# 4 CASE STUDIES

## Introduction

Four case studies are provided to illustrate in further detail the range of coastal erosion affecting a variety of archaeological remains on the Solway Coast. The three principal ones consider archaeological sites, described below, that vary greatly in form and period. These studies focus on the upstanding nineteenth century remains of Stairhaven harbour, the, Later Prehistoric promontory fort at Back Bay, and the Mesolithic and Medieval remains at Redkirk Point. Their archaeological importance is presented and the effects of violent wave-action, localised coastal erosion and more massive coastal erosion are brought into focus. It should be stressed at this point that, although all three sites exhibit the most severe erosion evident in the survey, their inclusion in this section, as examples, is designed only to illustrate the varying erosion processes affecting physically, culturally and chronologically dissimilar sites. The fourth short case study provides an example of accretion and erosion from Caerlaverock Merse.

**Stairhaven Bay** (Map 8) - **NX25SW 52** (NX 2094 5370)
**NX25SW 53** (NX 2083 5365)
**NX 2084 5358**
**NX 2087 5361**

*Brief history*

Numerous small harbours and landing places are situated on the Solway Coast. Many have no associated landward structures and were used simply for the transport, and often smuggling, of goods in and out of Galloway (Graham, 1979, 40). The remains of a small harbour survive at Stairhaven Bay. Long before the construction of the harbour, Stairhaven Bay was a well-known landing place for boats, much used by smugglers (Graham citing Wood, 1979, 64). The harbour, built in 1845 and enlarged in 1852 (Graham, 1979, 64), was originally designed as a port for the transport of agricultural produce to market. In 1848, soon after its original construction, a steamship service was proposed (Graham, 1979, 64). With the advent of the railways in the 1870s Stairhaven harbour lost its import/export business, after which it was used only by the occasional fishing vessel (Graham, 1979, 64).

*Environmental Setting of Stairhaven Bay*

Stairhaven is a small bay that lies between a headland to the north, known as the Crow's Nest and steep cliffs to the south. A small burn enters the bay from a north-easterly direction. The hinterland geology consists mainly of fluvioglacial sand and gravel which overlie greywacke sandstone that are assigned to Llandovery Series. The foreshore is very wide with an assortment of beach cover that includes sand, gravel and boulders between bare patches of sand.

*Structural Evidence*

The original pier, built in 1845, was straight, on an east-west axis and measured approximately 83m along its north side (Graham, 1979, 64; O.S., 1846). In 1852 the pier

was lengthened to 100m, giving it an outer end deflected north-westwards, and thus providing shelter to a tidal pocket in the south east part of the bay (Graham, 1979, 64; O.S., 1896). Wave action has now reduced the pier to a small surviving remnant 16.50m long, extending from the land. Immediately to the southeast, behind the pier, are the remains of small building, possibly associated with the harbour. Another associated building is the grain store, located approximately 150m inland from the harbour. Immediately south of the remains of the pier, on the foreshore, are two parallel lines of wooden posts, extending approximately 13m out to sea. These may relate to fishing activities in the bay. The pier itself was stone built and many of the stones of which it was constructed are now strewn around the area.

*Historical changes to the coastal edge.*

Examination of the 1846 First Edition,1896, Second Edition, 1909 and 1986 Ordnance Survey maps show that there have been significant alterations to the coastline here over a period of 140 years. Figure 2 is a colour coded plan that illustrates these relative changes. In broad terms the most significant change is apparent in the shape of the present shoreline which is more curved than the shorelines represented on the map coverage dated to 1846, 1896 and 1909 respectively. The nearby headland at Crow's Nest has altered in shape considerably, due to erosion occurring on its northern side. As well as alterations to the general course of the burn above the high water mark, a considerable amount of alluvium, to judge from the evidence produced by the sequential maps, has accreted at its outfall to the sea. The shore is presently receding immediately south of the ruined pier (PLATE 1). Coastal retreat has also occurred to the west of the broch. The changes summarised here have in all probability arisen owing in part to the relative instability of fluvio-glacial deposits that contrast with the hard greywacke surrounding the bay. The pier may have afforded shelter to the bay, by diffusing the impact of wave action, especially when it was extended in the mid-19th century. Its collapse may have produced renewed erosion, as wave action was again able to work on the formerly-protected softer coastal deposits in the vicinity.

*Significance and Evaluation*

Violent wave action has greatly reduced the pier at Stairhaven. It is not an isolated case: similar processes can be seen at Orroland Bay (NX 7746 4623; Map 35) and Knockbrex (NX 5820 4890; Map 28). The suite of decaying stone structures at Stairhaven Bay is significant as an example of a facility related to a former transport system that illustrates both the past economic and transport history of the area. The archaeological importance of the now badly ruined Stairhaven Bay harbour pier, one of many similar sites along the Solway Coast, is reinforced by the survival of contemporary, associated structures in close proximity to it. The function of these buildings was entirely bound up with the existence of the docking facility, and loss of the pier leaves them devoid of a key element that elucidates the choices made in where to site them and in their architectural characteristics. Consideration of these associated structures should be included in future work.

