Coastal Assessment Survey
Solway North Coast

September and October 1996

Volume 1 of 3: Introductory material, and the
western part of the coast:

Carrickcarlin Point to Crook of Baldoon

Map sets 1 to 19

A Report for HISTORIC SCOTLAND

by the CENTRE *for* FIELD ARCHAEOLOGY

THE UNIVERSITY OF EDINBURGH

CENTRE *for* FIELD ARCHAEOLOGY

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Author: M Cressey R. Toolis Date 27-1.97 27-1.97

Approved by: Bill Date 27/1/97

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Mike Cressey BA MSc PhD FSA(Scot) and Ronan Toolis MA PIFA
Editors: Bill Finlayson MA PhD FSA(Scot) MIFA and Ian Ralston MA PhD FSA FSA(Scot) MIFA
Illustrators: Kevin Hicks BA AAAI&S, Kirsty Cameron MA, George Mudie MA

CENTRE *for* FIELD ARCHAEOLOGY
Old High School
12 Infirmary Street
Edinburgh EH1 1LT

Tel: 0131-650-8197
Fax: 0131-662-4094

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1 INTRODUCTION

Background

In June 1996 Historic Scotland invited tenders to conduct the first phase of a coastal survey project to cover the Scottish part of the Solway Firth from the Mull of Galloway (NX 160 306) eastward to the bridging point of the River Sark (NY 327 669). Following submission of its Project Design, the Centre for Field Archaeology was awarded this project.

This project is part of a larger Historic Scotland review of archaeological resources in relation to the coastal zone and is the fourth such survey to be completed. Surveys have already examined: the north coast of the Forth estuary (Robertson 1996); the south coast of the Forth estuary (James 1996); and a stretch of coast from Ullapool to Lochinver in Wester Ross (Long 1996). This programme of work has emerged from the recognition of the importance of the coastal zone to Scottish archaeology and the need for information to allow Historic Scotland to determine the nature of the threats to coastal areas and to determine what the best solution is for specific sites (Ashmore 1994). Of particular relevance here was the recognition by Ashmore of the need to obtain better targeted standard information for coastal areas. As a consequence, all of the recent surveys have followed a similar methodology, based on Historic Scotland's *Archaeology Procedure Paper 4, Coastal Zone Survey* (1996).

In addition to the archaeological dimension, this survey has been conducted against a wider background of interest in the management of the Solway Firth. The *Solway Firth Review*, published in 1996 by the Solway Firth Partnership, presents a review of available information and is designed to provide a reference point for the development of a management strategy for the Solway Firth Partnership Area. Our survey encompasses only a part of this area, which also extends along the south shore of the Firth. The *Review* considers, amongst other topics, landscape and cultural heritage, geology and geomorphology, marine and coastal environments, ecology, social and economic resources, recreation and tourism, harbours and shipping as well as coastal protection, planning and management. Archaeology, and the preservation of archaeological sites, clearly cross-cut a number of these subjects, and the present Report represents a contribution to the debate leading to the development of a management strategy for the area.

The Department of Archaeology at Edinburgh University and the Centre for Field Archaeology have a long term interest in the archaeology of the coastal zone, perhaps best expressed in recent years in work in the Outer Hebrides, such as on the Valtos peninsula on Lewis, or at Bosta Beach on Great Bernera, and in the study of intertidal crannogs being undertaken by Alex Hale. In addition the Centre has already been involved in applied research along the north side of the Solway, having conducted extensive survey along the coast near Annan on behalf of British Nuclear Fuels plc and further west at the landfall of the Irish Gas Southwest Gas Interconnector pipeline. This project therefore represented an opportunity to combine the research interests of a number of members of staff and to provide the baseline for supplementary research over the next few years.

The fieldwork reported here was conducted by Kirsty Cameron, Dr Mike Cressey, Lisa Marlow, Dr Malcolm Murray, Ronan Toolis, Alex Hale, Matt Ritchie, and Jon Bendicks. Desk-based work and report production was chiefly conducted by Mike Cressey and Ronan Toolis, with illustrations being prepared by Kevin Hicks, George Mudie and Kirsty Cameron. Drs Geraint Coles and Ian Ralston provided assistance with the interpretation of geomorphological and archaeological data. Dr Bill Finlayson managed the project for CFA and Patrick Ashmore for Historic Scotland.

