The Archaeology of the Broads: a review

For Norfolk County Council, Historic Environment Service & the Broads Authority

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The Landscape of the Broads from Burgh Castle. This was part of the Great Estuary in the Roman period, but now shows many of the features of the modern landscape – open water, reed-swamp, grazing marsh and a farmhouse and drainage mill. Visible features of the historic environment form a key component of the landscape, easily understood by all, but buried archaeology is less well understood and less appreciated.

Broads Authority
The Broads - a member of the National Park family

Norfolk County Council

Introduction

Compared to other wetland, or former wetland, areas of the East of England the archaeology of the Broads is comparatively under-investigated (Brown *et al* 2000). The historic legacy of records seems scarcely to exist here. Finds made during medieval peat extraction would have gone completely unrecorded and Post-Medieval extraction of peat seems not to have been under the direction of large landowners, so the workings would have been less likely to be seen by educated individuals who could acquire and report on what was found. Bronze Age swords may not literally have been "beaten into ploughshares" – but they may have been re-cycled in other ways. Groundwater has been maintained at a higher level in many areas compared with, for example, the Fen Basin, and so deposits are often less visible and accessible. The masking of valley floor sites in the region by later alluvium further conceals low-lying sites from aerial survey and prevents conventional surface fieldwalking. Although some parts of the Broads are subject to relatively intense development for infrastructural and retail/housing development (e.g. the wetlands between Wroxham and Ludham: Hutcheson 1998) other areas are managed with conservation objectives paramount. Some areas are designated as Sites of Special Scientific Interest (SSSIs). Opportunities for modern archaeological investigation have therefore been restricted. Nevertheless several recent excavations associated with commercial or flood alleviation developments have produced significant results and are noted below.

Despite these limitations, several authors have provided assessments and reports on the historic environment and archaeology of the Broads (Hutcheson 1998, Murphy 2001, Fletcher 2003 and Albone and Massey 2007). Moreover English Heritage is currently developing a Statement of Significance for the Broads as part of the National Heritage Protection Plan (Activity 3A5: Exceptional Waterlogged Heritage Project, 6240: Heathcote and Campbell, in prep). This document is a collation of recent results and current conclusions and recommendations.

The study area

The Broads are defined by Natural England as National Character Area 80, located primarily within Norfolk with a small part of North Suffolk. Its boundary is defined as following the edge of the level, open marshland and valleys of the rivers Yare, Bure and Waveney, with their tributaries the Thurne, Ant, Wensum and Chet. These ultimately flow eastwards into the sheltered estuary of Breydon Water behind the Yarmouth Spit or, in Suffolk, to Oulton Broad. Its northern boundary is, in essence, continuous with the 14km stretch of coastline between Happisburgh and Winterton-on-Sea. The Norfolk and Suffolk Broads Act 1988 constituted the Broads Authority and the area within its executive boundary was given equivalent status to a National Park. The Authority also has responsibilities for maintaining the navigation along the rivers, which requires dredging and silt removal from the river beds. It includes ten National Nature Reserves and numerous Sites of Special Scientific Interest (Natural England: website[1])

From an archaeological perspective it is important that the wetlands and adjacent 'uplands' in the Broads are considered together, since they were originally managed as part of the same land-holding and agricultural system as defined by Williamson (1997). This report will, therefore, not be confined in a limited way to the marshes and river valleys but will extend

[1] Websites and pages are listed separately at the end of the Bibliography.

onto the interfluves. This helps to ensure that the study reflects human interaction between upland and marshes over the centuries. The National Mapping Programme (Albone and Massey 2007) defined co-axial field systems on the Broads interfluves and this has now been extended to the Suffolk portion of Lothingland and Greater Lowestoft.

Impacts and opportunities

The main factors affecting the buried archaeology of the Broads include:

- infill and commercial development altering the quality of the built environment and impacting buried archaeology in wetland areas, with more extensive development on the interfluves;
- development in wetland areas such as boat dyke/mooring extensions and the construction of wild-fowling ponds;
- groundworks associated with the Broads Flood Alleviation Project, which may protect historic buildings, but which may also affect buried archaeology adversely;
- changes in land use following the end of the ESA Scheme in 2014 and its replacement by NELMS (a scheme with different priorities and lower levels of funding) which may result in some ploughing on the marshland, with associated under-draining and dyke filling. Some 70% of England was covered previously, but in future there will only be *c.* 30-50% coverage. EIA consultations for this have already been seen;
- changes in water quality, eutrophication, abstraction, input of saline water from tidal flooding, besides diffuse pollution from land management;
- seasonal variability in river flows;
- depleted groundwater resources;
- bank erosion;
- dredging and mud pumping, in line with maintaining navigation, may have adverse effects, including the loss of peat baulks, as has happened at Barton Broad;
- nature conservation schemes including scrape development;
- offshore commercial development related to aggregate extraction and windfarm construction; and
- in the longer term, climate change and rising sea levels.

Viewed more positively, at least some of these threats provide opportunities for archaeological investigation and an increase in our understanding of the archaeology of the area. Groundworks for flood protection may be physically destructive, but on balance lead to an increase of archaeological knowledge. Dredging can also be managed to minimise damage and, in some cases, to produce information. As part of the planning system, archaeological mitigation will provide new data. What is a 'reasonable' requirement needs consideration: peat should be seen as a heritage asset and a palaeoenvironmental resource. To maximise the return of data it is important that both the Desk-Based Assessments and fieldwork are undertaken by organisations and staff familiar with the Broads environment.

The Broads Flood Alleviation project (www.bfap.org/) has resulted in several significant discoveries in The Broads, notably dug-out boat of Late Saxon date, (with associated animal bone deposits) near Ludham Bridge, a probably late-Medieval boat near Loddon in the Chet valley, Late Iron Age timber alignments at Beccles-Gillingham and Barsham-Geldeston, a pot boiler mound on the Waveney, and fishtraps in the Rivers Bure, Yare and Chet. Brickmaking sites have also been discovered at Reedham with an early example at West Caister.