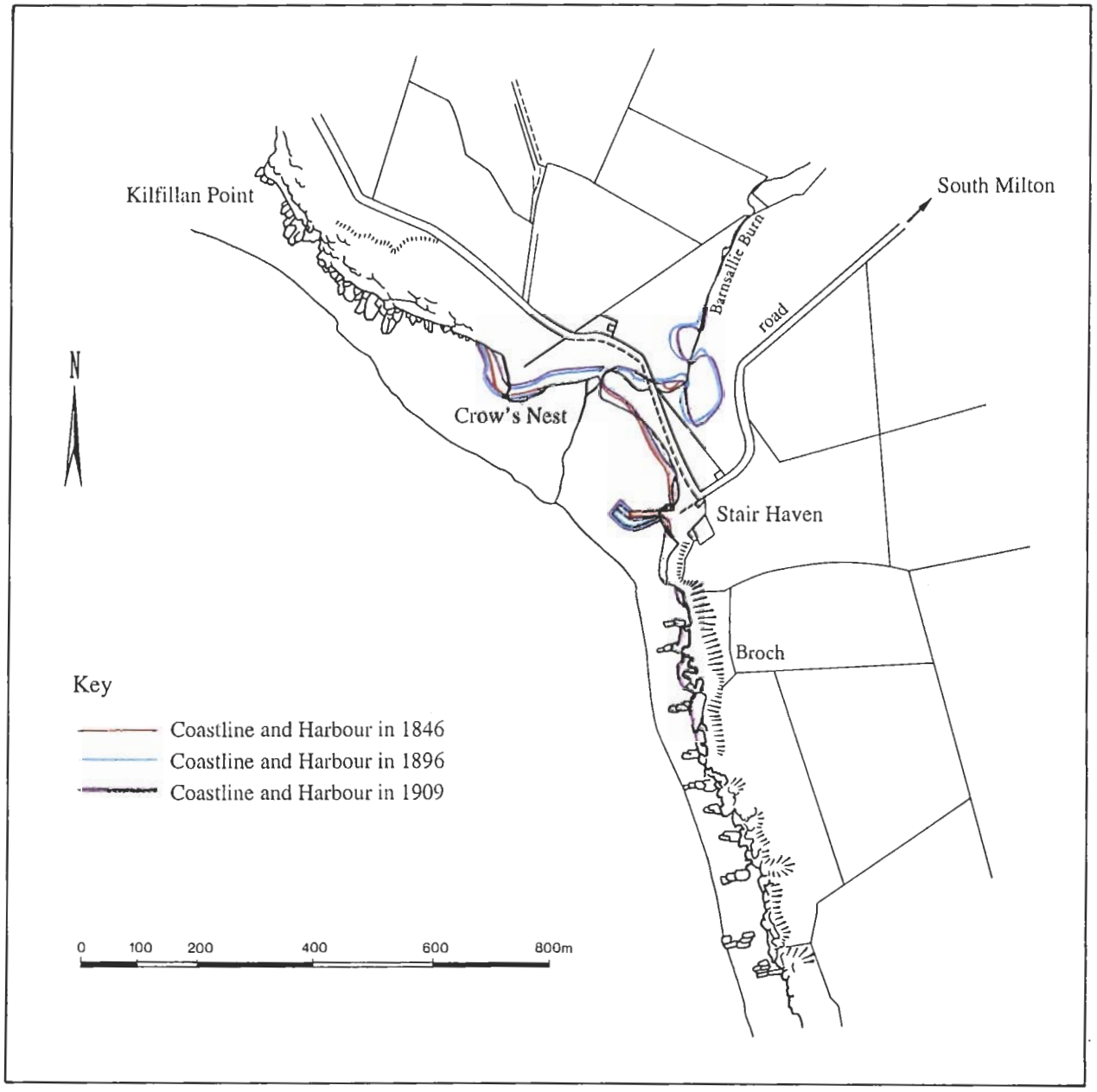



Figure 2 Stair Haven Bay

**Back Bay** (Map 13) - **NX33NE 2** (NX 3696 3932)

*Promontory forts of the Solway coast*

The promontory fort of Back Bay is one of twenty-two promontory or cliff forts situated on the Solway coast (See Map No 8). All the forts comprise sites situated on either a coastal promontory or cliff edge and thus necessitating their clear demarcation by *landward* obstacles only: these linear ramparts and ditches or semi-circular ramparts and ditches respectively may have been complemented by lesser works on their sea-girt or cliff-top sections, but, if so, no indisputable evidence of such works now survives. The enclosure at Back Bay itself is a small seaward sloping promontory defined by a curvilinear counterscarp bank, rock-cut ditch and rampart topped by the foundations and lower courses of a drystone wall, approximately 2.5m thick. A causeway leads across the line of the ditch through a clearly defined entrance in the rampart. Slight surface features, perhaps indicative of settlement remains, are evident immediately behind the rampart.

The generally scattered distribution of isolated promontory forts along the north Solway coastline forms a marked contrast to a cluster of sites around the southern tip of the Machars peninsula. Back Bay is located near the north western periphery of this cluster. Only one of these cliff forts, McCulloch's Castle, has been excavated but this yielded minimal information (Scott-Elliot, 1964). A sherd of Samian pottery, lying near the bottom of a hearth close to the eastern end of the rampart, was dated to the second century A.D. (Scott-Elliot ,1964, 123). Another possible promontory fort, Cruggleton Castle, yielded an uncalibrated radiocarbon date of 50 +/- 70 A.D. (GU 1638), from the partial remains of a hut circle (Ewart, 1985, 14) and a bronze brooch from the same site is estimated to date to between the mid-first and mid-second century A.D. (Caldwell in Ewart, 1985, 64).

The excavation at Cruggleton Castle, traditionally and historically identified as the seat of the early Lords of Galloway, was initiated in response to coastal erosion at the site (Ewart, 1985, 4-6) and, in addition to the Iron Age occupation, also provided evidence for occupation from the mid-eighth century A.D. to the mid-seventeenth century. Like similar sites elsewhere on the Atlantic seaboard (Gilmour, 1996, 6-9) and indeed elsewhere in Scotland, promontory forts in the Solway region may hold evidence for multi-phase occupation.

*Geomorphological setting*

The promontory fort at Back Bay is situated on red-brown clayey glacial drift deposits probably of Devensian age (Figure 3). The underlying bedrock is the more resilient greywacke sandstone. The fort is exposed to the full force of south-westerly gales. During the course of fieldwork, CFA noted that there is serious erosion taking place on the seaward margins of the bank and ditches. The clay-rich earthworks are being lost due to slope failure and constant weathering by the elements.

*Erosion at Back Bay*

The impact of coastal erosion affecting Back Bay promontory fort is localised within certain specific areas, particularly at the neck of the promontory where the defensive

