Federmesser mobility patterns in the Western Meuse area, Limburg, the Netherlands: the case studies of Horn-Haelen and Heythuysen-de Fransman I

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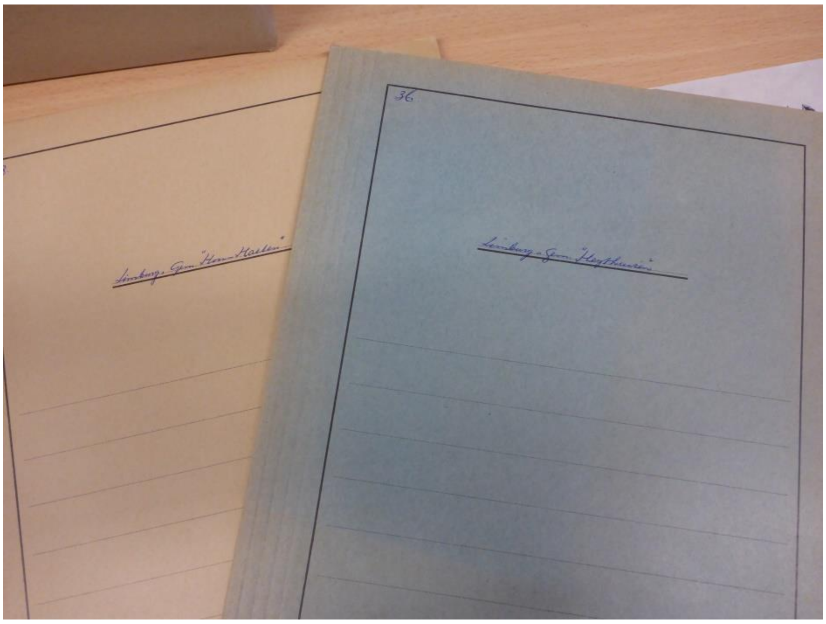

MA-Thesis Palaeolithic Archaeology

Federmesser mobility patterns in the Western Meuse area, Limburg, the Netherlands: the case studies of Horn-Haelen and Heythuysen-de Fransman I

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Preface

This thesis is the product of over 1,5 years of work on Federmesser-groups in the Area of Limburg. It came into being through my bachelor thesis, which focused on the collection by Amateur-archaeologist Jo Smeets. The site of Horn-Haelen was deliberately left out of this thesis because the author felt its unmixed character deserved special attention. Therefore, this thesis started out as a lithic study on the Horn-Haelen material. The ultimately more interesting site of Heythuysen-de Fransman was suggested by A. Verpoorte, related to the Gravettian question which will be addressed later. This may very well be the only time I'm allowed to research *exactly* what I want to, and I have tried to make the most of it. I hope my research has contributed to archaeology in addition to my own pleasure. And now onto the many people to whom I own thanks for this thesis.

Firstly, I would like to thank A. Verpoorte, my thesis supervisor for his extensive commentary on the various earlier versions of this thesis. Where I got lost in the vast amounts of (very interesting but totally not related) information, he helped me to focus on my actual research. His crash-course in academic writing allowed me to write it in such a way that the information in the thesis is truly objective, or so I have attempted to do. Reading up on the Paris-basin sites has also convinced me of the importance of publishing in English, making the information available for international study. Or maybe I should have just paid attention during French class.

I would like to thank my friends in Deventer, with L. de Rouw, R. Kramer and B. Steffens in particular, for their support and patience with me while writing this thesis. I would also like to thank C. Alink, N. Middag and S. Möller for helping with various illustrations and measurements. Of course, I would like to thank my family for everything during the last year, particularly my father, who happened to know various collectors through his work at the municipality.

For the preparation of the study, I would like to thank J. Deeben, with whom I discussed hunter-gatherer behavior in the Limburg area and the various sites there. I was also allowed to use his unpublished dataset, for which I am grateful. Also, I want to thank M.F. van Oorsouw, for arranging for me to speak on the subject at the Stone Age archaeology-day (Steentijddag) of 2014.

For the study of the various sites, I would like to thank the various collectors and their descendants who generously made all the material from Heythuysen-de Fransman available to me. I would like to thank S. Beeren for allowing me to visit for two days in a row and for all the information about the Beeren family and their history. I would also want to thank S. Silvrants, for also allowing me to visit for two days in a row and for all the information on the history of amateur-archaeology in Limburg. For the Verhaeg-collection, I would like to thank M. Verhaeg and E. Verhaeg and L. Lenders who made the collection available to me.

