

THE DUTCH EAST INDIAMAN 'ZEEWIJK' WRECKED IN 1727:  
A Report on the 1978 Expedition to the Site.

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# C O N T E N T S

	<u>PAGE</u>
INTRODUCTION	3
AIMS OF THE 1978 ZEEWIJK EXPEDITION	4
THE ZEEWIJK MAINSITE	6
A SURVEY OF THE ZEEWIJK MAINSITE	7
RESULTS OF THE SURVEY OF THE ZEEWIJK MAINSITE	10
EXCAVATION ON THE ZEEWIJK MAINSITE	12
INVESTIGATION OF WRECKAGE ON THE INSIDE REEF	13
UNDERWATER SURVEYS ON THE INSIDE REEF	15
SWIMLINE SEARCHES ON THE INSIDE REEF	16
MAPPING OF WRECK MATERIAL CONCENTRATIONS	16
GEOLOGICAL SURVEY ON INSIDE REEF	18
RESULTS OF THE GEOLOGICAL SURVEY	20
MARINE BIOLOGICAL SURVEY ON INSIDE REEF	20
INVESTIGATION ON ZEEWIJK SITES ON GUN ISLAND	22
LAND SURVEYS	22
LAND EXCAVATION	23
INVESTIGATION OF THE WELLS USED BY THE ZEEWIJK SURVIVORS	27
RESULTS OF THE LAND EXCAVATIONS	29
SLOEPIE'S SHIPYARD	34
CONCLUSION	39
FUTURE OF THE ZEEWIJK PROJECT	40
ZEEWIJK MAINSITE	40
SEARCH FOR OTHER WRECK MATERIAL CONCENTRATIONS	44
INSIDE REEF	44
ON LAND	45
APPENDIX	46
ACKNOWLEDGEMENTS	66

## INTRODUCTION

A history of the loss of the Dutch East Indiaman Zeewijk and reports on two previous expeditions to the site in 1976 and 1977 have already been published separately. (Ingelman-Sundberg 1976, Ingelman-Sundberg, 1977)

Thus a background story to the Zeewijk project and methods already accounted for in previous expedition reports will not be dealt with here. This is a paper which concerns exclusively with the land and underwater surveys and excavation work carried out during the 1978 expedition. For a brief summary of the Zeewijk story and previous work on the site see Appendix 1.

## AIMS OF THE 1978 ZEEWIJK EXPEDITION

At dusk on 9th of June 1727 the Dutch East Indiaman Zeewijk foundered off Half Moon reef in the Southern Abrolhos.

Today the remains of the wreck can be found in the breakers on the outside of the reef, scattered over several kilometres on the inside reef and on a nearby island, Gun Island where the castaways stayed for 10 months after the fateful disaster.

The third season of investigation of the site, the 1978 Zeewijk expedition, involved extensive work both on land and underwater.

The objects of the 1978 survey of the site were as follows:

### Underwater

1. To map the Zeewijk mainsite scattered in the breakers on the outside of Half Moon reef.
2. Do test excavations on the mainsite to establish if and in what quantity wreck debris had been trapped around cannon, reef formations and in hollows in the seabed.
3. Determine the origin, extent and pattern of wreck debris washed over the reef.

4. Triangulate, photograph and measure major wreck material concentrations on the inside reef in order to try and establish its volume, extent and origin.

5. Try to establish the origin and age of coral formations in or in the near vicinity of wreckage from the Zeewijk. The purpose of this investigation was to see whether the coral formations were present at the time of the foundering of the ship or whether they were secondary formations which had grown over old wreckage from the Zeewijk.

6. Investigate the flora and fauna in wreck material concentrations on the inside reef in order to try and see if the growth in the area had been affected by wreckage. If so these areas would be mapped and used as an indicator for the original size of the Zeewijk wreckage now since long perished.

#### On Land

On land the aims were:

1. To investigate areas of archaeological interest found during the 1976 and 1977 test excavations on Gun Island in order to establish the nature and extent of the sites.

2. Continue the investigation of areas which could have been possible building and launching places for the castaways yacht Sloepie.

3. Search for 18th century Zeewijk material in and around the wells on Gun and nearby Middle Island where the Zeewijk survivors are known to have collected water.

## THE ZEEWIJK MAINSITE

The Zeewijk mainsite is situated in 2-6m of water on a flat limestone bottom on the outside of Half Moon reef. It can be reached on an average of 2-4 days per month by either swimming through the breakers on the reef or by dropping divers directly onto the site by boat.

Before the 1978 Zeewijk expedition, it was known that there were two mainsite areas with wreck material situated about 300m apart, one containing a bow anchor and 7 cannon, the other a cluster of 12 cannon lying in the near vicinity of each other. In between these two areas various cannon and anchors had been spotted but the accurate relationship between the different wreck remains was not established. Due to the rough seas on the mainsite, where the surf often exceeds 7-10metres it had not been possible to plot the whole Zeewijk site on previous expeditions and the relationship between different wreck features was only known in the 12 cannon area where a triangulation had been completed.

## A SURVEY OF THE ZEEWIJK MAINSITE

The aim of the 1978 survey of the site was to try and establish the outline of the wreck, the relationship between each concentration of wreck material and the items within those areas.

To make the most out of the average 2 - 4 diving days/month, divers were divided into teams and assigned a special task within that team. It was decided in advance who was going to do the measuring, how and with whom, who was going to do the photography and who was going to take notes, buoy out new wreck material, etc.

The reason for this was that once on the site, so much energy had to be devoted to fight the surge and huge breakers that the divers barely could handle more than one task at a time, let alone trying to communicate or organize the dive. In addition, to work efficiently each diver could only carry one piece of equipment in the surge and thus the different working tasks had to be carefully planned ahead.

The mainsite dives were initiated by dumping the divers and a "buoy bank" directly onto the site from a jetboat. The "buoy bank" consisted of a 30m long rope with 2 x 9.5kg fish plates as weights on each end. A

loop was tied at every metre on the line to which in turn a numbered buoy with a rope was attached. If so desired coils of rope, measure tape, writing slates etc., could in the same way be attached and kept on the outside reef to save the divers from carrying things through the breakers onto the mainsite.

In order to establish the outline of the Zeewijk wreck and the number of cannon and anchors on the site the different anchors and cannon were buoyed out and the outline of the Zeewijk wreck photographed from the air. For the aerial photography standard size crayfish floats of 18 cm diameter were used, the minimum size float that could be seen from the air. The photography was carried out from a helicopter at a height of approximately 150 metres, and altogether 40 exposures were taken. The floats only lasted 2-3 days in the surf and it is obvious that ropes alone can not be relayed upon under sea conditions such as those on the Zeewijk site.

Due to rough seas and breakers it was not feasible to establish any control points on the Zeewijk mainsite which would have enabled accurate measurements from the aerial photographs. Instead, to accurately position the mainsite features of the Zeewijk onto the Australian Admiralty chart and get the relationship of the different wreck areas underwater, the following survey techniques were used:



The outer most part of the wreck (the main anchor, fig. 2) was chosen as a fixed point. A 200m rope with 10 metre marks was run down current to nearby concentrations of wreck material. Distances and compass angles were then taken between the different areas. To map the different wreck features within the various wreck material concentrations a fix point was selected and ordinary triangulation carried out. To be able to transfer this information to the Australian Admiralty chart each one of these fix points in turn had to be positioned with references to a national mapping survey station.

The star pickets on the inside reef had previously been located and plotted in relationship to the national mapping survey station NMF/635 and NMF/636 and could therefore serve as reference points (Ingelman-Sundberg 1976, p21).

By placing visible markers on the chosen fix points on the mainsite simultaneous horizontal sextant angles could be taken from two star picket stations on the inside reef, and from the intersection of the two angles the positions of the markers could be plotted on a map. As stationary markers would not have lasted long in the surf and as buoys could not be seen from the inside reef, a 3.50m tall bamboo pole with a rope at the lower end and a 90 x 50cm orange flag attached on top of it was stuck 40cm through a crayfish float

and used as a marker. This mobile survey mark could be tied down by one or two divers to any of the fixed points that had to be positioned. In between breakers the rope was hauled taught and the survey mark erected, thus allowing the sextant teams to take their readings.

By using walkie talkies simultaneous sextant sight could be taken from the boats stationed at the two star pickets. When the readings were completed, a flag was hoisted from the control boat the diver then swam to the next area to be positioned and the procedure was repeated.

The flag was erected for an average of about 2 minutes allowing for a double check on each sextant reading. Altogether 20 fixed points were thus positioned within the Zeewijk mainsite area.

#### RESULTS OF THE SURVEY OF THE ZEEWIJK MAINSITE

Although not a measurable plan of the site, the aerial photographs from the Zeewijk site for the first time show the outline of the main part of the wreck and its location in relationship to the different line of breakers in the area, fig. 1.

As a result of the sextant and triangulation surveys of the site 26 cannon and 5 anchors were positioned and

the two mainsite areas triangulated, fig. 2.

The location between the different cannon, anchors and wreck material concentrations were established and measurements of the individual wreck features were also taken. By stripping the cannon of seaweed and coral obviously more accurate measurements and more information about the cannon would have been gained. However, as this would have exposed the cannon to oxidization and further deterioration, they were left untouched and only external measurements were taken. On a exceptionally calm day, the calmest in three years according to the local fishermen, 4 cannon were sighted approximately 60m east of the 8 cannon area. These cannon are situated in the line of breakers in "white water" and are normally inaccessible to the divers. These has so far not been possible to plot accurately as is the case with the northernmost anchor and cannon on the site.

A striking result of the survey is to find that anchors and cannon weighing between 1 - 2 tonnes can be found over 1.1km apart, fig. 3.

The survey also showed that several anchors and cannon are broken. Explosives can almost certainly be excluded as the surrounding areas show no sign of having been affected and as the broken objects show the same

concretion as the undamaged ones. The diffusion of the site and the badly damaged wreck features illustrates more eloquently than anything else the force of the heavy swell and pounding breakers of the Indian Ocean.

#### EXCAVATION ON THE MAINSITE

To investigate the archaeological potential of the Zeewijk site test excavations were carried out in the 12 cannon area next to the cannon where objects appeared likely to have been trapped.

Testholes were dug to a depth of 35cm and revealed wreck debris such as fragments of case and onion bottles, musket balls, coins, bricks, wine glass stems and buttons. The artifacts were in a poor state of preservation. Except for a badly corroded Dutch doit no whole artifact was found. The wine glass stems were i.e. worn to small oval glass balls and the musket balls were reduced to lead lumps of various shapes and sizes. Near the cannon was also a roll of lead, some fragmentary copper sheating, cannon balls, bricks and ballast stones. Except for part of a bell and one piece of a copper ladle found in two hollows about 900m apart and 12 musket balls recovered from the 8 cannon area, no other artifacts were found. There seem to be very little wreck debris on the flat limestone bottom, instead the material appears to have been swept away by the breakers and the current in an easterly and northern direction. Investigation carried

out so far shows that minor wreck material can be found in patches around the cannon on the outside reef, that some artifacts have been trapped in hollows in the reef and that possibly some material could have settled in places where the reef raises abruptly towards the surface. However, this material seems to be in a fragmentary and very poor state of preservation.

#### INVESTIGATION OF WRECKAGE ON THE INSIDE REEF

The survey work of the wreckage spread in different places on the inside reef continued during the 1978 Zeewijk expedition. The offshore controls used in 1976 and 1977 were re-erected (9 star pickets located according to fig.2) in their original plotted position and in addition a baseline running from star picket 13 to 18 in Area D, was established. The new baseline was set up in order to enable the plotting of wreckage further than 1.5km from the mainsite. To enable the establishment of fixed markers in deeper water where star pickets and bamboo canes could not be used, the following markers were made up. A 2m rod with a rope at this bottom end and a 60 x 90cm coloured flag at its top was inserted through an ordinary crayfish float until about 40cm of that lower end of the dowling stuck through the float. The float was then tied onto the dowling with nylon cord. Separate from the dowling 2 sets of 5kg fish plates with double rope loops were lowered into the water on the spot chosen as fix point.

By using the rope at the end of the dowling to run through the loops on the fish plates on the bottom, the marker could be accurately adjusted so the flag stood upright in the water. Best results were achieved when the rope was tautened so the float was just breaking the surface at low water. To prevent the weights from moving in a heavy swell, a star picket was inserted through one of the loops and driven into the bottom, fig. 4.

To assure a straight baseline a sounding wire was used for the setting up of the new markers. The wire was first run out 200m eastward from star picket 6 taking 6, 3 and 13 in line. Here a new marker was positioned, marker 14. The following marker was then lined up with star picket 13 and marker 14 and placed another 200m further east. The procedure was then repeated until 5 markers were positioned forming a 1000m long baseline from star picket 6 to 18, near Area D fig.2. With this baseline any survey areas or artifacts could be plotted within 400m from the line all the way from the reef until the wreckage ceased at Area D.

The new reference points were related to the baseline on Gun Island and plotted with Theodolite and Geodometer with reference to the National mapping survey station NMF/635. This was done by taking a series of angles with a wild T.I.A. 20 second Theodolite reading angles with 4 repetitions, whereas the Geodometer read the distance to reflectors placed on top of the markers and star pickets.

## UNDERWATER SURVEYS ON INSIDE REEF

In order to try and analyse the pattern and distribution of wreckage washed over the reef a series of underwater surveys had been carried out during the 1976 and 1977 expedition.

This work involved swimline searches in 50 x 100m areas where wreck debris was plotted with their X and Y co-ordinates and raised (C. Ingelman-Sundberg 1976, p24). This work continued in area CHIF, fig. 3, from which 385 pieces of glass, stoneware, porcelaine and iron was recovered.

In addition, to investigate whether wreck material re-appeared in already surveyed areas a new swimline search was carried out in area ABCD surveyed in 1977, fig. 3.

This time the area revealed 135 finds of glass and ceramic as compared to 323 finds in 1977.

Altogether 520 pieces of glass, metal, wood, iron and ceramic were raised from an area of 2000m<sup>2</sup>.

The distribution and pattern of the different types of material raised from the 30,000m<sup>2</sup> large survey area in 1977 and 1978 is illustrated in fig.5.

## SWIMLINE SEARCHES ON THE INSIDE REEF

As a complement to the underwater surveys swimline searches were carried out in and on both sides of the 40m track of wreck debris scattered all the way from the reef 1.3km down current to the timber area, Area D. Concentrations of wreck material and significant finds were buoyed out with numbered buoys. Sextant readings were then taken from the buoys towards the markers on the new baseline and the artifacts raised. A 60m wide swimline search was carried out in between 30m south and north of star picket 12, 576m down current, a 20m wide area was searched from star picket 10, 1070m down current to star picket 15 and a final search team covered a 24m wide area from star picket 4, 1100m down current to approximately 100m south of the timber area.

During these searches no more major wreck material concentrations were encountered. Glass and ceramic dominated in the major track of wreck debris, whereas there was virtually no wreck material whatsoever on each side of the track.

## MAPPING OF WRECK MATERIAL CONCENTRATIONS

On the inside reef various concentrations of wreck material have been the object of separate surveys. The areas have contained major wreckage from the ship and the aim has been to try and establish what part of the



ship this wreckage has originated from.