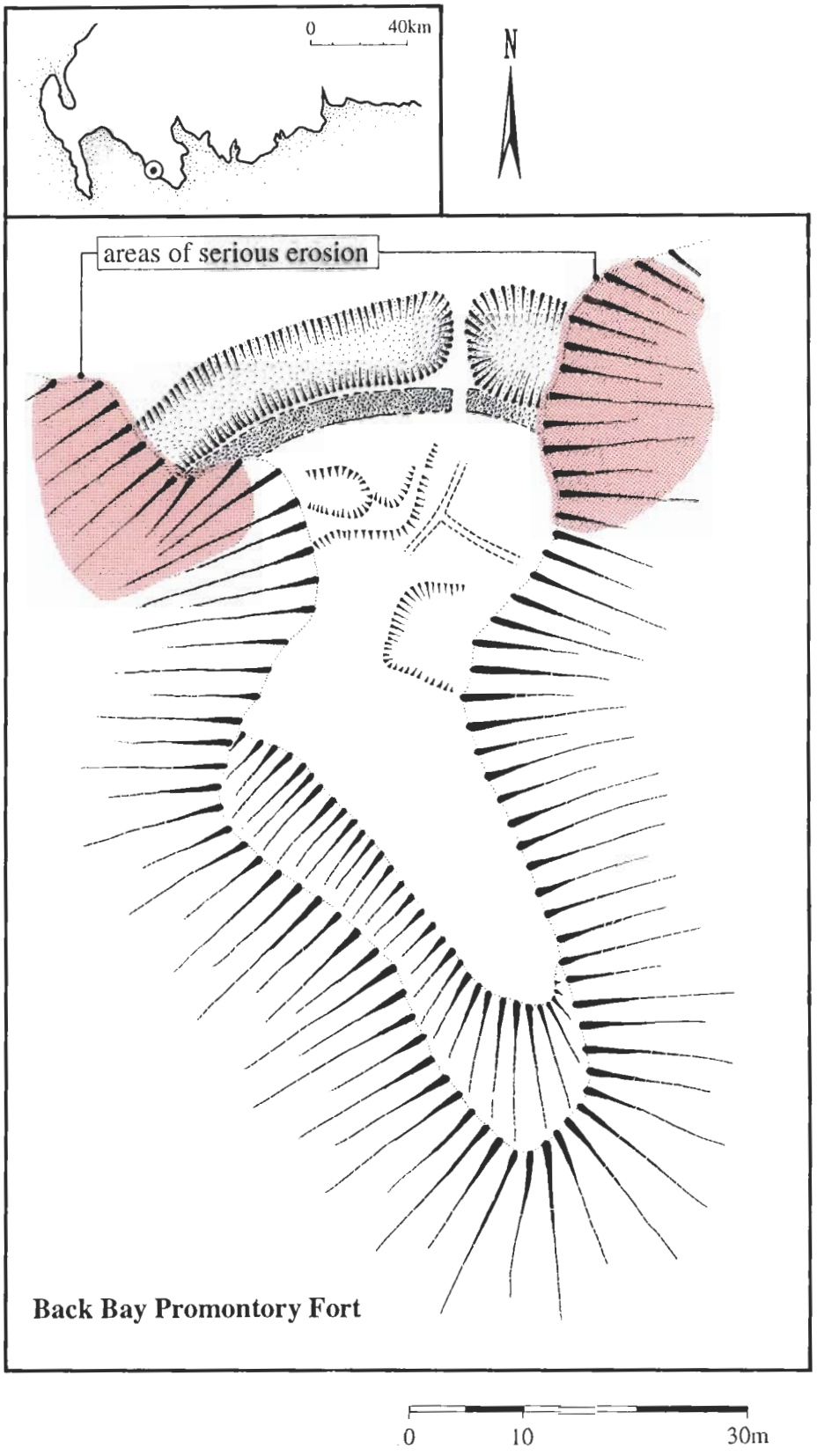



Figure 3 Back Bay Fort

structures are located. Animal impact at the site, including cattle and sheep tracks, and rabbit burrowing, is adding to the piecemeal destruction of the rampart, ditch, causeway and counterscarp. Indications of adverse impacts attributable to animals are common on many of the promontory forts on the Solway coast. Human impact, in the form of farming activities, notably dumping and visitor trails, also adversely affects the condition of many sites, despite the scheduled status of the vast majority of these promontory forts, although this does not appear to such a serious problem at Back Bay.

*Significance and Evaluation*

A recurring feature of many promontory forts on the Atlantic seaboard is the location of structures immediately behind the main rampart, even when the actual area enclosed is large (Gilmour, 1996, 4). An important factor, therefore, in gauging the impact of erosion is the consideration of the surviving condition of internal structures within the sites. The presence of internal structures immediately behind the main rampart at Back Bay is evident and should be taken into consideration in future work.

**Redkirk Point** (Map 56) - **NY36NW 5** (NY 3010 6503)
**NY36NW 13** (NY 302 650)
**NY36NW 22** (NY 302 651)
**NY36NW 34** (NY 3005 6514)
**NY36NW 44** (NY 302 650)
**NY36NW 48** (NY 302 650)

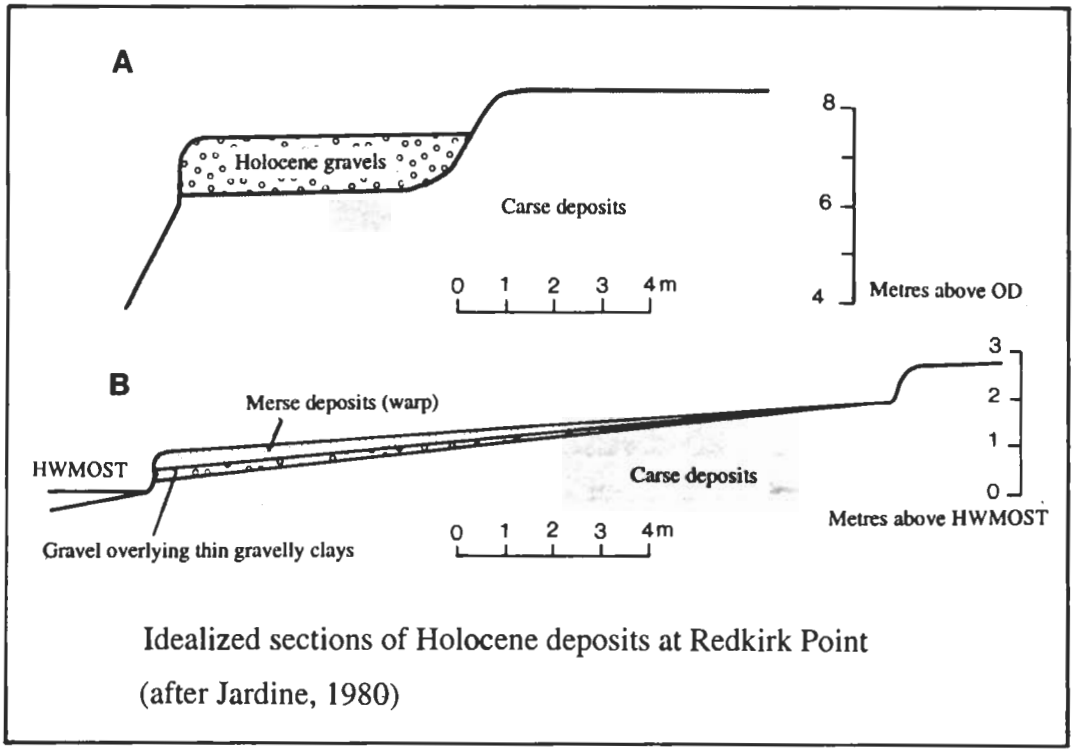
Coastal erosion of Redkirk Point has been an ongoing process since at least the seventeenth century A.D., when the Red Kirk itself fell into the sea (Truckell and Williams, 1967, 148). Probably built in the twelfth century, the church and its burial ground may possibly be associated with a large number of pottery sherds (broadly dating to the thirteenth to fifteenth centuries) found as the flood tides have progressively eroded the promontory. A much earlier occupation of Redkirk Point was revealed by the excavation of a hearth, dating from the seventh millennium B.C. (Masters, 1981, 113). A number of Mesolithic flints, also revealed by marine erosion at Redkirk Point (Cormack, 1983), provide additional evidence for Mesolithic occupation.

It has been suggested that the evidence for Mesolithic activity at Redkirk Point is considerably earlier than for other dated coastal Mesolithic sites in Dumfries and Galloway (Masters, 1981, 113). Mesolithic activity on the Solway Coast has in the past been tentatively divided into two phases: Early Mesolithic; that is activity *before* the main post-glacial marine transgression (Jardine, 1980, 10, Masters, 1981, 113); and Late Mesolithic, comprising activity *after* the main post-glacial marine transgression. Proposed Early Mesolithic sites, such as Low Clone and Barsalloch (Cormack and Coles, 1968; Cormack, 1970), are situated *above* the raised beach and are thus possibly indicative of an older coastline, relating to a higher sea level. Late Mesolithic sites, such as Terally (Livens, 1958), are located on the foreshore and are thus indicative of activity after the sea had receded. Through analysis of local geomorphological stratigraphy (Jardine, 1980, 7-10), the Mesolithic hearth at Redkirk Point, eroding from the raised beach deposits, was demonstrated to be older stratigraphically than the main post-glacial marine transgression. Two radiocarbon dates, of 8 000 +/- 65 B.P. (UB-2445) and 7 935 +/- 110 B.P. (UB-2470), obtained from the hearth, may readily be compared with a radiocarbon date of

8,135 +/- 150 BP (Q-637) from nearby geomorphological levels predating the main post-glacial marine transgression (Jardine, 1980, 10). There are two main caveats to this distinction of early and late Mesolithic. The first is that all the dated material from the Solway coast falls within the date ranges generally ascribed to the Late Mesolithic in Britain and is typologically of Late Mesolithic character. The second is that care has to be used in dating Mesolithic occupations by their geomorphological context. The geomorphological context provides a *terminus ante quem*, it does not date the site.

