

Centre for Archaeology Report 71/2005

**The Excavation, Examination and Conservation of a  
Wooden Trough from Badwell Ash, Suffolk**

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ISSN 1473-9224

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## **Summary**

This report covers the excavation, examination and conservation of this Iron Age wooden trough, as well as an appendix containing the plant macrofossil report. This compilation of reports has been put together to serve as reference for the work undertaken on this project. The restored trough is now on display in St. Moyes Museum, Bury St. Edmunds, Suffolk.

## **Keywords**

Conservation  
Excavation  
Technology  
Archaeobotany  
Wood  
Iron Age

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# The excavation, examination and conservation of a wooden trough from Badwell Ash, Suffolk (BAA013).

Jacqui Watson, John Newman, Richard Darrah and Val Fryer

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## **Introduction**

John Newman

Evaluation work in 1998, by the Suffolk Archaeology Field Team and funded by Lafarge Redland Aggregates Ltd, on the final phase of a quarry at Shackerland Hall, Badwell Ash, revealed a large timber trough lying on the edge of a buried stream or mere. The quarry is 9 miles (14km) north-east of Bury St Edmunds and the southern side of the site drops quite steeply into a small valley where the trough and a paddle-like object had been preserved for some 2,000 years under a thick hillwash layer prior to their discovery in trial trenches. Due to the poor quality of the underlying aggregates, the quarry was closed after the evaluation and the final phase remains intact with its waterlogged deposits. While the trenching did pick up evidence for prehistoric and Roman activity on the edge of this wet area the major find is undoubtedly the trough and a programme of study has been undertaken to examine and understand this object.

Large wooden objects are rarely found in East Anglia, so this is an exciting discovery and one that is worthy of further study and conservation to preserve it for future generations. The following report includes the detailed examination, accurate scale drawings, conservation by freeze-drying and the analysis of the sediments in the trough. Full site archive, including a comprehensive photographic record of the site work and the trough before conservation, is held by the Archaeological Service at their Shire Hall, Bury St Edmunds office under the SMR code BAA 013. Recording of the trough was funded by Suffolk County Council and the conservation by English Heritage.

## **Assessment of the two wooden objects found at Badwell Ash, Suffolk**

Richard Darrah

Two timbers were found in separate evaluation trenches excavated at Shackerland Hall Quarry. They were initially identified as a paddle and a boat but on assessment are shown to be a damaged, worked, plank and a complete high status oak trough which was skilfully and elegantly carved from a quarter of an oak tree. Although this piece is not dateable from the toolmarks the style and elegance of its shape plus the use of oversized timber

suggests that it is Iron Age rather than Roman, although the date of its destruction and deposition may be in the latter period.

### *Dimensions*

The plank is made from heartwood oak, 0.67m x 0.11m x 0.037m with a volume of 2.5 litres.

The trough is made from oak heartwood, 1.30m x 0.57m x 0.19m and wall thickness 0.045m (figs. 1 and 2). The timber has an estimated volume of 47 litres and the trough would have held between 40 and 50 litres of liquid.

### *Sampling*

Samples from attached silts both within and outside the trough have been taken for macrofossil analysis (see Appendix 1). Wood samples across medullary rays in the worked faces of the end grain were removed to attempt the identification of residues, but no further work was undertaken.

### *Tree ring analysis*

The trough has a potential sequence of approximately 100 annual growth rings beneath the handles at each end. It was suggested that it should be sampled for dendrochronology, but the wood was too degraded to do this without serious damage to the surface of the trough (pers.com. JW).

### *Description*

The trough was made from high quality oak and had been carved from the solid with axes (other tools may have been used but no evidence for these was seen). It was 1.3m long with straight ends and 0.57m wide with slightly curving sides. The top was flat and smoothly hollowed to a depth of 0.145m. The ends of the hollow were rounded and the marks left by the corner of the axe could be seen around this area where the tops of the sides of the hollow were intentionally rounded. It was skilfully shaped so that few toolmarks could be seen. At each end a flat horizontal lug was left across the full width of the trough (but tapering in at its rounded sides). The underside of these lugs had been left as split so that it was still easy to hold. At one end a notch had been cut into each side of the lug. The toolmarks on these notches had not been rounded in the same way as the sides of the lugs suggesting that they were secondary. The trough had been broken along its length in antiquity but had remained intact at deposition and was recovered as a complete object. It had been badly scuffed along the bottom surface to the extent that the bottom was nearly worn through, originally the base had been about 45mm. thick and it was now reduced to less than 10mm. in areas. The scuffing was fresh and had been done immediately before deposition. The greatest wear had occurred on the end furthest from the notches suggesting that it had been dragged by a rope along a stony surface such as a road. It was not the smooth scuffing one might expect on a log that has been dragged out of a wood over soft ground.

