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Walton Basin 2015-16:

A review of the ACRE Methodology

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CONTENTS

Summary

In 2012-13 CPAT conducted a study as part of the Cadw-funded Walton Basin project to investigate the impact of agriculture on all known monuments within the basin. This led to the development of a methodology for predicting the likely level of threat posed by cultivation which became known as Archaeological Conservation in Rural Environments (ACRE).

In subsequent years limited trail excavations were conducted to test aspects of the methodology and in this, the final year of the project, the methodology has been reviewed, assessing its suitability as a heritage management tool.

The methodology was developed with limited resources, drawing heavily on previous work in England and the results are inevitable less detailed. However, having reviewed the results from the pilot study the overall principal of assessing the level of potential threat by identifying the nature of the agricultural regime and determining the form of the monument is considered to be sound, although there are limitations, principally the availability of reliable landuse data.

At present the methodology has only been tested during the pilot study within the Walton Basin and clearly further testing would be appropriate in order to determine its overall suitability. However, while the methodology is clearly applicable to large-scale studies it is believed that it may be of more value as a management tool associated with agri-environment schemes. That said, the nature of the existing Glastir scheme is such that the methodology would be of limited value.

1 Introduction

1.1. The recent Cadw-funded study of the multiperiod complex of monuments in Radnorshire's Walton Basin highlighted the vulnerability of these important archaeological resources. It was recognised that monuments were under varying degrees of threat from continued ploughing in this highly productive agricultural area, as well as from piecemeal development. Few of the archaeological sites retain any upstanding element and are generally known only from cropmark evidence, which has raised a number of issues regarding the future management of the resource as well as the desirability and practicality of scheduling what are in some cases very large sites with no visible component.

1.2. A study was therefore undertaken in order to address some of the known issues relating to the management of this extensive and complex archaeological landscape. This comprised an examination of how farming and cultivation methods can affect archaeology in general, followed by an assessment of the potential impacts on sites within the study area. It was in part based on a series of studies conducted in England, including the *Conservation of Scheduled Monuments in Cultivation*, or COSMIC 1 study (OA 2006) and the more detailed Trials project (Booth and Spandl 2010), although the approach adopted for the Walton Basin was necessarily less detailed owing in part to restrictions in time and funding, but also a lack of comparable data for the study area. It was also recognised at the outset that the study relied on a number of assumptions imposed by the available data, particularly with regard to landuse and crop rotations.

1.3. The COSMIC 1 study project developed a model to assess sites at risk from cultivation and assessed the condition of the 'at risk' scheduled monuments and some non-scheduled sites. This was followed by the COSMIC Implementation project, known as COSMIC 2 (OA 2010), which refined the methodology and identified three main factors which determined the risk level for monuments:

- archaeological factors (significance and vulnerability)
- site intrinsic variables (slopes and soils)
- management factors (cultivation regime, depth and drainage)

1.4. The Walton Basin project developed a methodology for assessing the vulnerability and level of threat from agriculture to both upstanding and buried archaeology, based upon COSMIC, which has become known as Archaeological Conservation in Rural Environments (ACRE) (Jones 2014a). This was the first practical agri-environment related archaeological assessment methodology to be developed in Wales which it was hoped might have significant value across the country as a whole as a mechanism for predicting the level of agricultural threat.

2 The ACRE Methodology

Stage 1

2.1. The first stage involves the compilation and assessment of landuse data for the study area, using as many data sources as are available which provide comparable data for

the whole area. The aim is to identify landuse patterns to determine the agricultural regime for each field, identifying whether this is permanent pasture, part of a rotation, or intensively arable, for example. The data can then be used to determine the potential risk to archaeology posed by varying agricultural regimes, as summarised in Table 1.

