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**Mill Farm, Gilling West, North Yorkshire:
Radiocarbon dating**

by:
**Archaeological Services
University of Durham**

on behalf of:
Thornaby Angling Association

**ASUD Report 664
March 2000**

*Archaeological Services
University of Durham*
South Road
Durham DH1 3LE
Tel: 0191 374 3641
Fax: 0191 374 1100
archaeological.services@durham.ac.uk
www.durham.ac.uk/archaeologicalservices

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Radiocarbon dating, March 2000

Archaeological Services University of Durham

on behalf of:

Thornaby Angling Association,

34 Bensham Road, Darlington, Co Durham DL1 3DG

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1. Summary

This document concerns the radiocarbon dating of peat deposits on the site of the proposed western fishing lake at Mill Farm, Gilling West, North Yorkshire, and is subsequent to a staged programme of archaeological evaluation at the site.

The evaluation report (ASUD 1999) recommended that radiocarbon dates be obtained for the deposits in order to ascertain their potential for providing information regarding changes in local agricultural practices and environmental conditions over time. This information would be particularly useful with regard to the Iron Age, Roman and medieval periods.

¹⁴C dating has shown that the surviving peat deposits date from the end of the last glacial period up to the early Iron Age, and as such are generally too early to contribute to the research objectives mentioned above. Therefore, no further analysis of the peat is recommended at this time. However, the peat remains a valuable resource in terms of information regarding the reconstruction of past environments and, to some extent, human activity over a 7,500 year period. It is therefore recommended that a series of monolith samples are taken from the deepest part of the deposit and stored for possible future investigation. The environmental history of the site could therefore be preserved 'by record'. It is recommended that the monolith sampling is funded by the Thornaby Angling Association, but that any subsequent investigations should seek other sources of funding.

2. Introduction

In 1999 a staged programme of archaeological evaluation was carried out on land at Mill Farm, 0.5km west of Gilling West, North Yorkshire (NGR: ~~TA 1320 4730~~ ^{NZ 1775 0530}), prior to the proposed excavation of two fishing lakes (planning application no. 1/25/150-/PA/F-BAB/BB). Thornaby Angling Association commissioned Archaeological Services, University of Durham, to undertake the evaluation in accordance with a Scheme of Works supplied by the Heritage Unit at North Yorkshire County Council.

The evaluation comprised a desk-based assessment of all available records; a field inspection with selected areas of detailed topographic survey; an auger survey of peat deposits and retrieval of a core; assessment of the pollen record therein and an assessment of the likely impact of the proposed development (ASUD 1999). The results of this research can be summarised as follows:

- Gilling West acted as a significant central place in both pre- and post-Conquest periods
- Several earthwork remains are evident around, but not within, the application area
- Limited peat deposits are extant in Area 2, the proposed eastern lake
- Substantial peat deposits are extant in Area 1, the proposed western lake
- Pollen samples from Area 1 largely reflect local changes in the vegetation over time

In the first instance, radiocarbon dating of the Area 1 peat was recommended, to be followed by detailed pollen analysis if the peat formed during the later prehistoric, Roman or medieval periods. This is because later deposits would be expected to provide more information regarding landuse, agricultural practices and other human activities than early prehistoric deposits.

3. Radiocarbon dating

3.1 Samples

Three samples from the peat core were initially sent to the Scottish Universities Research and Reactor Centre (SURRC) at East Kilbride for radiometric ^{14}C measurement. The samples were taken from the approximate top, middle and base of the peat deposit. Each sample comprised four sub-samples, each of which occupied a 20mm depth of the core. In the event that there was not enough humic acid for conventional measurement in one sub-sample then it could be combined with the humic acid content of one or more of its neighbouring sub-samples. The samples were supplied as follows:

Sample 1a	0.44-0.46m	Sample 2a	1.60-1.62m	Sample 3a	2.62-2.64m
1b	0.46-0.48m	2b	1.62-1.64m	3b	2.64-2.66m
1c	0.48-0.50m	2c	1.64-1.66m	3c	2.66-2.68m
1d	0.50-0.52m	2d	1.66-1.68m	3d	2.68-2.70m

3.2 ^{14}C measurement and results

After initial examination of the samples SURRC reported that there was insufficient humic acid in the peat for radiometric ^{14}C measurement, even when all four sub-samples from each sample were combined. Consequently, it was agreed with Thornaby Angling Association that dating proceed via the AMS (accelerator mass spectrometry) facility at the University of Arizona. SURRC prepared a graphite target from one sub-sample of each main sample and these were analysed in Arizona. The complete Radiocarbon Dating Certificates for each sample together with explanatory notes are included as an Appendix to this report.