Project Aims

The objectives for the 1996 survey were set out in the Historic Scotland Project Outline as:

1) *To understand how best to assess the built heritage of the Solway over the next few years within the resources available, and in such a way as to encourage future research projects and local monitoring and fieldwork.*
2) *To prepare factual information on and an inventory of part of the coastal heritage to provide a basis for more work including:*
    - *detailed survey of important areas prior to protection, excavation or abandonment;*
    - *monitoring of sites and stretches of coastline by local organisations and people.*

In addition to agreeing to follow the Historic Scotland *Procedure Paper* to fulfil these objectives, CFA has undertaken to undertake certain additional elements of work to further the long term objectives of the project, including establishing local contacts with a view to promote long term monitoring of the shore and to conduct additional aerial photographic survey.

Report Format

This Report contains the results of the project. These are presented sequentially for each portion / cell of the coastline and follow a standard format. Elements included are an introductory section, a section describing the methodology employed, a section containing the geomorphological, coastal erosion and archaeological data and maps. Pertinent issues are highlighted through a number of case studies, which are followed by a section analysing the results and making various recommendations, and a list of references.

The Study Area

Introduction

The Scottish part of the Solway Firth included within the study area defined for this project comprises a wide variety of coastal forms, including hard steep shorelinesas well as a variety of areas in which depositional characteristics predominate. These latter comprise sand dunes, intertidal mudflats, estuarine and lagoonal complexes and saltwater marshes. The total length of coast in Dumfries and Galloway is estimated at 447km (Ritchie and Mather 1984), and the Solway Coast study area therefore comprises a significant proportion of this. Within this coastal strip, there are an estimated 35.4km of

beach formations. The total area of sand in Dumfries and Galloway, including beaches, dunes and links is 2,368ha, representing 4.7% of the Scottish total, but, at least in 1984, there were no beaches with high perceived erosion damage. 78% of the beaches have raised beaches near the coast, representing an important resource for early prehistory in the area. The presence of raised beaches and palaeochannels has resulted in this coastline having an extremely varied cultural heritage, ranging in date from the numerous Mesolithic sites identified (principally by W.F.Cormack) onwards to include features of industrial archaeological interest, such as the site of the former rail bridge over the Solway at Annan.

Known archaeological sites therefore range from "hard" upstanding structures to "soft" structures, marked by much flimsier and sometimes wholly organic remains such as the remains of former fishing systems and on to what currently appear to be largely structure free, and on occasion structureless sites, such as Mesolithic and Neolithic flint and chert scatters. Known cultural heritage sites occur on sectors of "hard" rocky coastline, as well as in "soft" areas, where sands, silts and clays constitute the geomorphological formations represented. The combination of differing geomorphological and archaeological site characteristics makes for a particularly rich and complex study area. The intricacies of marine transgressions and regressions, and the presence of raised beaches make the environment both complex and rewarding to study.

Extent and Dimensions

CFA initially proposed to conduct a rapid scan desk-based survey for both archaeological and geomorphological aspects of the survey for the full 320km length of coast and to determine, based on the results of this rapid scan, how much of the full 320km strip could be completed in detail during the subsequent desk-based and field stages. In the event, and partly as the result of relatively few previously unknown sites being located during the investigations, we were able to complete the full 320km distance for all stages of the project.

The Tidal Environment of the Solway Firth

The Solway Firth is influenced by the Atlantic Ocean and the physical features of the sea, climate and tidal regimes all contribute to the many varied shoreline features identified along the Solway Firth. The Solway Firth is an area of high tidal energy and this has a major bearing on the transportation of sea-bed sediment. The relative strength and duration of the tidal ebb and flood velocities tend to produce a resultant upstream transport vector which is augmented by wave induced currents. This strongly tidal environment has a bearing on shipping and, combined with the shallow nature of much of the Firth is a controlling factor as to why there are no major commercial developments at the head of the Firth (Solway Firth Review, 3 and 41).

The climate is relatively mild and certain parts of the Firth can at times be sheltered against the actions of wind and waves, although winds can change suddenly and expose sheltered coasts to wave erosion. The Galloway promontory affords shelter to areas in its lee from the severity of south-westerly gales. The height and direction of waves are governed by the dominant wind direction at any one time.