For the Horn-Haelen site, I want to thank Groningen University in general and K. van der Ploeg and H. Peeters in particular, who arranged for me to study the Horn-Haelen material from the GIA collection, in spite of their busy schedule. Secondly, I want to thank E. Rensink, for his commentary on the thesis proposal and making the soil profile from Horn-Haelen available to me. I would also like to thank L. Thissen for his information on his father J. Thissen and his relation to A.M. Wouters.

Of course, the sites could have never been published were it not for the original excavators. The site of Heythuysen-de Fransman is still the site of Sjeng Beeren, Sef Silvrants, Ad Wouters, Harrie Verhaeg and W. Vossen a.o., who spent many a free afternoon saving the artifacts from destruction. These active amateur archaeologists did the best they could with the best intentions and preserved the material for scientific study. The site of Horn-Haelen is still the site of Joep Thissen and Ad Wouters, who discovered the first Late Paleolithic site of Limburg in the sands of the PLEM-power plant.

Everywhere I went during my study of late Paleolithic sites in Limburg I was confronted with the legacy of A.M. Wouters. One only needs to open a random print of the "*Archaeologische Berichten*"-series to be confronted with the schism between professional and amateur-archaeologists that haunted Stone Age archaeology in the Netherlands for some 20 years. Still, many archeologists are doubtful on the authenticity of anything connected to the name of Wouters. Despite the controversy and personal conflict surrounding Wouters, it should not be forgotten he laid the basis for Stone Age archaeology in the southern Netherlands. Were it not for him, both sites would never have been published, in fact, Stone Age archaeology in the Netherlands would have been drastically different from what it is today. I would have been very curious as to Wouters' opinion on my thesis. Would he have written an angry article to defend his Gravettian claim, or would he have been happy the sites still receive the attention of a new generation thanks to him ?

1.0 Introduction

1.1 Investigating Federmesser mobility

After the end of the 'Golden Age' of the Upper Palaeolithic (Middle Upper Palaeolithic); during the maximum ice advance of the Last Glacial Maximum, North Western Europe was abandoned by human populations. Humans would not return the area for a period of several thousand years (Roebroeks *et al* 2000). After the Last Glacial Maximum, recolonisation started around 16.000 BP. Humans of the Magdalenian tradition appeared in the Rhineland and the Ardennes. During this period, the loess plateaus of the Southern Netherlands were visited by Late Magdalenian human groups for the first time (Rensink 2012). The Magdalenian is superseded by the Federmesser-groups during the Older Dryas and Allerød phases. It is on these Federmesser-groups this thesis will focus. The appearance of the federmeser-groups marks a major shift in subsistence strategy. It is in this period that a shift from large game hunting to broad spectrum subsistence occurred for the first time. Although many Federmesser-sites are known and have been excavated in the Netherlands, little is known about these early hunter-gatherers.

A key aspect of hunter-gatherer adaptations is mobility. Several models for the mobility of the Federmesser-groups have been proposed since terms like subsistence and settlement mobility were introduced by the New Archaeology in the 1970s and 1980s. Detailed models for the Netherlands were proposed early on by N. Arts and J. Deeben for the southern Netherlands (Arts 1987 111-112; Deeben 1988, 367; Deeben 1992, 27). Later, Houtsma *et al* presented a model based on the excavation of Haule V (Houtsma *et al* 1996, 140-142). Other models were proposed by Bolus and Baales based on excavations in the Neuwied basin, Germany (Bolus 1992, 193; Baales 2002, 231-255, Baales 2004). Models for the Kempen-area and sandy Flanders in Belgium were proposed by Vanmontfort *et al* (2010) and Crombé *et al* (2010). These models from Baales, Vanmontfort *et al* and Deeben and Arts all deal with virtually the same geographical area, yet they reach different conclusions. Testing the various models for the Netherlands is problematic because the basic data on important sites is unavailable, partial and/or unpublished.

This thesis investigates the Federmesser-groups of the Meuse valley in the Netherlands. Two key sites from the area have been selected for detailed study: Horn-Haelen (hereafter HH) and Heythuysen-de Fransman-Ia (hereafter HF-I). These sites were selected because they have been interpreted by Deeben as respectively a hunting camp near the river and a 'residential' base camp near a late glacial lake (Deeben 1989), representing two site types of his mobility model. Through revision of the lithic inventory of the two sites and a regional inventory of collections, this thesis aims to start an evaluation of current models of Federmesser-land use in the Meuse valley. This research is part of a large-scale inventory of flint material from the Middle and northern Limburg area. It is believed that these inventories could eventually lead to a more detailed insight in the spread of different early prehistoric remains throughout the Pleistocene landscape, both in terms of chronology and prehistoric activities (Smit 2010, 119).