***Geomorphological background***

Redkirk is one of several sites situated between Redkirk Point and the mouth of the River Esk. This coastline consists of raised coastal sediments which are exposed discontinuously in low cliffs between higher bluffs of red glacial till. The Holocene coastal deposits along this section of coast have been described fully by Bishop and Coope (1977) and Jardine (1964, 6-7 and 1980, 7-10). The highly organic sedimentary sequences stratified between layers of marine sand provide a definite evidence of marine transgression and recession (Table 1). Figure 4 shows a schematic representation of the shore line at Redkirk Point. The principal feature within Section A is the wave cut 'notch' that has been in filled with Holocene marine gravels. This is a result of marine transgression that eroded the earlier carse deposits. Twenty metres west of Section A, Section B was recorded as having a wide shelf attributable to marine inundation across the earlier marine carse deposits. This shelf was again overlain by marine gravels which were subsequently overlain by merse deposits attributed to episodes of flooding.




Idealized sections of Holocene deposits at Redkirk Point
(after Jardine, 1980)

Figure 4 Schematic section of shore at Redkirk Point

Figure 5 shows in detail the historical changes that have occurred at Redkirk Point . their recognition is based on three cartographic sources. The headland has been sculpted by erosion and the banks either side of the point have undergone modifications. The controlling factor here is the impact from the channel of the River Esk that is migrating nothwards. This is leading to severe erosion towards the east of Redkirk Point (PLATE 2).

*The significance of environmental remains at Redkirk Point*

Jardine and Morrison (1976 182) have outlined the likely circumstances that explain the occurrence of stratified biogenic sequences within cores and coastal sections in the eastern Solway Firth. Dateable environmental deposits were found to occur in one or other of four situations:

- as organic material e.g., organic detritus, wood, peat, or mollusc shell debris which either accumulated during temporary interruption in the course of the main Holocene marine transgression,
- or accumulated in the course of the recession from the sea from the maximum of the main Holocene transgression,
- or was deposited in the coastal non-marine environment after the sea had receded from the locality concerned;
- or formed as organic detritus which accumulated on a pre-existing land surface which was inundated in the course of the main Holocene marine transgression.

| SITE LOCATION | Radiocarbon years Before Present | Marine Transgression | Marine Recession |
|---|---|---|---|
| Redkirk Point (NY 302651) | 8135 ± 150 (Q-637) | √ | |
| Newbie Mains (NY 171651) | 7812 ± 131 (GU-375) | | √ |
| Newbie Cottages (NY 166650) | 7694 ± 99 (Birm-222) | √ | |
| Sandyknowe Bridge (NY 017776) | 7426 ±136 (GU-65) | √ | |
| Maximum Marine Transgression † | *c.*7200 | √ | |
| Nether Locharwoods (NY 056680) | 6645 ± 120 (Q-638) | | √ |
| 66m west of Newbie Cottages* | 5630 ±116 (Birm-200) | | √ |
| West Preston shore (NX 951549)‡ | 1850 ± 95 (I-5069) | | √ |

Table 1: Summary table of radiocarbon dates taken from stratigraphic and bore-hole sequences from the eastern Solway Firth (after Jardine 1980,52). Note: (†) this estimate applies only to the eastern part of the eastern Solway Firth. (*) This date represents the termination of the of the Main Holocene Marine Transgression in this region. (‡) Prior to this date, the sea withdraws to approximately its present position.

Table 1 summarises the radiocarbon dates based on palaeoenvironmental research on sea level changes in the eastern Solway Firth area (Jardine 1980, 52 ). The Holocene sea first flooded the land surface at Redkirk Point, near Gretna, at approximately 8 100 B.P. At Newbie Mains, near Annan, marine transgression was interrupted temporarily at approximately 7 800 B.P., but the main inundation occurred between 7 500-7 200 based on radiocarbon dating of sedimentary material from nearby Newbie Cottages.

The archaeological significance of the exposed Holocene coastal deposits in the region of Redkirk lies is the sheer wealth of palaeoenvironmental data that is stratified within these deposits. These have been demonstrated to contain an environmental record of sea level

