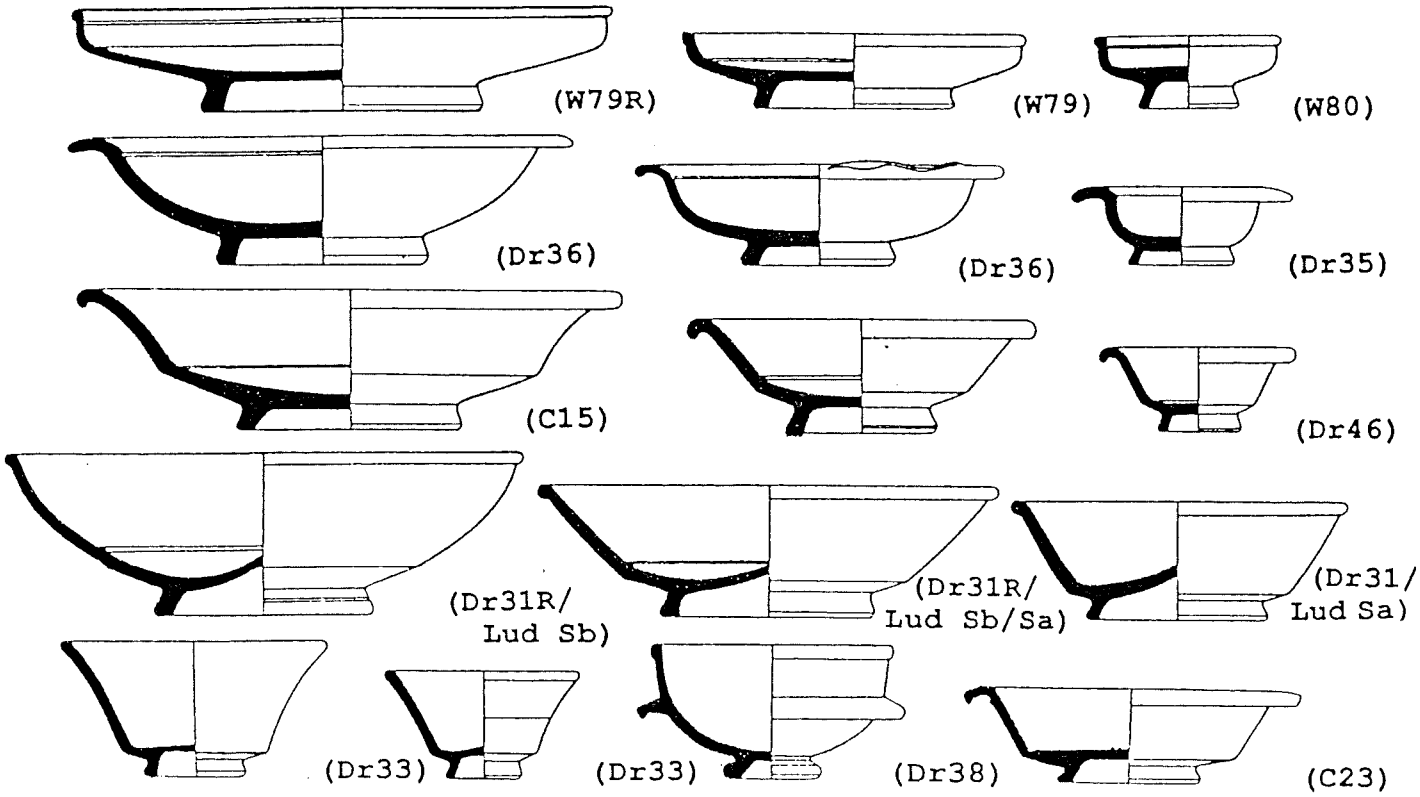


Amphora Sherds Within The Total Ceramic Assemblage



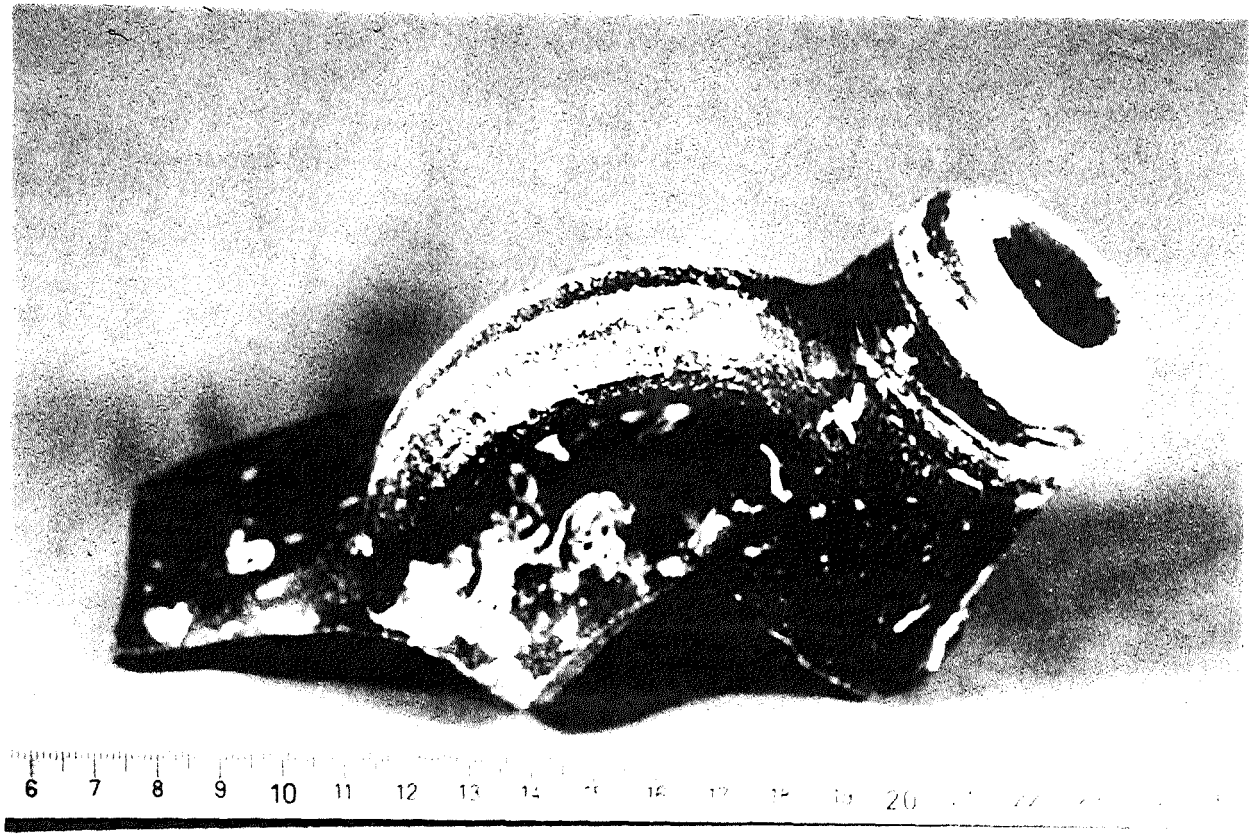
Tegula Within The Total Ceramic Assemblage



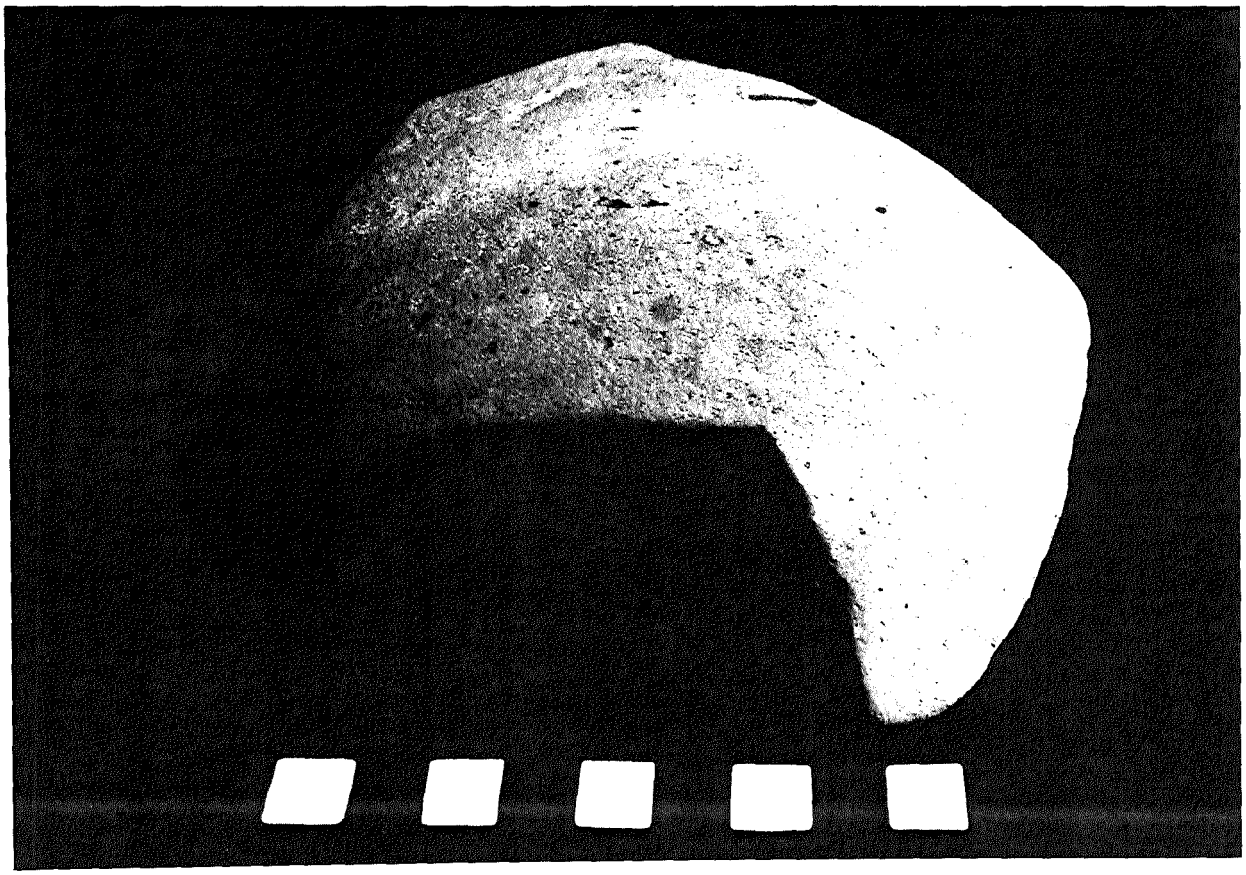


Samian Forms Recovered from Pan Sand and Pudding Pan Rock, Thames Estuary

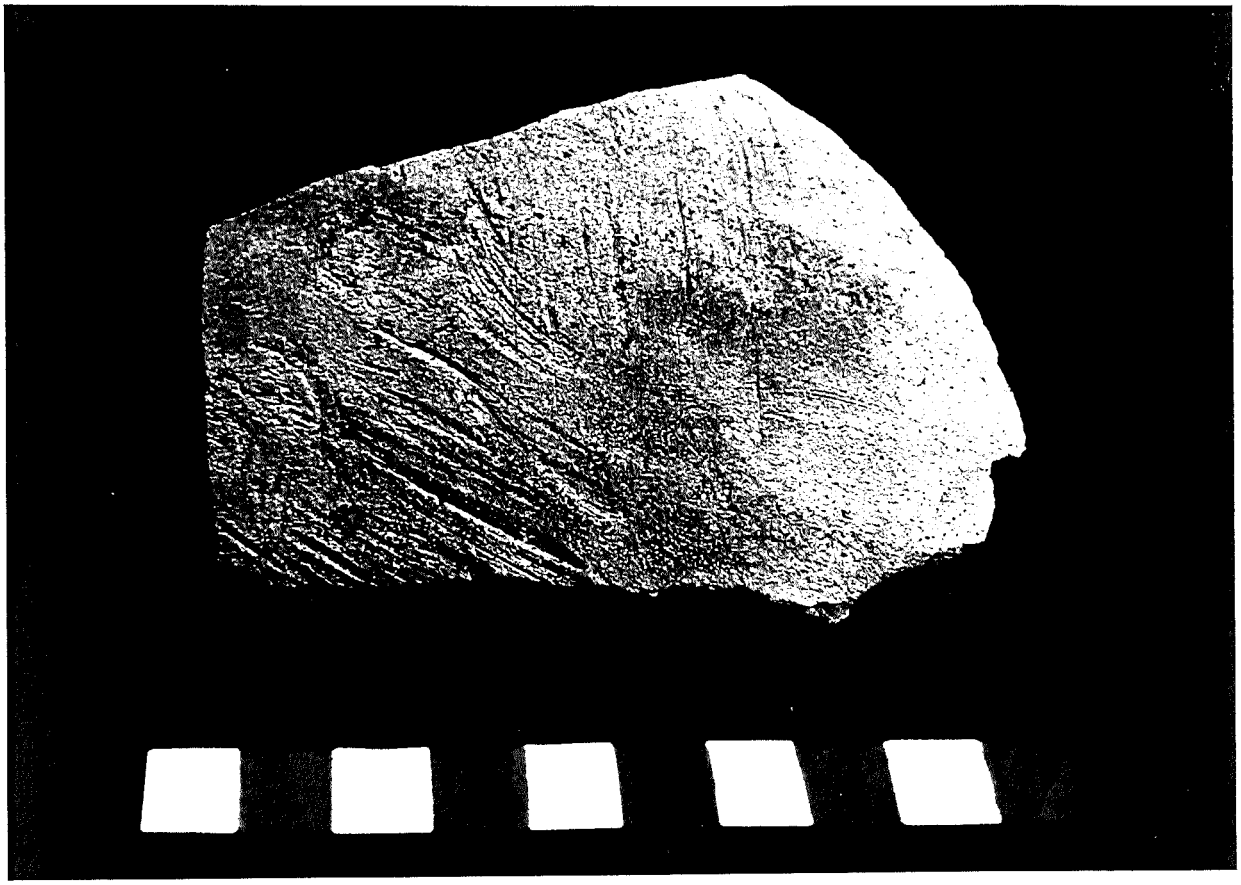
(courtesy of Mr. K. Watson)



73



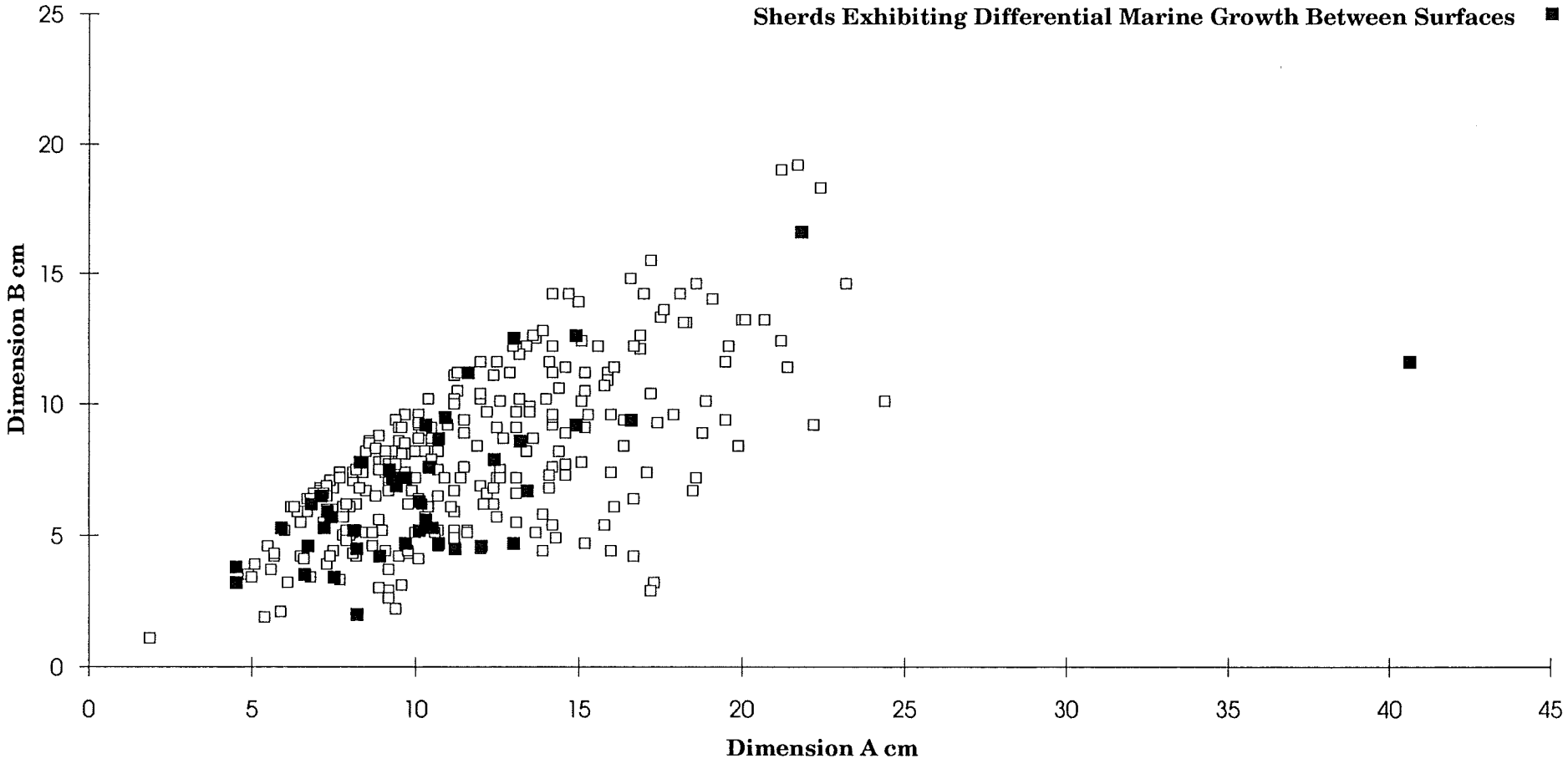
74

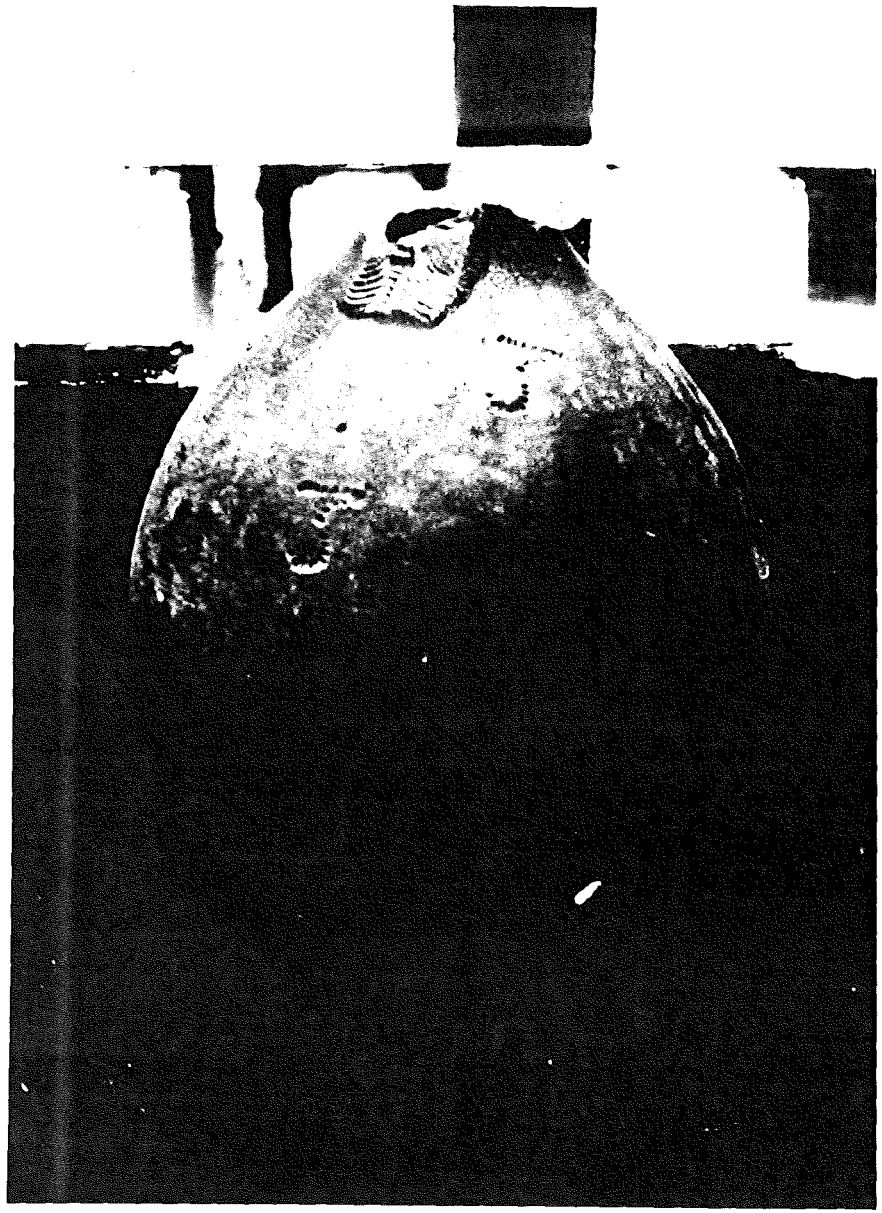


75

76

Differential Marine Growth Within Ryde Middle And Southampton Water Assemblages





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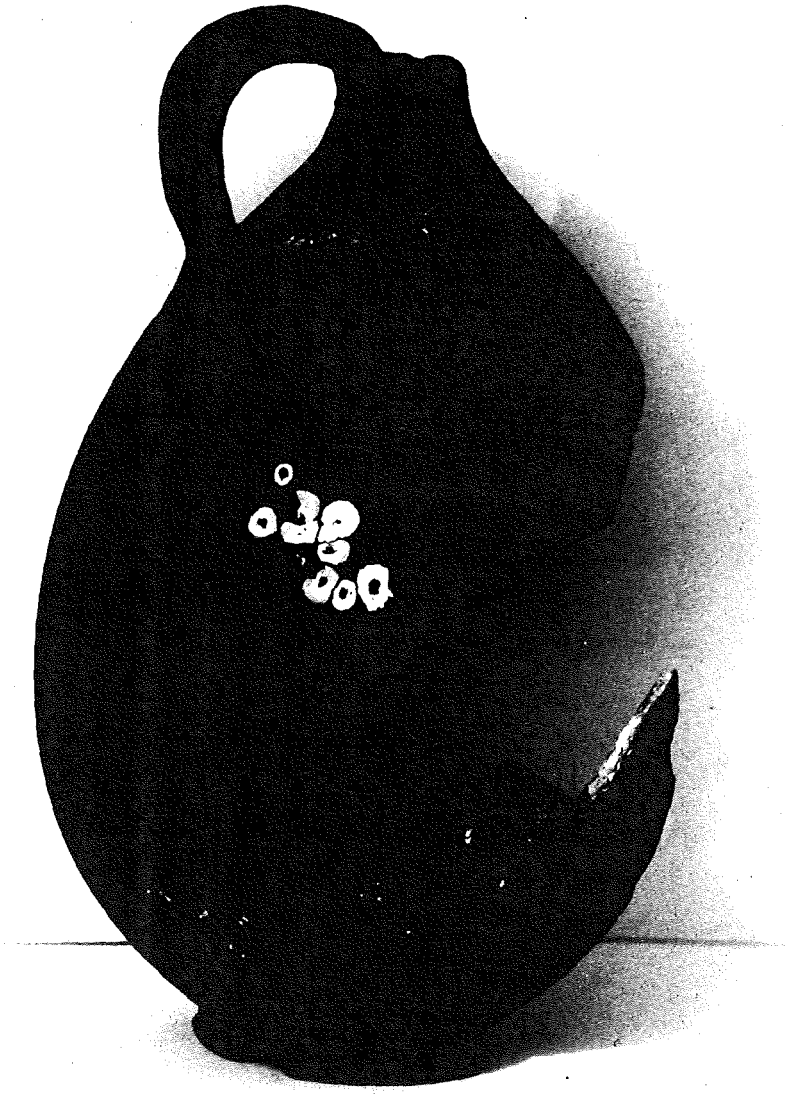
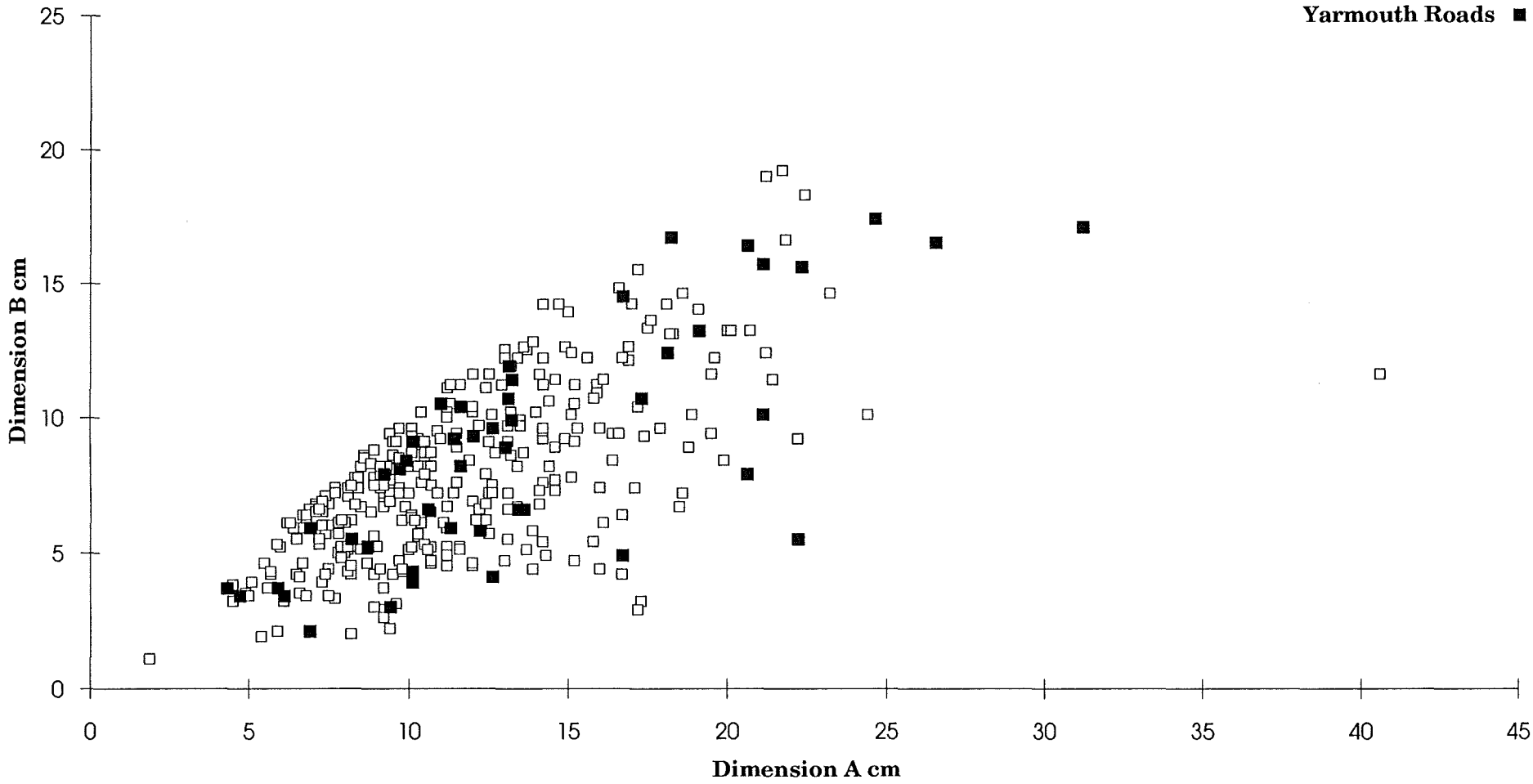
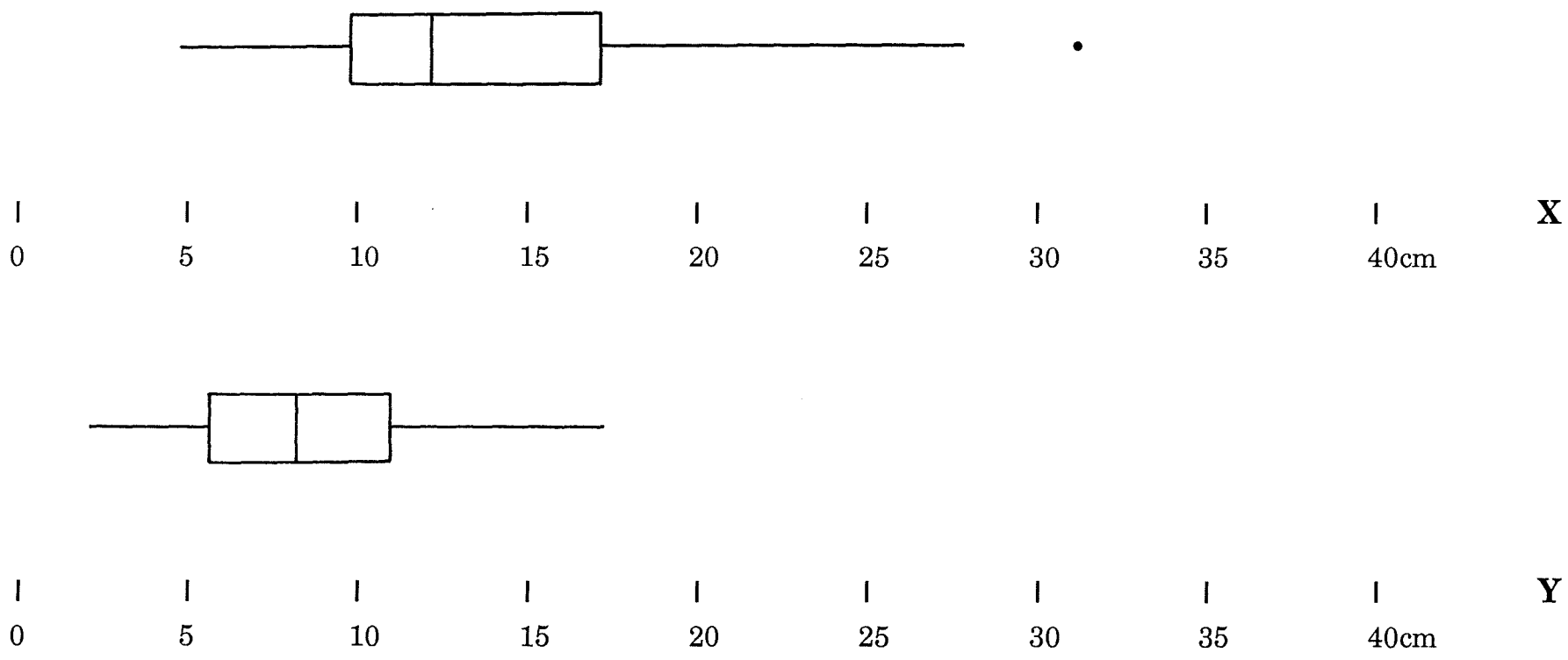