The summary results of each analysis are shown below. The 1σ (one standard deviation) level of confidence indicates a 68% probability that the true value lies between the $+1\sigma$ and -1σ limits. Broadening the limits to $\pm 2\sigma$ means the probability rises to 95%.

Sample 1a	0.44-0.46m (top of peat deposit)
Laboratory Sample Code	AA-36541(GU-8716)
Radiocarbon Age BP	2510 ± 45
Calibrated Age Ranges	1σ cal BC 788-524, cal BP 2737-2473
	2σ cal BC 798-410, cal BP 2747-2359
Sample 2b	1.62-1.64m (near middle of peat deposit)
Laboratory Sample Code	AA-36542(GU-8717)
Radiocarbon Age BP	6585 ± 55
Calibrated Age Ranges	1σ cal BC 5613-5479, cal BP 7563-7429
	2σ cal BC 5623-5424, cal BP 7573-7374
Sample 3d	2.68-2.70m (base of peat deposit)
Laboratory Sample Code	AA-36543(GU-8718)
Radiocarbon Age BP	9900 ± 70
Calibrated Age Ranges	1σ cal BC 9388-9253, cal BP 11,338-11,203
	2σ cal BC 9604-9230, cal BP 11,554-11,180

4. Discussion

The deepest deposits cored in Area 1 comprise sands, which are overlain by an olive-grey silty clay. It is likely that these sediments were deposited in water, probably a small oxbow lake formed by an earlier course of Gilling Beck. Over time, peat began to form and the site became a bog, a typical hydrosere succession. The lowest levels of peat have a radiocarbon age of 9900 ± 70 BP (2σ cal BC 9604-9230) which corresponds to the Allerod Interstadial, immediately prior to the end of the last glacial period. The uppermost

levels of the peat deposit have a radiocarbon age of 2510 ± 45 BP (2σ cal BC 798-410), placing the formation of this peat in the first half of the Iron Age.

It is not known if peat formation continued after this date, although it is likely that it continued until relatively recent times and has been truncated.

5. Conclusions and recommendations

The peat deposits in the area of the proposed western fishing lake at Mill Farm appear to have started to form at the end of the last glacial period. The most recent surviving peat deposits in this shallow basin have been dated to the first half of the Iron Age. Any peat formed after this date has since been removed.

From an archaeological point of view, it would have been particularly informative to study the archaeobotanical record for the Iron Age to medieval periods. It may have been possible to investigate the transitional nature of agricultural practices over time, as well as providing data regarding local environmental changes. This could have made a significant contribution to the regional assessment of the impact of Roman occupation on indigenous agricultural and economic practices. However, these periods are not represented at this site.

Following discussions with J. Huntley, the English Heritage Regional Advisor for Archaeological Science, no further analysis of this peat deposit is recommended at this time. However, the peat deposit remains a valuable resource in terms of the information that can be derived from it regarding the reconstruction of past environments and, to some extent, human activity over a 7,500 year period. It is therefore recommended that a series of monolith samples are taken from the deepest part of the deposit and stored for future investigation, perhaps as part of a post-graduate research project. Such an investigation may involve detailed analysis of both plant macro- and microfossils and invertebrates. The environmental history of the site could therefore be preserved 'by record'.

It is recommended that the monolith sampling is funded by Thornaby Angling Association, but that any subsequent investigations should seek other sources of funding.

6. Acknowledgments

Archaeological Services University of Durham gratefully acknowledges the following individuals and organisations for facilitating this work: Mr David Oxley (Thornaby Angling Association); Mr Hughie Bird (landowner); Mrs J Huntley (English Heritage); Dr G Cook (SURRC); the University of Arizona AMS Facility; the Planning and Development Unit at Richmondshire District Council and the Heritage Unit at North Yorkshire County Council.

