Arachaeology in the Severn Estuary 7 (1996), 67-84.

THE SEABANK ON THE WENTLOOGE LEVEL, GWENT: DATE OF SET-BACK FROM DOCUMENTARY AND POTTERY EVIDENCE

by J.R.L. Allen

Introduction

A rich variety of historic landscapes have evolved following the enclosure (land-claim) at various times of tidal marshes on the margins of the inner Bristol Channel and Severn Estuary (eg Aston and Iles 1986; Allen and Fulford 1986; Rippon 1996). Other than being flat and close to sea level, these settled and farmed landscapes today bear little or no resemblance to the natural environments which they replaced; in particular, the evidence for networks of tidal creeks that dissected the marshes has largely or wholly disappeared. Although defining, upstanding monuments of such historic landscapes, the seabanks and outfall works to be found in the region have been generally overlooked and left unrecorded as archaeological features, and are less well known than their critical role demands. The dating of many of these features is uncertain, especially in the case of the older examples, and is particularly difficult in the many instances where the repositioning of the original defence further inland (set-back) was enforced by coastal erosion. The lowland coastal zone has never been stable and the need to understand its character and functioning better is being emphasised by global climate change.

The purpose of this paper is to review the evidence for, and dating of, set-back on the Wentlooge Level, the southwestern portion of the Gwent Levels, on the Welsh side of the Severn Estuary (Fig. 1a, b). This is an especially instructive but far from unique example of the process, primarily because of the eclectic variety of evidence - geological, geomorphological, archaeological and documentary - that has survived. Not only can the evolution of the Wentlooge Level be perceived more clearly as a result, but the principles that emerge should be applicable elsewhere in the region and to other areas of enclosed coastal wetland in the British Isles.

The Wentlooge Level is a substantial area of enclosed wetland (*c*.3500 ha) lying between the Rhymney River in the southwest and the Ebbw-Usk rivers to the northeast (Fig. 1a, b). It is backed by low hills, chiefly of Old Red Sandstone and some Triassic and Silurian rocks with a mantle of glacial deposits (Squirrell and Downing 1969; Waters and Lawrence 1987), and underlain by 10-15 m of Flandrian estuarine sediments - the Wentlooge Formation - resting on an uneven, mildly dissected platform of the older beds (Allen 1987). This rock platform for the most part slopes gently down toward the axis of the estuary but seems to rise more steeply near the inland margin of the Wentlooge Level.

The Wentlooge Formation (Allen 1987; Allen and Rae 1987) consists of green estuarine silts with an intercalated peat (or peats) in a high middle position (Fig. 1c). In the present area, a single, ledge-forming peat *c*.0.1 m thick is exposed on the modern coast near the mouth of the Rhymney and east of St. Bride's Wentlooge, at the entrance to the Usk. Along the intervening shores, the peat thickens unevenly toward a maximum of *c*.0.85 m in the vicinity of Peterstone Gout, where it is joined 1.5-2 m below by a much thinner and apparently less laterally persistent leaf of peat. Borehole tests show that the peats gradually thicken inland away from the coast, attaining thicknesses of over 1 m close to Rumney and appearing virtually at the ground surface toward the complex landward margin near Marshfield (Fig. 1b). The uppermost beds of the Wentlooge

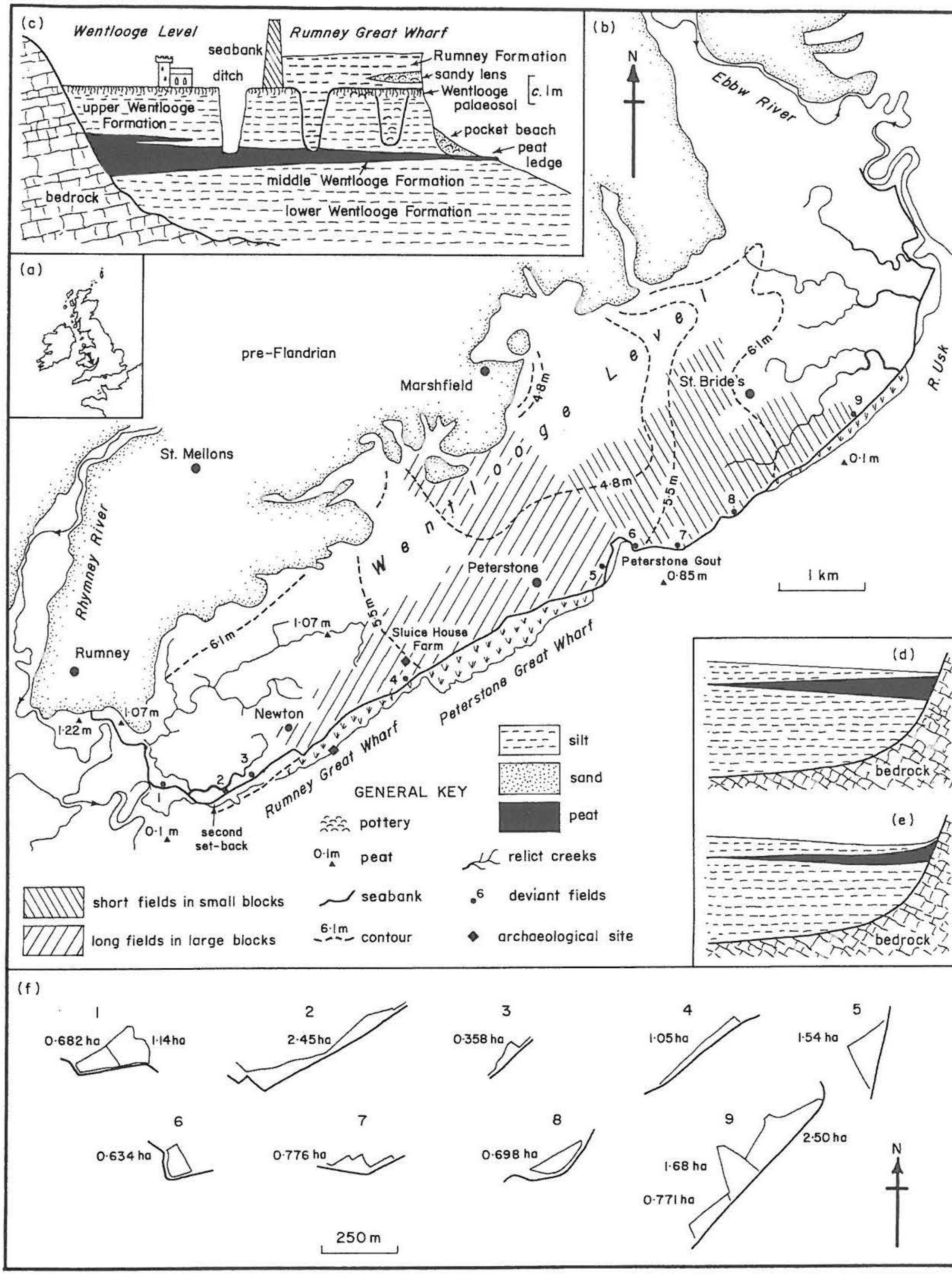

Figure 1: The Wentlooge Level. (a) General setting. (b) Alluvial outcrop, peat thickness, topography (after Rippon 1995, 1996), sea defences, and archaeological sites. (c) Schematic geological section at Rumney Great Wharf. (d, e) Schematic effects of consolidation (silt-10%, peat-33%). (f) Shapes and areas of deviant fields (see (b) for locations).

