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# Dowd's Farm
# Hedge End, Hampshire

## Supplement to Publication
## Pollen Analysis

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# Dowd's Farm, Hedge End, Hampshire (62354)

# Pollen Analysis Report

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## Introduction

Pollen analysis was carried out upon five features from the site Dowd's Farm. A total of 20 pollen samples were analysed. Archaeological features were predominantly ditches with one waterhole, chronologically phased to the Late Iron Age / Early Romano-British and medieval periods.

## Previous Assessment

An initial assessment was carried out by Wessex Archaeology (2008) on two features from the site – feature 14214 (monolith <201>), a Late Iron Age / Romano-British enclosure ditch, and feature 10412 (monolith <87>), a Middle Iron Age waterhole / medieval enclosure ditch. The conclusions of the assessment stated:

[For feature 14214] *pollen analysis shows that the local environment of the late-Iron Age was dominated by hazel woodland (scrub?) with oak. Small numbers of holly pollen are also of importance since it is very poorly represented in pollen spectra and as such, holly probably formed an important understorey component, such as seen in the New Forest today. The small numbers of alder, birch and pine pollen are regarded as non-local, longer distance transport from the region. The former will have come from river valley associations. There is, however, some evidence in the upper contexts for increasing open ground indicated by increasing grasses and small numbers of cereal pollen. Bracken has relatively high percentage values which may be interpreted as the ground flora of the suggested hazel scrub.*

[For feature 10503 / 10412] *although there is evidence of local grassland and some cereal cultivation, the pollen data suggest that the local environment comprised a mosaic of woodland types. Preliminary analysis suggests this consisted of oak and hazel with some lime and holly. Alder is of greater importance than in profile/sequence <201> (feature 14214) being common in lower-lying valleys probably as part of floodplain carr- woodland and as such is reflective of the local environment. This point is enhanced by that the pollen catchment of pit and ditch features is restricted to the very local, surrounding area. There is also evidence for some areas of open ground within the suggested woodland habitat. In the lower contexts (10494) there is some evidence for acid, heathland plants (heather, ling and Sphagnum bog moss). These taxa reflect the acidity of the local geology and soils. Grasses are, however, dominant and with some ribwort plantain indicates areas of grassland, possibly pasture. Similarly, small numbers of cereal pollen (usually not so well represented in pollen spectra) indicate growth of cereals. However, the possibility of this being of secondary origin from crop processing activities (threshing and winnowing) or from domestic waste cannot be ruled out*.

Due to the good preservation of the pollen from these features and the information that the assessment was able to provide about the local environment during these two phases, it was decided that further investigation should be undertaken during this later stage of archaeological work.

**Methodology**
A total of 20 pollen samples were assessed from five stratified trench sections (two to six samples from each feature - see Table 1). Samples were processed using a standard procedure (Moore *et al*. 1991); 2cm$^3$ of sediment was sampled. A *Lycopodium* spike was added to allow the calculation of pollen concentration. All samples received the following treatment: 20 mls of 10% KOH (80°C for 30 minutes); 20mls of 60% HF (80°C for 120 minutes); 15 mls of acetolysis mix (80°C for 3 minutes); stained in 0.2% aqueous solution of safranin and mounted in silicone oil following dehydration with tert-butyl alcohol.

After initial assessment it was decided to take undertake full analysis upon all 20 samples as pollen preservation and concentrations were found to be very good, with a good range of taxa reflected in the pollen assemblage.

At assessment, counts of 100 Total Land Pollen (TLP – excluding *Alnus glutinosa*, Cyperaceae, pteridophytes and bryophyta) were made for each level and calculated as a percentage of the pollen sum (*A. glutinosa*, Cyperaceae, pteridophytes and bryophyta calculated as percentage TLP + Group Sum). At the analysis stage, the pollen count was increased from 100 to a minimum of 400 TLP. Identification was made using a Nikon SE and Nikon Eclipse E400 at x400 magnification. Pollen nomenclature is based on Bennett (1994; Bennett *et al*. 1994) and ordered according to Stace (1997). The pollen diagram was drawn using Tilia v 2.0.2 (Grimm 1991). The pollen assemblages are broadly homogeneous throughout each profile and as such, no pollen assemblage zones have been defined.

Radiocarbon date from monoliths <87> and <201> are shown in Table 7 (see Pelling, Radiocarbon report). Dates have been calibrated against the IntCal09 Northern Hemisphere radiocarbon calibration curve (Reimer *et al*. 2009), using the program OxCal 4.16 (Bronk Ramsey 1995; 2001). All calibrated dates will be quoted as calibrated years AD/ BC, with the two sigma calibrated range (95.4%) stated for all dates, with the end point rounded outwards to the nearest 10 years (Bayliss *et al.* 2008, xii).

**Results**
As all samples were taken to full analysis, results of the initial assessment stage are not shown in this report as the pollen counts from this stage were incorporated into the extended counting at full analysis. The interpretation of the full analysis of the pollen samples is presented in chronological order by each sequence below.

**Interpretation**

**Late Iron Age / Early Romano-British**
Both enclosure ditches are located in the southern central area (Area C) of the site approximately 15m apart at their closest point. Both monoliths were taken from sections cut across the enclosure ditches which are spaced *c.*100m apart. Section 14307 is located on the south-eastern edge of feature 14317, with section 14214 located approximately half-way along the south-eastern edge of feature 13593. Sedimentary descriptions are given in Tables 2 and 3.

*Section 14214, Feature 13593, Enclosure Ditch, Monolith <201>*
The pollen assemblage is dominated by *Corylus avellana*-type (hazel) with *Quercus* (oak) and Poaceae (grasses). Other woodland components present include *Betula* (birch), *Alnus glutinosa* (alder) and *Ilex aquifolium*. The high amount of *C. avellana*-type would suggest that woodland is locally present (trees and shrubs/ climbers account for up to 90% TLP). This is confirmed by the presence of *C. avellana* fragments within the sequence (Pelling, charred plant report). The occurrence of *Sorbus*-type pollen is confirmed by the presence of *Crataegus* and *Prunus* sp. macrofossils from within the feature and in other locations (*ibid.*). The presence of *Lonicera periclymenum* (honeysuckle) again may suggest the local proximity to woodland as it produces large pollen grains that are not easily distributed over long distances.

*Calluna vulgaris* (heather) is present throughout the profile and a grain of *Erica tetralix* (heath) which may indicate some local presence of small patches of heath. The herb and pteridophyte assemblage contains a number of taxa indicative of human disturbance, mainly of pastoral activity. These include *Rumex acetosella* (sheep's sorrel), *Rumex acetosa* (common sorrel), *Plantago lanceolata* (ribwort plantain) and *Pteridium aquilinum* (bracken). There is also a low presence of Poaceae with an annulus diameter of 8-12µm in the lower samples, though whether these are derived from cereals or wild grasses is uncertain.

A radiocarbon date on wood charcoal from 0.54m (below the top of the monolith; top of context 14217) has provided a calibrated date range of cal AD 540-770 (NZA-31247; 1392±55) which correlates with the early to middle Saxon period. This is at difference with the phasing of the feature which is suggested to be from the Late Iron Age/ early Romano-British. The pollen samples are taken from the secondary fill and soil development contexts and are interpreted as "having been formed by continued gradual weathering back of the ditch sides and surrounding ground surface, and represent a likely time span of the order of decades to low centuries." The secondary fill also became increasingly organic towards the surface indicative of a wet, highly vegetated ditch environment (Norcott, sediments). Present within the overlying contexts are remains of wormholes and root penetration, so it is feasible that the dated charcoal could be intrusive and have been transported down-profile. However, if the radiocarbon date is to be believed, then the ditch is likely to have remained open over an extended period as it slowly infilled. The absence of aquatic pollen taxa and evidence of gleying would suggest a fluctuating water table, with the local vegetation likely to be restricted to low-level wet lawn taxa such as Poaceae, *Ranunculus acris*-type (buttercup family) and *Filipendula* (meadowsweet).