Thus Area A,B,C and D were surveyed in 1976 and 1977 (Ingelman-Sundberg 1976, Ingelman-Sundberg 1977) whereas Areas E and F were mapped during the 1978 expedition. Area E is situated 2.2km from the reef parallel to and 45m from Area D - an area containing timber and chainplates fig. 6, Area E consists of a 6.20m by 1.6m layer of outer skin lying in 2m of water on a sandy bottom, fig.7. The Planks are covered with nails about 2 - 2.5cm apart, are 35cm wide and have a thickness of 2.5cm. One 2 by 25cm and 2cm thick, piece of outer planking could be found in a fragmentary state on the inside of one of the timbers.

In order to investigate the connection between Area D and E a test excavation was carried out in between and in each one of the areas. A layer of 10 - 20cm of sand was removed before bare limestone rock was encountered. No artifacts or timbers could be found in the test areas excavated. The vicinity of area D and E and the fact that neither areas contain any fragments of artifacts seem to indicate that they once could have had some connection to each other, may be originate from the same piece of wreckage.

Area D has some resemblance to Area F. This area is situated closer to the reef about 800m from the main site and lays at a depth of 1.8m on a sandy bottom. It contains part of the rigging, scattered over an area of

28m<sup>2</sup>, fig. 8. Here 2 chain plates and 4 large parts of iron rigging and fittings were found. Except for an occasional bottle fragment and stoneware sheard there were no artifacts in the area.

Area F and D do not yield any quantity of artifacts and are the only larger wreck material concentrations containing chain plates. The fact that they also are located in line with each other according to the current and wave action in the area, suggests that they could have been part of the same lump of wreckage.

#### GEOLOGICAL SURVEY ON THE INSIDE REEF

In order to establish the origin of the seafloor and coral formations in different areas on the inside reef a geological survey was carried out.

Previous work off the Western Australian coast, i.e., the excavation of the Dutch East Indiaman Batavia (Green 1975) has shown that large sections of wreckage can be buried several metres in a coral reef without showing any traces on the outside. Little is known about this process and only recently has an investigation of coral growth on submerged wreck debris been carried out (North 1976). This study shows that samples of iron objects from the Batavia wreck were completely imbedded in coralline algae,

soft corals, molluscs and occasionally hard calcareous corals. The formation rate of this sedentary epifauna was gauged by measurements on objects placed on the wreck. It was found that within two years of being submerged iron material and bricks were completely covered with coralline algae and secondary growths of seaweeds of different types. Once this layer has formed the object is well preserved within its shell and as the coral grows the object becomes part of the reef.

Between Area D and Area E on the inside reef there is an 18m by 11m huge coral formation.

In view of the extensive coral growth which can occur on and around wreckage it could not be excluded that the coral lump between Area D and E could have formed around, remains of old Zeewijk wreckage. In order to examine this the following investigation was carried out:

Samples of surface sediment were collected in Area D and E and for comparative studies similar samples were collected at star pickets 1,4,6,10,15, and 17 and around cannon 4 in Area C.

In addition the reef structures were examined in Area D - E, along the reef run near star pickets 10 and 13 and on the coral lump situated 95m north of Area A.

In Area D - E test excavations were carried out down to 1.2m at the southern and eastern end of the coral lump.

## RESULTS OF THE GEOLOGICAL SURVEY

The examination of the coral formations in Area D - E show three stages of growth:

The surface of the coral situated at the base of the lump is heavily encrusted with algae, it is extensively bored and has lost all obvious surface coral character.

The next layer consists of dead coral which is less extensively altered - the surface shows obvious coral structure.

Stage three in the build up of the coral is represented by living coral such as mushroom coral forming extensive plates of a couple of metres in diameter.

A test excavation was carried out through these three layers but the area proved to be sterile.

## MARINE BIOLOGICAL SURVEY

In the same way in which geological information might help to add some information about the Zeewijk wreckage, it was hoped that the flora and fauna in the wreck material concentrations on the inside reef could give some indication of the original extent and location

of Zeewijk wreckage, which in particular through the action of marine animals, such as the shipworm (Teredo sp.), has now disintegrated.

The hypothesis was that iron, copper, wood or other material from part of the Zeewijk ship had effected the flora and fauna in and around the wreckage and that its position would still be indicated by variation in the growth in the area although the wreckage itself had disintegrated.

Biological samples were taken from 1m square at 7 different stations. Each metre square was sampled by taking 0.25m x 0.25m x 0.10m sediment sample which was collected in a plastic bag sealed underwater. Two samples were collected from Area D (station B-1 and B-2), one from Area E (station B-3), 3 from the outside of Area D and E (station A-1, A-2 and C-2) and one random sample was taken north of station B-1. Originally samples from sterile and fertile areas were to be compared to each other and then to sample from other sampling stations in the southern Abrolhos. However, preliminary investigation has shown that because of the varied nature of the natural substrate with respect to physical and biological factors, it would be necessary to carry out a more rigidly designed and widespread survey in order to first examine the natural variability of the flora, before it would be possible to test for any effect that the wreckage might have caused. A complicating factor is the wave action in the area, which apparently ensures that any variation in the composition of

the substrate is not reflected in the composition of the water from which the algae- and so ultimately the fauna- derives its requirements.

However, here it is possible that although the Zeewijk site might be unsuitable for this type of study, similar investigations might give important additional information on other submerged sites where turbulence does not occur. The identity of some of the species from the different sampling areas is shown in Appendix III.

#### INVESTIGATION OF ZEEWIJK SITES ON GUN ISLAND

##### Land Survey

Prior to the 1978 Zeewijk expedition some new information regarding the guano digging on Gun Island in the 1890's had come to light. In "A History of West Australia, a narrative of her past", Mr F.C. Broadhurst was quoted to have said that some material from the Zeewijk survivors campsites had been found within the range of sand drifts and thus could be found down to five feet and more. He also stated that if more digging was carried out further remains of Zeewijk material would probably be encountered. (Kimberly 1897). This statement indicates that the campsite referred to had been situated behind the sand dunes near the guano fields.

Thus by trying to locate and plot the boundaries of Broadhurst's guano mining on Gun Island there would be a fair chance to relocate the castaways' old encampments.

In 1897 A. Wells did surveys of Gun and nearby islands. In his field book there is information about the guano mining and the guano fields worked in the 1890's on Gun Island. To establish the location of these fields A. Wells' field notes and maps of the island were re-checked and transferred onto the 1976 survey map of Gun Island.

The borders thus achieved were related to areas where Zeewijk material had been found during the test excavations on previous expeditions. On the basis of this information some of the areas to be excavated were selected.

#### Land Excavation

In 1976 and 1977 a systematic testhole excavation had been carried out on the southern, western, northern, and eastern end of Gun Island. A series of 342 one metre square testholes had been dug at 10 metres intervals revealing 6 fertile areas at the western end of the island and 4 fertile areas at the north western end of the island. (Ingelman-Sundberg 1976, Ingelman-Sundberg 1977)

The aim of the 1978 expeditions was to commence a full scale land excavation in these areas in order to try and establish the nature of these different locations.

In areas where two fertile testholes had been located 10m apart and in line with each other, a trench was opened in between. One metre square holes were then dug every second metre before the in between laying areas were excavated. When isolated fertile areas had been located testholes were dug east, west, north and south of the fertile hole forming a "Greek cross". The aim was to thus establish the precise location and the extent of the fertile areas.

When larger fertile areas were encountered both methods of excavation were used, and to confine the whole extent of the area testholes were dug every second or third metre, depending on the location and nature of the site, until sterile ground was reached.

To begin with every fragment was registered with its X Y and Z co-ordinate. However, as the excavation progressed it became evident that no stratas or logical distribution could be found as regards the location of the artifacts. Matching pieces to one and the same artifact could be found at random within 1/2 to 5 metres. Much to the frustration of the archaeologist not one cubic metre of the 546 testholes investigated had escaped being thoroughly dug over by the nesting muttonbirds in the area.



Fig. 9, illustrates a piece of claypipe which had recently been kicked out from a muttonbird hole. This claypipe stem could have originated from anywhere between the surface and the bottom of the hole, which disappears at an angle of 45°, 85cm down in the sand. The original position of the claypipe was probably disturbed long ago and the 1978 location of the pipe is most likely temporary. At any time another hole will be dug in the same area and the "poor" claypipe stem will once again be kicked an unknown distance in any direction. Thus it is understandable that pieces of artifacts have travelled long distances and in the most astonishing directions.

Once it became obvious that the areas to be excavated had been severely disturbed, the 1 metre square holes to be dug within the trench or the "crosses" were excavated in quarters of 25 x 25 x 50cm. Artifacts found were related to a square and registered with the co-ordinates of that square and with artifacts of the same kind.

This solution proved to be a successful one, as fragments with a high probability of fitting together were thus immediately sorted out and registered in one lot instead of being dispersed in separate bags with separate registration numbers.

Also, taking into consideration that in some 1 metre cubic holes over 250 separate pieces of claypipes, wine bottles, barrel hoops, etc., could be found, the new way of registering proved to be a practical and time saving solution.

Accurate methods of recovering artifacts were used on some special occasions. In cases where fragile objects had been broken and were found in pieces in the near vicinity of each other, it was decided to move the whole area. The area was first carefully excavated with compressed air (Aqua lung) or compressed gas contained in small cans of "Dust Off" usually used for photographic work such as cleaning slides, camera equipment, etc. An elastic impression compound CA37 (usually used for taking dental impressions) was then poured over the whole area. This was then excavated from its surroundings, a tray was pushed in under it and thus it was taken back to camp in one piece. By turning the tray upside down the area could then be carefully excavated from the other side. Pieces of the same object as well as sand, roots - anything in the area - was stuck in its exact location in the rubber without having been moved during the course of excavation.

Any analysis or restoring of whole areas or artifacts could thus be done either back in camp or if desired at the Fremantle Conservation Laboratory. Once the examination is completed the CA37 can easily be peel off. CA37 is cheap, has a setting time of only

1-3 minutes and is easy to use. However, the area excavated has to be kept humid as CA37 has a tendency to shrink.

In cases where humidity had to be avoided and where extremely fragile objects had to be removed in one piece silicon was used instead (Silicon Rubber 'E' R.T.V.). The excavation technique used was the same to that used for the CA37.

#### INVESTIGATION OF THE WELLS USED BY THE ZEEWIJK SURVIVORS

The presence of wells with drinkable water on Gun and Middle Islands was the main cause for the survival of the Zeewijk castaways.

Water was regularly fetched from the wells and distributed to the different messes on Gun Island. In order to find out if any Zeewijk material had been lost in the wells, the main well on Gun Island, RH20-fig. 10 and two of the water containing wells on Middle Island were excavated.

5m of water was pumped out in RH20 and a 2m deep geological probe of the mud at the bottom of the well was examined. The only find was a piece of onion bottle resting on top of a layer of rocks found one metre under the black mud at the bottom of the well.

The mud probe contained black organic material, a layer of guano and after that the black mud re-occurred, fig. 11.

A test of the water showed 4,000 mg/l total dissolved solids which should be compared to drinkable water which is 3,000 mg/l total dissolved solids.

On Middle Island, the largest well on the south eastern side of the island was pumped out. The water depth was 70cm followed by a 1.5m layer of black mud.

There were no finds except for bird bones, stones and shells. Near the opening of the well sherds from an almost complete stoneware jug were found. This had most likely been used for fetching water from the well and the assembled sherds still show how the jug had shattered when it had hit the ground.

On the North end of the island further test excavations were carried out in a smaller well, believed to be "the narrow neck well", referred to in the ship journal (van der Graeff 30.9.1727). This well contained water to a depth of 40cm. The bottom of the well consisted of a hard layer of shells and stones. No finds were made.

Results from water tests of the different wells are shown in Appendix II as well as cross-section of the well RH20 on Gun Island.

## RESULTS OF THE LAND EXCAVATIONS

During the 1978 expedition, 204 test holes were dug in 11 different areas on the western and north western end of the island. These areas have all been severely disturbed by muttonbirds and analyses on the basis of an object's exact vertical and horizontal location cannot be made.

However, when the different areas are analysed as a whole complex, they do show certain characteristics, i.e. some areas contain personal belongings as well as remains of fire, bones, barrels etc., which indicates a campsite, whereas other rather seem to be storage areas or working areas, see Appendix IV.

Area 1 - 6 on the western side of the island fig. 10, mainly contain fragments of bottles, drinking glasses, barrel hoops, clay pipes, charcoal, bones, and some personal belongings such as beads, buttons and buckles.

Areas 1, 3, 4, 5 and 6 appear to be remains of messes, whereas Area 2 seems too large to represent only one mess.

Test excavations show that Area 2 contain more, Zeewijk material than any other place on the island. This location is known among local people as the "Zeewijk campsite". Whether this is an old tradition

or just a saying based on the fact that a lot of surface material can be found in the area is not known.

From the ship's journal, we know that there were 10 messes on the island, (van der Graeff 10.11.1727 - 19.1.1728).

The Deputy Surveyor General, John Forrest, who visited Gun Island in 1879, mentions how he had seen the remains of the Zeewijk survivor's old encampment (Forrest 1879), and Mr F.C. Broadhurst in 1897 found the traces of two distinct camps "identations were still apparent in the ground made by the feet of the company while moving in the form of a half circle round the camps...." (Kimberly 1897).

On the basis of this information, it is reasonable to believe that the officers had a more prominent encampment than the rest of the crew or that there were one or two main camps bigger than the ordinary messes on the island.

According to Broadhurst, Zeewijk material was found on the surface and in or near sand dunes as some of the articles had come within the range of sand-drifts and were buried down to five feet or more.

Area 2 runs from 1071/19 to 1099/19, a trench of 28 metres. It is the largest fertile area located on the island and fragments of bottles, drinking glasses, clay pipes, beads, buttons, bones, barrel hoops, charcoal, etc., indicates a campsite area. It is located in the sand dunes as a contrast to fertile areas in the soil on the eastern side of the island.

In five test holes, in area 1077/19 to 1082/19, there are 801 fragments of glass, ceramic, bone and metal as compared to 107 in the 5 most fertile test holes in Area 1, 56 in Area 3, 277 in Area 4, 156 in Area 5 and 248 in Area 6. From this it appears that Area 2 represents remains of the major Zeewijk campsites referred to by Forrest and Broadhurst.

However, it is difficult to draw any further conclusions about this site. The complicating factor is that Area 2 has been excavated at random on several occasions by various people prior to the 1978 Zeewijk expedition. The area between 1085/19 and 1091/19, although fertile, contains less artifacts than its surroundings. The amount of material increases again from 1092/19 onwards to the end of the trench. This could possibly be explained by previous digging activities in the area or it could also indicate the interspace between the two campsites referred to by Broadhurst in 1897. However, due to the severe

disturbance, this appears to be a problem which is very difficult to solve satisfactorily, and unless new information comes to light, we can only refer to this area as the remains of the major Zeewijk encampment.

Area 7 differs from the other areas on the western side of the island. 556 barrel hoop fragments (altogether 22.43 kg) and 174 bones, mainly beef, pork and seal indicates some kind of storage area rather than a campsite. There are also bottle fragments, some clay pipe remains, musket balls and parts of a pistol, but the amount and variety of material is different from that of, i.e. Area 2.

In the Zeewijk survivors ship journal, van der Graeff relates how they put up a special storage tent for the provisions to be taken on board the Sloepie and how precautions were taken to mount a guard over the victuals, (van de Graeff 4.12.1927 and 19.2.1728).

Area 7 is situated on the highest spot of the western side of the island. It is not in shelter, it is close to the wrecksite and it is visible from any point on the island making any thefts of the stored victuals a difficult task.

