STAR CARR

Volume 1: a persistent place in a changing world

NICKY MILNER, CHANTAL CONNELLER AND BARRY TAYLOR

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A Persistent Place in a Changing World

Nicky Milner, Chantal Conneller and Barry Taylor

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List of contributors and their affiliations

Marcus Abbott (reconstructions): ArcHeritage
Ashley Abrook (pollen): Dept. of Geography, Royal Holloway, University of London
Steve Allen (wood identification): York Archaeological Trust
Enid Allison (insects): Canterbury Archaeological Trust
Michael Bamforth (project manager, wood): Dept. of Archaeology, University of York
Alex Bayliss (chronological modelling): Historic England/University of Stirling
Taryn Bell (publication research assistant): Dept. of Archaeology, University of York
Julie Birchenall (flint refitting): School of Arts, Languages and Cultures, University of Manchester
Edward Blinkhorn (geophysics): University College London
Simon P. E. Blockley (climate): Dept. of Geography, Royal Holloway, University of London
Julie Boreham (geochemistry, micromorphology): Earthslides.com
Steve Boreham (geochemistry): Dept. of Geography, University of Cambridge
Christopher Bronk Ramsey (radiocarbon dating): Oxford University
Mike Buckley (ZooMS): School of Earth and Environmental Sciences, University of Manchester
Ian Candy (climate): Dept. of Geography, Royal Holloway, University of London
Julian Carty (student intern): formerly Dept. of Archaeology, University of York
Sophy Charlton (stable isotopes): Natural History Museum
Matthew Collins (bioarchaeology): Dept. of Archaeology, University of York
André C. Colonese (organic residues): Dept. of Archaeology, University of York
Chantal Conneller (site co-director, lithics): School of Arts, Languages and Cultures, University of Manchester
Oliver Craig (bioarchaeology): Dept. of Archaeology, University of York
Shannon Croft (residues): Dept. of Archaeology, University of York
Chris M. Darvill (climate): Geography, University of Manchester
Laura Deeprose (climate): Dept. of Geography, Royal Holloway, University of London
Elaine Dunbar (radiocarbon dating): Scottish Universities Environmental Research Centre, University of Glasgow
Ben Elliott (antler): Dept. of Archaeology, University of York
Amanda Farry (climate): Dept. of Geography, Royal Holloway, University of London
Margrethe Felter (conservation): York Archaeological Trust
Lucie Fletcher (birch bark rolls): Dept. of Archaeology, University of York
Charles A. I. French (micromorphology, geochemistry): Division of Archaeology, University of Cambridge
Virginia Garcia-Diaz (microwear): Faculteit Archeologie, Universiteit Leiden
Neil Gevaux (graphics): Dept. of Archaeology, University of York
Daniel Groß (European context): Schleswig-Holstein State Museum Foundation, Centre for Baltic and Scandinavian Archaeology
Pat Hadley (wet sieving): formerly Dept. of Archaeology, University of York
Don Henson (public archaeology): Dept. of Archaeology, University of York
Kirsty High (organic deterioration, geochemistry): Dept. of Chemistry, University of York
Rebecca Kearney (climate): Dept. of Geography, Royal Holloway, University of London
Becky Knight (finds manager, faunal remains): Dept. of Archaeology, University of York
Bernd Kromer (radiocarbon dating): Universität Heidelberg
Catherine Langdon (chironomids): Geography and Environment, University of Southampton
Pete Langdon (chironomids): Geography and Environment, University of Southampton
Paul Lincoln (climate): Dept. of Geography, Royal Holloway, University of London

Aimée Little (microwear, experimental archaeology): Dept. of Archaeology, University of York
Harald Lübke (European context): Schleswig-Holstein State Museum Foundation, Centre for Baltic and Scandinavian Archaeology
Alexandre Lucquin (organic residues): Dept. of Archaeology, University of York
Anthony Masinton (digital fly through): University of York
Ian P. Matthews (palaeoenvironment): Dept. of Geography, Royal Holloway, University of London
Alison McQuilkin (phytoliths): Dept. of Archaeology, University of York
Nicky Milner (principal investigator, site co-director): Dept. of Archaeology, University of York
Andy Needham (beads): Dept. of Archaeology, University of York
Terry O'Connor (faunal remains): Dept. of Archaeology, University of York
Nick J. Overton (British context): School of Arts, Languages and Cultures, University of Manchester
Adrian Palmer (climate): Dept. of Geography, Royal Holloway, University of London
Ian Panter (conservation): York Archaeological Trust
Kirsty Penkman (organic deterioration, geochemistry): Dept. of Chemistry, University of York
Diederik Pomstra (experimental archaeology): Faculteit Archeologie, Universiteit Leiden
Dominic Powlesland (geophysics): The Landscape Research Centre
James Rackham (palaeoenvironment): Dept. of Archaeology, University of Nottingham
Anita Radini (palaeobotanical remains): Dept. of Archaeology, University of York
Harry K. Robson (research assistant, fish, fungi): Dept. of Archaeology, University of York
Charlotte C. A. Rowley (geochemistry): Dept. of Archaeology, University of York
Tim Schadla-Hall (site history): Institute of Archaeology, University College London
Paul Shields (photography): Library, University of York
Mikkel Sørensen (European context): The Saxo Institute, University of Copenhagen
Barry Taylor (site co-director, palaeoenvironment): Dept. of History and Archaeology, University of Chester
James Taylor (GIS): Dept. of Archaeology, University of York
Maisie Taylor (wood): Dept. of Archaeology, University of York
Emma Tong (flotation): Dept. of Archaeology, University of York
Matthew von Tersch (photography): Dept. of Archaeology, University of York
Chloe Watson (illustrations): Dept. of Archaeology, University of York
John Webb (coarse stone tools): Dept. of Archaeology, University of York
Craig Williams (illustrations): British Museum
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'A visit in the spring of 1949 confirmed that Star Carr offered the most favourable prospects: pieces of bone and antler projecting from the side of a field ditch…., though themselves in a very poor state, pointed to the probability of much better preserved finds on the lakeward slope.'

(Clark 1954, xxi)

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Figure A (page ix): Nicky Milner introducing the site to York first-year undergraduates in 2015 (Copyright Star Carr Project, CC BY-NC 4.0).

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Prelim on Dating

Calendar date estimates given in the text have been derived by a variety of methods. Date ranges given in italics are Highest Posterior Density intervals derived from formal Bayesian statistical models. The parameter and the figure on which it is illustrated identify the distribution exactly. For example, Mesolithic occupation at Star Carr began in *9385–9260 cal BC (95% probability; start Star Carr*; Fig. 17.2), *probably in 9335–9275 cal BC (68% probability*).

Unmodelled radiocarbon dates have been calibrated using the probability method (Stuiver and Reimer 1993), rounded outwards to 10 years (or 5 years if the error term on the radiocarbon age is less than ±25 BP), and are given in normal type. These dates are identified by the internationally agreed laboratory code for the measurement (the uncalibrated radiocarbon determination is given either in the text or in the table referenced). For example, burning at Eton Rowing Lake is attested in 9180–8750 cal BC (95% probability; OxA-9411, 9560±55 BP), probably in 9130–8990 cal BC (36% probability) or 8930–8800 cal BC (32% probability).

All radiocarbon dates have been calibrated using IntCal13 (Reimer et al. 2013). Date ranges are given at 95% probability unless noted otherwise. Dates quoted by century or prefixed by 'c.' are informal date estimates derived from either Bayesian modelling or calibrated radiocarbon dates. For example, Mesolithic occupation at Star Carr began c. 9300 cal BC and the western platform was constructed in the middle of the 88th century cal BC (Figure 9.1).

Chapter 4 discusses climatic and environmental events that are recorded in other archives (such as ice cores) across Europe and the North Atlantic region. In general these are in archives where the chronology is typically reported in calendar years before present (either calibrated radiocarbon dates where present is fixed by convention to AD 1950 or ice core years before present which is fixed by convention to AD 2000 (B2K)) (e.g. Blockley et al. 2018; Rasmussen et al. 2014). Moreover, many climatic events are defined by their age in calendar years BP, such as the 8.2 ka BP, 9.3 ka BP, 11.1 ka BP and 11.4 ka BP events recognised in ice-cores. However, it is the convention in the archaeological literature for Holocene sites to use the cal BC/cal AD format. In order to avoid confusion, ages derived from ice cores are reported as BP (B2K) followed by a conversion to BC, which allows direct comparison with the radiocarbon and modelled chronologies that are reported as cal BC. Elsewhere BP appears simply as the unit of measurement for uncalibrated radiocarbon results. Ages derived from luminescence dating are reported as BC.

Summary

The Early Mesolithic site of Star Carr (North Yorkshire, UK) was excavated between 1949–1951 by Grahame Clark and published in 1954. The excavations uncovered a rich and unique range of artefacts that had been deposited into peat that had formed at the edge of a lake. The assemblage included large quantities of faunal remains, flint tools, and bone and antler artefacts including barbed points and antler frontlets. These were associated with a layer of unworked brushwood, which Clark interpreted as a living platform laid down at the lake edge. In the 1980s further work was undertaken by the Vale of Pickering Research Trust with the aim of producing a more detailed record of the local environment. However, these excavations also revealed a timber platform constructed of split and hewn timbers: the earliest evidence of carpentry in Britain.

Since 2004, further excavations have been carried out at Star Carr by Conneller, Milner and Taylor. The first phase of these excavations aimed to characterise the nature and extent of the dryland and wetland archaeology, and its chronological range, but also produced evidence that the site was under severe threat from degradation of the wetland deposits. In order to rescue what remained a second phase of work was undertaken, involving larger, open-area excavations, which provided a better understanding of the spatial patterning of activities undertaken across this part of the site. An extensive programme of radiocarbon dating was undertaken in conjunction with these excavations which demonstrated that the site was occupied for around 800 years, while a programme of coring in the lake sediments enabled the activities at the site to be placed within the context of climate and environmental change.

The excavations have revealed the complex history of the site with large structures erected in the context of activities that varied across time and space: 1) the earliest activity consisted of small-scale occupation on the dryland and persistent deposition of worked wood, articulated animal bone and flint tools into the waters of the lake; 2) during the main phase of occupation a series of large timber platforms were erected on the lake edge, dwelling-structures were constructed on the dryland and the wetlands continued as a focus for the deposition for animal bones, frontlets and a range of other artefacts; 3) during the latest phase, the dryland and wetland margins continued to be used, often for craft activities.

The artefactual material provides new insights into Mesolithic life. The extent of the worked wood has allowed a reconstruction of Mesolithic woodworking techniques, and a further 38 wooden artefacts have been found which greatly enhances our understanding of how important wood (a material rarely recovered) was for Mesolithic people. In total, 24,883 pieces of flint were found and by analysing these spatially, refitting and using microwear analysis it is possible to see evidence for activity areas, such as crafts and tool repair associated with structures, an axe factory, as well as a number of caches. In addition, a number of shale beads, including an engraved pendant was found which represents the earliest form of Mesolithic art in Britain. The analysis of butchered animal bone has also revealed new animals not previously found at the site including fish, wild cat and field vole. New finds of antler frontlets have increased our understanding of the diversity of human interactions with animals. Overall, despite the degradation, these excavations have provided a new understanding

of life in the Early Mesolithic that challenges many of the preconceived views of this period in terms of the character and scale of activity and the degree of investment in a particular place in the landscape.

Danish

Theis Zetner Trolle Jensen

Den tidlig Mesolitiske lokalitet Star Carr (Nordlige Yorkshire, Storbritannien), blev udgravet mellem 1949 og 1951 af Grahame Clark og herefter publiceret i 1954. Udgravningerne blotlagde et rigt og unikt genstandsmateriale som var blevet deponeret i en tørv der var dannet i kanterne af en gammel sø. Genstandsmaterialet inkluderende store mængder af faunalevn, bearbejdet flint, samt knogle og tak i form af f.eks tandede benspidser og pandeben med stejler. Alle disse fund blev gjort i et lag af ubearbejdet kvas, hvilket Clark tolkede som en slags levende platform, der var lagt ud i vandkanten. I løbet af 1980'erne foretog Vale of Pickering Research Trust yderligere udgravninger med det mål, at få et større kendskab til det lokale miljø. Det var i den forbindelse, at der blev afdækket en træplatform, som var konstrueret af splittede og tilhuggede træstammer: det tidligste tegn på tømrerarbejde i Storbritannien.

Siden 2004 har yderligere udgravninger fundet sted ved Star Carr af bl. a. Conneller, Milner og Taylor. Den første fase af disse udgravninger, havde til formål, at forsøge at karakterisere omfanget af arkæologien tilknyttet henholdsvis vådområdet og den tørre del, men afslørede samtidig, at stedets organiske deponeringer var under kraftig nedbrydning. I et forsøg på at redde det tilbageværende organiske materiale, blev der påbegyndt endnu en udgravningskampagne, som fokuserede på større områder. Dette resulterede i en bedre forståelse af de rumlige aktiviteter der havde foregået på stedet.

I forbindelse med udgravninger, blev der iværksat et omfattende kulstof 14 daterings projekt, der afslørede, at stedet var i brug i omkring 800 år. Derudover blev der foretaget adskillige boringer i søsedimenterne, hvilket gjorde det muligt, at placere stedets aktiviteter, inden for rammerne af henholdsvis klima- og miljøændringer.

Med udgravningerne, har det været muligt, at afsløre stedets komplekse historie, i form af bl.a opførelsen af store strukturer der varierede i både tid og rum; 1) de tidligste aktiviteter, bestod af mindre tilstedeværelser på tørt land, samt en vedvarende deponering af bearbejdet træ, artikulerede dyreknogler og flintredskaber i vandkanten; 2) under den mest intensive tilstedeværelse blev der anlagt flere store tømmer platforme ude i vandkanten, beboelses strukturer blev anlagt i nær tilknytning på tørt land og i vådområdet blev der fortsat deponeret dyreknogler, pandeben med stejler og en masse andre genstande; 3) håndværk af forskellig art fortsatte under stedets sidste fase, på både tørt land og omkring vådområdet

Det udgravede genstandsmateriale har bidraget med betydelig ny viden omkring livet i Mesolitikum. Omfanget af det bearbejdede træ har gjort det muligt, at rekonstruere Mesolitiske træbearbejdnings teknikker, og 38 andre trægenstande har desuden udvidet vores forståelse af, hvor vigtigt træ (et materiale der sjældent bevares) var for Mesolitiske mennesker. I alt, blev der fundet 24,883 stykker tildannet flint. Ved at analysere disse rumligt, med sammensætning og slidsporsanalyser er det muligt at rekonstruere forskellige aktivitetsområder, såsom, forskellige håndarbejder og redskabs reparationer der alle var tilknyttet strukturerne, et område hvor økser blev lavet, samt flere deponeringer. Derudover, blev der fundet flere skiferperler, hvor én af disse var dekoreret og dermed repræsenterer den tidligste Mesolitiske kunst fra Storbritannien. Analyser af slagteaffaldet har desuden afsløret nye arter, der ikke tidligere var erkendt på stedet, såsom fisk, vildkat og markmus. Nye fund af pandeben med påsiddende stejler, har desuden udvidet vores opfattelse af, hvor mangfoldig menneskets interaktion var med dyrene.

På trods af nedbrydningen af det organiske materiale, har udgravningerne leveret betydelig ny information om livet i Tidlig Mesolitikum. Denne information udfordrer meget af den tidligere viden om perioden, både i form af aktivitetsmønstre, men også forståelsen af omfanget af den tid der blev brugt, på et bestemt sted i landskabet.

German

Annabell Zander and Birgit Gehlen

Der frühmesolithische Fundplatz Star Carr (Nord Yorkshire, Großbritannien) wurde in den Jahren 1949–1951 von Grahame Clark ausgegraben und 1954 publiziert. Die Ausgrabungen lieferten ein reichhaltiges und einzigartiges Artefaktspektrum, welches in den Torf eines heute verlandeten Sees deponiert wurde. Das Inventar beinhaltet eine große Anzahl an Faunenresten, Feuersteinwerkzeugen sowie Knochen- und Geweihartefakten, einschließlich Widerhakenspitzen und Hirschgeweihmasken. Diese Artefakte wurden in Verbindung mit einer unbearbeiteten Schicht aus Reisig gefunden, welche Clark als eine Wohnplattform interpretierte, die am Rande des Sees angebracht worden war. In den 1980er Jahren wurden weitere Untersuchungen von der Vale of Pickering Research Trust unternommen, um die lokale Umwelt des Fundplatzes detaillierter dokumentieren zu können. Allerdings führten diese Untersuchungen auch zu der Entdeckung einer Holzplattform, welche aus zerteiltem und bearbeitetem Holz bestand: der früheste Beweis für Schreinerarbeiten in Großbritannien.

Conneller, Milner und Taylor führen seit 2004 weitere Ausgrabungen durch. Die erste Phase der Ausgrabungen zielte auf die Dokumentation des Umfangs und der Art der Funde und Befunde sowohl im Feucht- als auch im Trockenboden sowie der chronologischen Entwicklung des Fundplatzes. Des Weiteren wurde der Beweis erbracht, dass die Erhaltung der organischen Funde stark gefährdet war. Um die verbliebenen Artefakte zu retten, wurde eine zweite Phase der Untersuchungen eingeleitet, im Rahmen derer Ausgrabungen auf einer großen Grabungsfläche durchgeführt wurden. Diese Grabungen ermöglichten ein besseres Verständnis der räumlichen Struktur der belegten Aktivitäten am Platz. Die Altersbestimmung des Fundplatzes erfolgte durch umfassende Radiokohlenstoff-Datierungen, welche zeigen, dass dieser über 800 Jahre bewohnt wurde. Darüber hinaus wurden Kernbohrungen in den Seesedimenten vorgenommen, um die verschiedenen Aktivitäten in den Kontext von Klima- und Umweltveränderungen einbetten zu können.

Die komplexe Entwicklung des Fundplatzes wurde durch die Ausgrabung der vielfältigen Befunde erkennbar, die im Kontext von verschiedenen Aktivitäten entstanden sind: 1.) die früheste Aktivität bestand aus einer kleinräumigen Besiedlung des Trockenareals, wobei ständig bearbeitetes Holz, Tierknochen sowie Feuersteinartefakte in den See entsorgt wurden; 2.) während der Hauptphase der Besiedlung wurde am Rande des Sees eine große Holzplattform errichtet und Wohnstrukturen im Trockenareal des Platzes gebaut, während der Feuchtbodenbereich weiterhin als Zone für die Deponierung von Tierknochen, Hirschgeweihmasken und anderen Artefakten diente; 3.) während der letzten Phase wurden der Rand des Trockenareals und des Feuchtbodenbereichs weiterhin genutzt, häufig für handwerkliche Tätigkeiten.

Das Artefaktspektrum ermöglicht einen neuartigen Einblick in das Leben mesolithischer Jäger und Sammler. Die zahlreichen bearbeiteten Hölzer halfen bei der Rekonstruktion mesolithischer Holzbearbeitungstechniken. Während der neueren Grabungen wurden weitere 38 Holzartefakte gefunden, welche belegen, wie wichtig Holz (ein nur selten erhaltenes Material) für die Menschen des Mesolithikums gewesen ist. Insgesamt wurden 24.883 Silexartefakte entdeckt. Eine räumliche Untersuchung der Verteilung der Silexartefakte und der Zusammenpassungen sowie Gebrauchsspurenanalysen ermöglichen die Rekonstruktion verschiedener Aktivitätszonen, wie beispielsweise für handwerkliche Tätigkeiten, Reparatur von Werkzeugen assoziiert mit Strukturen, eine Axtwerkstatt sowie eine Anzahl an Caches. Zusätzlich wurden einige Schiefer-Anhänger gefunden. Ein besonderes Stück ist durch Gravierungen verziert. Dieses stellt die älteste mesolithische Kunst Großbritanniens dar. Eine neuerliche Untersuchung der Tierknochen mit Bearbeitungsspuren führte zu der Dokumentierung von Tierarten, wie Fisch, Wildkatze und Wühlmaus, welche zuvor nicht für den Fundplatz belegt waren. Die Entdeckungen weiterer Hirschgeweihmasken hat darüber hinaus zu unserem Verständnis der Vielfalt der Mensch-Tier-Interaktionen beigetragen. Trotz der starken Zersetzung des organischen Fundmaterials wurden durch die Funde und Befunde neue Erkenntnisse zum frühmesolithischen Leben gewonnen. Dadurch werden viele der bisher gültigen Meinungen in Bezug auf den Charakter und das Ausmaß der Aktivitäten in Star Carr in Frage gestellt und eine neue Sicht auf einen einzelnen Ort und seine Bedeutung in der Landschaft während der Mittelsteinzeit ermöglicht.

French

Alexandre Lucquin

Le site mésolithique ancien de Star Carr (North Yorkshire, Royaume-Uni) a été fouillé entre 1949–1951 par Grahame Clark et publié en 1954. Les fouilles ont mis à jour une gamme riche et unique d'artefacts qui avaient été déposé dans de la tourbe formée aux abords du lac. L'assemblage inclut de grandes quantités de restes de faune, d'outils en silex, et d'artefact en os et bois de cervidés, comprenant des pointes barbelées et des coiffes de bois. Ceux-ci étaient associées à une couche de brindilles non travaillées, que Clark interprétait comme une plate-forme d'habitation posée au bord du lac. Dans les années 1980, le "Vale of Pickering Research Trust" a conduit d'autres travaux afin de produire un enregistrement plus détaillé de l'environnement local. Cependant, lors de ces fouilles une plateforme construite de poutres de bois coupés et fendus a été découverte : la plus ancienne preuve de menuiserie en Grande-Bretagne.

Depuis 2004, d'autres fouilles ont été effectuées à Star Carr par Conneller, Milner et Taylor. La première phase de ces fouilles avait pour but de caractériser la nature et l'étendue archéologique des zones sèches et humides, ainsi que son aire de répartition chronologique. Mais elle a également démontré que le site était gravement menacé par la dégradation des dépôts en zone humide. Afin de sauver ce qui en restait, une deuxième phase de travail a été entreprise, impliquant des fouilles plus vastes et à ciel ouvert, ce qui a permis de mieux comprendre la structure spatiale des activités réalisées dans cette partie du site. Un vaste programme de datation par radiocarbone a été entrepris en conjonction avec ces fouilles qui a démontré que le site a été occupé pendant environ 800 ans, alors qu'un programme de carottage dans les sédiments du lac a permis aux activités du site d'être contextualisé par rapport aux changements climatiques et environnementaux.

Les fouilles ont révélé l'histoire complexe du site avec de grandes structures érigées dans le cadre d'activités qui varient à travers le temps et l'espace: 1) l'activité la plus ancienne consistait en une occupation à petite échelle dans la zone sèches et en des dépôts persistant dans les eaux du lac de bois travaillé, d'os articulés et d'outils en silex; 2) au cours de la phase principale d'occupation, une série de grandes plates-formes de bois ont été érigées sur le bord du lac, des structures d'habitation ont été construites sur les zone sèches et les zones humides ont continué à être le point focal des dépôts des os, coiffes et autres artefacts ; 3) au cours de la dernière phase, les bords des zones sèches et humides ont continué d'être utilisées, souvent pour les activités artisanales.

La culture matérielle apporte de nouvelles perspectives sur la vie mésolithique. L'ampleur du bois travaillé a permis de reconstruire les techniques de travail du bois mésolithique et 38 autres objets en bois ont été trouvés, ce qui améliore grandement notre compréhension de l'importance du bois (un matériau rarement retrouvé) pour les sociétés mésolithiques. Au total, 24 883 fragments de silex ont été trouvés et, par leur analyse spatiale, remontages et analyse tracéologique, il est possible de voir le témoignage des zones d'activité telles que la fabrication et la réparation d'outils associés à des structures, la manufacture de hache, ou encore des nombreuses caches. En outre, un certain nombre de perles de schiste, y compris un pendentif gravé a été trouvé ce qui représente la forme la plus ancienne de l'art mésolithique en Grande-Bretagne. L'analyse des restes osseux a également révélé la présence d'animaux qui n'avaient pas été trouvés auparavant sur le site, comprenant des poissons, des chats sauvages et des campagnols. De nouvelles découvertes de coiffes de bois ont augmenté notre compréhension de la diversité des interactions humaines avec les animaux. Dans l'ensemble, en dépit de la dégradation, ces fouilles ont fourni une nouvelle compréhension de la vie dans le Mésolithique ancien qui remet en question de nombreux préconçus concernant cette période en termes de caractère et d'échelle d'activité et de degré d'investissement dans un endroit particulier dans le paysage.

Spanish

Miriam Cubas

El yacimiento mesolítico de Star Carr (North Yorkshire, Reino Unido) fue excavado entre los años 1949–1951 por Grahame Clark y publicado en 1954. Las excavaciones arqueológicas descubrieron un rico y singular conjunto de artefactos que habían sido depositados en una turbera formada a la orilla de un lago. El conjunto incluía grandes cantidades de restos de fauna, útiles líticos, así como artefactos en hueso y en asta, incluyendo puntas dentadas y tocados de asta de ciervo. Estos se encontraban asociados a un nivel de maleza silvestre, que Clark interpretó como una plataforma acondicionada como espacio habitacional a la orilla del lago. En los años 1980 se llevaron a cabo nuevos trabajos por parte del Vale of Pickering Research Trust con la finalidad de documentar con mayor resolución el entorno medioambiental local. Sin embargo, estas excavaciones descubrieron además una plataforma construida con tablones de madera tallada: la primera evidencia de carpintería en Gran Bretaña.

Desde el año 2004, se han llevado a cabo nuevas intervenciones arqueológicas en Star Carr dirigidas por Conneler, Milner y Taylor. La primera fase tuvo como objetivo caracterizar la naturaleza y extensión de los

yacimientos arqueológicos de los humedales y de secano, así como su rango cronológico, pero también reveló que el sitio se encontraba en grave riesgo de conservación por la degradación del humedal. Con la finalidad de salvaguardar lo que aún se conservaba, se emprendió una segunda fase de trabajo con la apertura de zonas de excavación en área de mayor amplitud, lo que proporcionó una mejor comprensión de la distribución espacial de las actividades realizadas en el sitio. Junto con las excavaciones arqueológicas se llevó a cabo un intenso programa de dataciones radiocarbónicas que ha demostrado una larga ocupación durante cerca de 800 años, mientras que un programa de sondeos en los sedimentos del lago permitió situar las actividades del yacimiento dentro de un contexto de cambio climático y ambiental.

Las excavaciones han puesto de relieve una historia compleja para este yacimiento, con la construcción de grandes estructuras en un contexto de actividades que varían a lo largo del tiempo y del espacio: 1) la primera actividad consistió en una ocupación a pequeña escala en terreno seco y se caracterizaba por una persistente deposición de madera trabajada, huesos de animales articulados y útiles de sílex depositados en las aguas del lago; 2) durante la fase plena de ocupación se llevó a cabo la construcción de una serie de grandes plataformas de madera en la ribera del lago, en tierra firme se construyeron las estructuras de habitación, y el humedal continuó siendo el foco para depositar huesos de animales, tocados y un amplio rango de artefactos; 3) durante la última fase, los márgenes de los humedales y el terreno seco continuaron en uso, destinados frecuentemente a actividades artesanales.

El conjunto material proporciona nuevas perspectivas sobre los modos de vida mesolíticos. La cantidad de madera trabajada ha permitido reconstruir las técnicas de trabajo empleadas durante el Mesolítico, y se han recuperado 38 nuevos artefactos de madera que nos permiten comprender mejor la importancia que tuvo este recurso (un material raramente recuperado) para los grupos mesolíticos. Se ha recuperado un total de 24.883 piezas de sílex que, a través del análisis espacial, de remontajes y del análisis de las huellas de uso, han permitido evidenciar diferentes áreas de actividad, relacionadas con la fabricación y reparación de útiles y asociadas con las estructuras, una zona de producción de hachas, y una serie de escondrijos. Además, se ha recuperado una serie de cuentas de pizarra, incluyendo un colgante grabado que representa la primera evidencia de arte mesolítico en Gran Bretaña. El análisis de los huesos de animales procesados también ha revelado la presencia de especies previamente no documentadas en el sitio, como peces, gato montés y topillo agreste. Los nuevos descubrimientos de tocados en asta de ciervo amplían nuestro conocimiento sobre la diversidad de la interacción entre humanos y animales. En general, a pesar de la degradación del lugar, estas excavaciones han proporcionado una nueva comprensión de la vida durante el Mesolítico inicial que desafía muchas de las ideas preconcebidas sobre este período en cuanto al carácter y la escala de las actividades, y al grado de intervención en un lugar tan particular del paisaje.

PART 1

Introduction to the Site

'Every now and then discoveries are made which...illuminate as it were in a flash aspects of the life of the more or less remote past previously only dimly perceived...Star Carr is such a site.'

(Clark 1971, v)

CHAPTER 1

Introduction

Nicky Milner, Chantal Conneller and Barry Taylor

Introduction

In the spring of 1949 Dr Grahame Clark, a lecturer in archaeology at the University of Cambridge, visited an excavation near the village of Seamer in North Yorkshire: the site was Star Carr (Figure 1.1). The excavation had been carried out by John Moore, a founding member of the Scarborough and District Archaeological Society who had spent the previous few years recording archaeological sites on the low-lying carr-lands of the eastern Vale of Pickering. Through this work Moore had identified nine areas of early prehistoric activity, many dating on typological grounds to the Mesolithic. In some cases, these sites had been buried by layers of peat that had formed within a large, now in-filled lake, which Moore referred to as Lake Flixton (Moore 1950). Through the curator of the Scarborough Museum, Moore was put in touch with Clark. Clark had undertaken the first systematic study of the British Mesolithic as part of his doctoral research and had gone on to carry out a more extensive survey of the evidence from across Northern Europe (Clark 1936). In doing so, Clark noted the important role that wetland excavations had played in creating a much richer record of Mesolithic life on the continent, both by preserving organic materials such as animal bone and wood but also ecological material such as pollen that was being used to establish a broad chronology for these sites.

That summer, Clark began the first of three years of excavation that would revolutionise our understanding of the British Mesolithic and make Star Carr one of the most important archaeological sites in the country. Within the sediments that had formed at the edge of the lake Clark recorded a large assemblage of bone and antler artefacts, worked flint, and animal bone (Clark 1954) (Figure 1.2). The organic artefacts included almost 200 barbed projectile points as well as the remains of the red deer antler from which they had been made, scraping tools made from aurochs metatarsals, bodkins made from elk metapodials, and modified red deer frontlets, possibly used as headdresses or as hunting disguises. To this day it remains the largest assemblage of bone and antler artefacts from a Mesolithic context in Britain and many of the artefacts have yet to be found at any other site.

Drawing together the analyses of the different artefacts and materials, and studies of the plant remains preserved in the lake sediments, Clark drew (what was for its time) an incredibly detailed picture of life at Star Carr. The site, he argued, had originally been located at the shore of the lake with activity taking place on a

Figure 1 (page 1): The excavation of the birch tree (looking north) in 1950 (Copyright David Lamplough, CC BY-NC 4.0).

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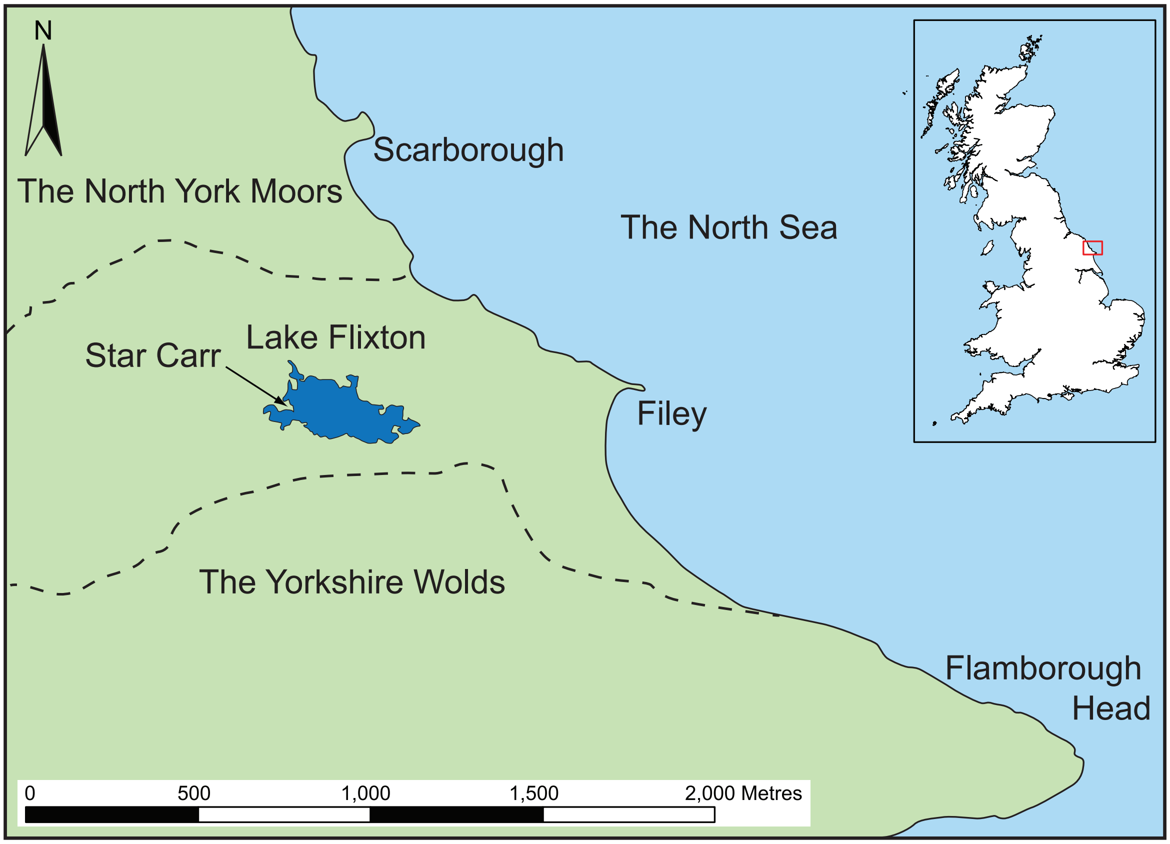

Figure 1.1: Location of Lake Flixton and Star Carr (Copyright Star Carr Project, CC BY-NC 4.0).

platform made from unworked birch branches. It had been inhabited on at least two occasions by a small group of families who had occupied the site during the winter and spring and who had subsisted largely by hunting in the surrounding landscape (Clark 1954). In 1972 Clark revisited these interpretations, arguing that Star Carr had been the winter camp for a group who had moved seasonally from the lowlands of the Vale of Pickering to the uplands of the North York Moors as they followed herds of migrating red deer (Clark 1972). In doing so, Clark also emphasised the close relationship between Mesolithic people and their environment and in particular how the spatial and seasonal availability of resources determined the choices they made in terms of patterns of settlement and mobility.

The effect on Mesolithic studies

The results of Clark's excavations and his subsequent interpretations of the site were to have a profound effect on the way we have come to understand the Mesolithic in Britain. In particular, the model of Mesolithic life as characterised by small, highly mobile groups moving seasonally between upland and lowland areas, or between inland and coastal sites, became a dominant theme in subsequent studies of the period (e.g. Jacobi 1978; Rowley-Conwy 1994; Donahue and Lovis 2006). In part, this is due to the influence that Clark himself had in shaping the discipline in Britain and beyond. However, it also reflects the richness of the material recorded by Clark, the high quality of the subsequent excavation report, and the failure to record a comparable assemblage at any other British Mesolithic site. Importantly, as more Mesolithic wetland sites have been excavated it has become evident that Star Carr is not at all typical of sites of the period (Conneller and Schadla-Hall 2003).

The fact that a single site has had such a strong influence on the period is itself symptomatic of a much broader failure to appreciate the dynamic and complex nature of the British Mesolithic. This is perhaps both a

Figure 1.2: Excavations at Star Carr by Clark (Copyright David Lamplough, CC BY-NC 4.0).

cause and a consequence of the fact that the Mesolithic has been significantly understudied compared to other periods. The term 'Mesolithic' was first used in 1866 by Westropp after Lubbock defined the terms Palaeolithic and Neolithic; however, it was far from clear what was meant by this term (Milner and Woodman 2005). In Britain it was only in the 1930s that the concept of a Mesolithic period came into more general use, notably by Grahame Clark. However, others such as V. Gordon Childe tended to ignore it and were dismissive of its contribution to the development of civilisation (Childe 1925). More researchers, many taught and enthused by Clark, became specialists in the Mesolithic period in the second half of the 20th century but it is only in the last 20 years or so that there has been a significant increase in numbers of Mesolithic scholars in Europe. This slow start for Mesolithic studies and some degree of negativity towards the period has undoubtedly led to the premise that it was homogenous and unchanging. However, a further subtext to this view is the persistent trope that hunter-gatherers lack history, continuously adapting to a particular set of ecological circumstances. This has been perpetuated in archaeological studies that describe Mesolithic lifeways in terms of broad, unchanging patterns of seasonal mobility. Within this context it is unsurprising that a single site can have such an influence on the way the Mesolithic has been studied.

The relatively late development of Mesolithic studies has also contributed to its poor representation in other media (Wickham-Jones 2010; Milner et al. 2015). Museum exhibitions or displays focusing on the Mesolithic are rare and the period is underrepresented in television programmes and in popular accounts of the British past. Although some exciting new discoveries have been reported in the popular media such as the Warren Field 'calendar', the 'discovery' of Doggerland and the Goldcliff human footprints (Blinkhorn and Milner 2013), many out-of-date stereotypes can still be found. These often refer to Mesolithic technology as being basic or rudimentary and describe subsistence practices as 'hand-to-mouth'.

In reality the Mesolithic was both culturally rich and highly dynamic, a fact that was known to Clark and which has been the focus of considerable research by archaeologists who work on this period. This can be seen most clearly in the considerable chronological variation in forms of projectile points (see Conneller et al. 2016) but is also apparent in the use of resources, architecture, and patterns of mortuary practice, settlement, mobility and territoriality (e.g. Spikins 1999; Conneller 2006; Waddington 2015). There are also significant regional differences in the character of Mesolithic material culture across Britain and Ireland, such as the distinctly maritime lifeways evident on the west coast of Scotland. These differences are likely to reflect a complex mixture of the specific cultural identities and histories of Mesolithic groups as they adapted to the regionally diverse landscapes of Mesolithic Britain. These landscapes also changed dramatically over time: throughout the Mesolithic, the composition of the native vegetation changed, as birch and pine forest was replaced by hazel, and then by mixed, broadleaf deciduous species. At the same time rivers changed behaviour and rising sea levels caused the gradual inundation of the North Sea plain, separating mainland Britain from continental Europe. Whatever the reasons, the Mesolithic cannot be seen as a single, uniform period but was instead both spatially and chronologically diverse.

Star Carr was occupied at the very start of the Mesolithic, which was itself a period of profound change. Less than four hundred years before the site was inhabited, the Northern European climate had warmed rapidly, marking the end of the Late Glacial Stadial and the start of the Holocene. Vegetation responded to the warmer climate, with grassland and scrub communities becoming established across much of the landscape, and wetland and aquatic vegetation recolonising lakes and the edges of rivers. Humans had arrived into this new landscape at the transition to this warmer environment, crossing over the North Sea plain from Northwest Europe. The nature of Terminal Palaeolithic human society at this time remains poorly understood but the archaeology suggests that they adopted a very mobile, versatile strategy in which the hunting of horses in particular played an important role (e.g. Conneller 2007).

By the time people had begun to occupy Star Carr and other Early Mesolithic sites, areas of open grassland were being replaced by birch woodland, changing the character of much of the landscape. Animal communities were also changing, with species such as roe deer and aurochs becoming established whilst horse and reindeer probably became extinct in mainland Britain (Jacobi and Higham 2009). Increasingly, the dating of these Early Mesolithic sites and the preceding episodes of Terminal Palaeolithic human activity suggest that there was a hiatus between the two, which coincided with a relatively short-lived deterioration in climate known as the Preboreal Oscillation (Conneller and Higham 2015). If this is the case, then the start of the Mesolithic represents the second Early Holocene settlement of Britain. However, the character of this Early Mesolithic activity appears to have been different to that of the groups that had arrived a few centuries before. Stone tool technology changed with a greater emphasis on flexibility and new tool types such as axes appeared (e.g. Barton 1991). Other technological developments include the management of plant communities through deliberate, repeated burning of wetland and woodland flora (e.g. Dark 1998a; Cummins 2003; Barnett 2009), along with the first evidence for large-scale, controlled carpentry (Mellars et al. 1998). There is also a sense that activity in particular places became more intensive; sites tend to be larger, were occupied for longer, and were revisited on numerous occasions.

However, what has been lacking is a real understanding of the lives of people who inhabited Britain at this time. Well-excavated sites of this period are rare, particularly those where organic materials have been preserved. Where sites have been investigated in the past they have often lacked the contextual and chronological detail necessary to pick out and explore specific aspects of people's lives or to unpick the different episodes of activity that were taking place. This detail is crucial if we are to write an account of the Early Mesolithic in which the people inhabiting these sites had their own history.

We have also lacked the capability to study in detail the relationship between Mesolithic people and their environment and the effect that climatic and environmental change may have had upon patterns of human behaviour. Whilst there is increasing potential to link palaeoclimate and palaeoenvironmental records with past human activity for the post-glacial period, archaeologists and palaeoclimate scientists have rarely taken advantage of each other's data. Climate and environmental studies previously have rarely been carried out at a human scale, whilst archaeological studies often fail to consider the complexity and variability exhibited in local environmental records. Part of this is due to problems of scale and resolution, with archaeologists all too keen to attribute poorly dated cultural changes to the closest climatic or environmental fluctuation, a problem described by Baillie (1991) as 'suck in'. It is also becoming clear that the major climatic events glimpsed in the Greenland Ice cores had varied effects in different areas of Northwest Europe. Therefore, it is only by looking at human activity and landscape at a local level that the complexities of the relationship between people and environmental/climatic change can be discerned.

Returning to Star Carr

It was to resolve these issues that we returned to Star Carr to undertake new excavations from 2004. Whilst Clark thought he had excavated the entire site, small-scale fieldwork in the mid-1980s had already shown that Early Mesolithic activity was far more extensive, extending across larger parts of the lake edge wetland as well as onto the adjacent dryland areas (Cloutman and Smith 1988; Mellars and Dark 1998). This made it very likely that assemblages of well-preserved archaeological material still survived within the wetland deposits, as well as raising the possibility that different forms of activity, including structures, may be found on what would have been the drier ground above the lake shore, an area almost entirely neglected in Clark's excavations.

Crucially, new excavations could provide the contextual and stratigraphic data that would be necessary to precisely date episodes of activity and which would allow us to study changing patterns of activity at a far tighter chronological scale than had been possible previously. More recent chronologies had been established for Star Carr, showing that the site had been occupied for at least 250 years (Mellars and Dark 1998; Dark et al. 2006); however, tying these chronologies to the artefacts excavated by Clark was problematic. At around the same time as we recommenced excavations, work that was being carried out on the British Neolithic had shown that it was possible to establish chronologies at the scale approaching that of individual human generations through the application of radiocarbon dating and Bayesian modelling (e.g. Whittle and Bayliss 2007). If a new assemblage of material could be recorded at Star Carr then it might be possible through the application of further radiocarbon dating to write an account of life at the site that was, essentially, historical.

In addition, the sediments that had accumulated within the lake still held considerable potential for the reconstruction of the environmental and climatic conditions contemporary with human activity at Star Carr. Previous work had already shown that the local environment had changed during the time the site was inhabited (Dark 1998a). Further work, carried out in conjunction with new excavations, could tie down more precisely the environmental conditions within which activity was taking place and explore the relationship between people and their changing environments more closely. What is more, the sediments that formed in the deeper part of the lake provide a record of the changing climatic conditions from the later stages of the last Late Glacial cold period into the Early Mesolithic. Relating this to precisely dated episodes of human activity would provide one of the first detailed studies of the relationship between early prehistoric people and their contemporary climate.

A further reason for returning to Star Carr came from our increased understanding of the local context of the site. Three decades of work by Tim Schadla-Hall and the Vale of Pickering Research Trust from the mid-1970s onwards revealed that Star Carr was one of a series of Early Mesolithic sites located on the shore of Lake Flixton. However, the nature of the archaeology from these sites was rather different. First, they seemed rather smaller in size and less dense, often made up of clusters of material deriving from occupations of different dates. They also lacked the range of material from Star Carr, including many of the iconic artefacts that had made the site so famous. Only three additional barbed points have been found (two at No Name Hill, the other at Flixton Island) and no further antler frontlets were recorded. Even animal bone tended to be more heavily fragmented than that in collections from Star Carr. This led to suggestions that Star Carr was a special site within the landscape (Conneller and Schadla-Hall 2003), perhaps a ritual site, where animal remains were formally deposited into the lake waters (Chatterton 2003). While we believed any mono-causal interpretation of such a large site that was repeatedly visited over such a long period of time was likely to be inadequate, the new fieldwork and interpretations offered new directions for research at the site. These also necessitated a high-resolution approach to understanding the spatial and temporal dimensions of activities in conjunction with a detailed knowledge of the timing of the development of the lake edge palaeoenvironment.

Finally, it had also become evident that the levels of organic preservation at the site were deteriorating. Visitors noted that the peat appeared to be drying out and shrinking at the site and that what had once been a flat

Figure 1.3: The field had been flat in the 1980s but deterioration of the deposits resulted in peat shrinkage and the topography of the field became evident, as shown here (Copyright Dominic Powlesland, CC BY-NC 4.0).

field in the 1980s was sloping and had begun to show undulations (Figure 1.3). Confirmation that the deposits were drying out to the detriment of the archaeology came in the early years of the project. Small-scale excavation within the wetland areas showed that the local water table had fallen below the level of the main artefact horizons and that organic material, such as bone and antler, was now very poorly preserved (Milner 2007).

In order to determine the best way to protect the archaeological potential of the site, Historic England (formerly English Heritage) organised two seminars where the results of these excavations and the state of organic deterioration were presented (Last et al. 2009); the first was held at the University of York in November 2008 and the second at the University of Cambridge in May 2010. These led to approval of an excavation in 2010 to assess the rate of deterioration, work that was funded by the Natural Environment Research Council (NERC) and English Heritage/Historic England. From this, a Management Strategy (Milner 2012) was developed to understand the full implications of securing and managing the evidential value of the site. This concluded that the deterioration was irreversible and full excavation was therefore necessary.

Shortly after this excavation, in November 2011, Star Carr was designated as a Scheduled Monument by the Department of Culture Media and Sport, which defined the site as being 'Nationally Important' under the provisions of the 1979 Ancient Monuments and Archaeological Areas Act. Funding from the European Research Council (ERC), granted in 2012, enabled large-scale excavations at Star Carr and forensic-scale research on activities in conjunction with high-resolution palaeoclimate modelling, based on multi-proxy evidence from Lake Flixton. The same year, Scheduled Monument Consent was granted by the Secretary of State, as advised by English Heritage/Historic England, allowing large-scale excavations to take place between 2013 and 2015.

Like Clark, our work at Star Carr has taken an interdisciplinary approach, integrating forensic-scale research with high-resolution palaeoclimate modelling, based on multi-proxy evidence from Lake Flixton. Open-area excavations were carried out in the wetland deposits in order to establish the character, phasing and spatial extents of human activity in these areas, whilst palaeoenvironmental studies established the contexts within which this activity took place. Large-scale excavations on the dryland parts of the site, coupled with geochemical analysis and palaeobotanical studies, were also undertaken to determine the nature of occupation on the adjacent, terrestrial landscape. At the same time, work was carried out in the deeper parts of the basin to establish the climatic conditions prevalent throughout the time that Star Carr was inhabited. We have also been very fortunate to collaborate with Alex Bayliss on a programme of dating and Bayesian modelling, funded by English Heritage/Historic England, which has provided a temporal resolution never before seen for a Mesolithic site. Drawing this work together we have sought to produce a detailed account of the lives of people who inhabited Star Carr in the early centuries of the Mesolithic.

Finally, we have also sought to use the work at Star Carr as a platform for promoting a better understanding of the Mesolithic to a wider, non-academic audience. The closest and most engaged audience has been the local volunteers and others who have been kept informed about our work through the Friends of Star Carr email list, Facebook page and our website (www.starcarr.com). In addition, a nearby primary school brought children to visit the excavations. Various members of the team have given talks to over 50 societies in the local area and farther afield. Interaction with the news media has come about through various discoveries made during the project, especially the first building to be identified at the site reported as 'Britain's oldest house' and the project has featured twice on *Digging for Britain* on BBC television. The project team also published a book aimed at a popular readership, *Star Carr: Life in Britain after the Ice Age* (Council for British Archaeology) and various articles about the site have appeared in popular magazines such as *British Archaeology* and *Current Archaeology*.

We have been particularly pleased that two local museums, The Rotunda (Scarborough) and The Yorkshire Museum (York), have created displays about the site, with cooperation and involvement of the project team. The team have also organised events for the public in both towns as part of wider festivals and events, such as the Scarborough Prehistory Festival and the YorNights Festivals run by the University of York. A more far-flung item of outreach was taking part in a large prehistory festival in Jeongok in South Korea which brought the site to several thousand people over three days. The project team was keen that there should be a longer-lasting legacy for public engagement and a major resource for use by schools is now available online which supports teaching about the Mesolithic as part of the school curriculum in England (http://www.starcarr.com/schools.html).

Structure of the volumes

The main results of our work are contained in these two volumes. This is supplemented by the digital archive, which is stored with the Archaeology Data Service (ADS) and allows access to the full set of records and specialist reports (https://doi.org/10.5284/1041580). The physical archive will be curated in The Yorkshire Museum.

The structure of these two volumes pays homage to Grahame Clark, who opened his 1954 publication with an interpretation of Star Carr, followed by the various specialist chapters. Following this format our first volume provides an interpretation of the site. Within Part 1 we also include a brief history of excavation and an overview of each season of our excavations. Part 2 presents an overview of the changing climatic and environmental conditions from the development of Lake Flixton through to the end of occupation at Star Carr. Part 3 provides key data on the spatial patterning of activity across the site in terms of dryland structures, wooden structures in the lake, faunal remains and flint. For Part 4, this evidence is then integrated with the radiocarbon dating in order to produce a narrative of activities through time and space, followed by a discussion of human lifeways at Star Carr. Part 5 provides the wider context to the site, with the British Mesolithic context, the European context and public engagement with the site and the Mesolithic. Part 6 provides a conclusion to Volume 1. Overall, we hope that this volume provides a thorough explanation of the nature of human activity at Star Carr throughout the period it was inhabited and how people responded to the changing environment and climate.

Volume 2 provides detail on the specific areas of research carried out as part of the recent programme of work at Star Carr. Much of this research has been brought together to provide the interpretations presented in Volume 1. The volume has been divided into six sections, reflecting (broadly) the nature of the material under discussion. The first three describe the work on which our understanding of both the context and chronology of the archaeology is based. These begin with Part 7, which outlines the aims, objectives and methods for the project and the geophysical survey carried out on the site. Part 8 provides a detailed discussion of the dating of the site, the climate reconstruction and the palaeoenvironmental analysis. Part 9 deals with the research undertaken on sediments, starting with an overview of the site stratigraphy, the soil geochemistry, and the research on the deterioration on the site and conservation of the artefacts. The final three sections describe the analyses of the main archaeological material from the site, divided into animal, vegetable and mineral (again following Clark). Part 10 focuses on the animal remains and the ways in which they were utilised, starting with the faunal analysis and the osseous technology, followed by the analysis of the barbed points, and antler frontlets, and concluding with a discussion of animals within the broader context of the European Mesolithic. Part 11 deals with the use of plant material, beginning with woodworking technology and evidence for possible plant management, the wooden artefacts, birch bark, fungi and the palaeoethnobotanical evidence in the form of charcoal and phytoliths. Part 12 covers the mineral finds: beads, including an engraved shale pendant, utilised stones and flint.

CHAPTER 2

A History of the Site

Nicky Milner, Barry Taylor, Chantal Conneller and Tim Schadla-Hall

Introduction

Star Carr has a long history of research, the nature of which has often reflected, and indeed stimulated, broader trends within Mesolithic archaeology. Following the initial discovery of the site by Moore and the excavations by Clark, Star Carr was the subject of extensive reinterpretation and debate. However, it was not until the mid-1980s that new excavations were carried out at the site, under the auspices of the Vale of Pickering Research Trust. Though these were initially undertaken to refine the site's palaeoenvironmental record, they also led to the unexpected discovery of a timber platform and small quantities of archaeological material, leading to further small-scale excavations in the following years. The results showed that Star Carr was far larger than Clark had assumed, with clear differences in the patterns of activity across the site, and that it had been occupied over a period of centuries. These findings as well as the impasse in debates over site function and seasonality ultimately led to the current project.

John W. Moore

The history of research at Star Carr begins with John Moore, without whom the site may never have been found. Moore was a local amateur archaeologist and a founding member of the Scarborough Archaeological and Historical Society. The Society modelled itself on the Scarborough Field Naturalists and at its October 1947 meeting it set up a series of 'recorderships' whereby individual members would specialise and report on work done on different archaeological periods. Moore, who had already begun to investigate the area that was to become known as Lake Flixton, took on the Palaeolithic (Chris Hall pers. comm. 2016).

In his published account of the fieldwork that he undertook between 1947 and 1949, Moore described the area as a 'quagmire of varying depth' with drainage ditches acting as field boundaries, emptying their waters into the Hertford Cut, a canalised river constructed over 200 years earlier (Moore 1950). It was through the investigation of these freshly dug drainage ditches, as well as fieldwalking on the higher ground above the extents of the peat, that Moore began to identify areas of Mesolithic activity in the area.

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Early in the summer of 1947 Moore discovered a flint blade whilst examining a deposit of gravel exposed in the side of a drainage ditch (Moore 1950). His subsequent excavations at the site (which Moore referred to as Flixton Site 1 on Flixton Island; Chapter 11) showed that it consisted of a dense scatter of worked flint that lay across the top of a narrow gravel ridge. Moore identified the flint as being Maglemosian (the Danish term for the Early Mesolithic then in general use in Britain, see Chapter 12) in character, and suggested that the material represented two separate camps on the basis of differences in microlith typology.

By late 1948 Moore had identified eight more sites in the surrounding area and had determined that the peat deposits had built up within a lake, which he named Lake Flixton (Figure 2.1). That year he communicated the results of his work to Grahame Clark. Clark, who for more than a decade had been seeking to excavate a Mesolithic site with good levels of organic preservation, asked Moore to identify a site where bone and antler were present. Moore agreed and excavated a small trench at Star Carr (his site 4) where he had previously observed animal bone and antler in the peat at the base of a drainage ditch (Clark 1949; 1954; Moore 1950). We know little of this excavation except that it covered eight square yards (just less than 7 m^2) and ran along the edge of the ditch. However, his results clearly convinced Clark of the potential of the site and provided the impetus for his subsequent excavations at Star Carr.

Moore did not work with Clark at Star Carr but instead undertook his own excavations at a second site on Flixton Island (Flixton Site 2), where he had discovered an assemblage of horse bone that appeared to date to the Late Upper Palaeolithic (Clark 1954). However, Clark did ask Moore to salvage material from the baulks between Clark's main cuttings at the end of the excavation (Clark 1954, 4). This produced a rich collection of flint and animal bone which was deposited permanently at Scarborough Museum. Unfortunately, Moore's paper archive has never been located.

Grahame Clark's excavations 1949–1951

Clark was well aware of the potential importance of Moore's discoveries. Excavations at several North European wetland sites in the earlier part of the twentieth century had recovered assemblages of animal bone and

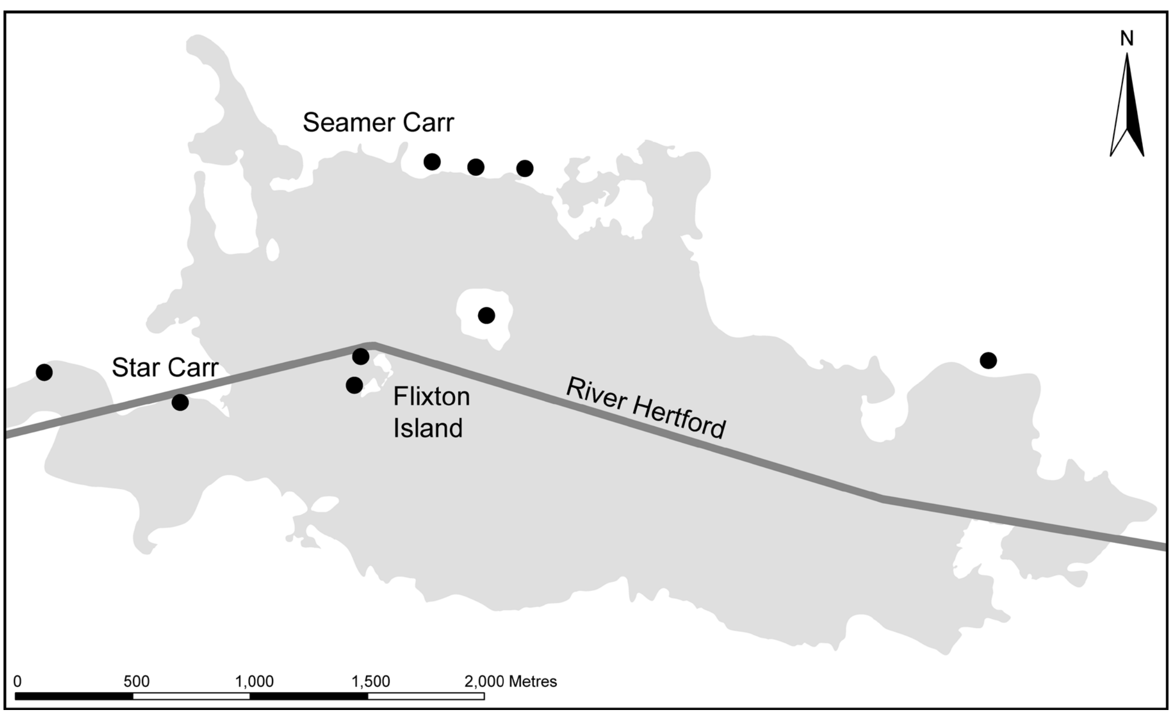

Figure 2.1: The extent of Lake Flixton as revealed through recent surveys, and the locations of the sites identified by John Moore (Copyright Star Carr Project, CC BY-NC 4.0).

artefacts made from bone and antler that provided a wealth of information on the technology and economy of Early Mesolithic peoples. Moreover, the pollen stratigraphy from these sites had been used to place them into a chronological sequence by relating them to the record of Early Holocene plant succession. Clark had initially been drawn to environmental evidence as a chronological method but from the late 1930s onwards increasingly became interested in the relationship between the environment and past societies. Clark viewed the environment as a constraining factor influencing all aspects of people's lives but in particular the technology and economy of a society. Clark emphasised these two components were potentially the most knowable to archaeologists, as well as being the most immediate to the perpetuation of life. Clark believed that to understand past environmental conditions and economy was thus to know something of how societies survived. So Clark sought new kinds of data: data which transformed artefacts from cultural markers to economic indicators and which transformed ecofacts from chronological markers to evidence for the environmental context upon which past societies depended.

Clark's ideas had developed through the work of the Fenland Research Committee, of which he was a founder member. The committee, influenced by contemporary Southern Scandinavian methods, adopted a multidisciplinary approach to the study of the fenland landscape, integrating the work of archaeologists, geologists, botanists, and a suite of other environmental scientists. The most influential of these was Harry Godwin, the pioneer of palaeoenvironmental studies in Britain. Godwin had established the sequence of Late Glacial and Early Holocene plant succession in Britain and related this to the corresponding records from mainland Northern Europe. In addition, together with his wife Mary, he had used pollen stratigraphy to demonstrate that antler 'harpoons' found in Britain and the North Sea were contemporary with Maglemosian sites in mainland Northern Europe (Godwin and Godwin 1933).

Drawing on his work with the Fenland Research Committee, and in particular his close relationship with Harry Godwin, Clark established the objectives that could be achieved through the excavation of a Mesolithic wetland site (Clark 1972). Full excavation of the site, paying particular attention to the recovery of organic materials, would determine the nature of the settlement and establish the likely size of the social unit involved, whilst the stratigraphic relation between artefacts would determine whether there were any changes in the character of the material culture assemblage through time. Correlation of the archaeological and palaeoenvironmental data would establish the character of the local vegetation, determine how the inhabitants of the site had utilised their environment and relate the site chronologically to the known archaeological record of the North European Mesolithic.

Moore's discovery of Mesolithic sites sealed by peat from the infilled Lake Flixton offered the potential to realise these objectives. Moore's work had attracted the attention of Godwin (Clark 1954, xviii). He was also advised by Gwatkin, the curator of Scarborough Museum, to send Clark a sample of the worked flint that had been recorded from Flixton Site 1. Clark later wrote of his excitement on receiving Moore's 'parcel of flints' and the realisation that his decade-long search for a waterlogged Mesolithic site was over:

> 'It took only a glance to see that here was a clue to something I had been seeking for many years: that is, a flint industry, analogous to that first recognized by Danish archaeologists at Maglemose, Mullerup, on the island of Zealand, from a British locality offering promise of recovering a settlement site with organic as well as merely lithic data … my first question on establishing contact with Mr. Moore was whether he had found antler or bone on any of his sites. On hearing that he had, I lost no time in meeting him' (Clark 1972, 10–3).

Clark visited Star Carr in the spring of 1949, after Moore's initial excavations, and confirmed that the site 'offered the most favourable prospects: pieces of bone and antler projecting from the side of the field ditch against the southern bank of the canalized Hertford River' (Clark 1954, xxi). Though the bone and antler was in a poor state, Clark noted that the topography of the site made it likely that much better preserved finds would be present in more waterlogged deposits at the site. Moore consented to large-scale excavation of Star Carr and this was then undertaken by Clark from 1949–1951 under the auspices of the Prehistoric Society and the Department of Archaeology and Anthropology at the University of Cambridge (Figure 2.2).

Through the excavation of Star Carr, Clark was able to continue the tradition of interdisciplinary research that had been established by the Fenland Research Committee and which had been employed so successfully at sites on the North European mainland. Clark directed excavations and undertook the analysis of much of the

Figure 2.2: Excavation at Star Carr with Clark on the spoil heap. This is thought to be cutting I (Copyright Scarborough Archaeological and Historical Society, CC BY-NC 4.0).

material culture, whilst Godwin and his doctoral student Donald Walker undertook the palaeoenvironmental analysis. The faunal material was analysed by Frederic Fraser and Judith King of the then Department of Zoology, British Museum (Natural History) and the bird bones were identified by Marjorie Platt of the Royal Scottish Museum, Edinburgh. The majority of the excavation team was made up of archaeology students from Cambridge. However, several local people also worked on the site, including David Lamplough who came at the age of ten with his father and has since returned and worked on the current project.

The excavations ran for three weeks during the summers of 1949 to 1951. During this time Clark and his team excavated a series of trenches (referred to as cuttings) through the deposits at the former lake edge (Figure 2.3). Here they discovered a large assemblage of bone and antler artefacts, including 191 barbed antler projectile points, elk antler axes and mattocks, bodkins made from elk metapodials and 21 red deer antler frontlets. These were found amongst a large assemblage of animal bone, antler (much of which had been worked to produce the barbed points) and worked flint. The archaeological material was associated with a deposit of unworked wood (described variously as birchwood and brushwood), which Clark interpreted as an occupation platform that had been laid down to stabilise an area of swamp at the edge of the lake (Figure 2.4). Two recumbent trees were also discovered lying at right angles to the platform, both of which appeared to have been deliberately felled and were interpreted as a possible landing stage (Figures 2.3 and 2.5).

Drawing together the evidence from the material culture, faunal assemblages and the palaeoenvironmental analysis, Clark produced a lively and engaging picture of Mesolithic life at Star Carr (Clark 1954). The palaeoenvironmental study indicated that the site was located within an area of reedswamp close to the water's edge and dated to the Preboreal (the period at the start of the Holocene, following the very end of the last cold phase; see Chapter 12). From the size of the site and what he surmised was evidence for the presence of both men (represented by hunting equipment) and women (represented by scraping tools) he argued that Star Carr

Figure 2.3: The excavations of Moore and Clark. Trenches excavated in 1949 and 1950 were assigned numbers by Clark (cuttings I, II, III and V), those excavated in 1951 were not and are marked in darker grey. The 'brushwood' and two trees from cutting II have been digitised from Clark's excavation monograph and superimposed on the trench plan (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 2.4: The 'brushwood' platform encountered during Clark's excavations. The wood in this photo is now thought to be the 'upper' level of brushwood (as noted by Clark) and is probably the equivalent to the layers of roots noted in the recent excavations (see Chapter 6) (Reprinted with permission from Milner et al. 2011. Copyright Taylor & Francis Group).

Figure 2.5: The birch trees found in cutting II (Copyright Scarborough Archaeological and Historical Society, CC BY-NC 4.0).

was a residential camp occupied by four or five family groups. Variations in the typology of the barbed points and the presence of material culture at different stratigraphic levels suggested that the site had been inhabited on more than one occasion, whilst the faunal analysis indicated that occupation had taken place during the winter and spring (based on the presence of both shed and unshed red deer antler). Clark's investigations remain an impressive picture of the way of life of a group of Mesolithic hunter-gatherers. They represent a seismic shift in the way prehistoric material was interpreted, and as an example of what can be achieved by asking new questions and examining new classes of data, they seemed to call into question the value of earlier excavations (Trigger 1990, 268).

The Vale of Pickering Research Trust

Despite the obvious importance of the area, no further fieldwork was carried out around Lake Flixton until the mid-1970s, when an extensive programme of survey and excavation was undertaken at Seamer Carr ahead of the development of a waste disposal plant (Schadla-Hall 1987; 1988; 1989; Conneller and Schadla-Hall 2003, Milner et al. 2011) (see Figure 2.1). Upon the completion of the project in 1985, the Vale of Pickering Research Trust was established with the aim of conducting a landscape-based investigation of the Early Mesolithic presence around the former Lake Flixton.

The Seamer Carr Project had established a detailed record of the environments that had formed around the north-west of the lake throughout the Mesolithic (Cloutman 1988a; 1988b). In 1985 this work was extended to Star Carr to provide a more precise account of the local environments contemporary with the occupation of the site (Cloutman and Smith 1988). To achieve this an 18 m long trench (VP85A) was excavated through the lake edge deposits c. 20 m to the west of the area investigated by Clark, with a second, smaller trench (VP85B) located 15 m to the south in a slightly deeper part of the lake (Figure 2.6). A series of pollen profiles taken from

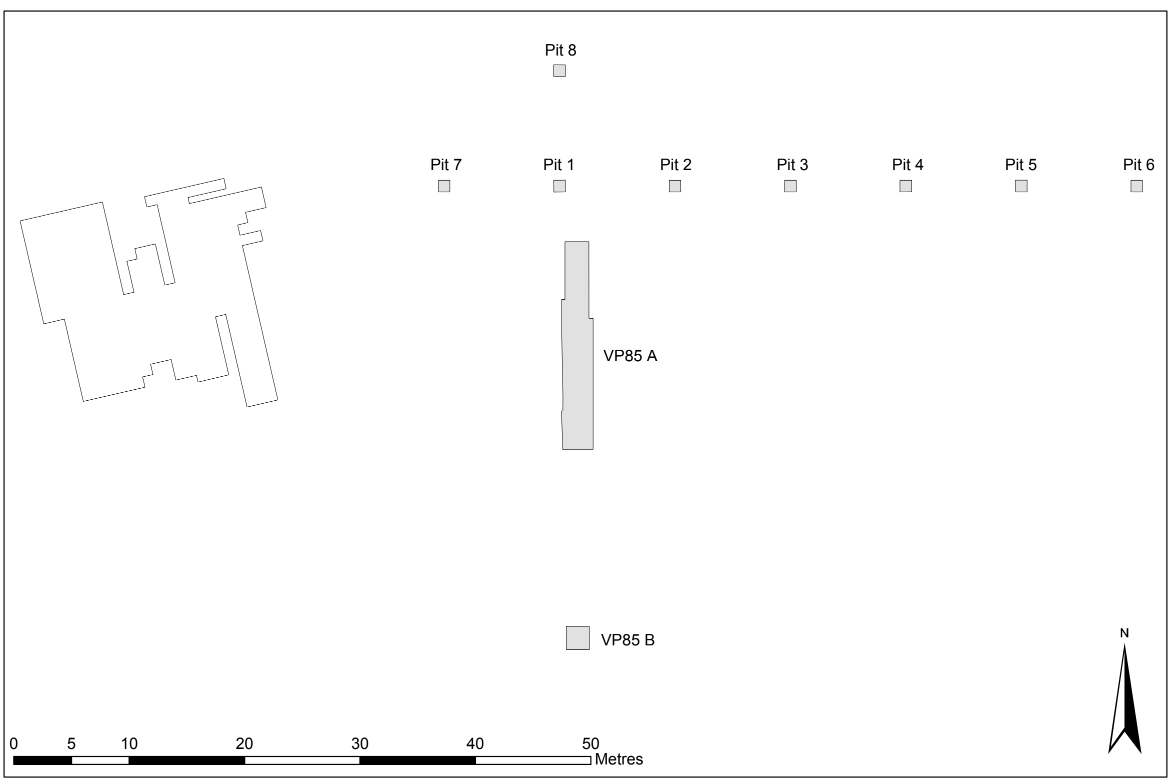

Figure 2.6: Plan of the trenches excavated in 1985 and 1989 in relation to Clark's excavation (on left) (Copyright Star Carr Project, CC BY-NC 4.0).

the sections of these trenches were used to establish the changing character of the wetland environments and the results correlated through a programme of radiocarbon dating.

Although the main trench was deliberately placed well beyond the limits of the archaeological deposits as set out by Clark, the excavations in VP85A recorded a dense scatter of worked flint, faunal remains and what appeared to be a wooden platform (Figure 2.7). These unexpected discoveries demonstrated, for the first time, that activity at Star Carr was far more extensive than Clark had realised and that there was considerable potential for further archaeological material in the surrounding deposits. However, what remained unclear was how this new material related to the part of the site investigated by Clark.

In order to investigate this further, small-scale excavations were carried out at the site between 1986 and 1989 and were supported by a new programme of palaeoenvironmental work undertaken by Petra Dark (Mellars and Dark 1998). This phase of investigation sought to establish the spatial extent of the site, its date and chronological range. It also aimed to determine if the changes to the local vegetation that had been documented in the work of Cloutman and Smith may have been caused by human activity rather than natural, environmental processes. To achieve this, Trench VP85A was re-excavated and extended, and a series of small test pits were excavated on what would have been the Mesolithic dry ground just to the north (Figure 2.6). New pollen and plant macrofossil profiles were recorded, both from VP85A and a core taken from the deposits adjacent to Clark's cutting II, and a revised radiocarbon chronology was established from material taken from the environmental samples. In 1992 and 1999 these dryland parts of the site were investigated further through fieldwalking surveys (Milner et al. 2011).

The results of this work demonstrated that activity at Star Carr extended far further than the area investigated by Clark. On the dryland, test-pitting and fieldwalking recorded concentrations of worked flint that extended over 120 m to the east of Clark's excavations. In the wetland, a re-analysis of the wooden platform confirmed that it was a deliberate anthropogenic structure made from deliberately split timbers, which had been laid down parallel to each other on the surface of the peat (Mellars et al. 1998). This, along with the presence of bone, antler and flint in the lake edge sediments, confirmed that activity within the wetlands was also more extensive than had previously been thought. In addition the palaeoenvironmental investigations showed that areas of reedswamp that had formed along the lake edge had been deliberately cleared by repeated episodes of burning (Dark 1998a). By dating these episodes, and using them as a proxy for human activity, it was shown that the site had been occupied for several centuries (Mellars and Dark 1998; Dark et al. 2006). On a less positive note, other forms of evidence also began to show that the archaeological material at Star Carr was under threat. The bone and antler was in a poor state of preservation (Rowley-Conwy 1998) whilst the presence of worked flint within the modern topsoil demonstrated that ploughing was starting to damage areas of in situ activity on the dryland.

Reinterpreting Star Carr

Clark's interpretations of Star Carr remained unchallenged in the decades immediately following his excavations and it was Clark himself who first revised his original analysis (Clark 1972). Here he argued that Star Carr was part of a seasonal pattern of settlement in which Mesolithic groups aggregated at the site in the winter, before moving onto the uplands of the North York Moors in the summer months as they followed herds of migrating red deer. This was based, in part, on observations of red deer behaviour on the Isle of Rhum, in the Inner Hebrides, where the animals undertook a similar pattern of seasonal upland-lowland migration.

From the late 1970s a series of papers critiqued some of the central aspects of Clark's interpretation of Star Carr. Perhaps the most significant of these focused on the faunal remains and the way these had been used to establish the season of occupation. In the original analysis, Fraser and King had used both shed and unshed red deer antler to calculate the minimum number of animals represented in the assemblage and the time of year they were killed. However, in a reassessment of the published data, both Seamus Caulfield (1978) and Roger Jacobi (1978) showed that the antler was over-represented in relation to the post-cranial elements of these species and had probably been brought onto the site as raw material, a point that was supported by the large amount of antler artefacts found at the site. As such, using the antler as a basis to estimate the numbers of animals killed at Star Carr and the season that the site was occupied was problematic. In addition, Clark (1954, 16) had noted that because pike are most accessible in the summer, the lack of pike on the site might

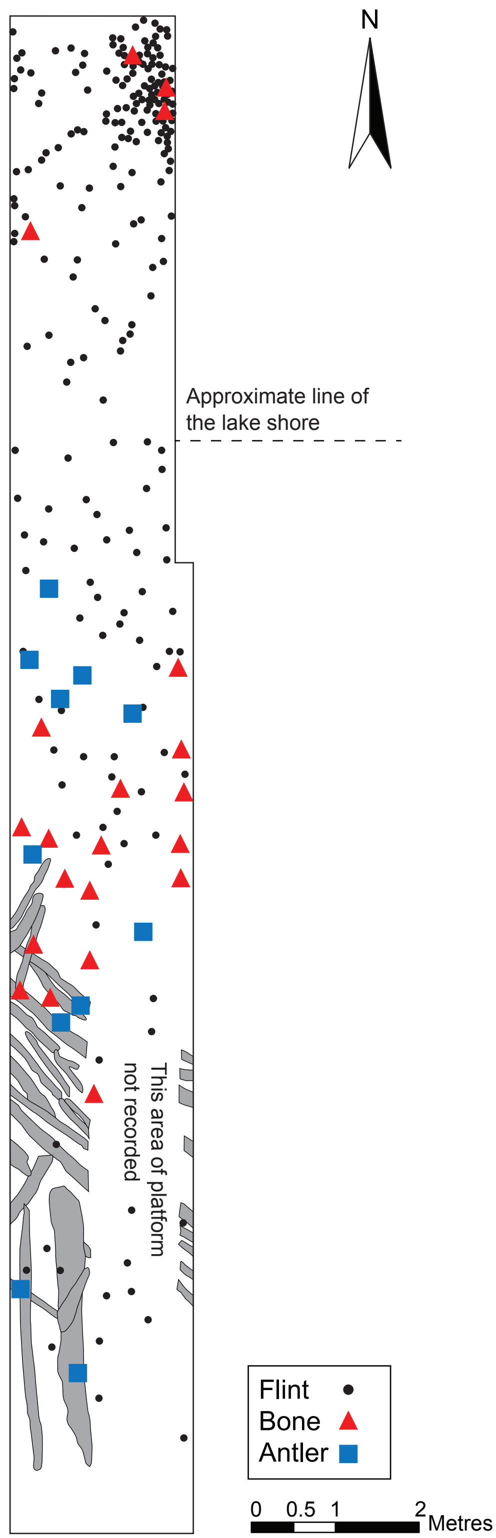

Figure 2.7: Plan of Trench 85A with timbers, bone, antler and flint (Copyright Star Carr Project, CC BY-NC 4.0).

reinforce the winter occupation hypothesis. However, Wheeler (1978), in his discussion about the absence of fish remains at Star Carr, noted that pike can be caught from February until late autumn and so they could not be used as a seasonal indicator.

Overall, reinterpretations revealed little consensus as to the time the site was occupied. Jacobi (1978) went on to demonstrate that occupation could be extended into the early summer from the unshed roe deer antler, Grigson (1981) pointed out that some of the birds recorded at the site would only have been present in the summer, Pitts (1979) argued that the site was occupied for most of the year, whilst Andresen et al. (1981) argued for sporadic visits at different times of the year. Summarising the various debates, Price (1982) stated that the remains represented 'an unknown number of occupations for which seasonality could not be determined' (1982, 6).

In an attempt to resolve these debates, Tony Legge and Peter Rowley-Conwy undertook a comprehensive re-analysis of the faunal assemblage (Legge and Rowley-Conwy 1988). Using tooth eruption data to establish the age at death of the younger individuals, they argued that most of the animals had been hunted and killed in the summer, with only one individual (a juvenile elk) killed at a later time in the year. However, Richard Carter used radiographs of tooth development in juvenile roe and red deer jaws to establish a more precise season of death. This showed that the young roe deer were killed slightly earlier in the year (Carter 1997), while at least one juvenile red deer was killed in the winter (Carter 1998). Carter argued that occupation of the site occurred in the cooler months of the year, bringing interpretations of seasonality full circle.

As well as the reinterpretations of the season of occupation, there has been considerable debate as to the function of the site. Caulfield (1978) argued that aurochs rather than red deer were the most economically important species and tentatively suggested that Star Carr was a butchering station or possibly a kill site, whilst Andresen et al. (1981) also argued that Star Carr was a kill site, noting that its location on a gravel spit would have been ideal for driving game into the lake. In contrast, Pitts (1979) suggested that the site had been used for the tanning of hides and the working of antler, both of which had been carried out within the lake edge swamp. Jacobi (1978) does not explicitly state the site was a base camp. Instead he puts forward a case for Star Carr being occupied in a variety of different seasons and having some functional relationship to microlith-dominated sites on the North York Moors and as yet undiscovered kill and butchery sites. Legge and Rowley-Conwy's (1988) reassessment of the faunal remains also offered a new theory of site function. By drawing comparisons with body-part representations of the main prey animals at Star Carr with assemblages of animal bones recorded in Binford's (1978) ethno-archaeological study, they suggested that Star Carr may have acted as a hunting camp that had been occupied by a small group of male hunters.

More recent interpretations have stressed the unusual nature of the site (e.g. Chatterton 2003; Conneller 2000; 2003; 2004; Conneller and Schadla-Hall 2003). Chatterton (2003), for example, argued that aspects of the assemblage, such as the presence of both intact and broken barbed points, suggest that it was not the product of ad-hoc disposal but ritual acts of deposition into the waters of Lake Flixton. Furthermore, both Chatterton (2003) and Conneller (2000; 2003; 2004; and see also Conneller and Schadla-Hall 2003) observed that despite large-scale excavations in the surrounding area, no comparable assemblages have been recorded at other Early Mesolithic sites around the lake. This led Conneller (2003; 2004) to argue that though the site had a varied use, it may have been regarded as an appropriate place in the landscape to dispose of animal remains, particularly red deer heads and antlers (see also Conneller and Schadla-Hall 2003), practices that have also been observed amongst contemporary hunter-gatherers (e.g. Jordan 2003).

Chatterton's work stimulated further debate focused on the character of the environment into which the assemblage recorded by Clark had originally been deposited. Whilst Clark argued that the site lay within reed-swamp at the edge of the lake and represented an area of in situ activity that took place on the brushwood platform, others had suggested that the area would have been underwater when the site was occupied. Price (1982), for example, argued that the preservation of the faunal material could only have come about if the artefacts had been deposited into standing water and that the brushwood platform was probably a natural accumulation of wood at the edge of the lake. As such, the assemblage recorded by Clark was probably discarded as waste from an activity area on the adjacent dry ground (an interpretation also supported by Legge and Rowley-Conwy 1988). Richard Chatterton (2003) noted that aquatic plant material was recorded from the deposits studied by Godwin and Walker, whilst estimates of the lake level established by Petra Dark placed the site below the level of the Early Mesolithic lake. In contrast, Paul Mellars (2009) has more recently argued that Clark's original interpretation was correct, arguing that the aquatic material may have been deposited through human or animal action and citing inaccuracies in some of the earlier surveys of the site, which when corrected would have placed the area above the lake water level. More recently, Taylor (2011; 2012) has shown that there was no single context of deposition, and that faunal remains and artefacts were deposited into a range of different environments that changed throughout the time the site was occupied.

Conclusions

Since it was first excavated, Star Carr has persisted in the archaeological imagination, being constantly re-worked and re-interpreted, and consistently referenced in major syntheses and textbooks. However, Clark's work cast a long shadow, with most subsequent interpretations focusing on his main preoccupations: seasonality and site function. As these aspects of the site have been debated there has been a tendency to interpret the archaeological evidence selectively in support of a single site function (base camp, hunting camp etc.) or season of occupation. This, in turn, has led to an impasse in these debates, with different researchers taking opposing (and apparently contradictory) positions with regards to the interpretation of the site.

This approach to the interpretation of Star Carr has become increasingly difficult to sustain. Several works from Jacobi (1978) onwards have emphasised the site's complexity, an issue that became apparent as fieldwork carried out in the 1980s showed that the site was far larger than previously thought and was occupied for several centuries (Mellars and Dark 1998; Dark et al. 2006). These new discoveries, together with recent reinterpretations of both the modes and contexts of deposition, have rendered a single interpretation for the function of this complex site untenable. They have also demonstrated that the debates regarding the interpretations of the site cannot be resolved by recourse to the existing archaeological data and that only through new excavations is it possible to truly understand the historical and spatial character of the Mesolithic occupation of Star Carr.

CHAPTER 3

Fieldwork

Nicky Milner, Barry Taylor, Chantal Conneller and Tim Schadla-Hall

Introduction

When the project began in 2003 we knew remarkably little about the character of both the archaeology and the related wetland stratigraphy at Star Carr. Apart from a section drawing from the 1985 excavation (Cloutman and Smith 1988), the published accounts of the previous excavations provided little in the way of stratigraphic data or its relationship to the archaeology. Nor did they give much indication of the sorts of materials that might be encountered in the large parts of the site that remained unexcavated. For this reason, fieldwork methods were reflexive, evolving over time as the results from one season went on to inform the strategy that was adopted in the following year. The reflexive nature of the fieldwork strategy was enhanced further by the close working relationship that was established with the specialists who worked on the project, many of whom had become an integral part of the excavation team by 2013 (some considerably earlier). This allowed the results of the excavations to quickly filter through into the methods that were adopted on site.

Work at the site can be divided into two main parts. The first began with fieldwalking and auger survey and an initial phase of excavation. The aims of this work were to determine the full spatial extent of Mesolithic activity, characterise the archaeology within both the wetland and dryland parts of the site, assess its preservation, and establish a methodology for excavating and recording this material on a larger scale. This was followed by a second phase of fieldwork, which took place between 2013 and 2015, where these methodologies were used to fully investigate and record a large sample of the site through open-area excavation.

Fieldwalking

Fieldwalking was carried out in the autumn of 2003 and spring 2004 (Figure 3.1). At this stage, a bank of higher ground was visible along the north of the Star Carr field, parallel with the River Hertford and as far west as the area of Clark's excavations, with a ridge extending along the eastern side of the field that sloped gradually towards the south. The fieldwalking focused on the areas of higher ground but extended into the surrounding peat in order to obtain a representative sample of material from the surface deposits. Transects were laid out

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Figure 3.1: Fieldwalking in 2004. The view is looking south towards the Yorkshire Wolds (Copyright Star Carr Project, CC BY-NC 4.0).

using a total station, and a group of volunteers walked each line. All finds were assigned a unique number and their locations were recorded three-dimensionally using a total station.

A total of 360 pieces of worked flint were recorded during the fieldwalking, with the density of material reflecting variations in the thickness of the overlying deposits and the effects of plough damage on the buried Mesolithic land surface (Figure 3.2). Flint concentrations were highest on the higher ground towards the north of the ridge and lowest towards the south of the ridge and along its edges where the depth of peat was greater. Flint recovery was also lower along the northern edge of the field where deposits of sand and gravel had been dumped in the 20th century during dredging of the River Hertford.

Palaeotopography

In 2005 an auger survey was carried out to map the basal topography of both the Early Mesolithic landscape and the deeper parts of the surrounding lake basin. Previous work at Star Carr and other sites around the basin had provided estimates of the Early Mesolithic lake level of between 23.4 m OD and 24.5 m OD, and had shown that archaeological material could be present within wetland deposits to a depth of 23 m OD (Cloutman 1988a; Cloutman and Smith 1988; Mellars and Dark 1998). For this reason, the basal ground surface was mapped at close intervals (points every 10 m), to a depth of c. 23 m OD, and transects were extended into the deeper parts of the basin where human activity was less likely to have occurred.

The results of this auger survey, and previous work in the area (Cloutman 1988b; Lane and Schadla-Hall forthcoming), showed that Star Carr lay on a large peninsula, just over 500 m wide (east-west) and 275 m across (north-south), which was connected to the landscape surrounding the lake basin by a narrow ridge on its north-west corner (Figure 3.2 and see Figure 2.1). The main body of the basin lay to the east, whilst to the south was a large, shallow embayment.

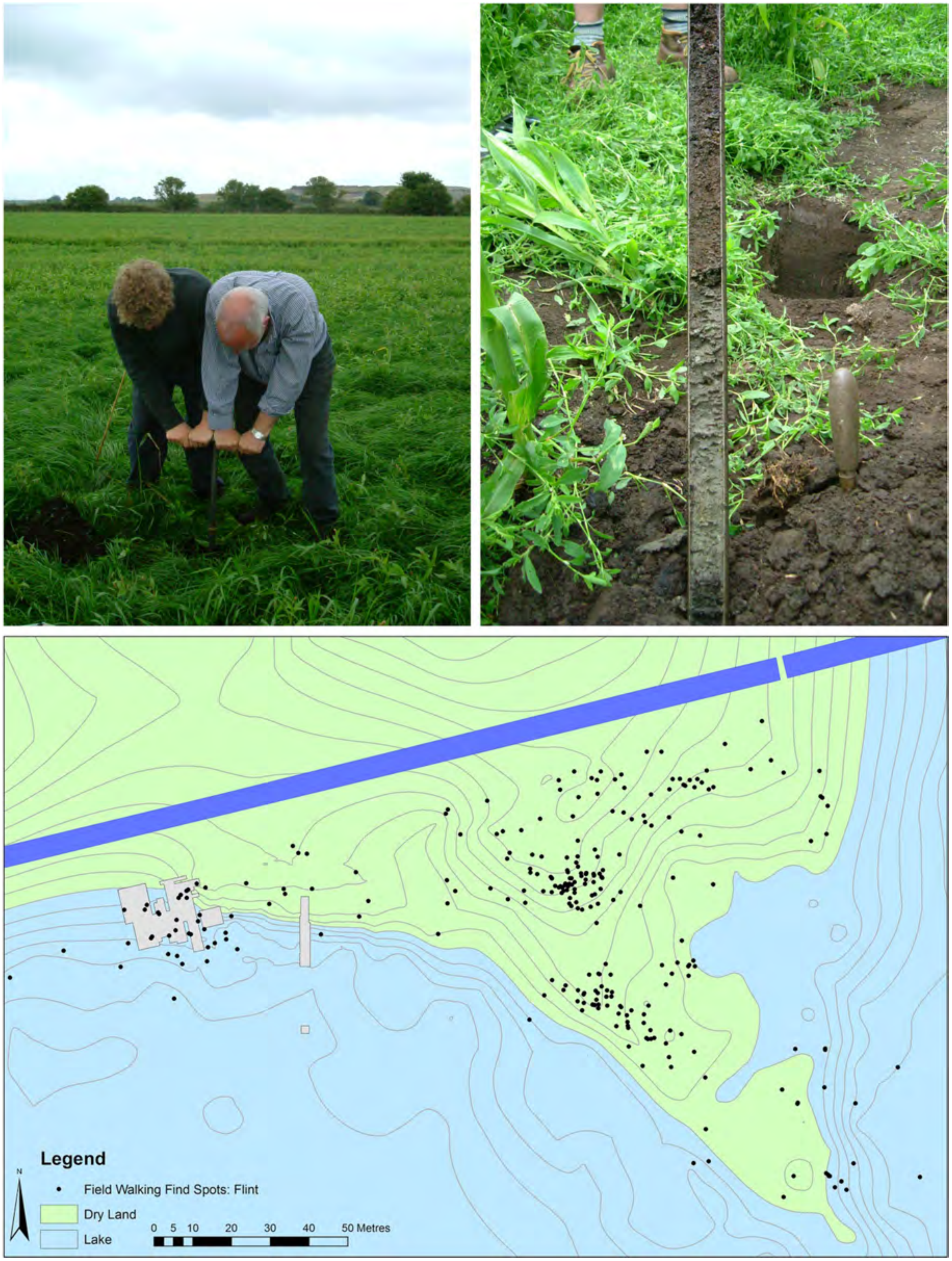


Figure 3.2: The Early Mesolithic topography and extent of the lake/wetland areas, and the results of the field-walking survey. The contours are at 0.5 m intervals and the lake level is set at just below 24 m OD (see Chapters 4 and 19). Previous excavations are shown in grey. The modern line of the River Hertford cuts across the Star Carr peninsula (coloured dark blue) (Copyright Star Carr Project, CC BY-NC 4.0).

Excavation

Phase 1

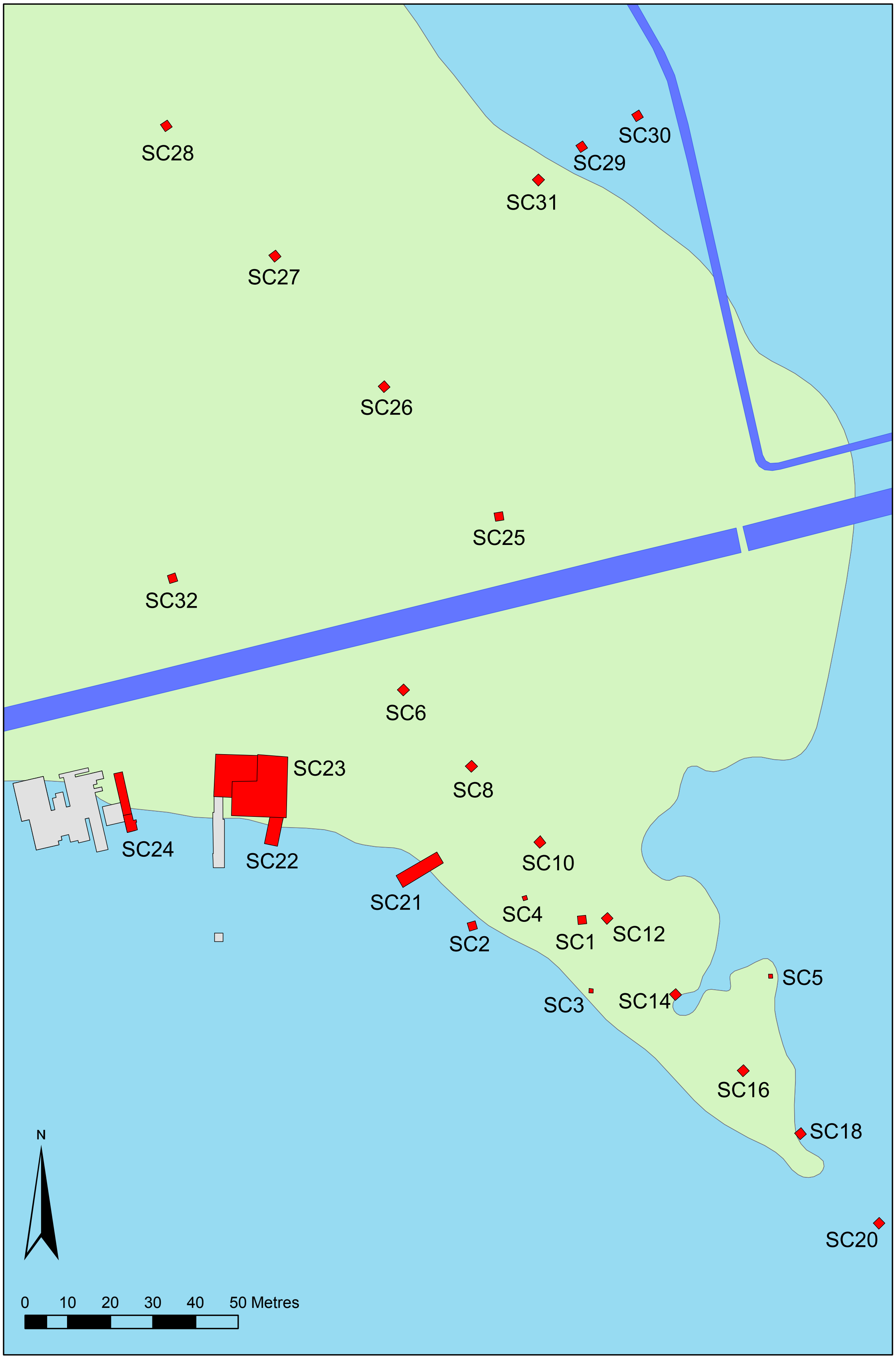
The results of the fieldwalking were 'ground truthed' in the autumn of 2004 when five test pits (SC1-5) were excavated over areas of denser finds concentrations and in parts of the site where fewer finds were recorded (Figure 3.3). In 2005, a further set of 2 × 2 m test pits were excavated along the ridge of higher ground and into the deep peat to the south (SC6-20), (it should be noted that there are no odd numbers in this sequence to allow further trenches to be added in between if necessary) (Figures 3.3 and 3.4). Bringing the results of this work together with the auger survey, it became clear that Mesolithic activity extended along much of the narrow ridge, with flint concentrations of up to 666 pieces recorded in the trenches located on what would have been the dry ground (Chapter 8). In many of these there was also evidence for plough damage and bioturbation which had dispersed the flint through the overlying sediments. However, areas of relatively intact Mesolithic activity were present to the north of the field, where thick deposits of sand and gravel, derived from dredging of the River Hertford, had been dumped over the modern land surface protecting the underlying deposits from recent ploughing.

In 2006 two larger trenches (SC21-22) were excavated through the lake edge wetland deposits to the east of VP85A, extending onto what would have been the Mesolithic dry ground (Figure 3.3). The aim of this work was to develop a methodology for excavating the waterlogged deposits and to establish a more detailed stratigraphic record for the sediments at the Mesolithic lake edge. Whilst little archaeological material was present in SC21, the excavation of SC22 recorded a small assemblage of worked flint and several pieces of worked antler amongst a natural accumulation of wood (Figure 3.5). An assessment of the plant macrofossils taken from the surrounding deposits suggested that this had been deposited into wet, reedswamp environments. Unfortunately, the wood and the antler were both very poorly preserved, providing the first indication that organic material at the site had begun to degrade (see Chapter 22) (Milner 2007).

The following year larger trenches were opened up in both the dryland (SC23) and wetland (SC24) parts of the site. SC24 was excavated through the lake edge deposits; 5.5 m from Clark's cutting II and intersecting one of his 1951 trenches. It was found that Clark's 1951 trench was larger than appeared in his monograph but that his excavation had stopped before he reached the basal deposits. Within SC24 a deposit of largely unworked roundwood was present, within which was a layer of deliberately split timbers (Figure 3.5). These were successfully excavated and recorded using a methodology developed during the previous season's fieldwork. The excavations in this trench also showed that small quantities of antler, animal bone and flint were present within the lake edge deposits but that levels of organic preservation were very poor (Milner et al. 2011). The causes for the deteriorating levels of preservation were investigated first in 2007 by Andy Needham and then through a large-scale programme of geochemical assessment by Steve Boreham and colleagues, funded by English Heritage/Historic England (see Chapter 22) (Boreham et al. 2011a; 2011b).

The dryland trench (SC23) was excavated between 2007 and 2008. It was located above the approximate line of the lake shore and provided the first large-scale record of the character of the archaeology within the Mesolithic dryland area (Figure 3.6). Whilst there was some evidence for plough damage, the deposits were relatively intact and extensive and in situ flint scatters were present along with poorly preserved animal bone. Some of this material was associated with a large, irregular hollow surrounded by a series of small stake and postholes. This was the first evidence for the presence of post-built structures at Star Carr and represented the earliest known structure in Britain (see Chapter 5).

Figure 3.3 (page 27): A plan of all trenches excavated during Phase 1 of excavation, coloured in red, with Moore/Clark's trenches and VP85A and B trenches coloured in grey. The modern line of the River Hertford cuts across the Star Carr peninsula and an 'L' shaped drainage ditch clips its eastern side (both coloured dark blue) (Copyright Star Carr Project, CC BY-NC 4.0).


SC28
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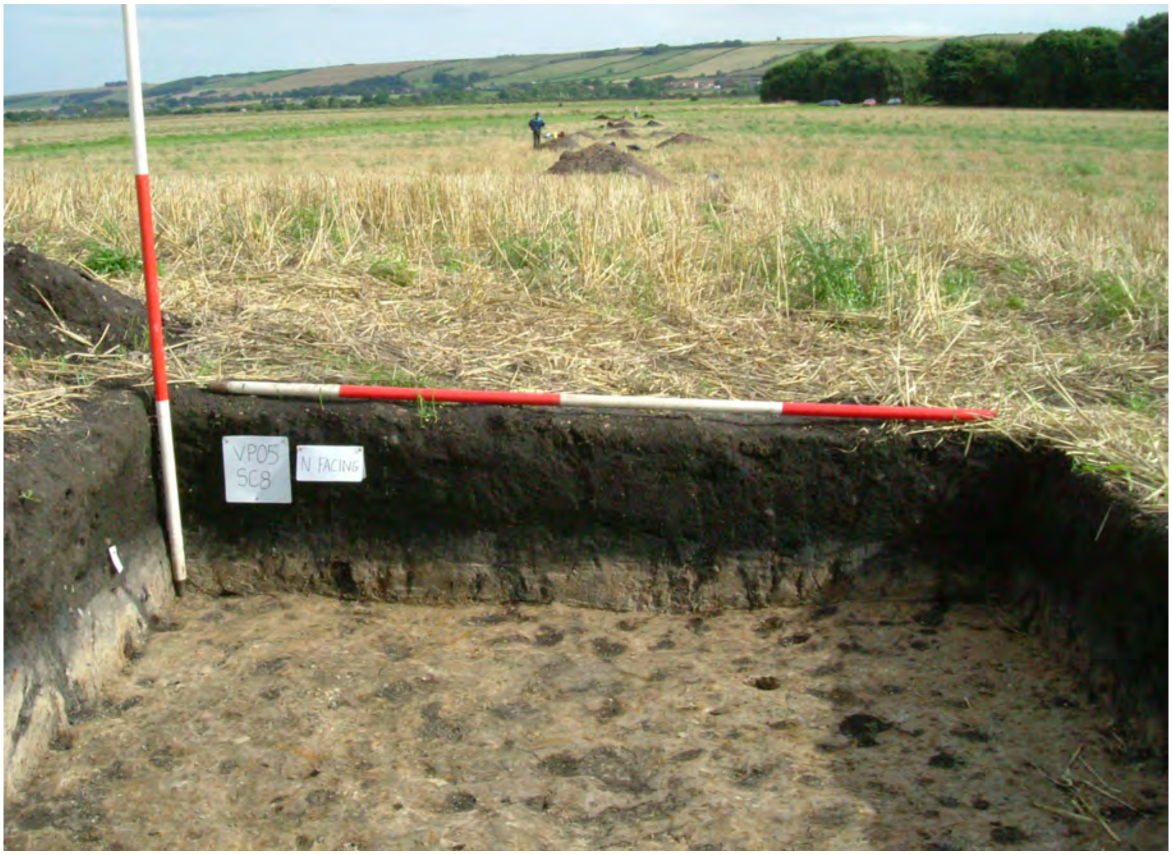

Figure 3.4: Test pits SC8-SC20 being excavated along the peninsula with the Yorkshire Wolds in the distance to the south (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 3.5: (left) Trench SC22 showing the natural accumulation of wood within a deposit of reed peat; (right) trench SC24 showing unworked roundwood and split timbers within reed peat. The unexcavated block of sediment on the left side of the trench was removed and excavated in the lab (see Chapter 15) (Left: Copyright Star Carr Project, CC BY-NC 4.0. Right: Sourced from Hadley et al. 2010, *Internet Archaeology,* licenced under CC-BY 2.0).

Figure 3.6: Excavation on the dryland (trench SC23) and the recording and sampling of the eastern structure in 2008 (Copyright Star Carr Project, CC BY-NC 4.0).

In 2008, whilst the excavation of SC23 continued, eight smaller test pits (SC25-32) were excavated in the field to the north of the River Hertford in order to determine the extent of Mesolithic activity and establish the character of the wetland stratigraphy further round the peninsula (see Figure 3.3). Scatters of worked flint were recorded on the dry ground (trenches SC25, SC26, SC27 and SC28), mainly in the plough soil, whilst demineralised animal bone was recovered from the wetland deposits (trench SC29). As with the trenches to the south of the River Hertford, there was also evidence for plough disturbance (Figure 3.7). This work, together with the fieldwalking and test-pitting in the southern field, provided an estimate for the total extent of Mesolithic occupation activity at Star Carr of roughly 19,500 m^2 (almost 2 hectares); a far larger area than envisaged by Clark (Conneller et al. 2012).

By the end of 2008 the project had successfully characterised the wetland and dryland archaeology and established methods through which this material could be excavated and recorded. It had also shown that levels of organic preservation had deteriorated since Clark's initial work at the site and that the material culture within the wetlands was now at risk. However, several key issues remained. First, how extensive were the timber platforms/trackways that had first been discovered at the site in 1985 and then again in 2007? Second, how did the stratigraphy in the areas investigated by previous researchers relate to that recorded by the current project? And third, how severe was the deterioration of the organic materials, and how much longer would they survive? It was also clear, given the importance of the site and the fact that waterlogged archaeological material was far more extensive than the area investigated by Clark, that the site required statutory protection.

In order to address these remaining questions and inform the future management plans for the site, a further season of excavation was undertaken in 2010, funded by the Natural Environment Research Council (NERC) and supported by Historic England (then English Heritage). Its aims were to determine the extent of the waterlogged archaeological deposits and the potential evidential value of any surviving organic material

Figure 3.7: Plough damage in SC27, which was also seen in most of the other dryland sites in both fields north and south of the Hertford Cut (Copyright Star Carr Project, CC BY-NC 4.0).

culture (including the timber platforms) and to determine the potential cost of excavating and recording this material. It also sought to establish both the state of organic preservation and the rate of decay by comparing material recorded during different phases of the project with those from previous excavations (Milner 2010). To achieve these aims, Clark's cutting II, VP85A, and trench SC24 were re-excavated and/or extended, whilst the previously unrecorded area between VP85A and SC24 was investigated through the excavation of a new trench (SC33) (Figure 3.8). Samples were also taken for insect and plant macrofossil analysis from the sections of VP85A, cutting II, SC24 and SC33 in order to establish the environmental context of the surviving archaeology (Chapter 19).

This work showed that levels of organic preservation were deteriorating very quickly, but that the surviving material could still yield useful archaeological and palaeoenvironmental data (Milner 2010). Small quantities of bone and antler (including barbed points) and several wooden artefacts were recovered, whilst further deposits of worked timber were recorded, both in the section of Clark's cutting II and SC33, demonstrating that the wooden platforms were far more extensive than the previous excavations had shown. Somewhat surprisingly, the re-excavation of cutting II also showed that Clark had discarded some material (including worked flint and faunal remains; see Chapters 7 and 8), and that the two trees, found in 1950 and photographed for the Clark monograph (1954) were still in situ (Figure 3.9). Following discussion with English Heritage/Historic England it was agreed that these trees should be left and reburied.

Phase 2

Given the deteriorating levels of organic preservation recorded in 2010 it was recommended that a second phase of work be undertaken at the site (Milner 2011), and this was funded by the European Research Council (ERC) and English Heritage/Historic England. This work took place between 2013 and 2015 and focused on an open-area excavation along a section of the lake shore (Milner 2012; Milner et al. 2013a; Milner et al. 2014). A single trench (SC34), extending from Clark's excavations in the west to SC22 and SC23 in the east, was

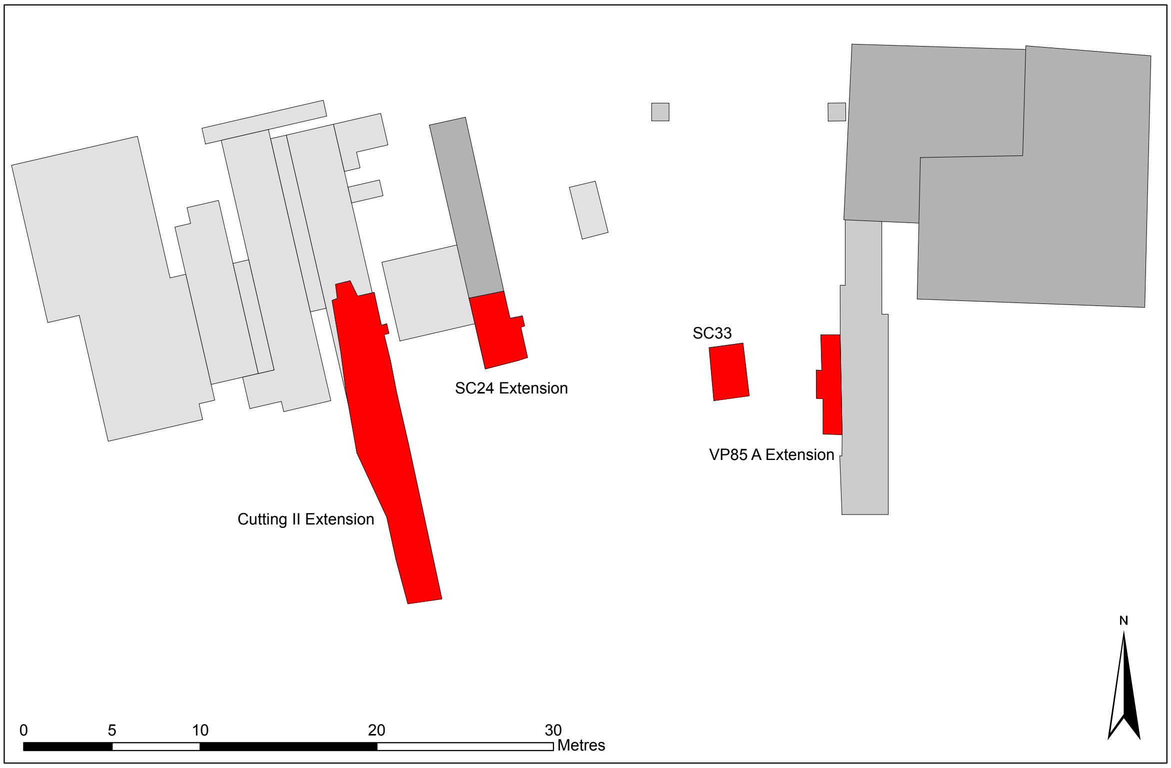

Figure 3.8: Plan of the 2010 trenches in red with previously excavated trenches marked in grey (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 3.9: The two trees first discovered by Clark in 1950 within cutting II (compare with Figure 2.5) (Copyright Star Carr Project, CC BY-NC 4.0).

excavated over the course of three 8-week seasons. In 2013 and 2014 excavations were carried out in the central area between the previous excavations by Clark and SC23 but were extended into the area immediately around Clark's trenches (including a small section of unexcavated baulk between cuttings I and II), and to the east of VP85A in 2015 (Figures 3.10 and 3.11). Unfortunately, trench 34 could not be extended any further south due to the presence of an active field drain which was situated parallel to the trench edge.

A second trench (SC35) was also opened 60 m to the east on what would have been the Mesolithic dry ground in order to ground truth geophysical anomalies that had been identified in 2010 (Milner 2010) (Chapter 16). However, on removal of the plough soil it became clear that the anomalies were the result of plough damage and variations in the depth of the peat. Due to time constraints this trench was closed down in order to focus resources on SC34.

The excavations in SC34 were complemented by a range of analytical techniques. Geochemical analysis was carried out on samples taken from the dryland area in order to identify particular zones of activity (Chapter 21), whilst microwear and residue analyses were performed on a sample of the lithic, osseous and wooden material culture (see various chapters in Volumes 1 and 2). Additional plant macrofossil and insect samples were also taken in order to establish a comprehensive record of the changing character of the local environments and the specific depositional contexts of material recorded from the wetland (Chapter 19). Finally, a comprehensive programme of radiocarbon dating and Bayesian modelling was undertaken to provide a precise chronology for the human occupation of the site (Chapters 9 and 17).

This phase of work provided a far clearer picture of the archaeology of the site (Figure 3.12), its spatial and chronological patterning, and its relationship to the changing character of the local environment. Within the wetland parts of the site, archaeological material was stratified within a sequence of Early Holocene sediments. At the base of the sequence was a coarse sandy gravel (319), covered by an organic rich sand (320). Above this was a sequence of organic deposits: fine detrital mud (317), coarse reed peat (312) and wood peat (310),

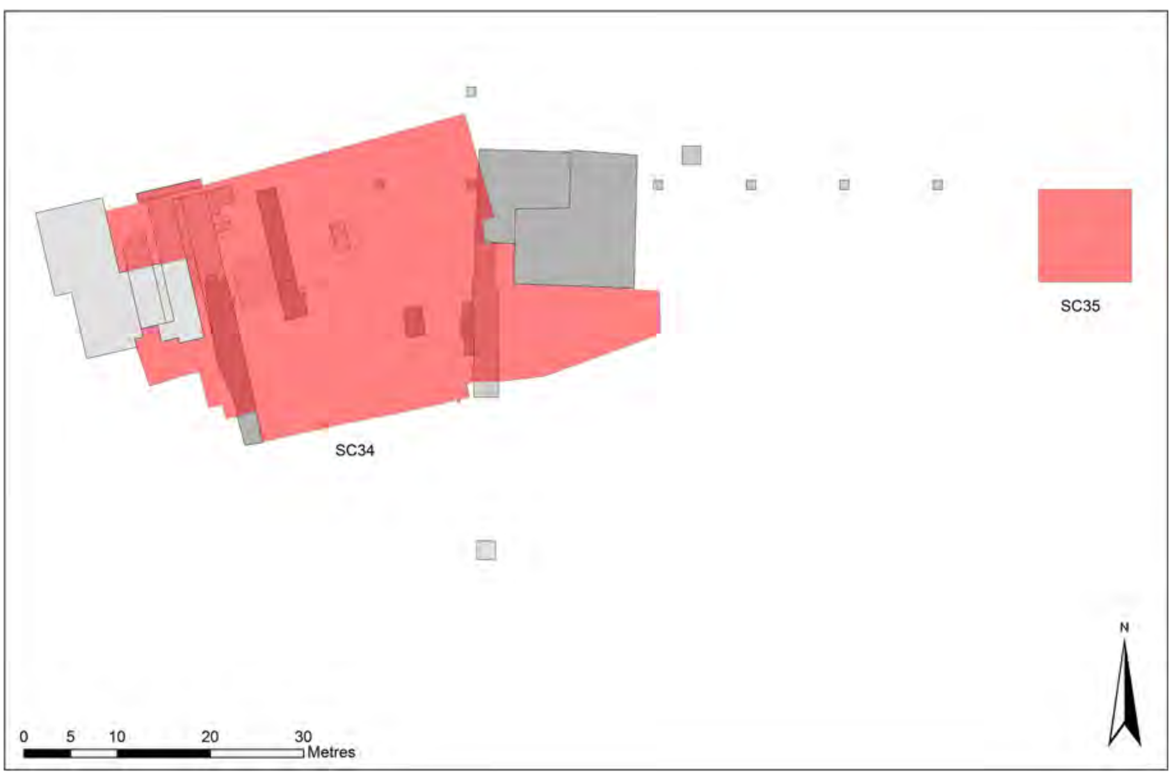

Figure 3.10: Plan showing the full extent of SC34 and SC35 (in red), in relation to previous trenches (shown in grey) (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 3.11: Aerial view of SC34 looking north. Clark's excavations lie at the western end of the trench (the baulk between cuttings I and II is beneath the white tent). Some of the central part of the trench had been backfilled by the time the photo was taken (Copyright Sue Storey, CC BY-NC 4.0).

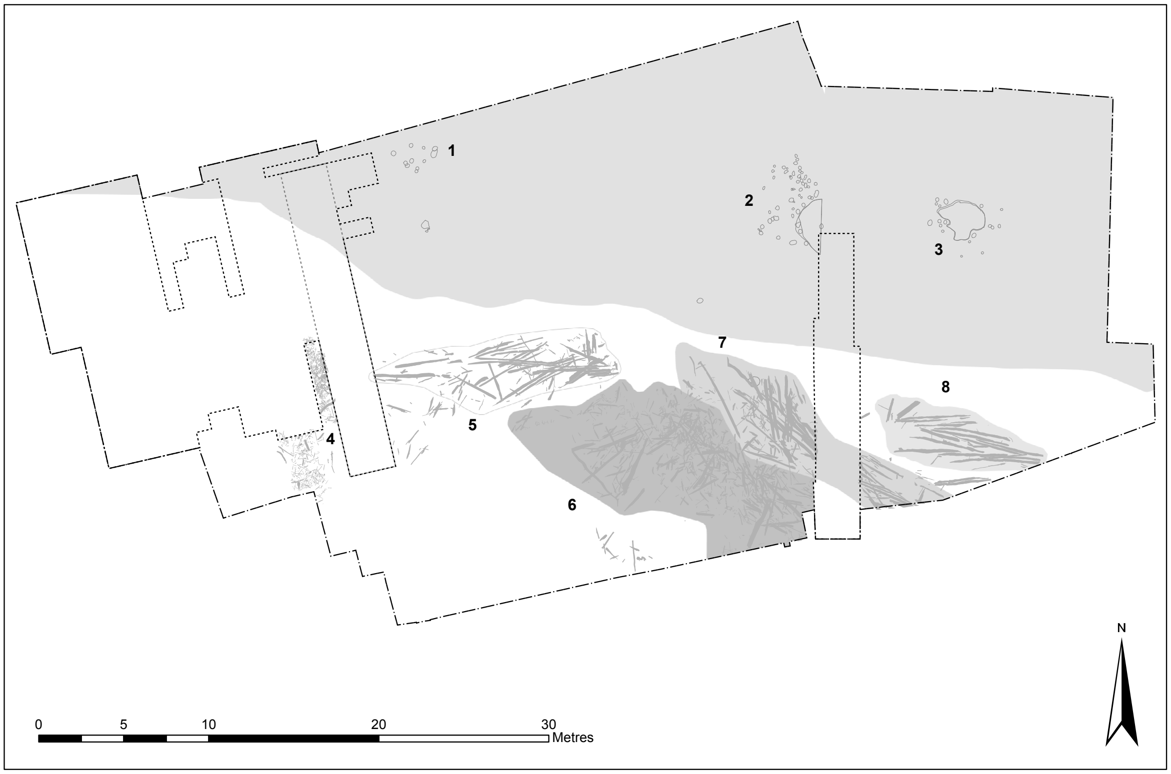

Figure 3.12: The key discoveries and analytical areas that will be referred to in other parts of this volume. 1: western dryland structure; 2: central dryland structure; 3: eastern dryland structure; 4: Clark's baulk (this and the area to the south of this are referred to as Clark's area); 5: western platform (and the brushwood was also found in this area); 6: detrital wood scatter; 7: central platform; 8: eastern platform (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 3.13: Central platform under excavation in 2013 (Copyright Star Carr Project, CC BY-NC 4.0).

reflecting the changing character of the lake edge environment from shallow water reedswamp to a more terrestrialised fen and carr (Chapters 4, 19 and 20).

In the reed peat were the remains of three large timber platforms (Chapter 6). The first, the central platform, which had been first encountered during the 1985 fieldwork, ran at an angle from the shore into the lake (Figure 3.13). The other two, the eastern and western platforms, (the latter had been partially recorded in SC24), lay closer to the line of the lake edge (Figure 3.14).

Lower in the wetland sequence (in the detrital mud and the base of the reed peat), a different sort of wooden structure was uncovered in 2013 and 2014, termed the detrital wood scatter (Figure 3.15). This was made up of a more diffuse arrangement of timber and was recorded from the basal sediments running almost parallel with the central platform. This was associated with a relatively large assemblage of animal bone, worked flint, antler and a number of organic artefacts (including two antler frontlets and several barbed points). Worked bone, antler and wood were also recorded from other parts of the lake edge wetlands, along with animal bone (much of which exhibited signs of butchery) and worked flint.

On the dry land, several more post-built structures were found (Figure 3.12; Chapter 5), and dense scatters of worked flint and smaller assemblages of animal bone were found across the dryland; their spatial distributions are examined in Chapters 7 and 8.

A very different assemblage was recorded from the area immediately adjacent to Clark's excavations and in particular from the unexcavated baulk between Clark's cuttings I and II. Here was a dense concentration of animal bone, worked antler, flint and wood and relatively large quantities of bone and antler artefacts, including red deer antler frontlets, barbed points and a bodkin (Figure 3.16). Based on the composition of the assemblage and its position in relation to the peat stratigraphy this was clearly a continuation of the material first recorded by Clark 66 years earlier.

Figure 3.14: The western platform on completion of excavation in 2014 (Copyright Star Carr Project, CC BY-NC 4.0).

Conclusions

Over the twelve years that the current excavations ran, both the character and scale of the archaeological work at the site gradually developed. The rationale for each stage of fieldwork and the methodologies adopted both on and off site were informed by the results of the previous seasons, the input of the different specialists and the advice of English Heritage/Historic England and colleagues from the wider archaeological community. This reflexive approach allowed us to adapt to changing circumstances 'on the ground' and provided the flexibility to trial new methods for excavating and recording the increasingly complex archaeological material we encountered. There are many other different approaches which could have been taken but the results which have come from this work, we feel, have justified our strategy.

Perhaps the most crucial development in the methodology we adopted came when we began to undertake large-scale, open-area excavations. Whilst the numerous smaller trenches excavated in both the wetland and dryland areas provided some indication of the nature of the archaeology, they were also misleading at times and led to a very disparate, fragmentary view of the site. Even when parts of the timber platforms had been recorded in several of the trenches it was impossible to really understand them: did they represent one platform or several? How big was it/they? It was only when a large area was exposed that their character and phasing could be understood. The open-area excavation was also effective for identifying other archaeological features, some of which had clearly been missed by earlier phases of work; for instance, the central dryland structure was bisected by trench SC23 and VP85A (without it being identified) and it is likely that more postholes were also present in the north of the trench. Nor is it likely that the detrital wood scatter would have been identified as a feature within the wetlands if it had been encountered in smaller trenches. This demonstrates the potential for open-area excavation within Mesolithic archaeology more generally.

Figure 3.15: Photograph of part of the detrital wood scatter during excavation (Copyright Star Carr Project, CC BY-NC 4.0).

The use of modern surveying techniques to record the positions of finds and GIS to manage this data, practices well established in Mesolithic archaeology, also proved invaluable in understanding the spatial patterning of the archaeological material. This, combined with the results of the analyses of the material and faunal assemblages, a comprehensive programme of refitting of the lithic material, the application of microwear analysis, geochemical studies of the sediments, and an integrated programme of radiocarbon dating has allowed us to examine in detail the forms of activity taking place across the site and how they changed over time.

However, it should be noted that the test-pitting and fieldwalking carried out in the early stages of the project have shown that activity at Star Carr covers approximately 19,500 m^2, but that less than 10% of this area has been sampled by excavation (including those areas investigated by Clark and the Vale of Pickering Research Trust). As such, we should be open to the possibility that other forms of activity, not encountered in the excavated areas, may have taken place at different parts of the site. That said, the results of our excavations have greatly increased our understanding of Star Carr, not only in terms of its chronology, extent and environmental sequences, but in revealing the complex and sophisticated nature of the lives of people who lived there.

Figure 3.16: The deposit of animal bones, antler, flint and wood from the baulk between Clark's cutting I and II, looking south (Copyright Star Carr Project, CC BY-NC 4.0).

PART 2

Climate and Environment

'A third reason attracting me was that Scandinavian scientists had pioneered the technique of pollen analysis, by means of which geographical change and successive periods of human occupation could be tied into a sequence of vegetational history reflecting the progressive warming of the climate.'

(Clark 1972, 10–5)

CHAPTER 4

Climate, Environment and Lake Flixton

Barry Taylor, Simon Blockley, Ian Candy, Pete Langdon, Ian Matthews, Adrian Palmer, Alex Bayliss and Nicky Milner

Introduction

At the time of occupation, Star Carr lay at the western end of Lake Flixton, a large shallow body of water that had formed in the eastern end of the Vale of Pickering. The lake forms an integral part of the story of Star Carr, providing the habitats for many of the animals that people hunted and the plants that they ate as food or used as materials. As it infilled, the peat that formed around the edges of the lake also created the conditions within which the archaeological evidence for the lives of these people was preserved. However, the lake has a far longer and more complex history that is bound up in the major climatic and environmental changes that accompanied the transition from the last cold period to the current Holocene interglacial warm period.

Over the past 120,000 years, since the last interglacial (MIS5e), there have been a series of major fluctuations in the Earth's climate (e.g. Rasmussen et al. 2014). It was towards the end of this period, during the Last Glacial Maximum, the last period of major ice advance, that the landforms within which Lake Flixton formed were first created. In Britain this is recognised as being part of a long cold period known as the Dimlington Stadial, based on a type-section of glacial deposits in East Yorkshire (Rose 1985), and dated to c. 30,000–16,000 BP (c. 28,000–14,000 BC). This was followed by a slow warming of the climate, punctuated by episodic climate shifts, that led into the start of the Holocene.

From a North Atlantic perspective, one of the most detailed records of these climate events is found in the Greenland ice-core records (Rasmussen et al. 2014) and is summarised in Figure 4.1. These records indicate a gradual warming after the Last Glacial Maximum, with rapid warming at c. 14,700 BP (12,700 BC), followed by another major cooling episode between c. 12,900 and 11,700 BP (10,900 and 9,700 BC; known in Britain as the Loch Lomond stadial, which is succeeded by the transition into our current Interglacial, the Holocene. In the Greenland record the warm episode is known as Greenland Interstadial 1 (GI1) and the cold transition is Greenland Stadial 1 (GS1), and as with the Dimlington Stadial they are thought to broadly equate to warm and cold periods in British and European records (the Lateglacial period consisting of the Windermere Interstadial and the Loch Lomond Stadial in the British sequence). Finally, the Greenland record suggests that the start of the Holocene was also climatically unstable with a series of short-lived but important cooling episodes notably

Figure 4 (page 39): Species of bulrush growing at the water's edge at Blakemere Moss, Delamere, Cheshire (Copyright Barry Taylor, CC BY-NC 4.0).

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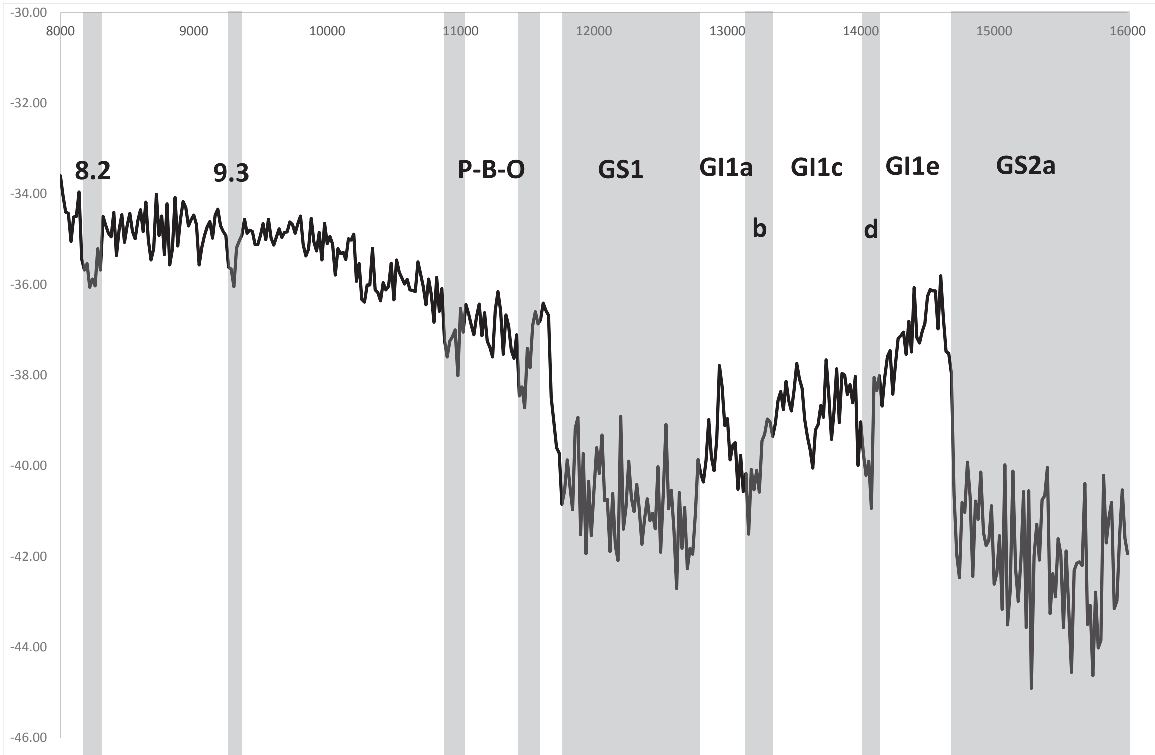

Figure 4.1: Climatic transitions in the Last Glacial to Interglacial from the δ^{18}O (‰) Greenland ice core record, replotted from Rasmussen et al. (2014) in ice core years before present (BP (B2K)). Grey shaded areas indicate cold oscillations in the Late Glacial period (GS2 and GS1) and cooling episodes within the warmer GI1 interstadial (GI1b and d), along with short-lived cooling events in the Early Holocene. These are defined in the formal Greenland event stratigraphy and occur approximately at 11,400 BP (9400 BC), 9300 BP (7300 BC) and 8200 BP (6200 BC). A further event is that part of the oscillations in climate at the very start of the Holocene recorded in the NGRIP ice core at ~11,100 BP (9100 BC), but this is not formally recognised in the event stratigraphy (Copyright Simon Blockley, CC BY-NC 4.0).

the PBO (Pre-Boreal Oscillation at 11.4 ka BP (c. 9400 BC)), and the 9.3 ka BP (c. 7300 BC) and 8.2 ka BP (c. 6200 BC) events. Crucial to our story, these climatic events also had major effects on the environments around Lake Flixton, resulting in fluctuations in the lake-water level, and changing patterns of vegetation both within the lake and across the surrounding landscape.

However, the development of the environments within the lake was also driven by more local ecological factors. Shortly after the lake formed it was colonised by aquatic vegetation, leading to the formation of a carbonate sediment (marl) within the basin. From the start of the Holocene, peat began to form in shallow water close to the shore, whilst marl and detrital muds accumulated within the deeper part of the basin. This caused the depth of water to decrease (though the level of the lake essentially remained the same), and allowed wetland vegetation suited to increasingly shallow conditions to expand into the lake, a process known as hydroseral succession. Initially, this process would have been most apparent in the relatively shallower water around the edges of the lake, where the buildup of peat would have quickly brought the sediments close to and then above the surface of the lake. In response, plants suited to shallow or seasonally flooded environments would have expanded into these areas, before being replaced by fen species and trees (Figure 4.2). At the same time, aquatic and emergent vegetation suited to deeper, more permanent standing water would have begun to encroach further into the lake, gradually reducing the areas of open water. As sediments continued to form within the basin, this succession of wetland environments would have expanded further into the lake until, by the end of the Mesolithic, the lake no longer existed as a body of water and had been replaced by a mosaic of wetland environments punctuated by streams and small pools of standing water.

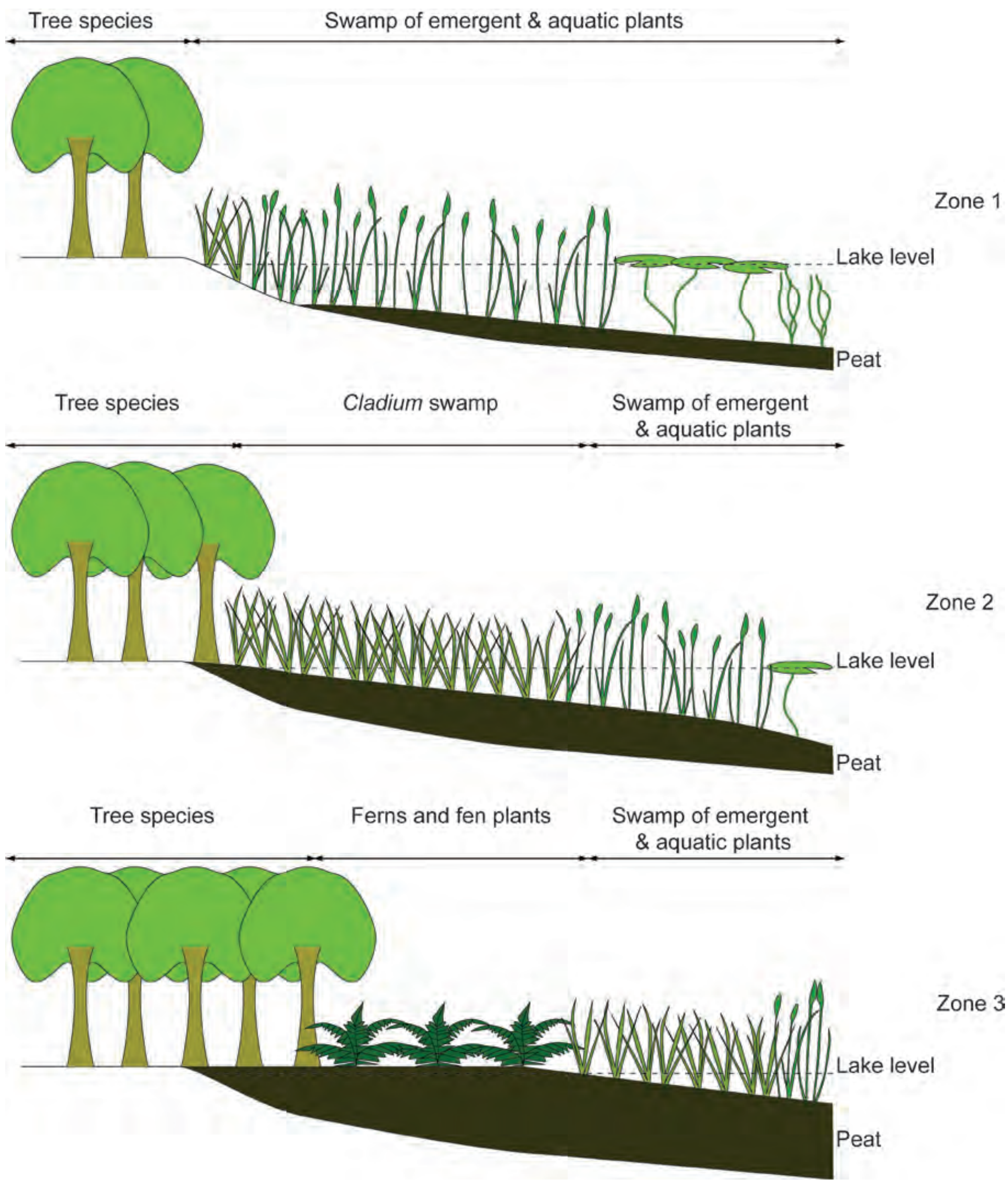

Figure 4.2: Generalised sequence of wetland environmental succession at the edge of lake Flixton (Zones 1–3 refer to the environmental sequence reported in Chapter 19) (Adapted from Taylor et al. 2017. Copyright Cambridge University Press (2017) reprinted with permission).

Understanding Lake Flixton

The history of the lake and the surrounding landscape was already well known before the current project started. The lake itself had been identified in the late 1940s through the surveys carried out by John Moore, and in 1949 Harry Godwin published the first pollen profile from the area based on samples taken close to Moore's excavations on Flixton Island (Godwin 1949). The same year, Godwin and his doctoral student, Donald Walker, began a more extensive palaeoenvironmental survey of the surrounding landscape, recording the stratigraphy of the basin through a series of borehole transects, and using pollen and plant macrofossil analysis to establish the changing character of the lake and terrestrial vegetation (Walker and Godwin 1954). The results of this work were then tied into the relative chronology that had already been established for Late Glacial and Early Holocene climatic events in Northern Europe by relating the environmental record recorded at Lake Flixton to the environmental sequences previously recorded at European sites.

In the mid 1970s a more detailed study of the environments around the western side of the lake was carried out by Ed Cloutman as part of the Seamer Carr project (Cloutman 1988a). As part of this work, auger surveys were carried out along the north-west edge of the lake basin, mapping in detail the Mesolithic land surface and the shallower lake margins. The survey was extended in the following years to cover the western side of the lake, including some of the deeper parts of the basin, and eventually the Star Carr peninsula.

Whilst Walker and Godwin had already described the main sequence of wetland development within the lake, Cloutman sought to refine this by establishing the rate at which these environments developed around the Seamer Carr area (Cloutman 1988b). To do this he recorded eight pollen profiles from different locations within the lake margins and correlated these on the basis of common, chronological horizons. By comparing the points at which different environments formed at these different locations, Cloutman was then able to map wetland succession across the Seamer Carr area. Cloutman went on to adopt a similar approach at Star Carr in the mid 1980s, recording a series of pollen profiles at intervals through the lake margins (Cloutman and Smith 1988). These were correlated using radiocarbon dating, resulting in an absolute chronology for the development of the wetland environments at the site.

From the late 1980s onwards, palaeoenvironmental research continued, largely under the auspices of the Vale of Pickering Research Trust. Auger surveys continued to be carried out around the lake and pollen profiles were recorded from Flixton Island and Moore's Site 9 by Jim Innes (Lane and Schadla-Hall forthcoming). In the 1990s the environmental record was refined further through work carried out by Petra Dark (née Day) (Day 1996; Dark 1998a; 1988b), who established a more precise chronology for the development of the Early Mesolithic lake edge wetlands at Star Carr, and a more detailed record for the Late Glacial and Early Holocene development of the wider lake (Day 1996; Dark 1998c). Dark also showed that the wetland vegetation at Star Carr was deliberately burnt over prolonged periods during the occupation of the site, possibly as a form of environmental management (Dark 1998b). In the following years Gaynor Cummins identified further evidence for the deliberate burning of both the wetland and terrestrial vegetation at several other sites in the area, during both the Early and Late Mesolithic, demonstrating the apparent ubiquity of such practices within this landscape (Cummins 2003).

When brought together, the results of the different surveys that have been carried out within this landscape create a formidable body of data that tells us much about the character of the environments that formed within and around the lake. Our contribution to this record is twofold. First, is a detailed record of the palaeoclimate from the very final stages of the last cold period to the Early Holocene, and which spans the period of time that Star Carr was inhabited. This has been established through a programme of coring, and the analysis of chironomids (non-biting midges) and stable isotopes present in the lake sediments (see Chapter 18). Together, these provide proxies for temperature and precipitation within the local area during the time the sediments were forming. Dates for this record have been correlated with the chronology established for the occupation of Star Carr, allowing us to explore the relationship between episodes of climate change and patterns of human activity (Chapter 9). Second, is a more detailed record of the nature of the wetland environments that were forming at Star Carr (Chapter 19) and the dates at which these changed (see Chapter 17). The results of this work have been brought together with recent palaeoenvironmental surveys carried out in other parts of the basin (see Taylor 2012), and the earlier work undertaken by Dark (1988) and Cummins (2003) to provide a comprehensive record of the environmental and climatic history of Lake Flixton.

The origins of Lake Flixton

During the Dimlington Stadial the North Sea Lobe of the British-Irish Ice Sheet advanced into the eastern end of the Vale of Pickering, extending at least as far as Seamer and Wykeham area (Catt 1991, 61; Catt 2007, 202). At the same time, the western end of the valley was blocked by a glacier at Ampleforth (Catt 2007, 194). With drainage at either end of the valley blocked, water accumulated within the Vale, creating the Glacial Lake Pickering, which probably existed between 19,000–15,000 BC (Kendall 1902, 499; Evans et al. 2016) (Figure 4.3).

As the glacier retreated from the eastern end of the Vale of Pickering, late in the Dimlington, it left a series of large irregular hollows (kettle holes) that were formed by the melting of blocks of ice that had become detached from the glacier, and ridges (terminal moraines and kames) formed by glacially transported material and sediment carried by meltwater streams (Franks 1987; Palmer et al. 2015). As the ice continued to retreat eastwards it deposited a large moraine at Filey, preventing the eastward drainage of water from the Vale into the sea (Catt 1987) with the rivers draining toward the south-west through the Kirkham gorge.

Water accumulated within the hollows left by the retreating glacial ice, creating a single body of water, Lake Flixton, from the start of the Windermere Interstadial at about 14.6 ka BP (12,600 BC), whilst the ridges and low mounds within and around the basins became small, hilly peninsulas and islands. As the climate warmed, aquatic and emergent vegetation quickly colonised the lake causing marl, a carbonate precipitate, to form within the basin (Dark 1998c), whilst grassland and willow scrub, followed by birch woodland became established over the dry ground (Dark 1998c). Around 12,900 BP (10,900 BC), the climate deteriorated with the onset of the Loch Lomond Stadial, which is broadly in phase with the abrupt cooling seen in key regional records at this time, such as the major cooling event, the Greenland stadial (GS1) seen in the Greenland ice cores (Figure 4.1). During this period aquatic vegetation became more sparse and the level of the lake fell, creating a series of separate basins (Palmer et al. 2015). The temperatures around Lake Flixton at this time would have been significantly colder than today with average summer temperatures as cold as 8°C (Chapter 18).

The Early Holocene Lake Flixton

As the climate warmed at the start of the Holocene, vegetation became re-established in the lake, leading to the resumption of marl formation within the basin and the start of organic sedimentation in the shallower lake margins. However, this was a transitional process, with the first evidence for warming starting *10055–9325 cal BC (95% probability; start onset Holocene*; Blockley et al. 2018, table S6), probably starting *9815–9415 cal BC (68% probability)* from the oxygen isotope records outlined in Chapter 18. This is in line with records across Northern Europe and the North Atlantic (e.g. Rasmussen et al. 2014), indicating a rapid shift in average temperatures, but with summer temperature rises being muted and unstable (between 10°C and 8°C) for the first c. 250 years of the Holocene.

The level of the lake rose rapidly at the start of the Holocene and by *9635–9445 cal BC (94% probability; onset organics 3178* Figure 17.22) or by *9430–9410 cal BC (1% probability),* probably by *9580–9550 cal BC (14% probability*) or *9535–9460 cal BC (54% probability)* the water level was at least 23 m OD, and probably closer to 23.5 m OD, high enough for aquatic plant material to be deposited in the accumulating organic sediments close to the shore at Star Carr (see Chapters 17 and 19). At this level the lake would have been present across much of the basin, filling the shallower embayments at Seamer Carr, Cayton Carr and Lingholme (Figure 4.4). Flixton Sites 1 and 2 (Flixton Island) would have been separate areas of dry land with a narrow area of shallow water between them, whilst deeper water lay between Flixton Island and No Name Hill. Star Carr itself lay on the southern shore of a large, hilly peninsula at the western end of the lake. The peninsula extended out into the lake at a point where the basin narrowed, creating a large embayment that led to the outflow channel to the west.