*Section 14307, Feature 14317, Enclosure Ditch, Monolith <213>*
The pollen assemblage is dominated by *Corylus avellana*-type, *Quercus*, *Betula*, *Poaceae* and *Pteridium aquilinum*. The woodland composition also includes *Alnus glutinosa* with small amounts of *Ilex aquifolium*, *Acer campestre* (field maple), *Fraxinus excelsior* (ash) and *Salix* (willow). It is likely that *A. glutinosa* and *Salix* represent areas of woodland upon waterlogged soils. The presence of a grain of *Populus* in the basal sample may be derived from *Populus tremula* (aspen) which again may be associated with these wetter soils.

*Calluna vulgaris* is found in all samples and again may be indicative of small patches of local heathland. The presence of *Plantago lanceolata* and high values for *Pteridium aquilinum* may again be indicative of pastoral activity. Poaceae grains that could be associated with cereal production are rare suggesting little arable activity close to the feature. The remainder of the herb assemblage can be associated with areas of woodland margin and/ or waste ground.

**Medieval**

*Section 14374, Feature 10489, Enclosure Ditch, Monolith <41>*

Dominated by *Quercus, Alnus glutinosa*, *Corylus avellana*-type and Poaceae. As *A. glutinosa* is counted outside of the main pollen sum, values of up to 40% TLP + *A. glutinosa* signify that it is a dominant component of the local vegetation. Woodland taxa such as *Salix* and *Sorbus*-type are also recorded. Poaceae with an annulus diameter 8-12μm are recorded and may indicate arable activity. The presence of a single grain of *Polygonum* (knotgrass) and *Ranunculus arvensis* (corn buttercup) may support this interpretation as both are commonly found to be an arable weed. *Plantago lanceolata* and *Pteridium aquilinum* are present in low amounts and often indicative of disturbed ground, possibly from pastoral activity. *Erica tetralix* and *Calluna vulgaris* are also present in low amounts and may indicate the presence of heathland.

Other herb taxa can be associated with woodland (e.g. *Silene dioica*-type (red champion), *Vicia sylvatica*-type (wood vetch) and *Primula*-veris type (primrose)), open grassland and waste ground (*e.g. Silene vulgaris*-type (bladder campion), *Cichorium intybus*-type (dandelion/ chicory) and *Solidago virgaurea*-type (daises/ goldenrods)) and damp conditions (e.g. *Valeriana dioica* (marsh valerian), *Thalictrum* (meadow-rue) and *Filipendula*).

*Section 10412, Feature 10503 / 10412, Waterhole and Enclosure Ditch, Monolith <87>*

Dominated by *Quercus, Alnus glutinosa*, *Betula*, *Corylus avellana*-type and Poaceae. As *A. glutinosa* is counted outside of the main pollen sum, values of up to 40% TLP + *A. glutinosa* signify that it is a dominant component of the local vegetation. Other tree taxa present include *Ilex aquifolium* and *Salix* with occurrences of *Ulmus* (elm), *Tilia cordata* (small leaved lime), *Acer campestre*, *Fraxinus excelsior* and *Sorbus*-type. *Hedera helix* (ivy) and *Lonicera periclymenum* are both present and are likely to be local in origin, possibly part of the local alder woodland.

The presence of *Primula veris*-type, *Rubus-type* (bramble), *Mercurialis perennis* (dog's mercury), *Teucrium* (wood sage) and *Scillia*-type (squills but also includes *Hyacinthoides non-scripta* (bluebell)) are all indicative of open woodland, such as that typically associated with coppice management. These, combined with the presence of *Corylus avellana*-type, *Sorbus*-type and *Acer campestre* may therefore indicate the presence of managed woodland in close proximity to the sample site. The presence of *Calluna vulgaris* may again be associated with some local areas of heathland.

Taxa associated with open grassland and waste ground are also present, including *Centaurea nigra* (common knapweed), *Silene vulgaris*-type, *Cichorium intybus*-type, *Solidago virgaurea*-type, *Echium* (viper's-bugloss) and *Sanguisorba minor* (burnet). There are a number of occurrences of Poaceae grains with an annulus diameter >8μm which may be associated with cereal production or alternatively wild grasses such as *Glyceria sp.* (sweet-grasses) and *Bromus* sp. (brome grass), the later known to be growing on site. The presence of *Papaver rhoeas*-type (poppy) may be associated with cereal production as it is commonly associated with arable activity.

Disturbance indicators that may be associated with pastoral activity are present including *Rumex acetosa*, *R. acetosella*, *Plantago media* (hoary plantain), *Plantago* *lanceolata* and *Pteridium aquilinum*. Taxa often associated with wetter environments are also present including *Filipendula* and *Mentha*-type (mint).

A radiocarbon date has been obtained from a supposed wooden stake of *Salix*/ *Populus* that was found within the monolith <87> and had been driven into the underlying natural greensand geology (context 10493). The date provided a calibrated age range of 370-90 cal BC (NZA-32369) relating to the Middle to Late Iron Age. This feature was interpreted on site as two intercutting features (context 10494 relating to feature 10503 and context 10429 and above relating to feature 10503), yet investigation of the sediments retained in the monolith suggested that only one feature is present in the monolith, with a halo effect giving the impression of an underlying pit. Four sherds of Middle Iron Age pottery were recovered from the waterlogged primary fill of waterhole 10503. The phasing of this pottery is in agreement with the radiocarbon date obtained from the supposed stake recovered from the underlying natural deposits. It is therefore unclear the exact phasing of the feature(s). The pollen assemblage appears to show little difference between the two contexts sampled. This either suggests that the vegetation composition remained largely unchanged between the Middle Iron Age and medieval periods or that the two features are (as originally suggested by the sediment interpretation) from a single phase, with the Middle Iron Age pottery reworked from elsewhere and the stake having remained *in situ* and later incorporated into the medieval enclosure ditch. It should be noted, however, that as the stake was only obtained from the monolith and not exposed within the excavated section, so its original purpose is not entirely clear. The possibility that it could be root material (with the pollen showing the local presence of *Salix*) cannot be overlooked. Indeed, *Salix* pollen is not always present within pollen sequences in great amounts as it depends upon the sex of trees present, with only the male tree produces pollen.

*Section 13994, Feature 14115, Enclosure Ditch, Monolith <187>*
Dominated by Poaceae, with *Quercus, Alnus glutinosa*, *Corylus avellana*-type and *Cichorium intybus*-type. Other tree taxa present include *Betula*, *Ilex aquifolium* and *Salix* with occurrences of *Ulmus* (elm), *Tilia cordata* (small leaved lime), *Acer campestre* and Salix. *Lornicera periclymenum* is present and likely to be local in origin, possibly part of the local alder woodland.

The presence of *Primula veris*-type, *Rubus*-type and *Vicia sylvatica*-type are indicative of open woodland, such as that typically associated with coppice management. These, combined with the presence of *Corylus avellana*-type and *Acer campestre* may therefore indicate the presence of managed woodland in close proximity to the sample site.

Taxa associated with open grassland and waste ground are also present, including *Centaurea nigra* (common knapweed), *Silene vulgaris*-type, *Cichorium intybus*-type, *Solidago virgaurea*-type, *Echium* (viper's-bugloss) and *Sanguisorba minor* (burnet). There are a number of occurrences of Poaceae grains with an annulus diameter >8µm which may be associated with cereal production or alternatively wild grasses such as *Glyceria sp.* (sweet-grasses) which could have been growing within the damp alder woodland. However, the presence of *Papaver rhoeas*-type and *Polygonum* may be associated with cereal production as it is commonly associated with arable activity. Disturbance indicators that may be associated with pastoral activity are present including *Rumex acetosella*, *Plantago lanceolata* and *Pteridium aquilinum*.

## DISCUSSION

### Overview of pollen assemblages

At face value it appears that there are two separate phases covered by the pollen sequences analysed from Dowd's Farm – a Late Iron Age/ Romano-British assemblage dominated by *Corylus avellana*-type and *Quercus*, and a medieval assemblage dominated by *C. avellana*-type, *Quercus* and *Alnus glutinosa*. This could be taken as suggesting that the *A. glutinosa* only became a dominant component by the medieval period. However this is likely to be a misleading conclusion. The two earliest features are both located in Area C on the southern edge of the site, whereas the other three are located 200-350m further north in the Paddock / Area S and Urban Park Area. In addition, this northern area contains an area of waterlogged deposits as a result of the main axis of drainage across the site, which is likely to account for the increased presence of alder woodland upon the waterlogged soils.