Also, as we will see later, it is situated in the vicinity of where Sloepie was loaded before she put out to sea. All these different factors make it a suitable



spot for a storage area. The finds of a large amount of barrel hoops and bones further support the theory that Area 7 could have been the location of the storage area referred to by van der Graeff in 1727.

On the eastern side of the island, 4 areas were excavated.

Area 8 proved to be similar in content to Areas 1, 3, 4, 5 and 6 and could have been remains of an ordinary mess.

Area 9 is very fertile. If we assume that the amount of artifacts found in Areas 1, 3, 4, 5 and 6 represent a tent or a mess - both expressions were used by van der Graeff in the ship journal - then Area 9 seems to be a major encampment area. It is likely that more than one tent was situated here. Finds of bones, fragments of barrel hoops, bottles, clay pipes, drinking glasses, iron and charcoal are common and in addition, ceramic, buttons, tools, a pulley sheave, coins, nails and a dice have been found.

The collection of artifacts suggest a campsite, whereas finds of tools, a pulley sheave and nails implicates some kind of connection with the construction work of the Sloepie. However, as campsite material is in majority and only a small number of nails and bolts have been found it is unlikely that this could have

been the shipyard. Rather, the composition of material suggest a major encampment occupied by people involved with the construction of the Sloepie. If the carpenter and his mates lived here, it would not be unlikely to find tools, bolts, nails and a pulley sheave in the area. It would be reasonable to assume that a great number of people were involved in the actual building of the ship and that it thus would be logical to find more Zeewijk material in an encampment associated with the ship building than would be the case in an ordinary mess. If that was the case, the actual building and launching place for Sloepie had to be situated somewhere in the vicinity.

#### SLOEPIE'S SHIPYARD

The question of where the Zeewijk survivors built and launched their yacht Sloepie has been the object of much speculations.

Suggestions put forward by previous researchers have systematically been investigated and in 1977 test excavations, swimline searches and soundings was carried out at the western, north western and eastern side of Gun Island (Ingelman-Sundberg 1977). The result of this work indicated that the north western end of the Gun Island not far from Area 9 could be a likely spot.

Stokes who visited the southern Abrolhos in 1846 believed that Sloepie had been built on a nearby islet ESE of Gun Island, Murray Island, and thus this area had to be investigated in order to complete the systematic investigation of different locations suggested as Sloepie's shipyard.

According to the ship journal the Zeewijk survivors had warped their boat in three different stages, from 4 feet to 6 feet and then to 9 feet of water (van der Graeff 1727, 1.3; 10.3 and 22.3 1728).

However, two lines of soundings outside likely launching places on the southern and northern end of Murray Island did not correspond to the depth measurements given in the ship journal. The first line of soundings ran 750m straight out from the northern beach till deep water was reached and on the second southern line deep water was encountered only 250m outside the beach. No surface finds were made on the island.

Having thus investigated and shown Stokes suggestion unfeasible the possible building and launching place for Sloepie had by now been narrowed down to the north western end of Gun Island, originally suggested by Aquinas College and by the Zeewijk expedition member Mike Pollard.

Soundings carried out in the area in 1977 closely corresponded to the information given in the ship journal and in addition two mast caps and an 18th century stoneware sherd had been found in the water 80m from the shore (Ingelman-Sundberg 1977).

Although the beach from where Sloepie had been launched most likely had been located, the exact spot for the building of the vessel was not known. This could only be traced by means of systematic land excavations.

In 1977 test excavations had been carried out along the shoreline between Lunch Point and Point Happy. 269 fragments of nails and iron and 3 pieces of Dutch 18th century glass had been encountered in a depression on the beach, 190 to 210m from Lunch Point.

To see whether this area, Area 10, had any connection with Sloepie, 9 test holes were dug every three metres over an area of 18m<sup>2</sup>. In addition probings were taken every metre from the baseline down to the beach.

The probings showed a slope of 1:20 on a flat hard limestone ground.

However, all test holes were sterile and it thus seemed unlikely that this place could have been the construction site of Sloepie.

The 18th century glass found along the shoreline could possibly have been washed ashore and also the iron, which in its corroded state had been impossible to date accurately. The nails and iron fragments found in 1977 could have been secondary material, maybe from the guano period, and preliminary microscopic and chemical studies currently carried out on some of the nails indeed show a 19th century structure of the iron. (A study of iron material from the Zeewijk will be published separately by M. Owens).

60m further north of Area 10 test excavations had revealed finds of pitch and iron nails. Thus 2 trenches were opened up in the area running from 157 to 293m from Lunch Point, Area 11. To confine the site holes were dug every second metre at each end of the excavation areas and in addition parallel lines of test holes were dug on each side of the trenches. A magnetometer survey was also carried out on both sides of the trenches in order to establish the location and extent of the iron in the area.

The land excavation revealed few artifacts associated with campsites. Instead the find of pulley sheaves, pitch and 476 whole and 1050 fragments of bolts and nails indicate that this could have been the shipyard.

However, the finds from the land excavation are only one of many indications which suggest this as the building and launching place for Sloepie. Other likely

1. The spot is closest to the Zeewijk wreck. The beach is easily approached from the sea and would have been convenient for the unloading of timbers from the wreck site.
2. It is sheltered from the prevailing winds in the area.
3. The spot is convenient for launching a vessel on rollers and then into deeper water (van der Graeff 28 February 1728).
4. The ship journal relates how the ship was to be taken around a small reef which extends westward from the NW corner of the island and being clear of this they were to set their course NE by N. This shows that Sloepie must have been anchored south of this reef which places her off the north-west beach of Gun Island. The same reef would also have protected her from northerly swells.
5. The systematic soundings carried out in 1977 outside this area correspond to details about Sloepie's launching given in the ship journal. (van der Graeff 10.3.1728 p 97 and 22.3.1728 p 99), fig. 12.
6. Just outside Area 11 the Sloepie would have been sheltered during the first stage of the launching. The island would have protected her from south easterly winds - the prevailing winds in the area on the 28th February when Sloepie was launched.
7. If launched here the boat would have the shortest distance to deep water. If the wind would have come up during the launching the boat would have been sheltered till deep water was reached. Also, once in deep water if she indeed had dragged, in any wind except for onshore winds she would have dragged in deep water, whereas from other places on the beach she would have dragged into shallow water and grounded.
8. The ship journal relates how Sloepie was anchored at about 1/4 of a mile from the island on the west side straight

opposite the yard (10.3.1728).

When the various information gained from soundings, swimline searches and test excavations are put together and compared with information given in the ship journal the implications are that Sloepie must have been built and launched on the north western side of Gun Island.

#### CONCLUSION

As a result of the 1978 expedition, the following aims have been achieved:

1. The outline of the Zeewijk wreck and its cannon and anchors have been plotted accurately for the first time. The potential for future excavations on the mainsite has also been established.

2. The surveys and excavations of wreck material concentrations on the inside of Half Moon reef have been completed and the areas individually mapped out, and plotted on the Australian Admiralty Charts.

3. On the basis of the underwater surveys, it has been possible to determine the extent and pattern of the wreck debris washed over the reef. Together with the information gained from the wreck material concentrations it is now feasible to partly explain the deterioration of the ship.

4. Land excavations on Gun Island has revealed the location of the Zeewijk survivors campsites, storage area and Sloepie's shipyard.

The aims of the Zeewijk project as put up in 1976 have now been achieved. The question today is, how much more and how much new information can we obtain from the wreck, and which methods should we use to gain this information.

#### FUTURE OF THE ZEEWIJK PROJECT

##### Zeewijk Mainsite

The Zeewijk mainsite on the outside reef has not been excavated. However, this is a very difficult task and there are many things to take into consideration.

There are approximately 2-4 days/month when it is feasible for a diver to swim through the breakers on Half Moon reef out to the main wreck. This swim against waves and current takes generally a quarter of an hour to half an hour depending on the force of the current and which part of the wreck one swims to; the return usually takes less time but again that depends on the size of the waves and the direction of the current and the tide.



The swim as well as trying to stay stationary and work in one place is quite an exhausting task and more often than not 80-85% of ones energy has to be devoted to conquer the forces of nature. rather than concentrate on ones work.

To improve the access to the Zeewijk main site divers could be dropped directly onto the site by jetboat. This can save some time as regards swimming to and fro to the wreck as well as increasing the amount of days one has access to the wreck. It is estimated that in this way it would be realistic to gain one or two diving days per month. However, the hire of a jetboat poses some difficulties as the crayfishermen in the area, can earn as much as 1500-2000/day during the good crayfishing season. This unfortunately is also the good diving season and thus to hire a jet boat would be very expensive indeed.

Also, during these extra 1 - 2 days/month on the wreck site work on the site itself would be more difficult than usual. The spells between breakers are shorter and thus visibility can only be obtained during very short periods of time. In a breaking wave the visibility is reduced to zero. If the breakers occur within too short intervals, the water does not get time to clear in between the waves, and thus, the diver cannot see where he is working. In addition the divers are thrown backwards and forwards

from one set of breakers and have fought back to ones working place on the seabottom one is washed away again.

Therefore, the only way of overcoming the difficulties on the Zeewijk main site is to approach the wreck differently to what has been done before.

What is needed is a stationary set up on the reef and on the seabottom. On top of the reef one could construct platforms holding the air supply to the divers, preferably Hookahs with hoses out to the wreck.

On the seabottom one would have to establish a roadnet of light chains and rope which would run to and around different main site areas to facilitate orientation and access to the working areas. Different coloured ropes would run to various working sites so the divers could pull themselves against the current and breakers.

As the waves soon chafe through the rope attached directly to the bottom a combined system of chain, floats and ropes have to be used, fig. 13. When in the area wanted the diver would have to hook himself to the "road net" on the seabottom in order to be able to stay reasonably stationary and protect himself from

being thrown onto the cannon, anchors etc. To stand the pull from the waves he would have to use harness with rope and carabina clip and as a security measure helmets would have to be obligatory.

The problems involved in work on the Zeewijk main site are not only confined to the means that are necessary to keep the diver safe; stationary and with an air supply on the seabottom, but also to the excavation of the site itself.

Because of the strong breakers any artifact is vulnerable to being washed away as soon as it has been exposed. Up to date geopick and hammers have been used to retrieve artifacts embedded in the coral and limestone bottom on the Zeewijk site. However, this is a slow and tedious method which sometimes can damage artifacts buried in the coral. Previous work on the Dutch East Indiaman Batavia (Green 75) has shown that small charges of explosives can be used as a complement to the geopick and hammer technique. In fact small charges of explosives used to shatter incrustations and coral has proved to cause less damage to the artifacts than the ordinary geopick and hammer technique.

The most practical way of excavation on the Zeewijk main site would be to combine these two techniques. Areas suspected to contain wreck material would be cut out of the seabed into manageable blocks. Hooks would be drilled into the lumps to which lifting

gear, ropes etc., could be attached. On a suitable day with favourable sea and diving conditions the lump would be freed with small charges of explosives, lifted and brought to camp for excavation.

#### SEARCH FOR OTHER WRECK MATERIAL CONCENTRATIONS

It is unlikely that any major wreckage from the Zeewijk will be encountered as already extensive searches have been carried out and all the cannon have been found.

However, it can not be excluded that some wreck material have been washed up to the northern most part of the reef where the strong northerly current fades away and the current and wave action swings SW around the edge of the reef. Any material carried so far could have come to settle on the outside of the reef and sunk there.

#### INSIDE REEF

The inside of Half Moon reef has been thoroughly investigated and the wreck material concentrations surveyed and excavated. In case there is ever a demand for display material for the Museum, chainplates found in Area F and Area D could serve as realistic and valuable display items showing part of the rigging of

an 18th century Dutch East Indiaman.

A large amount of glass, stoneware and porcelain, had been raised. Through sand movement new material might come to light as has been shown in the repeated survey of one of the underwater survey areas. One could therefore hope to find pieces of material which would fit to fragments already raised, however, it is unlikely that repeated swimline searches in the area would reveal much new information about the wreck.

#### ON LAND

Gun Island has been excavated to the extent that it is possible to identify the different areas of interest on the island.

The archaeological stratas are severely disturbed and the material fragmentary.

Unless new information is required and new aims put forward, the investigation of the island can be considered completed.

## APPENDIX 1

The Zeeland ship Zeewijk was wrecked in 1727 in the Abrolhos islands on the outside of Half Moon Reef at  $28^{\circ} 53.1'$  latitude and  $113^{\circ} 48.8'$  E longitude about 64 km from Australian mainland.

Survivors came ashore on a nearby island, Gun Island situated about 4 km from the reef. Here they lived for 10 months, four of which they spent building a boat for their rescue. They managed to survive on victuals from the wreck and fresh water from Gun and nearby islands. In April 1728, 82 out of a crew of 208 seamen and soldiers arrived safely in Batavia (Djakarta), Java.

In the 19th century Gun Island was visited by Stokes on HMS Beagle and in the 1890's guano diggers encountered remains of the Zeewijk camps while unearthing the island for guano. Artifacts recovered were handed over to the Perth museum in 1901.

In 1976 the Maritime Archaeology Department at the Western Australian Museum initiated the Zeewijk project and since then 3 major expeditions have been mounted to the site.

During the 1976 and 1977 expeditions the Zeewijk mainsite and scattered areas of wreck debris were located and mapped on the Australian Admiralty Charts. Surveys and swimline searches were carried out on the inside reef and the extent and pattern of wreck material washed over the reef was established.

A land survey of Gun Island was completed and areas of archaeological interest were located as a result of systematic test excavations.

The 1978 expedition to the Zeewijk site was a continuation of the survey work carried out in 1976 and 1977.

## APPENDIX II

	<u>Na</u> <u>mmol/l</u>	<u>K</u> <u>mmol/l</u>	<u>Ca</u> <u>mmol/l</u>	<u>Mg</u> <u>mmol/l</u>	<u>Pi</u> <u>mmol/l</u>	<u>Fe</u> <u>mmol/l</u>
GUN ISLAND	194	4.3	7.10	19.20	<0.1	1
MIDDLE ISLAND (PLAIN WELL)	33	0.8	2.90	3.80	<0.1	<1
MIDDLE ISLAND (NARROW NECKED WELL)	82	2.0	4.60	8.70	<0.1	<1

SIGNIFICANCE OF IONIC COMPOSITION OF ABROLHOS ISLANDS WELL-WATERGUN ISLAND

Na<sup>+</sup> concentration (194 mmol/l) and estimated osmotic activity of approximately 450 mosm/l indicate significant contamination with seawater (Na<sup>+</sup> 485, and approximately 1200 mosm/l). Humans with normal renal function would be capable of excreting urine of marginally higher Na<sup>+</sup> concentration and osmolality. In the face of a high protein diet, with the increased renal load of urea and other metabolites, and high environmental salt contamination, survival, particularly in a hot climate, would probably be limited to several weeks in the absence of fresh-water supplementation.

MIDDLE ISLAND  
(both wells)

Sodium concentration and osmolality would be well-tolerated and allow survival for indefinite periods of time.



APPENDIX III

Station A-1

Mollusca - Cronia avellana (Reeve, 1846)  
Chrysostoma zeus (Fischer)  
Pupa alveola (Souverbie, 1863) (dead)  
Hipponix sp.  
Prothalotia strigata (A. Adams, 1851) (dead)  
Liotina peronii (Kiener, 1839)  
Ethminolia sp. (dead)  
?Actinoleuca calamus (worn)  
Pseudostomatella refescens (Gray, 1847) (dead)

Echinodermata - Echinoidea. Nudechinus scotiopremnus  
H.L. Clark, 1912.

