7 Conclusions

Dating sites

As can be seen from the dates presented within section 3 (Additional radiocarbon dating, Table 3.1) there is, on average, a difference of between about 500 and 1000 years in the dates from the humic acid and humin fraction. This difference seems too great to be due to humic acid mobility, so it is more likely that the humins are derived from reworked older carbon (Hamilton pers comm). The extraction of macrofossils from five of the samples showed that this fraction gives dates younger that the humin or humic acid date, tending to reinforce the hypothesis that the sediment humin date is derived from older carbon, some of which may have been humified. As expected the macrofossil dates are, in all cases, the youngest estimates reflecting the addition of this fraction to an older organic-rich sediment derived from the partial decomposition and humification of soil derived organic matter. This suggests that the best policy is to target macrofossils which should give a date closest to the date of burial in such organic-sediment mixtures. The implication of this is that, whilst the peat and microfossils may be preserved in dry and dark conditions, potentially dateable macrofossils should be removed and stored separately, preferably in a frozen state as it is generally easier to extract macrofossils before drying out of the samples.

The results suggest that in this case the problems of dating the sites had not substantially altered in the 10-20 years since the samples had been taken. The fundamental problem remains that floodplain channel fill samples and alluvial peats contain material of a variety of ages due to both reworking and incorporation of older carbon and the persistence of residual fractions.

The palaeoenvironmental potential of the archived samples

The assessments of the monoliths archived at Exeter has shown that in most cases pollen and spore concentrations have remained high and there is no evidence of an increase in grain deterioration. The reason for this is almost certainly due to the dark and dry conditions that the monoliths were stored under. Having dried out slowly they had not been rewetted until sampling for the pollen and spore assessment. This suggests that this form of archiving may well be suitable for pollen and spores as it is considerably cheaper than either frozen or cold storage. Further research would be helpful here, however, as samples with different storage histories of 10-20 years old are rarely comparable making any statistical analyses problematic.

Integrating the environmental data

What we see at Wollaston is an almost totally cleared pastoral landscape, subdivided by the middle Iron Age, which then has a Roman land use pattern, associated with villas and the surrounding towns, imposed upon it. This is in line with the generally dense pattern of Roman settlement in the Nene valley and a fully utilized floodplain and surrounding slopes (Taylor 1975). The integration of the environmental data here has revealed the consistent presence of some unusual plants previously thought more restricted in their occurrence. These include *Centaurea cyanus* which, on strong pollen evidence (it is particularly distinctive pollen grain), is definitely present not only at the medieval site of Botolph Bridge, but also at Wollaston, Grendon and Hardwater Road. This suggests that it is a prehistoric rather than medieval introduction as has been suggested by several other sites (Tomlinson and Hall 1996), and particularly Iron Age-Roman deposits at Farmoor on the Thames floodplain (Jones 1979). A second plant is *Adonis annua*, a Roman introduction, now a rarity, characteristic of arable fields and has been identified from pollen at Wollaston Field 3 and Hardwater Road.

Future look and the environmental potential of palaeochannels

The pressure on the Nene Valley will only decrease due to there being few aggregate resources available for further extraction. Currently there is a proposal to extend the pit near Grendon. An application has been submitted by Hansons. The area between Wollaston and Cogenhoe doubled in size in the second development draft (SDD) of the first draft of the new Minerals Local Plan for Northamptonshire. This has excited some public protest (*Save the Nene 2006*) and will be subject to strict archaeological conditions, including environmental sampling. Elsewhere the valley is now a series of lakes and it is important to add the wealth of archaeological knowledge gained from these pits to the public information on display at these sites and in visitor centres etc.

An important element of the archaeology of the Middle Nene Valley is the wealth of environmental data that the area has produced. This reveals the emergence of partially cleared islands as part of a ritual landscape in the Neolithic, its use and expansion in the Bronze Age. Also revealed is the almost total clearance of the floodplain and lower slopes in the early Iron Age and the late Iron Age and the development of an intensive arable-based landuse with farms, roads and fields all being laid out in a regularised pattern. During the Roman period the area underwent 'deep Romanisation' to the point of the creation of a vineyard and remodelling of the Iron Age landscape. In the Saxon period this intense landuse continued and the modern landscape boundaries and features emerged. There is probably no other valley in England where this story is as well known as a result of aggregate exploitation. Future exploitation must, however, facilitate the contextualisation and synthesis of environmental data done on a site by site basis. This will be aided by the augmentation of the GIS system developed as part of this project and held by Northamptonshire County Council.

As the examples in this report show palaeochannels have significant limitations for environmental analyses, namely they are prone to hiatuses in the record (as at Grendon), they can have mixing of materials, and can have problems of residuality of organic components. In these respects raised mires or lakes can be superior sources of data, except that lakes also frequently suffer from major problems of reworking and poor radiocarbon dating control and raised mires are frequently ecologically isolated from areas of human activity such as farming.

However, this comparison is somewhat redundant as the major advantage of palaeochannels is that they occur in areas where there are no mires or lakes, such as the East Midlands and south-east England. The other obvious point is that they frequently occur very close to sites and in many cases form part of the site itself. Indeed, if palaeochannels with associated cultural materials, such as West Cotton, are regarded as archaeological sites then their environmental analyses is just one component of on-site work and should be done to as high resolution as possible as a matter of best practice. Only in this way will the hiatuses be recognised and on-site activities and conditions be potentially revealed. It follows that in most cases the potential of a palaeochannel cannot be recognised by its surface form, except where it has clearly been highly disturbed, or from its sedimentological or geochemical characteristics, although sediment pH has some indicative value under certain hydrogeological circumstances and organic-rich sediments are normally required (Brown *et al* 2007). The potential of palaeochannels is in reality closely associated with their location, with on-site channels having the highest potential and diminishing potential as distance increases away from any known archaeological activity. After outline analyses of pollen, plant macrofossils, beetles and chironomids, suitable sections of the record can be selected for high-resolution studies, if the resolution of the sediments allows this. As has been shown at Grendon this methodology can also provide the only continuous or linking data for different periods of site occupation despite hiatuses in the record. The relationship of palaeochannel potential to location adds weight to the potential of remote sensing methods such as Lidar for the assessment of site potential prior to evaluation or excavation (Carey *et al* 2006).