Table 1: Factors in assessing the potential risk to archaeology from varying agricultural regimes

Risk Level	Factors in assessing the potential risk to archaeology from cultivation
Very high – level 4	Regular arable cultivation; new cultivation of permanent pasture or land which has remained uncultivated for a significant period; forestry
High – level 3	Regular cultivation in a rotation which includes pasture or fallow
Medium – level 2	Occasional ploughing; direct drilling; woodland
Low – level 1	Permanent pasture

2.2. The pilot study utilised as its primary evidence the results from a landuse survey conducted for the Walton Basin in 1992, which was based on evidence gathered in the field, together with data from vertical aerial photography taken in 2006 and 2009. It was noted that by using only remote sensing it is difficult to differentiate between permanent pasture, fallow, or pasture within a rotation.

Stage 2

2.3. The second stage involves an assessment of the vulnerability of the monuments, based on their form and state of preservation according to the following six categories:

- Prominent earthwork
- Slight earthwork
- Shallow stratigraphy
- Negative features/Cropmarks
- Finds only
- Environmental deposits

2.4. For the Walton Basin this involved the polygonization of each monument using a Geographical Information System (GIS), creating polygons for each site to which data could then be attached. It is recognised, however, that some monuments may be composed of varying elements either because of their nature or as a result of differential cultivation, where they cross field boundaries. In such cases the monuments were divided into a number of polygons, linked in the dataset by the unique Primary Record Number (PRN).

2.5. Those with prominent earthworks are seen as being at greatest risk from cultivation since ploughing is likely to erode *in situ* material from upstanding earthworks and redeposit it elsewhere. The issue is not related solely to the height of the earthwork, but also the prominence of the break of slope and the angle of the slope. The steeper the slope and the more pronounced the break of slope the greater the potential for

plough erosion to occur where the slope changes, such as the top of a bank, for example. The earthworks of Castle Nimble motte and bailey fell into this category, as did the better preserved Bronze Age burial mounds. Slighter earthworks may have already seen significant plough levelling, such that there may be less potential for further erosion.

2.6. The depth of protective overburden is also a significant factor in assessing vulnerability, as is the presence of surviving stratigraphy. These factors will, however, generally only be apparent as a result of intrusive investigation, such as test pitting or trial excavation. The interior of Hindwell Farm Roman fort, for example, is an area which it was assumed would contain surviving stratigraphy in the form of occupation deposits and structural evidence.

2.7. Monuments which have no surviving upstanding component and may only be known as a result of cropmark evidence, or through geophysical survey, are seen as being less vulnerable than earthwork monuments. Many of the monuments within the Walton Basin fell into this category, surviving only as negative features cut into the subsoil, the features having already been truncated by ploughing.

2.8. The final categories relate to the less tangible monuments which may survive only as finds scatters or perhaps potentially significant environmental deposits.

Stage 3

2.9. The final stage combines data from the first two to assess the level of threat posed by of agriculture to a particular archaeological site, based on the matrix in Table 2, which takes into account the agricultural regime, the form of the site, and the slope. The original COSMIC study, conducted in 2003-6 and known as COSMIC 1 determined that among the sites which were particularly vulnerability to erosion were those located on moderate to steep slopes, where material from the upper part of the slope could be eroded by ploughing and deposited at the lower part of the slope, resulting in differential preservation. Accordingly, the matrix includes options for including the effect of slope if appropriate.

Table 2: Matrix for assessing the level of threat on various types of archaeology

	Risk level:	Very high	High	Medium	Low
Prominent earthwork	*Slope*	A	A	C	D
	No slope	A	B	C / D	D
Slight earthwork	*Slope*	A	A	C	D
	No slope	A / B	B	C / D	D / E
Shallow stratigraphy	*Slope*	A	B	C	E
	No slope	A / B	B / C	D / E	E
Negative features/ Cropmarks	*Slope*	A	B	D / E	E
	No slope	A / B	B / C	D / E	E
Finds only	*Slope*	A	B	D / E	E
	No slope	A / B	B / C	D / E	E
Environmental deposits	*Slope*	A	B	D / E	E
	No slope	A / B	C	D / E	E

2.10. In Table 2 the potential threat level to the archaeology is presented as one of five categories, A to E, where A is the highest level. This is based on principles originally set out as part of a framework for assessing impacts to the cultural heritage within the *Design Manual for Roads and Bridges* (HA 208/07; Volume 11, Section 3, Part 2), revised in August 2007, and is summarised in Table 3.