Offshore development results in investigation of Holocene deposits – geophysical and borehole studies - undertaken as part of obtaining abstraction licences or wind farms. Data from these studies would be useful in terms of giving a wider background picture for the Broads. English Heritage has insight into much of this work through its statutory responsibilities and Marine Licence applications. The results of much of this work will be published or available as grey literature. A survey of this material is required, principally by contacting the contractors, such as Wessex Archaeology.

Sedimentary sequence in the wetlands

The post-glacial deposits of the Broads comprise the Breydon Formation (Arthurton *et al* 1994), and the basal gravels of the Yare Valley formation. The conformation of the basal gravels could have been a significant landscape feature providing a depositional context for the Lower Peat. The Holocene sequence is outlined by Coles and Funnell (1981), based largely on investigations in the Yare valley. It includes predominantly estuarine muds (clays, silts and occasionally sands) in the lower valley, on Halvergate Marshes for example, with basal and intercalated peats, all overlying fluvial depsoits and Pliocene/Pleistocene Crag. Landwards, and in the upper river valleys, the clastic sediments thin and peats predominate. However, as noted below the date and extent of deposits is locally variable, related to palaeogeography. The stratigraphy of the Yare is generally taken as the 'standard' sequence for the Broads, though work has also been undertaken in the Waveney valley by Suffolk County Council Archaeology Service, though peat was degraded and pollen patchily preserved (Hill *et al* 2008), and elsewhere. In the Yare the Holocene sequence is:

1. Lower Peat (=Basal Peat). This peat, formed on a pre-transgression land surface is a wood peat overlain by *Phragmites* peat at its contact with the overlying clay. In the upper valley it occurs at -8 to -13m OD. It has been attributed to Godwin's pollen zones V, VI and early VII (Jennings 1955) and must date to around 9000-7500 BP (uncalibrated). The peat thickens and occurs at lower levels seawards. A basal biogenic sediment at Great Yarmouth (-19.3 to -19.5 m OD) including hydrobiid molluscs, formed in estuarine/salt marsh conditions, is dated to 7580 $\pm$ 90 BP (uncalibrated).

2. Lower Clay. From about 7500 BP marine transgression resulted in the overlapping of the Lower Peat by estuarine muds, mainly clays, but with coarser silt and sand sediments towards the sea. This transgression extended up to 20km inland from the *modern* coast. The position of the contemporary coastline is uncertain and plainly was dynamic over time. A reconstruction of palaeogeography is given in Coles and Funnell (1981, fig. 4). The top contact of the Lower Clay is not well-dated, but may fall around 5000-4000 BP.

3. Middle Peat. This intercalated peat, fen wood peat inland and dark structureless peat seawards, was attributed by Jennings to early zone VIIb onwards. The top contact has given a date of 1973 $\pm$ 50 BP (SRR-573; uncalibrated).

4. Upper Clay. This second phase of estuarine sedimentation (again mainly clays upstream, fine sands seawards) was more extensive than the previous one, reaching 23km inland from the modern coast: estuarine sediments have been recorded to within 7km of Norwich (Albone and Massey 2007, 6). Renewed estuarine conditions may have been initiated by the destruction of a sand barrier on the site of the modern Yarmouth sand-spit. The maximum extent is dated to 1609 $\pm$ 50 BP (SRR-575, uncalibrated). The palaeogeography of the Broads

estuary at this time is discussed by Boomer and Godwin (1993) and the overall palaeogeography is illustrated by Coles and Funnell (1981, fig 6). Estuarine sedimentation ended abruptly, probably as a result of the development of the Yarmouth sand spit; and estuarine conditions were thereafter confined to the area of Breydon Water.

Plate 1. Whitlingham, Norfolk. The exceedingly thin minerogenic unit within the Lower and Upper Peat sequence marks the ultimate inland Holocene extent of marine conditions, almost as far upstream as Norwich, at the time of the Upper Clay in the Late Roman to Early Saxon periods.

5. Upper Peat. Due to wastage following drainage and agriculture, and very large-scale Post-Medieval surface extraction, peat formed in freshwater conditions after the Upper Clay estuarine phase is patchily preserved (but also see Wallis and Green 2014).

The surviving sedimentary sequence in The Broads was continuous with that of an off-shore submerged landscape of Palaeolithic to Neolithic date. Markedly lower sea levels at some periods would have resulted in a substantially different coastline. In 2008 Palaeolithic artefacts were recovered from the offshore dredging Area 240 (licensed to Hanson Aggregates Marine Ltd) about 11km off the coast of Great Yarmouth. The finds showed that stratified archaeological material can survive in deposits, originally of terrestrial origin, being extracted for aggregates. This led to a programme of offshore geophysical and geotechnical work, palaeoenvironmental studies, grab sampling and extraction of dredgings from the area, which provided information on landscapes from the Palaeolithic to Mesolithic. Provisional results from Wessex Archaeology indicate that the artefacts are of varying date but most can be attributed to sediments deposited during the Wolstonian (Marine Isotope Stage 8/7) in a

palaeochannel and floodplain deposits (Murphy 2014, 15-16; Wessex Archaeology 2010, 2011 and references therein).

The successive offshore submerged landscapes of very widely differing dates will not be considered here, but it must be borne in mind that the Broads are essentially a small part of a wider North Sea palaeo-landscape connecting - ultimately - with the wetlands of the Netherlands. The Broads are not just English. Moreover, the Research and Management Framework developed for the North Sea should be considered as a possible model for a Broads Archaeological Research and Management Framework (Peeters, Murphy and Flemming 2009).