7. Reference

ASUD 1999 *Proposed development on land at Mill Farm, Gilling West, North Yorkshire: Archaeological Evaluation*. Archaeological Services Durham University unpublished archive report ASUD 633.

Duncan Hale
16th March 2000

Appendix

Radiocarbon Dating Certificates



Director: Professor A E Fallick

Scottish Universities Research and Reactor Centre

Rankine Avenue
Scottish Enterprise Technology Park
East Kilbride Scotland UK G75 0QF

E-mail: g.cook@surrec.gla.ac.uk
Telephone: 01355 223332
Direct Dial: 01355 270136
Fax: 01355 229898

RADIOCARBON DATING CERTIFICATE

7 March 2000

Sample	AA-36541(GU-8716)
Submitter	Duncan Hale Archaeological Services, University of Durham Science Laboratories South Road Durham DH1 3LE
Material	Peat : Whole Peat Dated
Sample Reference	Mill Farm, Gilling West, North Yorkshire : Sample 1 0.44-0.46m
Delta ^{13}C rel. PDB	-28.4‰
Radiocarbon Age BP	2510 \pm 45
Calibrated Age Ranges	1 σ cal BC 788-524, cal BP 2737-2473 2 σ cal BC 798-410, cal BP 2747-2359

N.B. 1. The above ^{14}C ages are quoted in conventional years BP (before 1950 AD). The errors are expressed at the one sigma level of confidence.

2. The calibrated age ranges are determined from the University of Washington, Quaternary Isotope Laboratory, Radiocarbon Dating Program, Rev. 4.0 1998. The decadal atmospheric calibration curve is used throughout and the calendar age ranges, obtained from the intercepts (Method A), are expressed at both the one and two sigma levels of confidence. In the case of marine shell samples derived from around the U.K. coastline, an apparent age (reservoir effect) of 405 ± 40 years (Harkness, 1983) is subtracted from the conventional ^{14}C age prior to calibration using the decadal atmospheric curve.

3. Samples with an AA coding are measured at the University of Arizona AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to SURRC should also quote the GU coding that is given in parentheses after the AA code.

Reference

Harkness, D.D. (1983) The extent of natural ^{14}C deficiency in the coastal environment of the United Kingdom. In ^{14}C and Archaeology, Groningen August 1981, 351-364.

Conventional age and calibration age ranges calculated by :-

P. Naysmith

Date :- 7-3-2000

Checked and signed off by :-

Gordon E Cook

Date :- 7-3-2000



Director: Professor A E Fallick

Scottish Universities Research and Reactor Centre

Rankine Avenue
Scottish Enterprise Technology Park
East Kilbride Scotland UK G75 0QF

E-mail: g.cook@surrec.gla.ac.uk
Telephone: 01355 223332
Direct Dial: 01355 270136
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7 March 2000

Sample	AA-36542(GU-8717)
Submitter	Duncan Hale Archaeological Services, University of Durham Science Laboratories South Road Durham DH1 3LE
Material	Peat : Whole Peat Dated
Sample Reference	Mill Farm, Gilling West, North Yorkshire : Sample 2 1.62-1.64m
Delta ^{13}C rel. PDB	-28.4‰
Radiocarbon Age BP	6585 \pm 55
Calibrated Age Ranges	1 σ cal BC 5613-5479, cal BP 7563-7429 2 σ cal BC 5623-5424, cal BP 7573-7374

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Director: Professor A E Fallick

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E-mail: g.cook@surre.gla.ac.uk
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RADIOCARBON DATING CERTIFICATE

7 March 2000

Sample	AA-36543(GU-8718)
Submitter	Duncan Hale Archaeological Services, University of Durham Science Laboratories South Road Durham DH1 3LE
Material	Peat : Whole Peat Dated
Sample Reference	Mill Farm, Gilling West, North Yorkshire : Sample 3 2.68-2.70m
Delta ^{13}C rel. PDB	-27.1‰
Radiocarbon Age BP	9900 \pm 70
Calibrated Age Ranges	1 σ cal BC 9388-9253, cal BP 11,338-11,203 2 σ cal BC 9604-9230, cal BP 11,554-11,180

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