Figure 1 demonstrates the principal movement of residual currents and the general trend of sediment transportation. Much of the work concerning sediment transportation in the Solway Firth has been established from study of radioisotopes originating from Sellafield (more particularly Cs^{137}) and the distribution of sea-bed and surface markers and sea-borne domestic waste.

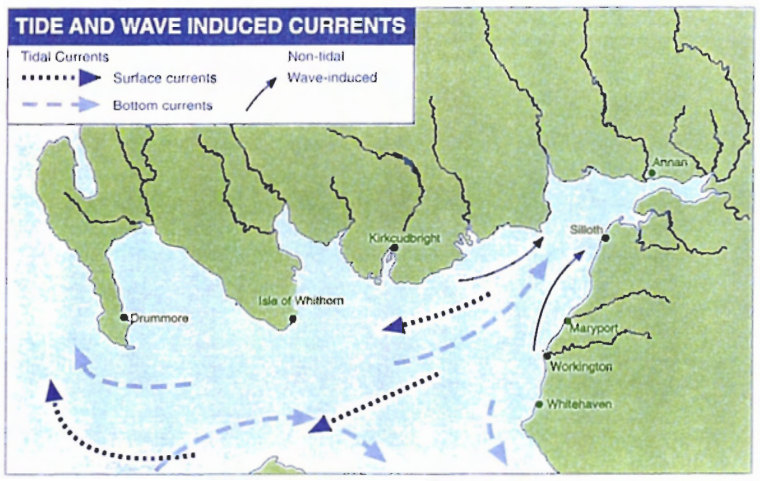

Figure 1 Tidal Currents (after Solway Firth Review 1996, 46)

Previous Archaeological Research

There has been a considerable amount of previous archaeological research in the area, and the desire to protect the archaeological resource is witnessed by the number of Scheduled Ancient Monuments along the coastal strip. Much of this research has, in recent decades, been prompted by coastal erosion, for example the work of Gordon Ewart at Cruggleton Castle (Ewart, 1985), or of Trevor Cowie in the Luce Sands. The information held in the Transactions of the Dumfries and Galloway Natural History and Antiquarian Society represents an invaluable resource. It is relatively unusual in Scotland to have a local society which has such a long and constant record of archaeological research and active local researchers such as Cormack have made a substantial contribution to our knowledge of this shore zone. The combined natural history and archaeological interests of the Society are of course particularly relevant to the needs of the current project. Restricted sectors of the coastal zone were examined as part of RCAHMS rapid assessment programme in the first half of the 1980s (RCAHMS 1991, 1985).

There has been a considerable amount of archaeological flying conducted in the eastern part of the survey area. Much of this has been undertaken in the late 1970s by Professor Barri Jones of Manchester University and has focused particularly on the Roman period remains at the east end of the study area (e.g. Jones, 1979, with map between pp. 40 and 41). Little systematic archaeological research has been conducted on cetrain landscape facets that have proved fruitful elsewhere, such as the extensive mudflats of the eastern part of the estuary.

There have been a number of geomorphological studies made along the Solway Coast, including work by Jardine and Morrison (1976). Recently research has been conducted by Andy Haggart of London Guildhall University. Dr Richard Tipping of Stirling University is currently working at Picts' Knowe, and in part his work is reassessing Jardine's research. Dr Tipping's research area does not lie within the current coastal margin but, since it has a marine component, this serves as a reminder of how considerable coastal change has been over the last few thousand years

Acknowledgements

We would like to express our thanks to all those who assisted us in this project. In particular we would like to mention Tony Woods of HM Coastguard Service Kirkcudbright and Wally Wright, the SNH warden at Caerlaverock.

2 METHODOLOGY

Within the framework furnished by *Historic Scotland Procedure Paper 4*, CFA proposed a four phase approach: rapid scan survey, full desk-based survey, field survey, and reporting.

Phase 1

CFA conducted a rapid scan desk-based survey for both archaeological and geomorphological aspects of the survey for the full 320km length. Based on the results obtained, senior staff then assessed whether the full 320km strip could be completed within available resources at the desk-based level. CFA had guaranteed to complete a minimum 250km strip at the full desk-based level, but had proposed to extend this if possible, as it was appreciated that the fundamental purpose of the study is to provide an initial suite of information covering as large an area as practical, which can then be examined in more detail as appropriate in subsequent stages.