Station B-1

Mollusca - Chrysostoma zeus (Fischer)  
Rhinoclavis fasciatus (Bruguiere, 1792)

Station C-1

Mollusca - Cronia avellana (Reeve, 1846)  
Cerithium tenuifilum (Sowerby, 1866)  
Pyrene (Columbella) scripta (Lamarck, 1822)  
Hipponix sp.  
Cerithium sp.

Station B-3

Mollusca - *Cerithium tenuifilosum* (Sowerby, 1866)

*Strombus mutabilis* (Swamson, )

*Liotina peronii* (Kiener, 1839) (dead)

Echinodermata - Holothurioidea. Order Apoda.

Station A-2

Mollusca - *Nassarius rufula* (Kiener, 1843)

*Tectus pyramis* (Born, 1780)

*Astraea* (*Bellastraea*) *tentoriiformis* (Jones)

*Pyrene* (*Columbella*) *scripta* (Lamarck, 1822)

*Cronia avellana* (Reeve, 1846)

*Prothalotia strigatus* (A. Adams, 1851)

*Septifer bilocularis*

*Lithophaga* sp.

*Pupa alveola* (Sowerby, 1863) (dead)

*Cerithium tenuifilosum* (Sowerby, 1866) (dead)

Station C-2

Mollusca - *Chrysostoma zeus* (Fischer)

*Cronia avellana* (Reeve, 1846)

*Prothalotia strigata* (A. Adams, 1851)

*Pyrene* (*Columbella*) *scripta* (Lamarck, 1822)

*Mitrella ligula* (Duclos, 1840)

*Liotina peronii* (dead)

*Bulla botanica* (dead)

*Hipponix* sp.

Station C-2 (cont)

*Cerithium tenuifilum* (Sowerby, 1866) (dead)

*Nassarius rufula* (Kiener, 1839) (dead)

*Pseudostomatella rufescens* (Gray, 1847)

Echinodermata - Echinoidea. *Nudechinus scotiopremnus*

H.L. Clark, 1912 and dead test of same.

Holothurioidea. *Holothuria michaeolseni* Erwe, 1913.

Station B-2

*Chrysostoma zeus* (Fischer)

*Cerithium tenuifilum* (Sowerby, 1866).

Molluscs identified by S.M. Slack-Smith

Echinoderms identified by L.M. Marsh.

Appendix IV shows the different types of material found in the various excavation areas.

It should be noted that the material is fragmentary throughout the areas and that the articles listed are generally part of a whole object not a complete artifact. As for most of the objects such as clay pipes, glass, nails etc this does not matter as the fragments are mostly of the same size. However, in the case of the barrel hoops there is a great difference as some are not bigger than 2 cm whereas others can be up to 50 cm long.

In Appendix IVa the number of barrel hoop fragments are noted. However, in Appendix IVb, where the frequency of artifacts from the five most fertile connecting testholes in each area are compared to each other the weight of the barrel hoops was considered to be the most accurate basis for comparison.

## Pestholes

<u>1081/30*</u>	- bone 1; bottles C*5, O*6; clay pipes 4; drinking glass 7; bolts 1; charcoal 5; iron frags. 6;	35
<u>1052/30</u>	- bottles C 5, O 4; clay pipes 1; drinking glass 3; charcoal 7; iron frags. 4;	24
<u>1083/30</u>	- bone 2; bottles C 2, O 3; clay pipes 3; drinking glass 5; nails 1; iron frags. 3;	19
<u>1084/30</u>	- bone 5, bottles C 3, O 1; clay pipes 1; drinking glass 6; charcoal 3; iron frags. 3;	22
<u>1085/30</u>	- bone 1, bottles C 1; clay pipes 1; drinking glass 2; charcoal 2;	7
<u>1086/30</u>	- clay pipes 1; drinking glass 1; iron frags. 2;	4
<u>1087/30</u>	- drinking glass 1; copper 1;	2
<u>1088/30</u>	- drinking glass 3;	3
<u>1089/30</u>	- bone 2; bottles C 1	3
<u>1090/30</u>		
<u>1091/30</u>		
<u>1092/30</u>	- bone 1, bottles C 1, O 1; clay pipes 2;	5
<b>Total</b>	- bone 12; bottles C 18, O 15; clay pipes 13; drinking glass 28; nails 1; bolts 1; charcoal 17; copper 1; iron frags. 18.	

\*C = case bottle

\*O = onion bottle

\* = highest concentration of artefacts per trench.

AREA 2

Testholes	Total of Artifacts
1071/19 - clay pipes 4; iron frags.1;	5
1072/19 - barrel hoops 1; bone 6; clay pipes 16; drinking glass 1; knives (razor) 1; musket & pistol balls 1; iron frags.2;	28
1073/19 - bottles 1; clay pipes 18; knives 1; nail frags.1;	21
1074/19 - bone 4; bottles 1; buttons 1; clay pipes 14; ceramic 1; drinking glass 4; knives 3; musket & pistol balls 2; charcoal 1; copper 2; iron frags.4; iron rings (loops) and chain 1; bolt frags.2; hinges 1;	41
1075/19 - barrel hoops 10; bone 1; bottles 4; bottles (0) 1; buttons 1; clay pipes 11; drinking glass 2; copper 1; corner brace 1; nail frags.4; bolt frags.1; musket & pistol frags.2.	39
1076/19 - barrel hoops 12; bone 1; bottles 10; bottles (0) 8; buckles 1; clay pipes 34; drinking glass 3; knives 25; copper 3; iron frags.5; nail frags.6; musket & pistol frags.1;	109
1077/19 - barrel hoops 14; bottles 4; bottles (0) 3; clay pipes 47; musket & pistol balls 1; iron frags.19; iron straps 2; iron rings (loops) & chain 1; nail frags.3; bolt frags.5;	99
1078/19 - barrel hoops 19; bone 20; bottles 10; bottles (0) 19; clay pipes 100; drinking glass 7; fishing flint 1; knives 4; musket & pistol balls 1; nails 3; lead 1; charcoal 6; copper 1; iron frags.28; iron rings (loops) & chain 3; corner brace 1; rope 1; nail frags.16; musket & pistol frags.1; brass frags.1;	244
1079/19 - barrel hoops 27; beads 4; bone 17; bottles 14; bottles (0) 9; clay pipes 128; drinking glass 5; knives 1; nails 2; seals 1; copper 3; iron frags 9; nail frags 17; bolt frags.3; hinges 1;	241
1080/19 - barrel hoops 15; bone 3; bottles 11; bottles (0) 6; clay pipes 68; drinking glass 2; fittings iron 1; musket & pistol balls 1; wood frags. 2; iron straps 4; iron rings (loops) & chain 1; unident 5;	119
1081/19 - barrel hoops 4; beads 1; bone 1; bottles 7; bottles (0) 3; clay pipes 66; drinking glass 3; charcoal 1; copper 3; iron frags. 1; iron straps 1; nail frags. 3; pewter frags 1; brass ferrule 1;	96
1082/19 - barrel hoops 5; bone 20; bottles 3; bottles (0) 11; buttons 1; clay pipes 110; drinking glass 3; musket & pistol balls 2; nails 1; iron frags. 2; iron straps 1; burnt shell remains of fire 1; nail frags. 9; chink 1; comb 1; flat glass 1;	172
1083/19 - barrel hoops 1; bone 2; bottles 1; bottles (0) 2; clay pipes 32; drinking glass 1; fishing equipment 1; nails 4; charcoal 2; copper 1; copper nails 1; iron frags. 6; burnt shell remains of fire 1; nail frags 2; copper fork 1;	58

1084/19	-	bottles 3; bottles (0) 3; clay pipes 20; drinking glass 3; iron frags. 4;	33
1085/19	-	bottles (0) 3; clay pipes 6;	9
1086/19	-	bottles (0) 3; clay pipes 4;	7
1087/19	-	bottles (0) 2; clay pipes 5; brass frags. 1; copper fork 1;	9
1088/19	-	clay pipes 2;	2
1089/19	-	bottles (0) 1; clay pipes 4;	5
1090/19	-	bone 21;	21
1091/19	-	clay pipes 1; iron frags. 1;	2
1092/19	-	bottles 1; bottles (0) 3; clay pipes 2; charcoal 2; nail frags. 1;	9
1093/19	-	clay pipes 3; drinking glass 2; iron frags. 10;	15
1094/19	-	bone 1; bottles (0) 3; ceramic 2; copper fork 1; copper stud 1;	8
1095/19	-	barrel hoops 2; clay pipes 9; drinking glass 2;	13
1096/19	-	barrel hoops 2; bottles 1; clay pipes 11; ceramic 1; copper 2; chink 1;	18
1097/19	-	barrel hoops 7; bone 2; bottles 2; bottles (0) 4; buttons 1; clay pipes 16; ceramic 3; drinking glass 3; copper 1; iron frags. 6;	44
1098/19	-	barrel hoops 1; bone 2; bottles 2; bottles (0) 4; clay pipes 18; ceramic 3; drinking glass 5; copper 1; iron frags. 2;	38
1099/19	-	barrel hoops 1; bone 11; bottles 1; bottles (0) 3; clay pipes 20; ceramic 5; drinking glass 3; knives 1; copper 1; iron frags. 7; unident. 1;	54

Total	-	barrel hoops - 121	nail frags. - 62
		beads - 5	bolt frags. - 11
		bone - 111	hinges - 2
		bottles - 75	musket & pistol frags. - 4
		bottles (0) - 91	pewter frags. - 1
		buckles - 1	brass frags. - 2
		buttons - 4	brass ferrule - 1
		clay pipes - 769	chink - 1
		ceramic - 15	comb - 1
		drinking glass - 49	flat glass - 1
		flint - 1	iron frags - 1
		fishing equipment - 1	copper fork - 2
		fittings iron - 1	copper stud - 1

knives (razor) - 1  
 knives - 35  
 musket & pistol balls - 9  
 nails - 10  
 lead - 1  
 seals - 1  
 charcoal - 12  
 wood frags. - 2  
 copper - 19  
 copper nails - 1  
 iron frags. - 106  
 iron frags - 8  
 iron rings (loops) & chain - 6  
 corner brace - 2  
 unident. - 6  
 rope - 1  
 burnt shell remains of fire - 2

AREA 3

Trench

Total of  
 Artifacts

1129/20 - barrel hoops 3; bottles O 4; clay pipes 2; drinking glass 1; musket and pistol balls 1; iron frags. 5; iron kettle frags. 1;	17
1130/19 - bottles C 3, O 6; clay pipes 2; drinking glass 1; copper 1; pewter spoon 1;	14
1130/20 - bone 2; bottles C 1, O 4; clay pipes 2; ceramic 2;	11
1130/21 - bone 1; bottles C 1, O 2; clay pipes 1; ceramic 1; copper 1;	7
1131/20 - bottles C 2, O 4; iron frags. 4;	10
Total - barrel hoops 3; bone 3; bottles C 7, O 20; clay pipes 7; ceramic 3; drinking glass 2; musket and pistol balls 1; copper 2; iron frags. 9; iron kettle frags. 1; pewter spoon 1.	



## Testholes

1129/10	- barrel hoops 14; bone 1; bottles C 5, O 9; leather 1; clay pipes 43; ceramics 1; drinking glass 5; nails 1; copper 4; nails 1; iron frags. 17; unident 5; nail frags. 1; pewter spoon frags. 1;	109
1129/11		
1129/12		
1130/10	- barrel hoops 22; beads 1; bone 30; bottles C 10; clay pipes 45; drinking glass 3; nails 2; charcoal 1; copper 2; iron frags. 2; parts of nails and bolts 2;	120
1130/11	- slate 1; bottles C 3, O 4; clay pipes 27; drinking glass 2; nails 1; charcoal 2; iron frags. 5; iron rings (hoops) 2;	47
1130/12		
1131/10	- bone 26; bottles O 1; clay pipes 25; drinking glass 2; iron frags. 5;	59
1131/11	- sterile	
1131/12		
Total	- barrel hoops 36; slate 1; beads 1; bone 57; bottles C 18, O 14; leather 1; clay pipes 140; ceramics 1; drinking glass 12; nails 4; charcoal 3; copper 6; nails 1; iron frags. 29; iron rings (hoops) 2; unident 5; parts of nails and bolts 2; nail frags. 1; pewter spoon frags. 1.	

## Testholes

1159/20 - bottles C 2, O 4; clay pipes 24; ceramic 1; drinking glass 2;	33
1160/19 - bone 1; bottles C 1; clay pipes 11; drinking glass 2; iron frags. 1; pewter frags. 1;	17
1160/20 - barrel hoops 1; bone 1; bottles C 1, O 3; buckles 1; clay pipes 16; drinking glass 1; nails 2; lead 1; charcoal 2; iron frags. 4;	33
1160/21 - bone 8; bottles C 2; clay pipes 18; iron frags. 6; copper 1;	35
1161/20 - bone 1; bottles C 2, O 1; clay pipes 28; drinking glass 1; iron frags. 10; pewter frags. 1;	44
Total - barrel hoops 1; bone 11; bottles C 8, O 8; buckles 1; clay pipes 97; ceramic 1; drinking glass 6; nails 2; lead 1; charcoal 2; copper 1; iron frags. 17; iron kettle frags. 1; pewter spoons 2.	

## Testholes

1159/9

1159/10 - barrel hoops 9; bone 9; bottles 0 1; clay pipes 30; ceramics 1;  
drinking glass 2; flint 1; scissors 1; nails 4; lead 3; charcoal 17;  
copper 1; iron frags. 22; iron rings (hoops) 21; kettle frags. 12; burnt  
shell remains of fire 1; 135

1159/11 - bone 2; bottles C 1, 0 1; clay pipes 40; ceramics 4; drinking glass 2;  
nails 3; charcoal 5; copper 2; iron frags. 1; kettle frags. 1; parts of  
nails and bolts 1; 63

1160/9

1160/10

1160/11 - barrel hoops 15; bottles C 1; leather 1; clay pipes 15; ceramics 3; nails  
2; charcoal 1; copper 1; iron frags. 2; iron rings (hoops) 1; 42

1161/9 - bone 1; clay pipes 14; scissors 1; nails 3; iron frags. 3; iron straps 1;  
iron rings (hoops) 3; parts of nails and bolts 1; pumice 1; 28

1161/10 - bone 2; bottles 0 2; buttons 1; clay pipes 5; drinking glass 1; lead 1;  
charcoal 3; iron frags. 5; 20

1161/11

Total - barrel hoops 24;  
bone 14;  
bottles C 2, 0 4;  
leather 1;  
buttons 1;  
clay pipes 104;  
ceramics 8;  
drinking glass 5;  
flint 1;  
scissors 2;  
nails 12;  
lead 4;  
charcoal 26;  
copper 4;  
iron frags. 33;  
iron straps 1;  
iron rings (hoops) 25;  
kettle frags. 13;  
burnt shell remains of fire 1;  
parts of nails and bolts 2.