Formation emerge from behind the seabank only at Rumney Great Wharf (Fig. 1b). All along the seaward edge of the marsh they are seen to be erosively overlain by the pale brown and grey silts of the Rumney Formation, which formed as tidal mudflats grew up into salt marshes (Fig 1c). The Rumney Formation is also exposed, but only intermittently, on the coast at Peterstone Great Wharf and near St. Bride's, where it erosively overlies the silts and peat(s) in the middle of the Wentlooge Formation. As was demonstrated (Allen 1987), the Rumney Formation at Rumney Great Wharf mantles a series of coastal embayments and headlands, not unlike those of the present shore, that had been eroded into the higher beds of the Wentlooge Formation.

The flat-topped headlands are capped by a buried soil known as the Wentlooge palaeosol. Everywhere along Rumney Great Wharf the palaeosol displays the same, simple, monogenetic profile, composed of a lighter-coloured, leached A horizon (0.25-0.35 m) with oxidation features that grades down into a blocky-prismatically jointed, darker B horizon (0.25-0.45 m) with evidence of clay-illuviation and local gleying (Allen 1987). This feature of an ancient land surface has a similar altitude to the ground immediately landward of the seabank, and in several places can be traced, with the sharply overlying Rumney Formation, right up to the seaward foot of the defence along the banks of the longer erosional gullies that cross the marsh. Judging by the evidence of early modern pottery and tobacco pipes from the base of the deposit, the Rumney Formation at its type-site did not begin to accumulate before the late 17th century (Allen, forthcoming).

Land-claim and set-back

The Wentlooge Level illustrates well the two main processes involved in the transformation and management of tidal wetlands for human use. One of these processes is the primal act of *land-claim*, also, but misleadingly and inappropriately, known as reclamation. Land-claim sees the enclosure of an area of wetland behind some kind of engineered, defensive bank, together with the provision of outfalls and a basic network of ditches for the drainage of precipitation. Provided that the seabank continues to exclude the tide, marine silt is no longer supplied to the wetland, which becomes geomorphologically stable and, over time, mantled by a soil. Subsequent to enclosure, roads and fields may be laid out, minor ditches dug, and settlements established, all in a general process of improvement and change from seasonal to year-round use.

Alluvial coasts are notoriously unstable, however, and in time a seabank may either become extensively breached during an exceptional storm or at least have its medium-term survival theatened, because of the erosion of the remaining salt marshes that protected it to seaward. Salt-marsh vegetation is very effective at damping storm waves, but only if the waves can run over a sufficient length of drowned marsh (eg Moeller *et al* 1996). In the event of storm damage, the inhabitants of an enclosure may decide immediately to abandon the first seabank and reposition it further inland. Alternatively, they may plan and construct at leisure a new defence on an alignement also further back from the sea, abandoning the first defence as evolving circumstances dictated. In each case, the seabank has been set back, and tidal siltation will in general resume on the abandoned portion of the original enclosure, burying soils, field earthworks, communications and settlements. *Set-back* or managed retreat is currently being officially encouraged as a practice in coastal management (Pye and French 1993, Burd 1995), but it is worth noting that the repositioning of seabanks has been widely pursued since medieval times in many parts of Britain (Owen 1952, Grieve 1959, Hall and Coles 1994) and besides the Severn Estuary (eg Allen and Fulford 1992, 1996).

Evidence for set-back on the Wentlooge Level

Natural topography

Although not immediately obvious, the natural topography of the Wentlooge Level has a bearing on whether the defence seen now has been repositioned.

The area today shows little sign of its origin in a tidal marsh, and there survive in the modern Severn Estuary no active marshes extensive enough to provide a model for the

Wentlooge Level prior to enclosure. An insight into its original character, however, comes from the Norfolk coastal marshes (Fig. 2), which approach the Wentlooge Level in scale, although composed of sandier sediments and affected by lower tides (French *et al* 1990). Essentially, these marshes consist of a vegetated platform high in the tidal frame dissected by extensive networks of tidal creeks that narrow, shoal and repeatedly branch landward, each network serving to flood and drain a particular 'catchment' area. The older, more mature parts of the marsh slope gently downward away from the sea and, on a smaller scale, away from the creeks with their bordering levees. Mineral matter reaches the marshes with the tide, which floods in through the creek networks, and the indigenous plants also add sedimentary material (root matter, autumn litter) to the platform. Under this dual sediment supply, the youngest marshes are growing upward faster than relative sea level is rising but, once mature, like the older platforms, may be expected broadly to keep pace with sea-level rise.

A relief-map of the modern Wentlooge Level (Rippon 1995; 1996) depicts a well-defined, basin-like topography on the alluvial surface, with a low point near Marshfield (Fig. 1b). To be fully understandable, it is necessary to recognise that this topography resulted from the interaction of three factors. Firstly, the Wentlooge Formation overlies a rock platform that appears to steepen up landward (Allen 1987). Secondly, reference to general principles, supported by field observations, shows that the rate of mineral deposition on a tidal marsh rapidly declines landward away from the coast and the banks of the larger tidal rivers, while the rate of organic sedimention may increase slightly (Allen 1990a; 1994; 1995; Woolnough *et al* 1995). Hence when mature the surface of the active marsh will slope gently down landward, while beneath it will accumulate silts with intercalated, landward-thickening peats, given an underlying upward trend of relative sea level (Fig. 1d). Thirdly, differential sediment consolidation will occur both during deposition and, particularly, following enclosure and the lowering of the water table (eg Smith, 1985; Cahoon *et al* 1995, Pizzuto and Schwendt, 1997). Note how a basin-like topography like that observed arises when the schematic cross-section (Fig. 1d) is recalculated on the plausible assumption that everywhere the silts are consolidated by 10% and the peats, which are much more compressible, by 33% (Fig. 1e).

Why is the basin-like topography abruptly truncated along the seaward margin of the modern Wentlooge Level (Fig. 1b)? In the light of the model (Fig. 1d, e), the pattern of contours (Fig. 1b), and the above-described thinning of the peat along the coast from *c*.0.85 m near Peterstone Gout in the topographic low to *c*.0.1 m where the Rhymney and Usk are bordered by higher ground, combine to suggest that a strip of alluvial land perhaps as much as 3 km wide has been eroded from along the seaward side of the outcrop. In terms of the depositional-consolidational model (Fig. 1d, e), the ground along the open coast should have been as elevated as that beside the rivers Rhymney and Ebbw-Usk. The present seabank thus emerges as probably a late feature, for had it been the initial defence, half of the area potentially available for enclosure would have been neglected for the want along the rivers of two short, additional lengths of seabank.