The two radiocarbon dates obtained for the features analysed highlights the potential problems with the interpretation of ditch fills and subsequent disturbance through the construction of intersecting secondary features. The radiocarbon date from monolith <201> indicates that the sequence is either very slowly accumulating or else has been subjected to down-movement of charcoal that was subsequently dated. The sequence in monolith <87> is even more complex as it was interpreted as an apparent medieval recut (feature 10214) through an earlier Middle Iron Age waterhole (feature 10503), the later supported by a radiocarbon date upon a suspected stake, yet the stratigraphy and pollen do not seem to agree with this conclusion. The general homogeneity of the pollen sequences from each feature indicates that either the sediment fills were rapid or else there was little change in the vegetation structure and composition within the pollen source area over the time of deposition. It may also be the result of some vertical mixing within the sediment column (such as earthworm activity). The general excellent preservation of the pollen assemblages and high pollen concentrations also argue against the possibility of differential pollen preservation and bias within the resultant assemblage.

### Heathland

The presence of *Calluna vulgaris* and occurrences of *Erica tetralix* would suggest that areas of heath are present locally. With the exception of *C. vulgaris*, most common heathland taxa are generally under-represented as very little pollen is dispersed beyond its immediate vicinity (e.g. Tinsley and Smith 1974; Evans and Moore 1985; Tallis 1997). With *C. vulgaris* it was commonly assumed that this was more widely distributed and therefore reliable as a heathland indicator (Huntley and Birks 1983; Evans and Moore 1985), yet recent estimates of the dispersal and relative pollen source area (RPSA) suggest that it also can have a limited source area, sometimes as low as only a few metres (Hjelle 1997; 1998; 1999; Bunting 2003; Bunting and Hjelle 2010). This will mean that *C. vulgaris* will be poorly represented in a pollen assemblage where the surrounding vegetation is dominated by well dispersed pollen, such as produced by many trees. Groves *et al.* (2012) in their review of the representation and expansion of lowland British heathland demonstrated how pollen sequences from valley mires in areas of contemporary heathland often contained low values of *C. vulgaris* and were therefore underrepresented and difficult to identify initial heath formation. Sites which did have higher *C. vulgaris* values often contained it as part of the on-site mire-forming vegetation (e.g. ombrotrophic mire).

The overall dominance of the woodland component and limited pollen source area of the features being investigated means that the heath component recorded is likely to only reflect small heath patches within the main woodland mosaic. A similar heath structure is suggested from the woodland site of Barrow Moor in the New Forest where consistent low values for Ericaceae (heath family) taxa may indicate the presence of small areas of heath within the general woodland mosaic from the late Neolithic but increase during the late Romano-British/ early Saxon period (Grant *et al.* 2009a). In contrast, sites in the New Forest from large areas of heathland show that heath development may have originated as small patches as early as the Late Mesolithic (Grant *et al.* 2009b). The latest heathland development recorded in this area was from a site in the north of the New Forest during the Romano-British period situated in close proximity to the main Romano-British New Forest ware pottery production sites (Grant 2005). Both the New Forest sites and Dowd's Farm are located in the Hampshire basin and therefore have similar underlying tertiary geologies. Bagshot sands, Bracklesham Beds and London Clay, all present at Dowd's Farm, are particularly susceptible to podzolisation and subsequent heath development under suitable conditions. The presence of heath taxa in the features subjected to pollen analysis suggest that it was present across the site albeit as small tracts, from at least the Late Iron Age/ Romano-British period until the medieval period.

**Arable and pastoral activity**

Each of the features investigated contains the strong presence of taxa that would often be associated with anthropogenic activity (Behre 1981). This involves both arable and pastoral activity. Taxa such as *Plantago lanceolata* are often associated with pastoral activity because they are resistant to trampling, yet it must be borne in mind that each of the features investigated is archaeological and therefore would be associated with human activity and ground disturbance. Whether the occurrences of all of the pastoral indicators can be associated only with pastoral activity is uncertain. *Pteridium aquilinum* has a strong relationship with anthropogenic activity and disturbance. However, *P. aquilinum* can be found in a wide range of habitats such as woodlands and heath as well as open habitats (Rodwell 1991a, 1991b; 1992; 2000). As the pollen assemblage implies that all three vegetation types might exist around the site, it may be difficult to place where *P. aquilinum* existed within these different vegetation mosaics. However, *P. aquilinum* is known to be a secondary invader upon abandoned farmland (Marrs and Watt 2006) and its presence can sometimes be used as supporting evidence for past grazing and/ or excessive burning (e.g. Webb and Glanvile 1962). *P. aquilinum* will also invade areas of heathland where the *C. vulgaris* becomes degraded such as when *Calluna vulgaris* colonization after fire is delayed by heavy grazing, or if there is excessive accidental or poor-quality burning. Overgrazing by sheep may also lead to a permanent replacement of *Calluna* by *Pteridium* (Miles 1979). In woodland conditions, *P. aquilinum* performance would be expected to be limited by low spore production as a result of shade, and both dispersal range and conditions for the establishment of both gametophyte and young sporophyte would be unfavourable. Greater spore production enabled within open-canopied woods, tree-throw holes, burns and canopy gaps during the woodland regeneration cycle, may account for why it is often only recorded in very low amounts pre-Neolithic before widespread woodland disturbance (Godwin 1975). Today, most *P. aquilinum* is found therefore in woodland, scrub, waste heath and hill pasture. (Marrs and Watt 2006). Therefore, although *P. aquilinum* can be associated with pastoral activity, it can also be associated with the management of the heath and woodland areas, and subsequent land abandonment/ reduced pressure that may be expected to coincide with the ceased maintenance of the features investigated and their infilling with sediment.

The identification of arable activity, as already noted in the results section, can be problematic. Large Poaceae grains are often associated with cereals and are frequently differentiated based upon annulus diameter (Andersen 1979). However, there is considerable overlap in size and characteristics between some wild species of Poaceae and cereals (Küster 1988); Tweddle *et al*. 2005; Waller and Grant 2012). Indeed, Tweedle *et al.* (*ibid.*) concluded that although *Secale cereale* (rye) pollen can generally be identified to species level, pollen from the other cultivated genera - *Avena* (oats), *Hordeum* (barley) and *Triticum* (wheat) - cannot be confidently separated from some wild grasses. In addition, as most pollen assemblages are derived from areas subject to waterlogging such as mire, ponds or ditches, then these aquatic environments are most likely to support the wild grasses that would produce the pollen which cannot be easily differentiated from domesticated grasses. The presence of cereal-type pollen should therefore not be taken at face value when interpreting a pollen diagram. However, it is possible to make a greater assertion that arable activity was occurring in close proximity to the features from Dowd's Farm as there are other "arable indicator" taxa present such as *Papaver rhoeas*-type, *Polygonum* sp. and *Ranunculus arvensis*. Plant macrofossil assemblages from the archaeological features clearly demonstrates that some cereal processing was occurring around the site, so in this case it is likely that the Poaceae grains with larger annulus' are indeed the result of local arable activity. Although there is the possibility that some of the cereal pollen could have been released during processing, its occurrence in each of the features investigated for pollen suggests that production was occurring nearby.

**Woodland composition, structure and use**

Although open areas containing heath, pastoral and arable activity have been identified and discussed above, the pollen assemblages are largely dominated by taxa which would be associated with areas of woodland. Both the Late Iron Age/ Romano-British and medieval features show the importance of woodland, and the pollen assemblage can help to suggest what the woodland structure may have looked like. There are two main types of woodland recorded from the site – the mixed oak-hazel dominated woodland on the dryer ground, and the valley bottom alder-willow woodland located upon the lower lying waterlogged soils, predominantly towards the northern part of the site.

*Corylus avellana* is the most abundant pollen type in each of the feature assemblages suggesting that it is an important woodland component. *C. avellana* does not do well in shaded conditions and so prefers to be in open woodlands, scrub areas, and along woodland margins. During the medieval period it was heavily utilised in coppice management as its wood was suitable for many purposes including charcoal production and wattle construction. It should be noted however that *C. avellana* only forms a minor component of the charcoal assemblage obtained from Dowd's Farm (Pelling, charcoal report). The two Late Iron Age/ Romano British features from Area C are in close proximity, yet the percentages of *C. avellana* vary by up to 40% TLP. If the two sediment fills are of contemporary date (see discussion over dating of feature 13593 above) then the proximity of the woodland edge to these two features can be alluded to. The dominance of *C. avellana*-type (up to 75% TLP) in feature 14214 and high *Quercus* values (up to 33% TLP) indicate that the woodland edge is in close proximity to the enclosure ditch. The plant remains from locations across the ditch also attest to the local presence of *C. avellana* with fragments found in several contexts (Wessex Archaeology 2008, 59). In contract, no such plant remains were uncovered from feature 14317 where the *C. avellana* component is lower, indicating a more distant woodland edge. Instead here there is a greater abundance of *Betula* and Poaceae which may indicate a more open environment with some local scrub woodland and regeneration.