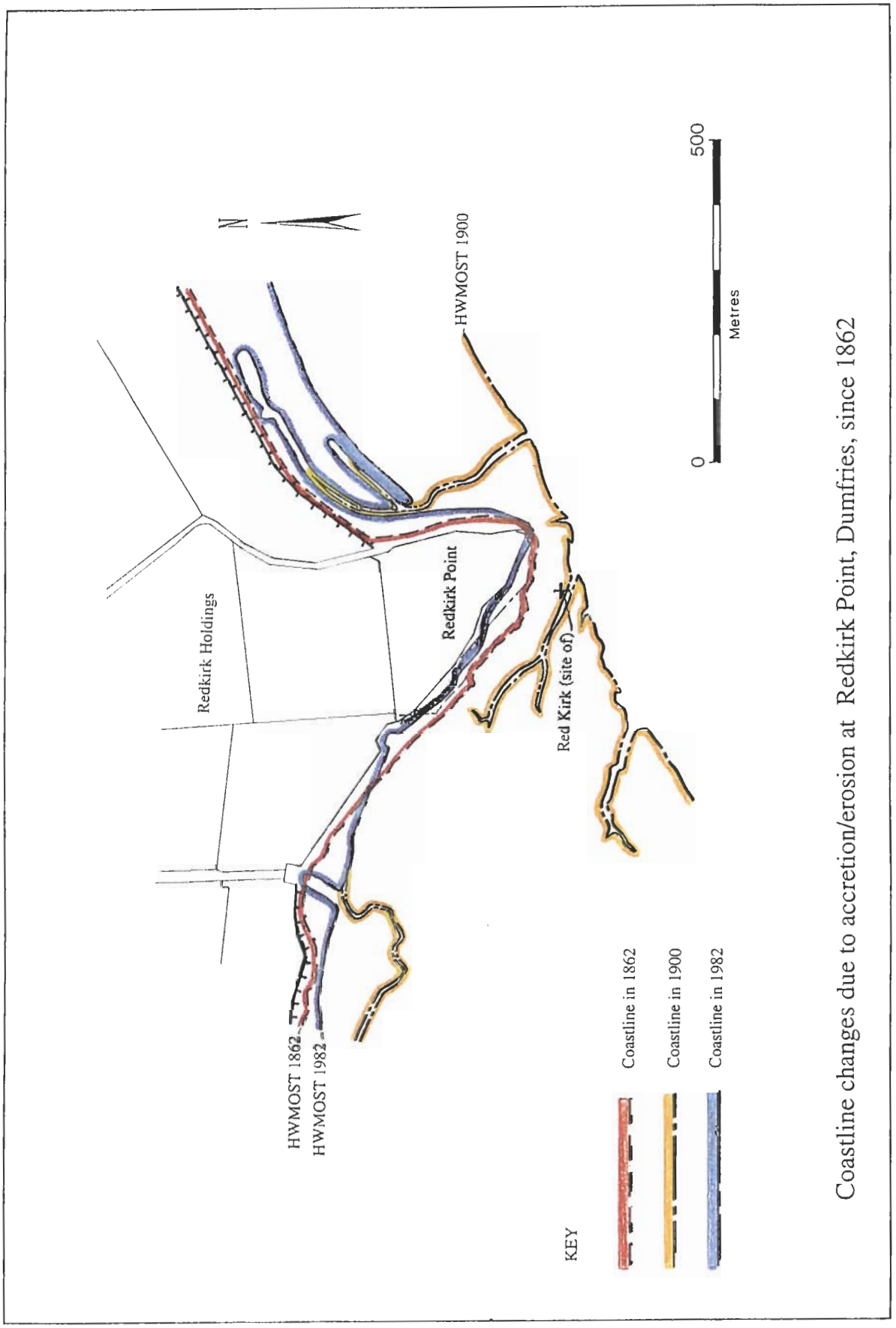



Figure 5 Redkirk Point

advance and retreat over the last eight thousand years. Their removal by erosion from seaward sections is considered to be as important as the loss of other early archaeological remains such as flint, pottery and hearths.

*Erosion*

The dumping of rocks, by the local authority in 1976 (Masters, 1981, 113), to form a coastal protection barrier has halted further erosion of the coastline here. However, the foreshore in front of the barrier is suffering from continuous and severe erosion owing to the flow down the course of the river Esk. A thin layer of dark organic material, revealed by the erosion of the overlying shingle beach, was discovered during the rapid field survey. Its proximity to known archaeological deposits indicates the potential importance of any archaeological data contained at the site, in relation possibly to the earliest settlement phase represented in Scotland.

*Significance and Evaluation*

Redkirk Point is a good illustration of the loss of archaeological and environmental data through erosion and how, even where coastal defences have been established, while these may halt the obvious progression of erosion on part of the shore, they may not entirely solve the problem. In some cases they may speed erosion in other areas, while in this case the identification of additional features beyond the protected zone has revealed that the defences may not in fact be protecting some of the more significant archaeological data. Even had the coastal protection barrier been specifically designed to protect the archaeological remains, it is unlikely that layers of organic rich material would have been considered as part of the site in 1976, perhaps illustrating how contemporary measures may not always protect what future archaeologists may regard as some of the more important features. Furthermore, and significantly for any coastal situation, as environmental data related to past coastlines are part of the pattern of evidence for variations in the coastal margins on the shore, they are themselves extremely sensitive to ongoing changes. Ironically, an attempt were to be made to protect the evidence of former coastal change, this would constitute an interruption to that process and would be artificially distorting the sequential evidence for coastal variation that was intended for preservation.

**Caerlaverock Merse**

Caerlaverock Merse provides a good example of the dynamic changes that can occur to a salt-marsh environment over the last 140 years (Figure 6). The Merse has been the focus of study owing to the physiographic changes that have occurred within this sector (see Maps 49 and 50). The Merse originally formed against the edge of a raised beach and developed seawards as a result of accretion some time prior to 1856. Marshall (1962) writing in on the development of the Merse outlined that at this time coastal change was occurring in two different ways. Firstly, at the east end, the Lochar Water was close in shore causing fluvial deposition and secondly, erosion was occurring at the west end by wave action. Bridson's study of the Merse in 1976 confirmed that the trend of erosion was indeed primarily west to east. This continues to the case to the present. The western end of Caerlaverock Merse is retreating rapidly. As was the case in the 1960s,the shifting

channel at the mouth of the Lochar Water is the main factor in sculpting the shape of the eastern end of the Merse.

