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HIGHWAYS AGENCY

# Archaeology on the A303 Stonehenge Improvement

## Appendix 3: Molluscs

*by Sarah F. Wyles*


Wessex Archaeology

# Archaeology on the A303 Stonehenge Improvement

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# Appendix 3: Molluscs

Sarah F. Wyles

## Introduction

Mollusc samples were taken at three sites to provide information on the local landscape and vegetational history. A series of 10 samples was selected from three trenches (1, 2, and 3) within Area C1 at WA50157 (Scotland Lodge). A sequence of six samples was taken through the Early–Middle Iron Age enclosure ditch section 275 (trench 2), a single sample from undated subsoil layer 301 (trench 3), a single sample from an undated tree throw 107 (trench 1) and two samples from tree throw 113 of Romano-British date (trench 1).

A series of 18 mollusc samples was selected from two test pits (1 and 2) along the Till Valley Auger Transect 2 (WA50286). A sequence of eight samples was taken through floodplain alluvium in test pit 1 and a series of 10 samples through the relict palaeo-channel seen in test pit 2. These sequences are undated.

A series of 22 mollusc samples was taken from three trenches (53, 54, and 57) within Area 4 North of A303, east of River Till (WA52524). Two samples were taken from probable tree-throw 5414 (trench 54) and sequences of nine and 11 samples through the colluvial deposits in trenches 53 and 57 respectively. Although the colluvial sequences are not securely dated, as only a few artefacts were recovered, it is thought that they probably represent a considerable time period, possibly Bronze Age to medieval.

## Methods

Standard analytical methods were employed, namely the identification of apical and diagnostic mollusc fragments following the nomenclature of Kerney (1999) using a x10–x40 stereo-binocular microscope. The following species diversity indices were calculated; Shannon, Brillouin, Delta 2, and Delta 4. The results were tabulated and histograms produced. For WA52524, the samples have been measured from the base of the trench up. Some species were grouped in the histogram and for WA50286 *Vallonia pulchella/excentrica* spp. has been classified within the marsh species group rather than with the open country species. Shells of *Cecilioides acicula*, a burrowing (and therefore potentially intrusive) species, were tabulated and the frequency calculated independently as a percentage of the other molluscs in the histograms. Details of the ecological preferences of the species follow Evans (1972) and Kerney (1999).

## Results

### *WA50157 Scotland Lodge*

The sediments of the sampled features and sequences are described below:

*Early–Middle Iron Age enclosure ditch section 275*

| *Context* | *Thickness* | *Description* |
|---|---|---|
| 270 | 0.30 m | A greyish brown friable silty loam. Sub-angular to sub-rounded – fine to coarse gravel - chalk/flint, moderately sorted. |
| 271 | 0.10 m | A light brownish grey silty loam. Abundant (<50%) angular to sub-angular and fine to coarse chalk/flint fragments. |
| 272 | 0.20 m | A light brownish grey firm silty clay loam. 20% sub-angular to sub-rounded chalk/flint fragments, moderately sorted. |
| 273 | 1.40 m | Light brownish grey silty clay loam. Abundant (50%) sub-angular to sub-rounded chalk/flint fragments. |
| 274 | 0.10 m | Very pale brown silty clay. 10% well sorted rounded chalk gravel. |

*Undated sub-soil Layer*

| *Context* | *Thickness* | *Description* |
|---|---|---|
| 301 | 0.05–0.15m | Subsoil. Brown silty clay loam - friable. Size fine to coarse gravel. 5% sparse to 10% moderate. Poorly sorted. A colluvial layer which thins out in an Easterly direction (downslope). |

*Undated tree-throw 107*

| *Context* | *Thickness* | *Description* |
|---|---|---|
| 108 | 0.30 m | Light brown/grey silty clay soil containing 70-80% chalk rubble <8mm dia and 10% pea chalk. |

*Romano-British tree-throw 113*

| *Context* | *Thickness* | *Description* |
|---|---|---|
| 111 | 0.50 m | Mid-yellow brown silty loam soil containing 10% pea-grit, 10% sub-angular flint pebbles and 5% sub-rounded chalk. |
| 112 | 0.50 m | Light brown/off white silty loam and chalk soil containing 50% chalk and 20% pea-grit. Redeposited natural. |

The snail numbers in these samples were generally rather low, with only two samples producing assemblages of over 100 shells (Table 1). However the mollusc assemblages recovered from these selected features show minor fluctuations in their composition and potentially indicate small changes in the local land use.

The assemblages analysed from the Early–Middle Iron Age enclosure ditch section 275 are all dominated by the open country species. The sequence can be divided into four zones reflecting very minor fluctuations within the assemblage compositions. Zone 1 covers context 274 and the lower part of context 273 (below 1.4 m) and it is characterised by a low level presence of shade-loving species mainly represented by the Zonatids, about 20% intermediate species with *Trichia hispida* being the dominant species within this group and assemblages of *c*. 70% open country species, with *Vallonia costata* being the predominant species. Other significant species are *Vallonia excentrica*, *Helicella itala*, and *Pupilla muscorum*. Zone 2 is represented by the assemblage from context 273 between 1.2 m and1.3 m. This is characterised by a similar assemblage composition to Zone 1 but with a large increase in *Vallonia costata.* The upper part of context 273 and context 272 correspond with Zone 3. Within this zone there is an increase in the intermediate species caused by a rise in Limicidae and a decrease in the open country species reflecting a decline in *Vallonia costata. Vallonia excentrica* becomes the dominant *Vallonia* and levels of *Pupilla muscorum* and *Helicella itala* also increase. In the final zone, covering context 271, the shade-loving element disappears, with the intermediate element being dominated by *Trichia hispida* and Limicidae and the open country group by *Helicella itala, Pupilla muscorum*, and *Vallonia excentrica* together with a low level presence of the Introduced Helicellids.

The shade-loving component, mainly the Zonatid group, in Zones 1–3 is likely to represent patches of long grass around and in the ditch rather than woodland. The interpretation of the open-country components of the zones is more complex. Although *Vallonia costata* thrives in short grazed grassland and avoids arable habitats it has been found in abundance in some colluvial deposits, indiciating at least a tolerance of arable environments in the past. Colluvial deposits typically produce restricted assemblages which tend to be dominated by *Trichia hispida, Vallonia*

*excentrica* , *Vallonia costata*, and Limicidae (Bell 1983). It has been suggested that dryness and disruption of the soil surface favours *Vallonia costata* and surface stability *Vallonia excentrica* (Evans 1972) and Vallonia costata may well have exploited the local environment of the internal bank.

The assemblage compositions tends to suggest:

Zone 1 – Local area of arable in the vicinity with patches of long grass around and in the ditch and patches of disturbed ground and short trampled grass on the internal bank.

Zone 2 – Local area of short grazed grassland with patches of long grass around and in the ditch and patches of disturbed ground and short trampled grass on the internal bank.

Zone 3 – Local area of arable in the vicinity with patches of long grass around and in the ditch. The areas of disturbed ground and short trampled grassland on the internal bank and in the vicinity are likely to have increased during this Zone as shown by the rise in both *Pupilla muscorum* and *Helicella itala*.

Zone 4 – Local area of arable in the vicinity with area of disturbed ground and short grassland on the internal bank and in the vicinity. This occurrence of Introduced Helicellids within this Zone indicates that context 271 was of Romano-British date or later.

The assemblage analysed for the undated colluvial layer mainly comprised open country species (70%), with no shade-loving species at all. The intermediate species group is dominated by *Trichia hispida* and Limicidae, and the open country species group by *Vallonia excentrica, Helicella itala*, and *Vallonia costata.* This is an assemblage typical of those retrieved from colluvial layers (Bell 1983) and it is likely that it is indicative of areas of arable activity in the vicinity.

The undated tree-throw, 107, produced very low snail numbers. The assemblage is dominated by open-country species and is similar to the upper fill of tree-throw 113.

The two assemblages from the Romano-British tree-throw 113 are different in composition. The assemblage from the lower fill, context 111, is dominated by the shade-loving species (*c*. 70%), mainly the Zonitids, *Carychium tridentatum* and *Discus rotundatus.* The other significant species, in terms of numbers, are *Pomatias elegans* and Limicidae. The shade-loving element declines to around 30%, reflecting a decrease in both *Carychium tridentatum* and *Discus rotundatus* in the assemblage from the upper fill context 112. *Helicella itala* and *Vallonia excentrica* are predominant in the open country group. A small amount of Introduced Helicellids are also present in this assemblage.

*Carychium tridentatum, Discus rotundatus,* and the Zonitids all thrive in leaf litter, while *Acanthinula aculeata* and *Cochlodina laminata* favour deciduous woodland in particular. The presence of some open-country species indicates that it is likely to have been open woodland. These assemblages show that there were small areas of open woodland around and within the small sub-enclosure 114/128 in areas of open grassland. Some of this woodland disappeared during the Roman period and the areas of grassland increased.