Pollen and plant macrofossils from the earliest Holocene deposits in Core B (Chapter 18) and the deep-lake profile previously recorded by Dark (1998c), and the very earliest organic sediments at Star Carr (see Chapter 19) show that a range of aquatic and emergent plants were quickly becoming established in the lake. These included species of pondweed and the floating aquatic plant water milfoil (*Myriophylum spicatum*) and beds of the aquatic algae stonewort (Characeae), with emergent plants such as bogbean (*Menyanthes trifoliata*), and species of sedge (Carex sp.), bulrush (*Typha* sp.) and bur-reed (*Sparganium*) growing in shallow water along the shore (Dark 1998c, 169–170). Beyond the water's edge the pollen analysis indicates a largely open

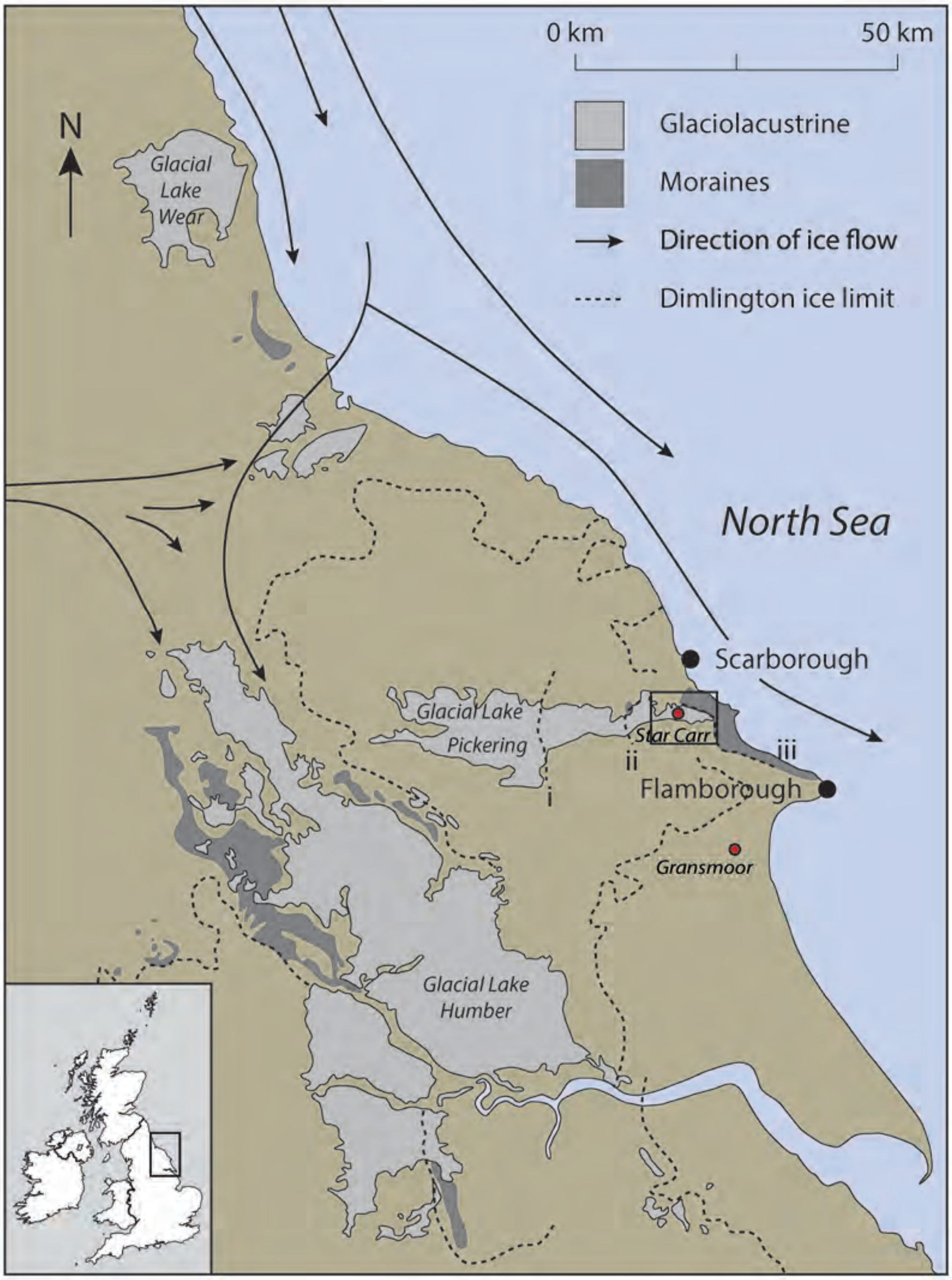

Figure 4.3: The regional context of Glacial Lake Pickering in relation to Glacial Lake Humber, adapted from Palmer et al. (2015, 51), including the models of the ice sheet extent in the Vale of York and extending along the east coast of Yorkshire and Lincolnshire. The maximum extent of the ice dam in the eastern end of the Vale is still debated and two maximum positions are shown. The first has the maximum of ice forming the Wykeham Moraine at position ii; the second, proposed by Foster (1985; position i), suggests the maximum position to the west of the Wykeham Moraine. Clark et al. (2004a) favour this latter position. Penny and Rawson (1969) suggest that the ice sheet retreated eastwards from Wykeham and stabilised to form the Flamborough Moraine at Position iii (Adapted from Palmer et al. 2015. Copyright (2015) with permission from Elsevier).

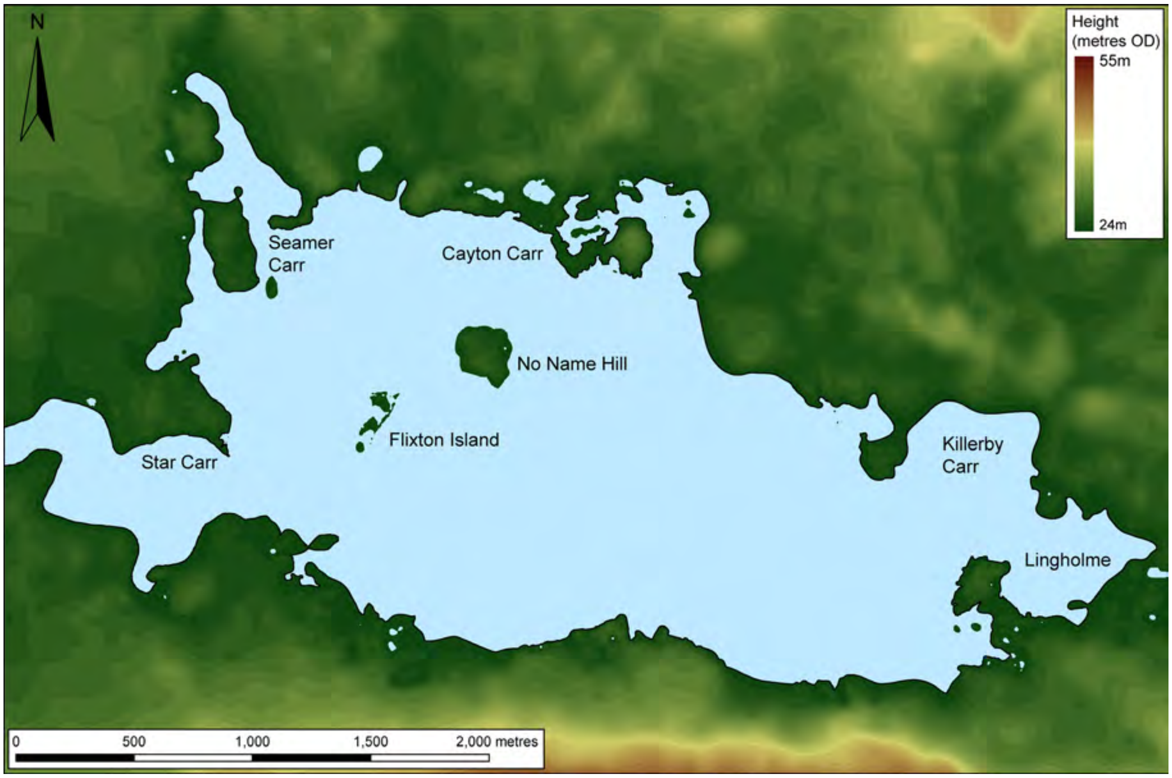

Figure 4.4: The Early Holocene Lake Flixton and surrounding topography (Copyright Barry Taylor, CC BY-NC 4.0).

landscape colonised by grasses, sedges, and tall herbs such as species of *Filipendula* (possibly meadowsweet), with areas of scrub, consisting of juniper (*Juniperus communis*), and species of willow (*Salix*) and birch (*Betula*) (Dark 1998c, 169; Chapter 18).

Though temperatures had warmed after the end of the Late Glacial Stadial, the Early Holocene climate was still highly unstable and at *10,025–9190 cal BC (95% probability; Isotopic event 1 start*; Blockley et al. 2018, table S6), probably at *9710–9255 cal BC (68% probability)* there was an Abrupt Climate Event (ACE 1), defined as a centennial scale abrupt climatic oscillation, seen within both the chironomid-based temperature reconstructions and $\delta^{18}O$ values. ACE 1 is most strongly seen in the $\delta^{18}O$ signal (decline by ~2‰) but is also seen as a 1.5°C decline in chironomid based summer temperatures. ACE 1 is consistent with a similar climate oscillation in the Greenland ice cores at 11,400 BP (c. 9400 BC; Chapter 18). The cooler climate persisted for as little as 80–100 years (*Isotopic event 1;* Blockley et al. 2018, figure S18), ending with an equally rapid rise in temperatures shortly before the first evidence for the arrival of Mesolithic groups.

The Early Mesolithic environment

Based on the plant macrofossil and insect data from Star Carr (Chapter 19), and other sites around the lake (Taylor 2012), wetland environments were already established around the lake by the start of the Mesolithic (environmental zone 1; Chapter 19). Reedswamp environments, consisting of *Phragmites* reeds, bogbean, club-rush, and species of sedge, bulrush, and bur-reed were present in standing water around much of the shore (Figure 4.5a). The lake level now lay at c. 24 m OD, placing areas of emergent vegetation in up to a metre of water. Beyond the reedswamp, communities of floating and submerged aquatic plants, particularly water-lily and species of pondweed, were growing in the deeper water, possibly with stands of emergent plants such as club-rush. At the shore, fen vegetation, such as gypsywort (*Lycopus europaeus*) and nettles (*Urtica dioica*) grew on the damp soils, amongst ferns, shrubs and trees, particularly birch and aspen (Figure 4.5b). Away from the

Figure 4.5: Lake edge reedswamp (a) and willow carr (b) at Rostherne Mere, Cheshire (Copyright Barry Taylor, CC BY-NC 4.0).

lake edge, the pollen record shows that the landscape remained open, with extensive areas of open ground covered with grasses and tall herbs, and more localised areas of scrub and isolated tree cover (see Chapter 18). However, from the archaeological record we know that areas of more dense woodland, that included birch, willow and aspen, were established by the start of the Mesolithic, probably forming discrete patches within the otherwise open landscape (see Chapter 6).

The wetland environments were highly diverse, varying in both their extents and species composition across the lake. Differences in the plant macrofossil assemblages suggest that the spatial distribution of particular species was uneven. Bur-reed, for example, is better represented in the assemblages from the north shore of No Name Hill than at other sites around the lake (Taylor 2011, 74), whilst yellow water-lily is more common at Star Carr (see Chapter 19). Spatially, the extents of the wetlands would have varied as differences in the topography of the basin created localised differences in water depth. This would have created extensive areas of reedswamp in the shallow embayments at Seamer Carr, Lingholme and Cayton Carr as well as the shallower stretches of lake edge, whilst in areas such as Killerby Carr, where the basin falls away rapidly, a much narrower fringe of vegetation would have separated the shore from the areas of deeper water (Taylor 2012, 438) (Figure 4.6). Though it is much harder to identify such variability on the terrestrial landscape it is likely that these areas were equally diverse, with discrete areas of birch, willow and aspen woodland, and juniper and willow scrub forming amongst areas of grassland and tall herbaceous plants.

The character of these environments changed throughout the early centuries of the Mesolithic. Across the terrestrial landscape, juniper scrub became more extensive, expanding over the areas of more open grassland, before a second abrupt climate event (ACE 2) occurred at *9665–9030 cal BC (95% probability, Isotopic event 2 start;* Blockley et al. 2018, table S6), probably at *9380–9090 cal BC (68% probability)*. ACE 2 is clearly expressed in the $\delta^{18}O$ signal (decline by ~1.5‰) and the chironomid based summer temperature record (1.5^{o}C). It is notable that this event was of the magnitude of other Early Holocene shifts such as the 8.2 ka BP event (c. 6200 BC); a later occurrence of climatic instability commonly thought to have negatively affected Mesolithic human populations. ACE 2, recorded at Star Carr, is coincident with an event recorded in the Greenland ice core NGRIP at 11.1 ka BP (c. 9100 BC) (but not in GRIP or GISP). It is also noted in records across Europe and may be a more isolated European phenomena. ACE 2 is associated with a vegetation response with a decline in birch and an expansion of grasses and other herbs, alongside peaks in Pediastrum and pre-Quaternary spores, both of which are suggestive of increased inwash of nutrients and derived material into the lake basin. Both of these indicators suggest increased landscape instability.

Shortly after this event, birch woodland became more established, replacing the environments of juniper scrub and the remaining areas of more open grassland (Chapter 18). This transition was rapid, occurring in a matter of decades, during which the terrestrial environments would have been both dynamic and spatially varied as areas of scrub, woodland and open grassland shifted and changed across the landscape.

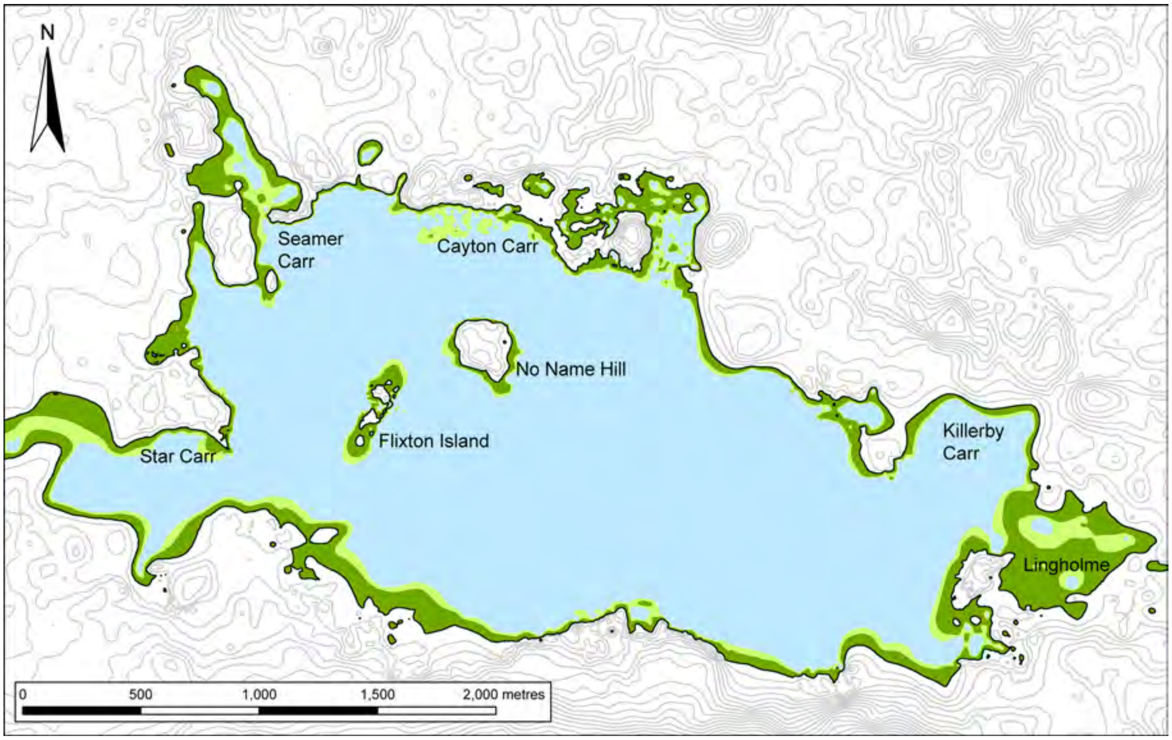

Figure 4.6: Approximate extents of the aquatic and reedswamp environments at the start of the Early Mesolithic (Copyright Barry Taylor, CC BY-NC 4.0).

Within the basin, the formation of organic and carbonate sediments caused the depth of water within the lake to shallow. This allowed plants suited to shallower or seasonally flooded environments to colonise the lake edge areas whilst reeds and other species tolerant of deeper water expanded further into the lake. At Star Carr, this process was underway from around *9145–9010 cal BC* (*95% probability;* first EZ2, Figure 17.22), probably in *9125–9055 cal BC (68% probability*) as the amount of water reaching the lake edge peats declined and saw-sedge began to grow across the site, along with sedges and *Phragmites* reeds (start of environmental zone 2; see Chapters 17 and 19). The same changes occurred several centuries later within the main body of the lake (e.g. Taylor 2012, 184) perhaps a result of different rates of organic sedimentation within this part of the basin.

By *8795–8605 cal BC (95% probability;* first EZ3, Figure 17.22), probably by *8750–8655 cal BC (68% probability*) the ongoing accumulation of organic sediments at Star Carr had begun to form beyond the reach of the lake water (see Chapters 17 and 19), and comparable conditions were becoming established in the main part of the basin shortly after (Taylor 2012, 440). A fen environment of grasses, ferns and tall fen herbs began to grow on the peat at Star Carr, with trees encroaching on the wetlands edge, whilst a denser carr of willow and aspen formed around other parts of the shore (Taylor 2012, 187) (Figure 4.7). However, these areas remained wet and boggy, and continued to be affected by occasional flooding, whilst small areas of standing, stagnant water persisted in places. At the same time, aquatic and swamp vegetation expanded further into the lake, creating a more expansive wetland environment. At the site of Flixton School House Farm, on the southern edge of the basin, aquatic plants and stands of emergent vegetation were growing at least 50 m from the former shore (Taylor 2012, 204–5) and comparable environments were probably present at Star Carr and in other, shallower parts of the lake. The shallow embayments at Seamer, Cayton and Lingholme were probably largely infilled by this date, creating extensive areas of fen and carr with isolated patches of reedswamp (Taylor 2012, 440) (Figure 4.8).

In the centuries that followed the end of human activity at Star Carr, the character of both the wetland and terrestrial environments began to change. Hazel became established as the principal arboreal taxa (Dark 1998c, 170), and its denser canopy shaded out much of the fern understorey and reduced the diversity of the woodland ground flora. Within the wetlands, the areas of willow and aspen carr that had formed over the peat at the edge

Figure 4.7: Rushes growing in pools of water in an in-filling lake edge (Doolittle Moss, Delamere, Cheshire) (left), and willow carr forming over lake edge peat (Rostherne Mere, Cheshire) (right) (Copyright Barry Taylor, CC BY-NC 4.0).

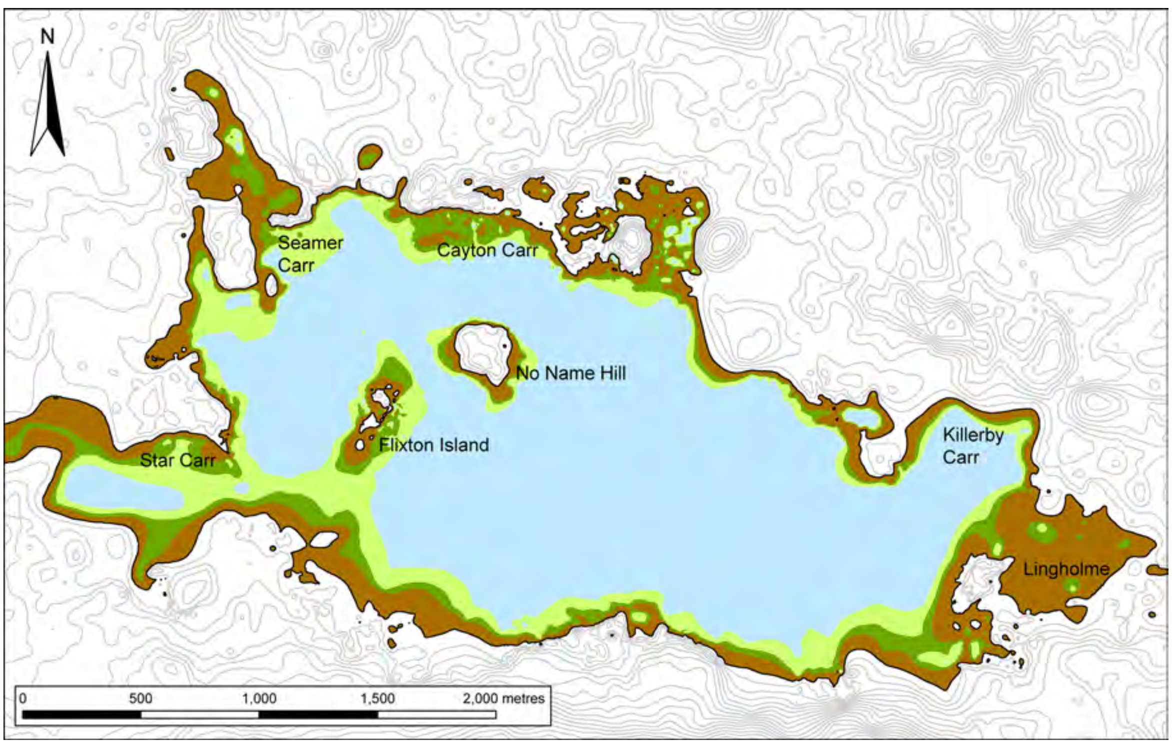

Figure 4.8: Approximate extents of the wetland environments c. 8500 cal BC (Copyright Barry Taylor, CC BY-NC 4.0).

of the former lake were replaced by a more open fen environment, an event dated at sites along the southern shore to the centuries around c. 8000 cal BC (Taylor 2012, 188; 10000 BP) (Figure 4.9).

At around the same time peat-forming wetlands began to expand over areas of previously dry ground beyond the lake shore, gradually burying lower-lying areas around the basin (Figure 4.9). Based on the composition of the peat, these environments consisted of tall fen herbs, ferns and sedges or grasses (Taylor 2012, 195). At Star

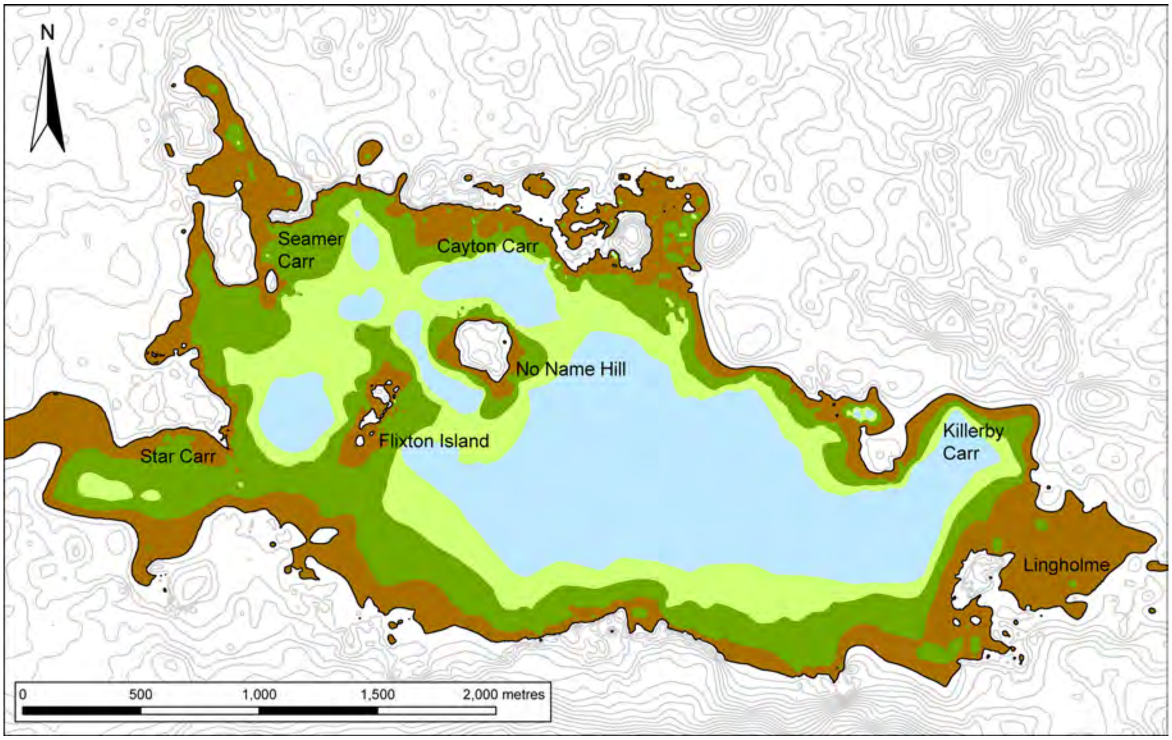

Figure 4.9: Approximate extents of the wetland environments c. 8000 cal BC (Copyright Barry Taylor, CC BY-NC 4.0).

Carr, dates obtained by Cloutman in the 1980s show that these terrestrial wetlands had reached the 25 m OD contour over the southern extent of the Star Carr peninsula in the centuries around c. 7800 cal BC (9800 BP), and had reached a similar elevation across the steeper slope along the east of the peninsula several centuries later (based on the dates in Cloutman 1988a, 15 Table 1).

The causes of these changes are unclear. There is no evidence for a significant rise in the level of the lake at this time and aquatic material is entirely absent from the peat forming over the areas of dry ground (Taylor 2012, 195). However, it is possible that a slight rise in the local water table, following on from the rises at the start of the Holocene, made conditions at the former lake edge too wet to support the growth of trees and led to the adjacent dry ground becoming waterlogged triggering the growth of peat in these areas (a process known as edaphic paludification).

The expansion of peat-forming environments over areas of dry ground would have altered the character of the landscape significantly and had a profound effect on the lives of its inhabitants. Occupation sites on areas of low-lying ground, such as Star Carr, would have been abandoned as fen began to encroach over them, and sites on the low hilly peninsulas around the edges of the basin would have become islands within the gradually expanding wetlands (Figure 4.10). Trees may also have receded on to higher, drier ground, leaving a large belt of open fen, between the hazel dominated woodland and the areas of reedswamp and open water within the basin.

In the deeper parts of the basin, the depth of water continued to shallow due to the ongoing accumulation of sediments, allowing wetland environments to become more extensive. At Flixton School House Farm, on the southern shore of the lake, terrestrialised fen environments had extended over 50 m from the shore by around c. 7200 cal BC, with stands of emergent vegetation growing amongst aquatic plants in what had formerly been deeper water over 300 m further into the basin (Taylor 2012, 208). In the following centuries this area also became terrestrialised, whilst swamp environments began to extend further into the lake.

Apart from short-lived fluctuations in the local water table, the wetlands continued to develop in a broadly linear manner throughout the next millennia, with swamp environments reaching some of the deeper parts of

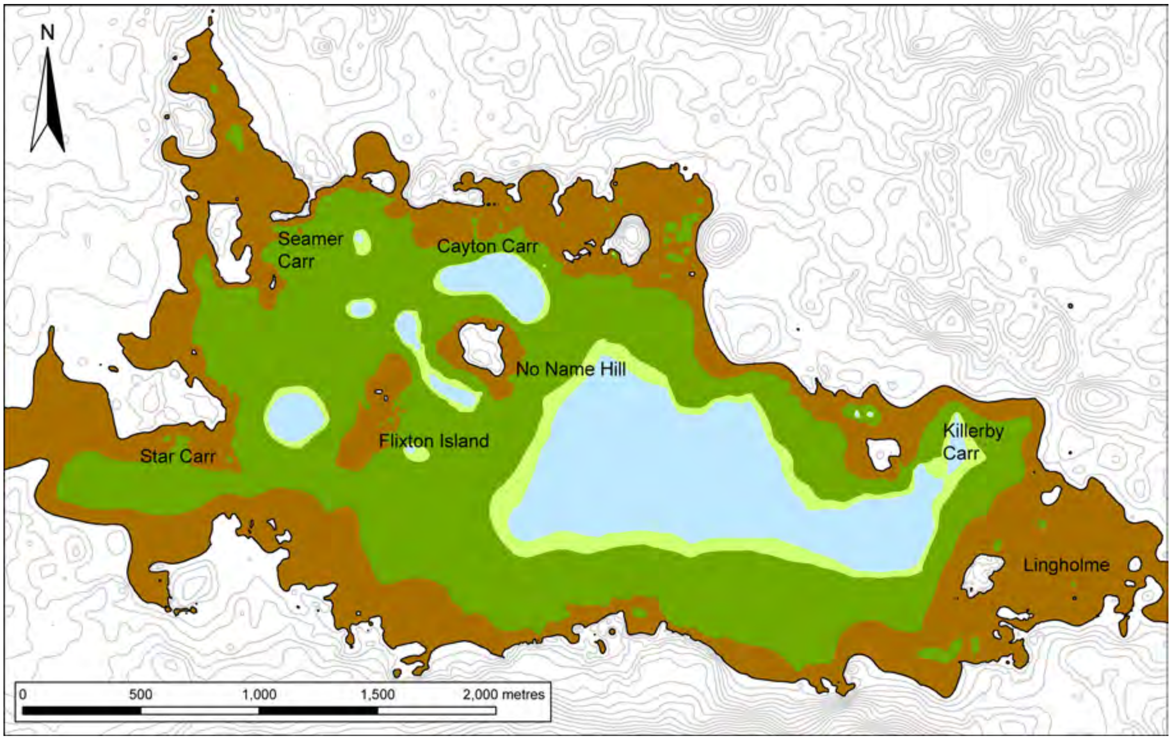

Figure 4.10: Approximate extents of the wetland environments c. 7500 cal BC (Copyright Barry Taylor, CC BY-NC 4.0).

Figure 4.12: A reconstruction of what the lake may have looked like during an early phase of occupation at Star Carr (Copyright Anthony Masinton, CC BY-NC 4.0).

To watch this video, scan the QR code with your mobile device or visit DOI: https://doi.org/10.22599/book1.1

the basin, and peat-forming wetlands encroaching onto increasingly higher ground (Taylor 2012, 448). Alder was becoming established around the lake from 6660–6360 cal BC (94% probability) or 6290–6270 (1% probability) (7640±85 BP OxA-4042; Dark 1988c, 170), and was growing locally at No Name Hill and Flixton School House Farm in the centuries around c. 5300 cal BC (Taylor 2012, 191). By this date, the lake had ceased to exist as a substantial body of water and had been replaced by a mosaic of fen, swamp and carr, with standing water restricted to discrete pools, probably colonised by emergent plants and fringed by shrubs and trees (Figure 4.11). Peat-forming environments had reached at least as far as the 26.5 m OD contour, leaving the Star Carr peninsula and many of the other Early Mesolithic sites buried beneath thick deposits of peat (Taylor 2012, 194). Beyond this wetland, a mixed deciduous forest of oak, elk, ash and lime covered much of the dry ground (Dark 1998c, 170).

Conclusions

A reconstruction of Lake Flixton has been created, providing some idea of what the landscape might have looked like about 11,000 years ago (Figure 4.12). However, the climatic and environmental history of Lake Flixton is highly dynamic. The Early Holocene, including the period when Star Carr was inhabited, was a time of significant change with abrupt shifts in climate and relatively rapid developments in the environments of the

Figure 4.11 (page 52): Tussocks of sedge and rush surround pools of open water in an in-filled basin (Doolittle Moss, Delamere, Cheshire) (Copyright Barry Taylor, CC BY-NC 4.0).

lake and the surrounding landscape. These environments were also diverse, varying in their nature and extent across the lake. Some of these changes would certainly have been noticeable to the communities of hunter-gatherers who inhabited this area. This is particularly true of the episodes of climatic change, which would have occurred within people's lifetimes. However, it is only by relating the environmental and climatic records with the well-dated archaeological sequences from Star Carr that we can start to consider the effects that these changes had on people's lives, as we show within the following chapters of this book.

PART 3
Spatial Patterning

'A moment's reflection will suggest that casual debris may be expected to extend some distance beyond the limits of the area actually occupied and the question arises how exactly this can be defined. In practice this is less troublesome than theory would suggest, since the density of worked flints declines sufficiently steeply to define the knapping area tolerably clearly.'

(Clark 1954, 5)

CHAPTER 5

Dryland Structures

Barry Taylor, Nicky Milner and Chantal Conneller

Introduction

Despite originally interpreting the site as a residential camp, Clark did not locate any structures such as huts or tents during his excavations. Though Clark suggested that this absence may have been due to taphonomy (Clark 1954, 9), we now know that the area he excavated would have been at least periodically submerged during the time the site was inhabited, making it unsuitable for most forms of built structure (Chapter 19).

It was not until the excavation of larger areas on what would have been the Mesolithic dryland that evidence for structures (in the form of cut features such as postholes) was recorded. When first observed in plan the features were somewhat ephemeral with slightly indistinct edges, probably resulting from bioturbation (such as worm or root action) mixing the fills of the features with the surrounding sediment, and gleying (see Chapter 20). However, once an area was cleaned and left to weather the features became more distinct, and upon excavation they turned out to be well defined, with a clear distinction between the edges of the cut and the surrounding deposit. Though some of the features were quite shallow it is unlikely that these have been truncated through later action given that the dryland parts of the site would have been buried beneath peat by the end of the Early Mesolithic.

The first structure was recorded in 2008, during the excavation of trench SC23, and consisted of a small hollow surrounded by postholes (the eastern structure) just beyond the extent of the Early Mesolithic lake shore. In the following years, two further concentrations of cut features were uncovered within the main part of trench SC34: a small concentration of possible postholes, known as the western structure, and a more complex arrangement of postholes and an associated hollow, known as the central and northern structures. Together, these features represent the earliest evidence for built structures in Britain and demonstrate a level of permanence in terms of the human occupation of this landscape that contrasts with traditional views of Early Mesolithic society (Conneller et al. 2012).

The western structure

The western structure is made up of a concentration of small features that were recorded at the western side of trench SC34, just to the north of trench SC24 (features [313], [505], [507], [508], [512], [513], [514], [515], and

Figure 5 (page 55): Aerial photograph of SC34 in 2014 (Copyright Sue Storey, CC BY-NC 4.0).

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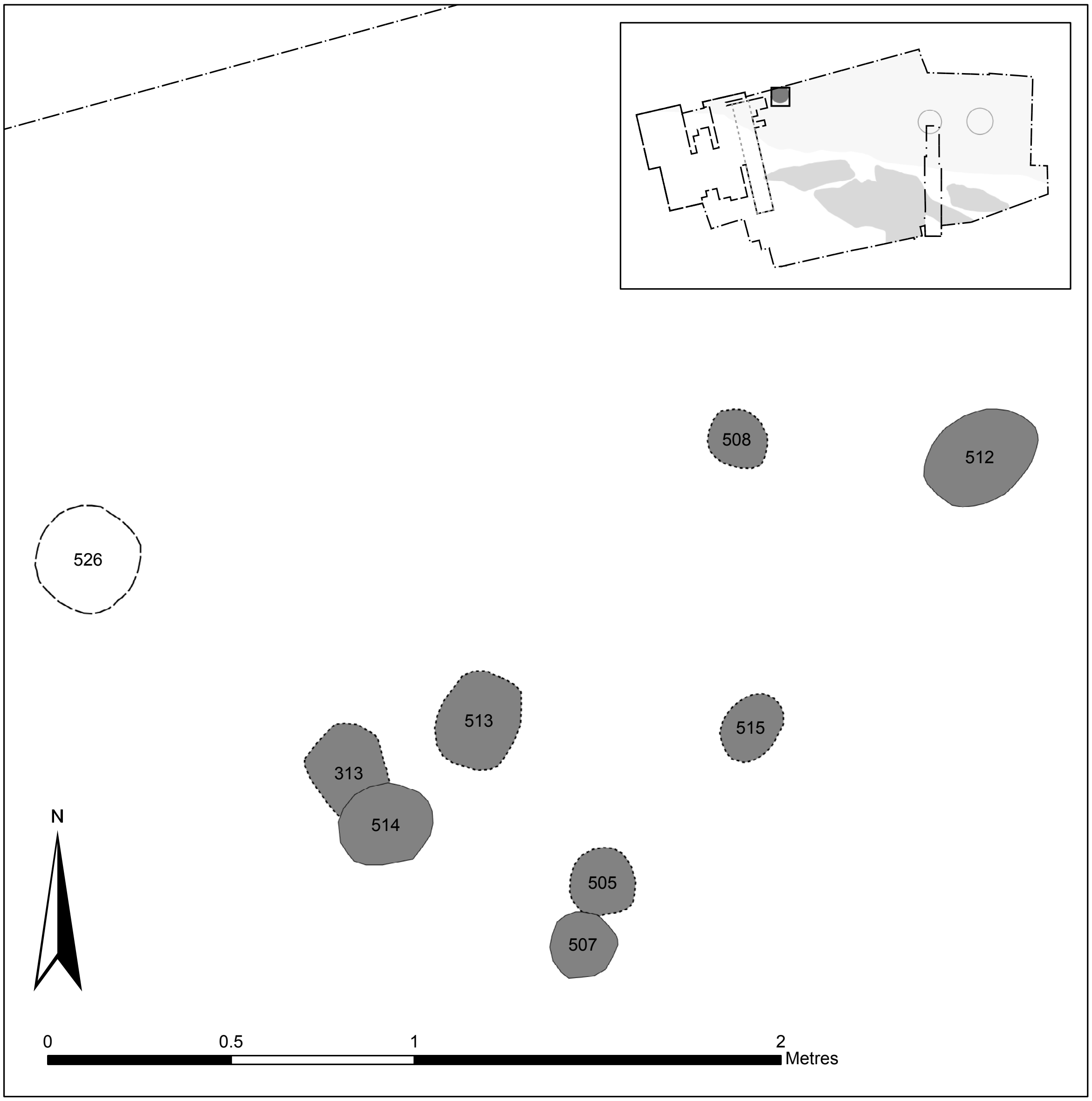

Figure 5.1: Plan and profile of the features comprising the western dryland structure (Copyright Star Carr Project, CC BY-NC 4.0).

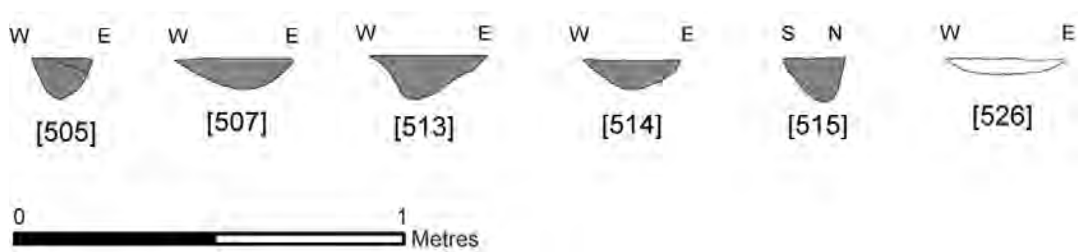

Figure 5.2: Profiles of the features comprising the western dryland structure (features [313], [508] and [512] were excavated in plan, and there is no drawn profile) (Copyright Star Carr Project, CC BY-NC 4.0).

[526]) (Figures 5.1 and 5.2). This was an area of mottled gleyed clay that had been disturbed by root action, making identification of features difficult. All of the recorded features are round or subround and have a similar diameter. Features [512] and [514] were considered by the excavator, CC, to be postholes. In addition, features [313], [505], [507], [508], [513] and [515] have steep sloping sides and a rounded base and could also be interpreted as potential postholes on the basis of the shape, size and profile (though the sides of [508] are less regular than the others). From its morphology, feature [505] probably held an upright post. Similarly, features [513] and [515] could potentially have held angled posts (approximately angled towards the east and west respectively) given the sloping aspect of one side of the profile, though this could be due to later disturbance of the sides of the feature. Feature [526] has a more gently sloping, bowl-like profile and could be interpreted either as a posthole or small pit.

The western structure lies near the centre of a dense concentration of worked flint, much of which is burnt. This extends c. 2 m from the footprint of the features before the lithic densities drop off (see Chapter 8, Figure 8.3). If the features are contemporary with the flint then it is unlikely that they supported an external wall, as this would be expected to have limited the spread of material. However, they could be the internal supports for a larger structure, the external edge of which is marked by the main concentration of flint. Alternatively, the postholes may not have been part of a walled building, but instead are the remains of another form of structure or structures, such as a raised storage area, or drying racks. Given the nature of the lithic assemblage, this may be an abandoned structure that has subsequently been used as a midden (see Chapter 8).

The central area

Overview

A more extensive and complex arrangement of features was recorded towards the central part of trench SC34 (Figure 5.3). Two potential structures are represented by these features: an arrangement of possible postholes around a shallow hollow (the central structure) and an arc of possible postholes just to the north (the northern structure). Unfortunately, the eastern half of the central structure was truncated by trenches VP85A and SC23 and not detected in either excavation, whilst the northern structure may have been truncated by Pit 1 (excavated in 1989), and possibly also by SC23. Scatters of potential pits and postholes were also recorded in the area to the west of both structures, some of which may have formed part of additional structural arrangements.

The central dryland structure

The central structure consists of a shallow hollow with an associated arrangement of postholes around its outer edge (Figures 5.3 and 5.4). The hollow [330] measures 3320 mm north-south and is 180 mm deep and, assuming it had a regular shape, was at least 2650 mm wide. The hollow had two fills: an upper fill made up of a dark brown sandy silt with gravel inclusions (context 325) and a lower fill which was a similar sediment but with less gravel (context 331). The hollow had been truncated on its eastern side by the excavation of VP85A and trench SC23, the base of the feature surviving a short distance within the area of these earlier excavations.

Six small, round or subround features were present along the western side of the hollow (features [338], [340], [342], [382], [348] and [332]) and have been interpreted as forming part of the same structure based on this spatial association. These features have a similar circular or oval shape in plan and rounded, bowl-like profiles (though some have slightly steeper sides or flatter bases). The exception is feature [342], which has a more irregular shape in plan, though this was due to disturbance on its north-east side. An additional feature, [350], which is very similar in size and shape, may also form part of this arrangement.

Two further features ([386] and [380]) lie slightly further away from the edge of the hollow, and could potentially form part of a second arrangement of features. Of these, feature [380] has fairly steep sides and a flat base, and could potentially have acted as a posthole, probably holding a post vertically. A single, shallow feature was also recorded at the base of the hollow [414]. The feature was a regular rounded shape, with sloping sides and a rounded base and filled with the same deposit as the hollow. It is not possible from the shape or profile of the feature to suggest the function.

Unfortunately we can say very little about this structure in terms of its architecture, as all of the associated features are too shallow to provide any clear indication of their function. However, the geochemical analysis has

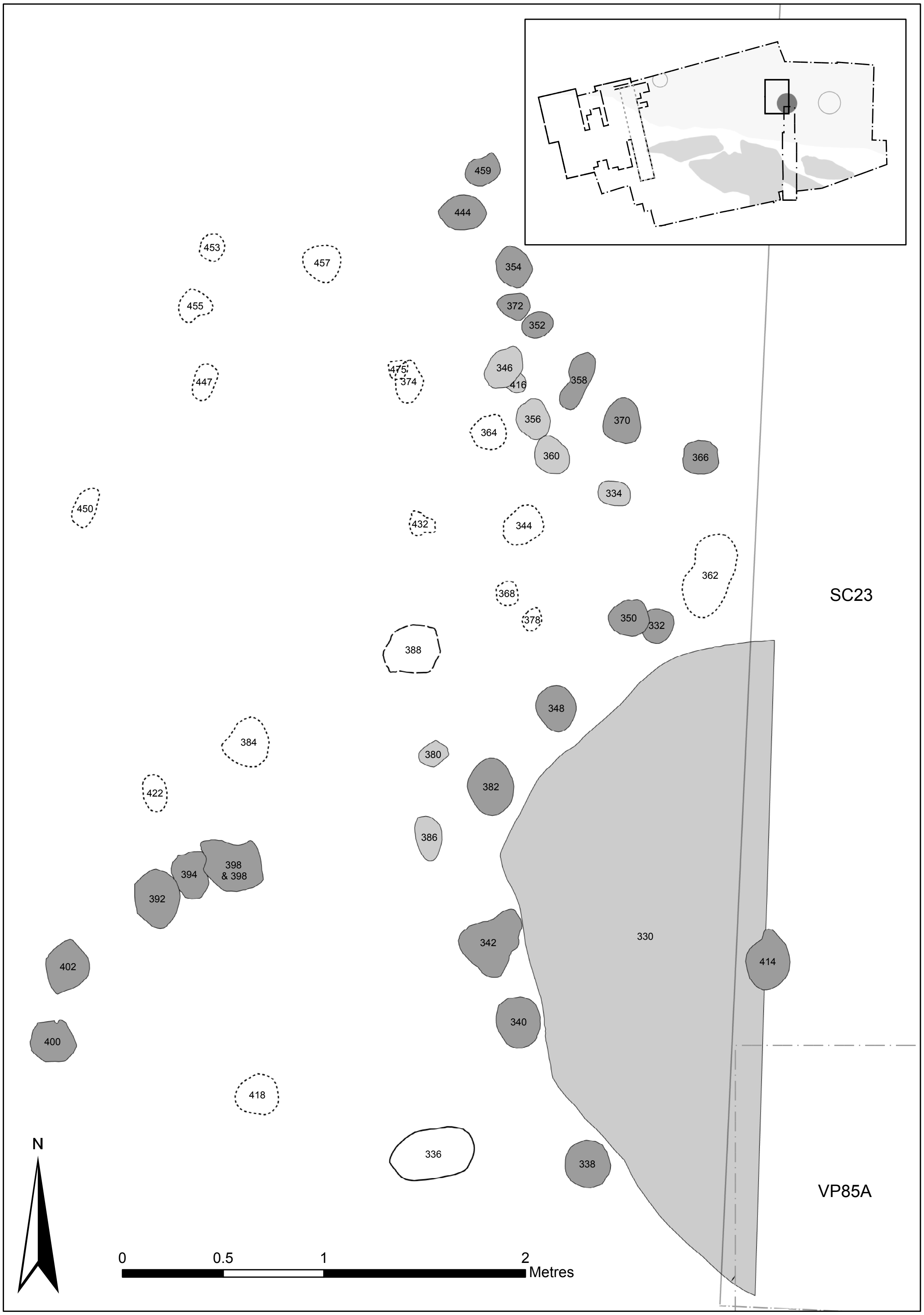

Figure 5.3: Plan of the central structure and postholes around it (Copyright Star Carr Project, CC BY-NC 4.0).

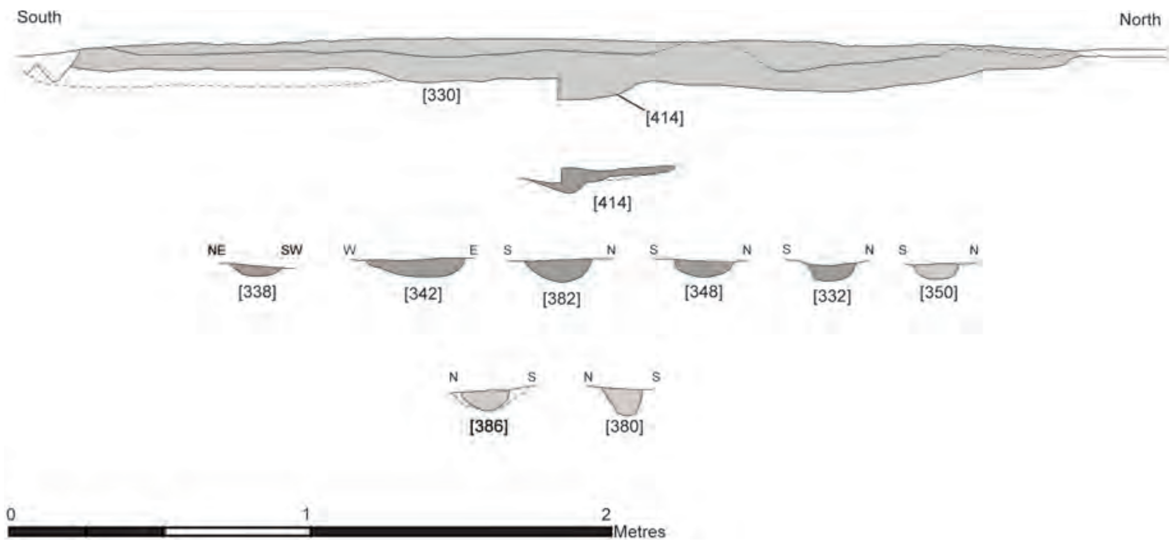

Figure 5.4: Profiles of the features comprising the central structure (Copyright Star Carr Project, CC BY-NC 4.0).

shown the area delimited by the hollow and the surrounding features is very different to the area outside of these features, which may suggest the presence of a wall or other barrier (Chapter 21). In addition, the very different geochemical signature recorded immediately to the south-west could indicate the presence of an entrance or exit to the structure at this location (Chapter 21 and see below). If the hollow and the surrounding postholes formed a regular shape, the structure probably formed an oval, orientated north-west/south-east, with an overall footprint of c. 4 m by c. 3 m. This would have been slightly larger if the outer pair of possible postholes formed part of the same structure. With the exception of feature [380] (which is likely to have held an upright post), there is no indication of whether the posts (and therefore the walls) were vertical or at an angle. It is possible that feature [414] may have held a central support or other internal feature, though this may have been unnecessary depending on the character of the structure. In contrast to the western and eastern structures there is very little lithic material associated with this structure, and most of the material recovered probably post-dates its use (Chapter 8).

The northern structure

A possible further structure (the northern structure) can be suggested to the north of the central dryland structure. This structure consists of an arc of eight features ([366], [370], [358], [352], [372], [354], [444], [459]) that runs for just over 2 m, with a second, shorter arc made up of five features ([334], [360], [356], [416], [346]) along its western side (Figures 5.3 and 5.5).

The features of the inner arc are all round or subround (feature [358] appears oval in plan but is actually made up of two smaller, rounded features). Features [352], [372], [444] and [459] have angled sides that slope down to a small curved base and could be stake or postholes (probably holding vertical stakes or posts). The remaining features have flatter bases with straight or sloping sides and cannot be assigned to a particular function on the basis of their form. The features forming the outer arc are sub-rounded/oval in shape. Of these, the profiles of features [360] and [346] could suggest that they were the remains of postholes, whilst the others are more ambiguous.

The northern structure is made up of at least one arc of features. Of the inner arc, four features can be interpreted as postholes on the basis of their morphology, and the remainder have been interpreted as the potential remains of postholes on the basis of their spatial relationship. It is possible that this arc of features was part of one side of a larger, circular or oval structure that extended to the north and east into trench SC23 but that the remaining postholes were either missed during the earlier excavations or had left no visible trace. If this is the case then the footprint of the structure was approximately 3.2 m by 2.8 m. Alternatively the structure may only have consisted of an arc of postholes, possibly supporting a wall or other structural feature. None of the features were deep enough to support a free-standing post of any significant height, suggesting that either the

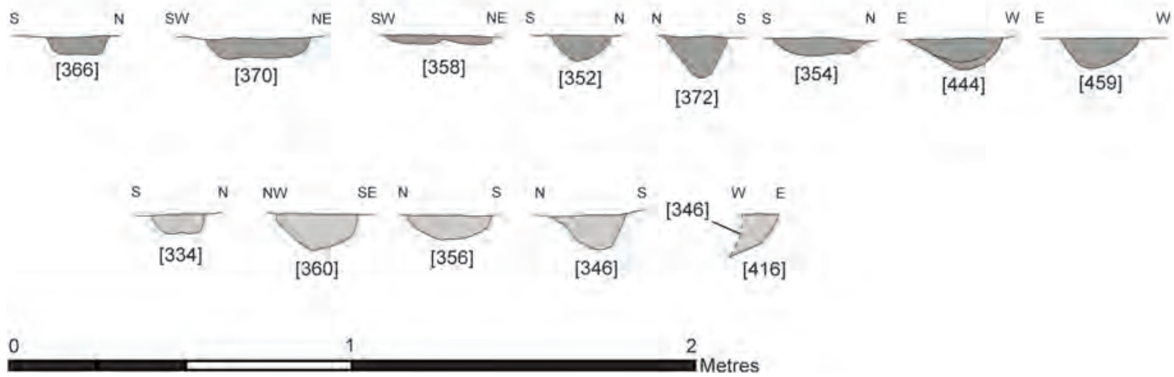

Figure 5.5: Profiles of the features comprising the northern structure (see Figure 5.3) (Copyright Star Carr Project, CC BY-NC 4.0).

posts were short, or that the purpose of the features was to hold posts in position rather than provide structural support in their own right. The outer arc is more tenuous than the inner one, though at least two of these features are potential postholes, probably holding vertical posts. This may represent part of the same structure or a separate arrangement of postholes.

Other potential structural features and pits in the central area

In addition to those features described above there were a scattering of features to the west and north of the central structure. Amongst these is an arc of six features ([400], [402], [392], [394], [398] and [396]), which lies to the west of the central structure (Figure 5.3 and 5.6). The features are all broadly sub-rounded (though the actual shape in plan of features [396] and [398] is difficult to discern), with sloping sides and a rounded base, though they vary in size and depth. There are at least two phases to this arrangement. Feature [394] is later, and cuts feature [398]. Features [398] and [396] also inter-cut, though the relationship between the two could not be established.

Most of the remaining features were classed as either potential postholes or as potential posthole/pits on the basis of their shape. None form a clear arrangement that could be interpreted as a building in the same way as the eastern, central or western structures, though they may have formed parts of smaller structural features. One feature [336] was identified as a pit on the basis of its fills. This was a small, oval feature 420 × 240 mm, with a bowl-shaped profile, that lay just outside the central structure (Figures 5.3 and 5.6). The fill (337) of the pit contained a very tight concentration of 25 pieces of worked flint and 24 fragments of animal bone. Most of the flint and all but one piece of animal bone have been heat affected, though there was no indication of in situ burning, suggesting the material had been collected together and then deposited into the feature. A second feature [388] has been interpreted (albeit tentatively) as a possible pit on the basis of its shape and size.

Finally, a single feature [451] lay approximately 7 m to the south-west of the central structure and the main concentration of pits and postholes (see Chapter 20, Figure 20.4). The feature was oval in plan, with a diameter approaching that of the larger pits and postholes, but was deeper (c. 30 mm deep) than other features at the site. From its profile, it could have supported a relatively wide and tall post, though given the lack of any associated features (and the absence of finds from its fill) it is difficult to infer a possible function.

Geochemistry in the central area

The results of the geochemical analysis provide some further information on the character of the structures in this part of the site and their relationship to the surrounding area (see Chapter 21 for a full discussion).

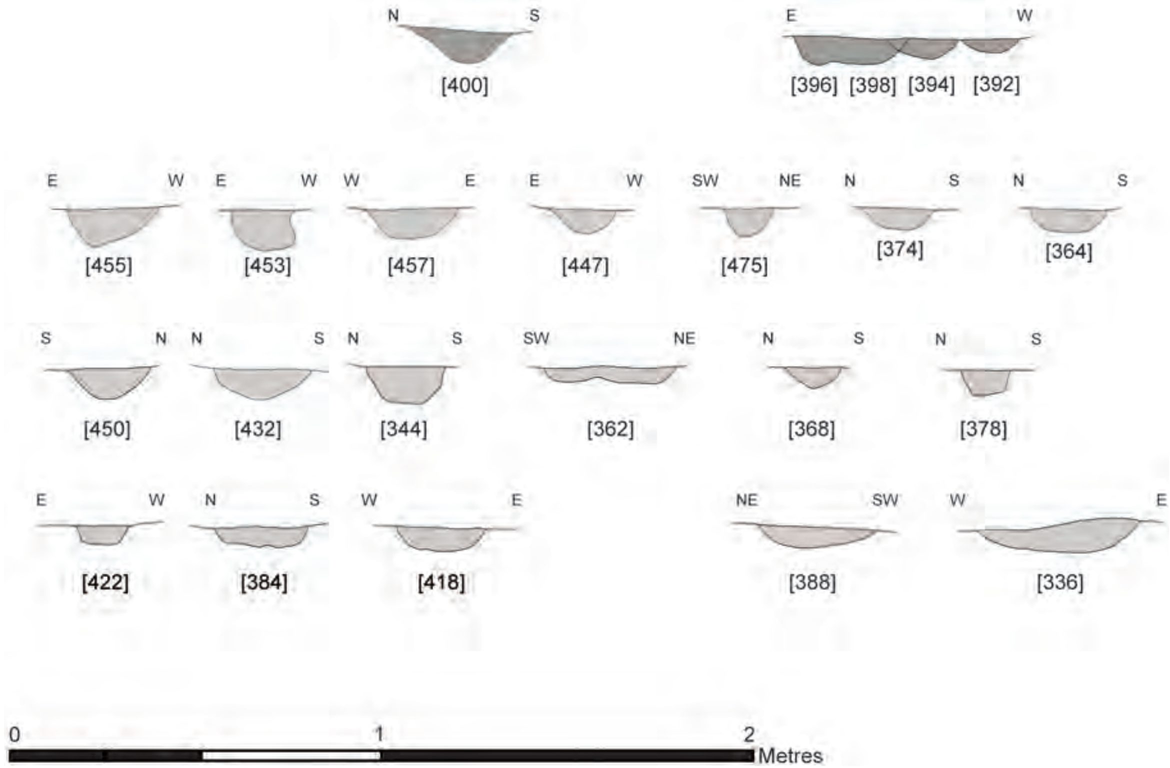

Figure 5.6: Profiles of other potential features in the central area (Copyright Star Carr Project, CC BY-NC 4.0).

The analysis has shown the samples taken from the area delimited by the postholes of the central structure are depleted in elements when compared with samples from outside the structure. This implies that activities within the structure were physically bounded, presumably by a wall or other barrier. It would also suggest that either the nature of activity within the structure was notably different to that taking place outside or that the interior of the structure was kept clean and that material was being removed and deposited elsewhere.

Samples taken just to the south-west of the structure have very high levels of phosphorus/phosphate which may be the result of more intensive deposition of organic material. This could be the result of waste material (potentially human waste) being deposited here from within the structure, implying the presence of an entrance. Alternatively it could relate to the use of pit [336], the fill of which contained a high proportion of burnt animal bone and flint.

The eastern structure

The eastern structure consisted of a shallow, irregularly shaped hollow, surrounded by an arrangement of 18 possible postholes (Figures 5.7 and 5.8). The central hollow was c. 200 mm deep with a maximum diameter of just over 2.8 m and had two distinct fills; an upper fill, which contained large concentrations of flint, and a lower fill, from which a much smaller assemblage of lithic material was recovered. Micromorphological analysis of these deposits showed that the lower fill had a very high organic content, probably resulting from the presence of a basal layer of plant material (such as reeds or bark) within the hollow, which had become oxidised, humified and bioturbated (French 2008). Although macroscopically visible charcoal was not noted within this feature during excavation (Conneller et al. 2012), more recent flotation of samples from the hollow have recovered small quantities of charcoal (deriving from birch and willow/poplar) whilst micro-charcoal was recovered from throughout the deposits (see Chapter 32).

Figure 5.7: The eastern dryland structure looking east, with the hollow and postholes around it which have been half sectioned (Copyright Star Carr Project, CC BY-NC 4.0).

The posthole features range in size and vary in their shape and profile (Figures 5.8 and 5.9). Feature [199] is clearly a posthole that held an upright post, as it contained a post-pipe with vertical sides and a rounded base. In addition, the profiles of features [177], [179], [181], [193] and potentially [171] and [201], which all have straight, near vertical sides and rounded bases, are also suggestive of postholes. Of these, the profile of feature [177] suggests that it could only have held a vertical post. The profile of feature [181] also suggests that it held an upright post, as the side closest to the hollow is vertical (if it held a post at an angle the profile would be more likely to slope towards the hollow) and the same is likely to be true of feature [201]. Of the remaining features, several could potentially be small pits, particularly features [169], [191] and [207], which have more regular bowl-like forms.

These features around the hollow comprise four spatial groups. The first two groups consist of arcs of possible features on the eastern side of the hollow; an inner arc of five features ([158], [156], [191], [207] and [193]), that lies up to 0.2 m from the edge of the hollow, and an outer arc of four features ([162], [160], [199] and [181]) that lies between 0.8 and 1.35 m from the hollow's edge. The other two groups are made up of separate clusters of features on the western side of the hollow; a southern group (features [169], [171], [173], [201] and [209]) and a northern group (features [167], [175], [177] and [179]).

The analysis of the lithic assemblages from this part of the site has shown that much of the refitting material respects the footprint formed by the outermost features surrounding the hollow (see Chapter 8, Figure 8.15). This would strongly suggest that at least some of the outer features supported a wall, which presumably formed the outer extent of the structure, whilst the remaining features were either internal supports or were part of other internal structures. Assuming that postholes were originally present along the entire length of each wall, then the structure would have been roughly trapezoidal in shape, with a curving wall at its south-east end, and would have been just over 4.1 m long and at least c. 3.6 m wide. However, it is possible that some features were missed during the excavation, or that the postholes were too slight to leave any trace, in which case the structure may have been circular or oval.

It is unlikely that the outermost postholes held large, substantial timbers. Of those features with regular, straight sides, none have a diameter greater than 190 mm, whilst the post-pipe in feature [199] has a diameter

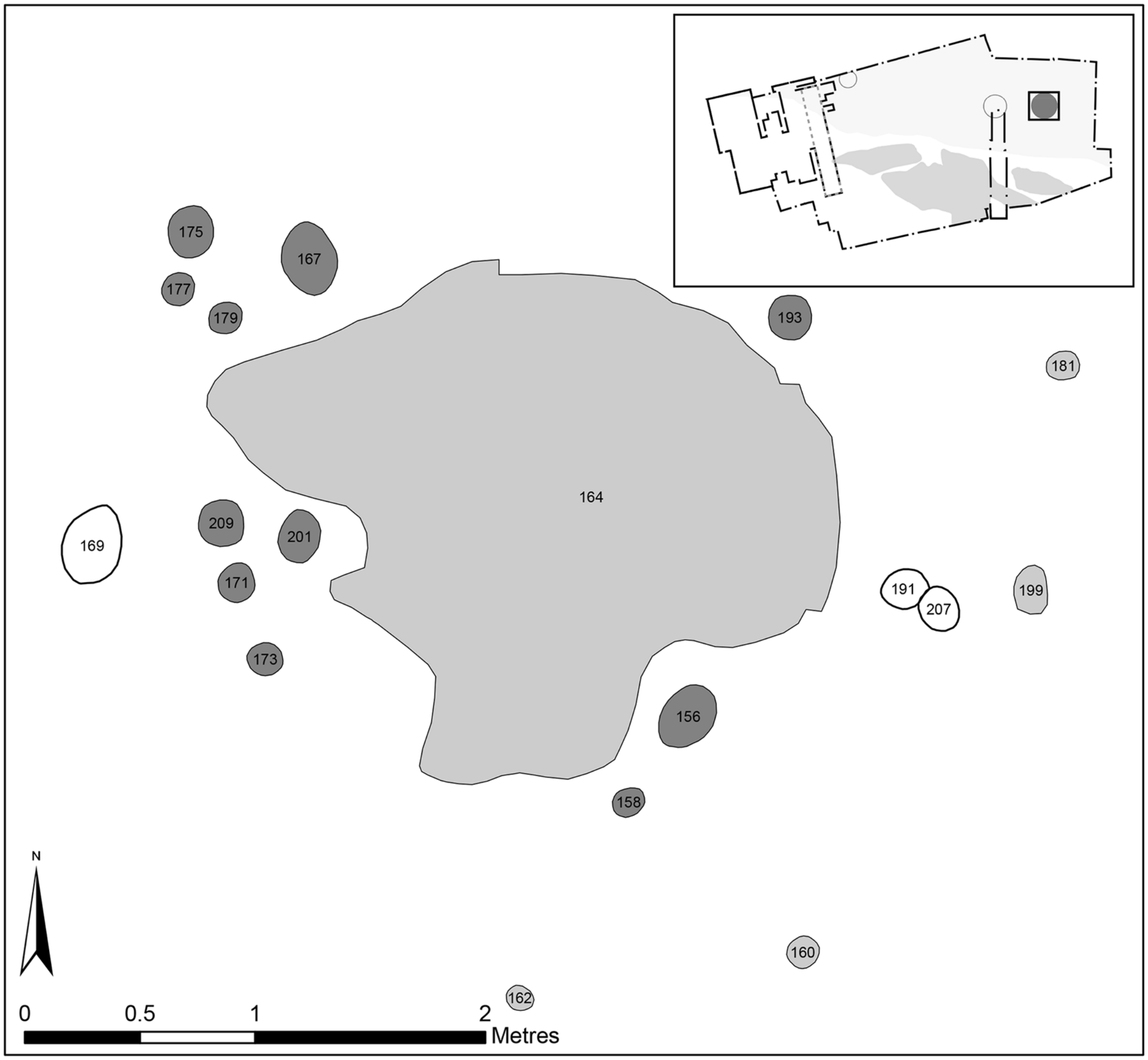

Figure 5.8: Plan of the features comprising the eastern dryland structure (Copyright Star Carr Project, CC BY-NC 4.0).

of only 60 mm. If the post-pipe is indicative of the structure as a whole then it was probably constructed from relatively thin posts or poles, though it is certainly possible that some of the features held thicker posts. From the orientation of the post-pipe in feature [199] and the profiles of the other postholes, these were probably held in an upright position. There is no clear evidence for an entrance, although both the north-east and south-west areas are free of posts and the lithic refitting suggests a possible entrance to the south-west (Chapter 8).

Conclusions

At least four structures can be identified from the arrangements of cut features and their relationship to the distribution of worked flint across the dryland parts of the site. Of these, both the eastern and central structures consisted of a hollow with postholes around it that probably held some form of wall (and potentially a roof). If the postholes of the northern structure originally formed a complete circuit then this may also have been a

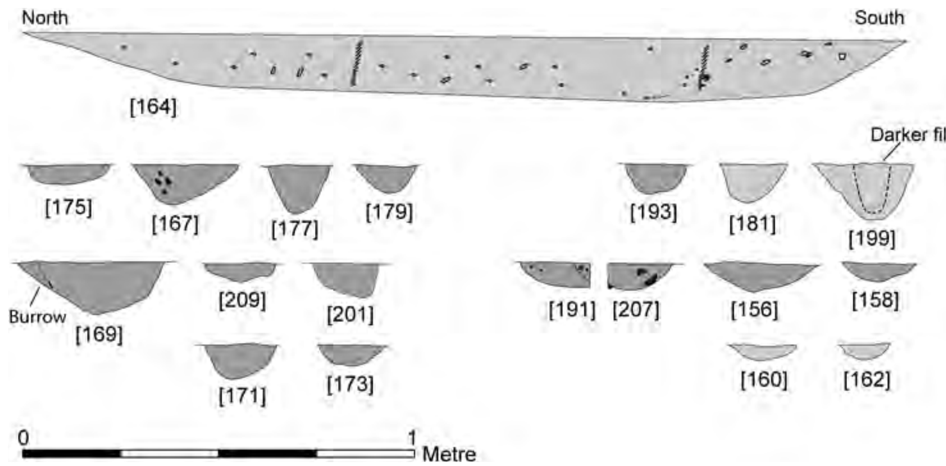

Figure 5.9: Profiles of the features comprising the eastern dryland structure (Copyright Star Carr Project, CC BY-NC 4.0).

walled, possibly roofed structure. Assuming this was the case, then all three are a similar oval shape and broadly comparable in size, ranging from 3.6–4.2 m long and 2.6–3.8 m wide. The character of the western structure appears to have been different and the excavated features may have held internal supports for a larger structure.

Both the eastern and possible northern structure appear to have been built with relatively thin upright posts or poles. The post-pipe in feature [199] has a diameter of only 60 mm, and if we take this as indicative of the size of post held by features of a similar size, then it most probably held thin posts or poles up to 100 mm thick. Posts at the smaller end of this range are unlikely to have borne the weight of a roof, and instead probably formed part of a frame or lattice made from relatively thin, flexible stems that was essentially self-supporting. In this case, the function of the postholes was probably to hold this frame in place and stop the building from moving. Though we lack the evidence from the central structure we could assume that it was built using similar methods.

Drawing on examples from the historical and ethnographic literature, there are several ways in which such a building could be constructed (Faegre 1979). One way is to set long poles (typically young saplings) into a circular or oval arrangement of postholes and then bend these over to create a dome or tunnel. Where the saplings meet in the middle of the dome, they are bound together using cord made from tree bast or other plant materials. Horizontal poles may be added, again lashed to the saplings using plant materials, to create a sturdier frame, which is then covered to create walls and a roof. These coverings are sometimes held in place by a second outer frame, or by angled poles.

Alternatively, if we assume that some of the posts were at the wider end of the range (perhaps 100 mm diameter or slightly more), then some of the inner postholes in the eastern structure might have performed a structural function, possibly supporting an internal set of more substantial upright posts that provided additional support for an external frame. In ethnographic examples these upright posts support a circular arrangement of horizontal beams, that in turn help to support an external conical frame constructed from poles or saplings set into an outer ring of postholes. Again, this outer frame is reinforced by the addition of horizontal poles, and the frame is then covered with other materials to create solid walls. In the case of the central structure, the single possible posthole from the centre of the hollow may have also acted to help support the external frame.

Whilst there is no archaeological evidence for the materials that were used to form the walls and roof, from the historical and ethnographic literature it is clear that there were a range of possible choices available to the inhabitants of Star Carr (Figure 5.10). This could include thatch (possibly of reeds), mats made from reed (stitched or woven together), birch bark or animal hides. Reed mats could also be attached to the inside of the frame, to help insulate the structure, or used as flooring. Given the amount of woodworking debris in the wetlands at Star Carr, it is also possible that thin, split timbers may have been used, either for the walls, roof or perhaps both.

Figure 5.10: Reconstruction of a Mesolithic-type house built at Archeon, an archaeological living museum in the Netherlands. This structure is larger than those found at Star Carr (7 × 5 m by 3.5 m high) (Copyright Leo Walterbeek, CC BY-NC 4.0).

The western structure is difficult to interpret as it lacks a relationship with a central hollow or a particularly coherent alignment and is not so clearly respected by the associated lithic scatter. This makes it harder to tell if the features represent single or multiple structures, or the function they may have performed in its construction. Assuming the features all held upright posts then they could feasibly have provided internal supports for a larger structure, the outer edge of which is reflected by the edge of the dense concentration of burnt flint. This may have been constructed in a similar way to the eastern structure, with an inner set of uprights, possibly supporting horizontal beams, and an outer frame of thinner saplings set into postholes that were not substantial enough to leave any trace. Alternatively, one or more of the postholes may have held a central upright post, which supported a covering of hides or similar material that was pegged into the ground on an arc defined by the extent of the lithic scatter, though such an interpretation is tentative.

However, the features need not have supported a roofed structure and their location may suggest that they performed other functions. This could include racks made from a framework of upright and possibly angled, posts or poles that could be used for drying or smoking fish, or plant materials, or for processing hides. This would certainly fit with the more rectilinear arrangement of the possible postholes and potentially the evidence for burning and craft activities represented in the flint assemblage (see Chapter 8). Similar features may also have resulted in the scatter of possible postholes in the area around the central structure. Though few of these form a coherent pattern, at least some may be the remains of storage structures, either built on the ground or raised on timber frames with floors made from split timbers or bark mats and used to store foods, materials, or items of equipment. Similarly, they could have been drying racks. Given the evidence for fish processing, plant processing and hide working on the site (Chapter 8), frames for such activities are certainly a possibility.

Overall, it is important to note that the structures that have been identified probably represent a fraction of the built structures on the site. For example, settlements of the Khanty, in Western Siberia, can include storage sheds, wood piles, ovens, raised caches, shelters for dogs, fenced smudge hearths (to repel mosquitoes) and stakes for hanging boots to dry, as well as dwelling structures (Glavatskaya 2006). Not only would many of these be hard to identify from arrangements of postholes, even with associated material culture, but some would leave little or no archaeological trace. Temporary lean-to shelters made from arrangements of wooden poles would not require postholes and neither would frames used for cooking food over fires, or drying meat or fish, whilst some more substantial buildings such as timber-built storage sheds or smokehouses can be free-standing. What is more, people at Star Carr may have used living trees as part of the structure of some buildings. The Orochen Evenki of southern Siberia construct storage structures (guula) on wooden platforms built on the trunks of living trees (Anderson 2006, 18), whilst some temporary structures and tents also make use of trees. Again, such structures would leave no archaeological trace but may well have formed part of the architecture of sites such as Star Carr.

The Star Carr structures are the earliest known examples of Mesolithic buildings in Britain and Ireland and contribute to the growing body of evidence that we have for architecture in this period. The only other structure that may be close in date to those at Star Carr was recorded at Deepcar, South Yorkshire (Radley and Mellars 1964). Though this was similar in size to those found at Star Carr, c. 3.4 × 2.1 m and was focused on a central hollow, there were no postholes and instead the hollow was delimited by stones. Another potentially early structure may be present at Three Ways Wharf (Lewis and Rackham 2011), where the distribution of worked flint making up one of the scatters may reflect the presence of a tent or building.

The evidence becomes more extensive as we move into the centuries around 8000 cal BC, when we see the appearance of larger, circular structures such as those excavated at Mount Sandel, Ireland (Woodman 1987; Bayliss and Woodman 2009), Howick, England (Waddington 2007), East Barns (Gooder 2007) and Echline, Scotland (Robertson et al. 2013) and Ronaldsway airport on the Isle of Man, excavated by Oxford Archaeology. In most cases these structures are focused around a deliberately constructed hollow with postholes running around the inside edge of the cut, some of which are angled inwards towards the centre of the feature. This would suggest a more conical structure than those at Star Carr.

Whilst it is tempting to see these later structures as representing the appearance of a new and distinct architectural tradition, there are distinct differences in the way they were built. In particular, Woodman has argued that whilst a deep, central hollow was certainly an aspect of the construction of the Howick structure, the shallow sunken areas at East Barns and Mount Sandel may simply have been the result of levelling the area ahead of the building of these structures (Woodman 2015, 309). As other researchers have noted, there are also a range of other structural forms during this, and later stages of the Mesolithic (e.g. Wickham-Jones 2004). Indeed, if the existing evidence for Mesolithic architecture is characterised by anything, it is diversity rather than similarity and until we find more Early Mesolithic sites with structures and generate a larger dataset we cannot be sure of any apparent patterning. Nevertheless, the data from Star Carr adds to the repertoire and range (both chronological and geographical) of Mesolithic architecture, and provides important new information on the way such structures were used.

CHAPTER 6

Wooden Structures

Michael Bamforth, Maisie Taylor, Barry Taylor, Harry K. Robson, Anita Radini and Nicky Milner

Introduction

In the years following Clark's excavations at Star Carr, archaeological attention has focused on the large assemblage of osseous material culture and faunal remains that were recorded from the site. However, an equally important feature of the site's archaeology was the platform of birch 'brushwood' that appeared to have been constructed at the edge of the lake in order to serve as an occupation surface (Figure 6.1). The significance of this find is reflected in the detailed manner in which it was described in Clark's first interim excavation report.

> 'The most interesting feature revealed by methodical excavation of the culture zone was the presence of a rough flooring of birch brushwood (plate ix). Some of the birch stems retained their bark and they were evidently thrown down with their side-branches intact. In certain cases the wood appeared to have been split and in places the upper surface showed signs of charring. As the work proceeded it became evident that … there was more than one phase of building: a lower level, rich in cultural material and interlaced with bone and antler, dipped with the surface of the gravel; and an upper one, more deliberately constructed of stems thrown across the line of our cutting, running out more or less horizontally … Although a few timbers had been rammed in obliquely, no certain traces of piles were found. No traces of any superstructure were observed, but the brushwood was covered in places by flattened birch-bark, (Clark 1949, 56).

By 1950, following the second season of excavations, Clark's understanding of the brushwood layers had developed further. To begin with, more thorough excavations of the upper layer showed that it was a natural accumulation of material rather than an archaeological horizon (Clark 1950, 109–10) (Figure 2.3). However, the lower layer continued to be interpreted as an occupation surface based largely on the presence of material culture and in particular the close correlation between the highest densities of worked flint and the extents of the brushwood (Clark 1950, 110–11). From the palaeoenvironmental analysis, Clark argued that the wood had been laid down to stabilise the surface of the swamp in order to allow the inhabitants of the site to camp at the edge of the lake (Clark 1950, 113; Clark 1954, 9). He also recorded stones and wads of clay which he argued

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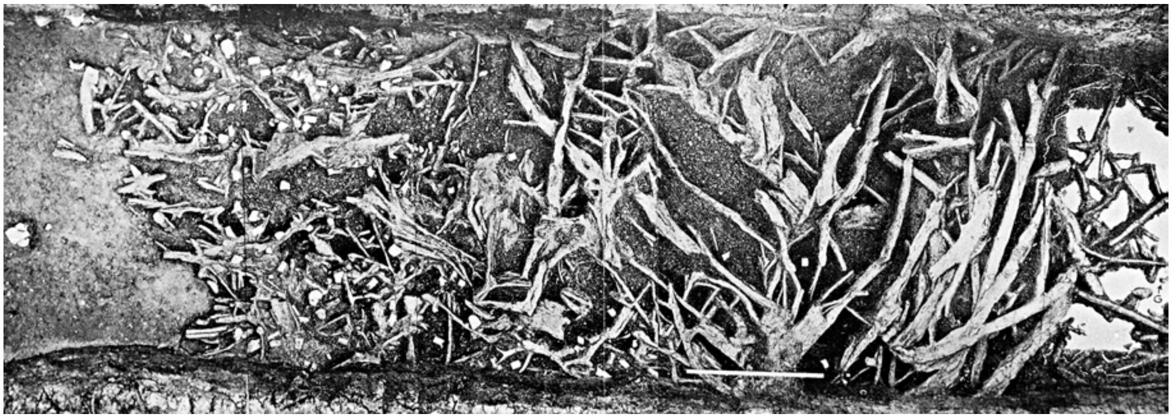

Figure 6.1: Composite photograph of the 'brushwood' from Clark's excavations (Copyright David Lamplough, CC BY-NC 4.0).

had been laid down in order to consolidate the brushwood and two large birch trees that had been deliberately felled (Clark 1950, 113), which he later suggested may have served as a 'primitive landing stage' (Figure 2.4) (Clark 1954, 2).

Subsequent reinterpretations of the site have questioned the anthropogenic nature of the platform and have suggested that the material probably represents a natural accumulation of wood that built up at the edge of the lake (e.g. Price 1982). However, Mellars countered this by arguing that the distribution of worked flint recorded by Clark from the brushwood reflects in situ activity areas and, as such, the wood must represent an occupation surface (Mellars and Dark 1998, 221). Reconciling these two arguments, Rowley-Conwy (2010) suggested that as the site was occupied in the summer when lake levels would be seasonally low, the area where the wood was accumulating could have served as a temporary occupation area (Rowley-Conwy 2010, 79–80).

In 1985 a more substantial wooden structure was recorded during the excavation of trench VP85A, some twenty metres from Clark's trenches (see Chapter 2). This consisted of a series of large timbers laid roughly parallel to each other and running diagonally across the trench (Figure 2.6). Analysis of the timbers showed that they had been split either tangentially, radially or across the grain with several pieces showing additional working traces and tool marks were identified on one piece that probably represented cleaving (Mellars et al. 1998; Taylor 1998). It was posited that the wood had been worked using either flint adzes and axes or elk antler mattocks, whilst aurochs metapodials, red deer tines or roe deer antlers could have served as wedges (Mellars et al. 1998). Samples taken from the timbers and analysed by Jennifer Jones identified the species of wood as aspen (*Populus tremula*) or willow (*Salix* sp.) (Mellars et al. 1998).

The structure was interpreted as a platform, laid to consolidate the wetland deposits or as a trackway to facilitate access to the lake itself, presumably for watercraft (Cloutman and Smith 1988, 52; Mellars et al. 1998, 62). Based on the stratigraphy of the timbers it was suggested that at least two episodes of wood accumulation had taken place (Mellars et al. 1998, 50). Importantly, this structure bore no resemblance to the brushwood platform or the two trees that Clark had encountered, either in terms of shape or the material from which it was composed.

The current project, and in particular the open-area excavation of the lake edge deposits between Clark's trenches and the area to the east of VP85A, has provided a far more detailed record of the construction and use of wooden structures within the Star Carr wetlands. A total of 4516 pieces of wood were recorded, of which 1602 have been split, trimmed or hewn. Three large timber platforms have been recorded (the central, eastern and western platforms) as well as a more diffuse scatter of wood, which may also have performed a structural function (the detrital wood scatter) (Figure 6.2). A deposit of largely unmodified roundwood (the brushwood area) was also recorded, as was an assemblage of wood from the unexcavated baulk between Clark's cuttings I and II, and the area to the south of his trenches (Clark's area). The wood assemblage has been broken down into a series of spatial analytical groupings representing identifiable structures or discrete scatters of material and a group labelled 'other' for the material that was recorded outside of the distinct spatial groupings (Figure 6.3).

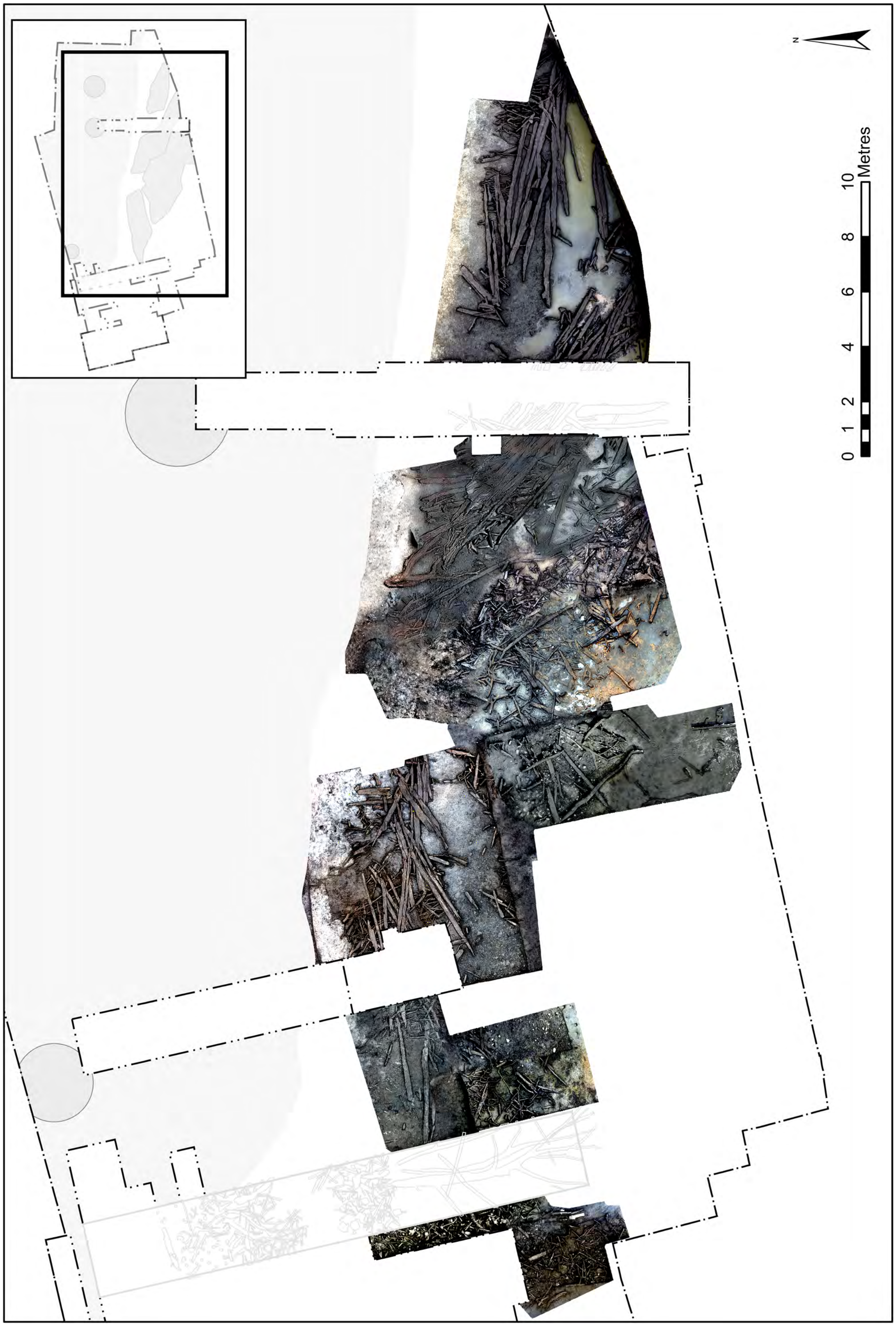

Figure 6.2: Composite orthophoto showing the principal wooden remains on site and what the site would have looked like had it been possible to excavate them all at once (exported from Agisoft Photoscan Pro). However, it should be noted that these wooden structures were not all in use at the same time (see Chapter 9). Each of the models can be viewed in more detail via the ADS (https://doi.org/10.5284/1041580) (Copyright Star Carr Project, CC BY-NC 4.0).

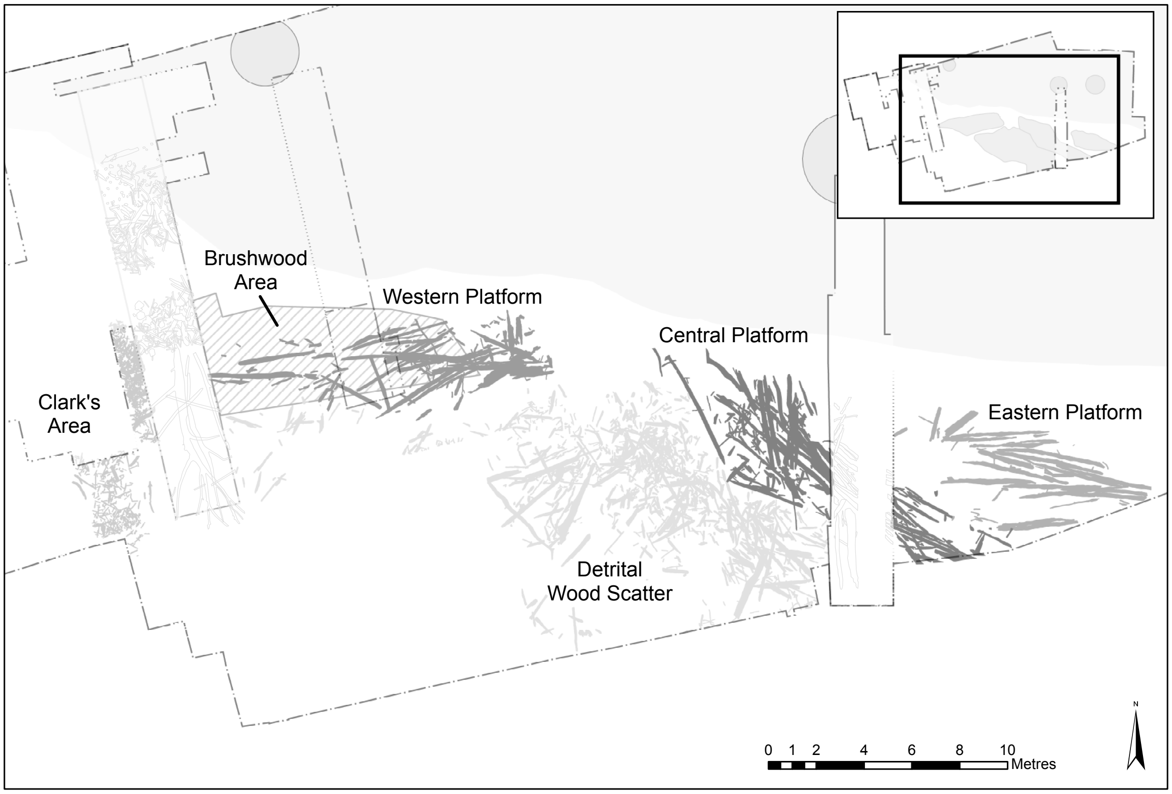

Figure 6.3: Location of the principal wooden remains (Copyright Star Carr Project, CC BY-NC 4.0).

Condition

Unfortunately, the deterioration of the deposits has had a serious effect on the condition of the wood and Chapter 22 presents the methods and further results of the condition survey. Within the assemblage as a whole, a high degree of compression was noted throughout. Overall, the results of the condition survey show that wood is best preserved in Clark's area and the brushwood (Figure 6.4). The borderline for meaningful wood-working analysis sits with material that scores a 3/moderate or above. The material from Clark's area has the highest percentage of material within this bracket (97%), on a par with the material from the brushwood area (95%) and somewhat better than the detrital wood scatter (80%) (Figure 6.4). However, it should also be noted that material in the west of the area of investigation tended to be in somewhat better condition than material towards the east, although the reasons for this are not clear.

The eastern platform appears to have the worst condition scores (30% scores 3/moderate or above) (Figure 6.4). Given the location of the material relatively high in the peat sequence and close to the edge of the lake, it is unsurprising that the majority of the material is in poor condition. In cross section, many of the timbers showed the upper half to be severely degraded with the wood's internal structure almost completely collapsed, whilst the lower half of the timber was in relatively better condition. The degradation of the material has obscured almost all surface evidence, with only a single example of tool faceting noted, and in several cases it was not possible to identify the primary conversion (split) of the material with any degree of confidence.

For the central platform, 52% of the wood scores 3/moderate or above. The material at the top of the upper layer was the least well preserved with condition generally improving with depth. The top timbers had badly degraded upper surfaces, the cross sections were highly compressed and intrusive roots were often visible. In addition, the platform lies on a slight slope which also led to variable preservation, sometimes noted within single timbers: the higher material, closer to the lake edge, had little or no surviving surface data such as tool facets or secondary tooling, limiting detailed analysis of this material (Chapter 22). Overall, 64% of wood from the

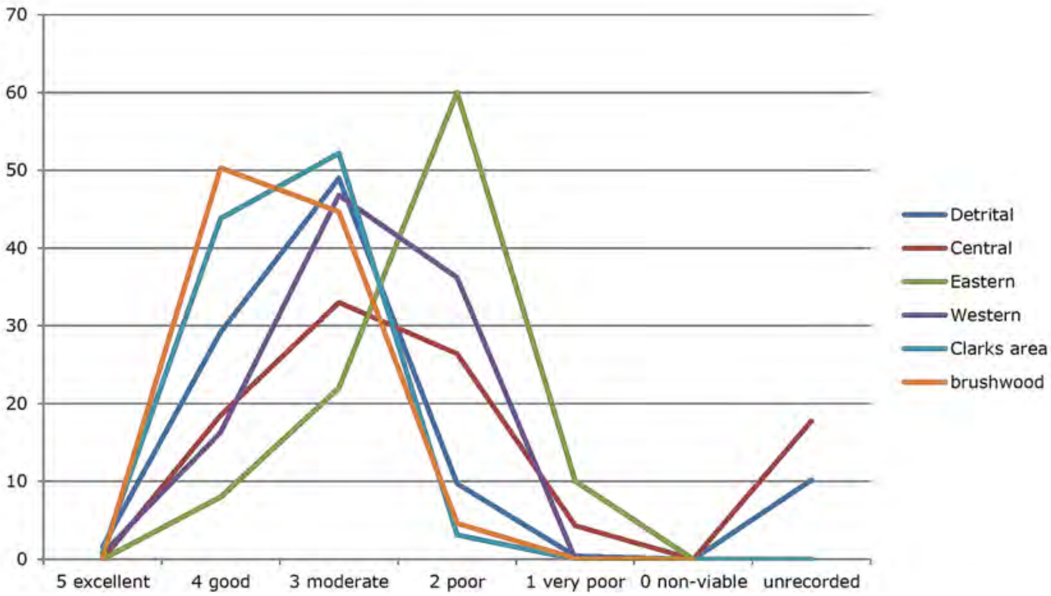

Figure 6.4: Results of the condition survey. The results are calculated as percentages for each area, i.e. in the brushwood 50% of items (1042 out of 2070) scored 4 (good) (Copyright Star Carr Project, CC BY-NC 4.0).

western platform scores 3/moderate or above. Here there are only three examples of tool facets. Again, in many cases, it is not possible to identify the primary conversion (split) of the material with any degree of confidence.

For all three timber platforms, where the end grain was exposed the wood was mottled yellow and black indicating oxidation and the subsequent associated bacterial action spreading through the wood via root holes and radially aligned voids generated by drying. When coupled with the high degree of compression, this material sits on the borderline for meaningful woodworking analysis. Due to the relatively poor condition of the material, it is only possible to achieve a ‘broad brush’ view of these platforms.

Wood categories

The wood assemblage has been split into six spatial analytical groupings reflecting either coherent structures or spreads of material (Figure 6.3): brushwood area, detrital wood scatter, central platform, eastern platform, western platform and Clark’s area. All material that does not fall into one of these spatially-defined groups is assigned as ‘other’.

Although every care has been taken when assigning items to a particular analytical group, the detrital wood scatter and the central platform are not clearly defined in plan. Although there is a clear delineation between the detrital wood scatter and the middle and bottom layers of the central platform, there is a possibility that some of the material assigned to the upper layer of the central platform may actually have formed part of the detrital wood scatter and vice versa.

As well as being assigned to a spatial group, each wood item has been categorised according to its macromorphology. As noted in Chapter 15, the system of categorisation and analysis of wooden items developed by Taylor (1998; 2001) has been adopted for this study. At the heart of this approach lies the subdivision of the assemblage into a series of categories. Although every effort has been made to ensure the categorisation is as objective as possible, it is still a subjective process. The principal analytical categories are:

Artefacts (ART): the categorisation of artefacts is discussed in detail in Chapter 29. This category consists of items that are objects (such as bowls), tools (such as hafts) or items that have been utilised as tools (ad-hoc tools). For the purposes of this study, stakes have also been included.

Timber (TIM): converted or unconverted material derived from trunk or branch wood with a diameter in excess of c. 100 mm, although length may also be considered. This is generally set at a slightly larger diameter (c. 150 mm, Goodburn 1992, 108) but has been reduced down for the purposes of this study as the trees are somewhat smaller in this Postglacial period (aspen, birch and willow) than the trees generally used as timber in later periods in the UK (ash and oak), to which this system is more normally applied. A further sub-division has been applied to timber from the Star Carr assemblage:

- *Trees (TIM – TREE)*: a substantially complete trunk of a tree that may or may not have been cleaned up: 'topped and lopped'.

Roundwood (RW): small-diameter material in the round derived from understorey growth, small trees (saplings), top and lop from older trees or coppice/pollard derived material. This category includes all the unconverted material smaller than timber (c. 100 mm in diameter).

Root (ROOT): the below-ground, woody element of a tree. As roots are often intrusive, they have been recorded but do not form part of the analytical assemblage.

Debris (DEB): culturally or naturally split material. Debris has several distinct sub-categories that material may be assigned to:

- *Roundwood debris (RWDEB)*: roundwood that has been split by cultural or natural processes.
- *Woodchips (WC)*: the small pieces of wood that are detached by a single blow of a tool, such as an adze or an axe.
- *Timber debris (TIMDEB)*: larger pieces of more complex split/worked woodworking debris or off-cuts derived from the reduction of timber.

The analytical assemblage consists of 4516 items, with material represented from all categories (Table 6.1). There has been some difficulty defining the difference between debris/timber debris and split timber as the material is all very similar in terms of conversion and appearance, with only the metric data varying. This issue has been addressed by considering split debris and timber debris together.

Original diameters have been suggested for split material where a complete radius from pith to bark or bark edge is present. Several abbreviations have been used to describe the features of waterlogged wood and the types of woodworking seen:

	Brushwood	**Detrital wood scatter**	**Central platform**	**Eastern platform**	**Western platform**	**Clark's area**	**Other**	**All**	**All**
Wood category	**Frequency**	**Frequency**	**Frequency**	**Frequency**	**Frequency**	**Frequency**	**Frequency**	**Frequency**	**%**
artefact	5	8	0	0	2	18	5	**38**	**0.8**
bark	83	12	3	0	0	1	4	**103**	**2.3**
debris	34	397	44	6	26	126	26	**659**	**14.6**
roundwood	1885	424	91	7	43	178	114	**2742**	**60.7**
roundwood debris	16	25	3	1	5	46	8	**104**	**2.3**
timber	8	225	94	27	55	14	15	**438**	**9.7**
timber debris	8	156	37	9	10	8	23	**251**	**5.6**
woodchips	31	82	4	0	0	59	5	**181**	**4.0**
total	2070	1329	276	50	141	450	200	**4516**	**100.0**

Table 6.1: Principal wood categories by analytical area.

- SB - Side Branch
- TR - Trimmed
- SP - Split
- HE - Hewn
- BE - Beaver damaged
- RAD - Radial
- TAN - Tangential

There are several unusual and distinct woodworking traces seen amongst the worked wood assemblage at Star Carr. These include items with lenticular cross sections and chamfered edges, the reason for which is unknown but might perhaps relate to the natural properties of the wood species whilst being cleaved. There is also a propensity for tangential outer splits and splits that fade/feather out at one or both ends. Similarly, there are many parallel sided split items and pieces with traces of longitudinal parallel grooves on split faces, both of which may be indicative of groove-and-split woodworking. Further traces that may be related to this practice consist of timbers which have scars that describe the cleaving away of smaller split pieces. For a full discussion of these see Chapter 28.

Species selection

A total of 180 taxonomic identifications were carried out on the non-artefactual and non-root wood recovered from the 2013–2015 excavations and the various taxonomic identifications have been interpreted as aspen, aspen/willow, willow, birch/alder/hazel and birch (see Chapter 15 for methods).

Amongst the non-artefactual assemblage as a whole, willow is the most frequent taxon identified, with moderate quantities of aspen, willow/aspen and birch and occasional birch/alder/hazel (Figure 6.5). In comparison to other wood categories, there is a strong tendency towards willow within the identified roundwood assemblage (Figure 6.5) with moderate quantities of aspen and birch, as well as occasional birch/alder/hazel

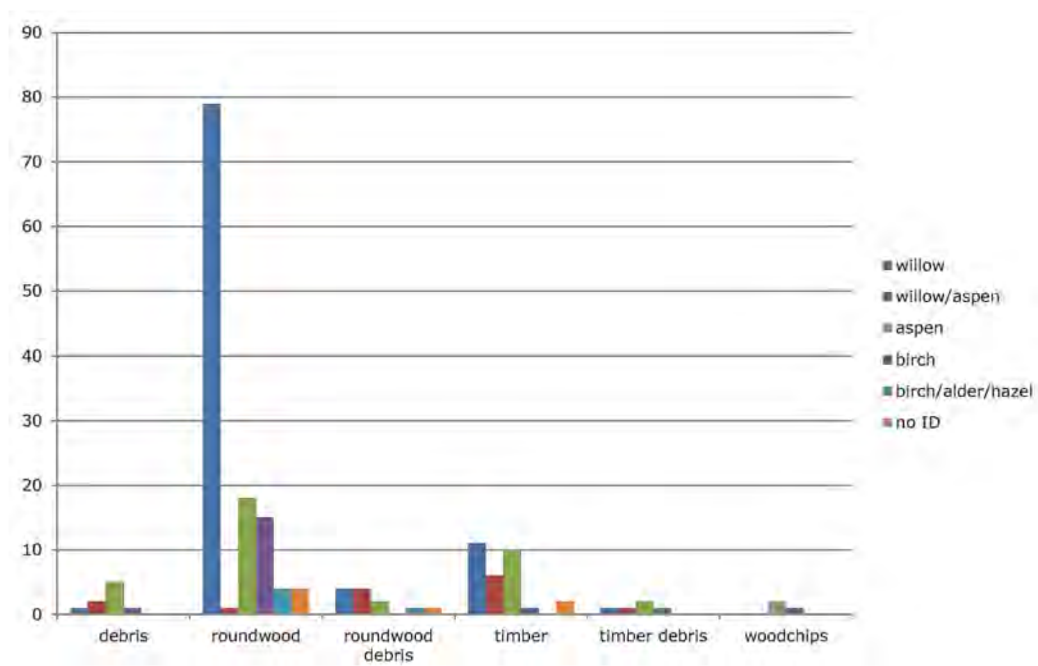

Figure 6.5: Frequency of taxonomic identifications by wood category (2013–2015 excavations only) (Copyright Star Carr Project, CC BY-NC 4.0).

present. Interestingly, if only roundwood with possible morphological evidence of coppicing is considered (see Chapter 28) then the incidence of willow rises to 80%, with birch, birch/alder/hazel and aspen still all present. The higher prevalence of willow is not repeated amongst the roundwood debris. Of the 30 identified items categorised as timber, willow and aspen are prevalent. There is a single item identified as birch (recovered from the detrital wood scatter). The taxonomic identifications carried out as part of the VP85A excavations of the central platform and a subsequent 2010 re-investigation suggested a strong tendency for timbers to be aspen, a finding that has been partially supported during this study (central platform timber identifications: aspen = 3, willow = 2, not identifiable = 2). However, there is a strong prevalence of aspen amongst the timbers of the western platform. These have been identified exclusively as aspen both during the current campaign and the 2007/2010 trial trenching (a total of 20 timbers across the two studies).

In summary, it seems that willow was preferred for roundwood, perhaps due to its propensity to regenerate as coppice stems (see Chapter 28) with aspen and birch also used. In terms of timber, aspen dominates with moderate use of willow and occasional use of birch. It should be noted that throughout Clark's reporting (Clark 1949; 1950; 1954) the wooden remains are identified exclusively as birch in terms of the artefacts (see Chapter 29), the recumbent trees and the birch brushwood platform, although no explanation is given as to how this was achieved. Given the relatively low prevalence of birch or birch/alder/hazel (13%) within the recently identified material, it seems likely that Clark's findings were to some extent based on assumption. This may well be linked to the propensity for the bark of waterlogged wood to turn a silver-grey colour as it dries, appearing to look like birch to the naked eye. However, it should be noted that the birch tree uncovered again in 2007 (Figure 3.9) was examined using techniques described in Chapter 15 and identified as birch by Allan Hall.

Results by Area

Clark's area

Introduction

This assemblage comprises a scatter of material that was recorded during the excavation of the baulk between Clark's cuttings I and II and the deposits immediately to the south of Clark's excavations in 2015 (Figures 6.6 and 6.7). It consists largely of roundwood and debris, though a wide range of other material is also present, including artefacts, woodchips and small quantities of timber. The full extents of the scatter are difficult to discern as it has been truncated on its northern and eastern extents by Clark's trenches and (for the most part) extended outside the limit of the current excavation to the south and west. The only clear indication of spatial patterning is seen in the material from the baulk, which becomes less dense and more diffuse at its southern extent and stops well clear of the edge of the 2015 excavation. From its location, the assemblage very probably represents a continuation of the wood encountered during Clark's excavations. However, there is no indication that this material formed a structural feature or was laid down as 'made ground', and instead it probably represents the deposition of material resulting from woodworking.

Analysis

Overview

The densest part of the assemblage lay within the baulk and was excavated and recorded in its entirety. Significant quantities of wood forming part of the same diffuse scatter were also encountered in the area to the south of Clark's trenches. However, due to time constraints, only a subsample of this material could be recorded (though this included all the worked timber recovered and a subsample of other worked material).

A total of 450 wood records are assigned to Clark's area (Figure 6.8). The majority (396, 88%) were within reed peat (312) with smaller quantities (54, 12%) within the underlying detrital mud (317), several being

Figure 6.6: Clark's area showing the wood excavated by Clark in cutting II (digitised from his plan) and the wood found during the recent excavations (Copyright Star Carr Project, CC BY-NC 4.0).

in contact with the basal gravel (320). Roundwood and debris make up the bulk of the assemblage, though there is a relatively high proportion of artefacts (the most recovered from any of the analytical areas) and woodchips. No material classed as trees was encountered in this area, though two birch trees were recorded during the original excavation of cutting II. There is evidence of charring on 51 items (11%). This occurs on a broad range of wood categories and is spread throughout the deposit (Table 6.2). In addition, two items, both recovered from the reed peat (312) have been gnawed by beavers: roundwood <116085> at one end and roundwood debris <116509> on a single side branch (see also Chapter 28). The preservation in this area is good. However, four items have ancient damage: two have ancient breaks at one end, a single timber seems to have been exposed and degraded prior to becoming waterlogged and one timber appears to have been broken in the ground in antiquity, the two halves becoming slightly dislocated from one another. It is interesting to note that the wooden artefacts recovered from this area also have an unusually high prevalence of ancient damage (see Chapter 29).

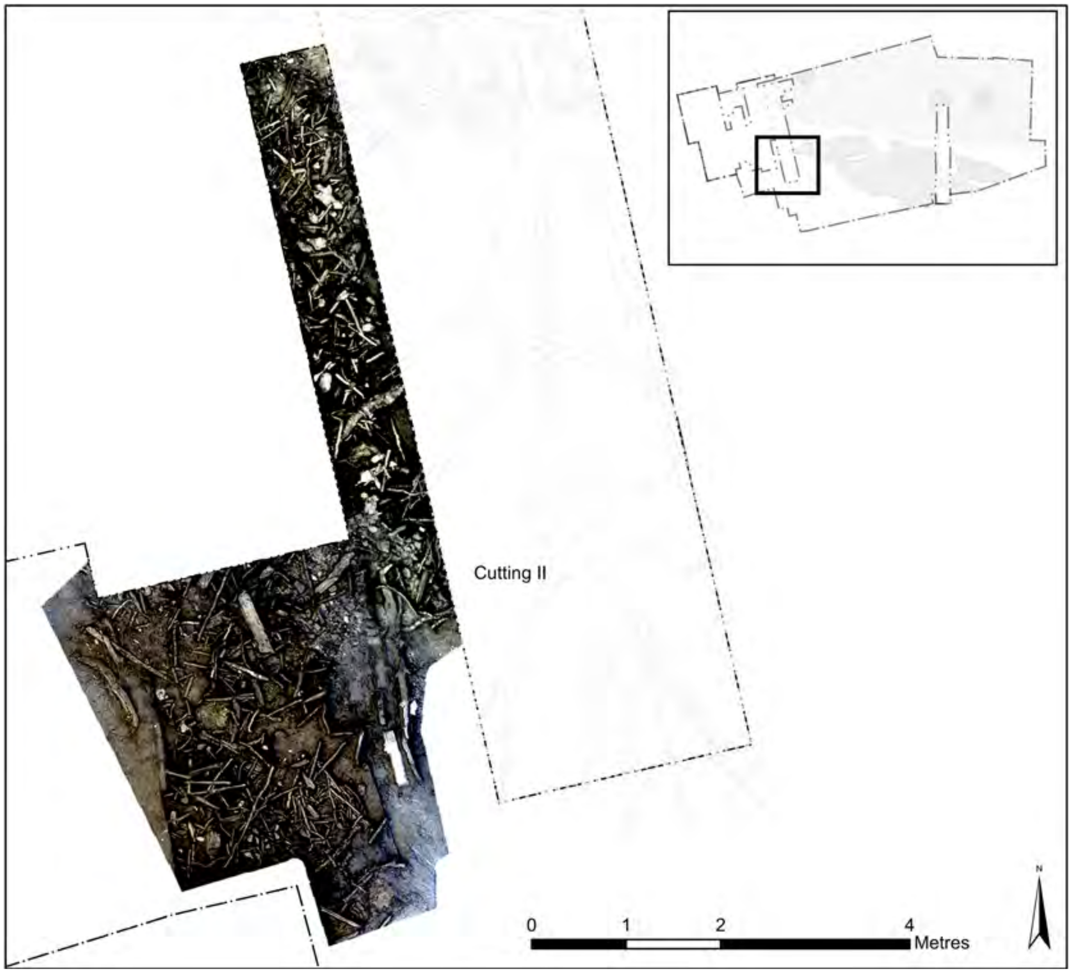

Figure 6.7: Composite orthophoto of Clark's area (exported from Agisoft Photoscan Pro) (Copyright Star Carr Project, CC BY-NC 4.0).

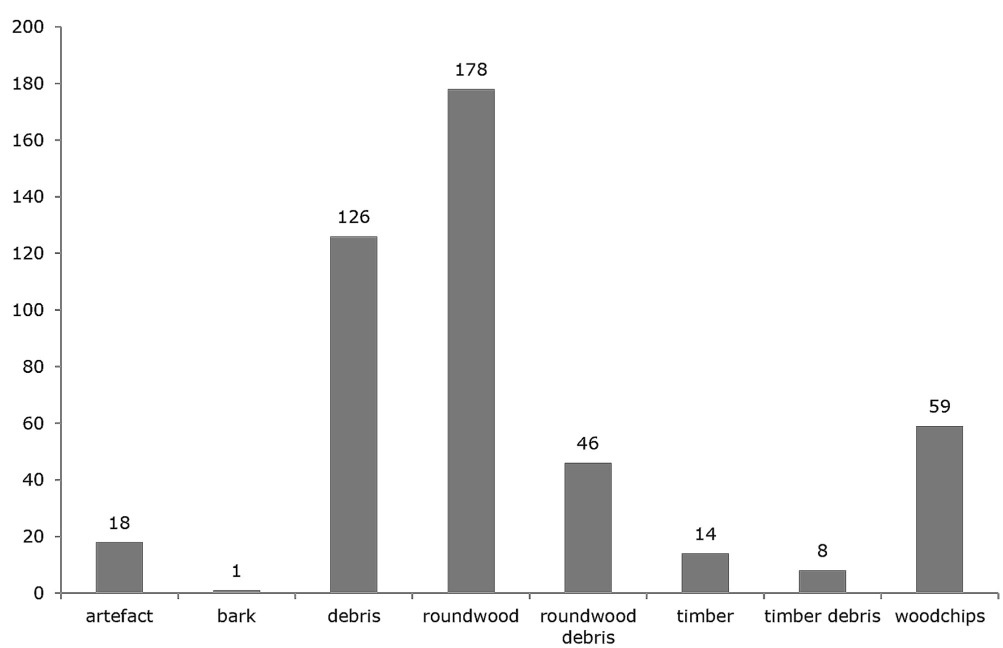

Figure 6.8: Wood categories from Clark's area (Copyright Star Carr Project, CC BY-NC 4.0).

Number	Type	Split	Charred?	Notes
114862	RW	N/A	Heavily	All over
114884	DEB	N/A	Heavily	All over
114895	RWDEB	Tan	Moderate	Outer face
115758	RW	N/A	Charred through	One end
115761	DEB	Tan	Moderate	One face
115762	RW	N/A	Charred through	One end
115773	RWDEB	Rad 1/2	Moderate	Outer face
115815	RW	N/A	Moderate	One face and one end
115817	RW	N/A	Lightly	One end
115818	DEB	N/A	Heavily	One face
115821	RW	N/A	Moderate	One face and one end
115825	DEB	Tan	Heavily	One face
115829	RW	Rad	Lightly	One end
115830	RW	N/A	Heavily	One end
115833	RWDEB	Rad 1/2	Moderate	Outer face
115836	DEB	Tan	Moderate	One edge
115841	RW	N/A	Moderate	One edge
115842	RW	N/A	Moderate	One end
115951	RW	N/A	Lightly	One end
115952	ART	N/A	Lightly	Proximal / worked end
115960	DEB	Tan	Moderate	One face
115961	RW	N/A	Heavily	All over
115962	RW	Tan faced	Lightly	One end
115971	DEB	Rad	Heavily	One end
115981	TIM	N/A	Heavily	One end
116080	TIM	Rad	Moderate	One end / underside
116081	RWDEB	Rad 1/3	Moderate	Outer face
116091	RW	N/A	Lightly	Upper face
116534	RW	N/A	Charred through	One end
116542	RW	N/A	Charred through	One end
116656	RW	N/A	Moderate	All over
116660	RWDEB	Rad 1/2	Lightly	Split face
116663	DEB	Tan outer	Moderate	Inner face
116674	DEB	Tan outer	Moderate	Inner face
116697	RW	N/A	Charred through	One end
116912	RW	N/A	Moderate	One end and one face
116914	RWDEB	Rad 1/2	Moderate	Outer face
116915	DEB	Rad	Lightly	One edge
116917	RWDEB	Rad 1/2	Moderate	One end
116921	DEB	Tan	Heavily	One face and all edges
116932	DEB	Rad	Moderate	One face

Table 6.2: *Continued*

Number	Type	Split	Charred?	Notes
117153	TIM	Rad 1/2	Charred through	One end
117155	TIM	Tan?	Moderate	Underside
117157	TIM	Rad 1/2	Charred through	One end
117159	RWDEB	Rad 1/2	Heavily	One end
117162	RWDEB	Rad 1/2	Heavily	One face
117163	RW	N/A	Moderate	All over
117167	DEB	Tan	Moderate	One face
117195	DEB	Rad	Moderate	One edge and one face
117197	RW	N/A	Lightly	One end
117225	DEB	Tan	Heavily	All over

Table 6.2: Evidence of charring in Clark's area.

Unsplit material

The unsplit material consists of 180 pieces of roundwood, two of which are stakes, <116654> and<116678>, and a single piece each of bark, debris and timber. Excluding the stakes, the 178 pieces of roundwood are located throughout the area. 46 (26%) have bark present and 78 (44%) show morphological features that may be indicative of coppicing. 21 pieces (12%) are charred. The roundwood varies in length from 45–1715 mm and in horizontal diameter from 10–89 mm. The roundwood in this area is noted as being particularly straight and long, with a high proportion of good-quality poles present. Sixteen items display some kind of woodworking: seven pieces are trimmed, generally at one end or at a side branch from one and occasionally two directions; two of these items are also torn in what has been described as a 'chop and tear' end; a further five items have been torn and one item has been snapped. Three items have been split at one end: two tangentially and one radially. Of these <116675> is noted as having very small, 'choppy' tool facets with a maximum width of 15 mm and length of 16 mm. A single piece of roundwood <116085> has been beaver gnawed at one end. The single unsplit timber <115981> seems to have been exposed and become degraded prior to waterlogging. It has also been heavily charred at one end and measures 320 × 130 × 60 mm. The single piece of bark <115753> is derived from a large timber and measures 180 × 55 × 9 mm and the one piece of debris <114884> has been heavily charred all over and measures 340 × 40 × 25 mm.

Split material

The 251 items of split material consist of 125 pieces of debris, 46 pieces of roundwood debris, 13 timbers, 8 pieces of timber debris and 59 woodchips. The split material classed as timber is spread throughout Clark's area and forms a smaller part of the assemblage than in other analytical areas. The material varies in length from 505–1395 mm, in breadth from 45–230 mm and from 6–100 mm in thickness. A single reconstructable original diameter was calculated as 210 mm. None of the material has bark present and four items are charred.

Some 31% of the timbers are radially cleft (two thin radial splits and two radial half splits) and 69% are tangentially cleft (including four items that are tangential outer splits) (Table 6.3). No tool faceting was seen, and unusual traces are limited to two items where the split fades out at one end and two items where the split fades out at both ends. Timber <117168> had been broken and become dislocated in the ground in antiquity. Two of the timbers stand out as having a somewhat 'structural' appearance, perhaps originally forming parts of small buildings or structures. Timber <117153> is a radial half split that has broken at one end, probably in antiquity, and is charred through at the other end. Measuring 735 × 165 × 100 mm (original diameter 165 mm) this is a very large timber to have snapped. The charring is also unusual, representing a possible 'protection mark' where it may have been in contact with, or perhaps jointed to, another timber (Figure 6.9). Timber <116651> is a thin, radially split plank measuring 755 × 140 × 6 mm (original diameter c. 280 mm) with a particularly neat and regular appearance, suggesting it may have been 'finished' (Figure 6.10).

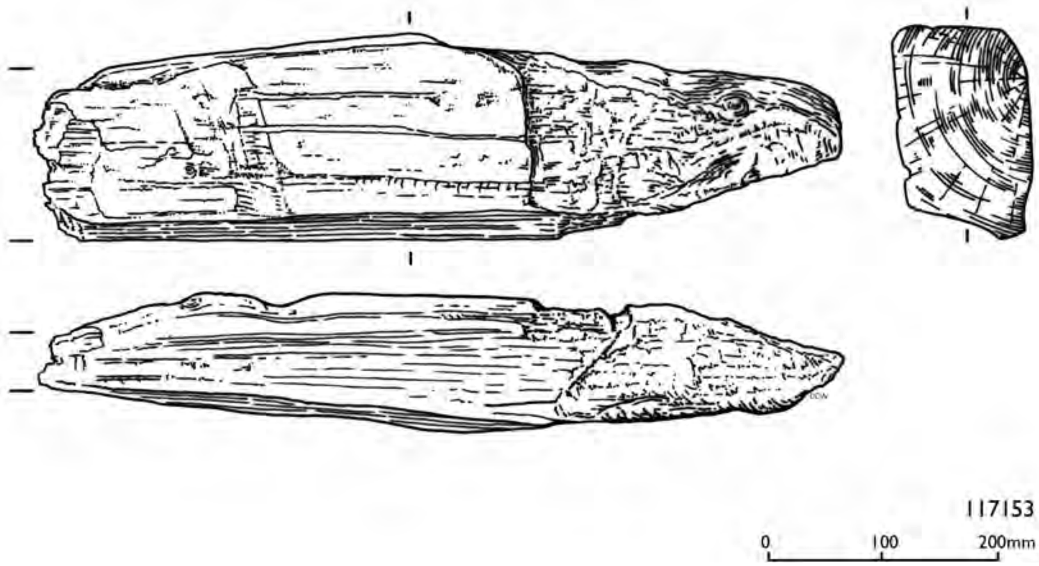

Figure 6.9: Charred timber <117153> (Copyright Chloe Watson, CC BY-NC 4.0).

Conversion	Timber	Timber debris and debris	Woodchips	Roundwood debris	Total frequency	Total %
Rad	2	31	13	1	47	18.7
Rad 1/2	2	1	0	37	40	15.9
Rad 1/3	0	1	0	1	2	0.8
Rad 1/4	0	4	0	2	6	2.4
Tan / Rad / Square	0	2	0	0	2	0.8
Tan	5	63	35	2	105	41.8
Tan outer	4	23	3	3	33	13.1
x-grain	0	1	0	0	1	0.4
Off RW	0	0	6	0	6	2.4
U/K	0	7	2	0	9	3.6
total	13	133	59	46	251	100.0

Table 6.3: Conversions from Clark's area.

The 133 pieces of timber debris and the debris are considered together. This material was spread throughout the area of investigation. No bark was present and 13 items are charred. The material varies in length from 47–670 mm, in breadth from 14–150 mm and in thickness from 5–52 mm. Original diameters could be calculated in nine cases, and these varied from 54–160 mm. Some 28% of the material is radially aligned, including thin radial splits and radial half, quarter and third splits (Table 6.3). A total of 66% of the material is tangentially aligned, including 23 outer splits. Some 7% are of unknown conversion and a single item <117185> is cross-grained. Two items are knots which have been split off, one of which <116521> displays tool facets that describe being trimmed at one end from one direction. Several items show working traces distinct

Figure 6.10: Timber <116651>: potentially finished radial plank (length 755 mm) (Copyright Star Carr Project, CC BY-NC 4.0).

to this assemblage: seven items are parallel sided, one item has a lenticular cross section and one item displays an inner split face that follows the ring structure and also has two chamfered edges.

Of the 59 woodchips that were identified, 22% are radially aligned, 65% are tangentially aligned (including one slab and two tangential outers), 10% are from roundwood and 3% are of unknown conversion (Table 6.3). Only the slab has bark present and a single item is charred. No tool facets were recorded from any of the woodchips. The material varies in length from 32–189 mm, in breadth from 9–81 mm and from 1–12 mm in thickness.

The 46 pieces of roundwood debris are, as might be expected, dominated by radially aligned items (89%). These are frequently half splits but also thin radial splits, radial third and quarter splits. Tangentially aligned items (11%) included three outer splits (Table 6.3). One piece retains its bark, one piece is possibly coppiced while some 20% of the material shows evidence of charring. The length varies from 20–596 mm, the breadth from 14–57 mm and the thickness from 5–33 mm. The 27 reconstructable original diameters vary from 14–60 mm. A single item has been gnawed by a beaver <116509> and a single item has been trimmed to a point at one end <116695>.

Discussion of Clark's area

Overall this assemblage is made up of roundwood and debris, with small quantities of timber and timber debris, but relatively high proportions of woodchips and artefacts (in relation to other parts of the site). The spatial arrangement of the assemblage shows no evidence that it represents a deliberately built platform or trackway, such as pieces laid parallel to one another or arranged to create a solid surface. In addition, only two stakes were recorded in the area and neither appears to have performed a structural function. Nor does the assemblage appear to have been deposited to create 'made ground' or to have functioned as an occupation surface, given its character and the low levels of larger pieces of wood.

Instead the wood recorded from this area appears to have been formed through the deposition of material generated from a wide range of tasks, probably undertaken on the dryland parts of the site, along with a smaller number of wooden artefacts. As the wood is interspersed with a large quantity of cultural material, including artefacts made from antler, flint, and bone, antler working waste and faunal remains (particularly in the baulk), these different materials have probably been deposited together into this discrete area of the lake edge.

Brushwood area

Introduction

This is a large deposit of mostly unworked roundwood, lying close to (and parallel with) the edge of the lake, and extending c. 10.7 m east of Clark's cutting II (Figures 6.11 and 6.12). Much of the roundwood was crooked and had smaller side stems/branches still attached, giving it the appearance of brushwood or brash. Interspersed amongst it were intrusive roots that radiate out from tree boles along the lakeshore, very low levels of worked wood (woodchips, timber, and debris) and five wooden artefacts (see Chapter 29). The assemblage has accumulated gradually and probably represents a build-up of largely natural material at the edge of the lake. Timbers of the western platform were also contained within this deposit but are discussed separately. Other archaeological material was very sparse in this area, consisting of very small assemblages of animal bone, antler and flint.

The material was first encountered in 2007 during the excavation of SC24, and again in 2010, during the re-excavation and extension of SC24 and Clark's cutting II. The western extent of the deposit was truncated by cutting II (but clearly extended into that trench), and the central area had been partially excavated during

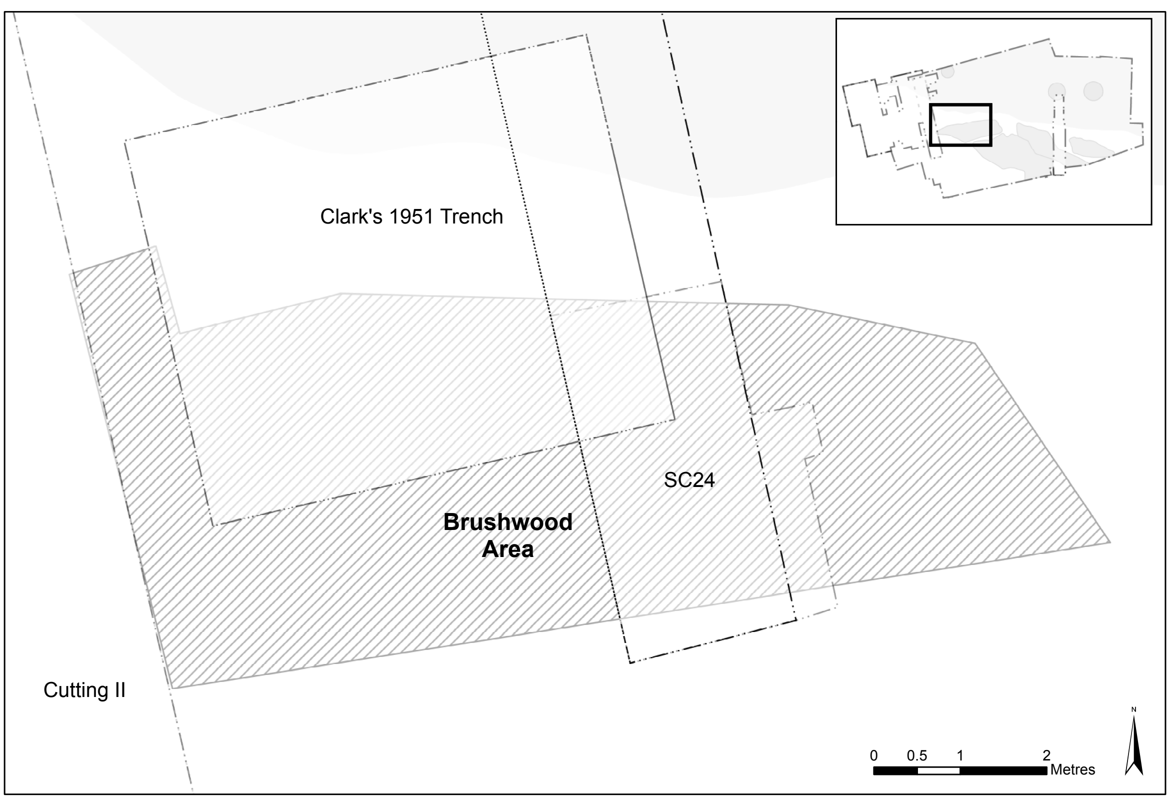

Figure 6.11: Plan showing the extent of the brushwood (shaded) (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 6.12: The brushwood exposed in 2013. The photograph looks to the south-east of the site and the far edge of the brushwood is truncated by the previously excavated trench SC24. The western timbers of the western platform are visible (Copyright Star Carr Project, CC BY-NC 4.0).

Clark's 1951 campaign. Given its proximity to Clark's excavations the deposit was tentatively interpreted as a continuation of the 'brushwood platform' recorded and described by Clark (Conneller et al. 2012). For this reason the area between SC24 and cutting II was exposed and excavated in its entirety in 2013. The deposit was excavated and recorded in nine arbitrary spits, numbered sequentially from the top down. All worked and charred pieces were fully recorded along with a subsample of the unmodified roundwood and a brief record was made of the remaining roundwood (each item being recorded only in terms of diameter, condition and presence/absence of bark).

Analysis

Overview

A total of 2070 wood records are assigned to the brushwood. The overwhelming majority are classed as roundwood, most of it unworked and of small diameter, though low levels of worked material (112 items) are also present (Figure 6.13). The majority of material was found within the detrital mud (317), with just under a third from the reed peat (320) and a small proportion from the basal organic sand (320) (Table 6.4). A total of 41 taxonomic identifications were made on samples taken from this deposit. Of these, willow was the most common species (and the most frequent species of roundwood), though aspen was also well represented and in several cases identification could not distinguish between the two. Birch was represented by a single item (Figure 6.14).

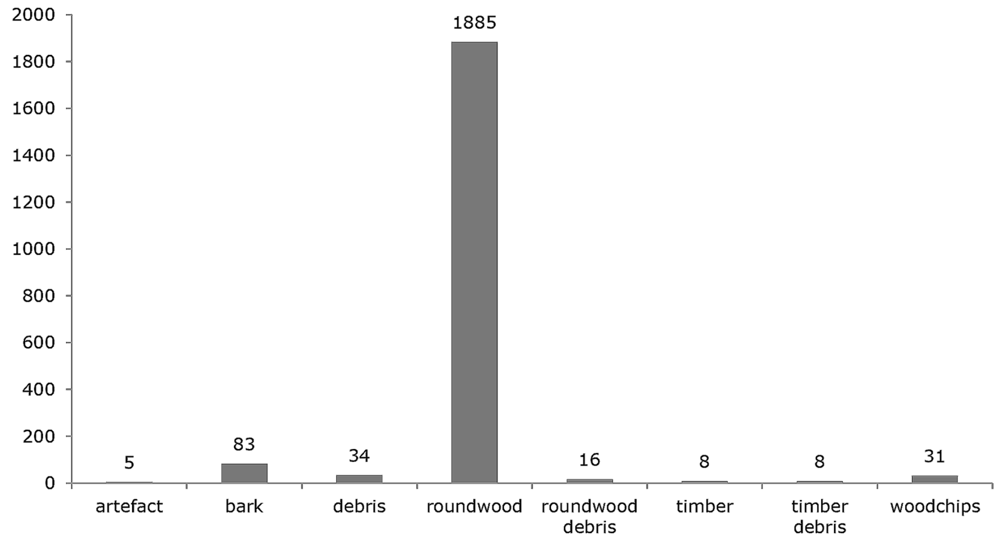

Figure 6.13: Wood categories from the brushwood (Copyright Star Carr Project, CC BY-NC 4.0).

Context	Description	Frequency	% of assemblage
312	reed peat	617	29.8
317	detrital mud	1414	68.3
320	organic sand	39	1.9
total		2070	100.0

Table 6.4: Material from the brushwood by context.

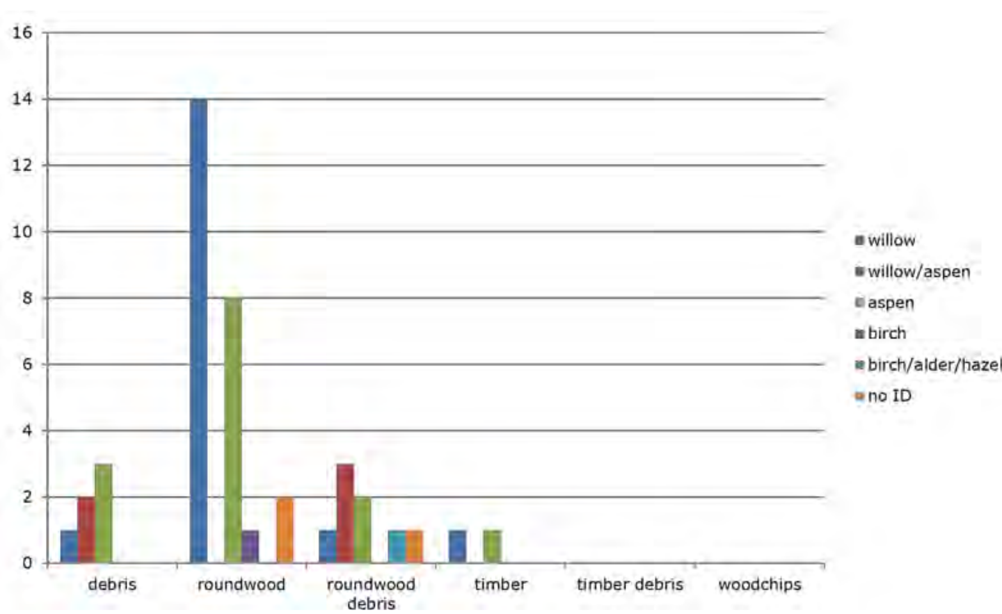

Figure 6.14: Frequency of taxonomic identifications from the brushwood by wood category (Copyright Star Carr Project, CC BY-NC 4.0).

A total of 22 items, representing 1% of the material recorded from the brushwood, show evidence of charring, with a tendency towards heavily charred material. A broad range of wood categories are represented and the charred material is spread throughout the deposit (Table 6.5). Six pieces of roundwood display evidence of beaver modification (Table 6.6). This generally takes the form of gnawed ends and side branches, though one item shows evidence of bark removal and another has been gnawed along an edge. It is of note that <99927> has

Number	Type	Split	Charred?	Notes
93556	RW	N/A	Lightly	c. 1 mm on underside of proximal / N end
94006	RW	N/A	Heavily	All over
94009	RW	N/A	Heavily	One end
94010	RW	N/A	Heavily	All over, both ends charred through
94011	DEB	Rad?	Heavily	All over
94015	WC	tan	Heavily	On one end and underside
94020	DEB	N/A	Heavily	All over, tan aligned amorphous lump
94022	DEB	N/A	Heavily	All over, charred into amorphous lump
94024	RW	N/A	Moderately	One end, 4 mm deep
94045	RW	N/A	Moderately	Underside
94047	TIM	Tan outer	Heavily	To at least 10 mm depth over whole of upper / split face
98001	RW	N/A	Moderately	One end of one face
98041	DEB	Rad	Heavily	One face
98042	ART	Tan	Heavily	One face
98043	DEB	Tan	Heavily	One face and one end
98768	RW	N/A	Heavily	All over
98773	RW	N/A	Heavily	One end
98775	RW	N/A	Lightly	All over
99227	RWDEB	Rad 1/4 (mod)	Moderately	Outer face charred away
99912	WC	Rad	Lightly	One edge
99917	RW	N/A	Lightly	One face
99927	RW	N/A	Lightly	One end. Probably charred post beaver gnawing

Table 6.5: Evidence of charring in the brushwood (tan = tangentially converted, rad = radially converted).

Number	Context	Spit	Type	Notes
98036	312	2	RW	1 side branch (D: 10 × 12 mm) beaver gnawed
99220	320	8	RW	1 end / beaver gnawed
99921	317	8	RW	Proximal end beaver gnawed
99927	317	8	RW	Both ends beaver gnawed. One edge gnawed. One end lightly charred, probably post beaver gnawing
99992	317	8	RW	Distal end and two side branches gnawed by beaver. Gnaw marks on shaft from bark removal
103190	317	8	RW	Proximal end and one side branch beaver gnawed. Distal end is a stepped chop and tear

Table 6.6: Evidence of beaver modification in the brushwood.

been charred, probably after it was beaver gnawed and <103190> has been trimmed and torn at one end and beaver gnawed at the other. Although one item is from relatively high in the sequence (spit 2) the remainder were recovered from near the base of the deposit (spit 8).

Trees

A single timber from this area has been classed as a tree trunk: <98005>. This item was truncated by the excavation of cutting II, with the remaining portion measuring 2420 mm long with a horizontal diameter of 135 mm. No bark was present and there is no evidence of woodworking.

Unsplit items

There are a total of 1971 unsplit items that are not classed as trees, consisting of 1885 pieces of roundwood, one timber, two pieces of debris and 83 pieces of bark (Figure 6.13). Of the 1885 pieces of roundwood, 166 were recorded with a full wood record and a further 1719 via rapid recording. The material was distributed throughout the deposit forming a dense layer of intermingled material. The vast majority of the roundwood had a 'brushwood'/'brash' appearance, being of small diameter and often crooked stem with frequent side stems. However, there were some straighter lengths and 14 items (<1%) showed morphological features suggestive of coppicing (see Chapter 28). Bark is present on 963 items (51%), which is somewhat higher than that noted from the debris scatter (38%) and the three platforms (central 24%, eastern 14% and western 0%) raising the possibility that the material in this area has shed its bark to a lesser extent than the roundwood recorded in other areas. The roundwood varies in length from 103–2175 mm and in horizontal diameter from 1–95 mm. Eight items have been trimmed at one or two ends, six of which have also been snapped or torn with an appearance often described on site as chop and tear. One of the trimmed items <103190> has also been beaver gnawed. Five other pieces have been modified by beavers (Table 6.6), one has been snapped and twelve have been charred (Table 6.5).

The single timber has been truncated at one end by cutting II. The remainder of the timber measures 1200 mm long with a horizontal diameter of 150 mm and no bark is present. The two pieces of debris are both heavily charred into amorphous lumps (Table 6.5).

Eighty-three pieces of bark were recorded. Whilst none shows any evidence of woodworking, the majority of the bark is derived from timber and some pieces are quite substantial (the largest measuring 270 × 25 × 5 mm). As timber represents such a small percentage of the assemblage recovered from this area, the bark cannot all have become detached from timbers present in the brushwood. Although much of the material may be naturally occurring it seems plausible that the bigger pieces may represent discards from an unknown bark-related process taking place in the vicinity.

Split material

There are 93 split items, consisting of six split timbers, eight pieces of timber debris, 32 pieces of debris, 31 woodchips and 16 pieces of roundwood debris (Table 6.7). The six split timbers were present in the reed peat (312) (four items) and detrital mud (317) (two items), and vary in length from 500–1075 mm, in breadth from 86–260 mm and from 5–62 mm in thickness. The material is generally straight grained and knot free with a single side branch noted on one timber. Bark is present on the underside only of the same piece and is noted as being thick (6 mm). All six items are tangentially aligned, two of which are outer splits. Evidence for tooling is limited with light faceting indicative of hewing present on the faces of two items. Three items (50%) show traces of grooves on one face, potentially indicative of groove-and-split (see Chapter 28). The upper face of <94047> is heavily charred to a depth of around 10 mm (Table 6.5). Although the split material is spread throughout the brushwood, there is a concentration of material within spits 7 and 8, suggesting that some of this material probably relates to the western platform (see below). However, it is not possible to determine this association with any confidence.

The eight pieces of timber debris and 32 pieces of debris are considered here together (totalling 40 items) (Table 6.7). These were recovered from all three contexts. The material varies in length from 60–498 mm, in breadth from 14–125 mm and from 1–30 mm in thickness. A single original diameter was reconstructable as

Conversion	Timber	Timber debris and debris	Woodchips	Roundwood debris	Total frequency	Total %
Rad	0	13	6	2	21	22.6
Rad 1/2	0	0	0	8	8	8.6
Rad 1/3	0	0	0	2	2	2.2
Rad 1/4	0	0	0	1	1	1.1
Tan / Rad / Square	0	0	0	0	0	0.0
Tan	4	21	19	1	45	48.4
Tan – surface split away	0	0	0	0	0	0.0
Tan outer	2	5	1	2	10	10.8
x-grain	0	1	0	0	1	1.1
Off RW	0	0	2	0	2	2.2
U/K	0	0	3	0	3	3.2
Total	6	40	31	16	93	100.0

Table 6.7: Frequency of conversions from the brushwood.

40 mm. Bark is present on two items (2.5%). Twenty-six items are tangentially aligned (32.5%), five of which are outer splits. Thirteen items are radially aligned (14.25%) and a single item is cross-grained (Table 6.7). No tool facets were noted, but possible traces of groove-and-split working were noted on 17 items, 16 of which are parallel sided and one with parallel grooves on one face. Three items are heavily charred (Table 6.5).

The 31 woodchips were also recovered from all three contexts. They vary in length from 32–193 mm, in breadth from 16–62 mm and from 3–23 mm in thickness. Again, the material is dominated by tangentially aligned material with 20 items (64.5%) aligned in this plane, one of which is a tangential outer. Six of the chips are radially aligned, two are off roundwood and three are of unknown conversion (Table 6.7). One chip has possible faint tool facets at one end and two items are charred (Table 6.5).

A total of 16 pieces of roundwood debris were recovered from the reed peat (312) and detrital mud (317). Two pieces have bark present and the material varies in length from 76–509 mm, in breadth from 16–62 mm and from 7–40 mm in thickness. Reconstructable diameters (obtained from nine items) range from 18–62 mm. As might be expected from material formed of converted roundwood, radial conversions predominate with 13 items (81.25%) in this plane and three items tangentially aligned (Table 6.7). One piece has possibly been trimmed at one end and one item has been moderately charred (Table 6.5).

Discussion of the brushwood

When observed on site, the assemblage of material encountered in this area appeared to be very similar to Clark's descriptions of the brushwood platform recorded during the 1949–51 excavation. Although the subsequent excavation of the baulk between cuttings I and II in 2015 recorded a very different wood assemblage (described above), the 2013 brushwood area clearly extended into the area investigated by Clark, and could represent at least part of the material that he interpreted as the brushwood platform or the upper, natural layer of wood.