81

Ryde Middle, Southampton Water and Yarmouth Roads Assemblages



Sherd Dimensions Yarmouth Roads Assemblage



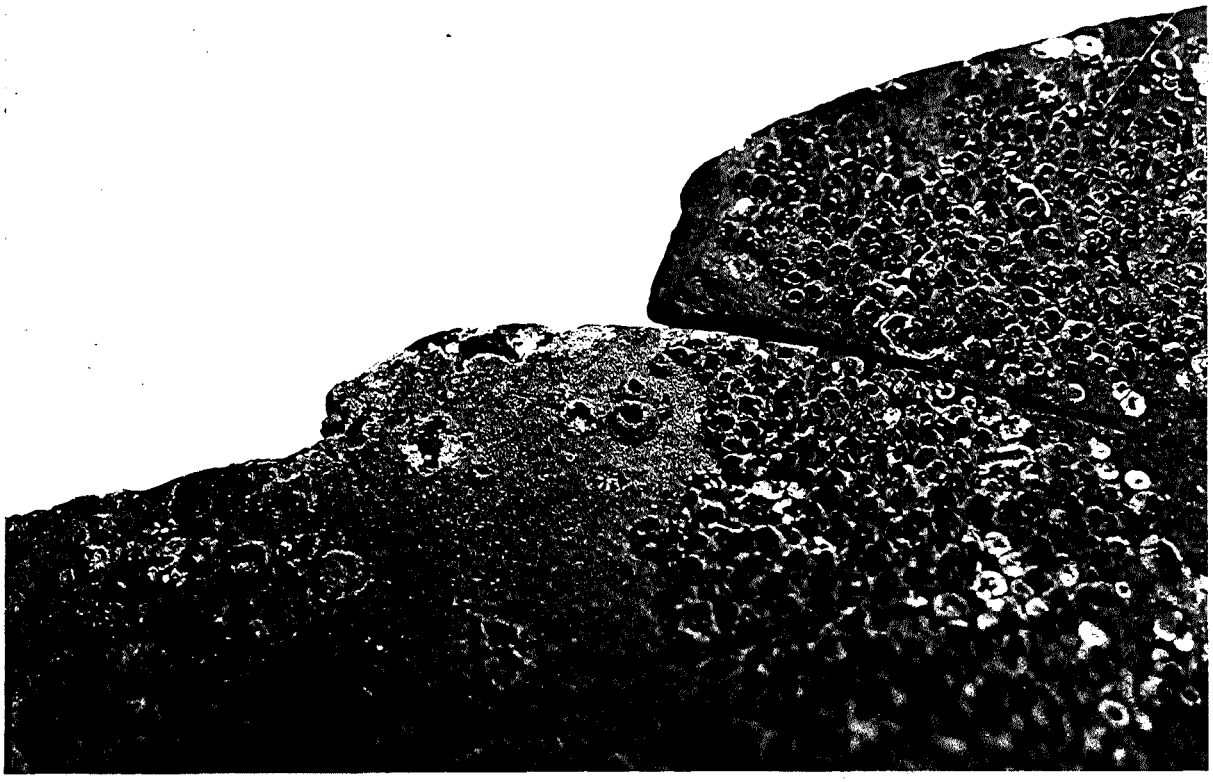
Sherd 5021 Outer Surface, Dressel 20 amphora fragment

Fracture encrusted with marine growth
Fracture, fresh except very light staining
Fracture, stained with light erosion
Barnacles (Fish & Fish 1989, 292-4)
Tube building worm (*Pomatoceros (L.)*, Fish & Fish 1989, 175)
Bryozoa (Ryland 1976)

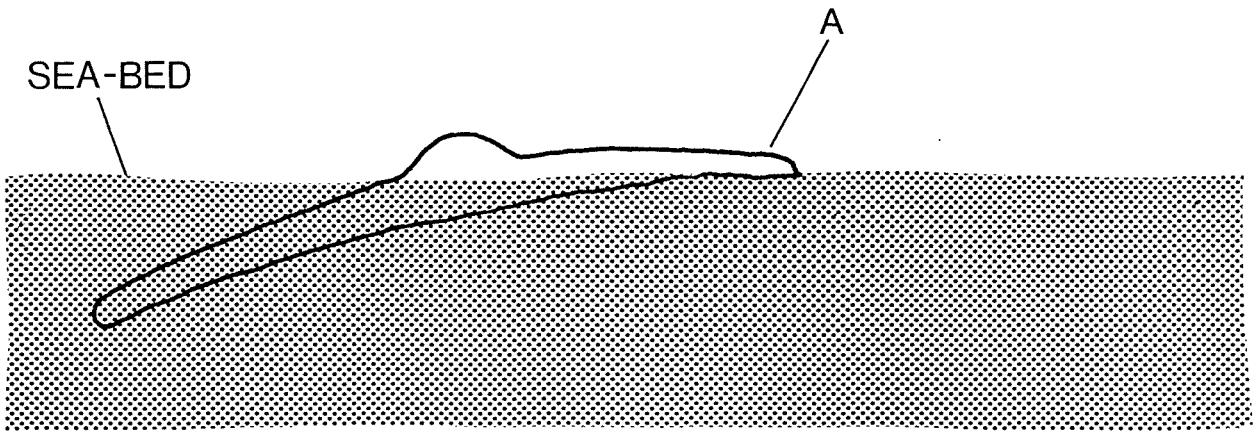
Sherd 5021 Inner Surface,
Dressel 20 Amphora Fragment

Fracture encrusted with marine growth
Fracture, fresh except very light staining
Fracture, stained with light erosion
Barnacles (Fish & Fish 1989, 292-4)
Tube building worm (*Pomatoceros (L.)*, Fish & Fish 1989, 175)
Bryozoa (Ryland 1976)

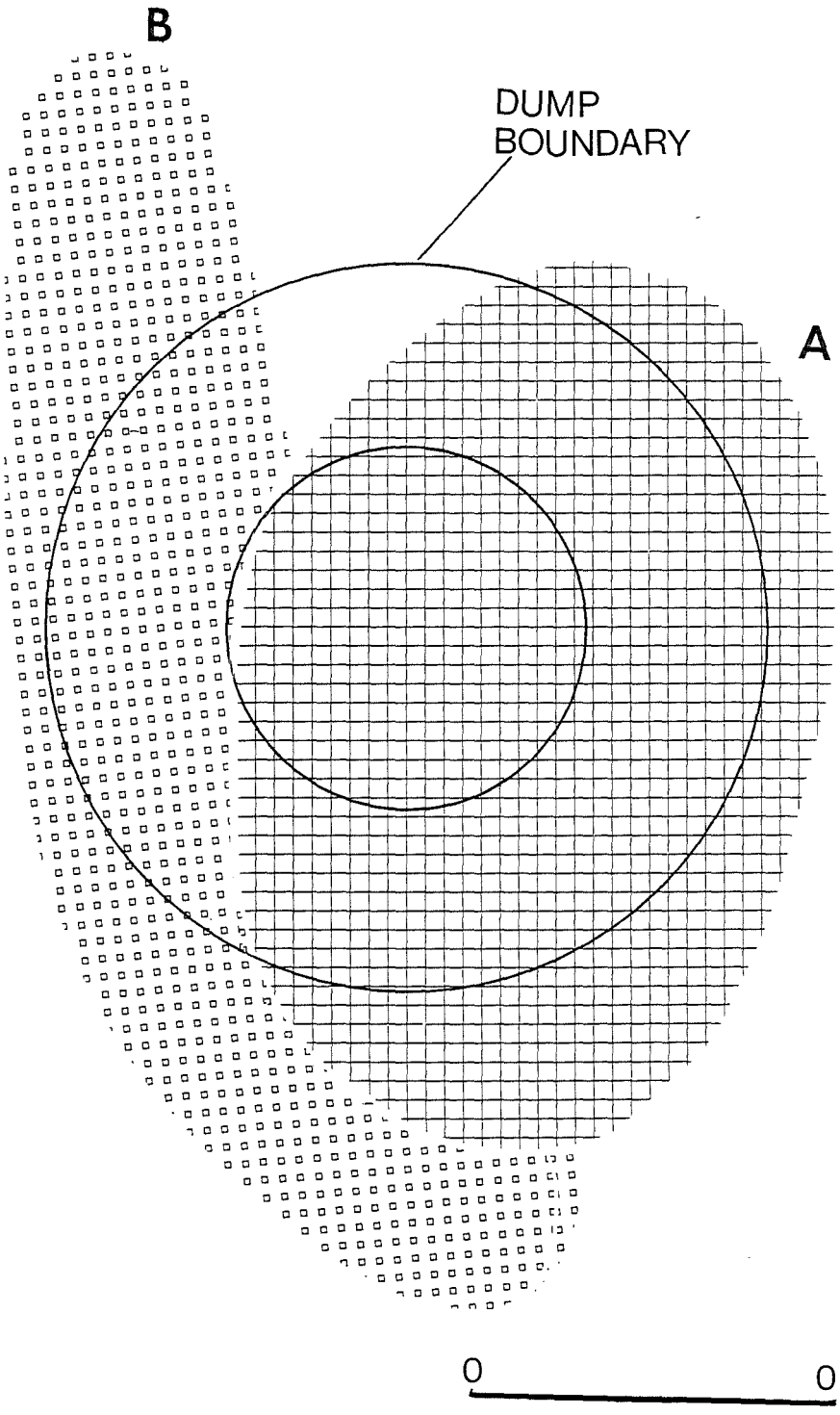
B

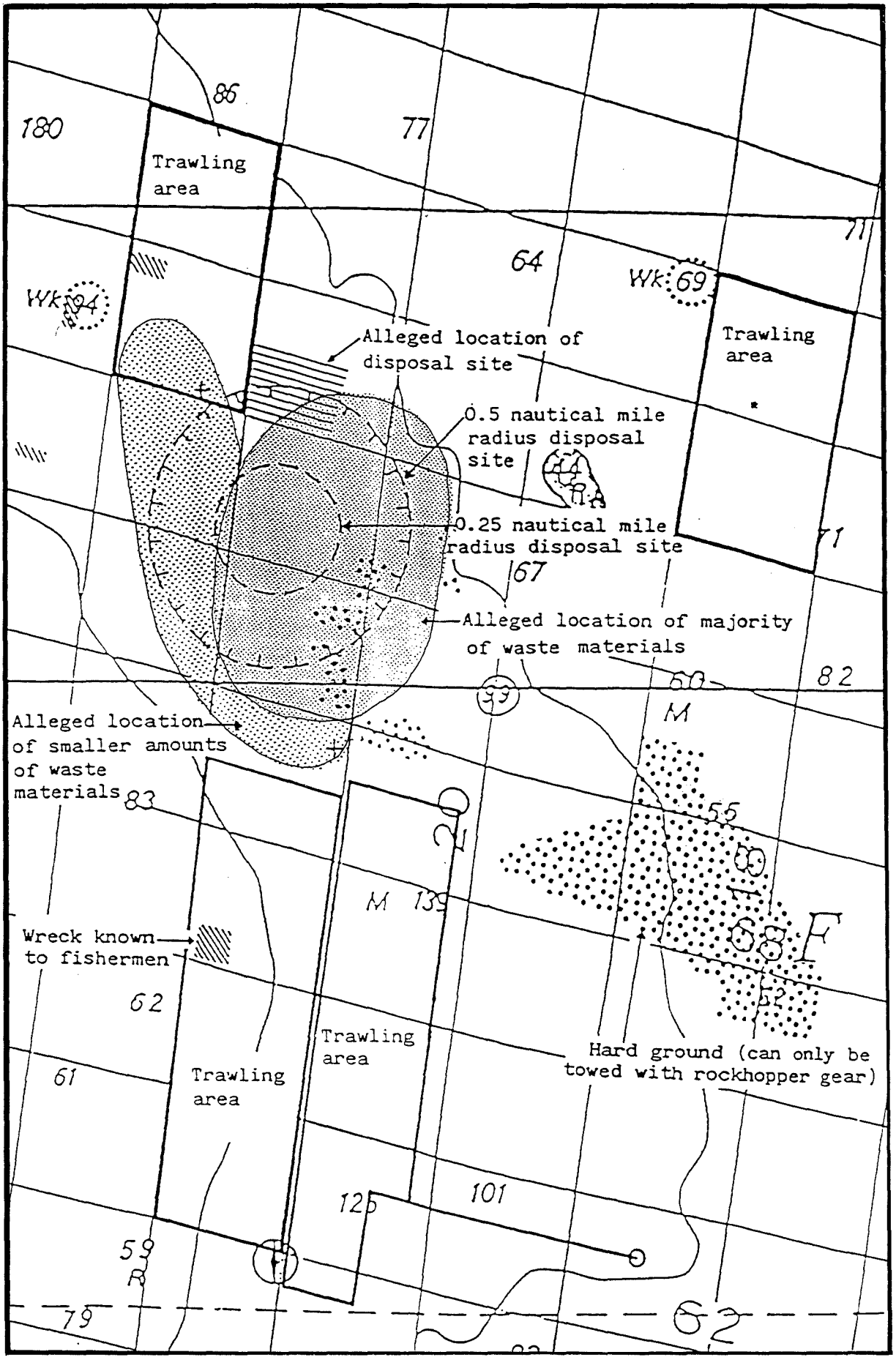


85

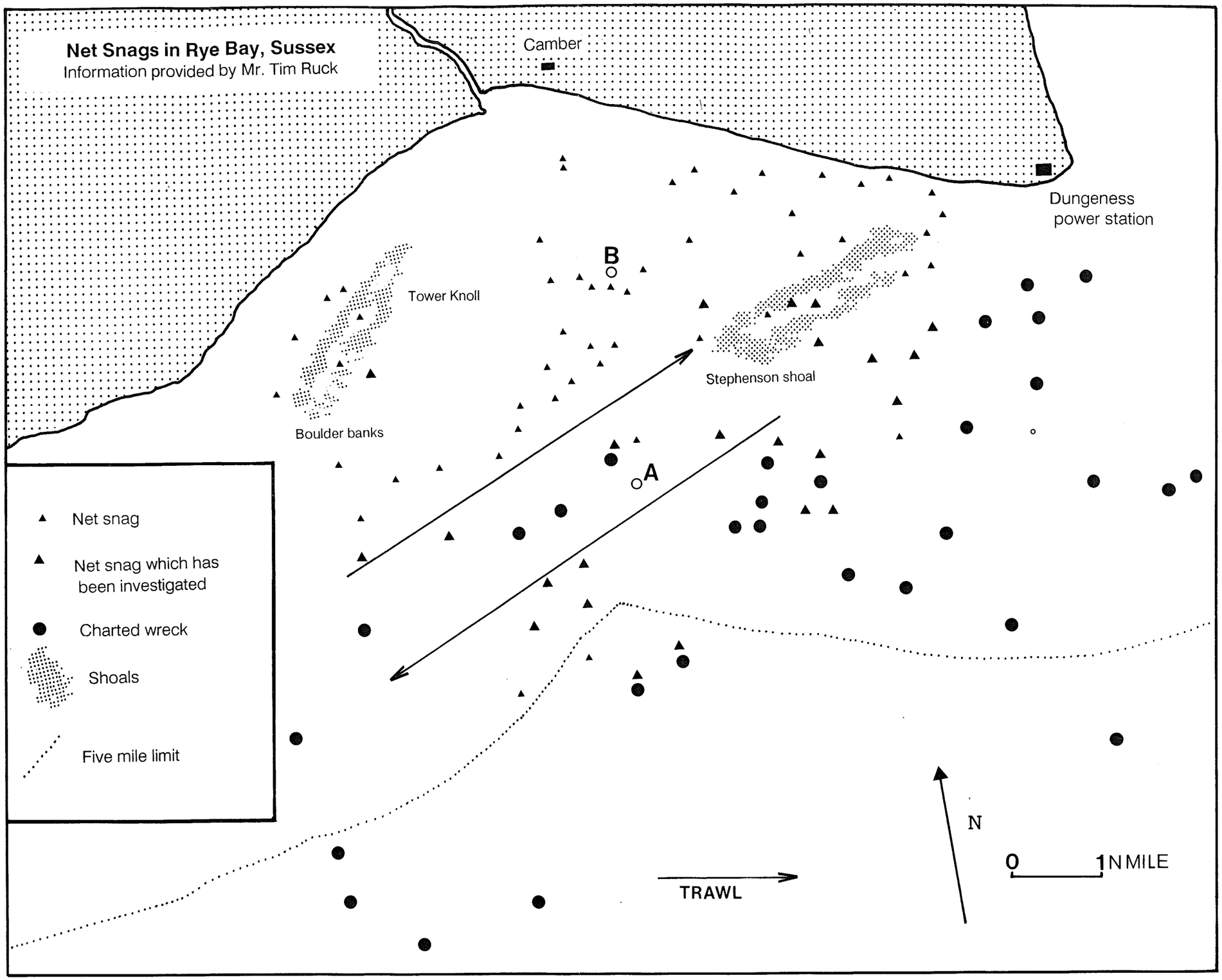


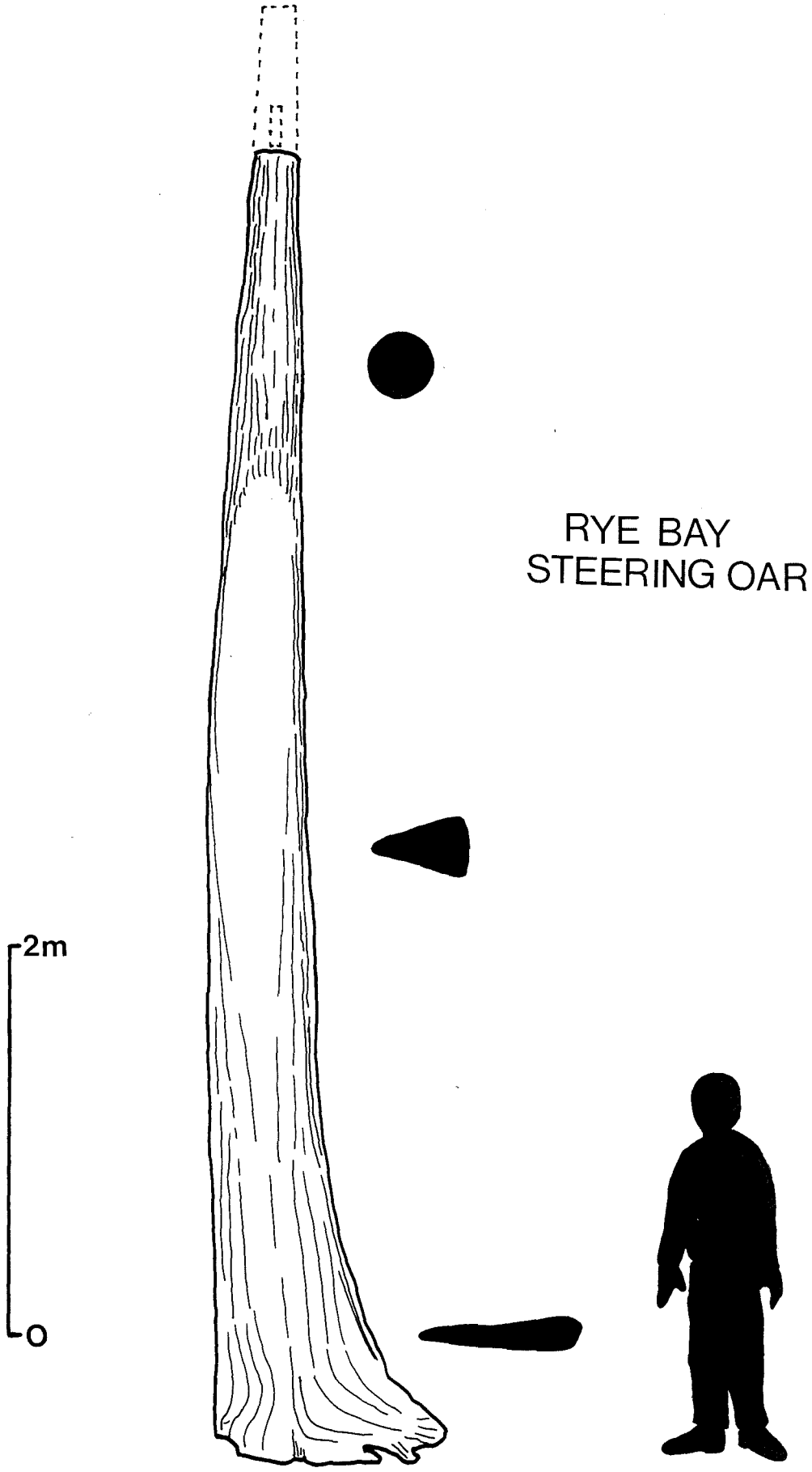
SHERD 5021


B
DUMP
BOUNDARY
A
0
0·5 N MILES

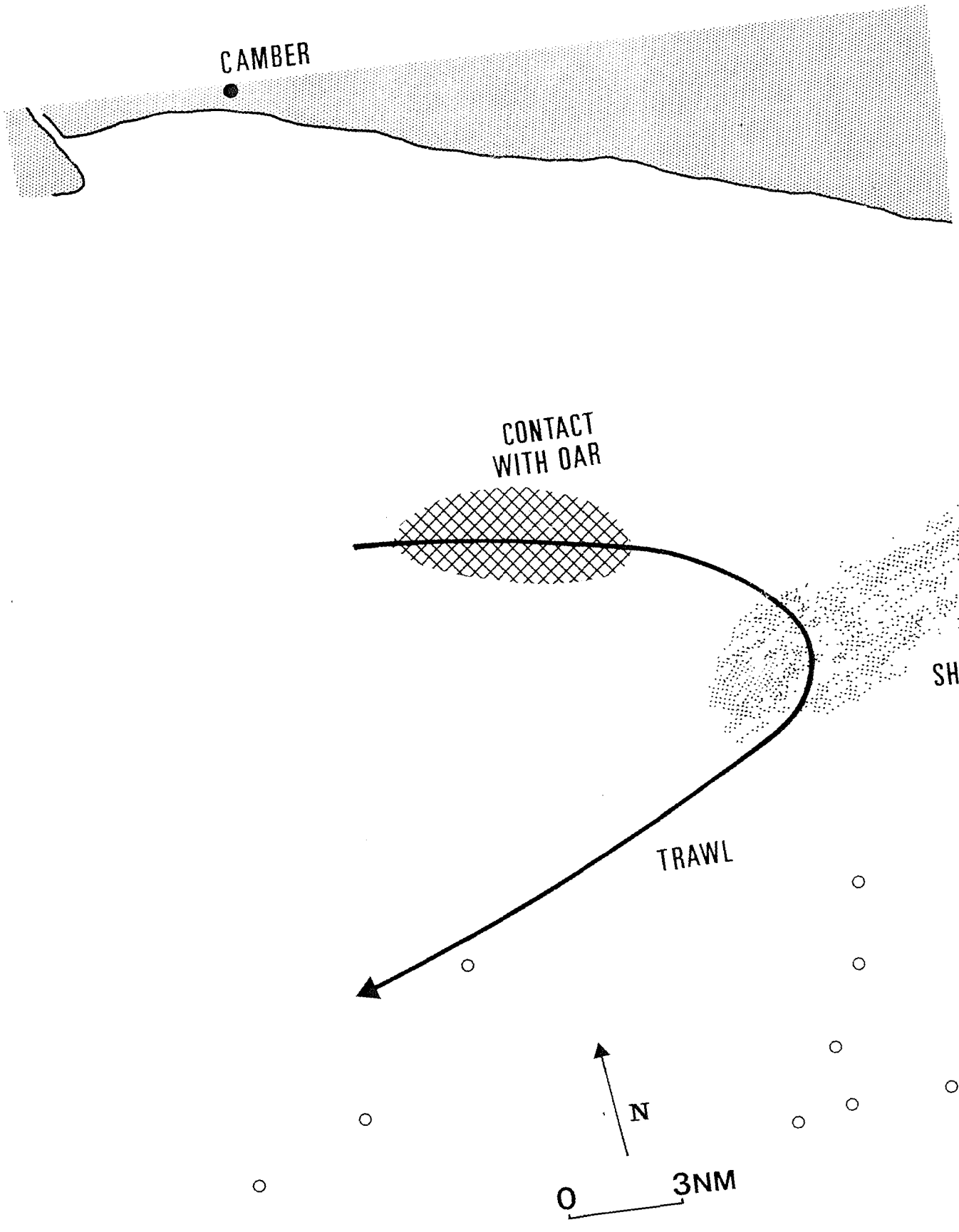


The Birch Point Explosives Dump
(reproduced with permission)

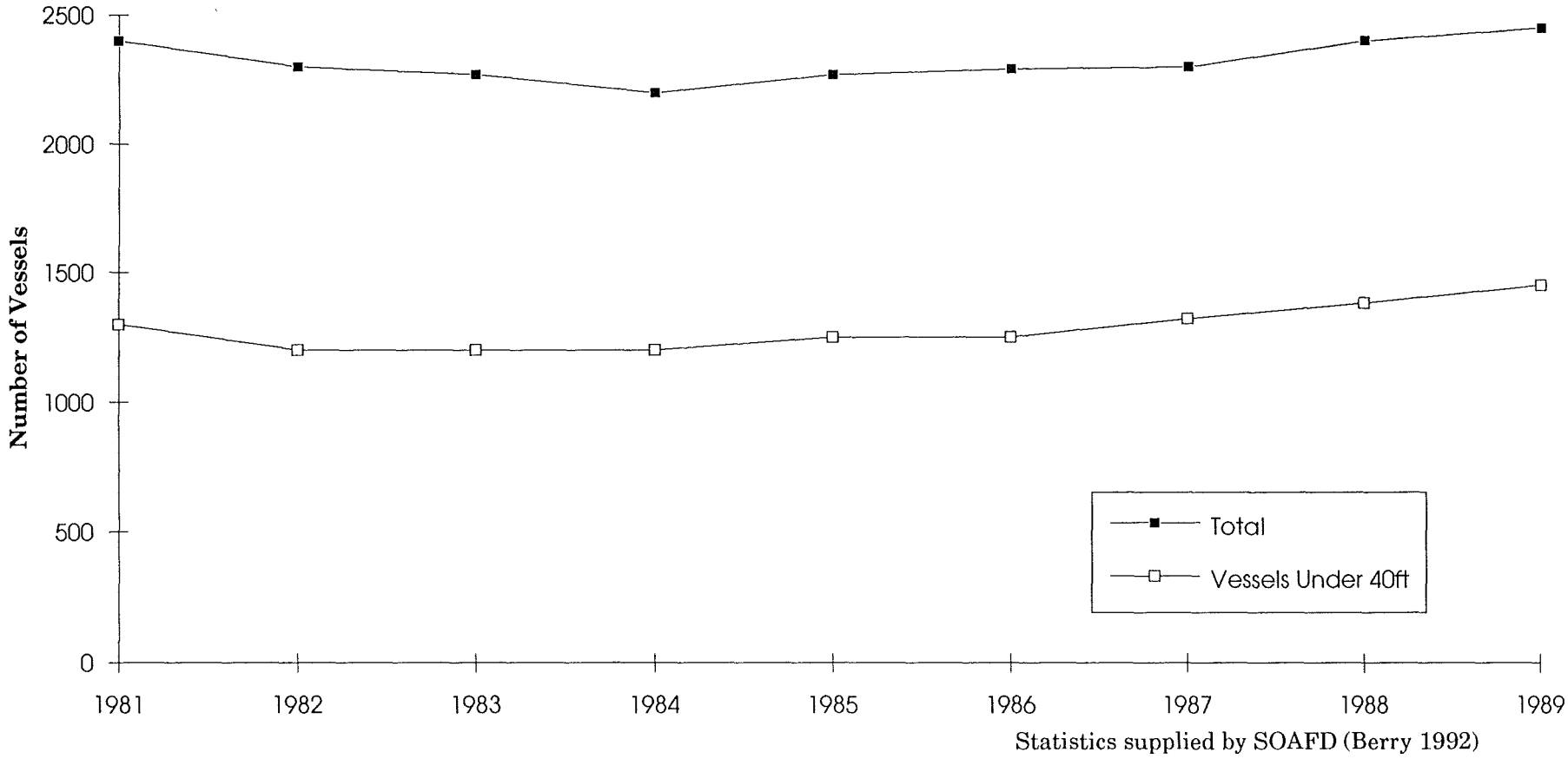

Net Snags in Rye Bay, Sussex
Information provided by Mr. Tim Ruck
Camber
Dungeness
power station
B
Tower Knoll
Stephenson shoal
Boulder banks
A
Net snag
Net snag which has been investigated
Charted wreck
Shoals
Five mile limit
TRAWL
N
0
1 N MILE



RYE BAY
STEERING OAR

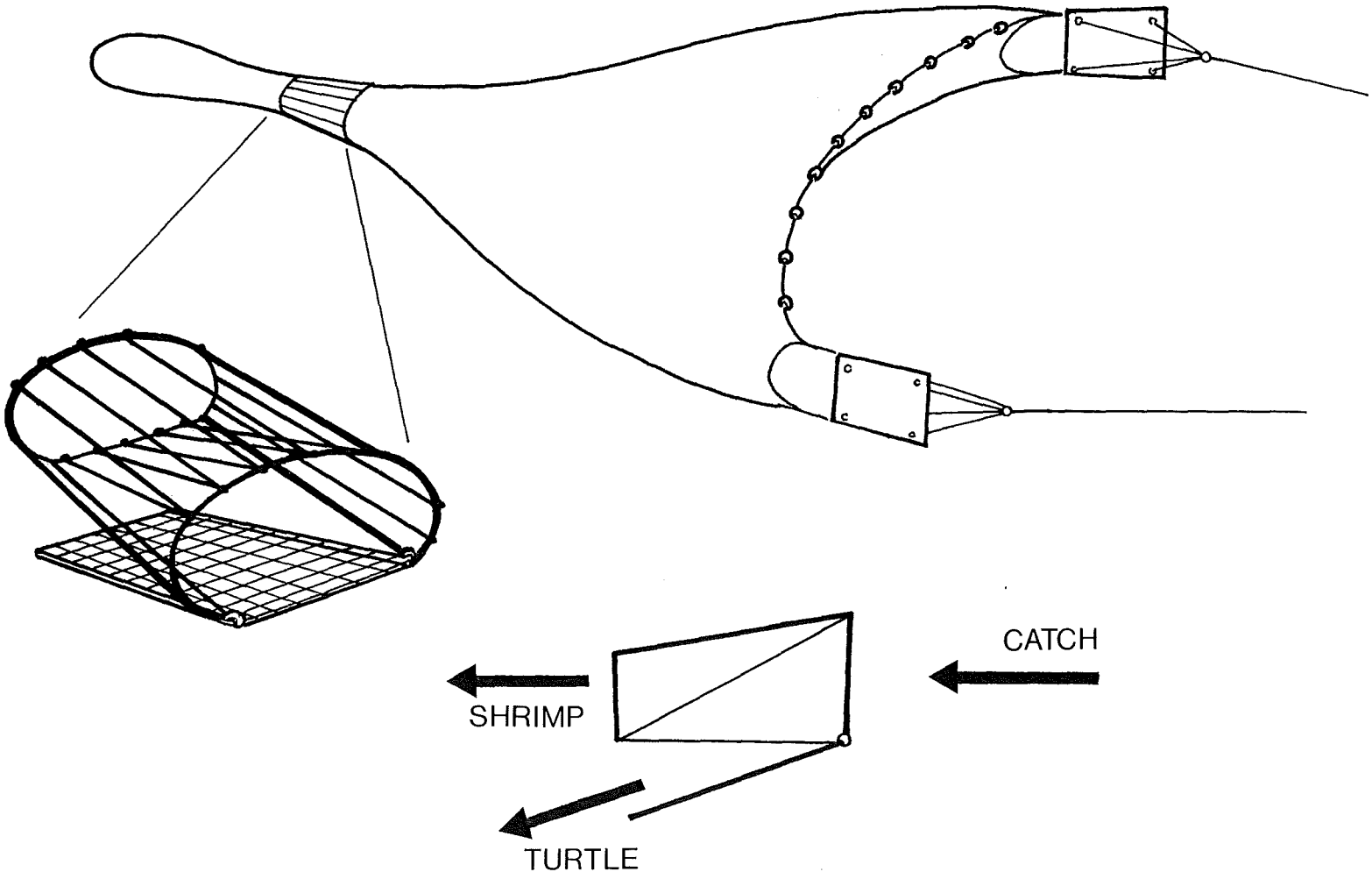

CAMBER
CONTACT
WITH OAR
SHOAL
TRAWL
N
0
3NM
CHART
WREC

Number of Fishing Vessels Registered in Scotland

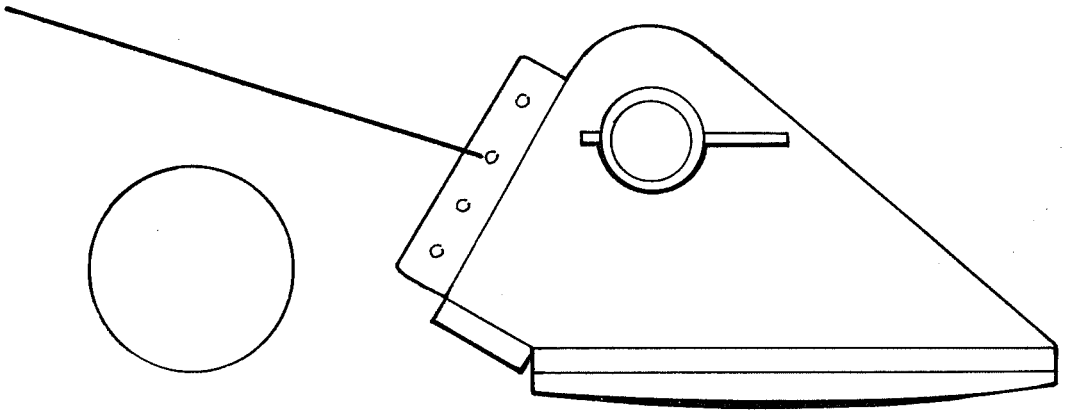


Statistics supplied by SOAFD (Berry 1992)

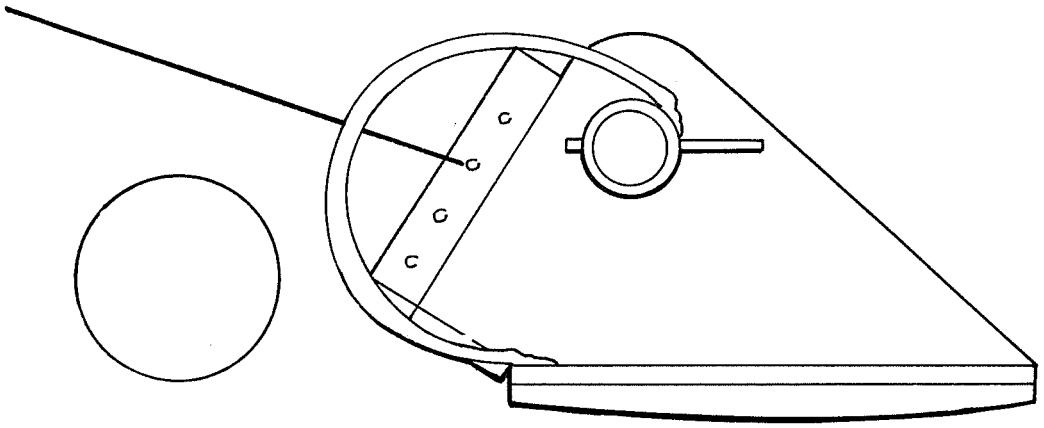
TURTLE EXCLUDER



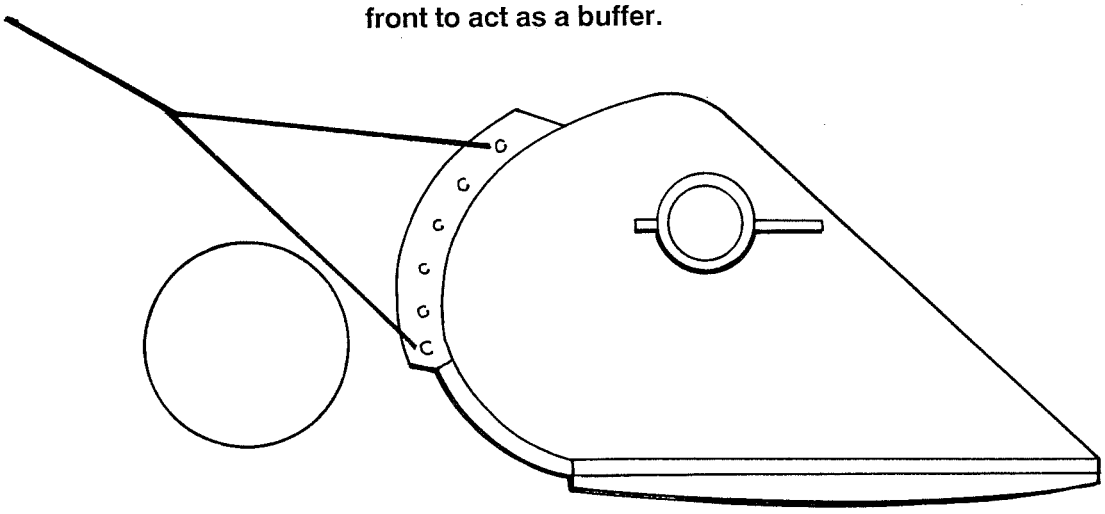
Modifications to modern beamtrawls



A A standard beam trawl head. The head is shown to scale with a 16 inch oil pipeline.