**Table 1. A303 Stonehenge Archaeological Surveys: 50157, land mollusc data**

| *Phase* | | | *Iron Age* | | | | *Undated* | *Undated* | *R-B* | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Trench* | *2* | *2* | *2* | *2* | *2* | *2* | *3* | *1* | *1* | *1* |
| *Feature Type* | | | *Enclosure Ditch* | | | | *Sub-soil* | | *Tree-throws* | |
| *Feature/Column* | | | *275* | | | | | *107* | *113* | |
| *Context* | *274/3* | *273* | *273* | *273* | *272/3* | *271/2* | *301* | *108* | *111* | *112* |
| *Sample* | *27* | *26* | *25* | *24* | *23* | *22* | *21* | *5* | *6* | *7* |
| *Depth (m)* | *1.6-1.7* | *1.4-1.5* | *1.2-1.3* | *1.0-1.1* | *0.8-0.9* | *0.6-0.7* | *spot* | *Spot* | *0.3* | *0.3* |
| *Wt (g)* | *929* | *1500* | *1500* | *1500* | *1500* | *1500* | *1500* | *1500* | *1500* | *1500* |
| *Pomatias elegans* (Müller) | 3 | 3 | + | 1 | 2 | 2 | 2 | + | 7 | 1 |
| *Carychium tridentatum* (Risso) | - | - | - | - | - | - | - | - | 15 | - |
| *Carychium* spp. | - | - | - | - | - | - | - | - | 8 | 2 |
| *Cochlicopa lubrica* (Müller) | - | 2 | - | - | - | - | - | - | - | - |
| *Cochlicopa* spp. | 2 | 1 | - | 3 | 2 | - | + | - | 1 | - |
| *Vertigo pygmaea* (Draparnaud) | 2 | - | - | 1 | - | - | 1 | - | - | - |
| *Vertigo* spp. | 1 | - | 1 | - | - | - | - | - | - | - |
| *Pupilla muscorum* (Linnaeus) | 3 | 8 | 5 | 2 | 7 | 8 | 8 | 3 | 1 | 1 |
| *Vallonia costata* (Müller) | 35 | 18 | 39 | 14 | 3 | 1 | 14 | - | 2 | 2 |
| *Vallonia excentrica* Sterki | 23 | 18 | 12 | 10 | 5 | 7 | 25 | 3 | 3 | 4 |
| *Vallonia* spp. | 10 | 3 | 6 | - | 2 | 1 | 2 | - | 3 | - |
| *Acanthinula aculeata* (Müller) | - | - | - | - | - | - | - | - | 1 | - |
| *Ena obscura* (Müller) | - | 1 | + | - | - | - | - | - | 1 | - |
| *Punctum pygmaeum* (Draparnaud) | 1 | 1 | - | 1 | - | - | 2 | - | - | 1 |
| *Discus rotundatus* (Müller) | - | - | - | - | - | - | - | - | 19 | 1 |
| *Vitrina pellucida* (Müller) | 1 | - | - | - | - | - | - | - | - | - |
| *Vitrea crystallina* (Müller) | 4 | - | - | - | - | - | - | - | 2 | - |
| *Vitrea contracta* (Westerlund) | 7 | 2 | 3 | 4 | 2 | - | - | - | 5 | 2 |
| *Aegopinella pura* (Alder) | - | - | - | - | - | - | - | - | 5 | 1 |
| *Aegopinella nitidula* (Draparnaud) | - | 1 | - | - | - | - | - | 1 | 4 | 3 |
| *Oxychilus cellarius* (Müller) | - | - | - | - | - | - | - | - | 4 | 1 |
| Limacidae | 8 | 2 | 2 | 6 | 8 | 5 | 9 | 1 | 7 | 2 |
| *Cecilioides acicula* (Müller) | - | 1 | - | 2 | 7 | 46 | 168 | 71 | 153 | 35 |
| *Cochlodina laminata* (Montagu) | - | - | - | - | - | - | - | - | 1 | - |
| *Clausilia bidentata* (Ström) | 1 | - | - | - | + | - | - | - | - | - |
| *Candidula intersecta* (Poiret) | - | - | - | - | - | 1 | - | - | - | 1 |
| *Helicella itala* (Linnaeus) | 17 | 9 | 9 | 4 | 9 | 13 | 25 | 8 | 4 | 12 |
| *Trichia hispida* (Linnaeus) | 12 | 7 | 6 | 5 | 5 | 8 | 18 | 1 | 1 | 1 |
| *Helicigona lapicida* (Linnaeus) | - | - | + | - | - | - | - | - | - | - |
| *Cepaea/Arianta* spp. | + | + | + | + | + | - | + | + | + | + |
| Taxa | 14 | 12 | 8 | 11 | 9 | 8 | 9 | 6 | 18 | 15 |
| TOTAL | 130 | 76 | 83 | 51 | 45 | 46 | 106 | 17 | 94 | 35 |
| Shannon Index | 2.050 | 2.016 | 1.490 | 2.078 | 2.061 | 1.814 | 1.861 | 1.467 | 2.408 | 2.292 |
| Brillouin Index | 1.890 | 1.805 | 1.354 | 1.802 | 1.790 | 1.589 | 1.729 | 1.136 | 2.148 | 1.840 |
| Shannon Index – Brillouin Index | 0.160 | 0.211 | 0.136 | 0.276 | 0.271 | 0.225 | 0.133 | 0.331 | 0.260 | 0.452 |
| Delta 2 Index | 0.822 | 0.828 | 0.672 | 0.844 | 0.860 | 0.815 | 0.822 | 0.706 | 0.872 | 0.842 |
| Delta 4 Index | 4.831 | 5.186 | 2.125 | 6.203 | 7.320 | 4.983 | 4.864 | 3.000 | 7.438 | 6.532 |
| % Shade-loving species | 9.2 | 5.2 | 3.6 | 7.8 | 4.4 | 0.0 | 0.0 | 5.9 | 69.2 | 28.6 |
| % Intermediate species | 20.8 | 20.8 | 9.6 | 31.4 | 37.8 | 32.6 | 29.3 | 11.8 | 17.0 | 14.3 |
| % Open country species | 70.0 | 72.7 | 86.8 | 60.8 | 57.8 | 67.4 | 70.8 | 82.4 | 13.8 | 57.1 |

*50286 Till Valley Auger Transects and Test Pits*

The sediments of the sampled sequences are described below:

*Test pit 1 – Floodplain alluvium*

| *Context* | *Depth( m)* | *Description* |
|---|---|---|
| 100 | 0.0–0.10 | 'Topsoil' –dark greyish brown (10YR 4/2) silt loam with rare fine chalk/flint fragments and rare medium flint gravel. [*Topsoil*] |
| 100 | 0.10–0.21 | Brown to dark brown (10YR 4/3-3/3) stonefree silty humic loam with coarse crumb to fine/medium blocky structure, with few fine fleshy roots, clear boundary. *[Base of soil profile*] |
| 101 | 0.21–0.55 | Light brownish grey to light yellowish brown (2.5YR 6/2 – 6/3) calcareous stonefree (but rare very small calcareous flecks) silt to silty clay becoming lighter in colour and denser in matrix with depth. Common fine clear yellowish red (5YR 5/6) mottles predominantly in the lower portion (from c. 0.4m), clear boundary. [*calcareous overbank alluvium*] |
| 102 | 0.65–0.72 | Zone of mottling within light yellowish brown (2.5YR 6/2) to pale yellow (2.5Y 7/3) calcareous silt marl. Many medium clear mottles of dark greyish brown (7.5YF), possibly representing a bA/B horizon [*calcareous overbank alluvium with ?some soil ripening]* |
| 102 | 0.72–0.81 | As above but a finer silt matrix with weak blocky – prismatic structure [*calcareous overbank alluvium with ?some soil ripening*] |
| 103 | 0.81–0.95 | Pale yellow (5Y 7/3) calcareous marl. [*Calcareous overbank alluvium*] |
| 104 | 0.95+ | *Gravel,* abundant medium subangular and angular flint gravel [*Valley gravel*] |

*Test pit 2 Palaeo-channel fill*

| *Context* | *Depth (m)* | *Description* |
|---|---|---|
| 201 | 0–0.20 | Topsoil mid brown silty clay |
| 201 | 0.20–0.27 | Dark greyish brown (10YR 4/2) humic silt with medium moderate crumb structure. Base 'B' horizon of alluvial gley soil. [*base of topsoil*] |
| 202 | 0.27–0.47 | Brown (10YR 5/3) stonefree silty clay loam with weak blocky structure, 0.1% fine macropores, very rare very fine chalk pieces, clear boundary. [*humic calcareous overbank alluvium with soil ripening*] |
| 203 | 0.47–0.92 | Light grey (2.5YR 7/2) massive calcareous marl with very rare medium rounded chalk pieces, sharp boundary. [*calcareous fine grained alluvium*] |
| 204 | 0.92–1.15 | Dark greyish brown to very dark greyish brown (10YR 4/2-3/2) silty clay with moderate to strong medium prismatic structure, fine distinct red (2.5YR 4/6) mottles. [*burial alluvial soil*] |
| 205 | 1.15–1.20+ | Mottled light fey brown silty clay with common to many medium flint gravel. [*Valley gravel*] |

The snail numbers in these samples were generally good, with only the three basal samples in Test pit 2 producing assemblages of fewer than 100 shells. The mollusc assemblages recovered from these selected sequences, however, show fluctuations in their composition, reflecting small changes in the immediate environment.