The trough was made from the highest quality straight grained timber. From the medullary rays and lack of curve to the annual rings it is clear that the trough was made from a quarter of a trunk. The trough is 0.57m wide, and

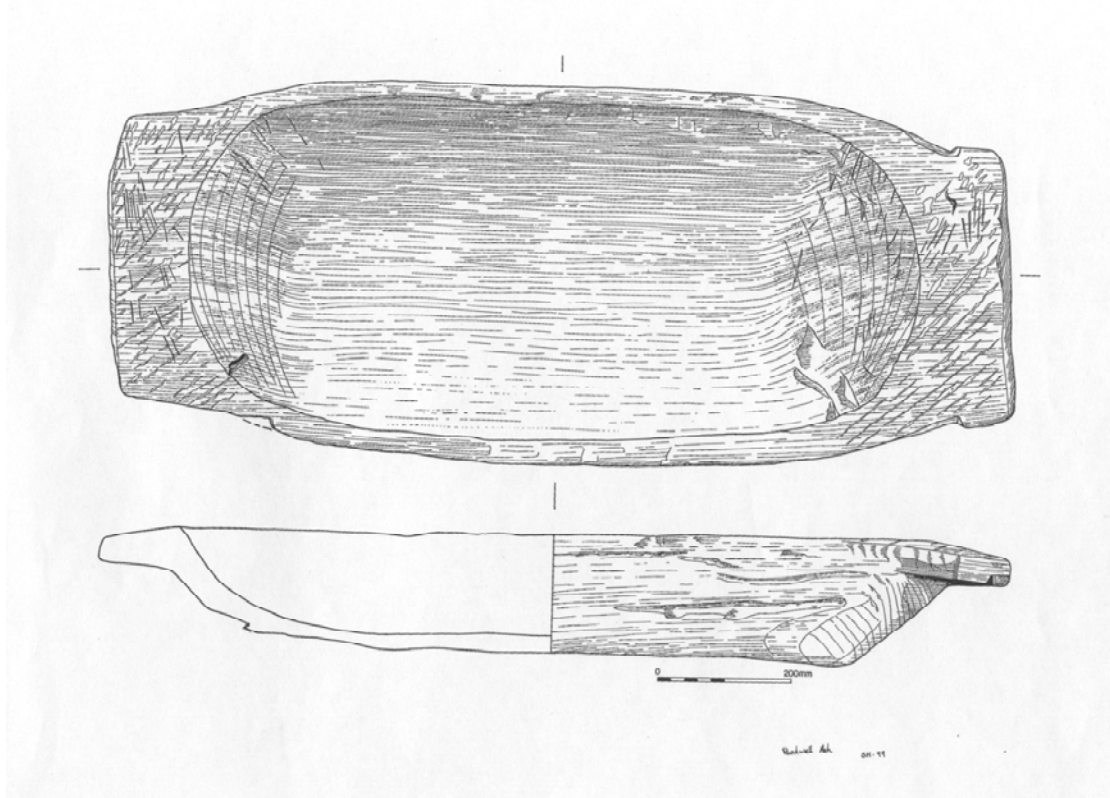


Figure 1. Badwell Ash Trough: Plan and section views, drawn by Sue Holden.