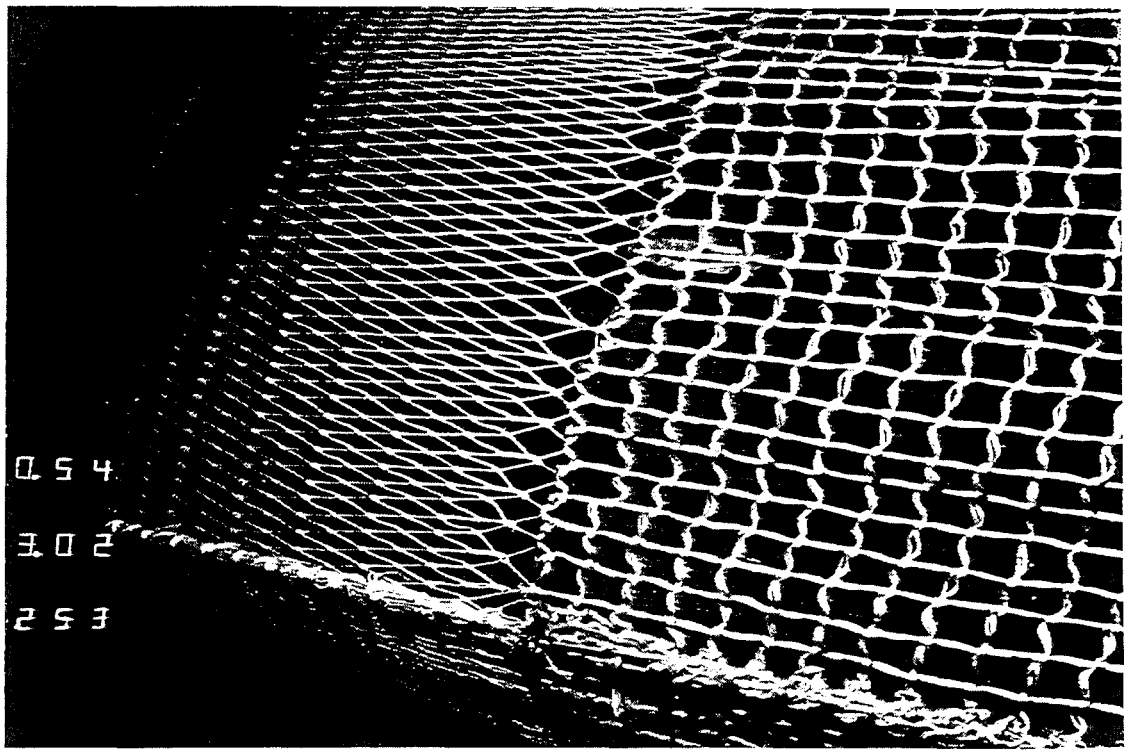


B A side view of an adapted beam trawl with a hoop welded in front to act as a buffer.



C A sideview of a proposed modifcation with the addition of a double towing bridle and more rounded shape to aid in sliding over obstructions.

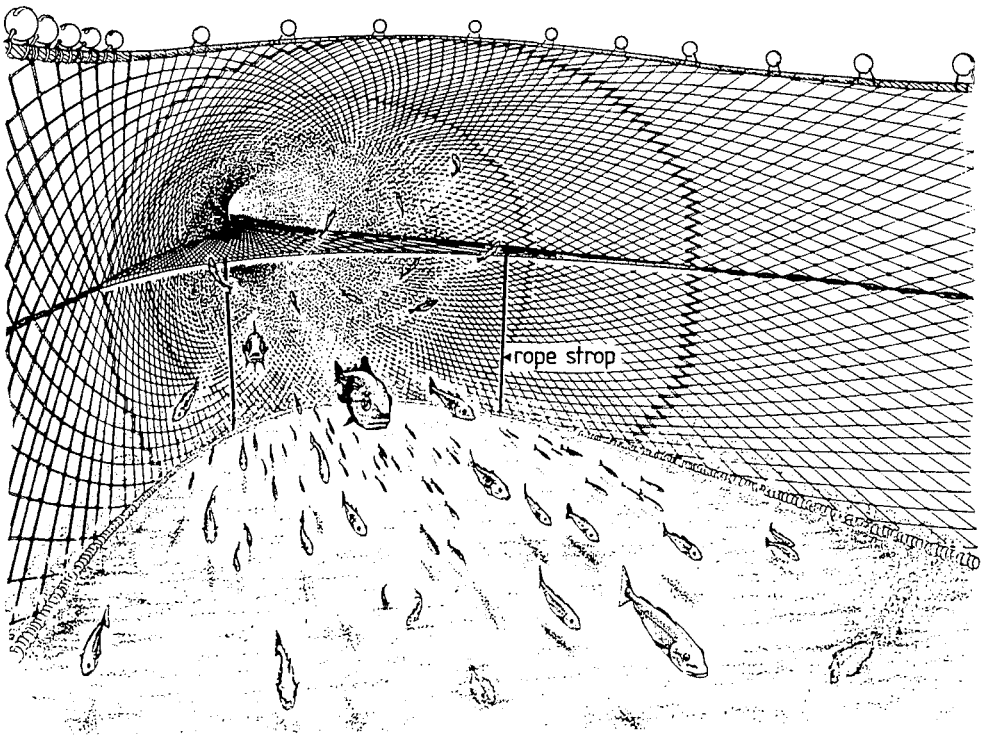
(See De Groot, 1977)



A square mesh codend.

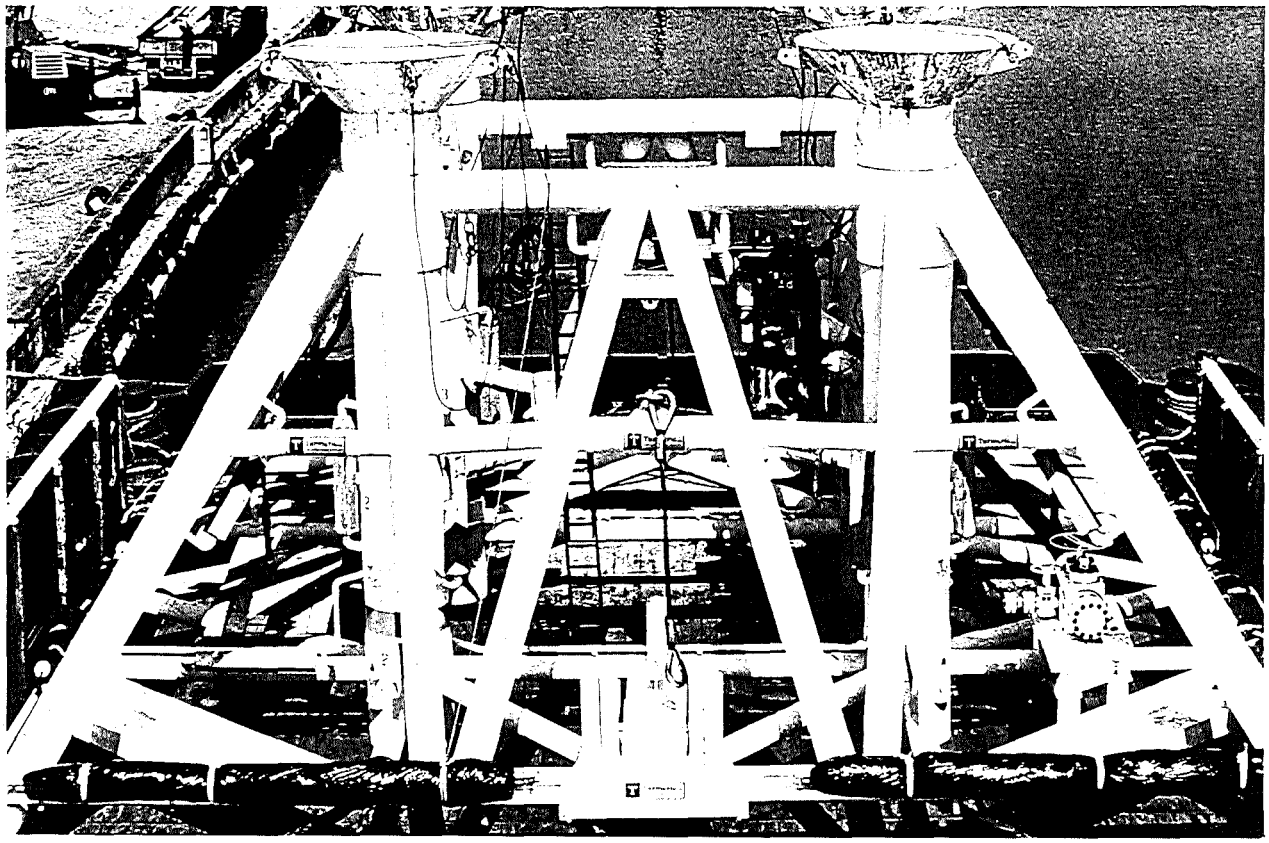
Note the difference between the square mesh on the right and the diamond mesh on the left in terms of the opening
presented to fish and debris.
(Reproduced with permission from Scottish Fisheries Bulletin 49)

95



The separator panel trawl.
(Reproduced with permission from Scottish Fisheries Bulletin 49)

96



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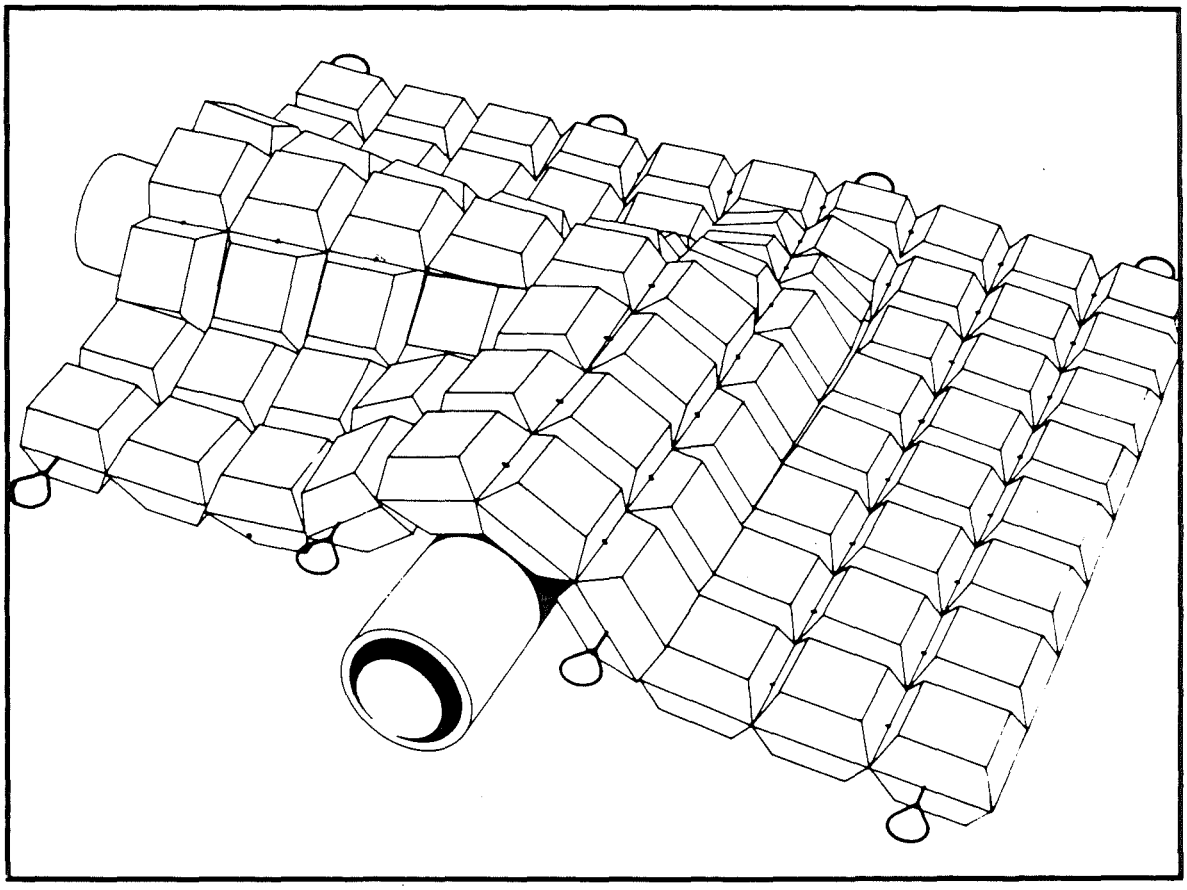
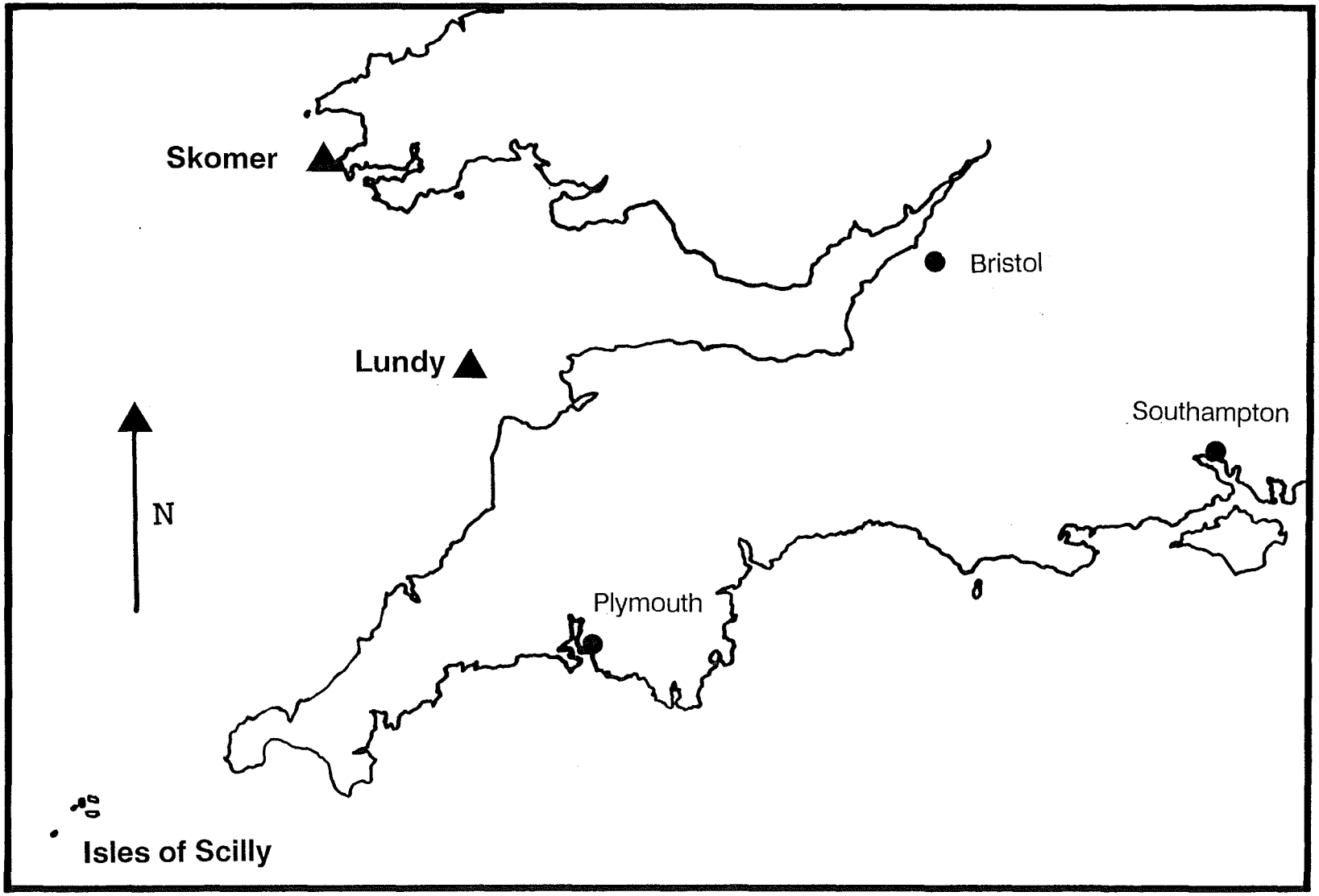


98

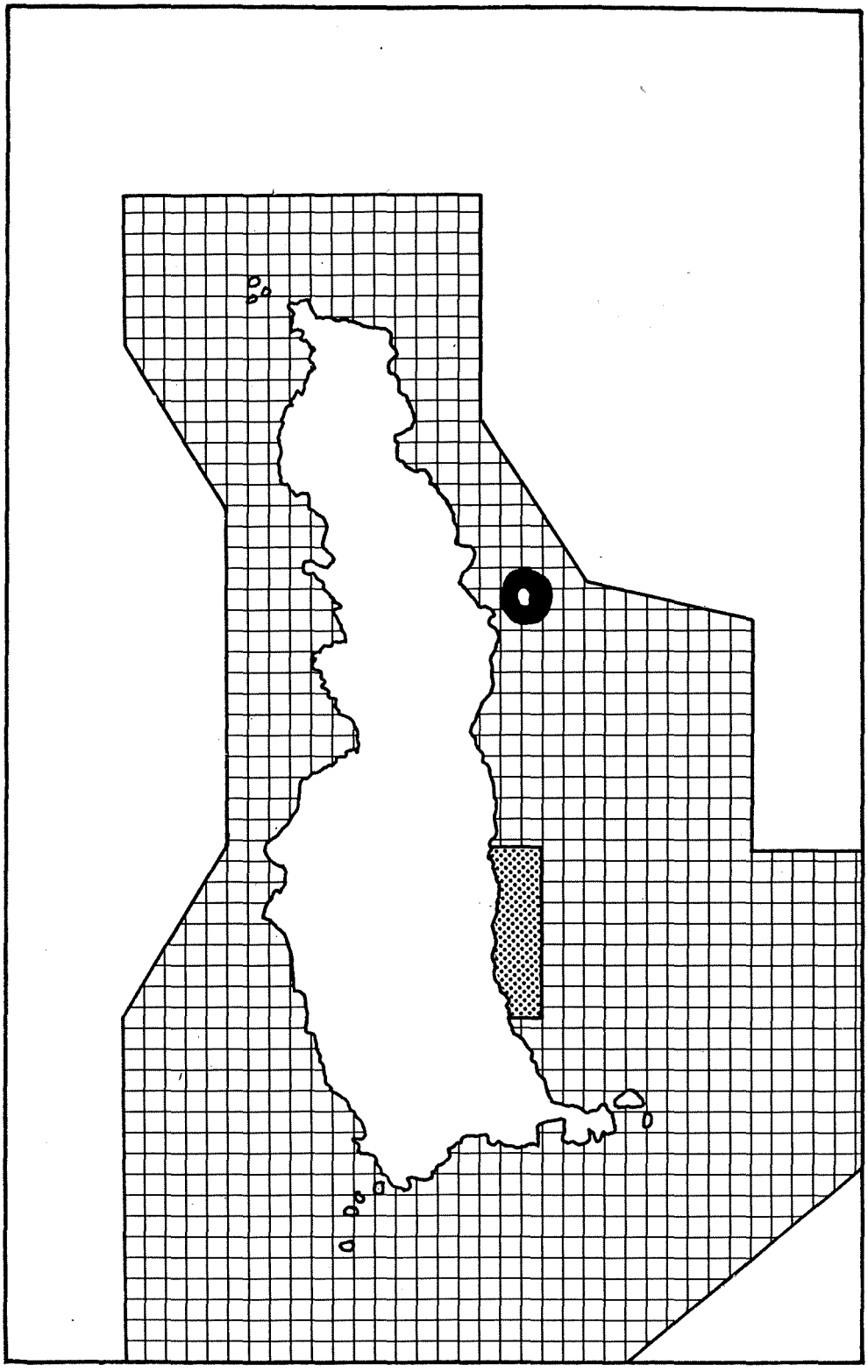


Locations of Statutory Marine Reserve ▲

Lundy Marine Reserve

Fishing Restrictions

(Information supplied by Mr. Gomm, English Nature)

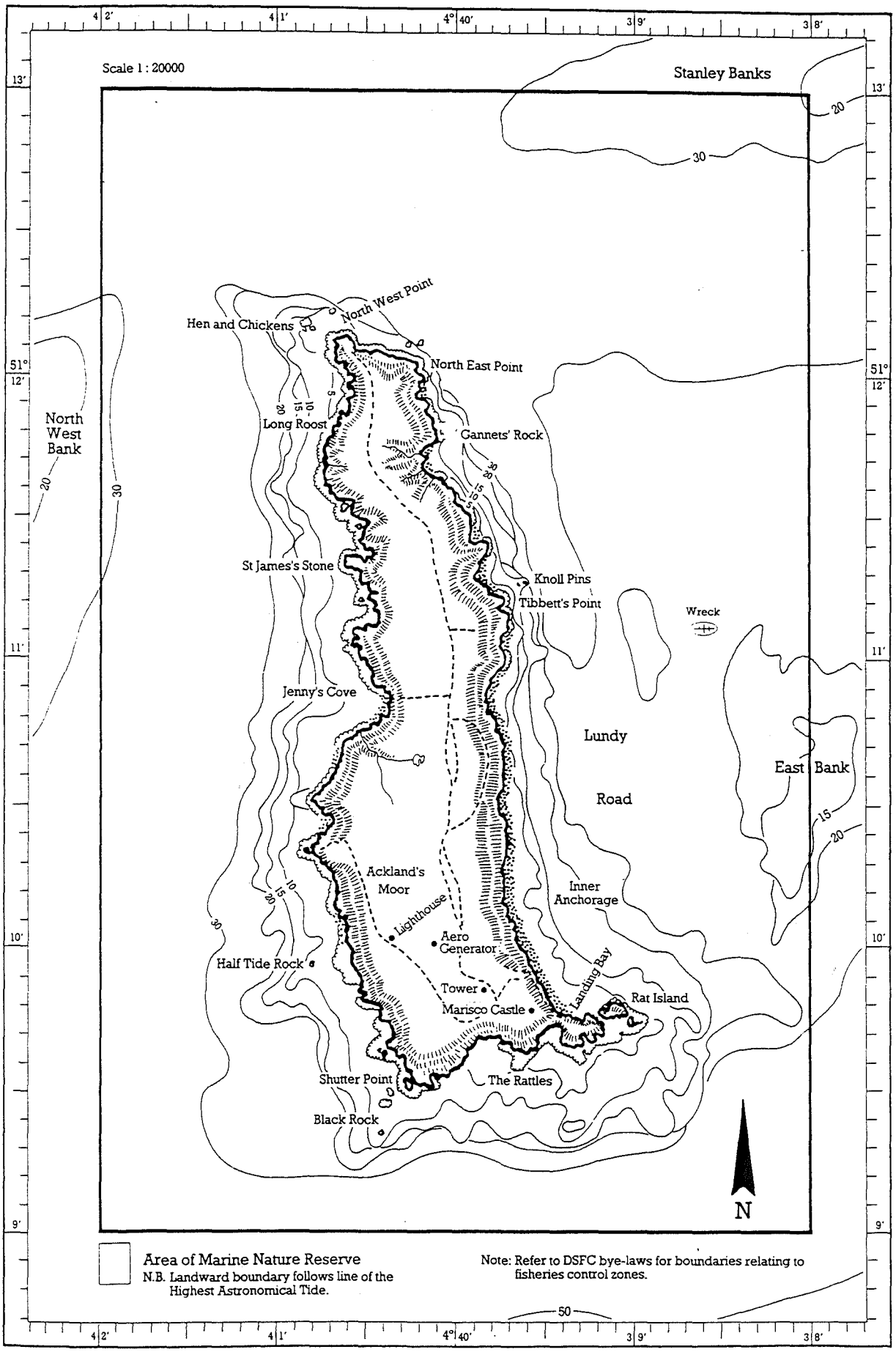


Published limits of reserve ——————

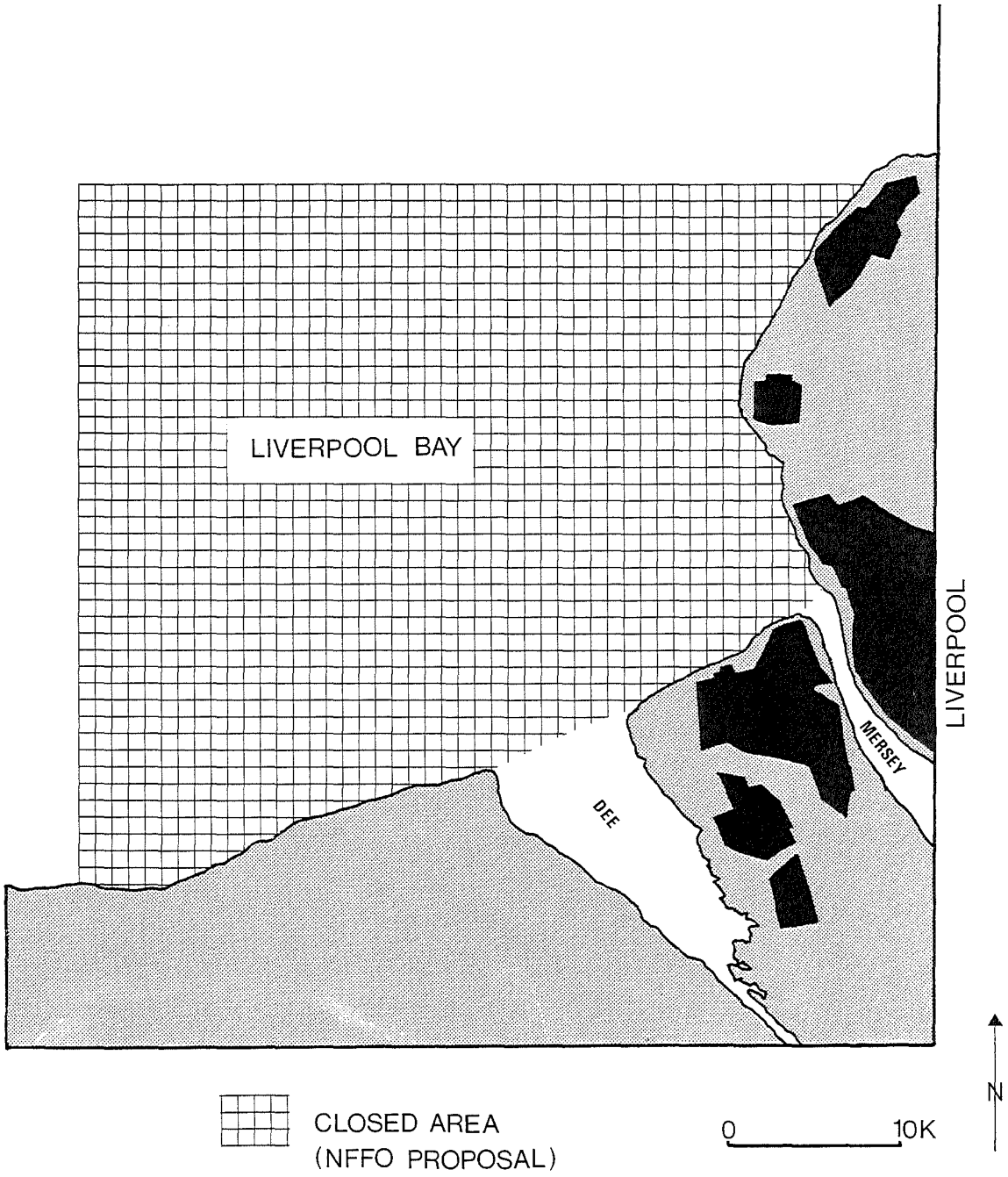
Area within which fixed gill netting is permitted