However, it is very unlikely that this assemblage represents a deliberately constructed platform or that it served as an occupation surface. The material occurs throughout the detrital mud (317) and overlying reed peat (312), suggesting that it accumulated gradually, and over a considerable period of time. This is supported by the dating of material from the assemblage itself and the chronology that has been established for the environmental sequence (see Chapters 9 and 17). The much higher proportion of roundwood that still retained its bark is also very different to the roundwood associated with the more obviously anthropogenic structures, such as the three platforms and the detrital wood scatter (though this in itself does not preclude the possibility that the material was deliberately deposited).

Instead, given the long duration of deposition and the broadly homogenous nature of the assemblage, most of which is unmodified, it seems likely that the majority of the material represents the gradual build-up of small-diameter roundwood that probably derived from trees growing at the lake edge. Whilst much of the deposit may have been generated through natural processes (small branches falling from trees), anthropogenic processes may also have been involved given the presence of chop and tear on several pieces of roundwood. This may have included the deliberate clearance of fresh growth in order to improve access through the trees or the maintenance and harvesting of coppice (Chapter 28). Furthermore, the presence of charred and culturally modified material, including wooden artefacts, probably also reflects woodworking tasks that were being undertaken along the lake edge.

Detrital wood scatter

Introduction

The detrital wood scatter consists of 1329 individual pieces of wood, including roundwood, split and unsplit timbers, and (more occasionally) entire trees, that form a large, roughly linear arrangement 25.8 m long (north-west/south-east) and up to 8.5 m wide (south-west/north-east) (Figures 6.15 and 6.16). It runs at an angle from the lake shore, through the wetland area and continues beyond the southern extent of the trench. The arrangement of the wood lacks any appreciable form or recognisable phases of deposition or accumulation and resembles a disorganised jumble of material (Figure 6.15). However, in terms of its overall shape there is a clear opening or gap amongst the wood on the south-west side of the scatter that coincides with a large concentration of animal bone, representing the limbs and parts of the bodies of at least two red deer and several osseous artefacts (including two antler frontlets) (Chapter 7). This, and the broadly linear form of the scatter, suggest that the wood was deposited to stabilise the soft basal sediments and allow movement from the shore into areas of deeper water, possibly (though not necessarily exclusively) for the purposes of depositing animal remains.

The scatter was unknown until the current programme of fieldwork (though it clearly extended into trench VP85A). It was first observed in 2010 when the excavation of trench SC33 encountered several large, split timbers. However, at this stage it was assumed that the wood represented a continuation of the platform that had been observed in VP85A. In 2013, a large part of the scatter was exposed during the excavation of the area to the west of VP85A. The remainder of the scatter was excavated and recorded during the 2014 and 2015 seasons.

Analysis

Overview

A total of 1329 wood records are assigned to the detrital wood scatter, 127 of which are roundwood recorded in plan only, making this the single largest assemblage of fully recorded material from the site. The scatter is also amongst the stratigraphically earliest assemblages on the site with 36% recorded from the basal sandy gravels (319) and organic sand (320) and 46% from the overlying detrital mud (317) and a much smaller proportion recovered from the reed peat (312) (Table 6.9). There was a tendency for the basal timbers, particularly in the eastern half of the scatter, to be in direct contact with the 'hard' geology below the lake deposits, suggesting that deposition began at a very early stage in the sedimentary sequence.

The most prevalent single category of material is roundwood, forming 32% of the total scatter, with only slightly smaller quantities of debris (Figure 6.17). Timber forms a relatively high proportion of the overall assemblage with 225 items (17%), 20 of which are classed as trees; interestingly, there is a particularly low prevalence (only five items) of unsplit timbers that are not classed as trees. Woodchips and timber debris are also relatively common and if one considers the woodworking waste together (roundwood debris, timber debris, debris and woodchips) it forms half of the entire assemblage. Eight wooden artefacts were also recovered (Chapter 29), including stake <107784>, found embedded vertically in the sediments at the south-west edge of the scatter. A total of 98 taxonomic identifications have been carried out from this area, though as has been noted elsewhere, the only trend is for willow to dominate the roundwood assemblage (Figure 6.18).

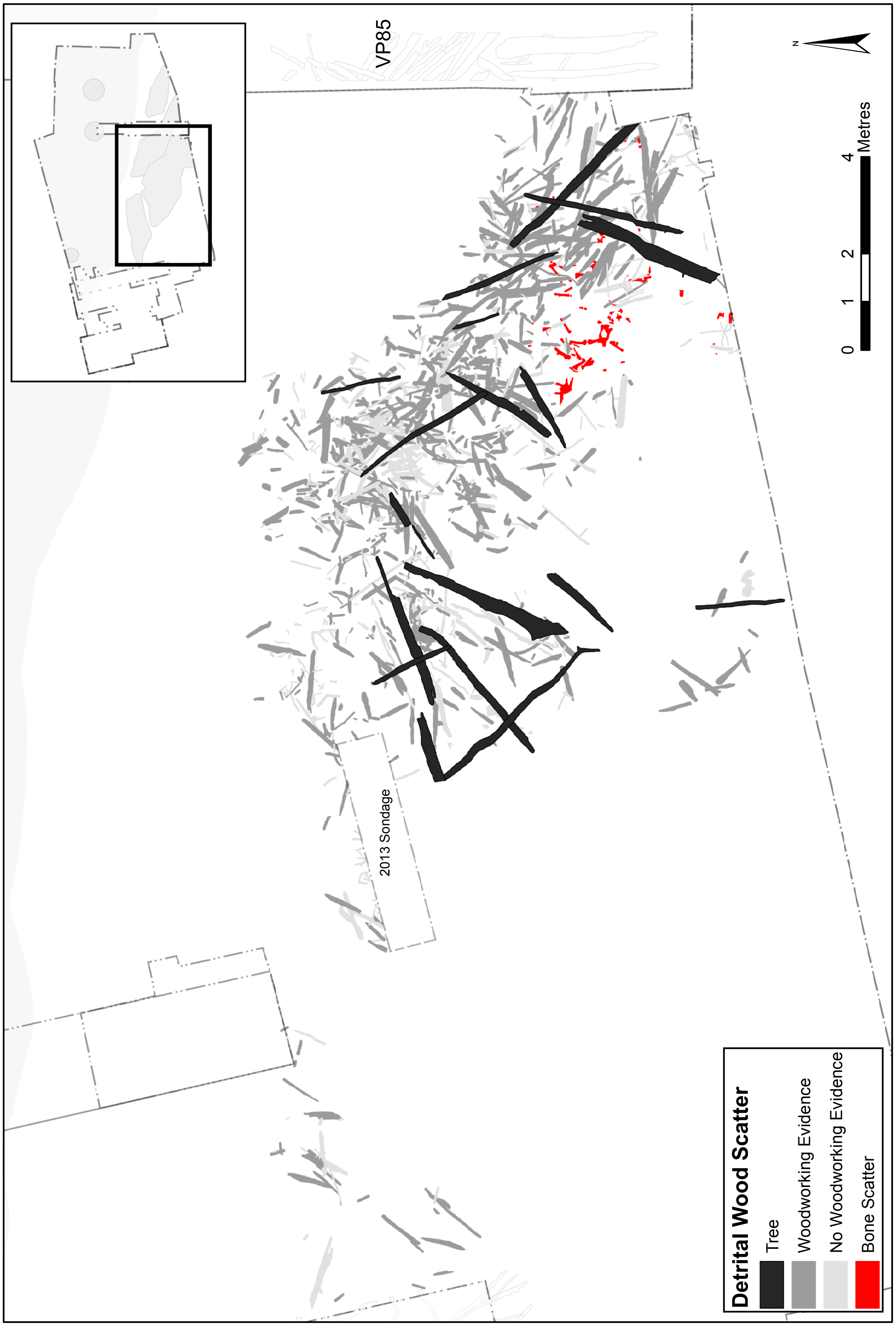

Figure 6.15: Plan of the detrital wood scatter highlighting trees and differentiating between woodworking and no woodworking evidence. In addition, the bone scatter (as described in Chapter 7) is located (Copyright Star Carr Project, CC BY-NC 4.0).

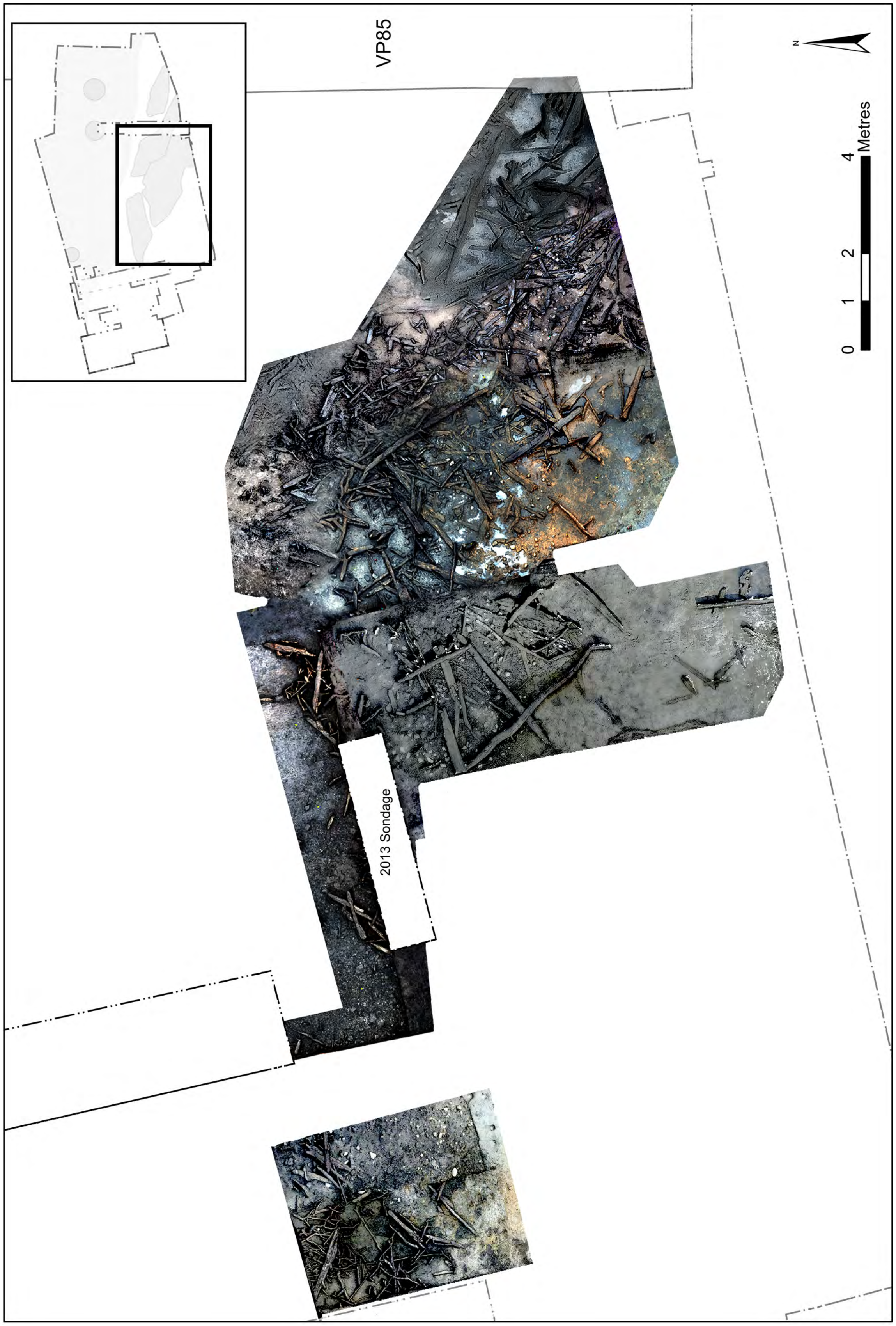

Figure 6.16: Composite orthophoto of the detrital wood scatter (exported from Agisoft Photoscan Pro) (Copyright Star Carr Project, CC BY-NC 4.0).

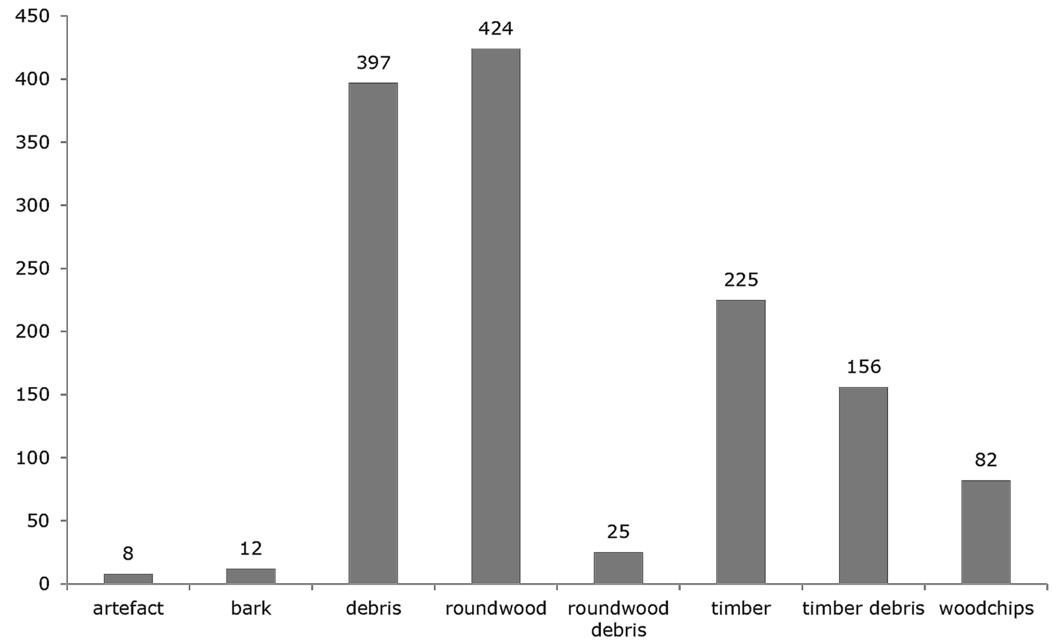

Figure 6.17: Wood categories for the detrital wood scatter (Copyright Star Carr Project, CC BY-NC 4.0).

Context		Frequency	% of assemblage
312	reed peat	109	8.2
317	detrital mud	609	45.8
319	sandy gravel	110	8.3
320	organic sand	374	28.1
Unrecorded	plan only	*127*	9.6
Total		1329	100.0

Table 6.9: Material from the detrital wood scatter by context.

As would be expected, condition generally improved with both depth and distance from the lake edge, though a high degree of compression was noted throughout. There is also some interesting ancient damage present: 11 items appear to have weathered before they became waterlogged and five items have snapped in antiquity, three of which have become physically dislocated from their constituent parts but mechanically refit with a high degree of confidence.

A total of 29 items (2%) are charred (Table 6.10). This occurs on a range of materials at varying intensities, which are spread throughout the deposit. Of particular interest is the charred distal/top end of stake <107784>, which suggests that the stake was burnt when it was in the ground. A total of 11 pieces of roundwood show evidence of beaver modification in the form of gnawed ends and side branches (Table 6.11). These are spread throughout the deposit but with a tendency to be towards the base of the scatter.

Trees

The 20 timbers classed as tree trunks (Table 6.12) vary in length from 1030–5530 mm and in horizontal diameter from 85–277 mm. The vertical diameters describe the high degree of compression seen in this area varying

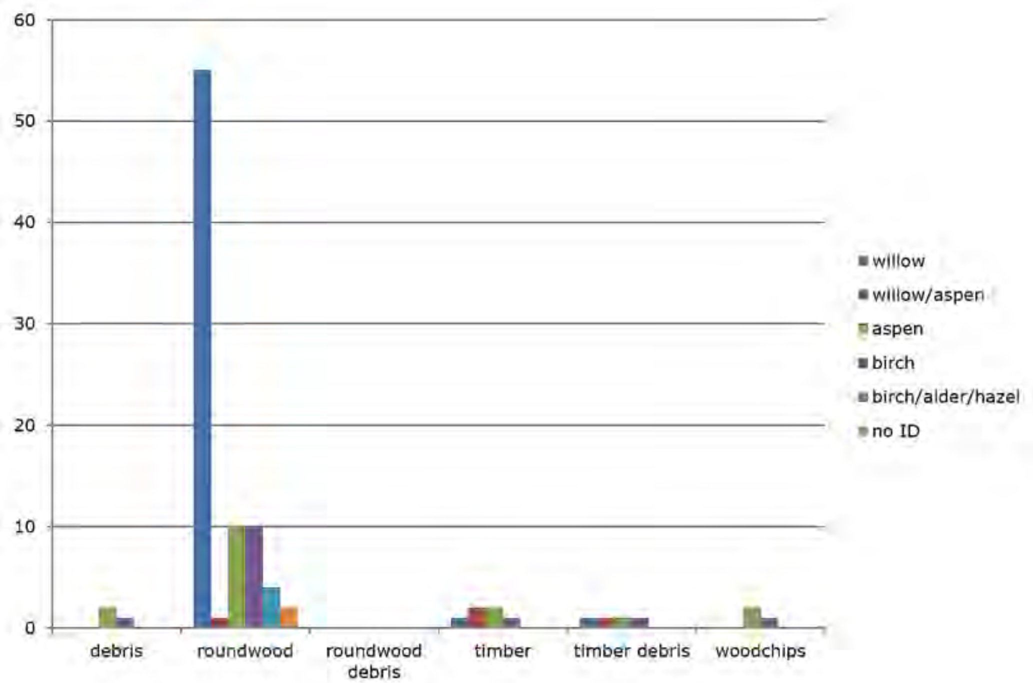

Figure 6.18: Frequency of taxonomic identifications from the detrital wood scatter by wood category (Copyright Star Carr Project, CC BY-NC 4.0).

from 18.8–76.0% of the horizontal values. The trees are generally straight grained with slow, even growth. They tend to have either no or occasional small-diameter (20–40 mm) side branches. The exception to this is <99932>, which is noted as having frequent small-diameter (c. 20 mm) side branches present. Bark is generally absent and is only noted from two items. One tree <109903> still had the root bole attached at the south-west end, suggesting this tree had fallen naturally and two others, <110390> and <110192>, also have some of the root bole remaining.

Woodworking evidence is noted from three of the trees. Of these, <99949> has had the upper surface tangentially split away. This is a negative of the conversion which produces the regularly occurring tangential outer split timbers. Tree <109557> is tangentially cleft at one end and has possible tool facets describing trimming to length at the other end and <110365> is radially half split at the proximal end where tearing and parallel chop marks cutting across the axis of the grain are visible on the split face.

Unsplit items

There are a total of 443 unsplit items that are not classed as trees, consisting of 424 pieces of roundwood, five timbers and 12 pieces of bark (Figure 6.17). Due to the high volume of roundwood encountered in the detrital wood scatter (425 items), a sub-sample of the material was recorded in detail (298 items) whilst the remainder (127 unworked items) were recorded in plan only.

The roundwood is distributed throughout the detrital wood scatter. This material varies in length from 40–2060 mm and in horizontal diameter from 6–95 mm. A total of 114 pieces have bark present and 74 (17%) have morphological traits that may be indicative of coppicing. A total of 45 pieces have tool facets describing trimming. The majority have been trimmed at one end and from one direction, though seven have been trimmed and torn, one has been trimmed at one end from two directions and one has been trimmed at both ends from one direction. A further two items have had side branches trimmed away, one of which has subsequently healed over. Roundwood stake <107784> has been trimmed at the proximal end from all directions to a point, whilst the distal/upper end is charred and possibly trimmed. There are a further 12 items that have

Number	Type	Split	Charred?	Notes
99808	RWDEB	Rad 1/2	Moderate	Proximal end, underside
99811	DEB	Rad (mod)	Moderate	One face and one end
99814	DEB	Tan	100%	–
99815	RW	N/A	Heavily	All over
99817	RW	N/A	Moderate	Underside, c. 10 mm deep
99890	TIM	Rad 1/3	Lightly	Upper face at one end
99903	RW	N/A	Moderate	–
99904	RW	N/A	Moderate	One end
103175	RW	N/A	Heavily	All over
103182	TIMDEB	Tan	Moderate	One part of face, max 4 mm
103194	DEB	Tan	Lightly	One side
103430	DEB	U/K	Moderate	–
103437	RW	N/A	Heavily	One end and one surface
103749	DEB	Tan	Moderate	One end
103780	DEB	Tan	Lightly	One end. One face
103800	TIMDEB	Tan	Lightly	One face
103812	DEB	Rad	Moderate	One face and one edge
107784	RW / STAKE	N/A	Moderate	Distal / top end is charred
109127	RW	N/A	Lightly	Upper face
109576	DEB	U/K	Heavily	One edge
109583	DEB	Tan	Heavily	One edge
109588	TIM	Tan	Lightly	Part of one face
109988	RW	N/A	Lightly	Underside
110173	TIM	Tan	Moderate	One edge
110357	RW	N/A	Moderate	One end
110360	TIM	Tan outer	Lightly	Outer, lower face. At one end
110472	TIMDEB	Tan	Moderate	Lower face
110509	RW	N/A	Moderate	Underside
110581	TIM	Tan outer	Moderate	Underside

Table 6.10: Evidence of charring from the detrital wood scatter.

Number	Context	Type	Notes
99822	312	RW	Distal end possibly beaver gnawed
99946	312	RW	1 end possibly beaver gnawed
99979	312	RW	1 end beaver gnawed
103104	312	RW	1 end possibly beaver gnawed
103123	312	RW	1 end beaver gnawed
103503	317	RW	3 × SB and proximal end beaver gnawed
109021	319	RW	1 end beaver gnawed
109361	319	RW	1 end possibly beaver gnawed
109574	317	RW	Both ends beaver gnawed
110573	320	RW	1 end beaver gnawed
113220	317	RW	1 end possibly beaver gnawed

Table 6.11: Evidence of beaver modification from the detrital wood scatter.

Find no.	Length (mm)	Horizontal diameter (mm)	Vertical diameter (mm)	Compression %
99801	5013	85	30	35.3
99894	2810	95	40	42.1
99932	3385	130	70	53.8
99949	3570	172	79	45.9
103148	1943	277	85	30.7
103785	1570	170	72	42.4
109030	3835	210	40	19.0
109557	2370	130	60	46.2
109903	3610	270	64	23.7
109905	5050	125	95	76.0
110192	1690	160	61	38.1
110365	3665	235	100	42.6
110390	1030	180	75	41.7
110401	1930	85	60	70.6
110528	3530	155	56	36.1
112992	4200	160	75	46.9
112996	1780	160	30	18.8
113239	1820	100	40	40.0
115699	1845	80	41	51.3
110377b	1975	160	60	37.5

Table 6.12: Trees from the detrital wood scatter.

been torn at an end and 11 items that have been beaver gnawed or probably beaver gnawed at one end, one of which has also had three side branches beaver gnawed. The beaver-gnawed material is distributed throughout the detrital wood scatter. Eleven charred items are distributed throughout the deposit.

The five unsplit items classed as timber are located throughout the detrital wood scatter. No woodworking or unusual taphonomy was noted and none of the timbers had any bark remaining. The timbers vary in length from 930–1690 mm and in horizontal diameter from 92–224 mm. None of the 12 pieces of bark shows any evidence of woodworking and it seems likely that this material has become detached from other items present in the scatter. The bark pieces were all very small, the largest piece measuring 162 × 48 × 8 mm.

Split items

There are 860 split items, consisting of 200 split timbers, 156 pieces of timber debris, 397 pieces of debris, 82 woodchips and 25 pieces of roundwood debris (Figure 6.17 and Table 6.13). The split material classed as timber is present throughout the detrital wood scatter and varies in length from 500–3175 mm, in breadth from 28–205 mm and from 8–65 mm in thickness. It is only possible to estimate original diameters in four instances: 66, 70, 72 and 120 mm. The material is generally straight grained with side branches or knots noted from only six items (3%). Bark is only present on four items (2%).

Some 13% of the split timbers are radially aligned with thin radial splits, radial half, third and quarter splits all represented (Table 6.13). Tangentially cleft material accounts for 85% of the split timbers with tangential outer splits well represented and four items (2%) are of unknown conversion. Evidence for tooling is limited with six items (3%) showing faint traces of possible tool faceting describing trimmed ends, one of which <103807> appears cross cut. There is also a high prevalence within this material of the distinctive working traces seen in

Conversion	Timber	Timber debris and debris	Woodchips	Roundwood debris	Total frequency	Total %
Rad	12	56	14	1	83	9.7
Rad 1/2	8	0	0	4	12	1.4
Rad 1/3	5	3	0	2	10	1.2
Rad 1/4	2	1	0	1	4	0.5
Tan / Rad / Square	0	5	0	0	5	0.6
Tan	123	346	51	10	530	61.6
Tan – surface split away	0	1	0	0	1	0.1
Tan outer	46	58	2	7	113	13.1
x-grain	0	5	2	0	7	0.8
Off RW	0	0	1	0	1	0.1
U/K	4	78	12	0	94	10.9
Total	200	553	82	25	860	100.0

Table 6.13: Frequency of conversions from the detrital wood scatter.

this assemblage. Nineteen items have a distinctive lenticular cross section, 25 items have splits that fade out, 11 of which have this feature at both ends. In terms of possible evidence for groove-and-split 54 items are parallel sided, 20 items display traces of longitudinal parallel grooves on split faces and seven timbers have scars that describe the cleaving away of smaller split pieces. Five split timbers show light or moderate charring, generally to part of one face.

The timber debris (156 items) and debris (397 items) are considered together (totalling 553 items), forming the largest component of the detrital wood scatter assemblage (Figure 6.17). The material varies in length from 53–500 mm, in breadth from 10–130 mm and from 1–67 mm in thickness, and bark is present on 17 items (3%). The material is dominated by tangentially aligned material (410 items, 73%), 58 (10%) of which are tangential outer splits, and two of which are slabs (Table 6.13). Interestingly, there are five square cross-sectioned pieces with tangentially and radially aligned edges, possibly representing the 'streamers' which form between surfaces during cleaving. The radially aligned material (60 items, 11%) includes thin radial splits, radial half, third and quarter splits (Table 6.13). There are five cross-grained items (1%) and 94 items (14%) that are of unknown conversion.

A total of 49 items (7%) have been trimmed. Of these 36 have been trimmed at one end and from one direction, several of which are also torn, one item had been trimmed at one end but from two directions and two items have had side branches trimmed away. Six items (1%) show faint traces of possible hewing on split surfaces. There is also a high prevalence of the distinctive working traces noted from this assemblage: 16 have a lenticular cross section and 33 items have splits that fade out, 24 of which have this feature at both ends. In terms of possible evidence for groove-and-split working, 201 are parallel sided, 59 items display traces of longitudinal parallel grooves on split faces and four pieces have scars that describe the cleaving away of smaller split pieces. Twelve items show evidence of charring, typically light or moderate and generally to part of one face.

The 82 items classed as woodchips are present throughout the detrital wood scatter. They vary in length from 43–220 mm, in breadth from 16–115 mm and from 3–22 mm in thickness. As with other categories of split material, the woodchips are dominated by tangentially aligned material (53 items, 65%), two of which are slabs: a tangential outer split consisting of bark and sapwood only, possibly indicative of bark removal (Table 6.13). There are also 14 radially aligned chips, two cross-grain, one off-roundwood and 12 of unknown conversion. Unusually for a woodchip assemblage, but as is the norm at Star Carr, evidence for tool facets is limited. One item appears trimmed at both ends <103678> and two items at one end: <109198> and <109367>. Two of the chips are gnarled and appear to have been detached from around a knot: <103776C and D>.

Finally, a total of 25 items are classed as roundwood debris and are present throughout the detrital wood scatter, varying in length from 78–440 mm, in breadth from 23–60 mm and from 9–32 mm in thickness. Where original diameters are reconstructable, they vary from 26–60 mm. Bark is present on two items. Eight items (32%) are radially aligned with thin radial splits, radial half, third and quarter splits all present. 17 (68%) are tangentially split with tangential outer splits well represented (Table 6.13). One item has possibly been trimmed at one end and one <99808> is moderately charred on the underside at the proximal end.

Discussion of the detrital wood scatter

The material making up the detrital wood scatter has been generated through a range of woodworking activities, most (if not all) of which were probably carried out on the dryland parts of the site. There is no evidence that the material making up this assemblage has been manufactured or selected specifically for deposition in this area (such as uniformity in size, shape or form), as might be the case in a formal trackway or platform, and there is no apparent coherency or organisation to the scatter. As such, it resembles an accumulation of waste material produced through a range of tasks. However, it is difficult to see how this assemblage would have built up either through deliberate, ad-hoc disposal, or through natural, re-deposition of material originally discarded on the dryland. Material washed down from the dryland is likely to have become trapped in the waterside vegetation or, if this had been cleared, the wood is likely to have built up along the shore as the action of the lake would have transported it back towards the water's edge. This would also apply to material discarded deliberately into the lake. We should also consider the size of this material. Whilst woodchips and smaller roundwood may have been transported into the lake through natural processes, or thrown from the dryland, this is unlikely to have been the case for the larger material, such as the 5 m long trees or the 3 m long split timbers.

Rather than representing ad-hoc disposal or natural accumulation, we would suggest that the scatter formed through episodic deposition of material in order to stabilise the soft basal sediments and facilitate access into an area of deeper water away from the shore. This is supported by a number of lines of evidence. First, the broadly linear arrangement exhibited by the main concentration of material suggests a degree of intentionality in the formation of the scatter and its interpretation as a form of trackway. Second, there are several cases of items that have broken and become dislocated in antiquity, hinting perhaps at some trample occurring within the deposit. Finally, the gap in the detrital wood scatter corresponds with a dense concentration of animal remains, including whole limbs, which were deposited whilst still articulated (and probably still fleshed) into the wetland along with two red deer antler frontlets, whilst several animal skulls were deposited towards the south-east end of the scatter (see Chapter 7). As this material appears to have been deliberately deposited between 9.5 m and 14.5 m from the shore, it is possible that the detrital wood scatter was laid down to assist access to these areas and to facilitate these depositional acts.

The lake edge platforms

Three lake edge platforms (western, central and eastern) were excavated during the current campaign. The central platform, first encountered in the 1985 excavations (trench VP85a) was an early target of the investigations. However the size, complexity and presence of two further lake edge platforms came as a surprise. The setting, form and construction of the three platforms is markedly similar, with each starting at the base of the contour describing the drop off of the lake edge, and running through the wetland, either parallel to the shore or (in the case of the central platform) at an angle from it. Each is broadly linear in plan and is defined by a series of large trees and split timbers defining the primary axis of the feature (Figure 6.3). All three platforms sit relatively high within the wetland sequence and are, as a result of this, the least well-preserved wooden remains encountered (Figure 6.4). Each platform will be considered individually below with a summary discussion at the end of the section.

Western platform

Introduction

The western platform is a broadly linear arrangement of split timbers and entire trees that runs through the lake edge wetland, almost parallel to the shore on the western side of the site. It is a substantial structure, 4.7 m

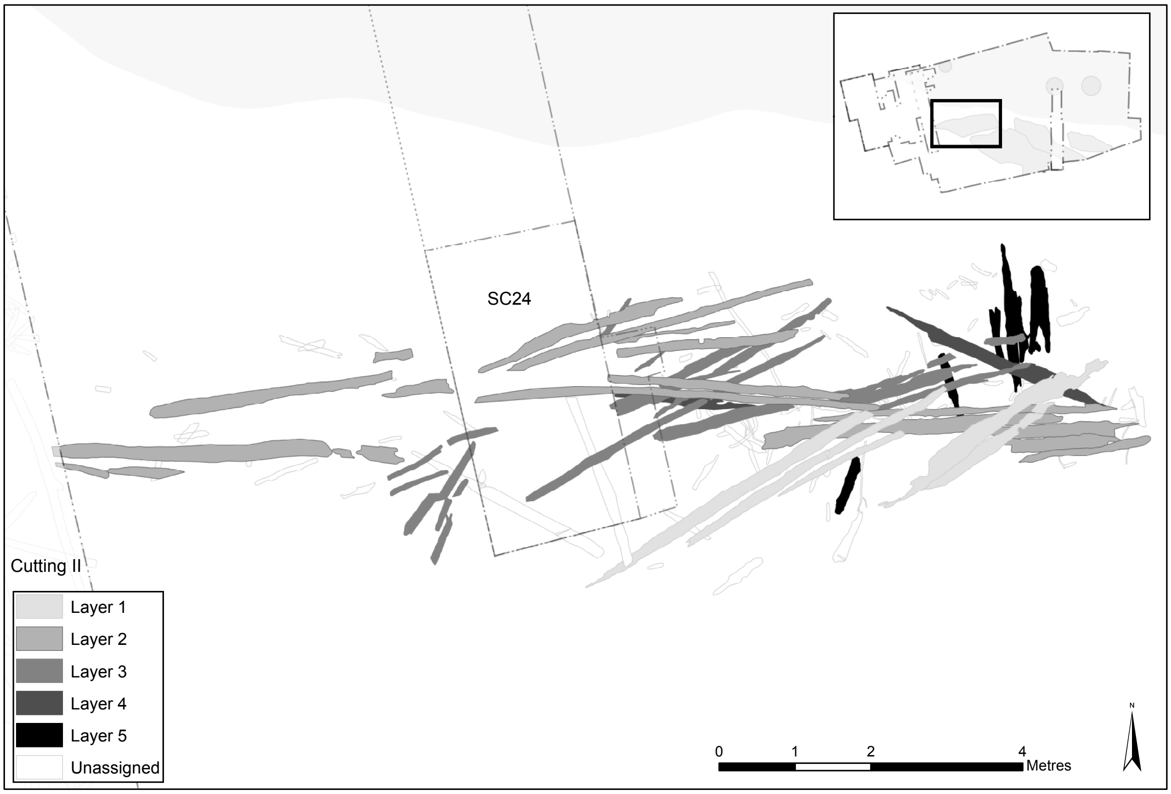

Figure 6.19: Plan of the western platform showing the five layers (Copyright Star Carr Project, CC BY-NC 4.0).

wide (north-south) and over 14.7 m long (east-west), though its full extent would have taken it several metres further to the west, into cutting II (Figure 6.19 and 6.20). The platform is formed of a series of five semi-discrete layers of timber, including split timbers and trees, with a dense horizon of generally north-south aligned roots above and deposits of largely unworked roundwood (mostly brushwood) below. The roots above the platform are markedly similar in appearance to the upper brushwood reported by Clark and could represent a similar deposit (Figure 2.3). Although built in several layers, the structure shows no evidence for separate phases of construction or use, there being no build-up of wetland deposits between the layers of wood, and appears to have been built in a single episode.

The platform was first encountered in 2007, when a series of split timbers, roughly parallel with the lake shore were recorded during the excavation of trench SC24 (Conneller et al. 2012). The continuation of these timbers was recorded in 2010 when SC24 was extended 0.5 m to the east to assess level of deterioration (Milner 2010), and a series of split timbers, assumed to be the westerly extension of the same structure, were recorded in the section of cutting II (Conneller et al. 2012). The remainder of the platform was excavated and recorded in its entirety during the 2013 and 2014 excavations. Due to the difficulties of recording degraded wood within the limited exposure of SC24 it has not been possible to link the 2007/2010 wood records with the material excavated in 2013/2014.

Analysis

Overview

A total of 141 wood records are assigned to the western timber platform. Of these, 110 form the platform itself (including two stakes classed as artefacts: <98878> and <110020>). Most were timbers, including 23 items classed as trees, though there are also quantities of roundwood and debris (Figure 6.21). There are a further

Figure 6.20: Composite orthophoto of the western platform (exported from Agisoft Photoscan Pro) (Copyright Star Carr Project, CC BY-NC 4.0).

29 sub-samples from the underlying brushwood and two beaver-gnawed pieces of roundwood from beneath the platform: <113449> and <113772>. The timbers of the structure lay predominantly within reed peat (312), though several items were recovered from the detrital mud (317), and the basal mineral sediment (320). The two pieces of beaver-gnawed roundwood were recovered from a grey-orange mottled till beneath the platform.

Taxonomic identification of material from the 2010 excavations was carried out by Allan Hall. This showed that the larger timbers and trees were exclusively identified as aspen (n= 10) whilst the majority of the roundwood were identified as willow (n=20) with occasional identifications of aspen (n=2). A further 13 items from the 2013–2015 have been examined by AR. These show the same pattern, with all 10 samples from the large timbers identified as aspen (Figure 6.22).

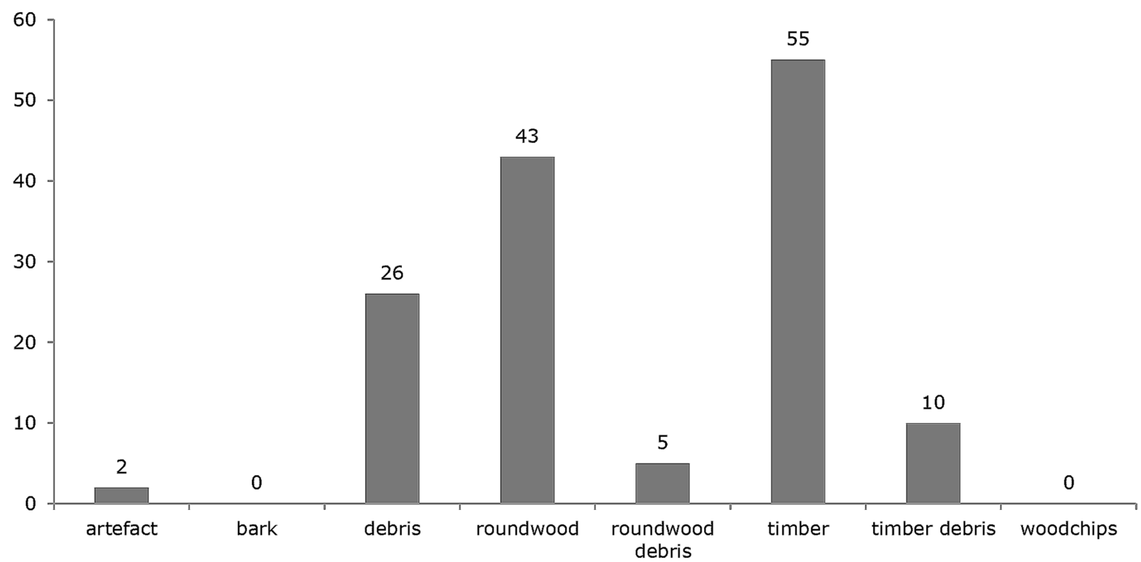

Figure 6.21: Wood categories from the western platform (Copyright Star Carr Project, CC BY-NC 4.0).

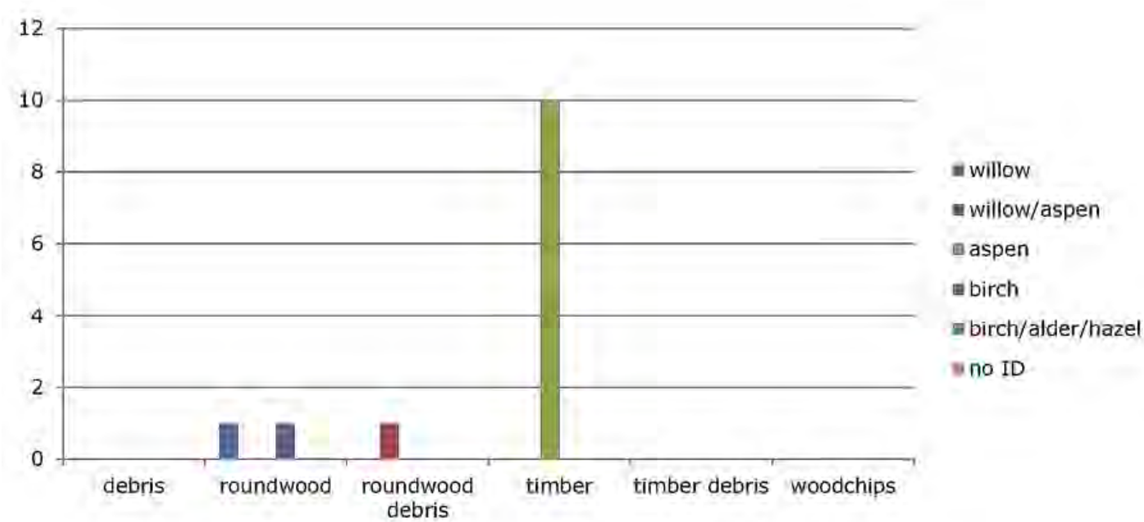

Figure 6.22: Frequency of taxonomic identifications from the western platform by wood category (2013–2015) (Copyright Star Carr Project, CC BY-NC 4.0).

Five items with evidence for charring were recorded from within the platform (three classed as timber and two as timber debris) representing 7% of the material (Table 6.14). Charring varies from slight to heavy with three items charred at one end, one item charred on one face and one item completely charred into an amorphous lump. Four pieces of roundwood display evidence of beaver modification having been beaver gnawed at one or both ends (Table 6.15). Two were recovered from the basal till beneath the platform, one from the brushwood beneath the platform timbers <109909> (which also has a possibly trimmed end) and one from amongst the timbers of the platform (Table 6.15).

Trees

Twenty-three of the timbers are classified as tree trunks (Figure 6.23 and Table 6.16). These vary in length from 1100–4485 mm and in horizontal diameter from 50–270 mm. The high degree of compression is evidenced by the vertical diameters, which vary between 11–62% of the horizontal values. The proximal/distal orientation of the trunks is only apparent in five cases, with no particular pattern noted. Timber <109924> has a possible root bole present at the southern end which may represent the reuse of a fallen tree. The timbers are generally straight grained, with occasional small (diameter c. 20 mm) side branches or knots present and no large side branches were noted. Bark was generally absent. The material is in poor to moderate condition with little surface data visible and many of the ends are degraded and 'feathering' away. Possible evidence for trimming was noted from a single item <110101>, which may have been trimmed from one direction at the distal end. In addition, timber <110134> is truncated along its upper surface, though it is unclear if this is due to degradation, splitting or possibly even wear and timber <109556> has a visible tear running from halfway along its length, to the distal end.

Unsplit items

The main body of the platform, excluding the material classed as trees, contains 25 unconverted items: 19 pieces classed as roundwood and six classed as timber (Figure 6.21). These items vary in length from 90–3165 mm and the long axis of the diameter from 12–195 mm. No facets on trimmed ends or side branches were recorded. Roundwood <99246> shows signs of beaver gnawing at both ends. Timber <110103> is also of interest having been smashed in the middle, probably in antiquity. It is also charred at one end.

In addition, a discrete layer of roundwood lay under the central and eastern timbers of the platform, most of which resembled brushwood (crooked stems with small side branches still attached). A sub-sample of 29 items were recovered and recorded from this deposit. These consist of two items classed as timber debris (both tangential outer splits), four pieces of debris (two tangentially aligned, one radially aligned and one of unknown

Number	Type	Split	Charred?	Notes
99080	TIM	Tan	Moderate	One end
99082	DEB	U/K	Heavily	All over. Charred into amorphous lump
109582	DEB	Tan	Lightly	One end
110103	TIM	N/A	Moderate	One end
113791	TIM	Tan outer	Moderate	Outer / lower face

Table 6.14: Charring from the western platform.

Number	Context	Position	Type	Notes
99246	317	platform	RW	both ends beaver gnawed
109909	312	brushwood beneath platform	RW	1 end beaver gnawed and possibly trimmed
113449	308	underneath platform	RW	1 end beaver gnawed
113772	308	underneath platform	RW	1 end beaver gnawed

Table 6.15: Evidence for beaver activity, western platform.

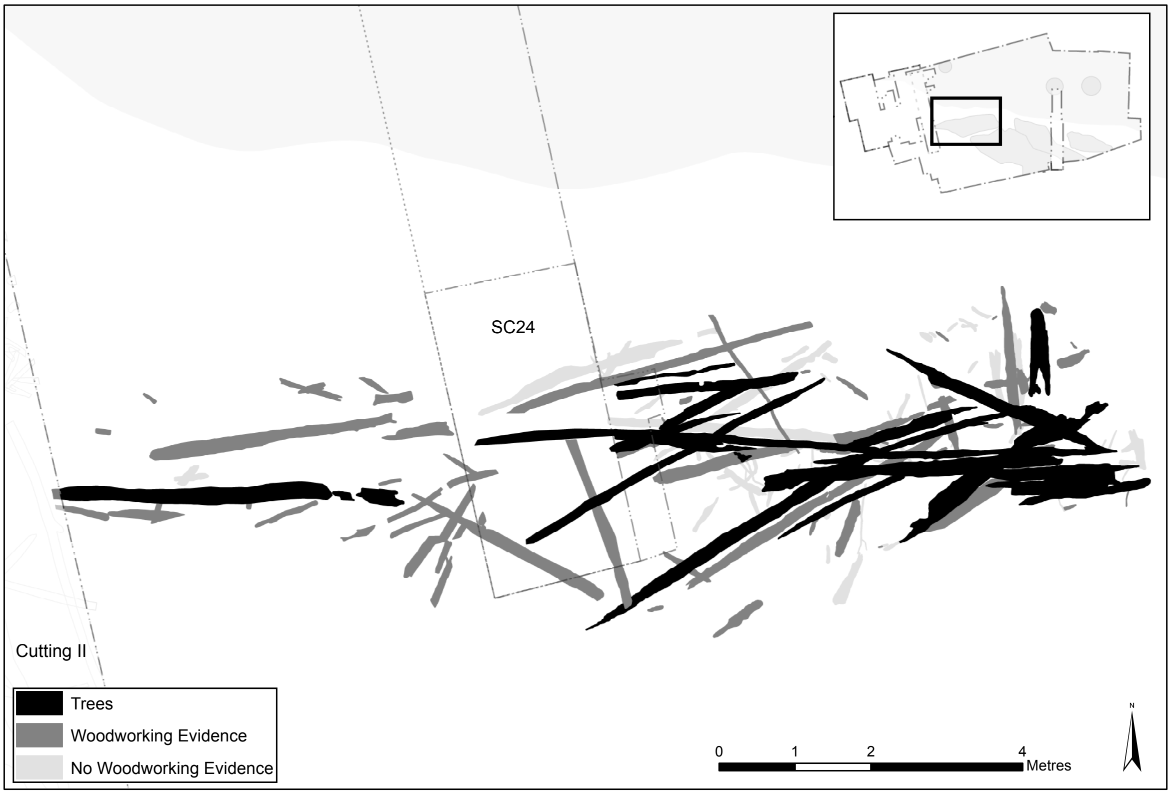

Figure 6.23: Plan of the trees, woodworking evidence and no woodworking evidence from the western platform (Copyright Star Carr Project, CC BY-NC 4.0).

conversion) and 23 pieces of roundwood, one of which is half split. The majority of the roundwood has bark present and varies in length from 72–940 mm and the long axis diameters vary from 7–56 mm. The only evidence for secondary working was recorded from <109909> which has been trimmed and beaver gnawed at one end. A comparable deposit of brushwood with smaller quantities of worked material lay beneath the western end of the platform, where it extended into the brushwood between SC24 and cutting II (see above).

Split items

The main body of the platform contains 60 split items: 26 classed as timber, eight as timber debris, 22 as debris and four as roundwood debris. Tangentially converted material dominates the assemblage with 35 items (59%) aligned in this plane. There are 14 radially split items (23%) and 11 items of unknown conversion (18%) (Table 6.17). The split material classed as timber varies in length from 505–3075 mm, in breadth from 66–230 mm, in thickness from 9–91 mm and is dominated by tangentially aligned material (17 items) with six radially split items and two of uncertain conversion. The timber debris and debris varies in length from 83–498 mm, in breadth from 29–145 mm, in thickness from 3–65 mm and is dominated by tangentially aligned items (n=18) with seven radially aligned items and nine of uncertain conversion.

Central platform

Introduction

The central platform is the largest and most substantial of the lake edge platforms, consisting of three layers of material (mostly large split timbers and trees) that form an overall structure that is 6 m wide and over 17 m long.

Find no.	Length (mm)	Horizontal diameter (mm)	Vertical diameter (mm)	Compression %
99212	4430	230	56	24.3
109556	1910	105	24	22.9
109924	3535	270	30	11.1
109938	2010	160	40	25.0
109949	1180	270	168	62.2
109952	2410	115	35	30.4
109953	4030	100	40	40.0
109964	2504	140	70	50.0
109965	4485	180	70	38.9
110003	3880	110	45	40.9
110042	1940	175	38	21.7
110043	3950	215	39	18.1
110101	1745	50	25	50.0
110107	2405	130	38	29.2
110110	1785	165	35	21.2
110123	1905	110	45	40.9
110125	1100	128	41	32.0
110126	1810	122	22	18.0
110132	2115	175	30	17.1
110134	1680	210	56	26.7
110141	1610	140	40	28.6
110149	2225	165	22	13.3
110150	2980	170	33	19.4

Table 6.16: Trees from the western platform.

Conversion	Timber	Other	Total frequency	Total %
Rad	1	3	*4*	6.7
Rad 1/2	3	2	*5*	8.3
Rad 1/3	3	0	*3*	5.0
Rad 1/4	0	2	*2*	3.3
Tan	14	17	*31*	51.7
Tan – surface split away	1	0	*1*	1.7
Tan outer	2	1	*3*	5.0
U/K	2	9	*11*	18.3
Total	26	34	60	100.0

Table 6.17: Conversions from the main body of the western platform.

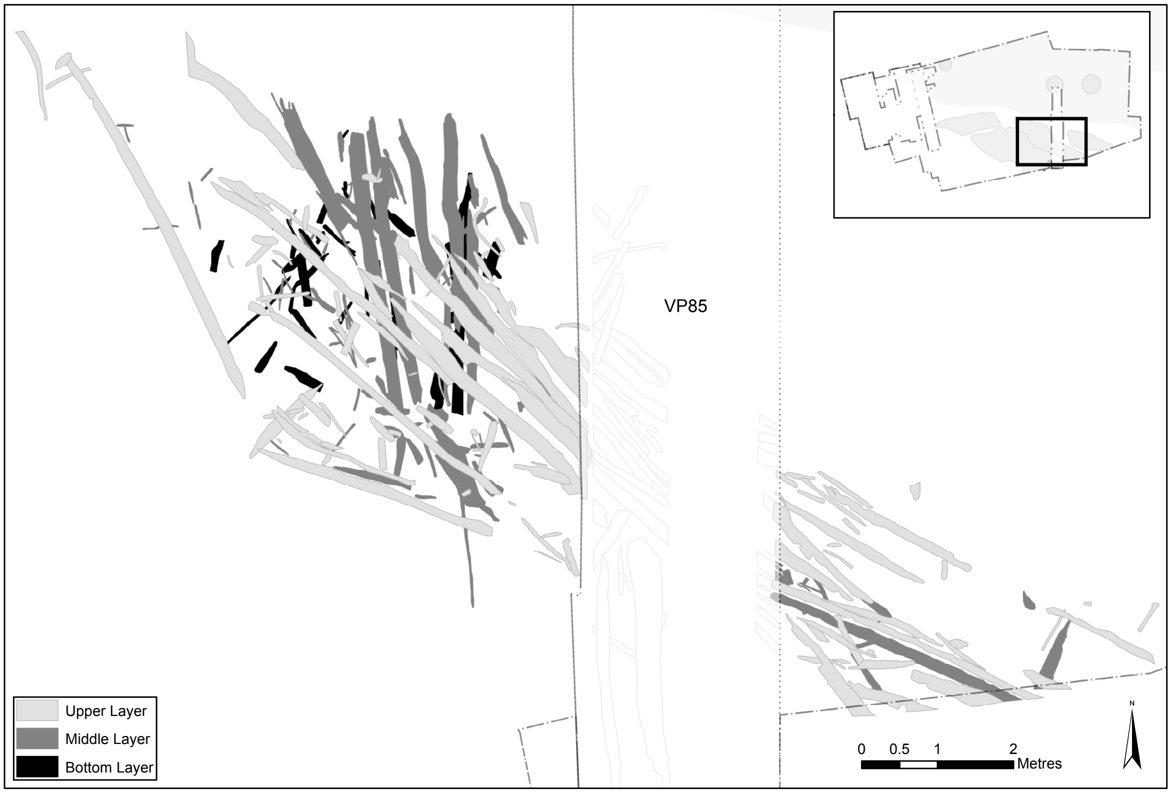

Figure 6.24: Plan of the central platform by layer (Copyright Star Carr Project, CC BY-NC 4.0).

It runs on a north-west to south-east alignment through the wetland part of the site, with its northern end close to the lake shore and its southern end extending beyond the edge of the excavated area (Figures 6.24 and 6.25). The platform consists of three layers of timber but was constructed in a single event, probably to facilitate access into the wetlands and possibly to areas of open water further from the shore. With the exception of a discrete cluster of worked flint, there is very little other archaeological material associated with it, though small quantities of animal bone, flint, and worked antler were recorded in the immediate surroundings.

The platform was first encountered during the 1985 excavation of trench VP85A and again during the extension of the same trench in 1989 (Cloutman and Smith 1988:39; Mellars et al. 1998, 47). During this work a group of parallel timbers were recorded running diagonally across the trench, with two further timbers to the south. Analysis of this material identified both radially and tangentially cleft timbers as well a piece of roundwood with a chop-and-tear end, and a pointed stake displaying significant surface charring (Mellars et al. 1998). The timbers produced some clear surface data and evidence of tooling and secondary working including clear, parallel, longitudinal grooves, which form part of the suite of evidence that has given rise to the style of woodworking described as 'groove-and-split' (Chapter 28).

Trench VP85A was re-excavated and extended to the west in 2010, exposing a continuation of the same parallel timbers. The western extent of the platform was then fully excavated during the 2013 season and a short section to the east was excavated in 2015.

Analysis

Overview

A total of 276 wood records are assigned to this structure (Figure 6.26): 130 to the upper layer, 66 to the middle layer and 80 to the bottom layer. The majority of these are timber (including 26 trees) and roundwood, though

Figure 6.25: Composite orthophoto of central platform (exported from Agisoft Photoscan Pro) (Copyright Star Carr Project, CC BY-NC 4.0).

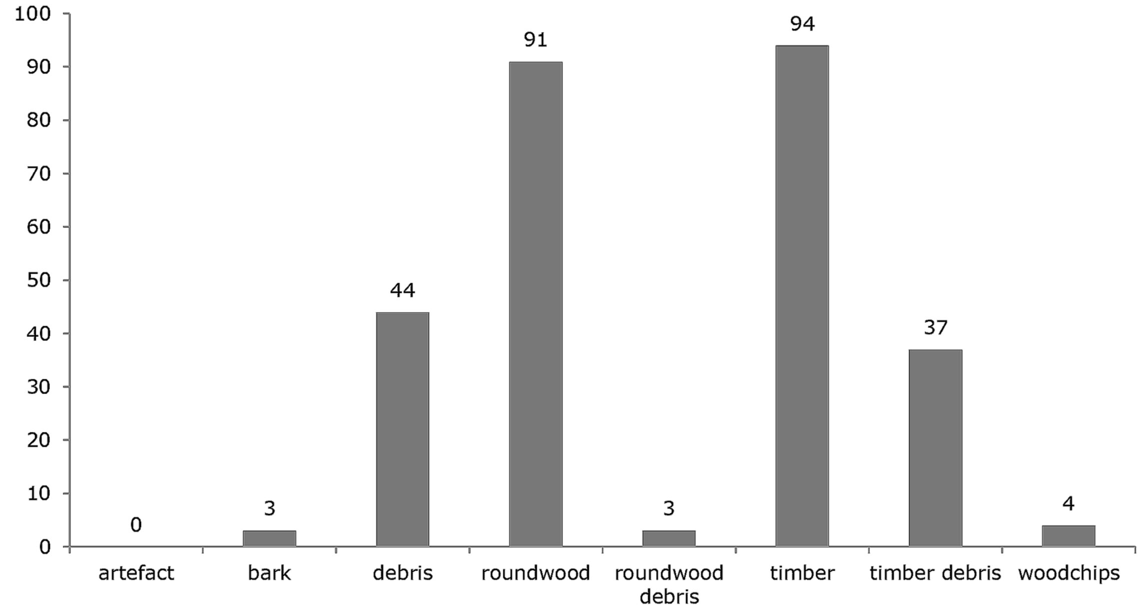

Figure 6.26: Wood categories for the central platform (Copyright Star Carr Project, CC BY-NC 4.0).

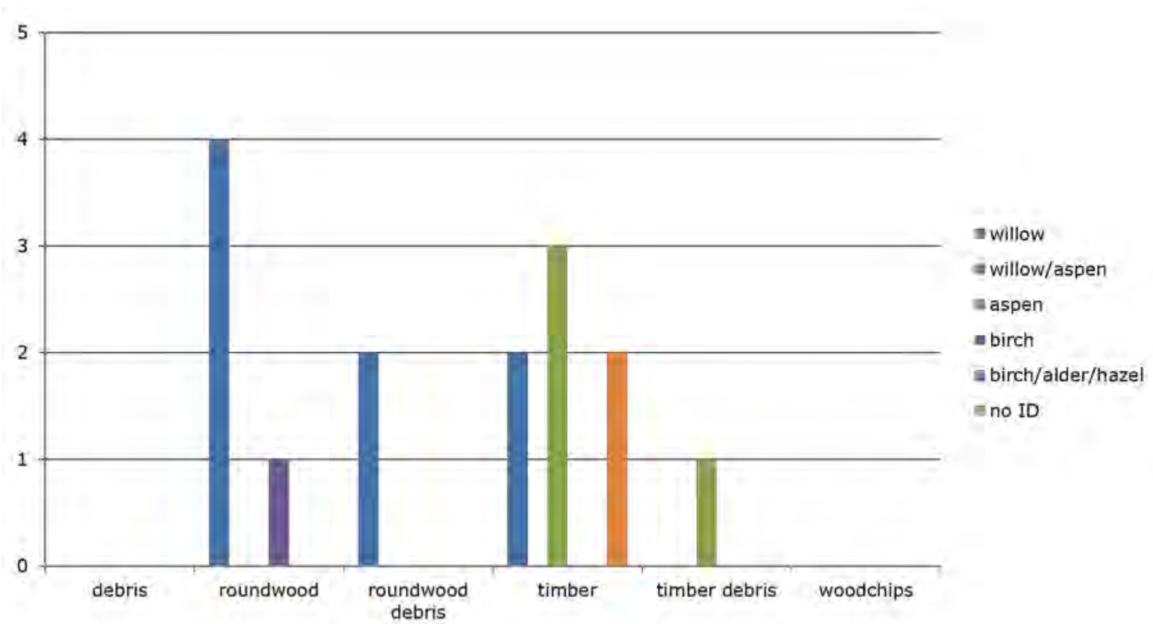

Figure 6.27: Frequency of taxonomic identifications from the central platform by wood category (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 6.28: Intrusive sand in the middle layer of the central platform (left); detail of resulting dislocation of timbers (right) (Copyright Star Carr Project, CC BY-NC 4.0).

significant quantities of debris and timber are also present along with very small quantities of roundwood debris, woodchips and bark. Of the 91 items classed as roundwood, 49 were recorded in plan only and not subjected to detailed recording. A total of 15 items from this area were submitted for taxonomic identification with willow, aspen and birch all represented (Figure 6.27). Willow was the most common species identified for roundwood, whilst the timbers were identified as willow and aspen.

The majority of the wooden remains of this structure lay within reed peat (312) with the lowest elements recovered from detrital mud (317). Sections of the middle and lower layer were truncated by a deposit of intrusive sand, deposited by a natural spring and forced through the peat deposits from the underlying geology by artesian pressure. The spring has destroyed the wood it has passed through and dislocated timbers it has passed in close proximity to (Figure 6.28).

A total of 11 items representing 2% of the material assigned to the central platform showed evidence of charring. The majority (n=10) came from the top layer (five larger charred items and five pieces of roundwood) though a single piece of charred roundwood was present in the middle layer (Table 6.18). In addition there were six pieces of charred roundwood, five from the upper layer and one from the middle layer. Three pieces are charred heavily on one end or face, two are moderately charred all over, and one item is lightly charred along one edge.

Trees

Twenty-six items are classed as tree trunks (Figure 6.29 and Table 6.19). The majority of these (17 items, 65%) are in the upper layer with eight (31%) in the middle layer and one (4%) in the lower layer. These vary in length from 895–5180 mm and in horizontal diameter from 80–230 mm. The high degree of compression seen in the material from this structure is described by the vertical diameters which vary from 10–65% of the horizontal values. Bark was only noted from a single item <99893> on which a long strip of bark 12 mm thick was present. The trees are straight grained with moderate small side branches (diameter c. 30–40 mm) noted from three items (<99746>, <99803> and <99893>) and a single side branch noted from two items (<99804> and <116054>), diameter c. 25–30 mm.

Three items display evidence of conversion including timber <99803>, which had faint parallel grooves on its surface, probably relating to groove-and-split type woodworking (see Chapter 28). In addition, the distal end of a side branch from <99804> had probably been beaver gnawed (though the condition of the wood precluded a definite identification of beaver gnawing), and the distal end of <116054> is radially quarter split (though it is unclear if this is a cultural or natural conversion).

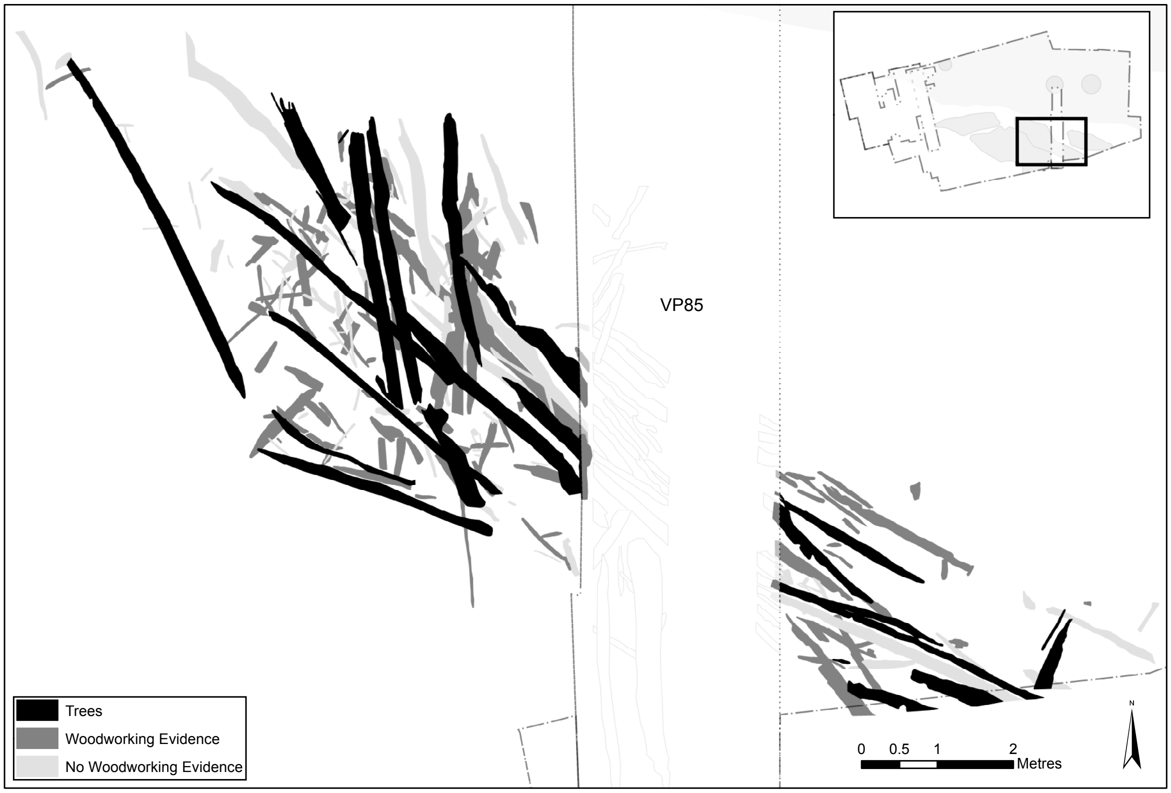

Figure 6.29: Plan of the trees, woodworking evidence and no woodworking evidence in the central platform (Copyright Star Carr Project, CC BY-NC 4.0).

Type	Find no.	Layer	Charring	Notes
Tree	99893	top	lightly	underside for 1 m at the proximal end
Timber (tan)	99960	top	moderate	at one end on outer / sapwood surface
Timber (rad)	99888	top	lightly	both faces at one end
Debris	99240	top	heavily	all over
Debris	99813	top	100%	all over

Table 6.18: Charring evidence from the upper layer of the central platform.

Unsplit items

There are 58 unsplit items, not including material classed as trees. These include 91 pieces of roundwood, 11 timbers, three fragments of bark and two pieces of debris (Figure 6.26). Due to the large volume of roundwood encountered, a sub-sample of the material was recorded in detail (42 items) with the remainder (49 items) marked on plan only.

The roundwood is spread fairly evenly through the top, middle and bottom layer of the platform. Ten recorded items have bark present and seven items (8%) have morphological traits often associated with coppiced material (see Chapter 28). There are no tool facets present, although two items (<103262> and <103498>) are clearly torn at the proximal end. Three pieces are charred heavily on one end or face, two are 100% moderately charred and one item is lightly charred along one edge. Five of the charred items are from the upper layer

Find no.	Length (mm)	Horizontal diameter (mm)	Vertical diameter (mm)	Compression %
99726	2910	150	22	14.7
99737	1950	135	19	14.1
99738	1400	205	30	14.6
99739	4200	130	32	24.6
99745	3590	224	40	17.9
99746	1560	156	40	25.6
99803	3890	150	30	20.0
99804	5180	138	40	29.0
99893	3220	170	80	47.1
99963	2425	80	52	65.0
103117	1542	217	32	14.7
103147	3400	160	67	41.9
103263	3901	150	60	40.0
103277	2390	230	55	23.9
103293	2445	160	80	50.0
103294	3750	180	95	52.8
115307	1230	200	20	10.0
115318	1111	185	72	38.9
115322	1715	180	62	34.4
115324	2222	140	19	13.6
115658	1385	155	42	27.1
115660	2330	110	32	29.1
115662	3460	160	20	12.5
115680	3660	100	20	20.0
116054	1775	143	75	52.4
116061	895	165	63	38.2

Table 6.19: Trees from the central platform.

and one from the middle layer. The recorded roundwood varies in length from 80–3740 mm and in horizontal diameter from 15–105 mm.

The 11 items classed as timber are generally good-quality, straight-grained, knot-free material, none of which has bark present. These larger items occur almost exclusively in the top layer with a single item present in each of the middle and lower layers. No woodworking, charring or unusual taphonomy was noted. The material varies in length from 394–3010 mm and in horizontal diameter from 100–160 mm.

None of the three fragments of bark shows any evidence of woodworking. Although these may have formed an integral part of the construction of the platform, it is equally likely they have fallen away from other items used in the construction of the platform. The largest piece measures 534 × 142 × 9 mm. Both pieces of debris are from the top layer. One of the pieces <99728> is a long piece of roundwood that has degraded into a radial half, the other <99813> is a completely charred amorphous lump measuring 270 × 105 × 10 mm.

Split items

A total of 143 split items form part of this structure (Table 6.20): 57 items classed as timber, 37 as timber debris, 42 as debris, four as woodchips and three as roundwood debris. The majority of the material is

Conversion	Timber	Timber debris and debris	Woodchips	Roundwood debris	Total frequency	Total %
Rad	3	9	*1*	*0*	13	9.1
Rad 1/2	0	0	*0*	*3*	3	2.1
Rad 1/3	0	0	*0*	*0*	0	0.0
Rad 1/4	0	1	*0*	*0*	1	0.7
Rad 1/8	1	0	*0*	*0*	1	0.7
Tan	28	47	*3*	*0*	78	54.5
Tan – surface split away	0	0	*0*	*0*	0	0.0
Tan outer	23	11	*0*	*0*	34	23.8
U/K	2	11	*0*	*0*	13	9.1
Total	57	79	4	3	143	100.0

Table 6.20: Conversions from the central platform.

tangentially aligned (112 items, 78%), with only 18 items radially aligned (13%) whilst 13 are of unknown conversion (9%).

The split material classed as timber is present throughout the three layers and varies in length from 515–3600 mm, in breadth from 34–210 mm and from 2–53 mm in thickness. This material is generally straight grained, with side branches only noted on one item, and generally lacking bark (present on one item only). Four items are thin, radial splits with the remainder tangentially aligned, 23 of which are the outer split (Table 6.20). No tool facets pertaining to trimmed ends were recorded. There is a tendency for these items to be parallel sided (n=15), and seven items show traces of parallel longitudinal grooves on the split surfaces, possibly related to groove-and-split. Seven items also have a chamfer running down one or both edges and three have a lenticular cross section. In addition a single timber from the top layer <99960> has moderate charring at one end on the outer/sapwood surface (Table 6.18).

The timber debris and debris are present through all three layers of the platform and are considered together. The material varies in length from 74–540 mm, in breadth from 17–150 mm, in thickness from 4–80 mm, and is dominated by tangentially aligned items (58, 11 of which are outer splits), with ten radially aligned items and 11 of uncertain conversion (Table 6.20). Several items display characteristics associated with groove-and-split woodworking; three have longitudinal grooves, 17 are parallel sided and the morphology of eight items has led to the suggestion that they may be debris produced by the groove-and-split technique (see Chapter 28). In addition, two items have a lenticular cross section. Two items, both from the top layer, are charred; radially split timber debris <99888> is lightly charred on both faces at one end, whilst debris <99240> of unknown conversion is completely charred (Table 6.18). Finally, one tangential outer split <99241> is a piece of woodworking debris where a knot has been removed from a larger timber, a common carpentry practice.

Four woodchips were present in the upper (1 item) and lower (3 items) layers. They vary in length from 76–155 mm, in breadth from 12–35 mm and from 5–10 mm in thickness. Three are tangentially aligned and one is radially aligned (Table 6.20). The three pieces of roundwood debris were located in the middle and lower layer. All are half splits from small-diameter wood (original diameters vary from c. 33–56 mm) (Table 6.20).

Eastern platform

Introduction

The eastern platform is a linear arrangement of timbers running north-west/south-east, roughly parallel with the lake shore, at the eastern end of the site. The platform is 4.5 m wide and extends for at least 11 m. Its eastern extent is difficult to establish but timber <114883> extends beyond the edge of the trench, and it is possible that the platform continues in this direction (Figures 6.30 and 6.31).

Figure 6.30: Plan of the eastern platform showing evidence for trees, woodworking and timbers with no signs of woodworking (Copyright Star Carr Project, CC BY-NC 4.0).

This bulk of the platform timbers lie in a single discrete layer and consists mostly of timber (including 17 trees) with smaller quantities of debris and roundwood. This appears to have been constructed in a single phase and acted either as a trackway through the wetland edge or a platform on which activities could be undertaken. A second layer of material, consisting entirely of medium-sized split items, all but one of which are tangentially aligned, lay below this and was separated by approximately 100 mm of sediment. These are either an earlier phase of activity or perhaps are residual timbers associated with the detrital wood scatter.

Analysis

Overview

A total of 50 wood records are assigned to this structure, 43 items forming part of the main structure and seven lying beneath. A single item, radially split timber debris <115333> from the lower layer, displays light charring. The wooden remains of this structure lay entirely within reed peat (312) with the lowest elements of the structure recovered from the base of this deposit. The majority of the material is timber, much of which is classed as trees. There are also small quantities of roundwood and assorted debris present (Figure 6.32). Four timbers were identified to taxa, all of which were identified as aspen.

Trees

The platform contains 17 timbers classed as tree trunks (Table 6.21). Four of these were identified as willow/aspen. The trees are all straight grained with no evidence of side branches noted, none have bark present and

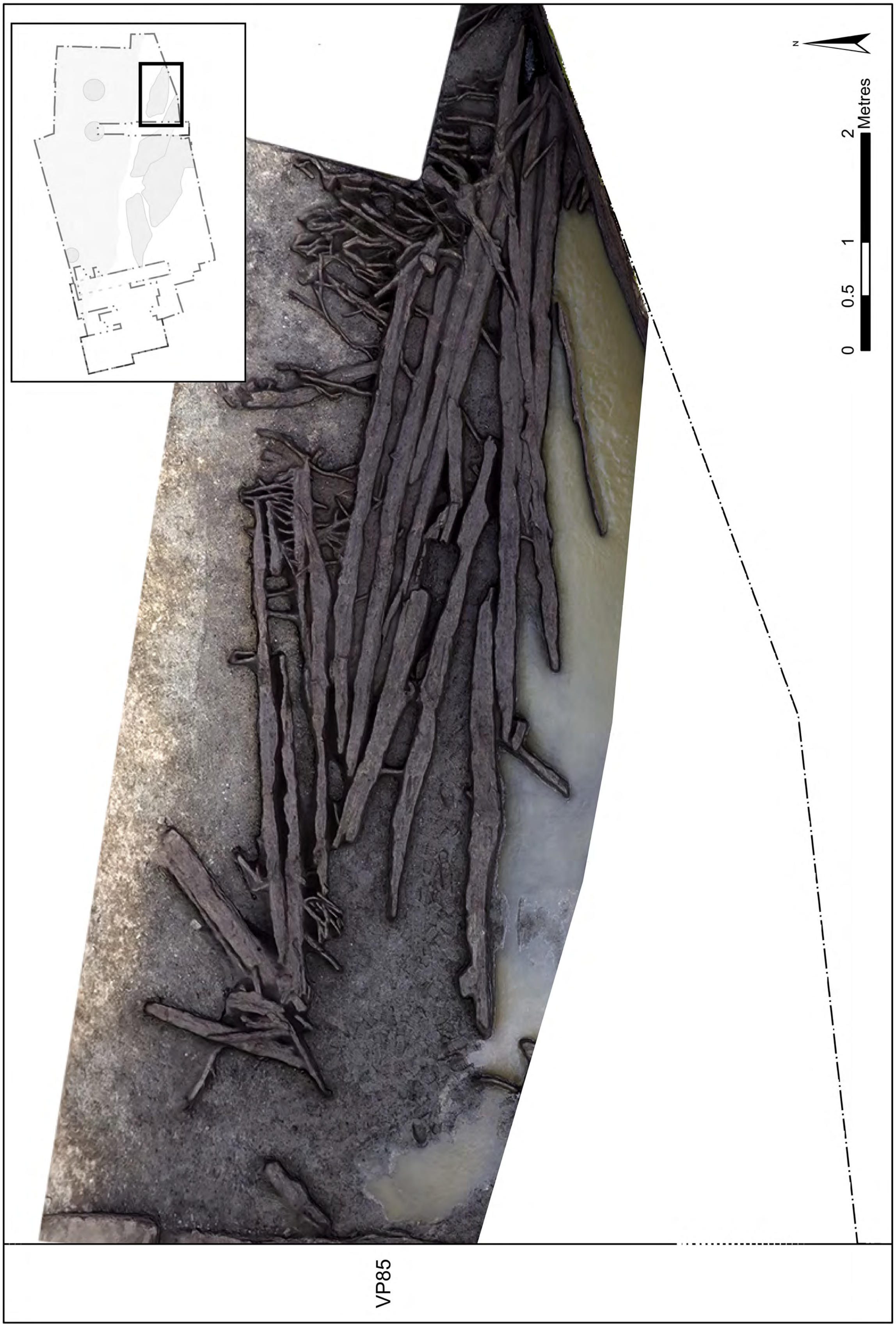

Figure 6.31: Orthophoto of the eastern platform (exported from Agisoft Photoscan Pro, courtesy of Dominic Powlesland) (Copyright Star Carr Project, CC BY-NC 4.0).

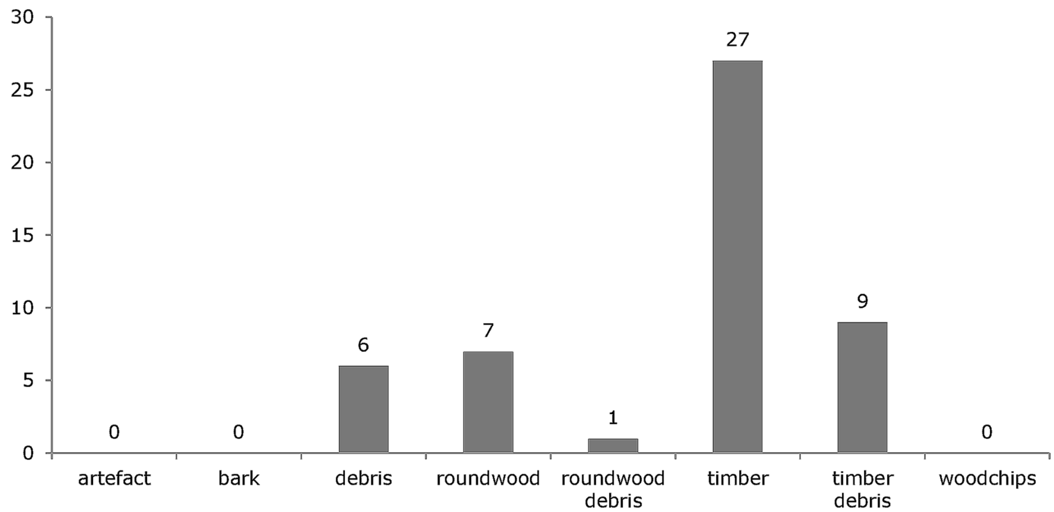

Figure 6.32: Wood categories for the eastern platform (Copyright Star Carr Project, CC BY-NC 4.0).

Find no.	Length (mm)	Horizontal diameter (mm)	Vertical diameter (mm)	Compression %
113252	3988	226	45	19.9
114252	4010	195	28	14.4
114854	3295	148	43	29.1
114856	3350	180	40	22.2
114860	4180	190	90	47.4
114861	3930	156	39	25.0
114874	3900	120	12	10.0
114879	4450	160	32	20.0
114881	3610	145	56	38.6
114883	4010	154	50	32.5
114885	4735	180	40	22.2
114888	4370	130	60	46.2
114890	4450	90	25	27.8
114897	3020	150	15	10.0
114898	1650	280	45	16.1
114899	4130	150	36	24.0
114900	1510	149	34	22.8

Table 6.21: Trees from the eastern platform.

none show any sign of woodworking. Due to the poor condition of much of the material it was only possible to identify the proximal/distal orientation of a few of the items, from which no particular trends are apparent. The trees vary in length from 1510–4735 mm and from 90–280 mm in horizontal diameter. The high degree of compression is evidenced by the vertical diameters, which vary between 10–47% of the horizontal values (Table 6.21).

Unsplit items

With the exception of the material classed as trees, there are a total of 11 unsplit items forming part of this platform: seven classed as roundwood and four classed as timber (Figure 6.31). Only one of these items has bark present. These items vary in length from 195–1070 mm and from 13–170 mm in the horizontal, long axis of the diameter. One item, <114875> has been trimmed to length at the proximal end from two directions.

Split items

A total of 22 split items form part of this structure: six classed as timber, nine pieces of timber debris, six pieces of debris and a single piece of roundwood debris (Figure 6.32). Tangentially converted material dominates the assemblage with 16 items (72%) aligned in this plane (Table 6.22), whilst three are radially split items (14%) and three are of unknown conversion (14%). The split material classed as timber varies in length from 565–2520 mm, in breadth from 55–200 mm, in thickness from 7–18 mm and is all tangentially aligned (Table 6.22). The timber debris and debris are considered here together. This material varies in length from 91–465 mm, in breadth from 30–170 mm, in thickness from 10–34 mm and is dominated by tangentially aligned items (n=10) with 3 radially aligned items and 3 of uncertain conversion (Table 6.22).

Discussion of the lake edge timber platforms

The three lake edge platforms are the most substantial wooden structures on the site. Each is constructed from large timbers (including trees and split material) that have been laid down directly onto the peat that was forming within the lake edge wetland. From their form and composition they are clearly deliberately built structures and not natural accumulations of material and represent significant investments in terms of resources and labour.

The central platform is the earliest, largest and most complex of these structures, consisting of three clearly defined layers of material. The timbers of each layer lay directly over each other with no sediment present between and had probably been deposited in a single event. The top layer is dominated by a series of large, unconverted trees, split and unsplit timbers, up to 3.8 m long, lying parallel to one another and aligned north-west/south-east (Figure 6.24). This forms the main axis of the structure, which runs for over 17 m (extending beyond the limits of the excavation). Where identifiable, the proximal ends of these timbers were generally lying to the south-east, away from the water's edge, and so cannot represent trees that have simply fallen into the lake edge wetland. Below these were a layer of parallel timbers, orientated north to south, which in turn lay on top of a series of parallel, tangential outer splits that followed the same

Conversion	Timber	Other	Total frequency	Total %
Rad	0	3	3	13.6
Rad ½	0	0	0	0.0
Rad 1/3	0	0	0	0.0
Rad ¼	0	0	0	0.0
Tan	5	9	14	63.6
Tan – surface split away	0	1	1	4.5
Tan outer	1	0	1	4.5
U/K	0	3	3	13.6
total	6	16	22	100.0

Table 6.22: Conversions from the eastern platform.

north-south alignment. These lower layers lie towards the north-west (shoreward) end of the platform and may have been laid down to provide additional support to this part of the structure or perhaps to elevate it further above the peat.

Although it is less coherent, the western platform is also a relatively complex structure, consisting of five semi-distinct layers of wood sat above a brushwood base. The main axis of this platform was made up of a layer of east-west aligned timbers (layer 2) running along its full extent. Again, this material was very large with most of the timbers between three and four metres in length. At its eastern end this material was overlain by an upper layer of timbers (layer 1), which ran at an angle to the platform's main axis, whilst three further layers of timber (layers 3–5) lay at the base of the platform, presumably to stabilise the structure and prevent it from sinking into the peat. As with the central platform there is no sediment between the layers of timber, as the platform has probably been constructed as a single event.

The eastern platform is the simplest of the structures, made up of a single layer of material, though as with the other platforms, this consisted of very large timbers (including whole trees), some over four metres long. Though an underlying layer of timber was present, this is separated from the main concentration of material by a layer of sediment and probably represents an earlier phase of activity.

Though there are some differences between them, the three timber platforms are very similar in terms of their construction, each possessing a principal axis made from large timbers (including whole trees). There is also a strong tendency for the timbers of each of the platforms to be aspen, including all the identified timbers from the eastern platform (n=4) and the western platform (n=20), and the majority of the identifiable timbers from the central platform (3 aspen, 2 willow). In addition, the platforms are notably different from the other large concentrations of wood at the site, with a far higher proportion of timbers than either the detrital wood scatter or Clark's area, and the highest prevalence of timbers classed as 'trees' (1.5% for the detrital wood scatter, 11% for the central platform, 21% for the western platform and 34% for the eastern platform). There is also an extremely low prevalence of wooden artefacts recorded from the platforms: just two timber debris stakes recorded from the western platform (See Chapter 30), and very low quantities of other archaeological material (see Chapters 7 and 8).

In terms of their function, the position of the platforms close to the edge of the lake suggests that they were constructed in order to enable movement into the wetland area, perhaps to access deeper water further from the shore. However, it is also possible that they were laid down to create a more solid, stable surface perhaps for hauling in boats or for undertaking particular tasks within the wetlands. Unfortunately the lack of associated material culture makes any further interpretation difficult and it should be noted that the platforms may well have performed multiple functions.

Other wooden remains

There are a total of 200 wood records that were recovered from parts of the site not assigned to any of the spatial analytical areas defined in the introduction to this chapter. These records have been sub-divided into four groupings: 1) The peat above the marl: 27 items, 2) wood peat (310): 65 items, 3) Clark's backfill: 2 items, 4) unassigned: 106 items.

The peat above the marl

A total of 27 items were recorded from the area above the marl dome (Chapter 20), the majority were recovered from the reed peat (312) and detrital mud (317), with a single item from within the basal organic sand (320). A range of material is represented, including timber, roundwood, forms of debris, and a single artefact: <107799>, an ad-hoc tool (Figure 6.33). Four items are charred, seven display morphological traits that may be indicative of coppicing, 14 items are split, and three have trimmed ends.

One of the timbers, <109922>, is a fallen tree that may be in situ. Lying approximately north (proximal)/south (distal), the proximal end is very heavily charred on the upper surface for the first 2000 mm terminating in a totally charred end. Numerous side branches are visible around what appears to be the crown, the first occurring approximately 400 mm from the charred proximal end. The surviving portion of the trunk measures 4.5 m × 310 mm × 70 mm. The charring may be a result of a burning event in the surrounding reed beds.

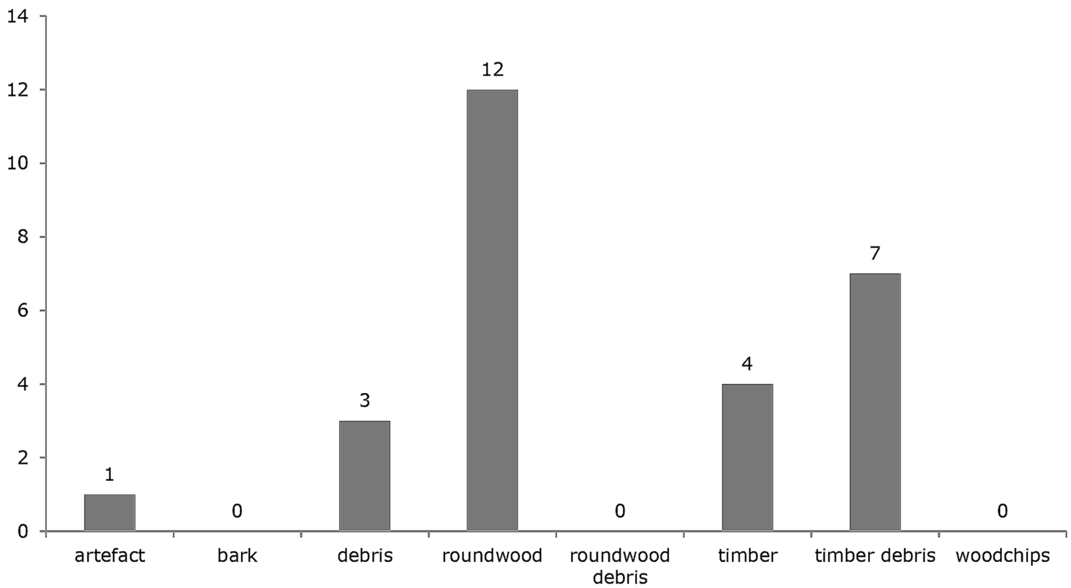

Figure 6.33: Wood categories for the area classified as peat above the marl (Copyright Star Carr Project, CC BY-NC 4.0).

Wood peat (310)

A total of 65 items were recorded from within wood peat (310) (Figure 6.34). Roundwood is the most common material, though other items are also present, notably timber, forms of debris, and a single artefact: an ad-hoc tool <107755> (Chapter 29). The majority of the material (89%) is in moderate or worse condition as might be expected given the relatively high position in the sequence of the material. The character of the assemblage is broadly similar to that seen in other areas: 17 items (26%) are charred, often heavily; 12 items (18%) show morphological traits that may be indicative of coppicing; 17 items (26%) are split. No evidence for tool facets was recorded.

Amongst this material is an interesting group of three pieces of tangentially split timber debris (<107759-61>) some 18 m south-west of the dryland deposits, in the south-west of the area of investigation, that appear to represent in situ primary woodworking debris derived from a single episode. One of the items is a tangential outer split and two are moderately charred on one face. The items are visually very similar and may perhaps represent debris from the working of the same parent timber. They vary in length from 120–255 mm, in breadth from 60–73 mm and from 8–14 mm in thickness.

None of the seven timbers recorded were worked and four are thought to be fallen trees, probably lying in situ. The first of these, <98866>, is a large, fallen tree aligned roughly north-south that lies above the timbers of the central platform. The proximal (north) end is 350 mm in diameter and lenses out at the edge of the waterlogged deposits against the slope of the lake edge. The distal end of the tree passes out of the excavation area some 10.3 m to the south (at which point its diameter is 80 × 110 mm). The first side branch is located 5.2 m from the proximal end and a major crux some 6.5 m. There are numerous side branches and the trunk is somewhat curved in the crown of the tree (Figure 6.35).

Figure 6.35 (page 117): Fallen tree <98866> lying above timbers of the central platform (Copyright Star Carr Project, CC BY-NC 4.0).

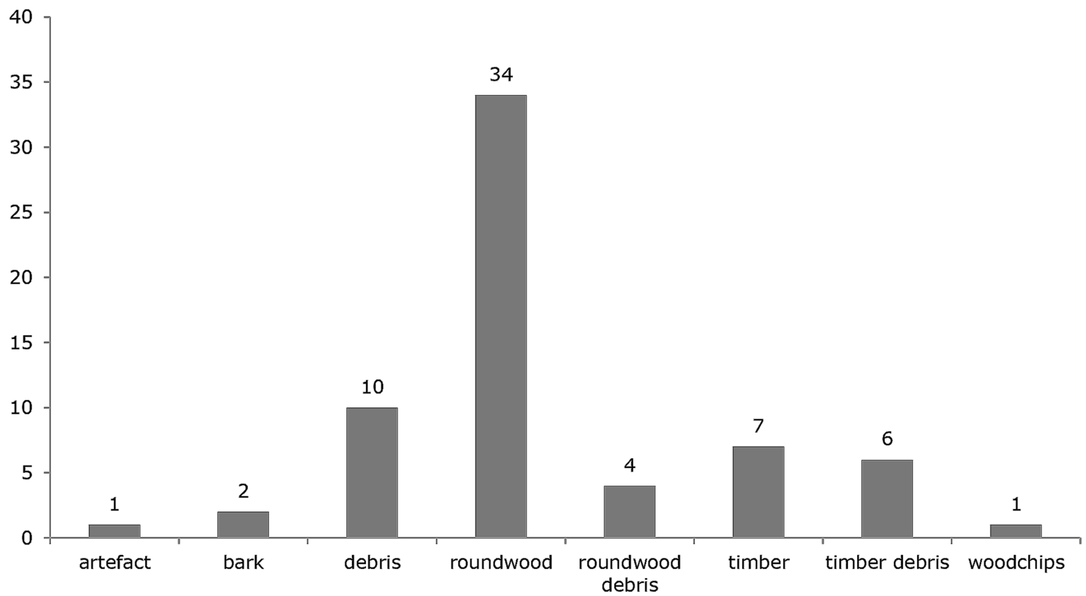

Figure 6.34: Wood categories classified as wood peat (310) (Copyright Star Carr Project, CC BY-NC 4.0).

The second, <113275>, is a section of tree trunk, lying approximately north-south, to the south of the brushwood some 7.5 m from the dryland deposits. The north end is truncated by previous excavations and the south end is degraded. Bark was present on the underside and moderate small side branches were noted. The trunk measures 1530 × 150 × 35 mm.

The remaining trees, <113763> and <113764>, are represented by lengths of highly compressed trunks, in very poor condition, measuring 1530 × 260 × 35 mm and 1530 × 260 × 35 mm respectively. In both cases bark is present and both ends are degraded. The trees were aligned north-south, above the timbers of the eastern platform, extending out of the trench to the south.

Clark's backfill

Occasional pieces of smashed-up waterlogged wood were present within the backfill of several of Clark's trenches. For the most part, this material was too heavily mechanically damaged and smashed to be analysed. However, two relatively intact pieces were recorded from the backfill of cutting V. Both were heavily charred and appear to be woodworking debris. Of these, <96111> is tangentially aligned and measured 197 × 60 × 10 mm whilst <96112> is an extremely unusual transverse aligned item measuring 140 × 82 × 12 mm.

Unassigned material

A total of 106 items are not assigned to any other spatial analytical group. These were recovered from the reed peat (312) and detrital mud (317) and are spread across the site. The material is similar in terms of make-up, appearance and woodworking evidence to that seen in other analytical groups (Figure 6.36). Three artefacts are present: a digging stick/haft or handle <113765>, small radial dowel <113768> and a sub-rectangular radial dowel <113778> (Chapter 29). A total of 18 items are charred, 34 are split and two have chop-and-tear trimmed ends. Much of the roundwood recorded in this area represents sub-samples of larger deposits of brushwood. However, seven pieces did display possible morphological evidence of coppicing.

Two fallen trees were recorded. The first, <109112>, is degraded at both ends and measures 1560 × 125 × 65 mm. Located to the south of the detrital wood scatter, part of the crown of the tree was present and partially recorded as roundwood <109113-117>. The second, <113251>, was lying proximal end north/distal end south, above the timbers of the western platform, where it extended out of the area of investigation. The first side branch occurred 2500 mm from the degraded proximal end and the excavated portion measured 5530 × 255 × 32 mm. The tree was in poor condition.

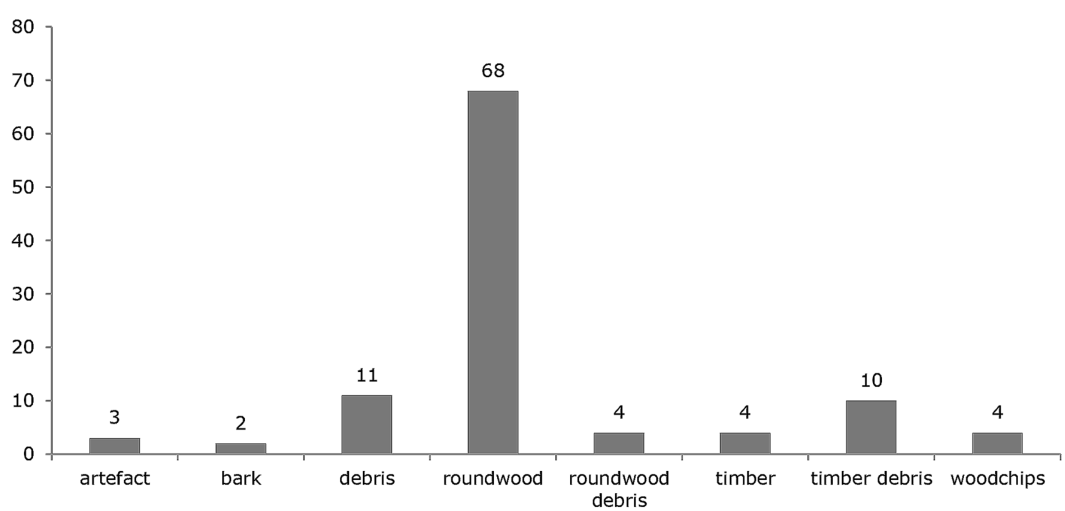

Figure 6.36: Wood categories classified as unassigned material (Copyright Star Carr Project, CC BY-NC 4.0).

Conclusions

Each of the previous programmes of fieldwork at Star Carr have recorded evidence of wooden structures that were used to facilitate forms of activity within the lake edge wetlands. For Clark this was the deposit of unworked birch brushwood, which he argued had been laid down deliberately to form a stable occupation surface at the edge of the lake (Clark 1954:9). The later excavation of VP85A recorded a very different structure, this time made from deliberately split timbers that had been laid down to form a platform or trackway (Mellars et al. 1998:62). Whilst the current project has changed the way we understand these earlier discoveries, its major contribution has been to show how extensive and varied the use of wooden structures was within the wetland areas.

The most significant of the structures, in terms of their physical size, and the labour and resources they entailed, are the three large timber platforms (the central, eastern and western platforms). These structures have much in common in terms of their form, setting and the raw material used in their construction. They all lie close to the edge of the lake and have been laid directly onto the peat. Their primary axis is defined by a mixture of entire 'cleaned up' tree trunks and extremely large split timbers, some up to 3.5 m in length, and from the absence of sediment between overlying timbers each appears to have been built in a single event.

There is no doubt that these are nothing other than deliberately built structures. To begin with, the component timbers have clearly been placed by the inhabitants of the site to create a regular linear surface, given the overall arrangement of the wood and the fact that at least some timbers lie parallel and abut each other on their longest sides. Added to this is the obvious layering visible in the central platform, which is made up of three tiers of parallel timbers, each of which is on a different alignment. Second, in contrast to the trees that had fallen into the lake, the trees that formed part of the platforms were straight grained and lacked side branches, features that suggest they had grown in areas of denser woodland cover. As such, they have been brought to this location and do not represent natural falls of trees growing on the shore. Third, apart from the trees, much of the material making up the platforms has been deliberately split, with evidence for the groove-and-split technique of working, whilst tooling marks were also present on the better-preserved timbers from the 1985 excavations (Mellars et al. 1998). Finally, whilst there is evidence for beaver gnawing on some pieces of wood, the contribution of this large rodent to the accumulation of wood recorded at Star Carr is minimal, representing only c. 0.5% of the total recorded assemblage and even less in terms of the material forming the platform. As such there is no possibility that the platforms represent the actions of beavers (for a full discussion of beaver activity see Chapter 28).

Whilst the intentionality of these structures is clear, the motivation behind their construction is harder to discern. Given their position and orientation it seems highly likely that all of the platforms were built to facilitate access into the lake edge wetlands, though whether this was for the purpose of hunting, the mooring of boats, accessing areas of open water, or other forms of activity is unclear. Furthermore, whilst the similarity in the appearance of the platforms makes it tempting to suggest they all shared the same function, the broad temporal frame across which they occur warns against such a simplification (see Chapter 9).

The detrital wood scatter, whilst lacking the same level of coherence and structure, was probably also a deliberate construction. Again, this is reflected in its linear form as well as the spatial relationship between the wood and the assemblage of animal bone that was deposited at the same time. However, in contrast to the large platforms, the detrital wood scatter has built up through successive episodes of deposition rather than a single phase of construction, and appears to have been used (at least in part) for the purpose of depositing parts of animal carcasses into a discrete part of the wetlands (Chapter 7).

In contrast, there is no evidence that the wood encountered by Clark acted either as a platform or occupation surface. The brushwood recorded during the current project represents a gradual, natural accumulation of material, probably of small branches falling into the lake edge from trees growing at the shore. This material clearly extended into Clark's cutting II and must have been part of the assemblage of wood that he recorded. Equally, the wood from the baulk between cuttings I and II, which also extends into Clark's excavations, is too diffuse to have formed an occupation surface or to have been deposited as made ground. Instead this material has probably been deposited into the wetlands, perhaps as part of the same sets of practices through which a large assemblage of animal bone, worked antler and flint was deposited. It should also be noted that the clay mentioned by Clark was also found in the recent excavations but on closer inspection it did not appear to form clay 'wads'; rather it appeared to be clay that had resulted from surface runoff from the dryland.

Whilst interpretations of the structural and functional aspects of these assemblages are clearly important we should also consider how the nature of the material provides other insights into the character and scale of woodworking at Star Carr. To begin with, the presence of large quantities of roundwood rods and poles with morphological traits associated with coppicing hints at either some deliberate management of woodland resources or perhaps simply a high degree of selection for long straight poles (see Chapter 28). Furthermore, the extensive wooden remains encountered at the site provide evidence for the use of significant quantities of split, trimmed and hewn wood. All the major wood categories are present from large timbers (including the utilisation of entire felled trees and naturally fallen tree trunks) through timber debris (off-cuts), smaller woodworking debris, woodchips, roundwood and roundwood debris. What is more, woodworking is a reductive technology and waste material, by-products and off-cuts occur in all of the assemblages. Whilst some of this may relate to the construction of the platforms, much of the material has been generated through the woodworking tasks relating to other structures, built either in unexcavated parts of the wetland or on areas of the dryland. These may have included the manufacture of components of the post-built structures that were recorded just above the shore (see Chapter 5), such as parts of their frames or internal features. Equally, they may have been generated through the building of other forms of structures which have left no identifiable trace, such as raised storage platforms. We should also consider the other forms of material culture that people may have been making from wood and that may have generated comparable assemblages of waste such as boats, traps, stools or ladders. Such artefacts and structures are seldom considered in our narratives of the Mesolithic but the data from Star Carr shows that these or similar objects would have been just as much a part of people's lives as things made from stone, bone and antler.

Given the scale of woodworking at Star Carr it is all the more surprising that there is so little comparable evidence from other Mesolithic sites, either in Britain or other parts of Europe. Two structures have been identified at the Williamson's Moss site in Cumbria, the first consisting of a layer of birch brushwood overlying a timber lattice, the second made up of two timbers and an extensive area of bark flooring (Bonsall et al. 1989), though neither approaches the scale of the Star Carr platforms. Wooden deposits recorded during nineteenth-century investigations at Round Hill, Skipsea have also been reinterpreted as a possible Mesolithic lake edge platform based on more recent radiocarbon dating and small-scale excavations (Fletcher and Van de Noort 2007; Van de Noort et al. 1995). However, the nature of this structure is difficult to discern, though the original accounts note an absence of piles and a general lack of discernible order amongst the wood (Fletcher and Van de Noort 2007, 318), features which are reminiscent of the detrital wood scatter. More recently, three vertical timber posts have been recorded from the Thames Foreshore at Vauxhall and radiocarbon dated to the very Late Mesolithic (Milne et al. 2010). Though there is no evidence for the nature of this structure, the size of the posts suggests a relatively substantial structure, such as a small raised platform or jetty.

Evidence for comparable wooden platforms or trackways from other parts of Northern Europe is also sparse. In Ireland wooden platforms have been recorded at Clynacartan bog on Valentia Island (Co. Kerry) (Woodman 2009) and Clowanstown (Co. Meath) (Mossop 2009), and layers of brushwood formed part of the construction of the lake edge platform at Lough Kinnale (Co. Longford) (Fredengren 2009). However, none consist of the arrangements of large timbers and trees noted at Star Carr and are generally interpreted as fishing platforms or artificial islands. Similarly brushwood and timbers formed the base of the bark platforms at Duvensee in Germany (see Chapters 12 and 30) and timbers are known from Bølling SøVest IV, in Denmark (Andersen and Møbjerg in press).

Indeed, it is not until the Neolithic, that larger timber structures become more apparent. A very early example was recently recorded during excavations at Belmarsh, Southeast London (Hart et al. 2015). This consisted of split timbers and an unsplit log, and is similar in size and shape to the Star Carr timber platforms. A fragment of another, potentially comparable, structure believed to form part of a trackway or platform was also excavated at Silvertown, London, and was formed of three narrow, overlapping planks (Meddens 1996; Stafford et al. 2012). Similarly, an Early Neolithic platform excavated in Stirlingshire, Scotland, consisted of large split and unsplit timbers (including tangential outer splits) supported on a timber and brushwood frame, creating a structure that was some 9 × 4.5 m (Ellis et al. 2002). Other forms of wooden structure include the Late Neolithic Corduroy trackway excavated at Hatfield Moor in the Humberhead Levels (Chapman et. al. 2013), and the brushwood trackways at Honeygore and Honeycat alongside a hurdle trackway at Honeycat (Coles et al. 1985) and the relatively complex Sweet Track in the Somerset levels (Coles and Orme 1984).

In the past, the absence of such structures from the Mesolithic (and particularly the Early Mesolithic) could be explained in terms of the perceived nature of society at this time, and in particular the high degree of mobility and small sizes of social groups. The evidence from Star Carr shows how wrong such assumptions have been. The timber platforms (and the wood assemblages more broadly) suggest large groups of people working together and investing resources and labour at this specific location. That we have not found comparable evidence at other sites may tell us more about our expectations than it does about life in the British Mesolithic.

CHAPTER 7

Assembling Animals

Becky Knight, Nicky Milner, Barry Taylor, Ben Elliott, Chantal Conneller and Terry O'Connor

Introduction

During the original excavations of the site, Clark recorded an extremely dense concentration of faunal material along with artefacts made of bone, antler, wood and stone. However, although the trenches were excavated by grid square, Clark's published account of his work provides very little information on the spatial patterning of the faunal remains. This extends to the archive, for while the grid square from which stone tools were recovered is recorded on the artefacts themselves, this information was not recorded on the animal bone. Clark suggested that most of the site had been excavated; his rationale being that there were much smaller quantities of material towards the edges of the trench. This is clearly illustrated by his plot of flint density (Clark 1954, figure 3) but whether the same drop-off occurred with the animal bone distribution is unclear.

The lack of documentation for the location of faunal material has contributed to the impasse in debates surrounding the site. Without any understanding of spatial patterning which might permit differentiation of the faunal material, either through time or by activity area, the assemblage has been treated as homogenous. Thus, the remains have been thought to reflect uniform patterns of activity (such as butchery and carcass processing at a kill site or hunting camp), often (though not always) carried out at the same time of the year (e.g. Caulfield 1978; Andresen et al. 1981; Legge and Rowley-Conwy 1988). The picture derived from this way of understanding the faunal assemblage presents a stark contrast with interpretations of the site derived from its material culture inventory, one of the richest in Europe, and one that cannot be easily attributed to the 'boredom reducing activities' of a small hunting party (Legge and Rowley-Conwy 1988). This chapter and the next attempt to reconcile the information from faunal remains and material culture by analysing all finds on the same spatial and temporal basis. In addition, this chapter and Chapter 23 will also address specific factors that have had an impact on the appearance of Clark's assemblage: namely marrow processing, taphonomy and Clark's own collection and retention policies.

The lack of understanding of the spatial patterning of faunal remains has also impacted on more recent interpretations of the site. Both Chatterton (2003) and Conneller (2000, 2004) have argued that much of the material recovered by Clark represents patterned, formal deposition of animal remains in the waters of the lake. However, without spatial information it is difficult to understand whether this is indeed the case, and if it is, what form this patterning takes.

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Our current excavations have expanded far beyond the area excavated by Clark, both across the Mesolithic dryland and into areas that would have been further out into the lake. However, as part of these excavations we have also excavated in and around Clark's trenches and now have a much better understanding of the nature and distribution of the faunal remains he encountered. From this, it is now clear that the material encountered by Clark is just a small, though admittedly highly idiosyncratic, part of a much more complex site that spans many centuries. Faunal remains have also been found across most other parts of the site, both dryland and wetland, in varying states of preservation. Although there are both similarities and differences in the types of animal remains deposited across the site, no other area is similar to Clark's in terms of concentration of remains. Thus the material Clark and many subsequent authors saw as typical of a Mesolithic site with good organic preservation appears, in fact, highly unusual.

Dryland

Overview

A total of 601 faunal remains (581 bone and 20 antler) were found across the dryland area of the site through excavation (termed here the hand-collected assemblage). There were also 473 fragments of bone found through flotation of soil samples.

The material from this area is particularly poorly preserved, typically desiccated, fragmentary, fragile and in the majority of cases, affected by root penetration. As a result, a large number of remains, 193 bone specimens and four antler specimens of the hand-collected assemblage cannot be identified to taxon or element by standard methods and so are classified as unidentified. A total of 303 of the bones, including unidentified, cervid, ungulate, large and medium mammals specimens and six antler specimens, were analysed using ZooMS (see Chapter 23).

Of the hand-collected faunal assemblage, 137 specimens have been identified to species, and a further 267 have been assigned to broad categories (such as bovid, or large mammal), whilst 197 specimens are unidentifiable (Figure 7.1). The majority of the material derives from large mammals, notably species of cervids (mainly

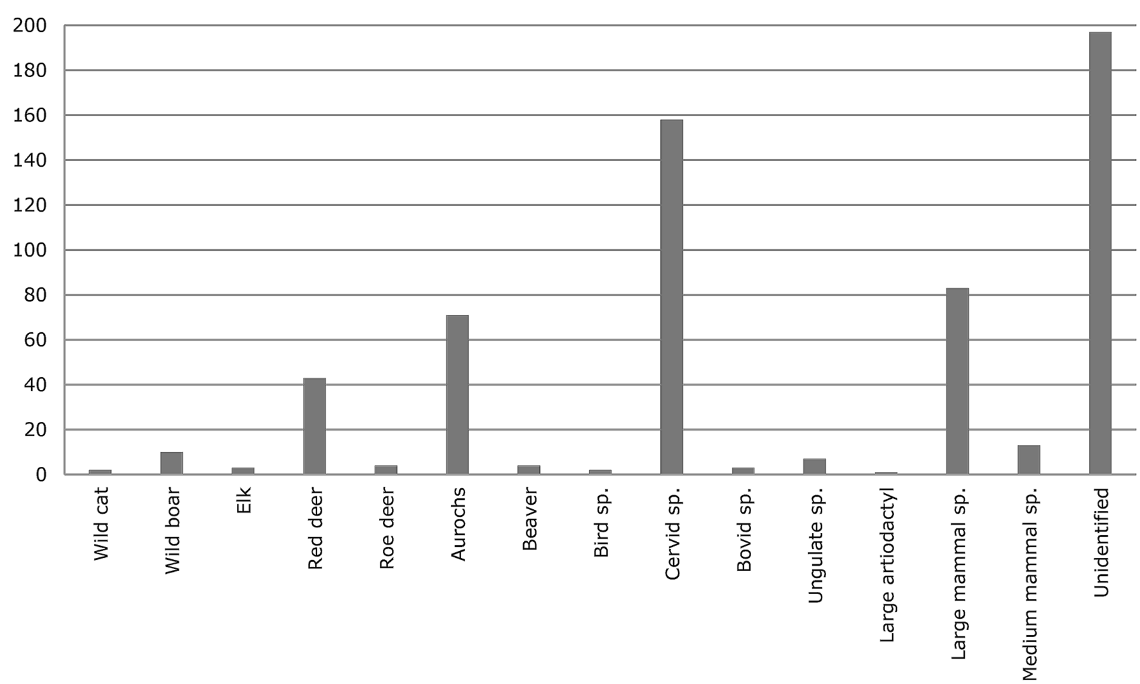

Figure 7.1: NISP of each species found within the dryland hand-collected assemblage (Copyright Star Carr Project, CC BY-NC 4.0).

red deer and elk), although aurochs are also well represented. However, a wide range of species are also present (albeit in much smaller quantities), including medium mammals (such as wild boar and roe deer), and species that are poorly represented in other parts of the site (such as wild cat and species of bird). It is important to note that the representation of the larger mammals may reflect the more robust nature of their bone, which would take longer to degrade beyond the point of identification than elements from small or more gracile species, though where bones are very fragmented, smaller taxa remain more identifiable from small pieces.

As well as the hand-collected assemblage, a further 473 specimens have been recovered from flotation of the soil samples (Chapter 15). The majority of these fragments cannot be identified to taxon or element (n=438). The identifiable fragments (n=35) represent a range of animal taxa including small mammals, fish and birds (Figure 7.2).

NISP by element

Elements of the limbs are most common, and with the exception of two specimens of wild boar, all derive from cervids (including elk, red and roe deer) and aurochs (Figure 7.3). Although the majority are only identified as long bone fragments, the upper and lower parts of both forelimbs and hindlimbs are present amongst those elements that can be identified more fully, as are metapodials, and the smaller bones of the ankles. Elements of the torso are less common and again derive from the larger animals; vertebrae and ribs are sparse and are restricted to the cervids and aurochs, whilst pelves are limited to cervids. Cranial elements (excluding antler) mostly derive from cervids, and where they can be identified more fully, to red deer, though beaver (which is represented by a mandible and loose teeth) and wild boar are also represented. Wild cat is represented by two phalanges.

Discussion

Broadly speaking, the character of the material from the dryland scatters is suggestive of tasks associated with butchering and processing animal carcasses and craft activities involving the working of bone and antler. This appears to be focused on cervids and aurochs, though there is also evidence for the processing of fish and of

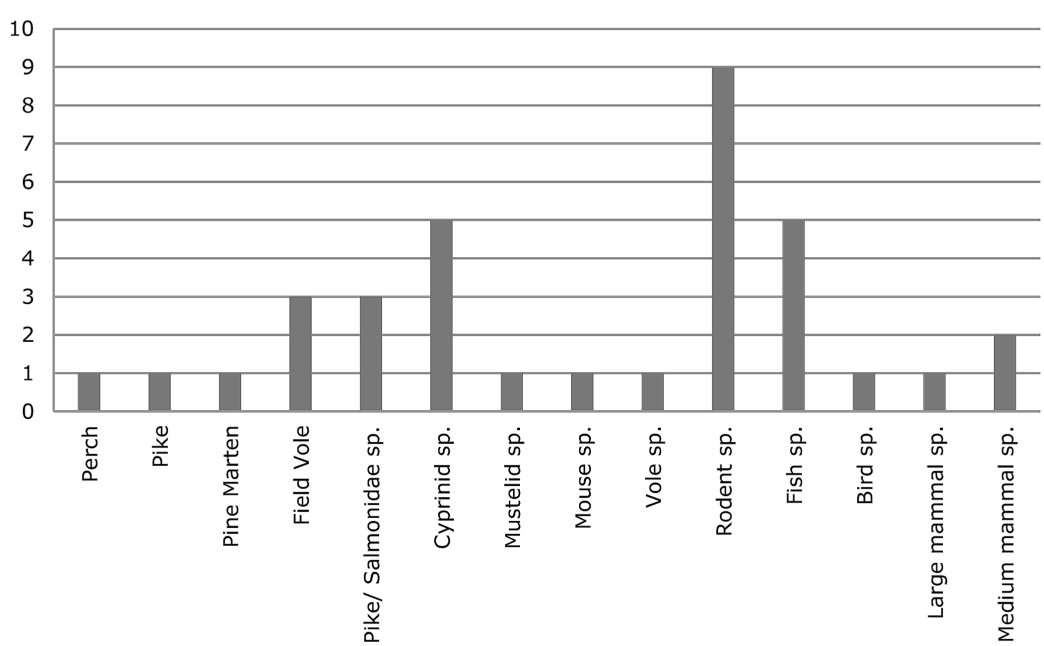

Figure 7.2: NISP for the species found during flotation of the dryland soil samples (Copyright Star Carr Project, CC BY-NC 4.0).

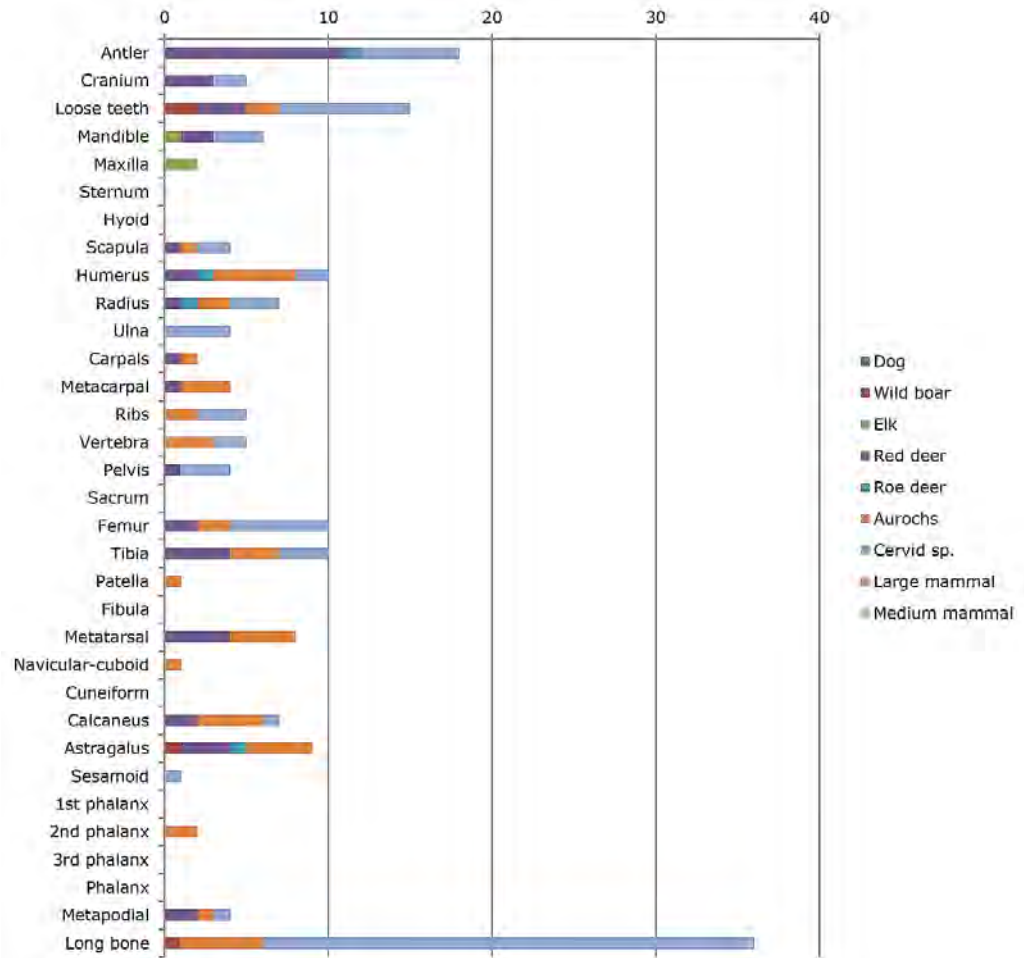

Figure 7.3: Distribution of elements on the dryland for the main species represented on the site (Copyright Star Carr Project, CC BY-NC 4.0).

small mammals and birds. Much of the material is located in two main scatters; one focused on the western structure, the other from within and around the central and eastern structures (Figure 7.4). In all cases there are assemblages of material both within the structures themselves and potentially related to their use, and within the surrounding areas.

A relatively large concentration of bone and antler (n=240) was found within the western structure and across the surrounding area (Figure 7.5). Most of this consists of poorly preserved, highly fragmented material, the majority of which derives from the limbs and podial elements of a range of medium and large mammals. Smaller quantities of material from the torso and crania (including antler) of medium and large mammals were also present, along with the remains of smaller animals (beaver and wild cat). Though evidence for human modification is relatively slight (which may be a product of the poor preservation and the fragmentary state of the material), the highly fragmented nature of the material, particularly outside the structure, suggests that much of the assemblage probably represents dietary waste (particularly the breaking of bones to extract marrow and fat) and craft-related activities.

The assemblage found within the western structure consists of 29 specimens, all of which are highly fragmented (Figure 7.5). Those that can be identified represent a range of medium and large mammals: red deer (n=5), aurochs (n=2), roe deer (n=1), wild boar (n=1), cervid species (n=1), ungulate (n=1), large ungulate (n=1), large mammal (n=4) and medium mammal (n=3). Most of the material that can be identified to element represents long bones (aurochs metacarpal and partial patella, red deer radius, red deer tibia, large mammal humerus, medium mammal femur, two medium mammal long bones and an unidentified long bone),

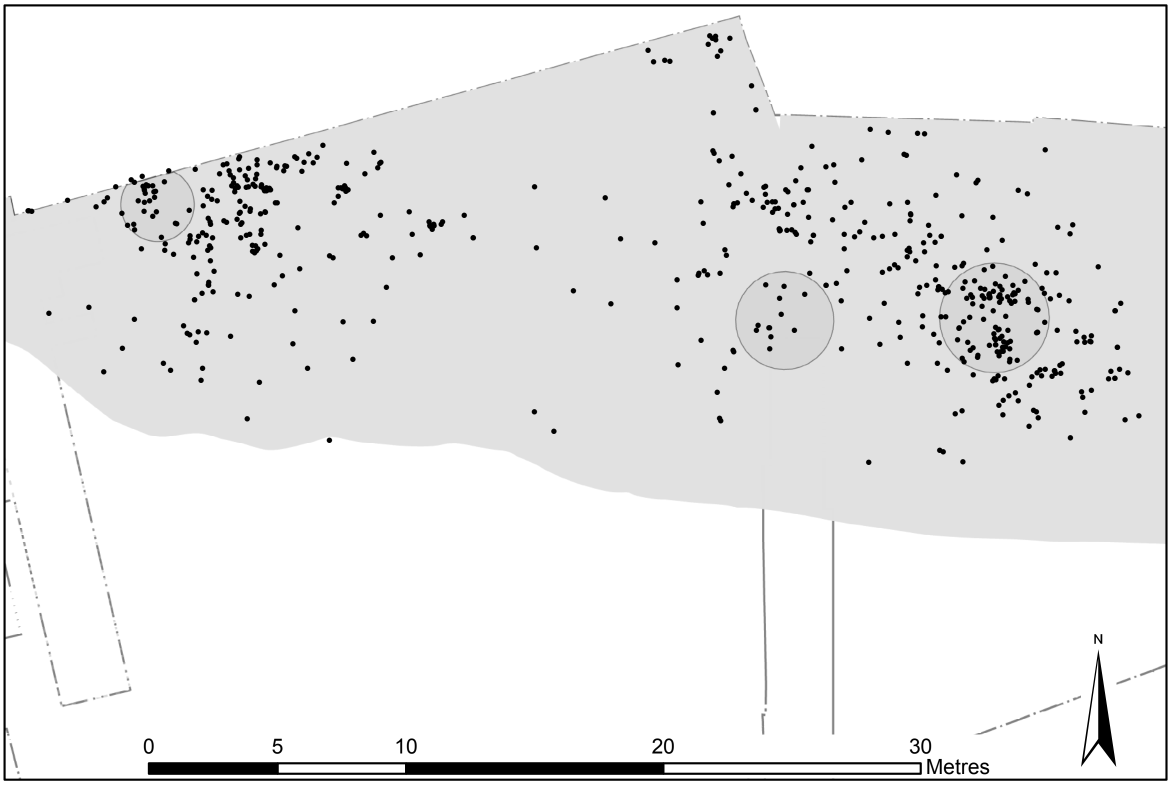

Figure 7.4: Spatial plot of the faunal remains on the dryland with circles depicting the three principal structures (left to right: western structure, central structure and eastern structure) (Copyright Star Carr Project, CC BY-NC 4.0).

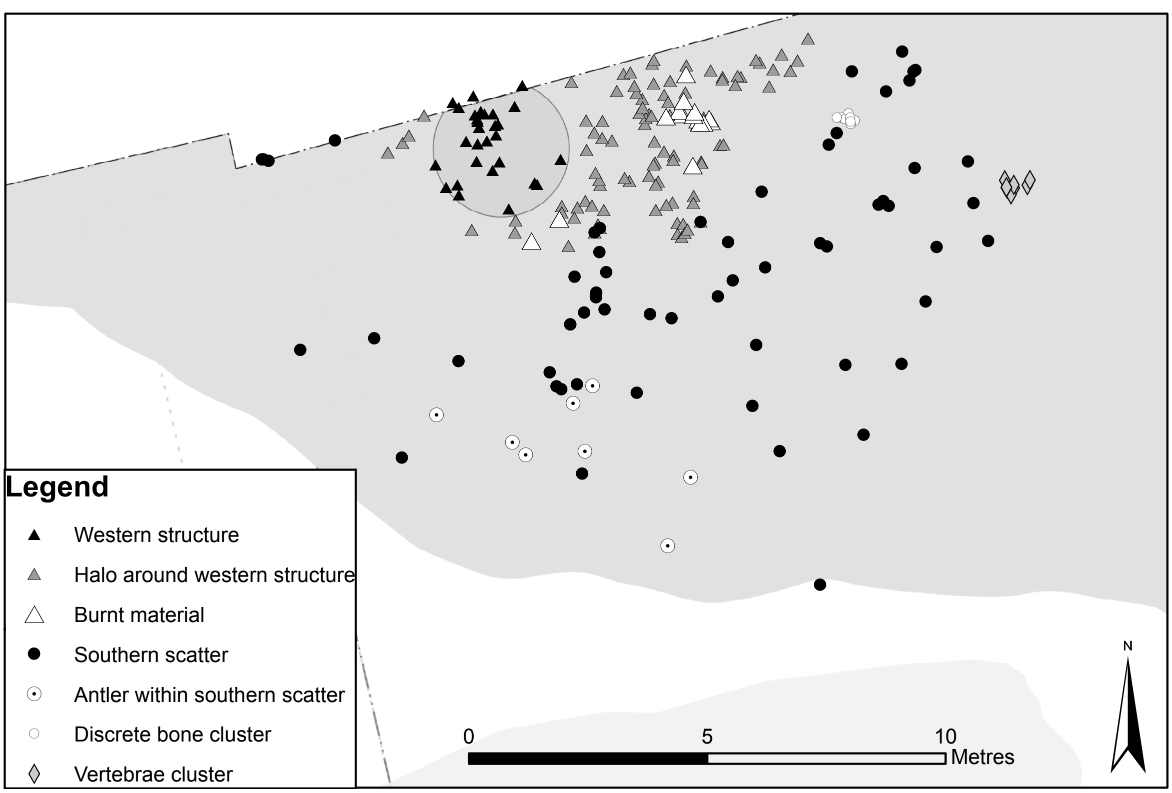

Figure 7.5: Plot of specimens from the area of the western structure (Copyright Star Carr Project, CC BY-NC 4.0).

and three astragali, (two red deer and one wild boar). Cranial elements are represented by three fragments of mandible (red deer, cervid species and large ungulate), an ungulate molar and a section of roe deer antler, whilst a small amount of material comes from elements of the torso (one large mammal pelvis fragment, a fragment of large mammal rib and a partial large mammal vertebrae). Two of these retain evidence for human modification: a fragment of large mammal humerus midshaft has a spiral fracture to one edge and the distal end of a red deer tibia has been removed from the main body of the element by a spiral fracture. The latter and three other fragments (14%) have also been exposed to heat.

A comparable range of material is present in the assemblage outside the structure (n=108) (Figure 7.5: halo around western structure spread). Whilst over half the assemblage was unidentifiable (n=66), the remaining specimens represent a slightly larger range of animals to those in the structure: aurochs (n=5), red deer (n=2), roe deer (n=2), wild boar (n=1), bovid species (n=1), cervid species (n=5), large artiodactyl species (n=1), large mammal species (n=18), medium mammal species (n=3), beaver (n=2), and wild cat (n=2). Most of the identifiable fragments represent bones of the lower limbs (one astragalus, two carpals, one humerus, two mandibles, one patella, three phalanges, two radii, three tibia, two metapodial fragments and 19 long bone fragments), whilst the torso is represented by a single fragment of pelvis and two fragments of vertebrae, and the crania by two loose teeth, two antler fragments and a fragment of burr. Of these remains, only one specimen clearly exhibits evidence of human modification: a fragment of large mammal long bone that has been longitudinally split. A total of 16 specimens (15%) exhibit signs of being exposed to heat, with the majority forming a discrete concentration to the east of the structure (Figure 7.5: burnt material). Only four of the charred remains can be identified to species and these remains consist of a fragment of an unidentified element attributed to wild boar by ZooMS, two wild cat phalanges and a partial roe deer radius. The fact this burnt material occurs together could reflect the presence of a small hearth outside the structure, or perhaps the cleaning out of hearth debris.

Beyond this is a more diffuse scatter of material (Figure 7.5: southern scatter) extending to the south as far as the lake shore and to the east, consisting of 68 specimens (8 antler, 60 bones). Broadly speaking, this is similar in character to the more dense scatter of material associated with the western structure and the immediate surrounding area and probably represents a similar range of practices. Of the specimens that can be identified to species, four derive from aurochs and 11 from red deer, whilst 22 are identified to broader taxonomic categories (seven cervid species, nine large mammal, four medium mammal, and two ungulate species). Most of this material derives from limb elements: 9 fragments of long bone, two femora, two tibiae, one metatarsal, two phalanges, two astragali and one carpal. Cranial elements are represented by antler (n=8), a fragment of mandible and three loose teeth, whilst the torso is only represented by three fragments of rib and a thoracic vertebra fragment. Of these, a relatively small proportion exhibit evidence for human modification: two long bone fragments have been longitudinally split, one red deer metatarsal has a spiral fracture, and there is a cut mark on an aurochs thoracic vertebra. A discrete scatter of eight fragments of poorly preserved antler (four of which can only be identified as antler and the other four as compacta) was found towards the south-west edge of the scatter. Though there is no evidence for human modification, these may reflect material deposited during an episode of antler working, carried out close to the lake shore. Overall, the character of the whole assemblage, the elements represented and the highly fragmented character of the material is suggestive of the processing of animal remains, either for butchery or craft activities.

A discrete concentration of animal bone (Figure 7.5: discrete bone cluster) is located within this more diffuse scatter, roughly 5 m away from the western structure. This consists of ten specimens, three of which can be identified as aurochs (a carpal, a fragment of distal femur, and a thoracic vertebra), six as deriving from a large mammal (all of which are vertebrae, including two thoracic vertebrae) and one that could not be identified to species or element. There is no evidence for human modification, though as with most of the material on the dryland this may be due to the poor surface preservation. However, the close spatial association of the material does suggest a small dump of bone generated through a discrete episode of a task such as butchery.

A similar cluster of bone (Figure 7.6) lies to the edge of the diffuse scatter, again consisting largely of vertebrae (n=7) and two unidentified fragments, all from a large mammal. The remains were found in a semi-articulated state and probably represent material deposited as waste from a task such as butchery.

Comparable assemblages of bone and antler were recorded from the eastern side of the site in the areas within and around the eastern and central structures. In total, 12 specimens of bone come from within the hollow of the central structure (Figure 7.7). Of these, three are identified as aurochs (a partial mandibular premolar, a partial mandibular second molar and one fragment that was unidentifiable), whilst three can only be identified as large mammal (a fragment of molar, a fragment of scapula and a fragment that could only be identified as long bone) and five cannot be identified to taxon or element (one of which derives from a long bone). Five specimens were tested

Figure 7.6: A discrete cluster of bone on the dryland (Copyright Star Carr Project, CC BY-NC 4.0).

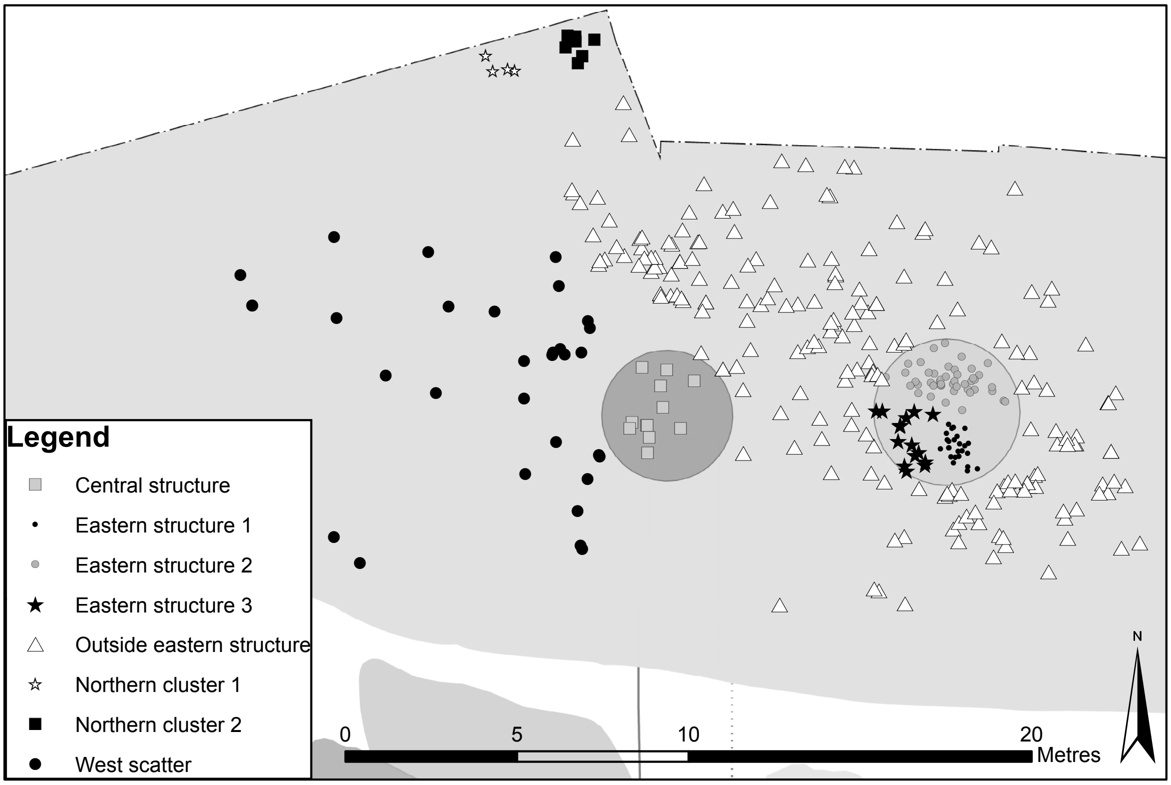

Figure 7.7: Spatial distribution of material around the central and eastern structures (Copyright Star Carr Project, CC BY-NC 4.0).

using ZooMS; however, only two revealed results, both identifying aurochs (the second molar and the unidentified fragment). None of the material exhibits signs of human modification. A fragment of a rodent cranial fragment was also recovered during the flotation of the soil sample from one of the surrounding postholes [382]. Overall, given the sparsity of material, it is very difficult to establish the nature of the activities that this may represent.

A larger assemblage of 26 fragments of bone comes from fill (337) of pit [336], just to the south-west of the central structure. However, only one fragment can be identified (a mustelid species, first phalanx). All but one of the fragments show evidence of having been exposed to heat, and were either burnt (black) or calcined (white). Small quantities of bone were also recovered from the fills of two postholes that formed part of the northern structure ([358] n=20; and [459] n=1), and a small, natural feature, less than a metre to the west ([462] n=9). None of this material can be identified to taxon or element, and none exhibit evidence for human modification. However, all of the bone fragments from feature [462] are calcined. Again, given the small quantities of material from these features and the lack of identifiable specimens it is not possible to interpret them further, although it is interesting that so much heat-affected material comes from two of these fills.

A total of 87 specimens have been recorded from within the eastern structure, forming three discrete concentrations. Though poor preservation has made identifications difficult, the assemblage includes a range of anatomical elements from a variety of species. The material is highly fragmented, with some evidence for human modification (mostly focused on the breaking open of bones) and probably represents dietary waste, particularly the extraction of marrow or fat, and potentially the manufacture of tools. Several fragments were also heat affected (one is calcined), which could either reflect the cooking of meat or accidental exposure to heat sources such as hearths. The spatial patterning of the material may reflect discrete episodes of such activity that were carried out at different times.

The first concentration consists of a densely packed cluster of 25 specimens on the southern edge of the eastern structure (Figure 7.7: eastern structure 1). Just over half of this assemblage (n=14) was identified by ZooMS to cervid species. A further five specimens can be identified by morphology to red deer (n=1), wild boar (n=2), aurochs (n=1) and large mammal (n=1). Only a very small proportion of this material (n=7) can be identified to element: two teeth (a second incisor of a wild boar, one premolar of a red deer), and parts of limbs (a metatarsal fragment of an aurochs, a femur fragment identified as cervid species and three long bone fragments identified as cervid species (n=2) and large mammal (n=1). There is no evidence for human modification, though this is not surprising given the poor levels of preservation. Two fragments have been heat affected.

The second concentration (Figure 7.7: eastern structure 2) consists of 47 highly fragmented specimens spread across the northern half of the structure. The majority of this material (n=30) was identified by ZooMS as deriving from cervid species, with the remains of wild boar (n=1), red deer (n=1), and aurochs (n=1) identified by morphology. Just under half of the assemblage can be identified to element (n=21). These represent a range of different skeletal parts, notably limbs; femora (cervid species), humeri (cervid species), tibiae (cervid species), ulnae (cervid species), metatarsals (red deer), a carpal (red deer) and a calcaneus (red deer), but also fragments of rib (cervid species) and skull (cervid species) and one fragment of antler (cervid species). Six specimens of bone show traces of human modification: four spiral fractures (a humerus fragment, tibia fragment and two metatarsal fragments), one percussion break (pelvis fragment), one longitudinally split (femur fragment). Three specimens have been heat affected, resulting in one becoming calcined (unidentified fragment) and two blackened (an ulna fragment and an unidentified fragment).

The third concentration (Figure 7.7: eastern structure 3) is located in the eastern part of the structure. This consists of 15 fragments of bone: 10 identified as cervid species (by ZooMS), a fragment of aurochs, a large mammal, and three that cannot be identified to species due to fragmentation. Only six specimens can be identified to element, mostly limb bones (a fragment of cervid radius and cervid metapodial, and three long bone fragments, two identified as cervid species and one as large mammal), and a fragment of cervid species pelvis. The cervid metapodial exhibits both a spiral fracture and a percussion break, whilst the cervid radius fragment exhibits a spiral fracture and appears to have been longitudinally split. Two further specimens (both unidentified) have been charred.

Whilst the assemblage within the eastern structure generally reflects the processing of medium and large mammals, the remains of other species were also recovered from the flotation of soil samples, mostly from the fills of the central hollow: the majority (n=341) are unidentifiable apart from a fragment of pine marten, some rodent bones and fish bones. All but one of the fragments found during flotation from this area are burnt or calcined. The fish bones comprise northern pike (n=1), perch (n=1), northern pike/salmon species (n=3) and cyprinid species (n=5). The rodent bones comprise field vole (n=3), mouse species (n=1), vole species (n=1) and rodent (n=4). It should be noted that a structure which is likely to have had plant flooring would have provided a good habitat patch for these rodents, with food, warmth and protection from other predators. Overall, the faunal specimens within the eastern structure probably represent the remains of dietary and craft activities.

A smaller assemblage (n=44) was also recovered from the fills of one of the outer postholes [169]. The six specimens that can be identified consist of a fragment of bird species coracoid, four separate fragments of rodent species incisor, and a small fragment of large mammal long bone. All but one specimen (fragment of large mammal long bone) exhibit varying degrees of heating: blackened, charred (grey/blue-white) or calcined (white).

Further evidence for butchery, processing and craft activities can be found in the assemblage from outside the eastern structure (see Figure 7.7, outside eastern structure). This consists of 207 fragments that extend approximately 25 m on a north-west/south-east alignment. Of these, 168 can be identified to species or to broad taxonomic categories. The remains of large mammals are the most common, with aurochs (n=43), red deer (n=11), elk (n=1), cervid (n=77), large mammal (n=27) and ungulate (n=1) all represented. The remaining material derives from wild boar (n=4), beaver (n=2) and roe deer (n=1) and a single fragment from a tetraonid bird species. The assemblage is largely made up of limb elements (femur=5, humerus=12, metacarpal=3, metatarsal=3, metapodial=5, radius=2, tibia=2, tibiotarsus=1, ulna=2, patella=1 and long bone fragments=35; astragalus=2, calcaneus=6, navicular-cuboid=2 and sesamoid=1), as well as smaller quantities of material from the torso (ribs=4, vertebrae=4, pelves=4, scapulae=4), crania (mandibles=3 and loose teeth=9) and antler (n=4). Two specimens, the astragalus and calcaneus of an aurochs, were found articulated in the ground. 11.5% (n=24) of the assemblage exhibits evidence of human modification with a mixture of spiral fractures, percussion breaks and evidence of longitudinal splitting. There are also eight specimens that appear to have been exposed to heat, and these are mostly to the north-east of the eastern structure. Taken together, the assemblage is very suggestive of mixed occupation waste, particularly butchery debris (due to the large number of fragmented limb elements), processing waste (ribs, vertebrae, scapulae and podial elements) and possibly tool/artefact production waste (longitudinally split bones, antler fragments, beaver mandibles and deer loose teeth). The lithic evidence, particularly from refitting, indicates that while in situ activity is present in this area, a significant component is likely to represent debris cleared out from the eastern structure (see Chapter 8).

Some degree of patterning can be observed in this large scatter of material. Wild boar remains appear to be focused around the area of the eastern structure, with five of the seven fragments recorded within 1.5 m of the outer set of postholes (Figure 7.8). Two of these are in an area where lithic material cleaned out of the eastern structure was deposited (see Chapter 8). As very little wild boar material can be identified to element it is not possible to say anything more about this pattern. An area with a higher concentration of aurochs bone is located further to the north-west. This consists of 12 fragments forming a broadly linear alignment approximately 2.5 m long (Figure 7.8: aurochs cluster). The fragments that can be identified to element derive mostly from limbs (humerus, metatarsal, astragalus and a long bone fragment); though other parts of the skeleton (the scapula and vertebrae) are also present. There is a spiral fracture on the humerus fragment. This material could potentially represent an episode of butchery or processing of an aurochs carcass.