1189/20 - barrel hoops 53; bone 45; clay pipes 1;	99
1189/21 - barrel hoops 80;	80
<u>1189/19</u> - barrel hoops 42; bone 63; bottles 0 1; musket and pistol balls 1; nail frags. 1;	108
<u>1190/21</u> - barrel hoops 104; bone 14; nail frags. 2; musket and pistol balls 14;	134
<u>1190/20</u> - barrel hoops 83; clay pipes 3; copper 1; iron bar 1; bottles C 1;	89
<u>1190/19</u> - barrel hoops 124; bone 36; bottles C 4; nails 1;	165
<u>1191/19</u> - barrel hoops 28; bone 5; bottles C 6; clay pipes 2;	41
1192/19 - barrel hoops 6; bone 2; bottles C 3, 0 3; clay pipes 2; unident 4;	20
1193	
1194/19 - barrel hoops 4; bottles C 1; clay pipes 1; musket and pistol balls 1; unident 1;	8
1195/19 - bone 2; clay pipes 2; iron frags. 4; iron straps 1; musket and pistol frags. 2;	11
1196/	
1197/19 bone 3; iron frags. 1; musket and pistol frags 2; pewter spoons 1;	7
1198/19 - bottles 0 1; musket and pistol balls 12; iron frags. 10; iron straps 2; parts of nails and bolts 3;	28
1199/19 - barrel hoops 7; bone 3; bottles 0 1; drinking glass 1; musket and pistol balls 2; charcoal 2; iron straps 5; nail frags. 3;	24
1199/20	
1199/23R- barrel hoops 4; bottles 0 1; musket and pistol balls 2; iron straps 1; parts of nails and bolts 1;	9
1199/25R- musket and pistol balls;	1
1199/21R- barrel hoops 5; bottles 0 2; clay pipes 1; musket and pistol balls 6;	14
1189/25 - barrel hoops 12; bottles 0 1; clay pipes 2; iron frags. 12;	27
1293/6R - bone 1; bottles c 2, 0 12; ceramic 2; drinking glass 5;	22
Total - barrel hoops 556; bone 174; bottles C 17, 0 23; clay pipes 14; ceramic 2; drinking glass 6; musket and pistol balls 25; nails 1; charcoal 2; copper 1; iron frags. 27; iron straps 9; unident 5; part of nails and bolts 4; nail frags. 6; musket and pistol frags. 18.	

## Testholes

109/10L	- bone 1; bottles C 3, O 4; copper 1;	9
110/9L	- barrel hoops 9; bone 1; bottles C 1, O 5; knives 2; iron rings (hoops) 9;	27
110/10	- sterile	0
110/11	- barrel hoops 2; bone 5; bottles C 1, O 1; iron frags. 3;	12
111/10L	- barrel hoops 9; bone 7; bottles O 5; clay pipes 3; nails 2; copper 3; iron rings (hoops) 5; parts of nails and bolts 2;	36
Total	- barrel hoops 20; bone 15; bottles C 5, O 15; clay pipes 3; knives 2; nails 2; copper 4; iron frags. 3; iron rings (hoops) 14; parts of nails and bolts 2.	

## AREA 9

150/0	- barrel hoops 15; bone 3; clay pipes 6; drinking glass 1;	25
151/0	- barrel hoops 19; bone 3; bottles(O) 2; clay pipes 3; charcoal 1;	28
152/0	- barrel hoops 16; bone 1; clay pipes 13; drinking glass 1; copper 1; iron frags. 2;	34
153/0	- barrel hoops 25; bone 4; bottles (C) 3; clay pipes 29; drinking glass 1; nails 1; charcoal 1; pully sheaves frags. 1; unident. 1; nail frags. 11;	77
154/0	- barrel hoops 74; bone 1; bottles (O) 3; clay pipes 19; drinking glass 1; knives 1; nails 2; bolts 1; copper 2; iron frags. 4; pully sheaves frags. 2; unident. 2; nail frags. 3; iron bar 1;	176
<u>155/0</u>	- barrel hoops 54; bottles (C) 7; bottles (O) 1; clay pipes 39; drinking glass 1; nails 1; iron bar 1;	104
<u>156/0</u>	- barrel hoops 78; bone 5; bottles (C) 3; bottles (O) 4; clay pipes 38; ceramics 1; charcoal 1; copper 2; iron frags. 2; copper brace 11; bolt frags. 1; iron bar 1;	147
<u>157/0</u>	- barrel hoops 31; bone 5; bottles (C) 9; bottles (O) 9; clay pipes 123; ceramics 2; drinking glass 2; fishing equipment 1; nails 1; copper 4; cu. nail 1; iron frags 1; burnt shell remains of fire 1; nail frags 3; p.s. frags 1; ferrule 1;	195
<u>158/0</u>	- barrel hoops 197; bone 22; bottles (C) 15; bottles (O) 8; clay pipes 99; drinking glass 8; nails 1; copper 1; iron frags. 1; tool 2; bolt frags. 2; ferrule 2; coin 1;	359
<u>159/0</u>	- bone 27; bottles (C) 11; bottles (O) 6; leather 1; clay pipes 67; drinking glass 7; copper 3; iron frags 132; pully sheaves frags. 1; tool 1; nail frags. 8; coin 1;	270

160/0	- barrel hoops 47; bottles (C) 6; bottles (O) 4; clay pipes 29; ceramics 1; drinking glass 4; nails 1; charcoal 1; nail frags. 5; dice frags. 2;	100
161/0	- barrel hoops 11; bone 21; bottles (C) 7; bottles (O) 3; clay pipes 19; ceramics 2; drinking glass 1; nails 1; copper 1;	66
162/0	- barrel hoops 9; bottles (C) 5; bottles (O) 5; clay pipes 6; ceramics 1; drinking glass 1; nails 1; charcoal 6;	34
163/0	- barrel hoops 19; clay pipes 2; drinking glass 1; nail frags. 1;	23
164/0	- barrel hoops 10; bottles (C) 2; bottles (O) 2; clay pipes 5; ceramics 1; drinking glass 2; copper 1; nail frags. 1;	24
165/0	- barrel hoops 2; bottles (C) 2; bottles (O) 2; clay pipes 5; drinking glass 1;	12
166/0	- barrel hoops 2; bone 1; bottles (O) 1;	4
167/0	-	0
168/70	- slate 1;	1
169/0	- clay pipes 1;	1
175/0	- bone 10; clay pipes 2; iron frags. 80; tool 2; nail frags. 29; bolt frags. 18;	141
179/0	- clay pipes 1;	1
151/2L	- barrel hoops 23; bone 3; bottles (C) 1; bottles (O) 3; clay pipes 4; bolts 3; lead 1; copper 1; pully sheave frags. 3; nail frags. 10; bolt frags. 2; iron bar 2;	56
153/2L	- barrel hoops 37; bone 11; bottles (C) 2; bottles (O) 1; buttons 3; clay pipes 15; nails 2; charcoal 20; iron frags 8; parts of nails & bolts 1; comb 2; wood 2;	104
155/2L	- barrel hoops 35; bone 21; bottles (C) 2; bottles (O) 7; clay pipes 37; ceramics 1; knives 1; nails 3; charcoal 2; iron frags. 2; unident. 1; burnt shell remains of fire 30; nail frags. 6; pewter spoons 1;	149
157/2L	- barrel hoops 13; bone 25; bottles (C) 3; bottles (O) 7; leather 1; clay pipes 25; ceramics 1; drinking glass 2; nails 2; iron frags. 1; burnt shell remains of fire 2; nail frags. 4; glass 1;	87
162/2L	- barrel hoops 1; bone 3; bottles (C) 2; bottles (O) 12; clay pipes 12;	30

151/3L	-	barrel hoops 8; bottles (C) 1; clay pipes 7; nail frags. 2;	18
157/11L	-	barrel hoops 4; bone 2; bottles (C) 4; pitch 1; nail frags. 4;	15
159/11L	-	barrel hoops 1; ceramics 1;	2
161/11L	-		0
Total	-	barrel hoops - 700 bone - 158 bottles (C) - 85 bottles (O) - 80 leather - 2 buttons - 3 clay pipes - 606 ceramics - 16 drinking glass - 34 fishing equipment - 1 knives - 2 nails - 16 bolts - 4 lead - 1 charcoal - 33 copper - 15 cu. nail - 1 iron frags. - 233 corner brace - 11 pully sheaves frags. - 7 tool - 5 unident. - 4 pitch - 1 burns shell remains of fire - 33 parts of nails & bolts - 1 nail frags - 87	bolt frags. - 23 pewter spoons - 1 p.s. frags - 1 iron bar - 5 ferrule - 3 glass - 1 coin - 2 dice frags. - 2 comb - 2 wood - 2

AREA 11

257/OR	-	bone 1; iron rings (hoops) 1; frag. nails 12;	14
259/OR	-	barrel hoops 1; nails 8; unident 1; frag. nails 8;	18
261/OR	-	bolts 1; frag. nails 18;	19
263/GL	-	barrel hoops 5; wood frag. 1; frag. nails 4;	10
263/OR	-	charcoal 2; iron frags. 3;	5
265/OR	-	bone 3; frag. nails 2; frag. bolts 1;	6
265/7L	-	burnt shell remains of fire 1;	1
265/6L	-	nails 1; bolts 1; charcoal 5; pitch 1; frag. nails 3;	11
267/9	-	iron frag. 3;	3

Testholes	Total of Artifacts
268/6L - iron frag. 1;	1
268/5L - barrel hoops 1; bottles C 1; clay pipes 1; knives 1; iron frags. 6; pulley sheave 3; tool 1; unident 1; iron harness 1; frag. nails 26;	42
269/0L - drinking glass 1; nails 2; iron frags. 12; frag. nails 8; frag. bolts 9;	32
270/0 - barrel hoops 2; iron fittings 2; nails 2; bolts 1; iron frags. 14; iron straps 2; corner brace 1; unident 4; pistol frag. 1; frag. nails 20; frag. bolts 8; hinge 2;	59
271/L - barrel hoops 7; drinking glass 1; nails 3; bolts 2; iron frag. 24; iron straps 3; iron rings (hoops) 1; frag. nails 26; frag. bolts 6;	73
271/2	
271/3L - iron frags. 43; unident 1; frag. nails 31;	75
272/L - nails 46; bolts 9; iron frags. 3; iron straps 1; unident 1; frag. bolts 19;	79
272/2R - barrel hoops 7; bottles O 2; nails 19;	28
273/L - barrel hoops 3; clay pipes 2; nails 37, bolts 5; iron frags. 3; part of nail and bolt 130;	180
273/1R - barrel hoops 14; clay pipes 2; iron rings (hoops) 1; part of nail and bolt 150;	167
273/3L - barrel hoops 9; bottles O 1; nails 9; bolts 1; iron frags. 5; iron rings (hoops) 1; unident 4; part of nail and bolt 84; frag. bolt 6;	120
274/0L - barrel hoops 7; bottles O 1; clay pipes 5; drinking glass 1; nails 21; bolts 1; iron frags. 3; iron rings (hoops) 9; part of nail and bolt 75; frag. nails 103;	226
275/0L - barrel hoops 3; bottles C 1; clay pipes 5; nails 44; iron frags. 44; frag. bolts 45;	142
275/3L - barrel hoops 4; bone 2; drinking glass 1; nails 28; bolts 11; iron rings (hoops) 1; unident 1; part of nail and bolt 11; frag. nails 179; frag. bolts 5;	243
275/1L - barrel hoops 23; clay pipes 1; nails 105; bolts 8; iron straps 1; iron rings (hoops) 2; unident 2; pistol frags. 1;	143
276/0L - bottles O 1; clay pipes 2; nails 76; bolts 2; iron frags. 26; iron rings (hoops) 1; unident 4; frag. nails 38;	150



277/L - barrel hoops 2; bone 1; clay pipes 1; bolts 1; iron frags. 20; iron straps 1; unident 3; part of nail and bolt 3;	32
278/L - clay pipes 2; nails 8; bolts 1; iron frags. 7; unident 3;	21
279/L - clay pipes 1; nails 2; iron frags. 14; unident 5;	22
281/OR - clay pipes 7; nails 15; nails 2; iron frags. 5;	29
285/7L - barrel hoops 1; charcoal 2; pulley sheave 1;	4
285/0L - copper 1;	1
287/0 - drinking glass 1;	1
291/1L - bolts 1;	1
293/7L - barrel hoops 5; clay pipes 1; nails 1; bolts 2; charcoal 1; part of nail and bolt 20;	30
Total - barrel hoops 94; bone 7; bottles C 1, O 6; clay pipes 30; drinking glass 5; iron fittings 2; knives 1; nails 427; bolts 49; charcoal 10; wood frag. 1; copper 1; iron frags. 246; iron straps 8; iron rings (hoops) 18; corner brace 1; pulley sheave 4; tool 1; unident 30; pistol frags. 2; iron harness 1; pitch 1; burnt shell remains of fire 1; part of nail and bolt 473; frag. nails 478; frag. bolts 99; hinge 2.	

Type of artifact	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	Area 11	Total
barrel hoop (wt.kg.)	0	3.5	0.57	1.25	1.13	1.7	22.1	0.53	15	0	1.2	47.41
beads		5										5
bone	9	61	3	37	11	14	118	15	59		2	329
bottle/case	16	45	7	18	8	2	11	5	45		3	160
bottle/onion	14	48	20	14	8	4	1	15	28			152
brass ferrule		1							3			4
brass fragments		1										1
buckles					1	1						2
burnt shell remains of fire							1		1			2
buttons		1					1					2
ceramics			3	1	1	8			8			21
chalk		1										1
charcoal	17	7		3	2	26			1			56
clay pipe	10	472	7	140	97	104	5	3	366		13	1217
coin									2			2
comb		1										1
copper fork												
copper fragments		7	2	6	1	4	1	4	10			35
copper nails				1	2				1			4
copper studs												
dice fragments												
drinking glass	23	20	2	12	6	5			17		2	87
flat glass		1										1
fishing equipment									1			1
flint		1				1						2
iron bar							1		2			3
iron bolt	1										22	23
iron bolt fragments		3									50	53
iron corner brace		1							11			12
iron fittings		1							3			4
iron fragments	16	40	9	29	17	33		3	136		73	356
iron harness												
iron hinge		1										1
iron kettle frags.			1				13					14
iron nail	1	6		4		12	1	2	1		274	301
iron nail fragments		45		1			3		11		320	380
iron parts of nails bolts				2		2		2			86	92
iron rings (loops)		4		2		10		14			13	43
iron spike												
iron strap		6				1						7
knives		5						2				7
lead fragments		1			1	4						6
lead seals		1										1
leather				1					1			2
musket and pistol balls		5	1				1					7
pewter fragments		1			1							2
pewter spoon			1	1					1			3
pistol fragments		1					14				1	16
pitch												
pulley sheave									1			1
pumice												
razor												
rope		1										1
scissors						2						2
slate								6				6
stone tool									3			3
unidentified wood fragments		5		5							7	17
Totals	107	801	56	277	156	248	156	71	712	0	866	3450

## ACKNOWLEDGEMENTS

As is often the case, a big project is not the result of one person's effort alone but of many people working together.

The Zeewijk project has only been possible because of the kind help from members of the Maritime Archaeology Association.

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Fig. 1 The outline of the Zeewijk wreck photographed from the air. In the foreground buoyed out cannon in the 12 cannon area, in the background the main anchor site.