Here and there on the Wentlooge Level, traces of tidal creeks (see Fig. 2) survive in the form of meandering or curving field boundaries, presumably where it was convenient to exploit a natural feature for drainage or property division (Allen and Fulford 1986; Allen 1990b). Rippon (1995; 1996) has mapped these in greater detail (Fig. 1b), finding them confined to the higher areas beside the Rhymney and Ebbw-Usk rivers. Note how these diminished survivors branch and decline inland, like their Norfolk counterparts (Fig. 2). Traces of creeks are, however, absent from the lower ground surviving along the open coast, especially around Peterstone, and near St. Bride's clearly swing in general orientation with the contours. Comparing the area to Norfolk, we can again see evidence for massive erosional losses. Rippon (1995; 1996) contends that these higher areas with relict creeks record post-Roman flooding and local burial of the Roman Wentlooge Level, followed by re-enclosure, to a different field pattern, in medieval times. The

Figure 2: Salt marshes on the Norfolk coast (area c.1.8x2 km, north toward bottom). Cambridge University Collection of Air Photographs: copyright reserved.

field pattern (see below) need not be chronologically significant, however, for what could be more efficient, at the time of enclosure, than to incorporate the relatively wider and deeper creeks of the higher areas into the drainage scheme rather than attempt to either infill or avoid them (Allen and Fulford 1986)? More importantly, Rippon's main, altitudinal argument - that the areas reach above the level of today's mean high-water spring tide - is invalid, since it may not be assumed that tidal water levels have remained fixed in space over time. The tidal planes rise significantly in altitude up the Severn Estuary (eg Allen and Rae 1988), attaining a maximum today some 15 km below Gloucester. Their position in space is governed by the tidal regime and the configuration of the estuary, which has changed significantly over time. In the much narrower and more seaward-lying estuary of the Roman period, toward which the stratigraphical evidence overwhelmingly points (Allen and Fulford 1986; 1987; 1992; 1996; Allen 1990c; Allen and Rippon, forthcoming), tidal levels along the Wentlooge coast could have been as high as if not higher than those of today. Moreover, post-Roman flooding followed by re-enclosure before the final set-back would have created for exposure on the modern coast a stratigraphic profile with two buried soils. The buried Wentlooge palaeosol can be seen over the length of Rumney Great Wharf to consist of only one, monogenetic soil-profile. Whether this is also true at Peterstone Great Wharf and in the St. Bride's area is not known, since the palaesol is not seen in these places. The palaeosol is expected to be present, however, but the stratigraphical level at which it should occur is concealed by either the sea defence or younger marsh deposits.

It would seem that the surviving topography of the Wentlooge Level is that of a considerable marsh longitudinally bisected by coastal erosion and so deprived of its expected coastal fringe of higher ground. The surviving higher ground is restricted to the banks of the tidal rivers that cross the marsh to the sea; the banks of these southeastward-flowing rivers, enjoying considerable protection from wave action, were less if at all affected by erosion during the period of coastal retreat.

Field ditches

The topographic evidence laid out above clearly points toward set-back but is not itself conclusive. Firm evidence for a managed retreat of the sea defence comes, however, from the relationship between the field boundary pattern and the defence.

Many of the extant field ditches between the mouth of the Rhymney and Peterstone Gout (Fig. 1b) are colinear with artificially cut features (Fig. 3) either visible on the intertidal peat ledge (Rumney Great Wharf) or traceable across the youngest marshes (Peterstone Great Wharf) (Allen and Fulford 1986; Allen 1987). Moreover, several of these features, cut into the uppermost beds of the Wentlooge Formation,

Figure 3: Air photograph (area c.450x350 m, north toward upper right) of Rumney Great Wharf showing fields, repositioned seabank, salt marshes, and the intertidal peat ledge (dark tone) with linear features representing ditch bottoms.

can be seen exposed in cross-section on the bold mud cliff at Rumney Great Wharf (Fig. 1b).

Allen and Fulford (1986) concluded that the intertidal features represent the surviving bottoms of field ditches that had been otherwise destroyed by coastal erosion, but which nonetheless belonged to the same drainage system as could be seen in the surviving Wentlooge Level. Consequently, they further concluded that the modern seabank had been set back inland across a once more-extensive agricultural landscape of ditched fields similar to that surviving today. From the coast, Allen and Fulford recorded a natural section through one deep ditch, sealed by the Wentlooge palaeosol and overlain by the Rumney Formation, that was full of Romano-British occupation debris. As this section lay within a few metres of one of the intertidal linear features, Allen and Fulford suggested that the entire system of ditched fields, in the surviving enclosure of the Wentlooge Level and on the shore, was in essence of Romano-British origin.

A conclusive proof of this final claim was furnished by later excavations (Fulford *et al* 1994), which demonstrated the presence of a settlement of the period, with at least one well, and a system of ditches and other dug features at the site (Fig. 1b). The excavated features formed part of the rectilinear pattern of fields discerned both landward and seaward of the defence.

Fields

In sharp contrast to the coast between the Rhymney River and Peterstone Gout, and without there being any essential change in the stratigraphy of the Wentlooge Formation, there are no known features on the well-exposed peat ledge between the outfall and the Ebbw-Usk which are plausibly ditch bottoms, based on their cut margins and colinearity. However, this should not be taken as evidence that the seabank between the Ebbw-Usk and the gout had not been set back, since the field patterns also differ between the two sectors (Fig. 1b). Between the Ebbw-Usk and the gout, the coastal fields belong to Rippon's (1996) type 'small blocks of short fields'. Those to the southwest of Peterstone Gout are mostly his more rigorously geometrical 'large blocks of long fields'. From the lack of artificial features on the peat ledge northeast of Peterstone Gout it would seem that the ditches for the short fields were cut to a shallower depth than those of the long fields. As the two sets of fields and ditches are separated by the major landscape-element of Broadway Reen, which empties at Peterstone Gout, the change in pattern need have no necessary chronological significance, and could merely reflect the fact that the reen was once either a property or task-force boundary.

Allen and Fulford (1986) introduced in their work on the Wentlooge Level a second line of evidence for set-back (see also Allen 1993), helpful where the ditches of abandoned fields do not survive intertidally, as at St. Bride's. They noticed that the seabank locally contributed to the definition of fields that were 'either (a) exceptionally small in size, or (b) of a triangular or other unusual form'. Both aspects may be combined, and it is now clear, referring to 19th-century maps (Gwent County Record Office D1365.2; Ordnance Survey six-inch maps, first edition, Monmouthshire XXXIII, XXXVIII), that at least nine deviant fields and field-groups can be identified along the seabank between the Rhymney and Ebbw-Usk (Fig. 1b, f), of which nos. 6-9 occur northeast of Peterstone Gout. Hence there can be little doubt that the seabank has been repositioned inland along the entire frontage of the Wentlooge Level, a distance of some 12 km.