*Quercus* forms the other main woodland component upon the dryland sites. Its abundance is attested by its presence within the charcoal record as the main component (Pelling, charcoal report). *Quercus* is likely to have been the main canopy component around this site, as other tree taxa such as *Fraxinus excelsior* and *Tilia cordata* are only recorded as isolated occurrences and were therefore unlikely to be a major component of the local woodland.

*Ilex aquifolium* is a consistent component of the pollen assemblages. *I. aquifolium* is found widespread as part as an understorey component of many woodland and scrub communities, but can also be found in drier parts of alder carr and alderwoods (Peterken and Lloyd 1967). In areas such as the New Forest it can also be found as pure holly woods (locally termed holms). *I. aquifolium* leaves and twigs are palatable to many animals and it is highly resistant to heavy grazing, with seedlings able to produce new shoots for at least 13 years when subjected to repeated nibbling (*ibid.*). *I. aquifolium* is also particularly suitable to pollarding and can be repeatedly cut to provide winter feed for grazing animals. In the New Forest flowering of *I. aquifolium* was rarely found on individuals less than 1.5m high, on only one third of individual 1.5-3m in height, and 88% flowered in those surveyed between 4.5-6m tall (*ibid.*). Its presence within the pollen assemblages would therefore suggest that it was probably well established with a number of mature trees prevalent in the local area. *I. aquifolium* litter decays to form a mull humus (Hadley 1954) and is able to grow on podzolised soils, the humus able to help form a transition to brown earths. Dimbleby and Gill (1955) consider this a major factor in the encroachment of oak woodland onto *Calluna vulgaris* heathland in the New Forest, and it is likely to be a key component in the shifting mosaic of heath patches within the main woodland zones of the area. Around Dowd's Farm the *I. aquifolium* may therefore form a useful resource for a pastoral economy, and is likely to be found along the woodland margins (in association with *Corylus avellana*) enabling woodland encroachment onto the heath, as well as forming a part of the woodland itself.

The presence of large amounts of *Quercus* charcoal suggests that it was heavily utilised and probably selectively felled/ thinned. This would have led to a reduction of the high woodland canopy and subsequently permitted understorey growth, with taxa such as *Corylus avellana* and *Acer campestre* represented. Some of the *Pteridium aquilinum* recorded may also originate from these open woodlands. The assemblage of herb taxa (albeit often chance occurrences) provides some insight into the appearance and use of some of this woodland. Taxa such as *Primula veris*-type, *Rubus*-type, *Scillia*-type and *Mercularis perennis* are all commonly associated with woodland under coppice management. *M. perennis* is known to reduce in vigour from competition from *Hyacinthoides non-scripta* and *Primula vulgaris* and an increase in light flux and disturbance (Rackham 1975; Jefferson 2008). However, recent investigations into the pollen representation of coppiced woodland attests to the strong presence of these taxa in the pollen assemblage from areas subject to coppice rotation management (Waller *et al.* 2012). *A. campestre* is also present and often associated with a ground flora where *M. perennis* and *H. non-scripta* are present (Jones 1945). *A. campestre'* most common form is as coppice as it tolerates shade and the great freedom with which it is able to coppice, and is known to have been recommended for coppice management by early writers. Marshall (1796, cf. Jones 1945) says its "principal value is for underwood; it is of quick growth and affords good fuel". To maintain *Quercus* within the surrounding vegetation it is likely that it also would have been subject to some form of woodland management, possibly coppicing, to avoid its depletion from over exploitation.

The alder woodland is found to be most prevalent towards the north of the site and this is likely to be a reflection of the local drainage, with waterlogging in the valley bottoms enabling *Alnus glutinosa* and probably also *Salix* to become established. The spatial extent of the *A. glutinosa* woodland cannot be established as the features investigated from this part of the site are all of single phase. The presence of *A. glutinosa* within feature 10503 (context 10494; section 10412) does indicate that this damp woodland may have been prevalent on-site during the Middle to Late Iron Age waterhole (feature 10503) which was sampled for pollen it could indicate that this wet woodland has been prevalent on-site for some time. *A. glutinosa* is recorded in low amounts from the two Late Iron Age/ Romano-British features and its pollen may be derived from these valley bottom woodlands which are at some distance from the features investigated. Taxa associated with the *A. glutinosa* and *Salix* is limited with no aquatics pollen recorded from any features and customary taxa such as Cyperaceae (sedges) also in low amounts in all sequences. *Corylus avellana*-type also includes *Myrica gale* (bog myrtle) as the pollen can be difficult to differentiate from *C. avellana* (Edwards 1981). However, the pollen identified as *C. avellana*-type is most likely to be derived from *C. avellana* only as there were no pollen grains displaying the characteristics that would be associated with *M. gale* (thinning around each pore). The limited wetland assemblage would suggest the alder canopy may have been dense limiting the development of understorey vegetation. Alternatively, the presence of *A. glutinosa* along these drainage areas where impeded drainage and waterlogging occurred, was sufficient to prevent encroachment from other deciduous woodland types not suited to these hydrological conditions.

**Conclusion**

Pollen analysis has shown that the vegetation surrounding Dowd's Farm during the Late Iron Age/ Romano-British and medieval periods consisted or a range of different mosaics. Although based upon a limited number of sequences, there does appear to have been some continuity in the nature of the vegetation. Woodland was a dominant component and would have provided a valuable resource for the occupants, which is apparent from the quantities of charcoal recovered during the archaeological excavations. The woodlands contain components that may be indicative of woodland management practices, and this may be a testament to the apparent continuity of the vegetation types observed within pollen from the different features. In addition to woodland management, there are some aspects which might suggest pastoral use of the woodlands also occurring, such as a wood-pasture scheme. *Ilex aquifolium* could have provided a useful source of winter fodder. Scrub encroachment would have also resulted in the boundaries of the vegetation mosaics shifting through time. The presence of many oaks would have made pannage (the activity of turning domestic pigs out onto the open woodland to feed on fallen acorns) an important activity to prevent other grazing animals from over-consumption of acorns which can be poisonous. Some aspects of the pollen assemblage recovered from Dowd's Farm could draw parallels with areas found in the New Forest today – open woodland, patches of heath, lawn, scrub and small arable holdings. However, the abundance of hazel (and coppice management) is now missing in the New Forest, which is due to a combination of overgrazing, abandonment of coppicing, extension of wood-pasture and deliberate removal for silviculture (*Quercus* and *Fagus sylvatica* (beech) mainly) (Grant and Edwards 2008).

