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Northey Island managed retreat

Report 5 - Results to February 1995

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Northey Island Managed Retreat
Report 5
Results to February 1995

Institute of Estuarine and Coastal Studies
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Report to English Nature
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CONTENTS

1. INTRODUCTION

Monitoring of geomorphological development of the managed retreat scheme on Northey Island has been continuing on a twice yearly basis since the scheme was implemented 3.5 years ago. In the latest monitoring campaign the work was carried out in August/September 1994 and February 1995. The methodology adopted at the commencement of the project has been continued in order to provide a time series of data and enable all the results to be assessed on the same basis.

The data being collected therefore includes:

- topographic survey of the site;
- accretion measurements along a transect extending from the back of the site through the spillway and across the mudflat to low water;
- accretion measurements distributed spatially across the site;
- analysis of sediment grain size characteristics across the site;
- general photographic record of site development, including vegetation colonisation, creek development and condition of the new walls.

This report represents the fifth in the monitoring series, within which the results of the latest monitoring campaign are presented, together with an assessment of continuing trends in the development of the site. Details of the rationale behind the scheme, and the monitoring methodology, are presented in previous reports and are not repeated here.

2. RESULTS OF MONITORING

The fourth in the series of monitoring reports drew together the results of previous surveys in order to analyse long term trends. It was therefore decided to incorporate subsequent results into the data series to build up the long term picture.

2.1. Topography

Contour maps of the site from both the September 1994 survey and that of February 1995 are included in Appendix 1. As discussed in report 4 the actual configuration of the contours varies according to the number and placement of the survey points, thus necessitating the statistical analysis of topography which has been undertaken throughout the monitoring. However, some trends in the contours may be observed. The surface of the marsh slopes upwards in two directions, i.e. from the spillway to the back of the marsh, and from the spillway to the diagonally opposite corner. Towards this latter direction there are two discontinuities in the slope where the two drain lines cross the site. Lower areas extend from the spillway and both drains towards the upper corner of the site. Although care should be taken in the detailed interpretation of these contours it appears that on successive survey occasions the contours move progressively further inland. Conversely those contours which represent the upper areas of the marsh at the back of the site remain in approximately the same position with only a slight displacement towards the back of the site.

This alteration in the topography may suggest that differential accretion is occurring on the site, with more accretion in the lower areas than the upper areas. Such differential rates may be a result of the normal fining of sediment which occurs with distance along the transport pathway, or simply that the surface at the back of the site is too high for significant input of sediment to take place.

The results of incorporating the two most recent surveys into the statistical analysis are given in table 1 below.

Table 1. Mean elevations of marsh surface (excluding creeks) for each survey date

Survey date	Mean elevation (mOD)	Variance	Standard deviation
Aug 1991	2.927	.052	.229
Jan 1992	2.892	.063	.250
Aug 1992	2.913	.061	.248
Feb 1993	2.888	.051	.227
Jul 1993	2.903	.055	.236
Feb 1994	2.952	.056	.237
Sept 1994	2.967	.060	.245
Feb 1995	2.988	.051	.227

These data are slightly different from those presented in the previous report. This is due to the fact that a refinement of the statistical analysis technique has been developed as described below. The figures as presented in table 1 therefore show an initial period of variation over the first year and a half following the breach with losses over the winter periods which were only partially regained in the following summer. By February 1993 the surface had reached its lowest elevation (3.9cm below the original level), and since this time there has been a gradual accumulation of 10cm from the lowest level (6.1cm from the original level).

2.1.1. REFINEMENT OF STATISTICAL ANALYSIS

The methodology adopted throughout this study is based on a comparison of statistical samples of populations of survey points distributed over the surface of the site. One method of determining whether the surface is actually rising is by comparing the means (an increase in the mean suggests accretion), and also the distribution of points around the mean (the variance) through the use of a t-test.

However, in the case of Northey Island there are two components to the variance:

- random differences resulting from the irregular surface, and
- a systematic variability induced by the presence of a slope across the site.

For the purposes of the present analysis the slope itself is not useful in determining whether the mean surface is rising, and therefore the systematic variability of the slope is incidental and hides any true changes in the surface. This problem was therefore overcome by fitting a planar regression surface to the data, which effectively rectifies Northey Island to a horizontal surface in which the sample points represent only random variation around the surface. This random variability may then be compared over successive years through the use of a t-test on the new variances in relation to the overall mean elevation. However, it should be noted that some systematic variability may remain since it was not possible at this stage to ensure that the planar surface was fitted to the maximum slope. It is possible, therefore, that the variability has been reduced rather than minimised.

Results

The descriptive statistics for the new surfaces are presented in table 2 below.

Table 2. Descriptive statistics for new surfaces

Survey date	Actual mean elevation	Standard deviation	Standard error	Variance	Count
August 1991	2.927	.105	.015	.011	46
January 1992	2.892	.128	.016	.017	67
August 1992	2.913	.149	.011	.022	181
February 1993	2.888	.135	.012	.018	127
July 1993	2.903	.118	.010	.014	144
February 1994	2.952	.104	.007	.011	214
September 1994	2.967	.145	.013	.021	122
February 1995	2.988	.159	.011	.025	221

The results of the t-test analysis are presented in table 3.

Table 3. T-values for differences between datasets using residual variance instead of total variance.

	Jan-92	Aug-92	Feb-93	Jul-93	Feb-94	Sep-94	Feb-95
Aug-91	1.502	0.600	1.774	1.223	-1.461	-1.701	-2.495
Jan-92		-1.018	0.198	-0.605	-3.830	-3.506	-4.510
Aug-92			1.509	0.657	-3.042	-3.127	-4.853
Feb-93				-0.974	-4.884	-4.448	-5.977
Jul-93					-4.103	-3.950	-5.507
Feb-94						-1.090	-2.783
Sep-94							-1.209

The following shows the critical values of t for each of the significant probability levels:

P-value:	**0.10**	**0.05**	**0.025**	**0.01**	**0.005**
t-value:	1.282	1.645	1.960	2.326	2.576

Shaded values in table 3 are therefore those which are significant at or above the 0.01 level (i.e. more than 99% significant).

Discussion

August 1991 is statistically different at the 0.05 level from February 1993, when the surface had reached its lowest level. Subsequently, it was not until February 1995 that a further statistical difference was observed with the original survey, i.e. the surface has now risen sufficiently above the original surface to be significant.

In 1992 and early 1993 the surface experienced net losses, with accretion commencing again in the summer of 1993 and continuing in subsequent years. By February 1994, therefore, the surface had reached a level which was statistically different from the lower elevations of the previous three surveys. From this point the significance continued to increase to a maximum difference between the very low level reached in February 1993 and the highest level of the most recent survey. As the level has risen between July 1993 and February 1995, however, the differences have become gradually less significant as would be expected.

The ability to determine statistically different changes of only a few centimetres in the surface is a major advance in the analysis of the development of this site. Such changes have been obscured in the past by the presence of the slope in the dataset. Further refinements may be possible with the development of new techniques to determine any changes in the actual slope, thus potentially confirming the observations made above regarding the form of the contours.

2.2. Accretion

The results of the accretion measurements have been compiled into the chart of all results from successive surveys as presented in figure 1. This shows that accretion on the mudflat may have slowed from the rapid rates seen in previous years. Indeed, the plate nearest low water appears to have experienced some erosion in the latest two surveys. Some accretion was seen in the other plates of the lower mudflat, but less in the plates located further up the profile, and very little in the time between the surveys in summer 1994 and winter 1995. These measurements are confirmed by observations whilst in the field which suggested that the profile across the mudflat has changed from a steep slope to a convex configuration, i.e. the upper mudflat is now relatively flat with a very steep drop into the channel itself. It may be expected that little change will be experienced in future years, possibly only as a response to isolated events such as storms.

Measurements from the marsh surface suggest a different pattern. It appears that some erosion has been experienced over accretion plates 13, 14 and 16, although the upper accretion plates 15 and 17 have experienced some accretion. It should be noted that data from accretion plate 12 has become unreliable through being permanently covered by standing water. This has therefore been excluded from subsequent analysis. The plates on the marsh surface have generally shown more variability between survey years than those of the mudflat. This is represented in figure 2 which shows the relative changes in depth between each survey period. Figure 2 shows that accretion plate 16 is the only plate which has experienced a consistent accretionary trend until August 1994 when there was some erosion. Both plates 13 and 14 have shown similar, though variable patterns. Accretion plate 15 experienced a large amount of erosion in early 1993 but consistent accretion at other times, and after an initial erosion period accretion plate 17 has shown slow but consistent accretion. It is possible, therefore, that the latest erosive trend may simply be a further expression of the variability of the marsh surface.