Two more clusters of material are present to the north (Figure 7.7: northern cluster 1 and 2), and may represent discrete episodes of activity, each of which resulted in the deposition of a small assemblage. Though the poor preservation of the material makes it difficult to determine the precise nature of these activities, the assemblage appears to be consistent with butchery or the processing of animal remains for dietary or craft purposes. The first (northern cluster 1) consists of four very poorly preserved specimens, none of which can be identified to species and only one of which can be assigned to a skeletal element (a fragment of long bone). The second cluster (northern cluster 2) consists of eight specimens, three of which can be identified to taxon or element (a red deer distal tibia epiphysis, an aurochs tibia midshaft fragment and a fragment of large mammal tibia midshaft). Of these the fragment of large mammal tibia exhibits a spiral fracture to one edge and the red deer distal tibia fragment has also been removed from the main body of the element by a spiral fracture.

To the west of the main concentration of bone and antler is a more diffuse spread of material (Figure 7.7: west scatter). This consists of 31 specimens (29 bone and two antler). Only eight can be identified to species: red deer (n=5), aurochs (n=2) and elk (n=1). A further eight can be assigned to broad taxonomic categories: bovid sp. (n=2), cervid sp. (n=1), large mammal (n=2), large ungulate (n=1), ungulate (n=1) and bird (n=1). There is a mix of elements representing all areas of the body; cranial elements are represented by a partial mandible, maxilla, and two loose teeth, a fragment of the occipital and a pedicle, as well as an antler tine and a

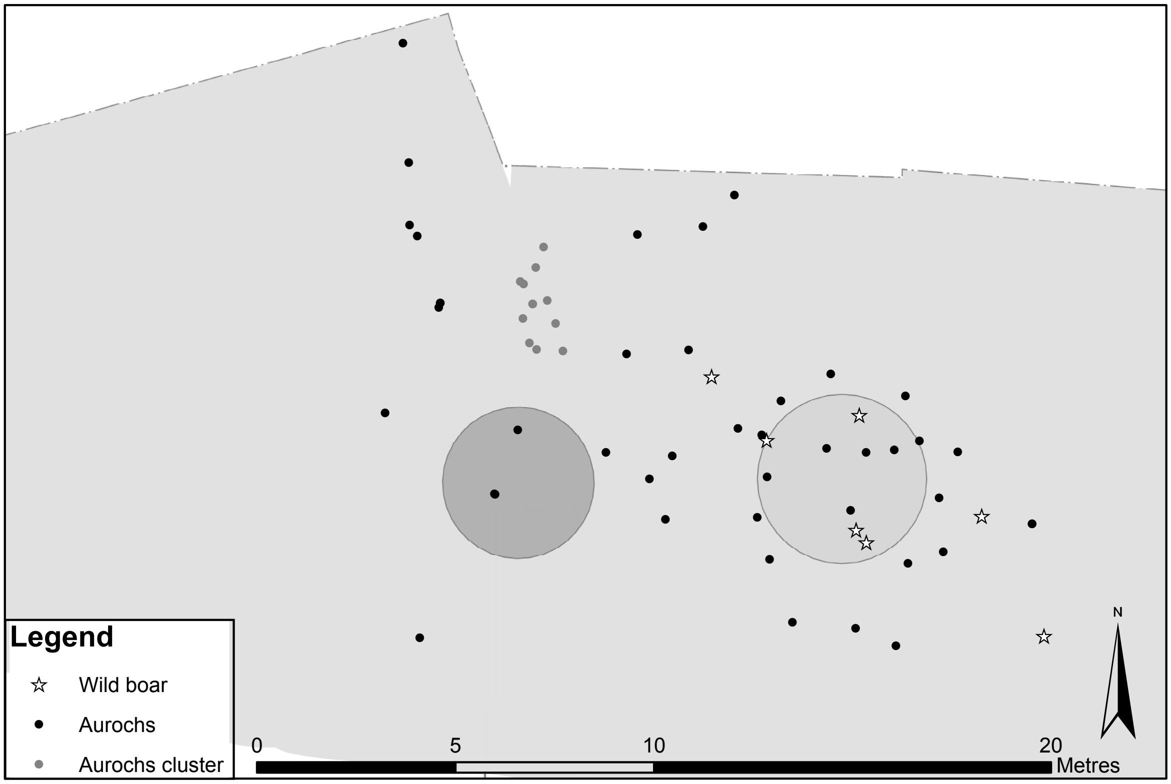

Figure 7.8: Distribution of wild boar and aurochs around the central and eastern structures (Copyright Star Carr Project, CC BY-NC 4.0).

fragment of compacta. Limb bones are also present (a tibia, two long bones, a second phalanx, an astragalus, a metatarsal and a metapodial fragment), as are bones of the torso (a fragment of pelvis and a lumbar vertebra). Of these, only three fragments (two unidentified fragments and a bird species long bone) exhibit evidence of being heat affected.

The wetland

Overview

This section relates to the wetland deposits but excludes material associated with the detrital wood scatter or Clark's area, as these are different in character and will be discussed separately. Generally speaking, faunal material was found in small quantities across much of the wetland area, though with slightly higher concentrations in the areas around the central and eastern platforms. However, none of this material lay directly on top of the timbers and therefore was not necessarily associated with their use. The preservation in these deposits was very variable and there was a large number of bone and antler specimens that exhibited evidence of demineralisation, compression, warping and splitting.

A total of 62 specimens of antler and 198 specimens of bone were recovered from the main trench (Figure 7.9). The most dominant species by far was red deer (n=105) followed by dog (n=69), aurochs (n=18), roe deer (n=8), wild boar (n=4), elk (n=3) and beaver (n=1). There were also several specimens that could not be identified to species: large mammal (n=26), medium mammal (n=5), cervid species (n=1) and large artiodactyl (n=1). Nineteen specimens could not be identified to taxon or element due to poor preservation.

In addition, a further nine specimens were recorded from other areas of the site, beyond the main trench: two from test pit SC18 and six from test pit SC20, both at the end of the peninsula and one from SC29 in the field to the north of the Hertford Cut, which had become demineralised (Table 7.1; see Figure 3.3 for trench locations). Of these remains, all of the long bone specimens exhibited evidence of human modification in the form of spiral fractures and percussion breaks. One specimen of red deer tibia midshaft from SC20 also exhibited evidence of carnivore modification: the breakage to the proximal end was uneven and was accompanied by tooth marks and tooth scores. Due to the small numbers and spread of these remains it is not possible to identify any clear patterns of distribution; however, it is of interest that the evidence for the deposition of faunal remains is spread across the wider landscape.

Test pit	Species	Element	NISP
SC18	Red deer	Metatarsal	1
SC18	Unidentified	Unidentified	1
SC20	Red deer	Tibia frag.	1
SC20	Red deer	Femur frag.	2
SC20	Red deer	Astragalus	1
SC20	Large mammal	Tibia frag.	1
SC20	Unidentified	Unidentified	1
SC29	Unidentified	Unidentified	1

Table 7.1: Animal bone data retrieved from test pits elsewhere on the site.

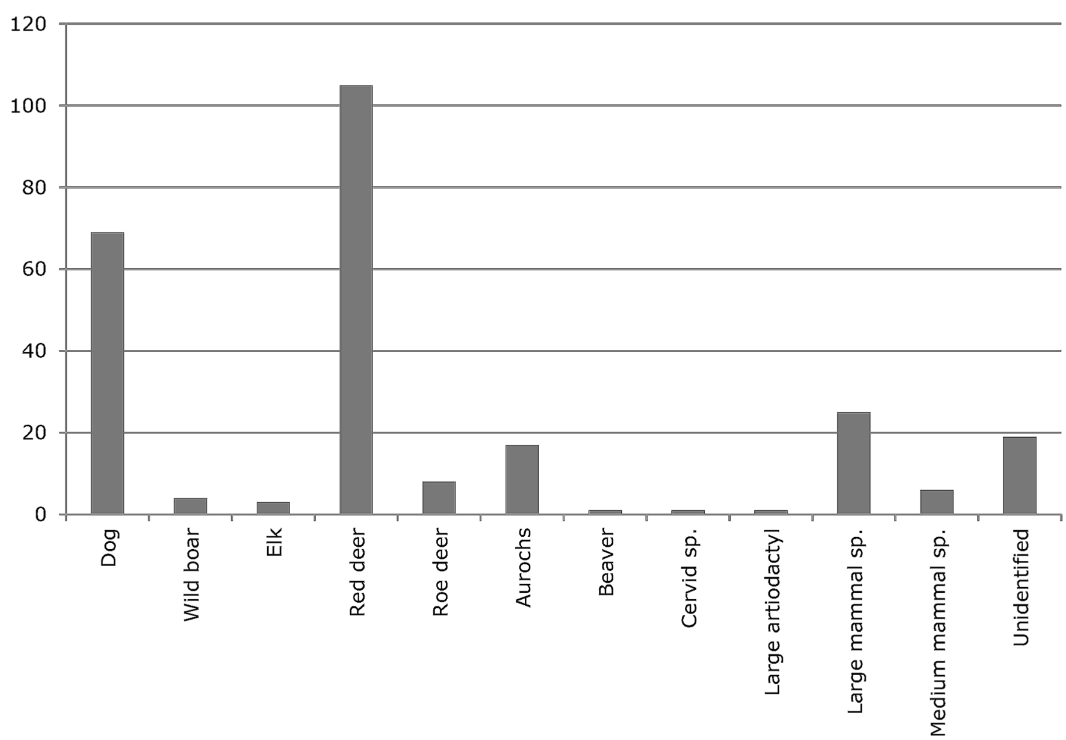

Figure 7.9: NISP values for the wetland (Copyright Star Carr Project, CC BY-NC 4.0).

NISP by elements

Dog is represented by the full range of body parts, though some of the small bones such as podial elements (carpals, tarsals and metapodials) are lacking (Figure 7.10). Red deer is mainly represented by cranial elements (including antler), long bones and podial elements. There is a distinct lack of elements from the torso (pelvis, sacrum, ribs and vertebrae) for the majority of species. Aurochs is mostly represented by long bones and podial elements (though a fragment of scapula and pelvis is also present). Roe deer is represented by long bones and antler, and a fragment of pelvis. The remaining taxa are represented by small numbers of skeletally unrelated elements, although both wild boar and beaver are represented by at least one mandible each. The majority of the missing elements are gracile and small (sternum, hyoid, carpal, patella, fibula and third phalanx) and could easily have been lost through post-depositional movement in areas that may have been at least seasonally submerged, or through preservation issues.

Discussion

Broadly speaking, the bone assemblage consists of relatively diffuse scatters of fragmentary material, mostly from the lower limbs, few of which had clear anatomical associations with other elements in the same area. A high proportion (n=83, 32%) of this material exhibits signs of human modification, mostly spiral fractures and longitudinal breaks. If the almost complete skeleton of the dog is discounted from these calculations, the percentage of modified material increases to 44%. This, along with the highly fragmented nature of the material is suggestive of debris associated with dietary processing.

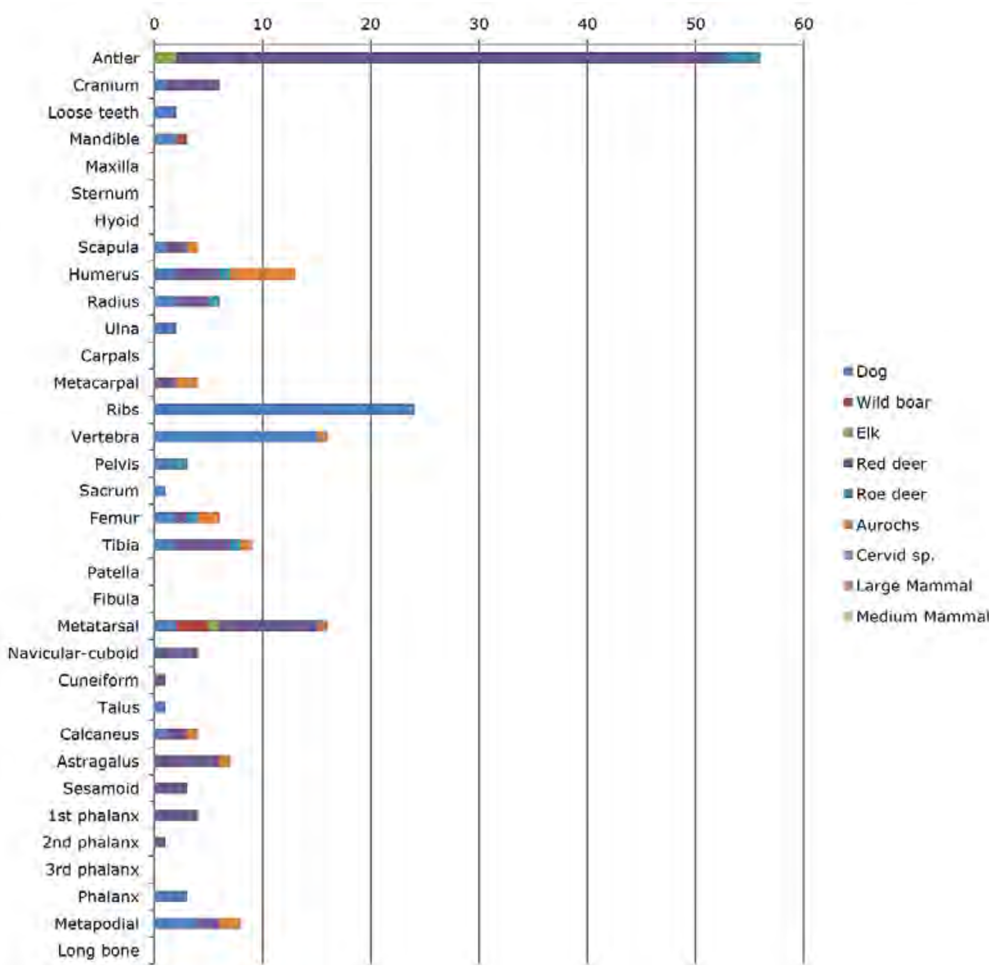

Figure 7.10: NISP values for the wetland for the main species represented on the site (Copyright Star Carr Project, CC BY-NC 4.0).

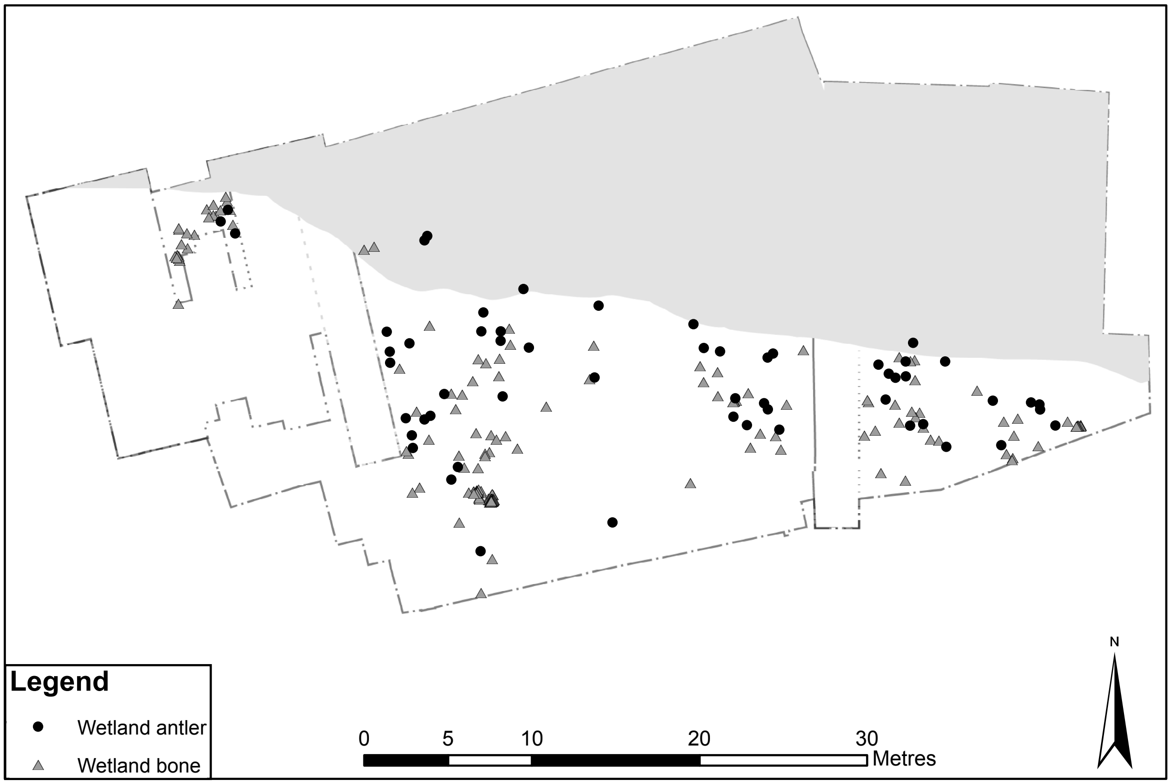

Figure 7.11: Plot of the distribution of the wetland bone and antler (Copyright Star Carr Project, CC BY-NC 4.0).

The largest concentration of material occurs in the east of SC34, in the area around the eastern platform and the sediments just to the north (Figure 7.11). The material was found in several areas within this part of the site, and probably reflects chronologically separate deposits. The first is located just to the north of the platform (Figure 7.12: group 1) and consists of the proximal half of a large mammal metapodial, the distal end of an aurochs metapodial, a fragment of unidentifiable bone and a very compressed frontlet <113901> (Chapter 26). Both metapodial fragments have their ends removed by percussion breaks.

A larger assemblage, consisting of a wider range of elements, was recorded above the eastern platform (Figure 7.12: group 2). This consists of red deer (the distal end of a humerus, the distal end of a metapodial, and half of an antler frontlet <113732>), roe deer (the proximal end of a radius, and a fragment of midshaft of a tibia), elk (a partial metatarsal), beaver (a partial mandible consisting of partial mandibular ramus and dental arcade lacking teeth), large mammal (a fragment of tibia midshaft and a fragment of rib midshaft) and medium mammal (a fragment of metapodial midshaft and a long bone fragment). All of the long bones had either percussion breaks, spiral fractures, or a mixture of the two, probably for the purpose of extracting the marrow and fats. An attempt had also been made to longitudinally split the tibia fragment, and the beaver mandible has been modified (the ascending ramus removed) by a percussion break, both suggesting preparation for tool production.

A separate spread of faunal remains was found to the east of the eastern platform (Figure 7.12: group 3), consisting mostly of long bones and podial elements. Of these, the majority derived from red deer (a complete scapula, a fragment of tibia midshaft, the proximal end of a metatarsal, a fragment of metapodial midshaft, complete calcaneus, astragalus, two navicular-cuboids, a cuneiform, two first phalanges and three sesamoids). The remains of other species were present but in smaller quantities, notably aurochs (proximal metacarpal, a fragment of distal femur), wild boar (two partial third metatarsals and a partial fourth metatarsal) and large mammal (a fragment of long bone midshaft).

Most of this material has been generated through the butchery and processing of animals. The red deer material occurs in three tight groupings of articulating and semi-articulated elements, all within one metre square. The first consists of a complete calcaneus, astragalus, navicular-cuboid and a lateral cuneiform, whilst the second group is made up of two complete first phalanges and three sesamoids. All of these elements are sided to the right and probably represent the removal and deposition of the lower foot of a red deer (Figure 7.13).

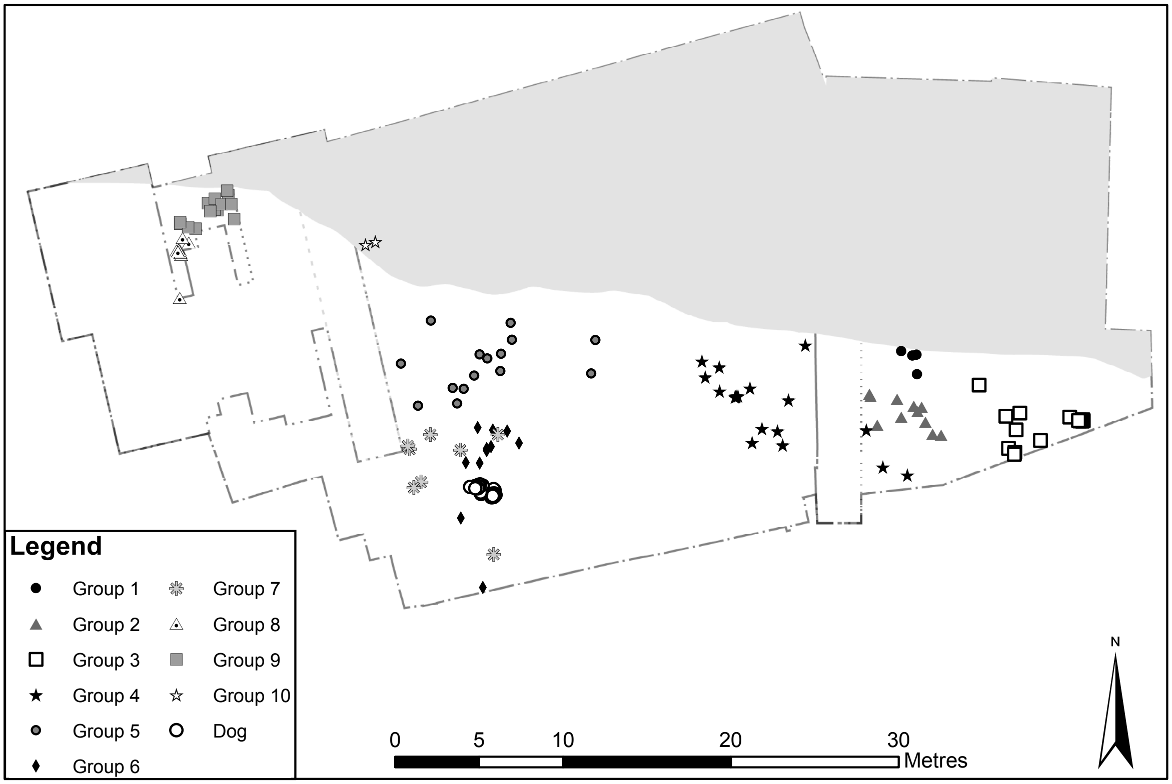

Figure 7.12: Plot of the different groups of bone as described in the text (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 7.13: Articulated calcaneus, astragalus, navicular-cuboid and lateral cuneiform (top) and articulated first phalanges and sesamoids (bottom) found to the east of the eastern platform (Copyright Star Carr Project, CC BY-NC 4.0).

The third group was found slightly lower within the sediments and consists of the proximal end of a metatarsal and a fragmentary navicular-cuboid. The distal half of the metatarsal also shows evidence of having been removed by a spiral fracture and an attempt at longitudinal splitting has occurred. As the metatarsal and navicular-cuboid were found later and the navicular-cuboid is a repeating element, this suggests these remains may belong to a separate deposition stage. In addition, there is evidence for percussion breaks, spiral fractures or a combination of the two on all of the remaining long bone fragments within this area, and the aurochs femur and the red deer tibia, metatarsal and metapodial fragment were all longitudinally split. These episodes of butchery and deposition are not contemporary as the groups of articulating and semi-articulated red deer elements occur within the wood peat (310), and represent a stratigraphically later event than the other material, all of which was deposited into the fine detrital mud (317) and reed peat (312).

Similar assemblages of material were recorded from other parts of the wetland. In the area above the central platform (Figure 7.12: group 4) was a spread of faunal remains consisting of red deer (two fragments of distal humerus, a complete astragalus, a complete but fragmentary navicular-cuboid, a fragment of metacarpal midshaft, the proximal end of a metatarsal and the proximal end of a radius) as well as aurochs (a fragment of midshaft and two distal humeri, a partial calcaneus and a complete astragalus) and the proximal end of a roe deer femur, a fragment of large artiodactyl tibia midshaft and a fragment of medium mammal humerus and rib. Of these, all but one of the long bones are modified by spiral fractures or percussion breaks (potentially for marrow extraction) and one fragment of red deer metacarpal and aurochs humerus are longitudinally split, which is suggestive of preparation for tool production. The lithic evidence indicates that the repair, maintenance and use of adzes was a major task in this area and these elements may have been caught up in similar activities.

Similarly, in the area above the western platform, there was a fairly diffuse scatter of 16 specimens, mostly the limb elements (long bones, metapodials and astragali) of red deer and aurochs (though fragments of red deer pelvis and crania were also present), as well as a roe deer pelvis (Figure 7.12: group 5). Seven specimens exhibit evidence for human modification; notably spiral fractures, percussion breaks and longitudinal splitting. This suggests this spread is the result of a mixture of marrow-extraction activities and tool production.

Animal bone was also recovered from the deposits of marl to the south of the platform (Figure 7.12: group 6), and in the overlying wood peat (Figure 7.12: group 7). This latter group consisted of red deer (partial scapula, distal end of a tibia, partial proximal end of a metatarsal and a complete astragalus), aurochs (a fragment of femur midshaft and a partial metatarsal) and large mammal (spinous process of a thoracic vertebra and a fragment that could not be identified to element). Four of the eight specimens (all long bones) exhibited human modification in the form of spiral fractures and percussion breaks for marrow extraction and two specimens (aurochs metatarsal and red deer metatarsal) were longitudinally split, most likely for tool production.

Comparable forms of activity can also be seen in the material recorded in the area to the north of Clark's excavations. Again, the faunal material occurs in different stratigraphic units and represents separate episodes of activity undertaken at different times. The earliest episode is represented by material from the reed peat (312) and consists of the elements of the left hindlimb of a red deer (a fragment of distal femur, a fragment of distal tibia, a complete astragalus, a partial calcaneus, partial navicular-cuboid, the proximal end of a metatarsal, two complete first phalanges and the proximal end of a second phalanx) (Figure 7.14), two large mammal specimens (a fragment of long bone and a fragment of neural arch of cervical vertebra) and an unidentified fragment that could not be identified to species or element (Figure 7.12: group 8).

The red deer specimens occur within a small area, less than 0.5 m across, were all from the left side of the body and four elements were still articulated in the ground (the calcaneus to the astragalus and the two first phalanges) As such, they probably represent a single limb. Five of the specimens exhibit evidence of human modification: the femur fragments retain a spiral fracture: the distal tibia has been removed from the main body of the element by a percussion break and resultant spiral fracture; the distal half of the metatarsal has been removed by a percussion break and resultant spiral fracture; and the calcaneus has a clear percussion break to its proximal end even though it was still articulated to the astragalus. Taken together, the material probably represents a discrete episode of activity in which one complete leg was utilised for meat and marrow and then the elements were discarded together. The large mammal long bone, which lay less than a metre to the north-east, also has a percussion break to one end and represents a further episode of dietary processing.

Stratigraphically later than this material is a spread of bone from the overlying wood peat (310). This consists mostly of fragments of the limb bones of aurochs (fragment of a metapodial midshaft), red deer (distal end of a metatarsal), roe deer (distal end of a humerus), as well as unidentified large mammal (indeterminate long bone

Figure 7.14: Semi-articulated red deer hindlimb found to the north of Clark's excavations (Copyright Star Carr Project, CC BY-NC 4.0).

fragments), though fragments of rib and part of a mandible (alveolar), both from an unidentified large mammal were also present, whilst three small fragments could not be identified to species or element (Figure 7.12: group 9). With the exception of two unidentified fragments, all the specimens were humanly modified by either percussion breaks or spiral fractures as a result of marrow and fat extraction, or represented small fragments of bone debitage from percussion breaks. Interestingly, this includes the large mammal rib fragment, which appears to have been longitudinally split, possibly as part of tool production.

Two further specimens of bone were found within the wood peat (310) on the very edge of the lakeshore, just to the east of Clark's excavations (Figure 7.12: group 10). They consist of a fragment of large mammal long bone and a fragment of red deer metacarpal midshaft. Both are humanly modified, with the long bone fragment exhibiting a spiral fracture and charring to one edge, and the metacarpal fragment having been longitudinally split.

Antler has a similar distribution to the bone and was produced largely through the deposition of waste resulting from the working of the material (Figure 7.15). To the east of the site, two clusters of antler were recorded just to the north of the eastern platform. Of these, one consisted of seven fragments and formed a scatter around a highly compressed red deer frontlet <113901>, with a second concentration of four more fragments lying close by. A further four fragments of material (3 sections of beam and a piece of compact tissue) lay within the peat that had formed above the platform. Of these, three pieces (one from above the platform, and two from the area to the north) exhibit traces of groove-and-splinter working. However, preservation in this area was poor, and more of the material may have been worked.

Comparable assemblages are recorded from other parts of the wetland. Thirteen fragments of antler of mostly red deer, but also elk and roe deer, were recorded from the peat above the western platform. The red deer antler consists of five sections of beam, a tine, two fragments of compact tissue and two pieces that cannot be identified to species. None of the material exhibits evidence for working, although preservation in this area was poor, which made positive identification difficult. However, the material was generally very small and may

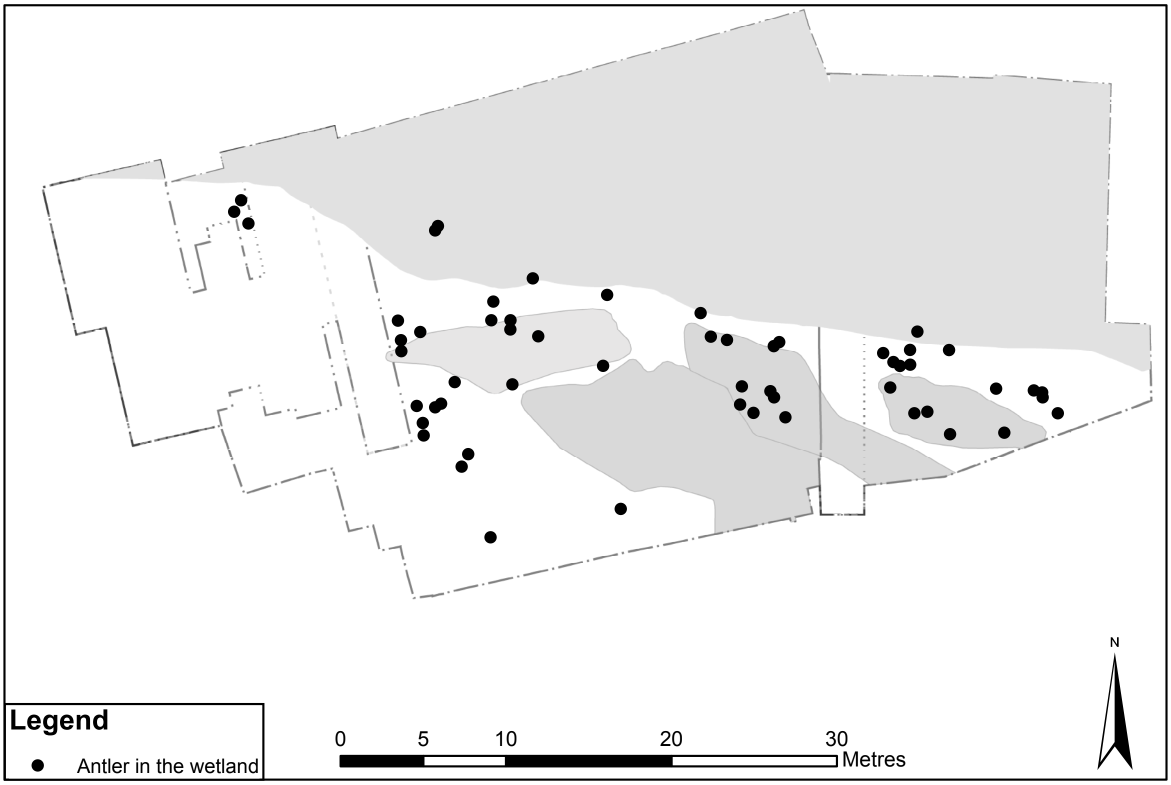

Figure 7.15: Antler within the wetland (Copyright Star Carr Project, CC BY-NC 4.0).

reflect debris from antler working in the area. Part of the beam and crown of a roe deer antler and two fragments of elk antler (one of which exhibits evidence for groove-and-splinter working) were also present in this area. A further 11 pieces of red deer antler (seven beam sections, three tines, a fragment of compact tissue) and four pieces of material identified only as antler were found in the peat over the central platform, of which eight show evidence for working using the groove-and-splinter technique. A pedicle fragment and two frontlets, also of red deer, were also present in this area and may also have derived from antler working.

Whilst the majority of the material from the wetland reflects butchery and dietary waste, and the debris from craft activities, two more unusual episodes of deposition were also recorded from this area. The first is a nearly complete, semi-articulated skeleton of a dog that was deposited into the wetland approximately 12 m from the shore (Figure 7.12). Most of the skeleton was present and many of the elements were found in a semi-articulated state (see Chapter 23: Figure 23.26; Table 23.7). There is very little archaeological material in this area and the remains probably reflect the deliberate deposition of a complete dog carcass into the wetlands. The second is the mandible of a wild boar <109227> found amongst the timbers of the western platform. Whilst this may represent the casual deposition of butchery waste, there is very little faunal material in the immediate area (only three fragments in the surrounding 2.5 m) and no other wild boar remains within 8.5 m. As such, the material may reflect a more deliberate act of deposition, possibly associated with the construction of the western platform (Figure 7.16).

Detrital wood scatter

Overview

While the majority of material in the wetlands represents the small-scale discard of dietery and craft waste, there are two areas where deposition of faunal material was both more clearly patterned and focused, and these

Figure 7.16: Wild boar mandible <109227> found within the western platform (Copyright Star Carr Project, CC BY-NC 4.0).

will be discussed in detail. One such area was the detrital wood scatter, representing some of the earliest evidence for activity at the site. The majority of bone was found spread within and to the south-west of the wood scatter, and as was suggested in Chapter 6, this feature may have facilitated the deposition of faunal material into an area of the wetland. The sediment conditions in this area were less extremely acidic than elsewhere on the site: in places pH 5.6, as opposed to pH 2.3 nearby. However, although some bones were relatively well preserved, there were also numerous specimens that exhibited demineralisation, compression, warping and splitting (Chapter 22).

A total of 160 faunal specimens were found in this area of the site (141 specimens of bone and 19 specimens of antler) (Figure 7.17). A range of species have been identified: red deer specimens are most common (n=109), followed by aurochs (n=12), elk (n=10), roe deer (n=8), wild boar (n=3), pine marten (n=1) and beaver (n=1). There are several specimens that cannot be identified to species (either due to high fragmentation or poor preservation): large artiodactyl (n=1), large mammal (n=10) and medium mammal (n=3). There are also two specimens that cannot be identified to taxon or element due to the small size of the fragments and therefore have been categorised as unidentified.

NISP by elements

Red deer is represented by the majority of the elements of the body, though these are not all present in equal proportions (Figure 7.18). Ribs in particular are poorly represented, as are the vertebrae of the lower back (lumbar vertebrae) and neck (cervical vertebrae). Other animals are represented by a more limited range of

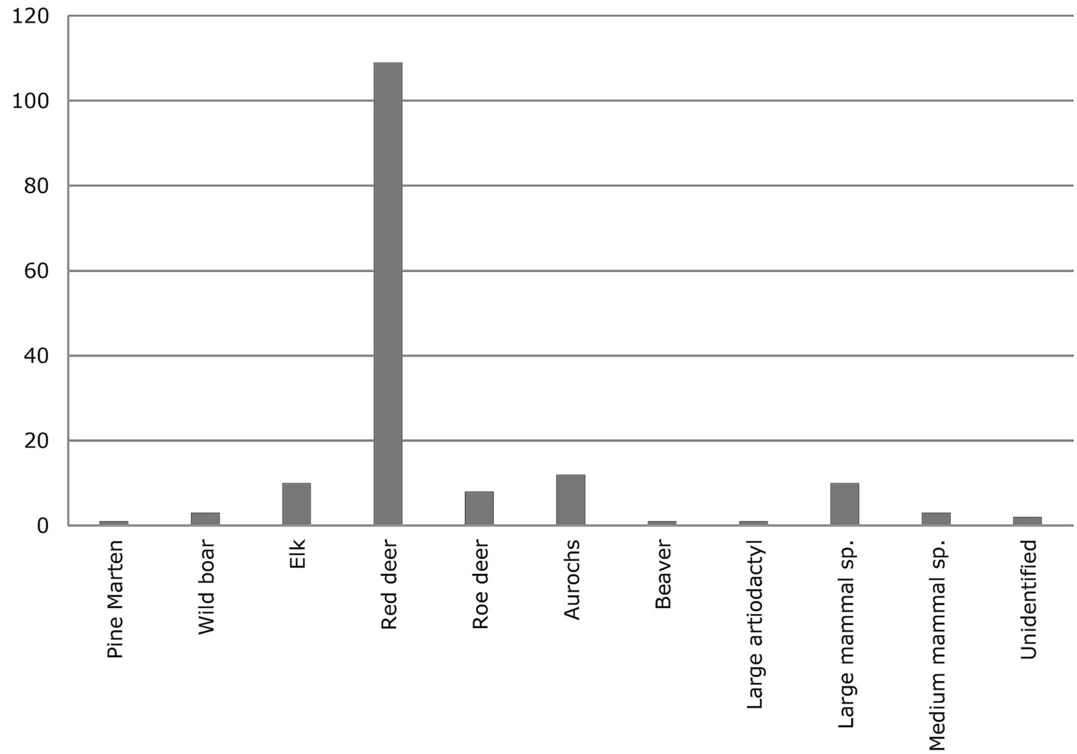

Figure 7.17: NISP values for the taxa found within the detrital wood scatter (Copyright Star Carr Project, CC BY-NC 4.0).

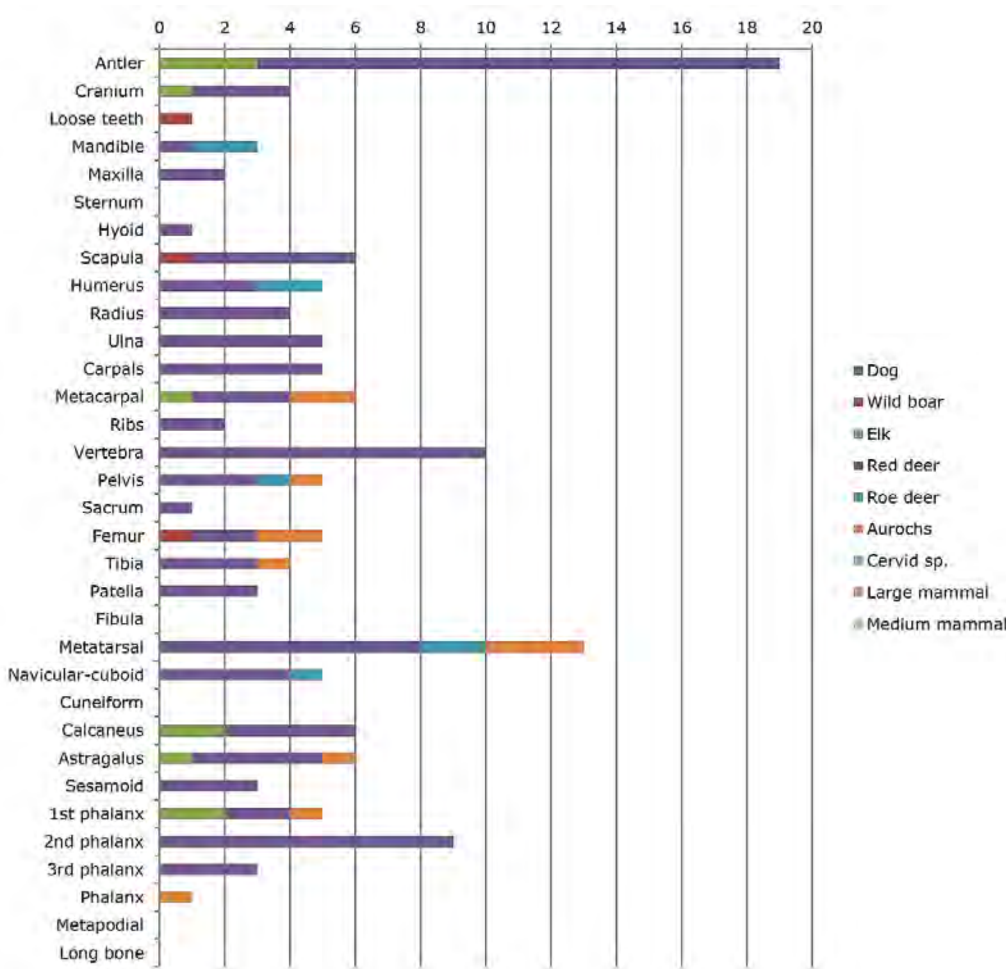

Figure 7.18: NISP values for the detrital wood scatter for the main species represented on the site (Copyright Star Carr Project, CC BY-NC 4.0).

elements from different parts of the body, which occur in small quantities: aurochs by bones of the limbs (though a fragment of pelvis is also present), elk by crania (including antler) and limb elements, and roe deer by podials, pelvis, mandible and humeri. The remaining taxa are represented by individual elements from skeletally unrelated parts of the body.

Discussion

The faunal material from the detrital wood scatter falls into two main assemblages (Figure 7.19). The first is located towards the southern end of the area and the majority of this material was deposited within a gap in the dense concentration of wood (Figure 7.20). This southern scatter consists of substantial parts of the bodies of several red deer, some of which were deposited in an articulated state, along with smaller quantities of elk bone (including a cranium and phalanges). The rest of the assemblage is scattered across the northern half of the detrital wood scatter and to the west and consists of smaller quantities of red deer (podial elements, phalanges, antler, long bone, scapula, rib, pelvis), elk (limb elements), aurochs (the hind limbs), and a very small number of roe deer, beaver, wild boar and pine marten.

The southern assemblage is made up almost entirely of red deer and consists of four near-complete limbs, along with the remains of several partial limbs, parts of the torso (mainly the thoracic vertebrae and pelvis), and crania (a female red deer skull, a fragment of mandible, and two red deer antler frontlets <99528> and <103625>), and a scattering of other elements (Figure 7.21).

The four near-complete limbs (left and right front limbs, and two left hind limbs) lay within the gap in the detrital wood scatter. The femur and tibia from the left hind leg, and the humerus, radius and ulna from the right front leg were articulated, whilst many of the remaining limb elements lay in a semi-articulated state (i.e. they were in anatomical position but not articulated). Several of the limbs were nearly complete. Of the first

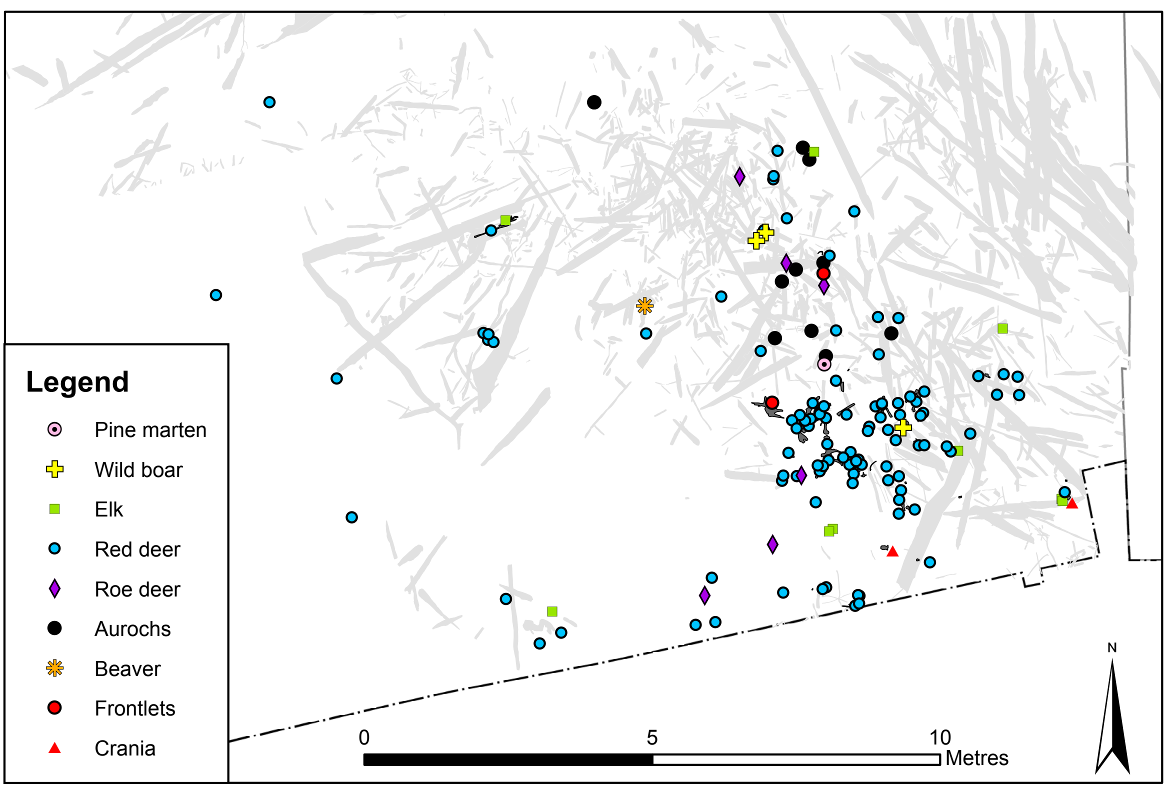

Figure 7.19: Distribution of animal remains across the detrital wood scatter (Copyright Star Carr Project, CC BY-NC 4.0).

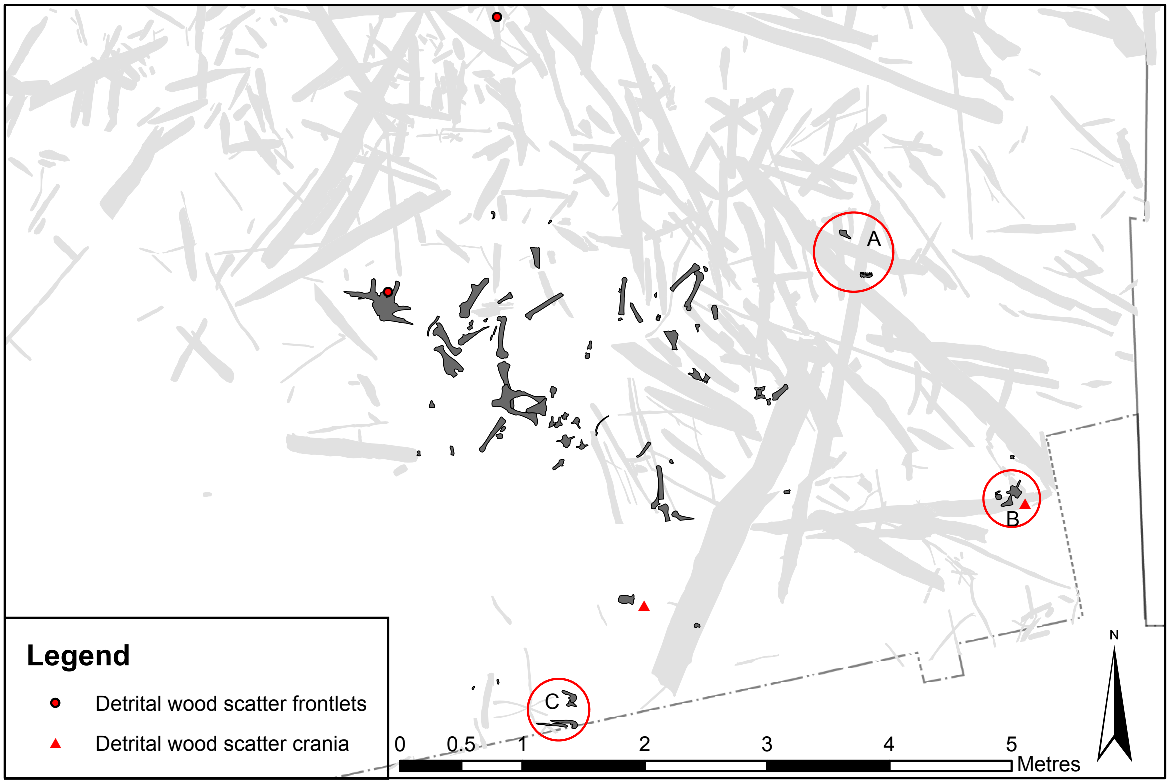

Figure 7.20: Plot of the red deer remains found within the gap of the detrital wood scatter and groupings A, B and C, as described in the text (Copyright Star Carr Project, CC BY-NC 4.0).

left hindlimb, the femur, patella, tibia, navicular-cuboid, astragalus, calcaneus, metatarsal, first and second phalanges were present; whilst only the third phalanx and tarsal bones were missing. The second left hindlimb is much more spread out but still in rough anatomical position and consists of femur, tibia, navicular-cuboid, astragalus, calcaneus, metatarsal and first phalanx; whilst some of the phalanges and tarsal bones were absent. The front left limb (including the scapula) was also nearly complete (missing just the phalanges and carpal bones). Most of this material was also semi-articulated with the exception of the radius, which lay 0.25 m from the ulna, and the metacarpal, which lay 0.2 m from the radius. The right front limb was less complete, consisting of the scapula, humerus, radius, ulna, metacarpal and triquetral, but missing most of the smaller podial elements. Two areas of the torso were also found in a semi-articulated state (a scatter of thoracic vertebrae, and a lumbar vertebra, pelvis and sacrum).

In addition, several other elements from different parts of the body, but lacking anatomical relationships, were also present in this area. These consist of limb elements (two right metatarsals and phalanges), the scapula of a large mammal, pelves (the left side of a second red deer pelvis and the left side of the pelvis of a large mammal), two crania (frontlet <103625> and a female cranium) and a cervical and atlas vertebra. The female red deer cranium (Figure 7.20), found slightly to the south, has a complete braincase but is missing the nasal bones and maxilla, i.e. it has been broken just anterior to the orbits and was also missing the mandible. In addition, a small section of red deer premaxilla and maxilla that refit and contain permanent second and third premolars, and a section of mandible containing a mixed dentition with deciduous third and fourth premolars and a permanent first maxillary molar, were recovered close to this main concentration of material (Figure 7.20: group A).

The only specimens identified to species other than red deer were an articulating right calcaneus and astragalus of an adult elk, a second, unassociated elk calcaneus, a roe deer left humerus, and a possible wild boar scapula. The elk astragalus exhibits a potential projectile wound with no sign of healing. Apart from the

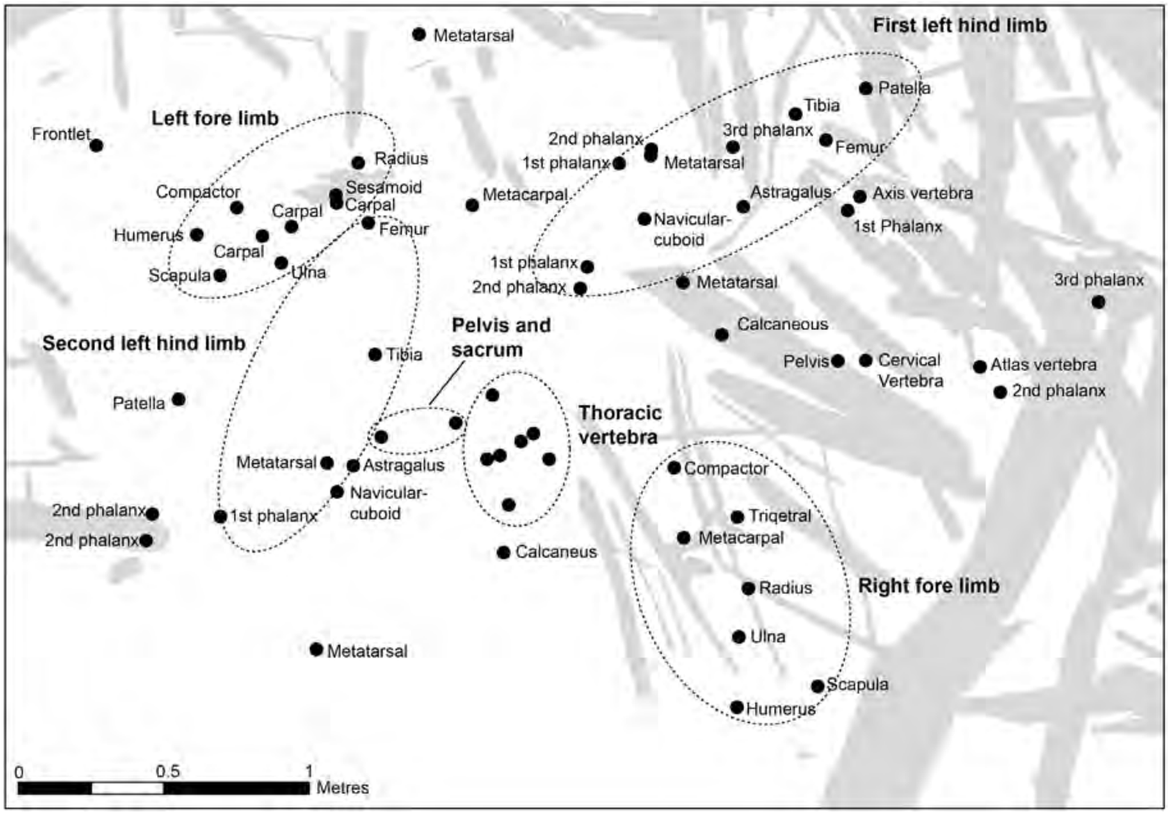

Figure 7.21: Distribution of red deer elements within the gap of the detrital wood scatter (Copyright Star Carr Project, CC BY-NC 4.0).

frontlets, the only red deer specimen in this area that exhibits clear signs of human modification is the radius of the front right limb which has cut marks on the midshaft anterior surface. However, the female skull also exhibits a break between the orbits and at the posterior end of the nasal bones there is no palatine bone present but the braincase is complete. Although there are no obvious signs of human modification, the area of the breakage to the front of the skull has begun to demineralise so evidence may have been obscured by this deterioration.

Overall, the faunal material associated with the gap in the detrital wood scatter consists largely of parts of the bodies of at least two red deer (based on the presence of two left hindlimbs), deposited in an articulated state with very little prior manipulation. A significant proportion of this material (three limbs and the thoracic vertebrae) also lay in their correct anatomical positions in relation to each other; the left and right forelimbs and shoulders lay next to each other with the scatter of semi-articulated thoracic vertebrae between them, whilst one of the left hind legs lay on the same side as the left front leg. The position of these parts of the body in the ground is consistent with the deposition of a partial carcass in a supine position. However, a significant portion of the animal is missing, notably, much of the spine (six thoracic vertebrae, five lumbar vertebrae, cervical vertebrae and caudal vertebrae), the cranium and the rear right leg. In addition, the articulating pelvis, sacrum and thoracic vertebrae are out of position and the second left hind limb clearly represents a separate individual.

There are three ways in which this could be interpreted. The first is that much of the assemblage represents the deposition of a complete red deer carcass, placed in a supine position in the lake. As it decomposed the body broke apart and the actions of the water moved the pelvis towards the thoracic vertebrae, whilst the

Figure 7.22 (page 145): The elk skull <108941> in situ (Copyright Star Carr Project, CC BY-NC 4.0).

missing elements (the right hindlimb, ribs, and lumbar vertebrae) moved outside the excavated area. The head may also have moved out of position and could be represented by the female cranium recorded to the south, or may have been removed prior to deposition (and potentially replaced with the frontlet that was recorded just to the west). Subsequently, further material, including a second complete limb, was deposited into the same area. However, this scenario does not explain the cut marks on the midshaft of the right radius, unless these were caused during the hunting and killing of the animal.

The second is that separate parts of the bodies of two or more red deer were deposited into this area, and represent an attempt to reconstruct (or at least to represent) a single animal. The repeating left hindlimb would suggest that it was the number of limbs that was important, not the fact that they came from the same animal. Similarly, the incompleteness of the carcass (notably the missing ribs and vertebrae) may reflect elements that were not deemed necessary in the representation of the animal.

The third interpretation is that the assemblage reflects separate episodes of deposition where large parts of different animals were deposited at this location, potentially at different times. Unfortunately, there is not enough evidence to argue more strongly for one scenario over the other: stable isotope results could not distinguish between individual bones and the antler frontlet in terms of diet (see Chapter 23: Table 23.11). In addition, although metrics were taken, the proportions of these remains are very similar and there is no clear distinction between individuals.

To the south of the gap in the detrital wood scatter are two discrete scatters: group B and group C (Figure 7.20). Group B is composed of the cranium of a juvenile male elk, two elk phalanges (which articulate), and a red deer sesamoid (Figure 7.20: group B). The elk skull is made up of partial antlers (palmate portion with missing tines), a partial frontal bone with the breakage occurring just in front of the orbits and a complete braincase (Figure 7.22). A partial maxilla was found in close proximity to the skull. These were not articulated, but the

size, robusticity and close proximity of the two suggests they would have originated from the same individual. The palatine bone of the elk skull was also found in close proximity but was not articulated.

Within group C (Figure 7.20), a partial humerus, two partial radii (one proximal end, one mid shaft which may have derived from the same element), an ulna and a number of phalanges of a red deer were found in a small cluster, probably representing a partial right forelimb, with four metatarsals, a scapula and a hyoid bone nearby. The humerus, both radii and all four metatarsals exhibit evidence for human modification in the form of percussion breaks, spiral fractures or a combination of the two. In addition, the ulna shows signs of being chewed by a carnivore.

The faunal remains from the rest of the detrital wood scatter are much more diffuse and more indicative of the deposition of waste deriving from the butchery, dietary processing (particularly the extraction of marrow or fat) and craft activities such as antler working. As in the area around the gap in the wood scatter, the specimens largely consist of red deer although a wider range of species are also present; mostly aurochs, but also pine marten, wild boar, roe deer, and elk (Figure 7.19).

The specimens either occur individually or in much smaller articulating groups that generally involve the bones of the ankle or podial elements and phalanges. The red deer assemblage consists of antler, much of which has been worked, as well as limb elements which includes a semi-articulated ankle (navicular-cuboid, calcaneus, astragalus and sesamoid). The aurochs are represented by a similar range of limb elements, two of which (a metatarsal and the first phalanx) were articulated, whilst roe deer are represented by limb bones and one mandible fragment.

There is also evidence of antler working (Chapter 24). Amongst red deer remains are four fragments of beam and one tine showing groove-and-splinter antler working, plus five beams which have been trimmed. Two pieces of elk antler have also been worked, one as an elk antler mattock preform. In addition, there a number of the bones that exhibit signs of human modification: 24 percussion breaks, 17 spiral fractures, 2 longitudinally split bones (aurochs metatarsal and red deer metatarsal) and a red deer radius and tibia with cut marks. Out of the 24 percussion breaks, 20 are on long bones (humerus, radius, ulna, metacarpal, femur, tibia, metatarsal), and four are on a calcaneus, mandible, rib and first phalanx. The majority of this patterning suggests breakage for marrow extraction. The longitudinally split bone is likely to have occurred for tool production. The cut marks are likely to be the result of skinning or meat removal. Overall, this assemblage probably represents material gathered together from tasks involving the processing of animal bodies, which have then been deposited into the lake.

Clark's area

This section relates to the previously unexcavated baulk between Clark's cuttings I and II and the area to the south of Clark's trenches. The assemblage from within the baulk formed a very dense concentration of material, with smaller concentrations present just beyond the southern edges of Clark's trenches (Figure 7.23). The density of material fell to the south, where a more diffuse scatter of bone and antler was recorded. The preservation of the assemblage in this area was much better than in other parts of the site, possibly due to the buffering effect of the neutral pH backfill and the area of calcareous marl to the south (see Chapter 22).

A total of 560 specimens were recorded from this area; 519 bone and 41 pieces of antler. Of these, just over half (298 specimens, 53% of the total) came from the baulk between cuttings I and II: an area of approximately 4 × 1 m. The most dominant species is red deer (162 bone and 37 antler specimens), followed by roe deer (49 bones and three pieces of antler), aurochs (41 bones) and elk (12 bones). There are a number of species which have less than five specimens: beaver, pine marten, wild boar, wild cat, wolf, common crane, red- or black-throated diver, white-fronted or bean goose and pike. Of these, wolf, common crane, red- or black-throated diver, and white-fronted or bean goose were only found in this area of the site. In addition, two specimens of fish were identified; a pike posterior abdominal vertebra and a pharyngeal bone belonging to a cyprinid fish (Figure 7.24).

Figure 7.23 (page 147): Tightly packed faunal remains in Clark's baulk area, along with wood and flint (Copyright Star Carr Project, CC BY-NC 4.0).

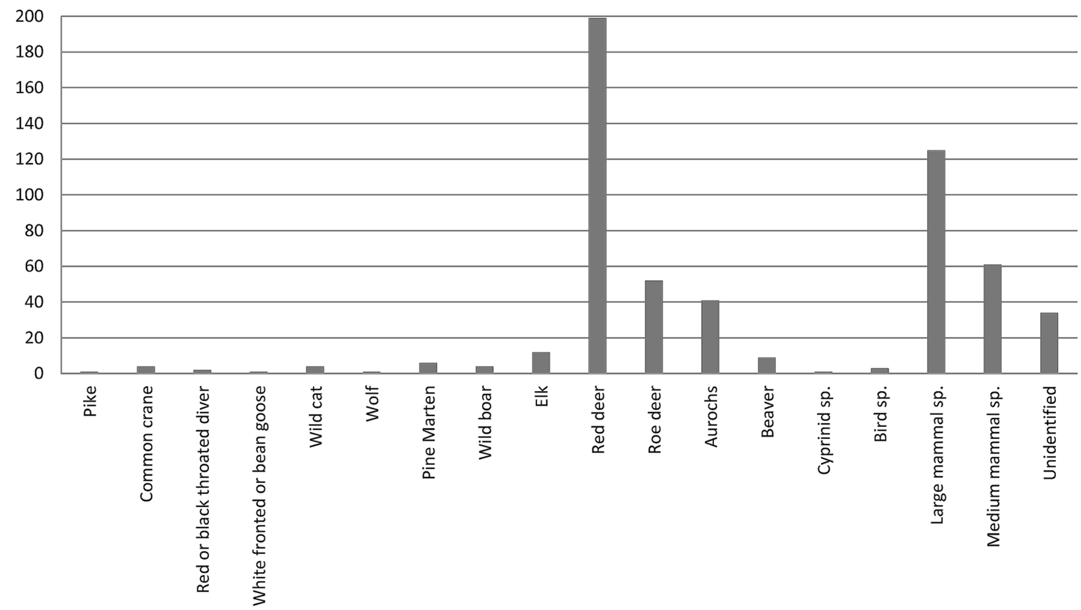

Figure 7.24: NISP values for the faunal remains in Clark's area (Copyright Star Carr Project, CC BY-NC 4.0).

NISP by elements

Overall, ribs have the highest representation (n=118), followed by antler, whilst most of the other elements are represented by fewer than 20 specimens (Figure 7.25). The only element which is not represented is the hyoid, although these are very fragile and are unlikely to survive well. For red deer, the assemblage represents most elements of the skeleton with fragments of limbs, torso and crania all present. There is a strong emphasis on the lower parts of the limbs (particularly the tibia, podial elements, phalanges and small bones of the ankle), the mandible, and antler, whilst the torso is poorly represented, consisting of small quantities of fragments of pelves and vertebrae. However, fragments of femur identified as large mammal were present, as were large quantities of ribs, both of which may derive from red deer. The other larger mammals are represented by smaller quantities of material and are less representative of the whole skeleton. Roe deer are largely represented by crania, torso (pelvis) and limbs, with the crania (which are represented by frontlets and a large fragment of skull) better represented than limb and podial elements. Elk are represented only by limb elements, which is in contrast to the material recorded by Clark, where the species is represented by a far greater range of elements (Legge and Rowley-Conwy 1988, 105).

Other species are represented by sparser quantities of material, showing little patterning in terms of particular parts of the body. Beaver, for example, are represented by very low numbers of fragments of mandibles, scapulae and limb elements, whilst for wild boar podial elements as well as scapula and mandibular fragments are present. Of the smaller mammals, pine marten is represented by complete limb bones (radius, ulna, and tibia) and pelvis, all of which occur singly, and two complete vertebra. Wild cat shows a similar pattern of complete elements, with the exception of one radius, which has been deliberately broken. Bird species are represented by single limb bones.

Discussion

It is important to note that the material from this area represents a sample of the much larger assemblage excavated and recorded by Clark (1954) and subsequently reassessed by Legge and Rowley-Conwy (1988). Unfortunately data on the spatial distribution of this material is not available, but the representation of elements per species from Legge and Rowley-Conwy's dataset should be taken into account, with the caveat that this represents a selectively collected assemblage, with unidentifiable, fragmented mid-shaft elements, representing material that had been smashed for marrow, not retained (see Chapter 23). This is likely to contribute to the low

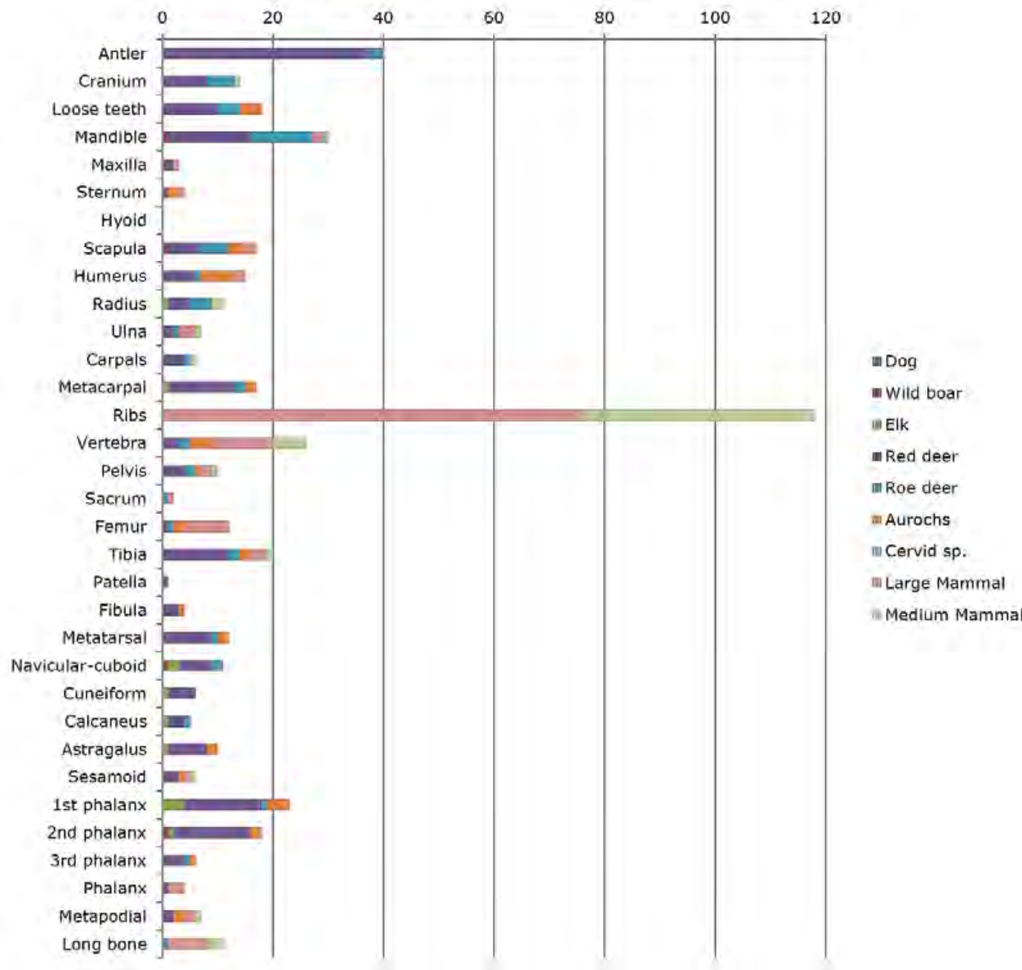

Figure 7.25: NISP of elements in Clark's area for the main species represented on the site (Copyright Star Carr Project, CC BY-NC 4.0).

representation of femora and humeri in Legge and Rowley-Conwy's dataset, resulting in their identification of Star Carr as a hunting camp. As Marean and Kim (1998, 88) state: 'most head-dominated and head-and-hooves-dominated patterns in the literature are an artifact of the exclusion of mid-shafts.'

Overall, there is no obvious patterning in terms of species distribution, with the remains of different animals randomly spread across the whole area. In particular there are no discrete dumps of individual species, even for those species that are less well represented such as aurochs (Figure 7.26). There is some possible patterning in terms of the distribution of elements, for instance, podial elements have a higher concentration in the north of the baulk (29% of bones) compared to the south (16%). These derive from a wide range of species (red deer, aurochs, elk, wild cat and wolf). Femora are absent from the baulk but occur in the area to the south of Clark's trenches (Figure 7.27), and there appears to be a gap in the distribution of ribs in the south-east of the area (Figure 7.28). This could, potentially, reflect differences in deposition, though given the relatively small sample that the assemblage represents in comparison to the material recorded by Clark, any such interpretation should be treated with caution.

The number of red deer frontlets is much higher in this area compared with other parts of the site, and four of these were found in the north end of the baulk. It is noteworthy that around one frontlet <115876>, two roe deer crania with attached antlers were found (Chapter 26) (Figure 7.29).

Very little material was recorded in a fully articulated state but groupings of semi-articulated material or concentrations of bones from the same parts of the body were present. The majority of these were the bones of the feet (metatarsal, metacarpal, astragalus, cuneiform, navicular-cuboid and phalanges), though distal ends of the

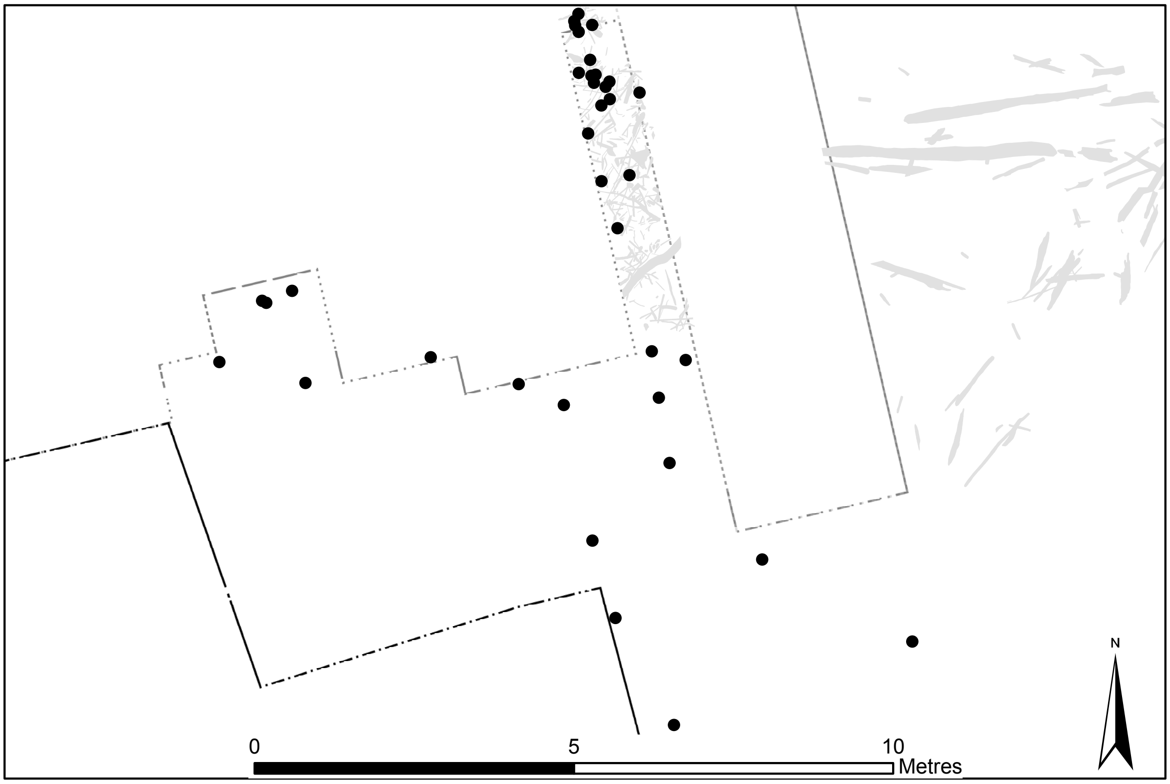

Figure 7.26: Aurochs remains within Clark's area (Copyright Star Carr Project, CC BY-NC 4.0).

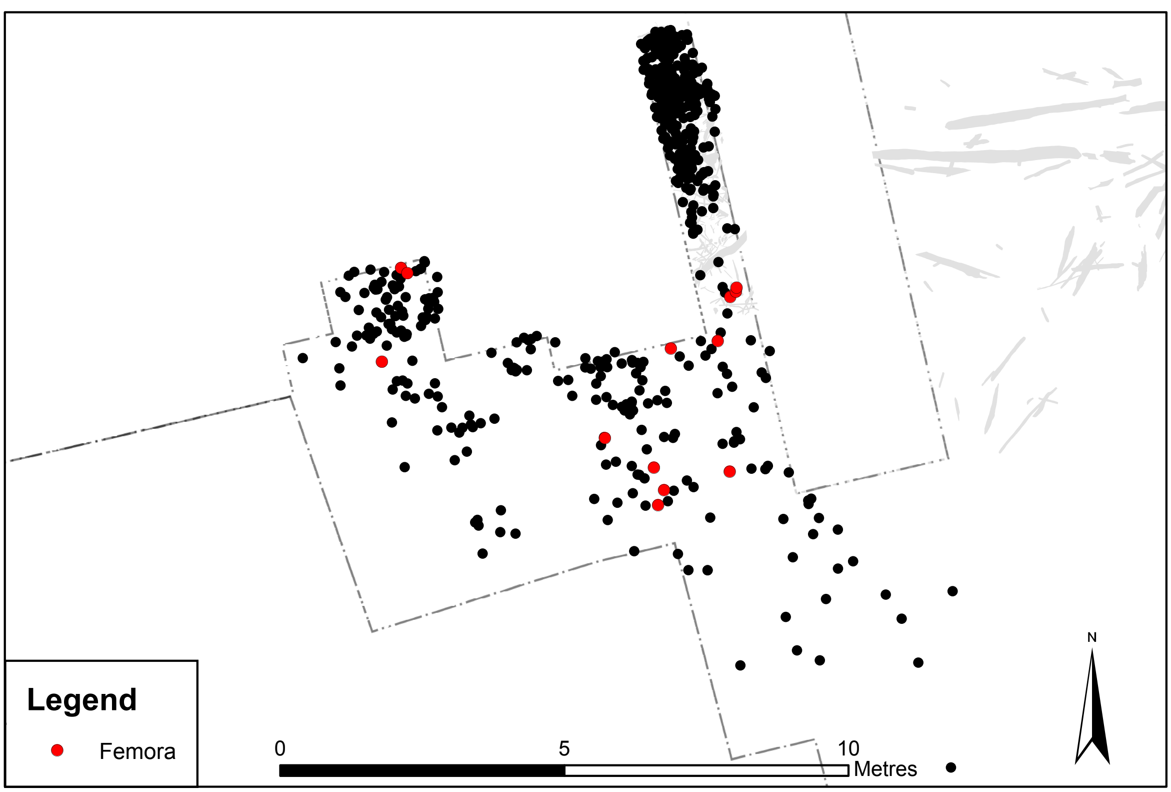

Figure 7.27: Plot of the femora of all species within this area showing representation to the south but none within the concentration in the baulk (Copyright Star Carr Project, CC BY-NC 4.0).

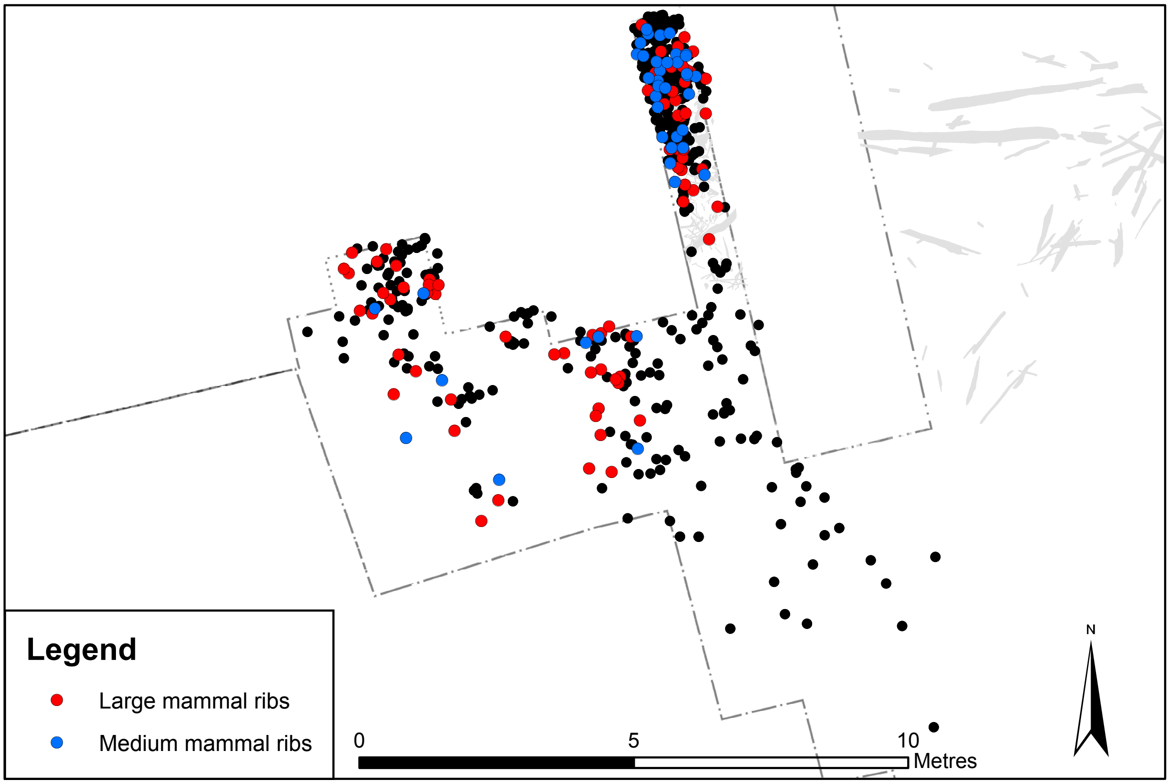

Figure 7.28: Plot of the ribs from the area showing an area to the south-east of the area with no ribs at all (Copyright Star Carr Project, CC BY-NC 4.0).

lower limb bones were also present. Most of the material derived from red deer, though clusters of articulated or semi-articulated elk, aurochs and roe deer material were also present. In all cases these groupings of material consisted of small numbers of elements (typically two or three), often in a fragmented state. More occasionally other parts of the body were also present in discrete concentrations.

A significant proportion of the assemblage (57% or 318 specimens) shows evidence for human modifications in the form of percussion breaks, spiral fractures and cut marks. These occur on a large range of elements; the mandible, maxilla, sternum, scapula, humerus, radius, ulna, metacarpal, rib, vertebra, pelvis, femur, tibia, navicular-cuboid, calcaneus, metatarsal and phalanges, and are present on most of the species. In some cases these modifications occurred on material found in a semi-articulated state, suggesting the processing and subsequent disposal of parts of the animal carcass. For example, the distal ends of a metacarpal, and first and second phalanx, as well as a complete third phalanx, all of a red deer were found in small cluster. The proximal head of the first phalanx had been removed by a spiral fracture whilst the mid-section of the first phalanx exhibited evidence of a percussion break. Though the material could not be sided, all the elements were of similar size and may represent the processing of parts of the foot of a single individual. Similarly, the distal ends of two first phalanges and the proximal end of a second phalanx, all of red deer, were found in an articulated state. There were percussion breaks to both first phalanges on their mid shafts, whilst the second phalanx exhibited a spiral fracture that had removed its distal end. Again, this suggests the processing of foot bones, potentially for the extraction of marrow, after which the material was deposited whilst still in articulation. A further 23 bones exhibit signs of longitudinal splitting thought to be associated with tool production.

Cut marks and scoring are also present on some of the specimens, reflecting the defleshing or dismembering of animals. The clearest evidence comes from the scapula of a wild boar where the position of cut marks around the posterior aspect of the glenoid processes probably resulted from the removal of the animal's forelimb. In other cases, cut marks are found on lower limb and podial elements with spiral fractures or percussion breaks and were presumably created during the butchering and processing of these animals. Other parts of the assemblage were generated through the processing of the skull, both for dietary and craft processes. The mandibles of five roe deer have had their ascending rami removed and breakages along the jawline beneath the tooth row caused by percussion breaks, probably for the extraction of marrow, and a mandible of a red deer and a wild boar had been treated in the same way. Score marks were also present on the parietals and around the pedicles of several roe deer crania, probably resulting from defleshing and skinning, whilst several modified red deer antler frontlets were also present. A small proportion of the assemblage (32 specimens) has evidence for animal action (gnawing), including one of the frontlets. However, there is no sign of weathering in contrast to the dryland areas.

Overall, the material from this part of the site (including the material recorded by Clark) represents a dense, roughly circular concentration of bone with a halo of dispersed material around it. There is little evidence from the material excavated in 2015 that there is any spatial patterning in terms of the representation of particular species or elements. Whilst we cannot tell if such patterning existed in the remainder of the assemblage, the fact that the MNI of the main species is very similar to that recorded by Clark (as presented in Chapter 23) supports the suggestion that the overall distribution of species was relatively homogenous. That said, there are some concentrations of material, such as the cluster of red and roe deer frontlets present in the baulk between cuttings I and II, and variations in worked flint that Clark recorded (see Clark 1949, Plate VIII; Clark 1950, figure 2; Clark 1954, figure 4). This may suggest that the assemblage was generated through discrete episodes of deposition. Unlike the detrital wood scatter, there is no evidence for the deposition of fully articulated limbs. Instead, the assemblage is consistent with the butchery and processing of carcasses for meat, marrow, skins, sinews, and tool manufacture. Given the environmental context of the assemblage (i.e. probably beneath shallow water; see Chapter 19) these tasks are unlikely to have been carried out at this particular location and the material has probably derived from activity areas at other parts of the site.

Figure 7.29 (page 151): A photograph to show the close proximity of one of the roe deer crania <116483> next to the red deer frontlet <115876> (the roe deer antler sits over the skull to the bottom left of the frontlet). The other roe deer skull <116473> had been excavated but was also located next to the red deer frontlet (Copyright Star Carr Project, CC BY-NC 4.0).

Clark's backfill

In addition to the faunal assemblage recovered from the unexcavated areas around Clark's trenches, a significant proportion of material has also been recovered from the backfill within his excavations. Before the current project began it was considered likely that faunal remains would be present within Clark's backfill. Roger Jacobi, having looked at the collections in the Natural History Museum, suggested that it appeared to be a selectively curated assemblage, focused on material that was relatively complete and identifiable to species (Jacobi pers. comm.). This was supported by both Robert Erskine, who worked on the original excavation and described to us how unwanted bone was left on the spoil heap, and David Lamplough, a volunteer on the recent project who had worked at Star Carr as a boy in the 1950s and had collected a small box of spoil heap finds.

Faunal material was recorded within the backfill of Clark's cutting II during the re-excavation of the trench in 2010 (Figure 7.30) and from the other trenches in 2015. A total of 333 specimens were recorded. Unsurprisingly, species representation broadly matches that of Clark's excavated assemblage, with a dominance of red deer, followed by smaller quantities of aurochs, roe deer and elk (Figure 7.31). Ribs are by far the most abundant element and were probably discarded because they are difficult to assign to species. However, a range of other elements are also present (albeit in smaller numbers), representing much of the skeleton (Figure 7.32). There are also some noticeable taphonomic differences between the majority of the in situ bones and the backfill material: a large proportion of the backfill faunal material is partially desiccated which has created splits, cracks, delamination and flaking of the cortical bone. Unfortunately, it is not possible to determine exactly how much material was discarded by Clark as only some parts of the area he investigated have been re-excavated. In addition, we do not know how many were lost at the time through degradation on the spoil heaps.

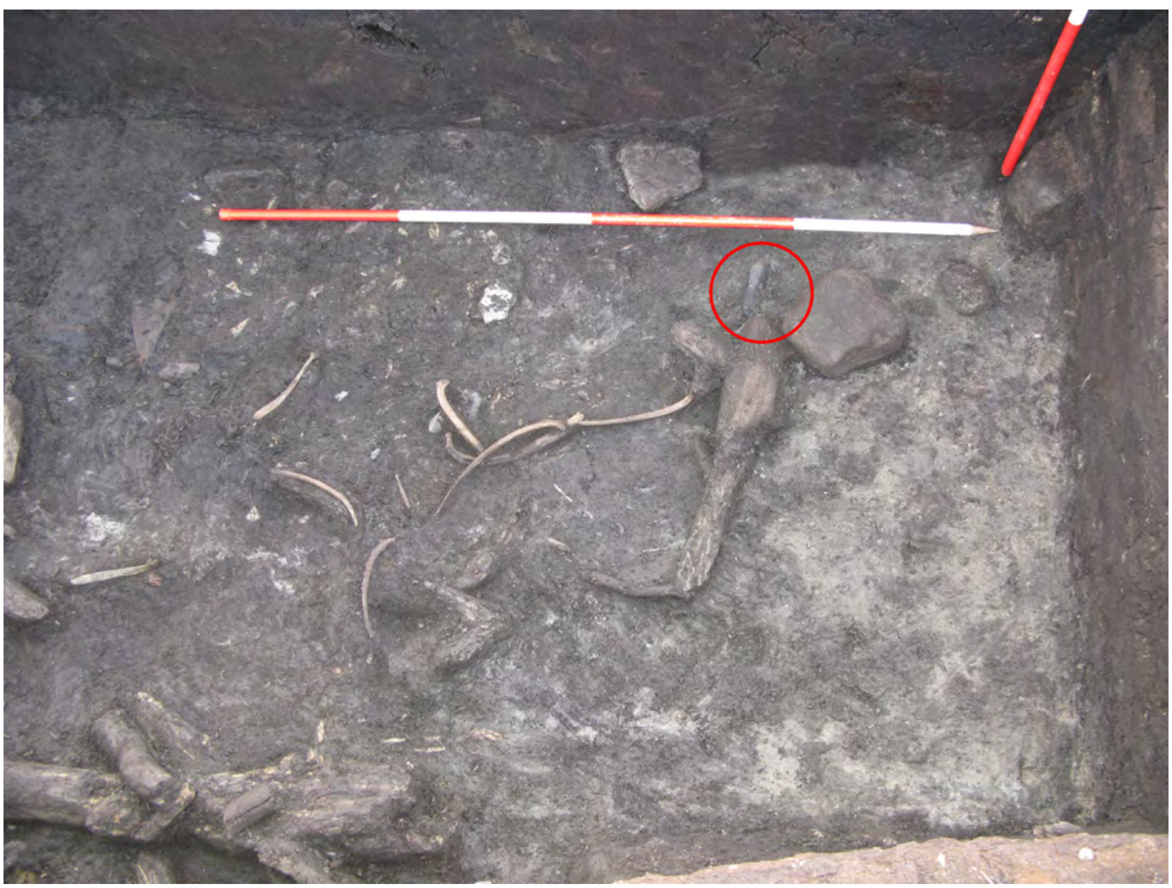

Figure 7.30: Large mammal ribs found while excavating Clark's backfill in cutting II (north end of the trench). Note the handle of a trowel (in red circle), left there in 1950 (Copyright Star Carr Project, CC BY-NC 4.0).

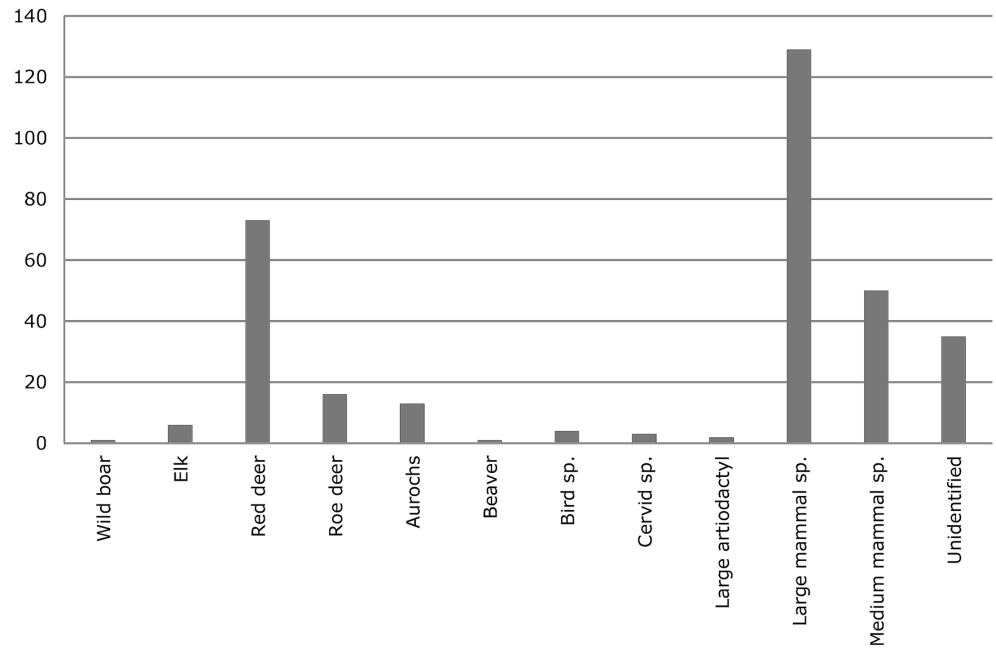

Figure 7.31: NISP values for species found in Clark's backfill (Copyright Star Carr Project, CC BY-NC 4.0).

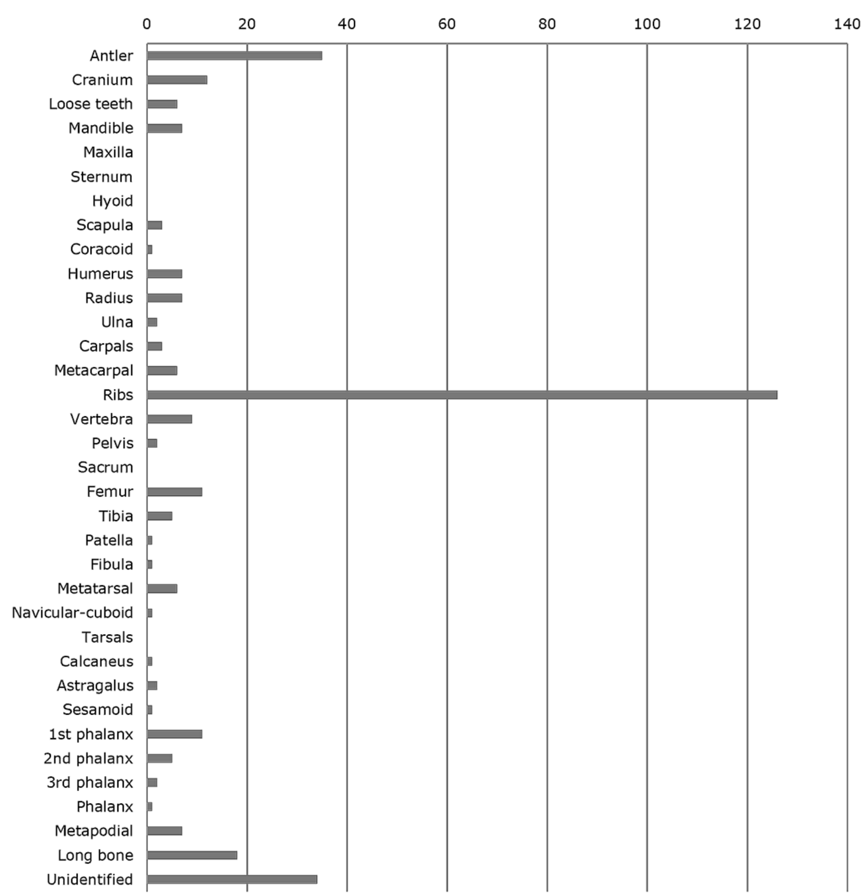

Figure 7.32: NISP values of all elements that were recovered from Clark's backfill (Copyright Star Carr Project, CC BY-NC 4.0).

Conclusions

Since it was first excavated, the faunal assemblage from Star Carr has been used to infer aspects of the site's economy and function. For Clark, it established the time of year the site was occupied, the size of its population, and its place within a wider pattern of seasonal mobility (Clark 1954; 1972). Subsequent researchers have reinterpreted this material to draw new conclusions as to the economic basis of the site, looking in particular at the representation of particular species or the parts of the animals that made up the assemblage (Caulfield 1978; Andresen et al. 1981; Legge and Rowley-Conwy 1988). In all cases, these studies have assumed the assemblage recorded by Clark represented both the entirety of the faunal material from the site and the entirety of material from Clark's excavations and was, therefore, representative of the forms of economic activity taking place at Star Carr. We now know this is not the case. Not only is animal bone present across a much wider area, but the material recorded by Clark represents an episode of deposition that was focused on a particular area and was limited to a specific point in time (Chapter 9). If we are to understand the forms of activity that generated this assemblage it needs to be placed within the wider context of the faunal material from the site as a whole.

Excluding the material from the detrital wood scatter and Clark's area, the combined assemblages from the wetland and dryland contexts are consistent with the butchery and processing of substantial parts of the bodies of red deer and aurochs. Much of the assemblage from the wetland was generated through the dismemberment and subsequent processing of the limbs of these animals, after which some of the material was deposited at the edge of the lake. This can be seen most clearly in two specific clusters of material. The first is the small cluster of limb elements recorded just to the north of the area investigated by Clark. These indicate the removal and subsequent disarticulation of the entire hind limb of the deer, after which the femur, tibia and metatarsal were broken open, probably to extract marrow or fat, resulting in the loss of parts of these elements. This material was then gathered together (the bones of the ankle and the phalanges still articulated) and deposited into the wetland at the edge of the lake. The second is the assemblage of articulated and semi-articulated red deer elements deposited to the east of the eastern platform. This reflects the removal of the foot from the rest of the limb, after which the bones of the ankle and the phalanges have been discarded (again, whilst still articulated), whilst the metacarpal was retained, probably for dietary processing or use in craft activities.

These practices are reflected (albeit more broadly) in much of the material from both the wetland and dryland parts of the site. The fragments of limb bones from the wetland (typically humeri, radii, tibia, metacarpals and metatarsals, and more occasionally femurs), which make up the majority of the assemblage, lack anatomical associations and show a high degree of modification (83 specimens, 32%), typically spiral fractures and percussive breaks. This is consistent with the removal and subsequent processing of limbs (particularly, though not exclusively lower limbs) and their subsequent deposition into the lake. Equally, the lower numbers of astragali and the lack of other elements of the ankle or the phalanges is consistent with the removal and differential treatment of these parts of the limb, which may have been discarded whilst still articulated (as was the case in the examples above), or taken and processed further at another part of the site. Similarly on the dryland, groups 2 and 3 in the eastern structure include fragments of the upper and lower limb bones of red deer and aurochs that exhibit spiral fractures, percussion breaks and longitudinal splitting. A comparable range of material is also present within and around the western structure and is also represented in the discrete cluster of fragments of the limb bones of aurochs, red deer and an unidentified large mammal that was recorded at the northern end of the site.

However, it is clear that other parts of these animals were also being processed on the site. On the dryland the two clusters of vertebrae recorded from the western side of the site, one of which was found in a semi-articulated state, probably represent dumps of butchery waste associated with the processing of the torso. Given that one of these was also associated with several aurochs limb and podial elements it is likely that other parts of the body (potentially of the same animal) were being processed at the same time. Similarly, the spread of aurochs elements recorded to the north of the eastern structure probably reflects the detritus of butchery and processing tasks that involved parts of the limbs, shoulders and spine of the animal. More broadly, the scattering of fragments of pelves, vertebrae, ribs, mandibles and crania across the dryland, some of which also have percussion breaks, reflects the butchering and processing of the torsos and skulls of these animals. Though the evidence from the wetland is sparse, the pedicle, frontlets and unshed antler of red deer, as well as the more isolated occurrence of scapulae and vertebrae of both red deer and aurochs, again indicate the processing of parts of the torso and crania.

Part of the assemblage from the detrital wood scatter has been generated through similar forms of activity as other parts of the wetland, notably the butchery and processing of the limbs and parts of the torsos of red deer, aurochs and elk, and to a lesser extent wild boar. In most cases this involved the disarticulation and processing of the long bones, notably the humerus, radius and metapodial elements, and the removal of the elements of the ankle and the phalanges, sometimes whilst still in articulation. In addition, the presence of fragments of mandible, scapula and pelvis also suggests that other parts of the carcass were being processed and deposited in this area. However, whilst people undertook these prosaic activities they were also depositing more substantial parts of the bodies of red deer into the wetland at the southern end of the detrital wood scatter. Depending upon how this material is interpreted it either reflects the deposition or reassembling of at least one complete animal carcass, or multiple episodes of deposition involving entire limbs, parts of the torso, and potentially the head. Either way, this material does not necessarily represent butchery and dietary practices and instead reflects other ways in which animal bodies were being treated.

Broadly speaking, the assemblage from the area investigated by Clark (including the material recorded as part of this project) is very similar to the assemblages recorded from the other parts of the site and has probably been generated by similar sets of practices. To begin with, a broadly comparable range of animals is present in both assemblages (though the quantities of material and the representation of individual species do vary). In terms of the treatment of the larger mammals there is evidence for the separation and subsequent processing of the limbs, the discarding of articulating ankle bones, and the processing of the phalanges, as well as butchery/processing of substantial parts of the torso.

Furthermore, the heavy processing of the lower jaws of red and roe deer, indicated by the high proportion of mandibles with percussion breaks, can also be seen on the dryland assemblages in the form of the fragments of mandible and loose teeth. In terms of the smaller mammals, the much lower quantities of material beyond Clark's area make comparison more difficult. However, a similar range of species are present in both areas and in the case of beaver, the emphasis on the processing of the mandibles that can be seen in both the dryland and Clark's area assemblages suggests that the species is being treated in comparable ways. Where the assemblages from these parts of the site differ is in the quantity of material deposited in the area investigated by Clark, the amount of this material found in articulation (or in a semi-articulated state), and the degree of preservation (including fragmentation). This would suggest that the main difference is in the way that the remains were curated and deposited and not the economic and craft activities through which the assemblages were generated.

A question that remains is whether the assemblages (both from Clark's area and the site as a whole) reflect the processing of whole animals or parts of carcasses brought onto the site, or to what extent particular animal body parts have been removed from site. Unfortunately, the poor levels of preservation on the dryland parts of the site, the highly processed nature of the assemblage, and the fact that large parts of the site remain unexcavated make any conclusions as to the completeness of the carcasses on the basis of the under-representation of particular elements problematic. Elements of the torso and cranium and to a lesser extent the upper rear limbs, are less common, a fact that could suggest that either the carcasses were incomplete when they arrived or that some parts of the body were subsequently removed. However, just under a third of the material from the dryland was unidentifiable both to species and element (30%, n=183/601), the area around the western structure being particularly poor (43% n=105/240), whilst some material could only be identified as long bone fragments of indeterminate species. This could easily account for at least some of the under-represented elements. What is more, the absence of elements from the assemblage need not reflect material that has been left behind at kill sites, or taken away to residential base camps. Large elements such as the femur can be largely destroyed through intensive processing for marrow, whilst other elements may be removed and used to manufacture tools. Furthermore, the ethnographic record shows that hunter-gatherers selectively remove elements from prey animals after they have been killed, curate elements separately after butchery, or deposit certain bones in different ways (e.g. Jordan 2006; Nelson 1983; Tanner 1979). Nor should we assume that there was a single, consistent way in which animals were brought onto the site or were subsequently dealt with. In some cases animals may have been brought onto the site as complete carcasses, butchered and processed and then deposited in their entirety. In other cases, limbs, torsos or heads may have been brought to the site, or parts of carcasses may have been taken away to other places in the landscape. Given the dynamic character of activity within the surrounding landscape (Conneller and Schadla-Hall 2003) there is unlikely to be a single, constant set of economic practices at Star Carr.

CHAPTER 8

Making Space through Stone

Chantal Conneller, Aimée Little and Julie Birchenall

Introduction

Clark's excavations at Star Carr were the culmination in a shift from his career in the 1930s as a 'passionate connoisseur of flints' (1974, 35) to the pioneer of economic archaeology in Britain in the late 1940s and 1950s. In fact Clark explicitly sought a site with good organic preservation to explore his new economic theories and as a result the weight placed on the lithic analysis in his publication was somewhat reduced in comparison with his previous work. For instance, in the report on the excavations at Farnham (Clark and Rankine 1939) the lithic report took up more than a third of the entire publication. However, in the publication of Star Carr, flint was only the third specialist report and shorter than the Farnham report. In it Clark provides a basic description of tools, technology and raw material, whilst interpretations of the site based on the lithics are discussed separately in the first chapter. Here lithic evidence was used to define the extent of the settlement, the gender of those occupying the site and their activities. Tool types were plotted but not commented on, beyond the remark that their distribution appears essentially homogenous (Clark 1954, 22).

Since Clark's excavations, new work at the site, not least the current excavations, has enhanced our understanding of the spatial extent and temporal depth of occupation. Rather than a drop-off in flint indicating the boundaries of a homogenous area as Clark imagined, our open-area excavations have revealed that this drop off simply indicates a change in the nature, intensity and focus of activities. To this end, this chapter is focused on differential use of lithic material across space. Lithic material is the most frequent find on the site and unlike organic material it does not decay. As a result we have an assemblage of material with equivalent levels of preservation across the entire site, permitting a much more accurate understanding of the differential use of wetland and dryland than possible for other materials where taphonomy is a major issue. Much of our understanding of the nature and structure of activities on the dryland must thus, by necessity, derive from the lithic assemblage.

The approach to the assemblage from the current excavations draws on the 'palethnographic' approach of Leroi-Gourhan and his students (Leroi-Gourhan and Brezillon 1972; Pigeot 1990); the techno-sociological aspect of the chaîne opératoire (Schlanger 1994). The assemblage has been analysed to understand the social dimensions of activities involving stone tools. The methods employed have been concerned to understand

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differences in use of the site across space and over time and how practices of manufacture, use and discard created space for Mesolithic people (*sensu* MacFadyen 2006). The focus of the analysis reported here is spatial, with refitting used not simply to understand the technical choices employed but the movement of lithic material around the site. Microwear has been employed to better understand the nature of activities in particular areas, presencing materials long since decayed, as well as addressing the interconnectivity of materials and actions. A combination of these techniques has been used to understand the role lithic materials and stone tools played in people's lives and the results of these analyses are outlined here and in Chapter 35: what choices were made in the selection of raw materials? Were particular tools curated and valued? What guided the discard and deposition of lithic material?

Activity areas: the dryland and the wetland

In the following discussion the open-area excavations comprising trenches SC22, SC23, SC24 and SC34 (Figure 8.1) have been divided into six parts and dealt with in turn: the western, central and eastern dryland areas and the western, central and eastern wetland areas (Figure 3.12). These six parts have been further subdivided according to area and in the wetland by area and layer. This results in a much more meaningful assessment of the lithic material in which spatial variation in activity areas can be discerned, as well as changes over time. The division of the assemblage into smaller areas was made in a variety of ways: material associated with major features such as structures and platforms; dryland and wetland-edge lithic material forming spatially discrete scatters; and finally areas with more diffuse spreads of lithic material deposited either within open water or between the major dryland knapping scatters. Due to the diachronic nature of peat formation at the lake edge (Chapter 4), vertically discrete wetland-edge flint scatters can cut across the peat stratigraphy. The division of material in this way resulted in 13 wetland sub-assemblages and 15 dryland sub-assemblages, which

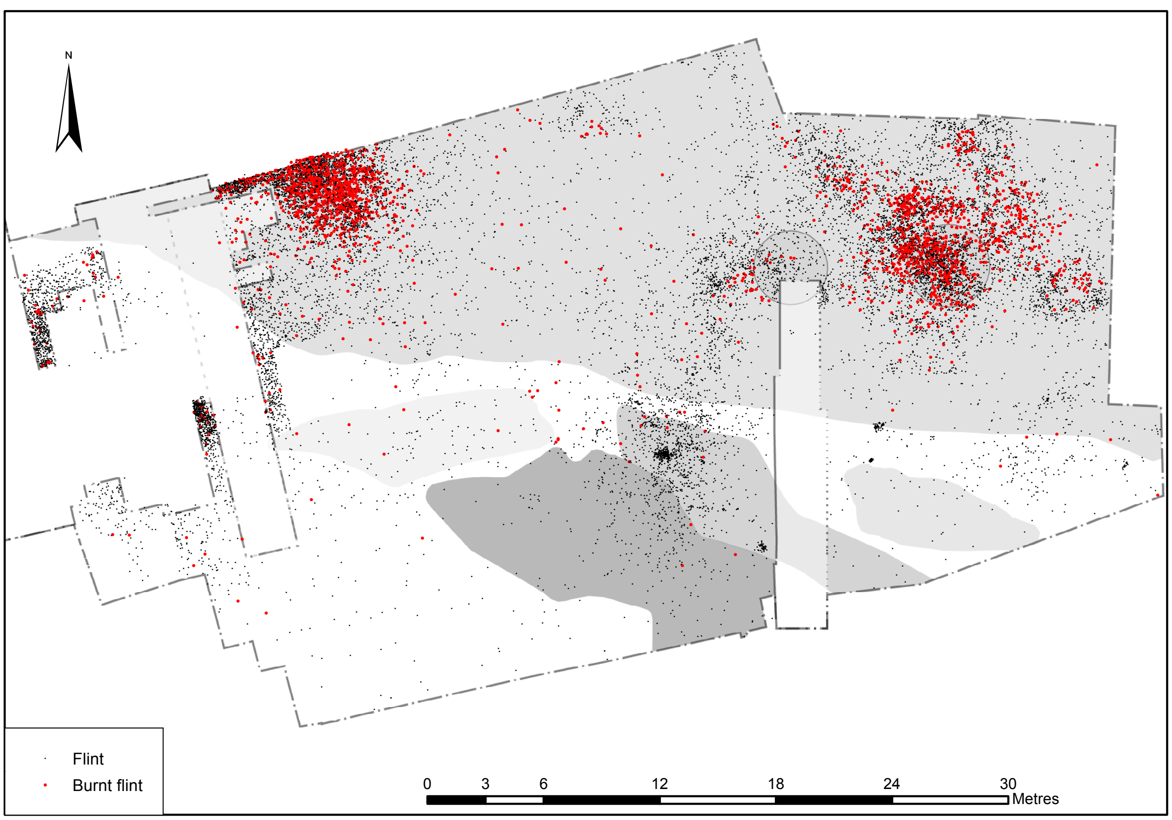


Figure 8.1: Distribution of flint and burnt flint across the site (Copyright Star Carr Project, CC BY-NC 4.0).

will be discussed below in turn. Connections between these areas which might indicate contemporaneity were explored through refitting (see Chapter 35 for methods).

Test pitting also occurred beyond the main area of open excavation; to the east along the eastern peninsula and to the north in the field beyond the Hertford Cut (Figure 3.3). The material from these areas gives a flavour of the nature of activities and intensity of use of areas of the site that remain to be extensively explored, and in the case of the area to the north of the Hertford Cut have probably been entirely ploughed out.

As will be outlined in this chapter, practices of discard and deposition of lithic material at the site are complex and varied. Dryland areas were busy areas of knapping and inhabitation, with the use and clearance of structures leading to the emergence of areas of middening, in addition to in situ knapping areas. As a site with a long duration of occupation, lithic material from previous occupations would have been visible and was often scavenged, cores rarely being recovered from areas where they were knapped. While most refit groups cluster within small areas of the site (within a scatter or adjacent scatters), some long-distance refits indicate material being moved large distances across the site (Figure 8.2). Microwear indicates the pieces moved were all utilised. While this might on occasions indicate contemporaneity between areas, reuse of lithic material still visible from earlier occupations is also a strong possibility.

There is also considerable complexity in lithic patterning in the wetland, with lithic material from open water contexts presumably representing depositionary practices and platforms seemingly kept clean of lithic debris. During the later occupations of the site, previous areas of reedswamp and open water were colonised by peat and fen and carr vegetation and the wetland began to be used for flint-knapping and the production and use of particular tools. Due to the rapidity of peat development (Mellars and Dark 1998), these are high-resolution scatters where shifts in the way the wetland was used over time can be discerned. A final feature of the wetland and wetland edge is the presence of lithic 'caches'. These consist mainly of clusters of partially worked nodules or cores, though some are more varied, such as the ×6 cache (named for the site grid square in which it was recovered), which consists of tools and cores. Many caches consist of good-quality raw material and were presumably established as secondary sources of raw material in the landscape, intended for use but for whatever

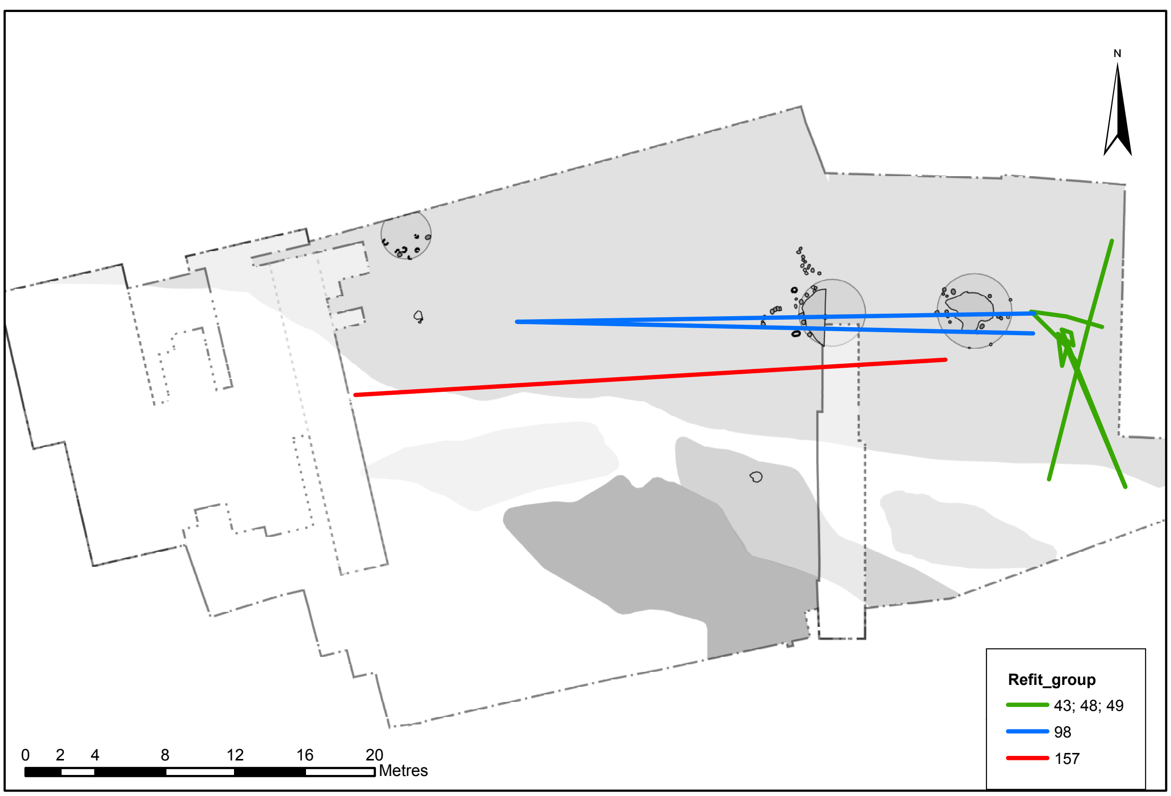


Figure 8.2: Long distance refits across the site (Copyright Star Carr Project, CC BY-NC 4.0).

reason not returned to. However, other caches may have had a different intention: two nodules of flint seem to be part of the western platform, either as large stones to reinforce it, or (given this structure is also associated with a pig mandible) as part of a more formal act of depositon associated with its construction. The caches at Star Carr, as is the case elsewhere in the Vale of Pickering (Conneller 2000; Conneller 2003; Chapter 11 this volume), are thus varied in their form, composition and likely purpose (see Chapter 35 for further discussion).

Dryland

Western area

The western dryland area is defined as stretching from the area of high lithic densities in the north-west of trench 34, up to scatter 7 in the middle of the northern part of trench 34, to the wetland edge in the south. It has been divided into three smaller areas (Figure 8.3): an extremely dense scatter with a high proportion of burnt flint encircling a semi-circle of postholes (the western structure, see Chapter 5); immediately to the west of this is a dense area of lithic material (Moore's area) which runs into the northern section of trench SC34 and is truncated to the south by Clark's excavation; surrounding these is a lower-density scatter of material (western structure surrounds).

Western dryland structure

The assemblage from this structure is distinguished by its high density and high proportion of burnt flint (Figure 8.3; Table 8.1). It is located within a ring of possible postholes, where lithic material is at its most concentrated and densities reach 432 pieces per square metre; the scatter extends around 2 m beyond the post-ring

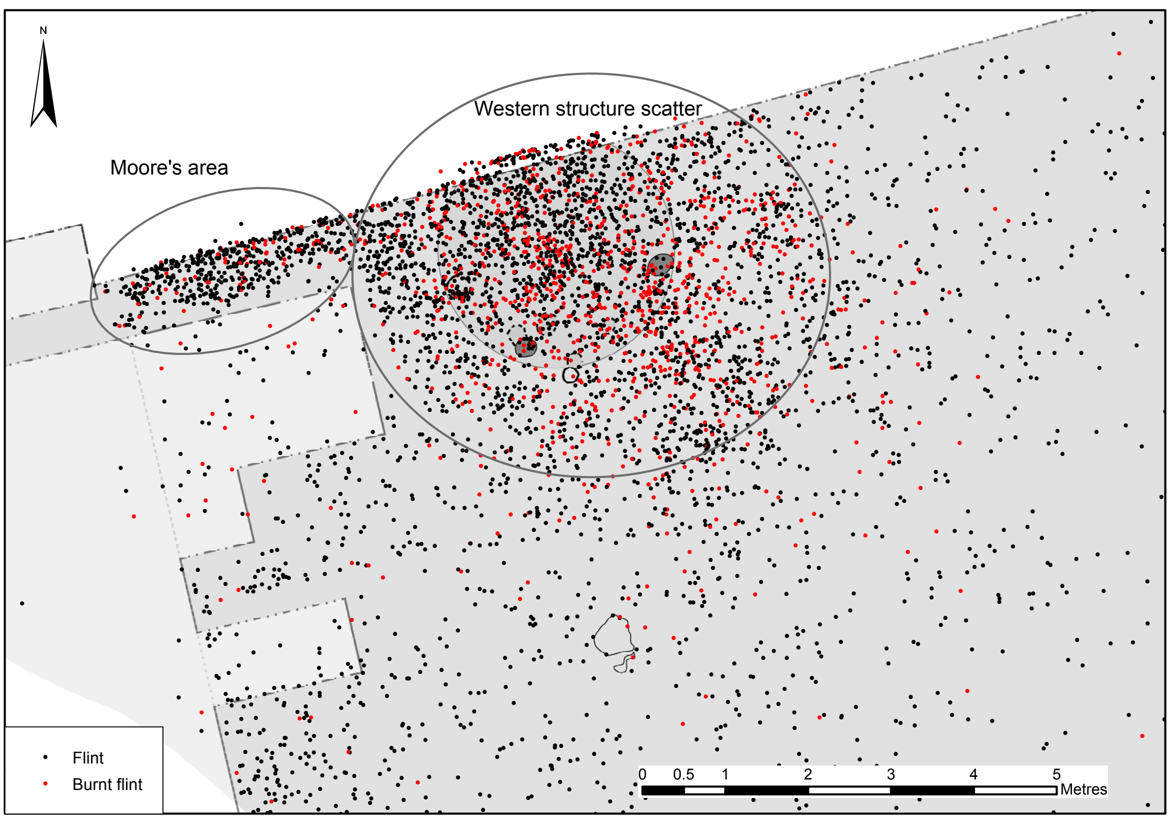


Figure 8.3: Plot of the flint and burnt flint in the western dryland structure, Moore's area and western structure surrounds (Copyright Star Carr Project, CC BY-NC 4.0).

	Western structure		Western structure surrounds		Moore's area	
Category	**No.**	%	**No.**	%	**No.**	%
Tools total:	**329**	**6.50**	**56**	**5.65**	**32**	**6.20**
Awl	14	0.28	5	0.86	1	0.19
Axe	2	0.40	1	0.17	0	0
Burin	53	1.05	6	1.03	3	0.58
Denticulate	2	0.40	1	0.17	0	0
Hammerstone	1	0.20	0	0	0	0
Micro-dent	5	0.10	2	0.34	0	0
Microlith	49	0.97	8	1.38	9	1.74
Notch	3	0.60	0	0	0	0
Scraper	62	1.22	7	1.21	6	1.16
Scraper/borer	1	0.20	0	0	0	0
Scraper/burin	2	0.40	0	0	0	0
Strike-a-light	3	0.60	1	0.17	0	0
Truncation	7	0.14	0	0	0	0
Retouched	14	0.28	0	0	0	0
Utilised blade	73	1.44	18	3.1	8	1.55
Utilised flake	12	0.12	4	0.69	3	0.58
Utilised fragment	26	0.51	12	2.07	2	0.39
Tool spalls:	**109**	**2.15**	**11**	**1.9**	**12**	**2.32**
Axe flake	20	0.39	4	0.69	2	0.39
Burin spall	54	1.07	3	0.52	9	1.74
Microburin	31	0.61	4	0.69	1	0.19
Retouch spall	4	0.40	0	0	0	0
Core preparation:	**104**	**2.06**	**14**	**2.41**	**18**	**3.49**
Core tablet	40	0.39	6	1.03	12	2.32
Crested blade	39	0.77	5	0.86	2	0.39
Plunging	18	0.36	2	0.34	4	0.77
SFR/fden	7	0.14	1	0.17	0	0
Debitage total:	**4516**	**89.28**	**499**	**86.03**	**454**	**87.98**
Blade	443	8.76	69	11.9	56	10.85
Flake	779	15.40	83	14.31	122	23.64
Fragment	1935	38.26	149	25.69	230	44.75
Chip	1203	23.78	172	29.65	31	6.01
Core	55	1.09	12	2.07	3	0.58
Core frag	13	0.26	1	0.17	1	0.19
Chunk	88	1.74	13	2.24	11	2.13
Total	**5058**	**100**	**580**	**100**	**516**	**100**
Burnt	**1760**	**34.8**	**25**	**4.3**	**82**	**15.89**

Table 8.1: Composition of the lithic assemblages from the western area.

at more moderate densities. 34.8% of the assemblage was burnt, the highest percentage across the site, with burning more common within the ring of posts but at high levels across the scatter. The high proportion of burning has also caused high levels of fragmentation: small chips account for 23.8% of the assemblage; also considerably higher than any other area on site. This high level of burning could represent the effects of a structure that has burnt down. Alternatively, this may have been a midden area possibly accumulating within the footprint of an earlier structure. Amongst the assemblage there are a number of worn or exhausted pieces, which perhaps make the latter interpretation more likely. The animal bone from this area is not burnt, suggesting different materials may have had different histories and thus supporting the midden theory. However, small, unburnt flint microdebitage is also common; this is generally considered an indicator of in situ knapping, though it is possible that lithic material was worked on mats and discarded into this area.

Tools are found in this assemblage in fairly average proportions for a dryland area of the site (Table 8.1; Figure 8.4). The main tool forms are found in relatively even numbers, with 53 burins, 49 microliths and 62 scrapers. Blades with macroscopic damage are common for a dryland area and awls are also well represented, as is true across the western part of the site more broadly. Two axes are present: an axe of grey Wolds flint was found on the western edge of the ring of possible postholes encircled by five axe thinning and tranchet flakes; the other axe was also made from grey Wolds flint and was recovered from the southern edge of the scatter. Tool spalls are represented, with microburins (n=31) present at only a slightly lower level than microliths, indicating a focus on microlith manufacture and retooling. Burin spalls are represented at similar levels to burins, with mainly primary spalls represented, indicating mainly production of these tools, but also some resharpening episodes. No obvious spatial patterning for the majority of the tools and tool spalls is present, except that awls are clustered in the southern part of the scatter, south of the postholes.

Microwear studies reveal a wide range of activities, many of them craft focused (Figure 8.5). Bone (scraping and grooving) and antler working is well represented, with seven examples clustering in the eastern part of the

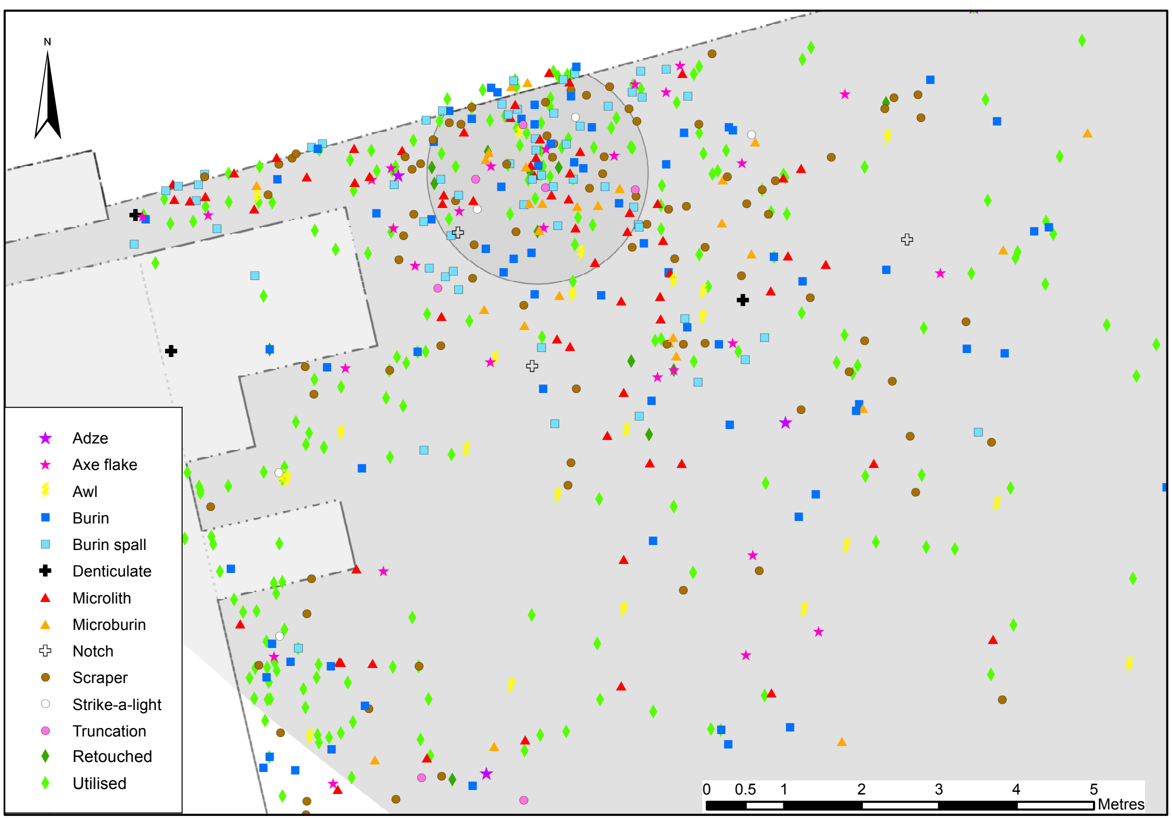


Figure 8.4: Tool distribution from the western structure and surrounding area (Copyright Star Carr Project, CC BY-NC 4.0).

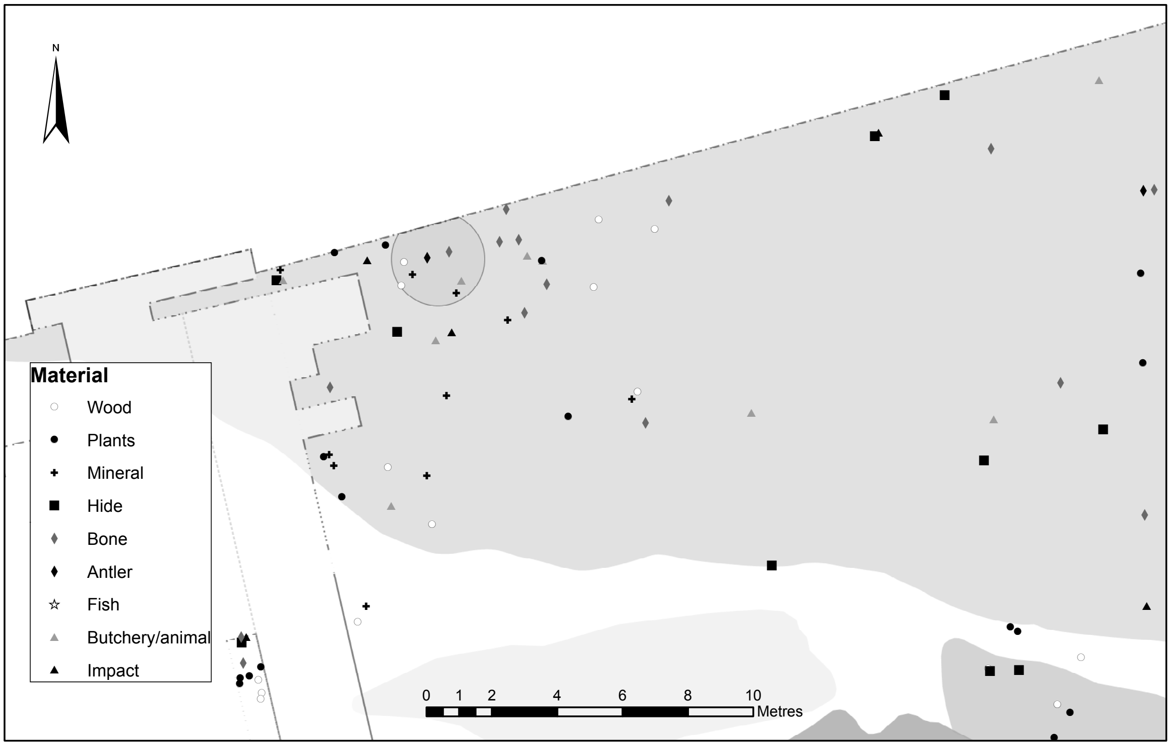


Figure 8.5: Microwear results from the western dryland area (Copyright Star Carr Project, CC BY-NC 4.0).

feature and immediately beyond the area encircled by the postholes. Plant-working traces are present on three pieces and woodworking on two, ranging from the eastern to the western margins of the scatter. Three pieces were also used on minerals: two awls, most likely related to bead production; the other a strike-a-light. An exception to this craft focus is an area to the east of the scatter where two pieces (<93724> and <94948>) were used for butchery: this coincides with an area where faunal remains are also common suggesting in situ activity here (Chapter 7). A well-used, hafted butchery tool <94931> was also found within the ring of posts. The barb of a projectile was found just outside the post ring. Re-use of artefacts, as might be expected for such a busy area, is also evident: a microlith <95542> used as a projectile was recycled to cut siliceous plants, probably reeds.

Because of the high level of burning and fragmentation, the decision was undertaken not to undertake refitting of this area en masse. Instead a targeted approach was taken and unburnt red flint, grey and white flint, and black flint were picked out to understand the formation of the assemblage. Only one refit occurred between two distinctive red blades, both of which appeared to have been used. Unfortunately this low level of refitting is compatible with both the structure and midden hypotheses for this area.

Western dryland structure surrounds

Surrounding the western dryland structure is a low-density scatter of material, extending up to 10 m from the postholes, numbering 580 pieces. It has low levels of burnt flint (4.3%), especially in comparison to adjacent areas. It is a balanced assemblage with similar levels of burins (n=6), microliths (n=8) and scrapers (n=7). In addition it contains large numbers of utilised flakes, blades and fragments (n=34), while awls (n=5) are also well represented. Tool spalls are evenly represented with four axe flakes, three burin spalls and four microburins, indicating tool production and maintenance. Numbers of burin spalls are relatively low for the site, though burins are present.

In this lower-density area, particular activities can be more readily discerned: for example, a cluster of three awls located in the western part of the scatter, three burins in the south and four scrapers in the east. There are more utilised flakes and blades in the western part of the scatter. More broadly though, tools are spread diffusely through this scatter, the result of many different activities over many years. Tool types and use-wear evidence are similar to that from the western feature suggesting continuation of the same suite of activities. Microwear data is available for four awls from this scatter. One example <94227> was used for piercing mineral and possibly animal hide. Another <93991>, found 2.5 m away, was used for piercing and drilling mineral, probably shale, as was <95971> on the eastern margins of the scatter. These three artefacts are likely to have been used in bead production. A shale and an amber bead were found by Clark around 3 m to the south of <94227>. The fourth awl <93521> was found around 4.5 m to the east of the examples used for mineral working. This was used as a multi-purpose plant-working tool, most likely for craftwork, and had been employed for cutting and scraping siliceous plants, probably reeds. In addition to these pieces, four tools retain evidence for woodworking, three of which are clustered to the east of the structure, while bone working and butchery are also represented. The microwear evidence from the area surrounding the structure indicates a focus predominantly on a range of craft activities, with butchery also occurring. This range of activities is similar to those recorded within the western structure, indicating these spaces were used in the same way, or if the structure represents a midden, that the lithic material recovered from it may represent artefacts originating from this area.

Moore's area

Immediately to the west of the western structure lies 'Moore's area', an area originally excavated by John Moore in 1948 (Chapter 2), which represents a continuation of the high flint densities noted in the north-east part of Clark's site. Moore's area has been truncated in its southern part by Clark's excavations and extends into the sections to the north, so its original extent is unclear. Thus the material recovered from this area in 2013–15 can be considered a sample of this dense area noted by Moore and so provides more detail on the area of highest lithic densities for Clark's site.

The flint recovered from Moore's area consists of 516 pieces from an area 2.7 × .0.75 m. Though the area excavated is small, the lithic distribution appears to have a discrete curved distribution, possibly indicative of a bounded feature, though no postholes or pit were noted. It displays much lower proportions of burnt flint (15.9%) than the western and eastern dryland structures; however, this could be explained by the fact that only the very edge of this scatter is present.

The tool assemblage is dominated by microliths (n=8) and utilised blades (n=8), though scrapers (n=6), burins (n=3) and one awl are present. Similar proportions of formal tools were recovered in 1948 by Moore. Tool spalls are dominated by burin spalls (both primary and secondary examples), though a microburin (microburins were also recovered by Moore) and two axe-sharpening flakes are also present. Microliths and used blades are scattered throughout, while axe flakes and burin spalls cluster to the east, and scrapers to the west, where they join a cluster of scrapers recovered by Moore. Microwear reveals that a blade <95749> was used for butchery, while another <95662> was used as a craft tool for piercing dry hide and scraping it using a mineral additive, presumably ochre (Figure 8.5).

Central area

The central dryland area stretches from scatter 7 in the north-west, to the easternmost part of trench SC23 (Figure 8.6). It encompasses four areas: the central structure; its surrounding area of small scale lithic scatters and tool use (central structure surrounds); scatter 6, an area of flint knapping and tool use to the north of the central structure; and scatter 7 to the north-west. The central dryland area in general has much lower densities of lithic material than the areas to the east and west. Burnt flint is also less common than other dryland areas with only two possible hearths; one in the south-central part of scatter 7 and one immediately to the west of the central structure.

Central dryland structure

The central hollow of the central dryland structure was located during the 2014 season, having been overlooked during the excavation of VP85A and SC23 (Chapter 5). As a result, the exact extent of the structure and

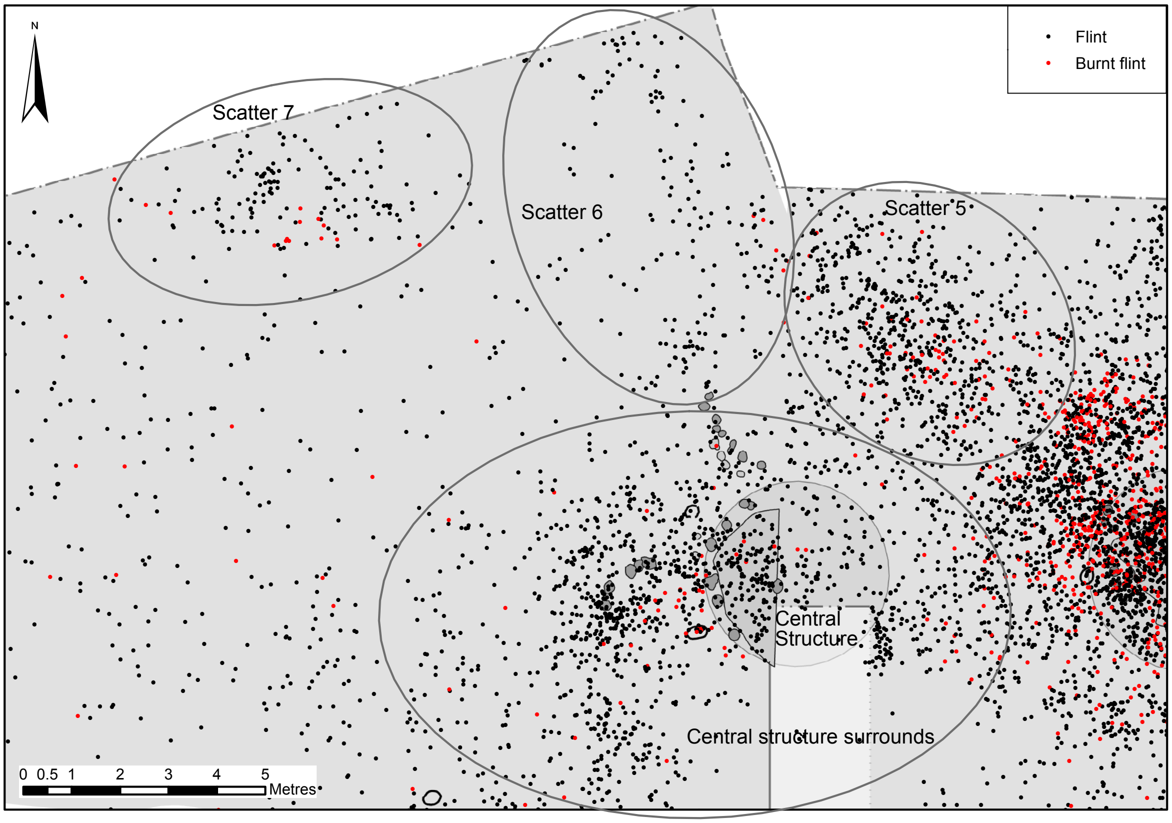


Figure 8.6: Distribution of flint and burnt flint in the central dryland area (Copyright Star Carr Project, CC BY-NC 4.0).

of the assemblage that derives from it is uncertain. The following discussion also includes the material excavated during the 1980s excavations, which was analysed by CC in 1996–7. The radiocarbon evidence suggests this area was a focus of activity on at least three occasions and as a result some complexity can be expected.

The assemblage from the central structure differs considerably from those deriving from both the eastern and western structures. It is a small assemblage of 407 pieces, with densities reaching 125 pieces per square metre, and this only in a discrete area; the scatter to the south-west that may actually lie outside the posthole ring. Densities in the region of 30–40 pieces per square metre are more typical. Burnt flint is also rare at 4.2% and is scattered throughout the feature suggesting it did not have a hearth or if it once did that it was cleared out. This is the lowest proportion of burnt flint not just for a structure but for any dryland area, including those that seem mainly generated through tool use. However, there is a cluster of burnt flint, including a concentration within posthole [336] immediately to the south-west of the structure (Chapter 5). This could suggest clearance of material from the structure or an external hearth located at an entrance to the south-west of the structure, though whether this was used at the same time as the structure is uncertain.

The assemblage within the structure is also more coherent than those recovered from the other two structures. Refitting has been relatively successful with a large group of eight pieces and five additional groups coming from the structure, despite the fact the material from the 1980s excavations could not be located to be incorporated into the current project's refitting programme. The most extensive refit group (87) consists of a partly worked core of brown flint which was reduced and discarded in and beyond the area of the structure (Figures 8.7 and 8.8).

Activity areas can also be discerned (Figure 8.9). A cluster of two burins and five burin spalls (two refitting as a snap) can be seen in the south-eastern part of the structure (most recovered during the 1980s excavations), amongst a dense knapping scatter of brown till flint. In the northern part of the feature are a cluster of three

	Central structure				Central surrounds		Scatter 6		Scatter 7	
Category	**2013 -4**	**VP85A**	**Total**	%	**No.**	%	**No.**	%	**No.**	%
Tools:	**22**	**6**	**28**	**6.88**	**112**	**9.4**	**18**	**12.16**	**24**	**14.2**
Awl	0	0	0	0	1	0.08	0	0	0	0
Axe	0	0	0	0	1	0.08	0	0	1	0.59
Burin	2	3	5	1.23	8	0.67	5	3.38	0	0
Denticulate	0	0	0	0	0	0	0	0	0	0
Hammerstone	0	0	0	0	2	0.17	0	0	0	0
Microdenticulate	0	0	0	0	0	0	0	0	1	0.59
Microlith	4	1	5	1.23	14	1.17	0	0	4	2.37
Notch	0	0	0	0	1	0.08	0	0	0	0
Scraper	3	1	4	0.98	19	1.59	2	1.35	1	0.59
Scraper/burin	0	0	0	0	0	0	0	0	1	0.59
Scraper/notch	1	0	1	0.25	0	0	0	0	0	0
Strike-a-light	0	0	0	0	2	0.17	0	0	3	1.77
Truncation	0	0	0	0	1	0.08	1	0.67	0	0
Retouched	0	0	0	0	3	0.25	0	0	1	0.59
Utilised blade	4	1	5	1.23	34	2.85	7	4.73	8	4.73
Utilised flake	1	0	1	0.25	10	0.84	0	0	2	1.18
Utilised fragment	7	0	7	1.72	16	1.34	3	2.03	2	1.18
Tool spalls:	**6**	**1**	**7**	**1.72**	**22**	**1.85**	**5**	**3.38**	**0**	**0**
Axe flake	0	0	0	0	5	0.42	3	2.03	0	0
Burin spall	4	0	4	0.98	12	1.01	2	1.35	0	0
Microburin	0	1	1	0.25	4	0.34	0	0	0	0
Retouch spall	2	0	2	0.49	1	0.08	0	0	0	0
Core prep:	**7**	**3**	**10**	**2.46**	**34**	**2.58**	**4**	**2.7**	**2**	**1.18**
Core tablet	3	1	4	0.98	14	1.17	3	2.03	1	0.59
Crested blade	2	2	4	0.98	15	1.26	0	0	1	0.59
Plunging	1	0	1	0.25	2	0.17	1	0.67	0	0
Flanc de Nucleus	1	0	1	0.25	3	0.25	0	0	0	0
Debitage:	**275**	**87**	**362**	**88.94**	**1045**	**87.67**	**121**	**81.76**	**143**	**84.61**
Blade	38	12	50	12.28	154	12.92	18	12.16	26	15.38
Flake	79	31	110	27.03	375	31.46	44	29.73	38	22.48
Fragment	128	33	161	39.56	449	37.67	53	4.62	60	35.5
Chip	24	10	34	8.35	29	2.43	2	1.35	18	10.65
Core	3	0	3	0.74	18	1.51	0	0	1	0.59
Core frag.	1	0	1	0.25	1	0.08	2	1.35	0	0
Nodule	0	0	0	0	0	0	0	0	0	0
Chunk	2	1	3	0.74	19	1.59	2	1.35	0	0
Total	**310**	**97**	**407**	**100**	**1192**	**100**	**148**	**100**	**169**	**100**
Burnt	**15**	**2**	**17**	**4.18**	**69**	**5.79**	**4**	**2.7**	**20**	**11.83**

Table 8.2: Composition of the lithic assemblages from the central area.