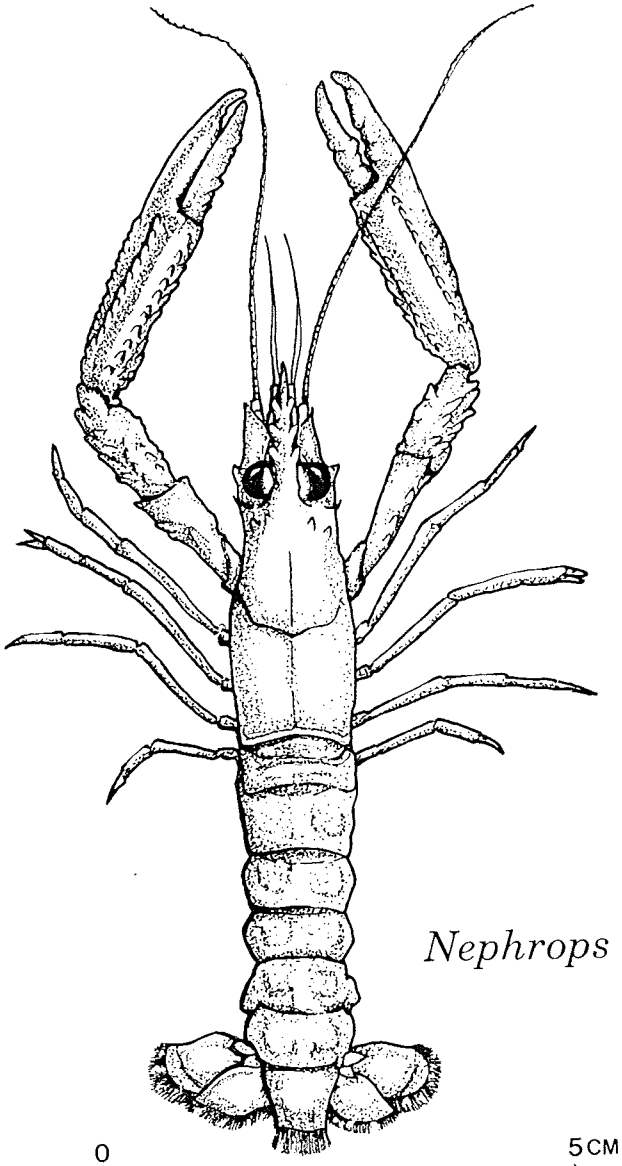
Area within which no person shall fish by trawling, tangle nets or fixed nets

Area within which potting is prohibited

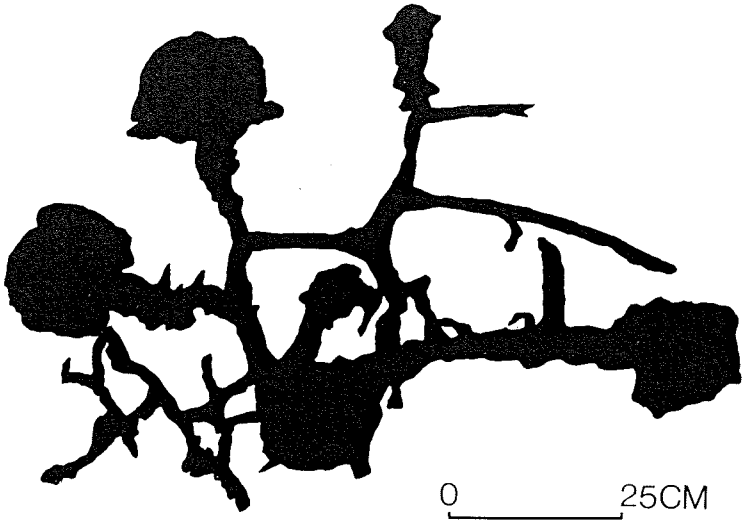


Published limits of reserve

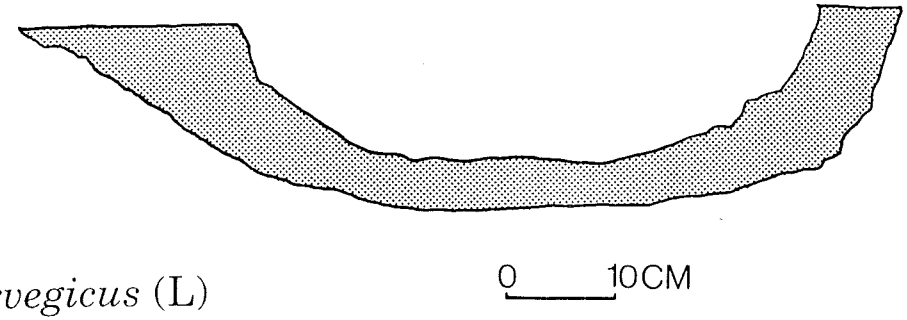

LIVERPOOL BAY
LIVERPOOL
MERSEY
DEE
CLOSED AREA
(NFFO PROPOSAL)
0
10K
N



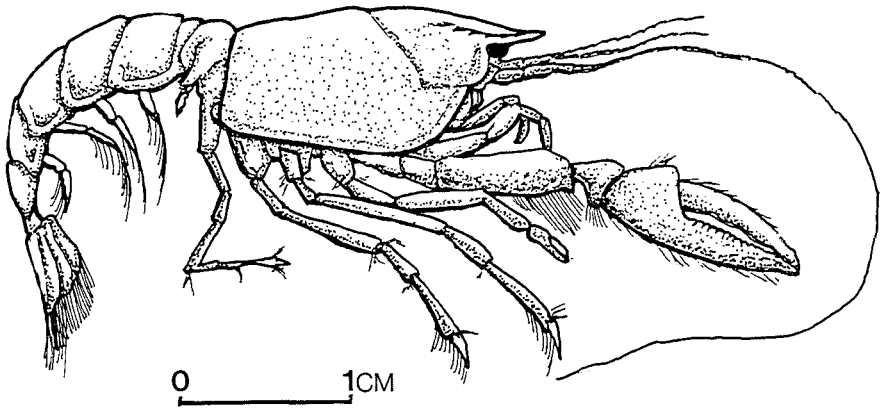
Nephrops norvegicus (L)



Cast of a burrow complex occupied by mature and juvenile *Nephrops* (Chapman 1980, 149).

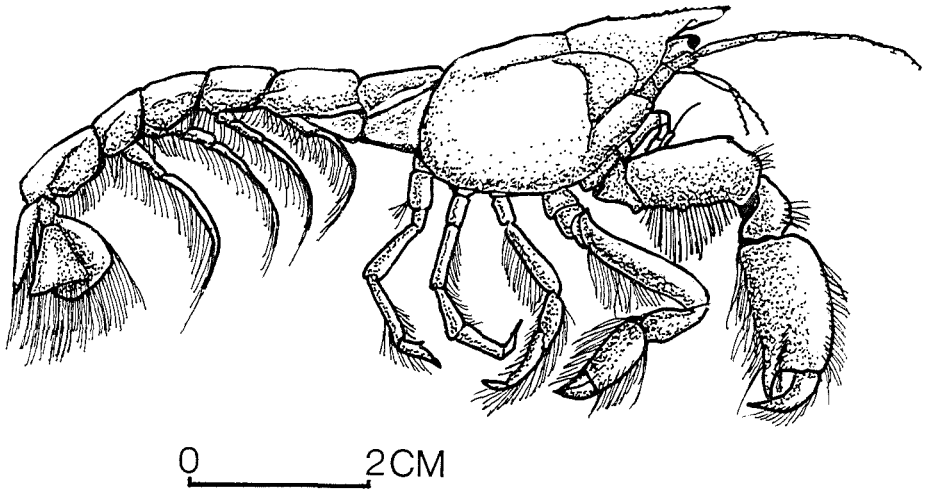


Section through a burrow cast (Howard 1982, 4)



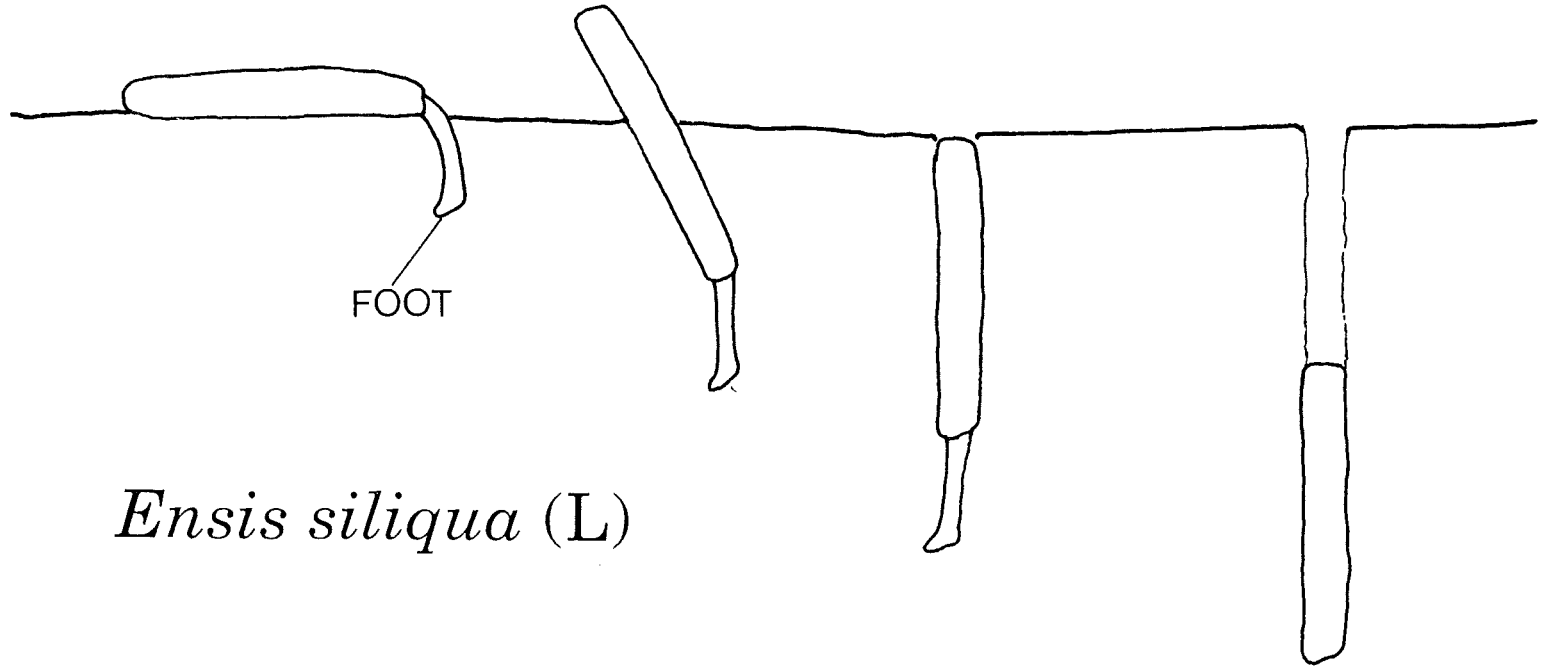
Calocaris macandreae (Bell)

103

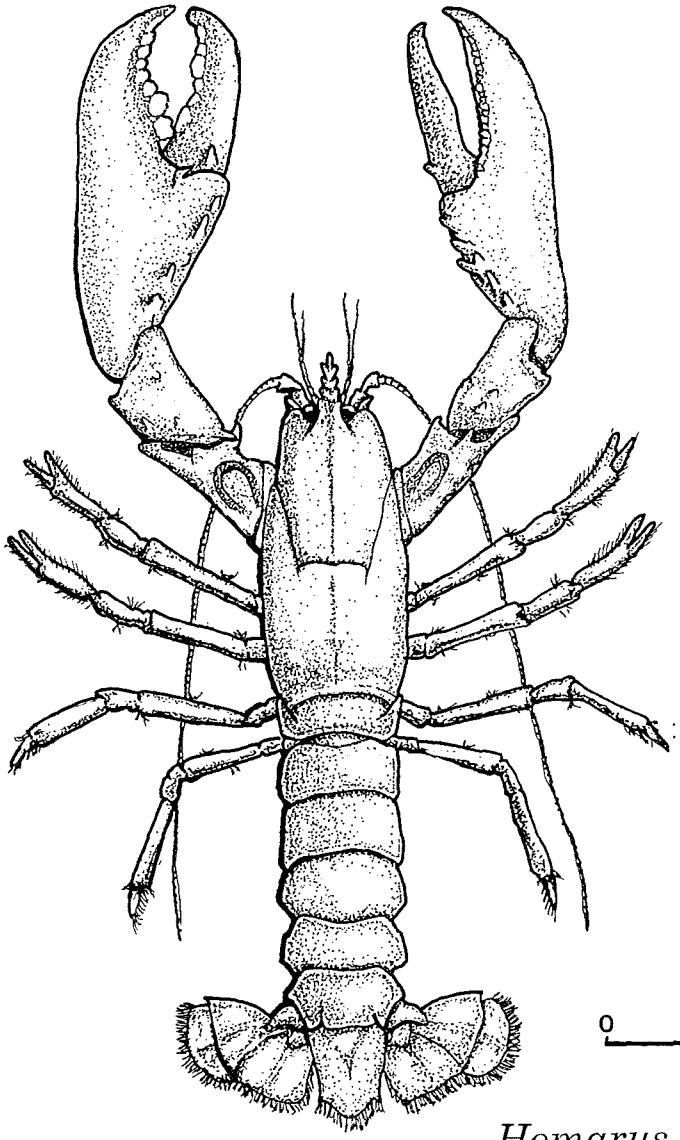


Upogebia deltura (L)

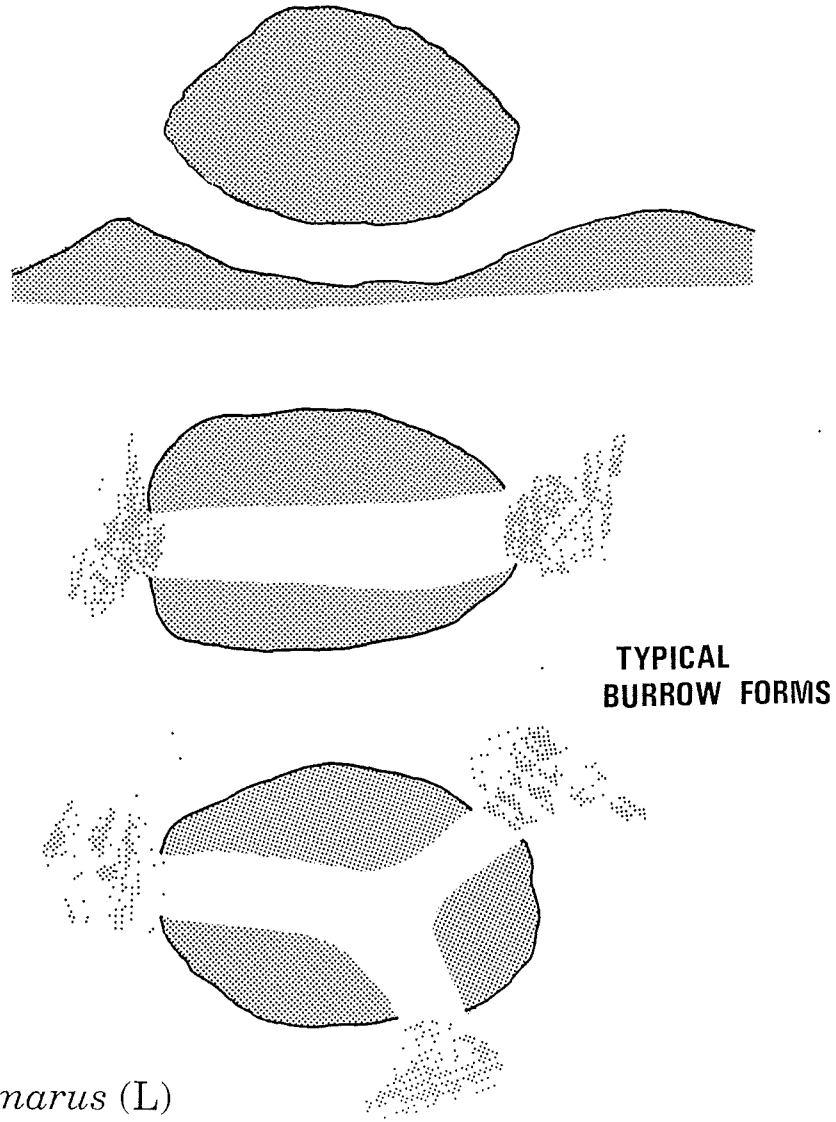
104



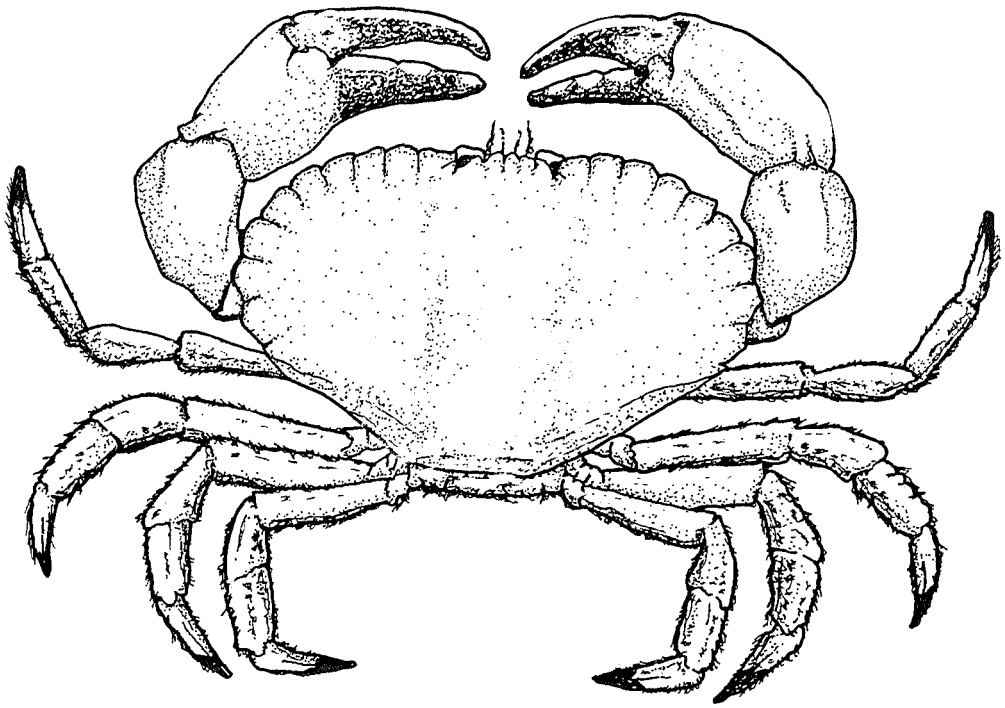
Ensis siliqua (L)



Homarus gammarus (L)

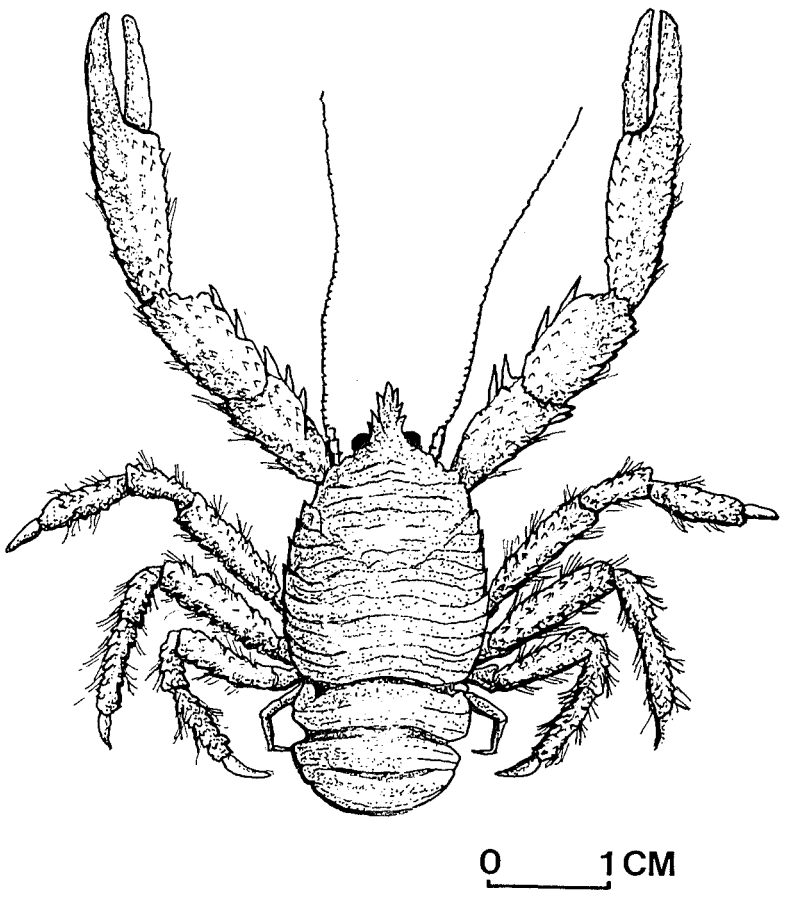


TYPICAL BURROW FORMS



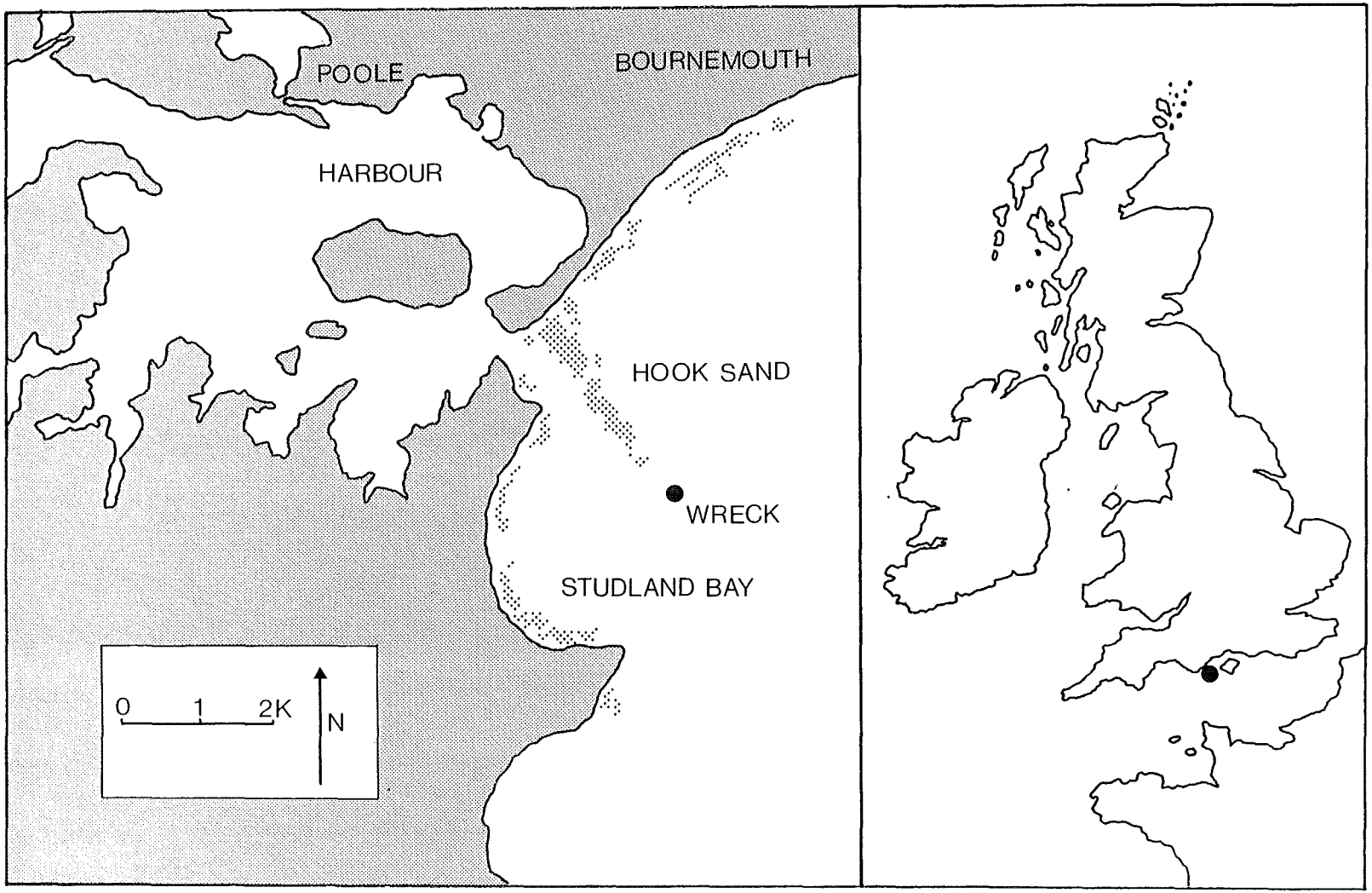
Cancer pagurus (L)

107

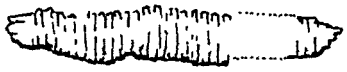


Galathea squamiferma (Leach)

108

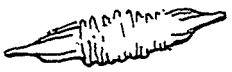

POOLE
BOURNEMOUTH
HARBOUR
HOOK SAND
WRECK
STUDLAND BAY
0 1 2K
N

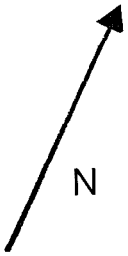
STUDLAND BAY

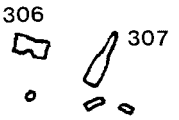


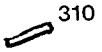
AREA 1

AREA 2



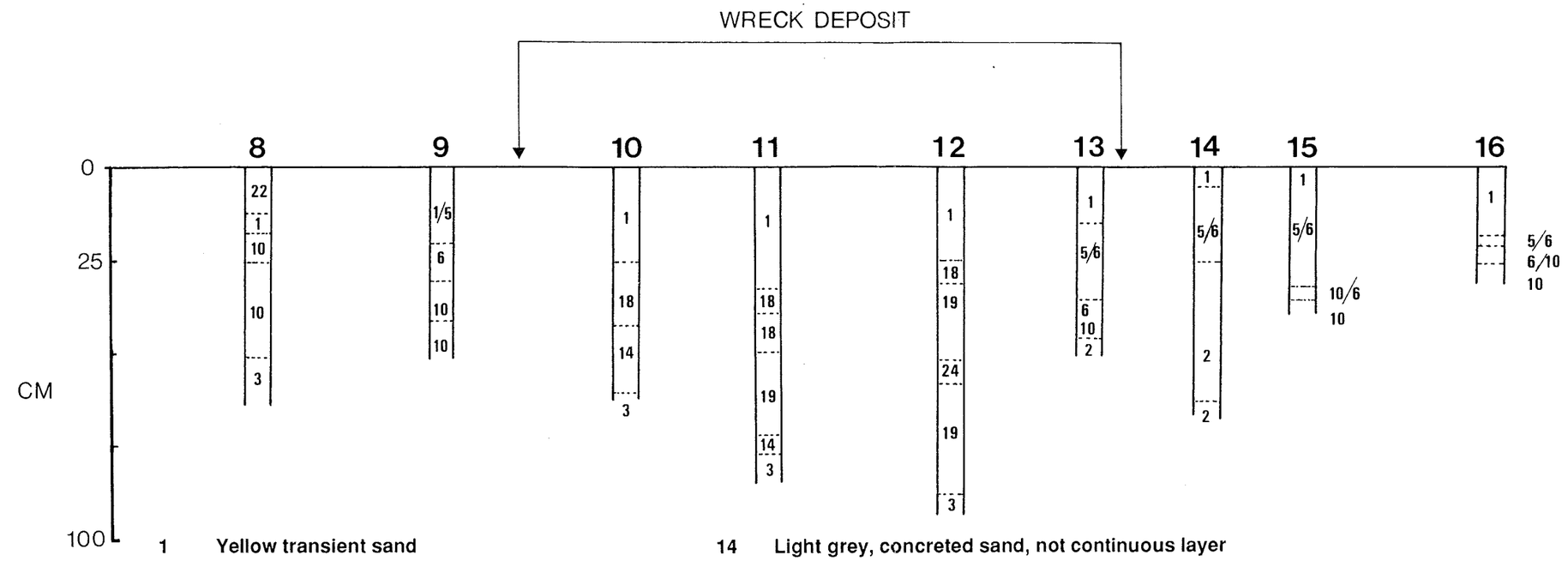






AREA 3

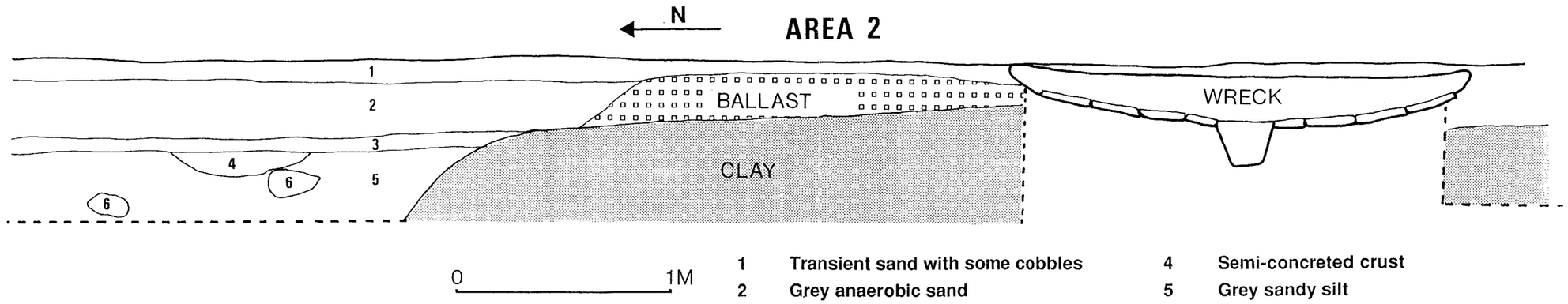
AREA 3 TEST PITS



1	Yellow transient sand
2	Grey clay, occasional oyster shell and flint
3	Loose, coarse sand, pre-wreck seabed
5	Grey-yellow sand and shell
6	Grey sand and shell - believed to be oxidised 5
10	Grey clay (soft)
14	Light grey, concreted sand, not continuous layer
18	Dirty grey sand with dark inclusions - many finds
19	Very soft, plastic clay, light grey with many stone and shell fragments
22	Transient sand, including shell, slightly silty
24	Hard pan, mixed grey and rust colour, hard crust with looser interior, various inclusions black flecks and burrow fragments