A documented and field-verified seabank

Although satisfied as to set-back, Allen and Fulford (1986) were vague about the dating of this significant event, suggesting a stratigraphical *terminus ante quem* of 'not later than the 16-17th centuries', on the basis of a single rim-sherd recovered from the base of the Rumney Formation where it overlay one of the headlands on the pre-Rumney coast. The Rumney Formation underlies the whole of Rumney Great Wharf and the inner-most part (high marsh) of Peterstone Great Wharf (Allen 1987), and with the Wentlooge palaeosol can at Rumney be traced up to the seabank. A substantial pottery assemblage (82 items; prehistoric, medieval, early modern) has since been recovered from the base of the Rumney Formation, the dominant early-modern component, including clay tobacco pipes, raising the start of deposition to not before the latest 17th century or possibly earliest 18th century (Allen, forthcoming). Pottery of a similar age was recently recovered from the Rumney Formation on Peterstone Great Wharf.

A substantially earlier *terminus ante quem* for the repositioning of the defence as a whole is afforded by an element of surviving seabank on Rumney Great Wharf which can be dated from a documentary source. South of Newton the defence makes a short, abrupt dog-leg, but without otherwise changing its general orientation (Fig. 1b). The defence southwest of the dog-leg is a simple earth bank over most of its length. Toward the Rhymney River, however, where Rumney Great Wharf and the outcrop of the Rumney Formation narrow and disappear, the seaward face of the bank is protected by a stepped pitching of well-dressed stone (Fig. 4). The length of less carefully prepared and laid stone suggests the repair of a subsequent collapse or breach. The Rumney Formation is only present to seaward of this bank, and the ground surface to landward is *c*.1.25 m lower. If the line of the defence northeast of the dog-leg is projected south-westward to the Rhymney river and parallel to the earth bank (Fig. 1b), a long, narrow tract with an area of 33.2 acres (*c*.13.4 ha) is defined. Allen (1990b) pointed out that this area is similar in size to a parcel of land described as abandoned to the sea when the people of Rumney Parish reported in 1590/91 the repositioning inland a decayed seabank. In identifying the field location of this abandoned ground, he cited the comprehensive and unambigous statement by the Court of Augmentations (Lewis and Conway Davies 1954, Sylvester 1958):

> 'Note that the Manor of Rompney lies adjoining the sea. There is a wall between the sea and the lordship for the defence of the same, which wall being about 2 years past in great decay, was by commission new made and placed more into the land than before it was, by reason whereof there was cut out and left betwixt the sea and the wall, 28 acres most part meadow and pasture of parcel of said demesnes of the manor besides divers other lands of the customary tenants...'

No other plausible site for this abandoned area can be located. Allen argued that the dog-leg adequately proved that the seabank had been realigned, and that the act of set-back, as recorded above, was the second to have affected the area. The main part of the seabank, therefore, was repositioned some time before 1588/89.

Stratigraphical evidence to support this conclusion has been sought, since it might be expected that the seabank abandoned in 1590/91 lay buried between the Wentlooge palaeosol and the Rumney Formation on Rumney Great Wharf. No trace of the defence has been found, probably because so little of the pre-Rumney headlands have survived in this much-diminished part of the area (see Allen 1987).

Summary

There can be no doubt from the evidence sketched above that the sea defence seen today on the Wentlooge Level was set back from its original position at least once and, over a *c*.1.2 km section at the southwestern end of Rumney Great Wharf, at least twice. The main repositioning occurred before 1588/89. To establish a *terminus post quem* for set-back, however, we must turn to largely archaeological evidence.

Pottery assemblages

Introduction

An archaeological *terminus post quem* for set-back is provided by an assemblage of medieval pottery from Rumney Great Wharf and is supported by another from nearby. Full details and a justification for the attributions may be found in the Appendix, but the following summary is appropriate to the dating issue.

Sluice House Farm

In 1992/93 a large slurry pit was dug at Sluice House Farm, Peterstone Wentlooge (Fig. 1b), on the southwest side of the main road between the barn and the track leading to the seabank (NGR ST 253792). The pit reached down through the upper Wentlooge Formation to a peat, probably that exposed on the foreshore. Upcast from the pit was dumped along the seabank nearby and yielded medieval pottery at several points, but no food refuse or contemporaneous building materials. Although small, the collection is of pristine material, in sharp contrast to that from Rumney Great Wharf (see below), and is additionally important because no other assemblages are known from the surviving, defended part of the Wentlooge Level.

Clearly domestic in character, this small assemblage is formed of comparatively few vessels including imported as well as local wares (Table 1, Fig. 5). The dating emphasis falls on the 12th and 13th centuries, with the liklihood that earlier and perhaps also later pottery is represented. A rubbish dump rather than a building appears to have been the origin context, although the apparent absence of food residues is surprising.

Rumney Great Wharf

This assemblage has been gradually accumulated over a period of about 15 years, since the discovery by Allen and Fulford (1986) and Fulford *et al* (1994) at Rumney Great Wharf (ST 244783) of Romano-British field ditches and associated stratified deposits. The sherds occur chiefly as a minor component of the transposed pottery, iron-making debris and food residues which strew the pocket beaches at the Romano-British site (Fig. 1b); a few items, as previously reported (Allen and Fulford 1986), came from an inextensive sandy lens within the lower part of the Rumney Formation (Fig. 1c), into which they had also been redeposited after tranposition, probably as the result at a bay-head of storms overwashing the growing salt marsh (Allen 1987). These variously transposed sherds are relatively small, weathered, and more or less strongly abraded, making determination and reconstruction difficult. Greater reliance than might otherwise have been the case has therefore been placed on the details of the fabrics. Occasional pristine sherds, taken to be in a primary stratified context, were recovered from the topmost 0.15 m of the Wentlooge palaeosol at the Romano-British site,

Figure 4: Seabank of 1590/91 with protective stone pitching.

that is, from within the leached A horizon. It is important to note that these sherds are not essentially different in context from much of the associated Romano-British occupation debris. The gradual opening up of the site through coastal erosion has shown that, where not infilling sealed pits, ditches and a well (Fulford *et al* 1994), the debris - stone, pebbles, burnt daub, pottery, bones and teeth, charcoal, and industrial materials and residues - lies unevenly and, in the hollows, deeply strewn within a horizon that can be seen on a scale of metres to tens of metres to undulate very gently between the leached and the darker horizon of the Wentlooge palaeosol. Otherwise, medieval pottery is extremely rare on the coast of the Wentlooge Level, and is invariably transposed.

Excepting two sherds of Glamorgan Ware, recovered from the uppermost layers of the Wentlooge palaeosol as just described, the assemblage is composed entirely of transposed material (Table 2, Fig. 6). The kind and variety of vessels represented, some imported and others of local manufacture, and especially their association with roof and floor tiles, points to the creation of the assemblage through the destruction of one or more domestic buildings. Those buildings need not have been far to seaward of where the two stratified sherds were found on the modern coast, and could have been on or close to part of the Romano-British settlement. The 12th and 13th centuries are well represented at Rumney Great Wharf, but the prominence of Glamorgan Ware, and the noticeable proportion of Malvern products, point to an upward range at least into the 14th century. Although the site lies only 1.3 km to the southwest of Sluice House Farm, yielding a much smaller collection, the two assemblages have only Ham Green and Glamorgan products in common (Tables 1, 2). Apparently, at Sluice House Farm there are several fabrics not represented at Rumney Great Wharf; these fabrics could be earlier than the Rumney suite.