The summary of the archaeology of the Broads

Results from the sites on the modern shore at Happisburgh, Norfolk, just north of the Broads, demonstrate that anatomically pre-modern humans inhabited an upper estuarine part of the early Thames towards the end of an interglacial, about 0.78-0.99 million years ago, within a wider habitat of boreal forest of pine and spruce. Habitats in this vicinity would have included the tidal river, salt marshes, freshwater marshes and a grass-dominated floodplain grazed by herbivores. The richness of food resources provided by this range of habitats may partly explain a human presence, but the fact remains that cultural adaptations to a cooler climate would have been necessary – potentially including the use of fire, shelters and clothes (Parfitt *et al*. 2010). This was not the only early human presence at these latitudes, for later Lower Palaeolithic activity has been demonstrated, around 700,000 years ago, though in a phase of warmer Mediterranean-like climate, on a former flood plain at Pakefield, Suffolk (Parfitt *et al*. 2005).

The National Mapping Programme (NMP) has provided an overview of the region's more recent historic environment (Albone and Massey 2007), with a separate report on the Waveney Valley, focusing both on wetland and 'upland' areas within the region, and building on the earlier work of Williamson (1987, 1997). There needs to be a review of the Historic Environment Records (HERs), and this is a priority for future work. Photographic evidence from the Norfolk Air Photo Library, the National Monuments Record and Cambridge University collections were the principal collections of images employed for the NMP. It covered an area of 543 sq km, defining sites ranging from the Neolithic to the Second World War. Besides mapping prehistoric ceremonial and funerary sites (Neolithic mortuary enclosures, Bronze Age barrows, and possible Iron Age square barrows) it highlighted extensive later prehistoric, Iron Age and Roman field systems, trackways and enclosures, (including farmsteads and possible villas in the central area of the Broads) and substantial evidence for medieval and later peat extraction, besides characterising military sites of the two 20th century World Wars. The study area included the well-known wetlands of the Broads, but also islands and peninsulas of higher ground, characterised by fertile loam soils developed on loess deposits. Some additional information has also come from recent excavations. In brief summary, the records obtained were as follows.

- Possible Neolithic sites are defined by large curvilinear enclosures, some with causewayed ring ditches (although none could be defined confidently as causewayed enclosures), possible hengiform enclosures and fifteen long barrows or putative mortuary enclosures. There was a concentration of monuments around Broome Heath and in the Waveney valley.

- From the Bronze Age monumental sites again predominated: 216 ring-ditches representing former barrows, usually positioned on valley slopes were mapped, some of them as barrow cemeteries, the largest being, again, at Broome. The barrow mounds rarely survived. Some non-funerary enclosures and field systems and triple-ditched boundaries (as at Earsham in the Waveney valley) may well be of this period, but could be later. An enclosure and associated field system at Ormesby St Michael was excavated by Oxford Archaeology East in 2009-10. From aerial photographic evidence the enclosure was undated but was assigned a tentative medieval or post-medieval date by the NMP. However, excavation showed a clear Middle Bronze Age date. Reappraisal of the NMP for this area is plainly required to reassess the evidence for Bronze Age settlement and agriculture.

- Distinguishing later prehistoric and Iron Age settlement enclosures and field systems from those of Roman date is problematic on aerial photographic evidence alone: many may have remained in use across these periods. However, in some places planned Roman landscapes definitely overlie subrectangular and trapezoidal enclosures, as at Beighton. Fifty coaxial field systems were identified overall, especially around the margins of the Great Estuary, possibly suggesting a transhumant agricultural system using both upland and wetland areas. However, associated trackways are generally parallel with the river valleys rather than directed *towards* them, which might imply a much wider system of land use. Small square ditched enclosures may be Roman or Iron Age square barrows, one of them at Haddiscoe being associated with an earlier Bronze Age cemetery. Late Iron Age timber alignments have also been excavated in recent years by Birmingham Archaeo-Environmental at Geldeston, Beccles and Barsham and these certainly relate directly to the river valleys. The Geldeston alignment represented a 4m wide route, running for some 500m across the floodplain. Besides their probable functional role these alignments may also have had territorial or ritual functions.