**Test pit 1 – Floodplain alluvium**

The eight assemblages analysed from the floodplain alluvial deposits in Test pit 1 are dominated by the freshwater species (Table 2). The sequence can be divided into three zones reflecting fluctuations in the assemblage compositions. Zone 1 covers the valley gravel context 104 and the calcareous overbank alluvium, context 103. It is characterised by a predominance of the catholic species *Lymnaea peregra*, although it declines from 79% to 67% within the zone, and an increase

within the amphibious species *Anisus leucostoma* and *Lymnaea truncatula*. Within Zone 2, which corresponds with the top of context 103, the calcareous overbank alluvium, context 102, and the bottom of the calcareous overbank alluvium, context 101, the assemblages are dominated by the amphibious species, in particular *Anisus leucostoma*, and the catholic species *Lymnaea peregra*, although this has decreased from its high level within Zone 1. There is a minor fluctuation within the middle of this zone, caused by a fall in *Lymnaea peregra* with a mirroring rise in *Lymnaea truncatula.* At the start of this zone, the slum species, as represented by *Valvata cristata*, form 10% of the assemblage and they decline to 1.5% within the zone. There is also a small presence of *Bithynia truncatula*, a moving-water species, throughout the zone. Zone 3 covers the calcareous overbank alluvium, context 101 from above 0.5 m, and is characterised by an increase in *Anisus leucostoma*, up to 59%, although this species declined within the zone to 39% of the assemblage. *Lymnaea peregra* is also present in significant numbers. There is a minor fluctuation within this zone as a result of an increase in numbers of *Lymnaea* peregra, matched by a decrease in *Lymnaea truncatula*. The marsh species, Succineidae and *Vallonia pulchella/excentrica* spp., increase within the zone up to 12%, while the intermediate species rise to 19%, mainly represented by *Trichia hispida*.

**Test pit 2 – Palaeo-channel fill**

The 10 assemblages analysed from the palaeo-channel fill deposits in Test pit 2 are dominated by freshwater, marsh, and intermediate species (Table 3). Four zones, reflecting fluctuations in the assemblage compositions, can be defined within the sequence. Zone 1 covers part of the buried alluvial soil, context 204 (1.0–1.1 m) and is characterised by a predominance of the marsh species, Succineidae and *Vallonia pulchella/excentrica* spp. Over 30% of the assemblage is formed by the intermediate species *Trichia hispida* and *Cochlicopa* spp. and 15% by *Anisus leucostoma*, an amphibious species. Within Zone 2, which corresponds with the top of context 204 and the base of the calcareous fine grained alluvium, context 203 (0.9–1.0 m), the assemblage is equally dominated by both the marsh species, in particular the Succineidae species, and the intermediate species, especially *Trichia hispida*. Zone 3 covers most of context 203 (0.5–0.9 m) and is mainly dominated by *Anisus leucostoma*, which increases then declines within the zone, and *Lymnaea peregra*, which decreases then rises within the zone. The marsh and intermediate species decrease within the zone with a rise in both at the top of the Zone. There is also a presence of the slum species *Valvata cristata* though out the zone, peaking at 8%. The intermediate species, particularly *Trichia hispida* and *Cochlicopa* spp. are predominant within Zone 4, which corresponds with the top of context 203 and the humic calcareous overbank alluvium, context 202. There is a fluctuation in the middle of this zone, caused by a rise in *Tricihia hispida*. The marsh group, represented by Succineidae *and Vallonia pulchella/excentrica* spp., rise within the zone to 36%, while the catholic and amphibious species decline. The slum group species have disappeared and there is an increasing small presence of open country species, mainly *Helicella itala.*

**Interpretation**

There are difficulties in analysing mollusc assemblages from deposits largely formed from overbank flooding. With these deposits potentially producing taphonomically mixed assemblages, it is not always clear which species were living on the floodplain and which are derived from the river. This especially applies to amphibious species such as *Anisus leucostoma* and to certain freshwater species which might breed on well-watered floodplains an in adjacent drainage ditches, such as *Valvata cristata* and *Lymnaea peregra* (Evans *et al.* 1992).

It has been suggested that a method of addressing the problems in studying Mollusca from deposits largely formed from overbank flooding is to look at them in terms of taxocenes. 'Taxocene' refers to particular proportions of species of a particular taxonomic group as reflecting, if subfossil, a former life situation. A taxocene is more of an interpretative statement, for example referring to a group of stratigraphically contiguous assemblages which as a whole have particular characteristics but which individually need not do so, whereas an assemblage refers to a collection

of shells without implications as to its environmental significance or to the relationships between its individuals (Evans *et al.* 1992).

Floodplains often have more extreme annual variations in properties such as flooding/drying, temperature, parching and vegetation structure than places which are not flooded. In consequence, the molluscan faunas tend to be specialised ones, often consisting of species which can invade and breed rapidly or which can survive drought or flooding (Evans *et al.* 1992). Studies by Robinson (1988) found that the terrestrial taxa (including the marsh species) found in the meadow land assemblages, where they represented 25–85% of the assemblages, were restricted in floodplain environments of pasture, where they formed less than 5% of the assemblages. Robinson concludes that the main limiting factor is probably that during the summer, the very short turf of the pasture provides very little shelter from insolation and that those species able to tolerate these dry conditions would not be able to withstand the wet conditions and flooding during the remainder of the year.

The local environments reflected by the zones within the two sequences are described below using the most appropriate taxocenes defined by Evans *et al.* (1992).

Test pit 1 – Floodplain alluvium

Zone 1 – *Taxocene 7.* A very restricted assemblage that may have originated from overbank flooding or from a floodplain environment of damp grassland.

Zone 2 – *Taxocene 7.* It is likely that at least half of the assemblage originated from a floodplain environment of damp grassland with seasonal flooding. There is a small part of the assemblage that is thought to have originated from a slow-moving water source with rich vegetation, as represented by *Valvata cristata* and *Bithynia tentaculata.*

Zone 3 – *Taxocene 7.* It is likely that at least 65% of the assemblage originated from a floodplain environment of damp grassland with possibly decreased seasonal flooding but with areas of marsh environments.

Test pit 2 – Palaeo-channel fill

Zone 1 – *?Taxocene 2* (with *Anisus leucostoma* instead of *Lymnaea truncatula*). It appears to reflect open meadow which flooded seasonally. It is likely to have stayed flooded longer than in Zone 2 and Zone 4 and may have had some permanent pools.

Zone 2 – ?*Taxocene 2* (without *Lymnaea truncatula* and *Anisus leucostoma*). It appears to be indicative of open meadow which flooded seasonally.

Zone 3 – *Taxocene 7.* It seems to indicate a floodplain environment of damp possibly lightly grazed grassland with seasonal flooding. There is a small part of the assemblage that is thought to have originated from a slow-moving water source with rich vegetation, as represented by *Valvata cristata.*

Zone 4 – *Taxocene 2*. It is indicative of open meadow which flooded seasonally, although it appears to be generally drier than the other Zones.

**Table 2. A303 Stonehenge Archaeological Surveys: 50286, mollusc data**

| *Feature Type* | *Floodplain Alluvium* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Feature* | *Test pit 1* | | | | | | | |
| *Context* | *103/4* | *103* | *102/3* | *102* | *102/1* | *101* | *101* | *100/1* |
| *Depth (m)* | *0.9-1.0* | *0.8-0.9* | *0.7-0.8* | *0.6-0.7* | *0.5-0.6* | *0.4-0.5* | *0.3-0.4* | *0.2-0.3* |
| *Wt (g)* | *2000* | *2000* | *2000* | *2000* | *2000* | *2000* | *2000* | *2000* |
| LAND SNAILS | | | | | | | | |
| *Pomatias elegans* (Müller) | + | + | - | - | - | - | - | - |
| *Succinea* c.f. *putris* (Linnaeus) | 3 | 2 | 7 | 11 | 3 | 2 | 5 | 10 |
| *Oxyloma* c.f.*pfeifferi* (Rossmässler) | - | 1 | 3 | 3 | 2 | 2 | 2 | 2 |
| *Succinea/Oxyloma* spp. | - | - | - | - | - | - | - | - |
| *Cochlicopa lubrica* (Müller) | - | - | - | - | - | - | - | - |
| *Cochlicopa lubricella* (Porro) | - | 1 | 1 | - | 1 | 1 | - | 1 |
| *Cochlicopa* spp. | - | - | 2 | 3 | - | - | - | 1 |
| *Pupilla muscorum* (Linnaeus) | 1 | - | - | - | - | - | - | - |
| *Vallonia costata* (Müller) | - | - | - | 1 | - | - | - | - |
| *Vallonia pulchella/excentrica* sp. | 1 | 5 | 1 | 3 | 3 | 6 | 4 | 9 |
| *Vallonia* spp. | - | 2 | - | 2 | - | - | - | - |
| *Vitrea contracta* (Westerlund) | 1 | - | - | - | - | - | - | - |
| *Nesovitrea hammonis* (Ström) | - | 2 | 2 | 1 | - | - | - | 3 |
| *Aegopinella nitidula* (Draparnaud) | - | 1 | - | 1 | - | - | - | - |
| Limacidae | 1 | 3 | 7 | 18 | 8 | 1 | - | 2 |
| *Cecilioides acicula* (Müller) | - | 1 | - | - | - | - | - | - |
| *Helicella itala* (Linnaeus) | - | - | - | - | - | - | - | - |
| *Trichia hispida* (Linnaeus) | 16 | 36 | 8 | 22 | 9 | 5 | 10 | 26 |
| *Helicigona lapicida* (Linnaeus) | - | - | - | - | - | - | - | - |
| *Cepaea/Arianta* spp. | - | 1 | 1 | - | 1 | - | 1 | - |
| FRESH- /BRACKISH-WATER | | | | | | | | |
| *Valvata cristata* Müller | - | 8 | 54 | 28 | 3 | 2 | 2 | - |
| *Bithynia tentaculata* (Linnaeus) | - | - | 10 | 33 | 7 | 1 | - | - |
| *Lymnaea truncatula* (Müller) | 1 | 8 | 11 | 55 | 9 | 7 | - | 2 |
| *Lymnaea peregra* (Müller) | 26 | 80 | 42 | 58 | 20 | 11 | 14 | 9 |
| *Lymnaea* spp. | 154 | 290 | 195 | 230 | 75 | 80 | 59 | 40 |
| *Anisus leucostoma* (Millet) | 16 | 72 | 172 | 222 | 58 | 167 | 128 | 67 |
| *Gyraulus crista* (Linnaeus) | - | 1 | 5 | 8 | - | - | - | - |
| *Pisidium* spp. | - | - | 1 | - | - | - | - | - |
| Taxa | 9 | 14 | 15 | 15 | 12 | 11 | 8 | 10 |
| TOTAL | 220 | 513 | 522 | 699 | 199 | 285 | 225 | 172 |
| Shannon Index | 0.833 | 1.168 | 1.612 | 1.758 | 1.697 | 1.226 | 1.089 | 1.697 |
| Brillouin Index | 0.779 | 1.126 | 1.563 | 1.717 | 1.603 | 1.170 | 1.036 | 1.602 |
| Shannon Index – Brillouin Index | 0.054 | 0.041 | 0.049 | 0.041 | 0.094 | 0.056 | 0.053 | 0.095 |
| Delta 2 Index | 0.363 | 0.521 | 0.728 | 0.773 | 0.753 | 0.594 | 0.568 | 0.756 |
| Delta 4 Index | 0.573 | 1.091 | 2.690 | 3.421 | 3.104 | 1.473 | 1.330 | 3.178 |
| % Shade-loving species | 0.5 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| % Intermediate species | 7.7 | 8.4 | 4.0 | 6.3 | 9.6 | 2.5 | 4.9 | 19.2 |
| % Open country species | 0.9 | 1.4 | 0.2 | 0.9 | 1.5 | 2.1 | 1.8 | 5.2 |
| % Unassigned land | 1.4 | 0.6 | 1.9 | 2.0 | 2.5 | 1.4 | 3.1 | 7.0 |
| % Amphibious species | 7.7 | 15.6 | 35.1 | 39.6 | 33.7 | 61.1 | 56.9 | 40.1 |
| % Catholic freshwater species | 11.8 | 15.8 | 9.0 | 9.4 | 10.1 | 3.9 | 6.2 | 5.2 |
| % Slum species | 0.0 | 1.6 | 10.3 | 4.0 | 1.5 | 0.7 | 0.9 | 0.0 |
| % Moving water species | 0.0 | 0.0 | 1.9 | 4.7 | 3.5 | 0.4 | 0.0 | 0.0 |
| % unassigned freshwater species | 70.0 | 56.5 | 37.6 | 32.9 | 37.7 | 28.1 | 26.2 | 23.3 |