1.2 Hunter-gatherer mobility

The hunter-gatherer lifestyle such as practiced during the Late Paleolithic consists largely of mobile humans pursuing food, shelter and satisfaction in different places (Binford 1980, 4). This 'pursuit' is referred to as mobility, the way in which people do this as mobility strategies, or settlement mobility.

Mobility is dependent on the structure of resources and the way humans choose to exploit them. In the 1970's and 1980's archaeologists from the new archaeology attempted to study these patterns. Instead of focusing on chronological sequencing of lithic material, the new archaeology sought to explain hunter-gatherer mobility and subsistence. It introduced new ways of understanding archaeological assemblages, their variability and their patterning. The models used for these interpretations were largely based on ethnographic evidence. The most influential model was proposed by Lewis R. Binford (1980).

Binford (1980) distinguishes two groups based on strategies related to the spatial structure of resources; foragers and collectors. Foragers 'map on' resources by moving the consumers to the resources. This strategy produces two types of site: the residential base and the location. There is high variability among foragers in the size of the mobile group and in the number of residential moves (Binford 1980, 5). The number of residential moves is increased with foragers, resulting in better coverage of their resource 'patch'. If the resources become scarce and dispersed, the mobile group will be divided into small units scattered over large areas. The large group breaks up into several 'minimal forager groups (5-10 persons) that disperse in the landscape. Foraging techniques are often applied to largely undifferentiated areas' (Binford 1980, 15).

Collectors use a logistical strategy, moving the resources towards the consumer. This strategy produces more types of sites: residential camps, field camps, stations and caches. In the collectors-system, the group is located at a residential camp. From this camp, special task groups range out to gather specific resources. These task groups produce their own (field camps). The residential camps are not moved as often as those of foragers. This leads collectors to be more 'static'. It should be noted that the dichotomy between foragers and collectors constitutes two ends of continuum, no either-or situation. Subsistence strategies may vary according to different variables such as temperature, resource availability, environment and season.

Kelly (1983) shows how humans adapt their mobility strategies to optimally exploit their changing environment. In a warmer environment, humans become increasingly dependent on plant resources and encounter-based hunting. This requires both high residential mobility and a more thorough coverage of the foraging area. Unless storable resources are present, residential mobility must be high. In general, the more dependent a group is on meat, the higher their settlement mobility, while the more they are dependent on plant resources, the more thorough their coverage is. Moreover, in colder environments (where humans are increasingly dependent on faunal resources), longer logistical forays must be made, increasing the distance over which the residential camp must be moved. In forested environments, where there is an increased environmental homogeneity, residential moves are high in number but the average distance per move is smaller. In arid environments, the number of residential moves is lower, but the migratory distance is higher (Kelly 1983, 295). Logistically based strategies such as the collectors-system are a response to the clustering of critical resources in a specific place or time. The number of critical resources becomes greater as climatic severity increases (Binford 1980, 18). Binford summarizes his model as follows: “Foragers move consumers to goods with frequent residential moves, while collectors move goods to consumers with generally fewer residential moves” (Binford 1980, 15). These two different subsistence strategies produce different types of site, which are supposedly archaeologically distinguishable.

The foragers/collectors model specifically, and the subsistence models by Kelly and Binford in general serve as the basis for the current models for Federmesser-mobility as proposed by Deeben (1988) and Baales (2002).

1.3 Models for Federmesser mobility

Since the introduction of the new archaeology, several models for Federmesser-mobility have been proposed for the Netherlands, Belgium and Germany. The two most important models will be discussed here: one developed by Arts and Deeben for the southern Netherlands and one by Baales for the German Rhineland.