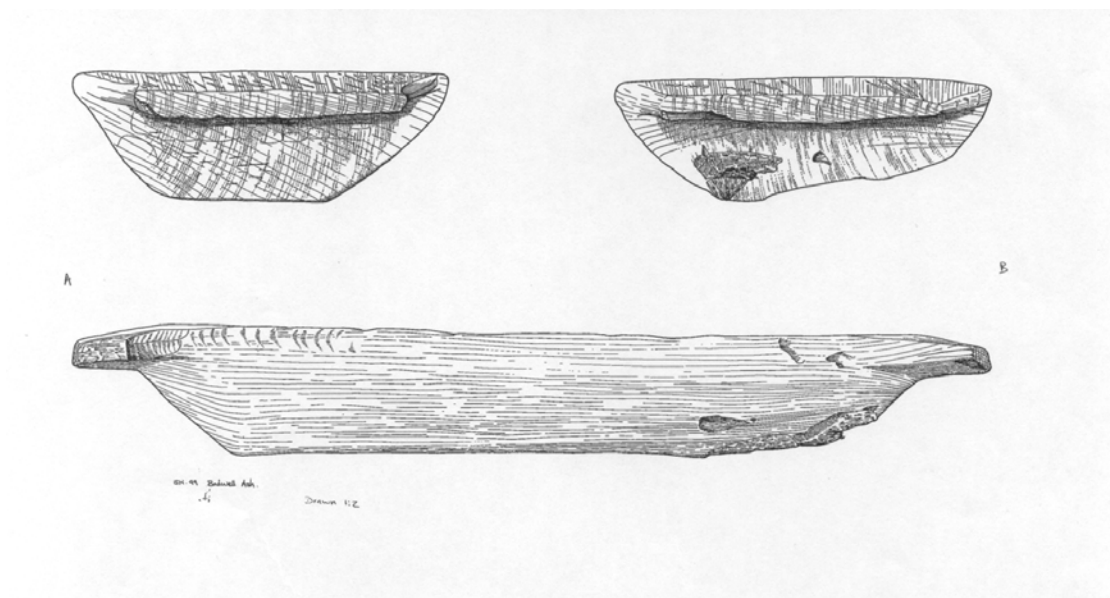


Figure 2. Badwell Ash trough: side views illustrating medullary rays and tool marks, drawn by Sue holden.

taking account that a lot of the wood has been removed, the original diameter of the trunk exceeded 1.43m.

The trough survives as six large pieces which can be reassembled to the original form. The surface preservation is good with some toolmarks and occasional tool signatures surviving, particularly on the curved surfaces beneath the lugs. It is not possible to identify the tools used in its construction, although one axe blade was at least 73mm. wide.

#### *The date of the trough*

Wooden troughs, dishes and platters made from halved logs hollowed out are known to have been used from the Neolithic to the Iron Age (Coles and Orme, 1980). Virgil describes them being carved from tree trunks (White, 1975), and they go on being made in this way into historic times. This example is unusual because it is carved from a small section of a large tree rather than hollowed out of a halved trunk. Its shaping is too accurate and elegant for it to be purely functional and the notches which make it into a sledge are a secondary use. The elegance of shaping suggests an Iron Age date but a later, Roman, date is not impossible.

#### *Statement of potential*

Although Roman wooden objects are frequently found on archaeological sites, Iron Age wooden objects are rare. While the trough had been abused and broken when it was deposited in the lake, it is possible that its deposition was deliberate and that other objects of a similar quality may have been deposited nearby. Also as a high status object of probable Iron Age date the trough is of national importance - as an elegant early Roman object it would be of regional or national importance. The trough may be an oversized version of the platter found at Glastonbury (Bulleid and Gray, 1966). It was intended for both use and display and should be conserved so that it can be viewed from on top and underneath.

The site may have research potential, and if it can be shown to contain substantial quantities of well preserved Iron Age wood then it should be monitored to ensure that anaerobic conditions are maintained.

### **Conservation**

Jacqui Watson

The wooden trough appears to have been cut from a single piece of oak, and most of the surface area has a tangential grain, which is unfortunately the one most inclined to shrink and split during the drying process. This surface is very hard and unlikely to take up a high molecular weight PEG, so it was decided to just immerse it in 25% PEG 400 for 6-8 weeks, then freeze and freeze-dry (Watson, 1987). The conservation procedure was timetabled as follows:-

- 28.xi.01 All pieces put into 25% PEG 400 in water.
- 29.i.02 All pieces put into deep freeze.
- 4.ii.02 Began freeze-drying, and this was mainly completed by 28.ii.02. The paddle required an extra fortnight to dry completely.