Concluding discussion

The Wentlooge Level is of particular importance in the Severn Estuary Levels because it offers an exceptionally wide range of evidence for the large-scale setting back of a sea defence and the timing of that critical event in the evolution of the landscape.

Four features of the area demonstrate the setting back of the modern seabank. One line of evidence is topographical. Essentially, the topography of the surviving Wentlooge Level is that of a natural tidal marsh and consolidated underlying deposit which has lost its seaward half through coastal erosion. The higher areas with relict creeks along the banks of the Rhymney and Ebbw-Usk rivers can be seen as survivors of a natural topography that would originally have also existed along the open coast. Accordingly, had it bisected the original marsh, the modern seabank would have been a poor attempt at enclosure and, therefore, is most likely to be not on its first line. The second,

Table 1. Composition of pottery assemblage from Sluice House Farm

ware	*sherd no (%)*	*sherd wt (gm), (%)*
Fabric A	6 (9.5)	140.0 (11.7)
Ham Green Ware (Fabric B)	5 (7.9)	61.1 (5.1)
Fabric C	13 (20.6)	145.2 (12.1)
Fabric D	14 (22.2)	166.9 (13.9)
Fabric E	1 (1.6)	88.9 (7.4)
Fabric F	17 (27.0)	555.6 (46.3)
Glamorgan Ware (Fabric G)	3 (4.8)	21.7 (1.8)
Miscellaneous fabrics	4 (6.3)	21.6 (1.8)
Totals	63 (99.9)	1201.0 (100.1)

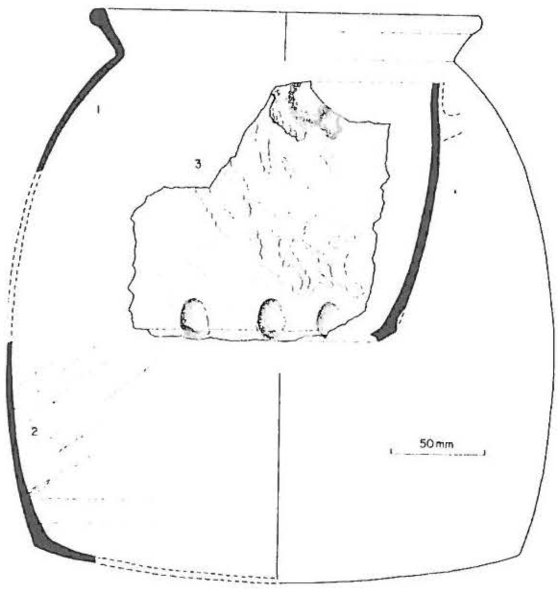

Figure 5: Medieval pottery (Fabric F) from Sluice Farm. (1, 2) Cooking pot represented by groups of conjoined sherds. (3) Thumb-printed base sherd.

Table 2. Composition of pottery assemblage from Rumney Great Wharf

ware	*sherd no. (%)*	*sherd wt. (gm), (%)*
Ham Green Ware (Fabric A)	15 (6.4)	119.8 (6.1)
Penhow Ware (Fabric B)	50 (21.4)	346.9 (17.7)
'Bristol' Wares (Fabric C)	15 (6.4)	126.3 (6.4)
Glamorgan Ware (Fabric D)	115 (49.1)	1102.0 (56.2)
Malvern Wares (Fabric E)	33 (14.1)	209.5 (10.7)
Miscellaneous fabrics	6 (2.6)	55.9 (2.9)
Totals	234 (100.0)	1960.4 (100.0)
'Bristol' tiles	4 (28.6)	118.5 (29.3)
Glamorgan tiles	9 (64.3)	255.6 (63.3)
Other tiles	1 (7.1)	29.8 (7.4)
Totals	14 (100.0)	403.9 (100.0)

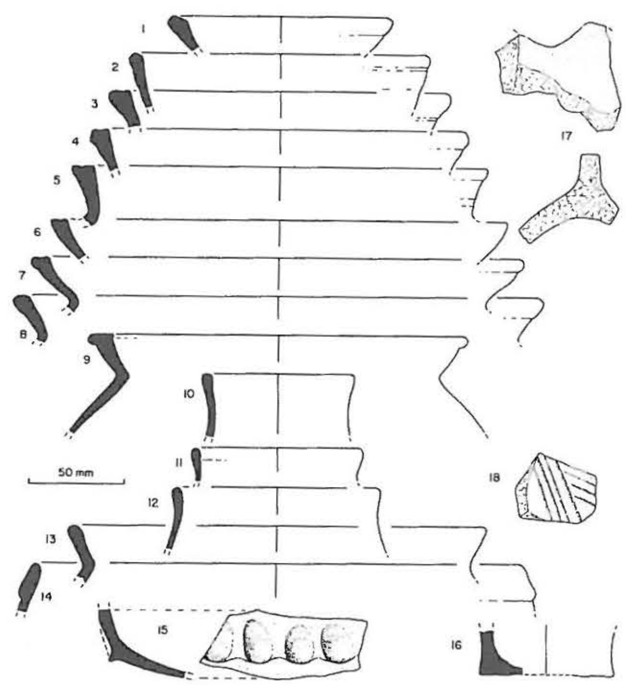

Figure 6. Medieval pottery and building ceramics from Rumney Great Wharf. (1, 2) Ham Green Ware. (3-8) Penhow Ware. (9) 'Bristol' Wares. (10-16) Glamorgan Ware. (17) Glamorgan ridge tile. (18) Glamorgan floor tile.

stronger line of evidence is the presence of deviant fields at many points adoining the length of the seabank where it backs the open coast. These fields differ markedly in size (*c.*1 ha) and shape (triangular-trapezoidal) from their immediate inland neighbours, and are best accounted for by the superimposition of the defence across a prior agricultural landscape. The third line of evidence, a combination of archaeological and stratigraphical features, is the strongest of all. The Wentlooge palaeosol has the same general altitude as the Wentlooge Level immediately to landward of the seabank, but is overlain on Rumney Great Wharf by *c.*1.3 m of the Rumney Formation, dating from the latest 17th-earliest 18th century up to the present. Passing beneath the active marshes of Rumney Great Wharf and Peterstone Great Wharf, field ditches extant on the Wentlooge Level can be traced into colinear features exposed for long distances intertidally. Excavation has shown that at one intertidal site these fossilised ditches are associated with a substantial Romano-British settlement.