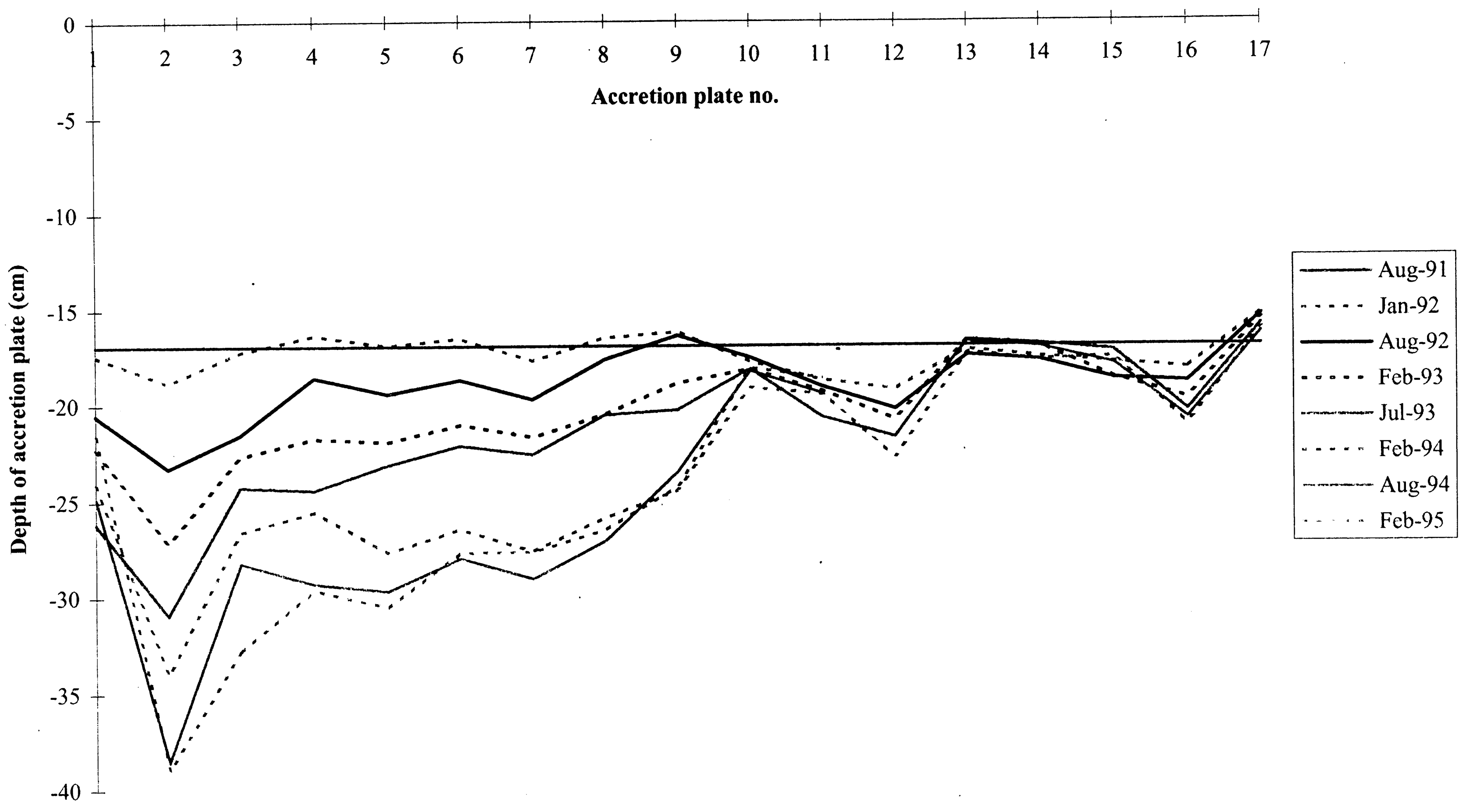
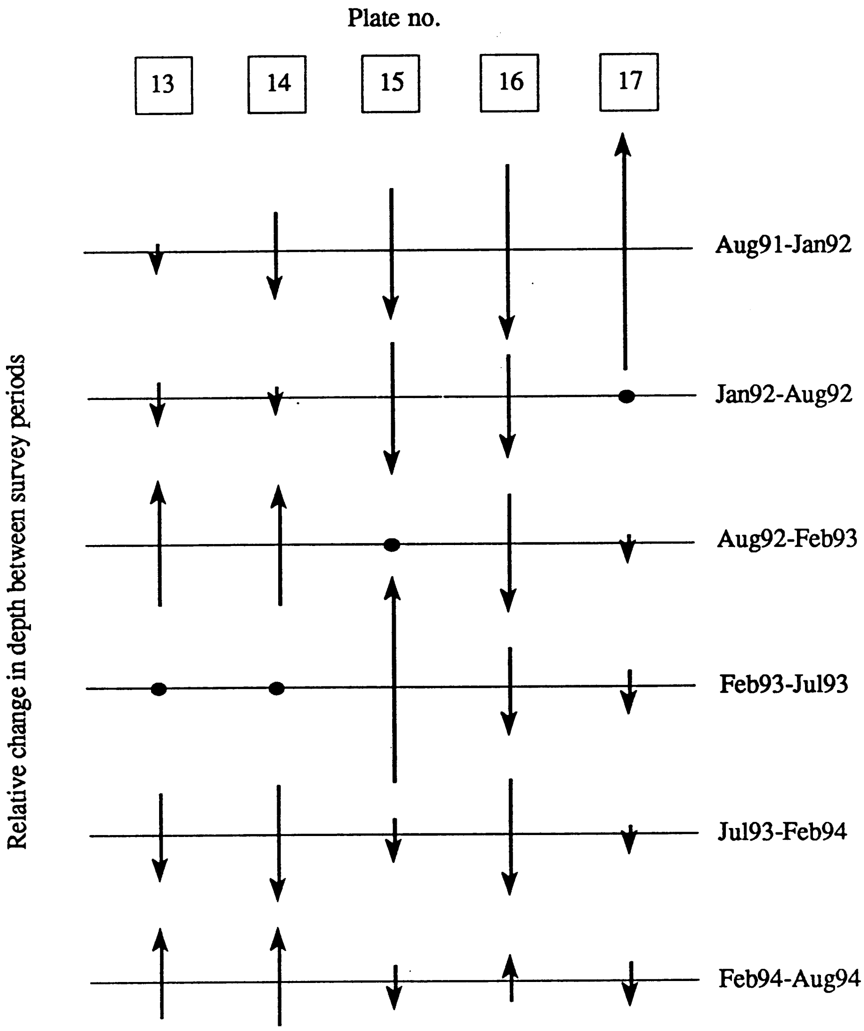


Figure 1	Institute of Estuarine and Coastal Studies
Changes in the depth of accretion plates over each survey period since implementation of the managed retreat	University of Hull



↓ shows that accretion is occurring over the plate

↑ shows that erosion is occurring over the plate

● shows that very little change occurred

Figure 2	Institute of Estuarine and Coastal Studies
Visual representation of change in accretion plate depths between survey periods	University of Hull