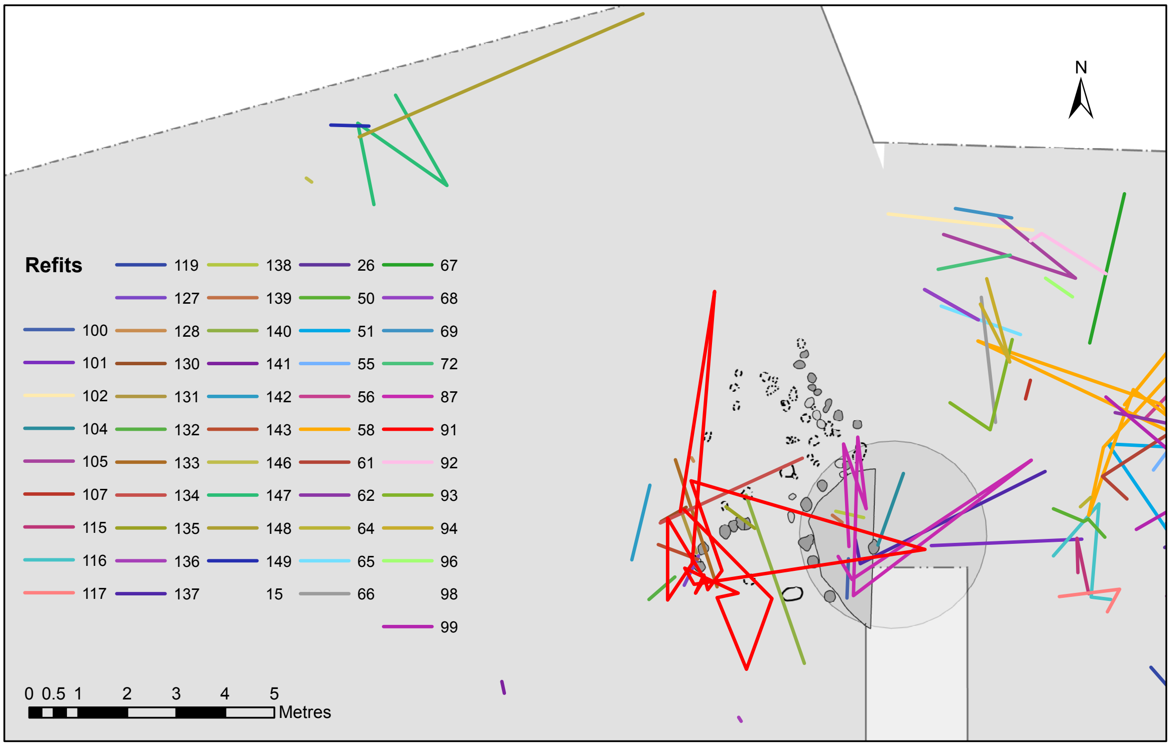


Figure 8.7: Refits in the central area (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 8.8: Refit sequence 87 (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

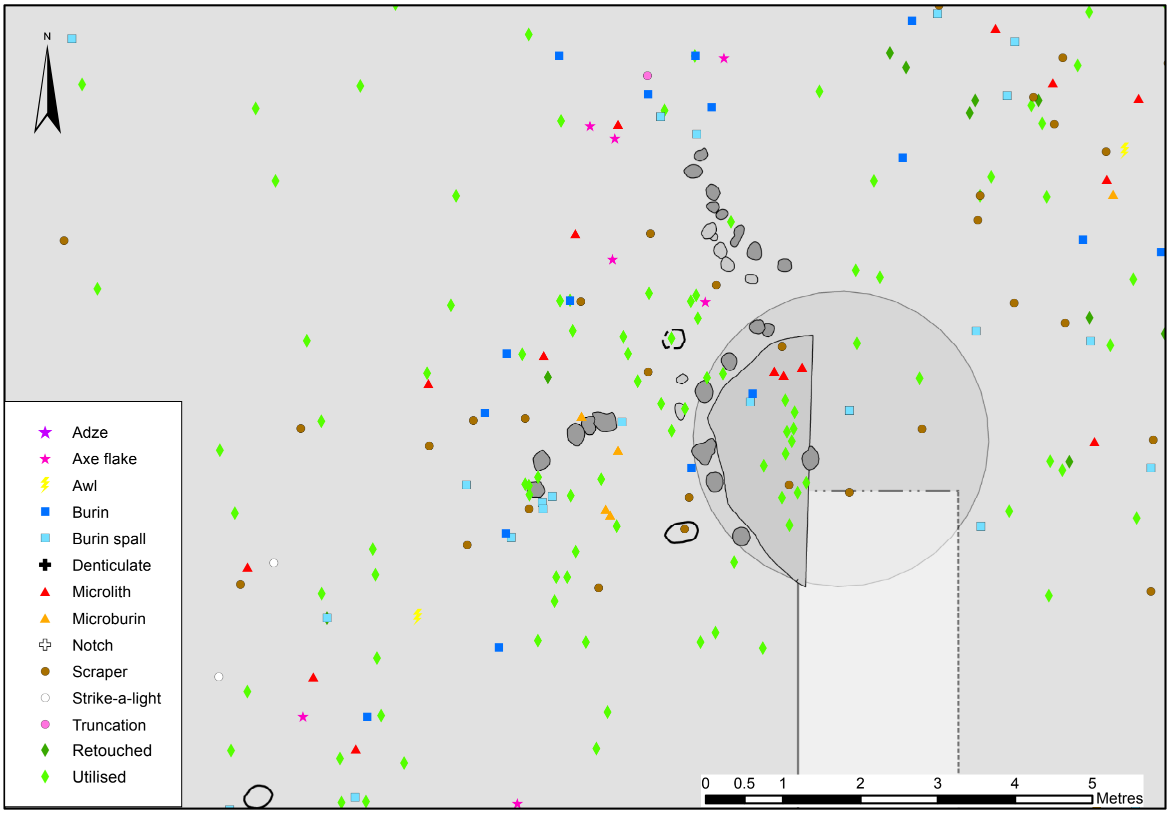


Figure 8.9: Tools from the central structure and surrounding area (Copyright Star Carr Project, CC BY-NC 4.0).

microliths, all obliquely blunted points made from brown till flint. Utilised blades cluster in the western part of the structure.

Microwear on one <107673> of the group of three microliths suggests it was used to pierce hide, either as an awl or as a projectile (Figure 8.10). Just outside the hollow, but within the postholes and only 0.7 m from this cluster of microliths is a bladelet <102584> which was used as the tip of a projectile. A blade was also used to scrape bone.

The high spatial integrity of the assemblage could be used to argue for a short-lived structure that has preserved the remnants of the activities of the people who inhabited it. However, in contrast to the eastern structure, refits tend to cross the boundaries of the central hollow and postholes. While material can of course be moved in and out of structures, the level of movement suggests that this knapping event occurred after the structure had decayed or had been dismantled. Furthermore, given the amount of scavenging of flint from previous occupations, it is likely that large refit groups, particularly ones including cores such as group 87, belong to the later phases of the site. Both strands of evidence suggest that the majority of this assemblage post-dates the central structure and that this feature was either kept clean of flint or was used in a very different way from both the eastern and western structures. The knapping episode represented by the refitting material may be focused on a cluster of burnt flint to the west of the structure, as is another refitting cluster to the west of the burnt flint, in the area of the central structure surrounds.

Central dryland structure surrounds

The area surrounding the central dryland structure can be characterised by moderate lithic densities, representing both knapping scatters and areas more focused on tool use. The southernmost part of the scatter represents an area of tool use and either small-scale knapping (with a handful of pieces removed from a core) or small dumps of knapping sequences into the wetland edge.

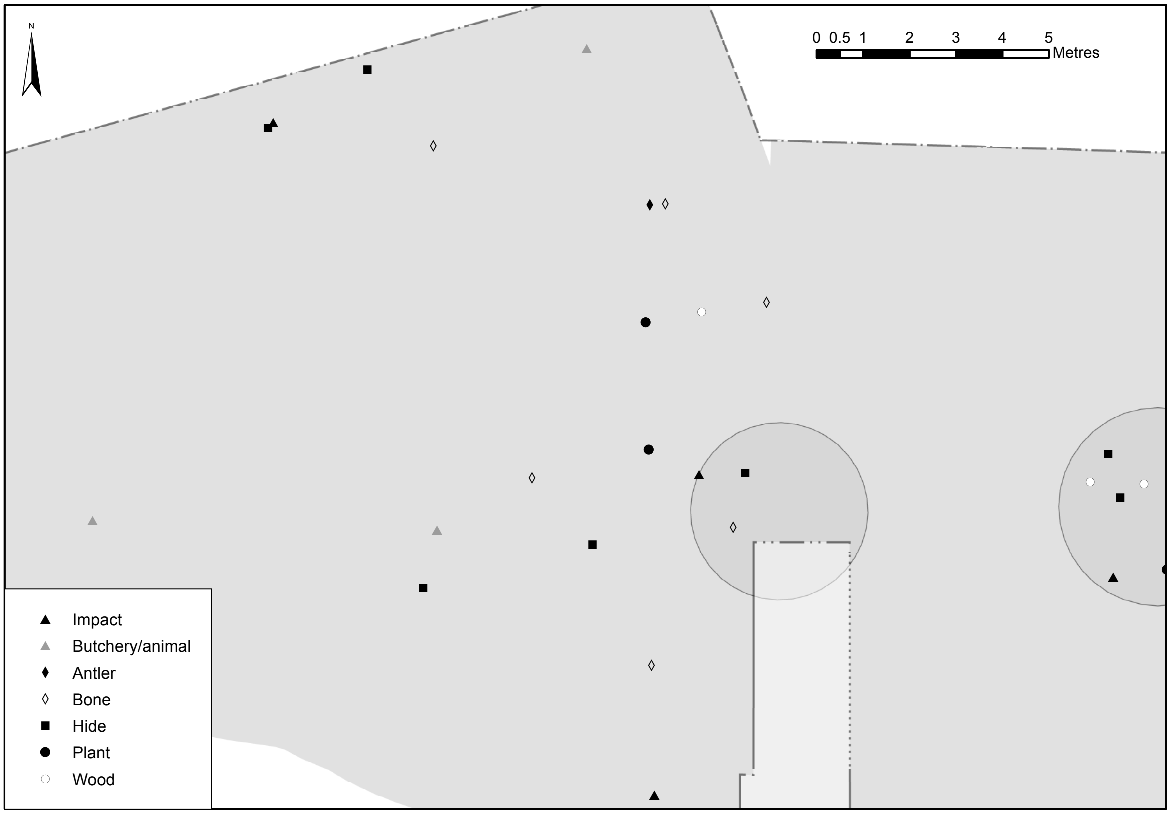


Figure 8.10: Microwear results from the central dryland area (Copyright Star Carr Project, CC BY-NC 4.0).

Overall scrapers are the dominant formal tool type (n=19) in this area and several refit into short knapping sequences indicating these were tools produced in this area. Two retouch spalls, further evidence for scraper manufacture, were also recovered. Microliths (n=14) and burins (n=8) are relatively common. Both burins and a microburin join into refit sequences indicating on-site production (Figure 8.11). A single awl and an axe were also recovered. Utilised flakes, blades and fragments are extremely common with 60 examples represented. These are also numerous in the central structure reinforcing the argument made above of connection between the two areas. Tool spalls attest to manufacture and maintenance activities with burin spalls most common (n=12) (some manufacture spalls but mainly resharpening spalls), microburins (n=4) and five axe flakes (representing the thinning and resharpening of at least two axes) all represented.

Several discrete clusters of lithic material can be discerned, suggesting this area has undergone less clearance than other areas of the site. A knapping scatter overlapping the western semi-circle of postholes is associated with three microburins and surrounded by a scatter of scrapers, four burin spalls (from a grey till and a Wolds burin) and two burins. Utilised flakes and blades are strongly associated with this scatter with 11 examples recovered. Large quantities of this small cluster refits, indicating the knapping of a large, tested or minimally reduced, distinctive grey/brown till nodule. This raw material group consists of a large refitting sequence (refit group 91) containing 19 pieces (Figure 8.7) and six further refit groups (127–132), all of two pieces. Refitting within the various sequences belonging to this nodule are two burins, a scraper and a microburin, indicating a multipurpose manufacturing event. One of the burins from this refit group was taken 6 m to the north to be used in scatter 6, an unmodified fragment was moved 4.5 m to the east to the area of the central structure, a flake was found 2 m to the south and an utilised bladelet was found 1.5 m to the east. Two tools (a scraper and a burin) from this sequence were recovered within the scatter of refitting debris centred on ×19 where they were made. The core belonging to this refit group was not found. It would have been large and still productive and is likely to have been removed for later use. To the east of this scatter a cluster of burnt flint may represent a hearth, which may have been the focus for the knapping represented by this large refit group, as it appears

Figure 8.11: Refit sequence 91 incorporating two burins and a scraper. A microburin probably also belongs to this group (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

to have been for the refitting material in the central structure. As has been argued for the refit group from the central structure, it is likely this refitting scatter represents some of the latest activity in this area.

Refits indicate scrapers were also made in the area of the central structure surrounds. Two scrapers, made from different raw material units, were manufactured immediately to the north of the ×19 scatter. One was recovered from the immediate area and the other used just north of the ring of postholes belonging to the central structure, a distance of around three metres.

A remarkable collection was recovered from pit [336]. Within this feature 25 tightly packed pieces of flint were found in an area of relatively low densities. Of these 18 were burnt and the remainder were all of Wolds material. Three artefacts were examined for microwear. One was unused, two others (<107972>, <107985>) were slightly burnt but preserved enough information to indicate they had been used, both to scrape an indeterminate hard material. The burning on this material precludes microwear in most cases, but evidence of use on two of the three pieces examined could mean this represents a personal toolkit rather than knapping debris.

To the south of this is a more generalised scatter of tools containing all major tool types including an awl and an axe. Microliths are particularly common here and this scatter seems to continue beyond the area of dark sediment (termed the occupation deposit, see Chapter 20) into the northern part of the 'axe workshop' (see below), where two microburins were also found. A microlith <107851> on the far western part of this scatter has hafting traces, which is unusual as it had no visible signs of impact. A second microlith, an extremely large obliquely blunted point found 1.7 m from the previous example, was used for a short time to scrape hide with a mineral additive, while its tip was used to pierce hide. In general the microwear results from the area surrounding the central structure indicate a focus on animal-related activities such as butchery, cutting bone and scraping hides, with one of the pieces used on hide also used to scrape bone. A single piece indicates plant working.

To the east of the structure is a low-density spread of material within which tools are relatively rare and consist mainly of scrapers (though a burin and two burin spalls and a single microlith were also recovered from this area). The only evidence of clustering is a group of six utilised pieces which were found immediately to the east of the structure. This area also contains knapping debris, in particular the reduction of a nodule of coarse grey flint. The high levels of refitting of this material indicates this scatter has seen little disturbance.

Scatter 6

Scatter 6 is a low-density scatter stretching from the north of the central structure to the north-east corner of SC34 (Figure 8.12). At its southernmost part is a small cluster of material. This seems to be a fairly disparate collection of material, perhaps derived from a clearance episode relating to an adjacent structure, or perhaps truncated by a structure. This small scatter is associated with three burins and two refitting tranchet flakes from an axe made of grey Wolds flint, though the axe itself was absent. A third tranchet flake from a different axe made of till flint was also found in the same area. A microlith <108736> found on the south-western edge of this cluster was used for cutting siliceous plants and was probably hafted. A plant-working tool was also used here, which was later re-used as a strike-a-light and a bone working tool. Just 0.8 m to the west of this cluster was a burin that refits to the large refit group 91 focused in the central structure surrounds.

Beyond this southern area formal tools are rarer. Two scrapers were recovered from the northernmost part of the site within a scatter containing a number of blades and pieces with macroscopic damage. One of these pieces, a fragment, was used for cutting soft-medium hardness material, possibly hide, and another was used for butchery. Just south of the scrapers is a handful of flakes and fragments that seem to derive from the same core. The only other formal tool is a burin. Used pieces are common and distributed throughout the scatter. Tools used to work bone and/or antler are common in this area with four examples recovered.

With the exception of the small cluster in the southern part of scatter 6, this appears to be an assemblage generated by tool use. Small debitage and burnt material are very rare. The scatter can thus be divided into three areas: the southern cluster, possibly representing clearance with evidence for burin production and use, axe resharpening and plant working; a central area with more varied tool use activities but with a focus on working bone and antler; and a northern area perhaps more focused on hide working and butchery, this latter correlating with faunal remains (northern cluster 1 and 2, see Chapter 7) including red deer and aurochs, identified as a possible butchery area. This scatter demonstrates a shift in the use of space from the intensely used high-density areas in and around the eastern and western dryland structures to a more diffuse area of activity on the clay.

Scatter 7

Scatter 7 is a small diffuse scatter, consisting of 169 pieces of worked flint in the northern part of SC34. A cluster of 10 pieces of burnt flint in the southern part of the scatter may represent a hearth. This scatter seems to represent a fairly discrete episode involving the reduction of four nodules. Two areas of activity are associated

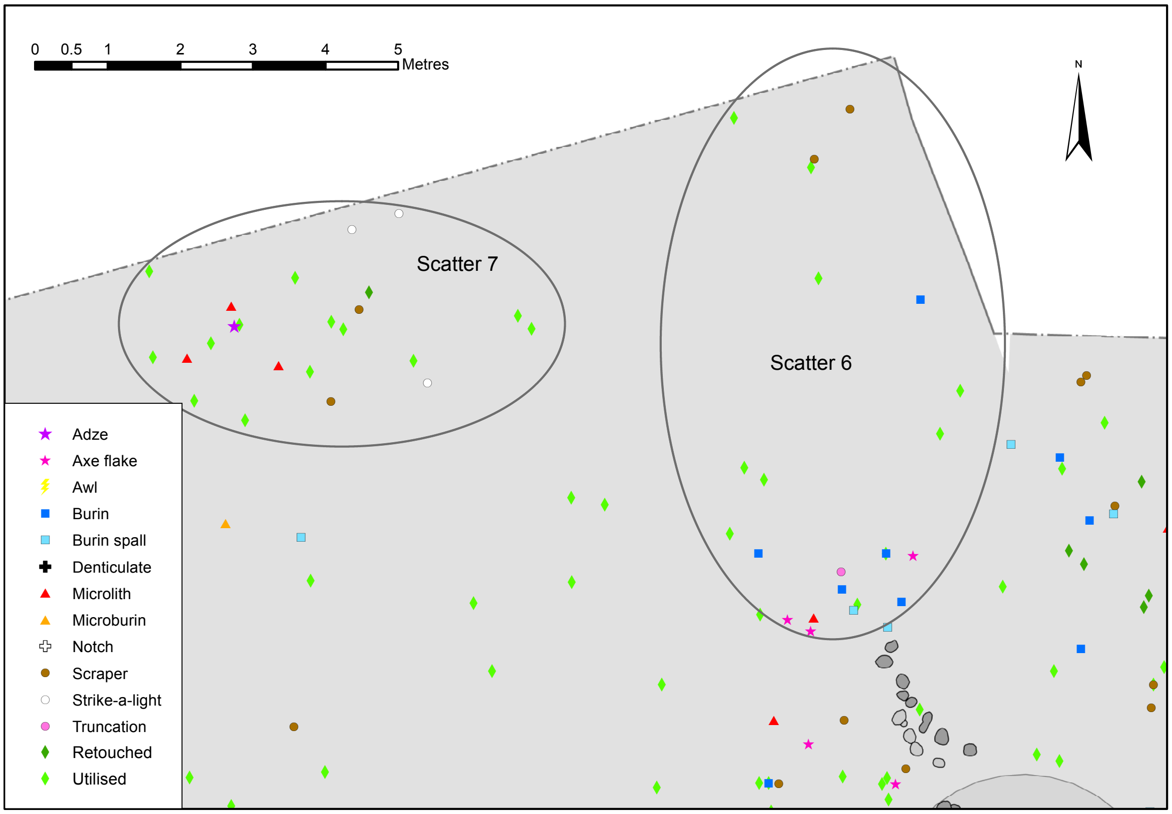


Figure 8.12: Distribution of tools in scatters 6 and 7 (Copyright Star Carr Project, CC BY-NC 4.0).

with the hearth. The first, to the north and west of the hearth, consists of a knapping scatter generated by the reduction of two nodules of brown speckled flint and one of grey. The first of these includes refit group 155, the second, refit groups 146, 148 and 149. One of the pieces from group 148 was found in the northern part of scatter 6, indicating connections between these two areas (Figure 8.12). Three microliths were recovered from the central part of the scatter: two are obliquely blunted points almost identical in size, the third a burnt fragment. One of the complete examples shows evidence of hafting and use as a projectile. Also within the central part of the scatter is an axe made from Wolds flint.

To the east of the hearth is a smaller scatter where a second brown nodule (including refit group 147) was reduced. A core that shares the very distinctive black/grey blotch of this refit sequence (though cannot be refitted) was recovered from scatter 4, possibly suggesting contemporaneity, or that the core was scavenged during a subsequent occupation. Products from this reduction sequence are also found in the northern part of scatter 7 suggesting contemporaneity. Within this eastern part of the scatter, tool use also occurred: a scraper was recovered and a blade fragment was used for grooving bone and scraping antler. One strike-a-light was recovered from this area, with a further two on the north-eastern margin of scatter 7. Utilised pieces are common and found distributed throughout the scatter. This whole area seems to represent a short-term activity area with two individuals undertaking different tasks around a hearth, sitting, facing the waters of the lake.

Eastern area

The eastern area encompasses the vast majority of trench SC23. Its focus is the eastern structure which contained vast quantities of flint including large amounts of burnt material (Figure 8.13). High densities are also recorded around the structure, particularly to the north and west in the form of scatter 4 where burnt flint is

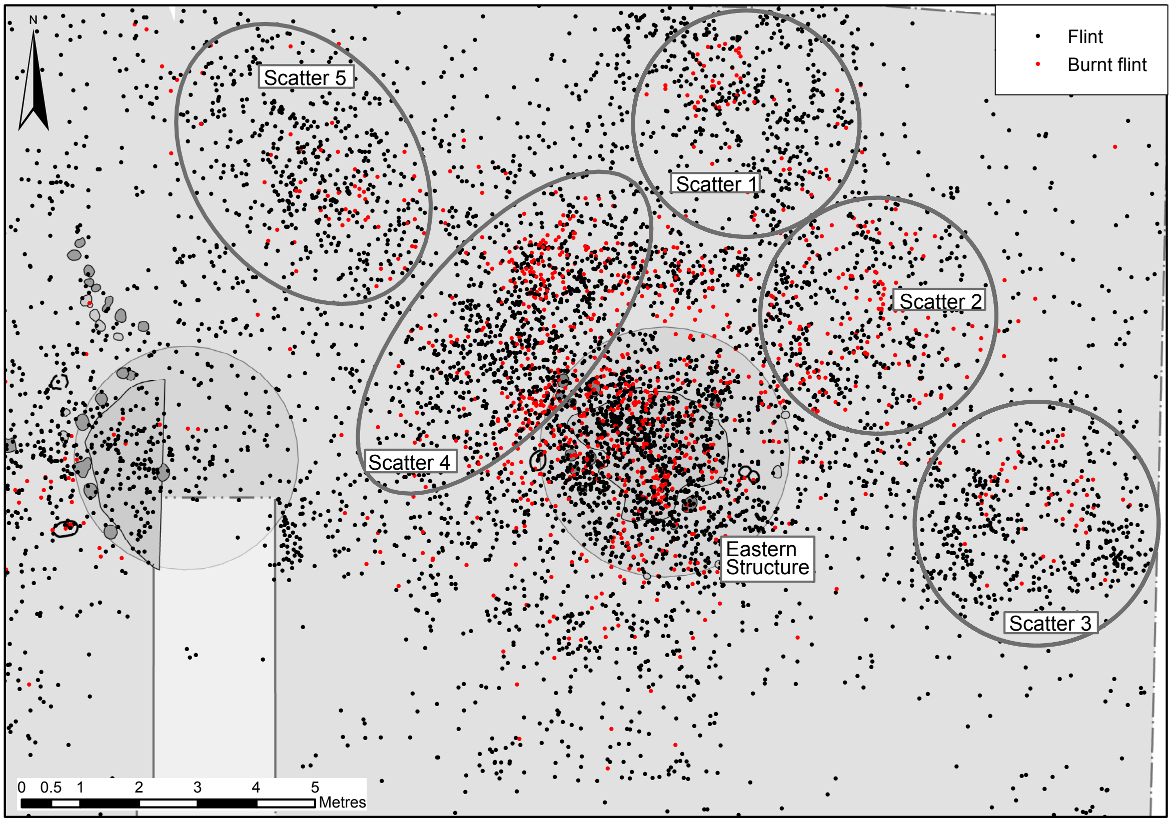


Figure 8.13: Distribution of flint and burnt flint in the eastern dryland area (Copyright Star Carr Project, CC BY-NC 4.0).

also common. Further to the north and east are three scatters, all with central hearths indicated by burnt flint, of which 1 and 2 probably, like scatter 4, have links to the structure. The whole area is characterised by clearance, middening and reuse of flint from adjacent scatters. Scatter 3 appears more discrete and may represent a later occupation. To the north-west is scatter 5; a lower density area characterised by some flint knapping but also areas of tool–use and discard. Between these lithic concentrations are empty areas, some distinctively linear in nature. One runs NE-SW, extending from the edge of the eastern structure to the lake; another runs NW-SE, between the northern edge of the central structure and scatters 4 and 5. At Tågerup, Sweden, similar linear empty spaces between areas of high lithic density have been identified as paths between dumps of material cleared out from an adjacent structure (Karsten and Knarrström 2003, figure 98). If the examples from Star Carr are also paths, the former would provide access from the eastern structure to the water's edge, the latter access to northern areas of the site now destroyed by the Hertford Cut.

Eastern dryland structure

A dense assemblage of lithic material was recovered from the eastern dryland structure. This was noticeably concentrated in the upper fill of the central hollow, while the lower, more organic layer contained relatively little material. A similar pattern has been noted by Grøn (2003) for Southern Scandinavian structures and is likely to indicate an organic covering/flooring of planks, bark, reeds or branches which prevented material working its way into the lower fill. Lithic material also clusters outside the central hollow but within the area of postholes. Burnt flint is common (23.3%) (Table 8.3) and is scattered across the structure with some clustering in the south-central area possibly representing a hearth, though the patterning is not clear. The presence of such a high density of sharp lithic material in an area where people would be living, or at least carrying out

	Eastern structure		Scatter 4		Scatter 1		Scatter 2		Scatter 3		Scatter 5	
Category	**No.**	%	**No.**	%	**No.**	%	**No.**	%	**No.**	%	**No.**	%
Tools:	**135**	**7.03**	**55**	**4.1**	**47**	**5.22**	**54**	**4.3**	**41**	**6.2**	**39**	**5.78**
Awl	0	0	0	0	0	0	2	0.16	1	0.15	1	0.15
Axe	2	0.1	0	0	0	0	1	0.08	0	0	0	0
Burin	14	0.73	15	1.12	8	0.89	5	0.4	2	0.3	4	0.6
Denticulate	0	0	0	0	1	0.11	0	0	0	0	0	0
Hammer-stone	0	0	2	0.15	2	0.22	0	0	0	0	0	0
Micro-denticulate	0	0	0	0	0	0	0	0	2	0.3	0	0
Microlith	33	1.72	12	0.89	10	1.11	18	1.43	6	0.91	5	0.74
Notch	0	0	0	0	1	0.11	0	0	0	0	0	0
Scraper	20	1.04	11	0.82	10	1.11	15	1.19	10	1.51	12	1.78
Scraper/ burin	1	0.05	1	0.07	0	0	0	0	0	0	2	0.3
Scraper/ knife	0	0	0	0	0	0	0	0	1	0.15	0	0
Strike-a-light	0	0	0	0	0	0	1	0.08	1	0.15	0	0
Truncation	0	0	1	0.07	0	0	1	0.08	0	0	0	0
Wedge	0	0	0	0	0	0	0	0	0	0	0	0
Retouched	1	0.05	4	0.3	3	0.33	2	0.16	0	0	4	0.6
Utilised blade	12	0.62	7	0.52	8	0.89	6	0.48	11	1.66	8	1.19
Utilised flake	0	0.05	1	0.07	2	0.22	0	0	2	0.3	2	0.3
Utilised fragment	2	0.1	1	0.07	3	0.33	3	0.24	5	0.76	1	0.15
Tool spalls:	**50**	**2.6**	**22**	**1.64**	**17**	**1.89**	**29**	**2.31**	**4**	**0.6**	**6**	**0.89**
Axe flake	5	0.26	2	0.15	5	0.55	1	0.08	0	0	0	0
Burin spall	31	1.61	16	1.19	11	1.22	21	1.67	4	0.6	6	0.89
Microburin	14	0.73	4	0.3	1	0.11	7	0.56	0	0	0	0
Retouch spall	0	0	0	0.07	0	0	0	0	0	0	0	0
Core preparation:	**17**	**0.88**	**15**	**1.12**	**16**	**1.77**	**16**	**1.27**	**5**	**0.76**	**18**	**2.67**
Core tablet	5	0.26	4	0.3	4	0.44	6	0.48	3	0.45	7	1.04
Crested blade	11	0.57	7	0.52	4	0.44	7	0.56	1	0.15	4	0.6
Plunging	0	0	0	0	4	0.44	0	0	0	0	3	0.44
Flanc de nucleus	1	0.05	4	0.3	4	0.44	3	0.24	1	0.15	4	0.6
Debitage:	**1769**	**92.09**	**1249**	**93.2**	**821**	**91.12**	**1157**	**92.12**	**611**	**92.43**	**612**	**90.67**
Blade	263	13.69	166	12.4	146	16.2	174	13.85	100	15.13	120	17.78
Flake	401	20.87	273	20.4	187	20.75	244	19.43	138	20.88	165	24.44
Fragment	919	47.84	678	50.6	431	47.84	646	51.43	313	47.35	291	43.11
Chip	156	8.12	90	6.72	42	4.66	67	5.33	55	8.32	23	3.41
Core	9	0.47	8	0.6	5	0.55	8	0.64	4	0.6	6	0.89
Core frag	1	0.05	1	0.07	1	0.11	2	0.16	0	0	0	0
Nodule	0	0	1	0.07	1	0.11	0	0	0	0	1	0.15
Chunk	20	1.04	32	2.38	7	0.78	16	1.27	1	0.15	6	0.89
Total	**1921**	**100**	**1341**	**100**	**901**	**100**	**1256**	**100**	**661**	**100**	**675**	**100**
Burnt	**448**	**23.32**	**406**	**30.3**	**121**	**13.43**	**355**	**28.26**	**63**	**9.53**	**70**	**10.37**

Table 8.3: Composition of the lithic assemblages from the eastern area.

various activities, could be considered unusual. A number of hypotheses designed to explain this phenomenon were tested during the course of the analysis:

1. The lithic material represents in situ lithic material from a number of occupations, which had simply been covered by further organic matting as it built up.
2. Lithic material had been cleared up regularly and deposited elsewhere but smaller elements from successive occupations had been missed or worked their way through organic matting.
3. Lithic material had been cleared, with the exception of the debris from the final phase of occupation.
4. The whole structure had been used as a rubbish dump once it was no longer used, as appears to have occurred at Staosnaig, Colonsay (Mithen 2000).

In order to test these hypotheses, all lithics from the structure were measured and laid out in refit trays. As might be expected, it was immediately apparent that the material did not make sense as an assemblage that was the product of a single short-term knapping station. Instead it appeared to be the product of a complex set of actions. Numerous raw material units were represented but only by a couple, or at best, a handful of pieces, indicating movement of material both in and out of the structure over a long period of time. Quantities of fragmented pieces are higher within the central hollow (52.1%) than the area outside it but within the posts (47.9%), indicating that the central area saw most intense use. However, both areas have slightly high levels of fragmentation in comparison to adjacent dryland areas, which average at 46.4%, and wetland edge areas where fragmentation averages at 21.4%, indicating the structure was a focus of activity.

In order to understand whether the debris of successive occupations were represented in the central hollow, lithic material was divided into 30 mm spits, according to height recovered and the composition of each spit recorded (by JB). Refits were recorded within and between spits. Unfortunately this exercise indicated that considerable post-depositional movement had taken place through the sediment, both within the central hollow itself and within the buried soil that comprised the area within the postholes. Refit sequences spanned up to 250 mm in height, with no apparent difference noted between the area of the central hollow and the postholes; thus any potential evidence for build-up of material over time had been extinguished.

However, there is some evidence for clearance of material from the central hollow. Lithic artefacts in the central hollow are generally small in size: an average of 24 mm (not including sieved pieces). This can be compared with an average size of 30 mm for material from within the post-ring and an average of 34 mm for the adjacent scatter 3. This would suggest that the larger material has been cleared out of the structure, and to a lesser extent from within the post-ring, and deposited elsewhere. The small size of the material also probably suggests that lithics were the result of in situ production rather than the structure being re-used as a midden, a fact supported by the coherence of the radiocarbon dates; the Staosnaig midden has discordant radiocarbon dates (Mithen 2000).

Considerable effort has been expended on refitting material from the structure and as a result refitting rates may be artificially inflated in comparison with neighbouring scatters. 46 refit groups were located (Table 8.4;

Refit group size	Number of groups
2	29
3	8
4	5
5	1
6	0
7	0
8	2
9	0
15	1

Table 8.4: Size of refit groups from the eastern structure.

Figure 8.14: Refits from the eastern area (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 8.14). Of these, most are small, consisting of a pair of refits, often snaps, rather than technological refits. However, there are longer sequences: two groups of eight pieces (refit groups 25 and 76) and one of 15 (refit group 58, of which only three pieces were recovered from the structure; the remainder are from scatter 4). Given the level of bioturbation it is unclear whether these longer chains of refits indicate the structure was never very thoroughly cleared or whether these represent evidence from a final occupation that was not cleared away. The average level of lithic material within the structure is 24.83 m OD. The average height of the three largest refit groups is 24.87, 24.79 and 24.84 m OD, possibly suggesting that two sequences may derive from a later occupation but the figures are certainly not definitive.

Another noticeable feature of the refitting is that refit sequences tend not to extend beyond the structure. Seven pieces extend slightly beyond the putative post-ring, all to the south-west. This could represent the location of the entrance to the structure, or since none of these refits extends more than 0.5 m from the post-ring, could suggest this structure had sloping sides. In addition three or possibly four sequences cross the structure boundary. Two join to scatter 2 (it is argued below that scatter 2 may at least partially represent cleared material from this structure). The third example is refit sequence 58, a knapping sequence encompassing the reduction of a small red bladelet core (Figures 8.15 and 8.16), which includes the production of a burin. Products from this core were found widely distributed across the north-west part of trench SC23, across a distance of 7.5 m. Most of the sequence was recovered from scatter 4, though the burin was recovered from a cluster of burins and burin spalls in scatter 1. The final two pieces in this sequence, an elongated flake and the small red core, were recovered from the structure. The fact they are in sequence suggests these were taken into the structure rather than being the product of reuse of the area after the structure was no longer standing. However, a core tablet from this sequence was also found in this structure. This is difficult to position exactly in the sequence; it represents an early removal, possibly the first, and has no sign of additional use. This could mean that this core also started life in the structure before being moved out, then back; or alternatively sequence 58 may represent material knapped in the structure that was incompletely cleared out into scatter 4, with some products undergoing use to the north. Alternatively the entire sequence may post-date the structure. The fourth sequence involves a burin with three removal spalls. The initial spall was found in the northern part of scatter 4 and the burin itself was deposited in the western part of the same scatter. However, the intermediate secondary sharpening spalls were found on the very edge of the post-ring. This could suggest that a burin first used in scatter 4 was taken into the structure for further use and resharpening before being deposited in scatter 4; however, since both of these spalls are on the very edge of the post-ring it is possible that they fall within the very edge of scatter 4.

A further reason for believing that material within the structure represents in situ working, rather than dumped material, is that there is some element of coherence within the assemblage. Burins and burin spalls are common, particularly within the north-west quarter of the scatter (Figure 8.17). Burin spalls tend to be primary spalls indicative of manufacture rather than resharpening and the burins associated with these spalls were not recovered from the structure, being moved for use elsewhere. Scrapers also cluster in this area, though they are also found more widely across the structure. Microliths and microburins were generally found in the margins of the structure, though a small cluster of microliths was located in the southern part of the central hollow, in the area of the possible hearth. Microliths (n=33) are the most common formal tool, followed by scrapers (n=20) and burins (n=14). Two axes were found within the structure and one c. 100 mm beyond the margins of the post-ring, possibly in the area of the entrance.

There are different patterns for the production and deposition for different tool types. Though some microliths appear to have been manufactured within the structure, the focus seems more on deposition of these artefacts, as microliths outnumber microburins 33 to 14. Burins, as described above, were manufactured in large numbers but used and deposited within the structure more rarely and most were removed for use elsewhere. Axes were resharpened (Figure 8.18), but the focus seems more on their maintenance and deposition than use in the structure. A refitting scraper indicates that at least some of these tools were manufactured within the structure.

Microwear reveals some of the tasks that took place within the structure (Figure 8.19). Scraper <90296> was used for hide working; this piece was not hafted and had been resharpened but not used post-resharpening, suggesting the maintenance and storage of tools was taking place here. Another scraper <91420> from the structure was hafted. Scraper <85844> from the south-eastern edge of the post-ring had traces of being used on moisturised hide, typically involving the scraper being launched onto the hide and thus likely to have been an outside

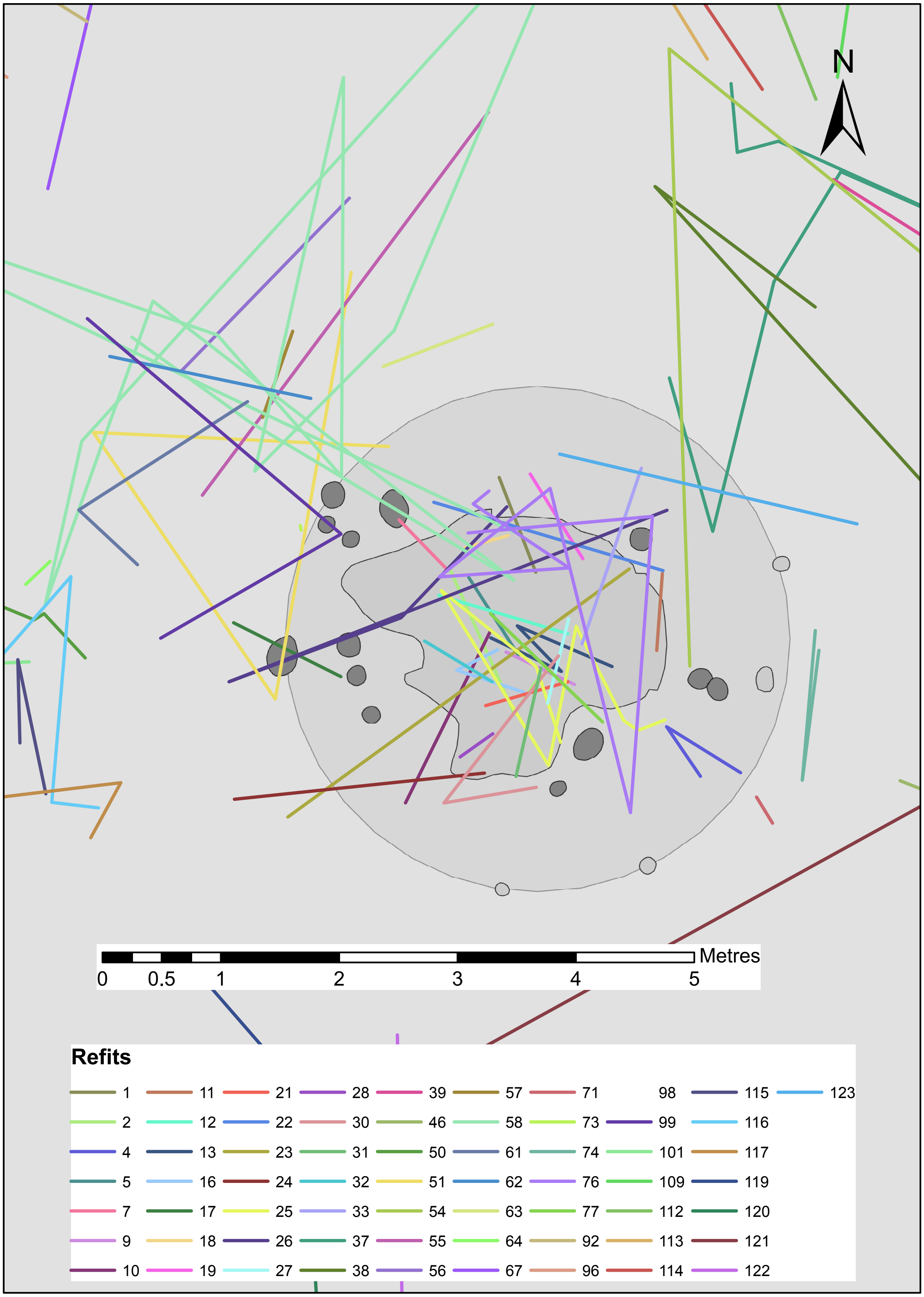


Figure 8.15: Refits within and around the eastern structure (Copyright Star Carr Project, CC BY-NC 4.0).

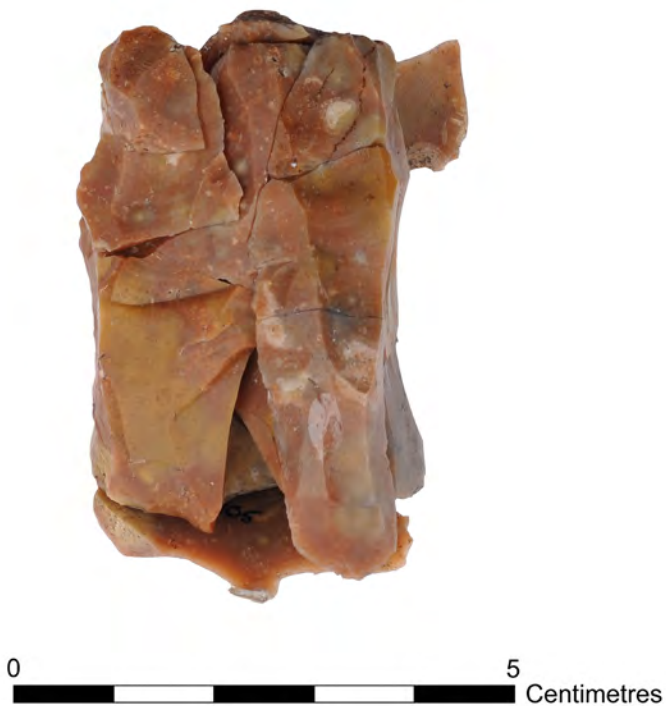


Figure 8.16: Refit group 58, incorporating a burin, and extending between scatter 4, scatter 1 and the eastern structure (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

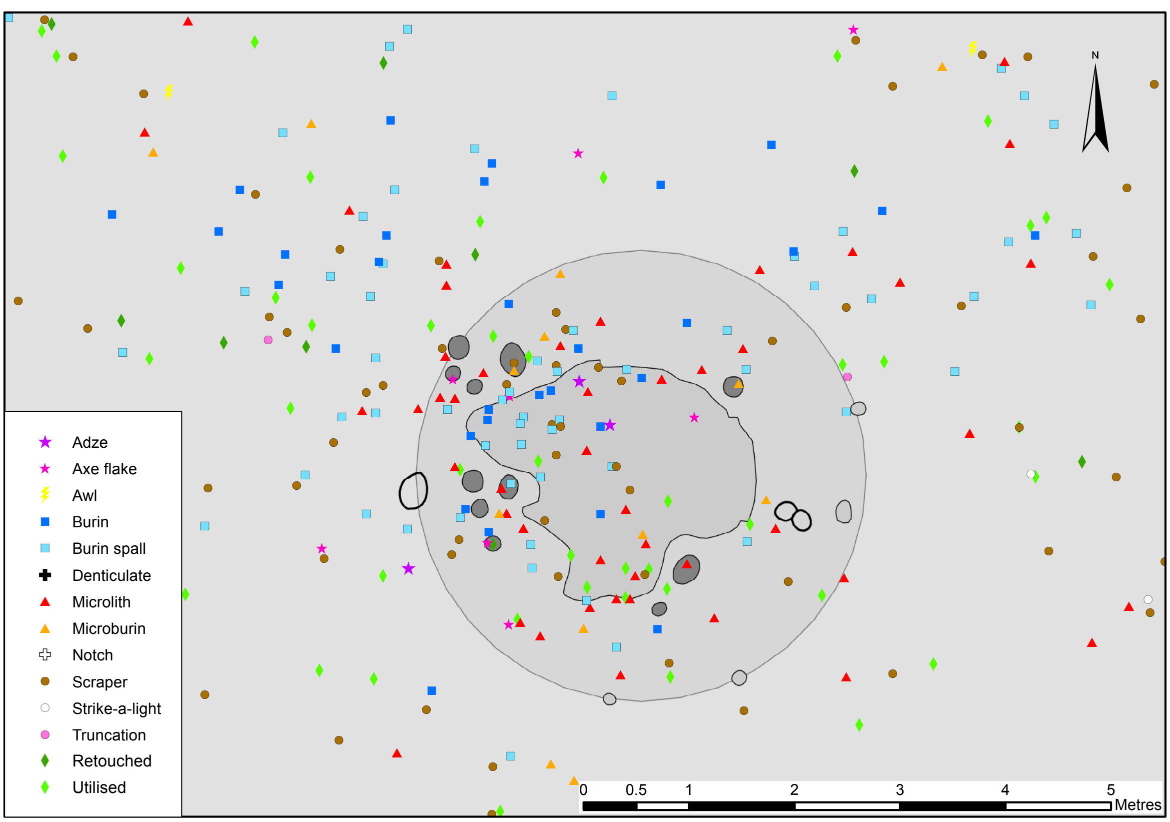


Figure 8.17: Tools from the eastern structure (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 8.18: Axe and resharpening sequence from inside the structure (refit group 76) (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

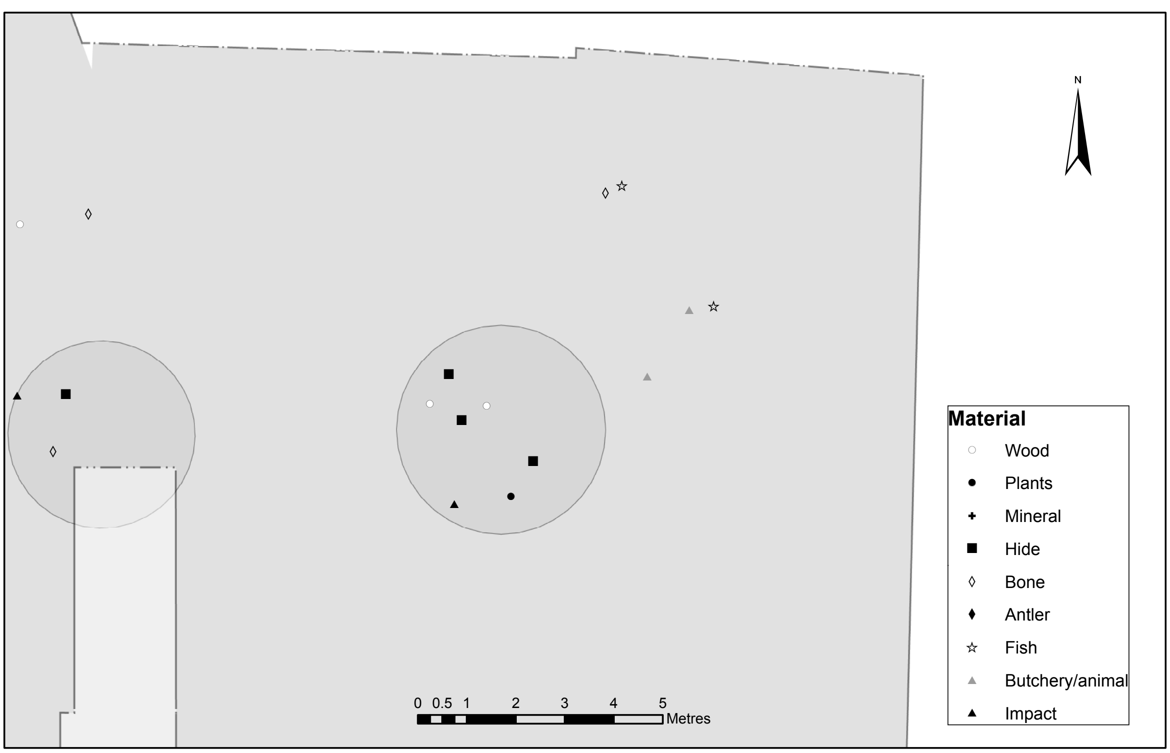


Figure 8.19: Microwear results from the eastern dryland area (Copyright Star Carr Project, CC BY-NC 4.0).

task. It may belong to an earlier or later phase of the site when the structure was not present; however, like several other tools in the structure it may have been brought in for rejuvenation or future use as part of a personal toolkit. A large blade <90863> which had not been produced either within the structure or the wider area was hafted and used to work plants and wood (cutting and scraping). At some point it was de-hafted with the hafted zone then re-used to scrape plants. An axe <92077> had been used for chopping wood: as this task is unlikely to have been undertaken in the structure it also seems to have been a piece brought in for repair, storage or deposition. The combination of hafted, imported and resharpened tools suggests many of the tools here are more than ad-hoc pieces and instead represent curated personal toolkits, stored and repaired within the structure.

In sum, the structure was composed of a central area of organic matting on which activity took place over a long period. Material was cleared out but a proportion remained, covered by matting. Some of the later phases of use may be better represented. The activities that took place within the structure were varied but included short knapping sequences and the production of tools for use elsewhere. The discard of microliths and repair of composite tools, of which components had been manufactured elsewhere, also seems to have occurred. Other tools were also brought in to be repaired; these include axes, scrapers and a large blade used to work wood or plant material. Some of these may represent personal toolkits stored in the structure. There does appear to be some spatial patterning within the structure, but it is difficult to ascertain whether this simply reflects the last period of use of the structure or represents repeated patterns, reflecting strict regulations surrounding the use of space by particular individuals, as described by Grøn (2003) for Siberian groups.

Scatter 4

Scatter 4 is located immediately to the north and north-west of the eastern structure. It is crescentic in form and, with the exception of the southernmost part, seems to respect the eastern structure. It is likely to represent either activities undertaken outside the structure or material cleared from the structure and dumped outside, or both. The scatter contains a large quantity of burnt flint which clusters in the southern and north-western parts but is part of a more diffuse spread of burnt flint around the structure. This could represent material cleared out from the structure. Refits are also quite broadly scattered around this scatter, rather than the tight focus on knapping clusters, which again might suggest a redeposited assemblage. However, refits either seem to respect the boundary of the structure or represent coherent transfers of usable material from scatter 4 to the eastern structure, which might argue in favour of complementary activity areas. Both hypotheses, and a combination of the two, are thus possible.

Scatter 4 produced a large assemblage of 1341 pieces, 30% of which are burnt (Table 8.3). Levels of tools are relatively low, perhaps as a result of high levels of burning rendering them unrecognisable, or because this scatter represents dumped debitage from which the tools have been retained. Burins dominate the assemblage (33 examples), though 12 microliths and 11 scrapers were also recovered. Burins are found throughout the scatter, though burin spalls (both manufacture and resharpening examples) are confined to the western half (Figure 8.17). Microliths, utilised pieces and scrapers have a much tighter distribution than burins, being confined to the south-west part of the scatter.

Refitting demonstrates that burins travelled widely across this area. Three resharpening spalls from refit group 51 were recovered from the northernmost, southernmost and westernmost parts of the scatter, while the burin was discarded up against the northern boundary of the structure, in all a distance of 10 m (Figure 8.15). Refit group 58 consists of the reduction of a red bladelet core, the products of which were moved around scatter 4, with two pieces (including a burin) recovered from scatter 1, while the final removal and the core were found within the eastern structure; these pieces scattered over a distance of 25 m. Another two burin and burin spall refit sequence (55 and 61) were recovered four metres apart and two metres apart respectively. Refit group 63 consists of three shatter fragments, which have shattered when burnt. Two of these pieces were found in the northern part of scatter 4, c. 1 m apart. The third refit (unfortunately recovered from sieving) almost certainly derives from within the ring of postholes, over a metre to the south. Other refits travelled less widely: in the south-west of the scatter refit 50, four shatter fragments from a burnt core were recovered within a square metre.

Scatter 1

Scatter 1 lies 5 m north of the eastern structure and consists of 901 pieces of flint (Figure 8.20). It is around 4.5 m in diameter and the northernmost part extends into the northern section of the site. It includes a small sub-scatter measuring around 1.5 m in diameter. A discrete cluster of 41 pieces of burnt flint (both plotted and sieved finds) in squares J9–J10 indicate a hearth. The assemblage is broadly balanced in terms of essential tool frequencies (Figure 8.20). However, examination of tool spalls suggests a focus on production and maintenance of burins, with 18 spalls represented; a mixture of primary production spalls and secondary resharpening spalls. Burin production seems to have taken place in the centre of the scatter where six primary burin spalls were recovered alongside two burins. Burins are distributed more broadly both in the centre of the scatter but also on its margins, indicating patterns of use and discard. One burin refits into a knapping sequence mainly reduced within scatter 4 but the final stages of reduction took place within the eastern structure.

Other areas were used for the production/use of different tools. In the northern part of the scatter three tranchet flakes indicate an axe was reworked. A denticulate was also found with the axe flakes: it is interesting to note that there is also an association of these two types in the axe workshop (see below) and denticulates may have been used in woodworking or haft maintenance. Microlith production seems a very minor activity: a single microburin is associated with two microliths (both obliquely blunted points) and three further microliths are found on the margins of the scatter. Scrapers tend to be found in the southern part of the scatter (within the southern cluster), generally singly or in pairs. Two pieces have been examined for microwear in the southern sub-scatter: one burin was used for fish processing (Robson et al. 2016) and a flake had been hafted and used to work bone.

Refit groups focused in this area do not extend beyond scatter 1 into other scatters. There is some spatial overlap between scatter 1 and scatter 2, where refit groups are more widely dispersed, but these groups are more focused on scatter 2. A burin from a refit sequence from scatter 4 was found on the edge of scatter 1; however, from a single connection it is difficult to say whether this indicates contemporaneity, diachronic superimposed activity areas or scavenging of flint from an earlier occupation.

Overall scatter 1 gives the impression of being a multi-functional area. Knapping was an important part of activities with a tested nodule, two hammerstones and several shatter fragments recovered. Both tool

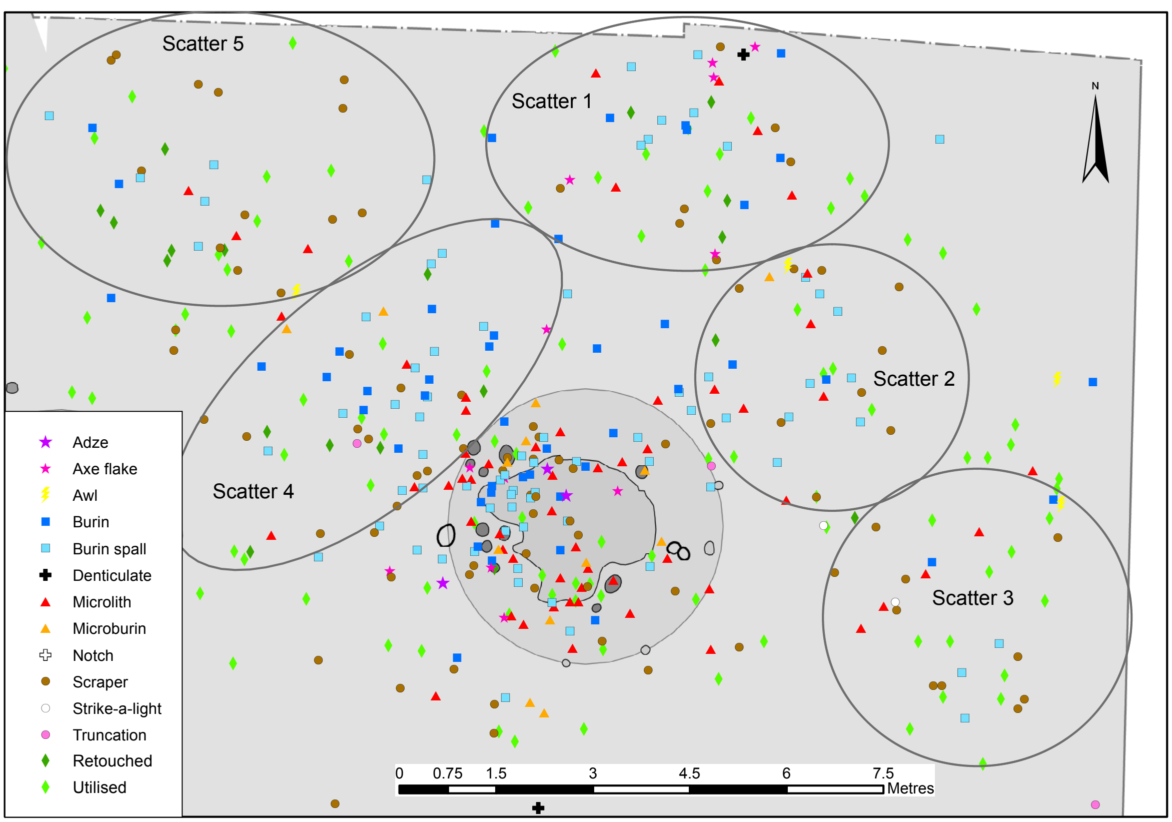


Figure 8.20: Tool distribution in the eastern dryland area (Copyright Star Carr Project, CC BY-NC 4.0).

production (microliths and burins) occurred, as did tool use, involving bone working and food preparation, the former possibly connected to the latter.

Scatter 2

Scatter 2 measures c. 5 m by 4 m and is located immediately to the north-east of the eastern structure. A large scatter of burnt flint (188 pieces), measuring c. 2 × 2 m across may represent a hearth (Figure 8.13). This cluster of burnt flint is surrounded by a more diffuse spread of burnt flint, perhaps indicating this scatter has been disturbed either by human or natural agencies. The burnt flint in scatter 2 also seems to represent part of a more general spread of burnt flint surrounding the eastern structure and thus may be attributable to clearance of material from this feature.

Microliths are the dominant tool type (18 examples) from scatter 2, with scrapers also common (n=15) and burins rarer (n=5), though 21 burin spalls were recovered, mainly primary examples; a pattern similar to that from the structure (Table 8.3). No distinct tool clusters are discernible, though there are seven burin spalls and two burins clustered in the vicinity of squares K4-5. Microliths and microburins are concentrated in the northern part of the scatter with seven microliths and five microburins spread across a 3 × 2 m area (Figure 8.20). An axe that seems to have been reworked as a core was found on the eastern edge of the scatter and a strike-a-light and truncation were also recovered.

Evidence for use-wear has been found on three pieces, all indicating a concern with butchery and food preparation. Two pieces have evidence for butchery and one has evidence for fish processing. Some activities (primary burin spalls, axe reworking, fish processing) seem similar to those undertaken in the eastern structure and the diffuse spread of burnt flint and lack of distinctive spatial patterning to activities could mean that this scatter has at least partially been generated through clearance and dumping of material from the structure. This hypothesis appears to be supported by the refits. Two refit groups centred in scatter 2 cross into the structure (Figure 8.14); neither appears likely to have entered the structure because they were useable blanks or tools. The refit groups in scatter 2 are also fairly dispersed (as are those from scatter 4), perhaps also indicating clearance activities.

Scatter 3

Scatter 3 is a small collection of 661 pieces. The scatter measures around 4 m in diameter and appears to represent a series of small clusters of knapping debris located around a hearth, evidenced by a small, discrete cluster of burnt flint (22 pieces) (Figure 8.13). Of the scatters surrounding the eastern structure it appears the most coherent with higher levels of refits and longer sequences represented. One refit sequence (group 40) has 11 pieces (Figure 8.21) while another (group 49) has 12 (Figure 8.14). Most are found entirely within the area of scatter 3, with some notable exceptions which indicate transport of blades to task areas, often on the wetland edge. Scatter 3 also has the lowest proportion of burnt flint (9.53%) suggesting its hearth was relatively short-lived and was not cleared out (or at least not within this area).

Scrapers are the most common tool type (n=10), which mainly cluster within the south-western part of the scatter, in the same area as burin spalls (four examples, both primary and secondary). Refitting suggests that at least some of the scrapers were manufactured within the scatter. Microliths by contrast are found in the northern part of the scatter, along with an awl, two burins, two micro-denticulates and a strike-a-light. No microburins were recovered. Blades and flakes with macroscopic edge damage are common and spread across the northern and southern parts.

Refitting of two long sequences indicate the import of two partially reduced nodules. One of these is a high-quality distinctive cloudy grey till, of which there are three large refit groups: groups 43 (6 refits), 48 (3 refits) and 49 (12 refits) (Figure 8.22). This was imported to the site as a part reduced nodule; it was knapped in scatter 3 and many blades were produced, of which several were used elsewhere on site, while the core itself was removed for use elsewhere. The products of this core were used to the north-west of scatter 2 and in the wetland immediately to the south where a large blade from this group was used for woodworking. A second part reduced core of poorer-quality flint was also brought to the area and reduced. The nodule on which this core was made was irregular, making working difficult and it was abandoned due to working problems. This raw material unit was knapped in broadly the same square metre area as group 43/48/49, immediately to the west

Figure 8.21: Refit group 40, knapping of a part reduced till pebble from cortical flakes to discarded core (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

Figure 8.22: Refit groups 43 (left) and 49 (right). A high-quality, grey till flint, the products of which are widely dispersed (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

of the potential hearth. However, in contrast its products remain in the immediate area, most likely because of the poor quality of the raw material.

Scatter 3 appears to be a relatively high-resolution scatter. Its high proportion of refits and coherent structure suggests it has seen minimal disturbance and scavenging of flint. Both of these features suggest it is relatively late in the sequence and almost certain to post-date the intense activity in the area that involved the use of the structure. The wetland refits are unfortunately not far enough lakewards to be dateable within the Bayesian model, though their stratigraphic position confirms the hypothesis that they belong to the later history of the site.

Scatter 5

Scatter 5 is a relatively low-density elliptical scatter in the north-western part of trench SC23, just extending into trench SC34. Burnt material is relatively diffuse although a concentration of 23 pieces could represent a hearth (Figure 8.13). Scrapers are the most common tool recovered from the scatter (n=12) with lower numbers of microliths (n=5) and burins (n=4). The only tool spalls recovered are burin spalls (n=6); both primary and secondary examples. Scrapers are found dispersed throughout the scatter, some on the northern and southern margins but also within the central part of the scatter (Figure 8.20). Utilised pieces are common and have a similar distribution to scrapers. Microliths were recovered within the central and south-eastern part of the scatter, including a cluster of three within a square metre. Burins and burin spalls are found in the western part of the scatter, several of which refit, though often across reasonable distances (2–3 m). This seems to be an area of tool use and very small scale knapping, perhaps with a focus on use.

The wetland

Introduction

The archaeology of the wetland and wetland edge has a very different character to the dense foci of knapping and tool use on the dryland. While some knapping scatters are present on the wetland edge, in general the material recovered from this zone consists of tools and utilised pieces, either discarded in areas where they were used, or on occasions subject to more formal deposition. Burnt flint and small debitage are rare. The rapidity of peat formation means that individual episodes of activity can be discerned in a way that is impossible on the dryland.

As with the dryland, the wetland has been divided into three areas (north, central and east), with both wetland–edge and purely wetland assemblages discussed in this section. In several areas peat growth has permitted assemblages to be split stratigraphically revealing the changing character of activities in the area.

Western area

The western area stretches from the small area wedged between Clark's trenches and north of his cutting III in the west, to the western platform in the east. It encompasses both wetland assemblages (that would have been deposited either in open water or areas that held standing water on a seasonal basis) and wetland edge assemblages (the product of activities that took place when peat growth had led to the development of fen and carr vegetation).

Area north of cutting III (bead area)

This is an area of cracked and friable peat which also appears to have suffered from bioturbation and trampling: the lithics appear to be spread through the depth of peat, though this varies in different areas. For instance, one tight cluster of burnt flint, which presumably represents a single event, is all found at the same level apart from two pieces found c. 100 mm lower. Similarly, mèches de foret (drill-bits) in the same grid squares sometimes have a big height difference between them, of up to 120 mm.

This is a dense area of lithic-focused activities. Knapping was certainly being undertaken, as demonstrated by large numbers of small chips, core maintenance flakes and debitage (Table 8.5). However, the area was also a focus for the production and use of tools. A wide range of formal tools were recovered, with almost equal

	North of Clark's area		Fen flint scatter	
Category	**No.**	**%**	**No.**	**%**
Tools:	***228***	***23.01***	***46***	***13.65***
Awl	18	*1.82*	6	1.78
Axe	1	*0.1*	0	0
Burin	15	*1.51*	7	2.08
Denticulate	3	*0.3*	0	0
Hammerstone	0	*0*	0	0
Micro-denticulate	1	*0.1*	0	0
Microlith	18	*1.82*	4	1.19
Notch	0	*0*	0	0
Scraper	16	*1.61*	5	1.48
Scraper/burin	1	*0.1*	0	0
Strike-a-light	2	*0.2*	0	0
Truncation	1	*0.1*	1	0.3
Wedge	1	*0.1*	1	0.3
Retouched	4	*0.4*	1	0.3
Utilised blade	90	*9.08*	15	4.45
Utilised flake	20	*2.02*	2	0.59
Utilised fragment	37	*3.73*	4	1.19
***Tool spall*s:**	***13***	***1.31***	***5***	***1.48***
Axe flake	1	*0.1*	3	0.89
Burin spall	9	*0.91*	2	0.59
Microburin	3	*0.3*	0	0
Retouch spall	0	*0*	0	0
***Core preparation*:**	***23***	***2.32***	***12***	***3.56***
Core tablet	8	*0.81*	4	1.19
Crested blade	14	*1.41*	4	1.19
Plunging	1	*0.1*	4	1.19
***Debitage*:**	***727***	***73.36***	***274***	***81.31***
Blade	137	*13.82*	86	25.52
Flake	180	*18.16*	85	25.22
Fragment	237	*23.91*	83	24.63
Chip	156	*15.74*	8	2.37
Core	13	*1.31*	5	1.48
Core fragment	0	*0*	1	0.3
Nodule	0	*0*	0	0
Chunk	4	*0.4*	6	1.78
Total	**991**	***100***	**337**	**100**
Burnt	***45***	***4.54***	***8***	***2.37***

Table 8.5: Assemblages from the western area wetland edge.

numbers of the three main types, microliths (n=18), burins (n=15) and scrapers (n=16) (Figure 8.23). However, the large number of awls (n=18) recovered from the area is particularly noteworthy, given their relative rarity on Mesolithic sites. The recovery of beads also from this area suggests these were used in bead production, a hypothesis that has been reinforced by microwear analysis and experimental work (Chapter 33). Four of the awls recovered from this area were used on soft mineral, suggesting in situ bead manufacture. Another was used on bone. This may suggest that bone or tooth beads were also being manufactured here: Clark recovered two cervid tooth beads suggesting tooth beads may also have been made at the site. Several of the microliths are relatively thick and sturdy and thus may also have been deployed as awls. Microwear suggests one was used to cut and scrape bone, though another was used as a projectile (Figure 8.24). Microliths were being made in the area, as indicated by the presence of microburins, though the low microburin ratio (1:0.11) indicates a greater focus on use/deposition than production.

While bead manufacture appears to have been a major task, other activities were also carried out in this area. Burins were made, used and resharpened, as is indicated by the presence of primary and secondary burin spalls, and scrapers were also recovered in large numbers. Other tools are also present, including an axe with no visible polish formation but extensive use damage on both ends (possibly resulting from percussion), strike-a-lights, denticulates and a wedge. Blades with macroscopic edge damage are also common.

This is a high-density scatter for a wetland edge situation, with almost 200 lithic artefacts per square metre; a density which also increases further away from the dryland. Macroscopic damage on artefacts that does not make sense as use-traces is likely to be evidence of trampling, suggesting this area was frequently accessed. Burnt flint is also relatively common for a wetland edge assemblage. A lot of this material is relatively lightly burnt, rather than white and heavily cracked. Several clusters and large chunks of charcoal were found in this area, suggesting hearths, which are likely to be responsible for the condition of the flint (Chapter 32). The light burning on the flint may indicate that these fires were of low intensity or short duration.

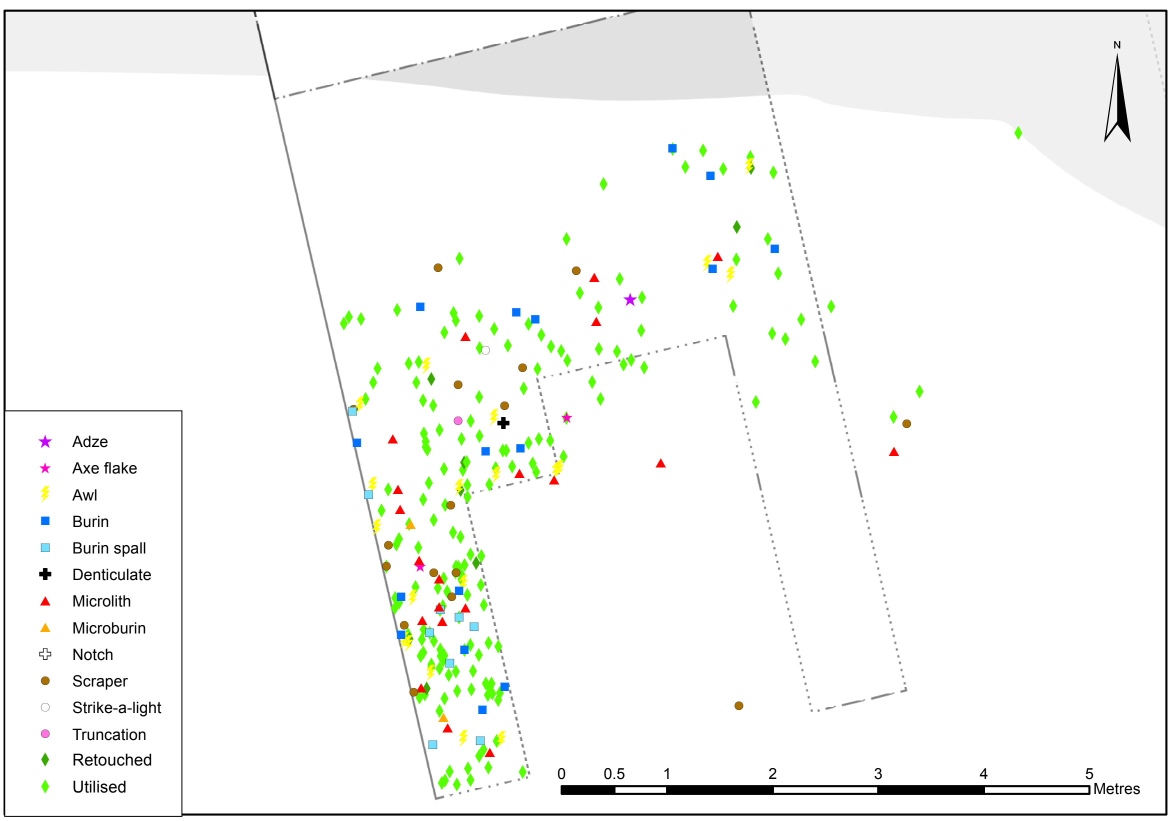


Figure 8.23: Distribution of tools in the bead area (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 8.24: Microwear results from the western area wetland edge (Copyright Star Carr Project, CC BY-NC 4.0).

Fen flint scatter

This sub-assemblage represents (apart from a Late Mesolithic composite tool) the latest evidence for occupation of Star Carr (see Chapter 9). The majority of this scatter has been excavated by Clark as it falls between his cutting II and his large eastern trench. While this scatter is located on the dryland/wetland boundary, as it is so late in the sequence this area of fen and carr is likely to have been relatively dry and stable at the time of occupation (Chapter 19). As a result this has more characteristics of a dryland assemblage than the bead area, north of cutting III, with lower quantities of tools and more knapping debris. Knapping appears to have taken place around a hearth, as indicated by a small cluster of burnt flint, with traces of another a couple of metres to the south. These may relate to the cluster of charcoal patches plotted by Clark (1954, figure 7; see also Chapter 32), suggesting knapping and tool use were taking place around a series of hearths.

A broad range of tools were recovered from this scatter (Table 8.5, Figure 8.25), with burins, awls and scrapers more or less equally common amongst the formal tools and large quantities of utilised blades. A relatively large number of awls (n=6) were recovered from this area. All are small and slightly asymmetric, suggesting the product of a relatively short-term episode. Two were selected for microwear analysis: one had slight traces of possible use; the other was used to perforate soft stone, suggesting that traditions of bead making continued at the site at this late date. Other tools also indicate craft activities: burins were used here and resharpened, and are associated with antler, while a scraper was used for woodworking. Utilised blades have a strong association with craft activities. Though we only have a small part of this area due to its previous truncation by Clark's excavations, it seems too varied and craft-focused to represent a small ephemeral occupation. It probably relates to domestic occupation elsewhere on the site, either an undated area excavated by Clark or an area on the dryland yet to be excavated. A refit between the fen scatter and a small discrete scatter to the south of the eastern structure suggests this late activity is connected to continued occupation of the dryland. Though there is less evidence for this later phase, it may be that this activity is less readily datable, as it was focused on the dryland and upper fen and carr levels where there is poor preservation of organic material.

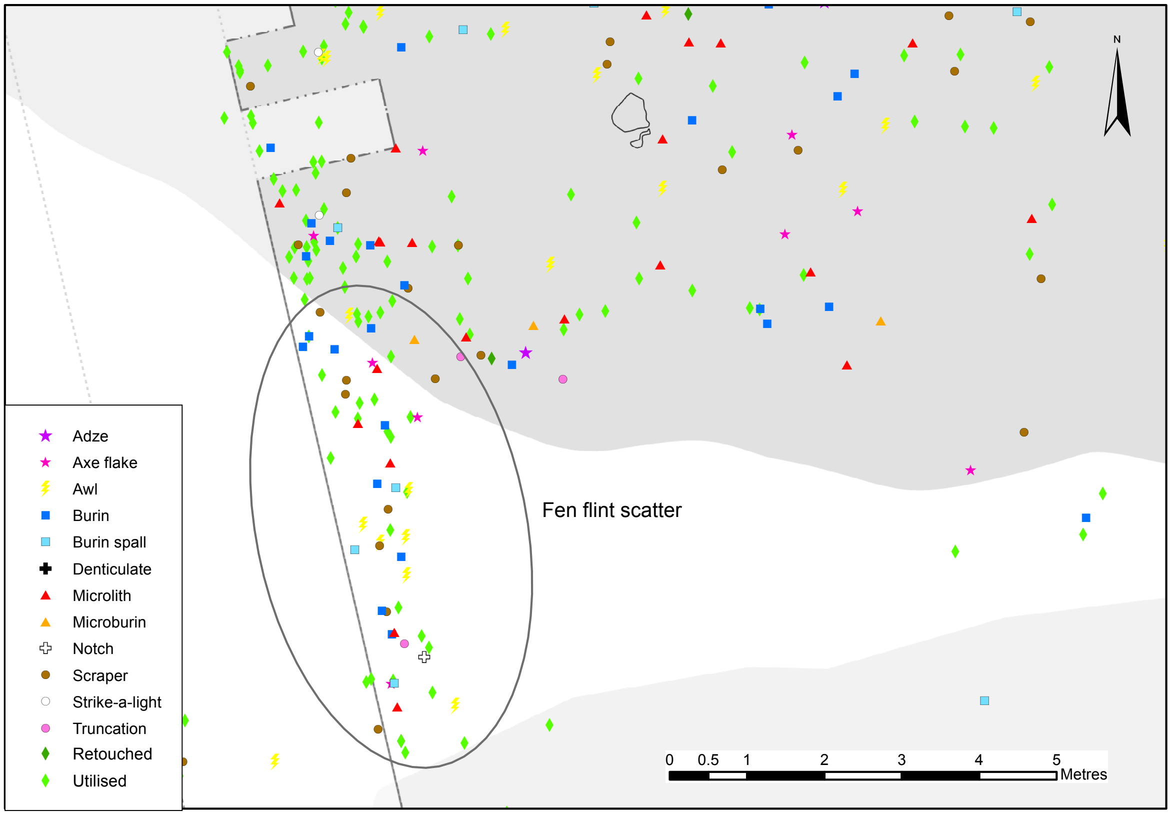


Figure 8.25: Distribution of tools from the area of the fen flint scatter (Copyright Star Carr Project, CC BY-NC 4.0).

Clark's area

Clark's area was identified as an area of dense deposition, and the character of this lithic material conforms with this hypothesis. This assemblage is heavily dominated by tools and pieces with macroscopic edge-damage. In terms of formal tools, scrapers are most common (n=17) followed by burins (n=13) and microliths (n=8), though the presence of smaller numbers of awls, serrates, denticulates, notches and truncations hints at the wide variety of activities embodied by this assemblage (Figure 8.26). However, most noticeable are the sheer quantities of blades, flakes and fragments with macroscopic edge damage. Many of these have been used to harvest and work plant material. There are high proportions of utilised blades in particular (22%) (Figure 8.26). A dominance of tools and pieces with edge damage is a noticeable feature of wetland lithic assemblages across the Vale of Pickering (Conneller and Schadla-Hall 2003); however, this seems to be on a different scale with 49.8% of lithics being either tools or exhibiting macroscopic damage. In other wetland areas at Star Carr percentages of tools and used pieces range from 12–33%. Also of note are the sheer quantities of lithics recovered (n=621) from this 5 × 0.9 m area, providing a maximum density of 371 pieces per m² and an average of 138 per m². While this is not the densest area of the site in terms of lithics, it should be noted that this sub-assemblage does not represent in situ knapping debris unlike other areas of the site with high lithic densities. More appropriate comparators are other wetland areas; the adjacent area south of Clark's area has maximum densities of 46 pieces of flint per m².

There are some suggestions that different types of activity are represented in this assemblage. For instance, although wetland assemblages rarely contain burnt flint or small chips (<10 mm) there are both in this assemblage. While small chips are uncommon they are present at the northernmost end of the excavated baulk: two were recovered from excavation and there is also 4.73g of microdebitage from wet-sieved samples. Burnt flint is more common (n=15, or 2.4% of the assemblage). This also clusters towards the northern part of excavated baulk and some, though not all, are at a slightly higher level, c. 50–100 mm above the majority of the flint

	Clark's area		**South of Clark's area**		**Western platform**		**Brushwood**	
Category	**No.**	%	**No.**	%	**No.**	%	**No.**	%
Tools:	***309***	***49.8***	***84***	***33.73***	***3***	***23.08***	***18***	***30.51***
Awl	2	*0.32*	1	*0.40*	0	0	1	1.70
Axe	0	*0*	0	*0*	0	0	0	0
Burin	13	*2.09*	4	*1.61*	0	0	1	1.70
Denticulate	4	*0.64*	0	*0*	0	0	0	0
Hammerstone	0	*0*	0	*0*	0	0	1	1.70
Micro-denticulate	2	*0.32*	2	*0.80*	0	0	0	0
Microlith	8	*1.29*	1	*0.40*	0	0	0	0
Notch	1	*0.16*	0	*0*	0	0	1	1.7
Scraper	17	*2.74*	7	*2.81*	0	0	2	3.39
Scraper/burin	0	*0*	0	*0*	0	0	0	0
Strike-a-light	0	*0*	2	*0.80*	0	0	0	0
Truncation	1	*0.16*	1	*0.40*	0	0	0	0
Wedge	0	*0*	0	*0*	0	0	0	0
Retouched	3	*0.48*	3	*1.20*	0	0	0	0
Utilised blade	136	*21.9*	33	*13.25*	2	15.38	9	15.25
Utilised flake	41	*6.44*	16	*3.21*	1	7.69	1	1.70
Utilised fragment	82	*13.2*	14	*5.62*	0	0	2	3.39
Tool spalls:	***9***	***1.45***	***5***	***2.01***	***1***	***7.69***	***1***	***1.70***
Axe flake	3	*0.48*	3	*1.20*	0	0	0	0
Burin spall	5	*0.8*	2	*0.80*	1	7.69	1	1.70
Microburin	0	*0*	0	*0*	0	0	0	0
Retouch spall	1	*0.16*	0	*0*	0	0	0	0
Core preparation:	***16***	***2.58***	***7***	***2.81***	***0***	***0***	***0***	***0***
Core tablet	7	*1.13*	6	*2.41*	0	0	0	0
Crested blade	9	*1.45*	1	*0.40*	0	0	0	0
Plunging	0	*0*	0	*0*	0	0	0	0
Debitage:	***287***	***46.22***	***153***	***61.44***	***9***	***69.23***	***40***	***67.8***
Blade	64	*10.30*	29	*11.65*	1	7.39	7	11.86
Flake	85	*13.69*	66	*26.51*	0	0	13	20.24
Fragment	116	*18.68*	32	*12.85*	2	15.38	16	22.03
Chip	2	*0.32*	3	*1.20*	2	15.38	0	0
Core	15	*2.41*	20	*8.03*	2	15.38	3	5.08
Nodule	0	*0*	1	*0.40*	2	15.38	0	0
Chunk	5	*0.80*	2	*0.80*	0	0	1	1.70
Total	**621**	***100***	**249**	***100***	**13**	**100**	59	**100**
Burnt	***15***	***2.41***	***8***	***3.21***	***2***	***10.53***	***0***	***4.17***

Table 8.6: Lithic material from the western wetland area.

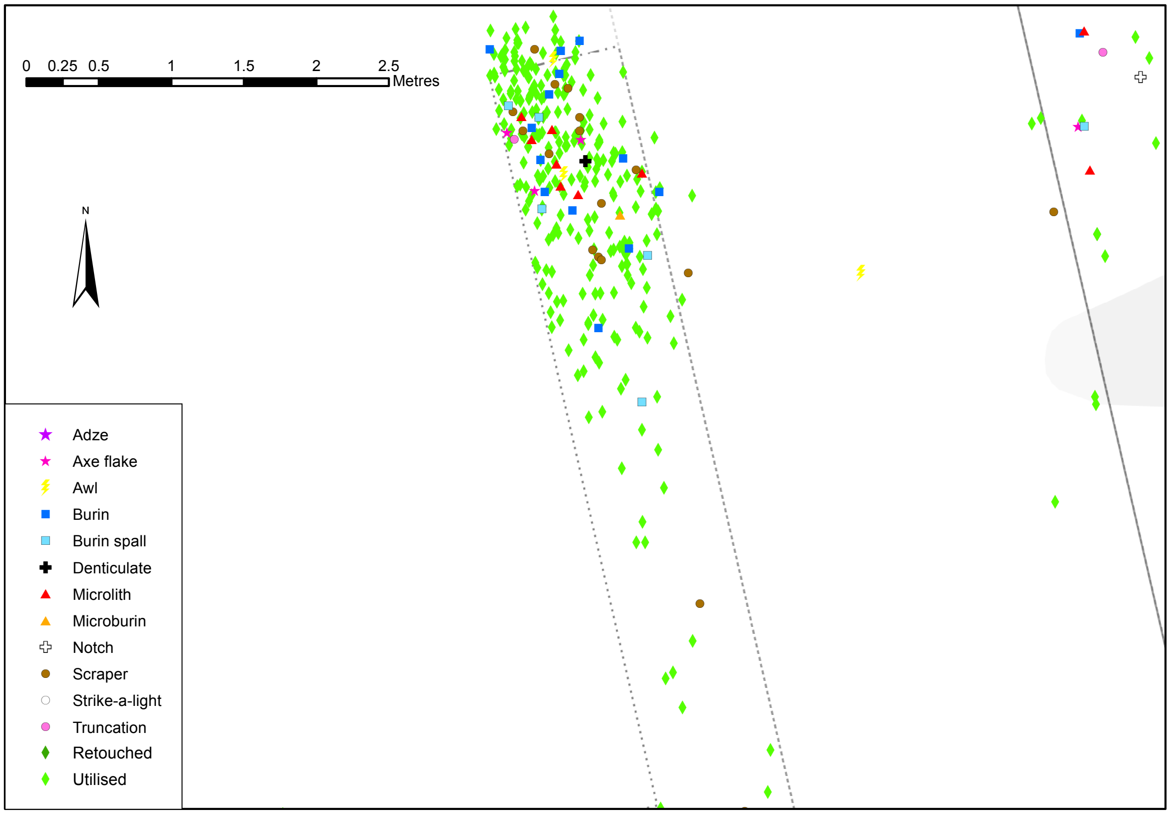


Figure 8.26: Distribution of tools from Clark's area (Copyright Star Carr Project, CC BY-NC 4.0).

assemblage. There are also some burin spalls representing both manufacture and resharpening which is unusual for a wetland assemblage. Microwear evidence is also more varied in the most northern part of this area with evidence of two awls used for working bone, a scraper used for hide working and a small retouched bladelet with impact damage (Figure 8.27). This seems indicative of a rather different set of activities involving flint-knapping, tools manufacture and hearths; either slightly different depositional activities or perhaps the upper levels of the baulk capture the very southernmost part of later activity spreading down from the fen carr scatter.

However, despite a small element of possibly later knapping activity nearer the dryland, the majority of this assemblage can be characterised as representing a super-dense area of discarded, mostly used, tools: a hyper-wetland assemblage. South of the most northerly metre of the excavated baulk, microwear also indicates typical wetland uses (see Chapter 35): cutting siliceous plants and woodworking. Previous work has suggested that such assemblages were composed of tools discarded in the course of activities in the wetland (Conneller and Schadla-Hall 2003). However, the sheer quantity and range of tools in this area would argue against casual loss and discard. Similarly, this assemblage does not represent clearance of waste flint from a settlement area as has been argued for waterlogged deposits in Scandinavia, as the assemblage is not representative of the lithic debris (mainly knapping waste) that might be found in middens or knapping stations. Only a carefully selected range of artefacts have been deposited, most of which are formal tools or blanks that have been used.

South of Clark's area

The lithic material recovered from contexts to the south of Clark's area is a typical wetland assemblage with a strong focus on tools and pieces with macroscopic edge damage (33.73%). It is in many ways similar in composition to the material from Clark's area, though lithics are at a much lower density and it has a lower proportion of tools and used pieces. In terms of actual tool types represented it is also similar to Clark's area in

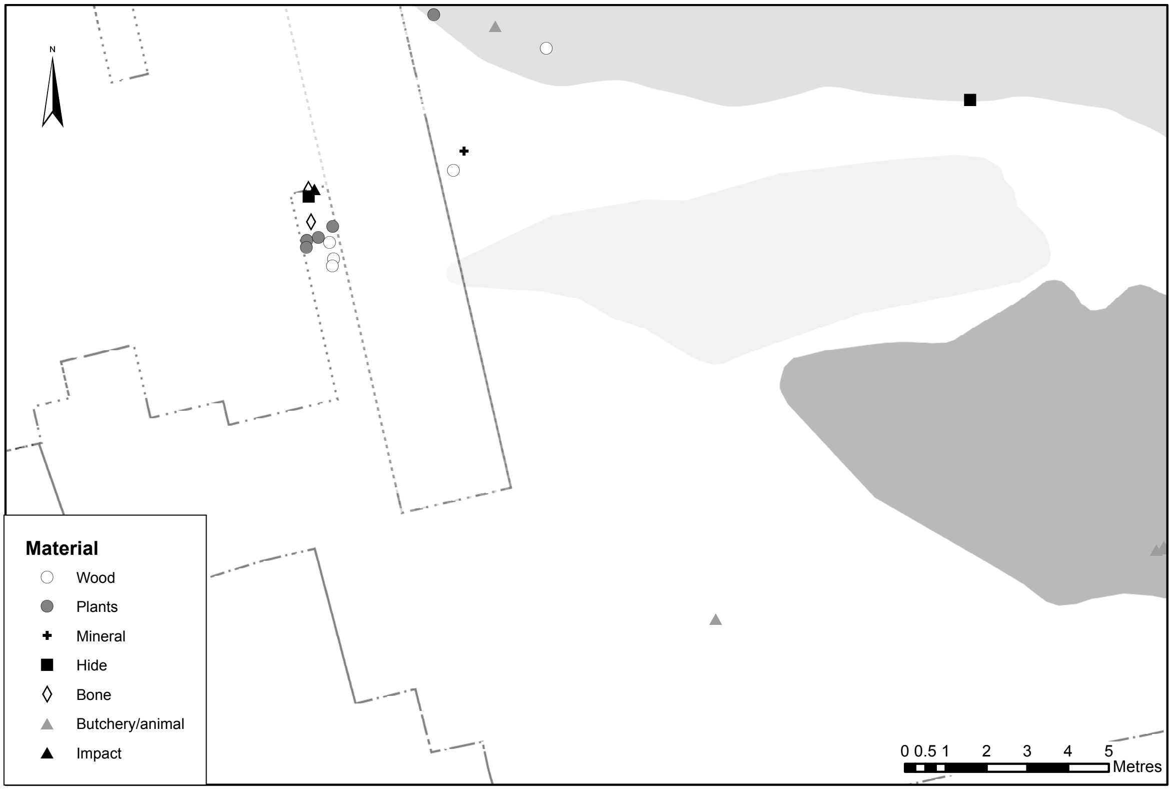


Figure 8.27: Microwear results from the western part of the wetland (Copyright Star Carr Project, CC BY-NC 4.0).

the dominance of scrapers (n=7), followed by burins (n=4) and microliths (n=1). It has a similarly wide range of additional tools: an awl, two serrates, two strike-a-lights and a truncation, and large quantities of utilised blanks (n=63) (Figure 8.28).

However, like Clark's area, it does have a number of characteristics that are unusual for a wetland assemblage: cores are common and there are more small chips and pieces of burnt flint than expected. Burnt flint is spread across the area; some pieces are from higher in the stratigraphic sequence when this area may have been more stable. However, other pieces are relatively low in the sequence and likely to have been emplaced when this area was at least seasonally open water. Several of these pieces are only slightly burnt, suggesting they may have still been useable and several others are tools or have use-damage. The presence of a number of cores which do not appear to have been knapped in the area is of interest. Refitting on the dryland has demonstrated that cores are rarely recovered from areas where they were knapped. Most of the cores were recovered from the north-eastern part of this area and at a similar level in the sequence and so could conceivably be part of a single episode of deposition. However, it is probably more realistic to think of the recovery of cores across the wetland from a variety of different contexts as part of a more informal sort of discard, based on the removal of large stones from the dryland settlement area.

Clark's backfill

During the re-excavation of Clark's cutting II in 2010 and cleaning of the area around the north and south of cutting I in 2015, lithic artefacts were encountered in Clark's backfill. Most of these were isolated pieces of the sort that might easily be missed by excavators in dark waterlogged sediments where sieving was not deployed. However, in 2015 a dense mass of flint was located towards the south-west part of what would have been cutting I. This consists of 1279 pieces (not all this material was recovered as it was in the section of our excavated area). It appears to represent an entire season's debitage, as tools were rare. It was noted by CC in her study of

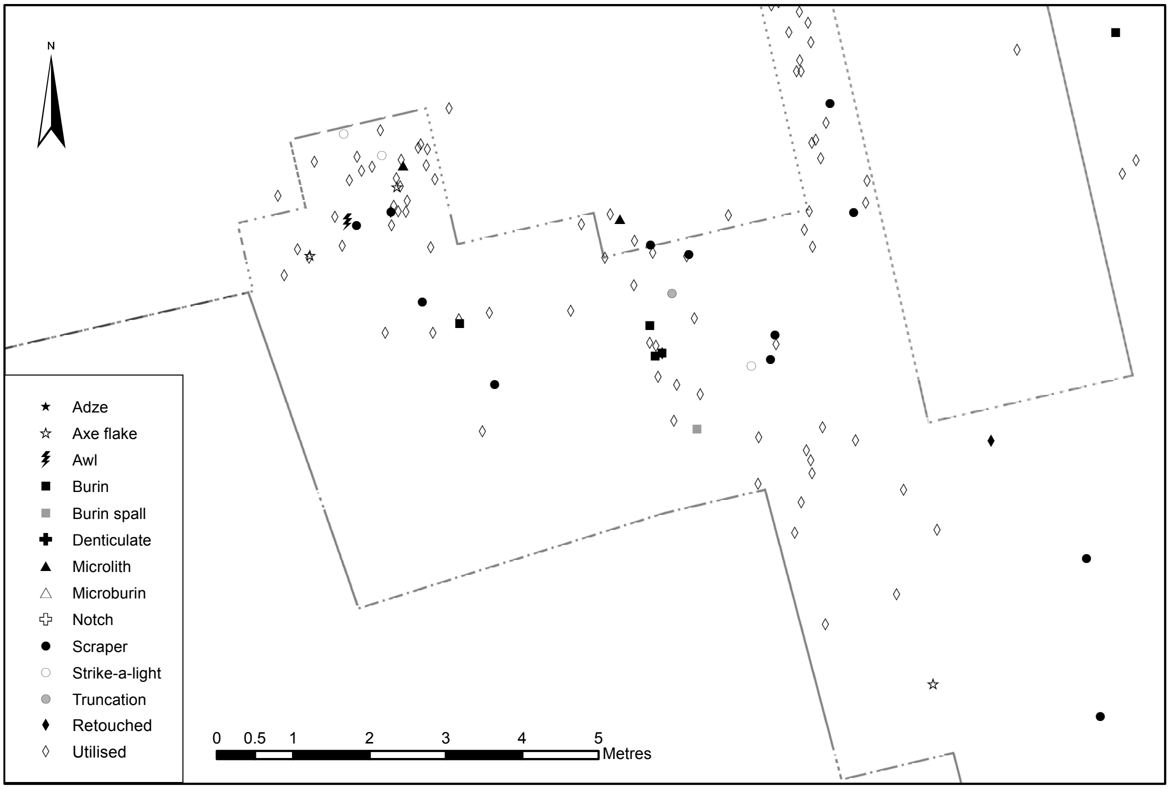


Figure 8.28: Tools from south of Clark's area (Copyright Star Carr Project, CC BY-NC 4.0).

the material from Star Carr in the 1990s that a large part of the debitage was missing; however, it was assumed that it had been dispersed, as was the custom of the time, across different museums – lithic material from Star Carr has been noted as far afield as the Archaeology Department Museum, Legon, Ghana (CC personal observation). However, the lithic material distributed to different museums tends to be tools, rather than debitage. In the introduction to the 1954 publication Clark writes that while a representative series of finds has been presented to different museums 'the residue of the material, including the complete flint waste of the 1951 season has been deposited in the University Museum of Archaeology and Ethnology at Cambridge' (Clark 1954, xxiii). This suggests that the debitage from the 1949 and 1950 seasons was not retained. Cutting I was excavated in 1949, so it is likely we have located that year's debitage. One piece is even labelled in pencil 43"/G3, which would be compatible with a grid from that year of excavation, which demonstrates (as the numbers would suggest) that this material was analysed by Clark and reported on before discard.

Cutting I cut through the bead manufacturing area in its northern part and there Clark located a cluster, or cache, of 11 stone beads and one amber bead (Chapter 33). The flint from the area north of Clark's cutting III, excavated by the current project, consists of some knapping debris but also tools and blanks that have been brought in and evidence for tool maintenance. It is likely that cutting I has clipped the edge of this area, where densities were lower. In cutting I much higher densities of flint were recorded in the wetland where Clark (1949) notes an extremely dense area of flint and organic finds, centred on his square K, which appears a continuation of the sort of evidence we encountered excavating his adjacent baulk.

The material recovered from the backfill is certainly compatible with having originally derived from cutting I, even though it represents the product of a selective discard policy. Blades are dominant. Many appear to have evidence for use, though because of its uncertain history utilisation has not been recorded. Burnt material is very rare, as are small flakes. The possibility remains that such pieces were not collected at all, but this is not the character of the more isolated material recovered from the remainder of Clark's backfill, which as argued above represents artefacts overlooked during excavation. It thus seems likely that this represents the remains of a wetland assemblage, consisting of tools (retained, now in museums), and blades and large flakes (discarded), and lacking small debitage and burnt flint. Some tools and spalls are present. None of these can be described as classic examples of their type, and may have been discarded for this reason, or possibly overlooked in the initial analysis.

Western platform

There is very little flint associated with the platform; it seems to have been an area that was deliberately kept clean. Only 18 pieces were recovered from a similar level to the platform. These appear to consist mostly of a wetland assemblage of blades with edge damage, particularly in the south, some of which actually appear to be slightly lower than the platform. The material in the northern part is different, including two small chips, a burin spall and two pieces of burnt flint (Figure 8.29). These are more indicative of dryland knapping assemblages and may conceivably have derived from dryland activities further to the north. A few artefacts can be highlighted: two extremely large tested nodules (110 mm and 160 mm in length) were located in between two timbers of the platform (Figure 8.30); and a large core was recovered from within the platform timbers just a couple of metres to the west. While the two large nodules were at a slightly lower level, they did appear to be related to the platform. While a structural role, or function as a raw material cache cannot be ruled out, these, along with a wild boar mandible described in Chapter 7, may represent more formal foundational or depositional practices associated with this platform.

Brushwood

A small assemblage of lithic material (59 pieces) was recovered from the brushwood. This is a typical wetland assemblage with a high proportion of tools (30.5%), and a lack of burnt flint and small chips.

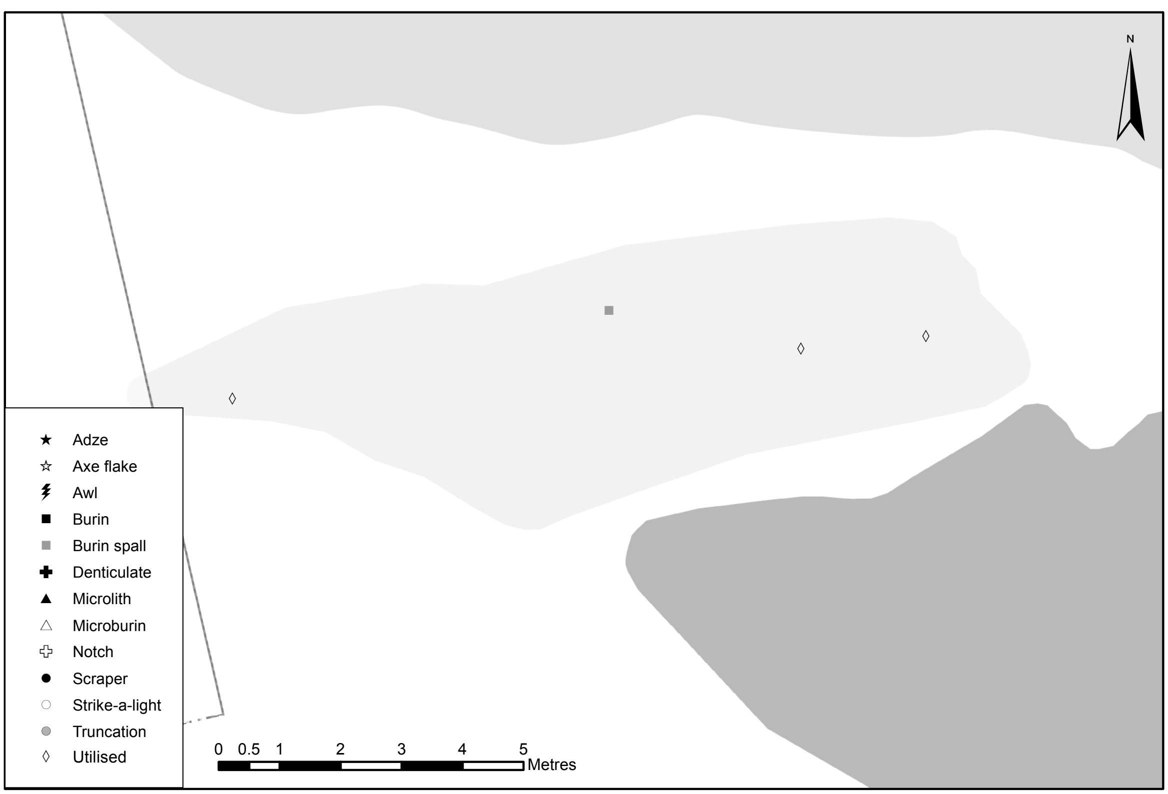


Figure 8.29: Distribution of tools and spalls from the western platform (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 8.30: Cache of two large nodules of till flint within the western platform (Copyright Star Carr Project, CC BY-NC 4.0).

Though the brushwood both underlies and covers the western part of the western platform, all the lithic material is recovered from the upper part of the brushwood, overlying the western platform, indicating little use of this area for lithic-focused activities during the early history of the site. The proportions of tools recovered are similar to the underlying western platform (31.6%); however, the forms of tools differ, suggesting continuity of tool use in the area but with a focus on different sorts of activities. Whereas the tools from the western platform are mainly blades with macroscopic edge-damage, in the brushwood utilised blades were recovered alongside a wide range of formal tools: an awl, a burin, a notch and two scrapers (Figure 8.31). Two cores and a hammerstone seem to represent the clearance of large bulky objects from the dryland. With the exception of a couple of utilised blades and a burin these tools are all concentrated in the north-western corner of this area, closest to the dryland where they are likely to represent a small, discrete activity area.

South of the western platform

This is a diffuse low-density scatter of 80 pieces which spans considerable depths of wetland deposits (as described in Chapter 20). It represents very low-density activity or deposition, initially in open water and later on boggy and seasonally wet ground. The majority (49 pieces) derives from the later history of the site when this was an area of fen or carr which had formed above the marl. The assemblage from this wood peat is characterised by a broad range of tools: burins are most common (n=5), corresponding with moderate amounts of antler waste found in this area (Chapter 7). A possibly reworked axe, a microlith and two scrapers were also found. As is usual amongst wetland assemblages, utilised pieces are common. One such flake was used for butchery.

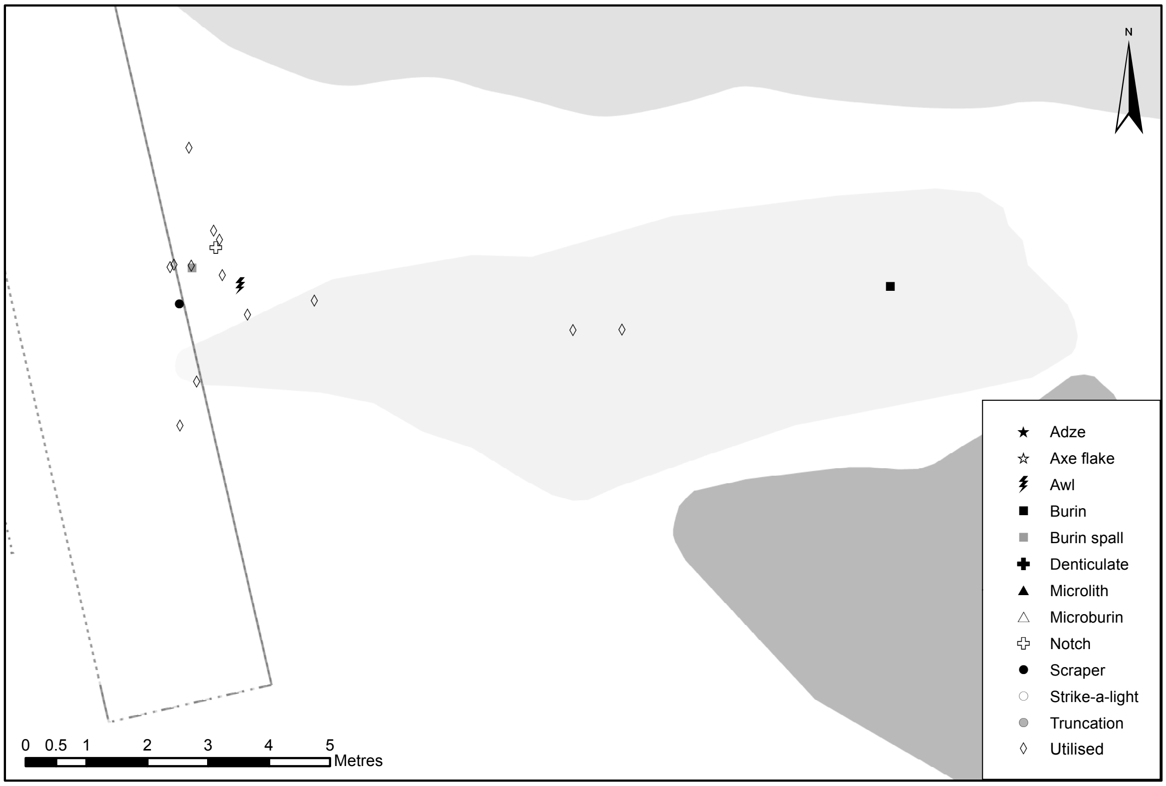


Figure 8.31: Tools from the brushwood (Copyright Star Carr Project, CC BY-NC 4.0).

In the underlying reed peat, formal tools are rarer, with only a single burin recovered, but blades and flakes with macroscopic wear are more common, representing 40% of the assemblage. Only three pieces were recovered from the underlying marl: a blade and two fragments, none with any obvious evidence of use. It seems that activities using lithics and depositionary practices focused on lithics were rarely undertaken in this area.

Central area

Detrital wood scatter

The detrital wood scatter lies to the south-west of the central platform and to the south of the western platform (Chapter 6). The lithic material associated with the detrital wood scatter is located in the lower contexts of the site, indicating it is likely to have been deposited into open water. It is possible that this material represents in situ tool use and discard during a very dry season when lake levels were low, but it seems more likely it represents purposeful deposition. In terms of composition this assemblage is very similar to that from the Clark's area but densities are much lower (Figure 8.32). There are very high proportions of tools and pieces with macroscopic damage (47.5%), which is comparable to the proportions of such artefacts in Clark's area (49.8%). Small chips and burnt flint, present in Clark's area in extremely low numbers, are entirely absent. As in Clark's area, the tool assemblage is dominated by pieces, particularly blades, with macroscopic damage. 20.8% of this sub-assemblage consists of used blades, in comparison with 21.9% in Clark's area.

Used pieces are concentrated in the northern and central parts of the detrital wood scatter. Formal tools are not common amongst the detrital wood: microliths are most common, with five examples, while scrapers (n=2) are also present and there are single examples of a notch, denticulate and chamfered piece, the latter the only known example from the site. These tools are widely distributed across the area, with the exception of a small cluster of three microliths, all obliquely blunted points, which were found in a broadly linear

	Detrital wood scatter		Central platform		Axe workshop	
Category	**No.**	%	**No.**	%	**No.**	%
Tools:	***57***	***47.5***	***30***	***16.95***	***94***	***9.18***
Awl	0	0	1	0.56	1	0.1
Axe	0	0	2	1.13	4	0.4
Burin	0	0	1	0.56	17	1.66
Chamfered	1	0.83	0	0	0	0
Denticulate	1	0.83	0	0	3	0.3
Hammerstone	0	0	1	0.56	1	0.1
Micro-denticulate	0	0	0	0	1	0.1
Microlith	5	4.17	5	2.82	14	1.38
Notch	1	0.83	0	0	2	0.2
Scraper	2	1.67	0	0	9	0.87
Truncation	0	0	2	1.13	1	0.1
Wedge	0	0	1	0.56	0	0
Retouched	0	0	0	0	4	0.4
Utilised blade	25	20.83	4	2.56	21	2.05
Utilised flake	10	9.33	3	1.69	10	0.98
Utilised fragment	12	10	2	1.13	6	0.6
Tool spalls:	***1***	***0.83***	***3***	***1.69***	***23***	***2.25***
Axe flake	0	0	3	1.69	18	1.76
Burin spall	1	0.83	0	0	4	0.4
Microburin	0	0	0	0	0	0
Retouch spall	0	0	0	0	1	0.1
Core preparation:	***4***	***3.33***	***5***	***2.82***	***31***	***3.03***
Core tablet	1	0.83	2	1.13	18	1.76
Crested blade	3	2.5	3	1.69	10	0.98
Plunging	0	0	0	0	3	0.3
Debitage:	***58***	***48.33***	***139***	***78.53***	***876***	***85.55***
Blade	16	13.33	25	14.12	188	18.36
Flake	23	19.17	37	20.9	258	25.19
Fragment	17	14.17	61	34.46	281	27.44
Chip	0	0	7	3.95	132	12.98
Core	2	1.67	10	5.65	5	0.5
Chunk	0	0	7	3.95	12	1.17
Total	**120**	**100**	**177**	**100**	**1024**	**100**
Burnt	***0***	***0***	***1***	***0.56***	***10***	***0.98***

Table 8.7: Composition of wetland assemblages from the central area.

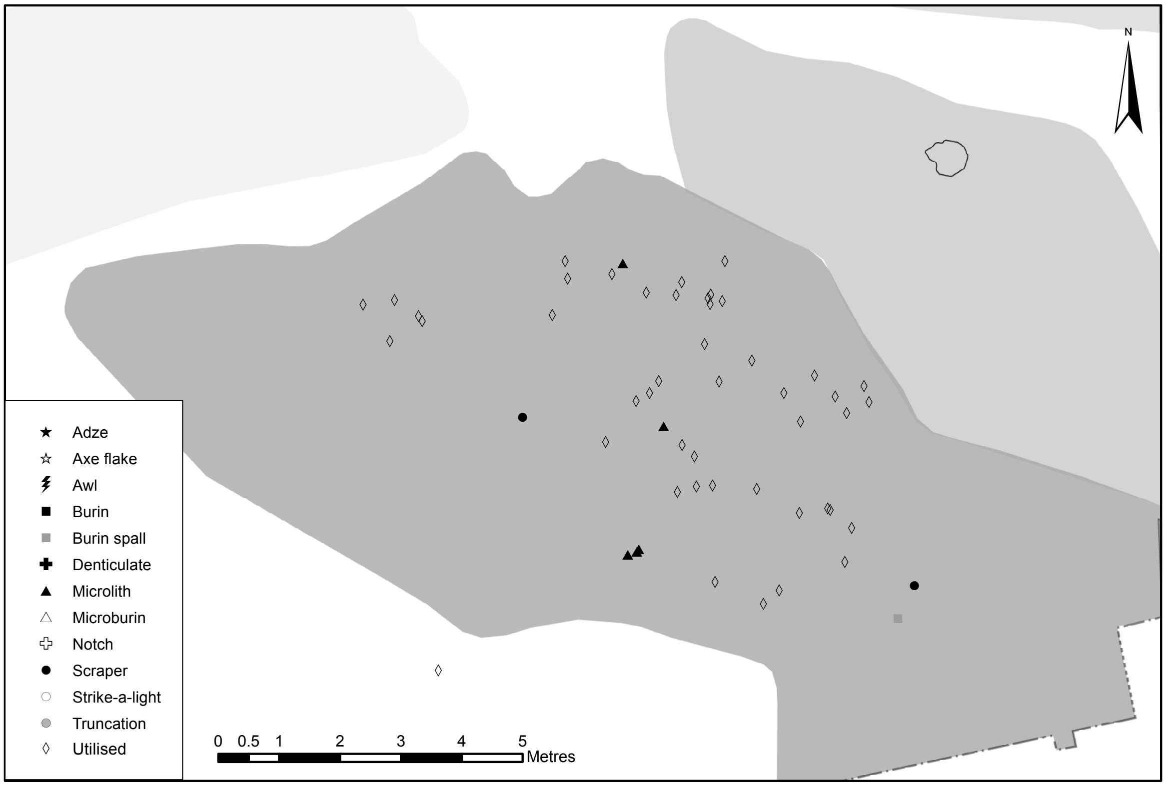


Figure 8.32: Tools from the detrital wood scatter (Copyright Star Carr Project, CC BY-NC 4.0).

arrangement across 180 mm. Spatial distribution and microwear evidence indicate this is likely to represent a composite projectile. All three microliths had soft animal traces (for further discussion see Chapter 35). This projectile may have been lost during hunting, though no haft was observed during excavation. Alternatively, dehafting and deposition of this group is also a possibility. In addition to the three microliths, four further pieces were studied for microwear (Figure 8.33): of these, two, <99314> and <109601>, were used on siliceous plants, whilst the third <108704> was used on soft wood, while the final piece, a scraper <99480> was not used.

Central platform

While both the western and eastern platforms have been kept relatively clean of flint, a moderate-sized assemblage of 177 pieces is associated with the central platform. However, this statement needs qualification in that while the main body of the platform itself is relatively clean, there is a marked concentration of material along its western margins. Some of this material consists of axes and axe flakes, suggesting that it may derive from the overlying 'axe workshop', perhaps sinking into, or being trampled into the softer peat on the southern margins of the platform. Some isolated pieces are present, as can be seen on the other platforms, but a key feature of this platform is the presence of small discrete clusters of lithic material, particularly deposited along its western edge.

These clusters vary in their size and composition. Some are small, such as a cluster of 4 small chips (<10 mm) spread over a 90 mm × 20 mm area and a vertical height of <15 mm. The largest of these clusters (the ×6 cache) is also the most southerly. This consists of 57 pieces, spread over an area of 550 × 550 mm, with the majority within an area of 330 mm × 210 mm (Figures 8.34 and 8.35). The scatter is spread vertically over 40 mm. It was noted during excavation that this cluster was located either side of a flat piece of wood and it was hypothesised that the lithic material was originally deposited in a bag onto this wood. Following decay of the bag, the material would spill either side of the wood. However, it is equally possible that an act of deposition centred on the wood led to material being displaced from the wood into the viscous mud either side through water action or

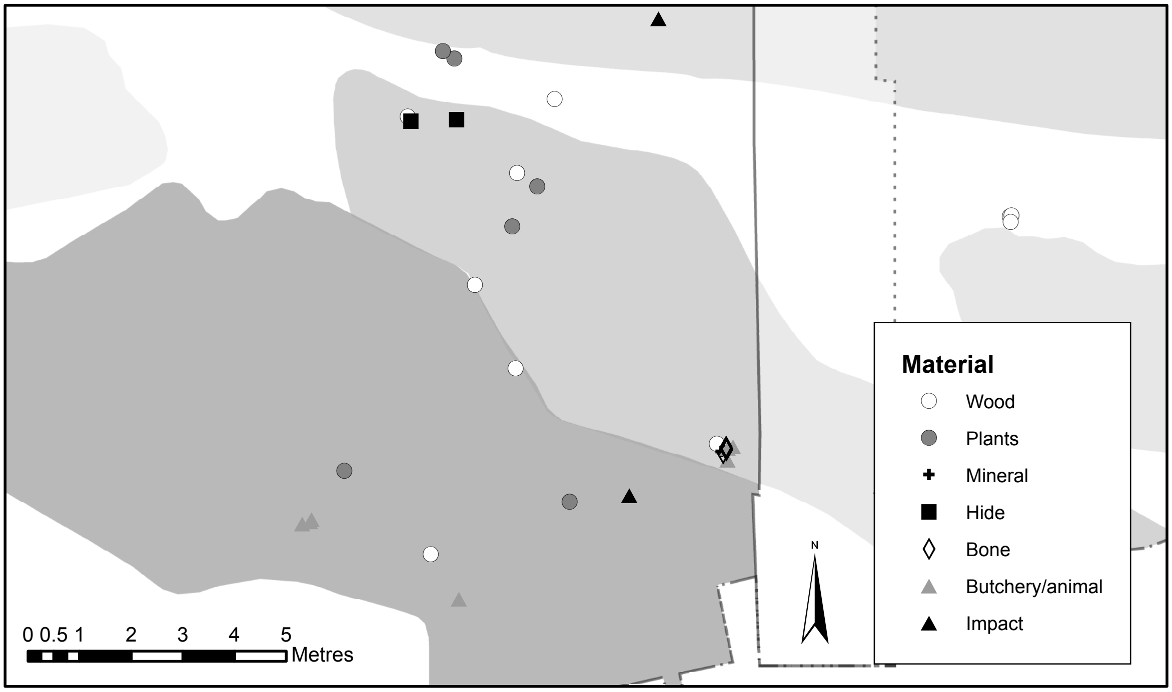


Figure 8.33: Microwear results from the central wetland. The dark grey shading represents the extent of the detrital wood scatter and the lighter grey represents the extent of the central platform (this also includes material at a higher level, above these two structures, which forms part of the axe workshop) (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 8.35: X6 cache (with refits) from the edge of the central platform (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

through the trampling actions of people using the platform. A large component of this scatter is a cluster of nine cores, mostly in their last stages of use and seven shatter fragments, most of which refit to produce two cores. It also consists of bladelets, flakes and fragments.

Microwear on 12 pieces indicates most of these had been used, mainly in the processing of an animal carcass: two pieces, <98971> and <98987>, were used for butchery, one <98985> to scrape soft animal material, four, <98981>, <98988>, <98989> and <98994>, for sawing and scraping bone, one piece <98953> was used on wood, another probably on mineral <98982>, and three (a core, flake and bladelet) were not used. This cluster has the feel of a personal toolkit that may have been lost, or deposited because it was at the end of its use life or even, given the use of the wetland for animal deposition, because of its involvement in animal-related tasks (Chapter 7).

This cluster is in many ways indicative of the sort of material found on the platform more generally. Formal tools are rare (Figure 8.36): five microliths and two scrapers were recovered, again mainly from the western margins of the platform. Two extremely small axes were recovered next to each other on the very margins of the platform. Neither preserves traces of use though their morphology indicates that they are at the ends of their use life and so it is likely that resharpening removed evidence of previous wear. These and axe flakes to the north may derive from the overlying layer, which is focused on axe repair and maintenance (see below). Other tools are represented by single examples. A modest collection of flakes and blades with macroscopic damage was recovered (n=9). These share a similar western distribution to the microliths though a microlith and an utilised piece were also recovered from the far south-east of the platform. Burnt flint is very rare: a single example was recovered at the northern end of the platform and this may, as has been argued in the context of the western platform, be derived from dryland activities further to the north.

Figure 8.34 (page 199): Cache/flint deposit, from the central platform, in situ (Copyright Star Carr Project, CC BY-NC 4.0).

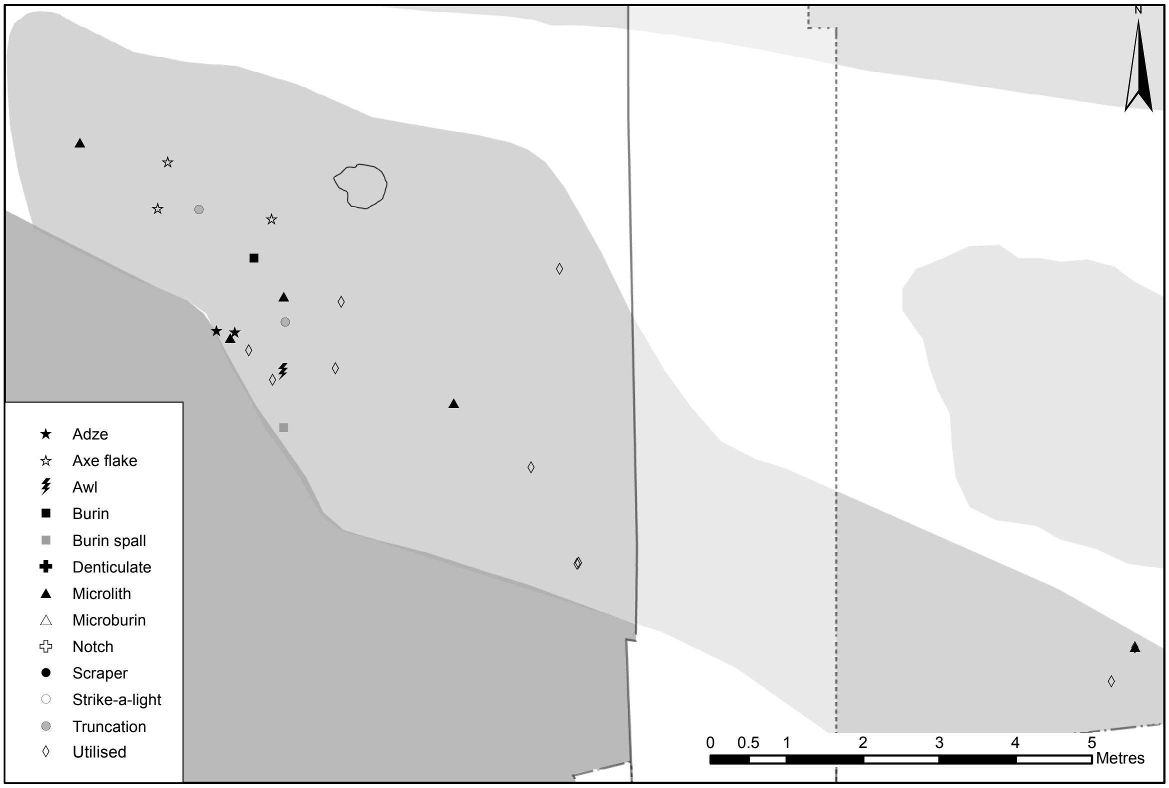


Figure 8.36: Tools from the central platform (Copyright Star Carr Project, CC BY-NC 4.0).

To sum up, the lithic evidence from the central platform suggests it was mainly kept clean. However, there are a series of clusters of flint along its western margins. While most of the clusters clearly seem to be associated with the knapping of a single nodule, there may also be personal toolkits represented. While some of this material may have been trampled from the overlying axe workshop, others seem to be discrete deposits of material, either deposited by people clearing traces of activity that occurred on adjacent dryland areas or representing flint waste derived from the clearing out of boats.

Axe workshop

The axe workshop is one of the largest and densest activity zones in the wetland usually characterised by low lithic densities. 1024 pieces were recovered from an area of 35 m^2. This is likely to represent an intense, short-lived activity event (Figure 8.37). The material is a high-integrity, vertically discrete scatter, spanning just a few centimetres in depths. The scatter is remarkably dense in places and despite being situated on a slight slope; the viscosity of the peat has kept in place large quantities of even the smallest microdebitage. Refitting rates are extremely high. The scatter is situated at the base of the wood peat and top of the reed peat and activity took place at a time when the area was becoming drier. It partially overlies the central platform, often with only a few centimetres of peat separating the axe workshop from the timbers of the platform, and there is some overlap between assemblages associated with the platform and the axe workshop. At the time this assemblage was created it is likely that the platform still represented a feature in the landscape; probably a slight rise of drier ground, but some of the uppermost timbers at the southern and western margins of the platform may still have been partially exposed. The level of the flint scatter seems to dip down from the western end of the platform, suggesting this area retained some of the platform's topography.

This assemblage is so called due to the quantity of axes, axe manufacture debris and resharpening flakes recovered. Four axes were recovered, plus two further examples from the southern area of the central platform

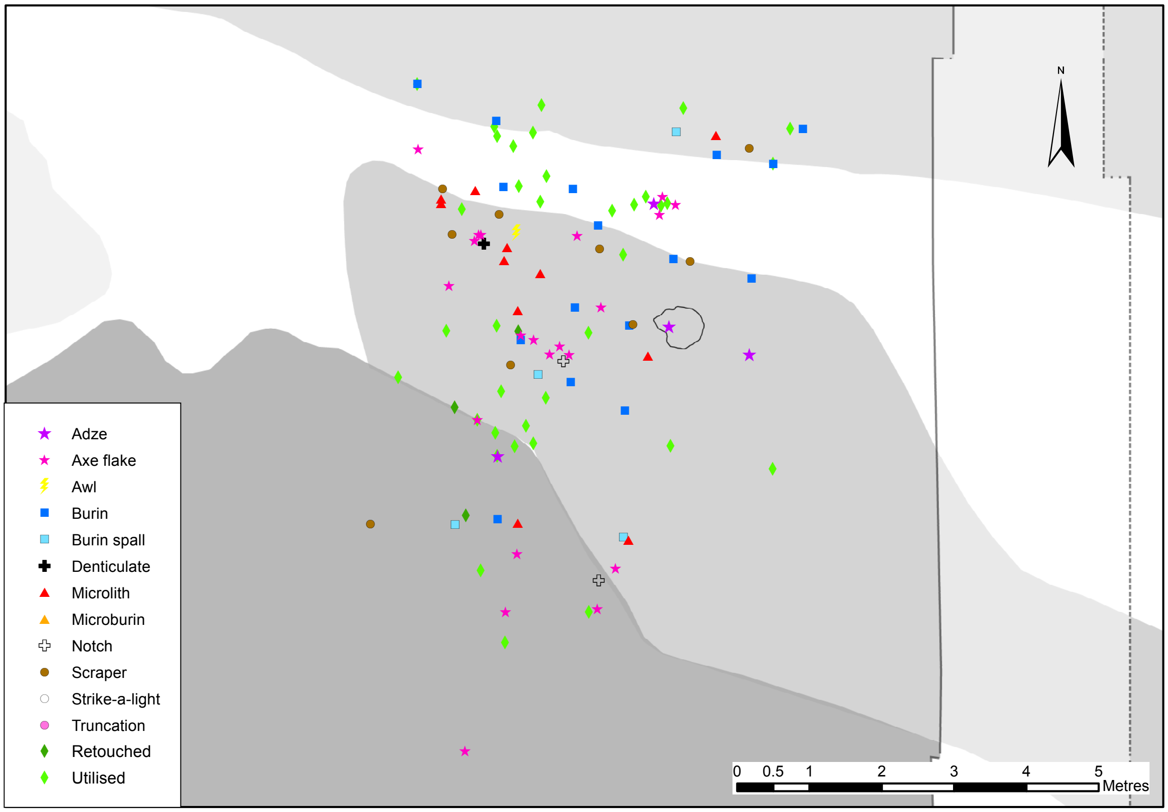
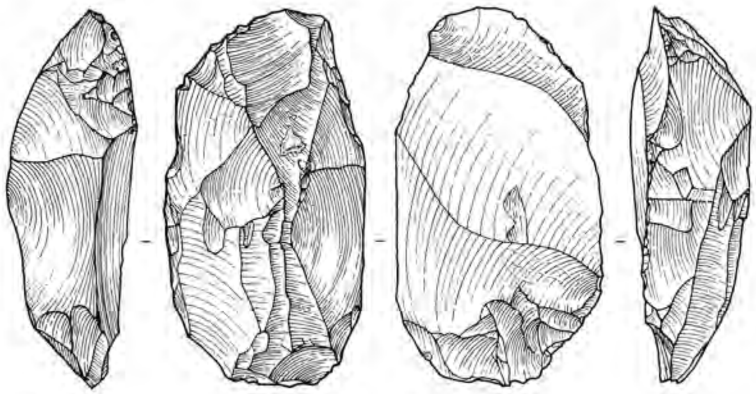


Figure 8.37: Tools found within the axe workshop scatter. The small sub-circular feature is charcoal spread (318) (Copyright Star Carr Project, CC BY-NC 4.0).

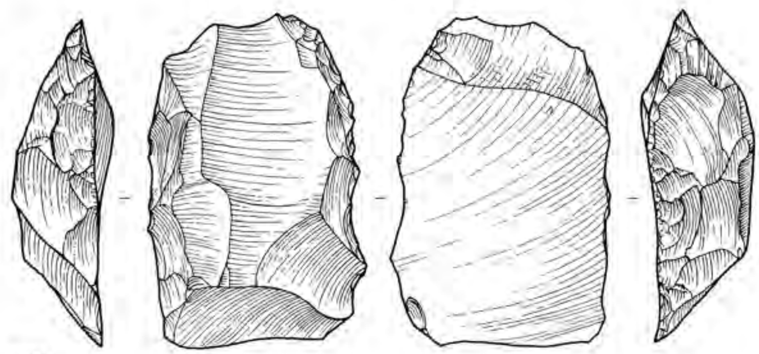
where there is an overlap between the axe workshop scatter and the material associated with the platform. There is greater vertical distribution of material in this southern area suggesting that some of these heavier pieces may have sunk into the underlying platform layer. Also recovered were two extensive refit sequences where the axes themselves were not found and several single tranchet flakes from axes were also missing from the area.

Of the recovered axes, two, <94367> and <99101>, are small (only 48 and 54 mm in length) and seem to have been made on large flakes (Figure 8.38). The other two axes, <99454> and <99150>, are larger. All the axes recovered appear to have been made and finished elsewhere with the refit sequences here only indicating resharpening. This ranges from a single tranchet flake refitted to <99454> (refit group 159), to minor resharpening and thinning of <99101> (refit sequence 126), to a long reshaping and resharpening sequence associated with <94367> (refit sequence 88) (Figures 8.39 and 8.40). Of these axes, only <94367> had evidence of use (woodworking of moderate intensity). Following this, the axe was rejuvenated, but no further use was made of it. An additional sharpening flake from refit sequence 88 was examined for microwear but no evidence for use was found. The remaining axes from this area did not have traces of use, possibly indicating that these too had been rejuvenated before being abandoned. However, <99101> had extensive surface abrasion, at odds with the freshness of the remainder of the assemblage. This suggests that this piece had a different history to the others, e.g. perhaps it had been transported in a bag for some length of time. This axe is the smallest of the four recovered (only 48 mm) and so may have had an extended life history before its deposition here. A small axe with very similar wear was recovered immediately to the south at the level of the platform, perhaps confirming the hypothesis that some of the heavy pieces in the southern part of this scatter had sunk to the level of the platform.

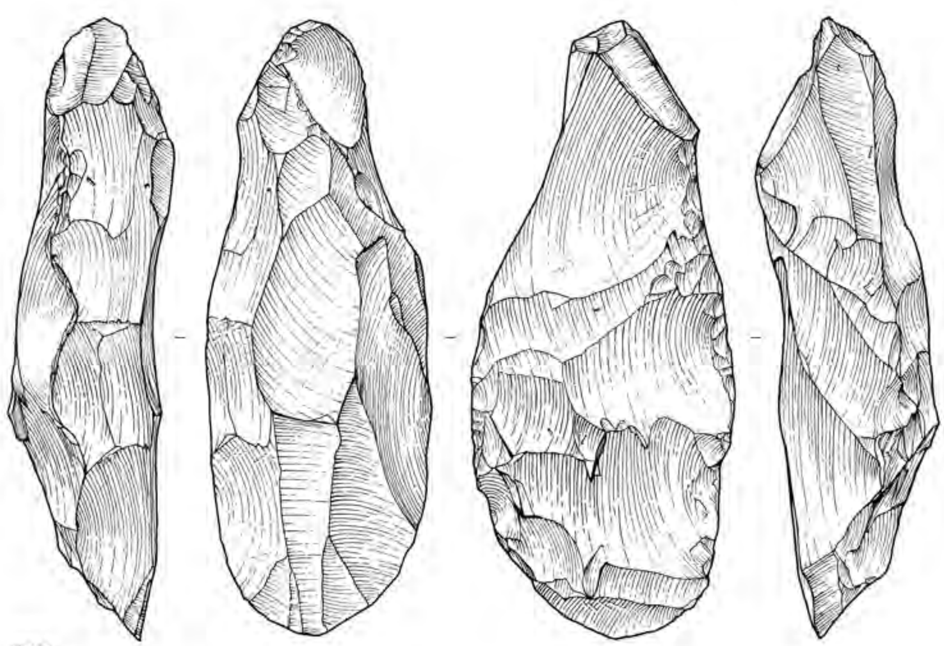
Figure 8.38 (page 203): Axes <94367>, <99101> and <99454> (Copyright Craig Williams, CC BY-NC 4.0).



94367



99101



99454

0 2cm

Figure 8.39: Refitted axe shaping sequence (group 88) including axe <94367> showing (top right) series of tranchet removals sharpening the reverse face, and along uppermost face (both left and right) longitudinal thinning flakes using the surface created by the tranchet blow as a platform. Two transverse thinning flakes (base of image) were also removed along the margins (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

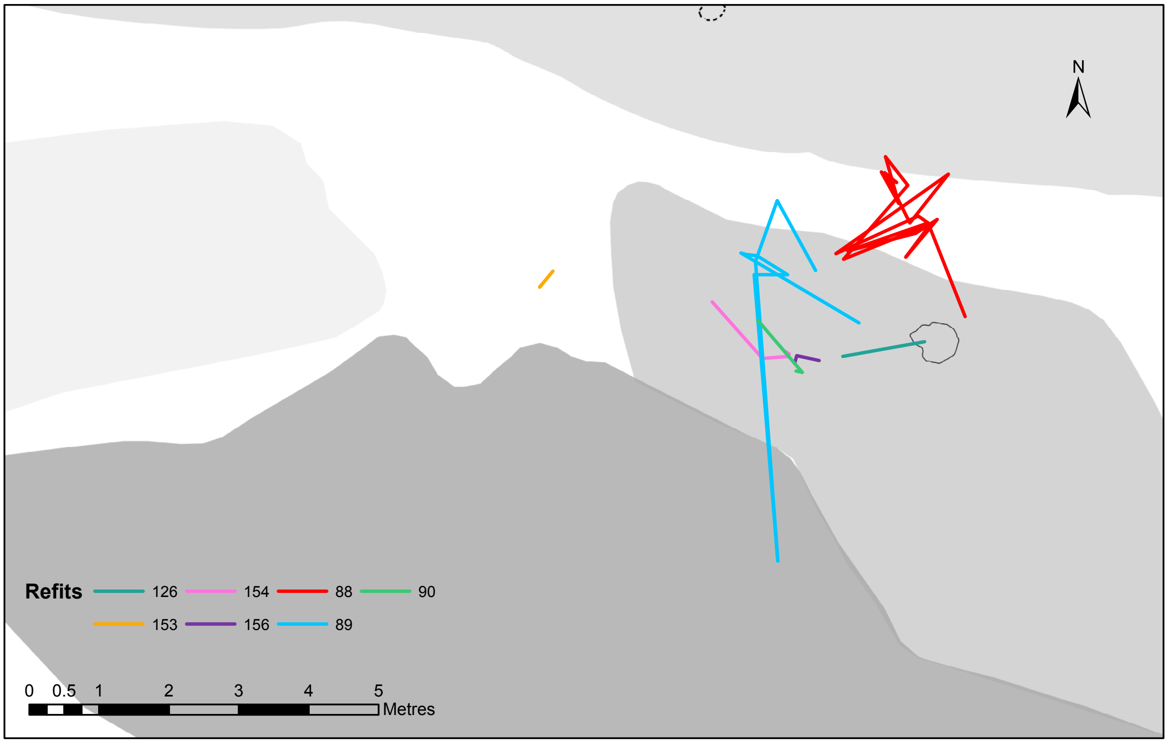


Figure 8.40: Refits from the axe workshop to the north and west of charcoal spread (318) (indicated by circle; see also Chapter 32) (Copyright Star Carr Project, CC BY-NC 4.0).

The two axes represented by the most extensive debitage scatters, one made from Wolds flint and the other from speckled grey till flint, were not recovered and seem to have been removed for use elsewhere. Both these sequences, in contrast to the other sequences where axes were recovered, may represent manufacturing sequences, shaping preformed pieces of material that had been imported to site, though it is equally possible that these represent extensive reworking sequences. Microwear indicates that one of these missing axes (grey till refit sequence 89; Figure 8.41) was used before being removed from the area and a tranchet flake (<98825>) was used for a short duration to chop wood. This is the second-to-last removal in the sequence, while the subsequent removal has no traces of use. This suggests the axes were made, or remodelled, used, rejuvenated, and then removed for use elsewhere.

Axe thinning and sharpening flakes are found in three small clusters around 1–2 m apart from each other (Figure 8.40). These seem to cluster around a hearth/charcoal spread (318) (see Chapter 32). Each cluster is associated with an extended knapping/refit sequence. Immediately to the north of the charcoal spread is refit sequence 88, the reworking of a brown till axe <94367>, found in a fairly tight cluster with the exception of the first removal in the sequence which was found closer to the charcoal spread. The axe itself was recovered from the centre of this cluster, despite being used part of the way through this sequence. The second cluster was found to the north-west of the charcoal spread and consists of the production/reworking of a grey till axe (refit group 89). This has a wider distribution, with three tranchet flakes from this sequence found beyond the immediate area of the scatter. One of these pieces, found closest to the charcoal spread, has been used, though the northernmost piece has not. The southernmost piece, found 4.4 m from the knapping area, was not examined for wear. The final cluster relates to the manufacture of a white Wolds axe that was not recovered from the site. Three small refit sequences (90, 154, 156) relate to this cluster, probably all from the same axe.

Other tools are present in addition to axes, indicating a broad range of activities in this area (Figure 8.37). Burins (n=17) are the most common formal tool and burin spalls (n=4), both primary and secondary, indicate the manufacture and resharpening of these tools; however, the disparity suggests that many were brought in to be used and discarded here. Microliths are the next most common type, represented by 14 examples.

Figure 8.41: Axe resharpening sequence (group 89) with tranchet blows and longitudinal thinning flakes removed from both faces (Photograph taken by Paul Shields. Copyright University of York, CC BY-NC 4.0).

Microburins are absent, suggesting the microliths were brought here as finished tools. Nine scrapers were recovered, as well as rarer examples of a range of other tools: an awl, a truncation, a serrate, three denticulates and two notches. Blades, flakes and fragments with macroscopic damage are present, though in lower numbers than in other wetland assemblages.

There is some spatial patterning to this material. Several utilised blades were found within the small cluster of material represented by the small brown axe reworking sequence. The north-west cluster was associated with a wide range of tools and tasks. Four microliths, three scrapers, an awl and a denticulate were found. One of the scrapers and the awl had been used for working hide, while a core had been used for working wood, reinforcing the idea that woodworking was an important component of activities here. The western scatter is associated with burins and a burin spall, a scraper, a notch used to work wood and some utilised blades, two of which had been used to work plants. The woodworking notch is strongly associated with axe flakes, perhaps suggesting haft maintenance, and given the evidence also for plant working, haft bindings for the axes may have been manufactured at the same time.

Much of the debris in this area is found in small clusters, usually in the range of 4–22 pieces. Each small cluster seems to represent a coherent collection, usually material from a single raw material unit, though they lack associated small debitage. These may represent very short-term knapping events where a handful of flakes and blades were removed from a core or material dumped in the wetland deriving from knapping events on the dryland.

Eastern area

The eastern area encompasses the eastern platform and the proximate wetland edge scatters, 'caches' (named after a raw material cache located there) and the SC22 scatter.