During the course of the rapid scan, CFA made initial contact with the relevant bodies listed in the Historic Scotland Procedure and Project Outline.

Phase 2

CFA then carried out a full desk-based study, in accordance with Historic Scotland procedures. This research identified a series of zones characterised respectively by accretion, stability, or recession, which were subsequently ground truthed to verify the preliminary conclusions on their characteristics derived from the desk-based study. Ground truthing was conducted on the basis of visits to sample locations, rather than by the examination of continuous lengths of coastline. An important aspect of this work was to assess the reliability of available geological mapping in the area.

CFA concurred with the Historic Scotland Project Outline in considering that aerial photographic imagery would be of particular importance to the survey, especially in the study of intertidal mud and silt flats. This view was partially an outcome of safety considerations. Examination of accessible aerial photography was also important to ensure good spatial coverage within the constraints of available resources. In addition, however, we consider that the aerial photographic imagery is probably the best available source of information for these areas below High Water Mark. Previous surveys of intertidal zones have shown that aerial photographic imagery is often the only source which reveals the patterns of large scale features.

There are several relevant series of photographs, including runs from the immediately post War period, and surveys undertaken in the 1960s and 70s and obtained for land use capability assessments. These provide closely-dated series of images that can be used for comparative purposes over a considerable period:, when combined with ground inspection, they can provide sequential evidence for almost 50 years of change. Although the Historic Scotland procedure documentation notes that the examination of several series of photographs and map sources can be expensive, CFA considers that, especially given the importance we attach to aerial photographic analysis for the intertidal zone, the time spent on aerial photographic analysis and other documentary sources , in this context,

repaid the investment. In addition, it can be difficult in the field to determine whether a given stretch of coast is accreting, stable, or eroding, or indeed oscillating through time and the aerial photographic evidence furnishes comparative data which makes this assessment more secure.

In addition to the existing aerial photographic collections, CFA considered that new aerial photography should be obtained. We note that the Historic Scotland Procedure advises against setting out to acquire new aerial imagery, except in certain conditions.t CFA however considered that, against the background of the known tidal regime of the Solway, the use of oblique aerial photography may permit the most economical and effective way of examining the intertidal zone specifically for archaeological purposes, in addition to the benefits to safety of avoiding walkover survey in what can be a treacherous area. CFA considered it unlikely that the existing coverage would provide a systematic record of the intertidal zone, which has been borne out by our examination of the available cover. Aerial photography accessible to CFA staff, thus, whilst providing valuable information for the coastal erosion aspect of the study, is far from furnishing a comprehensive set of images, achieved in suitable lighting and tidal conditions, for either the known archaeological resources located on the coastal edge or for potential examples located below the high water mark .

What is still required is an initial assay, if justified followed by systematic effort, to record the intertidal zone at low tide, with low sun, to gain the maximum definition of what may be relatively small-scale or fugitive traces, suitably highlighted by oblique lighting conditions. Given the assumed absence of substantial colour differences to enable feature identification against natural silts (as noted in the Project Outline) and the probability that many features will be eroding almost to the level of the surrounding deposits and will therefore only have low relief, it is vital that photographs are taken in optimal conditions of tide and lighting. To ensure that flying was undertaken in optimal conditions, we stated that we might not be able to conduct this element of Phase 2 at the same time as the desk-work, but would programme it to fit the theoretical ideal conditions. It is also clearly advantageous that an aerial sortie is fully informed by the results obtained by other components of the survey programme, and to this end a flying map has been prepared, on which target zones and sites have been identified In fact, tides, light and weather have meant that this aspect of work has not been possible within the timetable for producing this report and, with the agreement of Historic Scotland's Project Manager, the results of the aerial survey will be produced as early in 1997 as suitable conditions prevail, and a Supplement to the present Report will be prepared thereafter.