**Table 3. A303 Stonehenge Archaeological Surveys: 50286, land mollusc data**

| *Feature Type* | *Palaeochannel Fill* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Feature* | *Test pit 2* | | | | | | | | | |
| *Context* | *204/5* | *204* | *203/4* | *203* | *203* | *203* | *203* | *202/3* | *202* | *201/2* |
| *Depth (m)* | *1.1-1.2* | *1.0-1.1* | *0.9-1.0* | *0.8-0.9* | *0.7-0.8* | *0.6-0.7* | *0.5-0.6* | *0.4-0.5* | *0.3-0.4* | *0.2-0.3* |
| *Wt (g)* | *1100* | *1300* | *1450* | *1350* | *1500* | *1450* | *1500* | *1500* | *1500* | *1600* |
| LAND SNAILS | | | | | | | | | | |
| *Pomatias elegans* (Müller) | - | + | + | - | - | - | - | - | - | - |
| *Succinea* c.f.*putris* (Linnaeus) | - | 3 | 6 | 6 | 10 | 12 | 8 | 9 | 17 | 47 |
| *Oxyloma* c.f. *pfeifferi* (Rossmässler) | - | - | - | 1 | 2 | 3 | 4 | 3 | 6 | 5 |
| *Succinea/Oxyloma* spp. | - | 7 | 3 | - | - | - | - | - | - | - |
| *Cochlicopa lubrica* (Müller) | - | 2 | - | 1 | 1 | 1 | 5 | 1 | 3 | 8 |
| *Cochlicopa lubricella* (Porro) | - | 1 | - | 2 | 1 | 1 | 1 | - | 2 | 9 |
| *Cochlicopa* spp. | - | 1 | 2 | 2 | 3 | 2 | 7 | 10 | 20 | 15 |
| *Pupilla muscorum* (Linnaeus) | - | - | - | - | - | - | 1 | - | - | - |
| *Vallonia costata* (Müller) | - | - | - | - | - | - | - | - | - | - |
| *Vallonia pulchella/excentrica* spp. | 1 | 12 | 3 | 6 | 7 | 4 | 19 | 21 | 42 | 41 |
| *Vallonia* spp. | - | - | - | 1 | 1 | 1 | - | - | - | - |
| *Vitrea contracta* (Westerlund) | - | - | - | - | - | - | - | - | - | - |
| *Nesovitrea hammonis* (Ström) | - | - | - | 3 | - | + | 2 | 2 | 9 | 2 |
| *Aegopinella nitidula* (Draparnaud) | - | - | - | - | - | 2 | 4 | - | 2 | - |
| Limacidae | - | - | - | - | 2 | 1 | 2 | 4 | 4 | 8 |
| *Cecilioides acicula* (Müller) | - | - | - | - | - | 1 | - | - | 2 | - |
| *Helicella itala* (Linnaeus) | - | - | - | - | - | - | - | - | 4 | 8 |
| *Trichia hispida* (Linnaeus) | 1 | 9 | 10 | 20 | 21 | 28 | 41 | 47 | 133 | 108 |
| *Helicigona lapicida* (Linnaeus) | - | + | - | + | - | - | - | - | - | - |
| *Cepaea/Arianta* spp. | - | - | - | - | + | - | - | + | + | + |
| FRESH- /BRACKISH-WATER | | | | | | | | | | |
| *Valvata cristata* Müller | - | - | 1 | 6 | 12 | 31 | 10 | - | - | - |
| *Bithynia tentaculata* (Linnaeus) | - | - | - | - | - | - | - | - | - | - |
| *Lymnaea truncatula* (Müller) | - | - | - | 6 | 19 | 27 | 12 | 3 | 1 | 6 |
| *Lymnaea peregra* (Müller) | - | - | - | 22 | 43 | 58 | 42 | 5 | 1 | - |
| *Lymnaea* spp. | - | - | - | 69 | 29 | 46 | 23 | 4 | 4 | - |
| *Anisus leucostoma* (Millet) | - | 6 | - | 46 | 160 | 161 | 62 | 5 | 8 | 4 |
| *Gyraulus crista* (Linnaeus) | - | - | - | 1 | 1 | - | - | - | - | - |
| *Pisidium* spp. | - | - | - | - | - | - | - | - | - | - |
| Taxa | 2 | 6 | 5 | 12 | 12 | 12 | 14 | 10 | 13 | 11 |
| TOTAL | 2 | 41 | 25 | 192 | 311 | 378 | 243 | 114 | 256 | 261 |
| Shannon Index | 0.693 | 1.600 | 1.320 | 1.756 | 1.543 | 1.650 | 2.040 | 1.828 | 1.696 | 1.784 |
| Brillouin Index | 0.347 | 1.409 | 1.104 | 1.657 | 1.478 | 1.594 | 1.940 | 1.689 | 1.608 | 1.707 |
| Shannon Index – Brillouin Index | 0.347 | 0.191 | 0.215 | 0.099 | 0.065 | 0.056 | 0.099 | 0.140 | 0.088 | 0.078 |
| Delta 2 Index | 0.500 | 0.779 | 0.688 | 0.759 | 0.678 | 0.737 | 0.829 | 0.770 | 0.690 | 0.761 |
| Delta 4 Index | 0.0 | 3.970 | 2.529 | 3.222 | 2.129 | 2.835 | 4.963 | 3.485 | 2.257 | 3.237 |
| % Shade-loving species | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 1.7 | 0.0 | 0.8 | 0.0 |
| % Intermediate species | 50.0 | 31.7 | 48.0 | 14.6 | 9.0 | 8.7 | 23.9 | 56.1 | 66.8 | 57.5 |
| % Open country species | 50.0 | 29.3 | 12.0 | 3.7 | 2.6 | 1.3 | 8.2 | 18.4 | 18.0 | 18.8 |
| % Unassigned land | 0.0 | 24.4 | 36.0 | 3.7 | 3.9 | 4.0 | 4.9 | 10.5 | 9.0 | 19.9 |
| % Amphibious species | 0.0 | 14.6 | 0.0 | 27.1 | 57.6 | 49.7 | 30.5 | 7.0 | 3.5 | 3.8 |
| % Catholic freshwater species | 0.0 | 0.0 | 0.0 | 12.0 | 14.2 | 15.3 | 17.3 | 4.4 | 0.4 | 0.0 |
| % Slum species | 0.0 | 0.0 | 4.0 | 3.1 | 3.9 | 8.2 | 4.1 | 0.0 | 0.0 | 0.0 |
| % Moving water species | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| % unassigned freshwater species | 0.0 | 0.0 | 0.0 | 35.9 | 9.3 | 12.2 | 9.5 | 3.5 | 1.6 | 0.0 |