	Eastern platform		Caches		SC22 scatter	
Category	No.	%	No.	%	No.	%
Tools:	***2***	***20***	***18***	***5.75***	***65***	***21.45***
Awl	0	0	0	0	1	0.33
Axe	0	0	0	0	0	0
Burin	0	0	1	0.32	3	0.99
Micro-denticulate	0	0	0	0	0	0
Microlith	0	0	6	1.92	4	1.32
Notch	0	0	0	0	1	0.33
Scraper	0	0	2	0.64	8	2.64
Scraper/burin	0	0	0	0	1	0.33
Retouched	0	0	0	0	3	0.99
Utilised blade	0	0	6	1.92	24	7.92
Utilised flake	2	20	2	0.64	8	2.64
Utilised fragment	0	0	1	0.32	12	3.96
Tool spalls:	***0***	***0***	***1***	***0.32***	***7***	***2.31***
Axe flake	0	0	1	0.32	3	0.99
Burin spall	0	0	0	0	1	0.33
Microburin	0	0	0	0	3	0.99
Core preparation:	***0***	***0***	***3***	***0.96***	***10***	***3.3***
Core tablet	0	0	0	0.32	5	1.65
Crested blade	0	0	3	0.96	5	1.65
Plunging	0	0	0	0	0	0
Debitage:	***8***	***80***	***291***	***60.38***	***221***	***72.94***
Blade	2	20	9	2.88	53	17.49
Flake	6	60	35	11.18	51	16.83
Fragment	0	0	34	10.86	79	26.07
Chip	0	0	189	60.38	24	7.92
Core	0	0	15	4.79	11	3.63
Nodule	0	0	4	1.28	0	0
Chunk	0	0	5	1.6	3	0.99
Total	**10**	**100**	**313**	**100**	**303**	**100**
Burnt	***0***	***0***	***1***	***0.32***	***4***	***1.32***

Table 8.8: Composition of assemblages from the eastern wetland area.

Eastern platform

It has already been demonstrated that the platforms were kept clear of lithic debris and the same is true of the eastern platform which has by far the smallest lithic assemblage of all the platforms. Only 10 pieces were recovered, almost all flakes (n=8), of which two had macroscopic damage. The remaining two pieces were seemingly unmodified blades. All lithic material was recovered from the northern part of the platform suggesting it may relate to activities to the north rather than primarily associated with the platform itself.

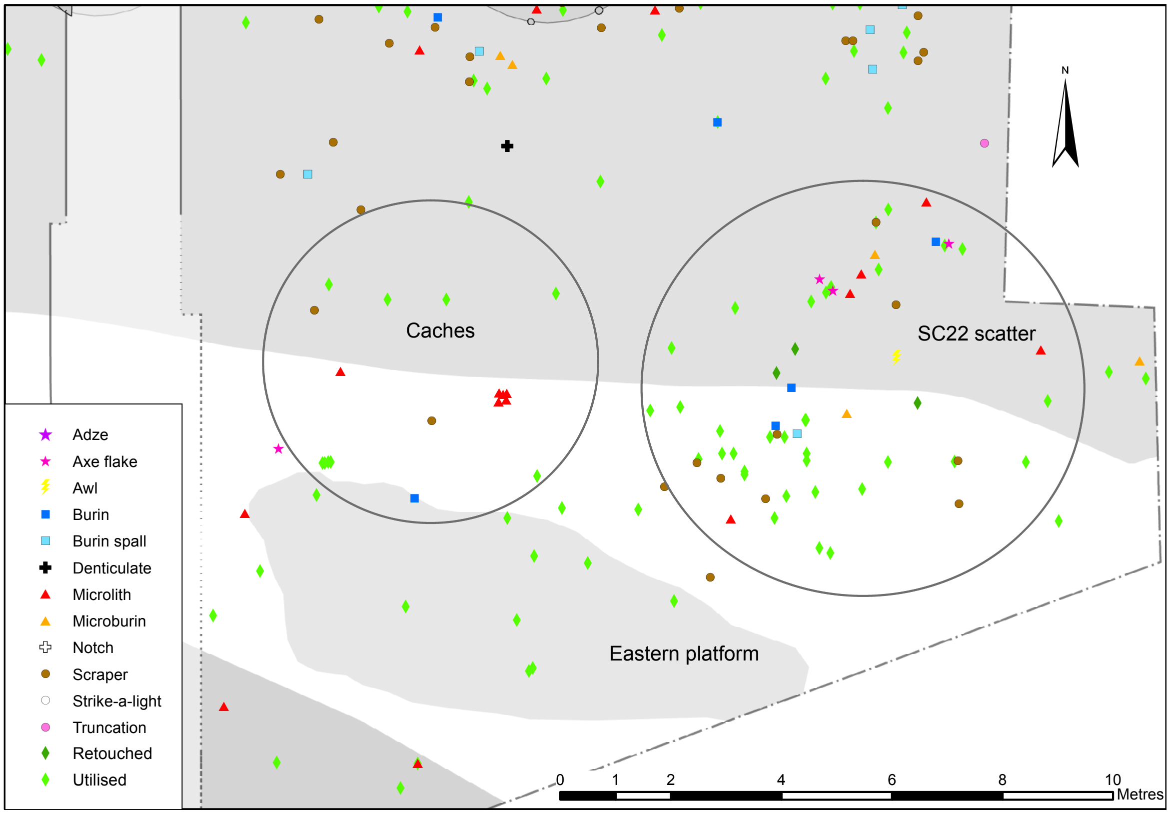


Figure 8.42: Distribution of tools from the eastern wetland (Copyright Star Carr Project, CC BY-NC 4.0).

Caches

In general this is an area with a very low density of lithic material extending between the dryland areas of trench SC23 and the wetland area of the eastern platform (Figure 8.42). This consists of low levels of tools (two scrapers, a burin and two microliths) as well as utilised and unused flakes and blades. There are three clusters of material within this low density background scatter which reveal the area was also used in very specific ways. The first of these is a cache of cores, preforms and chunks of raw material; the second a tight cluster of knapping debris associated with an antler frontlet; and the third, a Late Mesolithic composite tool.

The cache consists of 19 pieces, most of which probably derive from one large nodule that has been split (Figure 8.43). Most of these have been turned into cores through the removal of a few blades, though four remain unmodified shatter fragments and two have single or two removals. Seven of these pieces refit into three groups though probably all but four pieces derive from the same raw material unit. It is likely that this was a raw material cache; though some of the nodules contain flaws, most are high quality. A handful of pieces appeared to have been used. Three of these were examined for wear traces; all retained evidence for scraping wood (Figure 8.43). This cache was found amongst tree roots and it may be that the nodules were used to mark the tree to aid recovery of the nodules.

A second small cluster around 500 mm across consists of small chips and debitage, most of which derive from a single brown cortical till raw material unit. Some of the material refits. This seems to relate to some knapping activity that necessitated shaping, either of a preform core or the preform of a core tool. This small scatter is associated with an antler frontlet. The 3D distribution of this material suggests it may have been deposited in a pit, though none was glimpsed during excavation.

The final cluster in this area most likely dates to around a millennium after Star Carr was abandoned by Early Mesolithic groups. This is a cluster of five Late Mesolithic microliths consisting of four narrow, elongated scalenes and a narrow-backed blade; the former likely serving as barbs, the latter as a tip. If it was a composite tool

Figure 8.43: The AC8 cache. Most pieces derive from a single large nodule of till flint (Copyright Star Carr Project, CC BY-NC 4.0).

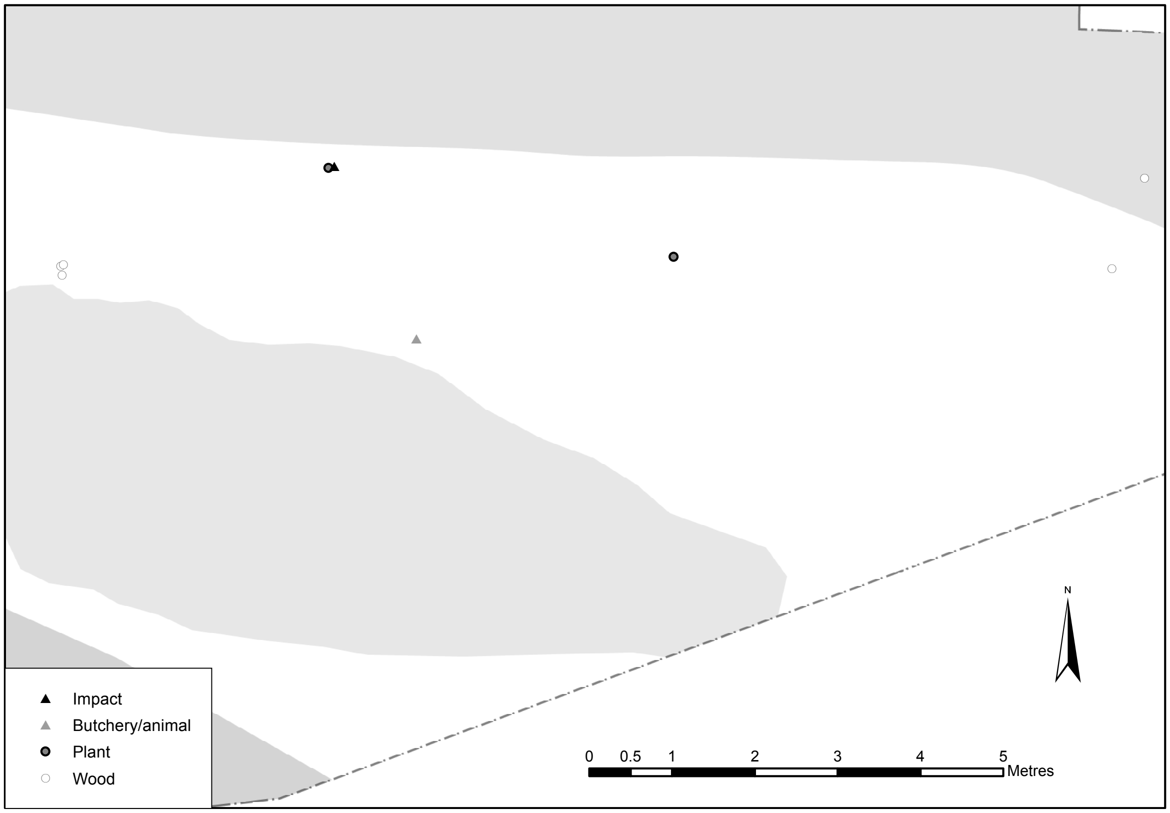


Figure 8.44: Microwear results from the eastern wetland area (Copyright Star Carr Project, CC BY-NC 4.0).

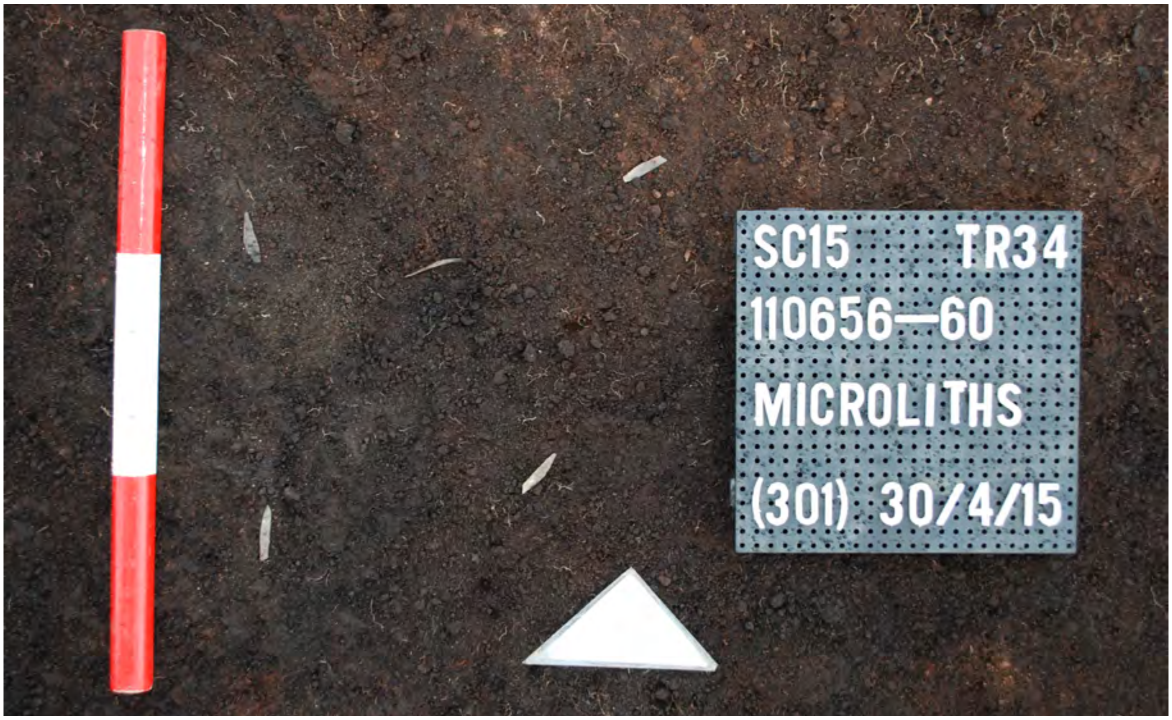


Figure 8.45: Late Mesolithic composite in situ (Copyright Star Carr Project, CC BY-NC 4.0).

it has been slightly disturbed (Figure 8.45). Myers (1986) has argued in the context of the Pennine Mesolithic that some of the isolated microlith clusters recovered from this region may represent caches.

SC22 scatter

The SC22 area assemblage stretches from the dryland of SC23 to the eastern end of the eastern platform. It has more evidence for lithic-focused activities than the cache area, yielding a moderate assemblage of 303 pieces. This has some temporal depth, spanning activity associated with the upper wood peat layers and the lower reed peat. The upper part of this scatter consists of a small assemblage of 45 pieces and on the basis of the Bayesian model (see Chapter 17) represents some of the latest activity at the site. A single microlith was recovered from this scatter, of Deepcar type, suggesting typological change over the lifetime of the site. A scraper and a composite scraper/burin were recovered from this layer as well as several utilised blades.

Also within the upper contexts of the site are a series of small scatters of knapping debitage which include tool production. Three microburins and a broken microlith indicate production and retooling. Axe flakes are also present in the northernmost part of the scatter, though no axes were recovered from the area. Tools are common in this upper layer with scrapers prominent, particularly in the southernmost part of the scatter. Three burins were recovered: two found adjacent to a burin spall and four microliths broadly distributed across the area. Two utilised blades from this area refit to group 48/49; a clear grey nodule that was knapped within the dryland scatter 3 (see eastern dryland area above). One of these blades was used to work wood on the wetland edge. In the reed peat below, the assemblage is a more classic wetland one consisting of large blades and flakes often with macroscopic edge damage. A scraper was also recovered.

The northern and eastern test pits

To the north and east of the main area of open excavation a series of test pits were excavated during the early years of the current project (see Chapter 3). These give some indications of the spread of activity across the site, as well as its nature and intensity.

North of the Hertford

Eight test pits were excavated north of the Hertford Cut. Test pits SC25-28 were excavated along the spine of the northern peninsula. SC32 was located to the west, immediately north of the main excavations, whilst pits SC31, 29 and 30 represent a west to east series going down toward the lake edge in the east. The dryland test pits in this series were almost entirely ploughed out but provide a record of activities in the area (Chapter 3). SC25 was the closest to the Hertford Cut and lithic material was recovered from recent ploughsoil (n=53), a layer of mixed ploughsoil and upcast from the cut (n=41), a pre-upcast ploughsoil (253), and from the glacial till and tree throws within it (n=94) (Table 8.9). As a result, the collection from this pit derives probably both from the

Category	**SC25**	**SC26**	**SC27**	**SC28**	**SC32**
Tools:	***17***	***6***	***1***	***0***	***0***
Awl	2	0	0	0	0
Axe	0	1	0	0	0
Burin	1	0	0	0	0
Denticulate	1	0	0	0	0
Hammerstone	0	0	0	0	0
Microlith	2	1	1	0	0
Micro-denticulate	1	0	0	0	0
Scraper	10	3	0	0	0
Utilised blade	0	1	0	0	0
Utilised flake	0	0	0	0	0
Utilised fragment	0	0	0	0	0
Retouched	0	0	0	0	0
***Tool spall**s:*	***6***	***3***	***0***	***0***	***0***
Axe flake	0	1	0	0	0
Burin spall	5	0	0	0	0
Microburin	1	2	0	0	0
***Core preparation**:*	***1***	***1***	***0***	***0***	***0***
Core tablet	1	1	0	0	0
Crested blade	0	0	0	0	0
Step fracture removal	0	0	0	0	0
***Debitage**:*	***417***	***172***	***62***	***5***	***8***
Blade	25	19	7	0	2
Flake	99	37	11	1	3
Fragment	254	98	40	4	3
Chip	32	12	0	0	0
Core	6	5	3	0	0
Nodule	0	0	1	0	0
Chunk	1	1	0	0	0
Total	**441**	**182**	**64**	**5**	**8**
Burnt	13	5	0	0	0

Table 8.9: Material from test pits located on the northern peninsula.

broad area of the test pit and the area of the Hertford Cut to the south. The figures suggest moderate densities of flint both in this area and to the south and activities to the south involving use of scrapers. SC26 has smaller quantities of flint (n=182). These also derive from a variety of contexts; notably ploughsoil (n=150), tree throws (n=15) and a sandy glacial till (n=13), the latter of which is likely to represent material that is broadly in situ. Moving further south, flint densities decrease with 63 pieces from SC27, all from the ploughsoil with the exception of two which were found within the basal mineral sediment. Finally in SC28, only five pieces were recovered, all from the plough soil. The series of three test pits SC29-31 running west to east were all empty of flint, while only eight pieces were recovered from SC32 to the north of the main excavations; four from ploughsoil and the remainder from upcast.

	SC6		SC8	
Category	**No.**	%	**No.**	%
Tools total:	***24***	***14.91***	***19***	***6.46***
Axe	0	0	1	0.34
Burin	4	2.48	0	0
Denticulate	0	0	0	0
Hammerstone	0	0	0	0
Microlith	6	3.73	5	1.7
Scraper	5	3.11	4	1.36
Truncation	0	0	1	0.34
Utilised blade	7	4.35	5	1.7
Utilised flake	0	0	1	0.34
Utilised fragment	1	0.62	0	0
Retouched	1	0.62	2	0.68
***Tool spall**s:*	***1***	***0.62***	***9***	***3.06***
Axe flake	1	0.62	4	1.36
Burin spall	0	0	3	1.02
Microburin	0	0	1	0.34
Scraper spall	0	0	1	0.3
***Core preparation**:*	***7***	***4.35***	***14***	***4.76***
Core tablet	3	1.86	8	2.72
Crested blade	1	0.62	4	1.36
Plunging	1	0.62	2	0.68
Step fracture removal	2	1.24	0	0
***Debitage total**:*	***129***	***80.12***	***252***	***85.71***
Blade	22	13.66	27	9.18
Flake	36	22.36	77	26.19
Fragment	56	34.72	126	42.86
Chip	11	6.83	14	4.76
Core	4	2.48	1	0.34
Chunk	0	0	7	2.38
Total	**161**	**100**	**294**	**100**
Burnt	5	3.11	32	10.88

Table 8.10: Assemblages from test pits on the northern part of the eastern peninsula.

Eastern peninsula: north area

Test pit SC6 yielded a moderate density of material with 160 pieces in situ (Table 8.10 and Figure 8.46). The northern part of the test pit was cut by a disused drainage ditch so the original figure would have been higher. This assemblage, though small, has a wide range of tools and is balanced between the 'essential' types (Mellars 1976). The only evidence for tool preparation/maintenance is an axe flake. SC8, 20 m to the south-west, has slightly higher densities of 294 in situ pieces. In contrast to SC6, burins are absent from the assemblage (though three burin spalls are present), with microliths and scrapers dominating. A key activity appears to have been

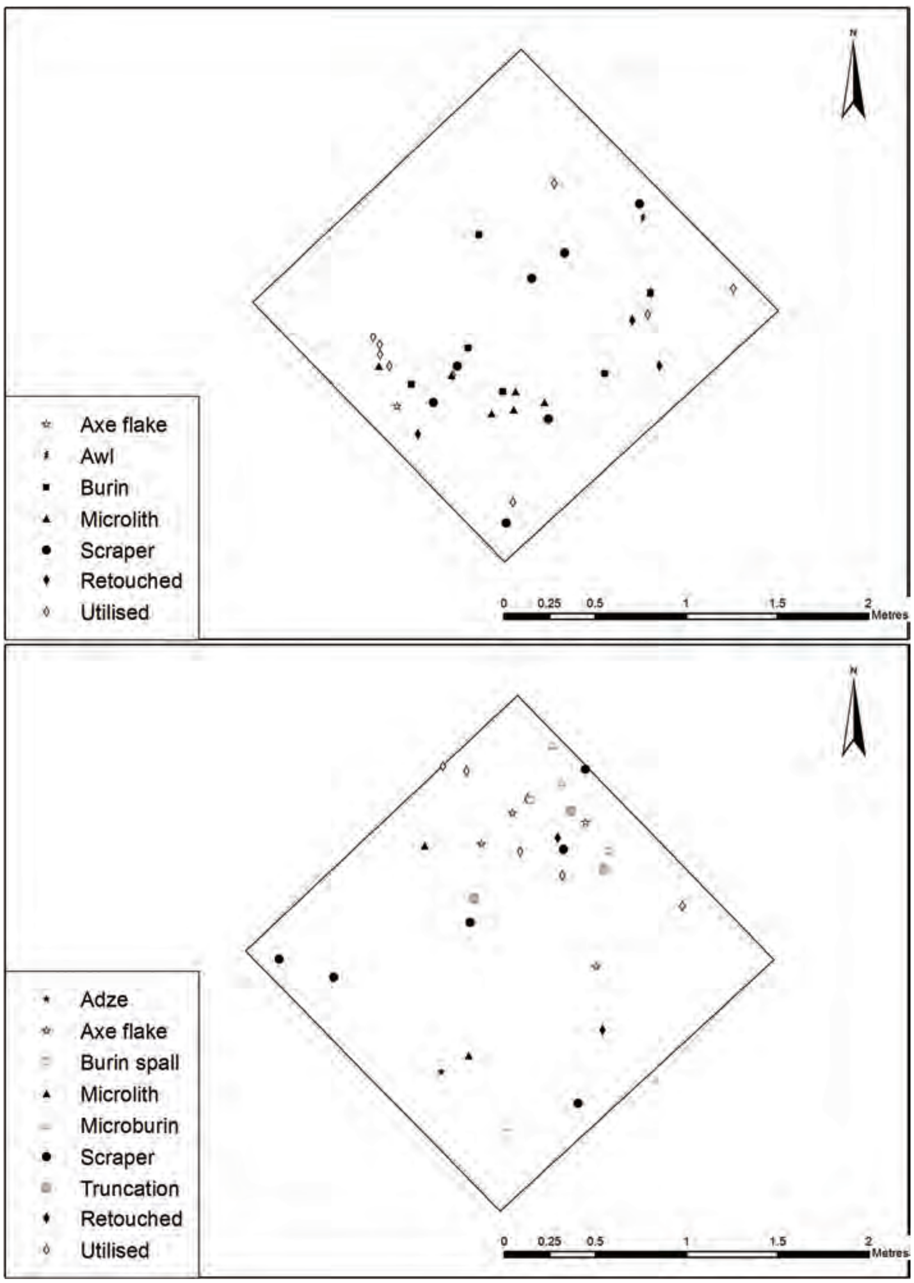


Figure 8.46: Distribution of tools in test pits SC6 (top) and SC8 (bottom) (Copyright Star Carr Project, CC BY-NC 4.0).

axe production/maintenance with four till axe flakes clustering in the northern corner of the test pit and an axe made of Wolds material recovered from the southern part. The northern area appears to have been a tool production area more generally as two of the burin spalls and two microburins were also recovered here. Burnt flint is clustered in this same area possibly indicating a hearth.

Eastern peninsula: central area

Several test pits were excavated in this area including the larger trench SC21, which stretches along a low shelf between dryland and wetland (Figure 8.47 and Table 8.11). SC21 represents one of the lowest-density areas of the site with only 63 pieces of flint recovered from an 11 × 3 m area. Tools in this area are also rare with only two burins and a single example of a microlith, scraper and truncation recovered. Three utilised pieces derive from the part of the trench closest to the water's edge. To the south of this trench is SC2, a wetland test pit located immediately to the west of the shoreline and only one piece of flint was recovered from this pit: a retouched fragment. To the east of SC2 is SC4, a 1 m^2 test pit, revealing a low- to medium-density scatter based on the reduction of a brown nodule of till flint; two utilised pieces are present but no formal tools. The northernmost dryland test pit in this area is SC10, located c. 20 m to the east of SC21. This also revealed a low-density scatter of 37 pieces. Formal tools and tool spalls were absent with only two retouched fragments and an utilised blade recovered. Finally in this central area are (from west to east) test pits SC1 and SC12, providing evidence for low-density lithic activities. In the southern part of the central area are test pits SC1 and SC12 (Figure 8.48). SC1 yielded 36 pieces of flint including a burin and two scrapers, recovered side by side. There is no evidence for tool production or maintenance. Two utilised pieces were found on the southern boundary of the test pit.

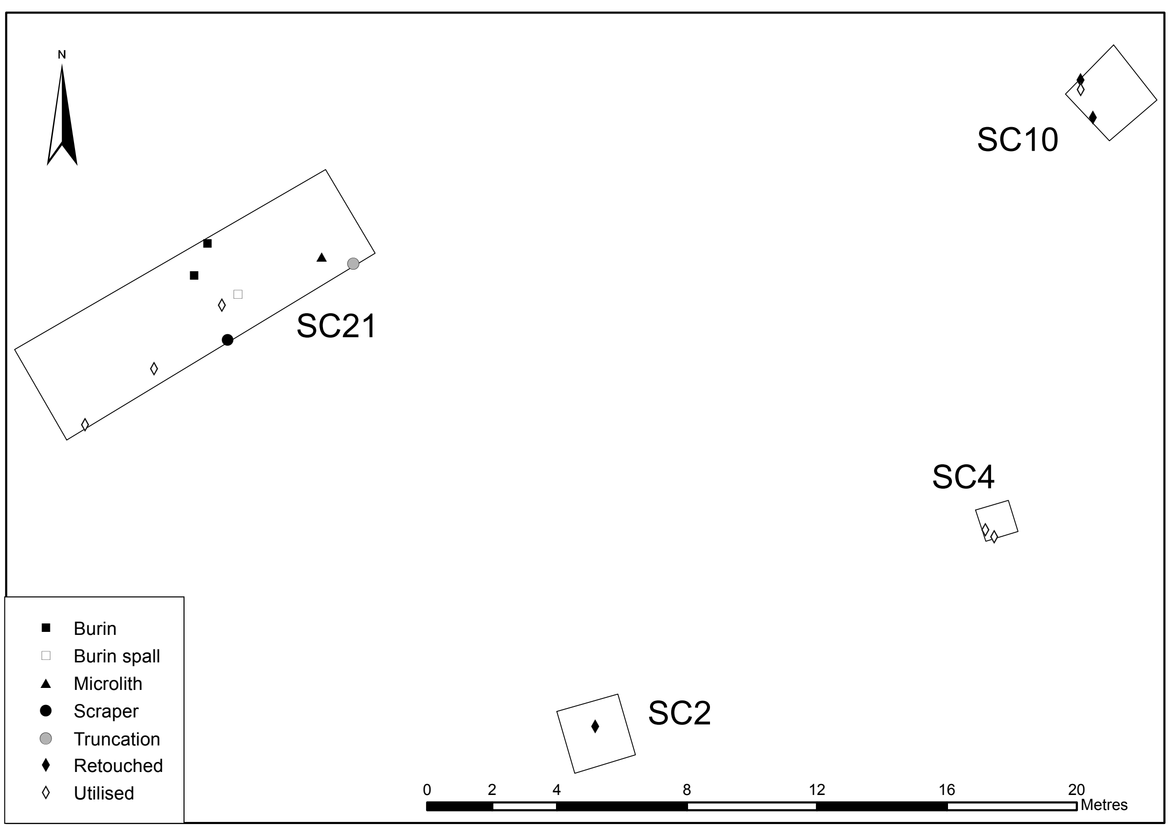


Figure 8.47: Distribution of tools in trench SC21 and test pits SC2, SC4 and SC10 (Copyright Star Carr Project, CC BY-NC 4.0).

Category	SC1	SC2	SC4	SC10	SC12	SC21
Tools total:	***4***	***1***	***2***	***4***	***5***	***9***
Burin	1	0	0	0	0	2
Hammerstone	0	0	0	0	1	0
Microlith	0	0	0	0	0	1
Scraper	2	0	0	0	2	1
Truncation	0	0	0	0	0	1
Utilised blade	1	0	1	1	0	2
Utilised flake	0	0	1	0	0	1
Utilised fragment	0	1	0	0	0	1
Retouched	0	0	0	3	2	0
Tool spalls:	***0***	***0***	***0***	***0***	***0***	***2***
Burin spall	0	0	0	0	0	1
Microburin	0	0	0	0	0	1
Core preparation:	***1***	***0***	***0***	***4***	***4***	***2***
Core tablet	0	0	0	1	1	0
Crested blade	0	0	0	2	3	1
Plunging	1	0	0	0	0	1
Step fracture removal	0	0	0	1	0	0
Debitage:	***18***	***0***	***26***	***30***	***107***	***51***
Blade	5	0	7	10	11	12
Flake	1	0	6	7	34	17
Fragment	9	0	11	10	51	17
Chip	1	0	0	2	7	5
Core	1	0	0	0	3	0
Chunk	1	0	2	0	0	0
Total	**23**	**1**	**28**	**37**	**115**	**64**
Burnt	1	0	2	4	30	1

Table 8.11: Assemblages from test pits on north-central part of the eastern peninsula.

SC12, only 1.7 m to the east of SC1, has increasing densities of material (n=115), including a cluster of burnt flint probably indicating a hearth.

Eastern peninsula: southern area

Six test pits were excavated on the southern portion of the eastern peninsula (Table 8.12; Figure 8.49, Figure 8.50). The larger 2 m test pit SC14 was excavated along the spine of the peninsula and the smaller test pits SC3 and SC5 were located to the west and east respectively. Very little material was recovered from the two smaller test pits: only one core came from SC3, whilst 12 pieces came from SC5. The material from the latter, though disturbed by spring action, has the appearance of a wetland assemblage with a couple of large utilised blades recovered. The material from SC14 is similar to that from test pits in the north-central portion of the peninsula in terms of densities with only 44 pieces recovered. Formal tools are present and are dominated by truncations, a tool relatively rare on the site. Three of these were recovered from the western corner of the trench adjacent to two utilised fragments and an utilised blade and in the same area as a cluster of burnt flint, possibly indicating a hearth. A scraper was also recovered from this test pit.

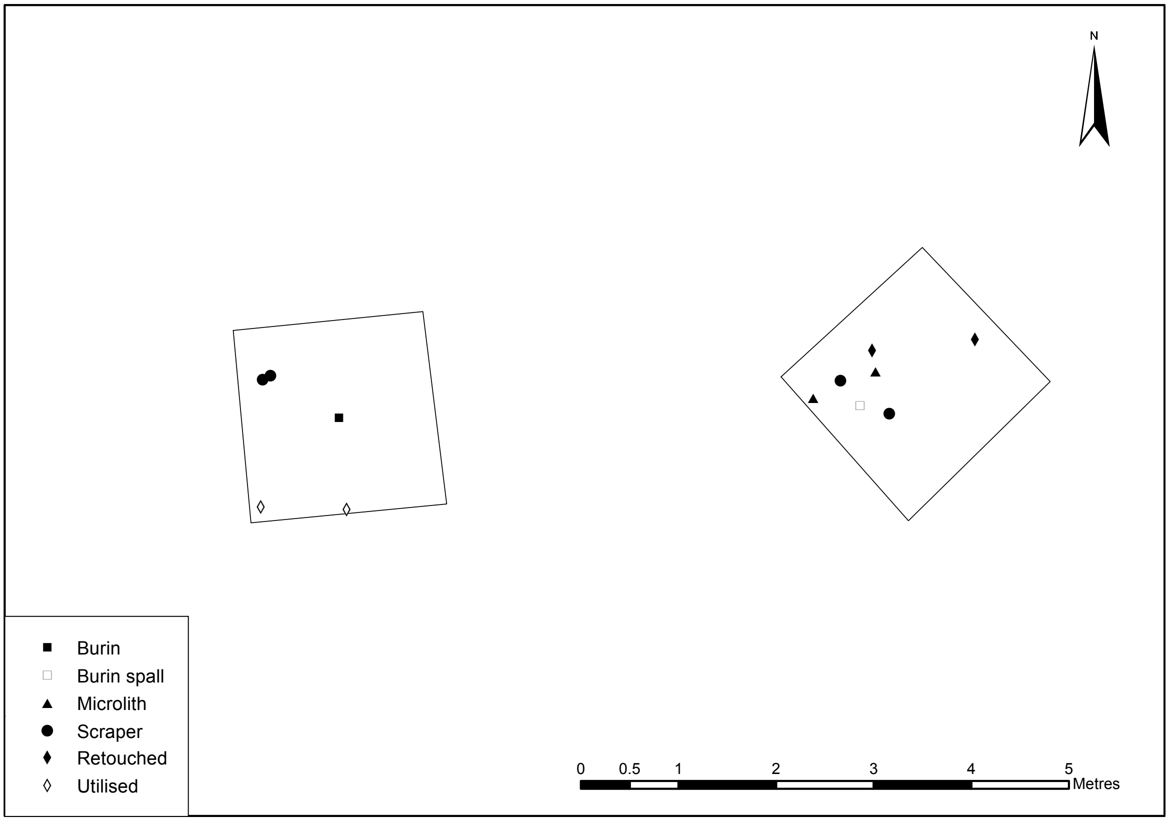


Figure 8.48: Distribution of tools in SC1 (left) and SC12 (right) (Copyright Star Carr Project, CC BY-NC 4.0).

Figure 8.49: Distribution of tools in test pits SC14 (left) and SC5 (right) (Copyright Star Carr Project, CC BY-NC 4.0).

Category	SC3	SC5	SC14	SC16	SC18	SC20
Tools total:	***0***	***2***	***4***	***36***	**37**	**1**
Burin	0	0	0	2	3	0
Denticulate	0	0	0	0	1	0
Hammerstone	0	0	0	0	1	0
Microlith	0	0	0	7	6	0
Scraper	0	0	1	8	1	0
Scraper/burin	0	0	0	1	0	0
Truncation	0	0	3	4	0	0
Utilised blade	0	2	2	6	16	0
Utilised flake	0	0	0	0	2	1
Utilised fragment	0	0	2	2	4	0
Retouched	0	0	0	6	3	0
***Tool spall**s:*	***0***	***0***	***0***	***7***	***4***	***0***
Axe flake	0	0	0	0	2	0
Burin spall	0	0	0	6	1	0
Microburin	0	0	0	1	1	0
***Core preparation**:*	***0***	***0***	***2***	***15***	***8***	***0***
Core tablet	0	0	2	8	4	0
Crested blade	0	0	0	7	3	0
Step fracture removal	0	0	0	0	1	0
Debitage:	***1***	***10***	***34***	***608***	***249***	***3***
Blade	0	2	5	74	40	1
Flake	0	3	10	125	57	2
Fragment	0	5	16	341	125	0
Chip	0	0	0	55	21	0
Core	1	0	0	8	3	0
Chunk	0	0	3	5	3	0
Total	**1**	**12**	**44**	**666**	**298**	**4**
Burnt	0	0	5	187	60	0

Table 8.12: Lithic material from test pits in south-central area of the eastern peninsula.

Three test pits were excavated on the southernmost part of the peninsula (Table 8.13, Figure 8.50). Twenty metres to the south-west of SC14 lies SC16. Here densities rise considerably with 666 pieces recovered indicating an intense area of activity. Tools are common, with the formal tools balanced between scrapers (n=8) and microliths (n=7). Burins are less common (n=2) though a composite scraper/burin is also present. Truncations, as in SC14, are common, with four examples recovered. Retouched and utilised blanks are also well represented. Tool production and maintenance is indicated by the presence of a microburin and two burin spalls. Burnt flint is common across the test pit with no indications of any clusters. This, combined with the high densities, could indicate an area of greater spatial complexity such as a midden or structure. SC18 produced a relatively dense scatter of 298 pieces, dominated by microliths (n=6), with smaller quantities of burins (n=3) and a single scraper. Retouched and utilised blanks are common (n=26). Tool production and maintenance activities are indicated by a couple of axe flakes in the western corner, a burin spall and a micro-intermediate, indicating microlith production. Tools are clustered in the central area where all the burins, a denticulate, two

Sub-assemblage location	% tools	% utilised blades	% chips (<5 mm)	% burnt flint
***Open water/ seasonally submerg*ed**				
Detrital wood scatter	47.50	20.83	0	0
Clark's area	49.80	21.90	0.32	2.41
South of Clark's area	33.73	13.25	0.20	3.21
Brushwood	30.51	15.25	0	4.17
Western Platform	23.08	15.38	15.38	10.53
Central Platform	16.95	2.56	3.95	0.56
Eastern Platform	20.00	0	0	0
Wetland edge/fen carr				
North of cutting III (bead area)	23.01	9.08	15.74	4.54
Axe workshop	9.18	2.05	12.98	0.98
Fen flint scatter	13.65	4.45	2.37	2.37
Dryland				
Western Structure	6.50	1.44	23.78	34.8
Central Structure	6.88	1.23	8.35	4.18
Eastern Structure	7.03	0.63	8.12	23.32
Moore area	6.20	1.55	6.01	15.89
Scatter 1	5.22	0.89	4.66	13.43
Scatter 2	4.30	0.48	5.33	28.26
Scatter 3	6.20	1.66	8.32	9.53
Scatter 4	4.10	0.52	6.72	30.30
Scatter 5	5.78	1.19	3.43	10.37
Scatter 6	12.16	4.73	1.35	2.70
Scatter 7	14.20	4.73	10.65	11.38

Table 8.13: Comparison of key features of dryland and wetland assemblages.

microliths and a scraper were recovered. The assemblage from the waterlogged test pit SC20 at the end of the peninsula is entirely wetland in character. It consists of a large blade (78 mm) and three large flakes, one of which bears evidence for utilisation.

Discussion

Analysis of the lithic material from the current excavations has revealed distinct contrasts between the lithic material recovered from the dryland and the wetland areas of the site. Broadly, the lithic material from the dryland can be characterised as composed of dense in situ knapping scatters, often focused on hearths, interspersed by areas of tool use. There are also structures and middens where varying amounts of clearance and maintenance have been carried out. The activities undertaken on the dryland were extremely varied with knapping and all categories of tools and tool spalls represented. Because of the focus on knapping, proportions of tools within structures and large scatters are low, between 4.1% and 7.03% (Table 8.13), though percentages are higher in the smaller scatters and tool-use areas. Burnt flint by contrast is common, in general greater than 10% and up to 34.8% in the western structure.

In the wetland, lithic assemblages are, with some exceptions, of low density and mainly composed of used and discarded tools. Percentages of tools vary between 16.95% and 49.8% in wetland areas and between 9.18%

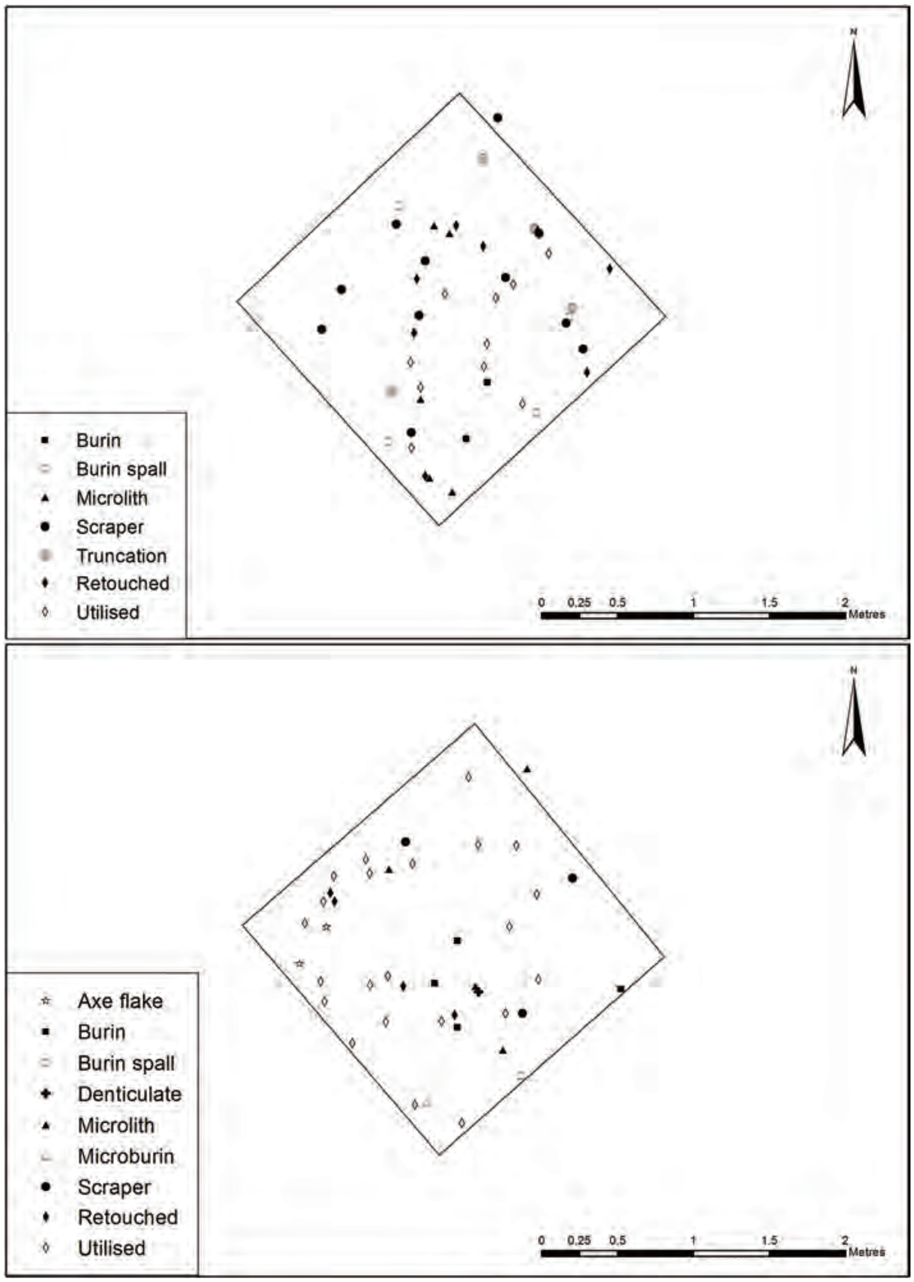


Figure 8.50: Distribution of tools in test pits SC16 (top) and SC18 (bottom) (Copyright Star Carr Project, CC BY-NC 4.0).

and 23.01% in wetland edge areas where knapping also occurred. Burnt flint is rare, representing between 0% and 15.38% of wetland assemblages and where it occurs is usually closest to the dryland (Figure 8.1). Small chips are also rare, between 0% and 15.38% of wetland assemblages, with examples again mainly towards the dryland size.

Blades are also longer in the wetland, averaging at 44.9 mm for wetland edge examples, 47.7 mm for Clark's area, and 49.2 mm for the detrital wood scatter, in comparison with an overall assemblage average of 42 mm. Utilised blades have a particularly strong association with the wetland composing between 13.25% and 21.9% of wetland assemblages, excluding platforms where, with the exception of the central platform, they are

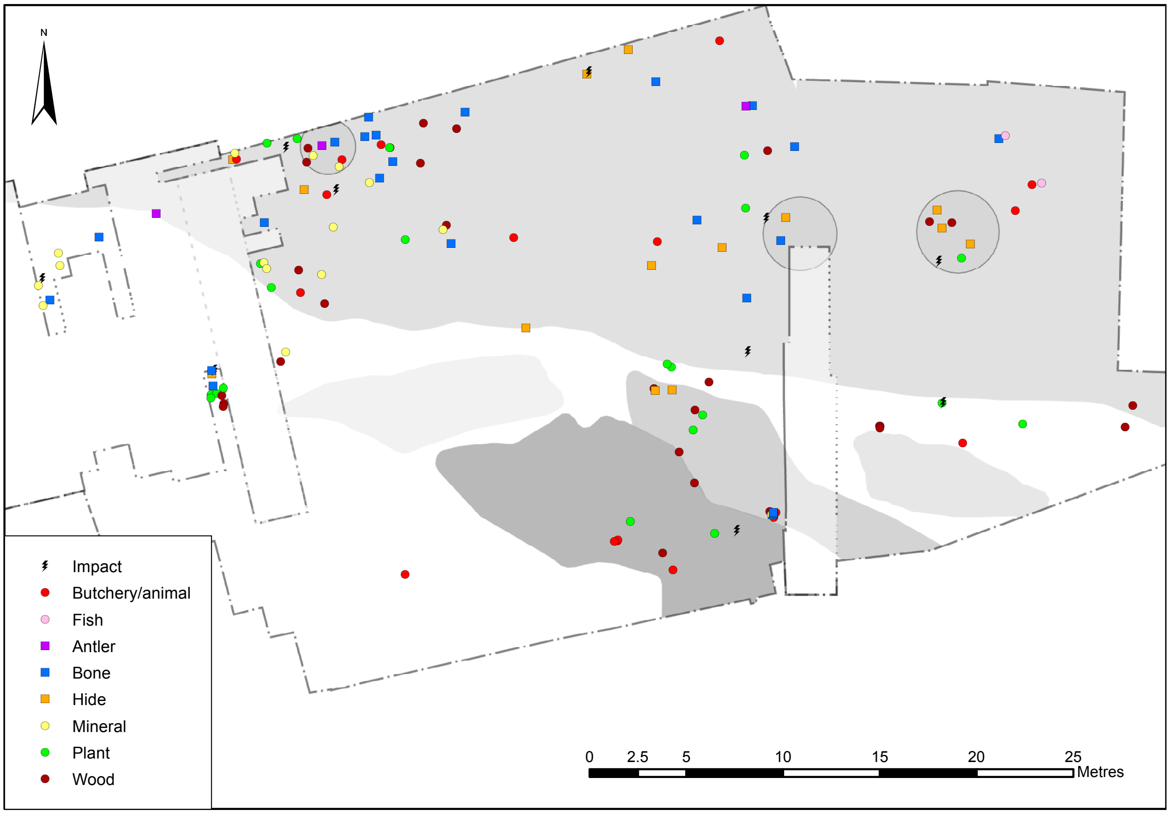


Figure 8.51: Microwear results across the site (Copyright Star Carr Project, CC BY-NC 4.0).

uncommon. They are particularly well represented in Clark's area. Utilised blades are less common in wetland edge assemblages, apart from the bead manufacturing area north of Clark's cutting III, where they are found in large numbers. Microwear indicates that the tools deposited in the wetland had a much more restricted range of use than those from the dryland: tools along the wetland edge were mainly used to work plants and wood; those from open water were used for plants, wood and in particular, the killing and butchery of animals (Figure 8.51). This latter group must represent artefacts deposited in the lake waters and may represent formal acts of deposition connected with the animal-focused wetland depositionary practices (see Chapter 10).

Conclusions

The excavation of a large open area and the use of an arsenal of techniques have allowed us to understand the rhythms of lithic procurement, working, use and deposition on a large site that was occupied for a long period of time. Such patterns could only be guessed at if a smaller area had been excavated. A key feature is the complexity of the lithic patterning. Star Carr is very different from Upper Palaeolithic sites where a tendency for short or single occupations makes refitting unproblematic and spatial patterning clear (see e.g. Conneller and Ellis 2007; Conneller 2007). While some discrete refitting scatters are present at Star Carr, these are the exception rather than the rule. Material has been cleared from structures and dumped elsewhere, as well as scavenged from previous occupations. In the wetland there are episodes of deposition resulting from activities on the lake edge but also from more formal acts of deposition.

A second clear finding points to ways in which different topographic/environmental zones were used, a pattern broadly noted before (Mellars and Conneller 1998; Conneller and Schadla-Hall 2003) but elaborated in this study. The dryland was used for flint knapping and tool manufacture, butchery and varied domestic and craft-focused activities. The wetland edge was used for discrete tasks, occasionally involving flint knapping/tool manufacture but more often activities focused on the cutting of reeds and rushes and for woodworking. Further out in the lake tools were deposited: these were often utilised blades, used for butchery as well as the same reed/woodworking tasks seen for the wetland edge. These patterns of wetland deposition were repeated in very similar ways from the earliest occupation of the site, the detrital wood scatter, to the deposition of material in Clark's area several hundred years later (see Chapter 9), suggesting long-term rules governing deposition.

PART 4

Interpretation

'...the need was no longer to excavate and classify flint implements or rely upon fortuitous discoveries of loose objects of bone or antler, but to excavate a site capable of yielding direct information about the way of life of Maglemosian man and about the character of his immediate environment.'

(Clark 1954)

CHAPTER 9

Interpretative Narrative of the History of Occupation

Nicky Milner, Barry Taylor, Chantal Conneller and Alex Bayliss

Introduction

There has been a long tradition in archaeological and anthropological research of viewing hunter-gatherers as people without history. Past interpretations of the Mesolithic have followed suit, with Star Carr seen as representing the basecamp or hunting camp of an endlessly repeating seasonal round (e.g. Clark 1972; Jacobi 1978; Legge and Rowley-Conwy 1988; see Conneller 2005 for a review and Chapter 11, this volume). Though Clark established the date of Star Carr, both through the system of pollen zonation and through radiocarbon dating (Clark 1954, 12, and see Chapter 17), and noted that it had been occupied on at least two occasions (Clark 1954, 9), he made no reference to potential changes in forms of activity at the site during the time it was inhabited.

It was only with renewed palaeo-environmental work at the site that evidence for long-term, repeated occupation became evident (Dark 1998a). Microcharcoal evidence was used to demonstrate intermittent occupation over several hundred years, interspersed with periods of abandonment (see Chapter 17). While this advanced our knowledge of the *chronology* of occupation of Star Carr far beyond what was known for other British Mesolithic sites at that time, human activities (beyond burning) could not be tied into this sequence, thus its *history* remained unaddressed. One of our motivations for returning to the site was to link the periodicity of occupation (as represented by the microcharcoal evidence) to the activities represented by the artefacts, and from this to understand the history and development of human occupation of the site. Opening up trenches on a large scale, focusing on stratigraphy in conjunction with 3D recording (Chapter 15), and a large-scale programme of radiocarbon dating (Chapter 17) has enabled us to develop a much more detailed understanding of the history of occupation

Our understanding of the chronologies of the environment around the lake edge, and human activity within it, is based on the twin planks of the archaeological and palaeo-environmental stratigraphy, and the suite of 223 radiocarbon measurements from the site. These different forms of evidence have been combined using formal statistical methodology to provide quantitative date estimates for transitions in the environment and human activities within it. This Bayesian chronological modelling is reported in detail in Chapter 17. Formal

Figure 9 (page 223): A reconstruction of the lakeshore with a reed bed, fish drying rack and structure (Copyright Marcus Abbott, CC BY-NC 4.0).

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date estimates provided by this model are presented in *italics* with a reference to the relevant parameter name and the figure on which it can be found. However, this is ultimately an interpretative narrative. The lack of stratigraphy within the dryland areas, coupled with the presence of a plateau on the radiocarbon calibration curve between c. 9100 and c. 8800 cal BC, renders the chronological position of even those dryland structures that have produced coherent groups of radiocarbon measurements uncertain. Other lithic scatters and areas of activity on the dryland lack radiocarbon dates entirely. Here our chronological placing of these is based on archaeological reasoning, and techniques such as refitting. Where uncertainty is present this is stated in the narrative.

A history of occupation

In the beginning, there were beavers. Gnawed wood at the bottom of the brushwood sequence shows that before Mesolithic groups came to the lake, other beings lived there (Chapter 28). These animals inhabited a landscape that was changing rapidly in response to the sharp rise in temperature at the start of the Holocene. Aquatic plants were colonising the lake, creating colonies of water-lily, pondweed, and rafts of the floating plant water-milfoil as well as beds of the aquatic algae stonewort (Dark 1998a). Bulrush and other emergent plants were becoming established in the shallower water at the edge of the lake, creating a narrow fringe of wetland vegetation, whilst across the dry ground, areas of open grassland were being replaced by scrub vegetation and birch.

Even then it was a landscape that may have contained visible traces of past human activity. At the start of the Holocene, Final Palaeolithic Long Blade groups had visited Lake Flixton, leaving evidence for substantial activity on its northern shore at Seamer C, and more ephemeral traces at both Seamer L and Flixton Island (Conneller 2007). Star Carr may also have been a focus for Long Blade activity. A possible bruised blade was found in upcast from cleaning out the Hertford Cut (the canalised River Hertford) which truncates the northern part of the site, and a couple of large faceted blades derive from the western part of the site.

At Star Carr, contemporary with the other Long Blade activity around Lake Flixton, is worked timber <110553>, which was found within the western area of the detrital wood scatter. This timber was found within the organic sand (320), representing one of the lowest elements of this scatter of material. The timber is relatively large, measuring 650 × 62 × 25 mm and is a radial ⅓ split, with the split fading out at one end: this is highly unlikely to have occurred naturally. This radially split timber dates to *9745–9725 cal BC (1% probability; 110553;* Figure 17.20) or *9670–9475 cal BC (94% probability)*, probably to *9660–9575 cal BC (65% probability)* or *9525–9510 cal BC (3% probability)*. This is *125–395 years (95% probability; gap 110553/Star Carr;* Figure 17.19), probably *230–365 years (68% probability)* before the start of Mesolithic activity at Star Carr (*start Star Carr*; Figure 17.2) (Figure 9.1). Though the timber predates the earliest evidence for Mesolithic occupation by at least a century, its stratigraphic position suggests it was redeposited in the position from which it was recovered by Mesolithic people.

Organic sediments had begun to accumulate across the lake margins at Star Carr from *9635–9445 cal BC* (*94% probability; first EZ1*; Figure 17.22) or *9435–9410 (1% probability*), probably from *9580–9550 cal BC* (*14% probability*) or *9535–9460 cal BC* (*54% probability*). By the time that Mesolithic groups arrived at the site, beds of *Phragmites* reeds were growing in shallow water along the lake edge, with sedges, bur-reeds, stands of bulrush, and bogbean, creating a dense, rich swamp environment that extended at least 15 m from the shore. At the shore, willow, aspen and downy/white birch were growing on damp, waterlogged soils, amongst patches of nettles and ferns, whilst in the deeper water beyond the reedswamp, were species of water lily and pondweed (Figure 9.2).

Mesolithic groups first arrived at Star Carr in 9385–9260 cal BC (95% probability; start Star Carr; Figure 17.2), probably in 9335–9275 cal BC (68% probability) – within a generation of 9300 BC. This was probably after the amelioration in climate following the end of Abrupt Climate Event 1 (*85% probable; Isotopic event 1 end*; Blockley et al. 2018, Table S6; see also Chapter 4). There are three spatially distinct areas of activity at the site dating to the 93rd century cal BC (Figure 9.1). These are 1) the brushwood; 2) the accumulation of worked wood, bone and antler in the detrital wood scatter; and 3) possibly a structure on the dryland (Figure 9.1). Whilst it is not possible to determine the relative order of these (Table 17.8), they reflect a range of different activities that were taking place at Star Carr during this time.

Figure 9.2 (page 227): Bulrush (left) and willow and sedge (right) growing in lake edge environments (Blakemere Moss and Christleton, Cheshire) (Copyright Barry Taylor, CC BY-NC 4.0).

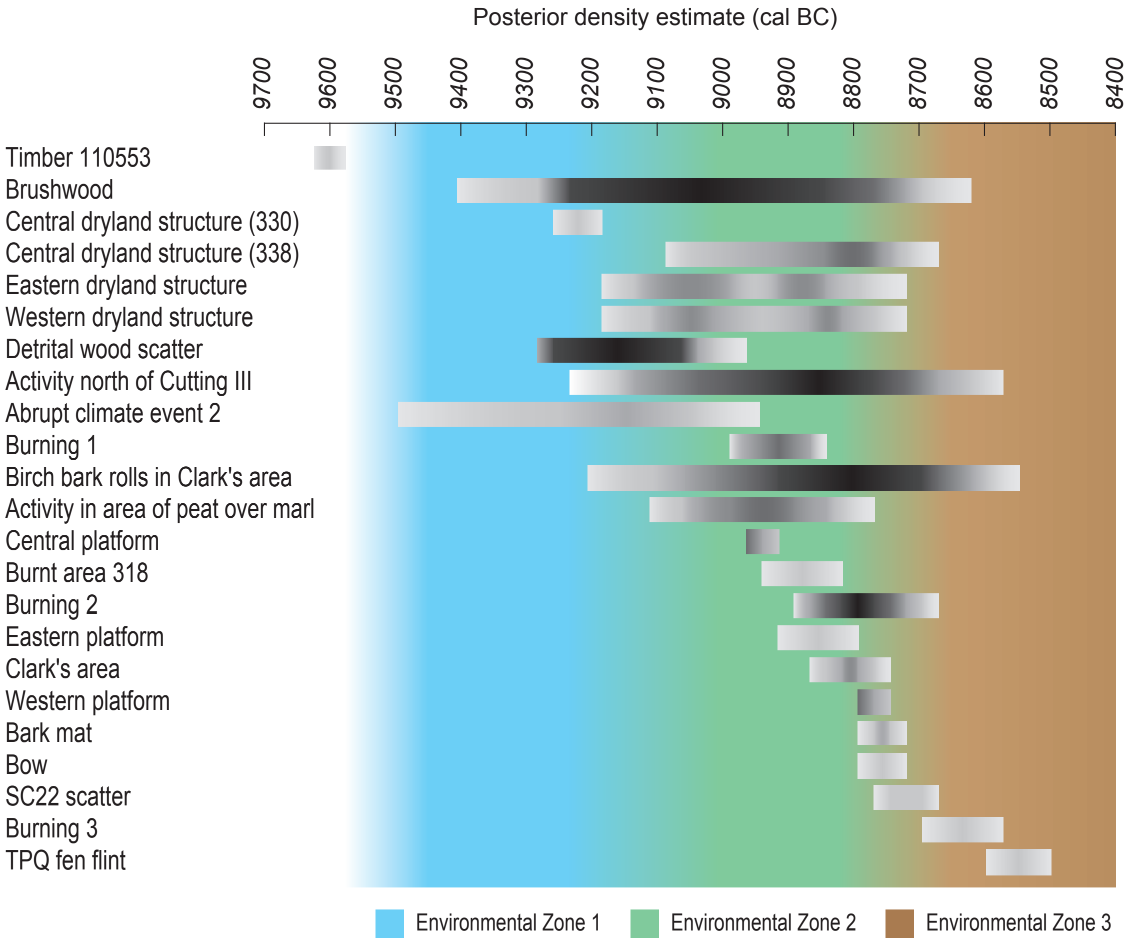

Figure 9.1: Schematic diagram showing the periods of different activities at Star Carr, the contemporary lake-edge environment (described in Chapter 19), and Abrupt Climate Event 2 (described in Chapter 4). The darker the shading the more probable that an element was present in a particular 25-year period (derived from the models defined in Appendix 17.1 and described in Chapter 17 and Blockley et al. 2018, star_carr_climate_B_C_to_Vedde.oxcal) (Copyright Star Carr Project, CC BY-NC 4.0).

In the western part of the site, people undertook tasks at the water's edge that resulted in the deposition of small quantities of worked wood into shallow water (Chapter 29), from *9340–9190 cal BC* (*95% probability*; *start brushwood*; Figure 17.10), probably from *9295–9235 cal BC* (*68% probability*). This material accumulated along with branches fallen from trees growing along the shore, into what has been termed the 'brushwood' (Chapter 6). No flint artefacts or animal bone relate to this early stage of brushwood accumulation, and it seems that tasks here were focused on woodworking only.

People continued to deposit artefacts in the area of brushwood close to the shore throughout the 93rd and 92nd centuries cal BC (Figures 17.7 and 17.10), including following the transition to reed peat in this area, which occurred in *9145–9045 cal BC* (*95% probability*; *base of reed peat 3178*; Fig. 17.6), probably in *9135–9095 cal BC* (*61% probability*) or *9085–9070 cal BC* (*7% probability*). It may be during this time that the left femur of an adult domestic dog excavated by Clark was deposited, although this is uncertain and may have been slightly later as the probability distribution of the radiocarbon date provides several possibilities (OxA-V-994-33; Figure 17.17).[1]

Although much of the material deposited into the wetlands probably derived from tasks undertaken on the dry ground, our datable evidence from this part of the site is limited to two fragments of charcoal from the upper fill of the hollow [330] of the central dryland structure (*1955d* and *SUERC-65239*; Figure 17.18). This hollow was surrounded by postholes, though half of it has been truncated by earlier excavations (Chapter 5). In addition, a large number of other postholes were found in this area, which are likely to relate to other structures. As described in Chapter 17, we have interpreted these samples as providing the best indication of the time when the central dryland structure was in use, and so it was probably contemporary with deposition in the area of brushwood and the detrital wood scatter in the later part of the 93rd century cal BC (Figure 9.1).

Two other structures were found in the dryland part of the site, the eastern structure which is also a hollow surrounded by postholes; and the western structure which is composed of postholes and a very dense scatter of flint, much of which is burnt (Chapter 8). However, uncertainties arising from bimodal posterior distributions are encountered (see Chapter 17) when we consider the possible chronology for the structures recorded on the dryland. The date estimates for both the construction and disuse of the eastern and western dryland structures, and for posthole [338] from the central dryland structure are strongly bimodal (Figure 17.18). Estimates for the durations of the eastern and western structures, however, strongly suggest a short period of use (Figure 17.19; Table 17.5). This, along with the statistical consistency of all the radiocarbon measurements from the eastern and western structures (see Chapter 17), strongly suggests that these buildings were either constructed and used on the first peak of their distributions, or on the second. It is unlikely that they were constructed on the first and disused on the second as this would entail centuries of use, which is improbable based on the coherent assemblage of radiocarbon dates produced by each structure. The weight of probability in these parameters generally falls around 60% in the generations around 9100 cal BC and around 30% in the generations around 8800 cal BC (Table 17.4). We really don't know, therefore, whether these buildings were constructed and used briefly in this period of the site whilst the brushwood at the lake edge and the detrital wood scatter were being deposited – or whether they belong to the (we will argue) intense activity on the site in the decades around 8800 cal BC.

The majority of the evidence for the early occupation derives from the detrital wood scatter in the central part of the site (Figure 9.3; Chapter 6). Here people began to deposit large quantities of worked wood and woodworking debris, animal bones, antler working waste, and flint into shallow water from *9315–9245 cal BC (95% probability; start wood scatter;* Figure 17.7), probably *9290–9255 cal BC (68% probability)*. This scatter was

[1] This measurement has only a *2% probability* of being part of the concentrated period of activity in Clark's area (see below); either this dog is really an earlier episode of activity in this location, or the pretreatment of this sample failed to remove all the PVA contamination and the result is very slightly too old.

Figure 9.3 (page 229): Reconstruction of the detrital wood scatter (Copyright Marcus Abbott, CC BY-NC 4.0).

To watch this video, scan the QR code with your mobile device or visit DOI: https://doi.org/10.22599/book1.2

made up of over 1300 pieces of wood, and extended over 30 m on a linear alignment from the shore through the wetlands. The material included timbers, roundwood, and entire trees, much of which had been worked. This included tangentially and radially split timbers, some with trimmed ends, roundwood that had been split or trimmed, woodchips and a number of artefacts including several dowels, a stake and the broken end of a digging stick (see Chapter 29). The scatter ran along the east side of the raised area of marl, perhaps at the boundary between the reedswamp and more open water to the west, and may have been laid down to stabilise the soft sediments so as to facilitate movement through the wetland.

Smaller quantities of animal bone (162 pieces), mostly red deer, but also elk, aurochs, roe deer, beaver and wild boar, as well as elk and red deer antler, were also deposited in this area, along with two worked red deer frontlets and several barbed antler points. A large proportion of this assemblage consisted of the remains of at least two red deer, which had been deposited whilst still in an articulated state into a gap on the south-west edge of the detrital wood scatter (Chapter 7). This material represents either the deposition of complete animal carcasses or large, articulated body parts into the wetland. One of the frontlets and several barbed points were also found in this area, and may have been deposited at the same time. Other unusual acts of deposition also occurred in this area. Two skulls, one from an elk and the other from an adult female red deer, were deposited onto the basal sediments to the south, and an elk cranium was deposited off the eastern edge of the scatter. The remainder of the assemblage was spread throughout the detrital wood scatter and was made up of smaller quantities of material, often exhibiting evidence for percussive breaks and spiral fractures. This appears to have been deposited following the butchery and processing of animal bodies, tasks probably carried out on the adjacent dryland.

Lithic artefacts are also present from the lowest levels of the detrital wood – albeit in low numbers (Chapter 8). All pieces in the lowest levels are blades with macroscopic edge damage. The presence of edge-damaged blades is a feature of the archaeology of the wetlands, and one that is found from their earliest use. In the upper parts of the detrital wood a greater range of lithic material is found, though it remains dominated by utilised pieces.

The deposition of material forming the detrital wood scatter ended during the 91st century cal BC. It ended in *9115–8915 cal BC (95% probability; end wood scatter;* Figure 17.20), probably in *9095–9000 cal BC (68% probability)*. By comparing the posterior distributions for the beginning and ending of this scatter we can suggest that artefacts were deposited in this area over a period of *135–310 years (95% probability; use wood scatter;* Figure 17.19), probably for a period of *160–250 years (68% probability)*.

Given the extended duration, representing some six to ten generations, we should consider how or why deposition was focused in this relatively discrete part of the lake edge wetlands. It is clear from the ages of those artefacts that have been dated that these cover the full span of this extended period (Figure 17.7). The demonstrably extended duration of this activity has implications for its intensity. The uncertainty in our estimate must be taken into account, but we must recognise that at most about 250 artefacts per generation were deposited at this location, and about 150 at least. Probably, a reasonable estimate can be obtained by using the median of the distribution of the duration of the scatter (eight generations) which would give us a deposition rate of 187 per generation (an average of 7 or 8 artefacts per year). However, it should also be noted that although the wood appears to be deposited through the sediments in this area, there is evidence for discrete episodes of deposition, notably the concentration of articulated red deer bones, and it is thus likely that there were intermittent periods of more intensive deposition.

Over this period, activity also continued in other parts of the lake edge, though as with the detrital wood scatter this was probably intermittent. In the brushwood area, people continued to undertake tasks that resulted in the deposition of worked wood into shallow water close to the shore, whilst the presence of charcoal in the north end of VP85A (*CAR-930*; Figure 17.13) could reflect ongoing activities on the adjacent dryland. We also have evidence for human activity in the form of the deposition of burnt birch bark rolls in the area to the north of Clark's cutting III (*SUERC-66039 and OxA-33663*; Figure 17.16). This is evidence for gradual expansion beyond the central area and presages more extensive use of the site in the ninth millennium BC.

At around the same time as the deposition of the brushwood and detrital wood scatter, and the use of the central structure hollow, there was a marked deterioration in the climate, with summer temperatures falling by

Figure 9.4 (page 231): Tussocks of wetland plants (in this case rush) growing in shallow water (Doolittle Mere, Delamere, Cheshire) (Copyright Barry Taylor, CC BY-NC 4.0).

1 to 1.5° (Abrupt Climate Event 2; Chapter 4). As a result, vegetation on the terrestrial landscape around the lake changed, as birch died back and open environments colonised by herbs and grasses became more expansive whilst soil instability caused sediments to wash into the basin (Chapter 18).

Throughout these centuries, organic sediments continued to accumulate within the lake margins, and whilst the lake level may have risen slightly, conditions would have gradually become shallower and boggier. From *9145–9010 cal BC (95% probability; first EZ2*; Figure 17.22), probably from *9125–9055 cal BC (68% probability*), conditions at the edge of the lake had become significantly shallower and were perhaps only seasonally submerged. In response, plants suited to shallower conditions, notably saw-sedge, began to grow on the peat (Figure 9.4). Initially, these may have been restricted to the areas closer to the shore but quickly expanded out to cover other parts of the site where they grew amongst the *Phragmites* reeds and other swamp plants. At the same time, reedswamp became more established over the area of marl, and wetland vegetation would have begun to expand further from the shore creating a more extensive reedswamp environment. Conditions at the lake edge remained wet and boggy, however, with pools of permanent standing water and an increasing depth of waterlogged sediment.

From the turn of the millennium, after the end of the climatic downturn (*83% probable* Abrupt Climate Event 2, Figure 9.1) there was a change of character, and perhaps intensity, in human activity within the wetlands. Quantities of macro-charcoal in Dark's profile M1 dramatically increase, suggesting more frequent (and perhaps more extensive) episodes of local burning within and perhaps around the edge of the wetlands. This period of burning (burning 1, Figure 9.1) began in *9070–8945 cal BC (95% probability; OxA-3349*; Figure 17.12), probably in *9020–8965 cal BC (68% probability)*. It ended in *9015–8845 cal BC (95% probability; end of burning 1*; Figure 17.12), probably in *8980–8895 cal BC (68% probability)*. It continued for a period of *1–130 years (95% probability*; *duration burning 1*; Figure 17.19), probably for *10–85 years (68% probability)*. However, the shape of this distribution suggests that this activity continued for two or three generations rather than being a single episode (Figure 9.1).

There is also evidence of human activity in the 90th century cal BC in reed peat to the south of Clark's excavations, to the west of the brushwood, and in the area of the marl mound (Figure 9.1). To the west of the brushwood, this began in *9280–8845 cal BC (95% probability; start reed peat in Clark area;* Figure 17.15), probably in *9135–8875 cal BC (68% probability)*; for example the birch bark rolls in Clark's area dated by *SUERC–66048* and *OxA-33667* were deposited at this time (Figure 17.15; Figure 9.1). In the area of peat over the marl this began in *9195–8855 cal BC (95% probability; start peat over marl;* Figure 17.16), probably in *9090–8925 cal BC (68% probability)*. Though a number of finds are present here, perhaps the most significant is the dog skeleton (*OxA-33678;* Figure 17.16) (Chapter 23). The dog carcass was deposited into an area of very shallow, perhaps only seasonally flooded, reedswamp that had formed over the marl. It only lacks a few small bones and although it was found in two parts, this is likely to have been caused by post-depositional processes, as gently lapping water pulled the skeleton apart. The question remains as to whether this was a natural death in the water or represents deposition into the water. Given that for several centuries previously, animal bones including articulated bones had been deposited close by in the detrital wood scatter, it is possible that this was a purposeful deposition.

The first of a series of substantial timber platforms (the central platform) was constructed in the middle of the 90th century cal BC (Figure 9.5). This lay on the same alignment, and slightly to the north-east of the, by now long disused, detrital wood scatter (*end wood scatter/central platform*; Figure 17.19; Table 17.5), and consisted of three layers of large timbers and trees (Chapter 6). These lay directly on top of each other, with little or no intervening sediment, and so the platform appears to have been built in a single event. On this basis we can estimate that the central platform was constructed in *8985–8925 cal BC (95% probability; central platform;* Figure 17.14), probably in *8970–8940 cal BC (68% probability)*. This is clearly later than both the start of the phase of burning (burning 1) evidenced in the macro charcoal in Dark's profile M1 (*100% probable*) and the end of the detrital wood scatter (*91% probable*) (Table 17.8) (Figure 9.1). It is also probable (*66% probable*), that the central platform was constructed before the end of this phase of burning (burning 1). Consequently it is plausible that at least one episode of this burning phase was carried out to clear vegetation ahead of the construction of the platform. The difference between our date estimates for the start of the first phase of burning and the construction of the central platform, however, strongly suggests that the burning began a generation or two before the platform was laid down (*start burning 1/central platform*; Figure 17.19).

Given the proximity and shared alignment of the central platform and the detrital wood scatter, their chronology is key to the interpretation of their relationship. The majority of deposition in the detrital wood scatter is clearly two or three centuries earlier than the construction of the central platform (Figure 17.7), but there is a small possibility that the final act of deposition occurred afterwards (*9% probable*). It is much more likely, however, that there was a gap between these events, one which lasted for *−55–170 years (95% probability; end wood scatter/central platform;* Figure 17.19*)*, probably for *40–140 years (68% probability)* (the negative value in this range reflects the possibility that there was an overlap between these activities rather than a gap). The balance of evidence suggests that there was probably a gap of at least one, and up to five or six human generations between the final deposition in the detrital wood scatter and the construction of the central platform.

Despite the chronological gap, the detrital wood scatter was probably still visible, in some form, by the time the central platform was laid down. As peat formed over the accumulation of wood and other materials it would have created a ridge of sediment, noticeably higher than the surrounding area. This is likely to have begun to form above the surface of the lake slightly earlier than the deposits around it, making it more visible even during periods of higher water, whilst reeds and other wetlands plants growing over it would have appeared taller than the neighbouring wetland vegetation.

The central platform ran from an area of boggy ground close to the shore, extending at least 17 m into the reedswamp. It was laid down onto the surface of the peat just after the deposits in this part of the site had begun to form close to (and perhaps seasonally above) the level of the lake. Conditions would have remained very wet, even during seasonally low water, and accessing this area would have involved wading through soft and relatively deep accumulations of partially decomposed vegetation and organic sediments.

Figure 9.5 (page 233): Reconstruction of the central platform (Copyright Marcus Abbott, CC BY-NC 4.0).

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The central platform is the only platform with reasonable quantities of associated artefactual material. While the majority of the platform was kept clean, a series of small clusters were found along the western edge. These may represent discrete dumps of lithic and faunal material deriving either from the dryland or from clearing out of boats using the lake. The associated faunal remains consist of antler and modified bone, which may represent the debris from tool production. On the southern part of the platform was the largest of these clusters, composed of flint, which seems to have been deposited onto a plank in a bag or basket (Chapter 8). This consists of exhausted cores and pieces used for animal processing. This may represent a personal toolkit that was lost or discarded because it was worn out, or even a collection of material that underwent special deposition due to its association with animal remains.

At the time the platform was constructed, in the 90th century cal BC, tasks leading to the deposition of lithic artefacts in the area of reedswamp over the marl and woodworking debris on the brushwood continued. Deposition in the area of peat over marl, however, ended in *9015–8650 cal BC (95% probability; end peat over marl*; Figure 17.16), probably in *8955–8795 cal BC (68% probability).*

Activity continued within the area of the central platform for two or three generations after its construction (*gap central platform/burnt area 318;* Figure 17.19), as peat began to form over the timbers. By this point the deposits in this area were probably only periodically flooded, though ground conditions remained wet, and herbaceous wetland plants (possibly reeds or sedges) were growing in the immediate area. The vertical spread of the flint scatter above the platform suggests that, although covered by peat, the platform persisted as a raised feature. On this raised area flintworking and tool use occurred, with the dumping of small spreads of material (as occurred on the platform) seemingly continuing. In situ knapping in this area focused on manufacture, reworking and resharpening of at least eight tranchet axes (Chapter 8). Two of these were missing but the remainder were recovered from the area and are either minimally used or unused. A wide variety of other tools were also recovered, indicating this area was used for a range of tasks. Burins are the most common, and are likely to be related to the working of the antler also found in this area. This range of activities was associated, spatially, with a discrete spread of carbonised wood which probably represents a single burning event in the wetlands (318) (Chapter 32). This occurred in *8965–8820 cal BC (95% probability; burnt area 318;* Figure 17.17) probably in *8940–8910 cal BC (22% probability) or 8905–8845 cal BC (46% probability).* This burning patch was found immediately overlying a refitting axe sequence (Chapter 8).

The episode of axe production and repair seems to have occurred in a landscape in which burning events were much less frequent than they had been just a few generations earlier. It is *79% probable* that the first burning phase had ended, and *82% probable* that the second burning phase had yet to begin when the burnt area was created (Table 17.8). The second phase of burning apparent from the macro-charcoal in Dark's (1998b) environmental Profile M1 began in *8915–8785 cal BC (95% probability; start of burning 2;* Figure 17.12), probably in *8880–8815 cal BC (68% probability)*. There was thus a gap of *25–155 years (95% probability; gap end burning 1/start burning 2*; Figure 17.19), probably a gap *of 55–120 years (68% probability)* between the end of the first phase of burning and the start of the second. This period of three or four human generations appears, broadly, to reflect the interval between the construction of the central and eastern platforms.

The eastern platform consists of a single layer of split timbers and trees, and runs for 11 m on a slight diagonal from the lake shore (Chapter 6; Figure 9.6). As with the central platform, it was laid down onto the peat after conditions were becoming shallower, or only seasonally flooded, within an environment of *Phragmites* reeds and other wetland plants. Our dating for the eastern platform is the least secure of our chronologies for the construction of the timber platforms as it is based on very few dated samples (see Chapter 17). On the basis of current evidence, however, it is clear (*97% probable*) that the eastern platform was constructed after the central platform. It was laid down in *8945–8760 cal BC (95% probability; OxA-33662;* Figure 17.14), probably in *8915–8895 cal BC (9% probability)* or *8880–8795 cal BC (59% probability).*

The eastern platform was constructed *–5–205 years (95% probability; gap central/eastern platforms*; Figure 17.19) after the central platform, probably *55–165 years (68% probability*) afterwards. The date estimates for the construction of the eastern platform and the date estimates for the start of the second phase of

Figure 9.6 (page 235): Reconstruction of the eastern platform (Copyright Marcus Abbott, CC BY-NC 4.0).

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burning are very similar, and it is not possible to determine which came first. It is certainly possible, however, that the start of the second phase of burning could include an episode of clearance before the construction of this platform. It is *76% probable* (Table 17.8) that the eastern platform was constructed after the flintworking activity around burnt area 318. Since the eastern platform was covered by a fallen tree only a few decades after its initial construction (*gap eastern platform/fallen tree*; Figure 17.19), its use cannot have been prolonged. This is reflected in the artefact assemblage associated – only 10 pieces of flint, indicating few activities using lithics in this area, or that the platform was kept deliberately clean.

At this time, during the 89th century cal BC, activity that led to the deposition of worked wood amongst the brushwood further to the west continued.

As discussed above, the place of the structures on the dry ground in this narrative is uncertain because of the bimodal nature of the posterior distributions of the eastern and western structures (Figure 17.18). We have argued in Chapter 17 that the central dryland structure may be the earliest, though there is also evidence from one of its postholes that there may have been later activity, contemporary with the other two dryland structures, in this area (Figure 9.1). The eastern and western structures have coherent (though bimodal) dates and though they could belong in the 91st century cal BC, there is a good chance that they date to the generations around 8800 cal BC, part of the intense activity on site at this time.

The eastern structure consists of a lenticular pit around 3 m in diameter, surrounded by a ring of posts, around 4 m in diameter (Chapter 5). The fill of the pit was dark and organic, a result of decomposed vegetal matter, possibly reeds or bark which served as a floor. The pit and area within the posthole was dense with lithic artefacts, including burnt flint (the remnants of a hearth). Though the structure probably underwent clearance during its lifetime, the later levels of occupation seem well preserved. They indicate short episodes of core reduction, the production of tools (often burins), and the use of tools in various craft activities, particularly hideworking, but also plant and woodworking. Antler suggests that organic tools were also made here. There is also evidence for curated personal tools being taken to the structure for repair or storage. Cooking also took place in the structure, with burnt fish bones, and burnt and highly fragmented remains of red deer, aurochs and pig recovered (Chapter 7).

The structure appears linked, either functionally or through refits, with many of the lithic scatters that surround it (Chapter 8). Scatter 4, a knapping scatter and area of tool use, in particular burin work, is closely linked to the structure through refits, and its large quantity of burnt flint may represent material cleared from the structure. Scatter 2 also appears to be linked through the structure as activities represented in the two areas are similar and refits also connect the two areas. Scatter 2 is focused on animal (and fish) processing, and the production of burins. It may well represent material cleared out from the structure and deposited in this area.

The western structure is of similar date to the eastern one, but rather different in nature (Chapter 5). No central pit was recorded, instead there was a semi-circle of possible post-holes which enclosed the inner part of an extremely dense spread of lithic material and animal bone. Much of this material is burnt; over a third of the flint displays traces of burning. While it may have had some use as a structure, the general character of the material remains – high quantities of burnt flint, exhausted pieces and lack of spatial patterning – suggest this area was used as a midden. This midden was used for the deposition of burnt waste, knapping material and used tools. The tools deposited on the midden had been mainly used in craft activities, the working of plants, wood, hide and bone. Immediately to the east was a butchery area, which may well represent in situ activities, and surrounding the midden was a low-density scatter of knapping debris and tools that also seem to mainly have been used in craft activities, including bead working.

To the south-west of the western dryland structure these generations also saw the deposition of the large assemblage of bone, antler, wood and flint into the reedswamp environments forming at the lake edge further to the west of Star Carr, as initially found by Clark (Figure 9.7). A small area of this had been preserved within a section of Clark's baulk and the excavation of this in 2015 revealed just how remarkably dense this material was. The wood tended to be small pieces of roundwood, which Clark labelled as the 'birch brushwood platform'

Figure 9.7 (page 237): Reconstruction of Clark's area (Copyright Marcus Abbott, CC BY-NC 4.0).

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in his figure 2 (Clark 1954, 3; though see Chapter 6) and wooden artefacts. Amongst the wood was a large and diverse assemblage of flint, bone and antler. This includes many of the iconic artefact types from the site such as the antler frontlets and barbed points.

Contrary to Clark (1954) and subsequently Mellars (2009), this assemblage does not reflect an episode of settlement activity within the lake edge reedswamp, rather it represents material that has been deposited in this area. At the time of deposition the area would have been at least periodically submerged and possibly permanently under shallow water, whilst the sediments would have been waterlogged and boggy. There is no evidence that the wood found within the assemblage had been laid down to form an occupation surface, and the dating of the material itself show that it had rapidly sunk into the underlying sediments, eventually coming to rest on, or just above the basal sands and gravels (Figures 17.15 and 17.22).

This activity began in *9125–9090 cal BC (4% probability; start Clark area;* Figure 17.15) or *8915–8775 cal BC (91% probability),* probably in *8850–8800 cal BC (68% probability).* This episode ended in *9100–9075 cal BC (3% probability; end Clark area*; Figure 17.15) or *8830–8710 (92% probability)*, probably in *8810–8755 cal BC (68% probability).* Overall, items were added over a period of *1–145 years (95% probability; use Clark area*; Figure 17.19), probably for a period of *1–65 years (68% probability)*. The shape of this distribution, along with the statistical coherence of the assemblage of radiocarbon results (see Chapter 17), strongly suggest a very short duration for this deposit.

At the beginning of the 88th century cal BC, the third (western) platform was laid down into the wetlands forming at the lake shore just to the east of this large assemblage of bone and antler artefacts (Chapter 6; Figure 9.8). This was made up of three layers of wood (split and unconverted timber, and trees) and ran for at least 14.5 m at a slight angle from the lake shore. Some unusual objects appear associated with its construction. To the east a wild boar mandible was laid down immediately under the timbers, yet visible between them, while in the north-central part two large flint nodules (110 and 160 mm in length) were placed in the same relationship with the platform. As with the other platforms it was laid down directly onto the peat, in an area of soft, boggy ground subjected to regular flooding where reeds and other wetland plants had been growing.

Again, based on the lack of sediment between the timbers of the western platform, we have modelled its chronology on the basis of the interpretation that it was constructed in one episode. This occurred in *8805–8755 cal BC (95% probability; western platform*; Figure 17.14), probably in *8795–8765 cal BC (68% probability)*.

The western platform is very likely (*95% probable*) to post-date the eastern platform, and was laid down *−25–170 years (95% probability; gap eastern/western platforms*; Figure 17.19) after the eastern platform, probably *15–120 years (68% probability)* later. In other words, two or three generations probably elapsed between their constructions. It is *60% probable* that the first items were placed in Clark's area after the construction of the eastern platform, but *98% probable* that they were deposited before the construction of the western platform. The estimated dates for the construction of this platform and the end of deposition in this area are too close for their relative sequence to be determined, but it is certainly possible that material continued to be placed into this area once the western platform had been constructed (Table 17.8).

There was clearly an intense period of activity in the seasonally flood reedswamp around the lake edge in the generations around 8800 cal BC. This saw the successive construction of two platforms, a concentrated deposition of artefactual material in Clark's area, and continued deposition of birch bark rolls and woodworking debris (and presumably other artefacts) along the shore, in the areas north of cutting III, in the reed peat in the locality of Clark's area, and in the area of the brushwood around the western platform itself (Figures 17.10, 17.15, and 17.17). The second period of burning also continued and, as discussed above, we argue that two of the structures on the dryland were used within these decades. The relative sequence of these activities is difficult to distinguish, given the resolution of the chronology presented here, as is their duration. However, there does seem to be intense activity at Star Carr at this time.

Like the central platform before it, the use of the western platform seems to have been relatively brief. Separated from it by an 0.15 m accumulation of peat, lay a birch bark mat which has been dated to *8800–8705 cal BC*

Figure 9.8 (page 239): Reconstruction of the western platform (Copyright Marcus Abbott, CC BY-NC 4.0).

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(94% probability; SUERC-59177; Figure 17.17) or *8665–8655 cal BC (1% probability)*, probably to *8785–8745 cal BC (68% probability)*. This was laid down probably only a few decades after the construction of the western platform (*gap western platform/bark mat*; Figure 17.19). It was probably at about this time that a bow (*SUERC-25240*; Figure 17.17) was deposited on the southern periphery of Clark's area (it is possible that episodic, low-level deposition continued in this area after the main concentrated phase of deposition here (e.g. *115876*; Figure 17.17)).

Two episodes of flint working probably fall in the 88th century cal BC. An assemblage of worked flint, mainly tools and blades related to antler working, was recovered on the interface between reed and wood peat at the easternmost part of the excavated area in trench SC22 (Figure 9.1). Although the date on a fragment of worked antler that may have been associated with this activity produced an anomalous radiocarbon measurement for technical reasons (OxA-16809; see Chapter 17), the stratigraphic position of this scatter allows us to estimate from the encircling radiocarbon dates that it was deposited in *8775–8665 cal BC (95% probability; SC22* scatter; Figure 17.20), probably in *8755–8705 cal BC (68% probability)*.

Flint working probably relating to the manufacture of shale beads has been recovered from the western part of the excavated area to the north of Clark's cutting III. A date on a birch bark roll from this area, from a similar height to the top of the main concentration of flint (*SUERC-66043*; Figure 17.16), may also place this activity in the 88th century cal BC. However, it may have begun rather earlier, as the worked flint is distributed vertically through c.120 mm of the peat sequence. Dates on birch bark rolls from the base of the flint concentration (*SUERC-66039* and *OxA-33663*) have bimodal distributions, and date this horizon to either the centuries immediately prior to c. 9000 cal BC or just after (Figure 17.6). However, whether the vertical distribution of the flint reflects the gradual accumulation of material over time or the results of taphonomic processes that have caused some of the flint to sink is impossible to determine.

The second phase of burning identified by macro-charcoal in Dark's (1998b) environmental Profile M1 ended in *8805–8630 cal BC (95% probability; end of burning 2*; Figure 17.12), probably in *8770–8675 cal BC (68% probability)*. This period of activity had lasted *45–215 years* (*95% probability; duration burning 2*; Figure 17.19), probably for *80–165 years (68% probability)*.

The deposition of worked timber at the lake edge in the area of brushwood (which had continued in the face of the construction and demise of the western platform) finally came to an end in *9090–8920 cal BC (12% probability; end brushwood*; Figure 17.10) or *8820–8510 cal BC (83% probability)*, probably in *8785–8630 cal BC (68% probability)*. This ended an activity in this space that had been carried out for numerous generations – for a period of *160–360 years (12% probability; use brushwood*; Figure 17.19) or *410–765 years (83% probability)*, probably for *470–655 years (68% probability)*.

From *8795–8605 cal BC (95% probability; first EZ3*; Figure 17.22), probably from *8750–8655 cal BC (68% probability)*, fen/carr began to develop around the lake edge at Star Carr (Figure 9.9). Preservation in these upper deposits is much poorer (Chapter 19), and so it is much harder to find datable material. Human activity on the site is, however, clearly demonstrated by flint assemblages within the wood peat, particularly along the eastern edge of Clark's cutting II.

In the 87th century cal BC, after an interval of *20–135 years (95% probability; gap end burning 2/burning 3*), probably after an interval of *65–110 years (68% probability)*, a marked but discrete peak of macro-charcoal is found in Dark's (1998a) environmental Profile M1. This occurred in *8735–8535 cal BC (95% probability; burning 3*; Figure 17.12), probably in *8685–8580 cal BC (68% probability)*.

Otherwise, activity in the 87th and 86th centuries cal BC at Star Carr has only been dated by measurements on a resin cake and a dog cranium from unknown locations in Clark's excavations (*OxA-2343* and *KIA-307034*; Figure 17.17), and by measurements on bulk sediment surrounding artefacts (*CAR-922* and *CAR-925*), and in one case an artefact (*OxA-1154*; Figure 17.13) from VP85A. A *terminus post quem* can be calculated for the deposition of a large scatter of flint by its stratigraphic position in the age-depth model for environmental Profile CII 2010. This deposit was made in or after *8670–8475 cal BC (95% probability; TPQ fen flint*; Figure 17.9), probably in or after *8605–8515 cal BC (68% probability)*. The fen flint seems to consist of a contiguous series of small scatters of knapping and tool use that extend into the Clark area (both into cutting II and Clark's eastern 1951 trench), suggesting that much of the material in this zone in the eastern part of Clark's trench may be relatively late. Evidence from Clark's western trench suggests they may be associated with small hearths. Most notable amongst the evidence from the current excavations is a cluster of five awls, all the same idiosyncratic shape, within the space of less than a metre. Beads were found not far away in Clark's

Figure 9.9: Reeds and willow growing on lake edge peat (Rostherne Mere, Cheshire) (Copyright Barry Taylor, CC BY-NC 4.0).

western trench. Burins are also common in this area, and the only faunal remains consisted of several pieces of antler. Utilised blades are also very common. All indications are that this is a craft area and suggests that the site continued to have a domestic focus late in its history. A refit between this area and a discrete knapping scatter to the south of the eastern structure suggests this craft area is connected to activities elsewhere on site which have not been dated. A specialist craft focus might suggest associated structures which are as yet undated or not yet excavated.

Human activity may also have taken place on the dryland in the 86th century cal BC, this being the date of the latest of the fragments of charcoal dated from the top fill of the hollow of the central dryland structure (*SUERC-65238*; Figure 17.18). This may be associated with either or both of two small knapping scatters, one to the east and one to the west of the structure, that high refitting success rates suggest these have seen relatively little subsequent disturbance. A final scatter that appears relatively undisturbed, and is thus more likely to derive from the later phases of the site, is scatter 3, located to the east of the eastern structure, which seems associated with animal-focused craft activities. A refit between this scatter and a blade found towards the top of the wetland sequence supports this suggestion.

Given the difficulties of obtaining a representative sample of datable material from the latest horizons at Star Carr, we must regard the estimated date for when Mesolithic activity on the site ended with some caution. However, based on the evidence available, this ended in *8555–8380 cal BC (95% probability; end Star Carr*; Figure 17.2), probably in *8525–8440 cal BC (68% probability*). Mesolithic occupation at Star Carr probably ended before the reedswamp had entirely disappeared (*95% probable*; Table 17.8).

Discussion

The earliest occupation of Star Carr, before 9000 cal BC, appears to have consisted of relatively discrete, but repeated episodes of activity that were focused largely on the central area of the site in the form of the detrital wood scatter and the central dryland structure. During this time people were felling larger trees, possibly modifying an existing clearing to create space for the initial occupation and collecting coppiced stems from trees on the margins of the clearing, at the water's edge, probably close to the brushwood to the west of the site. Some of the wood was worked into dowels, or artefacts, but the wood was probably also used to construct the central dryland structure and possibly other structures related to the large number of postholes in this area. To make the central structure people dug out a large central hollow which was surrounded with a framework of timbers, probably covered with plant material or animal skins. We know relatively little about the activities that went on within this structure as it either involved relatively little flintworking, or was thoroughly cleaned out at some point in its history.

Throughout the early history of the site, people deposited woodworking debris, roundwood, and in some cases entire trees, along with several wooden artefacts, into an area of shallow standing water to the south of the site, probably to reinforce the basal sediments and allow access into the deeper water further from the shore. In this detrital wood scatter they deposited the skulls of elk and red deer, and two red deer antler frontlets, articulating parts (or potentially entire carcasses) of red deer, and curated butchered elements, into an area of standing water roughly half a metre deep. Over time, these deposits created a substantial accumulation of worked wood, animal bone, antler and flint that extended at least 18 m from the shore.

The deposition of cervid heads, intact, partially modified, or as masks, is a key feature of the archaeology of the wetland at Star Carr, and it is worthy of note that it commences as soon as the site is occupied. The earliest date for animal deposition derives from an elk skull, which was deposited in the first half of the 93rd century BC *(<108941>*; Fig 17.7). This predates the earliest evidence for the deposition of red deer skulls by nearly a century (e.g. *OxA-33673*; Fig. 17.7). The patterned deposition of elk remains into water is a feature of the Early Mesolithic archaeology of Southern Scandinavia (see Chapter 12), and this evidence (albeit with few examples dated), might suggest the earliest occupiers of Star Carr were similarly focused on elk, with their preoccupation with red deer developing slightly later, though still relatively early, in the history of the site.

The detrital wood scatter also provides evidence for structure within wetland depositionary practices, with a focus on relatively complete faunal remains, modified animal heads, stone tools (rather than knapping debris) and bone, antler and wooden artefacts. It also provides evidence for the earliest antler frontlet from the site. The deposition of these important artefacts, one associated with articulated red deer body parts, the other on a flat piece of wood, can be argued to represent some form of special deposition.

During this early occupation, a clear downturn in climate occurred (Abrupt Climate Event 2; Figure 9.1), similar in scale to the 8.2 ka BP (c. 6200 BC) event (Chapter 4). Despite the occurrence of such a severe event, which impacted on both climate and ecosystems, the communities at Star Carr not only endured these changes but the same forms of cultural activities that characterise the site persisted unchanged.

After 9000 cal BC, it is clear that there was a broadening of the spatial focus and intensity of activities in comparison with the scale of events in the preceding three centuries. New areas have evidence for occupation for the first time: with the wetland area to the south of Clark's excavations initially used from the 90th century, a large midden developing in the north-west part of the dryland, and the eastern dryland area also revealing the first evidence of use. Activity still appears episodic, but there were periods where certain areas were intense foci of activity. One such area is Clark's area, where large quantities of animal bone, organic artefacts and worked flint were deposited in the decades around 8800 cal BC.

At the same time there are features indicating greater investment in place. The first of three timber platforms was assembled in the middle of the 90th century cal BC, with two further platforms placed on the edge of the lake over the following two centuries. Site maintenance activities, long considered an indicator of increased permanence, also increased during this time. The large and dense midden on the western part of the dryland indicates aggregation of material, as does the clearance and dumping of material from the eastern structure.

Archaeologically, the most visible sign of this increased intensity and scale of activity are the three timber platforms successively erected on the shoreline over a period of around 175 years. All are large structures which have been composed of large trees and in some cases split timbers, for example at the base of the central platform. However, there is no other structural evidence, e.g. posts to keep them in place. The eastern and western platforms are similar in construction even though they are not contemporary and they are more or less parallel to the shore. The central platform is at a roughly 45 degree angle to the shore, and the end of it is truncated (no further excavation could be carried out due to a land drain at this point).

The function of the platforms remains enigmatic. It seems unlikely they acted as working surfaces as very little artefactual material has been found either adjacent to or between the timbers. Even if the platforms were regularly cleaned, we might expect to find small pieces of flint and other materials in the gaps between the timbers, or accumulations of material to one side of the platform. The exceptions are several small, discrete deposits of artefacts that have been placed immediately under, within or adjacent to the timbers in the central and the western platforms. In the case of the western platform in particular, the presence of these deposits contrasts with the overall paucity of finds, either on or adjacent to the timbers, which would suggest that these are intentional acts of deposition as opposed to casual, ad-hoc disposals.

Though less archaeologically impressive, the post-built structures that were constructed on the dryland are also a clear sign of heightened scale of activity at the site. Large and relatively substantial structures can be constructed using plant materials or animal hides without the need for post-holes. The fact that the Star Carr structures were built on a wooden frame set into the ground suggests that their builders intended them to last. That the structure and the midden are both associated with intensive and repeated bouts of activity, probably occurring over a restricted period of time, further reinforces the impression of a greater intensity of occupation at this time.

As we have argued elsewhere (Conneller et al. 2012), the construction of the timber platforms and post-built structures suggests a scale of activity not usually associated with the very Early Mesolithic. This increased focus of Mesolithic people at Star Carr may have been born of an understanding of the past history of the site. It is likely to be no coincidence that the first timber platform was erected in the central part of the site, the area that had been the focus of the initial occupation, and no coincidence that spatially it respects the area of the detrital wood scatter. Even though this area appears to have been disused for several generations before the platform was built, it may, as we have argued, have persisted as a visible raised area, and in people's memory as a result of the depositionary acts that marked it as important. This platform marked this area and formalised a route down into the wetlands that had been undertaken by past generations. A similar relationship can be noted between Clark's area and the western platform. The intense deposition of artefacts and faunal remains in Clark's area was followed by the building of the western platform which abuts its eastern end. The temporal gap between the deposition and the platform in this case is shorter. Though the first artefacts entered the waters of the lake before the platform was built, later acts of deposition may be contemporary.

Depositional practices also show continuity with the earlier occupation of the site. Although the scale and intensity of deposition within Clark's area is greater, people selected the same sorts of material as they had done centuries before as they deposited artefacts around the detrital wood scatter. This included the butchered remains of animals, skulls, flint tools and utilised blades, and objects made from the remains of animals, including the red deer antler frontlets. They also continued to deposit such objects at other points along the lake shore, along with caches of material such as worked flint. This similarity in the choices of materials to be deposited suggests the persistence of cultural traditions, knowledge of appropriate ways to act in the world, presumably passed on from generation to generation.

These ongoing acts of deposition took place within the wider context of the habitual, routine practices of people's lives. Throughout these centuries people continued to harvest roundwood from trees at the water's edge, discarding waste material on the shore where it worked its way into the adjacent reedswamp, and working the wood into objects. They felled trees, using these as materials for the platforms but also, perhaps, for the post-built structures. People worked antler, discarding the waste material into standing water close to the shore, carried out tasks within the reedswamp that involved the use of flint tools, and worked wood and other plant materials as they sat around the eastern structure. They fished at the water's edge and hunted animals in the surrounding landscape, bringing the carcasses back to the site where they were butchered and skinned. Meat was cut from the bones, which were then broken to extract marrow, or worked into objects using flint tools. Waste was gathered up and deposited in the midden, whilst some materials were selected for deposition at particular places within the reedswamp. Throughout this time the ongoing accumulation of organic sediments caused the character of the wetlands to change, and people began to use this area in different ways. As peat formed over the earlier central platform people used this area to work flint into axes, leaving scatters of debitage over the surface of the swamp. Later, people worked antler within the wetlands to the east of the site, and around the same time they used flint tools to manufacture beads in swamp environments to the west. As the peat built up further, it began to form beyond the reach of the lake water and fen environment became established. Now people began to knap flint within the fen, perhaps around hearths, and use this to work antler and possibly shale for beads.

Conclusions

This evidence and dating programme has allowed us to produce an interpretation of activity at Star Carr through time. We can say that there was occupation, perhaps episodic and probably of varying intensity, throughout an 800-year period. We can track the history of human exploitation of the lake edge, and relate this to the changing wetland environment with some confidence. Comparatively intense deposition in the area of the detrital wood scatter occurred in the first centuries of human occupation at Star Carr, into shallow water at the base of which organic sediments were forming. This period of deposition ended as reedswamp began to encroach on the standing water, and a period followed when the lake edge continued to be utilised (brushwood continued to accumulate, the central platform was constructed), but deposition in the wetlands was less intense. The intensity of activity in the wetland increased, probably to a scale not previously seen at the site, during the generations around 8800 cal BC. Not only were the eastern and western platforms constructed, but large numbers of artefacts were placed in Clark's area in a restricted period of time. From the later 88th century cal BC activity around the lake edge perhaps reduced in intensity, but also changed in character as reedswamp made way for fen carr and flint working and bead manufacture could take place on the increasingly dry surface. The important limitation of this narrative is the uncertain position of the activity on the dryland. Did the coming of reedswamp in the early centuries of the ninth millennia lead not to a decrease in the intensity of activity at Star Carr, but rather a shift in focus to the dryland?

With the technologies for dating currently at our disposal, we cannot know. And this is a theoretical challenge, not only for integrating the story of the lake edge at Star Carr with the story of the adjacent dryland, but also for interpreting that narrative within the context of the British Mesolithic as a whole. How can we exploit a story narrated at a scale of centuries, and sometimes even human lifetimes, within a tale told across millennia? This is a new problem for Mesolithic archaeologists, but one that we are happy to face.

CHAPTER 10

Human Lifeways

Barry Taylor, Chantal Conneller, Nicky Milner, Ben Elliott, Aimée Little, Becky Knight and Michael Bamforth

Introduction

Just like Clark, our motivations in excavating Star Carr were to understand the lives of the people who lived at the site and, through them, to learn more about the people who inhabited this part of North-west Europe in the centuries following the end of the Younger Dryas cold phase (the Loch Lomond stadial in the British sequence; see Chapter 4). The material remains recovered from the site provide a wealth of information on economic and technical practices. However, these remains are also the products of relationships with other people, animals, plants and places. They are the results of decisions and actions not simply dictated by economic and functional considerations but by broader understandings of the world that people inhabited.

The treatment of animals

The inhabitants of Star Carr shared their landscape with a diverse population of animals, many of which were probably present within and around the lake itself. Though they would have avoided areas of human habitation, both elk and wild boar favour mosaic habitats of woodland and wetland of the sorts that would be found along the lake shore, whilst red and roe deer and (probably) aurochs may have inhabited the surrounding woodlands, coming to the lake to drink or to browse on the thickets of willow and aspen that were growing at the water's edge (Overton and Taylor forthcoming). The woodlands would also have been the habitats of the smaller mammals, such as pine marten, wild cat, badger, fox and hare. From the finds of beaver worked wood, beavers were visiting Star Carr and other areas around Lake Flixton to feed, and were probably living within the lake itself, along with pike and perch. Waterfowl were also visitors to the area, inhabiting the reed beds or the more open areas of water.

Our knowledge of these animals comes from the faunal assemblage recorded from the site during both the current project and the previous excavations. There has been a tendency to interpret this material in terms of its economic value and discuss it within the context of subsistence strategies. However, these are relatively narrow aspects of a much wider and complex relationship between Mesolithic people and the other animal species that inhabited this landscape. This relationship would have been articulated through the different ways

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in which animals were hunted, the traces they left in the landscape, and the remains of their bodies that were butchered and used as food, worked into objects, or deposited in different ways across the site. Yet this relationship extended beyond hunting and encounters which resulted in the death of animals. The inhabitants of Star Carr shared their landscape with these different species: there is no evidence to suggest any of these species became locally extinct during the occupation of Star Carr. As such, this relationship would also have been shaped by chance encounters within the landscape; animals seen, heard or smelt, but not hunted; tracks seen but not followed. These relationships can be explored through the analysis and interpretation of the remains of the animals, their treatment, and they ways in which they were deposited on site, as well as an appreciation of the behaviour of modern-day populations of these species.

Hunting technology and strategy

We can start by considering the ways in which the animals were hunted. We know from impact wounds found on the bones of animals at Star Carr and other European Mesolithic sites, that the larger animals, such as deer, elk, aurochs and wild boar, were probably killed by groups of people, armed with projectiles such as arrows, javelins, thrusting spears or darts, tipped with flint, bone or antler.

At Star Carr, hunting wounds were present on the scapulae of two elk and a red deer (Noe-Nygaard 1975; Legge and Rowley-Conwy 1988), and similar injuries have been recorded on the ribs, scapula and vertebrae of a range of medium and large mammals from Mesolithic contexts in Denmark (Noe-Nygaard 1974; Leduc 2014a). These include injuries sustained by weapons propelled towards the front of the animal, such as an arrow tip embedded in the humerus of a juvenile red deer in the Åmose peat bog and a healed fracture on the scapula of an adult deer from Jordløse, and from above, as well as from the sides and rear (Noe-Nygaard 1974; Leduc 2014a). In several cases there is evidence that animals were attacked by multiple assailants, notably the aurochs from Vig, which had been struck by an arrow and a spear (Noe-Nygaard 1973), and the aurochs from Prejlerup, which had 24 microliths recorded from different areas of the body (Fischer 1989), though these may represent cases of 'overkill' associated with unusual depositional contexts (Strassburg 2000).

The weaponry used to hunt these animals is well represented in the assemblage from Star Carr. Several of the flint microliths and blades have impact damage and use traces indicative of their employment as the tips and barbs of projectiles, whilst the barbed points (several of which also have impact damage on their tips and use wear from being hafted) would be suitable as the points of arrows, javelins or thrusting spears (Figure 10.1). Whilst we lack the shafts of the projectiles, there is considerable evidence for the manufacture of dowels which would have been suitable for either arrows or spears.

As well as weapons, other forms of technology may also have been utilised. Though we lack the archaeological evidence, it is possible that hunters used decoys or callers to mimic sounds of animals such as elk and red deer and attract them to points where they could be ambushed. Similarly, hunters may have worn disguises allowing them to approach their prey, a function that has sometimes been attributed to the red deer antler frontlets recovered from Star Carr (Clark 1954).

The methods employed to hunt and then kill animals would have been based upon the hunter's previous encounters with them, encounters that were either with the animals themselves or the traces they left in the landscape. This could include areas of more intensive browsing visible in the growth patterns of young saplings, marks left by red deer stags as they rubbed their antlers on trees to demarcate their territories, or broken branches and paths visible in the understorey as animals moved through the woodland. Through these observations the hunters would become aware of the different habitats and behaviours of particular species of animals, either in particular situations or at certain times of the year and how these differ with age, and then use this knowledge to predict areas in the landscape where the animals might be found and to devise strategies to engage them. This understanding of animal behaviour is likely to have been passed down between generations but would also have been adapted to suit the changing nature of the local environment.

Figure 10.1 (page 247): A replica barbed point showing traces of animal blood after being hafted and shot from a bow into an animal carcass (Copyright Aimée Little, CC BY-NC 4.0).

Depending upon their motivations, the hunters at Star Carr may have acted speculatively, travelling to areas where they knew a range of animals may be present, or visited specific locations where a particular species might be found. This may have included the extensive areas of wetland that were forming in the large, shallow embayment at the western end of the lake, an area where (to date) we have little evidence for very Early Mesolithic activity. Here, the clear open aspects and easy access to water may have made the area attractive to many of the larger mammals, as well as providing areas of aquatic vegetation on which elk could graze. They may also have sought out the thickets of willow and aspen that were established along parts of the lake shore, where the good lines of sight and easy access to browse may have attracted animals such as elk or red deer (Ripple and Beschta 2004). As more extensive areas of tree cover developed after the first centuries of the Mesolithic, people would have visited areas within the terrestrial woodland where specific animals had established territories.

These journeys to different places in the landscape may have been undertaken on foot, possibly following established trails through woodland or along parts of the lake shore, but they may also have been carried out by boat (Rowley-Conwy 2017). Though we lack evidence for watercraft, it is very likely that boats would have been used to travel around and across the lake, particularly given the presence of Early Mesolithic activity on both of the two islands. The lack of large trees in the very Early Mesolithic landscape make it unlikely that these boats would have been dugout canoes of the kind found on later Mesolithic sites such as Tybrind Vig (Andersen 2013). Instead, people were probably using open craft, made from skins or bark placed over a wooden frame, similar to the currachs of Ireland and the west coast of Scotland, or watercraft used by indigenous groups in North America (e.g. Adney and Chappelle 1964). The possible paddle fragment recorded by Clark (1954, 177) may have been used to propel such boats, though given its small size the interpretation of this artefact as a paddle is open to debate (see Chapter 29).

Given the cooperative nature of hunting and the size of the animals they sought, we can assume that the hunters operated as a group, most likely made up of different members of their community. Whilst hunting is often assumed to be an all-male activity in much of the archaeological literature, ethnographic studies have shown that gender restrictions often only relate to the act of killing an animal and that both men and women may participate in the hunt itself. The group would also have included people of different ages and probably

different familial or social relationships. Ethnographies of learning within hunter-gatherer groups describe the role that children can play within hunting activities, often using miniaturised (but not toy) hunting tools to actively participate in the hunting of birds and small game; thus making a significant economic and socially valued contribution, whilst learning the basic skills of hunting (Cattelain 1997). With this in mind, it may be worth considering that the smaller barbed points within the Star Carr assemblage may have served as miniaturised hunting tools for novice hunters (Elliott 2009).

As they travelled the hunters would have used the physical traces left by animals, such as damage on trees, fresh tracks, or dung, to establish their recent presence in the area. Then, specific strategies would be used to locate and then kill the animal depending upon the behaviour of the particular species, its age, and the time of year. Modern Kutchin hunters, for example, take advantage of the elk's tendency to double back on itself in their strategies for stalking the animal by intercepting it along points in its trail (Nelson 1986). Similarly, the recurrent behavioural habit of red deer coming to forest fringes to browse in the twilight of dawn and dusk is noted in a range of contexts and may well have drawn them to the edges of the lake or clearings deeper within the forest at specific times of day. In some cases, animals would have been stalked and killed individually, in others hunters would have flushed groups of animals from cover, picking off individual animals as they dispersed.

From the range of species present in the faunal assemblage from Star Carr it is clear that hunters did not focus exclusively on a single animal species. However, the age-at-death profiles show that they preferentially targeted animals of certain ages. In the case of red deer, hunters seem to have particularly targeted young individuals aged between three and five, just after males have left their mothers permanently (Legge and Rowley-Conwy 1988). Roe deer appear to have been hunted and killed when they were younger, though again this corresponds with the age at which the young males and females are driven away from their mothers. Legge and Rowley-Conwy (1988) have argued that these patterns reflect a hunting strategy targeting younger, inexperienced animals, who in the case of roe deer may have occupied more exposed, marginal habitats. However, amongst the red deer the vulnerable male yearlings, chased away from their mothers by adult males, are rarely represented in the faunal assemblage, suggesting that the older animals were seen as more appropriate to kill.

Though large-mammal hunting is often associated with projectile weapons in the archaeological literature, there is no reason to assume that it was the only method employed by people at Star Carr. Although direct evidence for trapping technology is lacking at the site, ethnographic accounts of hunter-gatherers do describe the use of traps and snares in the hunting of animals such as elk, red deer and bear (e.g. Nelson 1983; Nelson 1986). This includes the use of deadfall traps, spring traps and snares set across trails that the animals are known to use. Nor should we assume that the methods, tactics and technologies employed in large-game mammal hunting stayed the same throughout the time Star Carr was occupied. The changes in environment within the Vale of Pickering, combined with the impact of human hunting and shifts within the ecology of the Vale, would have led to changes in the behaviours of the species being hunted. This would have meant that the knowledge, techniques and technology involved in tracking and hunting would have been adapted and developed throughout the occupation of the site.

As well as hunting the larger mammals in the surrounding landscape, people at Star Carr were also killing smaller animals, either with projectiles or by trapping and snaring, as well as hunting wild fowl and fishing. As with the larger animals, these forms of hunting would have varied in terms of the technology and strategies that were employed and the places around the lake where they were carried out, depending upon the behaviour and habitats of the prey species. These practices would have been different to those employed in large-mammal hunting, not only in terms of the forms of weapons that were used, but also the numbers of people involved, and the scales at which they were carried out.

Of the smaller mammals, the best represented are beaver, though pine marten, hare, wild cat, fox and badger are all also present in the assemblage, albeit in very small quantities. Some of these may have been killed using projectile weapons; others were probably caught by trapping or snaring. The age-at-death profiles and depositional context of the beaver from Star Carr suggest that hunting may have been managed over a prolonged

Figure 10.2 (page 249): A dead fish speared on a barbed point from experiments using the replica bow (Chapter 29) (Copyright Aimée Little, CC BY-NC 4.0).

period of time. Whilst beaver lodges would have formed visible markers within the landscape and would have been relatively easy to break in order to smoke out entire families of beaver, this form of hunting is essentially unsustainable, as Lake Flixton would have been unlikely to have been able to support multiple lodges based on its size. There are also ethnographic accounts of beaver spearing, staking out known beaver runs and ambushing the animals with long-handled spears as they make their way to and from the lodge at dusk and dawn. However, given the value of an intact beaver hide for the production of waterproofed items of material culture, many traditional hunting societies prefer to employ traps. Boas (1905), for example, describes a form of deadfall trap, which is set in water to catch beaver. As the beaver encounters the trap it activates a trigger that causes a heavy log to fall, killing the animal. Again, these traps can be positioned along beaver runs to increase the chances of success. Similar versions of deadfall traps are used on land for trapping small mammals including pine marten, where the animal is lured beneath the trap by bait, which is attached to the trigger (e.g. Drucker 1951; Nelson 1986). Such traps are often set up against trees and surrounded with small structures made from branches, known as a cubby. Alternatively, snares set across trails could also be used to catch animals such as wild cat and fox.

From the presence of fish bones and fish processing polish on several pieces of flint it is also clear that people were catching perch, pike and possibly other species of fish from the lake (Robson et al. 2016). Given the lack of evidence for fishing equipment, such as hooks, nets or net weights from the site it is possible that these were caught using projectiles that were either thrown or fired from small bows (Figure 10.2; Chapter 29). Both perch and pike may have been fished close to the lake shore as the two species spawn in sheltered lake margins, whilst pike may also have been attracted by the waste material deposited by people at lake edge locations (Robson et al. 2016). Small bows may have also have been used for hunting wild fowl within or around the lake. Most of the birds represented in the faunal assemblage are waterfowl and so may have been hunted within the wetlands or at the edges of open water, though some, such as the red-breasted merganser, nest on dry ground and so may have been shot at nesting sites at the water's edge.

When discussing hunting in the past, it is easy to assume that animals themselves were somewhat passive within these encounters. We base our interpretations of hunting on faunal remains, themselves evidence for successful activities which resulted in the death of the animal. However, we should not assume that hunting at Star Carr had a 100% success rate, and the actions of the animals themselves would have played a key role in this. Hunting large, seasonally aggressive animals, many of which were considerably taller, stronger and heavier than a human adult, would have posed some considerable physical danger to the hunters and so the actions of the animals within this encounter would have been brought into sharp focus. The healed lesions noted by Noe-Nygaard (1975) and Legge and Rowley-Conwy (1988) attest to unsuccessful hunting attempts following which animals escaped, whilst the presence of these bones within the Star Carr assemblage also demonstrates that individual animals were encountered more than once by hunters. These repeated encounters would have allowed for the recognition of individual animals and the development of relationships between individual people and animals over their respective lifetimes (Conneller 2011). What is more, the methods that were used to hunt animals drew upon understandings of the animals themselves, which recognised differences between species, and between individuals of different age and sex. This extended beyond an understanding of very general behaviours, such as habitats and feeding patterns, to specific aspects of an animal's character. Modern Koyukon hunters, for example, are aware of the inquisitive nature of lynx, and leave coloured ribbons or carvings of faces on trees by the traps they set for it (Nelson 1986). In this way, hunting articulates an understanding of animal behaviour and appreciation of animals as living, thoughtful entities with which people interact.

Butchering and working animal remains

These interactions continued after the act of killing, when people processed the bodies of animals for food and materials such as hides, meat, sinew, bones, feathers and antlers (Figure 10.3). When processing animal bodies, people at Star Carr made choices as to which particular materials they wanted to use and which would be discarded.

Traces of these decisions are preserved in the fragmentation of the animal bone assemblage, the cut marks left on these bones during butchery, the wear traces on the flint tools used to carry out these actions and the working marks which have been preserved on the worked bone and antler, and the artefacts made from these materials.

In the case of the larger mammals, some initial butchery may have occurred at the place where the animal was killed. However, the evidence from the faunal assemblages indicates that much of the body was brought back to Star Carr. There, microwear on several flint tools and cut marks on a number of the bones show that the hides and meat were removed from the skeleton using flint to cut through the flesh and in some cases the tendons. If it had not already occurred, some of the animals were jointed, removing the limbs from body, and in some cases the bones of the limbs and the feet were also separated, though in others the bones remained articulated by their tendons.

Once the skin and flesh had been removed, some of the long bones were broken open to extract marrow by percussive action that removed one or both of the ends of the bones and split them longitudinally (Figure 10.4). In red deer, this appears to have been carried out most often on the metapodials, humeri, and tibiae, though other elements were also broken in a similar manner. In some cases the lower jaws of red deer and roe deer were also broken open to extract marrow through a series of strikes along the body of the mandible.

Particular parts of specific animals were also separated from the body to be used as materials in the making of objects. This can be seen most clearly in the utilisation of the antlers of red deer. These were brought to the site by both collecting material following the annual shed in spring and removing the antlers from animals killed whilst hunting. The collection of shed antler requires some consideration; once shed, antler is often gnawed by rodents and other deer if left on the forest floor, and the lack of gnawing on the Star Carr antler suggests that it was gathered swiftly after being shed (Legge and Rowley-Conwy 1988). Given the dispersed population densities of red deer males living in woodland during the spring, the rapid collection of shed antler implies that people were aware of the presence of deer at specific times of the year for purposes that were not always directly linked to hunting.

Figure 10.5: The removal of antler tines with a flint blade (Copyright Aimée Little, CC BY-NC 4.0).

The red deer antler brought to the site was almost always worked in some way. This usually involved the removal of the tines (Figure 10.5) which could be used, unmodified, in a range of different tasks including splitting wood, knapping flint, working other osseous materials and the application of the groove-and-splinter technique. This latter method of working antler involves the scoring of parallel grooves along the length of the antler beam to define a rectangular piece of material. The grooves are then deepened to penetrate the hard outer compactor tissue to get through to the soft spongy material within. The intervening rectangle is then prised away through the insertion of wedges and the cutting of short transverse grooves at each end of the splinter. Once removed, this rectangle (or 'blank splinter') can be worked with flint and coarse stone tools to remove the adhering spongy tissue to create barbed projectile points (Chapter 25).

Figure 10.3 (page 250): A replica arrow with feather fletching and animal sinew bindings (Copyright Aimée Little, CC BY-NC 4.0).

Figure 10.4 (page 251): Spiral fractures on mammal bones are thought to have resulted from marrow extraction, as seen replicated here (Copyright Aimée Little, CC BY-NC 4.0).

Figure 10.6 (page 253): Splitting a metatarsal bone so that it can be worked into a bodkin (Copyright Aimée Little, CC BY-NC 4.0).

In terms of the use of osseous materials (bone, antler and teeth) offered by animal carcasses, the occupants of Star Carr appear to have held a distinctive set of values which guided their decisions. Red deer antler was strongly preferred for making osseous material culture, with the vast majority of the red deer antler available being worked in some way to extract rectangular blank splinters. Whilst the extent to which individual pieces of antler were worked varies, the dominance of worked red deer antler over unworked antler indicates that making barbed points was a persistent concern for the people who spent time at Star Carr.

Other osseous materials were also worked at Star Carr, although not on the scale of that seen for red deer. The only identifiable animal tooth bead from the site was also from red deer: a perforated vestigial canine; the other tooth bead recorded only as 'cervid' (Clark 1954). Red deer canines were the tooth of preference for Upper Palaeolithic bead making in Western Europe (Taborin 2004; White 2007) but also had a wide currency in the Mesolithic. Small quantities of elk antler were also brought to the site in both shed and unshed forms and used to make elk antler mattocks, a heavy tool which when hafted could have been used to work wood. Aurochs bone was used to create heavy-duty chisel-like tools, whilst elk metapodials were occasionally used to create slender bodkins, which microwear analysis has shown may be involved in the working of plant materials and basketry (Figure 10.6).

An important and unusual form of osseous material culture which features at Star Carr is the worked red deer skulls. These were selected to include both male and female animals, young and old, with antlers in varying stages of development and shedding. These have all been worked to remove the facial bones, dentition and lower jaw. In many cases the back and base of the skull has also been trimmed away to leave the frontal and parietal bones, hence the term 'frontlets' which Clark used to define these artefacts. In a minority of cases, these remaining bones were then perforated with small holes ranging in number from one to four. When present, the antlers were worked extensively using the same groove-and-splinter process used to make blank splinters for barbed points. In some cases, this involved reducing the antlers to small stumps, in others an impression of

Figure 10.7: Red deer crania packed with damp clay and placed over hot embers (Copyright Aimée Little, CC BY-NC 4.0).

the antlers' original form is left whilst removing more than half of the circumference of the beams and tines. In these instances, the application of the groove-and-splinter process varies slightly to that used when working other antlers, with the spongy tissue within the beam being scooped and scraped away to leave hollowed-out antlers behind (Chapter 26).

Experimental work has established that much of this reduction of the skull would have involved covering the areas which were intended to be retained in wet clay, heating the fleshed head in a hearth for several hours, and then pecking away the unwanted areas of skull with a small hammerstone (Figure 10.7) (Little et al. 2016). This process also allows the brain to be cooked and extracted whilst opening the skull. In contrast to the working of the skull, the groove-and-splintering of the entire beam, to the extent seen in some of the frontlets, would have taken a considerably longer amount of time and effort.

Conventionally, these artefacts have been interpreted as 'headdresses', based on the perforations (which may have allowed webbing or strapping to be attached), the reduction of the antlers (which would have reduced the weight of the frontlets considerably) and what Clark described as the smoothing of the interior of the braincase (to make them a more comfortable fit for a human head). This concept of a headdress has stimulated discussions of their function; as disguises for hunting deer (Clark 1954), as costumes for ritualised dance (Clark 1954), or as tools of corporeal transformation to be used in the negotiation of interspecies relationships (Conneller 2004). However, recent experimental work has cast doubt on their suitability as headdresses, without the aid of considerable padding and attachment (Street and Wild 2015). Given the uncertainty over precisely how these objects were worn on the body, and the obvious need to refer to ethnographic literature in order to understand these enigmatic artefacts fully, we propose the use of the term 'mask' to describe them. The anthropological literature on the significance of making, using and depositing masks within hunter-gatherer groups is substantial, and the wide range of face, crown, pocket, finger and knee masks being documented amongst different groups leaves the issue of precisely how they were worn open to further debate.

Uniserial barbed points, in a variety of sizes and forms appear to have been important to the inhabitants of Star Carr and are by far the most numerous type of bone or antler artefact recovered from the site. At other Mesolithic sites across Europe, large-mammal long bones (specifically metapodials) are carefully prepared and split to make similar rectangular blanks. However, the inhabitants of Star Carr seem to have been less concerned with using animal bones to make barbed points; the evidence for the careful splitting of mammalian long bones is far outweighed by the amount of animal bone which has been broken apart percussively for the extraction of marrow. The decision to do this renders the broken bone material useless for barbed point production, due to its irregular size and shape. Clearly, bone marrow was deemed a valuable resource in its own right and antler seen as a more suitable material for the production of barbed points.

These values appear to remain consistent throughout the site's history, with worked antler and barbed points being deposited in different areas of the wetland throughout the sequence. They mark the inhabitants of Star Carr apart from groups of people living in Northern Germany, Denmark and Sweden in the Early Mesolithic, who favoured the use of metapodials and split rib bones for making very similar types of barbed points (David 2005). The fact that these people shared common ideas concerning the shape and form of their hunting tools, yet had quite different attitudes to the materials from which they were made, is a fascinating insight into the relationships between different groups of people living around Northern Europe at this time. Whilst they may have agreed on the form that material culture should take, their understanding and values of animal bodies was distinctly different.

The curation and deposition of animal remains

Other sets of values structured the ways in which the remains of animals were treated after they had been butchered and worked to manufacture objects. This can be seen most clearly in the dense deposit of bone, antler, flint and wood that was recorded from the baulk between Clark's trenches and which had been deposited into the lake edge wetland. The faunal material had been generated through the butchery and subsequent processing of animal carcasses. This had been deposited with the skulls of red deer that had been worked to varying degrees, worked antler, a large number of artefacts made from osseous material (notably barbed points but also an elk metapodial bodkin and scrapers made from aurochs metapodials), wooden artefacts and woodworking debris, and worked flint. The radiocarbon dating shows that this material was deposited over a very short period, possibly even as a single event, though patterning in the densities of this material suggests either several acts of deposition or the actions of a number of people.

There are several aspects of the assemblage that suggest that the material had been deliberately brought together and deposited, rather than resulting from ad-hoc, casual disposal. To begin with, some types of artefact were disassembled prior to deposition. The barbed points, for example, would originally have been hafted (as is indicated in the microwear analysis), but the absence of spear or arrow shafts within the assemblage suggests that these had been detached and deposited elsewhere. What is more, this was carried out on both intact (or near-complete barbed points with only minor damage) and on broken barbed points where just the tang survived. The same is true of a dehafted flint projectile point and of the antler axes and mattocks, all of which lack evidence for a handle with the exception of a single possible example where the handle had been burnt (Clark 1954:158; though see Chapter 29), and include both broken and more intact examples.

There is also evidence for the curation of artefacts. In the case of the red deer masks, both 'finished' and 'unfinished' examples were deposited together in the assemblage. In the case of 'unfinished' masks, these have had the facial bones and lower jaw removed, but the lower areas of the skull had not been trimmed away. Experimental work has established that the reduction of the cranial bones would have involved placing fleshed skulls within hearths (Little et al. 2016), but as this area of the site was submerged during the period of deposition it is impossible for the assemblage of incomplete masks to be the product of simple abandonment during in situ manufacture. Instead, these objects have been brought together and deposited alongside 'finished' and possibly utilised masks. This can also be seen within the pattern of deposition of the barbed points. Both intact (and re-usable) barbed points were deposited alongside points which had been damaged in use (and would have been repairable) and points which were broken beyond repair. Furthermore, the broken tips and midsections must have been retrieved (presumably from the carcasses of animals) and retained in order for them to have been deposited along with the more intact examples and the broken tangs, which would have been brought to the site on the arrow or spear shaft they were initially attached to. Despite differences in their functional viability, all of these artefacts were curated and brought together for deposition during this particular phase of the site's occupation, seemingly based on what kind of object they were, rather than what state they were in. This may suggest a temporality to deposition; that certain things had to be brought to the Star Carr lake edge at a certain *time*, regardless of their usability or disrepair.

The evidence for curation is not limited to the deposition of these artefact types. The presence of clusters of animal bones and bone fragments with anatomical associations but which were not found in an articulated state suggests the retention of material from specific butchery tasks, such as disarticulation and dietary processing of lower limbs. Similarly the presence of a relatively large quantity of worked red deer antler and the diverse range of animal species within such a spatially and temporally limited assemblage would certainly suggest that material was being retained and then brought together for deposition.

Different ways of treating animal bodies are also evident at the site. Several centuries earlier, animal remains were being deposited into an area of the reedswamp at the edges of the detrital wood scatter. Unlike the faunal material in the area investigated by Clark, a large proportion of the assemblage was found in a semi-articulated state, and with large parts of the body still in their correct anatomical position (Chapter 7). This material either represents the deposition of one or more complete red deer carcasses that must have been dragged or carried into the lake edge wetland, or the bringing together of parts of the bodies of several red deer (including complete limbs and parts of the torso), which were then placed in the wetland in their (broadly) correct anatomical positions, perhaps to represent a complete animal. While this latter practice is thus far undocumented in the Mesolithic, the assembling of composite human bodies out of the remains of more than one individual is known from the British Neolithic (Fowler 2001) while an animal body was constructed from human remains in the Levantine PPNB site of Kfar HaHoresh (Horwitz and Goring-Morris 2004). Associated with this possible composite deer were red deer masks, barbed antler points and the unmodified skulls of a female red deer and a young elk, the latter associated with a phalanx which might suggest it had an attached hide.

There are clear differences between the earlier material deposited around the detrital wood scatter and the assemblage deposited later in the area investigated by Clark. Not only were some animals deposited as complete bodies (or body parts) without being butchered but all the red deer masks and barbed points were complete. However, there are also many similarities between the two areas of deposition: a focus on animal heads and masks, antler debris and a stone tool assemblage dominated by utilised blades. The similarities in the choices of materials and objects and the deliberate way they were deposited points to a broadly comparable tradition, in relation to particular ways of treating animals and objects made from their bodies. This tradition spanned several centuries with the later episodes of deposition referencing specific aspects of the earlier practices.

There is also evidence for the special treatment of the bodies of dogs. With the exception of the possible red deer carcass in the detrital wood scatter, the only near-complete animal carcass recovered from the site is that of a dog. While this may represent a natural death in the wetland, the possibility that it may be a purposeful deposition must be entertained. Furthermore, two dog skulls were recovered during Clark's excavations whilst relatively few postcranial remains were recovered in comparison (three femora and a tibia) (Clark 1954:71; Benecke 1987; Schulting and Richards 2009). The skulls are not over-represented in terms of the other elements and given that two femora seem to derive from the same individual (Schulting and Richards 2009, 499), partial dog carcasses may have been deposited in Clark's area. This is a pattern also seen at other sites around lake, notably at Seamer Carr where six articulated cervical vertebrae of a dog were recorded (Clutton-Brock and Noe-Nygaard 1990).

However, animal heads more generally do appear to have been singled out for special deposition at Star Carr and the presence of the two dog skulls does (albeit tentatively) also hint at special treatment for these remains. Dogs, as the only Mesolithic domesticated animal, may have had an ambiguous role in Mesolithic societies, living with humans, yet not actually human. There is ample evidence that in later Mesolithic contexts this ambiguity was played out in mortuary contexts, with some dogs receiving burial and grave goods analogous to high-status humans, while others were disarticulated or killed and thrown into human graves (Larsson 1990). The current evidence from Star Carr also hints at differential treatment of dog remains, most likely as a consequence of the special role that dogs played as companion animals amongst Mesolithic groups.

Not all animal remains were treated in these particular ways. Relatively large quantities of bone were recorded from the dryland part of the site and whilst the poorer levels of preservation made it harder to identify them, the same sorts of elements (with the exception of complete heads) and species (apart from dogs) were being deposited in this area as in the wetlands. This takes us back to the point made earlier that decisions regarding the treatment of animal remains, including the objects made from them, may have been bound up in other aspects of people's lives, such as particular events and specific places, as well as broader understandings of the world.

The one animal species that we know to have been present at Star Carr but for which we have no evidence for the way their bodies were treated in death are humans, the remains of which are entirely absent from the site and from any of the other known areas of Mesolithic activity around the lake. Whilst it is possible that burial sites are yet to be discovered, their absence from a landscape that has been so extensively studied would suggest that human bodies may have been treated in other ways. This may have included practices involving the disarticulation of human bodies through excarnation and dismemberment, which are well represented in the record from other parts of Britain and North-west Europe (see Conneller 2006 and Gray Jones 2011 for a review of the evidence). Equally, bodies may have been cremated, a practice known to have played an important role in Mesolithic mortuary ritual sometimes in conjunction with other forms of body treatment (Gray Jones 2017). As Gray Jones has argued, widespread use of cremation could explain the apparent lack of evidence for mortuary practices, especially if the remains were not subsequently buried or were not accompanied by diagnostic artefacts (Gray Jones 2017, 50). The lack of any human remains from the Star Carr region precludes any further discussion of the potential forms that mortuary practices may have taken. However, what we can say with confidence is that given the lack of human remains from the site, the bodies of people and animals were treated differently in terms of the context of deposition and that lives that were so closely entwined were kept separate after death.

The treatment of stones

Of the stones found on site, flint was by far the most important: the vast majority of tools recovered from site were made from flint and it was a vital resource for the transformation of other materials. However, a wide range of other stones were used: chert, shale, sandstone, siltstone, greywacke, quartz, quartzite, pyrite, haematite and amber (fossilised tree resin) all show evidence of human modification. In addition we have evidence for unmodified stones that were transported into the wetland. Though many of the stones used on site share a similar source, they differ in their properties, different technologies were selected for their modification and they were used and deposited in different ways.

Sources

The glacial till that blankets the present east coast was probably the origin of the majority of stones employed on site; all can currently be obtained from it. However, the means by which they were procured may have differed. Though a stony glacial till underlies the site, the easiest way to obtain stones in a vegetated landscape is from watercourses and the coast, for groups where the sea was in reach. The latter seems to have been the source of most of the flint employed: the clear brown, black or grey or red speckled till flint favoured by Mesolithic groups which in general appears to have entered the Vale of Pickering in the form of small to medium beach pebbles with a heavily battered cortex. Currently this material can only be obtained from beaches in any quantity south of Flamborough Head and while the coastline was very different in the Early Mesolithic, the nearest beaches to Star Carr may not have been the best source of this material.

The coast is likely also to be the source of the amber and possibly the shale, though the delicacy of the latter might suggest derivation from a lower amplitude fluvial environment. The coarse sandstones probably derive from the latter; though water worn, some are still relatively angular. The lake itself is also a possibility. Haematite is also found within the local till but tends to be extremely degraded, so a different source may be possible. In contrast to the coastal sources of till flint and other stones, opaque white or grey Wolds flint was obtained locally from the Yorkshire Wolds, located at the southern boundary of the Vale. In the absence of evidence for Mesolithic flint mines, the likely source was head deposits on the edge of the Wolds escarpment or solution hollows on the chalk plateau itself.

Sources are important. We know that throughout prehistory certain sources were favoured and that their location often played a large part in how they were perceived (Bradley and Edmonds 1993). The association of the majority of the stone from the site was water and this may have engendered metaphorical associations between the two.

Selection

Of all the stone materials imported to the area, till flint was the most important with great quantities moved to the Vale of Pickering over the course of the centuries it was visited by Mesolithic groups. Small- to medium-size pebbles were favoured. Large cobbles were also used but were split into smaller units. Though it was the preferred flint source, till flint was often of poor quality containing flaws and fracturing along fault lines when knapped. Despite being the favoured source for both Final Palaeolithic Federmesser groups visiting the Vale, and for Deepcar groups in Northern England (see Chapter 11), Wolds flint found little favour amongst Star Carr groups in the Vale, with ratios of till to Wolds flint across Early Mesolithic sites in the Vale at between 5:1 and 20:1. However, Wolds flint was more frequently favoured for making axes, with 50% of the axes at Star Carr made from this material. This is likely to be due to both the large size and often tabular or semi-tabular form of Wolds flint nodules, which leant it to the form of axes much more readily than the small round nodules of till flint.

Other materials also show degrees of selection. In comparison with shale that can be collected today from the nearby coast, the material employed for the beads is rounder, smaller, finer and a paler colour. There appears to have been a deliberate selection of this more delicate material. The similarity of these beads to those from the Nab Head in south Wales (David 2007) suggests understandings of the sort of blanks suitable for bead manufacture were more broadly shared amongst groups making Star Carr-type assemblages, despite both geographical and temporal distance. Taborin (2004) has noted a preference for either squat or elongated bead forms in the Upper Palaeolithic, linking these with female and male symbols respectively. While these two forms cover most bases, such shapes can also be noted at Star Carr, with an elongated 'celtiform' shale pendant, discovered by Clark (1954, plate XX, H), as well as round/oval shale beads and the triangular decorated shale pendant (Chapter 33).

The other main material selected for bead manufacture was amber, with three beads recovered in Clark's excavations. Amber has a long history of use as beads, employed since the early Upper Palaeolithic (White 1995). As well as having colourful and lustrous properties (Figure 10.8), amber has properties which might mark it out as a powerful substance: it can contain small pieces of vegetation or insects, can float in salt water, and can carry an electrostatic charge.

Other minerals may also have been seen as powerful. Pyrite generates a spark and was used to make fire. There is evidence in later prehistory at least that this may have been equated with the life force itself (van Gijn et al. 2006). Haematite may also have been considered a powerful material bestowing a red colour to skin or clothing (Walker 2015). While used for many mundane activities it also has a strong association with the dead, almost universally used in Upper Palaeolithic and Mesolithic burials, including those at Aveline's Hole, Somerset, which is dated only a few centuries later than Star Carr (Schulting 2005).

Movement of material

While it has generally been assumed that the materials recovered from Star Carr were collected by its inhabitants (Clark 1972), exchange is a mechanism which should not be discounted. Exchange of amber, for example, is a possibility: it is rare on east coast beaches today and was an object of some interest to Mesolithic groups more broadly, seemingly widely exchanged between Baltic groups (Zvelebil 2006). Haematite, also although potentially local, seems rather different in consistency from that generally present in the glacial till and pigments seem to have been moved long distances in Southern France during the Upper Palaeolithic (Chalmin et al. 2007). Exchange is also a possibility we should at least consider for till flint. Some of the till material recovered from the Vale is extremely poor quality, particularly from some sites such as Seamer C (scatter K). The distance to the coast is difficult to determine (and distances changed over the course of time that Star Carr and surrounding sites were occupied) but it is likely to have been in the region of 10–20 km. In the absence of suitable rivers connecting Lake Flixton to the coast (due to a glacial moraine the local rivers flow to the west, not to the sea), transportation must have occurred on foot. Nodules were often imported without being tested. It seems strange that material, known to often be of poor quality, was not tested before being brought this distance and this might indicate the presence of intermediaries.

Figure 10.8: Replica amber bead with biconical perforation (Copyright Aimée Little, CC BY-NC 4.0).

Many stones are likely to have been brought to Star Carr unmodified; shale blanks for example seem to have been made into beads on site. Till flint was also often brought in as unmodified pebbles, though tested nodules with one or two removals are also in evidence. It seems likely that these were tested at source. Some raw material units were brought to Star Carr as preforms or partially reduced. Though some preshaping of cores may have taken place at source, an area dedicated to decortication of cores was located at Barry's Island within Lake Flixton, so it is likely that this occurred more locally. Large blades that were not produced on the site in which they were deposited are frequently recovered from Star Carr and other sites in the Vale; thus it is likely that people carried a stock of blades with them as well as flint in nodular/part reduced core form.

The preference for till flint led to the establishment of caches of raw material. Two such caches were recovered from Star Carr (Chapter 8). The largest of these was found in the eastern part of the site on the lake shoreline. It consisted of 19 pieces: large split nodule chunks, preforms and partly reduced cores. All are in a brown translucent flint which grades to opaque grey in its central part. Most of these probably derive from a single large split nodule; however, the removal of several blades from many of these pieces makes refitting tricky, although seven do refit. Three of these pieces have traces of use showing that they were used for cutting wood. This cache, when excavated, was associated with the roots of a tree. We cannot tell whether this was contemporary with the cache; however, the use of trees as markers for caches is known from the ethnographic record (Anderson 2006). The presence of woodworking traces on the cache might even suggest that the tree itself was marked, and such practices have been noted amongst the Khanty (Jordan 2003).

The second potential raw material cache consisted of only two pieces of raw material but both were large. These were found in between two planks of the western platform. The platform could possibly provide a marker for this cache, though the nodules were sufficiently heavy to have sunk into the lake muds beneath. An alternative interpretation is that this cache is related to the platform, either structurally or as a foundation deposit.

Figure 10.9: Grinding smooth a replica shale pendant using fine-grained sandstone (Copyright Aimée Little, CC BY-NC 4.0).

Techniques and manufacturing

A variety of techniques were used to work the stones found on site depending on the raw material employed. Flint and occasional till-derived cherts were the only stones flaked, sandstones tended to be pecked and shale was drilled and possibly polished (Figure 10.9). Flint nodules were prepared using natural ridges to initiate flaking. Smaller nodules tended to result in single platform cores. For larger raw material packages, cores were rotated and new platforms initiated to maximise the volume.