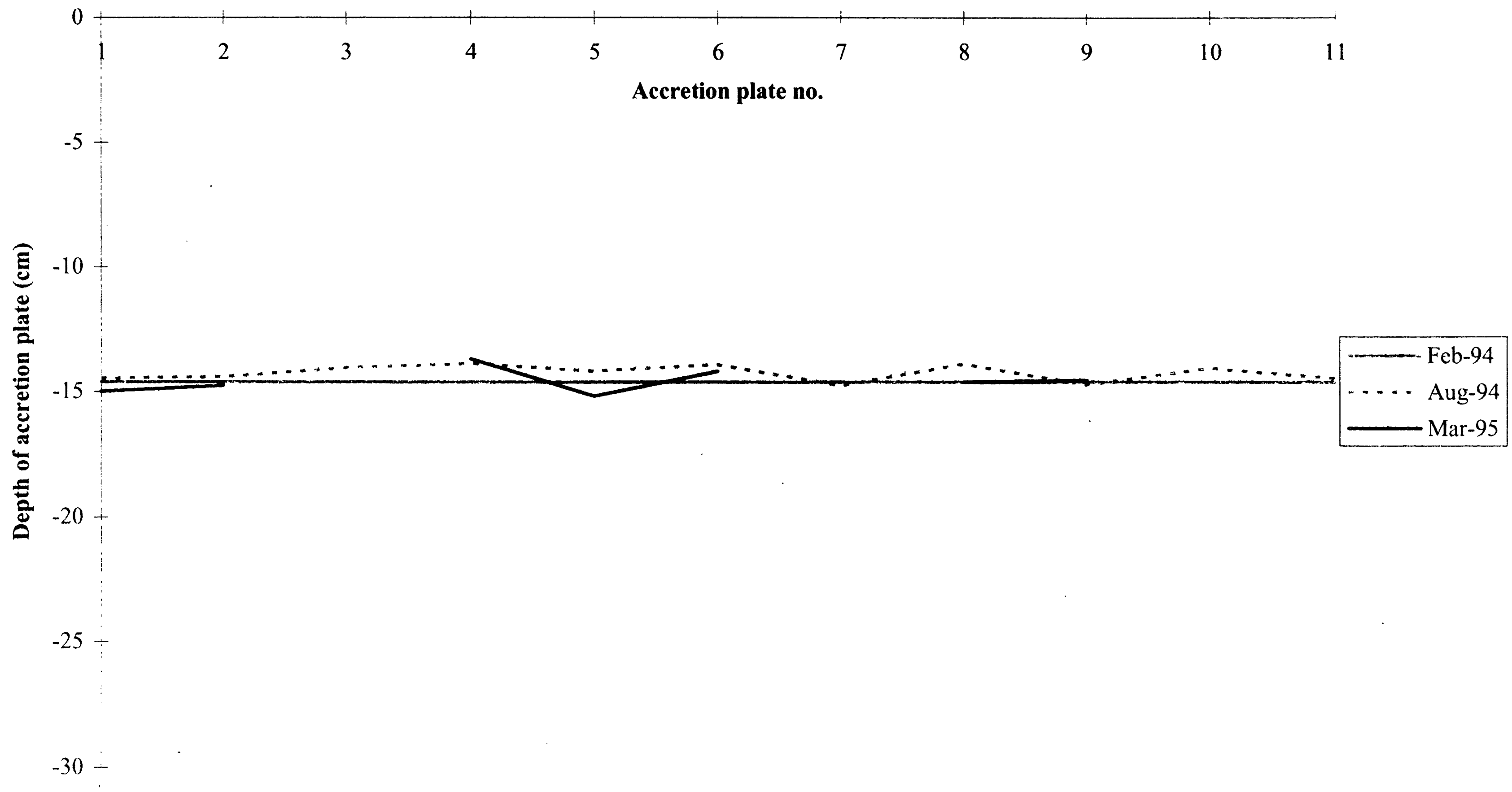


Figure 3

Changes in the depth of random accretion plates on marsh surface since installation in February 1994

Institute of Estuarine and Coastal Studies

University of Hull

In February 1994 additional accretion plates were installed in random locations across the marsh surface in order to substantiate readings from the transect and extrapolate trends across the whole site. The readings taken so far from these plates are included in Appendix 2 but further survey campaigns are required before trends may be observed in these data. From the first year of available data it may be seen that these plates experienced very little overall change, with a net accretion of 0.37cm over the spring and summer, and a net erosion of -0.37cm over the winter as seen in figure 3.

Table 4 summarises the long term trends in annual accretion rates in the three sets of measurements.

Table 4. Annual accretion on the mudflat and marsh transect and the random marsh points

	Jan 92 - Feb 93	Feb 93 - Feb 94	Feb 94 - Feb 95
Mudflat (transect)	4.125 cm	4.125 cm	1.43 cm
Marsh (transect)	0.552 cm	0.071 cm	-
Marsh (random)	-	-	-0.003

This clearly demonstrates the reduction in rates of accretion on the mudflat, with the steady accretion of 4cm/year dropping to only 1.4 cm/year. By contrast, however, the summer accretion on the marsh surface was lost over the winter, resulting in a negligible net accretion over the year.

During the most recent survey campaign problems were encountered with relocating the original accretion plates from the marsh transect. One of the plates was eventually found and excavated in order to check its condition. The plate was found to be badly corroded after its four years *in situ*, in contrast to the plates in the mudflat transect which are still in good condition. This also contrasts with experience elsewhere where similar plates have been installed for 10 years in mudflat and natural saltmarsh conditions. It is thought that iron oxides in the sediment of the set-back surface, possibly resulting from agricultural uses, are released with the flooding sea water and react with the aluminium of the plate causing corrosion. Alternative types of accretion plate are currently being investigated and will be installed to replace all existing plates on the marsh surface at the next survey campaign.

2.3. Sediments

As in previous years surface sediment samples were obtained on each survey occasion, four from adjacent to the transect and a further 10 which were originally randomly located across the marsh. These 'random' samples are approximately relocated each time so that, for example, RND1 is always located in the north west corner, but the exact location is not recorded. The sediment samples are returned to the laboratory and the grain size characteristics analysed. The full results of these analyses are given in Appendix 3.

A summary of the overall results is given in table 5, although interpretation of these should be undertaken with care since the spatial differences between samples may be great.

Table 5. Mean values of sediment grain size (μm), skew and standard deviation for all samples from each survey date

Survey date	Mean grain sizes (μm)	Skew	Standard deviation
August 1991	(no samples)	-	-
January 1992	17.03	0.087	1.858
August 1992	10.7	0.102	1.369
February 1993	10.62	0.108	1.382
July 1993	28.19	0.285	1.529
February 1994	6.59	0.002	1.702
August 1994	113.64	-0.256	1.981
February 1995	59.81	-0.376	1.559

Both sets of results from the latest survey campaigns show sediments which appear to be of larger grain size than in previous years. This is confirmed by the negative skew values which suggest that the grain sizes are also generally coarser than the mean. As with the samples from July 1993 those from the summer of 1994 were also significantly larger than the winter samples. It is not clear whether this is a real change in the overall sediment composition on the site or simply representing isolated events immediately preceeding the survey.

The spatial patterns of mean grain size across the site are shown in figures 4 and 5, with the approximate lines of the 'creeks' also illustrated to show the main transport pathways. It would be expected that the grain sizes would generally become finer with distance into the site, although allowing for transport of fine sediment along the creek lines. A complex pattern of size distributions may be seen in both datasets, although detailed patterns may be obscured by the distance between the samples. For example, it is apparent in figure 4 (August 1994) that sediments are generally coarser along the transect from front to back of the marsh. One explanation for this phenomenon may be that the size of the site, and relative size of the the spillway, is causing eddies in the water movement as the tide floods the site. Alternatively, coarser sediments may be being washed from the internal walls which have been shown to be suffering a degree of erosion. As observed in previous years, interpretation of sediment samples should therefore be undertaken with caution.

2.4. Development of drainage topography

A channel started to become incised into the compacted clays of the spillway at an early stage in the site development. Photographs 1 and 2 show that this channel has become significantly deeper, with steep sides in the lower sections through the spillway itself. Further up, although now an obvious channel line, the cross section is still relatively shallow, with a series of steps longitudinally along the channel.