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**Figure captions**

Figure 1: Pollen diagram from section 14214, feature 13593, monolith <201>, Dowd's Farm, Hedge End

Figure 2: Pollen diagram from section 14309, feature 14317, monolith <213>, Dowd's Farm, Hedge End

Figure 3: Pollen diagram from section 10374, feature 10489, monolith <41>, Dowd's Farm, Hedge End

Figure 4: Pollen diagram from section 10412, feature 10503 / 10412, monolith <87>, Dowd's Farm, Hedge End

Figure 5: Pollen diagram from section 13994, feature 14115, monolith <187>, Dowd's Farm, Hedge End

**Table 1: Features subject to pollen analysis from Dowd's Farm, Hedge End**

| Monolith | Section No. | Feature No. | Feature Type | Period |
|---|---|---|---|---|
| 201 | 14214 | 13593 | Enclosure Ditch | Late Iron Age / Early Romano-British |
| 213 | 14307 | 14317 | Enclosure Ditch | Late Iron Age / Early Romano-British |
| 41 | 10374 | 10489 | Drainage Ditch | medieval |
| 87 | 10412 | 10503 / 10412 | Waterhole / Enclosure Ditch | Middle Iron Age / medieval |
| 187 | 13994 | 14115 | Boundary Ditch | medieval |

**Table 2: Sediment Description from monolith <201>, feature 13593, section 14214, Dowds Farm, Hedge End. Monolith elevation is 36.98m aOD**

| *Depth (m)* | *Context* | *Full sediment description* | *Interpretation* |
|---|---|---|---|
| 0 – 0.20 | 14221 | 10YR 5/6 yellowish brown sandy loam, very slightly stony (1-5%) with very small to small rounded and subangular stones (2-20mm). Darkens slightly to base. Occasional FFRs (fine fleshy rootlets), visible root/worm channels. ?blocky structure (tricky in mono). Unsorted. Abrupt boundary | Ploughed in tertiary fill |
| 0.20-0.27 | 14220 | 2.5Y 4/2 dark greyish brown sandy loam, few stones (single broken flint pebble c.25mm), 2-5% charcoal lumps <3mm, occasional FFRs, common fine to medium faint clear to diffuse mottles of 10YR 5/6 yellowish brown (?looks like likely bioturbative physical mixing rather than product of gleying). C.1% very fine macropores. Possible v weak small ?blocky or crumb/gran structure. Abrupt to clear boundary. Possible statis horizon, although colouration may be due largely to charcoal content. | Likely slight stasis horizon although much of dark colouration due to charcoal content |
| 0.27-0.38 | 14219 | 10YR 4/6 dark yellowish brown sandy clay loam / sandy silt loam with common to many fine to medium distinct to clear mottles of 2.5Y 4/2 dark greyish brown. Rare charcoal flecks <1mm. Occasional FFRs. Few very small to small subrounded stones. Abrupt to clear boundary.<br>Toward base mixing apparent – worm/root holes filled with darker material from below. | Fill – relatively rapid deposition |
| 0.38-0.49 | 14218 | 2.5Y 3/2 very dark greyish brown clay loam/sandy clay loam. Few very small to small subrounded to subangular stones. C.1% very fine to fine macropores, occasional FFRs, some wormholes containing material from both above and below contexts. Abrupt boundary. Occasional charcoal <3mm. Structure tricky – possibly some but very strong & cohesive. @100x magnification shows fair amount of microscopic comminuted charcoal, in part at least giving dark colouration | Stasis horizon, quite organic ('A' horizon of groundwater gley soil) |
| 0.49-0.54 | 14217 | 10YR 4/6 dark yellowish brown clay loam, mottled with common (c.20%) 2.5Y 5/3 light olive brown & also containing some (5%) 2.5Y 3/2 very dark greyish brown (in worm/rootholes). One or two small flints, occasional FFRs. 2% very fine to fine macropores, medium blocky structure.<br>Rooted partially oxidised, basal horizon of groundwater gley soil | secondary fill / base of gley soil |
| 0.54-0.61 | 14217 | 2.5Y 5/3 light olive brown sandy clay loam, with sparse small iron stained mottles to top. Medium blocky structure, c.1% very fine to fine macropores, occ small stone, occasional tiny charcoal fleck. Abrupt to sharp boundary. | gleyed secondary fill |
| 0.61-0.68 | 14215 | 2.5Y 4/2 dark greryish brown sandy clay loam, few strong brown medium distinct clear mottles. Few to common stones, small, subangular. ?weak ?blocky structure, occasional FFRs, c.1% fine macropores. Abrupt to clear boundary.<br>Narrow dark band – possibly stasis event or topsoil derived material contributing organic/colour? Looks like gravely material likely derived from sides – primary fill. | Primary fill – Rapidly deposited unsorted side-derived gravely material, with band of likely topsoil derived material also. |
| 0.68-0.77+ | | 10YR 4/6 dark yellowish brown sandy clay loam - top few cm are slightly 'dirty' – (10YR 4/6 dark yellowish brown clay/sandy clay, mixed with 2.5Y 4/3 olive brown). Looks like maybe trampled/physically mixed upper surface of 'natural' geology. NB if feature of particular interest may be worth closer examination of top of this layer – possibly some inwashes of fine material (although this may be in geology rather than fill) | 'Natural' geology with mixed/dirty upper surface |

**Table 3: Sediment Description from monolith <213>, feature 10317, section 14307, Dowds Farm, Hedge End. Monolith elevation is 36.92m aOD.**

| *Depth (m)* | *Context* | *Full sediment description* | *Interpretation* |
|---|---|---|---|
| 0-0.21 | 14309 | 10YR 5/6 yellowish brown loamy sand , common medium faint clear mottles of 2.5Y 6/3 light yellowish brown. Rare charcoal <4mm, common rounded stones to base, up to 50mm. Clear to diffuse boundary.<br>Un/poorly sorted, likely ploughed in. | Ploughed-in tertiary fill |
| 0.21-0.39 | 14390 | 10YR 5/6 yellowish brown sandy silt loam. Very many medium to coarse distinct clear mottles, 2.5Y 5/3 light olive brown, occasional charcoal <10mm, fine fleshy rootlets. 1% very fine to fine macropores, few very small rounded stones. No observed structure. Clear boundary | Secondary fill |
| 0.39-0.51 | 14310 | 2.5Y 5/2 greyish brown clay loam with common (5-10%) distinct clear medium 10YR 5/6 yellowish brown mottles. ?medium ?blocky structure, weakly to moderately developed (tricky to distinguish in monolith). Common fine fleshy rootlets, c.1-2% macropores (fine to v fine), abundant charcoal lumps up to 10mm (mostly birch – *Betula pendula/pubescens*, but also some Pomoideae). Charcoal lumps have reddish ferruginous clay coatings in places, likely translocation down profile of clay (lessivage) as result of pedogenesis. No coatings observed on peds however (although very difficult to make peds out in any case). | Likely stasis with dumping of charcoally material incorporated |
| 0.51-0.70 | 14311 | 2.5Y 6/3 light yellowish brown sandy clay loam with very many clear distinct medium mottles of 10YR 5/6 yellowish brown. Smallish patch (c.2%) 5YR 4/6 yellowish red (iron rich clayey). Occasional fine fleshy rootlets. 1% v fine macropores. Poorly sorted but with fair bit of clay in it. | Possible primary fill, no lamination. Sample doesn't reach geology. |

**Table 4: Sediment Description from monolith <41>, feature 10374, section 10489, Dowds Farm, Hedge End. Monolith elevation is 28.40m aOD**

| *Depth (m)* | *Context* | *Full sediment description* | *Interpretation* |
|---|---|---|---|
| 0-0.10 | 10379 | 10YR 4/3 brown loamy sand (sand component fine), rare very small to small stones, sub ang to rounded, some iron staining in near vertical root casts. Occ fine fleshy rootlets, med to large blocky structure. Clear boundary | Secondary or tertiary fill |
| 0.10-0.34 | 10379<br>10378 | 10YR 3/2 very dark greyish brown loamy sand (sand component fine), rare very small to small stones to top (worm sorted down from modern soil profile). Rare charcoal lumps <10mm (@0.27m). 1-2% very fine to fine macropores, ?med ?blocky structure. Fine faint clear mottles of lighter grey – looks bioturbative rather than gleyey. Clear boundary. | Organic rich secondary fill – wet & highly vegetated environment |
| 0.34-0.55 | 10376 | 10YR 4/2 dark greyish brown loamy sand (sand component fine), rare charcoal lumps, occ FFRs, medium blocky structure. 1% v fine to fine macropores, occ v small stone to 0.55m. | Secondary fill |
| 0.55-0.61 | 10375 | 0.55-0.57m is band of 5YR olive silty clay loam, and several laminations of this same material at base of fills 0.6-0.61m. In between is similar to above layer. Represents fine material washed into feature soon after construction. | Primary fill with laminated fine material |