## *WA 52524 Area 4 North of A303, east of River Till*

The sediments of the sampled features and sequences are described below:

*?Tree-throw 5414*

| *Context* | *Depth* | *Description* |
|---|---|---|
| 5415 | Lower | Mid-greyish brown silty clay with common gravel and flints (<70 mm) |
| 5416 | Upper | Pale yellowish brown silty clay with common chalk fragments and flints (<50 mm) |

*Trench 53*

| *Context* | *Depth (m)* | *Description* |
|---|---|---|
| 5301 | 0–0.35 | Ploughsoil. Mid-brown silty clay containing occasional chalk fragments and flints. |
| 5302 | 0.35–0.85 | Colluvium. Mid-yellowish brown silty clay with occasional flints. Unit 1a |
| 5303 | 0.85–1.05 | Colluvium. Mid-greyish brown silty clay with common small chalk fragments (<10 mm). Unit 1b |
| 5304 | 1.05–1.30 | Colluvium. Mid-greyish brown silty clay with common flints. Unit 2a |
| 5305 | 1.30–1.45 | Buried soil. Dark greyish brown silty clay with common flints. Unit 3a |
| 5306 | 1.45–1.60 | Flinty gravel in a clay matrix. Unit 3b. |
| 5307 | 1.60+ | Natural. Broken chalk with flints with occasional patches of mid-brown clay. Unit 5 |

*Trench 57*

| *Context* | *Depth (m)* | *Description* |
|---|---|---|
| 5701 | 0–0.25 | Ploughsoil. Mid-brown silty clay with occasional flints. |
| 5702 | 0.25–0.80 | Colluvium. Mid-yellowish brown silty clay with occasional flints. Unit 1a |
| 5703 | 0.80–1.15 | Colluvium. Mid-greyish brown clayey silt with occasional chalk flecks and flints. Unit 1b |
| 5704 | 1.15–1.35 | Colluvium. Mid-yellowish brown mix of flints and gravel in silty clay matrix. Unit 2a/b |
| 5706 | 1.35–1.45 | Buried soil. Dark brown clayey silt with common flints. Unit 3 |
| 5707 | 1.45–1.60 | Flint gravel. Dark brown mix of flints and gravel with moderate small chalk fragments in a clay matrix. Unit 3b |
| 5708 | 1.60+ | Natural. Broken chalk with flints with occasional patches of mid-brown clay. Unit 5 |

The mollusc assemblages recovered from these samples show minor fluctuations in their composition and potentially indicate small changes in the local land-use (Tables 4 and 5).

**?Tree-throw 5414**

The two assemblages from the samples analysed from the probable tree throw 5414 have broadly similar percentages of both shade-loving (29% and 37%) and open country species (43% and 38%; Table 4). There are differences between the assemblages. The shade-loving element of the assemblage from context 5415 is dominated by *Discus rotundatus* and the Zonatids, the intermediate element by *Trichia hispida* and Limacidae and the open-country group by *Pupilla muscorum* and the Vallonias with *Vallonia costata* predominant over *Vallonia excentrica*. The assemblage from context 5416 is characterised by a decline in both *Discus rotundatus* and the

Zonatids together with the introduction of *Carychium* spp. in the shade-loving element, by an increase of *Pomatias elegans* within the intermediate group and a decrease in *Pupilla muscorum* with an increase in *Helicella itala* in the open country element. *Discus rotundatus*, the Zonitids and *Carychium tridentatum* all thrive in leaf litter and under logs but can also exploit the shady provided at the base of long unkempt grass, (although *Discus rotundatus* is the least common of these species in this environment). The presence of *Pomatias elegans* and *Pupilla muscorum* is indicative of area of bare earth and disturbed ground. The mollusc data appears to show a local environment of open woodland within an open, probably grazed, grassland landscape, which becomes less woody but with areas of long unkempt grass, where the trees had been, still within an open landscape of probably grazed grassland.

**Trench 57**

The assemblages analysed from Trench 57 are all very dominated by open-country species with the virtual absence of any shade-loving components (Table 4). The sequence can be sub-divided into three zones as a result of the fluctuations in assemblage composition. Zone 1 corresponds with contexts 5707 and 5706, the buried soil and flint gravel deposits and snail numbers are low. It is characterised by a predominance of *Pupilla muscorum*, *Vallonia excentrica,* and *Vallonia costata*. In Zone 2, which covers the colluvial deposits of contexts 5704 and 5703, *Pupilla muscorum* remains very dominant but decreases from 60% to 40% of the assemblage. Within this zone, although both species form significant percentages of the assemblages, *Vallonia costata* increases while *Vallonia excentrica* decreases. The occurrence of *Helicella itala* increases slightly through the zone. There is a minor fluctuation within this zone at the top part of context 5704 with a greater increase in *Helicella itala* and *Vallonia costata* and a corresponding decrease in *Pupilla muscorum* and *Vallonia excentrica* than seen in the broad trend. The assemblages from the colluvial deposit of context 5702 form Zone 3. This zone is characterised by the general increase in the intermediate species, mainly represented by *Trichia hispida* and Limacidae, together with the increase in *Helicella itala* and decrease *Pupilla muscorum*. *Vallonia excentrica* generally predominated *Vallonia costata* and the species mirror each other as they fluctuate between increasing and declining. Introduced helicellids begin to occur towards the top of the assemblage, indicating a possible Romano-British or later date for this zone.

Colluvial deposits typically produce restricted assemblages which tend to be dominated by *Trichia hispida, Vallonia excentrica*, *Vallonia costata,* and Limicidae (Bell 1983). These species are present in these assemblages from Trench 57, together with two other significant species, *Helicella itala* and *Pupilla muscorum.* Although the usual habitat of *Helicella itala* is one of short dry grassland, it has been found in abundance in some colluvial deposits, indicating at least a tolerance of arable environments in the past (Evans 1972). *Pupilla muscorum, however,* favours bare earth patches in open short grassland, as caused by intensive grazing, and does not thrive in arable conditions. It often occurs in large numbers, as it does within this sequence, and is known to have been abundant in the area at Durrington Walls (Evans 1972, 148), King Barrow Ridge (Allen and Wyles 1994), Vespasian's Camp (Allen 1999), and Earl's Farm Down (Allen and Wyles 2004).

The assemblage compositions tend to suggest:

Zone 1 – A local open landscape of short-turfed grazed grassland.

Zone 2 – A local open landscape of generally intensively grazed short-turfed grassland. There may be a period when the grassland was less intensively grazed, coinciding with the slight decline in *Pupilla muscorum* and rise in *Helicella itala* and *Vallonia costata*.

Zone 3 – A local open landscape with periods of arable and short-turfed grassland. The fluctuations between *Vallonia costata* and *Vallonia excentrica* may reflect changes in the local landscape, namely alternating between arable and pastoral use. There may have been a period of more intensive grazing within this zone, coinciding with the rise in *Pupilla muscorum*.

**Trench 53**

The open-country species dominated the assemblages recovered from the sampled colluvial sequence in Trench 53 and there is a complete absence of shade-loving species (Table 5). A single specimen of *Succinea/.Oxyloma* spp., marsh species, was recovered from sample 26, taken from the basal part of context 5302. The assemblages are typical of other colluvial assemblages and can be divided into four zones where there are minor fluctuations within the assemblage composition. Zone 1 corresponds with contexts 5306 and 5305, the buried soil and flinty gravel and snail numbers are relatively low within this zone. These assemblages are characterised by a predominance of *Trichia hispida* with some Limicidae within the intermediate species and of *Helicella itala* and *Vallonia excentrica*, with some *Vallonia costata* and *Pupilla muscorum*. The colluvial deposits of contexts 5304 and 5303 form Zone 2. The intermediate species within this zone are mainly formed by *Trichia hispida* and Limicidae, while the open country species are represented by an increase in *Vallonia excentrica* and a decrease in *Helicella itala*, *Vallonia costata,* and *Pupilla muscorum*. There were low numbers of Introduced Helicellids recovered in this zone. In Zone 3, which covers the lower part of colluvial deposit 5302, generally Limicidae increase while *Trichia hispida* decline within the intermediate species, while the open country species are dominated by *Helicella itala* which increase and *Vallonia excentrica* , which decrease. The assemblages within Zone 4 are very similar to those seen in Zone 4 with the exception that *Vallonia excentrica* increases while *Helicella itala* declines. There is also an increase in *Vallonia costata*. Small quantities of Introduced Helicellids were also present within the assemblages within zones 2-4, indicating a possible date of Roman or later for these deposits.

The assemblage compositions tend to suggest:

Zone 1 – A local open landscape of short-turfed grazed/trampled grassland.

Zone 2 – An open landscape with the local area having an increasing arable rather than pastoral use.

Zone 3 – A local open landscape with areas of arable and grazed grassland. The areas of pasture appear to increase towards the top of this zone.

Zone 4 – A local open landscape again with areas of arable and short-turfed grazed grassland, with an increase in the areas used for arable towards the top of the zone.