Table 3: Summary of the categories of threat level

Threat level	Potential impact to monuments
A	Change to most or all key elements of a monument, such that the resource is totally altered
B	Changes to many key elements of a monument, such that the resource is clearly modified
C	Changes to key elements of a monument, such that the resource is slightly altered or different
D	Very minor changes to some elements of a monument, the majority of which may be unchanged
E	No change

3 Field trials

3.1. Based on the results from the assessment of landuse and monuments at risk, proposals were developed to test the predictive model in the field through a series of small-scale trial excavations.

Cultivation and earthwork monuments

3.2. One of the few upstanding barrows within the Basin (PRN 309; SO 2522 6092) was chosen to assess the impact of cultivation of upstanding earthwork monuments. The ACRE assessment had determined the barrow as being at high risk (level A) as a result of intensive cultivation and particularly so as an upstanding earthwork. This assessment was validated by the findings which provided further evidence for the impact of regular ploughing on upstanding earthwork monuments.

3.3. The barrow survives as a low mound 1.1m high and 36m across, but had been spread by ploughing across the surrounding ditch, the internal diameter of which was around 28.5m. Ploughscars were identified on the surface of the mound and redeposited material from the primary turf mound was identified within the ploughsoil. It should be noted, however, that the agricultural regime has now changed in favour of direct drilling and the barrow is now generally excluded from cultivation (Jones 2014b).

Fig. 1 Hindwell Farm Barrow I (PRN 309). The mound had been significantly reduced by ploughing, with the material redeposited across the ditch in the foreground. Photo CPAT 3680-0019

Cultivation and cropmark monuments

3.4. The majority of sites within the Walton Basin were originally recognised as cropmarks and have no upstanding component. The cropmark selected for trial excavation was a trapezoidal enclosure (PRN 114412; SO 2505 6065), lying immediately to the west of the large Neolithic Hindwell Palisaded Enclosure (PRN 19376), which the ACRE assessment had determined as being at high risk (level B) as a result of intensive cultivation as part of a rotation which it was thought was likely to result in changes to many key elements of a monument, such that the resource would be clearly modified.

3.5. Two trenches were positioned to investigate the enclosure, both revealing ploughsoil 0.2m to 0.3m thick, overlying the gravelly subsoil. The surface of the subsoil was scarred by broad, parallel ploughmarks which had cut into the subsoil, and therefore into any buried archaeological deposits, by 0.1m (Fig. 2). The nature of the scars indicated that this was not a result of normal ploughing but was more likely to have been caused by a subsoiler or potato-ridge former. It is worth noting, however, that the current agricultural regime uses non-inversion tillage, which has a significantly

lower potential impact on buried archaeology, so long as this is not accompanied by the periodic use of a subsoiler.

Fig. 2 Hindwell Trapezoidal Enclosure (PRN 114412), showing ploughscars cut into the natural gravel within the interior of the enclosure. Photo CPAT 3682-0003.

3.6. Previous excavations within the same field, though over 200m to the north, had noted that the topsoil could be extremely shallow (015-0.25m), and while ploughscars were noted these were much more slight and likely to have resulted from normal ploughing (Fig. 3; Jones 2012a).

Fig. 3 The intersection of the Hindwell Cursus (PRN 33109) and the Hindwell Palisaded Enclosure (PRN 19376) in 2013, showing the shallow depth of ploughsoil. Photo CPAT 3335-0048

The influence of slope

3.7. It is a general belief that the erosion of buried archaeology through ploughing is likely to be most significant on sloping ground, where material from the upper part of the slope is often deposited at the bottom of the slope, resulting in differential preservation. The sites chosen to assessment this was the north-east terminal of the Hindwell Cursus (PRN 33109; SO 2705 6183). The ACRE methodology had identified this field as being under regular arable cultivation, thus presenting a very high potential risk (level A) likely to result in change to most or all key elements of a monument.