This site appears also to have been settled in medieval times, judging by an assemblage of building ceramics with varied domestic pottery. Although the bulk of the material is transposed, some sherds were recovered together with Romano-British occupation debris from the leached horizon in the Wentlooge palaeosol, thus providing no evidence for a post-Roman sedimentation event. As the pottery indicates occupation between at the least the 12th and 14th centuries, the 15th century emerges as the earliest possible date for the repositioning of the seabank, now to landward of the Romano-British and medieval settlements. The latest date for set-back is 1588/89, provided by a documented further repositioning of a length of the defence, which can still be identified on the ground from earthwork features, topography and stratigraphy. Thus the date of set-back of the whole defence along the open coast can be placed within a period of about two hundred years, at a time when climatic deterioration had increased the pressure of coastal erosion (Lamb 1984, Grove 1988).

An intriguing paradox is revealed by this conclusion. Once set-back had taken place, tidal sedimentation could have been resumed on the abandoned portion of the Wentlooge Level. However, as noted above, the Rumney Form-ation, overlying the Wentlooge palaeosol, dates on ceramic evidence from no earlier than the latest 17th century. Does this mean that, for a period of a few hundred years, there was a lowering of mean relative sea-level and/ or reduction in tidal range in the area, followed in the late 17th century by a renewal of the upward trend?

Although set-back leads immediately to the loss of agriculturally useful land, eventual gains are not excluded, and this aspect merits comment. The Rumney Formation, accreting from the late 17th century, records the re-appearance along the front of the Wentlooge Level of mudflats and salt marshes (Allen, 1987). Those marshes survive in enclosed form south-southeast of St. Bride's but in active form at Rumney Great Wharf (Figs. 1). As the stratigraphic section presented by the mud cliff and the air photograph (Fig. 3) show, the active marsh at Rumney Great Wharf grew up without the accompanying development of networks of tidal creeks that reached deep below the level of the Wentlooge palaeosol. All that can be seen on the present marsh are shallow pans and seldom-branching creeks at the greatest a metre or so wide and a few decimetres deep. These do not limit access to the marshand and present no hazards to grazing animals, unlike the complex networks of deep creeks normally found on salt marshes (eg Fig. 2) and recorded from many other areas where siltation was resumed after abandonment or set-back. For example, the enclosed marsh at Mersea Island, Essex (TM 017150), abandoned after a storm in 1897 created multiple breaches in the defence, is now intricately dissected by branching creeks up to 2 or 3 m deep that reach down through *c*.1 m of post-abandonment silt to cut beds far below the buried soil representing the marsh surface at the time of the original embanking. De Bakker (1948) has recorded from The Netherlands how deep, erosive creek systems rapidly spread away from unrepaired breaches in seabanks if the soil-material lacks erosion resistance. What makes the silts of the Severn Estuary Levels apparently resistant is not known, but suspicion falls on the presence of significant amounts of shell and other biogenic carbonate debris.

The search for similar evidence to the above in other parts of the Severn Estuary Levels should lead to a better general understanding of the coastal evolution of this archaeologically important region. That such evidence is eclectic should occasion no surprise; since the employment of an holistic approach is essential if archaeological sites and monuments in the lowland coastal zone are to be properly understood and managed in the face of global climate change.

Acknowledgements

I am very grateful to Alan Vince for examining a preliminary collection from Rumney Great Wharf and for introducing me to medieval pottery in South Wales and the West of England.

Appendix: Details of pottery assemblages

Sluice House Farm

Fabric A is represented by partly sooted body sherds from apparently a single, plain cooking pot that had been hand-made but with a perhaps wheel-related, wiped finish. The fabric is moderately hard to hard, sandy and visibly micaceous, varying from light grey internally to orange-brown on the outer surface. Thin-sections confirm the presence of very abundant subangular to rounded grains (<1 mm) of simple and polycrystalline quartz, accompanied by common to abundant, well-rounded granules (<4 mm) of a variety of quartzose sandstones and micaceous siltstones. There are occasional grains and granules of unfossiliferous, micritic limestone (some with scattered quartz silt) and sugary dolomite, together with dark brown pellets of silty clay. Very occasional grains of red ore are seen. The matrix is fine grained and silty. A definite source for the ware has not been identified, but a distinct possibility is the Bristol area, where Vince (1991) locates his fabrics Kc and Ke (late 11th and early 12th century) with a rather similar set of inclusions.

Five body sherds from at least two, large, hand-made vessels are assigned to Ham Green Ware (Fabric B). Four of the sherds are light grey grading to pinkish cream on the internal surface; the fifth is mid grey varying to pale grey. Abundant well-rounded quartz sand (<0.5 mm) and common, rounded to flake-shaped pellets (<5 mm) of clay are dispersed in a very fine-grained, slightly micaceous matrix. All the sherds carry a dull green glaze externally and three are further decorated with broad, unevenly spaced, horizontal grooves. Ham Green jugs are present at Chepstow in the 13th century (Vince 1991).

The wheel-thrown sherds attributed to fabric C include one from a large, round-based pot and another from an apparently globular, handled vessel. None of the sherds is ornamented. The fabric is soft and pale reddish brown, with a light grey core, consisting of very abundant grains (<2 mm) of quartz and some sandstone, with scattered, rounded pellets (<1 mm) of pale brown clay. In thin-section, the quartz includes many polycrystalline grains, and the sandstones are strongly indurated; the matrix is only slightly silty and there is little mica. The fabric is broadly similar to Vince's (1991) Ha group, local to Chepstow and of the late 12th to 13th century, but the rim is of unusual form.

Fabric D is represented by body sherds (some sooted) and a base sherd from largely hand-made cooking pots that included a flat-based form. Typically, the fabric is hard and light grey varying outward to orange-brown, but some sherds are either orange-brown or mid grey throughout; all are visibly micaceous. A thin-section confirmed the presence of abundant, subangular to rounded granules (<5 mm) of indurated sandstones (some schistose) and subangular to subrounded quartz sand (<1 mm), all set with occasional clay pellets in a fine-grained, silty matrix. Calcareous grains are lacking and the matrix is fine grained. Like fabric C, this ware has affinities with Vince's (1991) group Ha, of the late 12th and 13th century and local to Chepstow.

The single body-sherd in fabric E comes from a large, swollen, hand-made vessel. The fabric is hard and light grey in the core, grading internally to off-white and externally to light brown between the extensive splashes of pale green glaze. It consists in thin-section of extremely abundant, subangular to subrounded grains (<2 mm) of limestone (micritic, shelly-micritic, pelloidal, oolitic), with some fossil shell debris, broken ooids, and subangular-rounded quartz sand (<1 mm). Occasional fragments of chert and feldspar (microcline) were seen and there are some clay pellets. The matrix is fine-grained and slightly silty. An external ornament consisting of an horizontal band associated with a lattice pattern had been added using a comb before glazing. A definite source for this distinctive fabric has not been identified, but the inclusions could all have come from an area that included the Carboniferous Limestone, either in Glamorgan, the Forest of Dean or the Bristol district. If it is Papazian's Glamorgan Limestone-tempered Fabric, a late 12th-century appearance is indicated (Papazian 1990; Papazian and Campbell 1992).