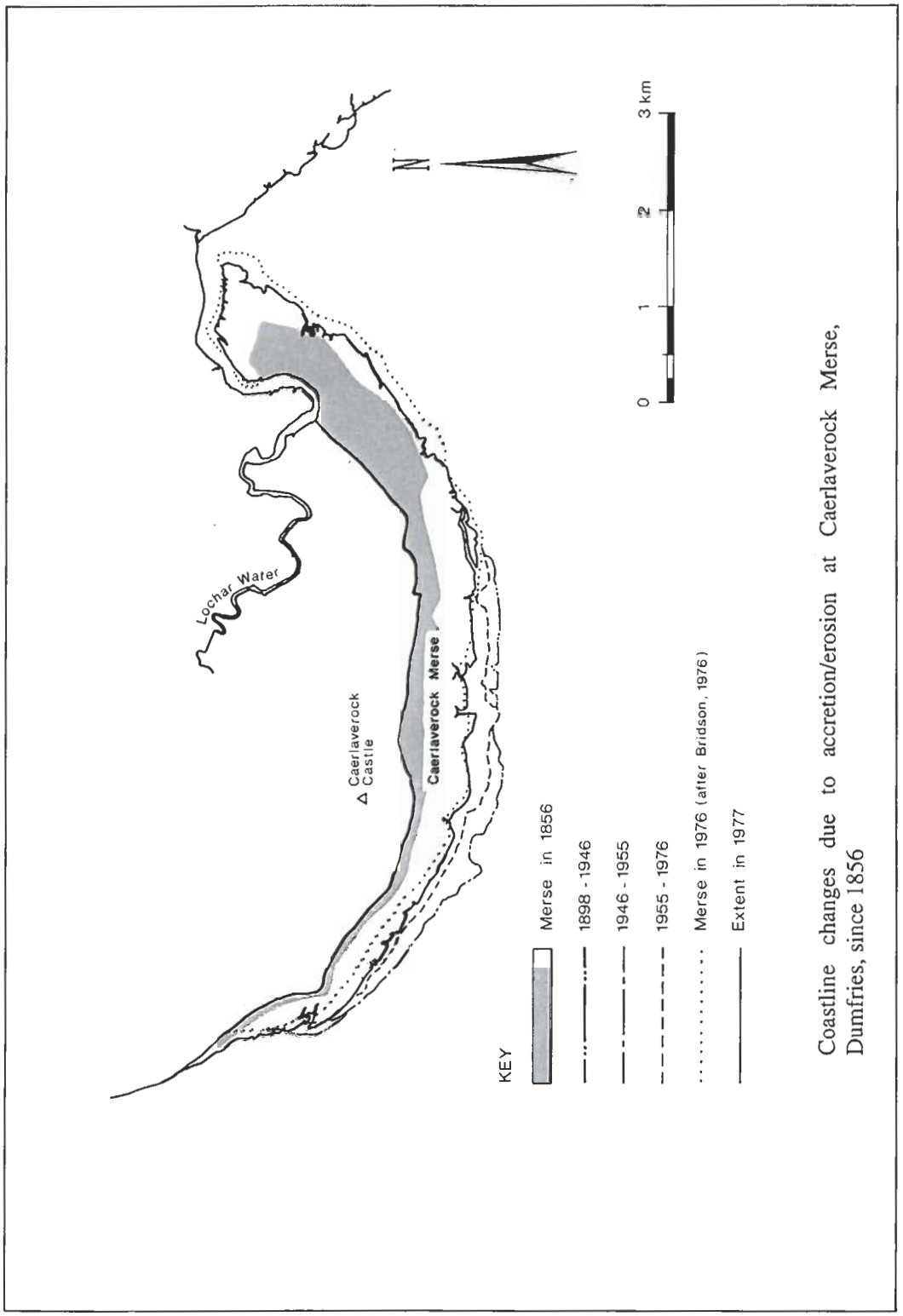



Figure 6 Caerlaverlock Merse

# 5 SUMMARY & RECOMMENDATIONS

## SUMMARY

### ANALYSES OF THE EROSION DATA

#### Introduction

This section examines the findings concerned with the erosional record of the north Solway coastline, based on the results of the field survey. The factors recognised as controlling coastal erosion are summarised in the diagram at the back of this report. The results of the coastal erosion survey data are shown summarised in Table 2 and in Figures 7 and 8. The percentage of the total length of coastline cited is based on the straight line measurement of each unit as mapped on each 1:25,000 map sheet (Maps 1-56). The combined length of all units is 317.1km. This figure was used to establish the percentage frequency of each erosion class. 317 km is obviously an underestimate of the true length of the coastline surveyed, as it does not incorporate the mean length of meandering rivers or deeply incised regions of cliff-edge and indeed other topographical irregularities along this coast, but it gives an indication of the relative significance of the results.

#### Erosion Survey Results

The *Accreting and Stable* and the *Eroding or Stable* classes share the same percentage frequency of 30% (n = 41 and 40 respectively). The units identified as *Definitely Eroding* were found to comprise 20% of the total length of the survey. The *Stable, Definitely Accreting* and the *Both Accreting and Eroding* erosion classes are much lower in frequency with representation at 10.6%, 0.5% and 8.2% respectively.

| Erosion Class | Number of units | Total unit length (km) | Total length (%) |
|---|---|---|---|
| Definitely Accreting | 1 | 1.9 | 0.5 |
| Accreting or stable | 40 | 96.6 | 30.1 |
| Stable | 13 | 33.8 | 10.6 |
| Eroding or stable | 41 | 96 | 30.2 |
| Definitely eroding | 28 | 63.8 | 20.1 |
| Both accreting and Eroding | 11 | 26 | 8.2 |
| | | | |
| **Total** | **134** | **317.1** | |

Table 2 Summary statistics of the erosion class units lengths.

The results from the *Definitely Eroding* class confirm that a substantial portion (20%) of the north Solway coast is being affected by serious erosion. This class includes areas where there is a direct failure of existing sea defences such as is the case at Low Curghie (PLATE 3) (Map 2), Stairhaven Bay (Map 8) and south of Garlieston pier (Map 18) (PLATE 4). The greater majority of units in this class occur on the eastern stretch of the north Solway coast towards Annan, where the coastal edge is generally soft (see below).

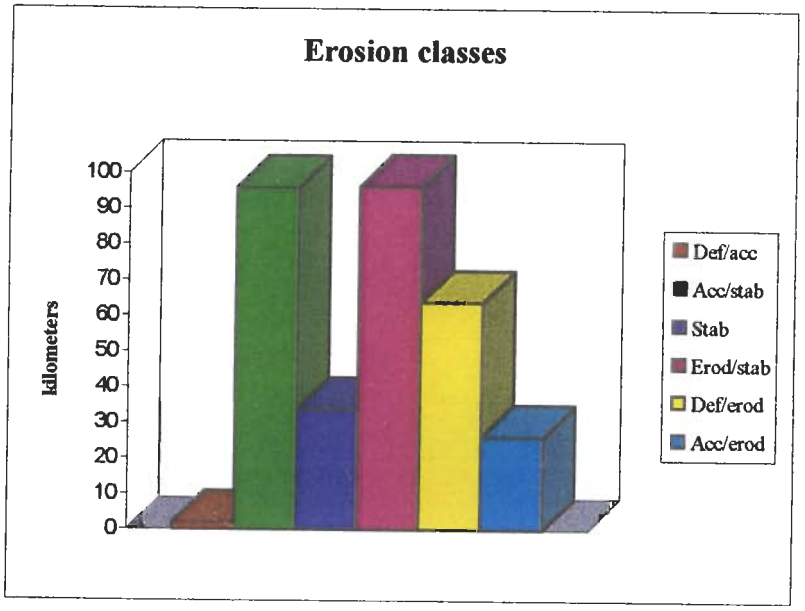



Figure 7 Frequency of erosion classes based on their overall distance of the field survey results.

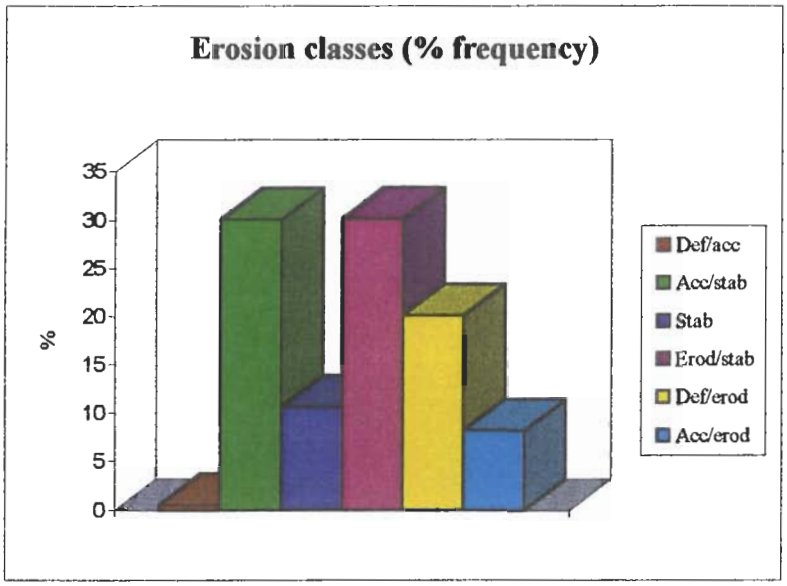



Figure 8 Percentage frequencies of individual erosion classes as a percentage of the total length of field survey (established as 317km based on linear measurement)

## Human Impacts

In addition to the coastal erosion processes affecting archaeological sites on the Solway Coast, human and animal impacts, predominantly attributable to livestock, are taking their toll on the condition of many archaeological sites.

The processes considered in this section can be separated into two groups: those related to farming, and those attributable to recreational uses.

*Farming Activities*

Adverse impacts due to animals, such as cattle and sheep tracks, rabbit and fox burrowing, and cattle scraping, are the cause of much deterioration visible on archaeological sites on the Solway Coast. Sites comprising earthworks, such as the sinuous banks traversing the substantial headland of the Mull of Galloway (NX13SW 17; Map 1), promontory forts (e.g. Old Fort, Dinnans (NX44SE 3; Map17), mottes (e.g. Green Tower Motte NX5847 5507; Map 27) and castles (e.g. Cruggleton Castle NX44SE 4; map 17) are particularly at risk from animal action. The condition of standing stones and upright cup-and-ring marked stones is also threatened by cattle rubbing. The impact of animals is exacerbated by the location of feeding troughs within archaeological sites, such as is evident at Old Fort, Dinnans, and the lack of, or inadequacy of, fencing to exclude stock from the entirety of certain archaeological sites.