## Table 4. A303 Stonehenge Archaeological Surveys: 52524, land mollusc data

| *Trench* | *54* | | *57* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Feature Type* | *Tree throw* | | *Test pit* | | | | | | | | | |
| *Feature/Column* | *5414* | | *2* | | | | | | | | | |
| *Context* | *5415* | *5416* | *5707* | *5706* | *5704* | *5704* | *5703* | *5703* | *5702* | *5702* | *5702* | *5702* |
| *Sample* | *8* | *9* | *10* | *11* | *12* | *13* | *14* | *15* | *16* | *17* | *18* | *19* | *20* |
| *Depth (m)* | *Spot* | *spot* | *0.0-0.13* | *0.15-0.25* | *0.25-0.37* | *0.37-0.47* | *0.47-0.60* | *0.60-0.72* | *0.72-0.80* | *0.80-0.90* | *0.90-1.00* | *1.00-1.10* | *1.10-1.20* |
| *Wt (g)* | *2000* | *2000* | *1000* | *1000* | *1000* | *1000* | *1000* | *1000* | *1000* | *1000* | *1000* | *1000* | *1000* |
| *Pomatias elegans* (Müller) | 2 | 14 | + | - | + | 2 | + | 1 | 1 | + | + | 2 | + |
| *Carychium* spp. | - | 4 | - | - | - | - | - | - | - | - | - | - | - |
| *Succinea/Oxyloma* spp. | - | - | - | - | - | - | - | - | - | - | - | - | - |
| *Cochlicopa lubrica* (Müller) | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - |
| *Cochlicopa* spp. | - | - | 1 | - | - | - | - | 2 | 1 | 1 | 1 | - | - |
| *Vertigo pygmaea* (Draparnaud) | 1 | 2 | - | 1 | - | - | 3 | 1 | 6 | 1 | - | - | - |
| *Vertigo* spp. | - | - | + | - | - | - | - | 1 | 1 | - | - | 1 | - |
| *Pupilla muscorum* (Linnaeus) | 12 | 3 | 4 | 18 | 36 | 28 | 155 | 89 | 38 | 16 | 5 | 18 | 2 |
| *Vallonia costata* (Müller) | 9 | 15 | 3 | 6 | 4 | 10 | 37 | 52 | 35 | 44 | 17 | 12 | 29 |
| *Vallonia excentrica* Sterki | 5 | 9 | 4 | 10 | 16 | 9 | 47 | 34 | 57 | 50 | 41 | 21 | 26 |
| *Vallonia* spp. | - | 1 | 1 | - | 1 | 1 | 6 | 6 | 6 | 7 | 6 | 2 | 6 |
| *Acanthinula aculeata* (Müller) | - | 3 | - | - | - | - | - | - | - | - | - | - | - |
| *Punctum pygmaeum* (Draparnaud) | - | 1 | - | - | - | - | 2 | 3 | - | - | - | - | - |
| *Discus rotundatus* (Müller) | 13 | 12 | + | - | - | - | - | - | - | - | - | - | - |
| *Vitrina pellucida* (Müller) | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Vitrea contracta* (Westerlund) | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| *Nesovitrea hammonis* (Ström) | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| *Aegopinella pura* (Alder) | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| *Aegopinella nitidula* (Draparnaud) | 4 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| *Oxychilus cellarius* (Müller) | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Limacidae | 5 | 8 | - | - | - | 2 | 8 | 8 | 13 | 21 | 19 | 17 | 18 |
| *Cecilioides acicula* (Müller) | 4 | 29 | 7 | 6 | 23 | 24 | 97 | 61 | 128 | 246 | 135 | 109 | 59 |
| *Clausilia bidentata* (Ström) | 3 | 6 | - | - | - | - | 1 | - | - | - | - | - | - |
| Clausiliidae | - | - | - | - | + | - | - | - | - | - | - | - | - |
| *Cernuella virgata* (Da Costa) | - | - | - | - | - | - | - | - | 1 | - | 2 | 4 | 8 |
| *Helicella itala* (Linnaeus) | 3 | 10 | 3 | + | 2 | 11 | 21 | 16 | 20 | 30 | 21 | 27 | 49 |
| *Trichia hispida* (Linnaeus) | 5 | 10 | 1 | 2 | 1 | 2 | 7 | 10 | 8 | 25 | 7 | 5 | 1 |
| *Helicigona lapicida* (Linnaeus) | + | + | - | - | - | - | - | - | - | - | - | - | - |
| *Cepaea/Arianta* spp. | - | 1 | - | - | - | + | - | 2 | - | + | - | + | + |
| Taxa | 15 | 18 | 6 | 6 | 5 | 8 | 9 | 11 | 10 | 8 | 8 | 9 | 7 |
| TOTAL | 70 | 106 | 17 | 38 | 60 | 66 | 287 | 225 | 187 | 195 | 119 | 109 | 139 |
| Shannon Index | 2.439 | 2.564 | 1.646 | 1.343 | 1.026 | 1.614 | 1.396 | 1.659 | 1.776 | 1.749 | 1.668 | 1.889 | 1.558 |
| Brillouin Index | 2.144 | 2.317 | 1.292 | 1.163 | 0.926 | 1.451 | 1.342 | 1.579 | 1.688 | 1.677 | 1.562 | 1.757 | 1.476 |
| Shannon Index – Brillouin Index | 0.295 | 0.247 | 0.354 | 0.18 | 0.10 | 0.163 | 0.054 | 0.080 | 0.088 | 0.072 | 0.107 | 0.132 | 0.082 |
| Delta 2 Index | 0.893 | 0.908 | 0.789 | 0.677 | 0.554 | 0.743 | 0.652 | 0.747 | 0.794 | 0.807 | 0.769 | 0.828 | 0.759 |
| Delta 4 Index | 9.592 | 11.02 | 5.182 | 2.285 | 1.290 | 3.070 | 1.890 | 3.010 | 3.946 | 4.288 | 3.461 | 5.093 | 3.244 |
| % Shade-loving species | 37.1 | 29.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| % Intermediate species | 20 | 33.0 | 11.8 | 7.9 | 1.7 | 10.6 | 5.9 | 11.6 | 12.3 | 24.1 | 22.7 | 22.0 | 13.7 |
| % Open country species | 42.9 | 37.7 | 88.2 | 92.1 | 98.3 | 89.4 | 93.7 | 88.4 | 87.7 | 75.9 | 77.3 | 78.0 | 86.3 |

**Table 5. A303 Stonehenge Archaeological Surveys: 52524, land mollusc data**

| *Trench* | | | | | *53* | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Feature Type* | | | | | *Test pit* | | | | |
| *Feature/Column* | | | | | *7* | | | | |
| *Context* | *5306* | *5305* | *5304* | *5304* | *5303* | *5302* | *5302* | *5302* | *5302* |
| | *21* | *22* | *23* | *24* | *25* | *26* | *27* | *28* | *29* |
| *Depth (m)* | *0.0-* | *0.15-* | *0.30-* | *0.40-* | *0.60-* | *0.80-* | *0.90-* | *1.00-* | *1.10-* |
| | *0.10* | *0.25* | *0.40* | *0.50* | *0.70* | *0.90* | *1.00* | *1.10* | *1.20* |
| *Wt (g)* | *2000* | *1850* | *2000* | *2000* | *2000* | *2000* | *2000* | *2000* | *2000* |
| *Pomatias elegans* (Müller) | + | + | 1 | 1 | 2 | + | + | + | + |
| *Carychium* spp. | - | - | - | - | - | - | - | - | - |
| *Succinea/Oxyloma* spp. | - | - | - | - | - | 1 | - | - | - |
| *Cochlicopa lubrica* (Müller) | - | 1 | - | - | - | - | - | - | - |
| *Cochlicopa* spp. | - | - | - | - | - | - | - | 2 | - |
| *Vertigo pygmaea* (Draparnaud) | - | - | 2 | 2 | 2 | - | - | - | 1 |
| *Vertigo* spp. | - | 1 | 1 | 1 | 1 | - | + | - | - |
| *Pupilla muscorum* (Linnaeus) | 1 | 7 | 35 | 14 | 3 | 1 | - | 2 | 1 |
| *Vallonia costata* (Müller) | 3 | 11 | 24 | 20 | 29 | 8 | 10 | 29 | 41 |
| *Vallonia excentrica* Sterki | 7 | 19 | 81 | 138 | 140 | 35 | 24 | 48 | 104 |
| *Vallonia* spp. | - | 4 | 9 | 12 | 7 | 6 | 3 | 9 | 8 |
| *Acanthinula aculeata* (Müller) | - | - | - | - | - | - | - | - | - |
| *Punctum pygmaeum* (Draparnaud) | - | 1 | 1 | - | - | - | - | - | - |
| *Discus rotundatus* (Müller) | - | - | - | - | - | - | - | - | - |
| *Vitrina pellucida* (Müller) | - | - | - | - | - | - | - | - | - |
| *Vitrea contracta* (Westerlund) | - | - | - | - | - | - | - | - | - |
| *Nesovitrea hammonis* (Ström) | - | - | - | - | - | - | - | - | - |
| *Aegopinella pura* (Alder) | - | - | - | - | - | - | - | - | - |
| *Aegopinella nitidula* (Draparnaud) | - | - | - | - | - | - | - | - | - |
| *Oxychilus cellarius* (Müller) | - | - | - | - | - | - | - | - | - |
| Limacidae | 1 | 9 | 22 | 37 | 46 | 28 | 31 | 44 | 69 |
| *Cecilioides acicula* (Müller) | 10 | 23 | 95 | 136 | 79 | 58 | 63 | 97 | 72 |
| *Clausilia bidentata* (Ström) | - | - | - | - | - | - | - | - | - |
| Clausiliidae | - | - | - | - | - | - | - | - | - |
| *Cernuella virgata* (Da Costa) | - | - | 1 | 3 | - | 3 | 5 | 4 | 5 |
| *Helicella itala* (Linnaeus) | 9 | 10 | 21 | 30 | 28 | 26 | 51 | 51 | 73 |
| *Trichia hispida* (Linnaeus) | 7 | 18 | 30 | 66 | 41 | 9 | 4 | 3 | 12 |
| *Helicigona lapicida* (Linnaeus) | - | - | - | - | - | - | - | - | - |
| *Cepaea/Arianta* spp. | - | - | - | + | 1 | 2 | + | + | + |
| Taxa | 6 | 9 | 10 | 9 | 9 | 9 | 6 | 8 | 8 |
| TOTAL | 28 | 81 | 228 | 324 | 300 | 119 | 128 | 192 | 314 |
| Shannon Index | 1.535 | 1.848 | 1.743 | 1.573 | 1.506 | 1.672 | 1.480 | 1.586 | 1.539 |
| Brillouin Index | 1.294 | 1.689 | 1.670 | 1.522 | 1.454 | 1.559 | 1.400 | 1.516 | 1.494 |
| Shannon Index – Brillouin Index | 0.241 | 0.159 | 0.074 | 0.051 | 0.053 | 0.113 | 0.080 | 0.070 | 0.046 |
| Delta 2 Index | 0.758 | 0.819 | 0.779 | 0.722 | 0.702 | 0.771 | 0.731 | 0.769 | 0.755 |
| Delta 4 Index | 3.667 | 4.870 | 3.599 | 2.621 | 2.382 | 3.504 | 2.805 | 3.409 | 3.113 |
| % Shade-loving species | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| % Intermediate species | 28.6 | 35.8 | 23.7 | 32.1 | 30.0 | 32.8 | 27.3 | 25.5 | 25.8 |
| % Open country species | 71.4 | 64.2 | 76.3 | 67.9 | 70.0 | 66.4 | 72.7 | 74.5 | 74.2 |