In the 1980’s N. Arts studied large amounts of flint from surface assemblages from the southern Netherlands (Arts 1987). Based on the results of these studies, the first models for settlement mobility in the southern Netherlands were proposed by Arts (1987) and Deeben (1988; 1992). Based on a model for the organization of hunting bands by Wilmsen (1973, 8), Deeben (1988, 368) proposed a model for

Federmesser-mobility based on a 'collector'-strategy. Hunter-gatherers of the Federmesser-groups moved around in a basic exploitative unit comprising of at least one or two families, residing in a base camp. The exploited resources (elk, roe deer, horse, aurochs and beaver) are animals that live solitary or in small herds, constituting small, stable resources. Because of the dispersion of the resources, hunting trips were organized to exploit them. This results in special purpose sites in the general area around the base camp. Deeben (1988, 369) interprets the sites that have a large number of finds and/or clusters of sites as base camps. The smaller sites are interpreted as "the greater part probably being extraction camps" (Deeben 1988, 369). Deeben distinguishes sites located in the coversand (Peelhorst sites) area and in the Meuse area, based on differences in subsistence potential (Arts 1987; Deeben 1988; Deeben 1992). The Peelhorst sites are often large sites (defined by Arts as sites over 2000m^2) located on the western or northern side of glacial lakes and fens on the Peelhorst area. These sites are usually large, rich in flint material and relatively 'clean' of material from later periods. The 'base camps' include Heythuysen-de Fransman-Ia, Meer-II, Drunen-Drunense Duinen, Oostelbeers, Lommel-Maatse Heide, Horst-Zwarte Plak, Bakel-de Rips, Millheeze and Nederweert-de Banen (Deeben 1988, 366).

Generally, the closer a site is to the Meuse, the bigger the chance it is mixed with material from later periods (Deeben 1992, 21). The Meuse sites are generally smaller and mixed with material from several later periods. According to Deeben, the Peelhorst sites represent long-term occupation sites (base camps). This is based, among others, on regular distances between these sites (Arts 1987). At these sites, activities such as animal consumption, flint knapping and the working of hides, bone and antler took place. In this model, the Meuse-sites function as short-term extraction camps for specific activities (Deeben 1992, 25-31).

Deeben interprets Federmesser-mobility as following Binford's collector-model, using base camps and extraction camps: "*…this would result in a number of special purpose sites, with the goal of maintaining the base camp by moving the resources to the consumers*" (Deeben 1988, 368).

Another model for Federmesser mobility strategy was proposed by Baales for the Neuwied Basin-area (Baales 2002, 231-255). Based on faunal evidence from Andernach, Kettig, Niederbieber and Urbar, he suggests a year-round presence by a single group in the Neuwied basin. Each site feature excavated in the Neuwied basin was associated with a tent-like dwelling, whose location could be reconstructed in a well-conducted excavation. One such tent was reconstructed at Andernach-Martinsberg using the ring-and-sector analysis. These tents would have been used for anywhere between a few weeks to less than two months (Baales 2002, 193).

The hunter-gatherers of the Allerød were presented year-round with a broad spectrum of stable faunal and floral resources. Based on the aforementioned theories based on ethnographic evidence, these resources would have been exploited most effectively through a high degree of residential mobility. People stayed in an area until the resources were exhausted, then moved on to another area. These people would return to an area as soon as the resources had recovered. This model corresponds with the isolated hearths in the Neuwied basin and the small evidence of activity at Miesenheim-2 (Baales 2002, 239). In Binford's terms, this model has aspects of a forager strategy with high residential mobility moving consumers to resources.

Both Baales and Deeben have proposed models for Federmesser-mobility for roughly the same area, the same period and the same group of hunter-gatherers. While Deeben's model features a clear distinction between base camps and extraction camps that corresponds with Binford's Collector-strategy, Baales describes a more dispersed strategy that features a higher degree of residential moves, but a smaller area, that corresponds more to Binford's Foragers models. This raises the question which mobility strategy Federmesser groups have actually used and how the archaeological record of the Federmesser groups is structured. This is the problem that we will investigate.