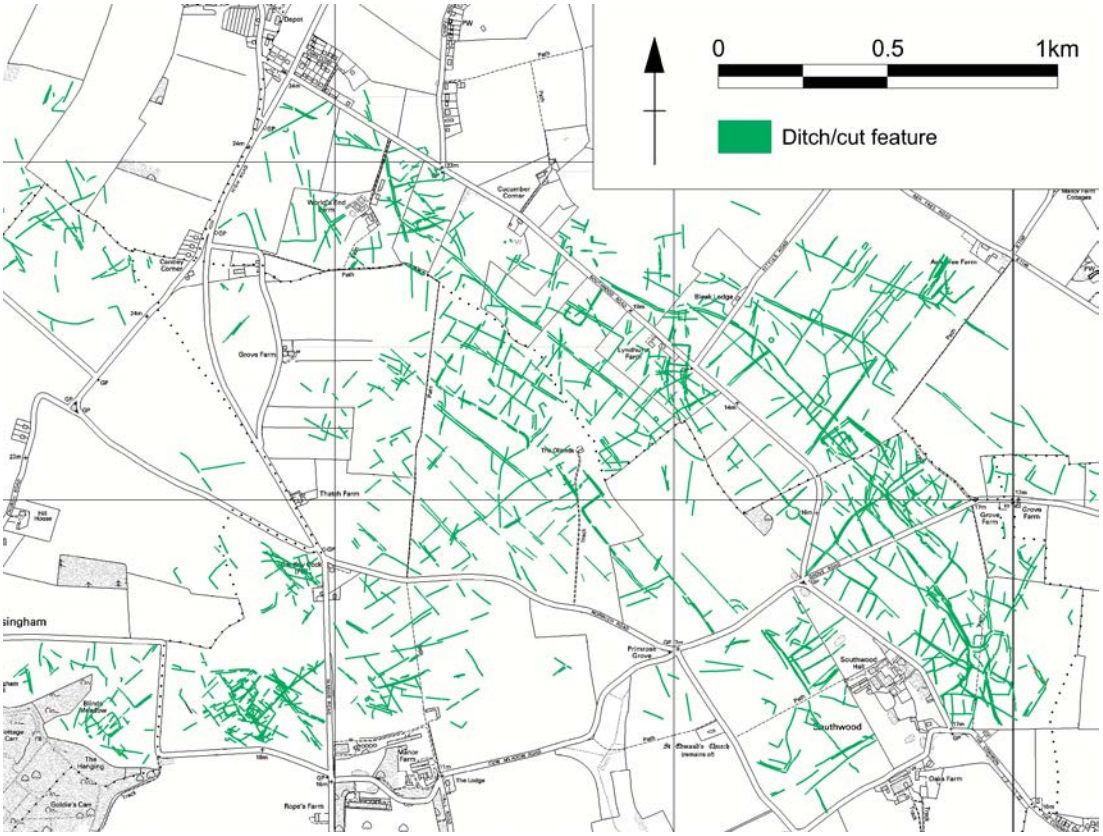

Plate 2: Cantley/Beighton field system. Base map © Crown Copyright, licence number 100019340 NMP mapping © English Heritage National Mapping Programme, licensed to Norfolk County Council

- A small Roman military site occurred at Reedham. However, the majority of Roman, or probable Roman, sites detected were enclosures, possible farmsteads and field systems. At Beighton, Carleton St Peter and Cantley, there are relatively well-defined enclosures probably representing villas, with other examples on the western edge of Flegg at Ashy-with-Oby and Thurne. A Romano-Celtic temple site has also been recorded, at Aldeby. Access to the Great Estuary was controlled by two Roman forts at Caister on Sea and Burgh Castle. Detailed palaeogeography of the coastline adjacent to the Caister fort has been investigated by Murphy (1993).

- Anglo-Saxon sites comprise linear earthworks probably of this period, as at Horning, and possible grubenhauser or sunken-featured buildings; however, some of the latter may in fact be small extraction pits. Flood Alleviation work near Ludham Bridge exposed a 3m long timber boat, dated to between Cal AD 650-780 and Cal AD 890-1020. It was associated with deposits of animal bones which, together with the boat, may represent a 'structured' deposit within a silting creek (H. Wallis, in Broadland Flood Alleviation Project website). An Anglo-Saxon post alignment was recorded at Herringby.

- Medieval features include moats, representing manorial complexes, and features associated with monasteries, as at St Benet's Abbey, destroyed churches and enclosures and field systems. Ridge and furrow was less common, but did occur on heavier soils on Boulder Clay or alluvial clays. On the coast saltern mounds occur at

the margins of the Great Estuary. Large peat-extraction pits dominate the record. The main urban development in the region was on the sand spit at Great Yarmouth. 11th and 12th century occupation material was stratified between layers of wind-blown sand and occupation continued until the present day. From the beginning fishing was the basis of the town's economy (Rogerson 1976, and *see* the Great Yarmouth Archaeological Map Project). The town's half-lion, half-herring crest reflects Edward III's gratitude for Yarmouth ships sent to participate in the Battle of Sluys in 1340 – more than the ships sent by the Cinque Ports of the south coast combined. Hulks and wrecks of the medieval period are uncommon, though recent works on the River Chet near Loddon have revealed an oak-plank boat believed to date from the Late Medieval period.

Plate 3: the vessel discovered on the River Chet. (photo: J. Albone, Norfolk County Council)

- The brief for this paper required the writer to focus discussion to below-ground archaeology (being the aspect which has generally received least attention). However, the Broads also has a wealth of post-medieval sites including extensive areas of later, shallower peat extraction and upstanding remains often of an industrial nature

  A number of these sites reflect the former use of the main Broads rivers as busy trading highways and also of past attempts to extend the navigations (e.g. the Aylsham Navigation, North Walsham and Dilham Canal, the Bungay Navigation and the so called 'New Cut' linking Reedham and St Olave's) and to facilitate access to the water - boat dykes, wherry cuts, staithes, or across the water, in the case of the many former ferry crossing sites. The waterways and the Broads in particular have a number of

wreck sites, often wherries, the local trading vessel, but other timber vessels have been discovered.

Waterside industrial buildings include granaries with wherry access beneath (e.g Stalham), maltings (e.g. Coltishall, Wayford Bridge, Ranworth, Oulton Broad and Ludham). There are also sites for lime burning (e.g Ludham, Whitlingham, Barton Turf) and brickmaking was particularly extensive (e.g Dilham, Surlingham, Rockland, Somerleyton, Reedham, Martham, Caister). Cement works were a feature around Breydon Water at Burgh Castle and Berney Arms, Reedham. More recent industrial activity and now a major landmark in the Broads is the Cantley Sugar processing factory established in 1912 on the River Yare with the advantage of access to water and the adjacent railway. Lost railways are another feature with remains of the former line between North Walsham and Great Yarmouth and the former line between Beccles and Haddiscoe found in a number of places.

- However, probably the most distinctive post-medieval remains are the Broads drainage mills c.70 survive in varying condition of c. 250 recorded sites. Only the Netherlands has more. Many still contain machinery and as a group they display a range of evidence of changing mill technology. The mills are found on most of the Broadland rivers but are very much tied into the landscape of Halvergate marshland triangle where they form an integral part of the wider Halvergate Marshes Conservation Area. Redundancy, exposure to elements and vulnerablility to vandalism mean a number of the mills are recorded locally as being ‘at risk’ and the Halvergate Marshes Conservation Area is currently included on English Heritage’s Heritage at Risk Register.