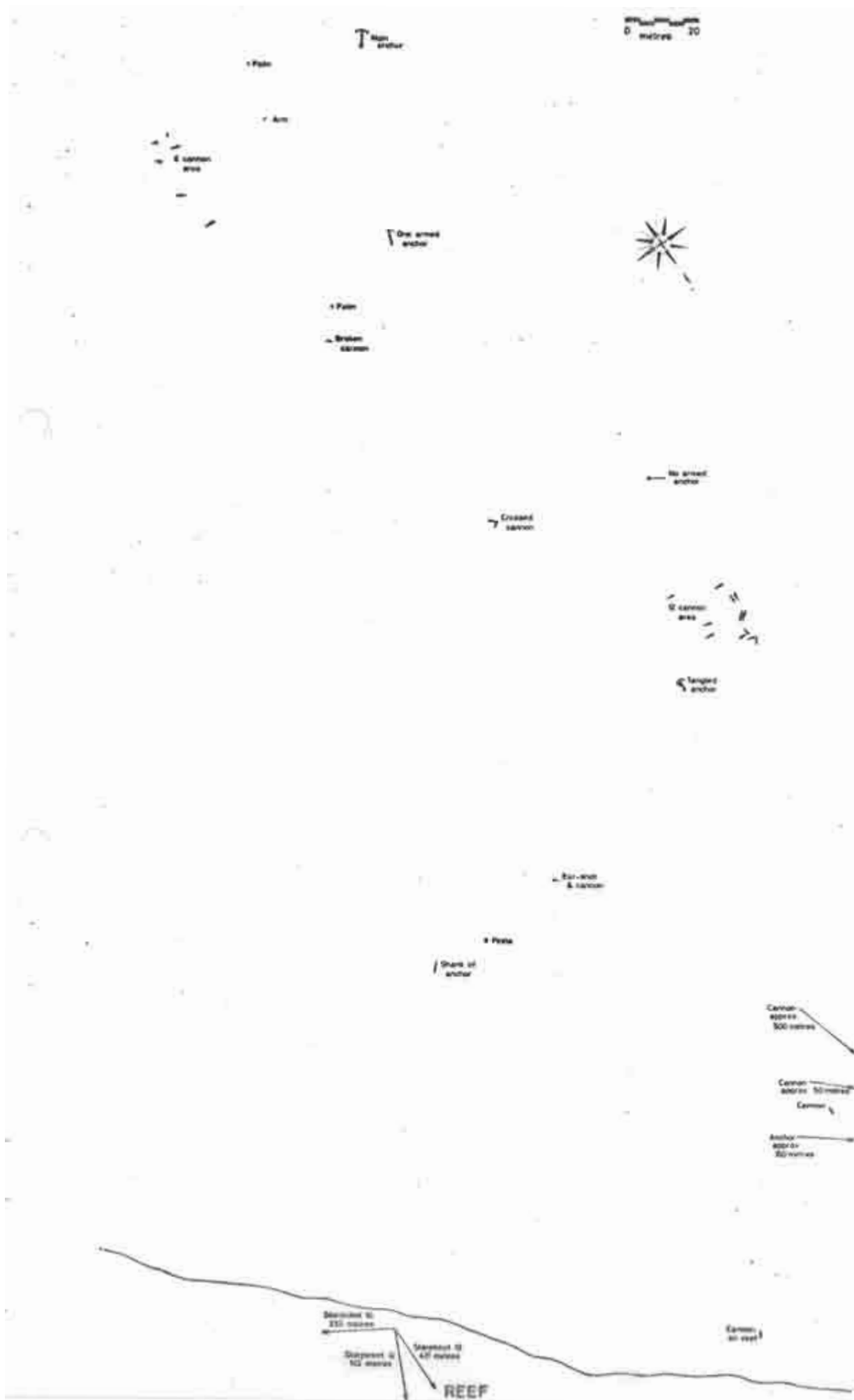


Fig. 2 Zeewijk main site mapped on the basis of sextant readings, triangulation and photographs. Drawing Mark Cliff.

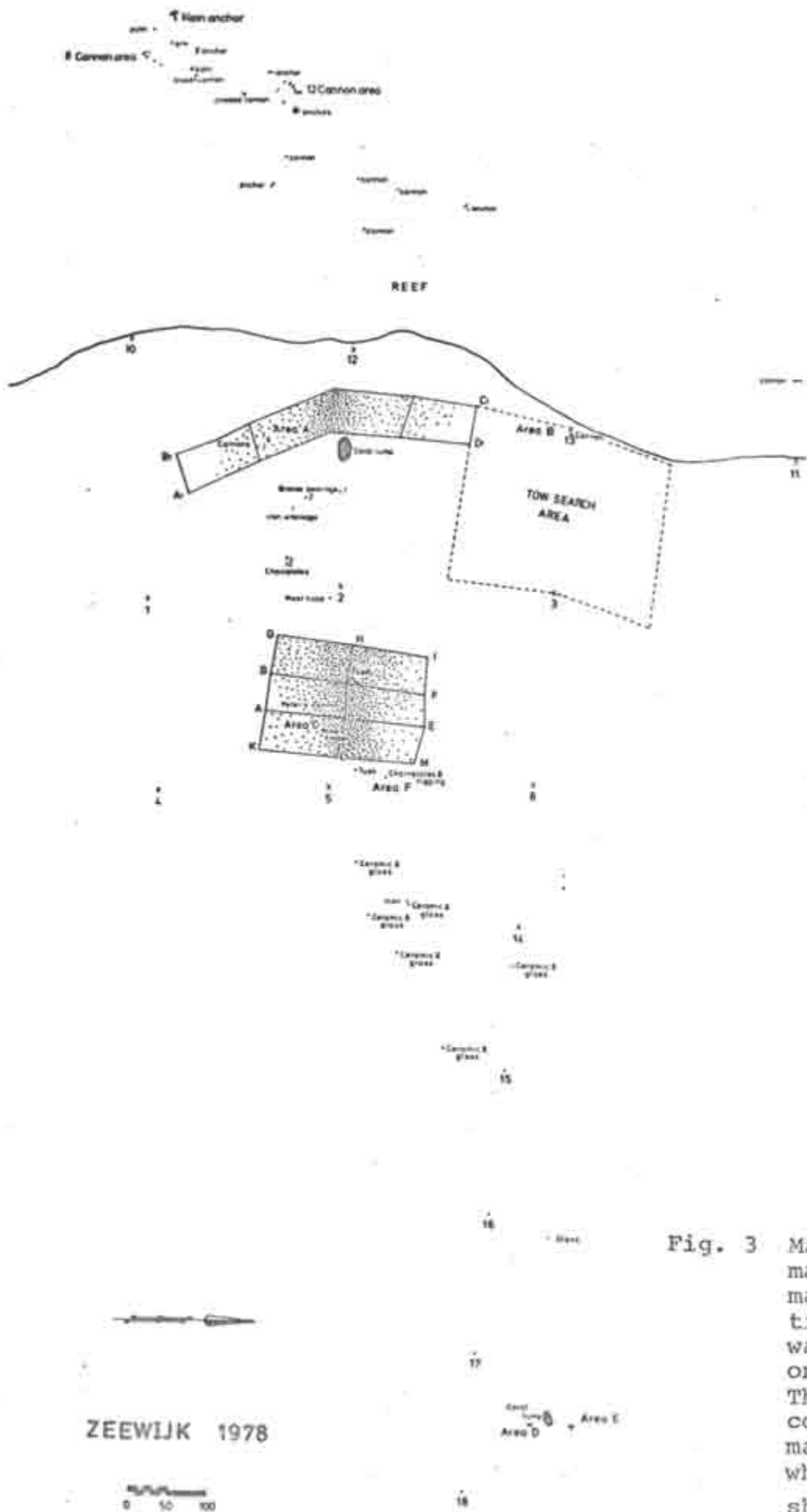


Fig. 3 Map showing Zeewijk mainsite, wreck material concentrations and underwater survey areas on the inside reef. The wreck material concentrations are marked Areas A-E, whereas the numbers show the position of the pickets.

ZEEWIJK 1978

0 50 100  
metres

dots inside the underwater survey areas indicate the distribution of wreck debris.

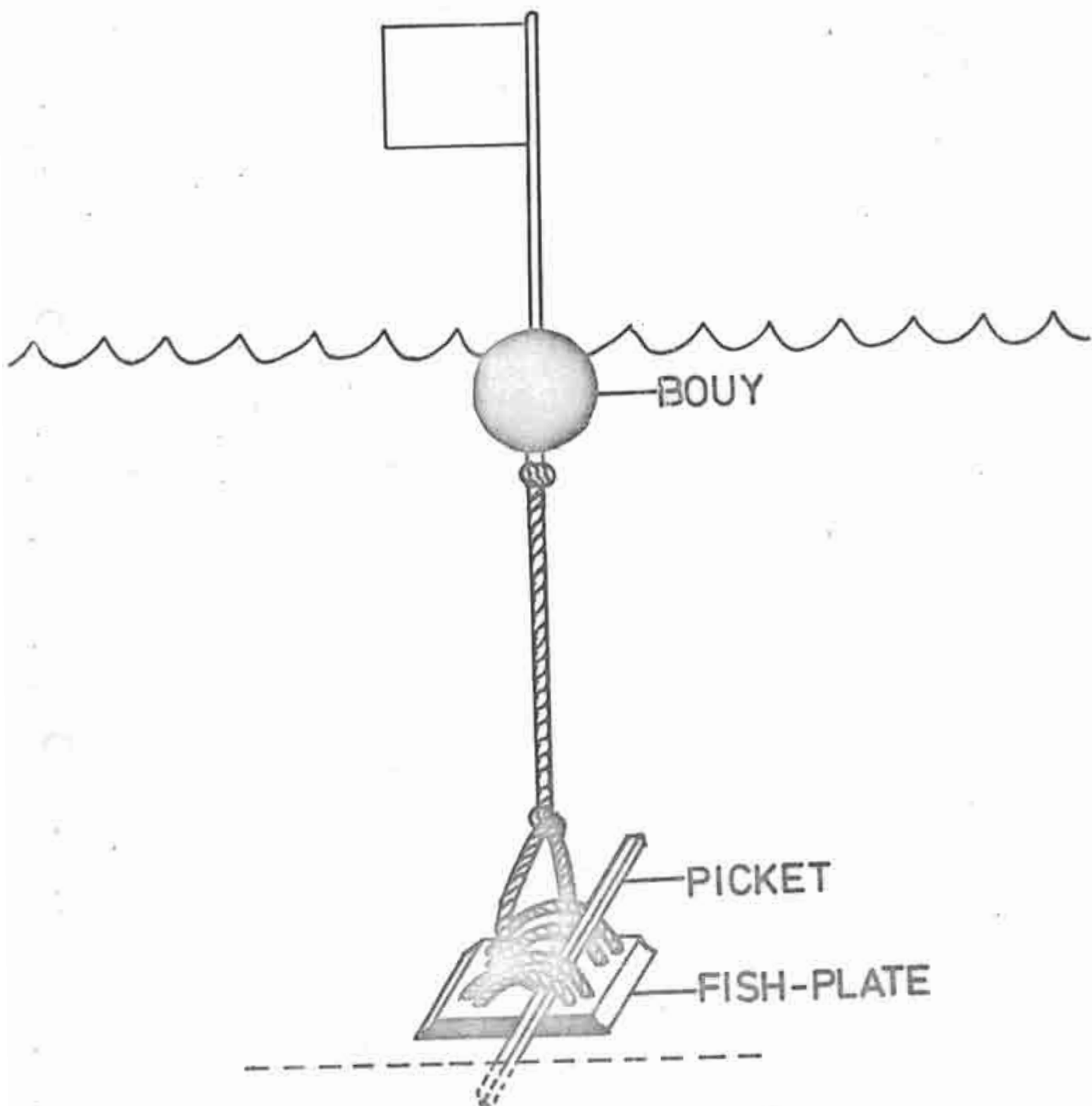


Fig. 4 A permanent marker used for the baseline on the inside of Half Moon Reef. Five of these markers were positioned in 2-3 m of water. Despite gale force winds from Cyclone Alby none of the markers moved from their original position. Drawings Sally Robins.

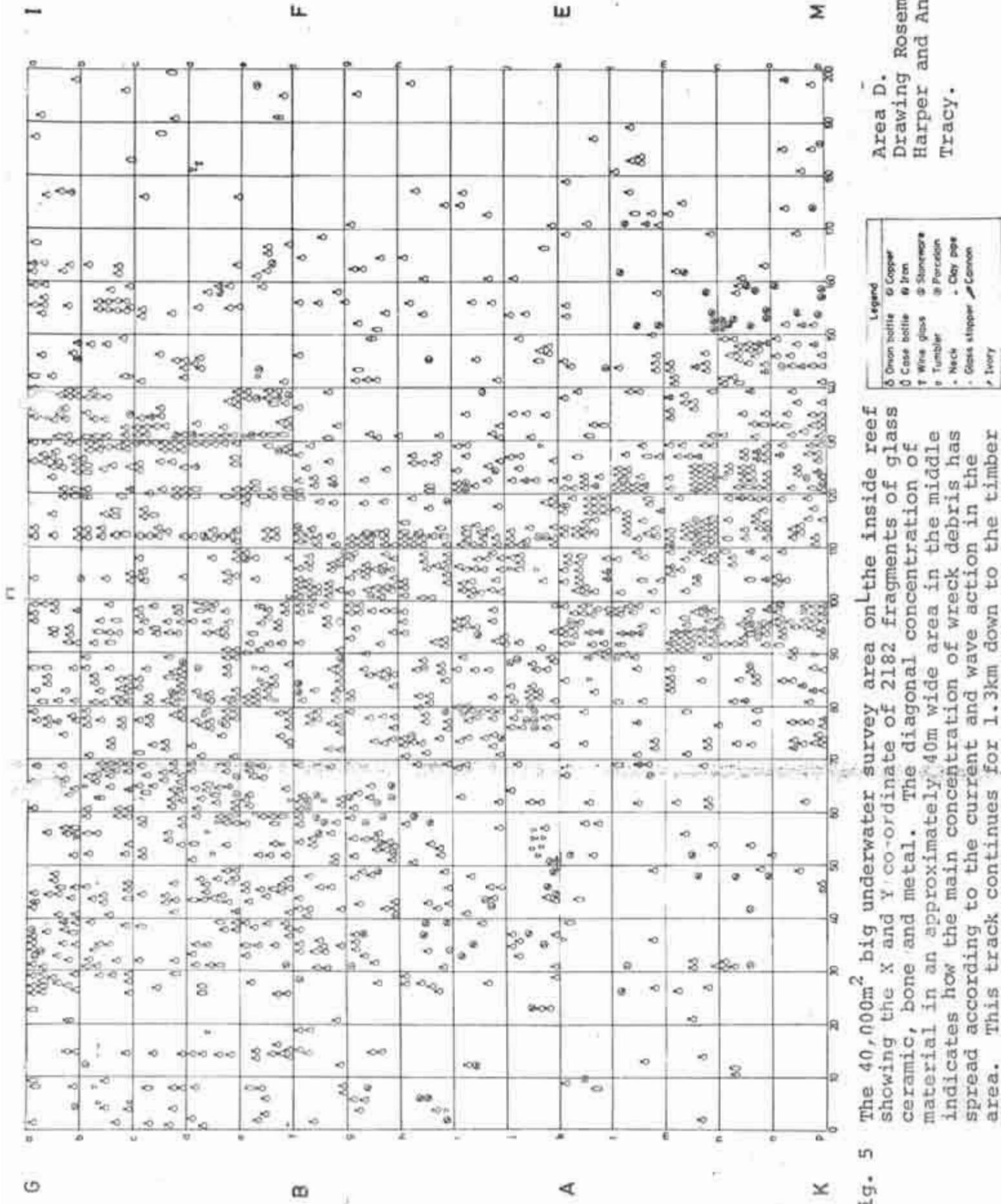
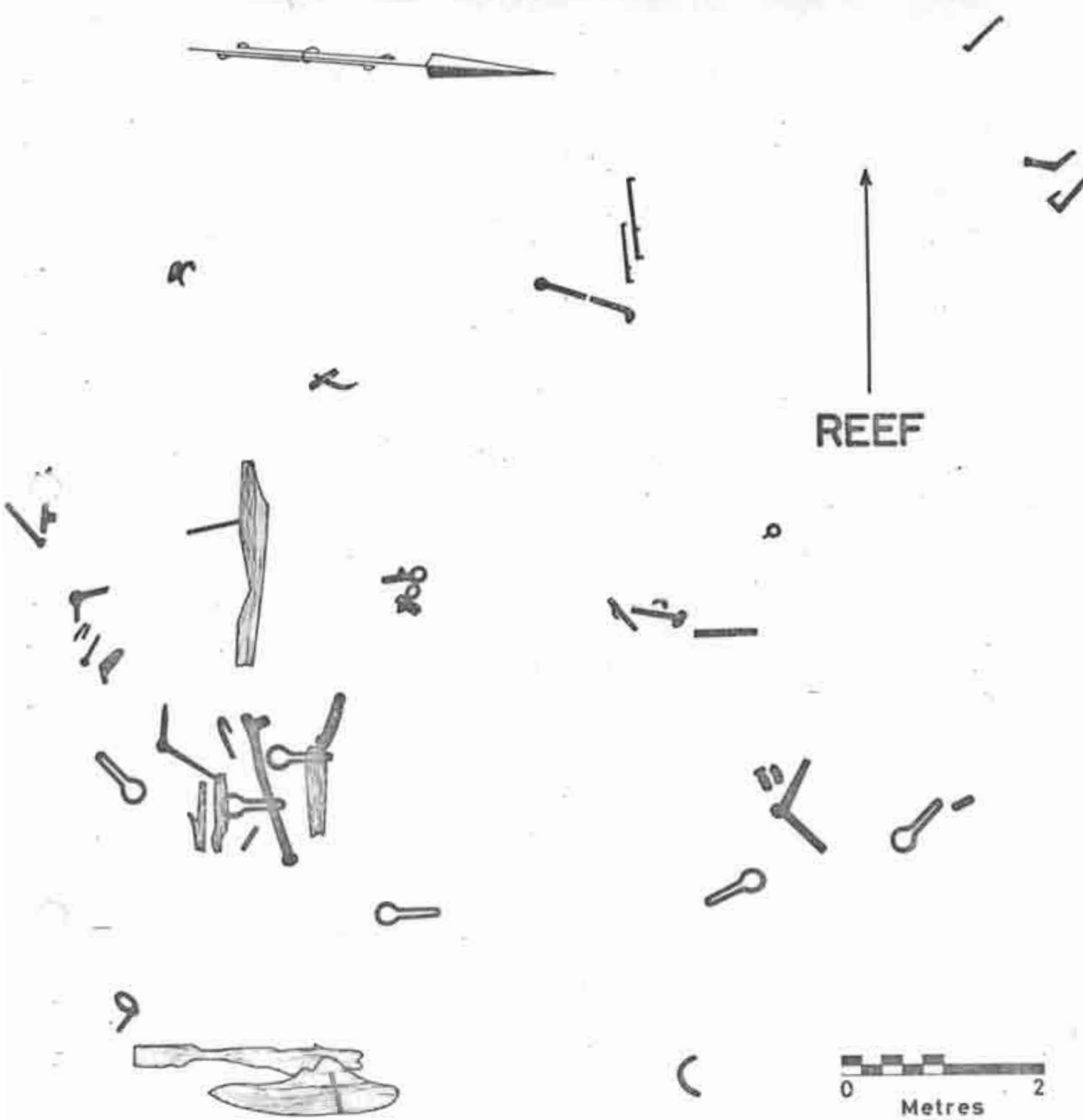