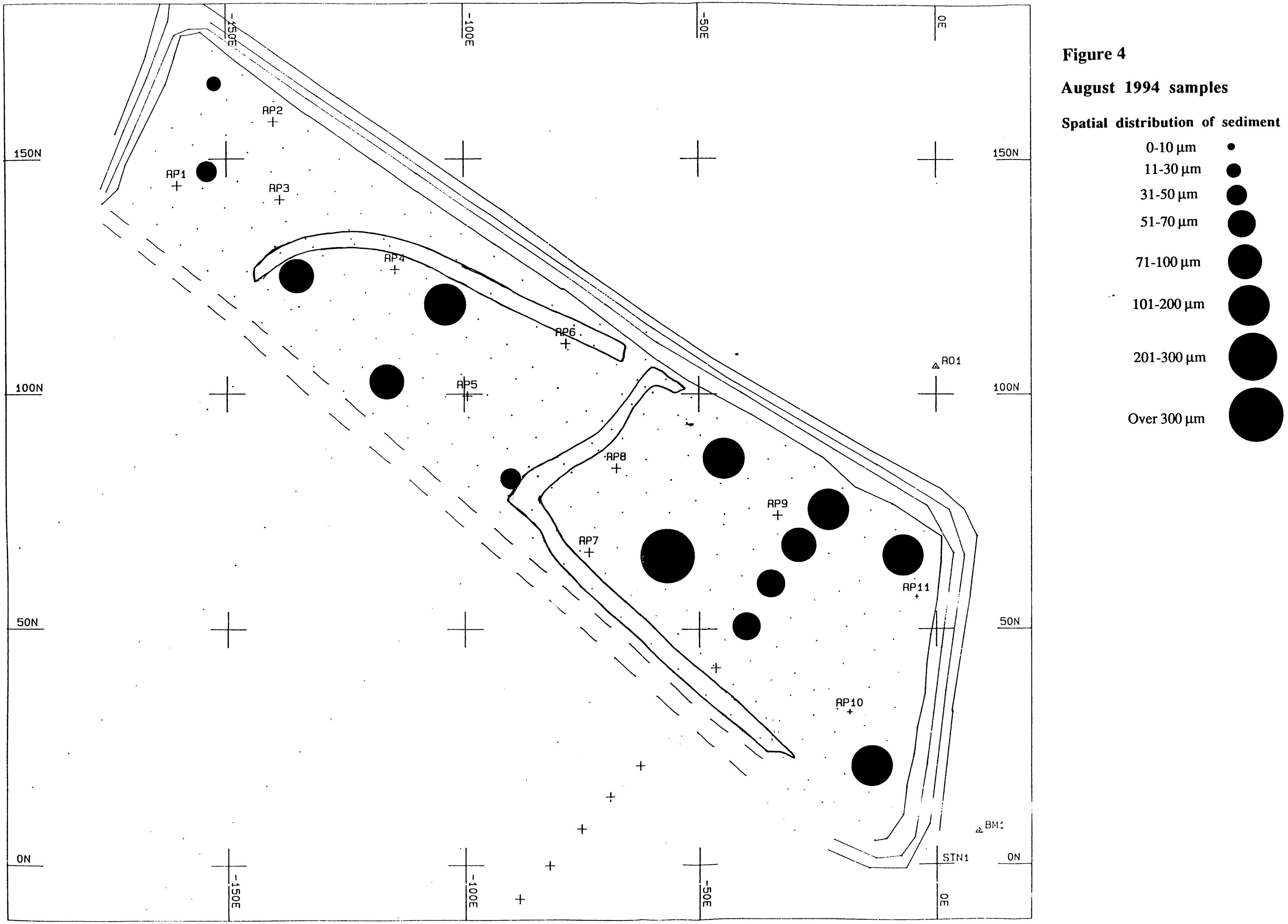
This suggests that development of the channel is continuing as expected, but connection to the areas of standing water within the site has still not occurred. There are now three discrete areas of standing water:

- the line running behind the front wall and across the centre of the site which was predicted to become the main creek (Photographs 3 and 4);

Figure 4

August 1994 samples

Spatial distribution of sediment sizes



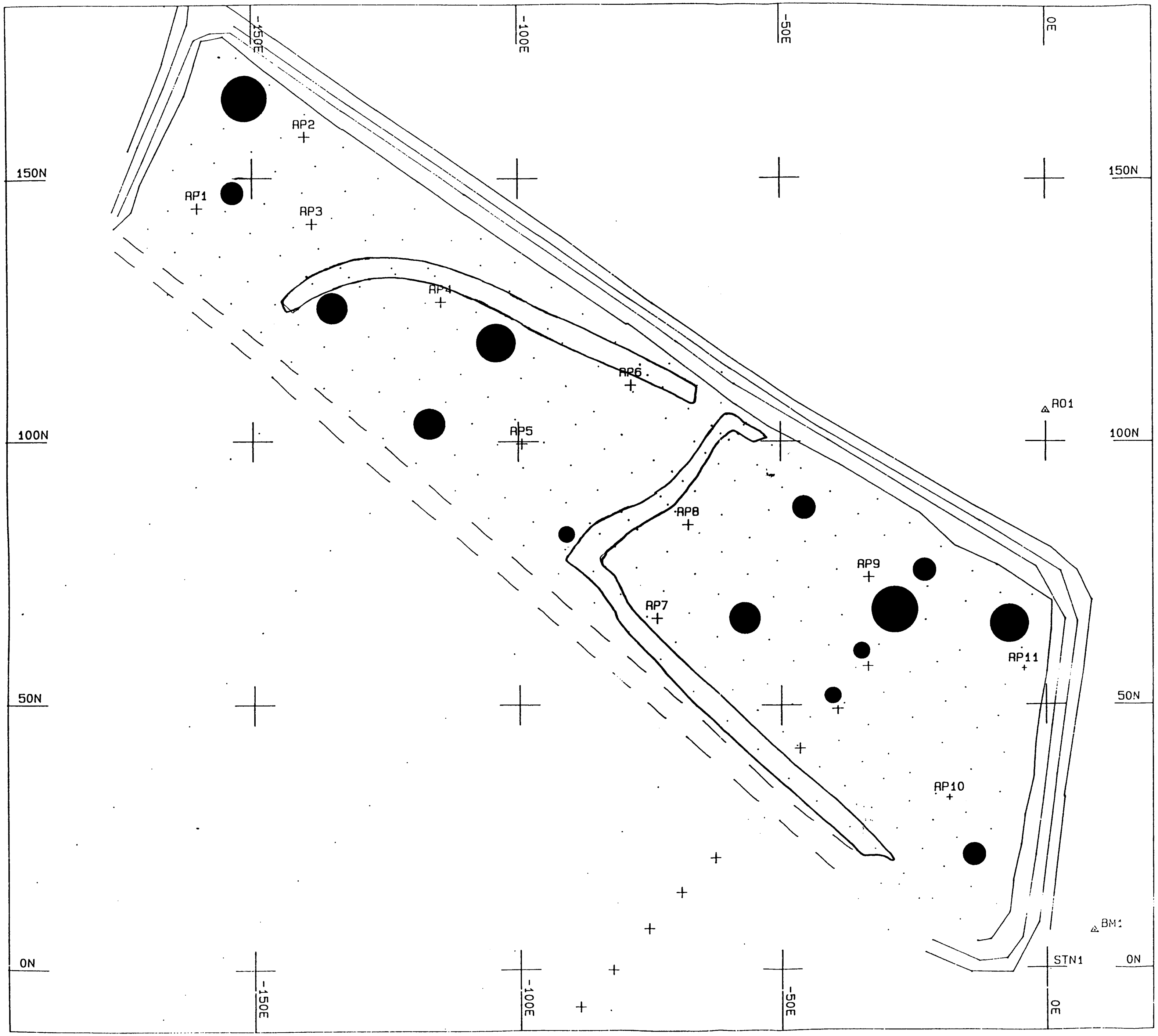


Figure 5

February 1995 samples

Spatial distribution of sediment sizes

0-10 µm

11-30 µm

31-50 µm

51-70 µm

71-100 µm

101-200 µm

201-300 µm

Over 300 µm

- the borrow pit of the original inner wall line running from the back of the site diagonally to the west (Photographs 5 and 6);
- a large ponded area at the western end of the site (also shown in Photographs 5 and 6).

Vegetation colonisation has been prevented in these areas and is resulting in well-defined steep edges to the ponds. It is therefore becoming increasingly unlikely that these areas will ever be colonised. Additional structures are also becoming apparent within the vegetated areas as seen in Photograph 16. It is possible that these areas represent embryonic salt pans which will provide a valuable insight into the continuing argument about how these structures are formed in a natural saltmarsh. However, although in this case it appears that the 'pans' are a result of differential vegetation colonisation, the process of pan development in a young marsh which accretes vertically may be different, i.e. resulting from differential patterns of accretion. Observation of these structures will continue in future monitoring campaigns.

2.5. General observations

2.5.1. VEGETATION COLONISATION

The photographs of the site taken in the summer of 1994 show the extent of vegetation colonisation which has occurred over the previous growing season. Photograph 7 at the eastern end of the site shows that the consolidated sediment of the borrow pits, although still more sparsely colonised than the rest of the site, now has a reasonable cover of *Salicornia*. This suggests that consolidation of the sediments delays but does not prevent vegetation colonisation, particularly by the opportunistic *Salicornia* species. Photograph 8, taken in the winter of 1995, shows that the line of the borrow pit appears to have a greater algal cover than adjacent areas which have been vegetated for longer. It is uncertain why this should be the case.