Plate 4: A drainage mill - an iconic image of The Broads (photo: Mike Page)

- From the 20th century, World War I pillboxes, as at Smallburgh and St Olaves, a munitions factory and hangars at Catfield, and systems of training trenches at Broome Heath, Brundall, Fritton and Waveney Forest have been recorded. World War II military sites are more extensively preserved, comprising pillboxes, perimeter defences for facilities such as searchlight batteries, and training areas, with strong defences of river crossings – anti-tank cubes, barbed wire obstructions, and gun emplacements. The rivers were used as potential natural stop lines for use if the coastal crust of defences were overwhelmed. An important group of World War II defences are located around Acle on the edge of the Halvergate Marshes. Finally, sites related to radar and radio were recorded, as at Neatishead and South Walsham.

The wetland erasure - peat extraction

During the early medieval period the Middle Peat in the upper valleys was extensively excavated to provide fuel (Lambert and Jennings 1960), as shown by borehole data, topographic studies and historical sources. The first phase of peat extraction had ceased by the end of the 14th century, after which the peat pits became flooded and then partly infilled with sediment, forming the present Broads. Studies of diatoms and other microfossils from the lake deposits have provided data on the process and timing of eutrophication, which is largely due to inputs of sewage effluent (Moss 1980 and references therein). Some Broads recorded on early maps, such as Honing Broad, became completely infilled and no longer exist. Medieval and later drainage, primarily grazing on the marshes of Halvergate and elsewhere, have been discussed by Williamson (1994). Following the demise of the deep medieval pits there was some peat ("turf") digging on a large scale in the post-medieval period up to the 19th century (Giller and Wheeler 1986). Extraction generally involved shallow but extensive pits known as turf ponds. These are up to 80cm thick, down to the Upper Clay, where it is present. As a result of this extraction, large areas of post-Roman peat have been lost. As noted below, the full extent of this loss needs documenting.

Research themes

Research is intrinsically of value for its own merits, but also provides data directly relevant to management, conservation, outreach and education.

- **An overall Archaeological Research and Management Framework should be developed for the Broads** (*c.f.* Peeters *et al.* 2009). In terms of structure it would probably be best to divide this study into three parts: palaeo-landscape and palaeoecology (peat, river valleys); landscape (field systems etc.); and surface (covering transport, industrial and military archaeology). Previous experience shows that this would be achieved most effectively by organising a day seminar at which experts on various aspects of the historic environment give presentations and research aims are discussed. This would be followed by the publication of an edited publication incorporating these presentations, conclusions and recommendations. Funding options for future research also need to be explored. Participation of local and regional universities is desirable to encourage research at masters and doctoral level.

- **Review and enhancement of the Historic Environment Records of the Broads areas of Norfolk and Suffolk is needed. This should not be just a number-crunching exercise but should, more subtly, aim to define patterns of deposition and long-term construction or extraction; and should feed into landscape**

modelling. It should include scoring of sites to reflect their significance. Amongst the categories of wetland sites that may be expected are Mesolithic through to Bronze Age sites on pre-transgression surfaces (e.g. burnt flint mounds and settlements); organic prehistoric sites within or buried by peat (e.g. trackways, platforms); buried intertidal/former intertidal sites (e.g. hulks, fish traps, salterns: and sites and remains associated with inland waterways (Murphy 2001). Analysis should extend to include definition of areas where good survival of sites can be expected and where they are most at risk.

- **An overall appraisal of earlier studies in the Broads should be undertaken.** At the seminar on 11th July 2014 several contributors referred to earlier studies in various types of format (paper archive, digital, published and unpublished), by various researchers, which are not well known at all. For example, Joyce Lambert's research data were deposited at the Norfolk Record Office but they remain uncatalogued and largely unusable. A cataloguing project and possible digitisation would be beneficial. Likewise some University research, often only available in theses, requires evaluation. Other published studies exist, such as the Broadland Land Use Survey (1967), with its classification of land as natural/semi-natural, and the Broads Vegetation Survey (1980) undertaken for the Broads Authority by the Institute of Terrestrial Ecology, (see below). However, the results have not yet been incorporated into archaeological thinking. Data are also available from borehole and geotechnical data from developments within the Broads, though it would be time-consuming to collate it. The British Geological Survey also holds historic borehole data, which is not necessarily always accurate but, used judiciously, can be informative. Finally, archaeological reports in the 'grey literature', produced by contracting organisations need inspection.

- **Reappraisal of the NMP results is required to re-consider possible evidence for Bronze Age settlement and agriculture** (cf. the enclosure at Ormesby St Michael, above) and to place the evidence for coaxial field systems in the area within the wider context of the county and Eastern England more generally.

- **Further palaeoenvironmental investigations are required to provide data on past sea-level change, climate change, vegetation history and post-glacial human interaction with the environment. In addition a more extensive assessment of peat survival and depth is needed, together with definition of surviving baulks between peat cuttings.** This should be supplied as a GIS layer on the HER. The 'classic' palynological investigations within the Broads (e.g. Jennings 1955) are old studies, nearly 40 years old, undertaken at a time when radiocarbon dating was very limited and the use of Bayesian statistics to refine calibration was unimagined. Some sites investigated by Lambert and Jennings (1960) were based on only very limited borehole studies (e.g. Hickling Broad) and the reliability of their conclusions have been queried. Re-investigation of some primary sediment sequences is needed to provide better chronological control. There is also a need to map all sites across the Broads where radiocarbon dates *are* available: some university work has not made it to the Historic Environment Records: existing palaeoenvironmental and scientific dating evidence needs to be added to the HERs. In general this would involve studies by experienced investigators, though volunteer involvement could be useful in, for example, recording sections in drainage ditches (see below).