**Table 5: Sediment Description from monolith <87>, feature 10412, section 10412, Dowds Farm, Hedge End. Monolith elevation is 27.97m aOD**

| *Depth (m)* | *Context* | *Full sediment description* | *Interpretation* |
|---|---|---|---|
| 0-0.07 | 10414 | 10yr 3/2 very dark greyish brown sand (some silt but not enough to form ball). Small mottles (5-10mm) of 2.5y 6/2 light browning grey (as context below) 5% at top 40% to base. Clear boundary | Fill |
| 0.07-0.13 | 10414 | 2.5y 6/2 light brownish grey sand. Occ fine fleshy rootlets. Pale but not a podzolic Eb. Looks very similar to greensand at base. Redeposited natural? | Fill - ?redep 'natural' |
| 0.13-0.16 | 10414 | 2.5y 5//2 greyish brown sandy clay loam, c.5% dark & also yellowish brown mottles – manganese and iron oxide precipitations around rootholes. Clear boundary | Fill |
| 0.16-0.33 | 10414 | 5y 5/2 olive grey loamy sand/sandy clay loam. Occ small flints from 25cm +. Clear boundary. Very similar looking to 'natural' greensand beneath. | Fill - ?redep 'natural' |
| 0.33-0.37 | 10415 | 2.5y 4/2 dark greyish brown sandy loam, occ charcoal. Abrupt horizon with a little mixing of below context. | Fill |
| 0.37-0.4 | 10415 | 2.5y 7/2 light grey sand – looks like an Eb but pretty sure it isn't – different texture & no illuviated horizons beneath. Sharp horizon. NB resembles nat greensand but apparently without glauconite. On inspection under microscope this is borne out – same material apparently but with glauconite removed. | Fill |
| 0.4-0.53 | 10429 | 5y 5/2 olive grey sandy clay loam. Occ laminae of clay, same colour. Sparse charcoal flecks, occ flint <20mm @46-50 | Fill with washed in clay |
| 0.53-0.72 | 10494 | 5y 4/1 dark grey (slightly olive) sandy clay loam. Waterlogged, common wood fragments, roots & rootlets, bark (sampled for 14C @ 60cm). clear horizon onto top of stake which is fragmented and 'bitty' at top | Waterlogged fill |
| 0.72-0.95 | | STAKE – waterlogged wooden stake, cut to point, driven through into 'natural' greensand below. See photo. Looked like deformed sediments around base of stake but on inspection is 'halo' of sesquioxides precipitating out from stake – first manganese then iron. | Possible stake, *in situ* |
| 0.95-1.22+ | 10493 | Gley 1 6/1 greenish gray sand, slightly darker/more organic at top under stake. Glauconite observed under microscope. Is a geological deposit, mistaken for fill by excavators due to the differential colouring of deposits by ?vivianite etc in anaerobic areas (see section photo). Was bright blue on excavation, oxidising to present colour on exposure | 'natural' greensand geology |

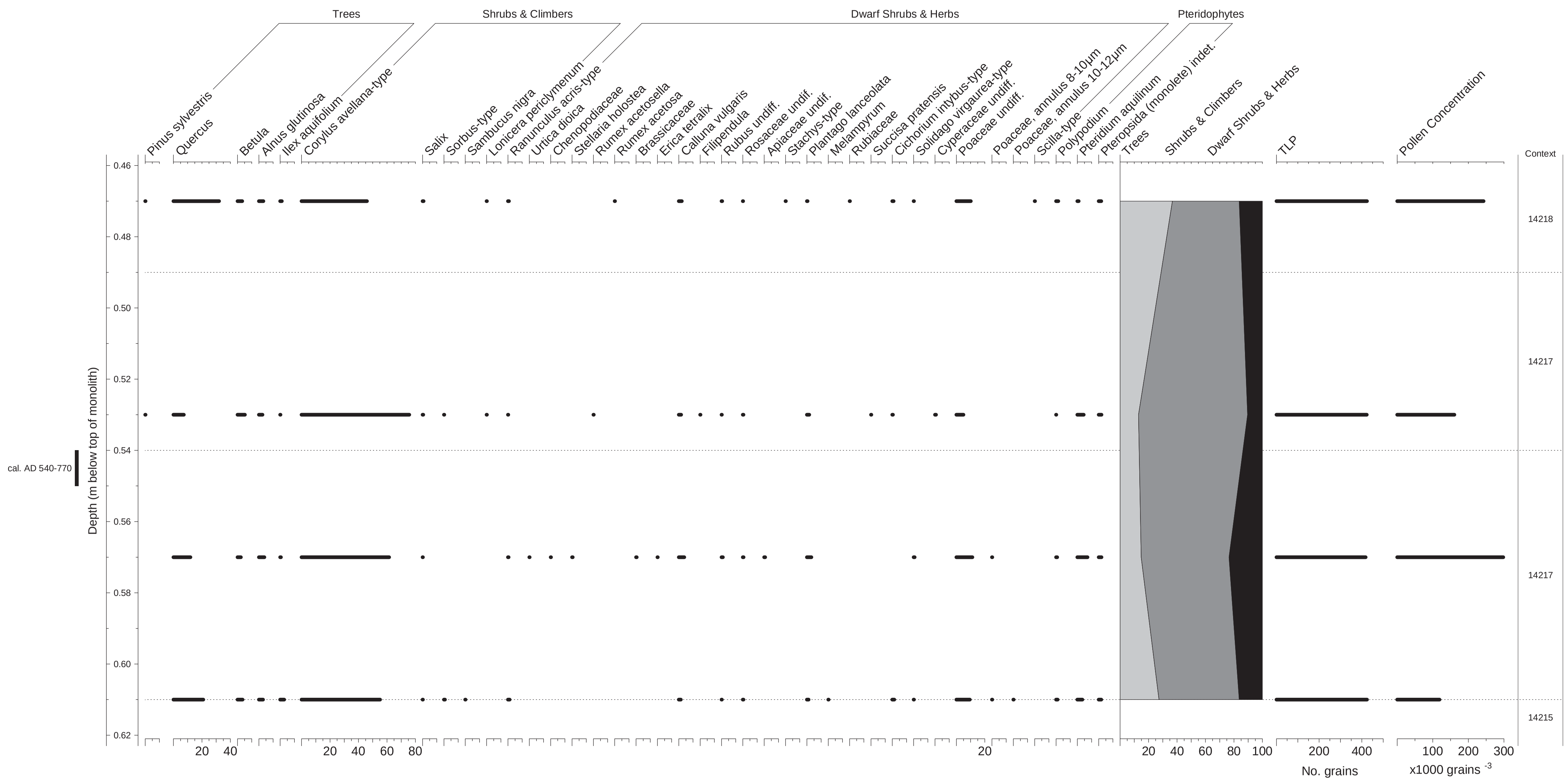
**Table 6: Sediment Description from monolith <187>, feature 13994, section 14115, Dowds Farm, Hedge End. Monolith elevation is 32.21m aOD**

| *Depth (m)* | *Context* | *Full sediment description* | *Interpretation* |
|---|---|---|---|
| 0-0.26 | 13995 | 10YR 5/4 yellowish brown silty clay loam, rare to sparse small charcoal lumps <2mm, coarse blocky (looks subangular) structure clearly visible in monolith. Clear boundary. | Tertiary fill / base of modern soil profile |
| 0.26-0.48 | 13998 | 2.5Y 5/3 light olive brown silty clay loam, rare charcoal lumps <5mm, most to top. Common (c.10%) medium faint to distinct clear to diffuse mottles of 7.5Y 4/6 strong brown (REDOX). Clear to abrupt boundary | Secondary fill |
| 0.48-0.56 | 14002 | 2.5Y 5/3 light olive brown (nearest match, although distinctly darker than above or below deposits) silty clay loam. Occ to quite common charcoal up to 10mm. c.2% very fine to fine macropores. Some slight redox mottling, faint <5%. Clear boundary. | Weakly developed stasis horizon |
| 0.56-0.86 | 14003 | 2.5Y 6/3 light yellowish brown very fine sandy silt loam. To 0.72m mottled with many medium prominent strong brown mottles. Rare charcoal <10mm. 1-2% fine macropores down to 0.77. | Secondary fill with rooting from above stasis |
| 0.86-0.94 | | 2.5Y 5/3 light olive brown clay loam, with common medium distinct strong brown mottles (redox). Fine material likely settling in standing water. | Could be top of primary fill – mono doesn't extend to base |

**Table 7: Radiocarbon dates obtained from Features 14214 and 10503 / 10412**

| Lab. Code | Monolith / Feature | Depth (m below monolith top) | Material Dated | Conventional Date | δ$^{13}$C (‰) | Calibrated Date (2σ range; 95.4%) |
|---|---|---|---|---|---|---|
| NZA-31247 | <201> 14214 | 0.54 | non-oak indet or oak (*Quercus*) charcoal | 1392±55 | -28.0 | cal AD 540-770 |
| NZA-32369 | <87> 10503 / 10412 | 0.72-0.95 | willow/poplar (*Salix*/*Populus* sp.) wooden stake | 2159±35 | -29.6 | 370-90 cal BC |