1.4 Approach and study area

Evaluating the models of Federmesser mobility is hindered by the backlog in the study and publication of many Federmesser sites in the Netherlands. Large numbers of sites were discovered and artefacts were collected by amateur-archaeologists in the period after World War II. This triggered various excavations, mostly by Dr. A. Bohmers (BIA, now GIA[1]). In total, more than 50 Upper Palaeolithic and Mesolithic sites have been excavated in the Southern Netherlands in the 1950-1960's (Bohmers 1956, Deeben 1988, 357). These included nineteen Federmesser-sites: Heythuizen-de Fransman-I, Horn-Haelen, Nederweert-de Banen, Bakel-de Rips, Budel II, Drunen, E11, Geldrop III/IV, Luyksgestel, Millheeze I-II, Neer-II, Oirschot VII 1,2 and 3, Oostelbeers-Dennendijk, Breda-Princenhage, Tilburg-Kraaiven, Westelbeers-Kapeldijk and Horst-Zwarte Plak (Arts 1987, 103). The Geldrop-sites were later published extensively by Deeben (1999b). However, most of the sites remain unpublished due to the discharge of Dr. A. Bohmers from the BAI. This led to a backlog in the publication of Late Palaeolithic sites, which has not been caught up to even today. According to Arts, this backlog is 'one of the most unsatisfying aspects of Dutch Stone Age archaeology' (Arts 2012, 267). Excavation reports are rare and documentation is generally absent and most of the excavators are deceased. Some of these sites have been published partially such as Milheeze (Arts 2012). Despite this, the author agrees with Arts that,

[1] Respectively Biological Archaeological Institution and Groninger institute for Archaeology.

"despite these limitations, they should at some point receive the attention they deserve" (Arts 2012, 267). Most of the documentation on these sites may already have been lost, and most of the people who excavated them are dead. The find-numbers written in crayon on the finds are beginning to fade (or already have). This would mean that all the effort and money invested in these excavations and their documentation has been wasted if these sites remain unpublished. For this study, improving the basic database for evaluating mobility models is the first priority.

The case study of this thesis encompasses a study of the Late Palaeolithic technology and settlement mobility in the middle and northern parts of the Dutch province of Limburg (see figure 1,1). The eastern part of the research area is formed by the Meuse River, the western boundary by provincial border between Limburg and Northern Brabant. The southern boundary is formed by the state border with Belgium. These limits have been chosen because it is part of the area on which Deeben's model is based.

The area includes two well-preserved sites which played an important role in the formulation of Deeben's model, were assumed to be relatively unmixed and have remained largely understudied and unpublished. HH will be studied as representing a site in the Meuse valley. HF-I will be studied as a representative of a large site in the Peelhorst area. These two key sites will be investigated in detail (see figure 1.1).