Fabric F accounts for at least three hand-made vessels with a smooth external finish. One is a sooted, round-based cooking pot represented by discrete groups of joining sherds from the base and rim and isolated fragments from the body (Fig. 5.1, 2). The rim is slightly everted, thickening upward to a wide, flat top above a distinct bead. The sherds lack glaze or other ornamentation. The other recognisable vessel is a globular jug or pitcher with a thumb-printed base (Fig. 5.3). A bright, apple-green glaze is heavily splashed externally over the lower part of the pot but becomes sparse upward. The sherd from the third vessel carries a bright, dark green glaze. The fabric is mid grey-dark grey in the core, grading internally to light grey-pale brown and externally to pale brown (except beneath glaze splashes). It is hard and composed of very abundant quartz sand (<1 mm) with scattered to common, generally rounded pellets (<2 mm) of pale brown to dark red clay. In thin-section, the quartz varies from angular to subrounded, and includes many polycrystalline grains, some with a stretched fabric or even, given the associated mica, a schistose appearance. There are a few grains of indurated siltstone and very occasional feldspars. The pellets are of a ferruginous, silty clay. The silty-sandy matrix has almost no mica. A source for this pottery has not been identified, but a local origin is plausible, with the forms suggesting a 12th-14th century date.

Glamorgan Ware (see Rumney Great Wharf, Fabric D, below) is represented by three body sherds from large vessels, at least one of which had been decorated with a thin green glaze. A late 12th to 14th century date may be suggested.

Rumney Great Wharf

Ham Green Ware (Fabric A) is represented chiefly by body sherds, but there is an almost upright, upward-thickening, flat-topped rim from a wide-mouthed vessel and another, slightly more everted rim possibly from a jug or pitcher (Fig 6.1, 2). The fabric is hard and pale cream to pale brownish pink, commonly with a light grey core. Thin-sections confirm the presence of common to abundant, subangular to rounded grains (<0.5 mm) of simple and polycrystalline quartz, with variable quantities of clay pellets and red-black ore grains (<3 mm), and very occasional sandstone fragments (some iron-cemented). Traces of a dull green glaze survive on a number of sherds. Ham Green Ware is present on the Welsh littoral generally from the late 12th to the late 13th century (Papazian and Campbell 1992). At Chepstow it appears in 13th-century contexts (Vince 1991).

The sherds assigned to Penhow Ware (Fabric B) appear to be all from hand-made cooking pots (Fig. 6.3-8). Typically, they are mid grey in the core, grading outward to a dull brown or orange-brown, with a visibly micaceous finish. As confirmed by thin-sections, abundant to very abundant, poorly sorted, mainly subangular quartz (<1.5 mm) is accompanied by occasional grains of indurated sandstone, very occasional feldspar, occasional pellets of silty clay and variable but generally small amounts of red-black, opaque ore (<1 mm). The matrix is coarse and silty-sandy. The rims present in the collection are upward-thickening and generally slightly everted; their tops are flat, commonly with either a central depression or slight, incised groove, and may be faintly beaded either internally or externally. Traces of a brown-green glaze survive on a few sherds; the vessels are otherwise undecorated. This ware dates from the late 12th to the late 13th century (Papazian and Campbell 1992).

The sherds of 'Bristol' Wares (Fabric C), apparently from largely plain cooking pots (Fig. 6.9), form a rather variable group. The core ranges from light to dark grey, grading outward to a dull pale brown or orange-brown and even mottled red. In hand-specimen and thin-section, the fabric is dominated by densly packed flakes and pellets of silty-sandy clay (<4 mm), accompanied by abundant, poorly sorted, subangular to subrounded grains of simple and polycrystalline quartz (<1 mm), with occasional quartzitic sandstones and very occasional feldspar. One sherd carried an incised groove beneath traces of brownish-green glaze. A 12th to 13th century date may be suggested.

Glamorgan Ware (Fabric D), which dominates the assemblage, is represented by sherds, including rims, bases and handles, from chiefly wheel-made jugs/pitchers and some cooking pots (Fig. 6.10-16). The two sherds recovered from the Wentlooge palaeosol at the Romano-British site (see above) come from different vessels also attributable to this ware. The fabric is moderately hard and mid to dark grey in the core, grading outward to dusky pink, orange-brown or pale orange, commonly with grey mottles. Thin-sections confirm the presence of common to abundant, well-sorted, subangular to subrounded grains of quartz (0.25-1 mm) with some indurated sandstone and very occasional feldspar, together with variable amounts of brown-red clay pellets (<3 mm). The matrix is fine grained and very slightly silty. The surviving rims of the vessels are simple, varying from rounded to slightly flattened at the top and slightly inturned to more usually upright or moderately everted. The bases of the larger forms are closely thumb-printed. Handles vary from strap-shaped (<42 mm wide) to cylindrical and had been pulled. Traces of an external, yellow-green glaze survive on about one-third of the sherds. Two are decorated with sets of combed grooves beneath the glaze; stab marks occur along some handles and are frequent at fixing points. The ware seems to date from the 13th and 14th centuries.

The sherds of Malvern Wares (Fabric F) appear to be from plain cooking pots, at least one of which was round-based; one sherd was decorated with a tight, sinusoidal incision. The fabric is moderately hard to hard and, typically, mid-dark grey in the core, grading to dull brown to orange-brown at the visibly micaceous surface. Thin-sections confirm the presence of extremely abundant, subangular to subrounded quartz (<3 mm) with subordinate indurated-schistose sandstones, occasional clay pellets and feldspar. The matrix is very silty. The cooking pots range between the 12th and the 14th centuries in the production area (Vince 1977). In Wales, however, Malvern wares are described as common only from the 15th century (Papazian and Campbell 1992). Vince (1991) found them to be rare compared to other wares in the mainly 12th-13th century contexts at Chepstow.

A number of sherds from floor and roof tiles were also recovered. The Glamorgan fabric is represented by six pieces (thickness 7-9 mm) from grooved and glazed floor tiles (Fig. 6.18) and three fragments, including one with a knife-cut crest (Fig. 6.17), of patchily glazed roof tiles (thickness 12-15 mm). There are also fragments of both kinds of tile in the 'Bristol' fabric, and one unprovenanced tile.

Bibliography

Allen, J.R.L. 1987 Shoreline oscillations in the Severn Estuary: the Rumney Formation at its typesite (Cardiff area). *Philosophical Transactions of the Royal Society of London*, B315, 157-184.

Allen, J.R.L. 1990a Saltmarsh growth and stratification: a numerical model with special reference to the Severn Estuary, southwest Britain. *Marine Geology*, 95, 77-96.

Allen, J.R.L. 1990b Reclamation and sea defence in Rumney Parish (Monmouthshire). *Archaeologia Cambrensis*,137, 135-140.

Allen, J.R.L. 1990c The Severn Estuary in southwest Britain: its retreat under marine transgression, and fine-sediment regime. *Sedimentary Geology*, 66, 13-28.

Allen, J.R.L. 1993 Muddy alluvial coasts of Britain: field criteria for shoreline position and movement. *Proceedings of the Geologists' Association*, 104, 241-262.