Photographs 5, 9, 10 and 16 show the differences in vegetation patterns in different topographic situations. Along the slightly higher areas at the back of the site (Photographs 5, 9 and 16) the vegetation is more diverse and significantly more vigorous than across the majority of the site which is dominated by annual *Salicornia*. Similarly, towards highest portion of the site in the western corner the vegetation becomes progressively more dominated by grasses. Along the levee at the back of the borrow pit which runs diagonally across the western end of the site the vegetation is again more diverse and more vigorous as shown in Photograph 10. This is contrasted by sparse colonisation along the consolidated sediment seen in the front of the photograph. The steep sides of the levee are also shown in this photograph.

Conditions have been sufficiently favourable up to the summer of 1994 to allow *Salicornia* also to colonise the lowered front wall as seen in Photographs 11 and 12. These photographs also show that the fronting mudflats are being colonised by patches of *Spartina*. This suggests that the wave climate outside the wall may have been reduced with the removal of the sea wall and its fronting blockwork. Continued observations will be made of any further development of the marsh outside the retreat site.

2.5.2. EROSION

Although there are signs of minor erosion along several parts of the inner walls the most significant area occurs at the head of the main creek line as reported in report 4. The extent of the erosion is seen in Photographs 13 and 14. It is believed that the permanent presence of standing water along this creek line is contributing to this erosion, allowing internally-generated waves to reach this portion of the wall at most states of the tide.

A further area of erosion is located on the eastern side of the wall adjacent to the spillway as seen in Photograph 15. Here the wall has eroded back sufficiently to expose the stabilising geotextile fabric. It is unknown whether this geotextile has been recently utilised in an attempt to stabilise the wall, or whether this was an original part of the wall construction.

3. CONCLUSIONS

As with previous years the conclusion from the latest set of monitoring is that the site is continuing to develop into an interesting young saltmarsh. The dominance of *Salicornia* is perhaps surprising given the relative elevation of the site, but the progression of increasing species diversity seen on the higher parts of the site may show how the rest of the site can be expected to develop in the long term.

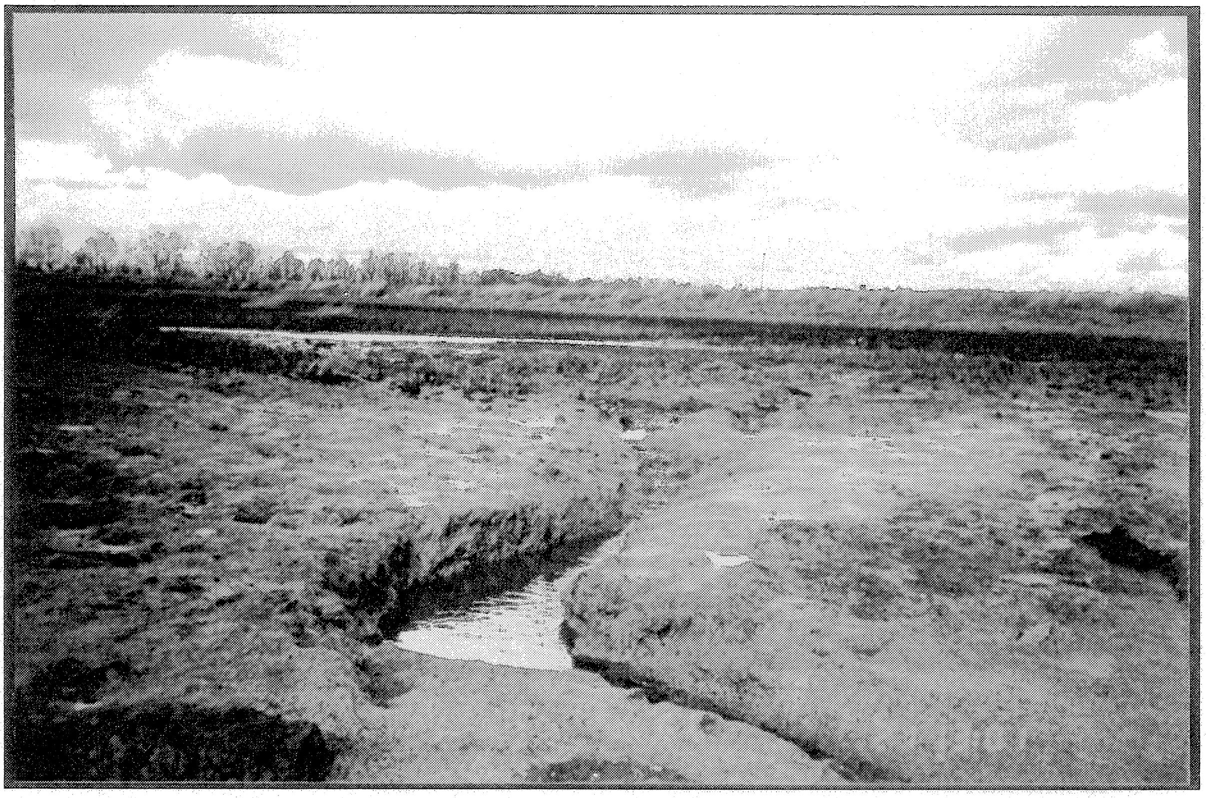
However, a major development in the analysis techniques has allowed significant changes in the elevation of the site to be observed for the first time. Initially the site experienced a net loss of height to its lowest point in February 1993 (1.5 years after the breach).. Subsequently there was continuous accretion, with an overall increase of 6.1cm from the original surface elevation (a total of 10cm from the lowest point). Further refinements of the analytical techniques will continue to be investigated.

There are a number of interesting changes in the site itself, such as the embryonic 'pans' and apparent colonisation on the foreshore. These will continue to be observed in the future monitoring campaigns since they may provide valuable insight into the functioning and development of the saltmarsh ecosystem.

Although a certain amount of erosion was observed in the latest accretion measurements, notably on the marsh transect, these have been generally variable throughout the study and may simply represent continuing instability.

As in previous years it is strongly recommended that vertical aerial photographs should be obtained of the site and adjacent estuary channel as soon as possible, since this will allow the changes observed on the ground to be placed into their overall context. An additional advantage of aerial photography is the ability to take measurements in the future of characteristics which may not have been noted as being of importance at this stage. In this way the history of the site is not completely lost.