In order to distinguish the individual pieces, they were allocated letters and their positions can be seen in Figure. 3. During the course of freeze-drying the sections were removed every week and weighed to monitor the progress of drying, and the results are presented in Table.1, and as drying curves in Figure 4. It can be seen, from the measurements taken of these pieces of wood, that between 65 – 85% of the original weight was in fact just water. If they had been allowed to dry out without any treatment, it is highly likely that the degraded wood structure would have suffered severe shrinkage and warping.

Once dry, the pieces of wood were allowed to acclimatise to ambient conditions in the laboratory before reconstruction could begin.

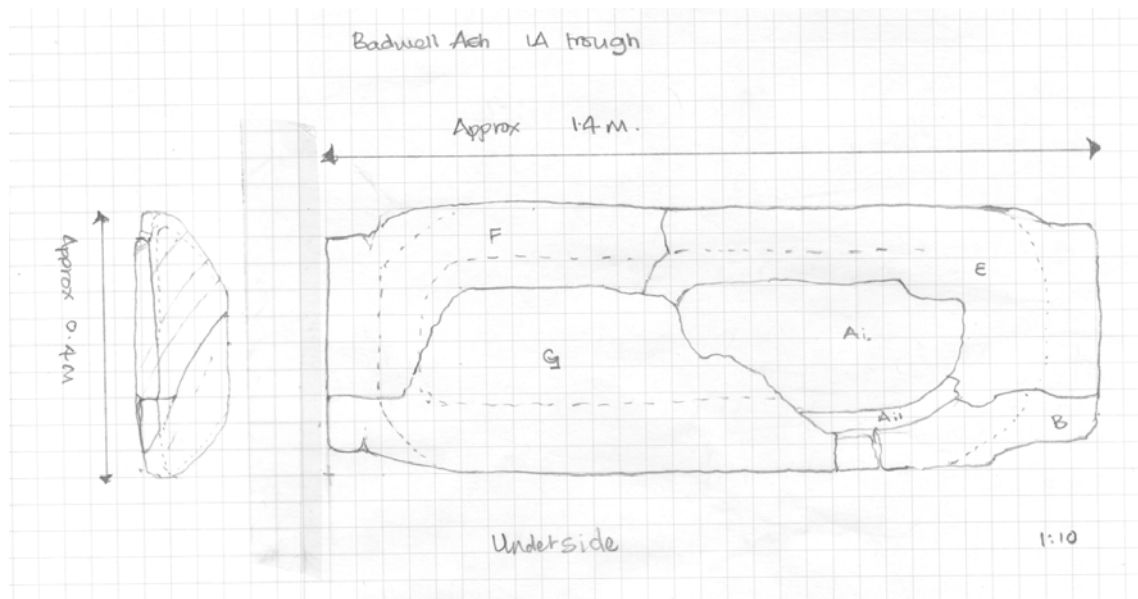


Figure 3. Lettered sections of the trough.

Table 1. Actual weight of the trough pieces and paddle/plank during the course of freeze-drying.

|                            | 4.2.02<br>frozen<br>weight | 19.2.02 | 26.2.02 | 4.3.02 | 11.3.02 | 19.3.02 | 28.3.02 | weight loss<br>as a % |
|----------------------------|----------------------------|---------|---------|--------|---------|---------|---------|-----------------------|
|                            | 0                          | 15      | 22      | 28     | 35      | 43      | 52      |                       |
| A                          | 1775.6                     | 1087.3  | 743.1   | 637.9  | 613.4   | 609.3   | 608.1   | 65.8                  |
| B                          | 884.4                      | 190.1   | 163.4   | 143.3  | 126.6   | 126.4   |         | 85.7                  |
| C group of<br>small pieces | 328.1                      | 115.3   | 110.2   | 108.9  |         |         |         | 66.8                  |
| D paddle                   | 1133                       | 749     | 699.1   | 644.3  | 584.6   | 546     | 515.7   | 54.5                  |
| E                          | 9493.2                     | 4363.8  | 3368    | 2959.9 | 2881.1  | 2874.6  |         | 69.7                  |
| F                          | 13067.1                    | 6509.3  | 2918    | 3718.8 | 3466.1  | 3660.8  |         | 72                    |
| G                          | 13773.2                    | 6197.8  | 5106    | 4636.4 | 4367    | 4342    | 4338    | 68.5                  |
| H small<br>piece           | 931                        | 296.6   | 296.1   | 295.7  |         |         |         | 68.2                  |