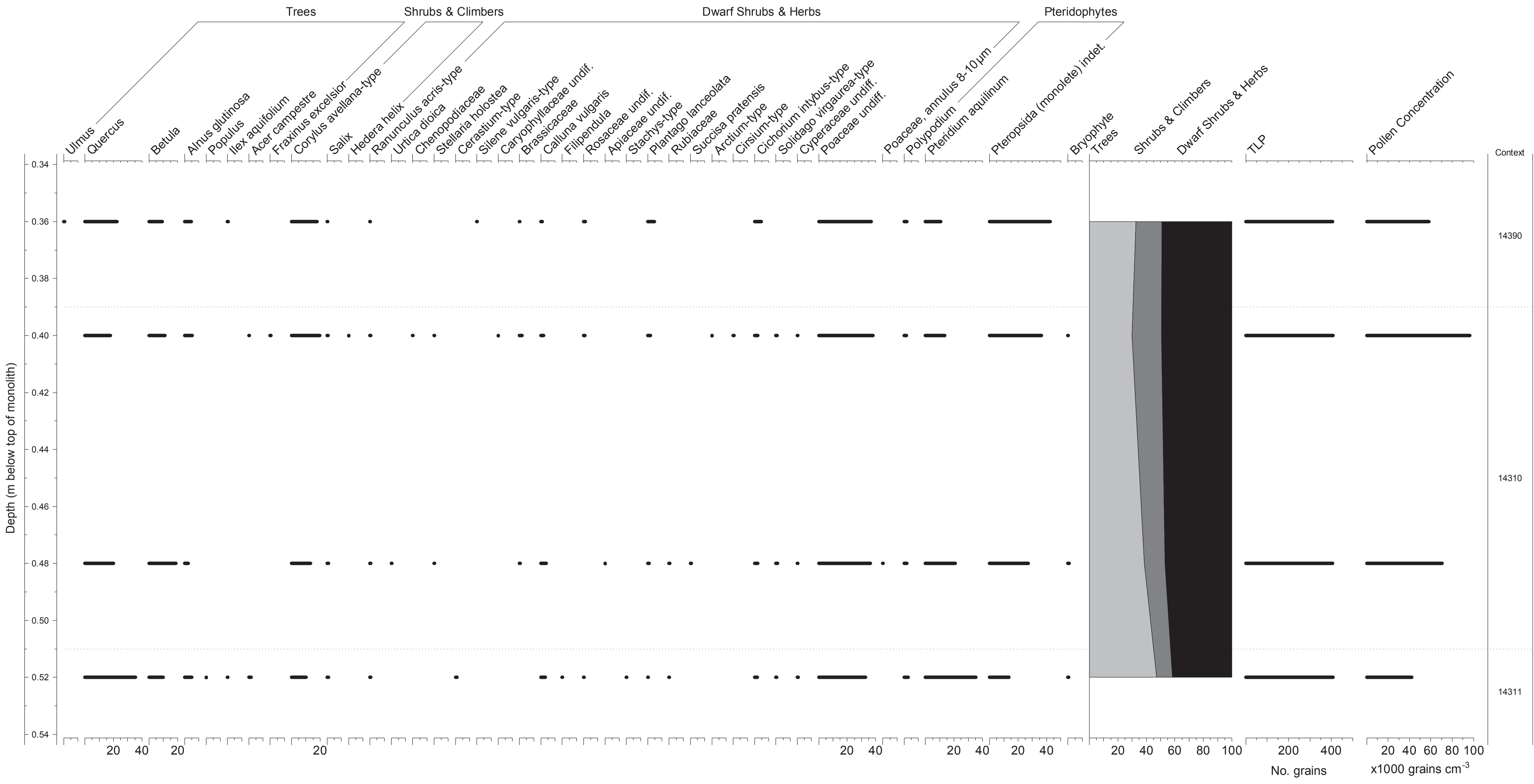
## 62354 Dowd's Farm, Hedge End, Section 14214, Feature 13593, Monolith 201




% TLP Ex. *Alnus glutinosa*, Cyperaceae, Pteridophytes and Bryophytes (%TLP + Group)

Analyst: M.J. Grant

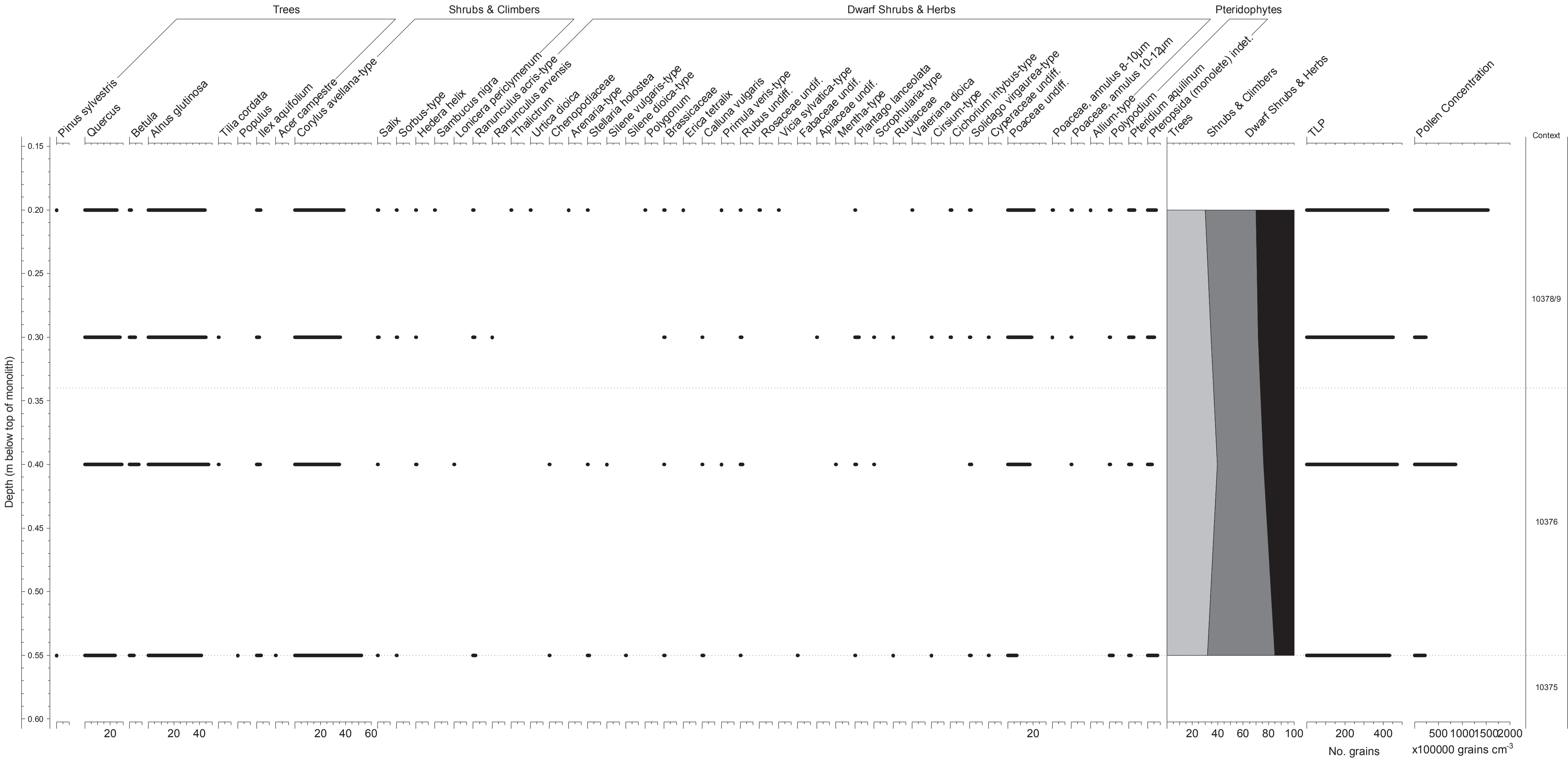
62354 Dowd's Farm, Hedge End, Section 14307, Feature 14317, Monolith 213