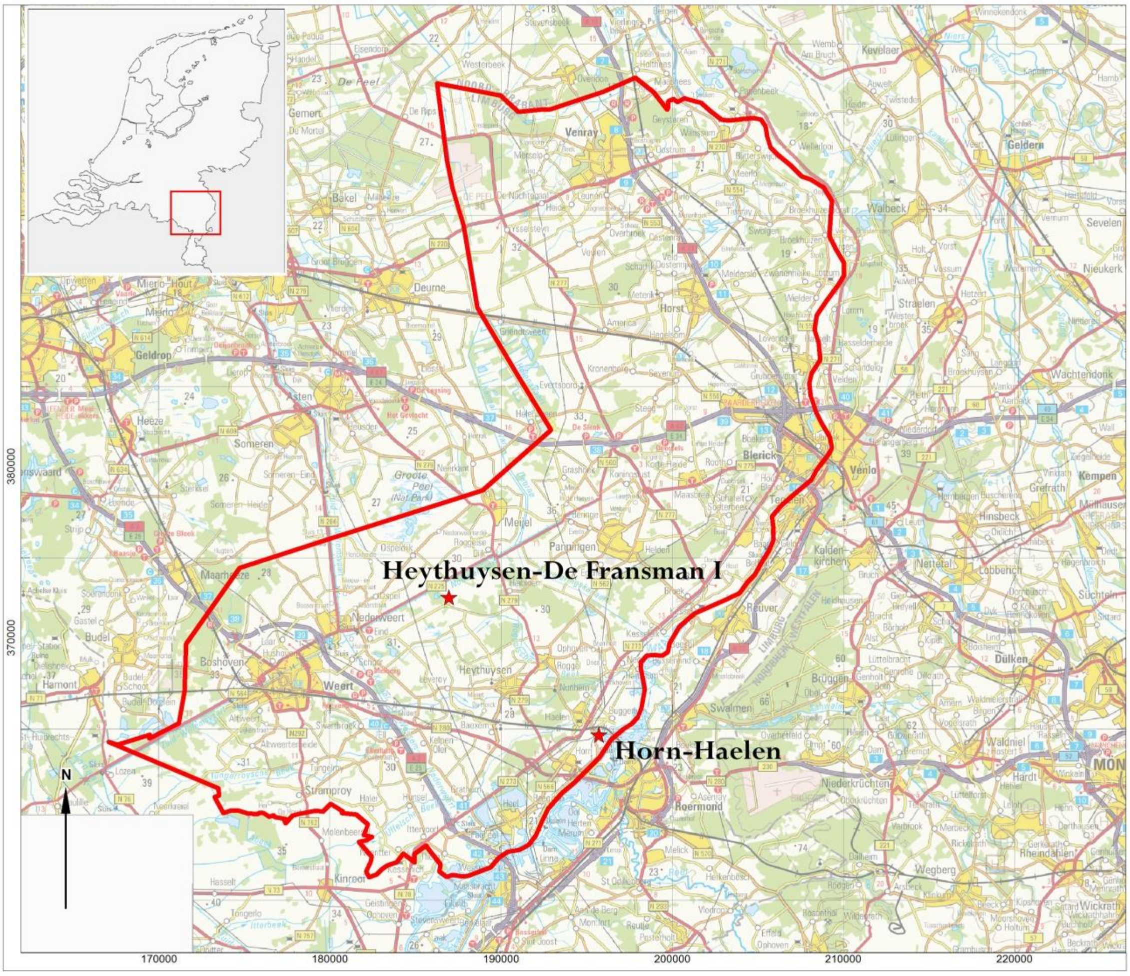


Figure 1.1: Location of the study area and the case studies (www.geodan.nl)

Apart from the investigation of two key sites, an inventory of Federmesser-sites will be provided for the research area. The relevance of such research is related to the Dutch research agenda for archaeology (Deeben 2006b, translated):

"Although a significant dataset is already available, it continues to be useful to further study the geographical distribution, environmental setting and date of late Palaeolithic and Mesolithic sites in the coversand- and Loess areas of the higher parts of the Netherlands. Regional inventories and analysis are to be refined (Meuse area, sandy areas in the provinces of Brabant and Limburg) or initiated (Ice-pushed ridge area, Drenths-Frisian plateau and the eastern sandy areas)."

The research allows for the creation of a more up-to-date review and map of known Late Palaeolithic sites in the region that is relevant for archaeological policy making in the region.

1.5 Research questions

The main problem for this thesis is the question whether an in-depth revision of the data from HF-I , HH and a review of other sites supports the functional site difference proposed by Deeben (1988) or alternative interpretations for Federmesser mobility such as the model proposed by Baales. In order to answer this question formulated specific questions about Heythuysen-de Fransman-Ia were formulated*:*

- What has actually been found at Heythuysen-de Fransman-I?
- What is the research history, age and stratigraphic position of the finds?
- What is the size of the site in terms of amounts of finds and spatial extent?
- What is the content of the lithic inventory and how ‘clean’ or ‘mixed’ is it?
- How does Heythuysen-de Fransman-I compare to other, published data for the Peelhorst-area?
- Can it be interpreted as a base camp?
-

And about Horn-Haelen:

- What is the context of the inventory of Horn-Haelen?
- What is the size and diversity of the lithic assemblage?
- Is the assemblage mixed with material from later periods?
- How does Horn-Haelen compare to other Meuse-sites?
-

And for the desktop study:

- What is the distribution of small and large sites based on the currently available data ?

1.6 Research methodology

To answer these questions, both archival study and study of find material is required. The archival study was conducted based on unpublished documentation of excavations and inventories. For the find material (flint artefacts), technological and typological studies were conducted. This was supplemented with a desktop study based on ARCHIS-II and a small scale inventory of unstudied collections.

1.6.1 Lithic analysis

For the analysis of the lithic material a subset of the criteria used on the lithic material from the Federmesser-site of Rekem was used (de Bie and Caspar 2000). The material was studied both metrically and non-metrically. Criteria were added for the description of the Laterally modified pieces, where the criteria by de Bie and Caspar were supplemented with the point types by Bohmers and Wouters (Bohmers 1956). For the technological criteria (Boards[2], Platform, Bulbs and Scars), a sample of the complete blades was studied. In appendix I a total list of criteria and typological distinction is added.