None of the stone technologies deployed at Star Carr were very complex or very time-consuming, whether these involved the manufacture of flint or coarse stone tools or shale or amber beads, and it is likely that these tasks could, in theory at least, be carried out by most members of the community. However, a variety of skill levels can be glimpsed in lithic assemblages from Star Carr and other sites around Lake Flixton, though variability in raw material quality may also be a contributing factor. Some refit sequences show high levels of skill and productivity, the best example coming not from Star Carr but from Seamer K on the northern shore of Lake Flixton (Chapter 11), where an elaborate multi-platform reduction sequence resulted in the production of 11 microliths from a single core. Conversely there is poor-quality knapping on display at Seamer C (near to Seamer K on the north shore), though here raw material is also extremely poor. There is also low productivity at VPD on the southern shore of the lake where a complete refitting sequence from decortication to the discarded core incorporated a single microlith. Similar features have been used to identify children or apprentices in the archaeological record, with children at the Magdalenian site of Etiolles given poor-quality raw material on which to practise (Pigeot 1990), a scenario that is also possible for Seamer C.

The identification of specialists, that is individuals focused on a particular skillset, who produced things for the use of others and in return were supported by the community (Apel 2008), has been made in early prehistory (e.g. Pigeot 1990) but only in situations where the level of difficulty of the technology would be beyond most members of the society. In a situation, as at Star Carr, where it was at least theoretically possible for everyone to produce the tools used in daily life, albeit with varying levels of skills, identification of specialists is difficult. It is reasonable on the basis of the available evidence to suggest they were unlikely to exist but that some individuals were more skilled than others. At the late Magdalenian site of Etiolles where specialist knappers were present, the products of specialists were scattered across the site suggesting distribution of the specialist tools to other individuals. At Star Carr it may have been more usual for people to produce tools for their own personal use. A refitting sequence from nearby Seamer K, for example, contained a couple of tools which were left where they were made, probably manufactured by someone for immediate use. On other occasions, as with the intense microlith manufacture also at Seamer K, an element of provisioning for future use may be involved, with one or two individuals making things for the wider group.

The example from Seamer K shows people sometimes made things for immediate use and abandoned them. However, on occasions tools and blanks underwent greater levels of curation. Different levels of curation are evident for particular tool types. Scrapers seem to have been moved around sites less. Burins tend to have been moved from areas they were manufactured but were often abandoned adjacent to refitting burin spalls, suggesting discard in areas they were used. Microliths almost never refit and seem to have been highly mobile tools used in the broader landscape. Axes also seem to have extended life histories. While resharpening sequences have been refitted, axes have yet to be refitted to entire manufacturing sequences. In the axe workshop at Star Carr for example, the two axes that were manufactured were removed, whilst the examples that were just resharpened were deposited there. A large unfinished axe roughout recovered from Star Carr was 230 mm long. Other axes from the site range in length from 48 to 100 mm, with an average of 67 mm. If the unfinished axe is in any way representative of the size of material chosen for axe production this would suggest these objects were extensively curated, undergoing many episodes of resharpening over their lives. The axes at Star Carr were so small because they were important personal objects that were looked after for long periods of time.

There is also evidence that certain lithic artefacts were curated as personal toolkits. One such example is a small cluster or cache recovered from the end of the central platform. This consisted of 44 small pieces of flint, including heavily reduced cores, small bladelets and flakes. Almost all the pieces analysed had butchery traces, with the exception of one piece used to work wood. All pieces are small and the cores have reached the limit of their productivity. The impression is of a small toolkit belonging to someone involved in processing animal remains. Lithic artefacts recovered from the eastern dryland structure give an impression of household possessions: three axes were recovered from this structure of which one has a refitting resharpening sequence. A scraper had been used, then resharpened and not subsequently used. A large knife used for woodworking was found in the structure but had not been made there. A small core, near the end of its use life but not entirely exhausted and that had been used extensively to the west of the structure was also recovered from within the structure. The impression is that curated pieces (personal or household possessions) were brought into the structure and stored there, aggregated for use in the craft activities and the food preparation that took place there.

While the non-flint stones have a restricted set of functions, as ornaments (beads) or to make other tools (such as a shaft straightener), flint is remarkable for its sheer range of functions: as tools to make other tools, such as barbed points, digging sticks and bows; other items of material culture such as beads, clothing, antler frontlets, bags, baskets and mats; structures, such as houses and platforms. It was also vital for everyday activities such as killing and butchering animals, harvesting plants and food preparation. It could be used for cutting, sawing, chopping, piercing, hammering, splitting etc. It was the glue that held Mesolithic life together.

Though flint was ubiquitous in Mesolithic life, it has generally been viewed by archaeologists as a mundane, functional material, devoid of the significance of rare organic artefacts such as antler frontlets. This may partly have been the case, as things that are often the most ubiquitous are the most taken for granted. However some flint artefacts may have been curated possessions which acquired extended histories. Flint tools also played a role in the unusual depositionary practices focused on the wetland. These wetland flint assemblages, based on the deposition of tools and used pieces, are the product of careful selection, with only particular pieces (mainly large used blades and some formal tools) suitable for deposition. This is a very different set of material to that deposited in middens, or left on knapping stations, which can be characterised as burnt material, waste, including very small chips and exhausted tools and cores. There is no doubt that some flint debitage was abandoned where it fell during routine knapping activities, but for other pieces, particular rules came into play when it came to their deposition.

What these rules were is more difficult to understand. It may be that the nature of the acts undertaken with the tools found in the wetland made it appropriate that they were deposited with a range of animal remains and unusual organic material culture. There is evidence elsewhere in Europe for the special treatment of flint associated with important acts and rituals (Conneller 2011). The deposition of the small cache/toolkit associated with butchery (described above) could be interpreted in several different ways: an accidental loss of a bag containing a personal toolkit, or alternatively the deliberate deposition of lithic material associated with the butchery of an important animal. It bears similarities to other acts of animal deposition in that it seems to have been wrapped in a bag or skin, as may have occurred with the elk skull in the detrital wood scatter, or with the antler frontlets which may have had skin attached and thus may also have been wrapped. A further possibility, if indeed this is a personal toolkit, is that this may have been placed in the waters of the lake on the death of its owner, destruction of personal objects at death being a common feature in both archaeological cases and in ethnographic accounts (e.g. Little et al. 2016).

The beads recovered from the site also have ambiguous depositional contexts (Chapter 33). The engraved pendant was recovered from the lake and is the most obvious case of the special deposition of a bead (Milner et al. 2016). The other beads were probably found in wetland edge contexts. This is the case, at least, for the two examples recovered during the recent excavations and the majority of the beads found by Clark cluster around these two. Of note amongst this grouping are two tight clusters of 10 and 12 beads respectively which Clark (1954, 165) suggested represented lost necklaces. Beyond this main concentration are a perforated red deer canine and an amber bead which from their location plotted by Clark may well derive from within the large deposit of material in Clark's area, and three beads found in Clark's eastern trench which could derive from a reedswamp or fen context. Two of this latter grouping, an amber and a shale bead, lay in direct contact suggesting they had been strung together.

The main cluster of beads corresponds with the main concentration of awls at the site. Many of these have mineral traces suggesting these were used for the manufacture of beads in this area. If this is a manufacturing area, it seems strange that this is where beads were also recovered in large numbers; there is nothing to suggest they were manufacturing rejects. Caching is a possibility, particularly for the clusters; however, evidence from the two beads recovered during the current excavations suggests they may have been worn. Neither of these two beads is broken, which might have suggested this was an area of clothing repair where broken beads were discarded and new examples sewn back onto clothing (wear traces suggest that these Mesolithic beads were attached to clothing rather than strung as necklaces, as is usual amongst early prehistoric beads).

Two further possibilities might be entertained. It has been argued that barbed points were made at Star Carr, used in the wider landscape and then returned to Star Carr for deposition. The same could be true of beads. An alternative interpretation would the same sort of decommissioning that has been argued might be responsible for the butchery toolkit deposition. Beads and clothing with a close connection to the human body might be the obvious thing to decommission on someone's death. Beads are common finds in graves and though unlikely to mark graves here, would be a symbolic means of marking someone's death at a particular place, at a time when human bodies were probably disarticulated and bones curated by the living (Conneller 2006).

The treatment of plants

The diversity that we can see in the ways that people engaged with animals and worked with stone, can also be seen in their use of plants. Although plants and plant-based crafts are often underrepresented in our narrative for the Mesolithic (Little 2014; van Gijn and Little 2016), it is clear from the data recorded at Star Carr that plants formed an important part of the material repertoire of the lives of people who inhabited the site. They were utilised for a wide range of purposes, often involving particular forms of technology, skill and knowledge that varied depending upon the species being worked and the nature of the object that was being produced.

Of the tree species, willow and aspen were used extensively for the manufacture of artefacts and for the building of structures, although a range of other species were also utilised more occasionally such as alder, alder buckthorn, elder and species of birch. In some cases, particular species were chosen for specific tasks; for example, aspen preferentially chosen for platforms and willow often used to make dowels and digging sticks (Chapter 29). It is also clear that particular trees were chosen depending upon the task at hand. For the building of the timber platforms, for example, people selected straight-growing trees with few side branches; properties that would make the wood easier to work (Chapter 28). This meant preferentially avoiding using the trees growing at the water's edge and selecting from those growing in dense woodland (though not necessarily far from the site). In other cases they harvested coppice, either naturally occurring or deliberately managed, for roundwood stems that they utilised as tools or (possibly) building materials. The more occasional use of other species may reflect their sparsity within the local environment, or the ad-hoc nature in which plant materials were used. However, it is also possible that specific species were used for particular tasks, either in terms of the artefact that was being manufactured or the use to which it was put.

A range of technologies were utilised in the initial collection of wood. To harvest the coppiced roundwood, people used axes to cut the stem and where necessary tore the stem from its base, whilst larger trees may have been felled by ring barking, by rocking, with axes, or as natural tree falls. However, in some cases trees may not have been felled at all and timbers may have been split from living plants, a practice well documented ethnographically (e.g. Boas 1905). At Star Carr, this practice may be seen in one of the trees in the detrital wood scatter that had had its outer surface tangentially split away, and the large numbers of tangentially outer split timbers found at the site.

The ways in which wood was subsequently worked and the technology that was employed also varied depending upon the motivations of those who worked it, whether this was for hafting tools, making structures or extracting dyes or even medicines. The clearest evidence we have for the use of the large timbers are the wooden platforms that were made using whole trees, stripped of bark and any branches and timbers radially or tangentially split using wedges and hammers, and then (in at least some cases) trimmed and hewn with axes. However, the quantities of woodworking material incorporated into the platforms and the detrital wood scatter and the fact that the radiocarbon dating shows that some timbers were being reused, would suggest that split timbers were also used for other tasks at the site such as the structures on the dry ground.

In other cases, timber was half and quarter split and then reduced further to make artefacts such as the bow, or worked into dowels to produce objects such as digging sticks, handles for use with other artefacts, or (possibly) spears. The precision with which some of this material was worked suggests they were finished using fine flint tools (such as flakes or blades), a point that is borne out by the results of the microwear. Forms of woodworking other than splitting can also be seen. A wooden 'platter' had been carved from a larger piece of wood, one piece of roundwood had a small hole drilled or cut through it, and microwear on a hafted flint blade shows that it had been used to scrape and groove wood.

Other parts of trees were also utilised, involving different forms of technical skill and knowledge. A withy was made from twisted strands of willow, perhaps to bind two timbers together, whilst microwear on a flint blade shows it was used to separate the bark from bast, part of the process for manufacturing cordage. Birch bark was also cut from trees and used to make mats, rolled around sticks and used as torches, or heated in rolls to produce resin.

As well as working with wood and bark, people also harvested and utilised herbaceous plant species at Star Carr, tasks that focused largely (though not necessarily exclusively) on wetland vegetation growing at the water's edge. The microwear analysis shows that people used flint tools, some of which were hafted, to cut and scrape siliceous plants. In some cases these tools may have been used to collect reeds that were growing in shallow water close to the shore. In others, tools with siliceous plant polish (mostly unretouched blades) were probably used to scrape reeds, extracting fibres for cordage, basketry and so forth. These activities seem to have taken place mostly at the lake edge, suggesting the first stage in plant working took place in situ, perhaps with the later stages (after the fibres were extracted and there was no need for a flint tool), taking place on drier land. However, indirect evidence for plant working is not restricted to flint tools, as the presence of plant polish on the tip of the bone bodkin has confirmed. It is possible this object was used in basketry, or perhaps as a clothes-pin for bark-cloth. In addition, it has been suggested that the paddle-like wooden object excavated by Clark (1954), may have been used for beating/softening plant fibres (Chapter 29).

Despite a relatively rich body of evidence, it is likely that the full range of material made from plants at Star Carr was far greater than that recovered during the excavations. Cord, produced from the fibres of nettles or wood bast, would have been an important and widely used resource (Figure 10.10), as would mats made from weaving or stitching reeds, and baskets made from cord, bark, or woven reed or thin stems. However, if we

Figure 10.10: Preparing nettle cordage (Copyright Aimée Little, CC BY-NC 4.0).

take our cue from the ethnographic data we should probably be thinking far more broadly, of objects as diverse as cradles, toys, mallets, log ladders (particularly if people were splitting timbers from living trees), boxes and boats. Plants may also have been used as dyes, glues or as medicines. In some cases, some plants may not even have been modified in order to have been used. Several pieces of roundwood found at the site had been utilised with little or no significant modification and the central hollow of the eastern structure is thought to have been floored with plants, perhaps reeds or ferns. In addition, the use of plants could have been used in smudge fires (to repel insects) and moss could have been used for babies' nappies (e.g. Nelson 1983).

While the evidence remains elusive, it is also likely that plants would have been collected and consumed as food. From data collected on other Mesolithic sites in Northern Europe this is likely to have included soft fruits, such as wild strawberry, the rhizomes of wetland plants such as bulrush, and the seeds of the water-lilies, all of which were present in this landscape. As with the use of plants in craft activities, the collection and subsequent processing of plant food might have involved the use of other tools: flint to cut material, wooden digging sticks to extract rhizomes, baskets to collect the materials, and in the case of water-lilies, boats to harvest plants from areas of deeper water.

The collection and working of plant materials at Star Carr was complex, diverse, and multifaceted. As with the working of stone, tasks involving the use of plants would have been undertaken at different scales and would have been carried out in response to an immediate need (such as the utilisation of unmodified roundwood as a digging stick) or in anticipation of future events (such as the preparation of timbers for the wooden platforms). The different tasks often involved different forms of technology and physical engagements with the plants themselves. They also drew upon knowledge and skills that were specific to the materials that were being worked and the objects they were being worked into. Knowledge of the physical properties of plants lay behind the choice to use a certain species or the selection of an individual tree, as well as an understanding of how the material would respond when split with wedges, or cut, drilled, or scraped with flint tools. Technical skill and knowledge was also required to effectively use the tools and handle and manipulate the different plant materials, tasks that also required the correct application of physical strength. It is also interesting to note that there is no evidence of fire being used to work, transform, reduce or harden wood (Chapter 28).

As with hunting, the requisite skills and knowledge involved in plant use would have been learned through active participation, so we can assume that, on at least some occasions, they were undertaken by groups of people of different ages related through kin or other social relationships. Some aspects of plant crafts would also have involved the cooperation of other people. The construction of the timber platforms would certainly have required the work of numerous people to pull trees from the woodland into the reedswamp at the edge of the lake and to undertake the splitting of some of the larger timbers. However, other tasks may also have been carried out as a group, such as the harvesting and processing of reeds at the lake shore.

It is often assumed that many of these tasks were undertaken by women and children, though as with hunting, this binary division of labour on the grounds of gender is based on a poor reading of the ethnographic data. There are numerous examples where both men and women collect plant foods and work plant materials, and where gender divisions are apparent it often relates to specific types or species of plants or the objects they are being worked into (e.g. McGuire and Hildebrandt 1994). What is more, these are often bound up in broader cultural rules regarding appropriate ways of conducting oneself in the world. These not only include rules on who should work with certain materials but also underpin decisions on what species should be used for particular tasks, the way they are used, and how it and any waste material was discarded. This can range from rules relating to the way bark is stripped from plants in winter, to prohibitions against burning wood chips and shavings (e.g. Nelson 1983). Often, these relate to the belief that plants possess spirits with the power to give or take away a person's luck in their future dealings with plants, or in some cases, to harm or even kill those who cause them offence (Nelson 1983). Though we lack the archaeological evidence for such beliefs, we should certainly consider that they may have structured the way people used and disposed of plant materials at Star Carr given the formalised manner in which the bodies of animals were dealt with.

Assembling things, making space

A popular image in archaeological reconstructions is a lone craftsperson, working flint or bone. However, few technologies are solo endeavours, depending instead on interactions between a range of different people and materials (Finlay 2003; Conneller 2011). It has been possible to reconstruct some of the interactions of different materials, and by inference, technologies and people, through microwear analysis. From this we can see that flint was clearly an important intermediary in the transformation of a wide range of materials, being used to work a broad spectrum of substances including antler, bone, hides (dry and fresh), wood and siliceous plants like reeds, as well as minerals, such as shale. Organic substances were also involved in such interactions, notably the use of elk bone to work plant matter, red deer antler, which may have been used as wedges for splitting wood and as hammers for flint working, or aurochs bone, which was probably used to scrape substances such as hide.

Furthermore most things made and used at Star Carr were, in one manner or other, composites, involving different materials and sets of technical knowledge. In some cases the composite nature of the object is obvious in the combination of different parts, such as hafts or shafts, binding agents and flint. Microwear evidence demonstrates many different artefacts made and used at Star Carr were hafted. These include blades, flakes, microliths, axes and scrapers; with hafts made of bone or antler or wood; mastics made from birch resin and hide bindings. Similarly, the dryland structures were made up of wooden poles, bound by cordage or withies and covered with woven mats, bark or hide. The production of these things thus brought together many different materials and technologies. What is more, if we follow Finlay (2003) and assume that at least some components were made by different people, the acts of making composite objects articulated social relationships between different people. Beyond this, making things articulated relationships between people and places, what Lesley McFadyen describes as mobile space (McFadyen 2006, see also Conneller and Schadla-Hall 2003; Conneller 2005). At Star Carr, these relationships formed within the site, as people fetched things made elsewhere, assembled them together, used them, and discarded them in different places. They also extended to other parts of the landscape, from the coast where flint was collected to the places within and around the lake where people hunted or fished or harvested plant materials.

The social and spatial relationships made through craft production can be seen through exploration of a single tool type: hafted flint microliths (Figure 10.11). Whilst the hafts themselves have not been found, the presence of hafts and hafting agents has been identified through microwear and other forms of scientific analysis (e.g. Aveling and Heron 1998). Where it could be identified, the hafts were made from hard materials such as wood, bone or antler, whilst the binding agent (where they were used) was birch resin. Therefore, the making of these tools required a range of separate tasks, each with its own attendant technologies, skills and knowledge and potentially undertaken by different people. Flint was carried from the coast, worked using locally procured hammerstones to produce a blade which was notched, snapped and shaped into the microlith. If the composite tool was to be used as an arrow (and many of the microliths at Star Carr were used as projectiles), then a thin stem, suitably straight and of the correct thickness, had to be selected, probably from woodland adjacent to the site, cut and trimmed to size with a flint axe and straightened using a sandstone shaft-straightener. To bind the microlith to the shaft, birch tar was used, probably cut from trees using flint flakes or blades, and then heated in a hearth to produce a tar that was applied to the flint. Finally, fletching would have been added, perhaps made from feathers, cut with flint and bound to the shaft with thin cordage made from animal sinew or plant fibre.

As well as creating relationships between places through the procurement of materials used in their production, microliths, as flexible and mobile tools (almost never recovered from where they were made) linked Star Carr with places in the broader landscape. They were used across the Vale and most likely the adjacent uplands to hunt animals but also used around Lake Flixton as knives for working plants. One microlith had two use lives: as a plant-working tool and a projectile, making contact with hide, bone, meat and plants, before being finally discarded in the western structure.

The making of things was also a social activity that involved the collaboration of different people, as well as the bringing together of different materials and the utilisation of different technologies. Taking the eastern structure as an example, people would have worked together to collect and trim the poles that formed the frame of the structure, or to harvest the reeds or bark, which they then worked to create coverings for the walls and roof. Some people may have dug out the central hollow, others would have held the poles in place whilst they were tied together and the roof and walls lashed onto the frame with cord or withies.

As a collaborative task, the building of the eastern structure would have been a social event, where people interacted with other members of the group. If some tasks were organised along social lines, such as gender, age or familial relationships, then the articulated relationships between these groups perhaps provided opportunities for people to meet and interact, whilst also highlighting distinctions and divisions amongst the inhabitants of the site.

The social nature of the structure and the relationships that were created and reaffirmed in its making continued during its use. From both the faunal and lithic assemblages recorded from within the structure there is evidence for a range of activities, the nature of which are not incompatible with the interpretation of the structure as a dwelling, where the inhabitants prepared food, worked materials and maintained tool kits. The faunal material was highly fragmented, suggesting the intensive processing of the bone, either for the extraction of marrow, the working of bone into objects, or both. Flint tools recovered from the structure seem focused on craft activity, mainly working dry hide, perhaps as part of clothing manufacture, or working plant material (possibly for mats and baskets). The structure also seems to be a place where personal or household tools were brought for repair and storage. Two flint axes and a scraper, manufactured in another place, were brought into the structure, resharpened and then left there without further use. Microliths were also brought in and left, possibly from composite tools that someone brought with them, either to repair, or to salvage the flint from a broken haft. Conversely, burins were manufactured in the structure and then taken away and used elsewhere.

Not all of the activities carried out in this part of the site were undertaken within the physically bounded (potentially private) space of the structure. Scatters of worked flint and highly fragmented animal bone were recorded around the eastern structure as well as within the area of the former western structure. Here, people knapped flint, in some cases working partially prepared nodules that had been brought to the site, and

Figure 10.11 (page 267): Replica flint microliths being hafted to an arrow shaft with birch tar (Copyright Aimée Little, CC BY-NC 4.0).

produced and repaired tools. These included burins (which were both manufactured and sharpened in this area), scrapers and microliths (the latter perhaps associated with the repair of composite tools), whilst an axe was sharpened and taken away. Flint tools were also used in this area; a burin to process fish, and a hafted flake to work bone, whilst the presence of flakes and blades with visible edge damage suggests other tasks involving the cutting and scraping of materials.

Some of these tools were also used to butcher and process the bodies of animals that were brought to the area around the structure, tasks that resulted in the deposition of animal bone as waste. Amongst this material, the presence of an articulating astragalus and calcaneus may reflect the discard of material from the dismemberment of an aurochs limb, whilst the concentration of fragmentary aurochs bone to the north-west of the structure has probably derived from the processing of a larger part of a carcass. Other faunal material in this area shows evidence for the breaking of bones, probably to extract fat or marrow, and longitudinal splitting, possibly as part of craft activities.

Some of the activities undertaken in this area were focused around hearths, the presence of which is reflected in the concentrations of burnt flint amongst the lithic scatters. The lack of more formal hearth structures, in the form of arrangements of stone or discrete pits with associated evidence for burning, suggest that these features were relatively shallow, or that fires were lit directly on the ground surface. From the analysis of charcoal samples from this and other parts of the site, they were fuelled with birch and willow/poplar (Chapter 32). The hearths themselves may have played a variety of roles; providing heat for the production of birch resin to use as a binding agent in the production of composite tools, smoke to repel insects and warmth for the people working around them. Some may also have been used in the manufacturing process of the red deer antler masks, others in the cooking of food.

Whilst some of the scatters of material around the structure appear to represent in situ activities probably broadly contemporary, they also include midden material derived from its clearance. Middening also appears to have made a significant contribution to the western part of the site. While there is likely to be some in situ material present possibly related to an initial use of the area as a structure (the western structure), the vast majority of the material lacks spatial patterning, and seems to have accumulated through the deposition of material gathered from elsewhere across the site, suggesting this area was used as a midden at some point in its history. This area has the greatest density of flint on site suggesting intensive deposition of material here. A large proportion of this material is burnt, suggesting it often represents debris related to the clearing out of hearths and possibly the clearing out of structures more generally. Flint densities are high in the north-west part of the site and the edge of the scatter (Moore's area, see Chapter 8) next to the midden is suspiciously circular; it is likely that there were more structures within the vicinity of the midden, beyond the northern edge of our trench (an area unfortunately truncated by both a field drain and the Hertford Cut).

The burnt material from the midden includes both flint and animal bone and is heavily fragmented in comparison with other areas, suggesting material that was cleared from areas with a lot of use. Within this midden were high proportions of utilised flint flakes and blades, along with more formal tools. Microwear shows that these were being used for a range of different activities including butchery and craft activities: the working of siliceous plants, bone, drilling stone and hide working. Several projectile points were also recorded, one of which had been reworked into a tool for plant use. Amongst this material was highly processed animal bone, probably waste from butchery and craft activities, including bone and antler working and clothing production.

The Star Carr midden (Chapter 35) is just one of a series of middens identified in Early Mesolithic contexts, such as Faraday Road (Ellis et al. 2003) and Three Ways Wharf (Lewis and Rackham 2011), which have been overshadowed by the rather more obvious later Mesolithic shell middens of Oronsay on the west coast of Scotland. Given arguments surrounding the significance of these later Mesolithic midden deposits (Pollard 1994; Pollard 2000) and of middens in later prehistory (Garrow et al. 2005; Jones 1998; Pollard 2001), a consideration of the broader social and symbolic significance of the Star Carr midden seems in order. The midden at Star Carr shared many features with other prehistoric middens with high levels of burning and fragmentation, possibly an effort to homogenise the midden into a singularised entity (Jones 1998, 310). Middens are memorialisations of past actions: visual and often olfactory evidence of the actions of past people and the bringing together of materials bearing traces of actions that occurred in particular parts of the landscape. Burnt material appears to have been of interest to Mesolithic people, being found in Mesolithic pits across the country (Blinkhorn 2012), suggesting that on certain occasions it may have been important to dispose of hearth debris in special ways. Burning transforms materials: making flint and bone appear similar, fragmented, opaque white, as occurred on this midden. There are also some suggestions that important objects were deposited here. For example, two burnt wildcat phalanges were found and Overton has pointed out the unusual representation patterns found for Mesolithic carnivores, with usually only isolated elements found on Mesolithic sites (Chapter 11; Overton 2016).

In the Early Neolithic, midden material appears to have embodied the activities of the group: when people left a place, they gathered midden material and buried this in pits (Garrow et al. 2005). Given that a lot of the material in the Star Carr midden derives from hearths, possibly from the structures, it is likely too that this material was redolent of group or household activities; its deposition perhaps symbolising the end of a period of occupation, or the start of a new episode of activity.

Like the structures on the dryland and the tasks resulting in the deposition of material in the midden, the building of the timber platforms employed different forms of technology and knowledge and the collaboration of different people. Specific trees were selected on the basis of their physical properties from particular places in the woodland. Bark was removed, and any side branches cut away. In some cases the trunk was split, probably by hammering wedges into it, and the timbers were trimmed and hewn with axes. In others, the whole tree was dragged or carried into the boggy ground of the swamp. However, in contrast to the areas of dryland, the platforms were clearly not places where people disposed of broken objects or waste materials. Nor were they places where tasks resulting in the deposition of large quantities of waste were carried out. Though some material is associated spatially with the areas around the platform, there is no indication of intensive episodes of flint or bone working. Instead, the material suggests more discrete episodes of deposition, possibly resulting in people keeping the platforms clear of detritus. The exceptions are several instances of more deliberate deposition associated with the western and central platform. In the case of the western platform, two large flint nodules and the mandible of a wild boar were present between the timbers. These are the only objects of their kind in this area and from their position they may have been intentionally deposited ahead of the construction of the platform.

The construction of the platforms was a significant undertaking and the scale of this enterprise can be illustrated by considering the amount of material that went into building the central platform. The 11 metres of the central platform that were excavated were composed of 26 largely unmodified tree trunks and 57 pieces of split timber, some over 5 m long, along with hundreds of smaller pieces of wood. As well as the effort involved in locating and bringing those trees to the lake edge and splitting the timbers, there was the manufacture of the necessary tools (including a lot of axes), many of which would have to be re-sharpened and repaired as the platform was being built. The logistics required to manufacture the central platform suggests it was a project that was planned and anticipated and its scale suggests that a large number of people came together to realise it. Tools may also have been made in anticipation and different people may have been involved in particular tasks. At some points groups of people would have worked together, lifting and carrying trees or dragging them across the ground and then positioning them into their correct place, whilst at others, people worked in smaller groups, splitting and hewing timbers. Some of these people would have learnt how to work the wood, where to drive the wedges into the trunk and control the split, following the examples set by those more experienced. Other people may have prepared food, brought water, or helped to repair equipment. As they finished, people would have waded, muddy, wet and tired from the lake edge swamp, their efforts perhaps marked by celebration.

Understanding the world

If the building of the central platform brought together large numbers of people, it was probably exceeded both in scale and intensity by the actions represented by the deposition of animal bone, flint and artefacts in the area first excavated by Clark. Based purely on the assemblage of material recorded from the baulk between Clark's cutting I and II, 560 specimens of animal bone were deposited here, along with objects made from the bodies of animals, and antlers that had been modified through this manufacturing process. The consistency of the radiocarbon dates suggests that not only was this material deposited over a short period of time but that all the material was contemporary with its deposition. In other words, the assemblage not only represents a discrete episode of deposition but contemporary episodes of hunting, killing and butchering animals, as well as the working of parts of their bodies into objects, and the tasks represented by the flint assemblage.

An obvious interpretation of large quantities of faunal remains deposited in a relatively short period is feasting. Meaty parts such as ribs and long bones are common in this assemblage, while mandibles and lower limb bones have been smashed for the rich marrow. Elk and aurochs were extremely large animals and Early Holocene red deer were also much larger than today. As such, the killing of several of these animals would amply provision a large gathering, an aggregation where several groups might meet up in the context of seasonal feasting and possibly also communal construction activity.

However, this is not the only story of this area: the assemblage is not simply the product of casual discard of feasting material, as there appears to be both structure to the deposit and a much broader range of material than can be neatly subsumed under the category of feasting. This latter includes lithic artefacts, particularly blades used in plant working, antler raw material and manufacturing waste, and a broad range of organic material culture such as barbed points and animal crania, including the red deer masks. There are unusual animal remains here also: the wings of two different birds, a crane and a black- or red-throated diver, part of a pine marten, the right forelimb of a wild cat and the only wolf remains from the site (a metatarsal, possibly indicative of the presence of a wolf skin). As has been argued for other depositionary acts at Star Carr, it may be that objects associated with important acts were deposited into the wetland: material from feasting, tools employed in key events, and the paraphernalia of ritual practices.

What people chose to deposit was guided by their broader understanding of the world and their interactions not just with other people but with the other beings that populated it, both animals and spirits. Anthropologists (e.g. Fausto 2007) have suggested that people who live by hunting and gathering are almost universally animist in their outlook and the evidence suggests the same was true for the people who inhabited Star Carr. Their world was one where animals could be seen to have the same desires and motivations as people and even to possess a soul; as a result, for people who depended on killing and eating these animals, the nature of human-animal interactions was one of great concern. Amongst Northern Eurasian hunter-gatherer groups, relationships between people and animals tend to be couched through concepts of reciprocity, where animals will choose to give themselves up to the hunter in exchange for respectful treatment of their remains. Jordan (2003) has described how amongst the Evenk, as amongst many hunter-gatherer groups, animal remains have to be treated with respect; as a result bear bones are deposited in deep pools and elk bones are returned to the forest. Jordan has urged archaeologists to seek similar patterns of deposition on archaeological sites.

Such motivations are likely to have guided the deposition of material at Star Carr. We note repeated patterns in wetland deposition from the earliest occupation of the site at around 9300 cal BC to the evidence contained in Clark's baulk, dated to around 8800 cal BC. These include the deposition of faunal remains, barbed points, antler raw material, utilised flint blades, with evidence for a focus on animal heads, including the antler masks. There is some evidence that this practice, as at contemporary sites in Southern Scandinavia, was initially focused on the deposition of elk remains, perhaps in a bundle wrapped within their hide (Chapter 12); however, by the middle of the 92nd century cal BC at Star Carr, red deer began to be the predominant focus for the deposition of cranial material. The focus on red deer heads appears to have encompassed the treatment of antler too. While antler has been found on the dryland, quantities involved are relatively low and limited to raw material (though preservational issues need to be considered too); the preference for the deposition of both antler-working waste and barbed points seems to have been the wetland. Barbed points seem to have been aggregated from the wider landscape and returned to Star Carr for deposition. The only identified tooth bead also comes from red deer. It may be that the head of the animal embodied the soul or essence of the animal and it was this element that was particularly the focus of deposition (Conneller 2004).

The gatherings of people involved in feasting and other communal activities would have provided an opportunity for quite different and powerful social statements to be made. It is within this context that we need to consider the antler frontlets, or masks, recovered from Clark's baulk and other areas of patterned wetland deposition such as the detrital wood scatter. Masks allow the wearer to modify or transform their identity and change the way in which they are perceived by others around them. It is therefore interesting to consider the material choices made in the creation of these masks and the implications these may have for the identities which were being constructed. Red deer is a constant theme but the sorts of animals involved are diverse. One frontlet, for instance, comes from a large, powerful male red deer, whose remodelled skull surface indicates that he had been involved in many rutting fights before he died (Chapter 26). He was killed in the spring, shortly after having shed his antlers. However, two other frontlets appear to have been smaller, younger male red deer who were killed when their antlers were still attached to their skull. Another frontlet was made from the skull of a large female deer. These frontlets/masks therefore embody a variety of differing personal and seasonal information about these animals, the kind that would have been immediately obvious to people who spent large amounts of time stalking, killing and butchering red deer. This variety of animal biographies, at odds with a hunting strategy focused on the predation of younger animals, suggests that the original identity of the animal was important to those who made and wore the masks and that elements of these animals' identities were being chosen to be assumed by the mask wearer.

However, the identities created through wearing the masks may have been much more complex than a simple transference of the identity of the animal chosen for mask production. This is suggested through the working of the antlers, which often dramatically alters the form of the artefact and obscures the original age and sex of the individual animal. This can be seen in the significant reduction of the antlers of several frontlets, which leave either short spikes of antler or stumps at the burrs, thus creating the impression of a much younger animal, a female deer, or one whose antlers have just begun to regrow following shedding. The masks with more intact antlers have also had their form modified with the removal of the crowns and beams again creating the form of an animal younger than the individuals themselves (Conneller 2011). Further to this, we may also need to consider the masks as being composite objects, with other materials attached to change the form and meaning of the finished mask. This is implied through Clark's suggestion of the use of webbing or strapping but also supported by our experimental work which highlights the need for substantial support if these artefacts were to be worn and ethnographies of masks which often feature the attachment of feather, hide, cordage, carved wood and pigment. All of these materials bring their own properties and effects to the finished mask and have the potential to shape the identity of both the wearer and the mask itself.

Within a social context, masks have the power to transform the identity of the wearer, at the moment of adornment and removal. The reasons for wanting to shift identity are plentiful and Conneller (2004) has argued previously for a perspectivist interpretation of these artefacts which would have allowed the wearer to negotiate with non-human social beings (such as animals) to ensure positive relationships between people and the world around them.

These moments of transformation are powerful statements, distinguishing the mask wearer from non-mask wearers in their ability to shift identity. As such, it may be crucial to consider the social setting at Star Carr when interpreting these masks. This is equally important given that these artefacts have not been excavated from other sites around Lake Flixton. What is it about this particular site which makes it appropriate for the use and deposition of these masks? One key factor may be the size of audience for the moments of transformation. As discussed above, Star Carr appears to have been a place where large groups of people congregated. As such, it allowed mask wearers to demonstrate their ability to shift identity before larger numbers of people than would normally be in one place at one time. The audience themselves may have had a vested interest in the results of these shifts in identities; the negotiation of human–other being relationships may have consequences for entire communities and witnessing these events may have been seen as significant in itself. As such, the putting on and taking off of masks may have been an important social event for the Mesolithic inhabitants and formed one of the motivations behind unusually large groups of people coming together at Star Carr.

The temporality of mask wearing is also worth some consideration here. There are no obvious areas of wear on the excavated artefacts which would allow for a more detailed understanding of their use-lives. Some of Clark's finds featured broken perforations, suggesting a certain degree of heavier use prior to deposition, although this pattern is difficult to verify within the larger assemblage. This is due in part to the absence of microwear opportunities, in part to the mixed levels of preservation observed across the site, and in part to the realisation that perforations are not a definitive feature in the form of these artefacts. As such, whilst it remains possible that some masks may have enjoyed extended use lives and multiple wearers, there is little evidence on which to take this discussion further.

However, there may be other factors which affect the context of mask wearing which mark Star Carr out as different from other sites around the Vale of Pickering. The timber platforms and detrital wood scatter create a unique type of lake edge space which may have been an important part of the setting for mask wearing. They would have provided a cleared area upon which many more people could view the wearers and the communal labour invested in their construction may have imbued them, and the spaces they create, with a degree of social status. Conversely, the dryland structures would have afforded spaces for mask wearing where visibility was restricted to that of a privileged few. The presence of such a high density of intentionally deposited animal remains within Clark's area of the site may also have been another key factor. If the identities being created contained an element of animal affects, being in close proximity to such a volume of specially treated animal materials may also have been an important part of the context of mask wearing. Certainly, the deposition of the majority of the masks within this area of the site would suggest that they were linked in some way.

Conclusions

Clark's interpretation of Star Carr described the site as a base camp occupied by a small group of families during the winter months of the year, and probably revisited on a number of occasions (Clark 1954). Re-interpretations of the site in the 1970s and 1980s (e.g. Jacobi 1978; Price 1982) and the re-excavations in 1985 (Cloutman and Smith 1988; Mellars and Dark 1998) hinted at greater complexity. However, many commentators continued to follow Clark in assuming a single, simple interpretation of the site, taking issue with his interpretation only in so far as the season of occupation or the function of the site (e.g. Andresen et al. 1981; Legge and Rowley-Conwy 1988). We hope that this chapter demonstrates that such ideas can no longer be entertained. These excavations have revealed the complexity, scale and intensity of activity at the site: spanning around 800 years, the product of a variety of domestic, task-specific and ritual actions and capturing within the patterning of the remains the very different ways that Mesolithic people had of understanding their world. The site embodies the material remains of many different lives, separated in some cases by long periods of time. However, we should not assume that later inhabitants of the site held no memory of the initial actions of the pioneer groups who first made their camp on the edge of the lake as the similarities in patterns of deposition certainly hint at commonly held beliefs passed down by oral tradition. Other things changed, the focus and intensity of occupation may have waxed, and waned, but people continued to return to Star Carr, a place where countless generations had been before.

PART 5

Star Carr inside and outside Mesolithic Europe

'To judge from the exiguous contemporary finds and from indications from the fuller material on sites of Boreal age, the culture represented at Star Carr extended over the bed of the present North Sea at least as far as Zealand.'

(Clark 1954, 191)

CHAPTER 11

The British Mesolithic Context

Chantal Conneller and Nick J. Overton

Introduction

The occupation of Star Carr took place between c. 9300 and c. 8500 cal BC (Figure 9.1). During this period there appears to have been relatively little Mesolithic occupation in the rest of Britain. This statement does need to be qualified as reliable radiocarbon dates for the British Mesolithic are rare (Conneller et al. 2016) and typo-chronologies are less refined than elsewhere in northern Europe. However, current evidence permits us to state that while Star Carr was occupied, Mesolithic groups were present in Southern England, focused almost entirely on the riparian affordances of the Thames and its tributaries (the Lea, the Colne and the Kennet). In the North, the main source of evidence for occupation contemporary with Star Carr comes from the Vale of Pickering itself. Typologically early sites on the North York Moors and the Pennines – the classic upland hunting camp counterpart to Star Carr's basecamp (Clark 1972; Jacobi 1978; Rowley-Conwy 1994; Simmons 1996) – are either undated, or have dates on bulked, un-identified charcoal that provide only *termini post quos* for the occupation. This latter evidence suggests that some of the Pennine sites could be contemporary with Star Carr but may also be rather later.

From around c. 8700 cal BC, at the time that Star Carr appears to have seen less intensive occupation, we begin to see changes in the nature of Mesolithic occupation in Britain. The period c. 8700 to 8000 cal BC was a time of intense change with evidence for the movement of Mesolithic groups into upland locations and into areas of Britain that had previously seen little occupation: Scotland, Wales, the Midlands and South-west England. Microlith forms became more diverse with increased regionalisation and the probable appearance of industries with small scalene triangles (traditionally heralding the start of the Late Mesolithic) towards the end of this period. New practices also appear, such as the deposition of human remains into caves.

Figure 11 (page 273): Map of Northern Europe including Doggerland. The map was drawn by Daniel Groß, prepared after Grimm 2009, based on Björck 1995; Boulton et al. 2001; Brooks 2006; Clark et al. 2004b; Ivy-Ochs et al. 2006; Lundqvist & Wohlfarth 2001; Weaver et al. 2003 (Copyright Daniel Groß, CC BY-NC 4.0).

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Early Mesolithic chronology

This chapter will focus on sites with radiocarbon dates that indicate they were occupied between c. 9300 cal BC and c. 8500 cal BC and were thus broadly contemporary with Star Carr, with some discussion of sites in the following centuries (Figure 11.1). To the rather short list of radiocarbon-dated sites will be added others that can be suggested to belong to this period on typological or pollen-stratigraphic grounds. At least three Early Mesolithic assemblage types have been identified on the basis of microlith typology and various technological features (Clark 1934; Radley and Mellars 1964; Reynier 2005): Star Carr assemblages are characterised by short obliquely blunted points, trapezes and large triangles; Deepcar assemblages are characterised by elegant, elongated obliquely blunted points often with retouch on the leading edge, partially backed points and rhomboids; and basally modified assemblages are characterised by short obliquely blunted points and a range of regionally diverse basally retouched forms. Our understanding of the chronology of these types has been enhanced through Bayesian modelling of existing dates as part of this project (Conneller et al. 2016).

This work suggests that Star Carr type assemblages appeared first in *9805–9265 cal BC (95% probability; start Star Carr-type;* see Conneller et al. 2016, figure 4), probably in *9495–9290 cal BC (68% probability).* Star Carr type assemblages disappeared in *8230–7520 cal BC (95% probability; end Star Carr-type;* Conneller et al. 2016, figure 4), probably in *8165–7835 cal BC (67% probability)* or *7830–7815 cal BC (1% probability).* Star Carr assemblages thus represent pioneer Mesolithic populations in both Northern and Southern

Figure 11.1: Map of main sites discussed in this chapter. 1: Vale of Pickering (Star Carr, Seamer C, K, D, L, VPD, VPE, Flixton School Field, Flixton School House Farm, Flixton 1, No Name Hill, Barry's Island). 2: North Yorkshire Moors (Pointed Stone 2 and 3). 3: Pennines (Warcock Hill N and S, Turnpike, Lominot 2 and 3, Windy Hill, Pule Hill Base). 4: Deepcar. 5: Rushy Brow. 6: Kelling Heath. 7: Great Melton. 8: Lackford Heath. 9: Lea Valley (Rikof's Pit, Broxbourne 102, 104, 106). 10: Colne Valley (Three Ways Wharf, Former Sanderson Site). 11: Eton Rowing Lake. 12: Kennet Valley (Thatcham, Greenham Dairy Farm/Faraday Road, Wawcott XXX) (Copyright Nick Overton, CC BY-NC 4.0).

England, moving into landscapes that were empty of people; however, the rarity of sites in the south suggest a short-lived incursion only.

Deepcar type assemblages first appeared in *9460–8705 cal BC (95% probability; start Deepcar-type;* see Conneller et al. 2016 figure 5), probably in *9090–8775 cal BC (68% probability).* Deepcar type assemblages disappeared in *8200–7240 cal BC (95% probability; end Deepcar-type;* Conneller et al. 2016, figure 5), probably in *8075–7620 cal BC (68% probability).* It is *95% probable* that Deepcar type assemblages first appeared after the first Star Carr type assemblages but it is *100% probable* that their use overlapped in time. Deepcar assemblages probably appeared around half a millennium after the first Star Carr type assemblages (Conneller et al. 2016, figure 8). Deepcar assemblages represent both initial pioneer and subsequent residential occupation in the south (see Housley et al. 1997). In the north, the presence of a few Deepcar style microliths at Star Carr in the latest context of the site might suggest a more gradual adoption of these forms by groups residing in this area.

Finally, our models suggest basally modified microlith type assemblages first appeared in *9280–8305 cal BC (95% probability; start basal modified;* Conneller et al. 2016, figure 6), probably in *8690–8335 cal BC (68% probability).* Basally modified microlith type assemblages disappeared in *7030–5845 cal BC (95% probability; end basal modified type;* Conneller et al. 2016, figure 6), probably in *6960–6460 cal BC (68% probability).* These assemblages certainly overlapped with the use of Star Carr type assemblages and Deepcar type assemblages (*100% probable*), at least in certain areas of the country. The appearance of basally modified forms coincides with a diversification and regionalisation of the Mesolithic with new areas of Britain occupied; a shift made by all Mesolithic groups in Britain, independent of the microlith forms they favoured.

Based on these models, the following review will include discussion of all Star Carr type sites on the basis that these are broadly contemporary with Star Carr itself, with the exception of the southern Welsh Star Carr type sites that are likely to post-date its occupation. Deepcar type sites will also be included in the discussion as these overlap with Star Carr's occupation. However, because many Deepcar type sites are likely to post-date Star Carr, those that have late radiocarbon dates or typologically fit the profile of late Deepcar sites (see Jacobi 1981) will be excluded from the discussion.

The following account focuses on excavated sites and is based on a combination of analysis of the original artefactual and faunal material by the two authors, site archives, the Jacobi archive and review of published literature.

The Vale of Pickering

Introduction

The only securely dated sites in Northern England that are known to be contemporary with Star Carr come from the immediate environs of the Vale of Pickering (Figure 11.2). In the course of excavations and palaeoenvironmental survey around Lake Flixton between 1976 and 2005, undertaken by Tim Schadla-Hall and the Vale of Pickering Research Trust, a total of 24 additional sites were found around the lakeshore and on islands in the middle of the lake. Most of these are entirely Early Mesolithic in date or have a significant Early Mesolithic component (Conneller 2000). The most extensively excavated sites were those located in the rescue campaign of 1976 to 1985 in advance of the Seamer area being used for landfill. Subsequently, a sampling strategy based on the location of the Seamer sites led fieldwork to focus on the excavation of 2 × 2 m test pits located along the 24.5 m OD contour. Some areas underwent further exploration but never on the scale of the Seamer sites (Schadla-Hall 1987; Schadla-Hall 1989).

Seamer K

Seamer K is located on the northern shore of Lake Flixton, focused on a small lagoon behind the main body of water, known as the western embayment (see Figure 11.2). The site contains both Final Palaeolithic and Early Mesolithic settlement debris (Conneller and Schadla-Hall 2003), separated in the southern part of the site by a late glacial coversand, and more ephemeral Late Mesolithic activity (David 1998). Radiocarbon dates show that the Mesolithic activity at the site is broadly contemporary with activity at Star Carr (Conneller et al. 2016, figure 4).

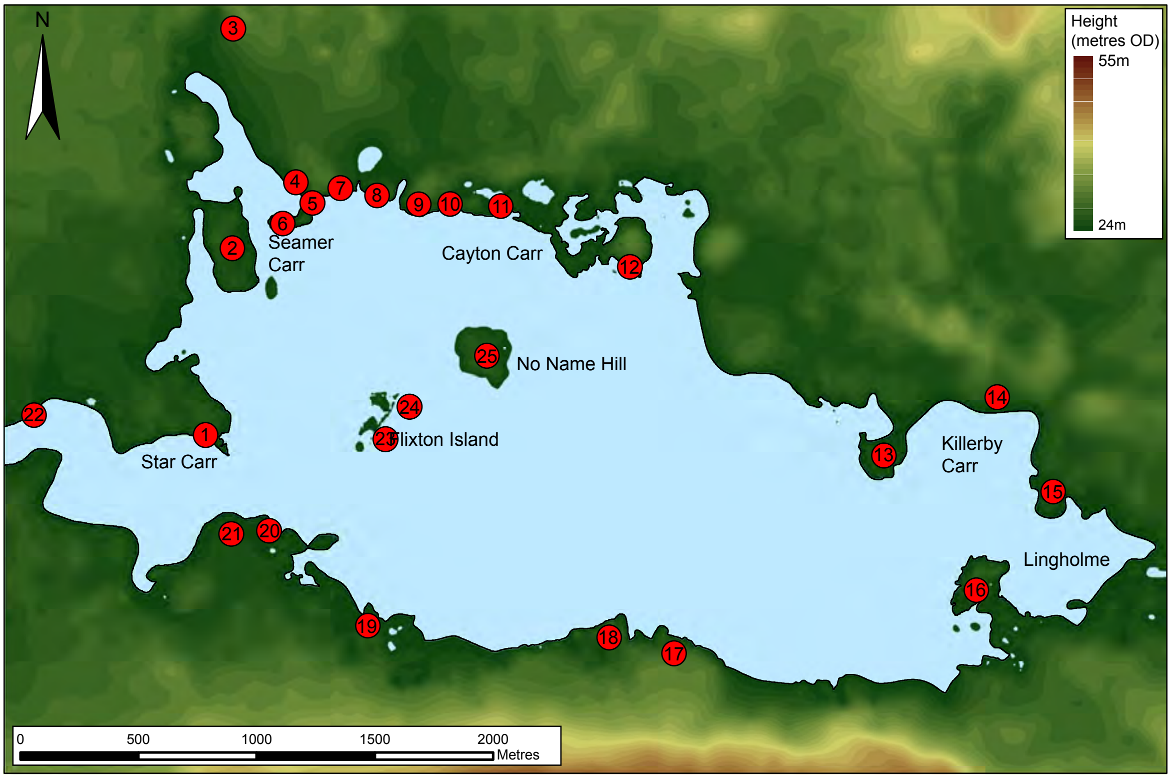

Figure 11.2: 1. Star Carr; 2. Ling Lane; 3. Seamer Carr Site F; 4. Seamer Carr Sites L and N; 5. Seamer Carr Site K; 6. Seamer Carr Site D; 7. Seamer Carr Site B (Rabbit Hill); 8. Seamer Carr Site C; 9. Manham Hill; 10–12. Cayton Carr; 13. Lingholme Site B; 14. Killerby Carr; 15. Lingholme Site A; 16. Barry's Island; 17. Flixton School Field; 18. Flixton School House Farm; 19. Woodhouse Farm; 20. VP Site E; 21. VP Site D; 22. Flixton Site 9; 23. Flixton Island Site 1; 24. Flixton Island Site 2; 25. No Name Hill (Reprinted from Milner et al. 2013b).

Six major lithic scatters of Early Mesolithic date have been identified at Seamer K (Figure 11.3). Scatter 5, though containing some Final Palaeolithic material from the adjacent scatter 4, is mainly Mesolithic in date and is probably the densest Mesolithic scatter on the site. A wide range of activities appear to have occurred here. Burins were made, used and resharpened (14 burins, 36 burin spalls), mainly in the eastern part of the scatter. A total of 24 scrapers were recovered and two awls. Microlith manufacture and retooling was also a major task with equal numbers of microliths and microburins (n=12) forming a discrete cluster within the south-eastern part of the scatter and refitting to two imported till cores. Burnt flint is very common at 22.7% and not dissimilar to levels for the eastern structure at Star Carr (Chapter 8). No clustering can be discerned, possibly due to disturbance.

In contrast, scatter 30 in the western part of the site is highly specialised, focused on microlith production around a small hearth and dated to *9255–8625 cal BC (95% probability; HAR-5241* Conneller et al. 2016, figure 4). Here three cores were imported and used to produce microliths. Production was intense with 40 microburins recovered and 11 microburins fitting back into a single core sequence. Twenty-one microliths were also recovered, indicating repair of composite tools as well as production. Other tools are rare: a single notch could be related to haft production and two truncations could also have served as components in composite tools. This scatter is associated with poorly preserved faunal remains of which only a red deer humerus could be identified to species. Scatter 7 in the south-west of the site is similarly microlith dominated (n=15) though microburins (n=6) are rarer. Production/discard took place mainly in the western part of the scatter. Burins (n=5) and burin spalls (n=7) are also common. A broad range of other tools are represented at low levels: three scrapers, two truncations, an awl and a notch.

Scatter 2 in the north-west of the site consists of a small knapping scatter to the north of a small hearth involving the reduction of two beach pebbles. To the south of the hearth is a dump/cache of 16 exhausted or

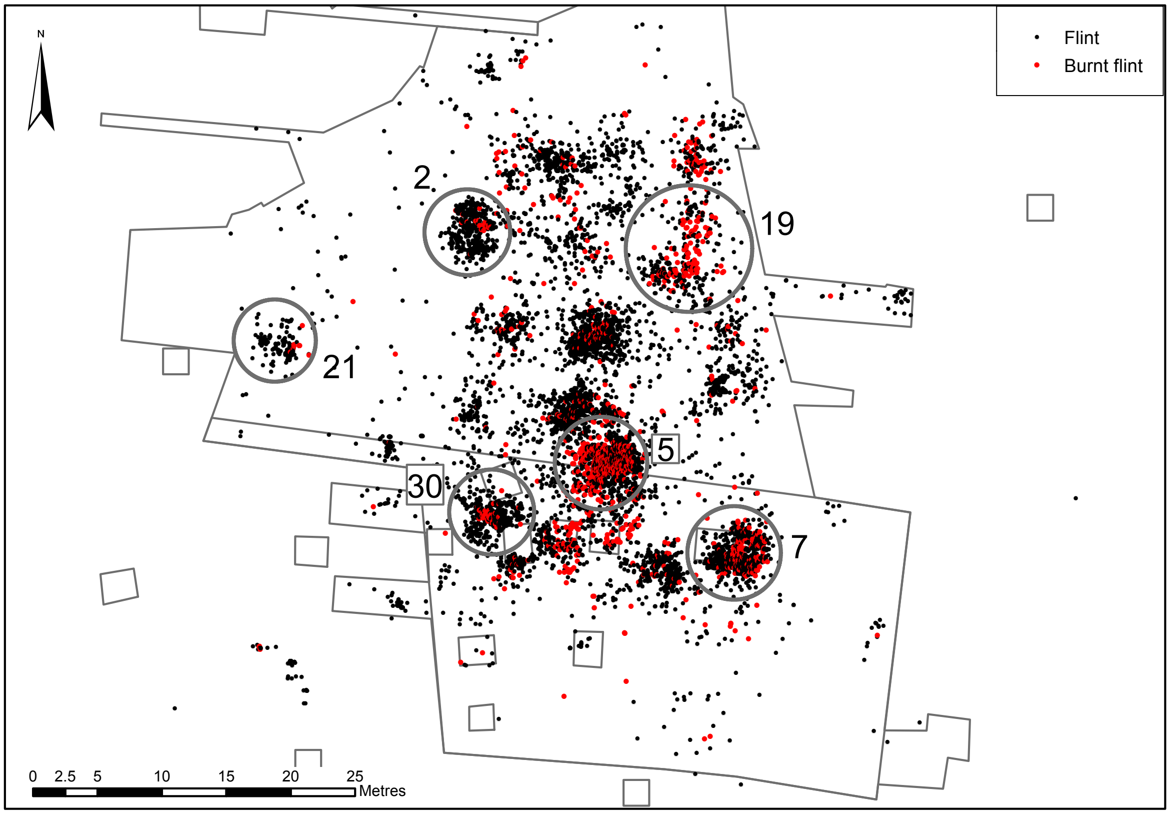

Figure 11.3: Early Mesolithic scatters (circled) at Seamer K (Copyright Star Carr Project, CC BY-NC 4.0).

flawed nodules and six unmodified nodules that are too small to be worked. Also present are a range of tools and debitage that were not knapped within this scatter. It is likely that scatter 2 represents a midden where material was cleared from the surrounding area. This scatter contains a worn core made of Scottish southern uplands chert, a rare possible instance of long-distance transfer of raw material.

More ephemeral activity is also represented at the site. Scatter 21 in the far west represents an isolated area where a small lithic assemblage of 158 pieces was recovered. Here a single nodule was reduced and tools made both for immediate use (scrapers) and for future use (microliths). This scatter does have a range of associated fauna: within the scatter is a cut marked goose bone; on the north-eastern edge was a large groove-and-splintered antler and an unmodified antler; to the north-west a red deer tibia and metatarsal.

Tool-use task areas can also be identified. In the north, the west and south-eastern parts of the site, areas of tool use are indicated by the absence of knapping debris and the presence of tools and large, edge-damage flakes and blades, such as a cluster of three scrapers associated with blades and fragments in the south-eastern corner of the site.

Site K is composed of a series of lithic scatters, indicative of a range of different tasks, some more specialised and intense, others more ephemeral and more generalised. There are no obvious refits between the Early Mesolithic scatters on the site, possibly indicating a lack of contemporaneity; we can instead imagine repeated occupation of this area for a variety of different purposes.

Seamer C

Seamer C is located around 250 m to the east of Seamer C. The site is also of mixed date containing both a Long Blade and an Early Mesolithic component. The Early Mesolithic material consists of two large scatters, H and K, and two smaller scatters B2 and G (see Figure 11.4). Radiocarbon dates exist for scatters H, K and G. Radiocarbon measurements for scatter H and K, obtained in the 1970s, have large standard deviations. Bayesian modelling reveals that occupation of Seamer C was broadly contemporary with Star Carr and that it is likely to have been visited on more than one occasion (Conneller et al. 2016, figure 4).

Scatter H can be divided into two sub-scatters: a northern and a southern one. The southern scatter is 4.5 m in diameter and has a very pronounced edge, suggesting it was enclosed by a boundary, either a tent or built structure (Figure 11.5). Within this a tight, central cluster of burnt flint can clearly be discerned that is likely to indicate a hearth. Adjacent to this are two clusters of flint likely to represent knapping scatters. This spatial integrity suggests a relatively short-lived structure.

Within this possible structure large quantities of scrapers were recovered: 71 examples were recovered with quantities of other tools low. A total of 11 microliths were recovered along with a microburin, a single burin and two burin spalls. Refitting demonstrates that many of the scrapers were manufactured here. This appears to be an area intensely focused on a specific task. The northern scatter by contrast is almost entirely focused on knapping with only a couple of scrapers and burins associated (Conneller and Schadla-Hall 2003). Fauna is sparse consisting of a handful of unidentifiable fragments.

Only 4 m to the north of scatter H is a small scatter, B2. This also can be broken down into two sub-scatters, a northern and a southern one. Within the northern scatter is a cluster of 20 aurochs bones, most within a 2 m area, with meaty limb bones well represented as well as mandibular fragments; pieces that might need processing for marrow (Uchiyama 2015). This area also yielded two microliths and a small knapping scatter consisting of the reduction of a nodule(s) of Wolds flint. The southern sub-scatter of B2 is more diffuse with more tools: a burin and three burin spalls, two awls and two scrapers attest to its use for craft activities.

Scatter K is located in the central part of the site (Figure 11.4). This is an area that has been disturbed and a number of tree-boles were recorded. This disturbance is reflected in the spatial distribution and stratigraphic reversal of radiocarbon dates. The scatter is characterised, as was scatter H, by the focus on scraper production

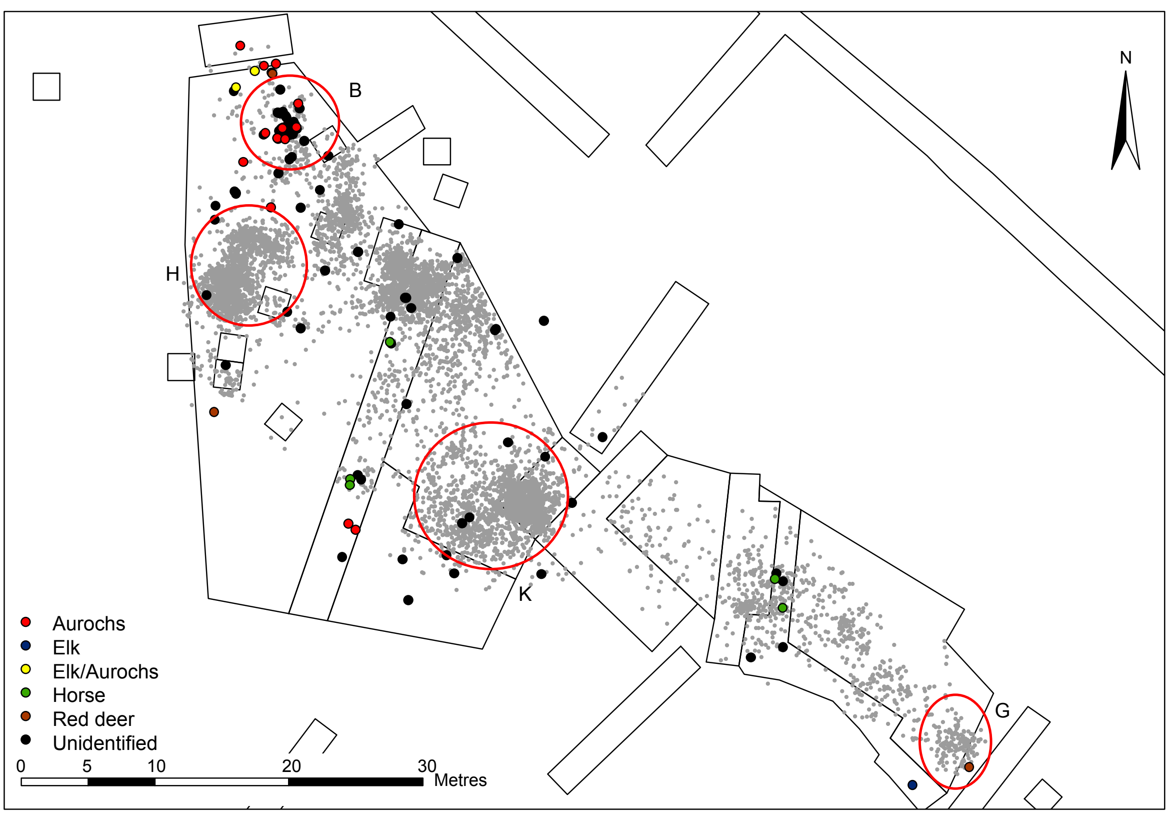

Figure 11.4: Plan of Seamer C, showing faunal remains (Copyright Star Carr Project, CC BY-NC 4.0).

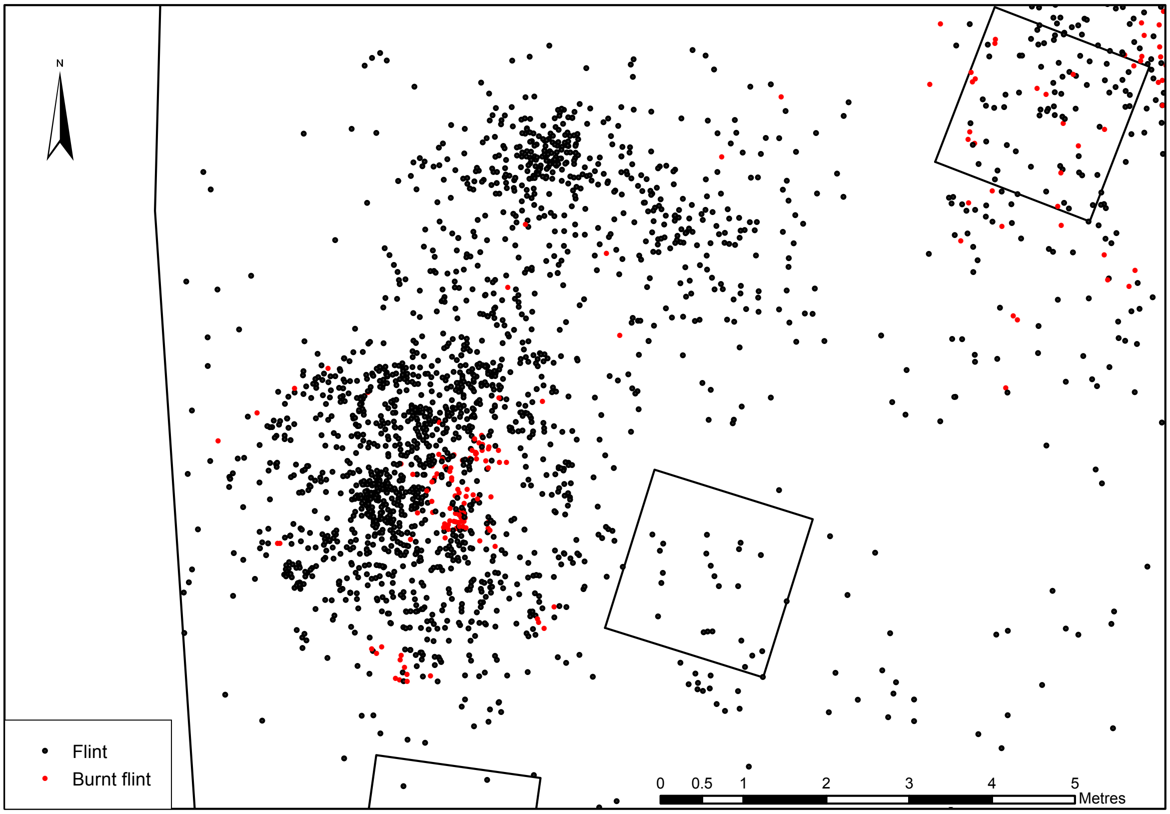

Figure 11.5: Possible structure at Seamer C, scatter H (Copyright Star Carr Project, CC BY-NC 4.0).

with 36 examples found in a 3.3 × 2 m area. Other tools are similarly rare with only three microliths and a burin found in the same small area. The similarity in composition of the Scatter H and K assemblages and the presence of three refits between the two scatters may suggest that they are broadly contemporary. The major difference between the two scatters is knapping quality. Scatter K is produced on extremely poor quality raw material and possibly by inexperienced knappers.

Finally at the eastern end of the site is scatter G, another small scatter. This scatter consists of several small scatters of lithic debris associated with small numbers of scrapers and microliths. Scatters of animal bone were also found here, with red deer and elk both identified. There is no evidence to suggest this scatter is contemporary with others at the site.

Lake Flixton: northern shore

Several smaller excavations in the Seamer area and further to the east located Mesolithic material on the northern shore of Lake Flixton. In general this is known only from small test pits and is poorly dated. However, all are potentially contemporary with Star Carr on typological grounds. In the Seamer area, Seamer L is a small lithic scatter of mixed date containing both Long Blade and Early Mesolithic material. The Mesolithic material suggests an area focused on microlith production and re-tooling. Seamer D is another small scatter located on the West Island peninsula consisting of 214 lithic artefacts. No radiocarbon dates are available but on stratigraphic grounds it is likely to be broadly contemporary with Seamer C and K. Flint knapping including the production of microliths and the use of imported scrapers took place around a hearth. To the north-west of the hearth was a cache of flint nodules found placed in a small pile of around 0.4 m diameter (Figure 11.6). All are tested or partially reduced; none are substantially worked. This seems to be a cache for raw material very similar to the AC8 cache found associated with tree roots at Star Carr (Chapters 8 and 35). The nodules at Seamer D are very similar

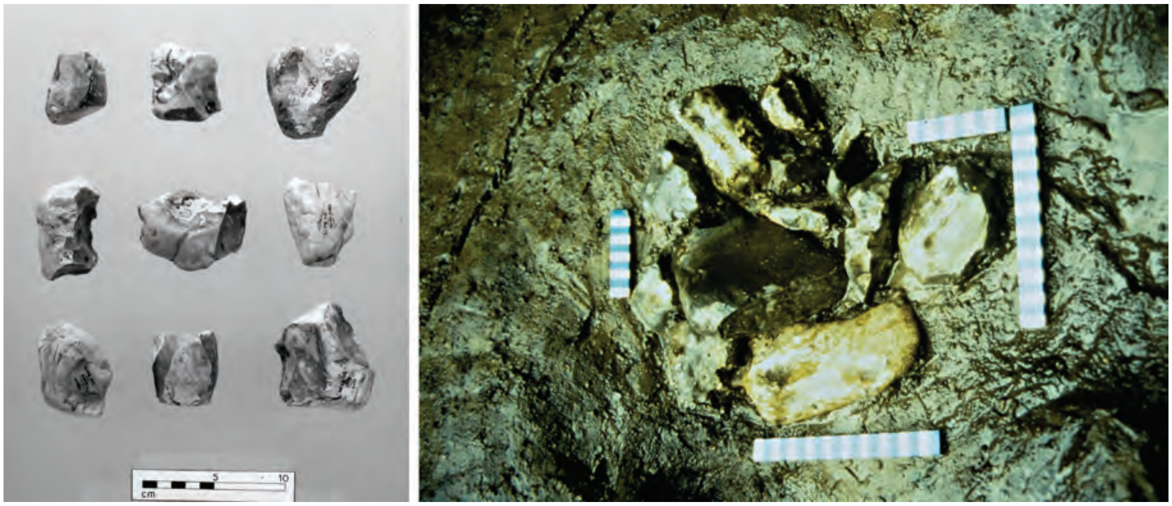

Figure 11.6: (left) Slide of nodules from Seamer D cache; (right) slide of the Flixton School cache (left: Copyright Gwil Owen, CC BY-NC 4.0; right: Copyright Vale of Pickering Research Trust, CC BY-NC 4.0).

raw material types, though unlike Star Carr there is no evidence they refit. Beyond the Seamer area, to the east at Cayton Carr, further Mesolithic material was recovered. In general this area did not seem to see much occupation; the greatest concentration of lithic and faunal material encountered was not in primary context but instead redeposited by a stream. Finally in the easternmost part of the northern shore material was recovered from Lingholme Farm. This is mainly a fieldwalked assemblage with both Early and Late Mesolithic material represented.

Lake Flixton: southern shore

Four sites have been located along the southern shore of Lake Flixton, immediately opposite Star Carr. The most westerly of these, VPD, consists of a 20 m² area, and two adjacent 2 m² test pits excavated in 1986 and 1988. These excavations located the northern part of an extremely dense lithic scatter, one of the densest in the Vale, and is thus likely to be an area of some significance. A cluster of burnt flint indicates a hearth on the southernmost edge of the trench. Fauna was present, of which 33 pieces could be identified to species: red deer and roe deer dominated but isolated elements of aurochs, elk, wild boar and wild cat were also present; an extremely diverse range for such a small area. The lithic assemblage is dominated by microliths (n=33) (one of which refits into a core sequence), though burins (n=11) and scrapers (n=16) are also well represented, with awls (n=2) and truncations (n=4) rarer. Retouched and utilised flakes and blades are well represented (n=94). Tool manufacture seems to have been a major task: microburins (n=34) and burin spalls (n=25) were recovered. Wolds material and some small till pebbles were worked but large blades also seem to have been imported to the site. There is some spatial variation evident with more varied activities carried out in the larger excavated area, and greater focus on microlith production in test pit VPQ, around seven metres to the south-west. 150 m to the east of VPD is VPE, another series of 2 m² test pits which located a series of relatively low-density lithic scatters. The largest of these, test pit VPJ yielded three microliths, three burins and a scraper.

Just over 1 km to the east is Flixton School House Farm where evidence of both Early and Late Mesolithic activity has been recovered. In 1999 a test pit located aurochs remains from a small, peat-filled hollow at the site. Later excavations uncovered a discrete area of activity directly adjacent to the hollow including substantial quantities of flint, posthole arrangements and intentionally constructed hollows (Taylor and Gray Jones 2009). Further excavation was also undertaken in the hollow with the aurochs remains but failed to uncover any further archaeological material, indicating the initially recovered faunal material was a single, discrete episode of deposition (Overton and Taylor forthcoming). Whilst attempts to directly date the bones failed, a pollen profile from the same trench (Cummins and Simmons 2013) places the deposition of the assemblage well before the expansion of hazel, dated locally to 8300–7780 cal BC (8940±90 BP, OxA-4377) (Mellars and Dark 1998).

The faunal assemblage formed a discrete deposit, less than 0.3 m across, with many elements in close association; macro-botanical analysis indicates the deposition was into a shallow pool of water amongst beds of *Phragmites* reeds and sedges (Taylor 2012). The faunal assemblage is comprised of three aurochs thoracic vertebrae, thirteen ribs, six from the left side of the body and seven from the right and a fragment of the right pelvis (Overton and Taylor forthcoming). These remains were originally considered to be an articulated portion of an animal; however, closer analysis indicates this is not the case. The morphology of the ribs indicates they originated from both the front and back half of the rib cage (see Figure 11.7) and whilst the three thoracic vertebrae

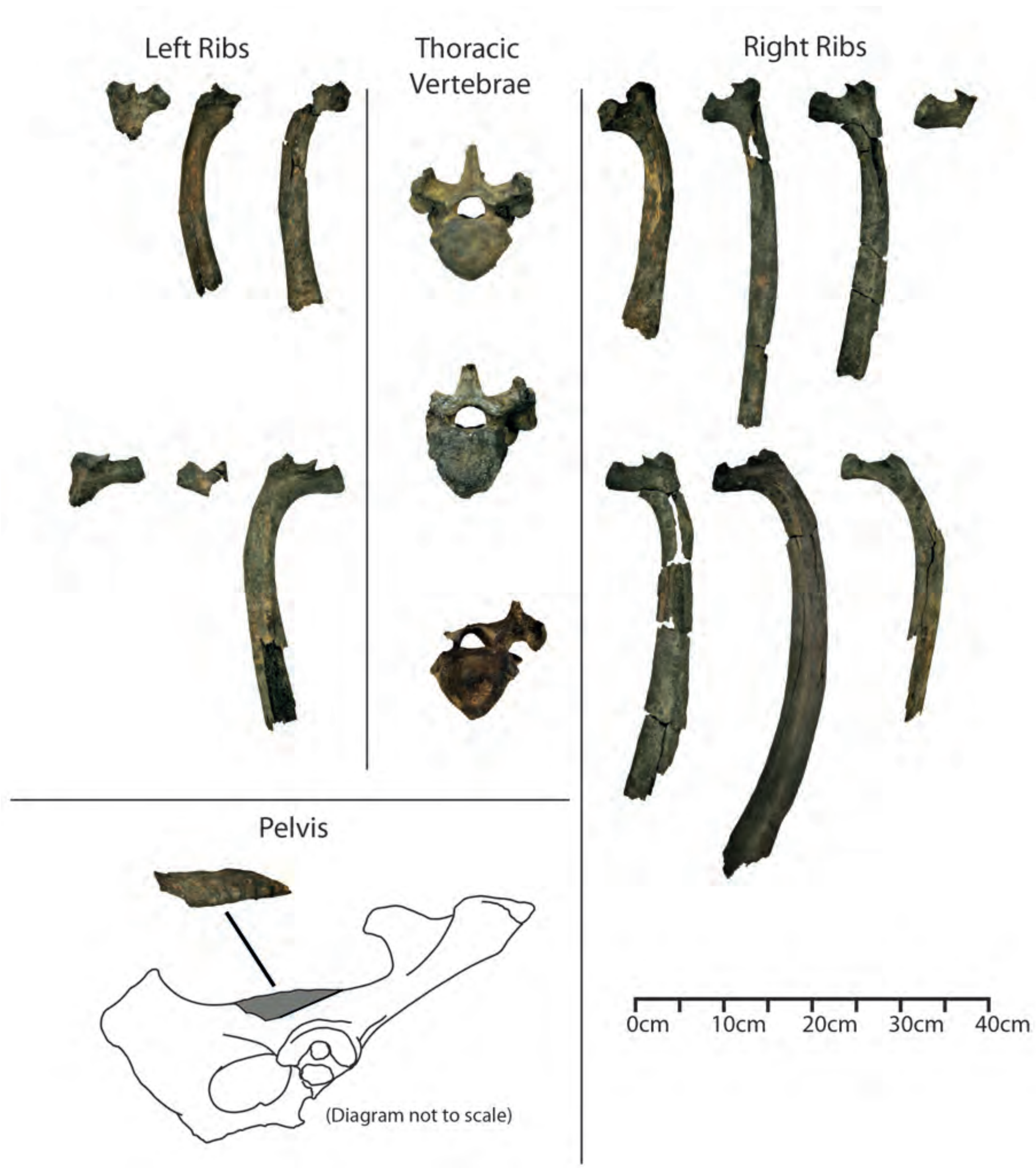

Figure 11.7: The Flixton School House Farm aurochs assemblage (Copyright Nick Overton, CC BY-NC 4.0).

may have been articulated and supported three pairs of the ribs, there is clearly still an over-abundance of ribs from other parts of the individual. Furthermore, the fragment of pelvis originates from a skeletal element that does not articulate directly with either the ribs or thoracic vertebrae; in both cases they are separated by the lumbar vertebrae and sacrum. Therefore, this represents a collection of skeletal elements from across a broad area of the skeleton. Given the watery context, it is unlikely this represents the remains of in situ butchering but instead can be considered as remains gathered together from a potentially larger assemblage and intentionally deposited together. Furthermore, given the close spatial proximity of these elements, they may have been wrapped up together or deposited in a bag (Overton and Taylor forthcoming), akin to discrete depositional practices evidenced at Early Holocene Danish sites (Leduc 2014b; Jessen et al. 2015; also Chapter 12).

Around 250 m to the east, situated on the adjacent peninsula, is the site of Flixton School Field. Here a series of test pits yielded Mesolithic material that on typological grounds represent a range of dates. Two adjacent dryland to wetland trenches OH and OI yielded moderate assemblages of flint; OH dominated by scrapers and OI by microliths. Both had wetland portions dominated by tools and larger utilised pieces where animal bone was common. A cache of five cores and tested nodules was located in the wetlands on the eastern edge of OI, extending into the section (thus possibly part of a larger cluster). This cache was located amongst lithic and faunal material; however, a second cache recovered from test pit PB was found isolated from other finds (Figure 11.6). This cache consisted of 12 extremely large but poor-quality nodules collected both direct from the till and from the beach.

Barry's island is the most easterly of the southern shoreline sites. A large assemblage of flint and animal bone was recovered from a series of test pits along the shore of the island excavated between 1992 and 1996. This site has been reported in the literature as a basecamp based on its faunal assemblage (Rowley-Conwy 1994; Uchiyama 2015). However, the evidence is very clear that the vast majority of material from this site was redeposited by a stream channel (as previously reported by Conneller and Schadla-Hall 2003). The wide scatter of radiocarbon dates reveals that the stream has redeposited material from a number of sites from a range of different periods spanning the late Palaeolithic to Late Mesolithic with the majority of the material dated belonging to the Late Mesolithic. The vast majority of the lithic material is heavily worn, compatible with water action. The only clearly in situ area is the lower contexts of trench LAO, where a refitting assemblage reveals decortification of several large nodules and shaping of material into preforms; in other words, a specialist task area located in reedswamp at the water's edge.

Lake Flixton Islands

Two islands were located in Lake Flixton: Flixton Island (consisting of two sites, Flixton 1 and 2), and No Name Hill. Flixton 1 was first excavated by John Moore between 1947 and 1948. A long trench across the gravel island located two areas of high lithic densities divided by a channel creating northern and southern areas. Several hearths were located within the scatters. Moore noted differences between the microlithic component of the two areas and suggested that the northern one might be earlier. Certainly the presence of more elongated obliquely blunted points than typical for the area may support the idea of chronological differences. Overall the assemblage is dominated by scrapers (n=165), though microliths are also common (n=78), and burins rather rarer (n=19). Microlith production occurred on the island, as did the rejuvenation of the two axes recovered. Utilised flakes and blades are common (n=185) and awls were also recovered, including the classic mèche de foret form found at Star Carr (Moore 1950). Fauna was relatively sparse though a barbed point was recovered. In all, the impression is of varied activity areas with some temporal depths.

Further excavations by the Vale of Pickering Research Trust across Flixton Island in 1986–1987 and 1993 located high densities of flint in test pits in the immediate area of Moore's trench. Test pit AH, only 0.8 m to the west of Moore's trench yielded a similarly dense flint scatter, evenly balanced between scrapers and microliths. Burins were similarly rare and axe resharpening was also noted. By contrast test pit AC to the south-west was dominated by burins but microliths and scrapers were rare, though microburins indicate that microliths were produced here. To the east of Moore's trench notable densities of flint were also present in test pit AJ.

No Name Hill is located to the east of Flixton Island, surrounded by some of the deepest water in Lake Flixton. A test pitting campaign in the late 1980s and early 1990s delineated the shoreline of the island, while fieldwalking and test pitting revealed that occupation on the top of the island, away from the shoreline, had been destroyed by ploughing. A radiocarbon date on a fragment of worked antler at the base of a sequence of deposits containing worked Mesolithic flint gave a date of 9160–8700 cal BC (Beta-104484, 9530±60 BP) (Cummins 2003). Of the small 2 m^2 test pits excavated along the shoreline, most yielded very small assemblages. Unit NC on the south-west shore was the only exception, with 385 pieces; a moderate-sized assemblage for this size test pit. Awls, microliths and scrapers were all represented and burin manufacture and resharpening was undertaken. Test pit BJ with 149 pieces of flint, including an awl and two scrapers is located on the western shore of the island. Nearly half of this assemblage was burnt, indicating the presence of a hearth. Other test pits yielded assemblages that are indicative of more ephemeral tool-use areas, lacking small debitage and burnt flint and characterised by high percentages of utilised pieces and formal tools. Many of these were recovered from the northern shore of the island, near to the water's edge. The evidence indicates that activities on the island were only ever small-scale, focused on low-level flint knapping and tool-use activities.

Star Carr and the Vale of Pickering

It is evident that Lake Flixton was a major focus of activity in the Early Mesolithic. Sites are numerous and there is evidence for considerable temporal depths. There are similarities between Star Carr and the other Mesolithic sites in the Vale. We see similar patterns of caching till flint nodules, as well as the association of wetland areas with tool-use assemblages. However, there are also differences. Many of these are likely to be amplified by the differential focus on Star Carr and the large areas excavated. Star Carr certainly seems different from the large open-area excavations at Seamer, but other sites which have had more spatially restricted excavation may be more similar.

Overall, many of the sites around Lake Flixton are characterised by more specialised occupation; for example, the intensive production of microliths or scrapers. Such areas are missing at Star Carr, either never present or elided by repeated reoccupation. Star Carr also seems to have more evidence of site maintenance: the middening of material, the clearance of material from structures and the scavenging of usable flint during later occupations; this is relatively rare elsewhere. There appears to have been a small midden present at Seamer K, scatter 2, though the coherence of material deposited on it argues for a relatively short use. The assemblage from the possible structure at Seamer C, scatter H, is coherent, focused on scraper production, refits well and does not seem to have undergone clearance. Structures are also rarer elsewhere with this example from Seamer C the only possible comparator. Neither postholes nor a central hollow were noted here suggesting it may have been a lightweight tent-like structure.

It is more difficult to comment on patterns of animal deposition, one of the major features that marks out Star Carr as special (Conneller and Schadla-Hall 2003; Conneller 2004). The artefacts made from antler that are so common at Star Carr are rare or absent elsewhere. No further frontlets are found beyond Star Carr and barbed points are rare, with three examples found at No Name Hill and one at Flixton Island. There are wetland areas beyond Star Carr that saw the deposition of animal bone such as Flixton School Field OH/OI and there are even instances of patterned deposition of fauna such as the aurochs described for Flixton School House Farm but thus far the intensity appears much less. However, this is an issue that is likely to have been affected by the VPRT sampling strategy where the majority of test pitting has occurred at the 24.5 m OD contour, rather than the submerged areas where this material is concentrated. To date, Star Carr clearly stands out in terms of its longevity and the intensity of deposition of animals and special artefacts; however, this is a situation that may change with further fieldwork around Lake Flixton.

Northern England and beyond

Introduction

Both Star Carr and Deepcar sites are found elsewhere in Northern England. Beyond the Vale of Pickering, Star Carr sites are relatively rare, consisting of Pointed Stone 2 and 3 in the North York Moors, Warcock Hill South/Turnpike and Rushy Brow in the Pennines and Manton Warren I and V and Manton Pond on the Lincolnshire Edge. Deepcar type sites are more common, being widespread across the Pennines, on the North York Moors, the Vale of Mowbray and the Lincolnshire edge. Unfortunately all these sites are undated or are associated with legacy dates that can at best be considered *termini post quos* (Conneller et al. 2016, table 1). In

Scotland, typologically Early Mesolithic material is either undated or has yielded surprisingly late dates. None of these dates can currently be relied upon: for example, the date from Morton A representing a measurement on bulked charcoal from a site with both typologically late and early material. These potentially early sites in Scotland (Morton A, Glenbatrick Waterhole and Lussa Bay) have often been compared to Star Carr type sites; however, these are dominated by triangles which are not typical for these industries. The undated broad microlith assemblage from the base of An Corran in Skye is probably most similar to a typical Star Carr type assemblage. This might make sense if the northern Star Carr groups in the north were moving along the early postglacial shoreline but currently the chronological position of these industries remains to be confirmed.

The North York Moors

In 1972, despite the fact that no Early Mesolithic sites were known from the North York Moors, Clark suggested that the people who wintered at Star Carr followed their prey and spent their summers on these uplands. In 1978 Jacobi provided support for Clark's hypothesis; the sites of Pointed Stone 2 and 3, located 20 m apart on the eastern flank of Bilsdale Moor East at 410 m OD, excavated by himself and Mr and Mrs Taylor. Both are Star Carr type assemblages characterised by similar typology and raw material use to Star Carr itself (Jacobi 1978). These two sites had a high proportion of microliths and microburins, while percentages of other tools were negligible. Jacobi suggested, again on the basis of putative red deer movement (for fauna was not preserved on either site) that the uplands would have been primarily exploited in the summer months. Such arguments were linked also to the contrasting composition of the assemblages at Star Carr and the Pointed Stone sites. Large numbers of burins (presumably tools for the manufacture of antler point blanks) were found at Star Carr; while only one dubious burin fragment was recovered from the upland sites. Since red deer shed their antlers in April, Jacobi equated the lack of burins at Pointed Stone with a lack of available raw material, thus placing occupation in the summer and so suggesting that the upland sites may have represented part of a complementary settlement system with Star Carr.

The Pennines

Mesolithic material has been recovered from the Pennines since the late nineteenth century and this rich history of excavation continues to the present day. Unfortunately much of the Pennine material is poorly dated. The area was the focus of Jacobi and Switsur's radiocarbon programme in the 1970s when archived charcoal from Francis Buckley's excavations in the 1920s was dated (Switsur and Jacobi 1975). Unfortunately the majority of conventional dating at that time required large quantities of bulked charcoal, which often could not be identified to species, so the dates acquired must be considered at best *termini post quos*. As a result it is impossible to state for certain that the Pennine assemblages are contemporary with Star Carr, though on typological grounds it is highly likely that at least some of them are.

Both Star Carr and Deepcar type assemblages are present in the Pennines (Radley and Mellars 1964). Published Star Carr type sites are known from Warcock Hill South/Turnpike, West Yorkshire (Stonehouse 1992), and at Rushy Brow, Anglezarke Moor, Lancashire (Howard-Davis et al. 1996). Major Deepcar type assemblages are represented at the sites of Warcock Hill North (Stonehouse 1992), Lominot sites 2, 3 and C (Spikins 1999), Windy Hill 3 and Deepcar itself (Radley and Mellars 1964); all in, or near, the Pennines. In their original articulation of the differences between Star Carr and Deepcar type assemblages, Radley and Mellars (1964) highlight the differential raw material use of the two groups, with Star Carr assemblages characterised by the use of east coast till flint and Deepcar assemblages by opaque white Wolds flint (Radley and Mellars 1964), though chert was employed to produce the majority of the assemblage at the more recently excavated site of Rushy Brow (Howard-Davies 1996).

The distribution of Star Carr sites currently appears more restricted than Deepcar sites, being only found in the area of Warcock Hill south and in the Anglezarke Uplands. At Warcock Hill are the sites of Warcock Hill South and Turnpike. Warcock Hill South was excavated by Francis Buckley who recovered at least 714 pieces of lithic material. The majority of the material was recovered from an area of four square yards, and also small patches near this concentration, though a small group of tools and debitage was located 50 yards from the main site and Star Carr type material was also recovered from exposed surfaces within 400 m of the site (Buckley 1924). The Turnpike site may represent one of these smaller concentrations (Stonehouse 1992). Turnpike was excavated in 1973 by Pat Stonehouse, who recovered 1688 pieces from a concentration measuring about 53 m². Both Warcock Hill South and Turnpike reveal similar raw material quantities (Table 11.1). Translucent flints dominate, with smaller amounts of Wolds material and black chert. Both sites are microlith dominated though microburin ratios vary dramatically. At Turnpike, microburins outnumber microliths, indicating extensive manufacturing activities. At Warcock Hill south the ratio is 21:9. This may reflect different excavation standards or may be a real pattern, picking up different activity areas along the ridge. Both sites have smaller quantities of other tools (Table 6.2). Scrapers, truncations and mèches de foret are fairly equally represented at Turnpike, while scrapers are more common at Warcock Hill south, though two truncations, two mèches de foret and a burin are also represented.

By contrast the tool assemblage recovered from Rushy Brow is dominated by microliths (Table 11.2), while large numbers of microburins indicate manufacture of microliths and repair of composite tools. The site is located on Anglezarke Moor, a western outlier of the Pennine chain, and is situated with unimpeded views over the southern Lancashire Plain (Howard-Davies 1996). The lithic scatter was associated with a semi-circular stone setting c. 1.5 m in diameter which may represent a windbreak. Though some glacial till flint was used, it represents only 3.2% of the entire assemblage (13 pieces). Of these, seven are microliths and another, an utilised flake, indicating transportation of this material as finished tools. Gearing up and replacement of broken till microliths took place using relatively poor quality Pennine chert, as indicated by microliths and microburins of this material. Thirteen cores of chert were recovered, all still relatively productive, suggesting either caching or that this material was insufficiently valued to be curated and transported elsewhere. If the Pennine sites and the sites in the Vale of Pickering are part of a single system of mobility (or exchange), it is telling that though till flint is imported to the Pennines, Pennine chert certainly does not return to the Vale. A notable find at Rushy Brow, and one that potentially connects the site to Star Carr, is a shale bead, found in four fragments (see Chapter 33).

Deepcar type assemblages are more common in the Pennines. Several of these were also excavated by Francis Buckley. Lominot 2 and 3 appear to have consisted of adjacent scatters or 'two round emplacements' (Petch 1924), although possibly representing a single occupation. Though microlith dominated, these two scatters also yielded a variety of different tool types, scrapers in particular being relatively common (see Table 6.1), while cores and microburins demonstrate core reduction and microlith production activities. Further small-scale excavation at Lominot (site C) was undertaken by Penny Spikins as part of the March Hill Mesolithic project (Spikins 1999), where a 15 m² trench surrounded by additional test pits were excavated. The material recovered was of mixed Early and Late Mesolithic date but differences in raw material use mean some Early Mesolithic activities, involving microlith production and burin use, could be discerned. Raw material quantities appear

Site	**Wolds%**	**Till Flint%**	**Chert%**
Deepcar type			
Deepcar	95.9	0.6	3.5
Lominot 2 and 3	92.0	5.0	1.0
Pike Low I	99.2	0.8	0
Pule Hill Base	94.0	4.5	0.7
Warcock Hill North	97.0	2.0	1.0
White Hill I	95.0	5.0	0
Windy Hill	94.0	2.0	4.0
Star Carr type			
Rushy Brow	0	3.5	96.5
Turnpike	4.2	80.3	10.2
Warcock Hill South	10.0	85.0	5.0

Table 11.1: Proportions of raw materials at Pennine Early Mesolithic sites.

Site	Assemblage type	Microliths	Scrapers	Burins	Axes	Saws	Microburin ratio
Warcock Hill S.	Star Carr	61.8	35.3	2.9	0	0	0.43
Turnpike	Star Carr	76.7	16.7	0	0	6.7	1.04
Rushy Brow	Star Carr	100	0	0	0	0	0.4
Deepcar	Deepcar	58.6	31.9	6.9	0.9	0.9	1.42
Lominot 2	Deepcar	52.5	36.8	10.5	0	0	–
Lominot 3	Deepcar	58.6	41.4	0	0	0	–
Pule Hill Base	Deepcar	76.2	16.9	0	0	6.9	0.04
Warcock Hill N.	Deepcar	60.1	32.3	5.1	0	2	0.37
Windy Hill	Deepcar	50.8	36.9	12.3	0	0	0.69

Table 11.2: Essential tool frequencies of key Pennine Early Mesolithic assemblages.

similar in all three Lominot scatters: Wolds material dominates, with a smaller percentage of clear brown flint. However, chert which was present in very small quantities at Lominot 2 and 3 is absent from trench C.

Other nearby sites of Deepcar type include Pule Hill Base and Windy Hill, situated roughly two miles south and north respectively of Lominot. Pule Hill Base was excavated in 1983 by Pat Stonehouse. This excavation yielded a large and dense assemblage of 7439 pieces of flint. Though proportions of the different raw materials (see Table 6.2) were remarkably similar to those of Lominot 2 and 3, activity patterns were rather different. Pule Hill Base is microlith dominated, though scrapers are also common (see Table 6.1). The assemblage is unusual in that though 99 Deepcar type microliths were recovered, the site yielded only four microburins. The deposition of microliths at the site thus appears unrelated to their manufacture, and if they represent pieces discarded during retooling, the replacement elements must have been manufactured elsewhere. The microliths may well represent cached material.

Windy Hill, a site excavated by Francis Buckley in 1922–3, represents a more balanced industry (Table 6.1). Though microliths again dominate, scrapers are common and burins more frequent than at other Pennine sites. The ratio of microliths to microburins is also more balanced indicating on-site microlith manufacture as well as deposition. Again raw material proportions are very similar to the other Deepcar type sites (Table 6.2), with Wolds material dominating and smaller amounts of brown translucent flint and minimal quantities of black chert.

Finally, around 30km to the south-west of the Central Pennine cluster, on the Pennine edge, is Deepcar itself. Located at c. 150 m OD on a spur overlooking the confluence of the rivers Don and Porter, the site was excavated in 1962 (Radley and Mellars 1964). Here three hearths were located, partly surrounded by exotic stones. A line of water-worn quartzite pebbles formed a line to the north of the hearths, while an arc of rounded gritstone on the edge of a hollow encircled two of the hearths. This may represent a dug feature or an elaborated natural hollow. Given that quarrying truncates this possible feature and areas of disturbance, it is difficult to understand the significance of this evidence. A series of tent rings with associated stones scavenged to create hearths appears likely, though a dug structure or elaborated natural feature is also possible.

The area of the hollow corresponds with the greatest concentration of lithic material. In all an extremely dense assemblage was recovered numbering over 23,000 pieces from an area of 70 m². Activities appear focused on microlith production with microburins very common, as were microliths (68 examples, almost all broken). Other tools are rarer: 37 scrapers, 21 notches and eight burins. The assemblage is dominated by Wolds material indicating connections to the east. All evidence suggests Deepcar is a camp dedicated to gearing up for hunting activities, probably accompanied by hide processing. The lithic densities and arrangement of stones suggest a repeatedly occupied camp.

Early Mesolithic Deepcar sites are generally much larger in size than Later Mesolithic activity sites. Pule Hill Base has been estimated at 250 m² (Stonehouse 1992) and appears to represent one super-dense concentration of material spreading outwards. Lithic production appears so frequent an activity at the site that individual knapping scatters have been obscured. Stonehouse (1992) notes that this type of site may not be unusual, as several such sites (i.e. Pule Hill North, White Hassocks I and II and Windy Hill) have yielded lithic artefacts in their thousands. The Star Carr type sites appear to be configured rather differently: Warcock Hill South (at 4 square yards) and Turnpike (at 53 m^2) are smaller than many Deepcar sites, less dense and appear to represent a series of synchronic or diachronic activity areas along a ridge. This pattern is similar to the Star Carr type sites in the Vale of Pickering (excepting Star Carr) and on the North York Moors. Here large, dense sites such as Star Carr and Flixton 1 are rare and even these are not as dense as the central part of the Pule Hill Base site. The pattern of activity is more typical of small, discrete knapping scatters and activity areas. This distinction is likely to have bearing on the different ways in which lithic-focused activities were organised in the landscape and in relation to occupation sites.

Though the Pennine sites are microlith dominated, their status as 'upland hunting camps' is not unproblematic. A broad range of other tools are also represented and though such incidences are usually explained as 'boredom reducing activities' whilst awaiting prey (e.g. Legge and Rowley-Conwy 1988), the activities represented in the Pennines appear more substantial than other potential hunting camps (e.g. Barton et al. 1995). If differential resharpening practices are taken into consideration (Myers 1986), most of the assemblages discussed appear more balanced between scraping tools and the cutting/piercing tools represented by the microlithic components. Scrapers are particularly abundant at several of the sites discussed (see Table 6.1) and are also found in large numbers at Pike Low 1 (Radley and Mellars 1964) and Waystone Edge Hassocks site 1 (Stonehouse 1992). Burins are rarer, with Windy Hill being a notable exception, though this is the case for almost all Early Mesolithic sites except Star Carr. However, this may be particularly true of the Pennine Early Mesolithic, a fact noted by Petch (1924, 19).

The Pennine sites thus appear to represent visits from relatively substantial groups associated with the procurement and subsequent processing of particular resources, possibly occurring at a particular season of the year. Jacobi (1978) argues that sites lacking burins may represent summer activities when antler was not available. However, burins are present in numbers at Windy Hill and a certain amount of variability is present in the manufacturing and depositionary activities represented at the Pennine sites. These sites are thus unlikely to represent an inflexible set of activities or 'site type' which was part of an unchanging seasonal round.

Early Mesolithic settlement in Northern England

Early Mesolithic upland sites in the Pennines and the North York Moors have frequently been described as summer hunting camps (Clark 1972; Jacobi 1978; Smith 1992; Rowley-Conwy 1994; Donahue and Lovis 2006). This originally derives from the work of Clark (1972) who borrowed the seasonal transhumance models of his Cambridge colleagues to describe Star Carr within its broader seasonal round. Mesolithic people, he argued, would follow their main prey animal, red deer, on its seasonal migration to the uplands. As such, in the following decades upland sites became relegated to logistical satellites of Star Carr.

In the same way that Clark's pioneering work on seasonality and site function focused subsequent interpretations on similar themes (see Chapter 2), so Clark's model of seasonal mobility has spawned seasonal settlement models of increasing complexity, but all based on the same premise: that Mesolithic people were seasonally mobile and replicated a single mobility pattern throughout the Early Mesolithic. However, the relationship of upland sites (as well as the remainder of the sites in the Vale of Pickering) to Star Carr very much depends on interpretations of what Star Carr actually represents; so for those who saw Star Carr as a winter base camp, small sites dominated by microliths in adjacent upland areas could be interpreted as summer hunting camps to form a neat, coherent seasonal round. Jacobi's (1978) observation that the same till flint sources were employed in the Vale of Pickering as well as at Star Carr type sites on the North York Moors and the Pennines reinforced a sense that these sites were connected.

However, if Star Carr represented neither a base camp nor a winter settlement, the nature of the upland sites as well as the remainder of the sites in the Vale of Pickering became more problematic. More recent work has also indicated red deer are unlikely to have undertaken upland migration during the Early Mesolithic and, in any case, they were not the dominant meat source (Caulfield 1978, Legge and Rowley-Conwy 1988). Interpreting Star Carr as a summer hunting camp, Legge and Rowley-Conwy (1988) suggest that a relationship with the (presumed) also summer sites on the North York Moors is thus less likely, instead hypothesising a relationship between Star Carr, other sites in the Vale of Pickering and the coast. Rowley-Conwy (1994) posited a more complex model following preliminary analysis of the faunal assemblage from Barry's Island. He suggests the existence of different site types in the Vale of Pickering – the 'hunting camp' at Star Carr and a possible winter base camp at Barry's Island (though this is now known to represent redeposited material of different ages). He related these to the hypothetical summer residential sites on the now-submerged coastline. Movement between the coast and the Vale of Pickering would be undertaken at various times of the year by hunting parties and whole groups. In this model, the role of the upland sites remains unclear.

The most recent attempt to elucidate seasonal settlement systems in Northern England once again suggests Star Carr represents a residential (in this case summer) basecamp (Donahue and Lovis 2006), with a relationship to logistical autumn/winter sites in the Vale of Pickering and to spring/summer residential, logistical and special extraction sites on the coast. In this scenario, upland sites represent autumn/winter logistical and extraction sites.

Given that models of Early Mesolithic mobility in Northern England are very much predicated on interpretations of Star Carr, what light can the current excavations throw on settlement patterns in Northern England more broadly? Lessons can perhaps be learnt from highlighting the temporal depth of the site and the evidence for shifts in the ways it was used over time. We should perhaps not expect particular places in Northern England to be used in the same way over the entire span of the Mesolithic. Despite the lack of dating of the Pennine sites, we can, using typochronological evidence, already see some broad differences in the way this area was occupied over time. Star Carr type sites are relatively few, smaller and lower densities and probably cluster in a few favoured areas. These are likely to represent pioneer incursions into these areas (Conneller et al. 2016); even so, with the possible exception of Rushy Brow, they cannot be dismissed as purely hunting camps as other activities, particularly involving scrapers, took place there. Deepcar type sites are more numerous, larger and denser and appear to represent the debris of groups with greater knowledge/focus on this area. As with other Deepcar tool assemblages across the country, in both upland and lowland contexts, these are dominated by a combination of scrapers and microliths with burins rare. Given Myers' (1986) well-made point that composite tools would incorporate many microliths while scrapers could be resharpened and reused many times, these sites do not seem particularly focused on hunting activities, even if projectile points were the predominant function of microliths. The use of Wolds flint on these Deepcar type sites in contrast to the glacial till of Star Carr type sites also indicates shifting mobility and procurement strategies.

Various commentators (Pitts 1979; Rowley-Conwy 1992; Donahue and Lovis 2006) have rightly highlighted the potential significant role of the coast for groups occupying Star Carr. It is likely that the early date of the Star Carr occupation came about as a result of rapid colonisation by groups moving along the coast. The coast was also the main source of flint for groups using the Vale of Pickering, as well as other items such as amber, while the canine remains from Seamer L also reveal a marine signature. However, there is unlikely to have been a consistent relationship with the coast throughout the entire time Star Carr was occupied. For example, there are possible indications that beach flint may have been exchanged rather than obtained directly and this may reflect temporal changes in people's relationship to the coast (see Chapter 35). The morphology of Doggerland was undergoing rapid change and marine influences were working their way through the area closest to Star Carr at around this time (Jelgersma 1979). It is likely to have been impossible to maintain any form of stable coastal settlement system in such an unstable area, and it is tempting to suggest the long-term focus on Star Carr as a fixed location in the landscape might represent a counterpoint to rapid transformations affecting familiar landscapes elsewhere (Conneller 2000).

The use of similar flint sources may suggest contacts between groups using the Vale of Pickering, the North York Moors and the central Pennines. It is reasonable, given similarities in tool form and raw material (Jacobi 1978), to suggest that the Star Carr type sites on the North York Moors represent logistical sites generated by groups also visiting the Vale of Pickering. It should be pointed out though that Pointed Stone 2 and 3 appear rather less focused on gearing up for hunting than some sites in the Vale of Pickering. The essential tool assemblage at scatter 30, Seamer K, consists of 100% microliths and a microburin ratio of 1.9, compared with 94.7% microliths and a microburin ratio of 1:1.75 at Pointed Stone 2 and 83.6% microliths and a microburin ratio of 1:1.04 at Pointed Stone 3. Binford (1978) outlines the huge range of sites generated by a single group in a single season, with hunting occurring (amongst other activities) on a range of short-term and longer-term sites occupied by a range of different people: from overnight camps occupied by male hunters to longer-term seasonal 'lovers' camps' occupied by young couples. Given the range of tools and the quantities of lithic material on Pointed Stone 2 and 3, it seems reasonable to suggest they represent camp sites of moderate duration. Jacobi has suggested that the rarity of burins (only a single example on Pointed Stone 3) may indicate these sites were occupied at a time of year when antlers were shed or in velvet. Pointed Stone 2 and 3 are the only excavated sites amongst 10 find-spots of Star Carr type material, suggesting persistent use of the North York Moors. Further excavation may reveal greater variation in use of these areas, as suggested by reports of an extremely large Star Carr type site near Osmotherley on the western edge of the Moors excavated in the 1990s (Lee Cherry pers. comm. 1995).

Star Carr type sites on the North York Moors also reveal variability with Rushy Brow dominated by microliths and microburins and evidence for a broader range of activities at Warcock Hill South and Turnpike. While use of mainly glacial till material on the two central Pennines sites suggests some connection with sites to the east, the use of chert at Rushy Brow indicates connections to the north or south, rather than the east. In addition, the site's location so far to the west on a western outlier of the Pennine Chain raises the possibility that this site has connections to the Lancashire coastal plain. Again this variation may have a temporal dimension.

The current evidence indicates logistical use of the landscape by Star Carr groups with sites of longer and shorter duration and with greater and lesser degrees of specialisation. Ethnographic accounts indicate northern latitude hunter-gatherers generate a wide range of sites and that seasonal movement varies on a year by year basis, and on the basis of personal decisions by individuals and family groups (Jochim 1991). The variability evident in the Vale of Pickering and adjacent upland areas is likely to reflect the product of a variety of decisions and actions produced by a variety of groups and group members in a variety of seasons and over several hundred years. The evidence indicates archaeologists should not continue to attempt to reconstruct a single, stable seasonal round for the Early Mesolithic.

Southern England

Introduction

The Mesolithic groups of the north of England seem to have moved into Britain along the coast of Doggerland. By contrast the colonisation of Southern England is likely to have occurred via movement along river systems by groups focused on the Channel/Manche River and its tributaries. In the absence of earliest Mesolithic sites from the Midlands (with no evidence for activity prior to the appearance of groups with basally modified microliths, sometime after c. 8700 cal BC, see Conneller et al. 2016, figure 6) there was probably little connection between these groups. While we need to look east for the broader cultural context for Star Carr (see Chapter 12), the Early Mesolithic of Northern France, with its strong riparian focus, seems a more appropriate comparator for the groups moving into Southern England.

In Southern England the Thames and its tributaries were the major focus of Early Mesolithic occupation. In contrast to the coastal/lacustrine focus of northern groups, in the south the Mesolithic world was focused on rivers, initially as route ways for colonisation, then as foci for settlement. At this time rivers were changing their behaviour from the braided, high-energy systems of the Loch Lomond Stadial, to meandering, anastomosing, and then single channel systems as watercourses stabilised in the Early Holocene (Chapter 4). As part of this process, older channels were cut off, creating levees and oxbow lakes that gradually infilled with peat. These often served as foci for occupation during the Early Mesolithic.

The Thames

One of the earliest reliable dates for a Mesolithic site in Southern England comes from the Middle Thames at the Eton Rowing Lake. Here, numerous Mesolithic occupation sites were located on a gravel island forming one edge of a shallow lake formed from a former channel of the Thames. This lake gradually filled with peat, creating an area of reedswamp dominated by bulrush and reedmace and fringed by birch and willow (Allen et al. 2013, 35). Some charred stems of bulrush, suggesting similar burning practices to Star Carr, date to 9180–8750 cal BC (OxA-9411, 9560±55 BP). The single date obtained for settlement activities is similar to that for the burning. This derives from an aurochs sacrum from an evaluation trench (180) and indicates settlement probably occurred between *9120 and 8655 cal BC (9120–8970 cal BC (14% probability) or 8945–8705 cal BC (80% probability) or 8670–8655 cal BC (1% probability)* (OxA-14088, Conneller et al. 2016, figure 5).

Also within this trench was a small scatter of 160 pieces of flint including four microliths (three obliquely blunted points and a trapeze), a scraper and an awl. Two further evaluation trenches were located along the gravel island and recovered additional, slightly larger, undated Early Mesolithic scatters. That from trench 166 contained two axes, five scrapers, two burins and a range of miscellaneous retouched and utilised pieces. The assemblage from trench 173 is balanced between scrapers and burins. Though not fully excavated, the evidence suggests a range of different sites, used for different tasks, situated along the wetland edge during the Mesolithic.

The Lea Valley

The Lea is the easternmost tributary of the Thames and the location of a series of Early Mesolithic sites. In the upper Lea Valley, a complex of important Early Mesolithic sites was located in the Broxbourne area, just to the north of London, where fieldwork by Samuel Hazzledine Warren in the early years of the twentieth century, and by Roger Jacobi in the early 1970s, uncovered evidence for four Early Mesolithic sites. More recent developer-funded excavations have also provided evidence for Mesolithic occupation in the Lower Lea (Corcoran et al. 2011; Grant et al. 2012). In the Upper Lea, Broxbourne 102 was located on a former gravel bar, rising above a wetland area. The site, at Rikof's gravel pit, was excavated by Warren in 1932, who located a fairly dense but concentrated scatter of nearly 2000 artefacts within a cluster around 4.5 m in diameter. Tasks seem particularly focused on the use of notches and denticulates, possibly for woodworking, a suggestion which is reinforced by the presence of two axes and resharpening flakes. Numbers of utilised blades are also high. The production of microliths and retooling composite tools and use of scrapers were also important tasks. Only one animal bone was found but this was too poorly preserved for identification (Warren et al. 1934).

Further work was undertaken in the early 1970s by Jacobi, with a series of small sites excavated in an area of old gravel workings around 1.2 km to the north of Rikof's pit. Broxbourne 104 and 106 dated to the Early Mesolithic. Relatively little information is available for site 106: a date of 9150–8290 cal BC (9360±150 BP, Q-1146) was obtained on bulked unburnt hazelnuts from a thin peat layer (Switsur and Jacobi 1979). This layer also contained a scatter of Early Mesolithic flints including obliquely blunted microliths and cores and splinters of animal bone. Rather more archive information is available for site 104. Here an area of c. 15 × 8 m was excavated on the edge of a flooded gravel pit (Jacobi n.d.). The lithic assemblage was found within peaty gravel lying on top of a gravel bank (Reynier 2005), with occupation debris extending off the bank and out into the peats of an adjacent channel. This layer was dated to 9660–9570 cal BC (1% probability) or 9560–8420 cal BC (94% probability; 9610±200 BP Q-1096) through a measurement on bulked animal bone (Switsur and Jacobi 1975). Analysis of the distribution of lithic artefacts across the excavated area indicates one main scatter with an area around 2.5–3 m in diameter where lithic densities exceed 100 pieces of flint per square metre. A noticeable feature of the assemblage is the extremely high densities of burnt flint. In several squares more than 30% of flint recovered was calcined. While burnt flint is common across the site, densities are generally higher in the area of greatest flint concentration and the area immediately surrounding this. This may represent repeated clearing out of a central hearth, but another possibility is that the area of high lithic debris, which has an especially high drop-off rate in the north, represents a small structure which has been burnt down.

The assemblage recovered from site 104 is balanced between a number of different tasks, with only scrapers poorly represented. Most tools are concentrated in the central area of the possible structure with the exception of axe production and use of notches which occurred outside. Microliths were the most common formal tool with 25 recovered. Microburins were even more common (n=33), indicating microlith production and retooling was an important component of activities. No axes were recovered, yet axe manufacture seems to have been an important task focused particularly in the northern part of the site. A total of 56 axe thinning flakes were identified, with several refitting. Burins are represented in moderate numbers (n=15) and scrapers are relatively rare. Broxbourne 104 can be characterised as a single occupation site, possibly focused on some form of structure. A wide range of tasks were carried out in the area of the possible structure, involving cutting, the manufacture of composite weapons and the use of burins and scrapers. To the north of this area axes were manufactured and a range of tasks including use of burins, notches and microlith manufacture occurred. Red deer and aurochs remains were brought to site possibly for tool manufacture and processed outside the area of the main concentration (Jacobi n.d.).

The Colne Valley

A series of Mesolithic sites have been located along the Colne, mostly in the vicinity of Uxbridge. From early collections and excavations from railway cuttings (Denham) and gravel pits (100 acres (Boyer's) Pit, Denham and Sandstone, Iver) (Lacaille 1963), to more recent developer-funded work at Three Ways Wharf, the Former Sanderson site, Cowley Mill Road and Preferred Area 4, the Colne was a favoured place for Mesolithic groups. A similar situation to the Lea pertained with areas of wetland developing around cut-off channels of the braided river, surrounded by fen vegetation with drier areas colonised by pine, birch, willow and aspen (Lewis and Rackham 2011).

Three Ways Wharf

Three Ways Wharf, in the centre of modern day Uxbridge, lies on the eastern edge of the Colne floodplain. The site contained four main scatters of flint and animal bone relating to both Late Glacial/Early Holocene Long Blade occupation and Early Mesolithic occupation phases. Only scatter C contained Mesolithic material; a concentration of burnt and unburnt lithic and faunal material in scatter C west indicate a Mesolithic phase of occupation around a hearth or fire with the steep fall-off of lithic material possibly suggesting a tent. Samples on tooth dentine suggest a date in the 86th or 85th century cal BC (Conneller et al. 2016, figure 5).

Scatter C West had lithic densities of around 150 m per square metre, generally indicative of a medium-density site, which has been suggested to represent a single occupation, possibly occurring in winter (Lewis and Rackham 2011). Bone densities were high: over 33,000 specimens of animal bone were recovered, the majority as a result of an intensive sieving program. The total number of fragments identified to species was much lower; just below 1200 specimens. The assemblage is dominated by red deer making up 80% of all identified specimens, followed by roe deer making up 18% of identified specimens, followed by isolated elements of beaver, fox, pine marten and wildcat. The red deer assemblage is dominated by limb elements suggesting deer were being killed and butchered elsewhere and the isolated limbs were then transported to Three Ways Wharf. Furthermore, equally high frequencies of meat-rich upper limb elements and meat-poor lower limb elements suggest these elements may have been brought to the site for marrow extraction over meat removal or consumption and may even have been introduced after defleshing (Lewis and Rackham 2011; Overton 2014). The extraction of marrow is supported by high levels of fragmentation, including evidence for direct percussion and this has also been suggested as evidence for the extraction of bone grease (Lewis and Rackham 2011).

Formal tools are dominated by scrapers, which cluster on the margins of the scatter. The dense southern part of the scatter also seems to have been the main manufacture and tool-use area. Microlith production took place here and a high density of tools with woodworking traces in the same area might be related to haft manufacture. Burins were also made here, though mainly used to the north. Hideworking and antler working were also carried out in this area. The northern part of the scatter is lower density and seemingly associated with more specialised activities. In the north-west a cluster of scrapers was found in an area where microwear evidence suggests bone and antler working took place. In the north-east a cluster of burins was associated with an area focused on woodworking but where butchery, antler working and hideworking also took place. Axe production debris is common compared to other southern English Mesolithic sites, mainly concentrated to the south and west of the main scatter.

Distribution of bone specimens demonstrate a concentration in the south-west portion of the site (Figure 11.8), which has been interpreted as a 'midden' or intentional collection of the osseous material (cf. Lewis and Rackham 2011). However, using the distribution of burnt bone and flint specimens to identify the location of the hearth, it appears that this collection or 'midden' of bone partially overlaps the hearth, yet the bones themselves are not burnt. This suggests that whilst these specimens originated from marrow extraction around the fire, the remains were later collated and deposited together after the hearth fire had died and cooled (Overton 2014).

Former Sanderson Site

The site of the Former Sanderson Site factory is located 200 m north of Three Ways Wharf, also on the eastern edge of the River Colne; excavation between 2002 and 2004 uncovered an in situ occupation layer on the

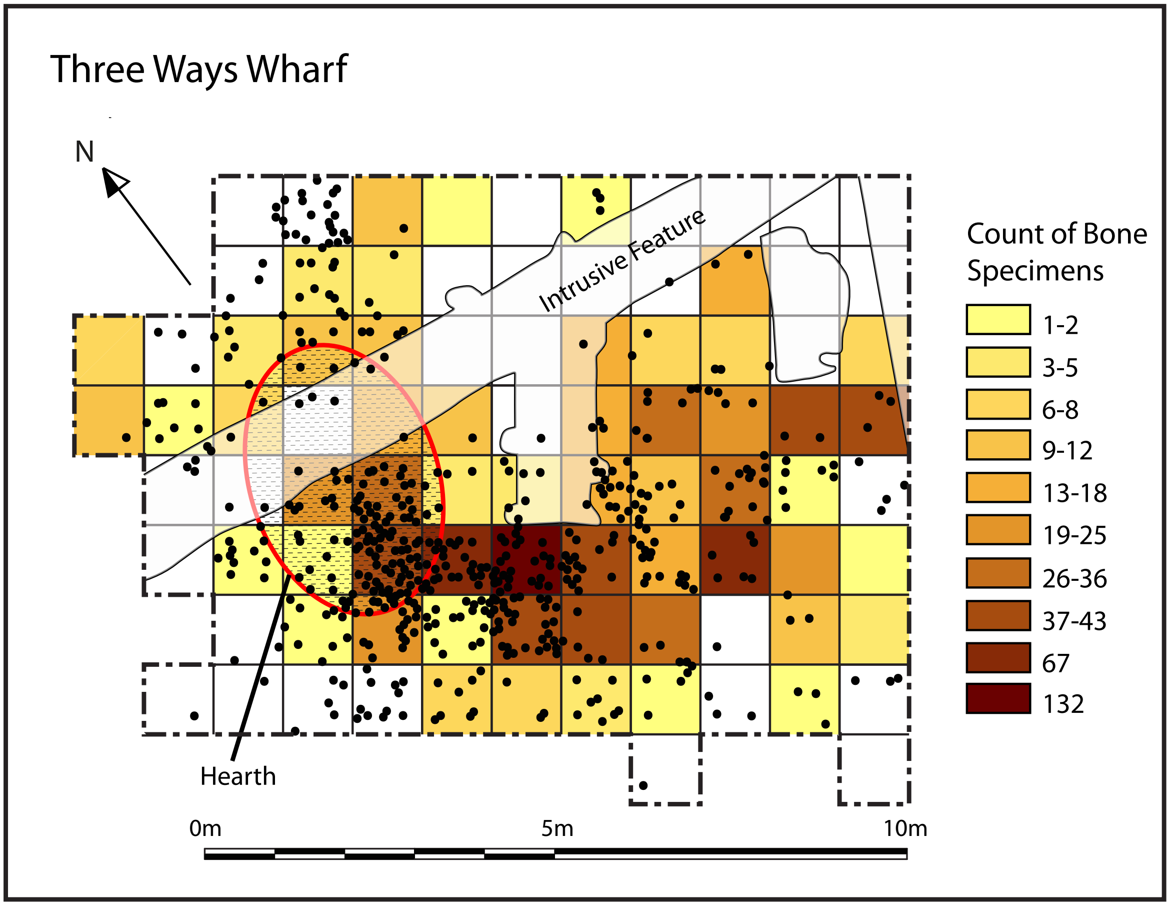

Figure 11.8: Distribution and density of faunal remains at Three Ways Wharf. Shaded squares represent specimen frequency per square recovered through sieving, and black dots represent individual 3D-located specimens. Position of hearth indicated by concentration of burnt lithic and osseous material (redrawn from Lewis and Rackham 2011, density and distribution data from Overton 2014) (Copyright Nick Overton, CC BY-NC 4.0).

western side of a gravel ridge with four scatters yielding over 3000 Early Mesolithic lithics and 1200 bone specimens (Halsey 2006). To the east of these scatters, a patch of densely burnt gravel on the top of the ridge was interpreted as a hearth area, forming a focal point of the Mesolithic activity. A date from charred hazelnut shell returned a date of 8600–8300 cal BC (Beta-200075, 9230±50 BP, Halsey 2006), placing occupation at the Former Sanderson Site within the Early Mesolithic.

A large central flint scatter represents a varied series of tasks including flint knapping, the use of flakes and blades for cutting, and retooling of composites. Single examples of saws, scrapers and burins were also recovered. The northernmost scatter seems more focused on flint knapping than tool use. Immediately to the north of this scatter is a cluster of cores which may represent a cache or midden, while to the east is an area of tool use distinguished by the presence of utilised flakes and blades and axe resharpening flakes. Most of the fauna is associated with the two southern scatters. This area is associated with a cluster of scrapers in the south-west part and microliths and an axe from the south-east part.

The faunal assemblage contains just over 1000 specimens and is dominated by red deer in terms of the number of identified specimens with slightly lower frequencies of wild boar, infrequent beaver remains, and a single specimen identified as otter. However, minimum number of individual frequencies indicate a dominance of wild boar, with a minimum of four in contrast to just one red deer. This discrepancy is the result of very poor preservation and high levels of post depositional fragmentation leading to the differential destruction of the smaller wild boar elements. Skeletal element frequencies indicate the introduction of whole wild boar to the site that were butchered before some, but not all, of the limbs were removed. In contrast, the red deer assemblage contained fore and rear limb elements and a single skull with antlers and mandible but no elements of the axial skeleton. This may suggest the limb elements and skull were introduced to the site after initial butchery elsewhere. Furthermore, the tight spatial grouping of these remains, the vast majority within a single square metre, suggests these remains may represent the intentional collation and deposition of red deer remains, including the antlered skull of a young male (Overton 2014).

The Kennet Valley

The Kennet Valley is another area which has yielded large quantities of Early Mesolithic material. One Star Carr type site is present at Thatcham IIIB (patinated series) and several sites have a low presence of basally modified microliths; however, it is Deepcar type sites that the Kennet is associated with, both in the middle Kennet, in the Thatcham/Newbury area, and further upstream, around Wawcott/Kintbury (Froom 2012). Fieldwork in adjacent upland areas has yielded relatively little material (Richards 1978) indicating that this concentration around the Kennet is a genuine pattern, rather than simply the result of land use and research history.

Thatcham

Located on the north bank of the River Kennet, just downstream from Newbury, evidence for Early Mesolithic occupation at Thatcham was first recorded in 1920 (Peake and Crawford 1922) and later greatly expanded upon through Wymer's excavations in the 1950s and 1960s (Figure 11.9) (Wymer 1962). These uncovered extensive scatters of lithics and animal bone from five trenches (described as 'sites') along the edge of the floodplain terrace (sites I–III, of which II is the most substantial) and into the adjacent wetland deposits (sites IV and V) (see Figure 11.10). Environmental data indicate occupation was within rich birch/pine woodlands with willow, aspen and occasional alder growing on the terrace edge and a rich and complex marsh flora in the

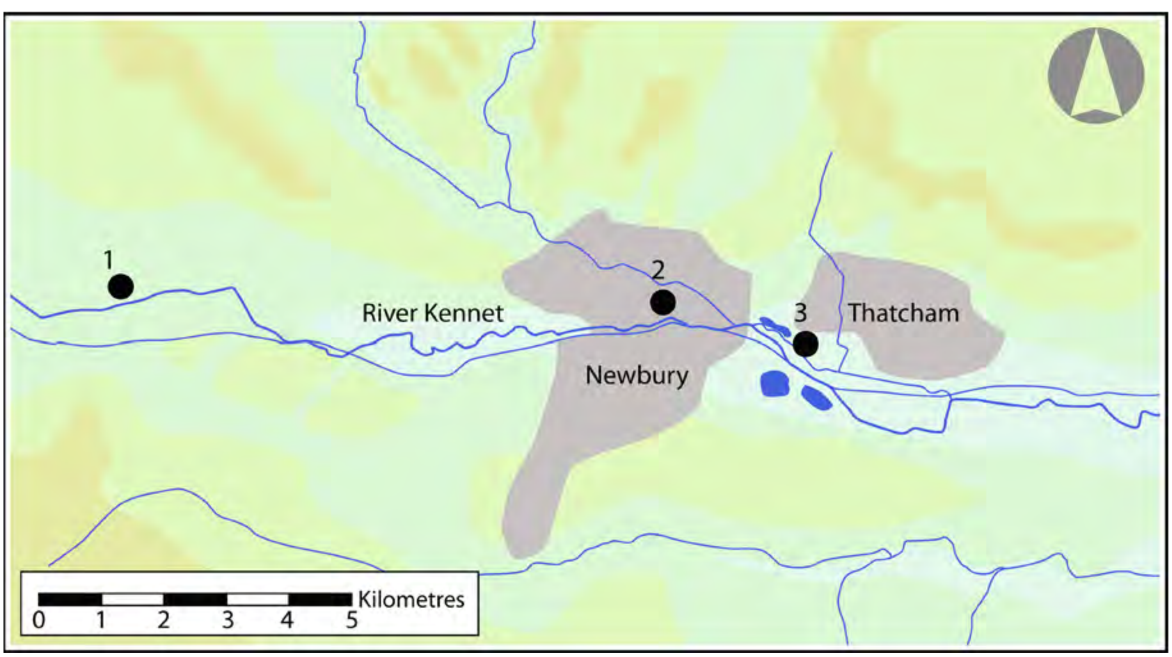

Figure 11.9: Map of sites in the Kennet Valley. 1. Wawcott XXX; 2. Faraday Road/Greenham Dairy Farm; 3. Thatcham I–IV (Copyright Nick Overton, CC BY-NC 4.0).

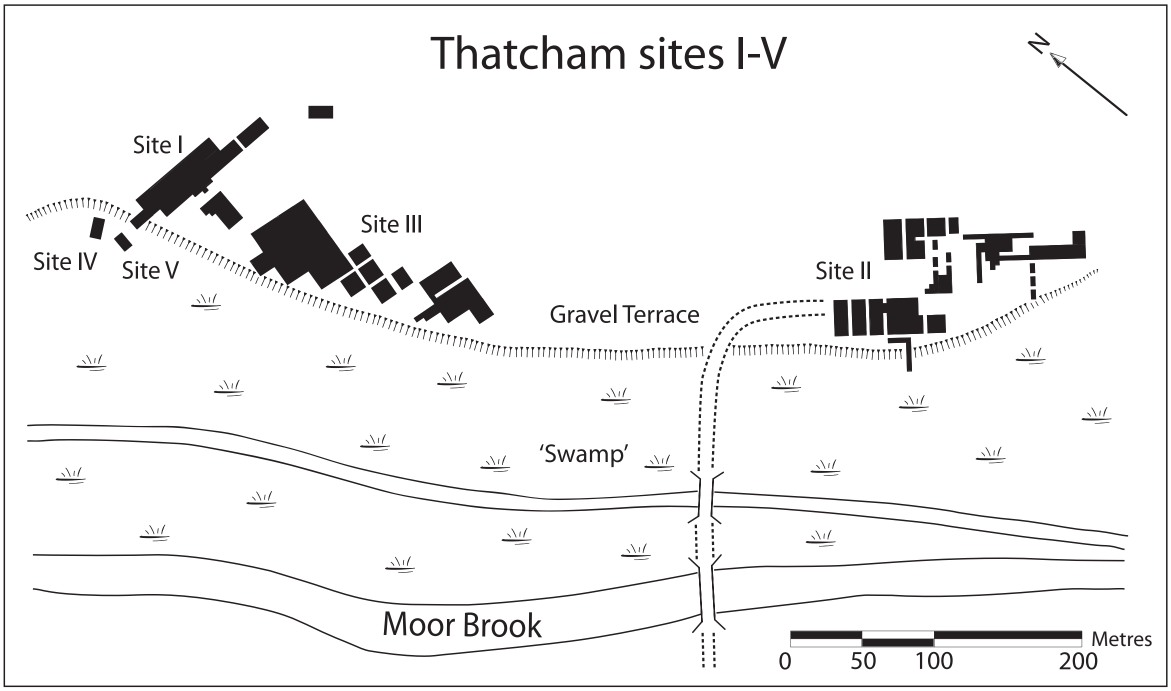

Figure 11.10: Trench plan of the Thatcham sites (Redrawn from Overton 2014).

floodplain wetlands (Chisham 2004, 186–7). Reliable dating of dryland activities at Thatcham is particularly poor. Thatcham III has returned a single reliable date on resin of *8640–8260 cal BC* (*OxA-2848*; Conneller et al. 2016, figure 5).

Better evidence is available for areas of wetland activity. The deposition of faunal material into a small pond at Thatcham V started in 9265–9915 cal BC (64% probability) or 9075–9055 cal BC (1% probability) or 9015–8910 cal BC (24% probability) or 8910–8845 cal BC (6% probability)(OxA-26540, 9675±45 BP, Conneller and Higham 2015). This means Thatcham V probably represents the earliest dated evidence for activity in Southern England. Two further AMS dates from microcharcoal interpreted as originating from anthropogenic fire or clearance events within the local Thatcham environ also returned relatively early dates of 9190–8640 cal BC (9528±80 BP, AA-55303) and 9140–8670 cal BC (15% probability) or 8940–8530 cal BC (79% probability) or 8510–8480 cal BC (1% probability; 9436±81 BP, AA-55305) (Chisham 2004, 191), indicating activity at Thatcham broadly contemporary with Star Carr. Unfortunately we cannot tell whether this wetland activity belongs with the small patinated Star Carr occupation at Thatcham III or with the more extensive Deepcar occupation.

All five 'sites' returned faunal material, though recent analysis of the Thatcham assemblages has identified discrepancies between archived faunal material and records of specimen frequencies made at the time of excavation that suggest a number of the site assemblages are only partial (Overton 2014). Although these assemblages are of limited use in providing detailed interpretations of Early Mesolithic activity, they do indicate a wide range of hunted species dominated by red deer and wild boar, notably high frequencies of beaver (making up 10% of the identified specimens), followed by roe deer and then very low frequencies of aurochs, elk, badger, dog, fox, pine marten, wild cat and wolf.

On stratigraphic grounds (Reynier 2005), the earliest occupation of the Thatcham complex is the Star Carr type site (Thatcham IIIB) located to the south of the complex and consisting of lithic material clustered around a hearth. No fauna is preserved from this area of the site, apart from a couple of pieces of roe deer antler from the northernmost area. The tools recovered from this area are a small, relatively varied assemblage with microliths (n=8), awls (n=6) and retouched and utilised blades (n=6) most common. Other tools (two burins, three saws, a scraper, a notch and an axe) indicate a wide variety of activities were carried out.

Much more extensive occupation debris is associated with the northern, Deepcar type scatters (Thatcham IIIA). Comparison of extant and archived faunal material indicates that of the sites originally excavated by Wymer; only the Thatcham site IIIA assemblage still contains the majority of the material originally recorded. The density and distribution of lithic and faunal material (Figure 11.11) indicate a general spread of material along the gravel terrace, continuing into Thatcham I, made up of a number of discrete concentrations often focused around hearths. Distributions of flint indicated two major scatters at Thatcham IIIA, one to the eastern side and a second to the north-west corner (see Wymer 1962), the former associated with eight hearths, the latter with seven, suggesting repeated occupations of the same area of the gravel terrace. The faunal assemblage from Thatcham IIIA is dominated by wild boar and red deer making up 22% and 17% of the identifiable specimens respectively, followed by beaver making up 13%, and much lower frequencies of roe deer, aurochs, elk, badger, fox, wild cat and wolf. The presence of skeletal elements from across the body in the red deer, wild boar and beaver assemblages indicate the introduction of whole individuals to the site; however, notably low frequencies of wild boar limb elements suggest that after whole individuals were introduced and processed at the site, the meat-rich limb elements were then removed. Other ungulate species are too infrequent to present any clear patterning; however, the remains of carnivore species indicate they were introduced to the site as single, potentially defleshed elements (cf. Overton 2016).

The spatial distribution of wild boar and red deer suggest the remains of these two species relate to separate events with the wild boar concentrated in the eastern scatter and the red deer in the north-west scatter. The

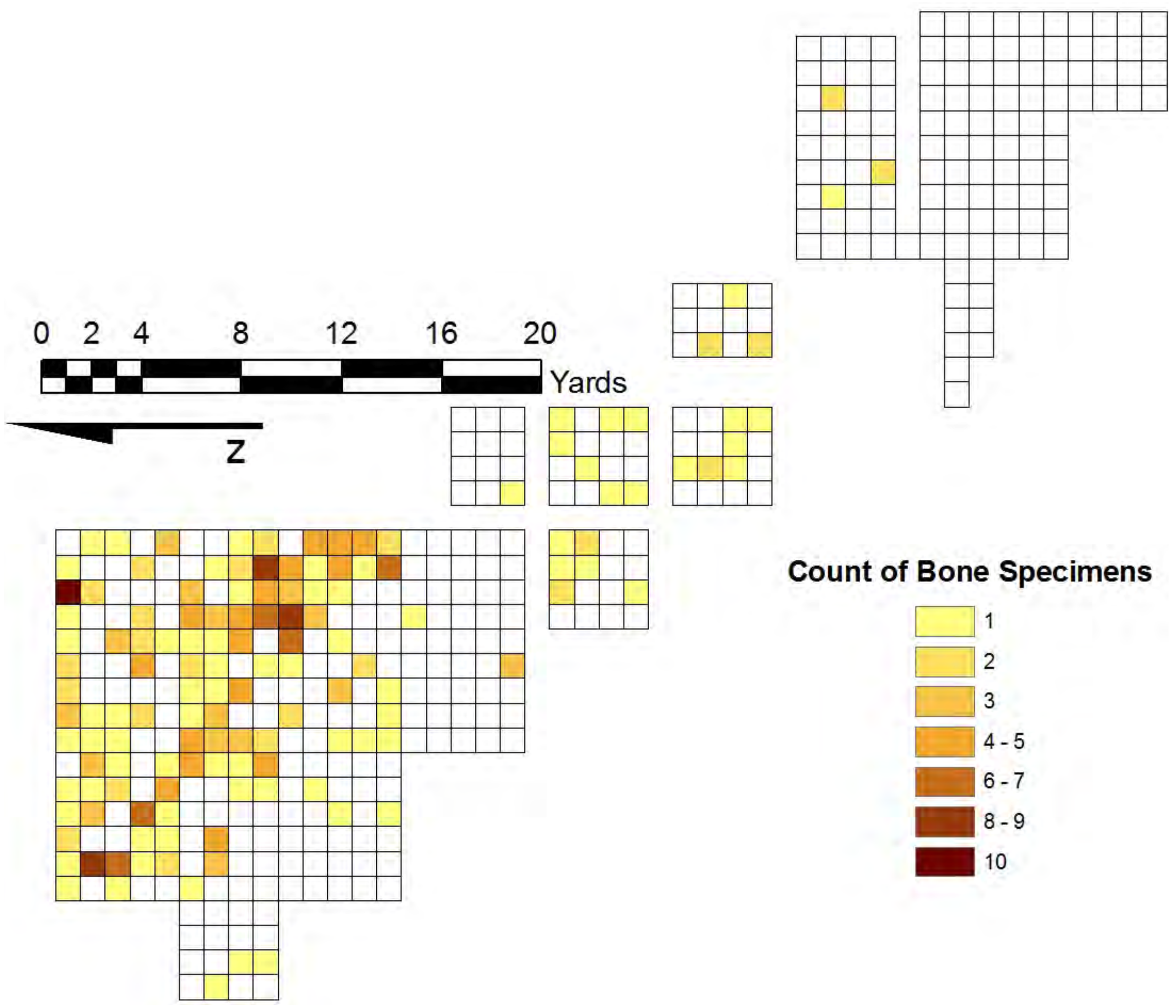

Figure 11.11: Density and distribution of faunal material at Thatcham site III (Reprinted from Overton 2014).

seasonality data derived from this material further supports this, indicating the wild boar remains originate from a hunting event in the late summer to autumn and the red deer from winter (Overton 2014). The lithic artefacts also suggest diverse activities in these two areas. The eastern area is where both lithic densities and occupation features are at their greatest. Eight hearths were excavated in a 35 m^2 area. This evidence suggests a series of partially superimposed occupations with people returning to very specific locations in a way rarely seen in the Vale of Pickering.

This creates some problems for understanding how space was used at the site as lithic material was undoubtedly scavenged and re-used in successive occupations. However, there is some spatial patterning to the material that can be glimpsed. Discarded microliths and evidence for microlith production are clustered around all hearths present in this area, as is evidence for production/use of burins, though these latter are at much lower numbers. Within this large area more discrete activities such as the production of bone and antler tools and axe production can also be discerned. In the north-western area a separate series of lithic scatters around these hearths can be more readily differentiated than in the eastern area. These are associated with varied activities such as processing wild boar remains or retooling. The densest of these scatters is more varied with evidence for the manufacture of microliths and the use of burins, awls and scrapers.

Two bone tools were also found in this area; a large spear and a small point or awl (Wymer 1959; Jacobi n.d.), both shaped from large ungulate metapodials. These are two of only a handful of Mesolithic bone points, alongside specimens from Brandesburton, Holderness, and most recently Star Carr (Clark and Godwin 1956; Bartlett 1969; Elliott 2012; also see Chapter 25) and the only examples of securely dated unbarbed bone points in the British Mesolithic. Furthermore, two fragments of antler point were also recovered from the Thatcham excavations (cf. Elliott 2012); however, unlike the uniserial points from Star Carr, these too were unbarbed. This presents a notable contrast between the osseous technologies recovered from Thatcham and the sites in Northern England (Overton 2014). One final osseous artefact of note was a pair of unshed red deer antlers, attached to a skull fragment, which appear to have been deposited points down into the Mesolithic land surface. The edges of the skull fragment, made up of the frontal bones, exhibit evidence of anthropogenic manipulation to remove this antler-bearing portion from the rest of the skull. The specimen lacks the reduction of the antlers which characterise the Star Carr frontlets and perforations which are present on some of the Star Carr specimens and a number of other examples from continental Europe (Chapter 26). However, the Thatcham specimen can still be seen as sitting within a broader pattern of intentional isolation, manipulation and deposition of red deer antlers and frontal bones in the Early Mesolithic.

To the north is the contiguous area of Thatcham I where three small scatters can be discerned, associated with hearths. In general lithic densities in this area are lower and fauna was relatively poorly preserved (Wymer 1959, 21). Scatter 1 in the western part of the site is a low-density knapping scatter associated with microlith production and retooling, the use of scrapers, awls, serrated blades and burins; the latter located next to two antler tines and a small bone point. Extant fauna from this scatter consists of red deer, roe deer, aurochs and pine marten. Scatter 2 in the eastern part of the site is focused on microlith production and retooling and use of scrapers and notches; the latter possibly associated with shaft preparation. To the west and north of scatter 1 and the east of scatter 2 were areas with extremely low flint densities where finished tools are common. These appear to be areas of tool use where tasks were undertaken and fauna including pig, red deer, roe deer and fox were found, possibly suggesting a butchery area. Seasonality evidence is available for this scatter in the form of a juvenile red deer which was killed in January/February (Carter 2001).

Scatter 3, the area of greatest flint densities at Thatcham I is located mainly in the southern trench (Wymer's grid 2). In contrast to the more generalised scatters to the north and to the south at Thatcham III, activities here appear more specialised and intense with a concentration of 29 microliths and eight awls in a 12 m^2 area. Little fauna was associated with this scatter; however, it is bounded to the south by an ancient channel from which the remains of red deer, roe deer and wild boar were recovered (Overton 2014). The recovery of specimens throughout the stratigraphic sequence indicates they were deposited whilst the channel was active, suggesting it may have been used as a dump for faunal remains; alternatively they may have been transported by water action.

The data suggests that the material at Thatcham Site III and the material spread more broadly over the five sites are a palimpsest of repeated activity, establishing the floodplain terrace at Thatcham to be a place in the landscape that was reoccupied at numerous times throughout the year, where groups were undertaking a range of tasks and hunting a range of different species within a mosaic of wetland and woodland habitats.