Allen, J.R.L. 1994 A continuity-based sedimentological model for temperate-zone tidal salt marshes. *Journal of the Geological Society of London*, 151, 41-49.

Allen, J.R.L. 1995 Salt-marsh growth and fluctuating sea level: implications of a simulation model for Flandrian coastal stratigraphy and peat-based sea-level curves. *Sedimentary Geology*, 100, 21-45.

Allen, J.R.L. (forthcoming) A medieval timber setting and subrectangular diggings in late Flandrian estuarine sediments, Rumney Great Wharf, Gwent *Archaeologia Cambrensis*.

Allen, J.R.L. and Fulford, M.G. 1986 The Wentlooge Level: a Romano-British saltmarsh reclamation in southeast Wales. *Britannia*, 17, 91-117.

Allen, J.R.L. and Fulford, M.G., 1987 Romano-British settlement and industry on the wetlands of the Severn Estuary. *Antiquaries Journal*, 67, 237-289.

Allen, J.R.L. and Fulford, M.G., 1992 Romano-British and later geoarchaeology at Oldbury Flats: reclamation and settlement on the changeable coast of the Severn Estuary, southwest Britain. *Archaeological Journal*, 149, 82-123.

Allen, J.R.L. and Fulford, M.G. 1996 Late Flandrian coastal change and tidal palaeochannel development at Hills Flats, Severn Estuary (SW Britain). *Journal of the Geological Society of London*, 153, 151-162.

Allen, J.R.L. and Rae, J.E. 1987 Late Flandrian shoreline oscillations in the Severn Estuary: a geomorphological and stratigraphical reconnaissance. *Philosophical Transactions of the Royal Society*, B315, 185-230.

Allen, J.R.L. and Rae, J.E. 1988 Vertical saltmarsh accretion since the Roman period in the Severn Estuary. *Marine Geology*, 83, 225-235.

Allen, J.R.L. and Rippon, S.J. (forthcoming) Iron Age to early modern activity at Magor Pill and palaeochannels, Gwent: an exercise in lowland coastal-zone geoarchaeology. *Antiquaries Journal*.

Aston, M and Iles, R. 1986 *The Archaeology of Avon*, Bristol: Avon County Council.

Burd, F. 1995 *Managed Retreat: a Practical Guide*. Peterborough: English Nature.

Cahoon, D.R., Reed, D.J. and Day, J.W. 1995 Estimating shallow subsidence in microtidal salt marshes of the southeastern United States: Kaye and Barghoorn revisited. *Marine Geology*, 128, 1-9.

De Bakker, G. 1948 De inundaties in Nederland in 1944 en 1945 en de gevolgen daarvan. *Boor en Spade*, 2, 77-82.

French, J.R., Spencer, T. and Stoddart, D. 1990 *Backbarrier Saltmarshes of the North Norfolk Coast: Geomorphic Development and Response to Rising Sea Levels*. London: University of London, Department of Geography, Discussion Papers in Conservation 54.

Fulford, M.G., M.G., Allen, J.R.L. and Rippon, S.J. 1994 The settlement and drainage of the Wentloge Level, Gwent: excavation and survey at Rumney Great Wharf 1992. *Britannia* 25, 175-211.

Grieve, H.E.P. 1959 *The Great Tide*. Chelmsford: County Council of Essex.

Grove, J.M. 1988 *The Little Ice Age*. London: Methuen.

Hall, D. and Coles, J. 1994 *Fenland Survey. An Essay in Landscape and Persistence*. London: English Heritage Archaeological Report 1.

Lamb, H.H. 1984 Climate and history in northern Europe and elsewhere. In: Morner, N.A. and Karlen, W. (eds) *Climatic Changes on a Yearly to Millennial Basis.* Dordrecht, Reidel, 225-240.

Lewis, E.A. and Conway Davies, J. 1954 *Records of the Court of Augmentations Relating to Wales and Monmouth.* Cardiff: University of Wales Press.

Moeller, I., Spencer, T. and French, J.R. 1996 Wind wave attentuation over saltmarsh surfaces: preliminary results from Norfolk, England. *Journal of Coastal Research*, 12, 1009-1016.

Owen, A.E.B. 1952. Coastal erosion in E. Lincs. *Lincolnshire Historian*, 9, 330-341.

Papazian, C. 1990 The survey of medieval ceramics from south-east Wales. *Medieval Ceramics*, 14, 23-39.

Papazian, C. and Campbell, E. 1992 Medieval pottery and roof tiles in Wales AD1100-1600. *Medieval Pottery in Wales*, 13, 1-107.

Pizzuto, J.E. and Schwendt, A.E. 1997 Mathematical modeling of autocompaction of a Holocene transgressive valey-fill deposit, Wolfe Glade, Delaware. *Geology*, 25, 57-60.

Pye, K. and French, P.W. 1993 *Erosion and Accretion Processes on British Saltmarshes. Vol. 5. Management of Saltmarshes in the Context of Flood Defence and Coastal Protection.* Cambridge: Cambridge Environmental Research Consultants.

Rippon, S. 1995 The evolution of a historic wetland landscape: the Gwent Levels Historic Landscape Study. *Severn Estuary Levels Research Committee Annual Report 1994.* Lampeter: SELRC, 7-19, 157-165.

Rippon, S. 1996 *Gwent Levels: the Evolution of a Coastal Landscape.* York: CBA Research Report 105.

Smith, M.V. 1985 The compressbility of sediments and its importance on Flandrian Fenland deposits, *Boreas*, 14, 1-18.

Squirrell, H.C. and Downing, R.A. 1969 *Geology of the South Wales Coalfield. Part I. The Country around Newport (Mon.)*, 3rd ed. Memoirs of the Geological Survey of Great Britain. London: HMSO.

Sylvester, D. 1958 The common fields of the coastlands of Gwent. *Agricultural History Review*, 6, 9-26.

Vince, A. 1977 The medieval and post-medieval ceramic industry of the Malvern region: the study of a ware and its distribution. In: Peacock, D.P.S. (ed.), *Pottery and Early Commerce.* London: Academic Press, 257-305.

Vince, A. 1991 The medieval pottery. In: Shoesmith, R., *Excavations at Chepstow 1973-1974.* Bangor: Cambrian Archaeological Monographs 4, 93-140.

Waters, R.A. and Lawrence, D.J.D. 1987 *Geology of the South Wales Coalfield. Part III. The Country around Cardiff*, 3rd. ed. Memoirs of the Geological Survey of Great Britain. London: HMSO.

Woolnough, S.J., Allen, J.R.L. and Wood, W.L. 1995 An exploratory numerical model of sediment deposition over tidal salt marshes. *Estuarine, Coastal and Shelf Science*, 41, 515-543.

John Allen,
Postgraduate Research Institute for Sedimentology,
University of Reading,
P.O. Box 227,
Whiteknights,
Reading, RG6 6AB

The Committee is extremely grateful to the Council for British Archaeology for a grant towards the cost of this publication