4. PHOTOGRAPHS

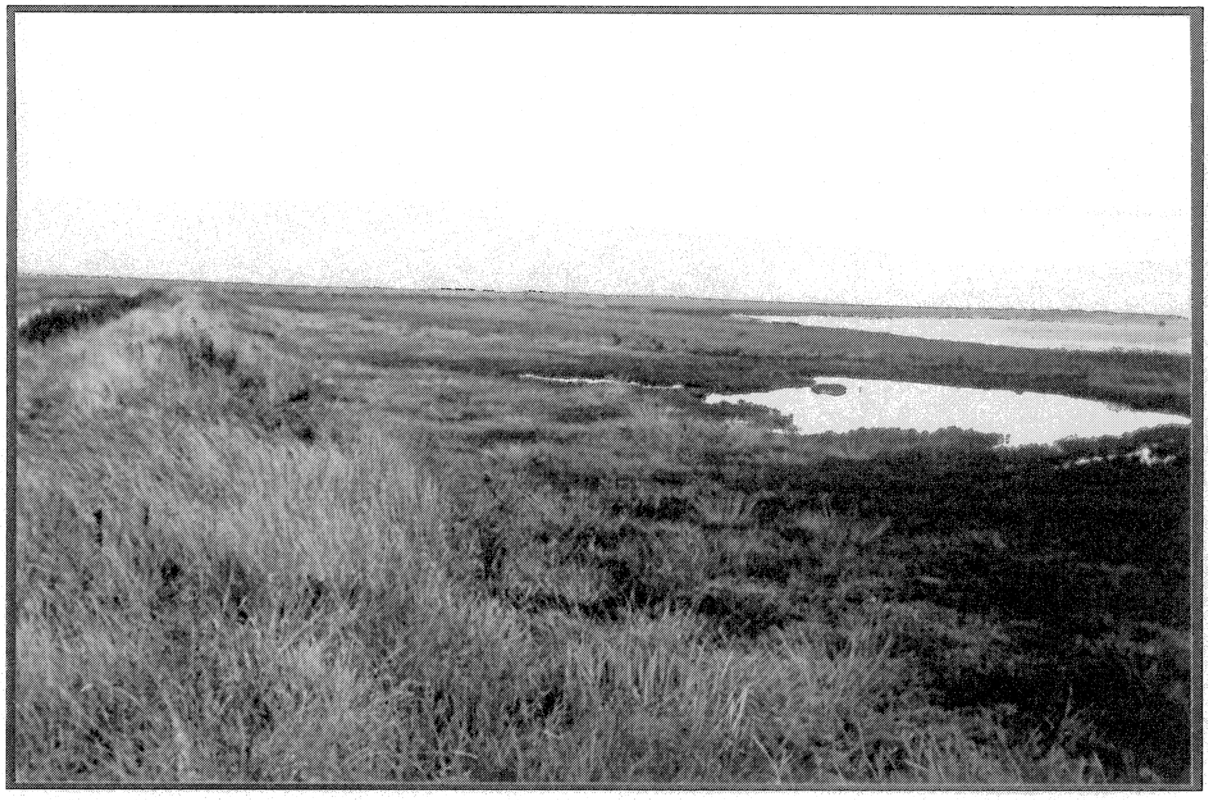


Photograph 1: **February 1995**
From the mudflat across the spillway, showing incision of the channel

Photograph 2: **February 1995**
Looking from east to west across the spillway. This shows that the spillway channel has not yet become connected with the 'creek'.

Photograph 3: **August 1994**
Looking across the centre of the site, showing the well-defined creek edges

Photograph 4: **February 1995**
As above (at a slightly lower state of the tide)



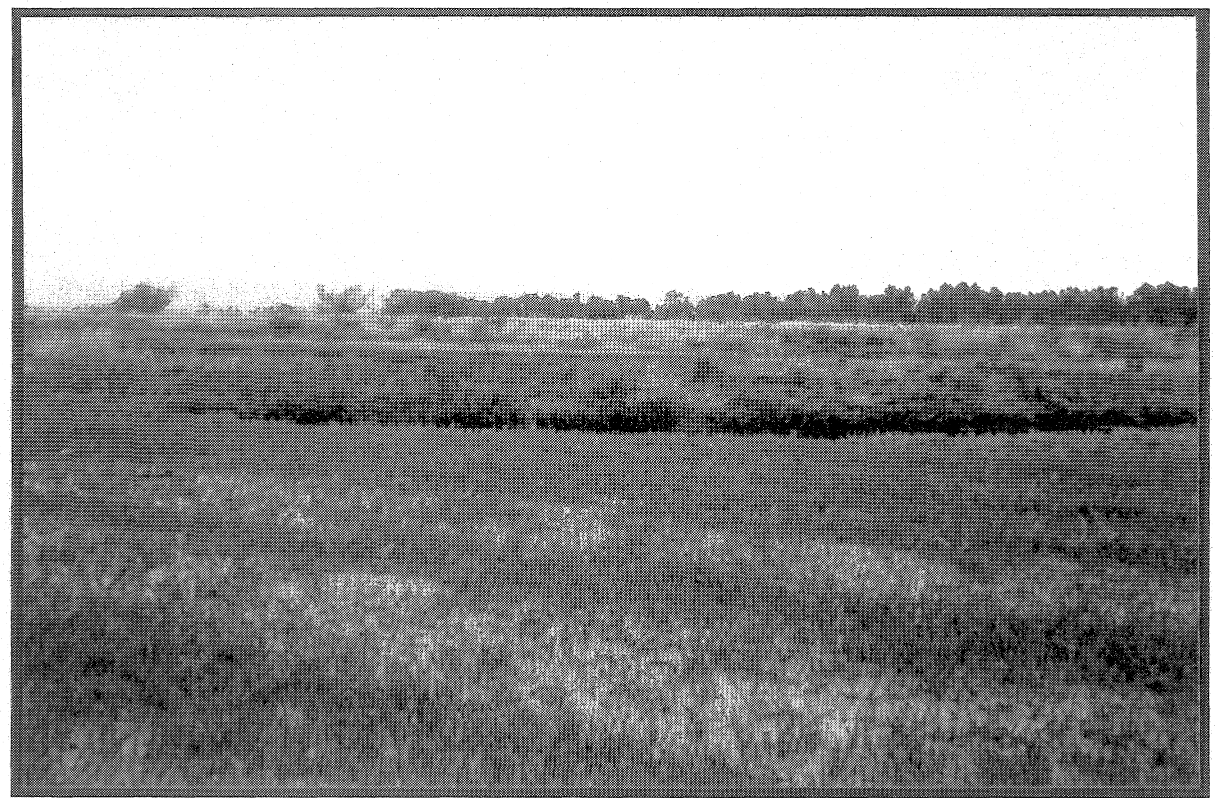
Photograph 5: **August 1994**
From the back of the site (western end) showing large pond and degree of vegetation diversity in the higher areas

Photograph 6: **February 1995**
From the front of the site (western end) showing inner borrow pit and large pond

Photograph 7: **August 1994**
From the back of the site (eastern end) showing increased degree of *Salicornia* colonisation since previous year

Photograph 8: **February 1995**
From the front of the site (eastern end) showing the greater degree of algal cover along the old borrow pit line

Photograph 9: **August 1994**
Looking along the back of the site, showing the increased vigour and diversity of plants in the higher areas



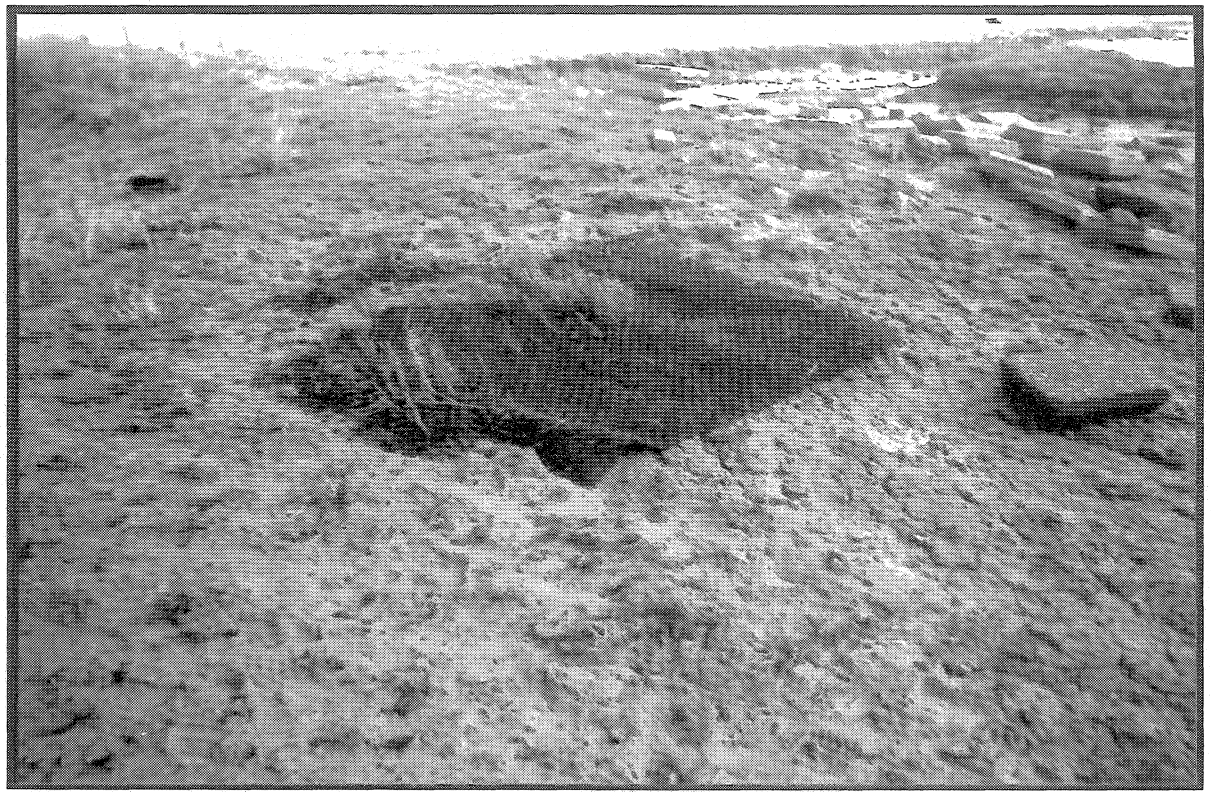
Photograph 10: **August 1994**
From the front of the site across the inner borrow pit. Note the steep edge and degree of vegetation diversity along the levee