Fig. 5 The 40,000m<sup>2</sup> big underwater survey area on the inside reef showing the X and Y co-ordinate of 2182 fragments of glass ceramic, bone and metal. The diagonal concentration of material in an approximately 40m wide area in the middle indicates how the main concentration of wreck debris has spread according to the current and wave action in the area. This track continues for 1.3km down to the timber

Area D.  
Drawing Rosemary  
Harper and Ann  
Tracy.



ZEEWIJK SURVEY 1978  
 AREA D

Fig. 6 Area D, where a major part of the Zeewijk wreck have come to settle. Chain plates in the area indicates that one part of the side of the ship have sunk here.  
 Drawing Mark Cliff and Ron Stevens.

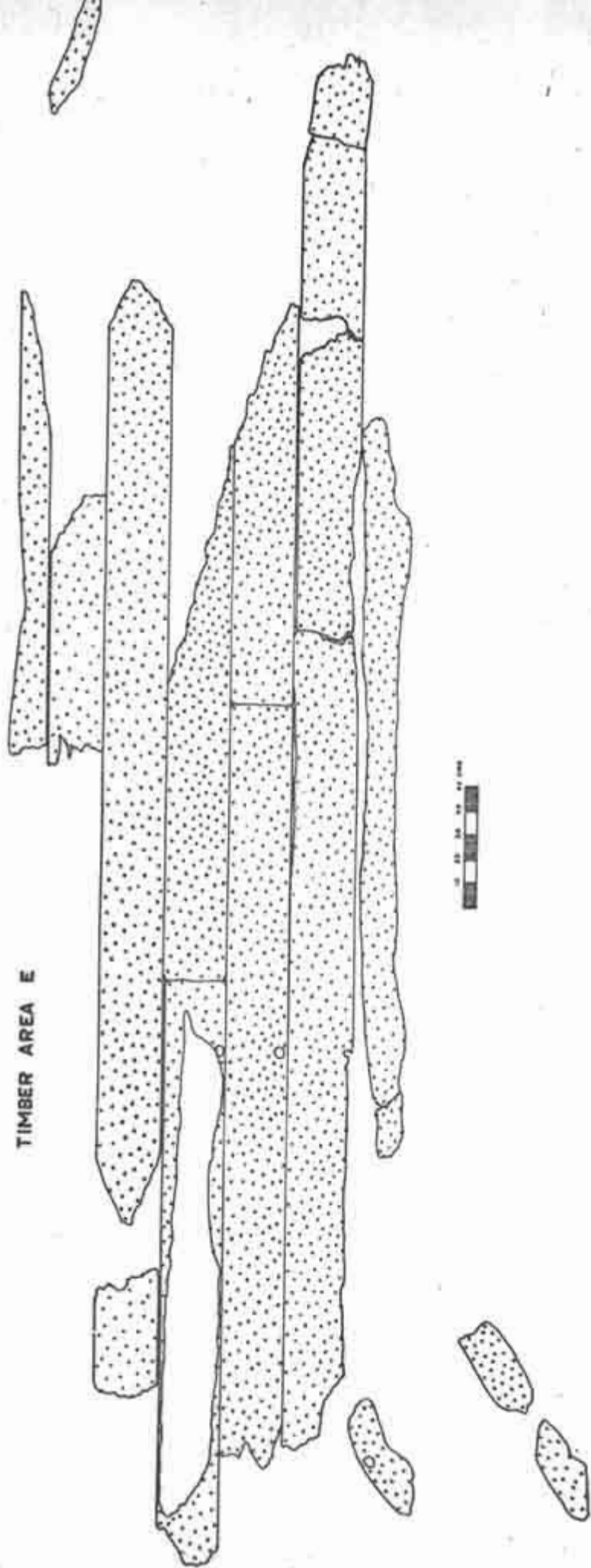


Fig. 7 Area E possibly once part of Area D. Today only 9.9m<sup>2</sup> of the outer skin remains.  
Drawing Ron Stevens.



Fig. 8 Chain plates and part of rigging in Area F. Drawing Mark Cliff.



Fig. 9 Claypipe stem which just have been kicked out from a muttonbird hole.



# LAND EXCAVATION: GUN ISLAND 1977&78

LEGEND	
FERTILE	☐
STERILE	□

0 metres 20

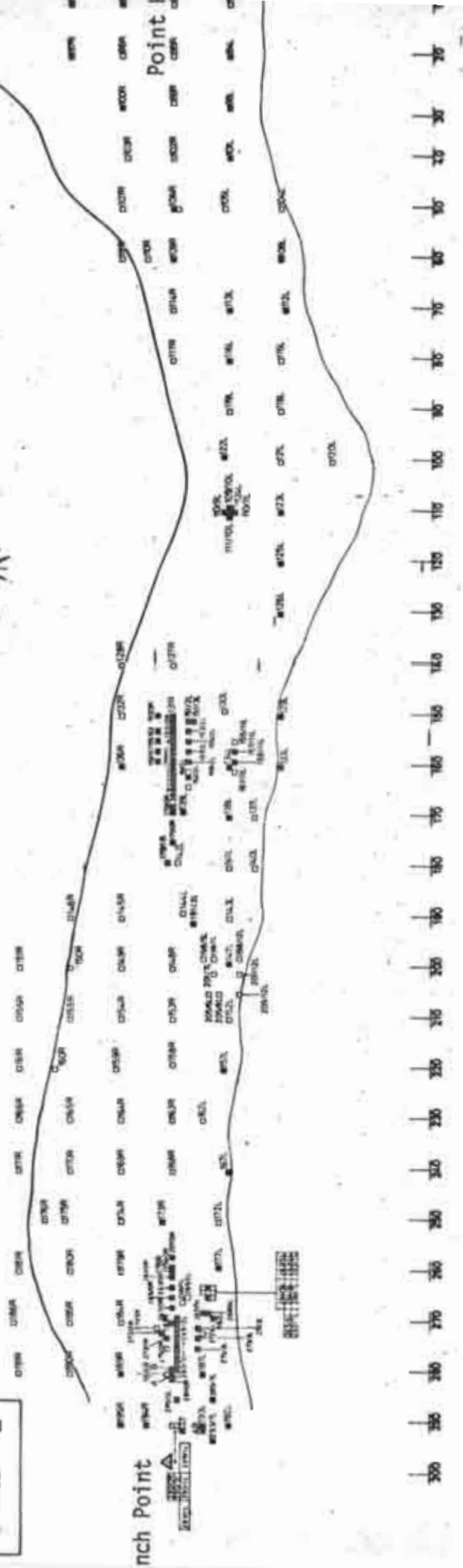


Fig. 10C Detail of land excavation between Lunch Point and Point Happy, Areas 8-11.

WELL SECTION R.H. 20 GUN IS.

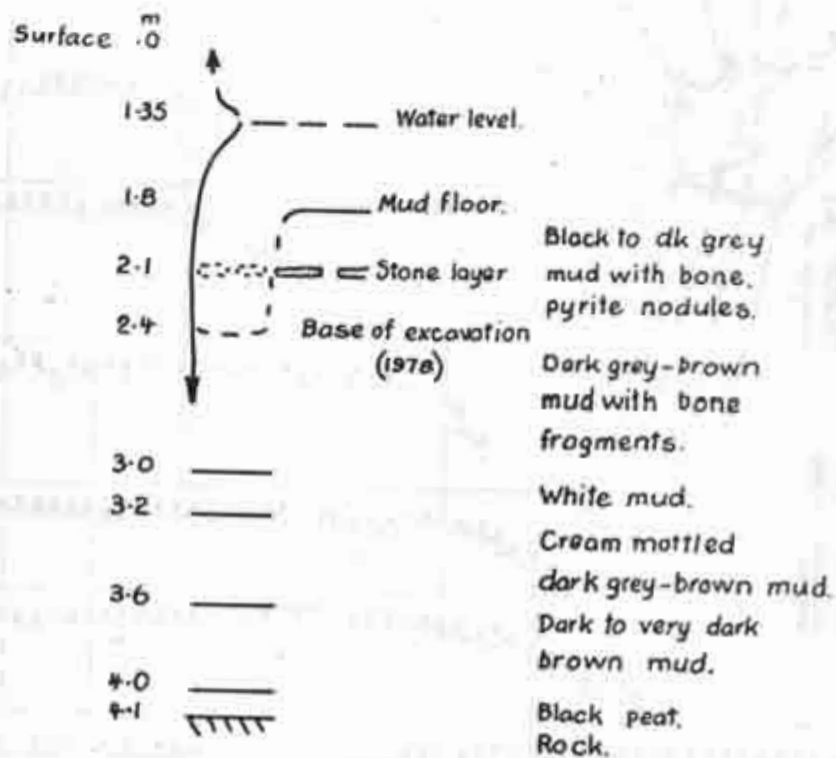


Fig. 11 Cross section of the well R.H 20 on the western side of Gun Island.