111

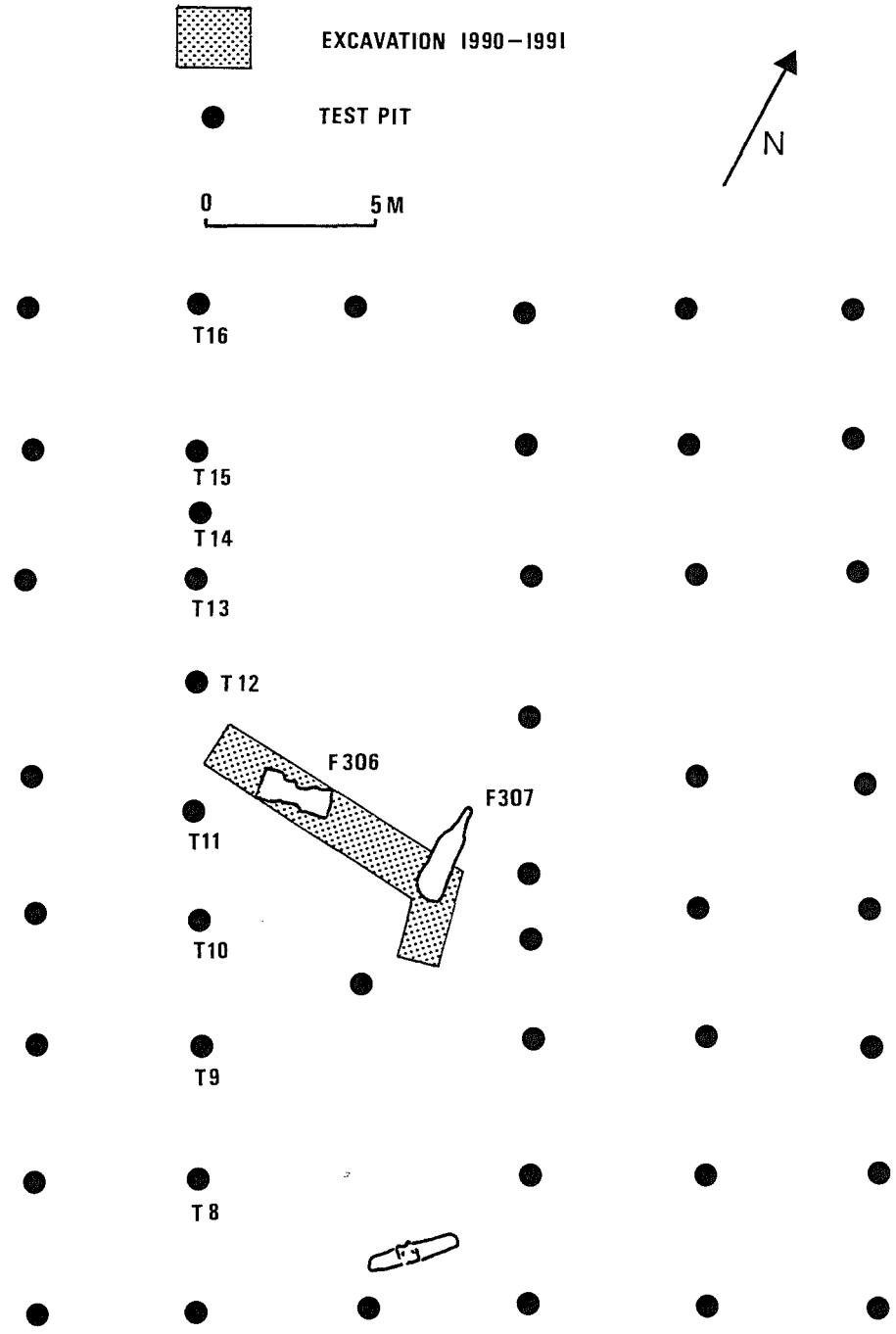
AREA 2

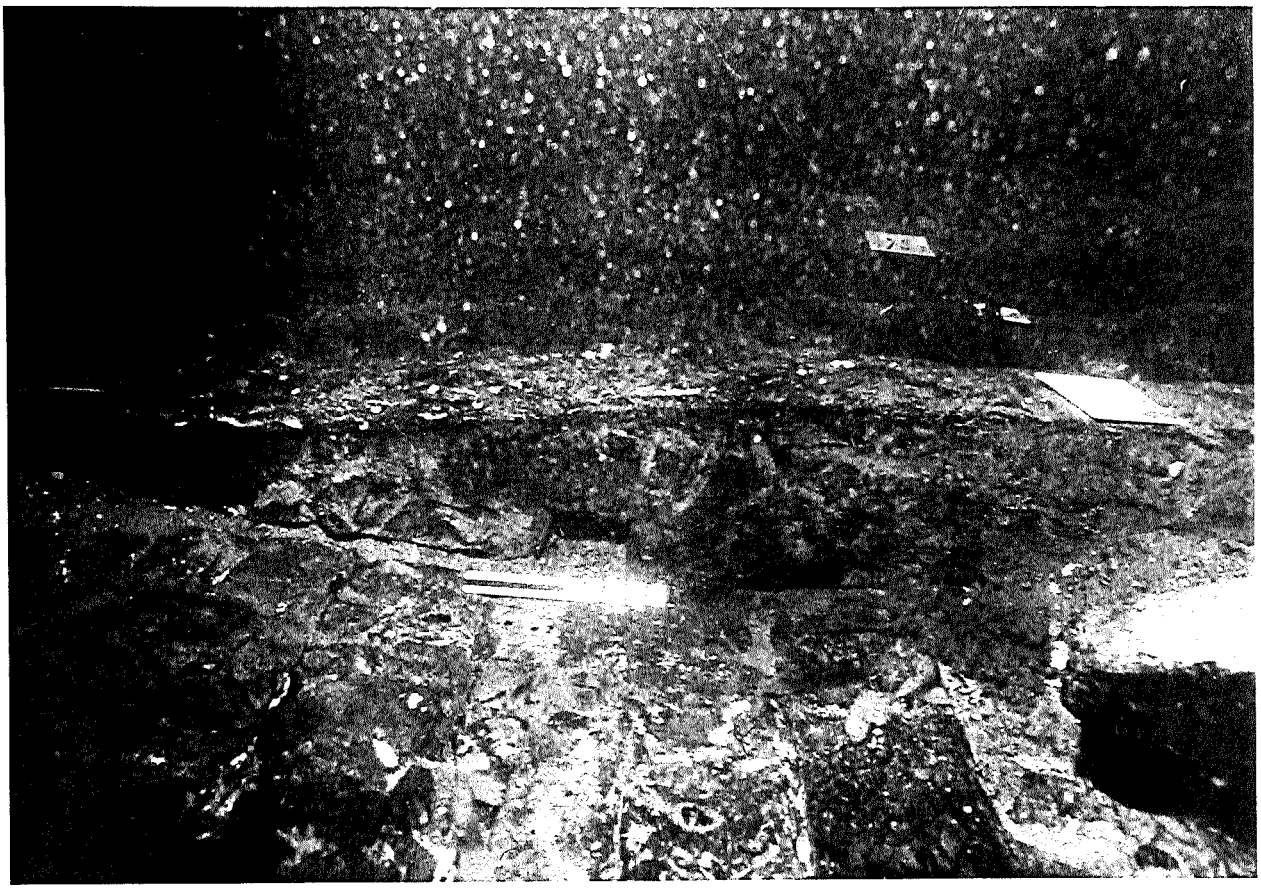


1	Transient sand with some cobbles
2	Grey anaerobic sand
3	Organic layer
4	Semi-concreted crust
5	Grey sandy silt
6	Ballast

112

AREA 3


EXCAVATION 1990–1991
TEST PIT
N
0
5 M
T16
T15
T14
T13
T12
F306
F307
T11
T10
T9
T8



114

115

116

117

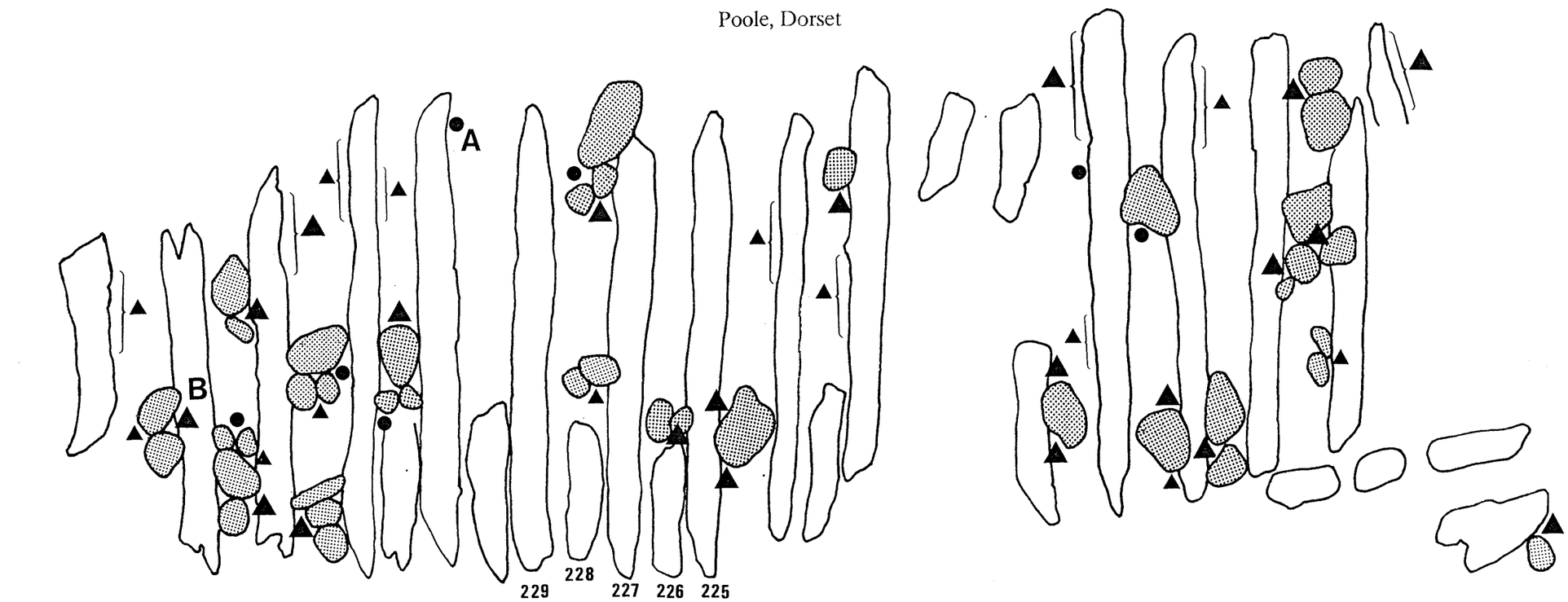
118

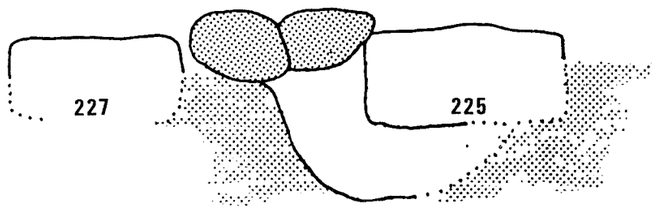
119

Survey Of Burrowing Fauna

The Studland Bay Wreck

Poole, Dorset





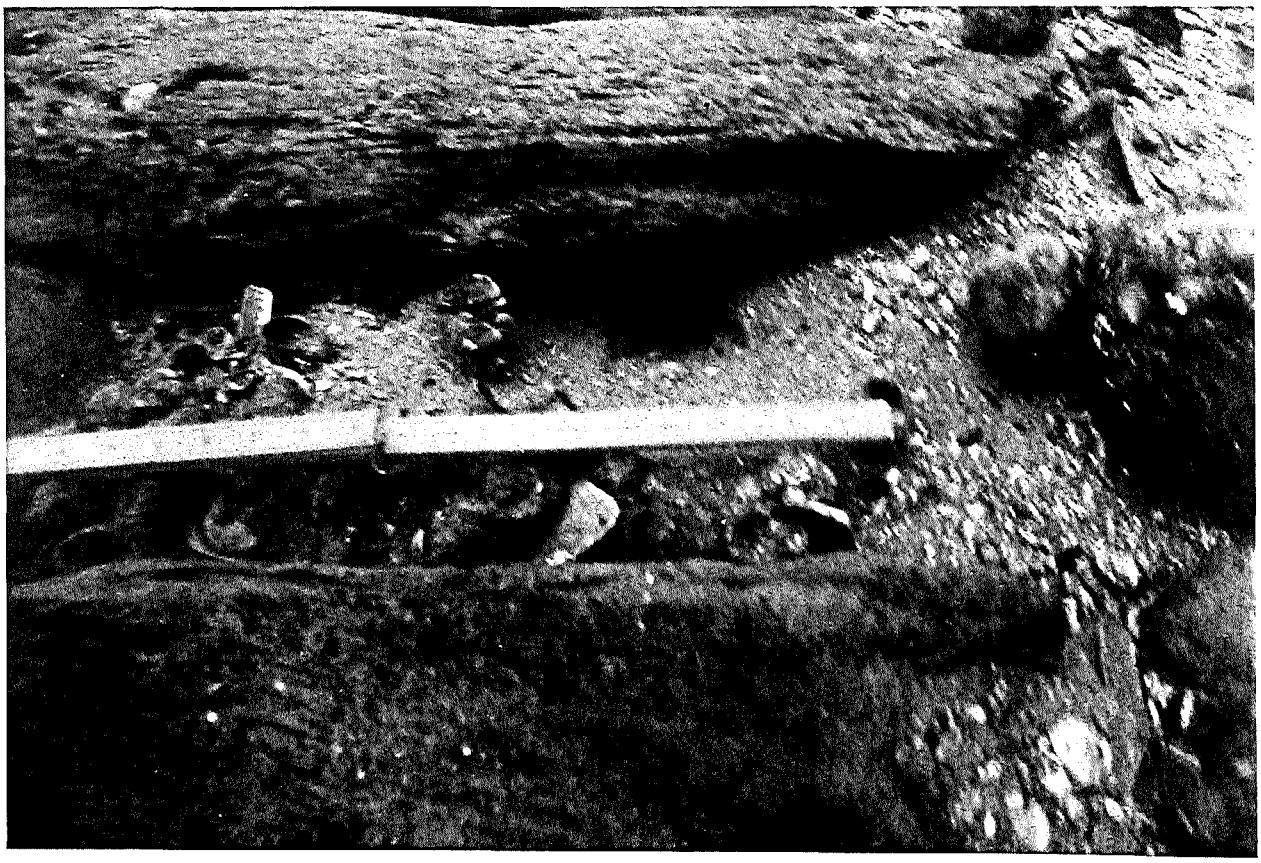
Area of timber undercut by burrow / scour

● Burrow occupied by crab (species unknown)

▲ Burrow occupied by squat lobster *(G. Squamiferma)* more than 5cm deep

▲ Burrow occupied by squat lobster *(G. Squamiferma)* up to 5cm deep

122



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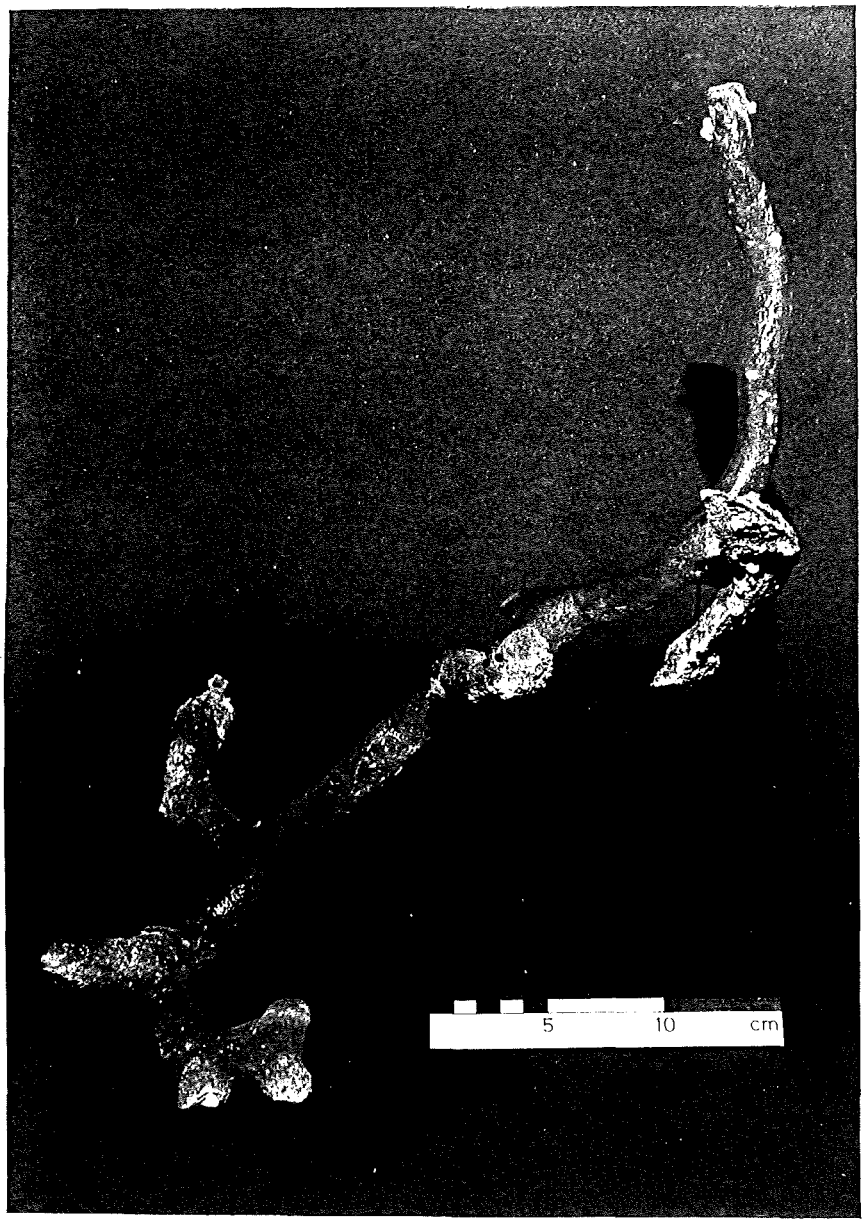

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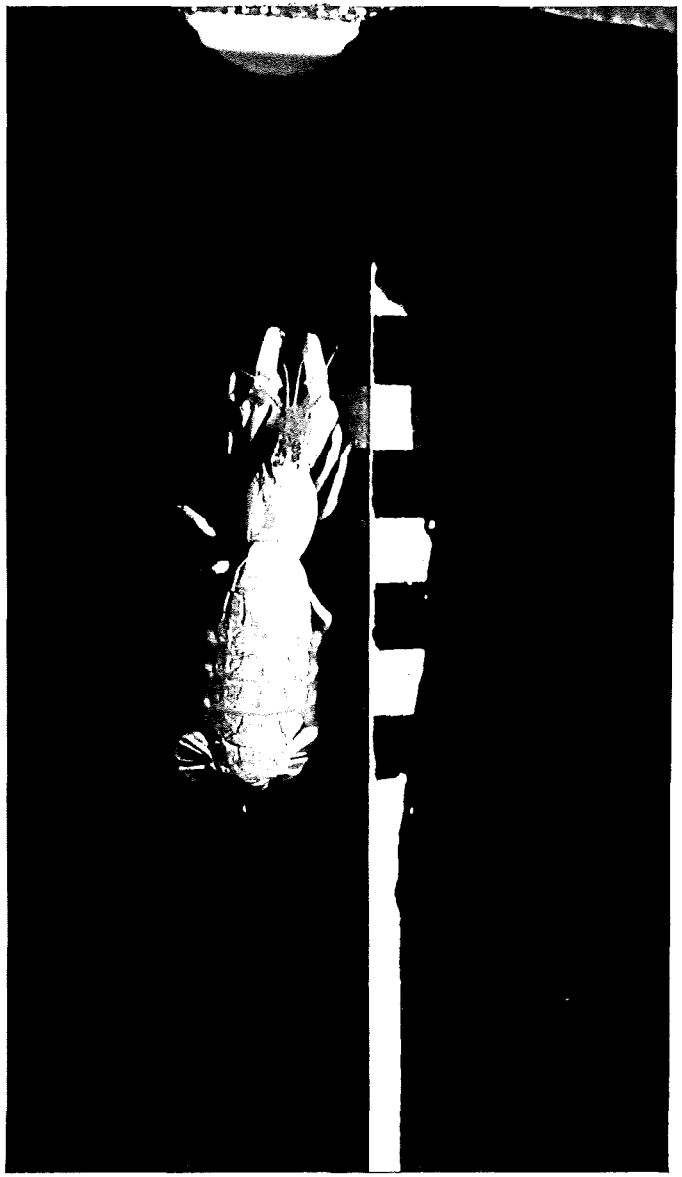
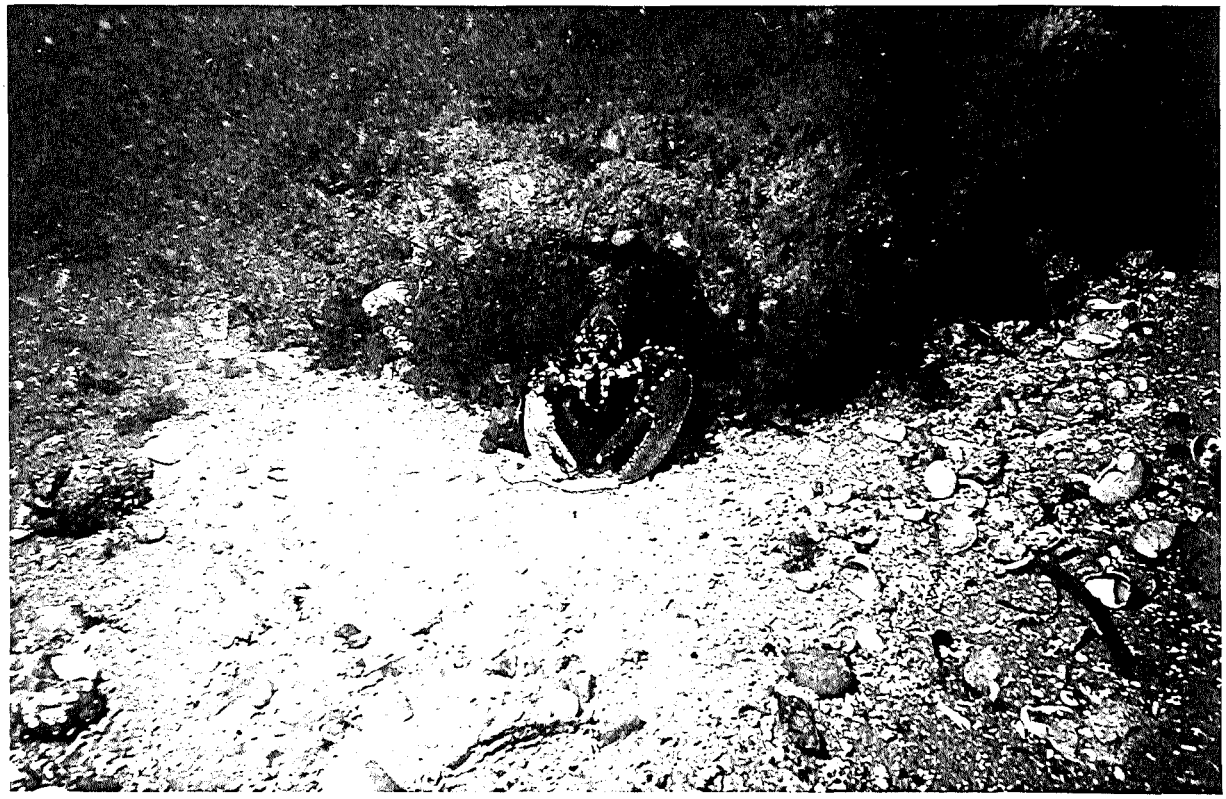


125

126



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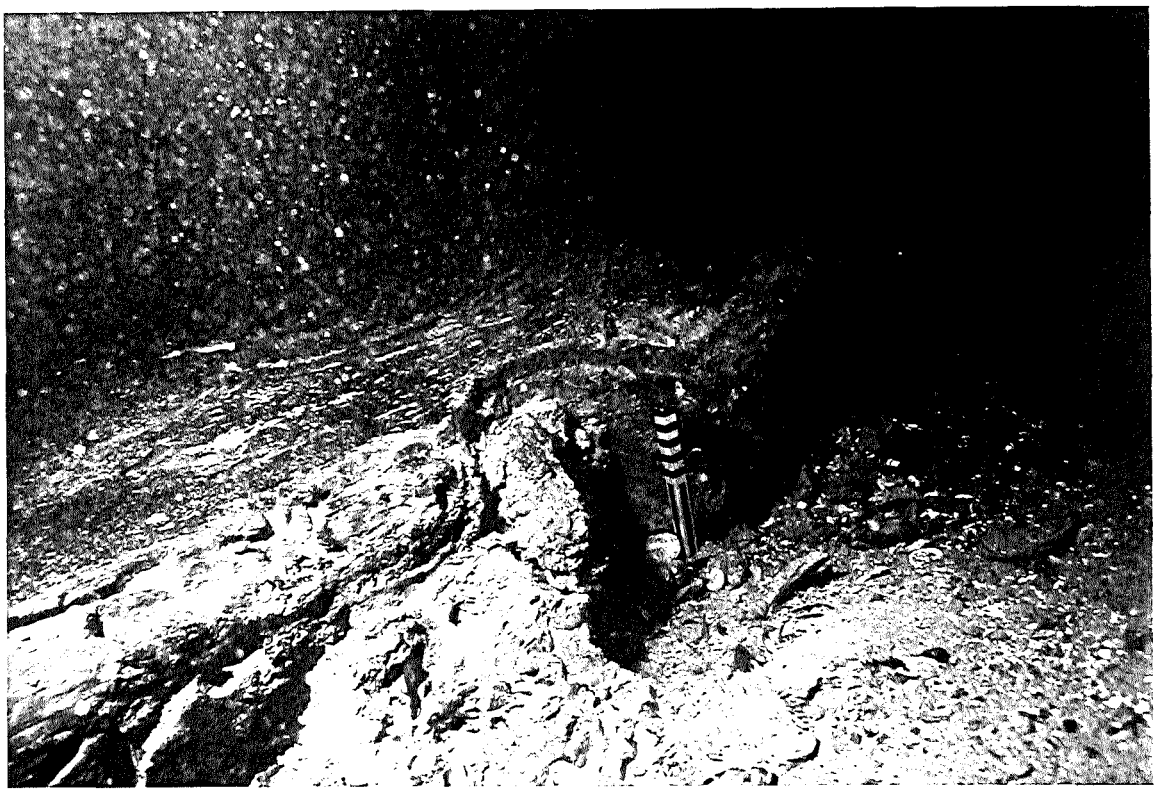
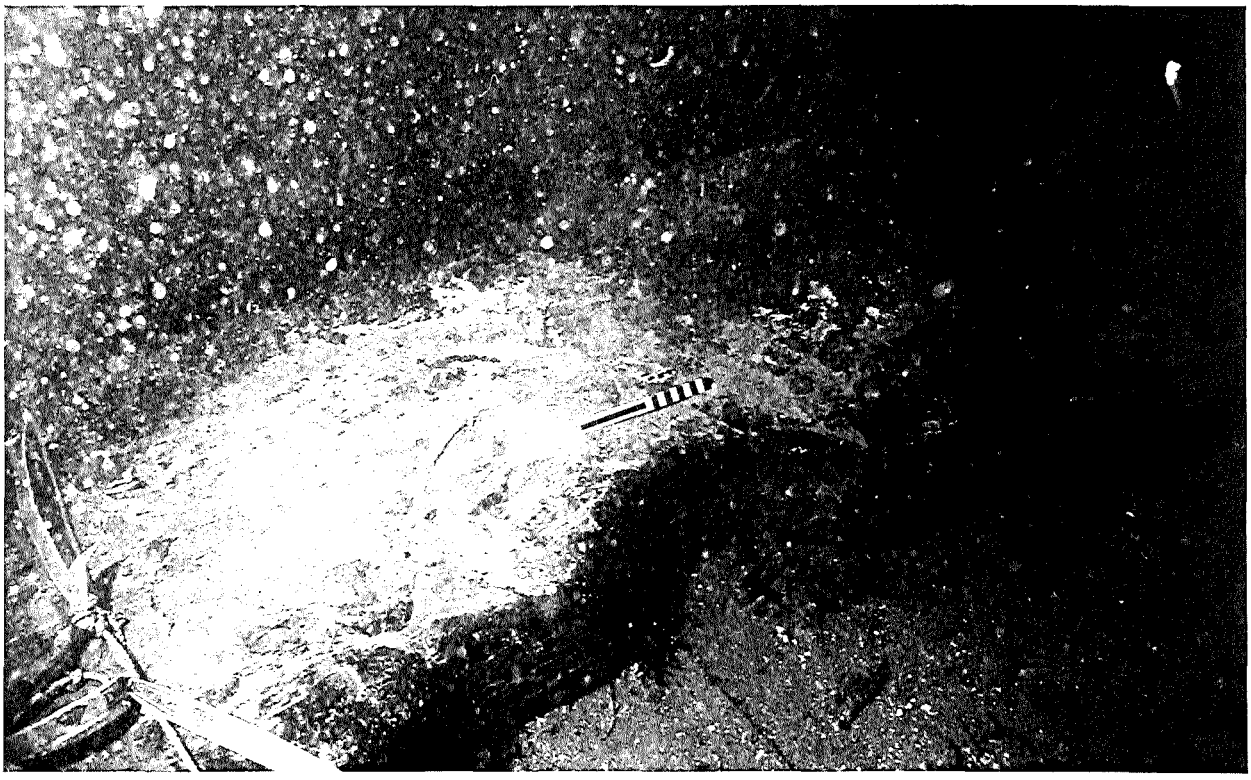
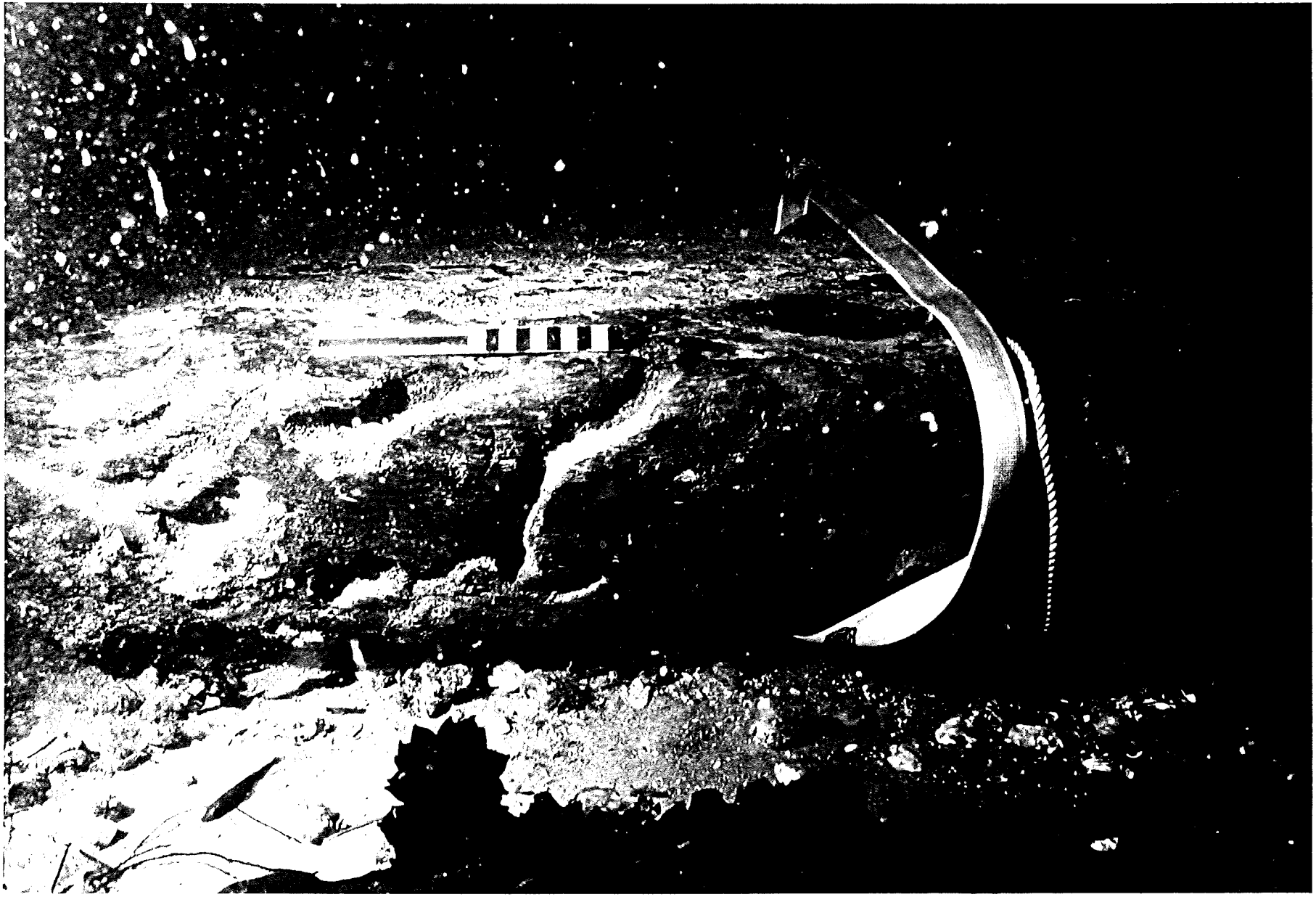