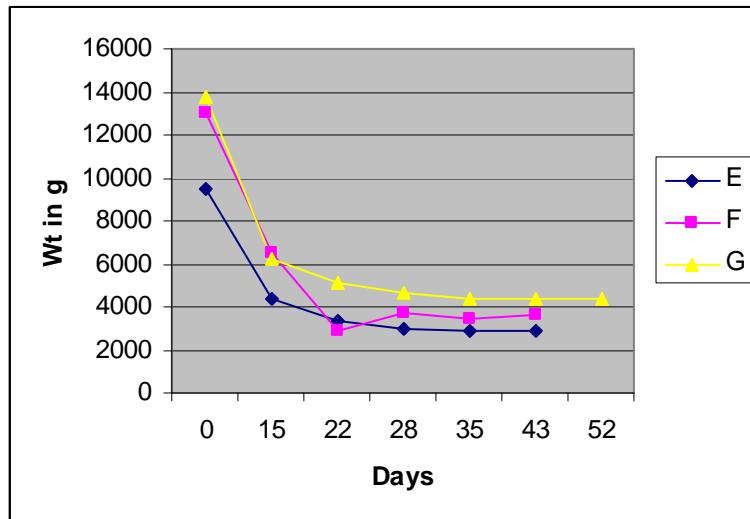
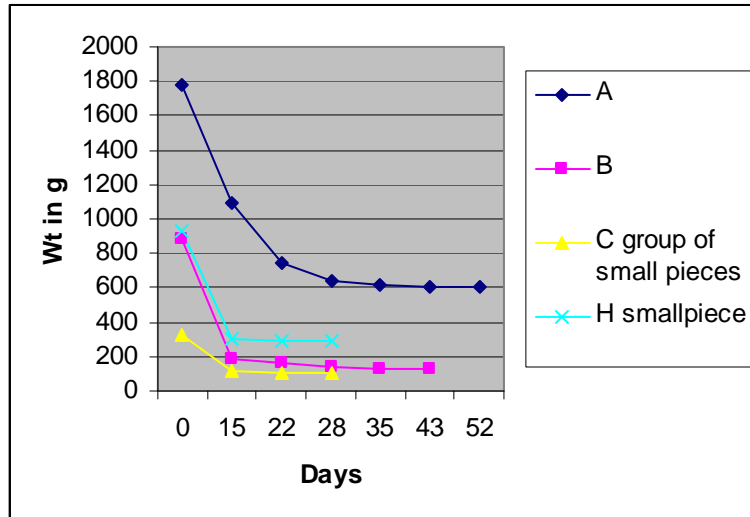


Figure 4. Drying curves for the trough fragments.

The surface was sealed with 3% Klucel E™ (hydroxy propyl cellulose) in 50:50 dist. water and IMS (Jackson and Watson, 1995). This solution was applied by brushing onto the wood surface to avoid wetting it unduly, then left overnight to dry thoroughly. This one coat slightly darkened the surface and left shiny patches on the rays as these areas are not very porous.

The reconstruction work was undertaken by The Mary Rose Trust. Some of the joints were easy to locate, but others have had to be aligned with the grain because it had broken as a result of splitting along the medullary rays. The large pieces have been repaired with wooden dowels, supported and gap-filled with wood pulp and PEG 6000. The same paste has also been used to gap-fill other small areas of loss to give a better impression of the complete piece. To get an even surface colour for the wood, a layer of PEG 6000 has been applied and melted into the exposed surfaces (Figure 5.).



*Figure 5. Restored wooden trough.*

## **Display**

The trough will sit more or less well on its base, but will need support if it is to be displayed at an angle. It is quite light in weight after freeze-drying, so there should be no need to use custom-made supports.

The trough will, however, need relatively stable display conditions. Freeze-dried wood can usually tolerate some fluctuations in humidity without noticeable effect, but one should aim for between 40 -65% RH. Over 65% and the PEG applied to the surface and used for gap-filling might creep and leave a white bloom on the wood surface. Should this happen it can be removed by melting it with a low temperature heater, such as a hair dryer, and then blotting off the excess wax.