## *Discussion*

At Scotland Lodge the analysed mollusc assemblages indicate a landscape of mixed environments with localised patches of long grass and disturbed soil around the immediate vicinity of the enclosure ditch and internal banks within a wider open area of both arable and pastoral land-use. There also appear to be small areas of open woodland, probably deciduous, which decreased over time.

This pattern of an open landscape with areas of both arable and pasture has been seen elsewhere in the locality. The molluscan studies at the Iron Age hillfort of Vespasian's Camp have indicated a changing landscape of open rough pasture to short trampled grassland to tillage to tillage or short grazed grassland (Allen 1999). The colluvium studied in the dry valley at Figheldean also showed periods of varying land-use, namely grassland, followed by arable followed by arable and grassland (Allen and Wyles 1993). The mollusc assemblages analysed from a linear ditch at Earl's

Down farm also indicate periods of less intensive grazing and intermittent tillage (Allen and Wyles 2004).

In the Till valley, the picture of the local environment is one of an open floodplain grassland landscape with varying levels of seasonal flooding.

The nature of the grassland appears to change between the two possible taxocenes recorded. Taxocene 7 is similar to assemblages seen at Port meadow (Robinson 1988) and Butlers Field Avebury (Mount 1996). *Anisus leucostoma* and *Lymnaea truncatula* and other amphibious snails comprised most of the assemblages of pasture land at Port Meadow. In the Thames basin although *Lymnaea peregra* will tolerate a wide range of conditions it was seen as unlikely to have lived on the floodplain (Robinson 1988). Whereas although the aquatic species, including *Lymnaea peregra*, at Butler's Field Avebury (Mount 1996) may have originated from the river, they are all capable of surviving drought and are likely to have actively inhabited the floodplain for at least part of the year. In this instance the environment was interpreted as damp floodplain grasslands. At West Overton (Evans *et al.* 1993) the assemblages dominated by *Lymnaea peregra* have been interpreted as flooding and alleviation within a varied environment of open marsh, sedge swamp, scrub and woodland. In this instance however there is a very high diversity within the assemblages in comparison to those from the Till valley. The assemblages within this taxocene at Till valley, do not fall into either Robinson's strict floodplain pasture group or meadow group as the terrestrial species taxa always form over 5% but less than 25% of the assemblages. It seems likely that at Till valley this taxocene may reflect a lightly grazed damp floodplain grassland with varying degrees of seasonal flooding with the possibility of some more permanent pools on occasions. The assemblages at Till valley which have been assigned to taxocene 2 have similarities to assemblages seen from meadow grassland in the Upper Thames floodplain (Robinson 1988) and also reflect differing degrees of seasonal flooding.

Within this area of the Till valley there appears to be a pattern of fluctuating levels of seasonal flooding and areas of both lightly grazed grassland and meadow within the damp floodplain grassland. There is a little evidence to indicate that the water source was likely to generally be slow-moving with rich vegetation.

At WA52524 the mollusc data shows a changing local environment with the earliest landscape reflected by the assemblages recovered from ?tree-throw 5414, which appear to indicate a local environment of open woodland within an open, probably grazed, grassland landscape, which becomes less woody but with areas of long unkempt grass, where the trees had been, still within an open landscape of probably grazed grassland.

There are similarities in the local landscapes indicated by the mollusc assemblages from the two colluvial sequences. In both Trench 53 and 57 the mollusc assemblages (Zone 1) within the sedimentary Units 3a and 3b indicate a local open landscape of short –turfed grazed grassland. There are differences in the local environments indicated assemblages relating to the sedimentary Units 2a/b and 1b (mollusc Zone 2) where it is thought that the local environment of Trench 57 was predominantly one of short-turfed intensively grazed grassland and that around Trench 53 having an increasing arable rather than pastoral use. The local land-use reflected by the mollusc data for the sedimentary Unit 1a (mollusc Zones 3 and 4) is one of a fluctuation between arable and pastoral use. This is likely to date to the Romano-British period or later.

This pattern of an open landscape with areas of both arable and pasture within a wider settlement landscape has been seen elsewhere in the locality; including at the Iron Age enclosure west of Winterbourne stoke (50157). The molluscan studies at the Iron Age hillfort of Vespasian's Camp have indicated a changing landscape of open rough pasture to short trampled grassland to tillage to tillage or short grazed grassland (Allen 1999). The colluvium studied in the dry valley at Figheldean also showed periods of varying land-use, namely grassland, followed by arable followed by arable and grassland (Allen and Wyles 1993). The mollusc assemblages analysed from a linear ditch at Earl's Down farm also indicate periods of less intensive grazing and intermittent tillage (Allen and Wyles 2004).