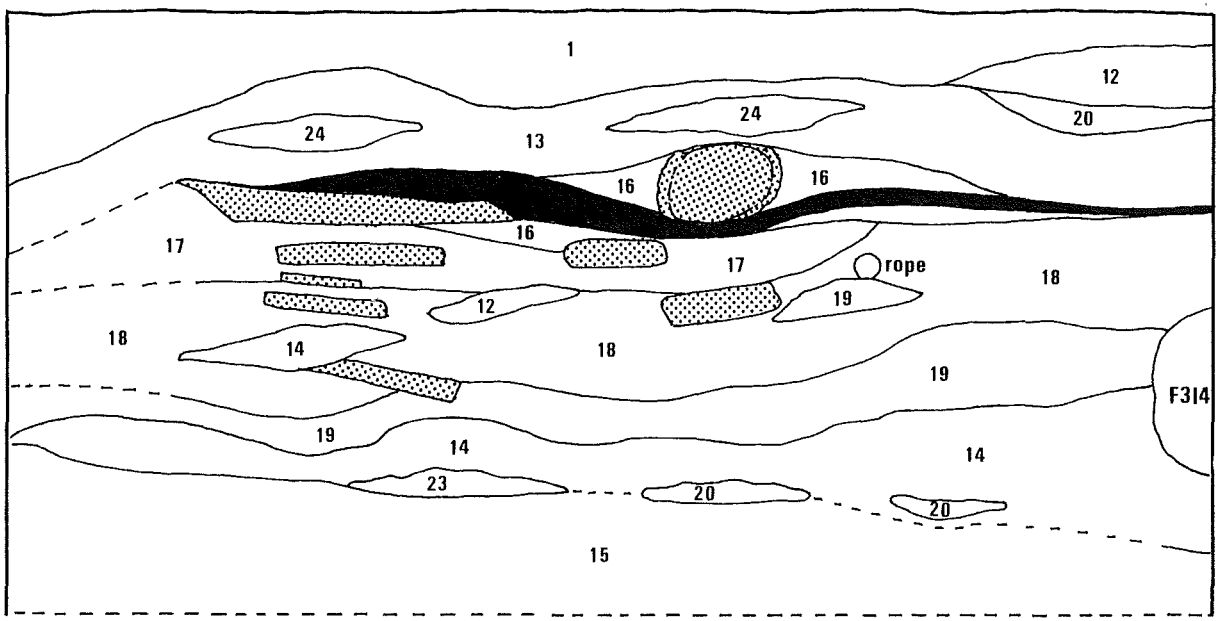
129



130



AREA 3 TRENCH 1

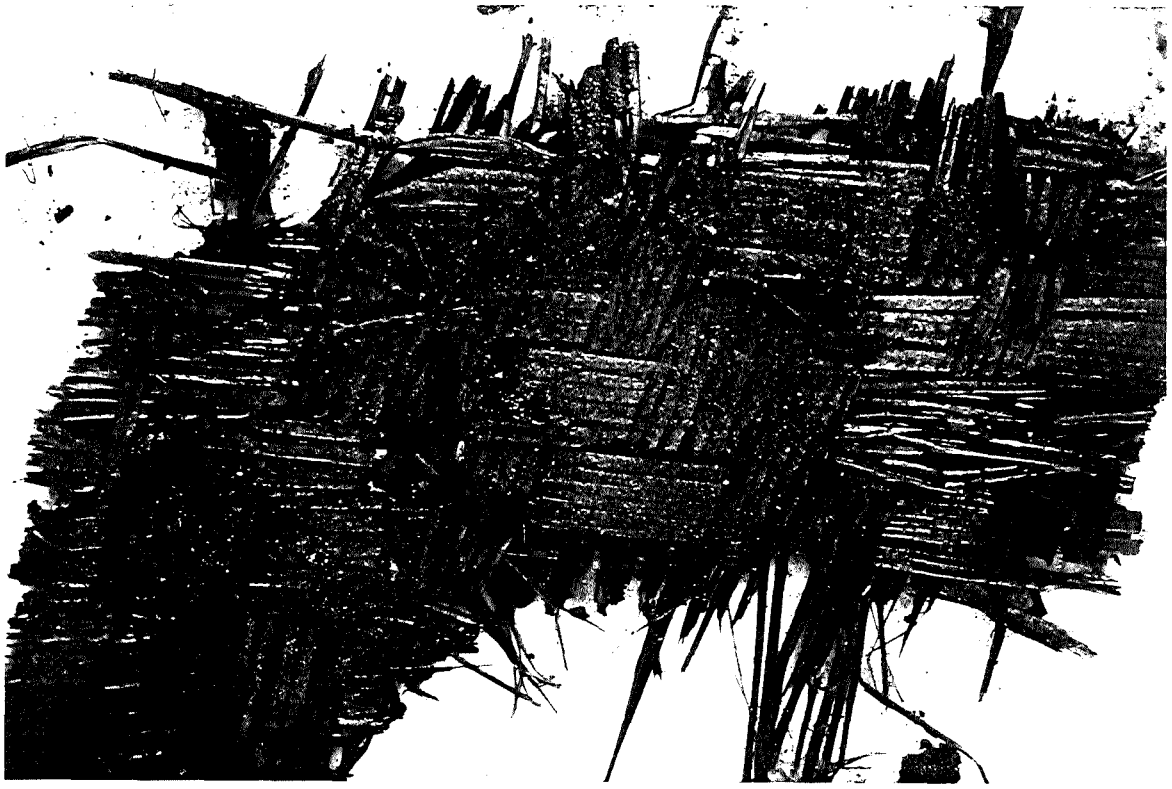


0 0·5M

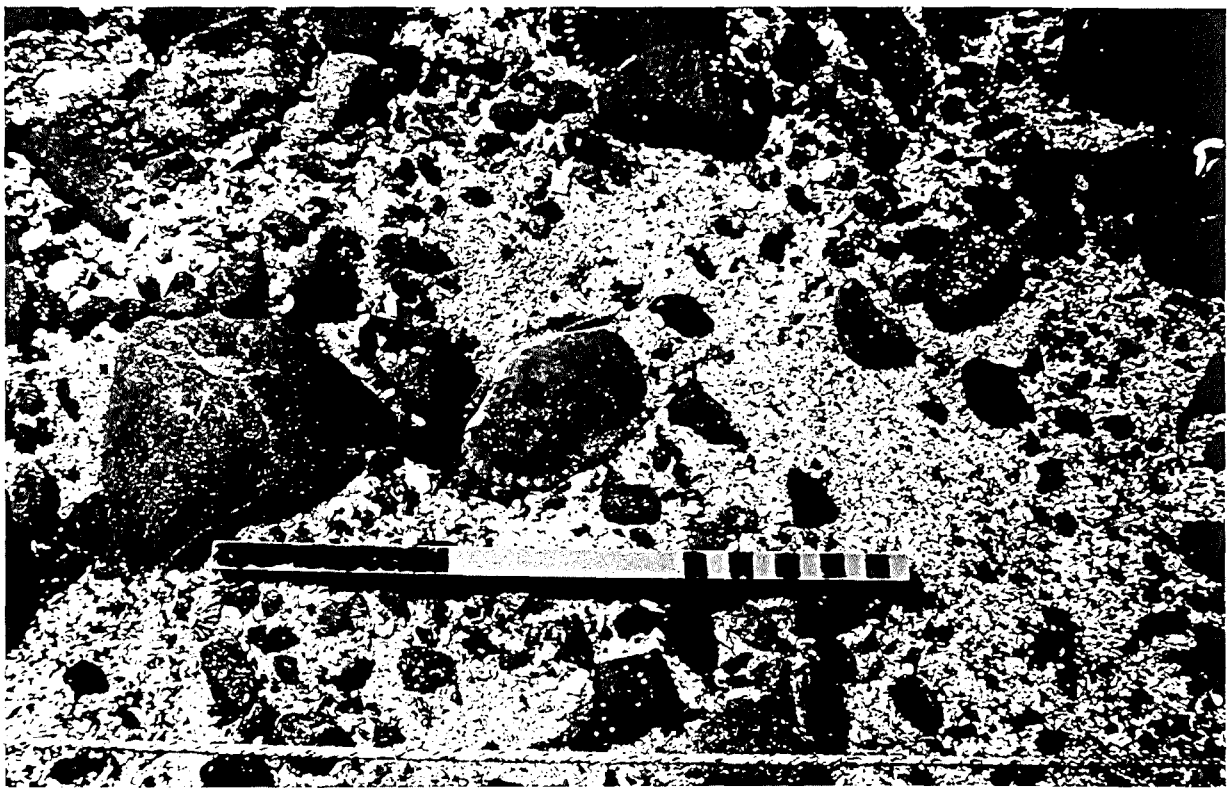
Wood

Context 21 - straw / organic matter. Very dark matrix with some wood chips.

1	Yellow transient sand
12	Semi-concreted iron-stained silt
13	Light grey anoxic sand
14	Light grey concreted sand
15	Loose sand, clean, few shell fragments
16	Fine, grey compacted sand / silt, contains oyster shell
17	Fine very light grey sand, no shell
18	Dirty grey sand with black flecks. Many finds in this context
19	Very soft (quite plastic) light grey clay, many stones and shell fragments
20	Intermittent coarse, silty sand. Orange colour, very mobile
23	As 20 but partially hardened, includes burrow fill
24	Hard pan, mixed grey and rust colour; hard crust with looser interior. Various inclusions, *e.g.* black flecks, shell, *Upogebia* burrows.



134



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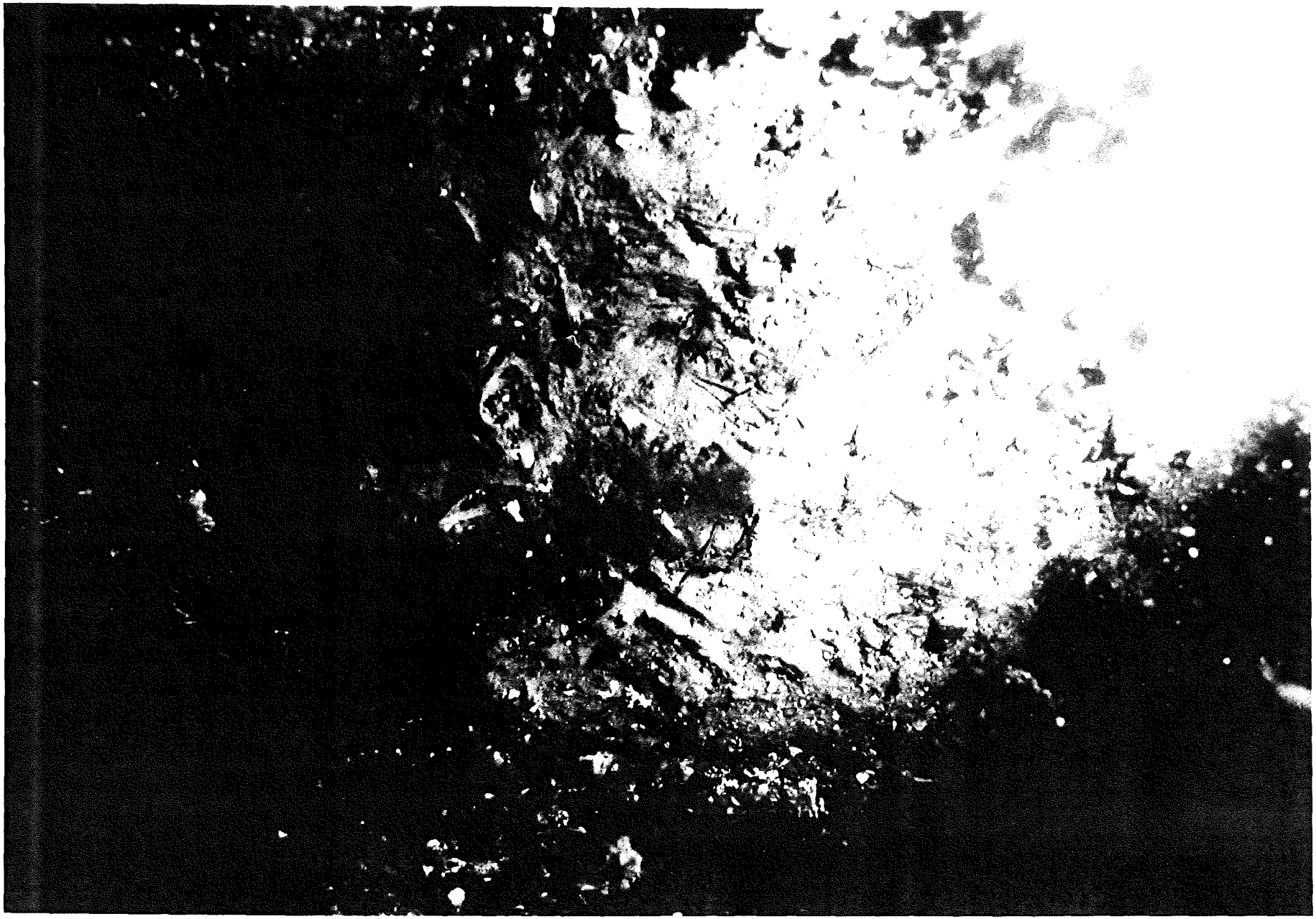
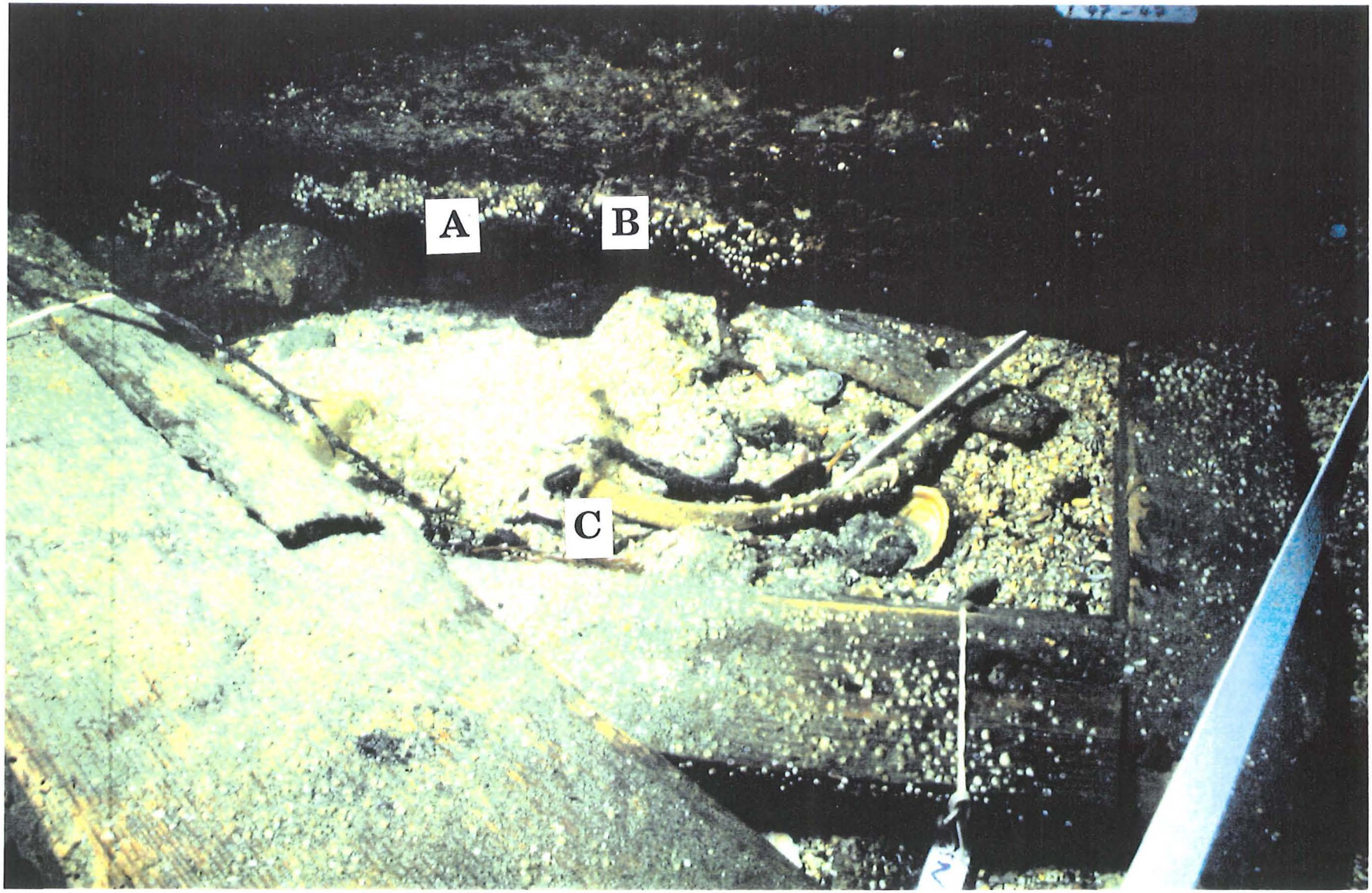
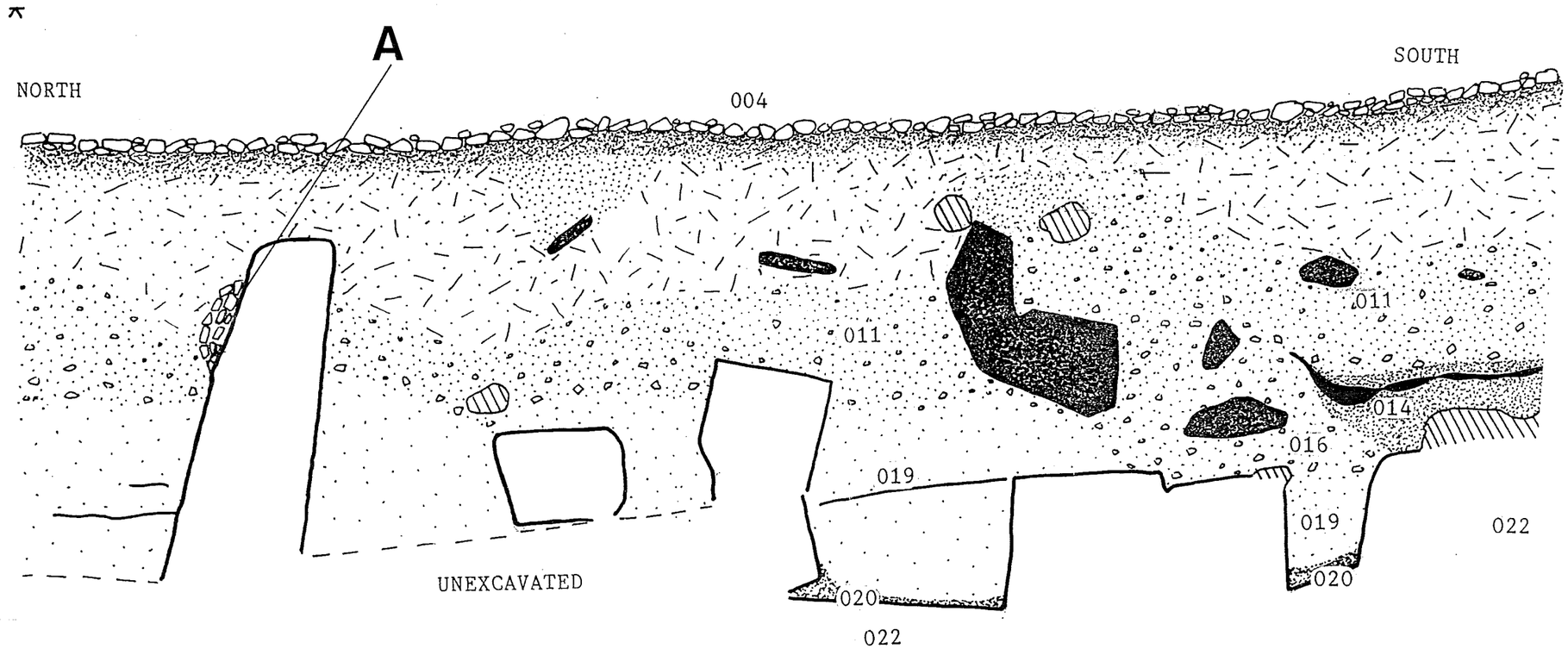


138

139


A
B
C



004 Surface layer of cobble, silt and shell fragments
009 Smooth soft grey clayey silt with few coarse components - found around timbers
010 Grey and brown silty clay with frequent large shell fragments and iron stone pebbles
011 Light grey silty clay with frequent fragments of dense clay similar to bed clay
014 Brown / grey sandy silt with occasional organic flecks
016 Fragments of bed clay and occasional small shell fragments in fine clayey silt
019 Very soft mid to dark grey clayey silt, similar to 009
020 Compact grey sandy silt
022 Hull fragment - starboard side transom stern

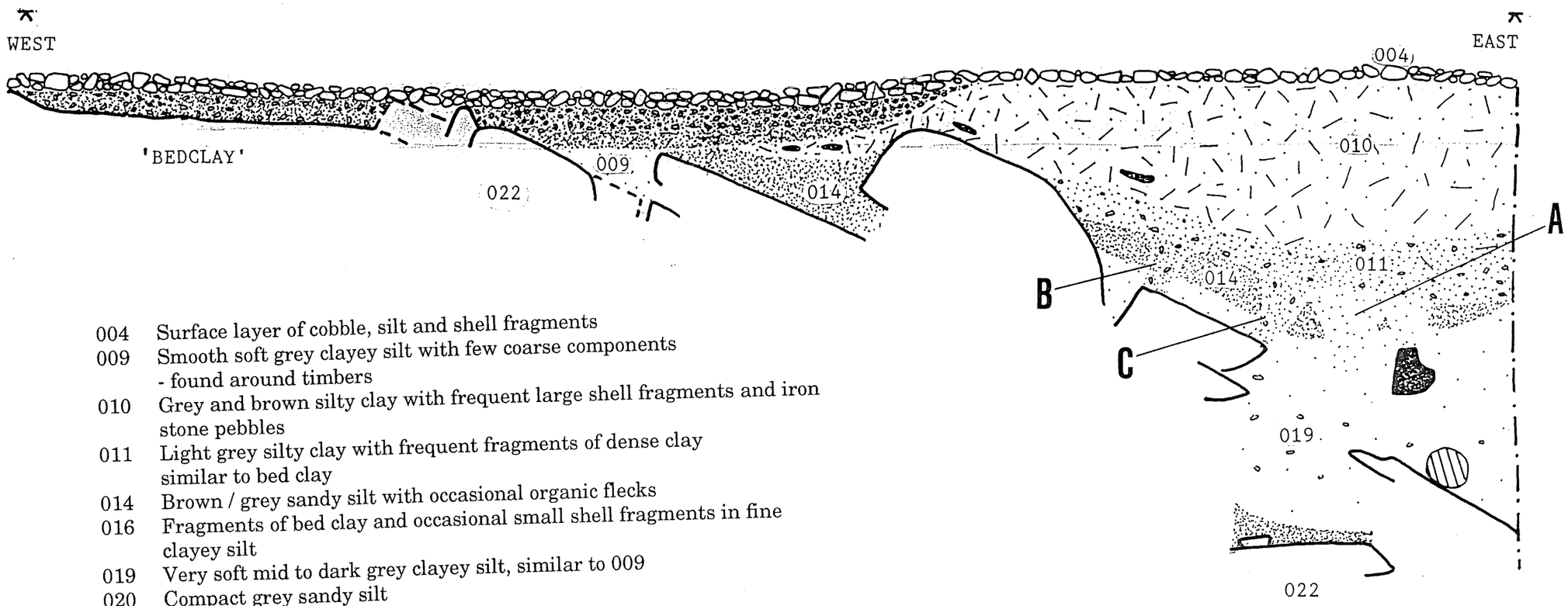
WOOD

EAST SECTION TRENCH 3

No. 284

50 CM

In order to avoid misinterpretation, the section has been reproduced directly from the archive rather than redrawn, courtesy of Isle of Wight Archaeological Service.



004 Surface layer of cobble, silt and shell fragments
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011 Light grey silty clay with frequent fragments of dense clay similar to bed clay
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016 Fragments of bed clay and occasional small shell fragments in fine clayey silt
019 Very soft mid to dark grey clayey silt, similar to 009
020 Compact grey sandy silt
022 Hull fragment - starboard side transom stern

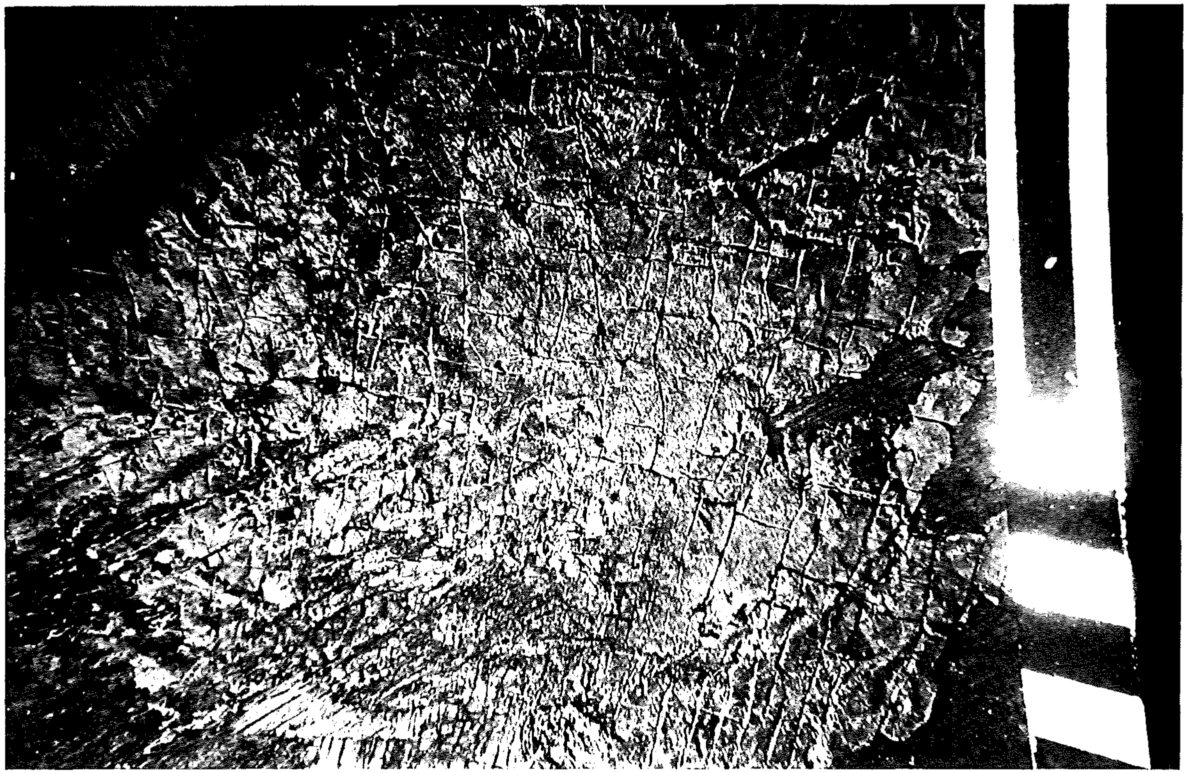
WOOD

In order to avoid misinterpretation, the section has been reproduced directly from the archive rather than redrawn, courtesy of Isle of Wight Archaeological Service.