1.6.2 Classification of collections

If we wish to evaluate the model for hunter-gatherer behavior in the study area, the methodology needs to be adjusted to the archaeological visibility. Collections of flint scatters must be translated into one of the ethnographically proposed site types. In the Netherlands, the most widely used scheme are those by Stapert (1985) and Arts (1988). Stapert subdivides hunter-gatherer sites into five categories based on the number of recovered artifacts (Stapert 1985, 56-59):

1. *Isolated artifacts*
2. *Lithic raw material procurement sites*
3. *Small sites with fewer than 1500 artifacts >1,5cm*
4. *Medium-sized sites* with 1.500-5.000 artifacts larger than 1,5cm.
5. *Large and very large sites* more than 5.000 artifacts larger than 1,5cm

This site-classification was largely based on surface sites, linking these to ethnographically established site-types (base camps, extraction camps etc.) (Binford 1980). Because the types of Arts and Stapert were based on an incomplete dataset and because many 'base camps' turned out to be multi-period palimpsests, these models have fallen out of use since the 1980's (Verhart and Arts 2005) Because

[2] The edges of the blade(let)

Stapert's categories encompass complete site assemblages, including the flakes, these are not useful for selectively collected assemblages. To adjust it for aselectively collected assemblages, the following estimation has been made: research on an aselectively collected collection (J. Smeets) produced tool percentages of 17% (Neer-Boshei), 20% (Neer-Zwaarveld) and 9% (Neer-Kappertsberg), creating an average tool percentage of roughly 15% in a sample of 9.767 artifacts (Stoop 2013). This would mean that a 'large' site (5.000 artifacts) would minimally include an estimated 750 tools for a complete assemblage. Because site material is often distributed over various collections, not all of which can be studied, and not every artifact may have been prospected, the arbitrary definition of a minimum of 500 tools for a 'large' site will be used in this thesis.

For this study, site assemblages could usually only be studied partially or indirectly (via ARCHIS). When looking at surface collections in this way, only three site types were distinguished: a single find, a small-medium collection, and a large collection. These site types are based on tool counts (formerly retouched pieces) rather than artifact count to correct for the collector's bias.

1. *Single finds*

If an artifact is found during an excavation or survey, without any associated material, it is defined as a category-1 site. This type corresponds to Stapert's type 1 sites. To define a find as a single find, it location must have been researched thoroughly. Single finds resulting from a single short survey may very well yield only one artifact, although more finds may be present.

2. *Small or medium collections (<500 tools)*

This group consists of all sites that contain multiple tools, but no more than 500. This category includes both the type 2, 3 and 4 categories by Stapert. As a consequence of this nearly all surface sites are found in this category.

3. *Large collections (>500 tools)*

Large collections are defined as containing more than 500 tools. Even distinguishing large sites from medium sites can prove challenging. The amount of artifacts recovered from a site may result from various criteria unrelated to the actual flint assemblage.

1.7 Overview

In the next chapter, a general overview of late glacial archaeology in northwestern Europe will be presented. This chapter will deal with the established climatological and archaeological framework in which this thesis is embedded. Then, in chapter 3, an overview of the study area on which this thesis will focus will be given. In chapters 4 and 5 respectively, both of the case studies will be described. This includes research history, location, stratigraphy and lithic analysis. In chapter 6, the total of Meuse- and Peelhorst-sites will be compared on location, geomorphology and assemblage size. The thesis will be concluded with chapter 7.

Late Glacial Archaeology of Northwestern Europe

2.1. Introduction

Mobility strategies are primarily dependent on the availability of resources, which is linked to the natural environment. To understand why people behaved the way they did, it is important to understand the climate in which they lived. The focus of the late Paleolithic research has an emphasis on the way these hunter-gatherers responded to their changing environment. This chapter provides an overview of late glacial climate as well as the archaeological sequence for Northwestern Europe. The Allerød, the period of the Federmesser groups, will receive particular attention. A general overview of all climatic, geomorphological and vegetational developments is presented in figure 2.1.

2.2. Climate change at the end of the last glacial

The end of the last glacial is a time period with rapid changes in climate and environment. The climatic developments will be described by the following periods: the Late Pleniglacial, Bølling, Older Dryas, Allerød and Younger Dryas (Hoek 2008). Dates are given in uncalibrated ^{14}C years BP.

2.2.1 Pleniglacial / glacial maximum (up to 12.800 BP)

During the Pleniglacial, the coldest phase of the Weichselian, Northwestern Europe was largely covered by arctic desert, bordering the tundra. The ground was permanently frozen and vegetation was virtually absent. Because of this absence of vegetation, large volumes of sand were being transported by the wind (Berendsen 2004, 185). The average temperature in July during this period is estimated to be around 0°C.