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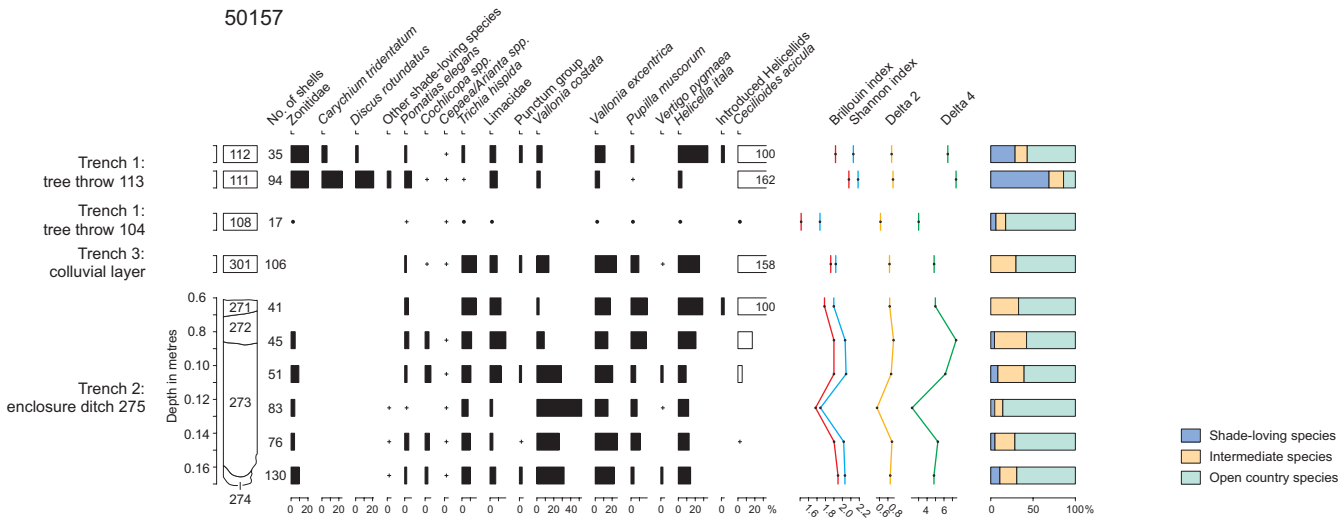
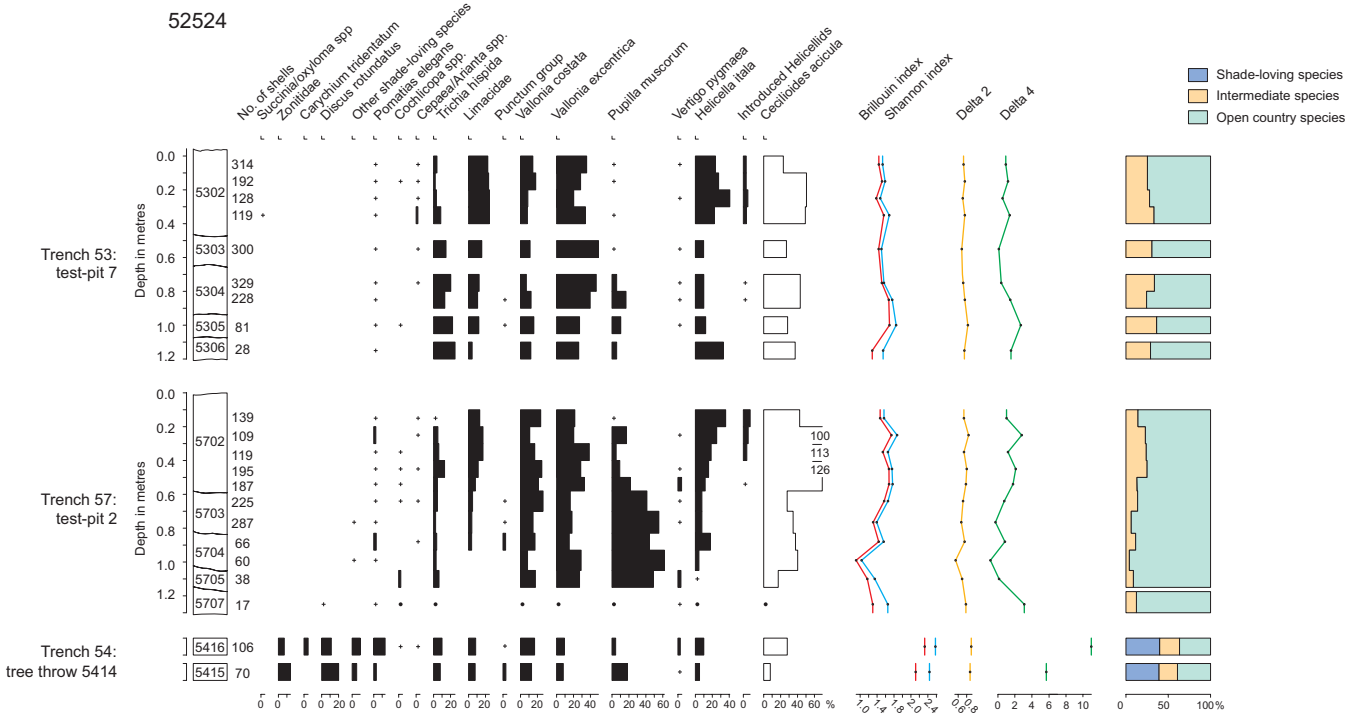
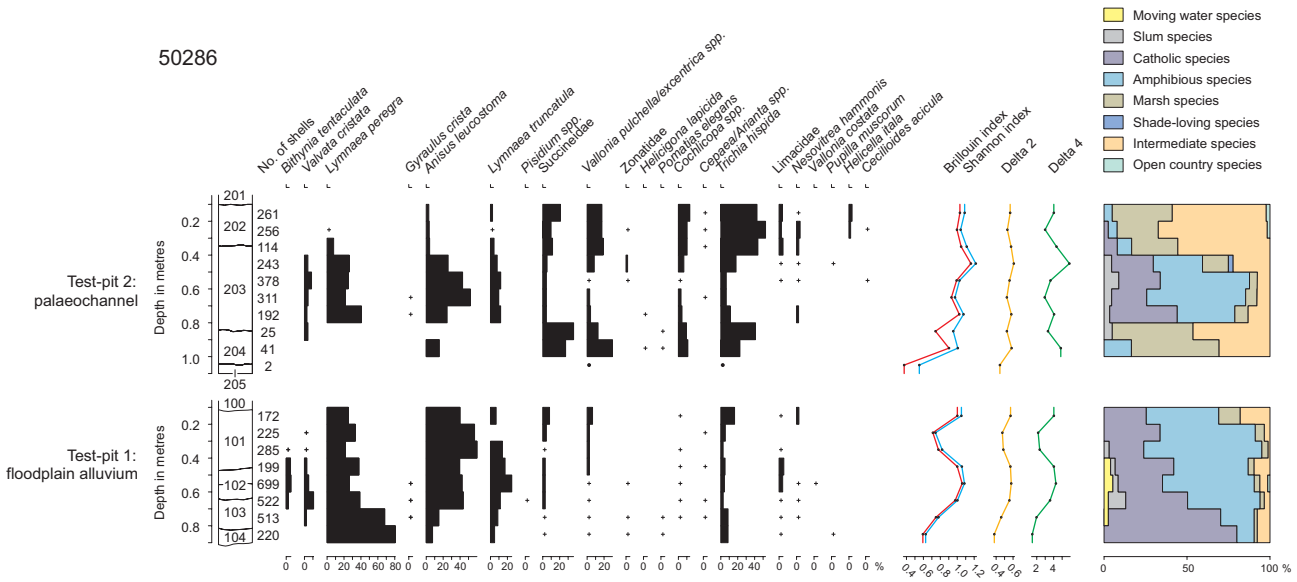

50157
No. of shells
Zonitidae
Carychium tridentatum
Discus rotundatus
Other shade-loving species
Pomatias elegans
Cochlicopa spp.
Cepaea/Arianta spp.
Trichia hispida
Limacidae
Punctum group
Vallonia costata
Vallonia excentrica
Pupilla muscorum
Vertigo pygmaea
Helicella itala
Introduced Helicellids
Cecilioides acicula
Brillouin index
Shannon index
Delta 2
Delta 4
Trench 1:
tree throw 113
Trench 1:
tree throw 104
Trench 3:
colluvial layer
Trench 2:
enclosure ditch 275
Depth in metres
112
111
108
301
271
272
273
274
35
94
17
106
41
45
51
83
76
130
100
162
158
100
%
Shade-loving species
Intermediate species
Open country species


52524
No. of shells
Succinia/oxyloma spp
Zonitidae
Carychium tridentatum
Discus rotundatus
Other shade-loving species
Pomatias elegans
Cochlicopa spp.
Cepaea/Arianta spp.
Trichia hispida
Limacidae
Punctum group
Vallonia costata
Vallonia excentrica
Pupilla muscorum
Vertigo pygmaea
Helicella itala
Introduced Helicellids
Cecilioides acicula
Brillouin index
Shannon index
Delta 2
Delta 4
Shade-loving species
Intermediate species
Open country species
Trench 53: test-pit 7
Trench 57: test-pit 2
Trench 54: tree throw 5414
Depth in metres
5302
5303
5304
5305
5306
5702
5703
5704
5705
5707
5416
5415
314
192
128
119
300
329
228
81
28
139
109
119
195
187
225
287
66
60
38
17
106
70
100
113
126
%

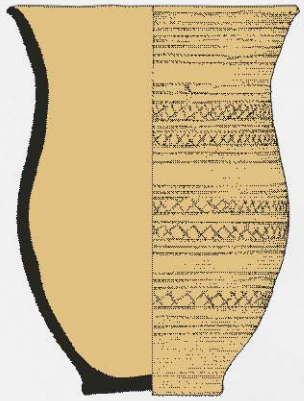

50286
Moving water species
Slum species
Catholic species
Amphibious species
Marsh species
Shade-loving species
Intermediate species
Open country species
No. of shells
Bithynia tentaculata
Valvata cristata
Lymnaea peregra
Gyraulus crista
Anisus leucostoma
Lymnaea truncatula
Pisidium spp.
Succineidae
Vallonia pulchella/excentrica spp.
Zonitidae
Helicigona lapicida
Pomatias elegans
Cochlicopa spp.
Cepaea/Arianta spp.
Trichia hispida
Limacidae
Nesovitrea hammonis
Vallonia costata
Punilla muscorum
Helicella itala
Cecilioides acicula
Brillouin index
Shannon index
Delta 2
Delta 4
Test-pit 2:
palaeochannel
Depth in metres
201
202
203
204
205
261
256
114
243
378
311
192
25
41
2
Test-pit 1:
floodplain alluvium
100
101
102
103
104
172
225
285
199
699
522
513
220
%
100 %

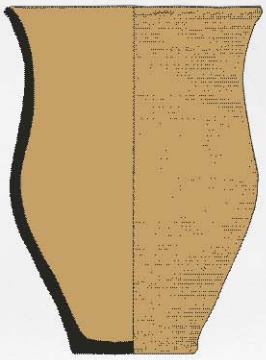
This volume reports on the archaeological works undertaken between 1998 and 2003 as part of the A303 Stonehenge Improvement highway scheme promoted by the Highways Agency.

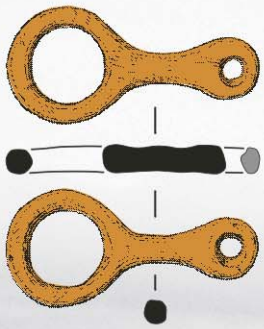
The A303 trunk road and the A344 which pass Stonehenge are widely agreed to have a detrimental effect on its setting and on other archaeological features within the World Heritage Site. Around Stonehenge there is noise and visual intrusion from traffic and also air pollution. Each year nearly one million people visit the World Heritage Site and surroundings, using visitor facilities intended to cater for a much smaller number.

Many plans that might improve this situation have been examined, involving partnership working across many organisations. Common to all these has been the aim of removing traffic from the area of Stonehenge and at the same time addressing highways issues with regard to road capacity and safety.

This volume sets out the objectives of the extensive programme of archaeological work that was undertaken to inform the planning of the highway scheme, the methods used, the results obtained, and to explain something of the significance of works which provided a 12 km transect across the WHS and beyond: the first of its kind ever undertaken.







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HIGHWAYS AGENCY

Wessex Archaeology