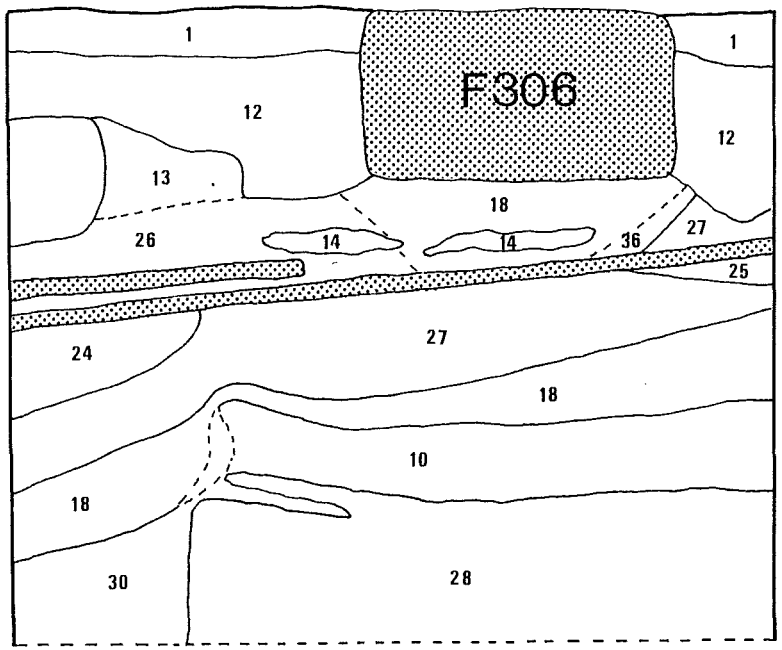
NORTH SECTION TRENCH 3

No. 272

50 CM



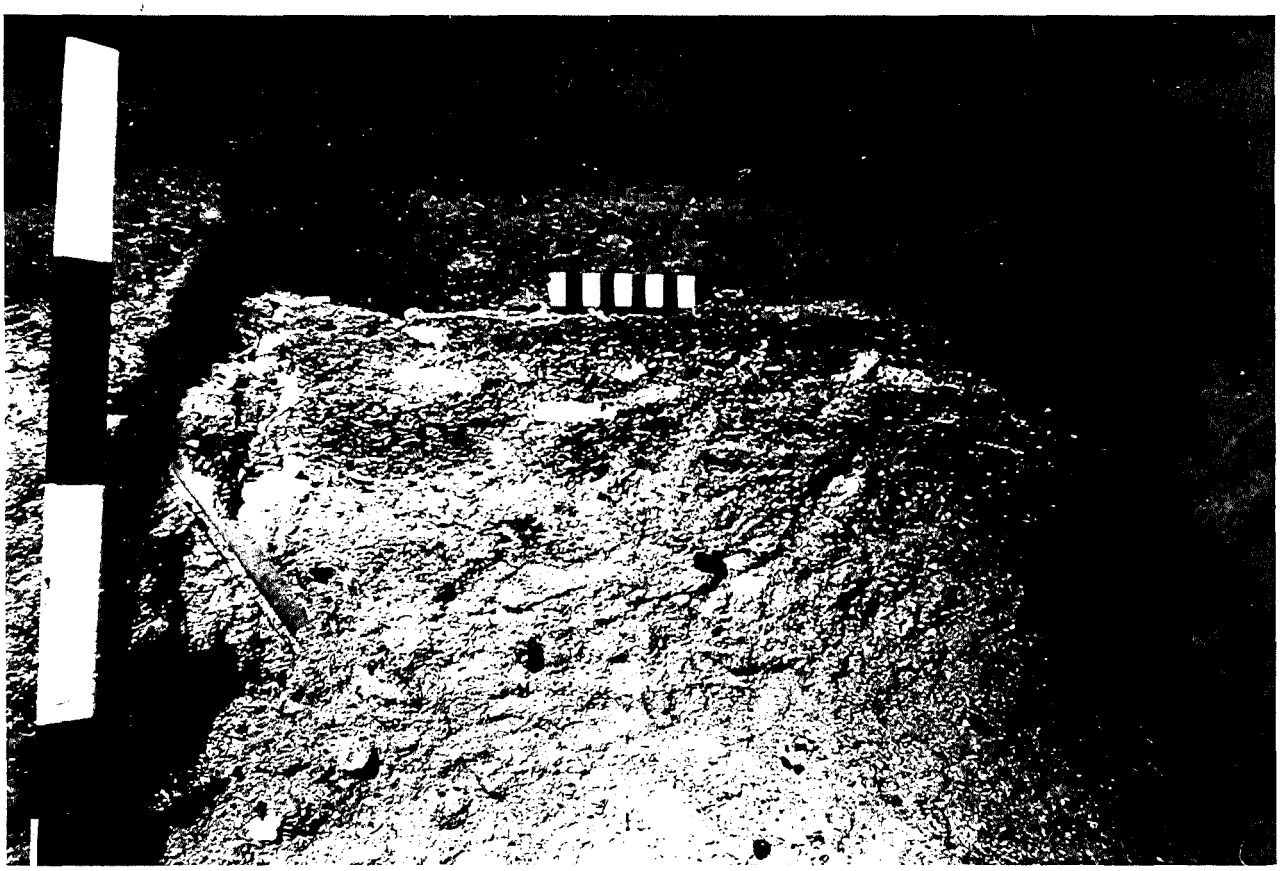
AREA 3 TRENCH 1



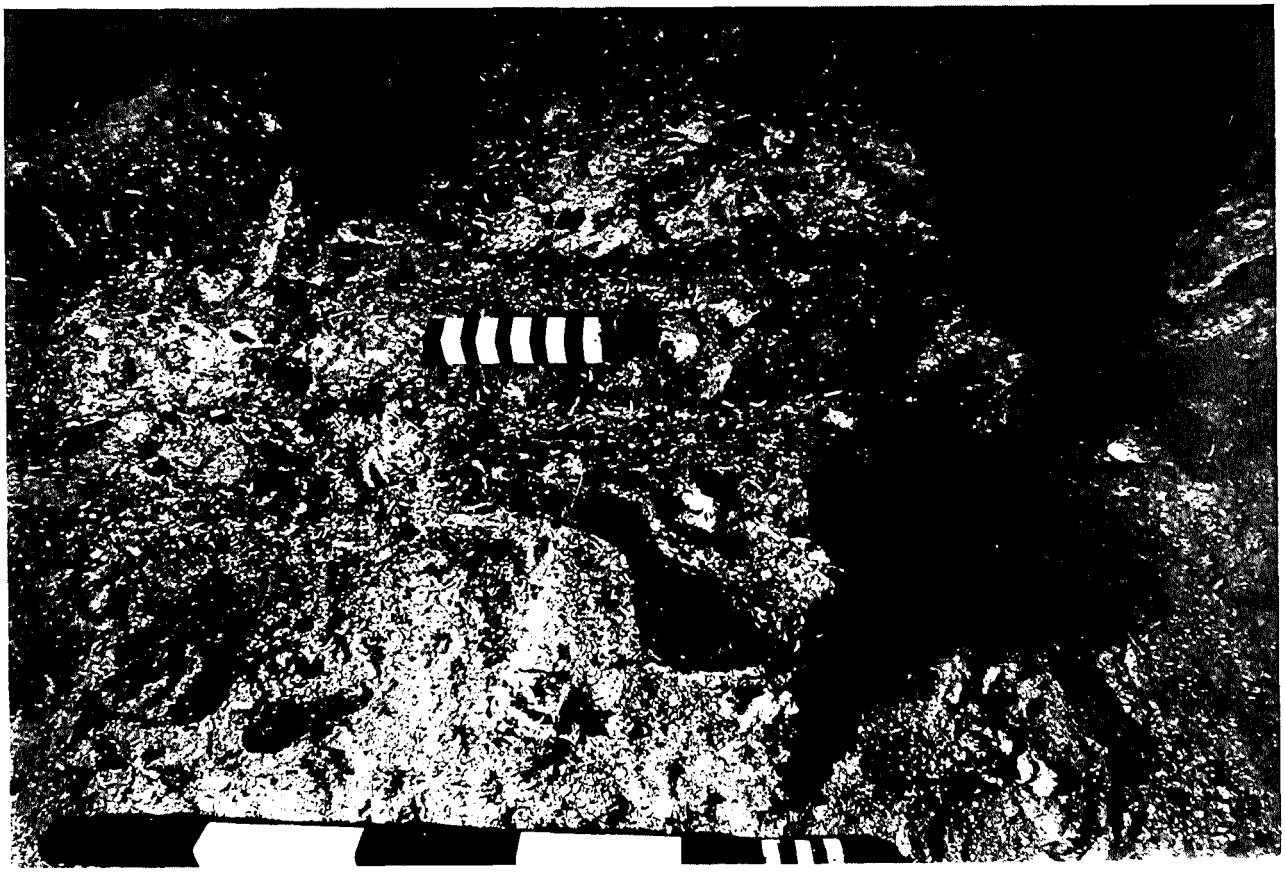
0 0·5M

Wood

1 Yellow transient sand
10 Grey clay
12 Semi-concreted iron-stained silt
13 Light grey anoxic sand
14 Light grey concreted sand
18 Dirty grey sand with black flecks - many finds in this context
24 Hard pan, mixed grey and rust colour; hard crust with looser interior.
Various inclusions, *e.g.* black flecks, shell, *Upogebia* burrows.
25 Grey sand / clay - very plastic feel
26 Mid-grey loose sand - no shell fragments
27 Horizontally layered oyster shell fragments - some gritty sand
28 Compacted layer of gravel within sand and clay matrix
30 Grey sand with black flecks, no shell - looks like compacted 18
36 Loose light grey sand



145



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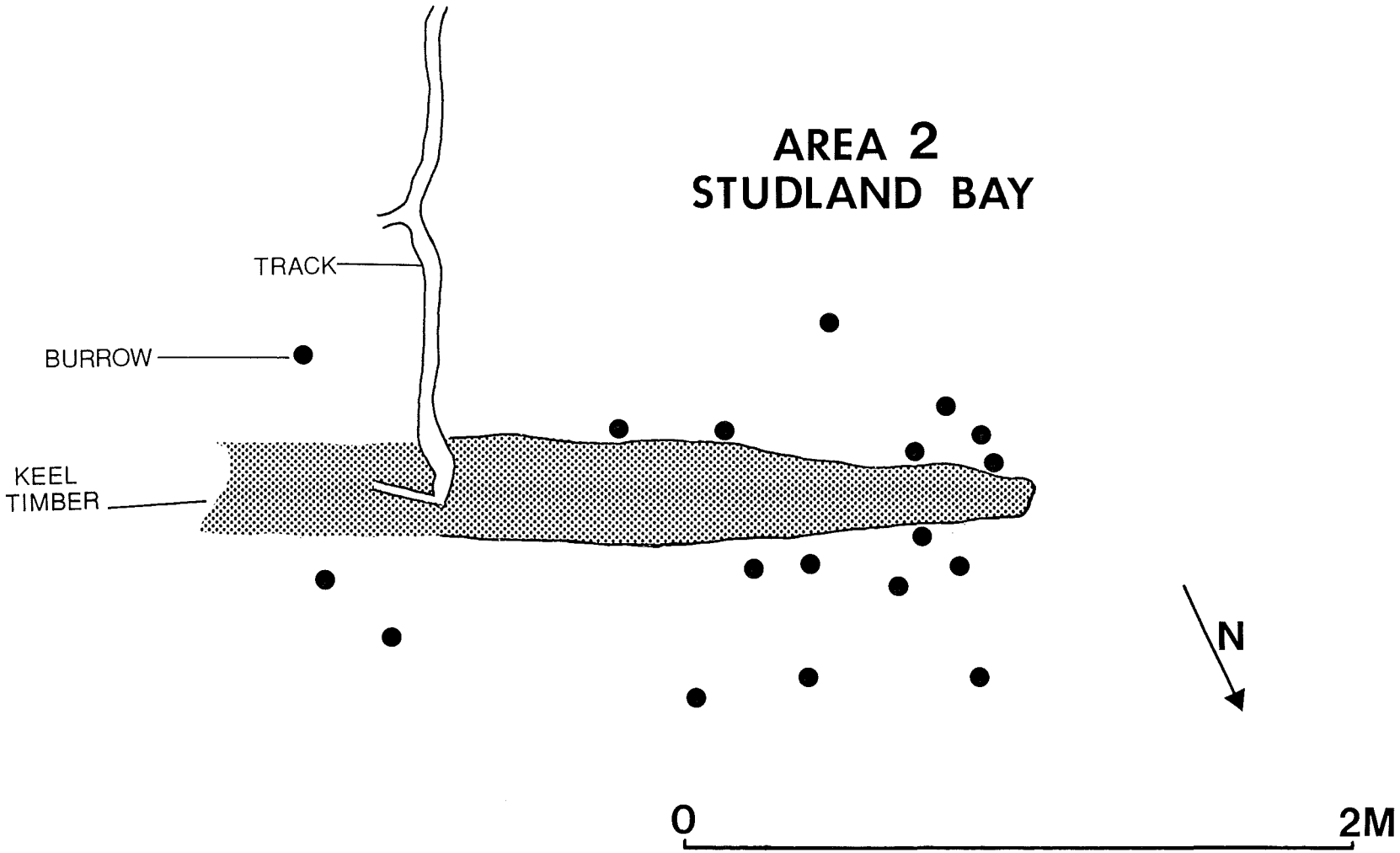
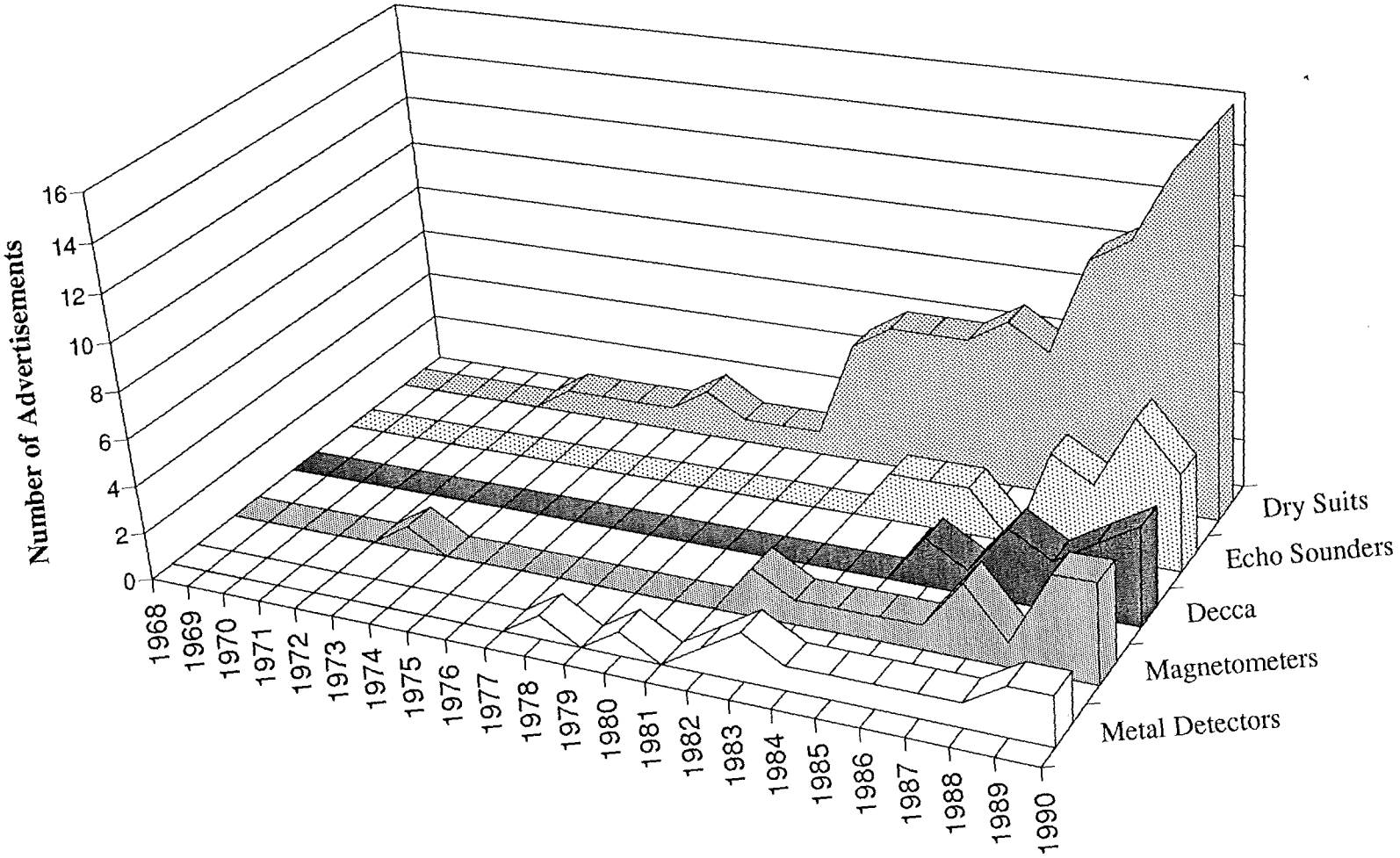
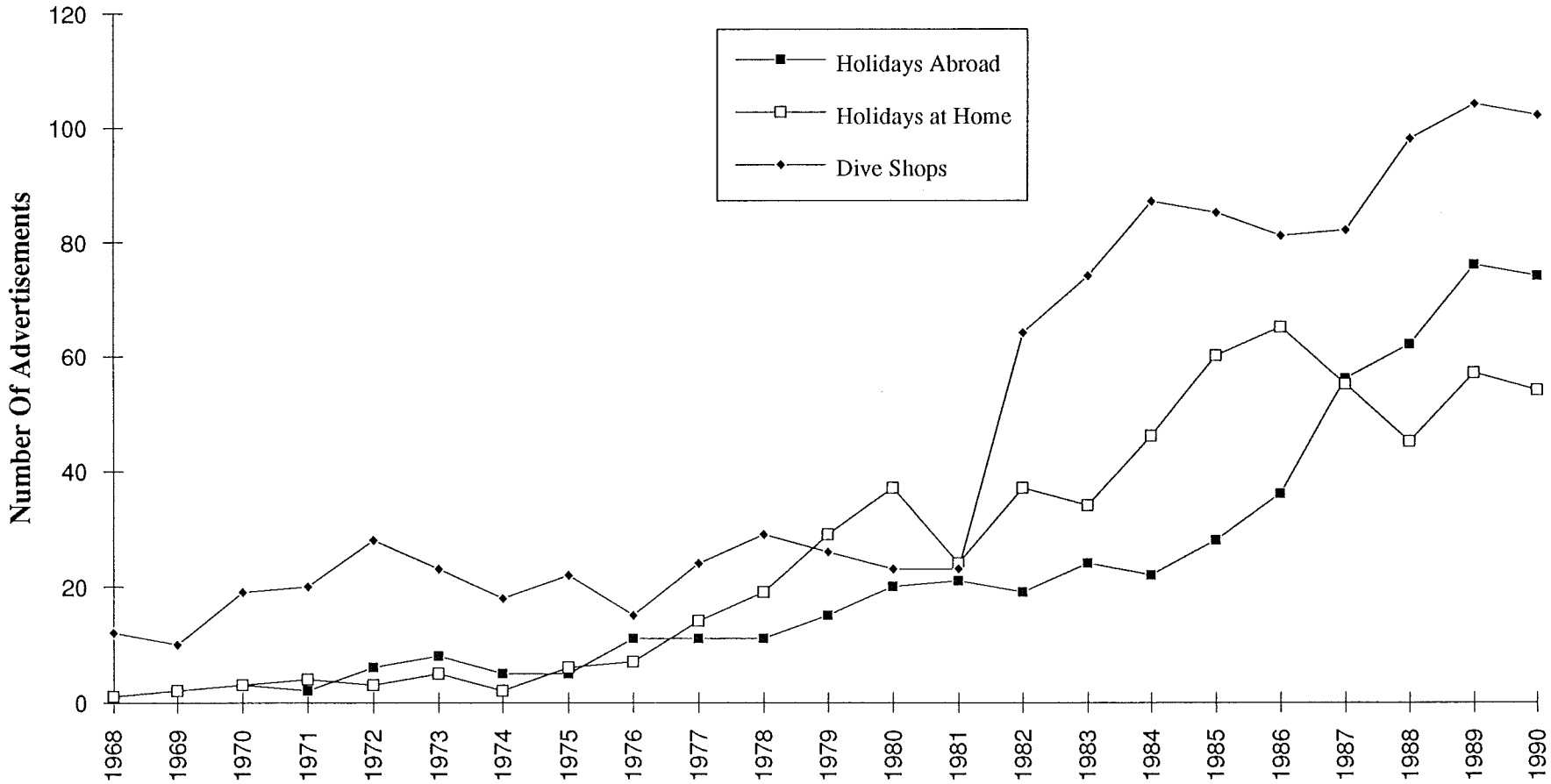

AREA 2
STUDLAND BAY
TRACK
BURROW
KEEL
TIMBER
N
0
2M

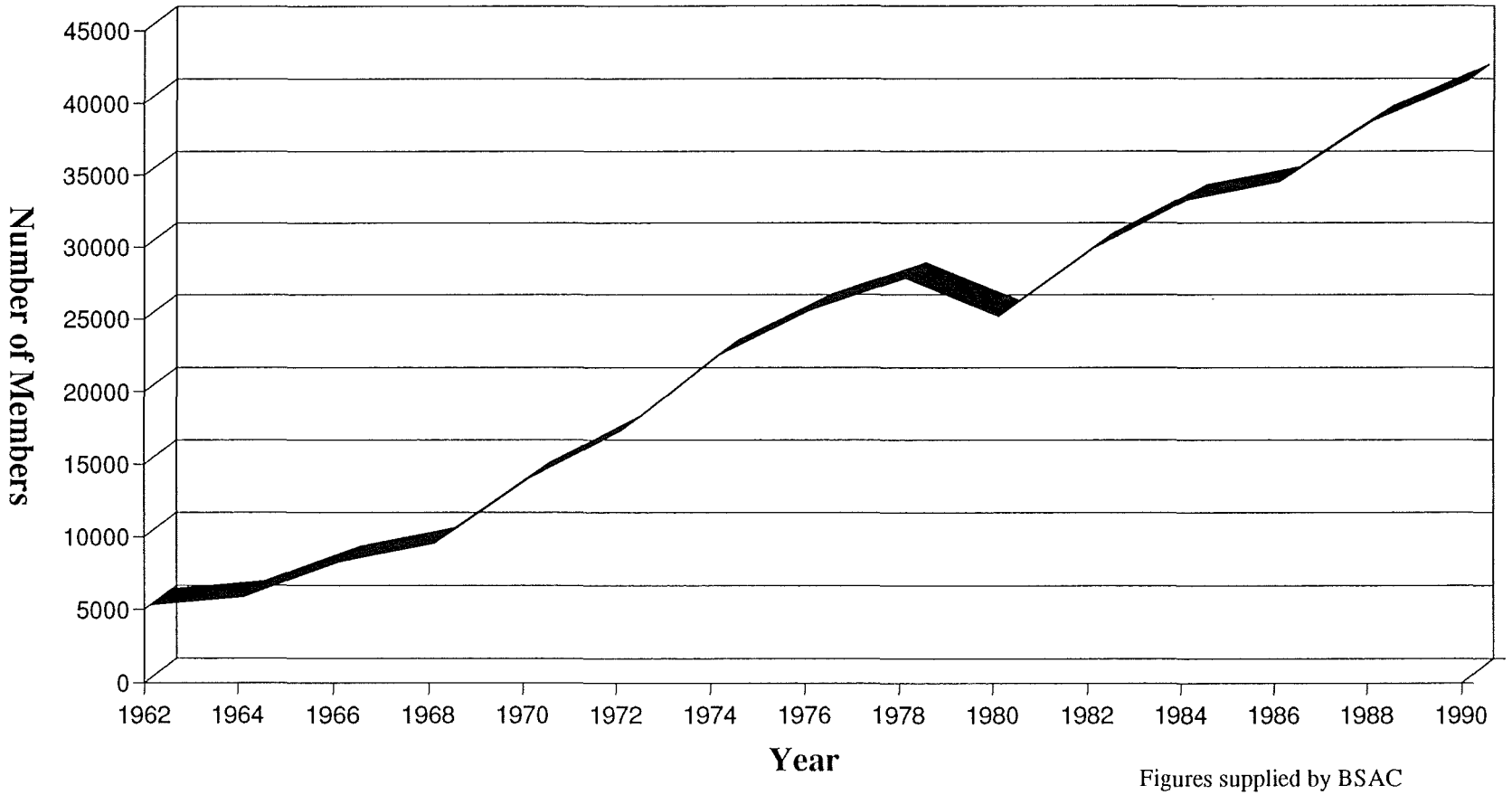
Reproduced with permission from Fishing News (18 January 1991)


Number of Advertisements
16
14
12
10
8
6
4
2
0
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
Dry Suits
Echo Sounders
Decca
Magnetometers
Metal Detectors

Number of Advertisements in Diver Magazine 1968-1990

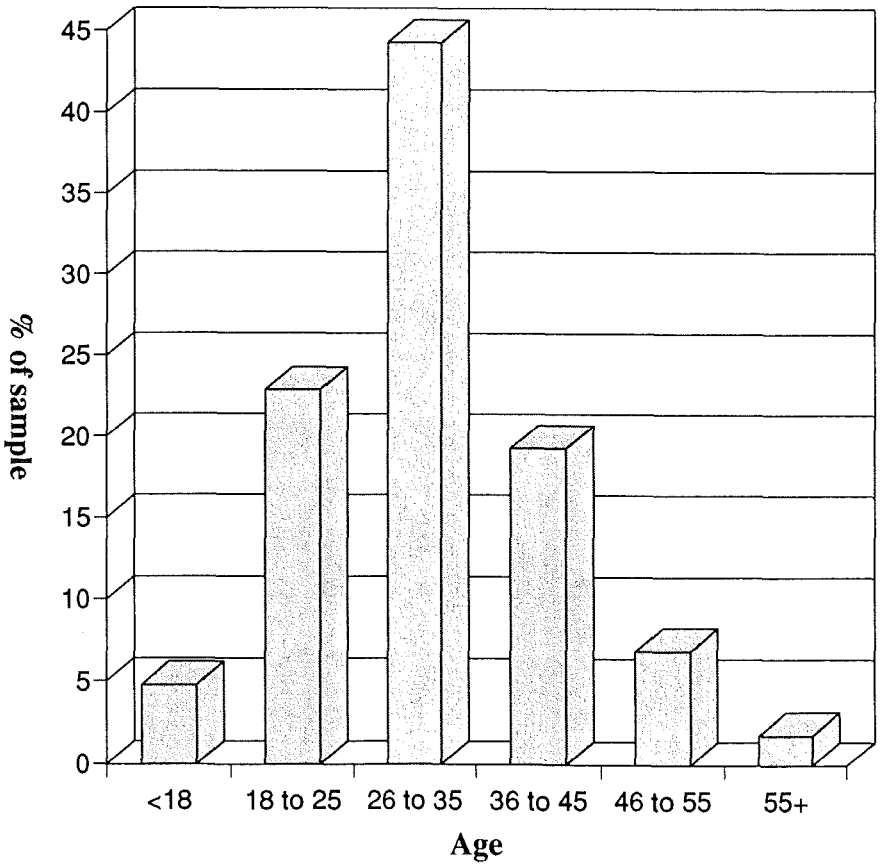


BSAC Membership 1962-1990

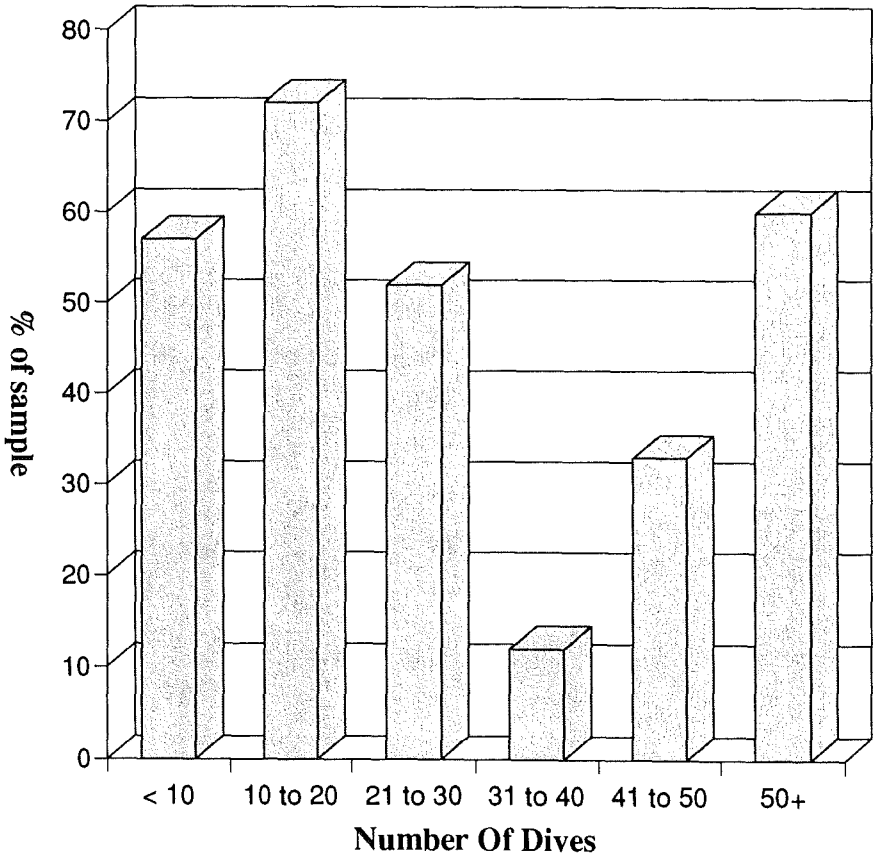


Figures supplied by BSAC

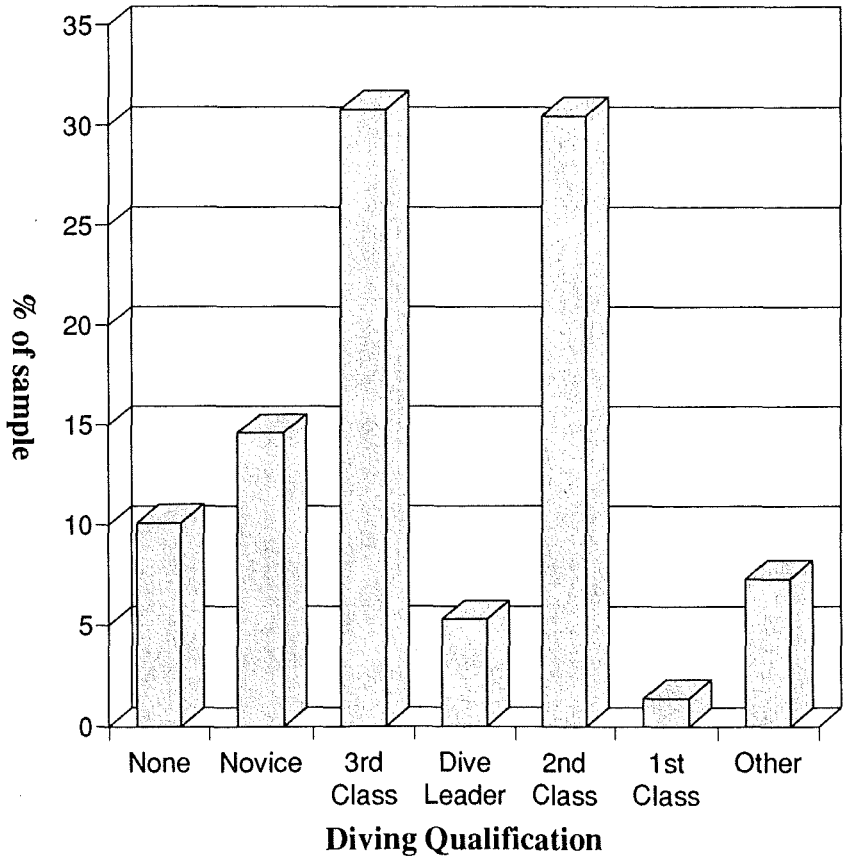
Age Of Sample



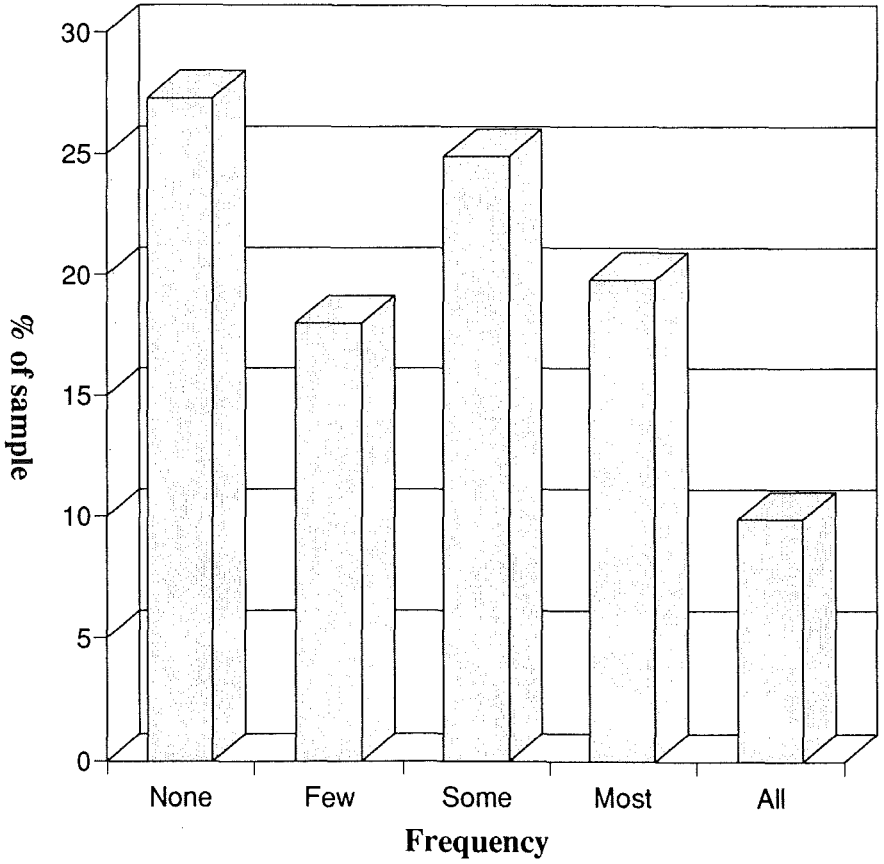
Dives Undertaken In The Previous Twelve Months