SOUNDING PROFILES 1977

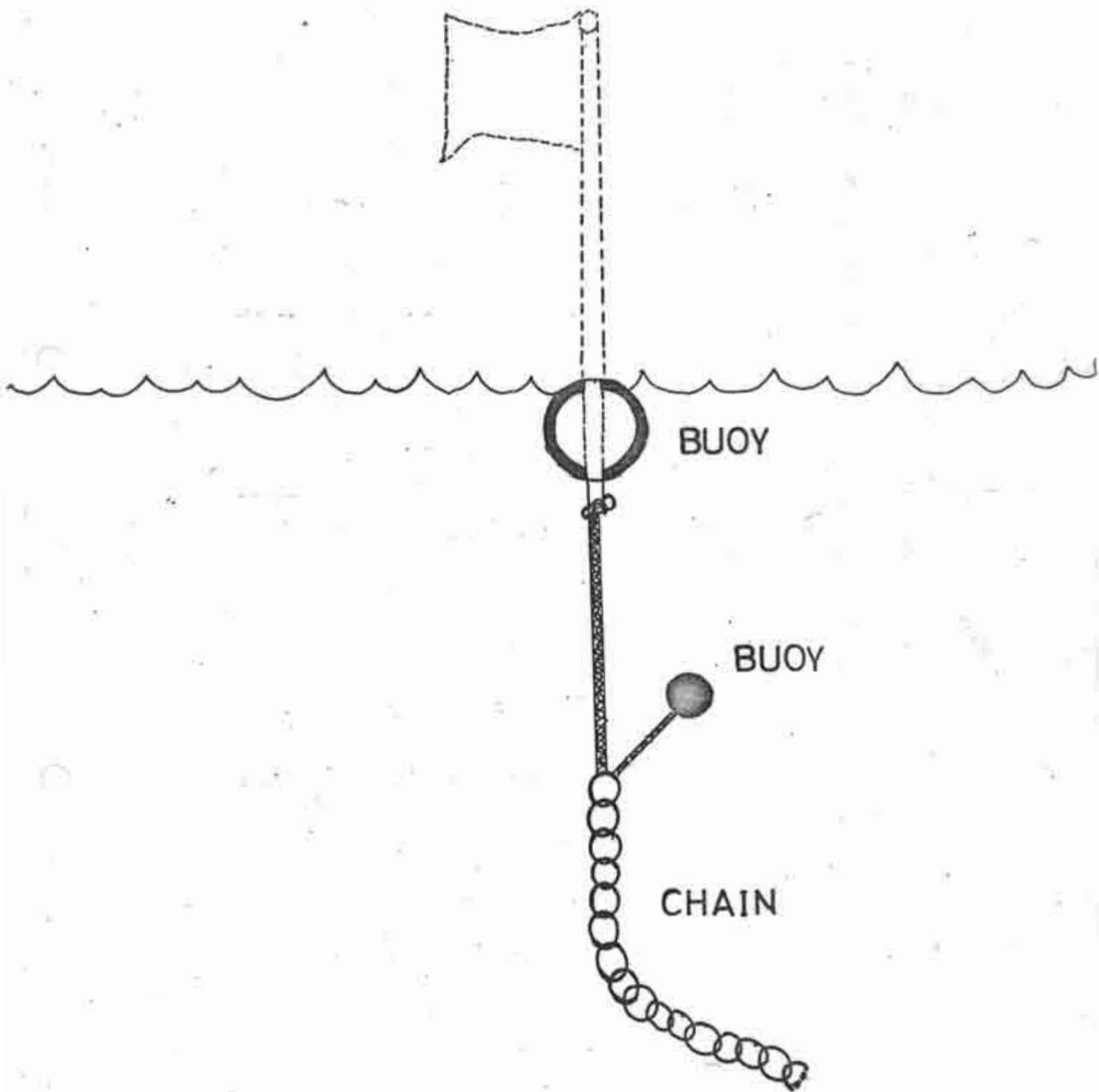
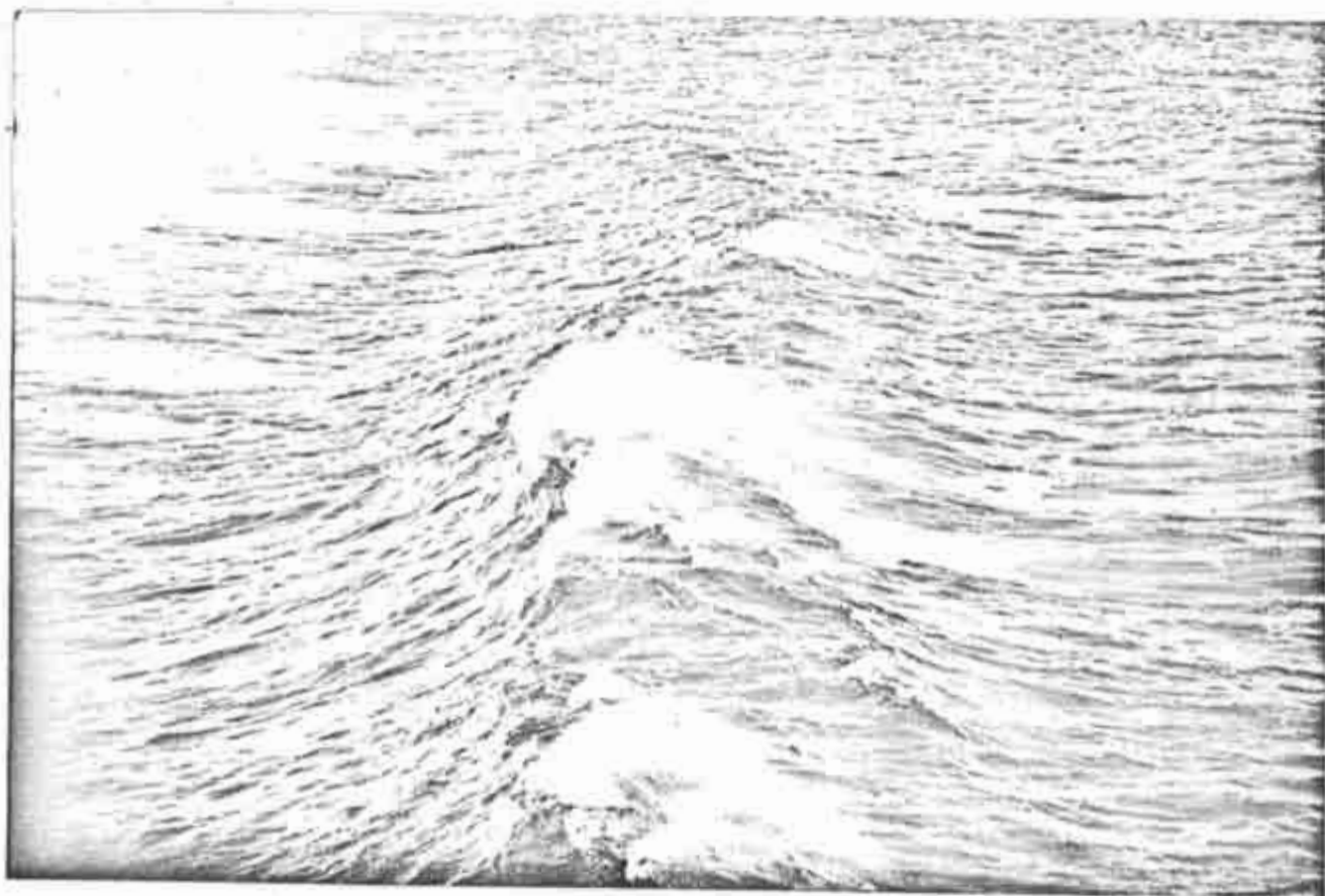


Fig. 13 Suggestion for buoy arrangement preventing the buoys from being immediately washed away by the surf.

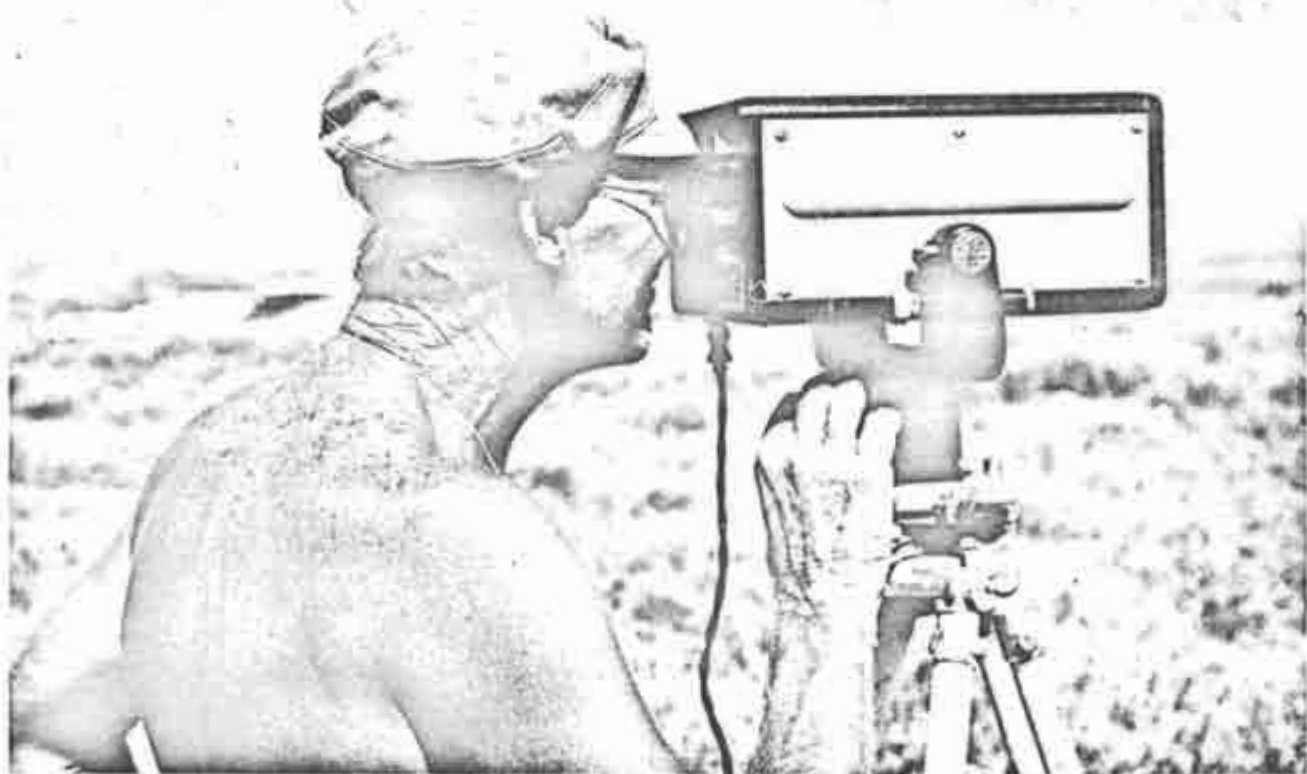
Drawing Generieve Farmer.



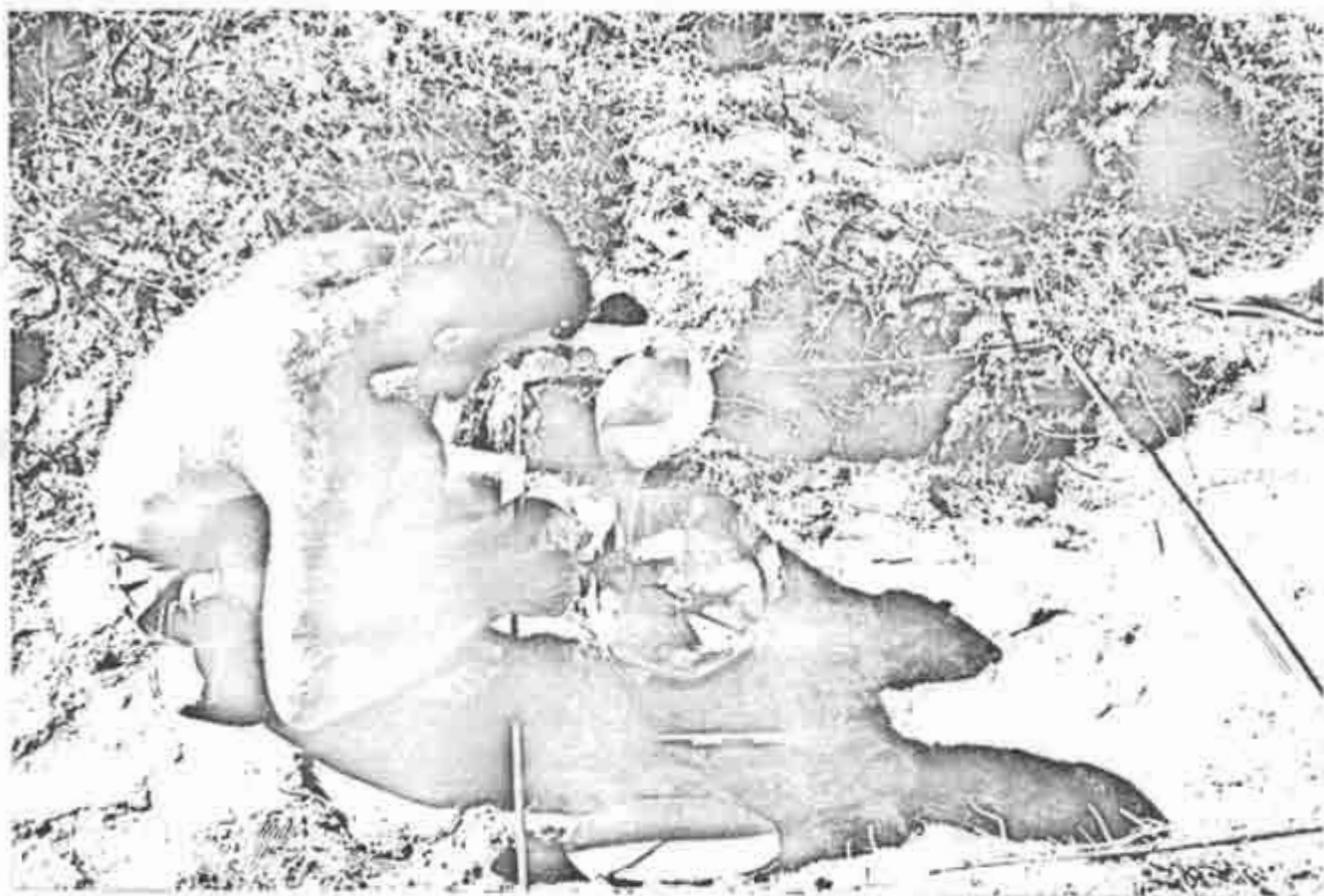
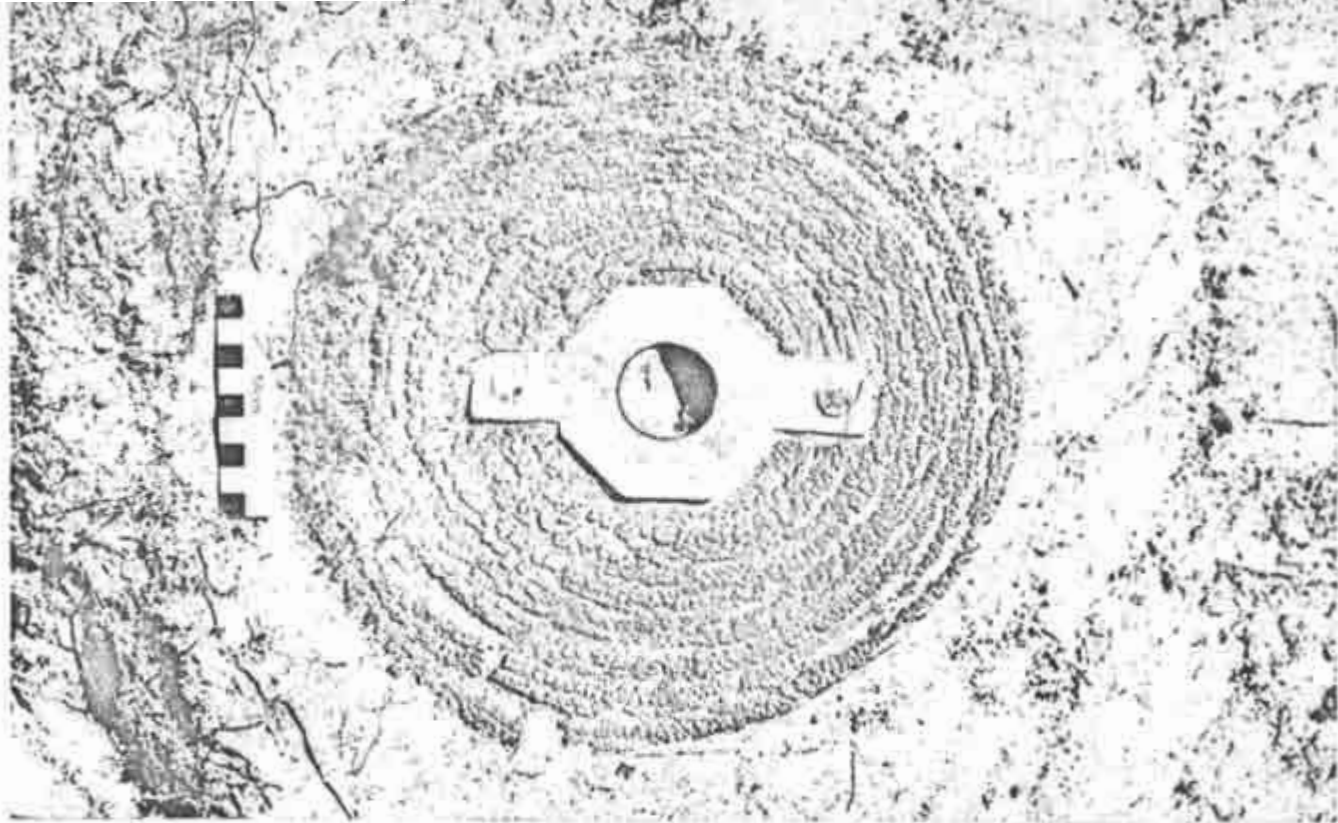
Diver examines rigging in Area F.



The heavy breakers of the Indian Ocean which have spread the Zeewijk site over an area of several kilometres.



AGA Geodimeter Model 76 used for positioning the  
survey targets with lazer.



Pulley sheave recovered in one piece with the help of Silikon.