Faraday Road/Greenham Dairy Farm

The sites of Faraday road and Greenham Dairy Farm are located within the town of Newbury on the River Kennet's northern bank, upstream from the Thatcham Sites. Although the two sites are directly next to one another, a gap of over 30 years between excavations (Sheridan et al. 1967, Ellis et al. 2003) has led to the sites retaining separate names. However, it is extremely likely that the artefactual material from both sites is part of the same Mesolithic spread. Environmental evidence suggests the local environs were very similar to that of the Thatcham sites with occupation taking place on a gravel terrace surrounded by birch/pine woodland, overlooking a floodplain with more open vegetation.

At Greenham Dairy Farm a small area of around seven square metres was excavated and an assemblage of 2495 flint artefacts and one antler pick were recovered. As Froom (2012, 127) points out this is a remarkable density of lithic material compared to other Early Mesolithic sites in the Kennet Valley. The assemblage is dominated by microliths (n=117), and their production and retooling activities appears to have been a major task. Scrapers (n=27), utilised blades (n=13) and notches (n=8) played a more minor role. A small faunal assemblage includes wild boar, red deer, roe deer and aurochs which are represented mainly by head and foot remains.

The more recent excavations at Faraday Road by Wessex Archaeology uncovered in situ Mesolithic flint and over 3000 bone specimens sitting within a slight hollow; dating of a charred hazelnut returned a date of 9120–8500 cal BC (9418±60 BP, NZA-11038, Ellis et al. 2003, Conneller et al. 2016), indicating activity within the Early Holocene. The lithic assemblage recovered is similar to that from Greenham Dairy Farm in the dominance of microliths (n=65), with smaller numbers of retouched/utilised blades (n=55) and scrapers (n=22), and other tools fairly negligible.

The faunal assemblage was dominated by wild boar making up 82% of identified specimens from a minimum of 12 individuals with much lower frequencies of red deer, roe deer, aurochs, beaver and wild cat (cf. Overton 2014). The sub-assemblages for most species were too small to provide any clear patterns of treatments from skeletal element frequencies, aside from the wild cat remains that indicate the introduction of single defleshed element to the site (Figures 11.12 and 11.13) (cf. Overton 2016). However, the large wild boar assemblage indicates the introduction of whole individuals to the site that were systematically disarticulated and defleshed before the bones were collected within a discrete deposit within a natural hollow. Ageing data from the remains indicate a range of ages from yearlings to mature adults of both sexes. This patterns is somewhat expected as wild boar form large mixed age and sex groups (Truve and Lemel 2003, 52), but it also suggests that humans may have hunted as groups and killed multiple boar in each event leading to a demographic cross section in the faunal remains. However, seasonality data derived from the wild boar ages indicated potential activity throughout the year (Overton 2014) and the remains from Faraday road were from multiple, temporally discrete hunting events. This suggests that the remains from Faraday Road are the result of a series of repeated deposition events in which humans returned to the site and intentionally collated the remains of multiple individuals together with the remains from previous hunting events.

Wawcott XXX

Further up river to the west lies the Wawcott/Marsh Benham complex of sites excavated by Roy Froom from the early 1960s and located mainly on the floodplain gravels (Reynier 2011). Wawcott XXX is the most extensive of the Early Mesolithic sites investigated by Froom. A total of 7260 worked flints were recovered, associated with a faunal assemblage of which 43 elements could be identified to species. The assemblage is unusual in the wide range of species represented: wild boar and red deer, the staples of the Kennet Valley sites, are relatively rare with six and seven elements recovered respectively. Elk is represented by eight elements and aurochs by 15, the only assemblage within the Kennet where these species are most frequent (Froom 2012).

The excavated areas are composed of a series of separate lithic scatters some of which are likely to represent reoccupation of the same area, others which may be contemporary. Scatter 3, though small, is the main area that shows connections to other areas of the site where blanks were produced for use elsewhere. Microlith production and retooling seems to have been a major task accompanied by smaller scale production of a range of other tools. Two scrapers were recovered and several burins, or at least blanks for their production, seem to have been made at the scatter though the burins themselves were used in scatter 4. Scatter 2 was focused on microlith production, while scatter 4 appears focused on axe and burin production. The three central scatters

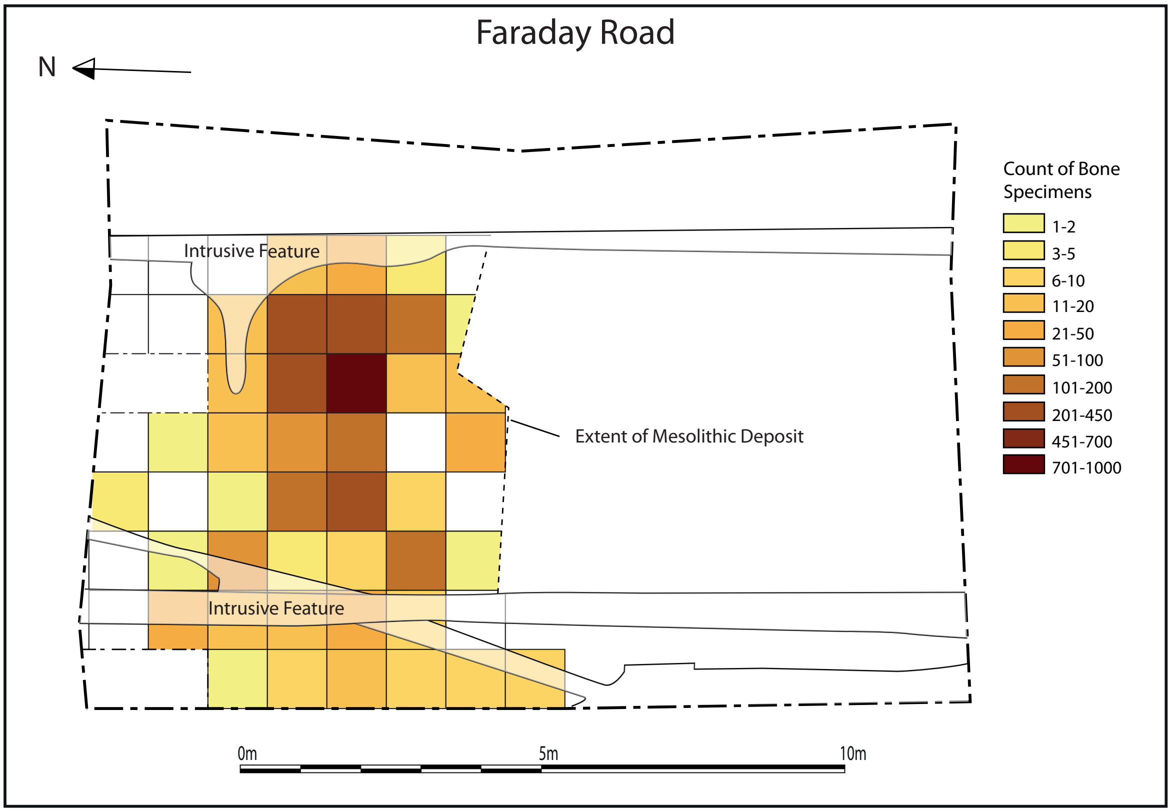

Figure 11.12: Extent of Mesolithic occupation layer and the distribution and density of faunal material at Faraday Road (Outline redrawn after Ellis et al. 2003, density and distributions from Overton 2014. Copyright Nick Overton, CC BY-NC 4.0).

Figure 11.13: Whole isolated wild cat tibia from Faraday Road (Adapted from Overton 2016. Copyright Cambridge University Press (2016), reprinted with permission).

2, 3 and 4 are also united by the fauna recovered. All have yielded a restricted range of species: red deer and aurochs, though elk is also present at scatter 3.

The remaining scatters 1, 5 and 6 are less obviously connected to others. Scatter 1 is very small and focused on the production of a small but broad range of tools with one or two examples of, or production evidence for, microliths, burins, scrapers and axes. The faunal assemblage of elk, badger and pig also sets it apart from the central scatters. The two eastern scatters, 5 and 6, also seem relatively separate, both from the rest of the site and each other. Both are large in comparison with the other two. Scatter 6 is focused on burin production and use. Scatter 5 has few tools or tool spalls apart from a few microliths and an axe flake.

East Anglia

East Anglia has three major Early Mesolithic sites: Lackford Heath, Kelling Heath and Great Melton. Of these only Lackford Heath has a radiocarbon date, on resin, indicating the site was occupied in *8740–8270 cal BC* (*OxA-2342*; Conneller et al. 2016, figure 5). Typologically Great Melton probably belongs to the Boreal period. Kelling is a large site, most of which is Early Mesolithic of some form but underwent early excavation (Sainty 1924; 1925; 1927) and as a result is difficult to understand in any greater detail. Kelling now has a near-coastal location but in the Early Mesolithic would have probably been located near to a river system which ran across Doggerland.

Lackford is located on the west bank of the river Lark, a tributary of the Great Ouse. The site was excavated in 1947: lithic material was found within a hollow, filled with dark sediments, originally interpreted as a structure with a central and peripheral hearth (Jacobi 1984). An extremely high density of flints (c. 5000) was recovered from a 9 m^2 area. The homogeneity of the microliths probably suggests a single occupation. Only a small proportion of the assemblage survives; within this collection microliths and scrapers dominate and are found in fairly equal numbers. Saws, truncations, a reworked axe, a piercer and a notch were also found. How representative this is of the broader assemblage is difficult to say.

Southern Britain at the time of Star Carr

The numerous sites located in Southern England with relatively well preserved faunal assemblages offer a unique window into the lives of people in the Early Mesolithic. Much like the northern sites, the southern assemblages highlight a concern for intentional actions of collating materials into meaningful deposits, including the 'middens' at Faraday Road and Three Ways Wharf, and the potential red deer skull and limb collection at the Former Sanderson Site. Furthermore, the remains within them clearly demonstrate that Mesolithic hunter-gatherers did not focus on hunting any one species. The differences in species frequencies between sites in close proximity to one another, such as the dominance of red deer at Three Ways Wharf, but the dominance of wild boar at the Former Sanderson site, demonstrates specific sites were occupied to hunt specific species at specific times. This presents a picture of humans living and moving within the river valleys of Southern England, occupying and re-occupying a network of sites to undertake a range of tasks that included hunting specific species, from a large variety of ungulates to smaller species such as beaver. This range of species, including the notable dominance of wild boar at many of the sites, stands in stark contrast to previous narratives of Early Mesolithic red deer economies (e.g. Jarman 1972; cf. Overton and Tayor forthcoming).

The faunal assemblages from sites in Northern Britain also demonstrate hunting practices that targeted a wide range of species over any single one (Overton and Taylor forthcoming), no more so than Star Carr; however, there are noteworthy differences between the northern and southern sites. Firstly, the high frequency of wild boar at the southern sites is in sharp contrast to the absence or extremely low frequencies of the species at northern sites. Conversely, elk and aurochs are either absent or extremely infrequent at the southern sites, aside from Wawcott XXX which is an extremely small assemblage: yet these species make up a substantial or even a dominant portion of the assemblages from northern sites such as Star Carr, Seamer Carr and Flixton School House Farm. These differences in species frequency are most likely a reflection of differing environmental conditions in the early postglacial landscape including the local dominance of pine in the Kennet and Colne Valleys and the earlier colonisation of Southern Britain by denser vegetation providing conditions favoured by wild boar but pushing the larger, open-woodland adapted elk and aurochs, further north. However, this would lead to differences in Mesolithic lifeways; hunting either smaller gregarious wild boar or much larger and predominantly solitary elk or aurochs, all living within their own preferred habitats, would have required different hunting methods and strategies both in the context of the hunt and more broadly through the changing seasons. In building a picture of Early Mesolithic activity in Britain it is important that we avoid presenting a single, homogenous account of life, in favour of a picture that highlights the dynamic differences between communities across Britain that is reflected in the archaeological record.

Into the west...and the north

Towards the end of the period that Star Carr was occupied and in the centuries following its abandonment, broadly between c. 8700 and c. 8000 cal BC, there is a change in the archaeological record with evidence for the expansion of Mesolithic groups into new areas and the appearance of new practices. For the first time there is evidence for occupation in Wales, the Southwest, the Midlands and Southern Scotland. Though such sites are poorly dated, this may also be the period in which Deepcar groups moved into the upland areas of Southern England to focus on springs and smaller watercourses: for example, Oakhanger, Hampshire, dating to the second half of the ninth millennium BC (Conneller et al. 2016, figure 5). It should be noted that this late appearance may be artificial, the result of the difficulty of gathering organic samples away from the river valleys. There are sites that typologically would be compatible with an earlier date, such as Dozmary Pool on Bodmin or the Star Carr type assemblage from Waun Fignen Felen in the Black Mountains. Early dates might also be expected for the Southwest as groups moved into Britain along the coastline of the Channel/Manche embayment.

This expansion in settlement was accompanied by increased typological diversity: Late Deepcar sites with crescents date to the second half of the ninth millennium BC at Oakhanger (Conneller et al. 2016, figure 5); assemblages with a range of basally modified points from c. 8500 cal BC (Conneller et al. 2016, figure 6); and Welsh Star Carr type sites (similar to Star Carr but with large, elongated scalene triangles) from c. 8500 cal BC (Conneller et al. 2016, figure 4). These appear to reflect increased regionalisation as Britain infilled with Mesolithic groups. While broad similarities with Continental Europe remain, these are articulated very differently at the regional level: for example in Northern France, large crescents (segments) are found with basally modified 'Beurronian B' Industries; in Britain with Deepcar type industries.

At the same time new practices occur, particularly relating to the deposition of human remains. In Southwest England, South Wales and Northwest England human remains, often isolated elements, were deposited in caves. The earliest evidence for this practice probably comes from Badger Hole (Somerset) and from a collective burial at Worm's Head (Gower). However, it becomes more widespread in the following centuries with continued deposition at Badger Hole and Worm's Head and new sites at Mewslade Bay (Gower), Greylake, Gough's Cave and Aveline's Hole (all in Somerset) and Kent's Bank Cavern (Cumbria). The appearance of these new practices suggests, in some parts of Britain at least, new ways of marking human relationships with place. At Star Carr, and elsewhere in Britain during the first centuries of the Mesolithic, this had been undertaken in part through depositionary practices focused on animal remains, with human remains noticeably absent. The focus on the deposition of human remains, accompanied with regionalisation, could indicate a reconfiguration of worldview, with ancestors rather than animals becoming important.

Conclusions

Star Carr has come to be seen as representative of Early Mesolithic Britain, following Clark's belief that what he had excavated was typical of any site with good organic preservation. Previous work has argued that Star Carr played a unique role within the Vale of Pickering, with Star Carr a major, long-term focus of repeated wetland deposition in contrast to the more ephemeral sites, focused on specific, but temporally shifting tasks, found elsewhere around Lake Flixton (Conneller and Schadla-Hall 2003). Borrowing terminology from the French Magdalenian, we might perhaps see Star Carr as a 'super-site' (Bahn 1982): a residential site, but not just a base camp; a place where people met up, but not simply an aggregation site; a place where people made and/or exchanged objects (such as axes and beads), including art objects, and where people performed ceremonies and other ritual acts. Could we perhaps then see this particular articulation of sites as 'typical' with other 'super-sites' in the British Mesolithic record with similar relationships to adjacent short-term logistical and residential campsites?

The answer, currently, is no. The Early Mesolithic upland sites of northern England, while more varied than currently credited, are rather different in scale and diversity of activities. In Southern England people appear to have used the landscape rather differently. The nearest to a 'super-site' would perhaps be Thatcham III, but the impression of this site is that it has been generated through repeated small-scale visits to the same place with occupations, including hearths, superimposed over a long period. It seems simply a scaled-up version of the kinds of occupation present along different stretches of the Kennet. It might thus be considered a 'persistent place' (Barton et al. 1995), but one that seems different in nature from Star Carr. There are hints, perhaps, of some form of patterning in deposition, in the recovery of faunal remains from the small pond of Thatcham IV/V, and in the human bone recovered from overlying tufa deposits at Thatcham III, but how these relate temporally to adjacent dryland evidence is currently uncertain. The occupation evidence in the Kennet and other Thames tributaries seem similar to patterns in Northern France, with small-scale, repeatedly occupied sites on the lower terraces and floodplains of major rivers. Elaborate organic artefacts are rare and when recovered come from the major rivers themselves rather than settlement sites. To what extent this represents human action or the results of the destruction of Mesolithic sites through channel migration remains to be determined.

The presence of 'super-sites' that are currently unidentifiable due to lack of faunal preservation also needs to be taken seriously. Super-dense Early Mesolithic sites such as Oakhanger V/VII are possible candidates, though on current evidence this is later than Star Carr and the product of a different set of landscape values. Other 'super-sites' may remain to be discovered. In Northern England, other palaeolakes might provide possible locations. The recovery of several barbed points from Holderness, though apparently unassociated with other artefactual evidence, certainly points to an Early Mesolithic presence in the area. Barbed points are rare in the Vale of Pickering, apart from Star Carr, and the Holderness examples are likely to indicate more extensive occupation nearby. However, Star Carr's most immediate connections lie to the east, both in the raw materials employed and in the likely route taken by the first Mesolithic colonisers. If any site similar to Star Carr does exist, its most likely location is the submerged landscape to the east of the Vale of Pickering and, beyond this, to the land bordering the North Sea, where shared traditions of technology, material culture and ritual practice can be glimpsed (Chapter 12).

CHAPTER 12

The Early Mesolithic in Southern Scandinavia and Northern Germany

Mikkel Sørensen, Harald Lübke and Daniel Groß

Introduction

Excavations were undertaken at Star Carr by Clark in order to find a British counterpart to the well-known European sites such as Mullerup, Holmegård, Sværdborg, Lundby, Duvensee and Ageröd (Clark 1954, 179). Clark noted that there was a certain cultural homogeneity across the North European plain at this time when Britain was still joined to the Continent. As it turned out, the material culture from Star Carr proved to be earlier in date compared to these other sites, which indicated to Clark that Star Carr belonged to a distinct phase of the Early Mesolithic, termed in Northwest Europe the Maglemose culture (Clark 1954, 180).

Before the development of radiocarbon dating in the 1950s, the dating of the Early Maglemose culture was carried out using relative stratigraphies of pollen and plant macrofossils. Open landscapes with juniper, followed by birch and pine forests represented what was defined as the 'Preboreal' period, whilst a varied deciduous forest characterized by hazel, alder, lime and oak marked the transition to the 'Boreal' period. In Southern Scandinavia, the Preboreal period is dated from c. 9600 BC to c. 8000 BC. Yet the transition to the deciduous forest occurred earlier in the south-east part of the region compared to the north-west meaning that the vegetation, the fauna and the Mesolithic economy must have varied from east to west during the Late Preboreal period.

Clark noted that it was difficult to establish the context of Star Carr within the cultural sequence of Northwest Europe due to the paucity of Preboreal sites in the archaeological record. As such, he examined Klosterlund by the shore of the former lake Bølling in Jutland, Denmark, as a comparator though noted that this assemblage consisted of only flint and stone objects. Since then, dating methods have improved and more sites of this period have come to light. However, for the 800 or so years of occupation at Star Carr there are still relatively few sites of this period in Northwest Europe, especially when compared to other periods, and of these, very few have organic preservation. This chapter sets out the details of some of these sites; these have been mapped in Figure 12.1, which also shows the reconstruction of the ancient shoreline of the North Sea at the time.

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Figure 12.1: Southern Scandinavian and Northern German Maglemose sites. Preboreal sites: 1. Lundby kettle hole lake deposits (Hansen et al. 2004; Jessen et al. 2015); 2. Skottemarke elk deposits (Møhl 1980; Sørensen 1980; Fischer 1996); 3. Favrbo elk deposits (Møhl 1980); 4. Vig aurochs deposit (Hartz and Winge 1906); 5. Nørregaard VI (Sørensen and Sternke 2004); 6. Årup contexts 1, 2 and 3 (Karsten and Nilsson 2006); 7. Barmosen I (Johansson 1990); 8. Bjergby Enge (Andersen 1980); 9. Klosterlund (Mathiassen 1937; Petersen 1966); 10. Gl. Ullerød (Jensen 2002); 11. Draved 611, 604s and 332 (Sobotta 1991); 12. Henninge boställe (Althin 1954); 13. Hasbjerg II (Johansson 1990); 14. Flaadet (Skaarup 1979); 15. Mullerup; 16. Sværdborg; 17. Holmegaard; 18. Åmosen; 19. Pinnberg 7 (Rust 1958a); 20. Duvensee; 21. Hohen Viecheln (Schuldt 1961); 22. Rothenklempenow 17 (Schacht and Bogen 2001); 23. Potsdam-Schlaatz (Benecke et al. 2002); 24. Friesack (Gramsch 2002); 25. Bedburg-Königshoven (Street 1989); 26. Mönchengladbach-Geneicken (Heinen 2014). The map illustrates the land masses at the Pleistocene/Holocene transition (compiled by Grimm 2009 after Björck 1995a; Boulton et al. 2001; Lundqvist and Wohlfahrt 2001; Weaver et al. 2003; Clarke et al. 2004; Brooks 2006b; Ivy-Ochs et al. 2006; with further additions from Woldstedt 1956; Björck 1995b; Björck 1996; Zahn 1996; Coope et al. 1998, figure 4H; Kobusiewicz 1999, 190; Gaffney et al. 2007, 3–7 and 71) (Copyright Daniel Groß, CC BY-NC 4.0).

The Maglemose culture in Northwest Europe

The discovery and definition of the Maglemose Culture

Before the Maglemose culture was defined, Stone Age archaeology was already well established in Southern Scandinavia, arising from the discovery of coastal shell middens which were investigated by the 'Kitchen midden commissions' and dated to the Ertebølle culture (Late Mesolithic). However, in 1900 a new type of site was discovered by the National Museum trained botanist and archaeologist Georg Frederik Ludvig Sarauw (1862–1928). On the 8th of June 1900 he was sent by the National Museum to the bog of Mullerup in Western Zealand. Here a local teacher (M. J. Mathiassen) had reported unusual, well-preserved finds of ancient bones, charcoal and lithics from the bog during peat cutting. Sarauw immediately undertook an excavation to an unusually high quality standard for the time, examining the geological layers and botany within the bog as well as the spatial distribution of the artefacts and their stratigraphic position. In 1903 he published a thorough account of this excavation and coined the term 'Maglemose'. He argued that what he had found was not an Ertebølle cultural site but something older: an inland culture that lived within large bogs and had an economy based on aquatic and terrestrial resources (Sarauw 1903). The culture was first called 'Mullerup', after the nearby village; however, as the local bog was called 'Maglemose' the culture was finally named after the bog. In fact, 'Maglemose' means 'large bog' in Danish and there are many Maglemose place names all over Southern Scandinavia. Thus, in the Danish language the Maglemose culture simply means the Stone Age culture found in large bogs. In 1904 a new site was found in the Maglemose bog of Mullerup just north of the first one. This was investigated in the same year and then again in 1915.

Following this, the extremely rich and well-preserved site clusters of Southern Zealand, the Sværdborg bog (Friis Johansen 1919), Holmegård bog (Broholm 1924) and Lundby Mose, were found and became of great importance for the understanding of the Early Maglemose culture due to their unique preservation of organic materials. On Jutland, the Klosterlund site was excavated as a part of Therkel Mathiassen's large-scale survey of the inland river systems (Mathiassen 1937). Mathiassen took a landscape approach and presented the 'Gudenaa culture'; a concept that is now viewed as a conglomerate of both Early and Late Mesolithic assemblages. Yet Mathiassen did not ascribe the Klosterlund site to the Gudenaa culture as its assemblage was clearly different to other Mesolithic sites of the region. Furthermore, analyses of the stratigraphy and pollen demonstrated that the assemblage was Preboreal. Thus the material from the Klosterlund site became the first large Preboreal assemblage in Southern Scandinavia.

Apart from isolated stray and surface finds, the first Early Mesolithic bog sites outside Southern Scandinavia were discovered almost concurrently in Northern Germany at Friesack, Brandenburg, by Max Schneider (Schneider 1932) and at Duvensee, Schleswig-Holstein, by geologist Karl Gripp and archaeologist Gustav Schwantes (Schwantes et al. 1925; Schwantes 1928). In 1938, when Hermann Schwabedissen finished the first synthesis of the Mesolithic in Western Northern Germany (Schwabedissen 1944), Alfred Rust began excavating the Early Mesolithic site of Pinnberg (Rust 1958a). Based on the work from Sarauw, a chronological framework for the Maglemosian was already established before the Second World War. After the war, Early Mesolithic research was revived when Schwabedissen commenced new investigations at the Duvensee bog in 1946 (Schwabedissen 1949) and Ewald Schuldt excavated the newly discovered site of Hohen Viecheln in Mecklenburg-Vorpommern from 1953–1955 (Schuldt 1961).

In the following decades of the 20th century, research on the Early Mesolithic in Northeastern Germany has been especially influenced by Bernhard Gramsch. In addition to his thesis on the Mesolithic in the lowlands between the Elbe and Oder (Gramsch 1973), the resumption of excavations of Early Mesolithic sites near Friesack were particularly important for the understanding of the Maglemose culture (Gramsch 1987a; Gramsch 2002). In Western Germany Klaus Bokelmann continued the research on Mesolithic sites at Duvensee from 1966–2001 and discovered nearly 20 new, mainly Early Mesolithic bog sites (Bokelmann 1971; Bokelmann 2012). Further important Early Mesolithic sites with organic remains investigated in the late 20th century include Bedburg-Königshoven, North Rhine-Westphalia (Street 1991), Rothenklempenow, Mecklenburg-Vorpommern (Schacht 1993; Kaiser 2003) and the kill site of an aurochs at Potsdam Schlaatz, Brandenburg (Gramsch 1987a; Gramsch 1987b). Another site with strong potential is the recently discovered site of Mönchengladbach-Geneicken (Heinen 2014).

Dating the Maglemose culture

The first attempt to develop a systematic relative chronology of the Maglemose culture from its inventory by typological analysis was made by Carl J. Becker. In 1952 he ordered microlith types, blade core morphology and scraper types into five phases (Becker 1952). This model was reviewed and expanded by Brinch Petersen who, by mainly studying the microliths and their frequencies, suggested a division into six phases (Petersen 1973). More recently, a study of the Maglemose culture lithic blade technologies defined seven different concepts of production typical to four different technological phases, the first two of which appear in the Preboreal (Sørensen 2006). Thus today the lithic artefacts of the Maglemose culture are generally relatively dated by microliths and lithic blade technology.

However, in recent years studies of bone tool technology and the possibility of absolute dating by the AMS radiocarbon method have demonstrated that the material has great potential for both relative and absolute dating (David 1999; David 2006; Andersen and Petersen 2009; David 2009; David and Sørensen 2016). For example, barbed bone points and antler adzes are examples of types of artefacts that can be relatively dated in terms of their morphology and from which species they are made. However, a problem in Southern Scandinavia is that relative chronologies are generally developed on material from Eastern Denmark (Zealand) where more sites have been excavated and the best preservation is encountered. Studies of Maglemose cultural material in Western Denmark (Jutland) show that the Later Maglemose culture in particular does not necessarily follow the Eastern Danish development (Andersen and Sterum 1971; Sørensen in press). Moreover, from the island of Bornholm, Nielsen (2001) proposed a regional relative chronology based on microlith morphologies of four phases that partly differ from the generally suggested microlith chronology.

The same applies for Northern Germany where since the first excavations in the 1920s morpho-typological differences, especially in the microlith and bone point assemblages, led to a definition of an independent Early Mesolithic 'Duvensee' culture or group that was separated from the Eastern Danish Maglemose culture (Schwantes 1928; Schwabedissen 1944; Bokelmann 1971; Gramsch 1973). However, due to the close resemblance in the flint (Sørensen 2006) and bone and antler technology (David 1999; David 2009) such a strong separation seems no longer justifiable from today's perspective. Therefore, an interpretation of the North German inventories as a regional, southern expression of the Maglemosian technocomplex is widely accepted.

In sum, it can be said that the typological and chronological framework of the Preboreal Maglemosian that has been established over the last century in Southern Scandinavia and Northern Germany and to which Star Carr has contributed, must be considered trustworthy. However, this is not to say that the Preboreal Maglemosian is without chronological and typological problems. There are indeed regional variations seen both in ecology, typology and in cultural chronology across the great North European lowland during the Preboreal, as for example reflected by partly differing lithic typologies and in bone and lithic technologies. Yet despite these differences we see that there are still more which culturally unite the Preboreal assemblages of the regions, than divides. Moreover, the relative chronology, built up over years, is now gradually being confirmed and made absolute by radiocarbon dating.

In this paper we do not present all the radiocarbon dates from the sites because in general they are not comparable to those presented for Star Carr in Chapters 9 and 17: many of the dates were measured a long time ago, some using bulk charcoal, and many not using AMS dating methods or Bayesian modelling. Instead, we discuss sites which are roughly contemporary with Star Carr in terms of being Preboreal in age, dated either by pollen sequences, lithic technology or radiocarbon dating as presented in Figure 12.2. All these methods have their limitations; however, new dating programmes employing Bayesian modelling are being carried out on other sites such as Hohen Viecheln and Duvensee and it is hoped that in the future we can analyse the radiocarbon dates of many of these sites using the same methodology as employed in the recent study of Early Mesolithic British sites (Conneller et al. 2016).

Site descriptions

Introduction

There are a number of Preboreal and Early Boreal Mesolithic sites in Southern Scandinavia (Petersen 2009, 25) and these can be divided into two main categories: 'habitation sites' and 'deposition sites'. Very few if any of the habitation sites have well-preserved organic materials. The deposition sites, on the other hand, are found in wetlands, often kettle holes, and thus do preserve organic remains. This dichotomy of preservation in southern Scandinavia in relation to site function can partly be explained by a lowering of the water table that took place during the Preboreal/Early Boreal period (e.g. Iversen 1967, 388). This meant that dry zones near to lakes, where habitation could take place, were not overgrown by peat during the Preboreal and in the Western Danish

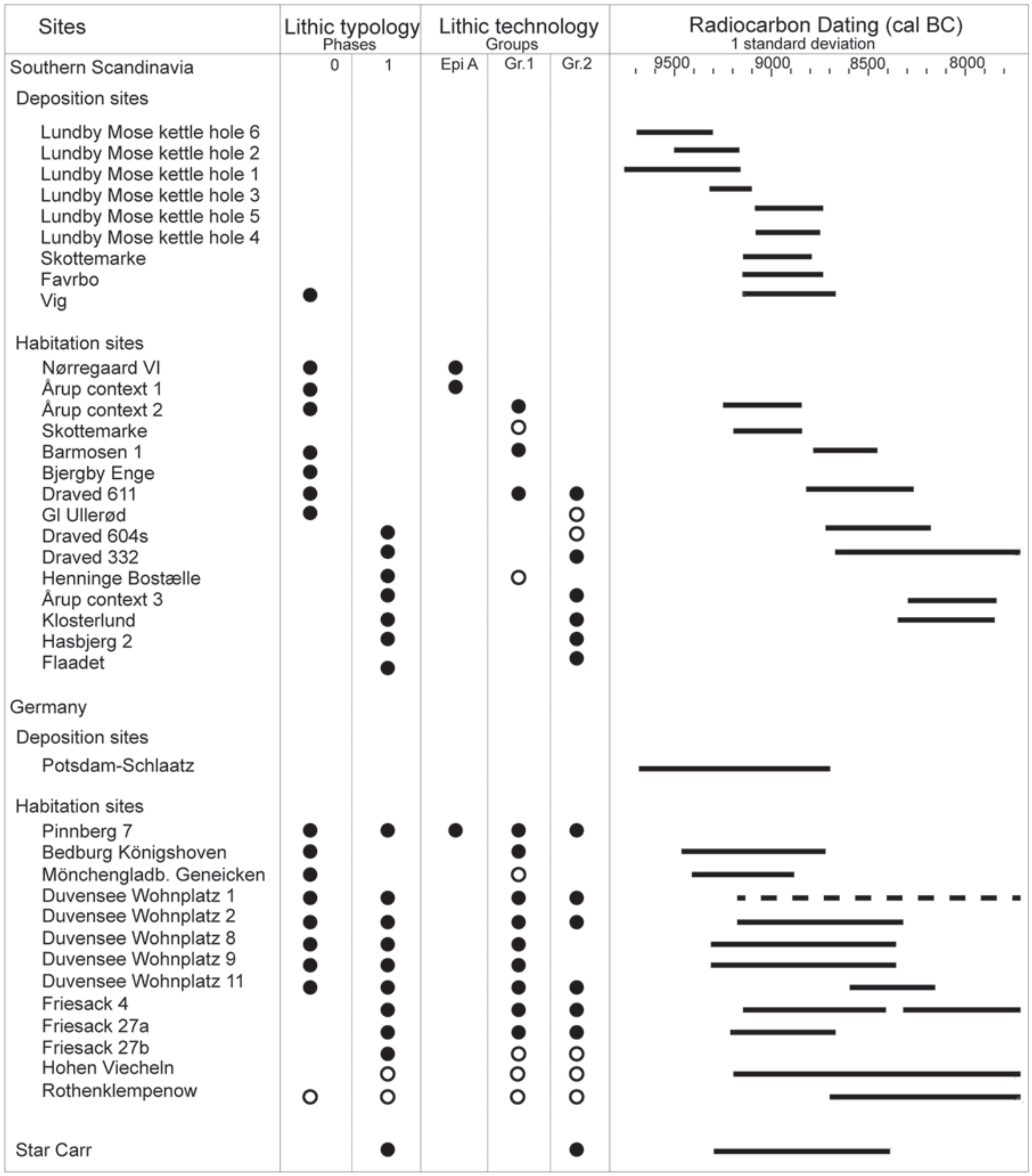

Figure 12.2: The chronology of the Early Maglemose (Preboreal) assemblages of southern Scandinavia compared with typology, technology and absolute dating to the Star Carr assemblage. The lithic typology phase 0 is characterized by simple broad obliquely blunted microliths and large flake adzes, while phase 1 is characterized by inventories with varied obliquely blunted lanceolates and a frequency of isosceles and segment microliths and slender cores axes. The lithic technology is generally grouped on the basis of lithic blade technology. The EpiA group represents an Ahrensburgian/Long Blade Industry blade technology, the Gr.1 a simple single platform production of thick blades, and Gr.2 a production of thin blades from single fronted unipolar and dual platformed blade cores. Legend: Dots represent technologically thoroughly studied assemblages, and circles represent assemblages that need further study. The radiocarbon dating for each site is plotted from the earliest endpoint to the latest endpoint of all the calibrated radiocarbon dates from the site (at 1σ). Dashed lines show conventional radiocarbon dates with large uncertainties. For the dating of Star Carr see Chapter 17 (Copyright Mikkel Sørensen, CC BY-NC 4.0).

regions a more acidic geology and wetland environment exist which only seldom allows for the preservation of organic materials such as bone and antler.

In Germany the situation is slightly different in that here several habitation sites have been found with preserved faunal remains. In particular, in North-eastern Germany, sites are preserved where prehistoric people settled in wide river valleys formed by glacial meltwaters ('Urstromtäler') at the end of the last Glaciation. In these areas extensive wetlands formed which transformed into fens over time, although there were regional differences in the water table for the Early Holocene. Thus, contrary to the Southern Scandinavian material, organic artefacts at habitation sites tend to be preserved.

The Preboreal bone deposits

Introduction

There are five sites which date to the Preboreal and can be classed as bone deposition sites. Three of them have produced quantities of elk bone and the other two aurochs bone. The evidence from each of the sites clearly demonstrates that these were not natural deaths and they have typically been interpreted as either prehistoric hunting failures or deliberate ritual deposits (Pedersen and Brinch Petersen in press).

Favrbo (Denmark)

In 1920 an elk bone deposit was unearthed by peat cutting in a small bog called Krudtmosen near Favrbo on Western Zealand. The bones were excavated and examined by the geologist K. Jessen (Møhl 1980). According to Jessen the bones were found as a concentration in a lower peat layer that had been directly placed upon moraine sand. The bone material was re-analysed by U. Møhl (1980). He noted that this assemblage was represented by two individuals: an elk bull and an elk cow. Most of the bones had cut marks presumably from butchering and they had been split for marrow. The two frontal antler tines had been cut off from the bull's skull, presumably to be used for tool making. The antler and an examination of the cow's teeth suggested that the bone had been deposited in winter. Both pollen analysis and radiocarbon dating date the bones to the Middle Preboreal period (Møhl 1980).

Lundby Mose kettle hole (Denmark)

The Lundby Mose kettle hole site is situated in Southern Zealand close to the Sværdborg-Lundby bog from where numerous Maglemose sites of primarily Boreal and the Early Atlantic periods have been excavated. The kettle hole site is c. 100 m × 40 m and situated on arable land. It was excavated during 1999 and 2000 by the local museum. It revealed at least nine different well-preserved bone deposits situated under the present-day water table (Jessen et al. 2015) (Figure 12.3).

Even though the bones in each of the deposits had been clearly manipulated (Leduc 2014b), not many artefacts were found that could reveal who the hunters were. In the deposit LM1 an elk antler adze, typical of the Mesolithic Preboreal (e.g. such as those from Star Carr) was unearthed, suggesting a cultural attribution to the Maglemose Culture. In deposit LM3, a lithic arrowhead had penetrated into an elk sternum, but the type of arrowhead could not be determined due to its broken base. However, the way in which the animals had been butchered and the practice of depositing elk bone are consistent with other bone deposits dating to the Preboreal period, e.g. from the sites of Skottemarke and Favrbo (Møhl 1980; Sørensen 1980).

Archaeological analysis (Hansen et al. 2004; Pedersen and Brinch Petersen in press) and zoological analysis (Leduc 2014b) of the deposits LM 1, 2, 3 and 6, revealed that one or several elk individuals had been laid into the bog as an assembled concentration of bones that had most probably been wrapped into the skin of the killed animal. The deposit LM5 contained many more species (aurochs, red deer, pike, wild boar and dog) and the bones were more spread out. The recent interpretation of these deposits is that the single species bundle deposits (LM1–3, LM6) were laid into the lake as part of a ritual practice while the LM5 deposit represents a toss zone from a nearby site (Pedersen and Brinch Petersen in press). This site could be Lundby IV, an assemblage of material that had been surface collected close to the kettle hole before the excavation (see below, Johansson 1990).

Figure 12.3: (top) The LM5 deposit under excavation with the geological profile of the layer with finds within it above the Late Glacial sand; (bottom) the LM2 deposit of bundled marrow-split elk bones (Copyright Charlie Christensen, CC BY-NC 4.0).

The geological context of the LM1–3 and LM 6 deposits is characterized by a dark brown gyttja (organic detrital mud) directly above a Late Glacial layer of clay, suggesting an Early Preboreal date for this layer. This early date is confirmed by radiocarbon dating of the bone material, the oldest deposit being LM6 dated to the very beginning of the Preboreal period. The LM 1–3 dates are, except for the elk antler adze in LM 1, slightly younger, dating to the first half of the Preboreal, while the LM 5 layer dates to the Late Preboreal. A core taken in the kettle hole for pollen and macrofossil analysis revealed a Preboreal vegetation sequence which was supplemented by absolute ages (Jessen et al. 2015). This analysis suggests that the direct dating of the elk bones compared with the dated stratigraphy, was in some instances slightly too old (e.g. the elk antler adze from LM1). It was suggested that this difference might represent a hard water effect due to elks living in an aquatic environment and consuming water plants. The dating of these bone deposits represents the earliest Mesolithic activity, including tool making in Northern Europe, yet there are no dates for habitation sites that can further support the presence of people within Southern Scandinavia during this early phase.

Skottemarke (Denmark)

This bone deposit was found in 1902 during peat cutting in a bog in the central part of the island of Lolland. S. Müller and G. Rosenberg from the National Museum undertook an excavation of the find spot and recovered in situ contexts. The bones were re-analysed by U. Møhl in 1978 at the Danish zoological museum in Copenhagen and were interpreted as being the remains of at least six elk (one calf, four cows and a bull) (Møhl 1980). Most of the bones had been split for marrow but metapodials were missing, possibly because they had been selected for tool production. Based upon the age of the elk calf bones it was deduced that these were killed during winter. No tools were found within the bone deposit; however, a concentration of finely barbed bone points and flint artefacts were found only a few metres away but clearly separated from the bones. Pollen sampled from around the finds and a column, taken during the original excavation and sent to the geological museum in 1902, revealed that the contexts with the finds in them were of Middle Preboreal date (Sørensen 1980). This was confirmed by radiocarbon dating of the elk bones (Møhl 1980). The evidence shows that after the animal was killed, each of the shoulder blades were stabbed from the inside out leaving a large hole in each of them; because of this, the Skottemarke bone deposit is interpreted as a ritual deposit that can compared to historical ritual Saami practices (Møhl 1980; Pedersen and Brinch Petersen in press).

Potsdam-Schlaatz (Germany)

In 1984, during building work of a new residential area in Potsdam, the partial remains of a male aurochs skeleton were found. These remains included the skull, the majority of the spine, and some ribs. It is thought to have died in a shallow river bed, probably during the summer or autumn (Gustavs 1987, 32–34; Weiße 1987, 61). Cut marks were evident on the bones and undiagnostic stone tools were found in association with it. As the missing bones relate to the meat-bearing parts of the carcass it is thought that these parts must have been transported to the campsite (Gramsch 1987b, 50). Other bones were also found at the site: single bones of another aurochs, red deer, horse and wild boar. The sedimentological and pollen evidence suggested a date belonging to the Younger Dryas (Loch Lomond Stadial in the UK, see Chapter 4) (Gustavs 1987; Kloss 1987; Weiße 1987). However, because this fauna was more likely to be associated with the Early Holocene, Kloss (1987, 65) suggested a younger date. The aurochs and associated fauna were radiocarbon dated, placing the finds into the Early Preboreal (Benecke et al. 2002), which still predates the large Mesolithic habitation sites such as Friesack, Hohen Viecheln or Duvensee. It is therefore difficult to provide any further interpretations, particularly due to the lack of diagnostic stone tools.

Vig (Denmark)

The aurochs from Vig was found by a local farmer in a small peat bog in Northwestern Zealand during May 1905. He reported the find to the Zoological Museum and geologist and botanist N. Hartz went to examine it: the skeleton was almost complete and extremely well preserved and three broad, simple obliquely blunted points were found with it. A zooarchaeological examination showed healed and fresh wounds with two flint points embedded into the bone. From this, it was hypothesised that the aurochs had been hunted several times by people hunting with bows and arrows and that it died within the lake from its severe wounds. The microliths are typical of the earliest Maglemosian phase (Phase 0). They were made from broad irregular blades which are typical of the first blade technology group (Group 1). Hartz also examined the stratigraphy and demonstrated that the aurochs was unearthed from the bottom of a brown gyttja layer and just above a sand layer. The appearance of aspen (*Popular tremula*) and pine trees (*Pinus sylvestris*) provided a Middle Preboreal date and an AMS radiocarbon date on a bone sample has since confirmed this (Fischer 1996).

The habitation sites

Introduction

Fourteen habitation sites dating to the Preboreal are discussed here, ordered alphabetically. They produce a variety of information though as can be seen, very little in the way of organic material. Therefore, dating is usually carried out using typological and technological analysis of the lithics and where radiocarbon dating is possible it is generally carried out on charcoal.

Årup context 1 (Sweden)

The Årup site complex is situated in Northeast Scania where the large lakes of the region run out into the Baltic Sea through the River Skrabeåen. The excavations were carried out by the Swedish Heritage board prior to a road construction (Karsten and Nilsson 2006). In total, nine clearly separated concentrations of lithics and, in some cases, structures were investigated of which three can be defined as belonging to the Preboreal Mesolithic of Southern Scandinavia. In this area the subsoil is sandy, meaning there is little possibility for organic preservation.

The oldest of the Årup concentrations is context 1, which was found 1.5 m below a sandy soil deposited by Baltic Sea transgressions. This context consists of a 5 × 5 m concentration of 2118 lithics. The majority of the lithic material was of the local Kristianstad flint, but importantly, 267 pieces of Maastrichtien flint must have been imported to the site, most probably from Western Scania or from Zealand, where these sources appear. The assemblage almost only represents blade production and it has a limited tool inventory consisting of 25 microliths, 10 microburins, 10 end scrapers, three knives with retouch, three burins, burin spalls and a hammer stone. No adze production was found in the material. Thorough investigations were carried out using spatial analysis, refitting of the lithics and use wear analysis. From this, the find spot was interpreted as a single event, most probably a short-term hunting and butchery camp.

The microliths are generally simple obliquely blunted points, yet some have more retouch along the lateral edge. The blade industry represents an Ahrensburgian tradition where large thin blades are detached from flat single fronted cores by means of a soft stone hammer. The find layer could not be dated, but the overlaying layer in the well-developed geological stratigraphy has been dated by charcoal (from pine) and corresponds to the Middle Preboreal period, meaning that context 1 is older than this period (Karsten and Nilsson 2006, 61).

Årup context 2 (Sweden)

Årup context 2 is represented by a c. 15 × 7 m concentration of 3984 lithic pieces (Karsten and Nilsson 2006, 86). The lithic material was situated in a layer that was c. 0.3 m thick, implying that some bioturbation had affected the site. Several large boulders were found within the excavation area, one of which had clearly been employed as a seat and used for flintknapping. Three possible postholes were found in relation with the lithic concentration and interpreted as part of a hut or windshield construction.

The material is characterized by a relatively small sized blade industry and tool production. In all, 10 microliths, 7 microburins, 11 endscrapers, 4 borers, 2 knives and a flake adze were identified. Approximately one third of the lithic material was burned. Only 104 pieces of flint were imported Maastrichtien flint whilst the remainder was local Kristianstad flint. Spatial analysis, refitting and use wear analyses were carried out and showed that there had been a living area with three fireplaces, an area of habitation and three activity areas in which butchering, flintknapping and bone antler working had taken place.

The microliths are obliquely blunted points, but some have an extended lateral retouch. One microlith is of the isosceles triangle type. The blade production method is characterized by use of single platform circular cores and hard hammer technique, as seen within the Barmosen 1 assemblage (below). This typology and technology is typical of the Middle Preboreal period in Southern Scandinavia (Sørensen 2006). A charcoal sample of pine was radiocarbon dated to the same period (Karsten and Nilsson 2006:103).

Årup context 3 (Sweden)

At Årup 3 only 129 lithic artefacts made from the local kristianstad flint were found (Karsten and Nilsson 2006). In all, two microliths of the simple lanceolate type, a borer, a burin and two flake adzes, a strike-a-light and a hammerstone were identified. Twenty-nine pieces were defined as irregular blades and five pieces were identified as used blade cores. The site is remarkable because of a very well-preserved fireplace and what is thought to be four postholes and features which may represent part of a wall construction. This has been interpreted as a hut construction with an outside hearth. Due to the small number of artefacts, the site can only be tentatively typologically dated to Maglemosian phase 1 and technogroup 2. A radiocarbon date on pine charcoal from the fireplace provided a date for the Latest Preboreal period (see Figure 12.2).

Barmosen I (Denmark)

The Barmosen I site is located in the Barmosen bog in Southern Zealand just south of the large Sværdborg/Lundby bogs. It was excavated in 1967 and published in 1990 by the excavator A. D. Johansson. A cultural layer with a central concentration of lithic artefacts was found at the bottom of a turf layer just above gyttja, indicating that the site was originally in a wetland position close to a former lake. In total, 99.25 m^2 were excavated in ¼ m^2 and 3-dimensional plotting of tools was undertaken.

A large bark layer was encountered which was almost the same size as the lithic concentration and was interpreted as the floor of a hut construction. Above this lay a sand and charcoal layer which was 2.4 × 1.5 m wide, up to 70 mm thick. This was interpreted as part of a fireplace construction. The spatial distribution of the lithic material revealed a circular c. 6 × 6 m shape with a bimodal concentration in its centre. An analysis of the weight of the lithic material showed that the larger flint is distributed on the periphery of the concentration, along with what could have been a wall towards the east and west, whilst the very small pieces of flint revealed activity areas inside the construction. Moreover, the small flint distribution partly continued towards the north and south from the concentration leading to the interpretation that these areas might have functioned as entrances to a hut construction. In the central sand layer fish bones and bird bones were excavated e.g., pike (*Esox lucius*), carp (Cyprinidae) and grebe (Podiceps). From the gyttja layer beneath the sand layer an aurochs bone was excavated.

In all 1353 artefacts were classified as lithic tools, 19,295 pieces as lithic debris of different types, five pieces as hammerstones, 14 pieces as bone tools and 87 fragments of seemingly not worked bone, antler and tooth. Moreover, 22 lumps of pitch/resin, two of which had human teeth imprints, were recovered. The tool inventory is dominated by broad obliquely blunted points (n=68), burins (n=68), endscrapers (n=65), symmetrical flake adzes (n=34), drills (n=24) and one core axe. Moreover, many differently retouched pieces, which cannot be classified into formal tool type categories, were recorded. From analysing the lithic debris it was shown that lithic production was carried out at the site, except that large blanks for flake adzes were serially produced at other locations and imported to the site.

The lithic technology at the site can be characterized as a blade and a flake adze industry. Irregular blades of various sizes were serially produced from single platform or multi-platform cores by hard hammer technique (Sørensen 2001; Sørensen 2006). From these, the majority of the tool types were produced (scrapers, burins, drills, knives etc). The flake adze production was performed from large serially produced blanks, a method that has been identified at Early Mesolithic sites specifically in the Barmosen area (Johansson 1990; Sørensen 2006). Their production into adzes can be identified by diagnostic 'wing shaped' flakes also found at Barmosen I. The bone tool inventory was rather fragmented and affected by burning. Among the fragments was part of a finely serrated bone point of Early Mesolithic type. Several other fragments had burin facets and grooves and must be interpreted as production waste or preforms of a bone industry conducted at the site.

The tree species were ascertained from 595 pieces of charcoal from the cultural sand layer. The majority of these were from poplar (*Populus* sp. 53.4 %), but birch (*Betula* sp. 20%) and pine (*Pinus* sp. 10%) were also present (16.6 % was defined as either poplar or willow (*Salix* sp.)). It was concluded that the range of species represented a Middle Preboreal forest regime. AMS dating of the charcoal placed the site into the Early/Middle 9th millennium cal BC (Fischer 1996). When typologically and technologically compared to the sites from Duvensee (e.g. Duvensee 8) and to the microliths of the Vig aurochs and the respective radiocarbon dates of these sites, the radiocarbon dating of the Barmosen site appears to be too young. The reason for this is unknown, although it has been suggested that humic acid contamination from the peat above the cultural layer may have influenced the radiocarbon dates, despite a pre-treatment of the samples.

Bjergby Enge (Denmark)

The Bjergby Enge site was found within a peat bog in Western Zealand in 1952. This was found as a surface scatter of very homogeneous lithic material on the surface of the harrowed peat bog in an area of c. 7 × 7 m and was collected by a local amateur. Later the area was excavated by another amateur. No preserved organic artefacts can be associated with the assemblage. The material was briefly published by the archaeologist K. Andersen (1982). The finds include c. 1200 pieces of flint and blade production is represented by c. 330 pieces and 15 cores. In total, 52 broad obliquely blunted points, 2 knives, 2 drills, 5 end scrapers and a flake adze are present in the assemblage. Due to its typology and simple blade production, the site is defined as belonging to the Earliest Maglemose Culture with a close affinity to the Barmosen 1 assemblage.

Draved (Denmark)

A cluster of Early Mesolithic sites are located in the Draved bog in Southwestern Jutland. Around 30 find spots with a Mesolithic inventory are known from the bog, four of which were excavated by H. Kapel of The National Museum of Denmark between 1959 and 1970 (Sobotta 1991). The excavated sites are represented by Draved 611, 604, 329 and 322; Draved 604 is further separated into two sites 604 and 604 South (S). There is not much information available about the actual excavations except that the sites were excavated in metre squares and the stratigraphy was described as a sandy soil with possible finds in its top layer, overlain by peat, and with no preservation of organic material in the find layers except for charcoal. Sieving of the excavated soil was not undertaken.

In all cases the sites are represented by concentrations of lithic artefacts, typically c. 5 × 7 m in size. These clusters have been spatially analysed and compared to other sites of the Maglemose culture by Sobotta (1991). The sites have been relatively dated by their microlithic typologies as well as being dated by radiocarbon analysis; however, the radiocarbon dates are not secure. Based on typology the oldest site is 611 due to the presence of broad obliquely blunted points as the only type of lithic point. This site is dated by radiocarbon dating to the Middle Preboreal period. Site 322 includes simple obliquely blunted points but also microliths with fully retouched lateral edges. Moreover, the microliths were generally made on thin, long and narrower blades. For these reasons this assemblage can be considered slightly younger than assemblage 611. The radiocarbon dating of this site consisted of two dates; one falls into the Late Preboreal period and one into the Early Boreal period. Sites 604 and 604S include a combination of obliquely blunted points and isosceles triangles. This is a typical composition for sites dated to phase 1 corresponding to the Late Preboreal or the Boreal transition. Site 329 is dated typologically and by radiocarbon dating to the Younger Boreal period.

Flaadet (Denmark)

The Flaadet site is situated on the island of Langeland. It was excavated during the spring of 1973 by Langelands Museum. The geology and the vegetation history in relation to the site was analysed by researchers from The National Museum (Fredskild 1975; Skaarup 1979). The Flaadet site is located on a former small island centrally placed within less than 1 km^2 of a drained bog. The bog was ploughed during the mid 20th century and the site appeared as a flint scatter. The excavation of the site revealed that the lithic material was generally situated in the plough soil consisting of heavily degraded peat including chalk from the former lake bottom. The pollen analysis of the lake stratigraphy suggested that the peat had built up from the Late Boreal and that the island had been inhabited before this, during a lowering of the water table from the Late Preboreal to the Boreal periods (Iversen 1967).

The excavation revealed a concentration of typologically consistent lithic material within an area of c. 17 × 13 m. This concentration was completely excavated and recorded by metre square. Test excavations and field surveys revealed that no other lithic concentrations could be found on the island or within the nearby bog. In total, 26,212 lithic artefacts were classified and of these 2064 pieces were identified as tools. A very small assemblage of bones was recovered in the soil within the excavated site area and wild boar, red deer, roe deer and possibly elk were identified.

Due to its size and stratigraphy the site was interpreted as a palimpsest; however, it is a very concentrated spatial distribution with consistent lithic typology that suggests the site was formed within a short or modest period of time. The site occupation phase must correspond to a period when the lowering of the groundwater made it possible to inhabit the island, i.e. during the Late Preboreal or Early Boreal periods.

The site is of archaeological importance due to its consistent lithic material, thus making it a key typological site of this particular phase. The blade industry is characterised as consisting of irregular thin blades produced from single or dual platform cores using what is considered to be a direct, soft stone hammer technique. In total, more than 400 microliths were recorded. The vast majority of these are narrow obliquely blunted points with one partially or fully retouched lateral edge (n=293); however, triangular microliths (isosceles) appears as a clear component (n=53) as well as segment shaped microliths (n=18). Other tools were generally made on blades and are classified as end scrapers, simple burins, borers and a variety of differently retouched blades. Axes/adzes appear as slender well-formed core axes and only a minority of irregular flake adzes appear. Typologically the site is dated within phase 1 and technologically within group 2, corresponding to the Late Preboreal or Early Boreal periods (Figure 12.2).

Gl. Ullerød (Denmark)

The site of Gl. Ullerød is located in Northeast Zealand within a drained river and lake system. It was excavated in 2001 by archaeologists of the local Hørsholm Egn Museum after it was discovered during a modern reconstruction of the river (Jensen 2002). The site was excavated in square metres and the soil was wet-sieved. The excavation revealed a distinct half circular cultural layer, c. 10 m wide, containing sand, charcoal, burnt stone and flint artefacts. Further, it was determined that only about half of the site was preserved as the cultural layer was cut through by a machine digger. The analysis of the remaining cultural layer demonstrated a clear central concentration of artefacts. Furthermore, the cultural layer contained two central sand and charcoal areas, interpreted as fireplaces. The finds inventory is modest and consists of c. 500 small blades, 13 microliths, 12 microburins, 11 blade knives, 3 end scrapers, 2 burins and a single adze made from a large frost fracture. The microliths are all simple obliquely blunted points but were made on thin and narrow blades. The site is therefore considered typologically and chronologically related to the Klosterlund assemblage, dated to the Late Preboreal Maglemose Culture. Unfortunately, the site did not yield any organic remains and reliable dating of charcoal from the fireplaces has not been achieved.

Hasbjerg II (Denmark)

The Hasbjerg II site was found in the Sværdborg bog, South Zealand by archaeologist A. D. Johansson in 1965 (Johansson 1990, 54ff). It was located in a drained and ploughed bog, very near to a promontory reaching out into the former bog. In 1968 Johansson decided to excavate the plough soil in metre squares and it was found that the site stretched out as a concentration of lithic artefacts with very limited in situ preservation. In total, 58 m^2 were excavated showing a clear concentration in the middle part of the excavated area. The following analysis of the burnt flint revealed that the material was centrally concentrated, suggesting a central hearth. In total, 8058 flint pieces were recovered. A total of 83 microliths were found; 50 of which were simple obliquely blunted points, nine had some extended lateral retouch and 12 were defined as isosceles types, the rest as fragments. Of the other tools, 19 were end scrapers, four borers, 38 burins, 22 blades with lateral retouch, 15 flake adzes and two core axes. The blade cores and the blade material reveal a single and dual platform blade production method by means of soft hammerstone percussion (Sørensen 2006). No organic artefacts were found and consequently no absolute dating was possible. From seriation analysis of the microliths the Hasbjerg II site is demonstrated to be closely related to the Klosterlund, the Flaadet and the Star Carr assemblages (Johansson 1990, 52), an interpretation that can be confirmed by a comparison of the blade production methods. The dating of the site is therefore typologically dated to the Maglemose culture phase 1 and techno group 2, corresponding to a Late Preboreal date.

Henninge Boställe (Sweden)

The Henninge Boställe site is situated in Central Scania on a small promontory on the north side of a river that, during the Mesolithic, connected Lake Ageröd with the western Ringsjön. The site was discovered during the middle of the 20th century by amateur excavators. It was then excavated by the archaeologist C-A. Althin. The excavation was only very briefly described (Althin 1954), yet it was stated that some undisturbed parts of a settlement layer were preserved. Based on Althin's site description, it can be assumed that the site was not completely excavated. In total, c. 3649 lithic artefacts were retrieved during the excavation. Nineteen microliths were defined as simple obliquely blunted points and isosceles triangles. Moreover, five core axes, three borers, 26 end scrapers, 36 burins and four blade knives were recovered. The blade and core material revealed a blade production method from single platform circular cores by means of hard hammer percussion. No organic preservation was mentioned and therefore there are no absolute dates. Due to the types of microliths and the 'crude' blade industry, Althin interpreted the assemblage as belonging to his Oldest Mesolithic phase, i.e. the Preboreal period.

Klosterlund (Denmark)

The Klosterlund site is located in Central Jutland on a small sandy promontory stretching out into the Bølling bog, a former lake that has now been restored. Its excavation was undertaken in 1936, led by T. Mathiassen and with participation of the botanists J. Iversen and J. Troels-Smith (Mathiassen 1937). A total of 194 m^2 were excavated in a 10 m trench located between the promontory and the bog. The cultural layer consisted of dark sandy soils with charcoal and lithic artefacts. It was between 0.1 and 0.4 m thick and located directly on a sandy subsoil and overlain by peat. The acidic subsoil did not yield any bone or antler artefacts. In total, c. 30,000 lithic artefacts were excavated. Of these, 1298 were classified as tools by E. Brinch Petersen (Petersen 1966).

The typology of the majority of finds includes simple narrow obliquely blunted points, some with fully retouched lateral edges and a few segment microliths. Small narrow core axes and irregular flake adzes made on frost fractured blanks were also present. The typology corresponds to Phase 0, thus dating to the Preboreal. The blade industry was characterized by thin irregular blades produced from single fronted, often dual platform, blade cores by means of the soft stone hammer technique (Sørensen 2006). This blade production method and concept is typical of the second technological group in the Maglemosian, dated to the Late Preboreal and Boreal periods. Geological dating of the stratigraphy and the cultural layer places the site in the Late Preboreal period (Iversen 1967). Four conventional radiocarbon results have been made on charcoal which dates the cultural layer to the late 9th millennium cal BC. The relatively northern location in Central Jutland of Klosterlund suggests that the vegetation was Preboreal later, as also demonstrated by its radiocarbon dating, than in for example Northern Germany. Overall, the Klosterlund site can be defined as a palimpsest of occupations that was only partly excavated. However, the consistent typology of the assemblage as well as the stratigraphy in which the cultural layer is clearly apparent beneath the peat layers suggests that the site was only inhabited during a Preboreal vegetational phase.

Lundby IV (Denmark)

The Lundby IV site is located in Southern Zealand only a few hundred metres from the Lundby Mose kettle hole. At this site a concentration of lithic artefacts on the surface of the bog were found in 1965 by the local archaeologist Axel Degn Johansson. In addition, a few artefacts made from bone and antler of typical Early Mesolithic types, such as fragments of a finely serrated bone point, were also found. The flints from this concentration have a very distinct white patina that was very different to other stray finds found in the same area. In total, 15 microliths were found, 14 of which were simple obliquely blunted points, and one isosceles triangle.

Due to the microlith inventory and the appearance of large flake adzes the site is defined as a 'Barmosen' type site and can be relatively dated to the Middle-Late Preboreal period. It can be assumed that the people living at the Lundby IV site were responsible for one or more deposits in the Lundby kettle hole (see above). Due to the affinity with the Barmosen 1 assemblage, it is likely that the Lundby IV site was in use during the Middle Preboreal period and thus may be related to the LM5 deposit in the Lundby kettle hole.

Nørregaard VI (Denmark)

Probably the clearest Early Mesolithic site in Southern Scandinavia is Nørregaard VI which is located in central Southern Jutland. The site was excavated in 1994 by archaeologists from the local museum prior to the construction of a highway. The site is relatively high above sea level and is not found within a wetland situation. In all, 3184 lithic artefacts were recorded, of which 217 were classified as tool types: microliths (n=18), axes/adzes (n=20), end scrapers (n=10), burins (n=56) and borers (n=2). The material was excavated from both the plough soil layer and the sandy subsoil below and recorded in ¼ metre squares. The spatial distribution of the artefact material reveals a dense concentration c. 6 × 6 m in diameter and the existence of a central hearth has been suggested through the examination of the burnt lithic debitage (Figure 12.4). The site has been interpreted as a short-lived habitation site, including a possible hut/tent structure (Sørensen and Sternke 2004).

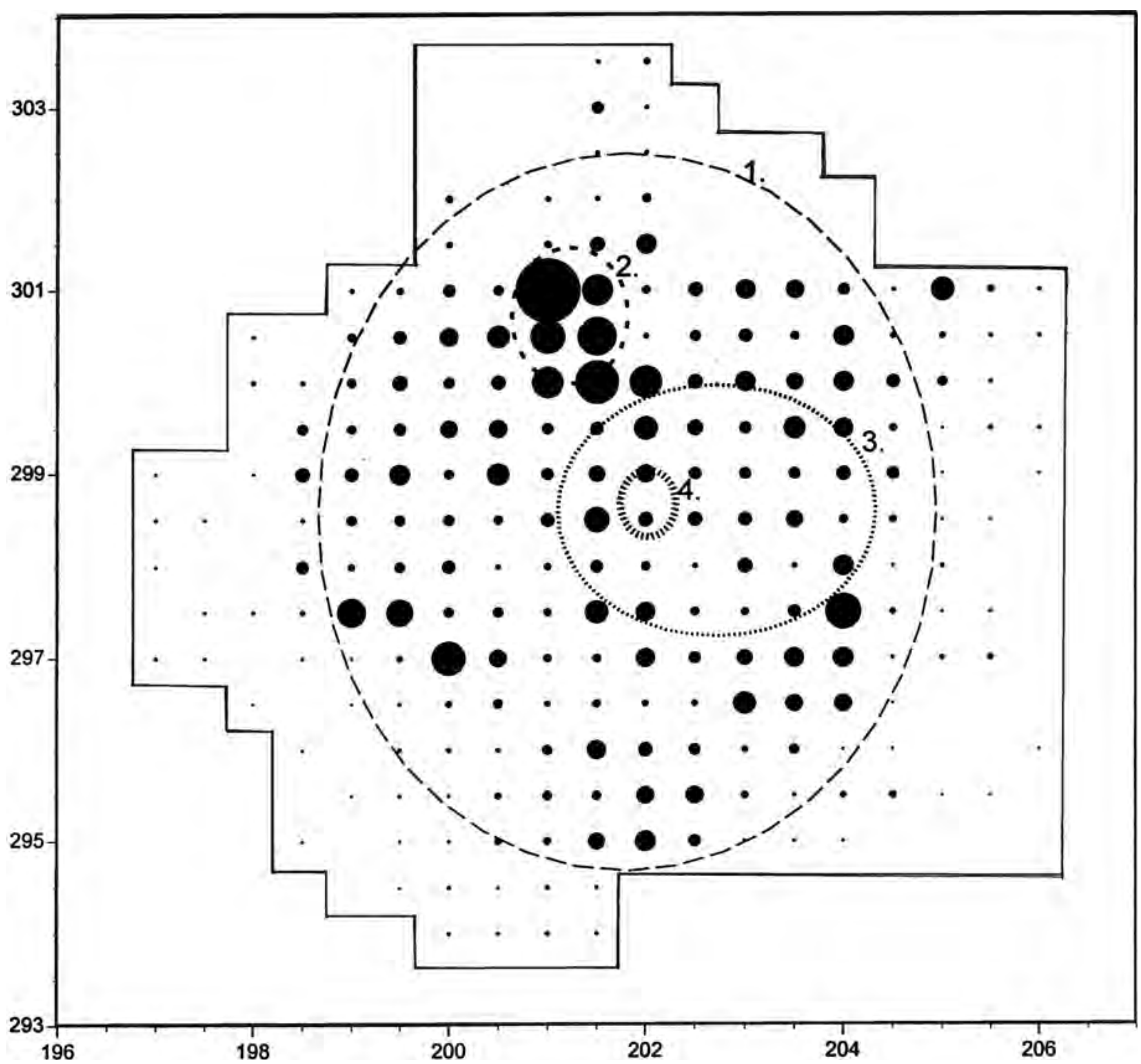

Figure 12.4: The spatial interpretation of the Nørregård VI site. Concentration of lithic artefacts recorded below plough soil in ¼ m^2. 1. Knapping and lithic tool activity area; 2. main knapping area; 3. habitation area; 4. main hearth (after Sørensen and Sternke 2004. Copyright Mikkel Sørensen, CC BY-NC 4.0).

The assemblage includes simple microliths typical of both the Early Maglemosian and the Epi-Ahrensburgian as some of these have basal retouch making them similar to zonhoven points (Figure 12.5) (Taute 1968). The main reason that the site is considered to be transitional Mesolithic is the production of flint adzes made from large frost fractured blanks. In total, four flake adzes (and eight preforms/fragments) and two narrow core axes (and four preforms/fragments) are present. This axe/adze typology of large flake adzes and slender core axes and their technological productions are typical of the Preboreal Maglemose culture as seen at the Barmosen and Draved sites (see below). However, the blade industry and the appearance of imported long blades, some of which were clearly bruised, point to the Epi-Ahrensburgian/long blade complex. It should be stressed that due to the limited spatial distribution, the modest number of artefacts and the consistent lithic technology and typology, the Nørregård VI assemblage cannot be interpreted as a palimpsest or a chronologically mixed site. Unfortunately radiocarbon dating cannot be carried out due to lack of organic preservation; however, the adzes indirectly date the assemblage and the site to a landscape with trees, i.e. the Preboreal period.

Pinnberg 7 (Germany)

The Ahrensburg Tunnel valley is renowned for the unique and vast sites of Stellmoor and Meiendorf excavated by Alfred Rust and dating from the end of the Younger Dryas or the Earliest Preboreal periods. However, this area was also occupied in slightly later times, e.g. the site of Ahrensburg-Pinnberg 7 (Rust 1958a). At this site,

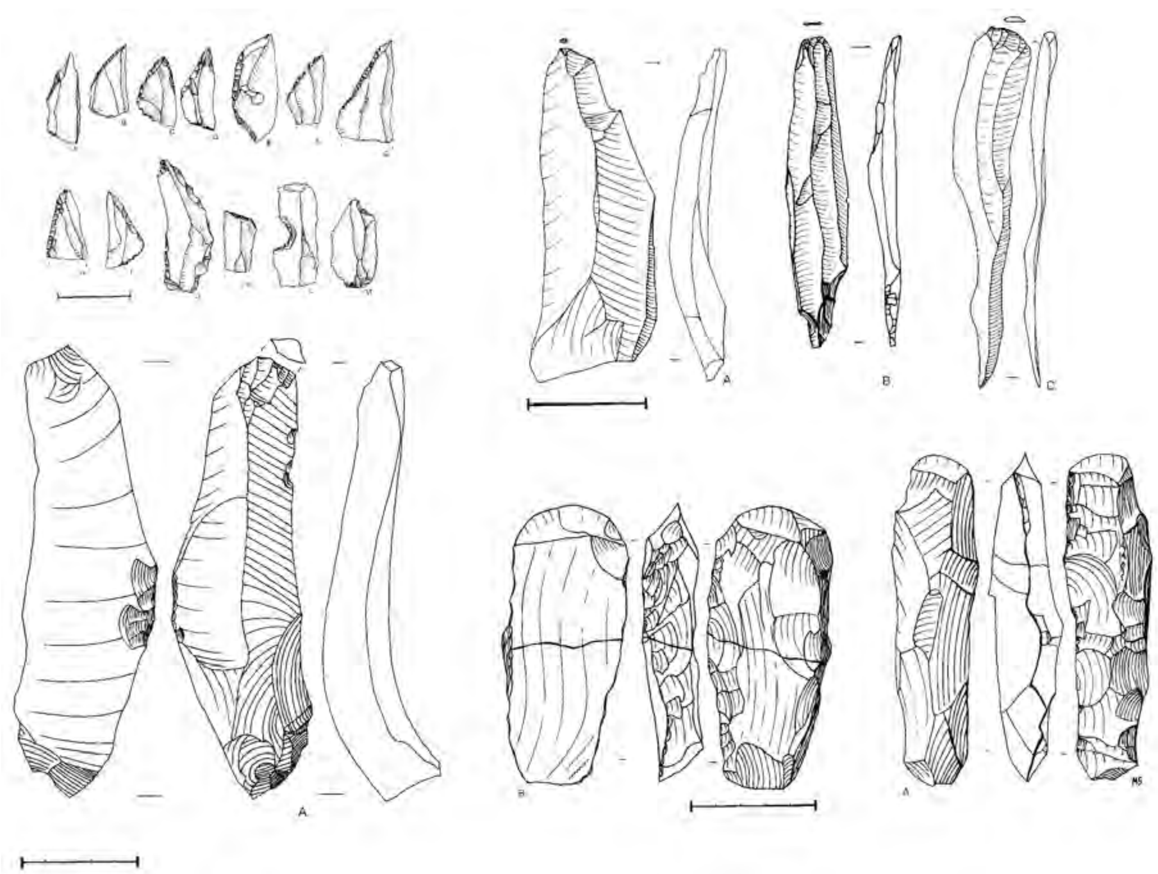

Figure 12.5: Lithic artefacts from Nørregaard VI. (Upper left) microliths and preforms (scale 20 mm); (upper right) large blades (scale 50 mm); (lower left) long blade with bruised edges (scale 50 mm); (lower right) large flake adze and slender core axe (scale 50 mm) (after Sørensen and Sternke 2004. Copyright Mikkel Sørensen, CC BY-NC 4.0).

Rust uncovered an extensive artefact inventory dating from the Late Palaeolithic to the Late Neolithic or Early Bronze Age. Originally aiming to find huts of the Late Glacial reindeer hunters, he almost completely excavated the prehistoric settlement area. Due to the artefacts it was long assumed that Pinnberg 7 could provide information on the transition between the Late Palaeolithic and Early Mesolithic technocomplexes. This was even more likely as Rust separated up to nine different occupation layers from which one was dated slightly older than the sites in Mullerup and Duvensee, i.e. the Maglemose Culture (Rust 1958b, 32–55, 76). Consequently, Rust defined a cultural entity which he entitled the 'Pinnberg-Kultur'. He also discovered six huts and three graves. Due to the extraordinary character of the site it received a lot of attention when it was finally published in 1958, but doubts on the chronological distinctness of the different cultural layers were raised shortly after (e.g. Gramsch 1960, 63; Taute 1968, 214; Bokelmann 1971, 26). A recent re-evaluation of the archive material could not verify the existence of the hut and grave features (Groß et al. 2016; Groß et al. in press a). Furthermore, a technological re-analysis of the blades from Pinnberg 7 could not find any indications that the proposed occupation layers can be comprehensibly retraced, even though clearly different striking techniques were proven. As a result, Groß et al. (in press a) concluded that Pinnberg 7 'has to be regarded as a mixed find inventory that represents a wide chronological range' and that Rust's chronologically different occupation layers cannot be proven (Figure 12.6).

Figure 12.6: The wide chronological span of the finds from Pinnberg 7 is also reflected by the lithic projectiles. (Top row) backed point and four tanged points from the Late Palaeolithic; (lower row) a simple point (chronologically indeterminate), one triangle microlith from the Early Mesolithic, three transverse arrowheads from the Mesolithic/Neolithic transition and a surface retouched arrow head from the Late Neolithic or Early Bronze Age (Photograph by Claudia Janke. Copyright Archaeological State Museum, CC BY-NC 4.0).

Settlement sites with organic preservation

Introduction

There are only six Preboreal sites, classified as settlement sites with organic preservation, all of which have been found in Germany. The organic remains provide the potential for better dating but also provide a suite of artefacts and ecofacts which expand our understanding of the material culture and how people subsisted during this period. There are also some striking similarities with Star Carr, particularly the antler frontlets found at Bedburg-Königshoven and Hohen Viecheln.

Bedburg-Königshoven & Mönchengladbach-Geneicken (Germany)

In 1987 the site Bedburg-Königshoven was excavated by Jürgen Thissen. The site was dug as a rescue excavation in advance of opencast lignite mining and consequently was destroyed. Located c. 20 km south-east of Mönchengladbach in the Rhineland, the site has become known for two antler frontlets found in the former shore area of an ancient oxbow lake (Figure 12.7) (Street 1989, 9–11; Street 1998, 165; Wild in press). Several other bones from different animals were found here, as well as Early Mesolithic artefacts made from stone and bone. The remains of aurochs are by far the most numerous at the site (Street 1999). Cut marks on many bones provide evidence for butchery but there is also evidence for domestic activities. The site is dated to the Early Preboreal (Street et al. 1994).

Other evidence for the exploitation of aurochs is provided by the site of Mönchengladbach-Geneicken. Here in 2014, aurochs remains were found in an area of 25 m^2. Almost 80% of the skeleton is represented and it could be shown that the meat and marrow-rich parts must have been cut and then thrown back into the shore area where the carcass was located (Heinen 2014, 300–301). Two microliths were found in association with the bones so that it is likely that these are projectiles from the hunt, especially because they show impact damage. Two concentrations of Mesolithic finds were found in the direct vicinity but a connection between the three finds spots is not yet proven (Richter et al. 2015, 474).

Duvensee (Germany)

The Duvensee peat bog in south-west Schleswig-Holstein, Northern Germany, represents one of the most prominent Stone Age palaeo-landscapes in Northern Europe. After the first archaeological investigations of Mesolithic sites by G. Schwantes and K. Gripp in the 1920s, and later by H. Schwabedissen, further research was conducted by Klaus Bokelmann from the 1960s. An intensive survey and excavation programme led to the discovery of several new Mesolithic and Neolithic camp sites on small islands or peninsulas on the western border of the former lake. Currently, 24 find spots in the bog area are known, despite several Stone Age sites having been destroyed by ploughing on the sandy-loamy shore areas of the Duvensee lake (Figure 12.8). The Preboreal sites Wohnplatz 8 and 9 and the Early Boreal sites Wohnplatz 1, 2 and 11 are of particular interest for the present study. The outstanding preservation of these campsites with hearths, bark mats and flint knapping areas allows detailed examinations of the spatial organisation of prehistoric hunter-gatherer campsites, even though they may present only one very specialised and temporary part of the economic and settlement behaviour.

The oldest Mesolithic sites known so far in the Duvensee bog are Wohnplatz 8 and 9, which are situated close to one another on a small former island at the western border of the former lake. Wohnplatz 8 was excavated by Bokelmann between 1978 and 1981 (Bokelmann et al. 1981), whereas Wohnplatz 9 was investigated later, between 1988 and 1989 (Bokelmann 1991). Both sites are dated to the Late Preboreal and cannot be separated by radiocarbon dating due to the Preboreal plateau in the calibration curve. However, palynological analysis carried out for both sites demonstrated that Wohnplatz 9 is older. In both cases large parts of the former occupation area were excavated and consisted of a central open fireplace surrounded by birch or aspen bark mats and distributions of charcoal and flint artefacts. Additional trenches in the adjacent shore zone provided only sporadic evidence of animal bones, so that hunting cannot have been of great importance on these sites. However, the microliths and microburins demonstrate that the production and/or repair of hunting weapons had taken place during the short time of occupation. The most striking difference between the two sites is that on the slightly younger Wohnplatz 8, numerous burned hazelnut shells were recovered; however, according to the


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Centimetres


0
50
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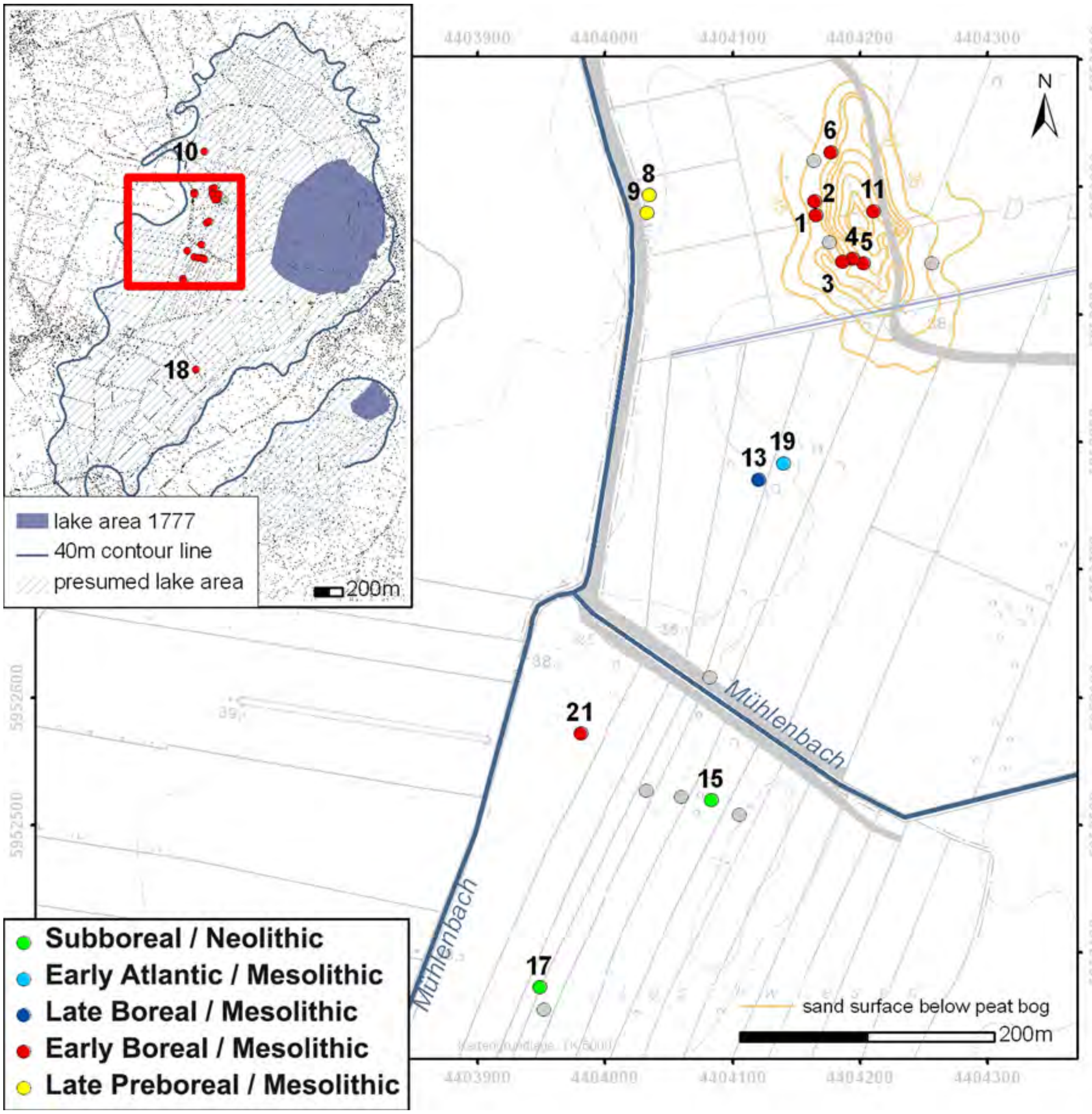

Figure 12.8: Overview of the different sites in the Duvensee bog with local site number and date (Illustration: J. Freigang and K. Göbel. Copyright Centre for Baltic and Scandinavian Archaeology, CC BY-NC 4.0).

palynological investigations, hazel initially only existed sporadically in the landscape. It can be concluded that because of the lack of burned hazelnut shells on Wohnplatz 9, the main reason for the initial occupation of the islands of Lake Duvensee was not the harvesting of hazelnuts and that this food was used as an addition to the diet when it appeared in the region.

The lithic technology is similar to the south Scandinavian sites and can be characterized as an industry dominated by irregular blades produced by hard hammer techniques from single platform or multi-platform cores: Techno complex 1 (Sørensen 2006). The microlith assemblage consists mainly of simple, partly obliquely or lateral retouched microlithic points and only a few have fully straight or convex retouched lateral edges: Phase

Figure 12.7 (page 322): The two antler frontlets from Bedburg-Königshoven (Photograph by J. Vogel. Copyright LVR-Landesmuseum Bonn, CC BY-NC 4.0).

0 (Sørensen 2006). Adzes are prepared from flakes or from frost sherds and only a few irregular shaped core adzes exist. Burins and scrapers are rare.

The next youngest Mesolithic sites known so far in the Duvensee bog are situated on another small island approximately 150 m to the east of Wohnplatz 8 and 9, dating to the Early Boreal (Figure 12.8). The earliest ones (through palynological analysis) are Wohnplatz 1, 2 and 11 that date between c. 8800 and 8400 cal BC (Bokelmann 2012) and are therefore contemporaneous with the final occupation phase at Star Carr.

Duvensee Wohnplatz 2 was the first excavated Mesolithic site in the Duvensee bog by Schwantes in 1924 and 1926 (Schwantes et al. 1925; Schwantes 1928; Jenke 2009; Jenke 2011). Duvensee Wohnplatz 1 was investigated in 1946 by Schwabedissen (1949) and from 1966–1967 by Bokelmann (1971). Both sites are situated next to each other on the western shore of the island and consist of an approximately 4–5 m long and 3 m wide area covered by birch and pine bark mats and a central open fireplace. Several concentrations of flint artefacts and tools, charcoal and burnt and unburnt hazelnut shells were found around each fireplace. On Duvensee Wohnplatz 2, under the bark mats, an underlay of brushwood and sticks or branches was found (Schwantes et al. 1925; Jenke 2009). At Wohnplatz 1, wooden planks were found partly under the bark mats; these were split off from the outer part of larger trees (Bokelmann 1971, 11).

The lithic industry is still dominated by irregular blades produced from single or multi-platform cores and direct hard hammer techniques and soft direct hammer techniques (stone or antler) both exist: Techno complex 2 (Sørensen 2006). Flake and core adzes are present. Scrapers and lateral retouched blades and flakes are common; borers or burins are rare. The microlithic assemblages belong to the relative chronological phase 1 (Sørensen 2006). Simple partly retouched microlithic points still dominate and only a few points with fully lateral retouch or segments exist. The elongated trapezes ('Trapezspitzen') are noteworthy because Clark (1954, 102) describes these as a typical element for Star Carr. In addition scalene and isosceles triangles as well as triangles with a concave retouched shorter leg are present but in lower quantities than microlith points (Bokelmann 1971, 14–15).

Due to the acidic soil conditions in the occupation area, bone preservation was poor and only a few animal bones and artefacts were found. However, in 1926, Schwantes discovered a paddle made out of pine wood next to Wohnplatz 2 in the gyttja layers that should be the second-oldest one in Northern Europe after the piece from Star Carr (Chapter 29). However, recent radiocarbon dating revealed that it does not belong to Wohnplatz 2 but dates to a younger, Late Boreal occupation phase (Jenke 2009; Jenke 2011).

According to Bokelmann (1971, 13) the limited size of the occupied area and the relatively small number of artefacts are indicators of a short-term settlement. Because of the thick concentrations of cracked hazelnut shells the occupation must have taken place during August to September when hazelnuts are ripe. The other evidence suggests that people were carrying out bone and antler working and hunting weapons were being repaired and renewed.

Almost contemporary with Wohnplatz 1 and 2 is Wohnplatz 11, which was located next to the highest and driest spot of the former island. It was excavated by Bokelmann from 1996–2001 and is by far the most complex Mesolithic site in the Duvensee bog (Bokelmann 2012). What initially appeared to be a uniphase central fireplace of a larger settlement area turned out to be a multiphase structure that had accumulated intermittently over an extended period. It consists of a concentration of four hazelnut roasting hearths, bark-mat layers and incorporates small knapping areas with a diameter of about 4 m (Figure 12.9). The main period of activity spanned c. 250 years (Figure 12.2). Wohnplatz 11 was not occupied continuously throughout this period as peat had started to form over some bark mats but people may have returned to this location every few years before trees could hide it from view. This pattern is consistent with the number of bark-mat layers, which implies that the site was used on average at least once a decade. Soon after c. 8500 cal BC it was abandoned and the site was overgrown with peat. Although the construction of the hearths used for hazelnut roasting has been published (Lage 2004; 2011; Bokelmann 2012), due to the retirement of the excavator the site has not yet been finally published. These studies are currently being resumed under the auspices of the Centre for Baltic and Scandinavian Archaeology (ZBSA) as part of an interdisciplinary research project.

In summary, the excellent preservation of the Duvensee sites have provided a detailed insight into the development of the Early Mesolithic economy in Northern Europe. However, we have to be aware that the sites provide only a small insight into economic behaviour. Therefore it is problematic to use the sites for a reconstruction of the whole Early Mesolithic foraging strategy, suggesting that hazelnut exploitation is the main characteristic feature and meat was only of subsidiary importance (e.g. Holst 2010; 2014). As Bokelmann

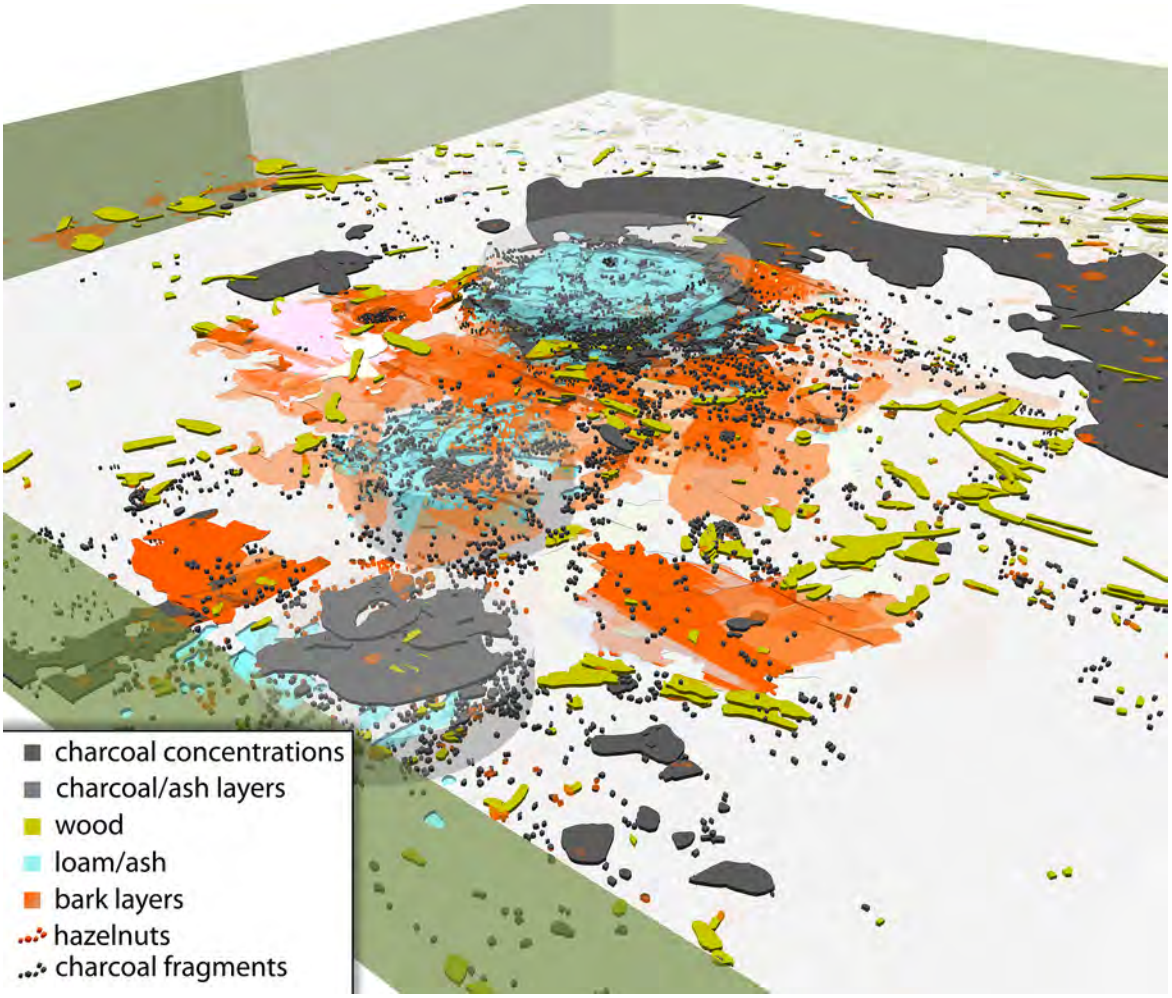

Figure 12.9: Duvensee Wohnplatz 11. Archaeological structures excavated from 1997–2001 in a 3D GIS model. This shows the position of the birch bark mats and of hazelnut roasting hearths in the excavation trench (Illustration: N. Binkowski, J. Freigang and K. Göbel. Copyright Centre for Baltic and Scandinavian Archaeology, CC BY-NC 4.0).

(2012) has shown, the quantity of hazelnuts which might be harvested cannot be predicted year to year due to changes in the weather. Therefore, it has to be questioned whether Mesolithic people established a special gathering technology which relied on nuts being stored as a surplus for the winter months or whether the Duvensee sites were used in a more opportunistic way and represent years of rich hazelnut harvests (Groß 2017).

Friesack (Germany)

Friesack is a micro-region in the state Brandenburg in Northeastern Germany where three sites from the Early Mesolithic are known and located in close proximity to each other. The most extensively excavated site is Friesack 4: this site was located on a former island in the middle of a wetland system. Most of the settlement site had been largely destroyed by sand quarrying in the 18th century. The first investigations began as early as 1916 by the amateur archaeologist Max Schneider (Gramsch 2002, 51–53). When Schneider had finished his work at the site in 1925 he was convinced that pottery was invented at Friesack during the Mesolithic due to ceramic finds associated with Mesolithic tool types. This was published in his 1932 book 'Die Urkeramiker' ('The Protoceramics') (Schneider 1932) but as was proven later, this interpretation had several shortcomings.

In 1940 Hans Reinerth conducted further excavations at Friesack 4 which indicated that undisturbed layers with organic preservation were still present at the site, especially in the former shore area (Gramsch 1987a, 76). Plans for the lowering of the groundwater that would negatively affect the organic remains led to the most extensive excavation in the area which began in 1977 and lasted until 1989, focusing on the prehistoric shoreline (Gramsch 2002, 52–54). Further excavations were carried out in 1998, headed by Gramsch, and in 2000–2001 Stefan Wenzel excavated some remaining areas of the former settlement.

Among the vast amounts of organic finds from the excavations, Friesack 4 is characterized by stratified layers at the shore edge which included erosional phases which intersected with the accumulation of organic sediment and at least 65 events could be differentiated. This made it possible to connect the artefacts in these sediments to specific dryland settlement events which caused this erosion. Numerous radiocarbon dates proved the presence of Early Mesolithic people from the Middle Preboreal up to the Early Atlantic (Gramsch 2002, 64–65). Around 100,000 flint artefacts, 20,000 animal bones, 900 tools made from bone, antler or teeth, and almost 100 artefacts made from wood or bark, including net and rope fragments, have been recorded (Gramsch 2002, 65; 2016).

This extraordinary and extensive spectrum of finds is therefore key when comparing Early Mesolithic technology and typology for North and Central Europe, and particularly Star Carr. Because of the enormous number of bone and antler artefacts, including almost 391 bone points and fragments, Friesack 4 has contributed to our understanding of the typo-chronology of this important artefact category for the Early Mesolithic (Gramsch 1990; David 1999, David 2009; Gramsch 2011).

It is also important to note that like Star Carr, Friesack 4 was located close to a large water system (Groß in press) and is part of a settlement system with contemporaneous sites in the vicinity (Figure 12.10). One of these sites, Friesack 27a, was also located on what would have been an island. It was partly excavated during the 1980s in connection with the work undertaken at Friesack 4 and even though an area of only 38 m² was investigated, a similar situation with layered sediments was recorded, though far less extensive. The occupation at this site starts in the Late Preboreal and ends during the Boreal when there was no longer connection to open water (Groß in press). The third site, Friesack 27b, is located on another former island and so far is only known from surface collections. From typology it is assumed that the site was also occupied during the Early Mesolithic but was probably used during the Late Mesolithic and Early Neolithic as well (Groß 2017, 86–90).

Hohen Viecheln (Germany)

Hohen Viecheln, located on the former shore of Lake Schwerin, was discovered in 1952 by children who found at least seven barbed points whilst playing. After test pitting, large excavations by Ewald Schuldt followed between 1953 and 1955 and uncovered more than 300 bone points. Minor-scale investigations were carried out in 1995 by Sigrid Schacht because of the restoration of an artificial channel ('Wallensteingraben') cutting through the site that was first constructed in the 16th century (Stuhr 1899) and resulted in the destruction of the main parts of the prehistoric settlement. In these excavations it was shown that undisturbed layers still existed below the base of the channel. In 2016 the ZBSA took sediment cores to investigate the environmental development of the prehistoric shoreline (Groß et al. in press b).

Due to the large number of bone points, Hohen Viecheln is seen as a key site for the Southern Maglemosian, even though it was noted during the excavation and in Schuldt's monograph (1961) that the site has to be split into several chronological layers and therefore does not reflect a single occupation. The palynological analysis by Schmitz (1961) is especially important for the understanding of the site's chronology because these dated the main occupation phase to the Late Boreal and Early Atlantic with two earlier phases in the Late Preboreal and Late Preboreal/Early Boreal transition. More than 10,500 artefacts made from flint, almost 350 bone tools and several other finds represent a chronological span from the Early Mesolithic to the Neolithic. Still most of the finds originate from Mesolithic layers and especially the bone and antler artefacts are important in this respect because of their typo-chronological value and technological information (David 1999; David 2009). However, due to complex stratigraphic information (Schüle 1962; Gramsch 1964; Pratsch 2006) it has not been possible to obtain a sound chronological framework for dating the finds indirectly (Groß et al. in press b). Therefore, almost 40 radiocarbon dates have been obtained from bone artefacts to understand the chronology and stratigraphy at Hohen Viecheln (Wild in press; Groß et al. in press b). The majority of the organic finds actually date to the Early Mesolithic and thus provide an insight into the chronology of different forms of organic artefacts

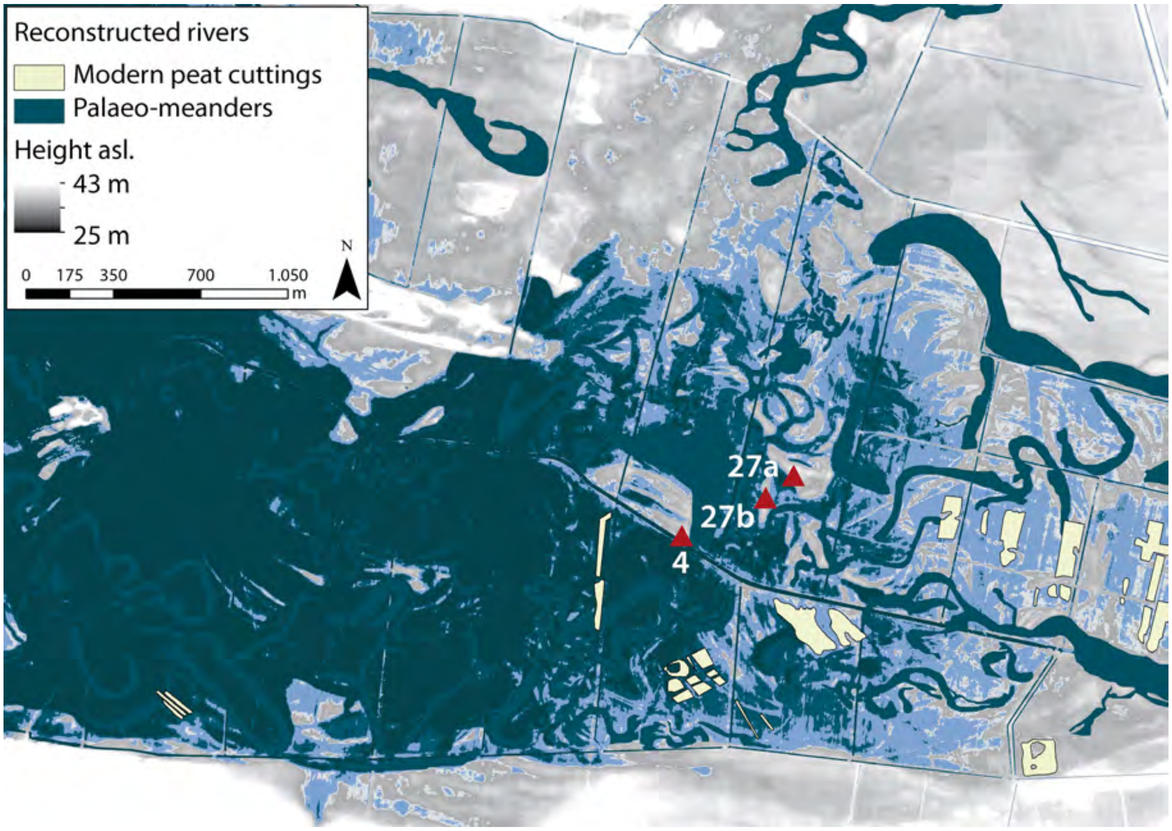

Figure 12.10: Modelled water levels and geomorphology show the rivers that existed during the Preboreal around Friesack. It is also evident that the sites were situated on islands or in island-like locations. The sites are indicated by red triangles with their respective number (Reprinted from Groß 2017, Abb. 22; geobasis-data: © GeoBasis-DE/LGB (2013)).

in North-eastern Germany at that time. One of the notable finds from the site is an antler frontlet, comparable to those found at Star Carr (see Chapter 26), and this too was dated to the Preboreal.

Rothenklempenow (Germany)

The site of Rothenklempenow lies on the edge of a former lake and was excavated from 1982 to 1993 by Sigrid Schacht. The significant artefact spectrum recorded during the early phases of work motivated the excavator to extend the trenches into the lower-lying areas towards the former lake (Schacht 1993, 112–113; Schacht and Bogen 2001, 6). The excavations indicated the existence of two settlement areas and an Early Mesolithic refuse zone in the adjacent lake. The organic preservation, especially in the refuse zone, had preserved a wide range of organic materials, notably the bones of fish, animals and humans, as well as artefacts such as a *baton de commandement/Lochstab*, bark floaters and remains of nets, bone points and pendants made from teeth (the latter exhibiting typical decoration for the Maglemose culture) (Schacht 1993, 116). The settlement area next to the excavated refuse zone consisted of two layers containing Neolithic and Mesolithic material. In the other settlement area a grave of a c. 50-year-old woman was found and stratigraphically dated to the Late Mesolithic (Schacht 1993, 117; Bach and Bruchhaus 1995). After a break of six years, new excavations in Rothenklempenow were conducted in 1999 and the spectrum of artefacts was increased by further finds (Schacht and Bogen 2001). The site is clearly an important one, but to date extensive analysis and publication of the material is still lacking.

Discussion

Due to the differential taphonomy of sites in Southern Scandinavia, two chronologies have been established for the Preboreal: an absolute one developed from radiocarbon dating of the bone deposits and a relative chronology that is mainly developed from the lithic assemblages and in particular the microliths excavated at habitation sites. However, these two chronologies do not always provide the same interpretations of Preboreal Mesolithic society and its development.

It is particularly problematic that we still have no radiocarbon evidence for habitation sites in Southern Scandinavia before the Middle Preboreal period. Dating of reindeer bone from the site of Stellmoor suggests early Late Glacial/Preboreal hunting close to Southern Scandinavia, yet the cultural attribution of these hunters is not absolutely clear. At the same time the early date for an elk antler adze of clearly Mesolithic type from the Lundby kettle hole (LM1) suggests an appearance of Maglemosian people in the very first part of the Preboreal, or even the earlier Younger Dryas, although as discussed, this date could be too old. In central Jutland the site of Nørregaard VI appears to date, based on typology and technology, to the Palaeolithic-Mesolithic transition and to an affiliation with the Epi-Ahrensburgian/Long Blade complex (that has its distribution in Western Europe). Therefore, it might be the case that several culturally diverse groups inhabited these Early Preboreal landscapes and were mobile in relation to seasons and game. Moreover, it could be the case that these different, very early Preboreal groups related differently to the various landscapes and their particular biotopes: in the early forested Weichsel moraine landscape in eastern part of Southern Scandinavia we see the Maglemose group, whilst in the more open steppe Saale moraine landscape of Western Europe the Epi-Ahrensburgian group seems to be found.

Star Carr is one of our earliest Mesolithic habitation sites but it does not seem to belong to a highly mobile group of hunter-gatherers, as suggested by the sparse remains of some of these other locations in the very first part of the Preboreal period. Instead, Star Carr connects in many aspects to the earliest Maglemose habitation sites found in Southern Scandinavian and Northern Germany. In Southern Scandinavia we are still hoping for the excavation of a Preboreal wetland habitation site with good preservation because only through the comparison of well-preserved material and better radiocarbon dating of such a site can we begin to better understand the connection between Star Carr and the related Southern Scandinavian sites.

South of Scandinavia, a slightly clearer picture can be drawn, due to the larger number of radiocarbon dated sites in Northern Germany. While there are no sites with Mesolithic technocomplexes before the Middle Preboreal in the central part of the North German Plain, evidence for Early Preboreal Mesolithic sites are known further south from the Cologne Lowland. Therefore, it can be assumed that Mesolithic traditions were introduced from the south and successively spread towards the north so that the Maglemosian developed. While the general appearance of the Early Maglemosian technocomplex is quite uniform especially from a lithic technology point of view, several regional differences become evident when organic artefacts are examined (e.g. David 1999; Cziesla 2006).

One of the important ways in which we can understand past human behaviour is through an examination of the economy. The importance of well-excavated wetland sites like Star Carr should not be underestimated: even though several sites with good organic preservation have been found in Denmark and Northern Germany, the subsistence economy is insufficiently understood. For instance, while some sites have produced important hunting and fishing tools, the amount of fish found on Maglemosian sites still remains very low despite the fact that aquatic fish were clearly important as a food resource, as new studies on stable isotopes of Early Holocene human remains show (Fischer 2007; Fischer et al. 2007; Terberger et al. 2012; Drucker et al. 2016; van der Plicht et al. 2016). We also know little about the role of plants in the subsistence economy; however, for the Late Preboreal in Germany we do see the use of hazelnuts, although in Scandinavia an abundance in hazel does not appear until the onset of the Boreal.

In sum, the main problem that we currently face is understanding the earliest part of the Preboreal in Northern Europe: we still lack finds and dates that can help us to see how Mesolithic people established themselves in the landscapes of Northwest Europe, or what we can term 'the process of Mesolithic colonisation'. However, part of this problem is also linked to how we define the Mesolithic period. One approach is to follow the geological epochs and define the first Mesolithic with the first anthropogenic Holocene date. However, if we insist on a definition that incorporates the humanities, we need to consider the Mesolithic as representing a clear shift in how people lived, engaged in and perceived their world. Perhaps then, the first Preboreal habitation sites that demonstrate local resource exploitation in terms of lithics, fauna and plant materials are also the ones that we should define as our first Mesolithic sites. For example, at the sites of Star Carr, Friesack, Duvensee and Barmosen 1, we see the earliest evidence of people who had gained specific knowledge of the particular regional landscape and therefore had the possibility to stay within the same landscape for years and even generations. Indeed, these sites represent populations that colonised the Northwest European landscapes and which we can therefore define as representing the first Mesolithic societies of this area. At the same time, we have to remember that these people were probably also the ones to colonise further into Northern Scandinavia, for example along the coast of Norway, though this time in a very different marine and environmentally subarctic landscape.

CHAPTER 13

Engaging a Wider Audience

Don Henson and Nicky Milner

Introduction

The site of Star Carr is of major international importance for our understanding of Early Mesolithic ways of life and for the early postglacial resettlement of northern Europe; yet the site is largely unheard of (and the Mesolithic largely unknown) in the nearby town of Scarborough (Milner et al. 2015, 233). Surveys carried out in the town during 2009–2011 showed that only 8% of respondents knew the name and any details of the site. Likewise, only 8% knew anything about the Mesolithic period. Only 3% had heard of both the Mesolithic and Star Carr (Milner et al. 2015, 235–237).

This lack of awareness of the Mesolithic is not restricted to the local area around the site but is a national phenomenon. Finlayson and Warren noted that the Mesolithic is invisible to the public as its sites are mostly empty fields or beaches without 'the physical immediacy of an encounter with a monument', and that Mesolithic studies were an academic specialism with 'little public resonance' (Finlayson and Warren 2000, 134). Wickham-Jones also noted that:

> 'Few hunter-gatherer sites are laid out for the public to visit, information on their lifestyle is usually glossed over in popular depictions on television or in the literature, and courses are often only for the initiated. It is almost as if these people never existed.'
>
> (Wickham-Jones 2010, 2–3)

A simple search on Google for the periods of British prehistory yields 488,000 results for the Mesolithic. This may seem impressive but is the least number of results for any of the prehistoric periods: only 1.1% of the total search results for periods of British prehistory. The marginality of the Mesolithic in mainstream popular publishing is illustrated by the *Very Short Introduction* series published by Oxford University (Gosden 2003), whose volume on prehistory has index entries for the Palaeolithic and Neolithic but not for the Mesolithic. There was some Mesolithic content in the longest running of all British archaeology television series, *Time Team* (1994–2013), although this was sparse: only four programmes in 20 years. In sum, it is argued that the Mesolithic is still the most neglected period in British prehistory (Blinkhorn and Milner 2013, 5).

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However, this does not need to be the case. In other parts of Europe the Mesolithic is much better known outside of academia and through the public engagement work we have done as part of the Star Carr project, we are well aware that there is a thirst for information and opportunities for engagement, once people get to know about the period. This chapter sets out some of the work we have undertaken in order to rectify this and in particular focuses on the work by DH on producing resources for schools, which forms part of a PhD project on 'The Public Perception of the Mesolithic'.

A framework for public engagement

The Mesolithic seems to be far more recognised and given greater prominence within the public sphere on the continent than in Britain. Some of the key sites for the period are in Scandinavia, especially in Denmark. Therefore, it is no surprise that the Danish school curriculum includes the Late Mesolithic Ertebølle culture among the topics to be taught in history. It is part of the canon of knowledge that all children are expected to know. Danish museums have been especially active in interpreting the Mesolithic to the public. For example, the Mid-Jutland Museum Service has created a trail around the Mesolithic site of Bølling Sø which integrates virtual reality through QR codes that can be scanned by visitors' phones. They have also created an online schools resource about the site, Livet med Bølling Sø (www.nilen.dk/projeckter/boellingsoe/index.htm).

The National Museum in Copenhagen has three whole rooms devoted to the Mesolithic. There is even a whole museum devoted to a Mesolithic site, Vedbækfundene (Figure 13.1), which has interpretive displays of a high standard and intellectual coherence that cannot be matched by any British museum displays of the period (Figure 13.2). Likewise, Mesolithic sites in Northern Germany are well served by the displays at the Schloss Gottorf museum in Schleswig-Holstein where two large rooms use a mix of objects and three-dimensional reconstructions to bring the period to life. In the Netherlands, visitors to the Archeon archaeological theme park near Leiden can begin their visit by entering a Mesolithic campsite (based on excavated evidence from Bergumermeer) on a lake edge and even take a dug-out canoe onto the lake (Figure 13.3).

This difference in approach to public engagement in different parts of Europe was discussed at the MESO 2010 conference in Santander, prompting further attempts to improve the situation, particularly in Britain. The Mesolithic Research and Conservation Framework for England, funded by English Heritage/Historic England, identified the promotion of the period as a major strategic theme: Strategy 1: Improving public engagement and education (Blinkhorn and Milner 2013, 26), based on: 'a continuing need to disseminate our understanding of the Mesolithic widely, clearly and in non-specialist language in order to explain the story of how the repopulation of Britain took place in a changing world' (Blinkhorn and Milner 2013, 13).

The need to communicate the Mesolithic more widely is an important issue. It is in many ways the key period in the story of Britain. It was when Britain was first permanently settled and whose population formed the base genetic stock to which later migrations have been added. Moreover, the life led by Mesolithic communities has many resonances with the present day. Their study could form part of discussions about various contemporary issues such as long-term climate change, rises in sea levels, sustainable interactions with the 'natural' environment, amongst others, as pointed out by Wickham-Jones (2010).

Figure 13.2: The display case at the British Museum which covers Mesolithic Europe and features some material from Star Carr and a column of the Meilgaard shell midden from Denmark (Copyright Don Henson, CC BY-NC 4.0).

Within the overarching theme, a number of more specific sub-themes were identified in the research framework (Blinkhorn and Milner 2013, 26–27):

> S1.1 improving coverage in national media of the relevance of the period to discussion of climate change and sea level rise;
> S1.2 increasing Mesolithic display in museums;
> S1.3 innovative presentation using digital technology and the Internet;
> S1.4 working with local societies;
> S1.5 running training workshops in Mesolithic archaeology;
> S1.6 engaging schools, having it taught in the curriculum and producing resource packs for schools;
> S1.7 improving undergraduate understanding of the period;
> S1.8 developing more avenues for PhD research into the period.

Figure 13.1 (page 332): Mesolithic gallery at Vedbækfundene in Denmark which takes the visitor through various seasons and how different raw materials were used (Copyright Don Henson, CC BY-NC 4.0).

Figure 13.3: The view from the Mesolithic camp at Archeon in the Netherlands with dug-out canoes on the lake for the public to use (Copyright Don Henson, CC BY-NC 4.0).

Sub-themes 5, 7 and 8 are long-term goals that require future work. However, actions have been taken on the other sub-themes by the POSTGLACIAL team during the lifetime of the project. Outreach work between 2006 and 2015 has included (Milner et al. 2015, 242–244):

- publicising the excavations through site open days;
- engaging with local people through more than 50 talks to local groups and taking volunteers to help on the excavations;
- having local school pupils on site in 2013 and 2014;
- creating an activity resource for the Young Archaeologists' Club, also freely available for schools;
- providing public events at various national and local festivals;
- publishing books aimed at a public audience (Milner et al. 2012; 2013c);
- working with The Yorkshire Museum on several exhibitions about Star Carr, using short films, information boards, a virtual fly-through and soundscape;
- working with The Rotunda Museum in Scarborough on a new permanent display about Star Carr.

In addition, the excavations have attracted local, national and international media attention for 'Britain's Oldest House' in over 120 newspapers worldwide (e.g. *Washington Post, The Guardian, Toronto News, Brisbane News*) and worldwide TV and radio coverage (BBC, Sky, ITV, Channel 4, CNN) (Milner et al. 2015, 233). The excavations have also now appeared on two series of the BBC television archaeology magazine programme *Digging for Britain*. Work with schools has intensified with the delivery of 18 classroom sessions on the Mesolithic in 10 schools in North Yorkshire. Other outreach activities include interviews on BBC Radio York, a Minecraft session with the York branch of the Young Archaeologists' Club and the development of a website with short films and information (www.starcarr.com).

Resources for schools

The wider research into the communication of understandings of the Mesolithic in Britain identified a number of channels of communication in which the public perceptions of the period are forged. These include webpages, popular books, newspaper articles, images, television, museums and fiction. Not all of these reach the same audiences and not all reach a mass audience. While the outreach activities listed above were a useful way of publicising the project's work, it was felt that school education offered the possibility for reaching the largest potential audience from the widest range of backgrounds. Producing educational materials for use in schools would also allow outreach work to continue after the end of the project. Therefore, a major output of the research is a set of resources for use in primary schools that are available for download on the Star Carr website, at http://www.starcarr.com/schools.html.

Star Carr is well placed to deliver exciting content to the teaching of prehistory, as is the Mesolithic as a whole, with many new discoveries in recent years enhancing our interpretation of the period and giving it greater visibility in the media. In creating resources for schools, we are following the lead given by Grahame Clark, who was an early and passionate advocate for the role of archaeology in education (Clark 1943). Clark highlighted the ability of archaeology to develop an understanding of common humanity and put right many of the ills that were plaguing the modern world. The specific context of his advocacy may have been during the Second World War, yet his words still have potency today: 'What is needed above all is an overriding sense of human solidarity such as can come only from consciousness of common origins. Divided we fall victims to tribal leaders: united we may yet move forward to a life of elementary decency' (Clark 1943, 113).

Archaeology could give to education an understanding of 'the biological unity and the cultural inheritance of mankind' (Clark 1943, 115), as well as the complete picture of people in nature and of human society. Clark saw the school curriculum as having no relevance to real life, which 'breeds barbarians possessed of a little knowledge in restricted fields, but unaware of its relation to life in human society' (Clark 1943, 115). He argued that primary schools should begin with the teaching of prehistory and what was common to humanity (Clark 1943, 118).

Schools are a vital audience for improving perceptions of the Mesolithic and of Star Carr. The traditional outreach activities of public talks and events will only ever reach a self-selecting and restricted audience. Work with schools has the potential to reach a large number of children from a range of backgrounds.

The Mesolithic had been taught in schools in England up to 1990. Star Carr was mentioned in school textbooks from around 1962 onwards (Doncaster 1962; Bowood and Lampitt 1966; Osborn 1968; Sauvain 1970). The site was a major case study in a teachers' guide to prehistory which was the first to really encourage children to look at and question interpretations based on archaeological evidence (Dawson 1983). However, the new national curriculum was introduced in England in 1990. This began the teaching of history with the Romans and prehistory effectively vanished from school classrooms. It was only the most recent changes to the curriculum in 2013 that reintroduced the teaching of prehistory in England. The site of Star Carr was prominent in school resources produced before the national curriculum and continues to be so. It was mentioned in 18 resources between 1921 and 2015, with the next commonest sites being mentioned in only two resources each: Cheddar, Howick and Öfnet.

The national curriculum orders now stipulate that pupils should be taught about changes in Britain from the Stone Age to the Iron Age. Non-statutory examples are given of (Department for Education 2013):

- Late Neolithic hunter-gatherers and early farmers, for example, Skara Brae;
- Bronze Age religion, technology and travel, for example, Stonehenge;
- Iron Age hill forts: tribal kingdoms, farming, art and culture.

The use of 'Late Neolithic' to describe the hunter-gatherers is unfortunate and reflects both the lack of archaeological input into the latest curriculum revision and the general lack of awareness of the Mesolithic outside of those who study it. Also, we face a generation of teachers who have never taught prehistory, and therefore feel 'a bit lost' in the topic and want online resources linked to professional development (King 2015, 1–2).

The approach to improving perceptions of the Mesolithic has been to understand the role of narrative in framing understanding among non-academic audiences. Fortunately, the new national curriculum (like its earlier versions) includes telling and listening to stories as an essential part of English-language teaching. Resources based on narrative should therefore be attractive to primary school teachers who can cover more than just history through the Mesolithic. The task in producing resources for schools is therefore one of trying to rebuild the narrative of the Mesolithic in order to do more than simply provide knowledge of a previously unknown period. Narratives make learning attractive and easier for pupils and allow the highlighting of important themes, such as those outlined by Clark. The resources that have been produced are divided into three sets, each designed to answer a question:

a) what is archaeology? – providing a way for pupils to engage with the authorial voice of archaeologists as creators of the Mesolithic narrative;
b) what do we know of the Mesolithic? – the ideas we have constructed about the period, told explicitly through fictional narratives;
c) what can we learn from the Mesolithic? – highlighting the thematic resonances between the Mesolithic and the present.

The first question is answered through the Archaeological Skills Log (Figure 13.4). This is based on an underlying narrative that attempts to engage pupils with archaeological processes and for us as archaeological authors to be overt about how we construct our narratives. The skills log has five separate lessons with 13 classroom

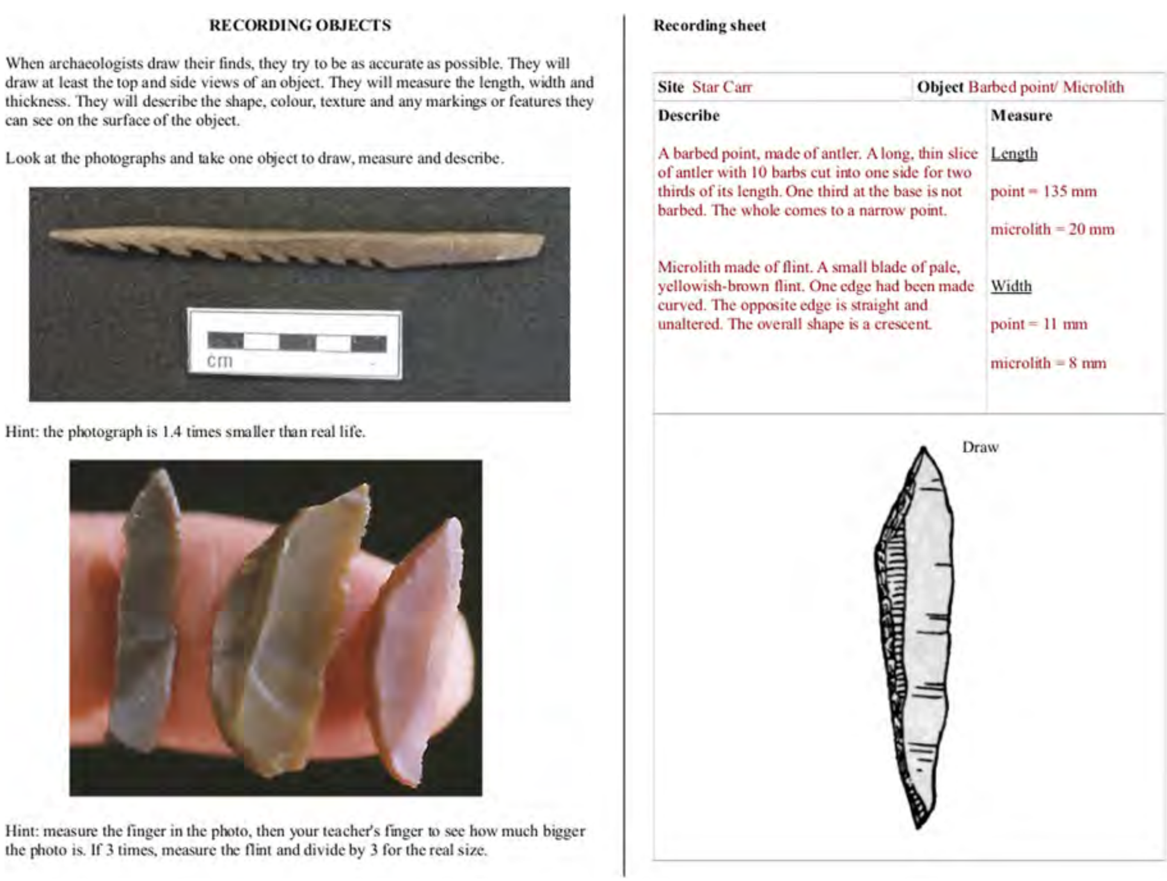

Figure 13.4: Recording objects as an archaeologist, from the Archaeology Skills Log (www.starcarr.com) (Copyright Don Henson, CC BY-NC 4.0).

activities that take pupils through five steps to becoming an archaeologist: finding out information, identifying things, recording objects, analysing how people lived and telling others about Star Carr. As well as classroom activities, the skills log contains sets of information (fact checks) about the period. There are also debating points which highlight disagreements about what we think the period was like or where there is more than one possible interpretation of the archaeological evidence. The activities support the teaching of historical skills, literacy, numeracy and art.

The second resource is based on a set of overt fictional narratives (short stories) about the daily lives and experiences of named characters, 11,000 years ago. The stories allow for the exploration of various aspects of Mesolithic life, while the use of named characters should enable greater pupil engagement with the period. The nine short stories provide insights into the life of a Mesolithic family: Neska (a girl, 9 years old), Mutil (a boy, 6 years old), Aita (their father), Ama (their mother) and Osaba (Aita's brother). Each story illustrates an aspect of Mesolithic life and is backed up by a short section on what and how archaeologists know about this. There are 28 classroom activities based on the following short stories: moving home, making things, food, friends and strangers, a hint of winter, the bad old days, boy or girl, animals or plants, coming of age, a new life. The activities are designed to support not only the history curriculum but also art and design, design and technology, English, geography and maths.

The third resource is *Lessons from the Middle Stone Age* and provides background knowledge and ideas to help pupils develop their own narratives about a few key aspects of the period. It introduces them to the idea of debate or uncertainty about our understandings of the past (Figure 13.5). There are seven lessons with 19 activities for the classroom: change is inevitable, the living environment, healthy eating, what makes us happy, the origins of ourselves, human diversity and the great debate (do we see prehistoric people as either noble savages or nasty and brutish, to get pupils to think about how we value the past and different ways of life). The lessons can help to support personal, social, health and economic education (PSHE), spiritual, moral, social and cultural development (SMSC) as well as history.

These resources are supported by a set of background information about the Mesolithic and Star Carr. They are all designed to be used in the classroom and as stand-alone resources without access to artefacts or museum displays. However, they could easily be adapted to be used with both.

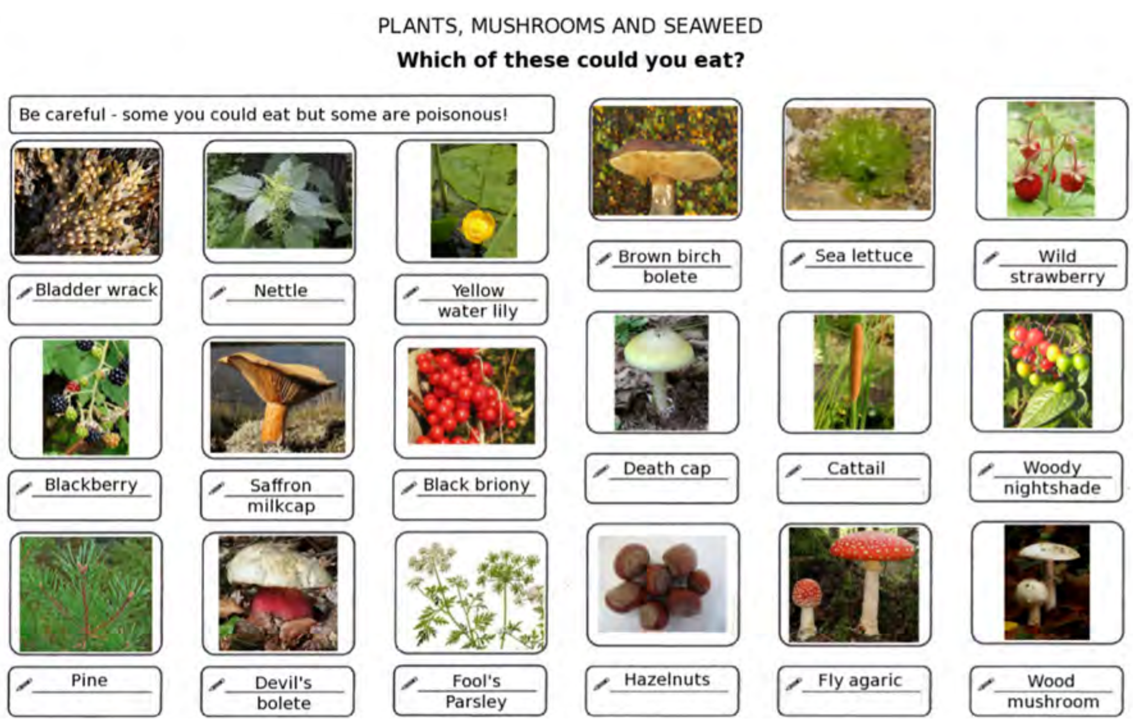

Figure 13.5: Worksheet on which plants you could eat in the Mesolithic (Worksheet copyright: Don Henson).

Conclusions

The Mesolithic may have low archaeological visibility through a lack of upstanding monuments. However, this is not the same as saying it has low importance or can be safely marginalised in public interpretation. There have been several new discoveries in recent years that have caught the attention of the media: the Goldcliff (and other) human footprints, the Warren Field pit alignment, the sites at Blick Mead or Langley's Lane, the Maerdy decorated post, the Greylake skulls, Cheddar Man, the Howick or Echline houses, the underwater site at Bouldnor Cliff, the reconstruction of Doggerland and the Storegga tsunami. There have also been a series of popular novels set in the Mesolithic such as Paver's *Chronicles of Ancient Darkness*, as well as *The Gathering Night* (Elphinstone 2009) and *Stone Spring* (Baxter 2011). The first of Paver's novels, *Wolf Brother* (Paver 2004) has been the subject of three sets of schools resources. The biggest of these was produced by the Scottish Forestry Commission (Mackay 2013). The Mesolithic is becoming much more visible.

The period has great relevance for the modern world with current concerns about climate change and sustainability. It is also a fascinating way of life so very different from our own and yet one that is attractive to many with its seeming closeness to nature. This is exemplified by the popularity of television series such as *Bushcraft* presented by Ray Mears in 2004, Mears' series *Wild Food* presented with Gordon Hillman in 2007 and the so-called 'reality' series *10,000 BC* in 2015 and 2016. As Clark noted, the Mesolithic also has cogent lessons about humanity that are surely needed now more than ever before. It is too important to leave to the largely inaccessible pages of academic journals. Some of the regional and local museums in Britain are beginning to showcase the period with new displays. The school curriculum in England now has 'the Stone Age' as part of history teaching for the first time since the 1980s. The modern excavations have thus come at an opportune time. Star Carr is well placed to deliver a new public engagement with the Mesolithic. We have shown here the steps we have taken so far along this road, but this is not the end of the journey, merely the beginning.

PART 6
Conclusions

'In conclusion it is only fitting to emphasise that, useful though the investigations at Star Carr have been in helping to fill a gap in the prehistory of north-western Europe, much remains to be learnt. The Star Carr excavations have opened up rather than closed a field of prehistoric research'.

(Clark 1954, 191)

CHAPTER 14

Conclusions

Nicky Milner, Barry Taylor and Chantal Conneller

At the time of writing it is almost 70 years since the first evidence for Mesolithic activity at Star Carr was recorded. In that time the site has variously been interpreted as a residential base camp occupied by small family groups, a hunting camp, an industrial site and site of ritual deposition (e.g. Clark 1954, Pitts 1979, Andresen et al. 1981, Legge and Rowley-Conwy 1988, Mellars and Dark 1998, Chatterton 2003). Common to most of these interpretations is the view that Star Carr was only occupied at certain times of the year by a highly mobile group who moved to sites on the surrounding uplands or to the coast in order to exploit seasonally available resources. As Conneller (2003) has argued, these different interpretations of Star Carr have all sought to place the site into one or other of a limited range of functional categories that relate to a broader but equally limited set of practices within the surrounding landscape. In doing so, the possibilities of Mesolithic lives are reduced to a narrow range of activities undertaken within a seasonal cycle that repeats, without change, for generations (Conneller 2005).

The results of the excavations carried out at Star Carr between 2004 and 2015 have transformed our understanding of the site. In doing so they have shown that life in the Early Mesolithic was too complex to be reduced to a narrow set of site types and have revealed the significance of historical changes in the ways the site was occupied. The results of the excavations have also challenged many of our more traditional assumptions regarding the character of Mesolithic society. The small-scale excavations and fieldwalking surveys carried out in the opening years of the project showed, almost immediately, that the spatial extent of activity was far greater than Clark had appreciated, whilst the discovery of a post-built structure on the dryland (the eastern structure) and part of a second timber platform in the wetland hinted at a more settled way of life than has traditionally been assumed (Conneller et al. 2012). Once larger excavations took place the sheer scale of activity at the site became apparent, with three large timber structures in the wetland and at least four post-built structures on the ground above the lake shore. Associated with these was evidence for an extensive range of different technical and economic practices, aspects of which were structured by values relating in particular to the treatment of animal remains. Far from being uniform and unchanging, the analysis of the faunal and artefact assemblages (and in particular the programme of refitting) and the radiocarbon dating showed that the nature, focus and

Figure 14 (page 339): Photograph of the digging team on the last day of the 2015 excavation season (Copyright Star Carr Project, CC BY-NC 4.0).

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scale of these activities changed throughout the time that Star Carr was occupied, as different generations used the site in different ways.

This understanding of the site has only been possible due to the scale of the excavations. Though the small trenches and test pits excavated in the opening years of the project helped to establish the extent and the character of the archaeology, it was the open-area excavations that provided the opportunity to fully appreciate the spatial and chronological complexity of the site. Though the detrital wood scatter was first encountered during the excavation of trench SC33 in 2010, there was no indication of the character of this deposit until the area was excavated more completely from 2013. Similarly, the size of the timber platforms and their spatial and chronological relationships were only revealed during the open-area excavations even though both the central and western platform had been identified during earlier phases of work. What is more, the eastern platform lay undetected until the final season of excavation, having been missed by trench SC22 by less than half a metre. Equally, the structures on the dryland only became apparent once relatively large areas were opened and cleaned and some features were clearly missed during the excavation of some of the smaller trenches. The importance of large, open-area excavations to our understanding of the Mesolithic has also been demonstrated through the important work on other European sites, such as those at Motala, Sweden (Carlsson 2007), Lundby Mose, Denmark (see Chapter 12), and Syltholm, Denmark (Sørensen 2017), each of which have changed our understanding of the nature of society in this period.

The excavations at Star Carr have also thrown new light on the sophistication and range of Early Mesolithic technology and material culture. The platforms are particularly important in providing a rare glimpse into the scale of woodworking technologies. The woodworking traces recorded on the timbers show, conclusively, that these were the result of deliberate human action, whilst their sheer size differentiates them from any other structure from this period. Their function remains ambiguous due partly to the lack of material culture associated with them, but they were all constructed in similar parts of the site and were almost certainly laid down to stabilise the lake sediments and provide access through the wetland. The structures found on the dryland have also been an important addition to the story. Though they only survive as postholes and hollows, they have provided further evidence of Early Mesolithic architecture, whilst the associated material culture from the eastern structure in particular has revealed the complex dynamics of occupation, with material cleared out into adjacent middens and tools brought in for repair and curation.

Other forms of material culture recorded from the site are rare in the context of the British Mesolithic: the engraved shale pendant augments the sparse record we have for art whilst the bow and digging sticks are thus far unique in Britain. Added to this is the increased evidence for technical and craft activities, notably the techniques used to work wood, the methods of manufacture of the antler frontlets and the evidence for the use of plants. Drawing this data together with the results of the spatial analysis of the faunal material and the refitting of the lithic assemblage it has been possible to appreciate the richness and complexity of the material aspects of people's lives.

Although Star Carr is unique within its landscape (Conneller and Schadla-Hall 2003), we should not assume that the site is not representative of wider trends within contemporary, Early Mesolithic society. With this in mind we conclude by briefly drawing out a number of points relevant to our understanding of life in the European Early Mesolithic.

The first is that the scale of activity and the degree of permanence within the landscape seen at Star Carr stand at odds with the traditionally held view of Early Mesolithic society which is generally perceived in terms of small group sizes and a high degree of mobility (Conneller et al. 2012). The construction of the timber platforms, and perhaps to a lesser extent the dryland structures, indicate a significant investment in terms of labour and resources in this particular place in the landscape. This is matched by the long-term, enduring practices at the site which are reflected in the ongoing deposition of animal remains, osseous artefacts and worked flint into the lake edge wetland. The building of the platforms also implies the presence of relatively large numbers of people at the site given the volume of wood that was involved in their construction. This also applies to the tasks that are represented by the very large assemblage of animal bone in the area investigated by Clark. Even taking the most conservative estimate of the minimum number of individuals (MNI) represented by this material, this is a large number of animals that were hunted, processed and consumed in a relatively short period of time. When taken together with the spatial extents of the site (which cover an area of over 19,500 m^2) and the scale and intensity of activity exhibited within the artefact and faunal assemblages, the evidence certainly points towards periods when there was a significant focus by relatively large numbers of people on this particular place in the landscape. Recent analysis of the faunal assemblage from the site of Norje Sunnansund, in south-east Sweden, suggests a subsistence strategy that is consistent with a sedentary population, broadly contemporary with Star Carr (Boethius 2017). Whilst the people who lived at Star Carr were not necessarily sedentary, the site provides strong evidence for greater focus on particular places in the earliest Mesolithic (particularly in comparison with the preceding Upper Palaeolithic period), with meaning and significance attributed to specific locales. Our narratives of the Early Mesolithic need to provide more nuanced understandings of the way people inhabited their landscape and one that takes account of historical change.

The second broader point that can be taken from this project is that the use and deposition of animal remains and of other materials were structured by factors that went beyond technological and economic considerations. The selective use of antler for the manufacture of barbed points has already been noted by Conneller (2004; 2011), to which we could also add the use of elk metapodials for bodkins. There are no functional reasons for the exclusive use of these specific materials for these particular tasks (bone is used in the manufacture of projectile points in the Scandinavian Mesolithic, for example) and the decision to use them appears to relate to other values. Similarly, whilst some instances of deposition within the wetland reflect ad-hoc disposal, others are suggestive of more deliberate, structured practices. The material from the detrital wood scatter reflects the deposition of complete, articulated red deer limbs (and potentially complete carcasses) into the wetland, along with skulls of elk and red deer (either in an unmodified state or having been worked into frontlets). This is not the casual disposal of butchery waste but the deliberate deposition of large, unbutchered parts of animals (or possibly even complete animal bodies) and the selection and deposition of specific body parts (in this case, skulls). It is possible that the near-complete dog skeleton also represents a deliberate act of deposition though the lack of associated material culture makes this interpretation more tentative. There are also aspects of the assemblage in the area investigated by Clark that indicate that this has been curated (and in some cases undergone some initial selection and treatment) prior to deposition.

Acknowledging the role that cultural practices played in the treatment of particular materials has important consequences for our understanding of the European Mesolithic. To begin with, the economic nature of Mesolithic sites is often defined on the basis of the character of the faunal assemblage and particularly the representation of different elements of the animal's body. As it becomes more apparent that cultural practices can play a part in the way animal remains are treated, curated and deposited, we must revisit some of these interpretations and develop new ways of inferring forms of economic activity from faunal assemblages. Furthermore, identifying these practices provides insights into the beliefs of Mesolithic people, an area of enquiry that has had far less attention than in other periods of prehistory. Ethnographic accounts of contemporary hunter-gatherers describe how the treatment of animals is often bound up within a broader understanding of the world where non-humans are considered to be 'alive' in the same way as humans. Within these animist ontologies, the use and deposition of animal remains (as well as other materials) is governed by rules, adherence to which ensures future success in tasks such as hunting or the collection and working of plant materials. Whilst we should be cautious of imposing the beliefs of contemporary hunter-gatherers onto the past, we should explore the possibility that similar ways of seeing the world existed in the European Mesolithic and structured the way that materials made from animal bodies, and other materials, were used and discarded.

The third point is that the people who inhabited Star Carr had their own history; one that was defined both by continuity and change. To begin with, there are clear differences in the scale and intensity of activity throughout the time the site was occupied. The early centuries of occupation were characterised by low-level but repeated episodes of activity focused on relatively discrete parts of the site, with the later centuries witnessing far more extensive occupation at a more intensive scale. Forms of activity also changed as woodland became established over areas of more open ground and the lake edge wetland developed from reedswamp to fen and carr. At Star Carr itself, the development of the wetlands led to changes in the focus of activity on the site; the construction of the timber platforms occurring as conditions at the lake edge became shallower and boggier, whilst activity that had originally been limited to the dryland areas began to encroach onto the terrestrialised fen during the final centuries of occupation. Although it is difficult to see archaeologically, other aspects of people's lives would have changed as the animals they hunted and the plants they collected responded to the developing environments and the geomorpology of adjacent coastal areas changed radically. Whilst such changes may not always have been perceptible to people living through them, the inhabitants of Star Carr clearly had an awareness of their past. The central platform respects the alignment of the earlier detrital wood scatter, possibly formalising an earlier pathway through the wetland used by earlier generations.

Similarly, the deposition of material in the area investigated by Clark referenced practices that were undertaken centuries before, when antler frontlets, worked flint, barbed points and the bodies of animals were placed into the wetland by the detrital wood scatter. This continuity of practice suggests that cultural traditions were passed on through generations and that people undertaking such acts of deposition were aware that similar acts had been carried out at the same location, and in similar ways, by their ancestors. It is tempting to suggest that the practices of animal deposition that took place in the early history of the site may have structured its future reoccupation as a persistent, significant place. Through following these lines of evidence, we can begin to view the people inhabiting Star Carr, and other sites across Northern Europe, as people with history and awareness of their own place within a much wider world.

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Star Carr is one of the most important Mesolithic sites in Europe. It was discovered in the late 1940s by John Moore and then excavated by Grahame Clark from 1949-1951, becoming famous in the archaeological world for the wealth of rare organic remains uncovered including barbed antler points and antler headdresses. However, since the original excavations there has been much debate about how the site was used: was it a residential base camp, a hunting camp or even a ritual site?

From 2003-2015, excavations directed by Conneller, Milner and Taylor aimed to answer these questions. This work has demonstrated that the site is much larger and more complex than ever imagined and was in use for around 800 years. The excavations show that Mesolithic groups were highly invested in this place: there is evidence for a number of structures on the dryland (the oldest evidence for 'houses' in Britain), three large wooden platforms along the edge of the lake, and the deposition of rare artefacts into the lake edge, including more antler headdresses and a unique, engraved shale pendant. People continued to occupy the site despite changes in climate over this period. The main results of our work are contained in two volumes: the first provides an interpretation of the site, and the second provides detail on specific areas of research.

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