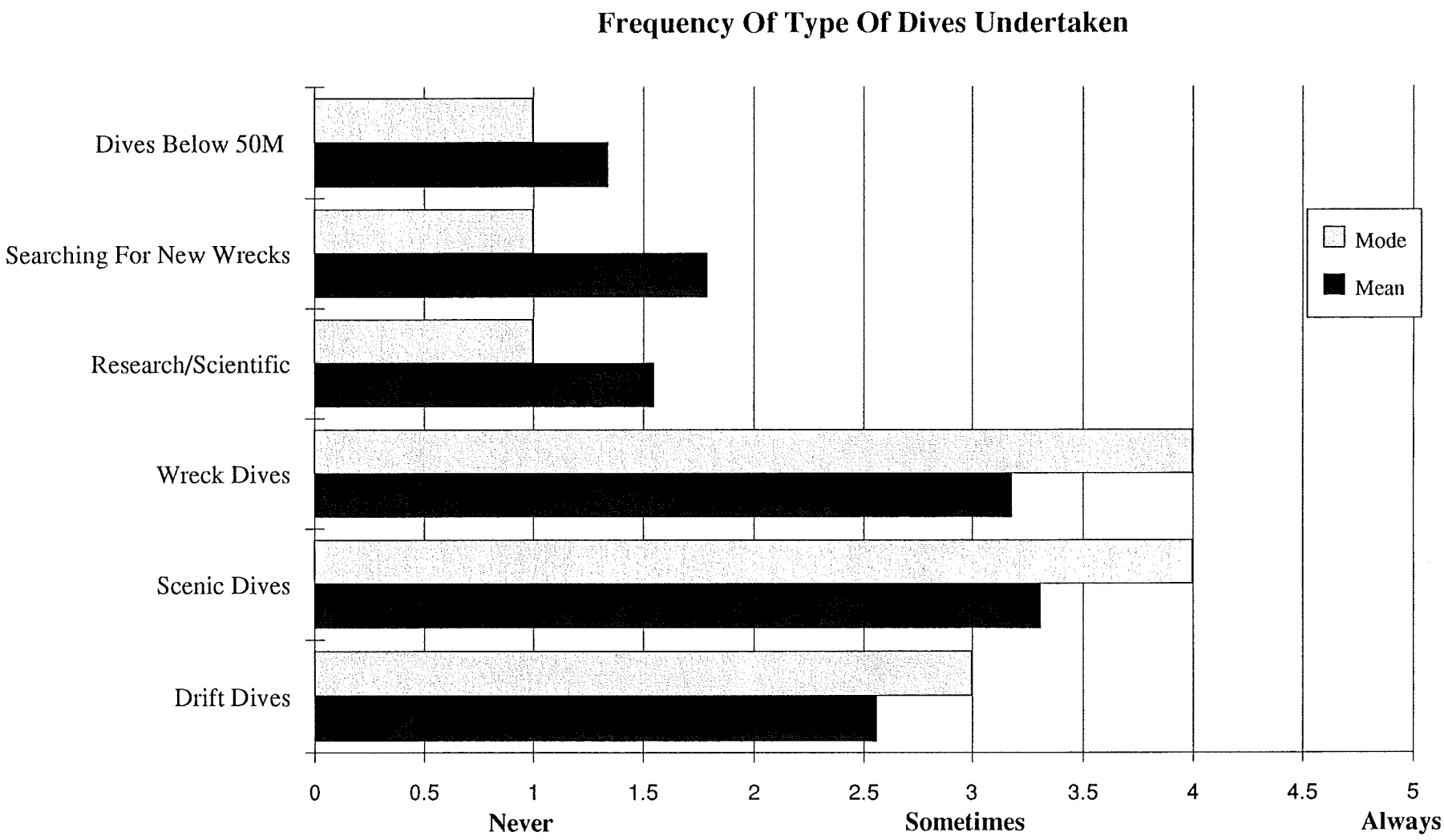


Diving Qualification Held By Respondents To Questionnaire 1

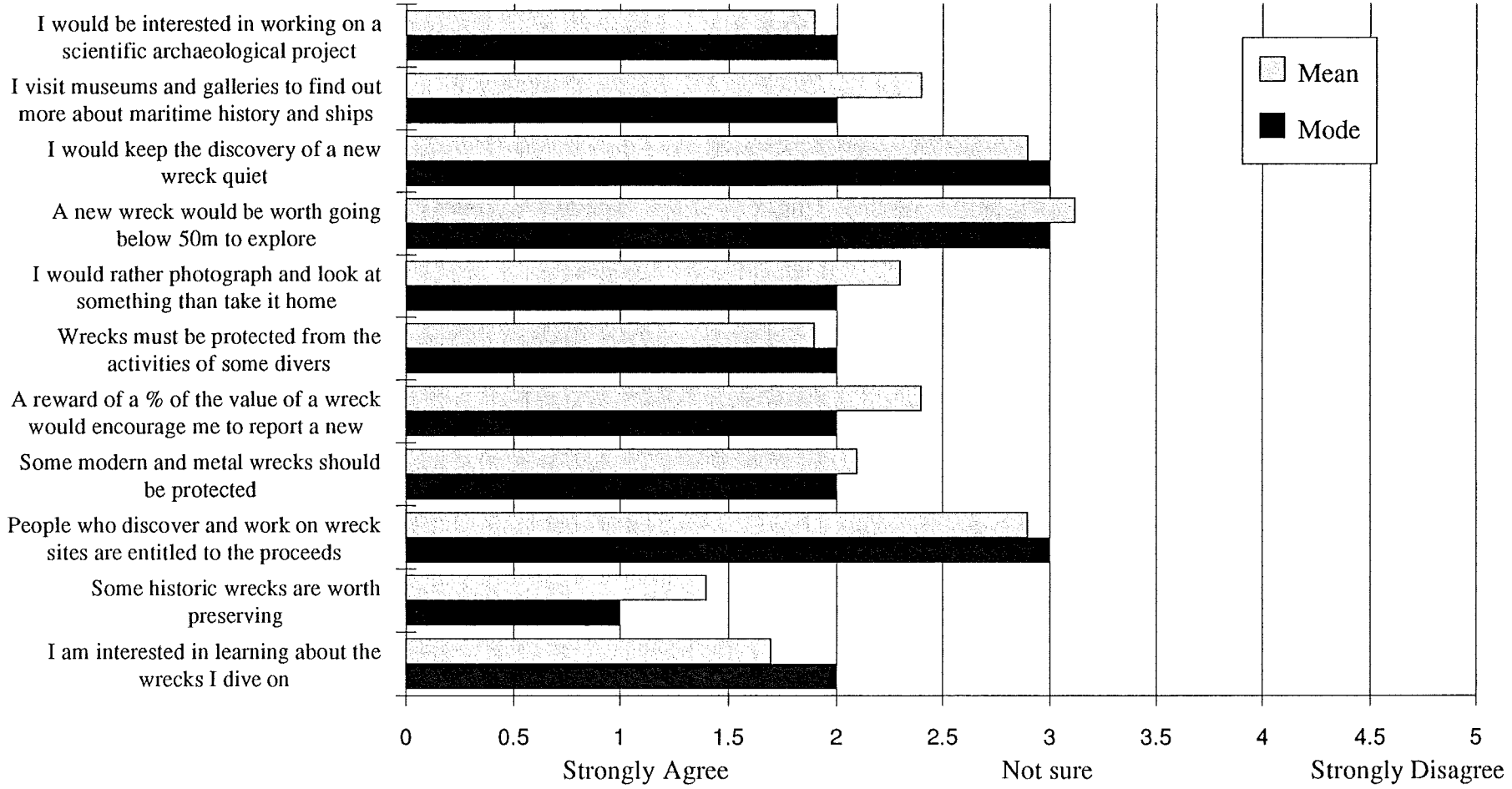


Frequency Of Dives From Hardboats In The Last Twelve Months

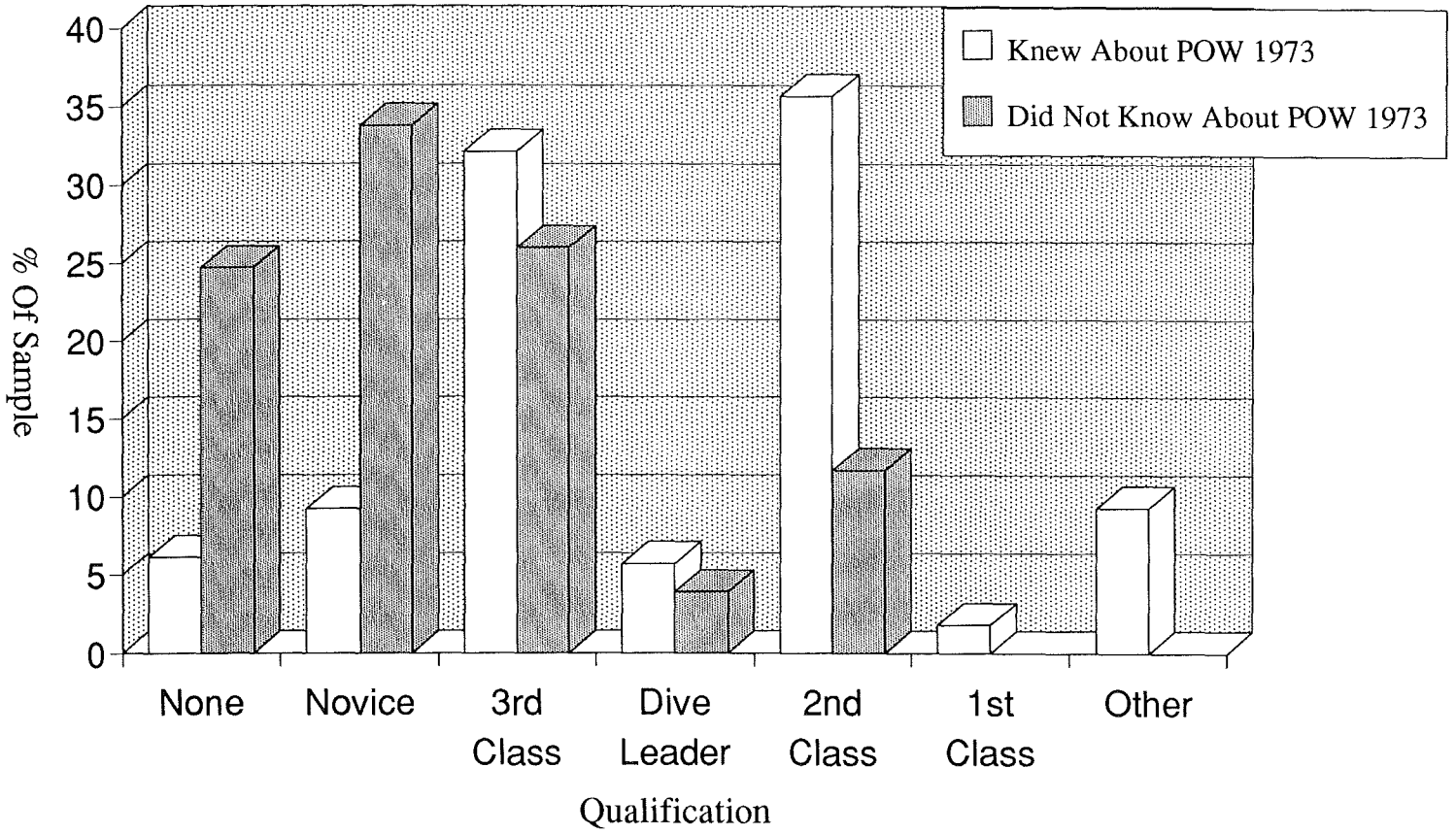


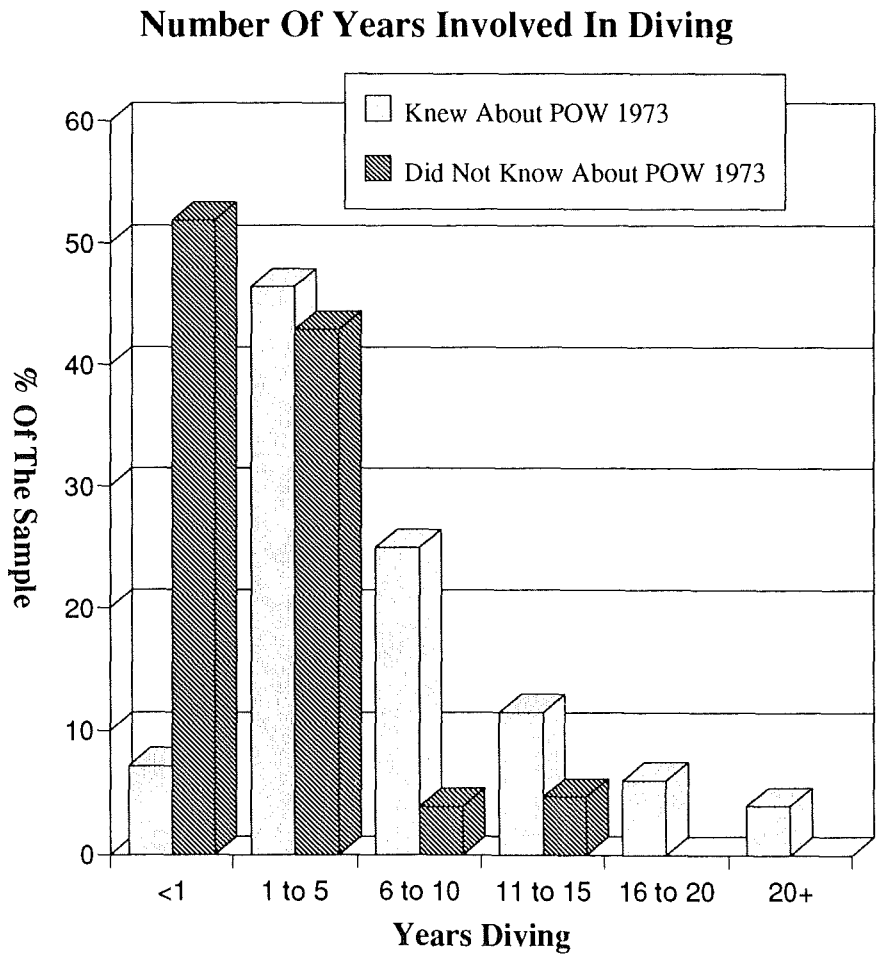

Frequency Of Type Of Dives Undertaken
Dives Below 50M
Searching For New Wrecks
Research/Scientific
Wreck Dives
Scenic Dives
Drift Dives
Mode
Mean
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Never
Sometimes
Always

Responses To Question 8

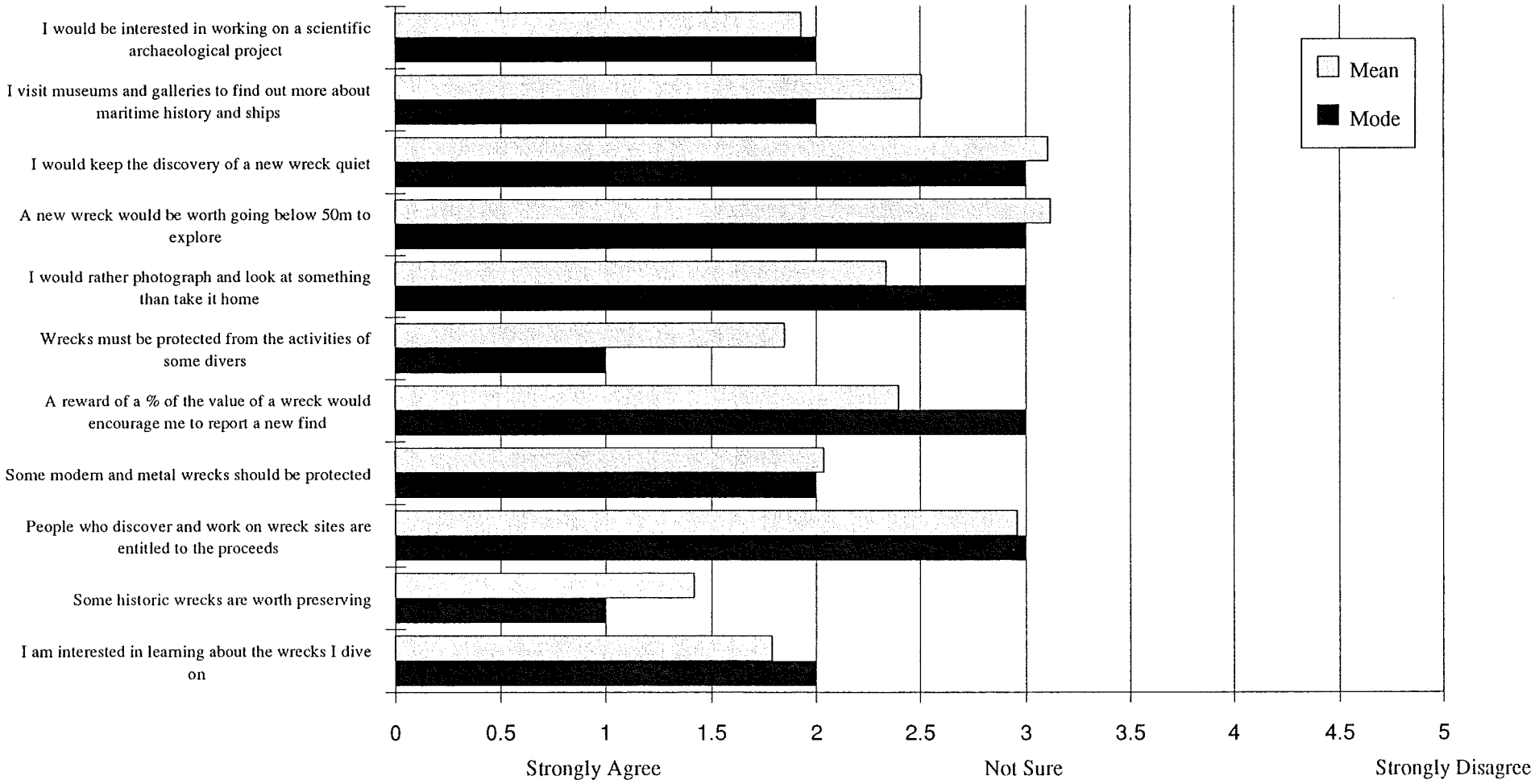


Dive Qualification

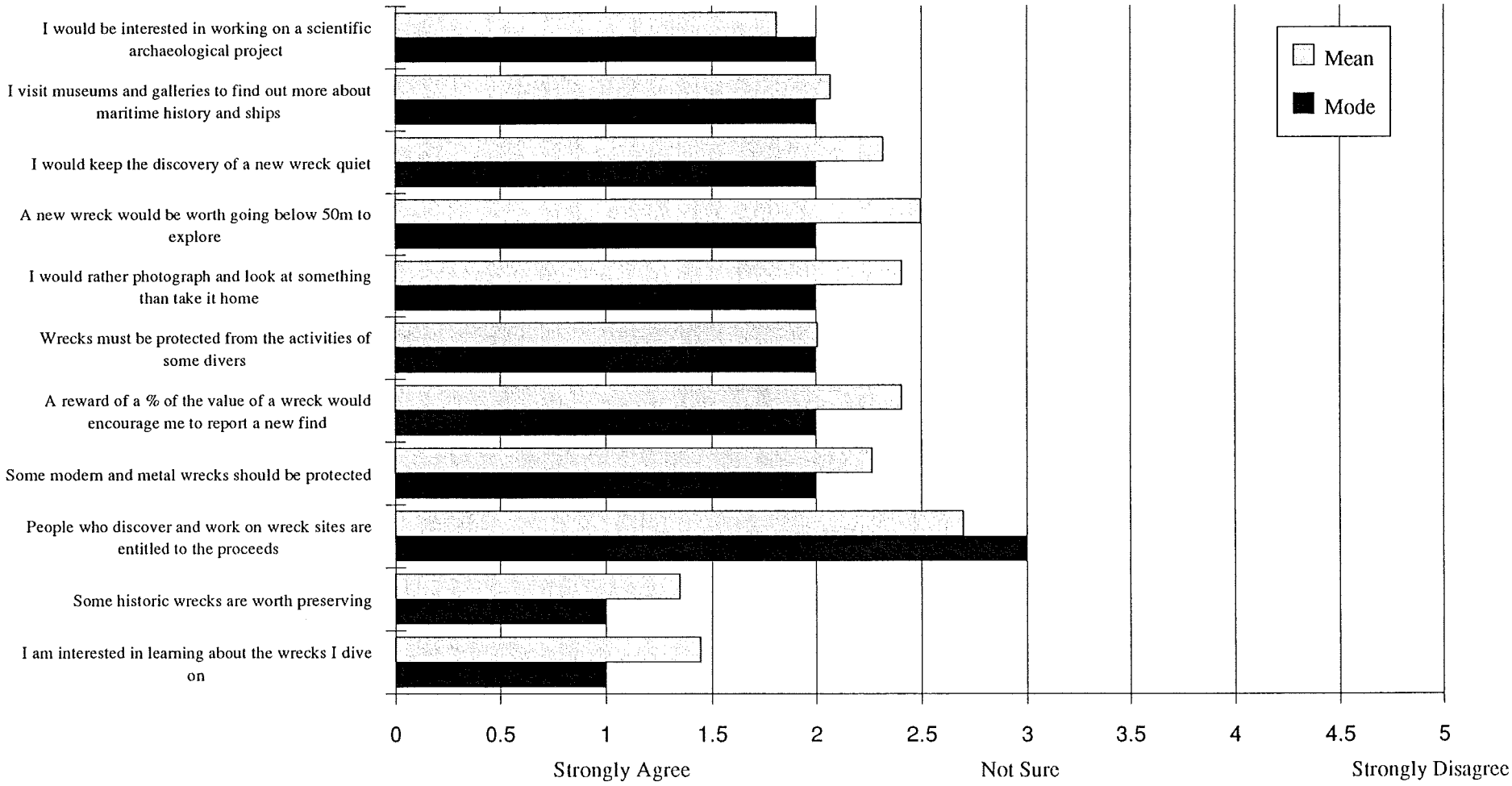



Number Of Years Involved In Diving
Knew About POW 1973
Did Not Know About POW 1973
% Of The Sample
60
50
40
30
20
10
0
<1
1 to 5
6 to 10
11 to 15
16 to 20
20+
Years Diving

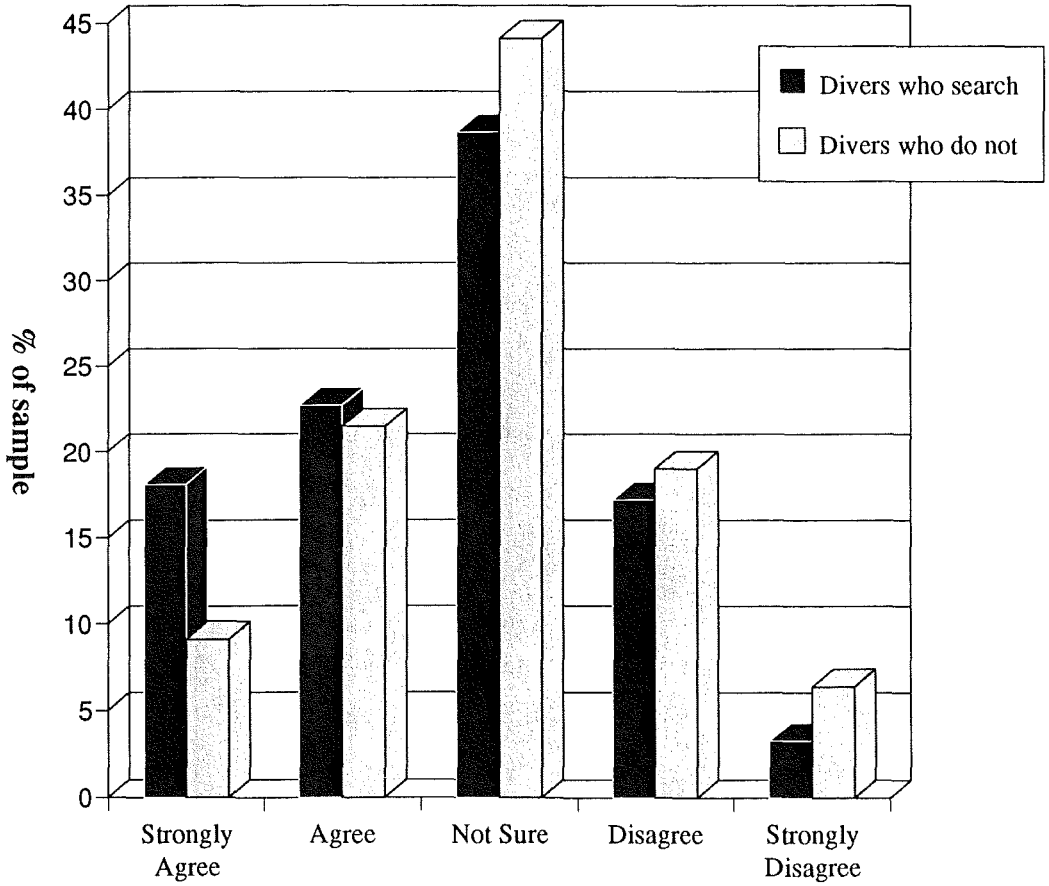
Responses To Question 8 From Divers Who Do Not Search For New Wreck



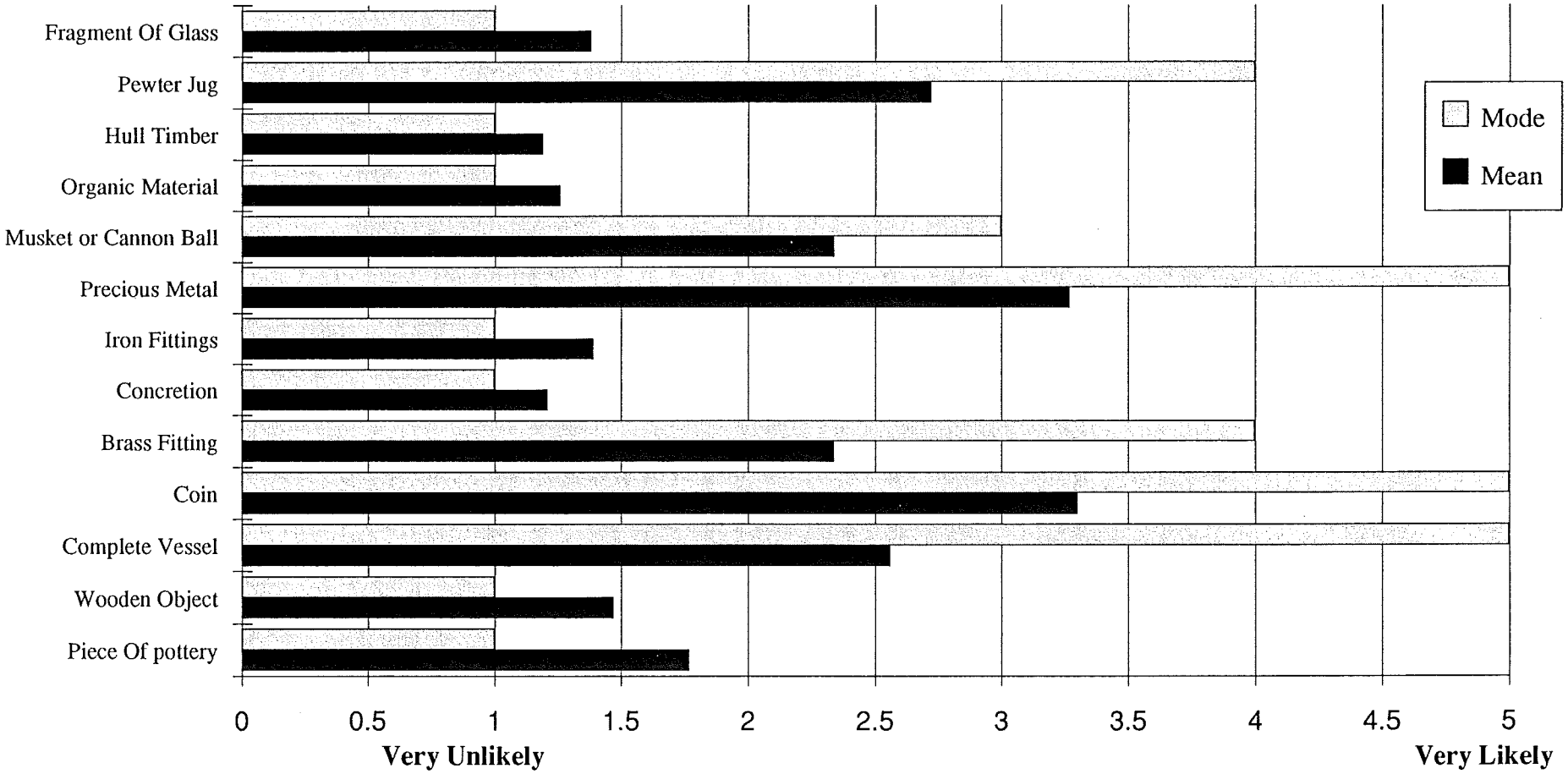
Responses To Question 8 From Divers Who Search For New Wreck

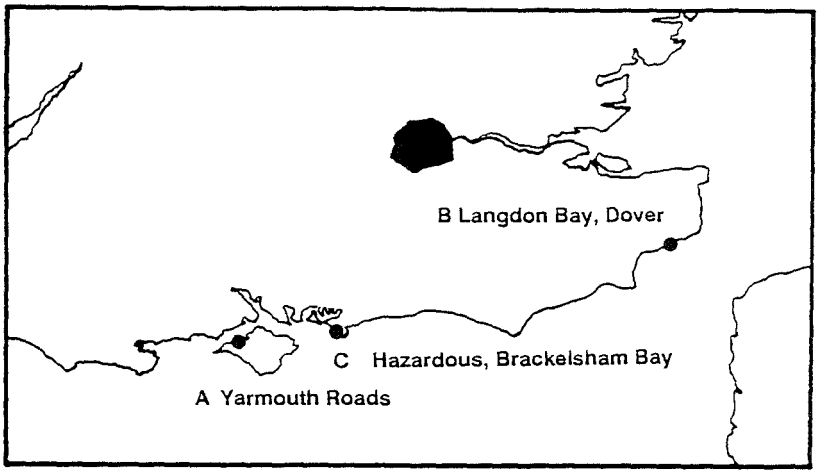


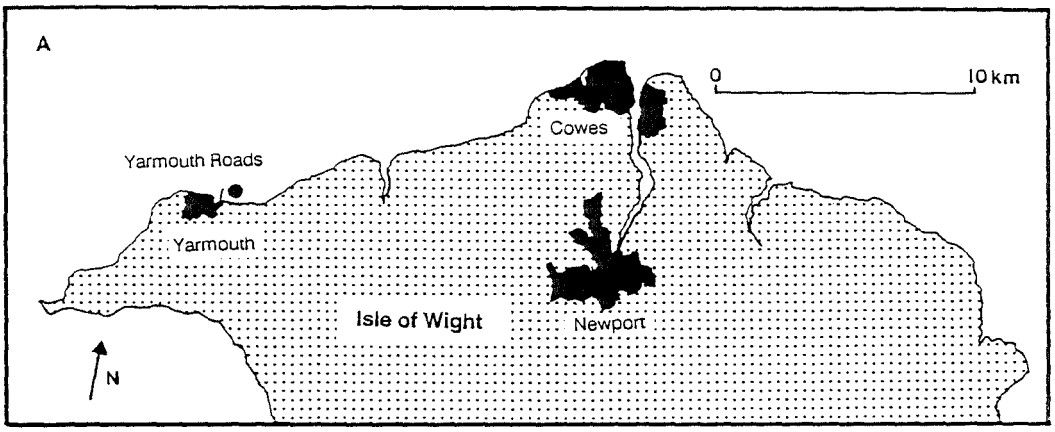
Responses to the Statement 'people who discover and work on wreck sites are entitled to the proceeds.'

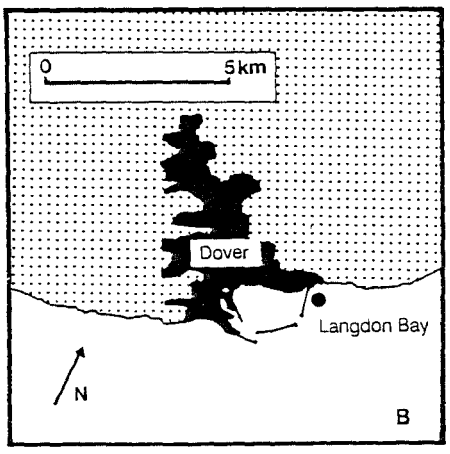


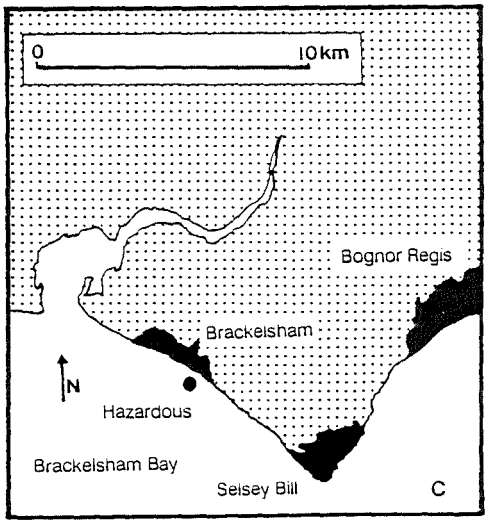
How Likely Would You Be To Pick Up And/Or Remove Any Of The Following From A Pre 20th Century Wreck?




B Langdon Bay, Dover
C Hazardous, Brackelsham Bay
A Yarmouth Roads


A
0
10 km
Cowes
Yarmouth Roads
Yarmouth
Isle of Wight
Newport
N


0
5km
Dover
Langdon Bay
N
B


0
10km
Bognor Regis
Brackelsham
N
Hazardous
Brackelsham Bay
Selsey Bill
C