Activities related to farming, such as ploughing, quarrying and dumping also adversely affect various archaeological sites on the coast. The most serious case of dumping, compounding excavation damage, was noted at Castleyards promontory fort (NX75NE 5; Map 34) where a deep pit, immediately behind the rampart, had been recently excavated and filled with the carcasses of sheep and cattle. Slightly further east along the coast, a quarrying pit is evident within Spouty Dennans (NX74NE 9; Map 35). At Burrow Head promontory fort (NX43SE 1; map 15), recent extraction of material from the outer

rampart is evident and is exacerbated by cattle scraping themselves on the exposed surface.

*Recreational Impact*

The profusion of coastal walks is another factor affecting the condition of archaeological sites on the Solway Coast. Monuments comprising earthworks again form the most vulnerable group. The most serious examples of erosion, where footpaths have gouged gaps through earthworks, occur at the Burrow Head promontory forts (NX43SE 1 and NX43SE 3; Map 15), Isle Head (NX43NE 8; Map16), Borness Batteries (NX64SW 2; Map 29) and Castlehill Point (NX85SE 1; Map 37). The promotion of a 'pilgrim way' along the coast of the Machars peninsula, around Whithorn (Murray, 1996), may only add to the traffic, and the implementation of measures to safeguard and promote the archaeological sites there are recommended.

**Discussion**

Whilst the inclusion of human impact within the general summary of erosion processes possibly strays beyond the tight structure of the project design as outlined in Historic Scotland's *Archaeology Procedure Paper 4 - Coastal Zone Survey*, the inspection of sites during the field survey revealed that many survive in a narrow band between farmed land and the high water mark along much of the coastline. This factor contributes to the occurrence of specific erosion processes, as outlined above, which form an integral part of the general erosion of coastal archaeological sites. As such, it is important, when drawing up measures to alleviate erosion of coastal archaeological sites, that the erosion dynamics in their entirety are taken into account.

## ARCHAEOLOGICAL SITES

334 archaeological sites (including those not exhibiting structural remains) were recorded in this assessment survey. Coastal erosion, was recognised to be affecting 118 sites, or 35.3 % of the population ( Figure 9). The eroding sites could be separated into two groups, defined by the extent and severity of the coastal erosion that is apparently occurring. Following the guidelines expressed in *Archaeology Procedure Paper 4 - Coastal Zone Survey* (H.S., 1996, 14), the coastal erosion state was qualified as good, meaning negligible erosion; fair, meaning moderate erosion; and poor, meaning severe erosion. A distinction was therefore made between moderate and severe coastal erosion (Figure 10). The results show that **moderate** coastal erosion affected 16.2 % and **severe** coastal erosion was recognisable at 19.1 % of the total population of known archaeological sites. The variable nature of archaeological remains, as discussed below, means that generalised recommendations on remedial or other possible actions are, however, difficult to make. The unique combination of structural remains and erosive activities present at each site should take precedence over general prescriptions.

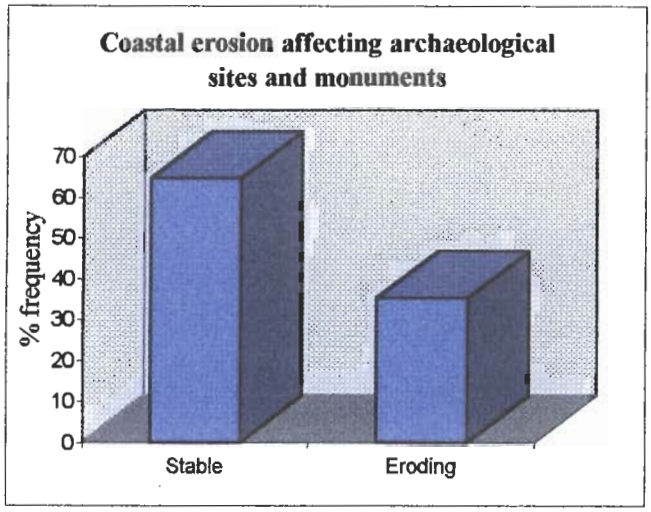



Figure 9

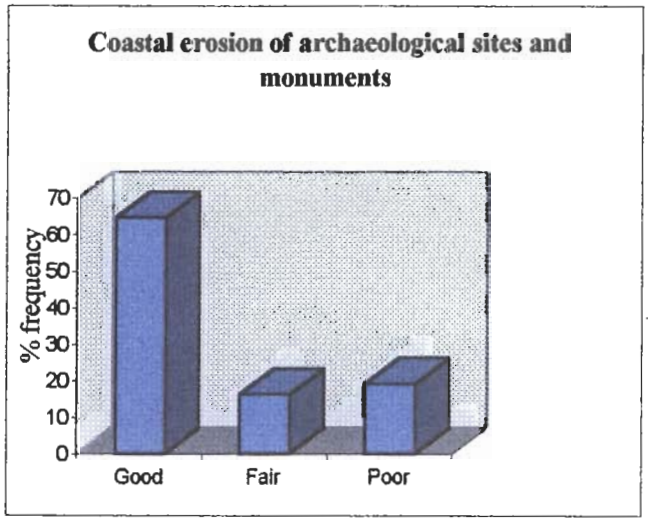



Figure 10

Following the guidelines set down in *Archaeology Procedure Paper 4 ; Coastal Zone Survey* (Historic Scotland, 1996, 14) the archaeological sites were separated into chronological groups:-

| | |
|---|---|
| Early Prehistory (EP): | 8000BC - 1000BC |
| Later Prehistory/Early Medieval (LP): | 1000BC - 1000 AD |
| Medieval (M): | 1000 AD - 1700 AD |
| Post-Medieval/Industrial (PM): | 1700 - 1900 |
| Early 20th Century/WW 2 (TC): | 1900 - 1945 |

No significant problems were identified with multi-period sites that extend beyond the limits of these groups, areas with significant multi-period occupation, such as Redkirk Point were treated as separate find spots or sites.

The extent of coastal erosion affecting each chronological group can be gauged from Figure 11, where the number of sites in a group is expressed as a percentage of the total population of **eroding** sites:

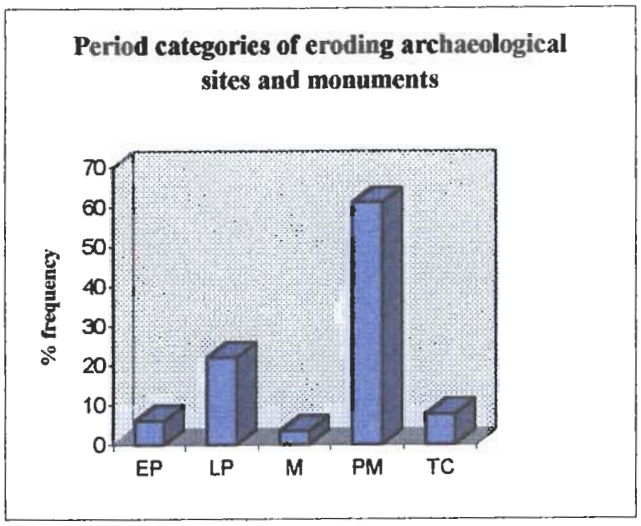



Figure 11

*Early Prehistoric Sites*

A small, scattered distribution of early prehistoric sites are affected by coastal erosion. They comprise a flint scatter at Terally Bay, in the Rhinns, a hammerstone findspot at Kirkcudbright Bay and the Mesolithic occupation site and associated finds at Redkirk Point. Localised coastal erosion and instability of the foreshore account for the erosion at the first two sites, while massive coastal erosion affects the last-named site. Regular monitoring of these sites must be considered.