Photograph 11: **August 1994**
Looking along the front sea wall. Note vegetation colonisation on wall top and *Spartina* (new areas?) on the foreshore

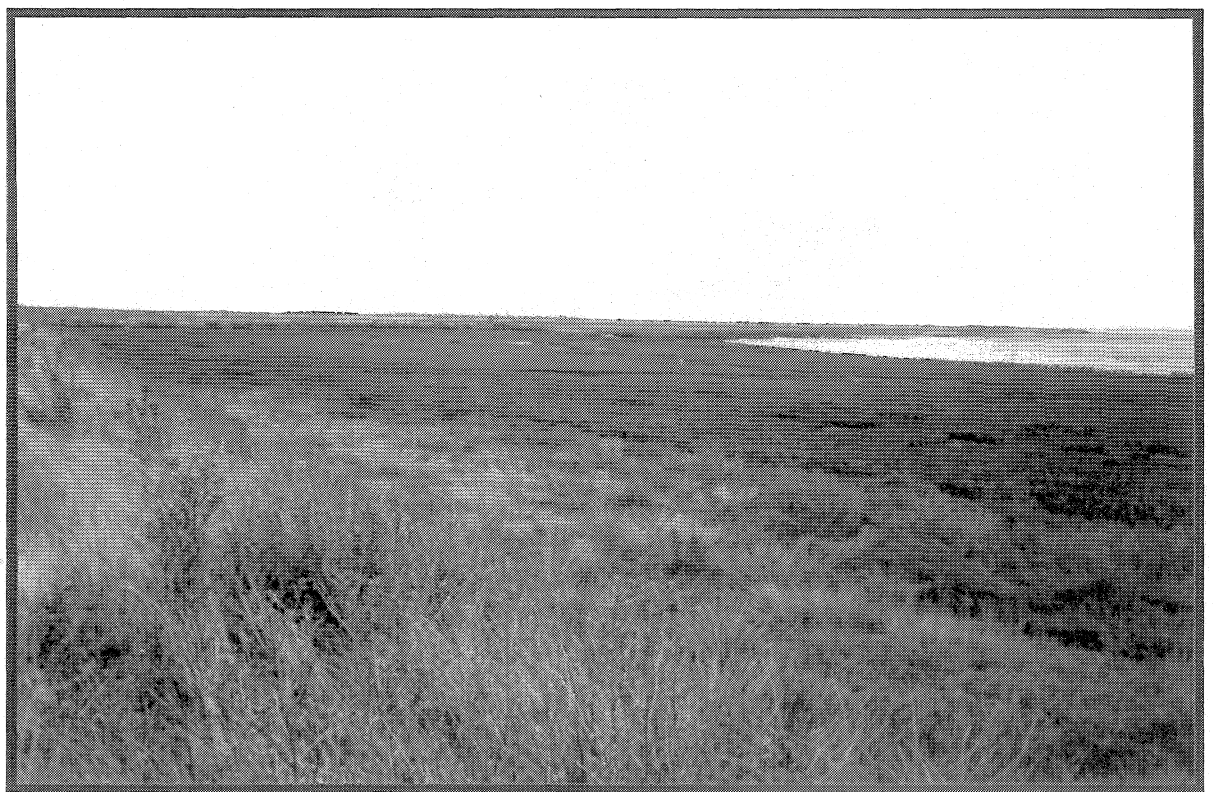
Photograph 12: **February 1995**
As above

Photograph 13: **August 1994**
Erosion of sea wall at the head of the transverse creek

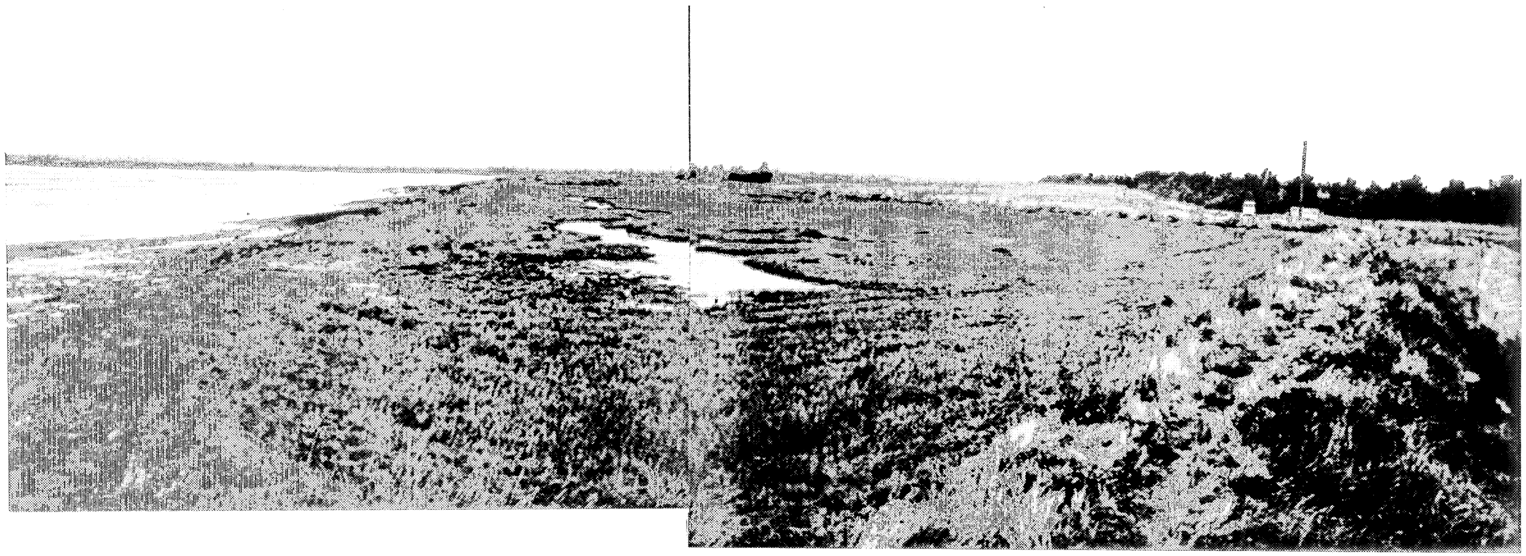
Photograph 14: **February 1995**
As above



Photograph 15: **February 1995**
Erosion of sea wall adjacent to the spillway exposing geotextile fabric



Photograph 16: **August 1994**
Possible development of 'pan' structures within the newly vegetation marsh



Photograph 17: **August 1994**
General view across the site looking west from the spillway corner

Photograph 18: **February 1995**
Similar general view for comparison. Both views may be compared with Plates 15 and 16 in report 4 to show general site development

5. APPENDICES

Appendix 1: Contour maps (September 1994 and February 1995)

Appendix 2: Depth of accretion plates (August 1994 and February 1995)

Appendix 3: Sediment characteristics

Appendix 1. Topographic contour maps

LEGEND

———	Sea Wall Base
———	Sea Wall Top
- - - -	Sluice Cutting
—·—·—	New Borrow Ditch
—··—··	Former Sea Wall
———	Marsh Edge
+	Accretion Plate
·	Survey Point