- The Broads are characterised by peat extraction pits of medieval and later date (Albone and Massey 2007, 31-38). The earlier medieval features were large and 3-4m deep, often down to the underlying clay. A rising population and demand from the salt industry for fuel encouraged extraction from the 12th century onwards. The demise of this system was, in part, related to marine flooding, including the flood of 1287, but also probably related to a decrease in population in the mid to late 14th century. Some Broads entirely silted up but they are detectable on historic maps and aerial photographs, notably in the Thurne valley, where curvilinear drainage channels represent the earliest evidence for enclosure. Post-medieval extraction continued into the 18th and 19th centuries, notably in Poor Allotments, common land made accessible to the poor. Extraction was on a massive scale, undertaken long the lines of Doles – strips of land allocated to individuals (Williamson 1997). **Further historic map and documentary research is needed to define better the development of systems of extraction, besides defining areas of peat loss which will, in turn, affect archaeological survival from earlier periods.** Some work has been undertaken in relation to fenland management; but it is considered that a wider study would be a long and costly project. One contributor from the seminar, however, considers that surface peat deposits need to be defined in terms of location, extent, condition (hydrology), management of the area, threats, desiccation, excavation for development and nature conservation purposes and removal and that the Broadland Land Use Survey and the Broads Vegetation Survey should provide about 95% of the information needed (see above). This needs consideration. Special attention needs to be paid to these upper levels for they are scarce and at greatest risk of desiccation and disturbance (Fletcher 2003). Other palaeogeographic change requiring assessment is the changing courses of rivers: there is a need to map lost and changing courses and lost drainage features, notably in the upper Thurne valley. LiDAR survey seems a useful approach.

- Albone and Massey (2007, 26-30) have defined extensive systems of coaxial field systems, with a concentration on the Yare-Bure peninsula. This field system is characterised by roughly parallel long boundaries of northwest to southeast alignment and associated with trackways. Small trapezoidal enclosures also occur. North of Hoveton there is another system with a largely east-west alignment. However, the critical question is their *date*. In the absence of excavation, dating is *suggested* by associated surface finds and relationships with other, dated, features. The former evidence, limited though it is, has largely been of Roman date. Pre-existing landscape features such as Bronze Age barrows suggest dating for some systems. **Ground-truthing by fieldwork and excavation at critical locations where these systems relate to earlier or later features, or adjacent contemporary archaeological sites, is needed to provide dating and phasing evidence. Initially these locations need to be defined, before developing a research programme.**

- **Hulks and hulk assemblages need more recording and assessment.** English Heritage has undertaken survey of hulk assemblages on coasts (Heritage Protection: Thematic Survey of Hulk Assemblages (Coastal Survey: 3A2 5919) and this provides a methodology for survey and assessment in the Broads. Those recorded during the coastal survey were, in 90% of cases, recent and well known locally, but a very small proportion of hulks will always be exceptional in terms of age or vessel type, and so require detailed recording or even lifting and conservation. A particular problem in the Broads is that hulks can be seen as navigation hazards and something to be tidied

away. Losses in recent years include a wherry near Ranworth visitor centre and the former Burgh Cement Works wherries on Breydon North Wall. Where hulks have been lifted there may be problems in terms of long-term conservation and so funding and facilities for this need *firmly* assuring before lifting. Additionally, in the Broads, it is thought that it will still be possible to obtain oral evidence on the vessels represented and the patterns of deposition.

- **Aircraft crash site information needs to be collated and research added to the Historic Environment Record.** Many crash sites are known locally and the locations of others could no doubt be ascertained.

- Drainage features were mapped in some areas however not consistently across Halvergate Marshes. NMP coverage for the Broads area is almost complete. F**urther mapping to cover the upper Bure valley using conventional aerial survey but also LiDAR imagery where available is needed.**

- **The evidence for salt production, especially around the Halvergate Marshes, needs further investigation.** There is plenty of evidence from the Domesday Book, but little archaeology. Mounds in this area are assumed to represent medieval salterns but there has been little excavation (*cf.* Ash Tree Farm and one investigated by NAHRG at Six Mile House on the River Bure).

- **The results of offshore geophysical and vibrocore investigations undertaken during Marine Licence applications require appraisal and synthesis to provide a wider background to the sedimentary sequence of the Broads.** See Wessex Archaeology (2010, 2011) for examples of what is available.

- **Opportunities to investigate the archaeological and palaeoecological resource as part of the development control process must be welcomed and exploited** (see Case Study, p. 14). These will include residential, commercial and flood alleviation developments. It is important, however, to understand that it is not possible to request work simply to secure information: requests must be justified in the planning context.

One possible source of funding for some of these activities may be via the National Heritage Protection Plan, managed by English Heritage. The present round of the NHPP concludes in 2014 and a revised version will be produced for the future. The structure of the plan may change but relevant Activities in the present version comprise:

2C1 Major environmental threats
2C2 Attritional environmental threats
3A3 Deeply buried/subterranean survey
3A5 Wetland survey
4F2 Field systems
5C1 Historic Environment Record development.

Managing the archaeology of the Broads

The Broads are currently managed by the Broads Authority following the Broads Plan of 2011 (website). The document includes specific reference to landscape and cultural heritage (pp. 28-9) and includes the specific policies LC1.3 “Develop comprehensive evidence base of

cultural and historic landscape characterisation and assets to inform management guidance" and LC1.4 "Complete survey of sites and features of geodiversity significance in the Broads." The present paper will contribute towards these. However, the plan also includes policies related to climate change, sea-level rise (with reference to the The Broads Flood Alleviation Plan and its successor after 2021), water quality, biodiversity, agriculture and land management, navigation and promoting understanding, enjoyment and well-being. Historic environment management must take account of all these issues within the context of poor visibility of archaeology in wetland areas and the fragility of the waterlogged archaeological resource. Whilst water tables may, in general, be maintained at levels that will maintain the survival of organic materials, modern chemical contamination, eutrophication and salt-water influx may have adverse and unpredictable effects.

- **A review of the Broads Plan is required to integrate archaeology (and, for Pleistocene and Holocene deposits, geodiversity) more fully within the objectives defined and to develop combined conservation and heritage objectives and monitoring of water quality and chemistry**. The Plan is up-dated regularly, at approximately 5 year intervals, so there is an opportunity to influence the 2016 plan, for which work is beginning now.