In many respects the palaeoenvironmental data required for the purposes of the project have already been collected, and one of the chief aspects of the work that was required is that of collation. Unfortunately, as much of this work has not been conducted with a specific archaeological/heritage interest and has occurred over the last 30 years, there are inevitably problems of compatibility of information and standards of research. The focus of most of the palaeoenvironmental research has been on Holocene deposits and Late glacial material is less well studied.

Phase 3

The archaeological survey undertaken required (as specified in the Historic Scotland procedure) to be systematic and to be conducted in all relevant land parcels (with the exception of unsafe intertidal areas and certain areas of cliffed coastline. In general on cliff lines the top of the cliff edge was walked, and a search was made for previously known sites on the cliff face, but the base of cliff edges could not be systematically walked.). Our initial estimate was that we could cover a minimum length of coast (including foreshore and immediate hinterland) of approximately 250km. We did not attempt to specify at the outset exactly which strips this examination would include, as the selection in part depended on access negotiations conducted after award of contract. There were obvious potential problems in gaining access, for example the extent of fieldwork that could be undertaken around the Luce Sands depended upon arrangements that could be made with the Ministry of Defence. CFA did, however, undertake to ensure that the field survey covered a representative sample of the various combinations of environmental settings and, on the cultural side, remains of diverse periods and types. In the event, both the rate of progress and the helpfulness of the MoD and other landowners allowed us to survey almost the entire 320km coastline.

The desk study was completed before fieldwork commenced, allowing the field teams to be supplied with data assembled froma range of sources for checking. In essence, the fieldwork comprised standard archaeological fieldwalking survey, combined with the recording of the erosional status of sites, the assessment of vulnerable parts of the landscape, and ground truthing of geomorphological data. We used GPS to assist in the determination of the location of sites for mapping as required in the Historic Scotland Procedure, where mapped features at the local scale did not provide accurate control points. Because of the restricted availability of various members of the project team, the survey was not done as a single sweep, but comprised a walk over by a team of archaeologists, several inspections by the geomorphologists and a final survey session by the geomorphologists in conjunction with CFA's Environmental scientist (Dr Cressey) on the project.

Survey conditions were not ideal, as extensive areas of thick vegetation cover of land above the High Water Mark, potentially masking small-scale archaeological features, proved to be a problem. Although the survey was conducted in the autumn and early winter of 1996 few problems were encountered with weather conditions. Some areas, of course, could not be walked. These included some areas of high cliffs, and, most significantly along the Solway coast, areas of intertidal mudflats that could not be traversed on foot for safety reasons.

Phase 4

We allowed a considerable time element for reporting, as we appreciated that a considerable volume of data was likely to be produced during the survey. The present Report has been produced in the format requested by Historic Scotland. Preceding surveys in the series described in the Introduction above had made progressive modifications to the Historic Scotland specification, based on lessons gained during the course of work, and the present Report has made a further number of minor modifications designed to help make the data more accessible. These involve separating the archaeological data into separate lists for sites on firstly the coastal edge and foreshore and secondly those located within the hinterland areas that were examined.

3 STUDY RESULTS

This part of the report presents the survey results. For the purposes of this study, the coastline was divided into 56 sections. Each section of the survey is presented with a brief introduction to its hinterland geology and coastal morphology, followed by the identification of its erosion class. Then built heritage and archaeological resources are briefly enumerated. Following these introductory pages, are the gazetteer pages for each subject, each page of gazetteer entries accompanied by its respective map at the scale of 1:25,000.

Analysis of the results is presented in a series of case studies comprising Part 4 of this Report, with more general analyses and recommendations being held over until Part 5.

Within the study zone, there are extensive areas of shore which presently appear to be stable, but which have at some point been armoured by coastal defences. It is assumed that the defences are there because of past erosional problems and therefore it is considered that the addition of a new erosional class, extending those used in previous surveys, might be appropriate to categorise such sectors. These form, effectively, sectors of meta-stable shore - which are only stable because of the emplacement of man-made coastal defences. Should these defences fail or be allowed to fail under a policy of managed retreat, then archaeological sites behind them would of course be threatened. This proposed coastal category has not been introduced in this *Report*, but the descriptions contained in the various sectional accounts reveal the existence of this phenomenon. It is important to draw attention to the existence of such man-made defences, since any policy change affecting their upkeep could over time produce indications that the number of archaeological sites currently actively threatened by erosion could be a serious underestimate.