Consideration should also be paid to the light levels, and avoid spotlights shining directly onto the wood surfaces, otherwise the heat they generate could soften the resins and waxes used to repair and gap-fill the trough.

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Appendix

**PLANT MACROFOSSILS AND OTHER REMAINS FROM  
BADWELL ASH, SUFFOLK (BAA 013): AN ASSESSMENT.**

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March 2000

## Introduction

Excavations by the Suffolk County Council Archaeological Service at Badwell Ash uncovered a Iron Age/Roman wooden trough. Two samples were taken from the inside of this object and submitted for assessment.

## Methods

The samples were processed by manual water flotation/washover, collecting the flots in a 500 micron mesh sieve. Because of the high organic content of the flots, sub-samples were sorted whilst wet under a binocular microscope at magnifications of up to x 40. The plant macrofossils and other remains noted are listed in Table 1. Nomenclature within the table follows Stace (1997). Tabulated material was waterlogged unless otherwise stated.

The non-floating residues were scanned at the time of processing to ascertain whether artefacts were present, but none were noted.

## Plant macrofossils

Charred and waterlogged glume bases of spelt wheat (*Triticum spelta*) were noted at a very low density in both samples. No other cereal remains were recorded.

Seeds/fruits of common weed species were also present. These included orache (*Atriplex* sp.), swede/turnip/cabbage (*Brassica* sp.), fat-hen (*Chenopodium album*), knotgrass (*Polygonum aviculare*), meadow/cretin/bulbous buttercup (*Ranunculus acris/repens/bulbosus*), dock (*Rumex* sp.), field penny-cress (*Thlaspi arvense*) and stinging nettle (*Urtica dioica*). Seeds/fruits of wetland and aquatic plants included wild celery (*Apium graveolens*), sedge (*Carex* sp.), rush (*Juncus* sp.), duckweed (*Lemna* sp.), ragged robin (*Lychnis flos-cuculi*), mint (*Mentha* sp.), blinks (*Montia fontana*), water-pepper (*Polygonum minor*), water crowfoot (*Ranunculus* subg. *Batrachium*) and celery-leaved crowfoot (*R. sceleratus*). Tree/shrub macrofossils were rare but included bramble (*Rubus* sect *Glandulosus*) and elderberry (*Sambucus nigra*) seeds.

Other plant macrofossils were also noted. These included small fragments of charcoal, waterlogged roots, rhizomes or stems, wood fragments and indeterminate buds, culm nodes, leaf fragments, seeds and twigs.

## Other material

With the exception of waterlogged arthropod remains, which were abundant in both samples, other materials were extremely rare, but did include fragmentary caddis larval cases and pieces of black porous 'cokey' material.

## Discussion

At the time of writing, the exact relationship between the wooden trough and the associated organic layers is unknown, therefore the following discussion is purely speculative. The charred material, including cereal chaff and weed seeds, is probably derived from an extremely low density scatter of refuse which may have been wind dispersed across the area. Spelt wheat is known from early/middle Bronze Age through to Roman and early post-Roman contexts in the eastern region of England. In the present case, it is not possible to ascertain whether the glume bases recovered are contemporary with the trough or from an organically rich deposit which subsequently accumulated.

If the remaining macrofossils are derived from the local flora, they appear to indicate that the area was predominantly damp with some standing water, but also with some drier weeded areas.

## Conclusions

In conclusion, although the list of plant taxa noted is reasonably comprehensive, the exact date and origin of the macrofossils and their precise relationship to the wooden vessel is unclear. It appears that spelt wheat was grown and possibly processed locally, but it is not known whether this agricultural activity was contemporary with the deposition of the trough.

## Recommendations for further work

Although the assemblages are comparatively rich, the origin and date of the material is unknown. Therefore, no further quantitative work is recommended.

## References

Stace, C., 1997 *New Flora of the British Isles*. Cambridge: Cambridge University Press, Second edition.