- **Best practice guidelines on planning and development in conservation and development should be developed with stakeholders. Although this is already, in principle, part of Planning Policy, it needs to be more actively pursued.**

- **Monitoring and protection of highest potential, the oldest and youngest sequences, and areas of high potential for the recovery of artefacts and sites are needed** (Fletcher 2003). English Heritage's Science Advisor has noted that lessons from current work on monitoring groundwater conditions at sites around Flag Fen, Cambridgeshire, and their effects on the preservation of waterlogged sites such as Must Farm could be directly applicable to monitoring in the Broads.

Management comprises conservation (within a development context), but also presentation, to help make people aware of the historic environment within which they live. This is essential in aiming to strike the right balance between economic development and conservation as part of the planning system. Moreover, in such a humanly-modified landscape as the Broads, a sound understanding of palaeoecology is essential in terms of interpreting modern ecology. A proposal for a pilot Historic Landscape Characterisation (HLC) was developed by Hutcheson (1998: see Appendix 1). Historic Landscape Characterisation was subsequently undertaken for the whole of Norfolk. Discussion of the proposed Broads HLC with David Gurney and Alison Yardy has indicated that an HLC is no longer considered to be an appropriate approach, but rather would be achieved by the documents recommended in **Research Themes**, above. At a national level input into English Heritage's Statement of Significance for the Broads as part of the National Heritage Protection Plan (Activity 3A5: Exceptional Waterlogged Heritage Project, 6240: Heathcote and Campbell, in prep) will be needed to emphasise the exceptional status of the historic environment of the Broads and, potentially, to apply for future funding from the NHPP.

Although nature conservationists are well aware that modern wetland habitats in the Broads are a product of past human activity (George 1992), this need not necessarily translate into an understanding that present-day nature conservation management can have adverse impacts on

historic resources. There are some areas where collaboration is mutually helpful: maintaining high water levels in wetlands is beneficial for both natural and archaeological resources. Monitoring and maintaining the peat in its present condition to prevent deterioration of the resource is needed, and this will necessitate monitoring water tables and water chemistry (Fletcher 2003). Conversely the digging of 'scrapes' or ponds may physically destroy archaeology. Moreover conflicts of interest may arise with other users of the Broads: increased tourism, for example, may require construction of new infrastructure besides increasing erosion of banks from boat washes. Establishing best practice guidelines for future conservation and development with stakeholders is necessary to ensure that the archaeological resource is not endangered. The Broads Authority's statutory purposes must be balanced, something that further research will help to ensure. Archaeology is under-researched in the area so further work is needed to ensure a correct balance. "**Communicating effectively with other Broads stakeholders and user groups is a priority for archaeologists and palaeoenvironmental researchers"** (Fletcher 2003).

Other factors influencing management include climate change, sea-level change, fluctuation in water tables, hydroseral changes, changes in agricultural practice and colonisation by invasive species, especially those with deep root systems. **Monitoring will be required at sensitive locations**.

Community and volunteer involvement

Community involvement for the historic environment involves several components: access to information and the undertaking of fieldwork and research that will be seen as useful and productive by all parties involved.

Information and publicity for schools and the community in general is needed in order to amplify people's perception of the landscape in which they live. It is probably fair to say that many residents of the Broads have a strong sense of regional identity; but also that this, to a large extent, relates to the medieval and post-medieval landscapes. Far fewer people are aware of the longer-term history and prehistory of the region. The identification of target potential groups is needed (e.g. in terms of the National Curriculum).

Information can be provided in various formats as hard copy (booklets, leaflets, sign-boards) and also digitally. Collaboration with partner organisations to provide information through linked websites, hides and information centres would be helpful. Information points and exhibitions should be used at 'visitor hot-spots' (Fletcher 2003). Albone and Massey (2007) have emphasised that the NMP data are ideal for incorporation into the internet and could be incorporated into future versions of the Norfolk Heritage Explorer website.

In terms of volunteer fieldwork and research three main areas stand out immediately.

- In wetland areas of the Broads archaeological deposits and artefacts are invisible due to sedimentary cover. Hence surface fieldwalking in these areas would be ineffective. However, systematic inspection of drainage ditches has been shown in other areas, such as the East Anglian Fenland, to reveal buried archaeology. **The establishment of a volunteer team to monitor and record recently-cleaned dyke-side exposures would be profitable.** The local basis of such a team would facilitate contacts with the Internal Drainage Boards, landowners and tenants to obtain information on when dyke-cleaning would take place. There is the potential to record significant

sedimentological and geoarchaeological information. Experience has shown that different results are obtained when fresh and weathered sections are recorded. Surveys would, however, only be undertaken from the dyke-side. Access is an issue and Nature Conservation bodies may be one means through which this work could be undertaken. Getting correct information through to the HERs is fundamental. There is also concern abut the volume of post-excavation work generated by amateur work, which can produce ”non-archaeology”. Nevertheless, the writer’s experience from other parts of the country shows that volunteer teams can make a valuable contribution to recording transiently exposed archaeological deposits.
Comparable volunteer work has already been undertaken as part of some of the English Heritage ‘Rapid Coastal Zone Assessment Surveys’ and in the Broads, various forms of field survey have already been undertaken in the area of St Benet’s Abbey. The Norfolk Coastal Heritage project is another good example of what can be achieved. Volunteers could also help to define and record hulks within the existing waterways.

- In dryland areas, especially valley slopes, the NMP work has demonstrated very extensive coaxial field systems but these are generally poorly dated. **Systematic surface fieldwalking and metal detecting at critical locations within these coaxial field systems would amplify the numbers of associated datable artefacts and indicate concentrations where small-scale trenching, to recover stratified material, could be productive.**

- The origins of modern settlements are in general poorly understood. **The now well-established procedure of small-scale test pitting by volunteers has the potential to provide data on settlement origins and later activities.** This has already been undertaken at Acle under Carenza Lewis. An essential consideration for such work is assurance that finds are reported to the HER, which has sometimes not happened. Training in documentary research techniques is also desirable. All of these activities would require training and professional support to be effective. Preparing leaflets and booklets and placing material on the internet all require specialist skills. Hence funding sources would be needed. The Heritage Lottery Fund is one obvious source of funding, but perhaps the Broads Authority could also provide support.