Northey Island Survey 14.9.94

SCALE 1 : 750

CONTOUR INTERVAL 0.1m

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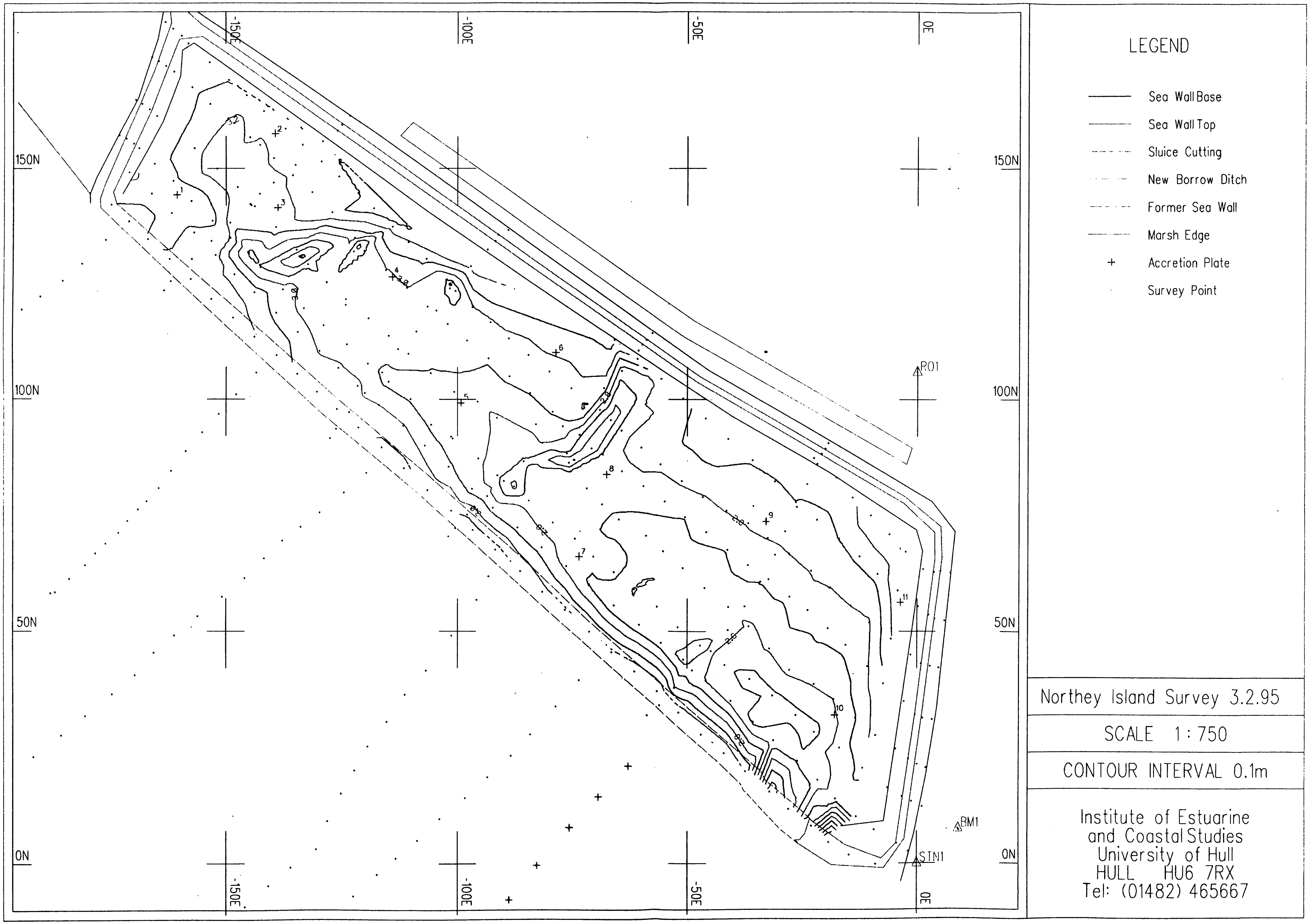

Northey Island Survey 3.2.95

SCALE 1 : 750

CONTOUR INTERVAL 0.1m

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HULL HU6 7RX
Tel: (01482) 465667

Appendix 2. Depth (cm) of accretion plates

Accretion plate no.	Depth in August 1994	Depth in February 1995	
PAC1	-27.04	-23.72	
PAC2	-39.78	-40.22	
PAC3	-28.19	-32.70	
PAC4	-30.84	-31.14	
PAC5	-29.37	-30.18	
PAC6	-29.56	-29.26	
PAC7	-30.20	-28.80	
PAC8	-27.98	-27.40	
PAC9	-24.12	-24.90	
PAC10	-13.02	-12.86	
PAC11	-10.89	-10.08	
PAC12	-23.63	(standing water)	
PAC13	-15.75		
PAC14	-21.87		
PAC15	-18.43		
PAC16	-19.87		
PAC17	-17.27		
Additional random accretion plates installed February 1994			
	February 1994	**August 1994**	**February 1995**
RND1	-16.02	-15.87	
RND2	-15.14	-14.92	
RND3	-18.06	-17.48	
RND4	-17.22	-16.46	
RND5	-15.12	-14.68	
RND6	-16.22	-15.51	
RND7	-12.28	-12.42	
RND8	-14.20	-13.46	
RND9	-11.86	-11.98	
RND10	-14.28	-13.73	
RND11	-10.22	-10.06	

Appendix 3. Sediment characteristics

English Nature.
Northey Island.
Summary of Particle Size and Organic Data.
Summer 1994.

SAMPLE	% CLAY & SILT	MEDIAN Ø	MEAN Ø	SORTING COEFFICIENT	MEDIAN µm	MEAN µm	SKEW	% ORGANIC CARBON	% LOI at 400°C	% COAL CONTENT
RND1-S94	43.55	3.51	2.33	2.37	87.71	198.37	0.119	5.775	12.795	12.365
RND2-S94	56.00	4.41	2.58	2.43	47.08	167.22	-0.093	8.860	17.309	11.566
RND3-S94	58.93	4.59	2.32	2.64	41.48	200.69	-0.219	3.511	16.618	12.138
RND4-S94	40.39	3.26	1.71	2.58	104.43	305.48	0.025	8.922	24.161	12.341
RND5-S94	85.40	6.18	4.43	1.54	13.82	46.51	-0.358	4.984	10.385	14.455
RND6-S94	73.27	5.56	3.61	2.04	21.24	82.06	-0.311	5.933	13.625	13.007
RND7-S94	80.02	6.14	3.21	2.05	14.19	107.75	-0.489	3.718	7.178	15.087
RND8-S94	77.89	5.71	3.43	1.97	19.12	93.09	-0.345	5.608	13.320	14.348
RND9-S94	90.68	6.44	4.69	1.39	11.53	38.76	-0.423	7.498	15.876	12.687
RND10-S94	93.43	6.59	5.22	1.26	10.38	26.91	-0.427	2.647	3.149	17.045
NOR1-S94	81.60	5.88	3.98	1.80	16.95	63.17	-0.324	6.269	10.106	12.175
NOR2-S94	83.59	5.88	3.99	1.74	16.99	62.82	-0.312	2.902	5.834	13.679
NOR3-S94	78.32	5.04	3.51	1.79	30.37	88.04	-0.078	3.391	5.629	12.827
NOR4-S94	73.85	5.61	3.18	2.13	20.44	110.08	-0.354	3.572	10.230	12.162

Summary of Particle Size and Organic Data.
Winter 1995.

SAMPLE	% CLAY & SILT	MEDIAN Ø	MEAN Ø	SORTING COEFFICIENT	MEDIAN µm	MEAN µm	SKEW	% ORGANIC CARBON	% LOI at 400°C	% COAL CONTENT
RND1-W95	82.23	4.88	4.40	1.22	34.02	47.33	0.196	2.927	2.458	15.336
RND2-W95	81.49	5.85	3.80	1.83	17.35	71.81	-0.314	1.953	3.673	14.656
RND3-W95	91.41	6.42	4.70	1.38	11.71	38.43	-0.407	2.395	5.970	12.612
RND4-W95	87.83	6.43	3.88	1.72	11.57	68.02	-0.513	2.168	4.529	15.833
RND5-W95	99.94	6.94	6.43	0.87	8.14	11.57	-0.405	0.907	3.535	16.306
RND6-W95	84.75	5.88	4.26	1.61	17.00	52.33	-0.241	1.747	3.076	17.593
RND7-W95	86.84	6.36	3.74	1.73	12.19	74.16	-0.483	4.455	9.787	11.174
RND8-W95	89.66	6.51	4.12	1.50	10.99	57.34	-0.479	1.490	5.643	15.594
RND9-W95	91.08	6.56	4.36	1.45	10.58	48.74	-0.485	4.220	9.384	11.078
RND10-W95	60.14	4.92	2.32	2.67	33.01	200.78	-0.285	6.900	11.535	11.708
NOR1-W95	92.74	6.60	5.07	1.28	10.30	29.73	-0.442	2.564	4.939	14.500
NOR2-W95	97.18	6.67	5.83	1.09	9.84	17.55	-0.388	1.259	4.492	14.204
NOR3-W95	82.88	6.37	3.81	1.83	12.12	71.05	-0.526	2.339	6.960	18.247
NOR4-W95	84.72	6.42	4.37	1.64	11.65	48.43	-0.494	3.341	12.262	17.307