## Key to Table

x = 1 – 10 specimens    xx = 10 – 100 specimens    xxx = 100+ specimens  
c = charred

## Flora by Val Frayer

| Sample No.                                       | 1    | 2    |
|--|------|------|
| Context No.                                      | OO30 | OO30 |
| <b>Cereals</b>                                   |      |      |
| <i>Triticum sp. (glume base)</i>                 | xc   |      |
| <i>T. spelta L. (glume base)</i>                 | xcf  | xc   |
| <b>Herbs</b>                                     |      |      |
| <i>Aethusa cynapium L.</i>                       | x    |      |
| <i>Agrostemma githago L.</i>                     | x    |      |
| <i>Anagallis arvensis L.</i>                     | x    |      |
| <i>Aphanes arvensis L.</i>                       |      | xc   |
| <i>Atriplex sp.</i>                              | x    | xc   |
| <i>Brassica sp.</i>                              | xcf  | x    |
| <i>Chenopodium album L.</i>                      | x    | xc   |
| <i>C. ficifolium Sm.</i>                         | x    |      |
| <i>C. rubrum/glaucum</i>                         | xcf  |      |
| Chenopodiaceae indet.                            | x    | xc   |
| <i>Cirsium sp.</i>                               | xcf  | xcf  |
| <i>Euphrasia/Odontites sp.</i>                   | x    |      |
| <i>Fallopia convolvulus (L.)A.Love</i>           |      | x    |
| <i>Fumaria officinalis L.</i>                    | x    |      |
| <i>Persicaria maculosa/lapathifoila</i>          | x    |      |
| Small Poaceae indet.                             | x    |      |
| Large Poaceae indet.                             |      | x    |
| <i>Polygonum aviculare L.</i>                    | x    | x    |
| Polygonaceae indet.                              | x    |      |
| <i>Ranunculus sp.</i>                            | x    |      |
| <i>R. acris/repens/bulbosus</i>                  | x    | xx   |
| <i>Rumex sp.</i>                                 | xx   | x    |
| <i>Solanum sp.</i>                               | x    |      |
| <i>Sonchus oleraceus L.</i>                      | x    |      |
| <i>Stellaria media (L.)Vill.</i>                 | x    |      |
| <i>Thlaspi arvense L.</i>                        | xc   | x    |
| <i>Urtica dioica L.</i>                          | xcf  | x    |
| <i>Valerianella dentata (L.)Pollich</i>          |      | x    |
| <b>Wetland/aquatic plants</b>                    |      |      |
| <i>Apium graveolens L.</i>                       | x    | x    |
| <i>Carex sp.</i>                                 | x    | x    |
| <i>Juncus sp.</i>                                | x    | x    |
| <i>Lemna sp.</i>                                 |      | x    |
| <i>Lychnis flos-cuculi L.</i>                    |      | x    |
| <i>Mentha sp.</i>                                |      | x    |
| <i>Montia fontana L.</i>                         | x    | x    |
| <i>Polygonum minor (Hudson)Opiz</i>              | x    | x    |
| <i>Ranunculus subg. Batrachium (DC)A.Gray</i>    | xx   | xx   |
| <i>R. sceleratus L.</i>                          | x    | x    |
| <i>Scirpus sp.</i>                               | xcf  |      |
| <i>Sparganium erectum L.</i>                     | xcf  |      |
| <b>Trees/shrubs</b>                              |      |      |
| <i>Rubus sect. Glandulosus Wimmer &amp; Grab</i> | x    |      |
| <i>Sambucus nigra L.</i>                         | x    | x    |
| <b>Other plant macrofossils</b>                  |      |      |
| Charcoal <2mm                                    | xx   | x    |
| Indet.buds                                       |      | x    |
| Indet.culm nodes                                 | x    | x    |

|                                |                |                |
|--------------------------------|----------------|----------------|
| Indet.leaf frags.              | xx             | x              |
| Indet.seeds                    | x              | x              |
| Indet.twig frags.              | x              | x              |
| Waterlogged wood frags.        | x              |                |
| Waterlogged root/rhizome/stem  | xxx            | xxx            |
| <b>Other material</b>          |                |                |
| Black porous 'cokey' material  |                | x              |
| Caddis larval cases            | x              | x              |
| Waterlogged arthropods         | xxx            | xxx            |
| <b>Sample volume (litres)</b>  | <b>2</b>       | <b>1.5</b>     |
| <b>Volume of flot (litres)</b> | <b>0.5</b>     | <b>0.4</b>     |
| <b>% flot sorted</b>           | <b>&lt;25%</b> | <b>&lt;25%</b> |