3.8. The results were somewhat unexpected, however, as the ploughsoil proved to be more shallow at the base of the slope. One reason for this could be the presence of a 5m-wide lynchet against the nearby boundary which may have influenced the depth of ploughing so that the results may be anomalous (Hankinson 2014).

Fig. 4 Two trenches (arrowed) investigating the terminal of the Hindwell Cursus in 2013 and the influence of slope on the vulnerability of the archaeology. Photo CPAT 3696-0010

4 Conclusions

4.1. It was always the intention in developing the ACRE methodology that it should provide a means of assessing the potential impact of agriculture on monuments which could be applicable to any farmed environment. At present the methodology has only been tested during the pilot study within the Walton Basin and clearly further testing would be appropriate in order to determine its overall suitability.

4.2. The methodology was developed with limited resources, drawing heavily on previous work in England as part of the COSMIC study (OA 2006 and 2010) and especially the Trials project (Booth and Spandl 2010). The results are inevitable less detailed than those which would be achieved using the COSMIC 2 approach, and there is no consideration of the role played by different soils.

4.3. However, having reviewed the results from the pilot study the overall principal of assessing the level of potential threat by identifying the nature of the agricultural regime and determining the form of the monument is considered to be sound, although there are limitations.

4.4. The principal restriction is the availability of suitable data from which to determine the landuse. In individual cases it may be possible to obtain information directly from the farmer, which is clearly the optimal situation and would include not only current landuse but also information of the method of cultivation, the type of rotation and the frequency of any ploughing.

4.5. For larger scale assessments, including that of the Walton Basin, it would not be practicable to obtain this information uniformly across the whole area. It will always be preferable to utilise data on landuse which has been gathered as a result of field survey, rather than remotely, but without contacting those who farm the land there will always be discrepancies, most commonly in differentiating between pasture within a rotation and permanent pasture. The pilot study was fortunate in having access to field survey data from 1992 to set a baseline against which changes in landuse recorded by aerial surveys in 2006 and 2009 could be compared to provide an indication of the likely agricultural regime. While it is possible to assess landuse on the basis of a single source this will inevitably be flawed and the use of multiple sources over a more lengthy time period should always be preferred.

4.6. For large area studies it is clear that the value of the assessment, particularly on a site by site basis, is limited by the reliability of the landuse data. Nevertheless this approach is still of value in identifying monuments most likely to be under threat from cultivation and providing data to assist with and support management strategies.

4.7. On a smaller scale, however, the reliability of the data is likely to be much greater, particularly when landuse information can be gleaned directly from those who farm the land and/or as a result of fieldwork. In this respect the methodology could have been of considerable value to the Tir Gofal agri-environment scheme, which dealt with entire farms and involved an element of fieldwork. The current agri-environment scheme, known as Glastir, is divided into two parts and Historic Environment Features (HEFs) are identified as polygons within the scheme. The lower level (entry level) part merely requires that farmers ensure that no damage is done to the areas outlined as HEFs. As this level of Glastir has no officer, or other specialist input through farm visiting, there is no scope to assess cultivation practices and the only option available is to exclude the HEF from agriculture, which is generally the case. The higher level (targeted element) of the scheme presents only limited options in that it is possible to dictate the method of agriculture used within the HEF. This may present opportunities for applying the ACRE methodology within Glastir, but given that the majority of Wales' agriculture is not arable those opportunities will be limited.

4.8. The results from the trial excavations were as expected with regard to the impacts of cultivation on both earthwork and cropmark sites, providing further evidence of their vulnerability. However, the excavations failed to confirm the general belief that monuments located on a slope may be more vulnerable to cultivation than those at the base of the slope, although with hindsight the choice of site was not ideal since the presence of a prominent lynchet within the field may have influenced the pattern of ploughing.

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