.Case study:

Hunter's Yard, Ludham, Norfolk

Development in many wetland areas of the Broads is likely to be restricted by planning considerations, and any new structures would probably be constructed on piles, with little exposure of deposits. However, recent evaluation and palaeoenvironmental sampling at this site provides an example of the conditions to be expected in open-area excavation, and the information that may be gained. Work was undertaken following a Brief from Norfolk Historic Environment Service, reported on by Wallis and Green (2014).

The site, on the north bank of the Womack lies at below 1m OD, where a new boat dyke was to be dug, adjacent to an earlier dyke. A flint dagger of Bronze Age date came from the site in 1933, probably from the earlier dyke, and a desk-based assessment also indicated medieval peat-digging in the area, with post-medieval brick and lime kilns towards the end of Womack Water. Three 'window samples' were taken through the deposits at the site, though prevailing waterlogging limited access on foot and for the augering rig. The site was repeatedly monitored during the works but the site remained flooded throughout and no *in situ* deposits could be seen. The spoil heaps were inspected, so far as was possible, but they produced only a single heat-shattered flint. One of the cores was assessed in detail for palynology and diatom analysis and radiocarbon dates were obtained. Quantitative palynological analysis of eight samples and diatom analysis of five from one core (WS 1) was undertaken, providing a bare outline of ecological change at the site.

The deposits, and outline palaeoecology, were as follows (top to base):

Unit 7. Modern make-up

Unit 6. Modern dredging from the main dyke

Unit 5. 'Upper Peat', reed-swamp and fen peat. Towards the base of this deposit diatoms indicate continued marine influence, but in the upper part there are no indicators of a continued marine connection.

Unit 4. 'Upper Clay', shown by diatom analysis to have been deposited in brackish marine conditions during a period of relatively high sea level. This deposit started to accumulate at this site at - 1.21m OD in the Middle Saxon period. Pollen indicates proximity of salt marsh and probable reed bed. Towards the top of this deposit marine influences were stronger with high tides bringing fully marine sediments onto salt marshes at the site.

Unit 3. 'Middle Peat', formed largely under wet alder carr with increasing flooding from the main river, the base of which was dated to cal AD 130-260 and cal AD 300-320 (Early to Mid Roman). The top was dated to Cal AD 730-740, cal AD 770-900 and cal AD 920-940 (Beta-361555) 95% probability (Mid to Late Saxon). Peat accumulated for 400-800 years with no obvious hiatus, during a phase of increasingly waterlogged conditions in the Thurne Valley. Indicators of nearby human activity include charcoal and a single heat-shattered flint. The pollen assemblage shows no sign of sea-level rise but a diatom sample at – 1.21 MOD indicates that the area eventually became the upper marsh of a mud flat along the tidal Thurne.

Unit 2. Fluvial sands of Holocene or earlier date. There is a possibility that this was a prehistoric or Roman land surface. Palynology suggests a local vegetation of oak, alder, lime, beech, holly and hazel with little or no grass. It is thought that scrubby woodland, locally damp, existed away from higher ground areas of oak, lime and beech woodland.
Unit 1. Crag: marine sands and gravels of Pliocene/Pleistocene date.

Compared to other parts of The Broads the Thurne valley is less well investigated and so the work at this site provided new data on the history of the 'Great Estuary', showing that at Hunter's Yard marine influence was still expanding in the Middle Saxon period. It is probable that salinity in this area was controlled by the development of the Yarmouth Spit.

In conclusion the results from the site indicate that archaeological evaluation of open trenches during construction are unlikely to expose *in situ* deposits without damming/pumping; but also that limited 'window sampling' can provide significant palaeoenvironmental data.

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A seminar to discuss an earlier draft of this document was held at The Archive Centre, Norfolk County Council on 11th July 2014, involving informed individuals. Comments arising from this seminar were subsequently forwarded to the writer, mainly anonymously, by Alison Yardy and have been inserted into this text. The writer is extremely grateful to all participants whose local and expert knowledge has greatly improved the text. Some comments were thought to be too specific for this document but should readily be incorporated into the Archaeological Research and Management Framework for the Broads, proposed above.

Appendix 1

A proposal for a pilot Historic Landscape Characterisation (HLC) was developed by Hutcheson (1998). He proposed a study area comprising a 10km margin of wetlands along the Rivers Bure, Ant and Thurne, from Wroxham to Ludham. This is no longer considered appropriate, but its aims require record.

The academic aims of such a pilot project would fit with the objectives of the previous section for research by HER inspection and analysis and historic map and documentary research: modelling, through mapping, landscape changes through time; mapping the settlement pattern through time, as presently known; and characterising changing landscapes throughout prehistory and history. The conservation objectives would be

- to identify the area's historic landscape elements, including semi-natural features;
- to develop general principles and policies, and detailed proposals, for management of the historic resource
- to devise a method of evaluating individual features of the landscape for day-to-day management by landowners, tenants and local government; and
- to develop research designs to assist in the long term management of the historic landscape.

The methodology would derive data from the county HER, the Listed Buildings Register, the NMP (and any studies following from it, see above), and from documentary and cartographic sources. The data would be mapped onto geological, hydrological, soils and modern ecological maps as overlays within a Geographical Information System (GIS). This would form the basis for delineating landscape differences and definition of landscape zones. This would be followed by a fieldwork programme involving condition assessment for a targeted sample of known sites and detailed scrutiny of other landscape components such as ditches, hedgerows, banks, dykes, lynchets, bridges and walkways, roads and tracks. Photography, field description and digital sketch mapping would be entered onto the data base. Following development of a full methodology a Project Design for extension of the study across The Broads should be written.

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