% TLP Ex. *Alnus glutinosa*, Cyperaceae, Pteridophytes and Bryophytes (%TLP + Group)

Analyst: M.J. Grant

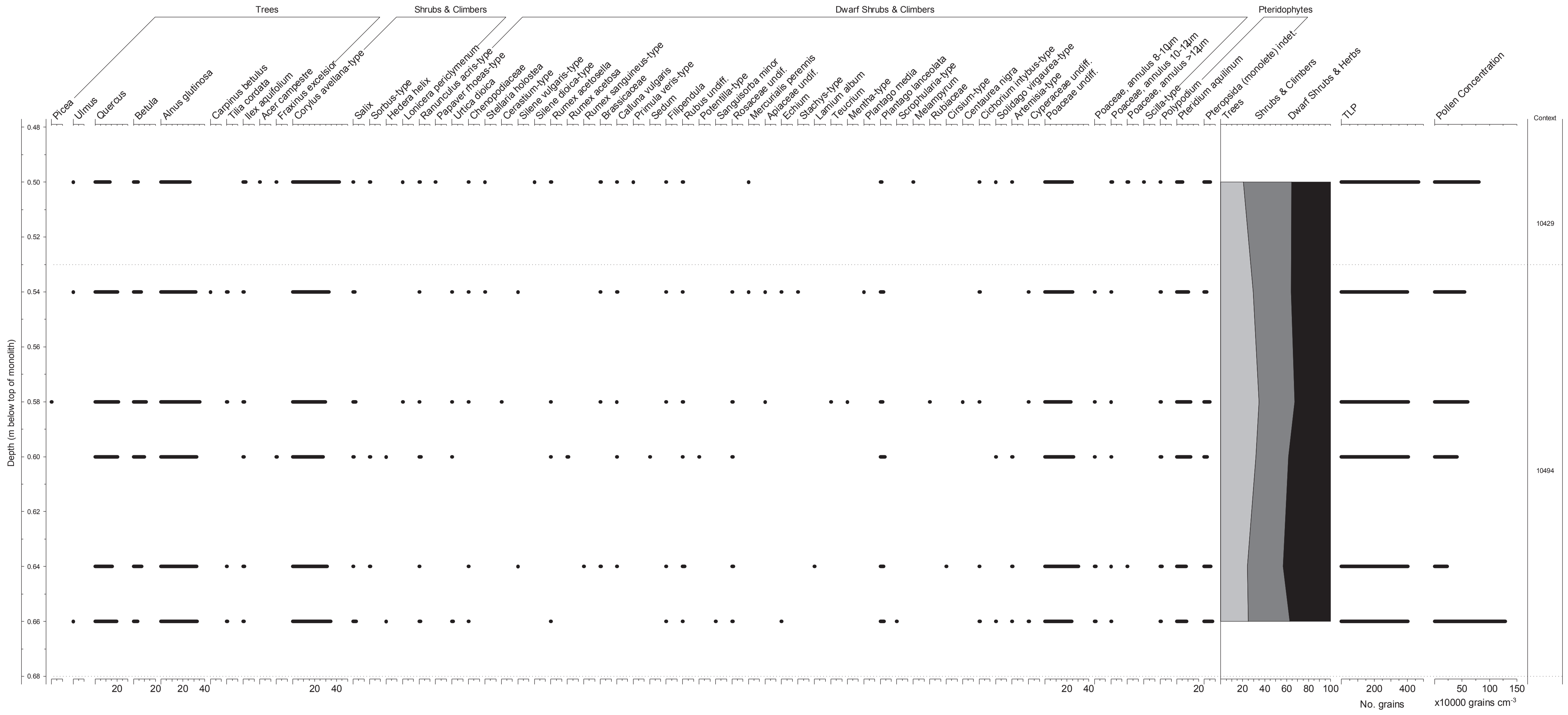
62354 Dowd's Farm, Hedge End, Section 10374, Feature 10489, Monolith 41




% TLP Ex. *Alnus glutinosa*, Cyperaceae, Pteridophytes and Bryophytes (%TLP + Group)

Analyst: M.J. Grant

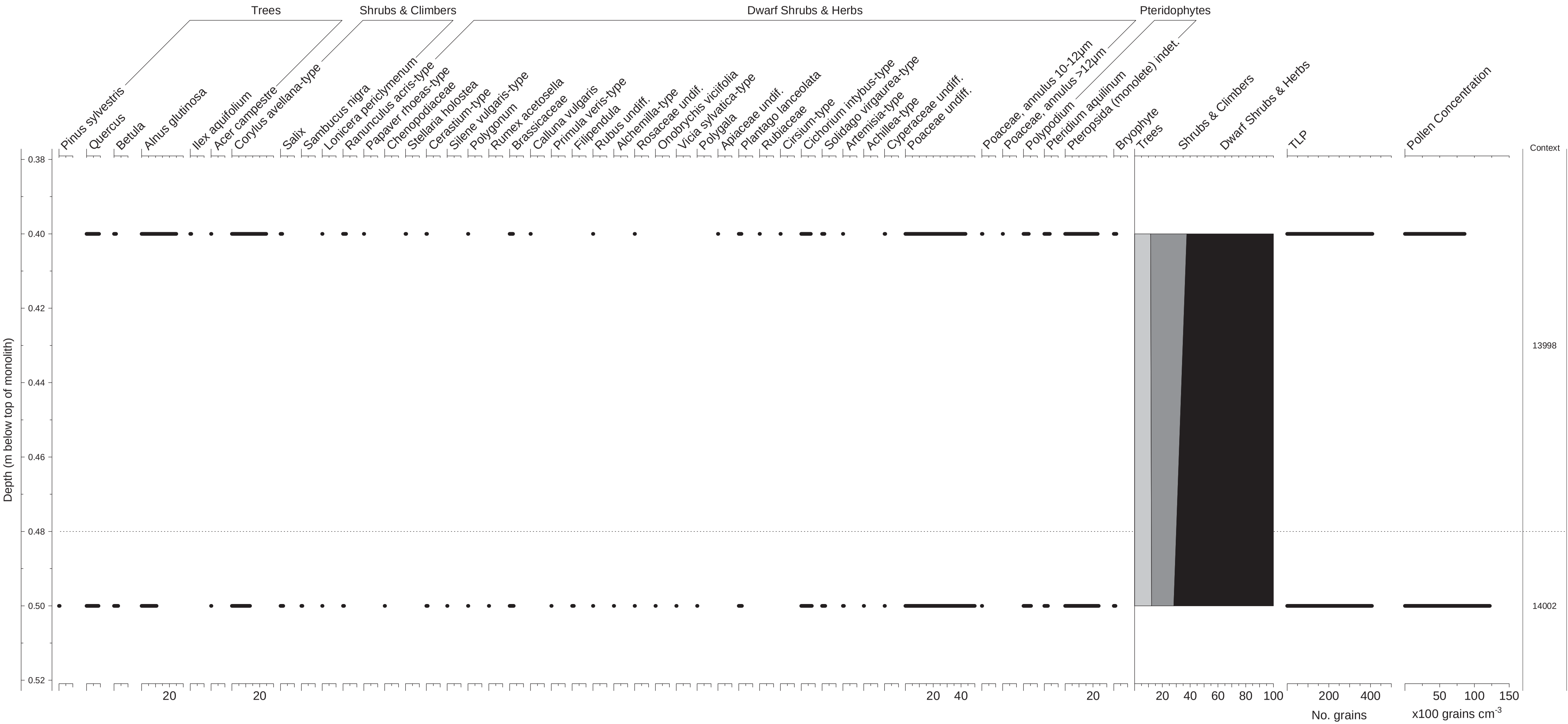
## 62354 Dowd's Farm, Hedge End, Section 10412, Feature 10503 / 10412, Monolith 87




% TLP Ex. *Alnus glutinosa*, Cyperaceae, Pteridophytes and Bryophytes (%TLP + Group)

Analyst: M.J. Grant

# 62354 Dowd's Farm, Hedge End, Section 13994, Feature 14115, Monolith 187




% TLP Ex. *Alnus glutinosa,* Cyperaceae, Pteridophytes and Bryophytes (%TLP + Group)

Analyst: M.J. Grant

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