*Later Prehistoric & Early Medieval Sites*

A larger, but equally scattered distribution of Later Prehistoric and Early Medieval sites, dominated by the cluster of promontory forts around the southern tip of the Machars peninsula, are adversely affected by coastal erosion. They consist mainly of promontory and cliff forts, but also include 'homesteads', a possible galleried dun, a broch and less strictly defined classes of settlements. The known sites appear overwhelmingly to indicate places of settlements, located on the seaward limits of the land, and offer a marked contrast with the settlement record from the middle ages onwards, during which this geographical setting seems to have been much less favoured. This broad temporal distinction emphasises the archaeological potential of this group of remains. Localised coastal erosion, in many cases exacerbated by human and animal impact, poses a serious threat to numerous examples within these series and a surveying and monitoring programme is strongly recommended.

*Medieval Sites*

A small, scattered distribution of medieval sites is suffering from coastal erosion. Localised coastal erosion affects Kirkclaugh Motte and Cruggleton Castle, while massive

erosion has obliterated the remains of the Church and related medieval remains at Redkirk Point. Monitoring of Redkirk Point, as emphasised in the discussion of this site, should be made on a more frequent basis than the other sites in this group. Although it is very likely that no medieval structural remains now survive at Redkirk Point, isolated finds from this period may continue to be revealed by the erosion of the foreshore.

*Post-medieval and Industrial sites*

Constituting by far and away the largest group of eroding sites on the Solway Coast, the extensive, but generally scattered distribution of more recent sites is nevertheless dominated by clusters of monuments and remains, particularly within the numerous bays and inlets of the coastline. The group as a whole differs markedly in nature from the preceding groups and includes piers, harbours, shipwrecks and fisheries. Predominantly maritime and industrial in character, the majority of sites are located on the foreshore and are particularly vulnerable to violent wave action. Although monitoring is recommended, detailed survey of a representative sample may be the best response to the erosion affecting this class.

*Early Twentieth Century*

A small distribution of monuments, mainly comprising World War Two defences, designed landscapes, coastal defences and fish traps, largely clustered at Garlieston Bay, Carse Sands, Arbigland, and Redkirk Point, are affected by a limited range of coastal erosion processes {?? Or of limited severity}. The gardens of Galloway House border on a severely eroding coastline at Cruggleton Bay, south of Garlieston, while in the foreshore of Garlieston Bay itself, the rusting hulk of a Mulberry, used in training exercises during the Second World War, is vulnerable to violent wave action. The sea defences at Carse Bay and Arbigland are also affected by violent wave action, as are the monuments at Redkirk Point. The general dilapidated condition of many of the World War Two defences was recorded during the field survey, but this data is not included in the tables above. A monitoring and surveying programme may represent the best response for this group of sites.

## SUMMARY

As stated above, the range of archaeological sites evident on the Solway Coast are affected by a range of coastal erosion processes. These impact of these can be seen generally to correspond to different groups of chronologically distinct archaeological monuments and remains, reflecting the varying topographical locations of the relevant sites. Briefly the results of the survey have revealed the following broad trend affecting vulnerable sites on the Solway Coast:

A small number of early prehistoric settlement sites are vulnerable from localised or more massive coastal erosion. A larger number of later prehistoric and early medieval settlement sites are again affected by localised coastal erosion, often exacerbated by human and animal impact. A small number of medieval settlement sites share the same trend as the early prehistoric sites. The largest group of sites, comprising monuments and remains of an industrial and maritime nature from the post-medieval and industrial periods, are adversely affected primarily by violent wave action. The last group

considered, comprising a range of monuments of the early Twentieth century, exhibit the same general vulnerability; that is from the detrimental effect of violent wave action.

This survey represents a snapshot of the condition of the archaeological remains that were visible in late 1996. It is clear that, in addition to the rapid nature of the survey, there are a number of other biases inherent in the results. Chief amongst these are the characteristics of the vegetation cover that significantly hindered survey above the high tide line, and the nature of many of the coastal deposits. This latter issue is of concern in areas of soft coast, where both on the mudflats and in areas incised by rivers and streams, it is likely that moving sediments and shifting channels within the sediments have in the past buried archaeological features. Where such sediments are still mobile, it is likely that a different array of archaeological remains may become visible from time to time. As this process is relatively constant and fluid, any time-limited survey is going to reflect only the character and range of remains that may globally be present in such environments Furthermore, as some deposits and features may rapidly degrade once exposed, any periodic survey programme is likely to miss some features. Given these concerns it appears certain that the most appropriate method for locating archaeological (or palaeoenvironmental) sites of interest would be to encourage a system of local monitoring.

Another landscape facet in which our rapid overview is probably insufficient concerns the dune systems. CFA knows that it has proved possible in the past for excavations to be conducted in these areas, for example those conducted by Trevor Cowie in Luce Sands, and that that area is of great archaeological importance (as witnessed, for example, by the site of Torrs Warren, where the only substantial pitchstone knapping site in Scotland has been located, with material examined by Dr Finlayson). CFA survey could identify little in these areas, and this appears to be the result of current management practices employed within them. Substantial areas of the Luce Sands have been levelled and grassed over to facilitate the recovery of munitions, which has had an impact on both the presence of archaeological remains and their visibility. Furthermore, the absence of animal grazing, perhaps especially at Torrs Warren, has allowed the growth of a substantial scrub cover. While this has prevented recent sand deflation leading to blow-outs, it has prevented the detection of any additional sites in this area during the survey programme reported here. The growth of scrub on the dune systems may be detrimental to their SSSI status, and it appears possible that more active management of these sites may be adopted at some point in the future to restore their ecological interest. If that were to happen, it would be important that the potential archaeological interest be considered.

## RECOMMENDATIONS

A number of recommendations have been made through this report. These are:

- To establish a local network of fieldworkers to encourage regular monitoring of areas of soft sediments
- To conduct more detailed geomorphological studies to provide a more detailed chronology for the coastal sediments, allowing inferences to be made regarding the likely presence and period of buried archaeological remains
- To conduct more detailed survey of a number of specific, representative sites.

- To ensure that a systematic programme of monitoring of known threatened sites be established.
- To mantain good communications with other agencies interested in the management of the coast.

These recommendations can only be achieved through a combination of approaches. Some of the work may be achieved directly by Historic Scotland through the Monument Wardens, or indirectly by the award of grants for specific pieces of research. Wider (and more frequent) monitoring will require additional efforts and should ideally include the Local Authority Archaeologist and Museum Officers as well as the participation of local groups, since the former have both local knowledge and relevant professional expertise. The Council for Scottish Archaeology may have a role to play in encouraging or co-ordinating local society efforts.

As part of the current exercise we are in the process of producing a summary note describing the work of the project. This will be discussed with Historic Scotland and the Local Authority Archaeologist before release to various organisations and heritage centres along the coast. In addition, we are producing posters, suitable for sending to local museums, libraries and schools. We have proposed a local lecture and will be looking at other opportunities to present the work of the project to the local populace.