2.2.2 Bølling (12.800 – 12.000 BP)

The first warm phase of the Late Glacial is referred to as the Bølling. This was also the period during which the maximum for the Lateglacial temperature occurred, with mean July temperatures of 16° around 13-12.5 Ka BP and mean January temperatures ranging between -13 and +2°C (Lowe and Walker 1997, 343; Van Geel *et al* 1989). The warmer conditions allowed for more vegetation; large areas became covered in herb-rich grasslands. The period is characterized by a generally temperate climate. The changes in vegetation caused a decrease in the volume of water, sand and gravel transported by the rivers. The river regimes shifted from a braiding to a meandering pattern.

2.2.3 Older Dryas (12.000 – 11.800 BP)

After the initial warming of the Bølling, temperature lowered for a short period of time around 12.000 BP. The Older Dryas is marked by a short-lived decline in trees and shrubs. This is most noticeable as the *pinus* fall of 11.950 BP (Hoek 1997, 205). This also caused lake levels to drop for a short period of time (Hoek and Bohncke 2002, 128) The mean July temperature decreased to about 14ºC for this period (van Geel *et al* 1989). The deposition of coversands also resumed briefly during the Older Dryas.

2.2.4 Allerød (11.800-10.800 BP)

The Allerød is the second warm phase in the Late Glacial. The Allerød is generally cooler than the Bølling. Some minor climatic oscillations also occur during the Allerød warm phase, referred to as the Intra Allerød Cold Periods (Lowe and Walker 1997, 346; Crombé *et al* 2013, 162). The mean temperature was 13-16°C for July and -16 to +6° for January (van Geel *et al* 1989). The vegetation is characterized by a substantial extension of *Betula* and later colonization of *Pinus* (Berendsen 2004, 220; Vermeersch 2011, 268). The Allerød can be subdivided into a *Betula*-phase (11.900-11.250 BP) and a *Pinus* phase (11.250-10.950 BP) based on arboreal pollen.

The Allerød is characterized by soil development in the younger coversand I deposited in the Older Dryas. One of the most typical soil developments of the Allerød is the so-called Usselo-soil (Berendsen 2004, 190). The presence of charcoal in the Usselo soil is linked to large-scale forest fires. These forest fires are classically related the eruption of the Laacher see volcano, which is dated to 11.062 BP (Baales *et al* 2002, 286). However, others argue that these wildfires were common and occurred throughout this period, and are not synchronous with the end of the Allerød (Bohncke and Hoek 2002, 130; Kaiser *et al* 2009). These authors argue that the pine forest were no longer in equilibrium with the wet environment. The many dead pine trees would then have become prone to large-scale forest fires (Bohncke and Hoek 2002, 130). A weighted average for dated Usselo-charcoal linked to this events is given by Bohncke and Hoek (2002, 130) at 10,988 ± 26 BP.

The increased vegetation density diminished discharge and sediment load, which caused concentration and incision by rivers, changing them from a braiding to a meandering pattern. This may also have caused a temporary decline in groundwater level in the adjacent areas (Bohncke and Hoek 1997). Despite this, lake levels were high and peat bogs were formed in deflated areas and valley bottoms because water discharge was blocked by coversand ridges near the riverbeds (Bohncke and Hoek 2002, 128; Vermeersch 2011, 268).

Information on the fauna of the Allerød-period is mostly based on finds from the Neuwied basin in Germany, where many faunal remains were found beneath the Laacher see pumice. The diversity of the faunal evidence is illustrated in table 2.1. At higher areas, open grasslands with relic horse herds may have persisted, but the reindeer disappeared from the area (Baales 2004, 65). There are only very few faunal remains preserved in the sandy areas of northwestern Europe. Some burned animal bones are known from Dichteren, Millheeze, Westelbeers and Wierden (Lauwerier and Deeben 2011, 10).

Table 2.1: Evidence for Presence / Hunting for Allerød Fauna[3]

	Neuwied Basin	Mertloch	Golden Mile	Paris Basin	Doetinchem-D	Wierden	Millheeze & Bakel	Westelbeers
Horse	H	X	X	XX	H			
Red Deer	X	X	X	X				
Roe Deer	X		X					
Elk	X				H			
Aurochs	H							
Ibex	X							
Chamois	X							
Boar	X			X	H	H		
Hare/Rabbit				X	H			
Beaver								H
Carnivores								
Bear	X	X						
Wolf	X							
Dog	X							
Fox	X							
Badger	X							
Weasel	X							
Marten	X							
Birds								
Capercaillie		X						
Galliformes	X							
Tit	X							
Fish								
Pike	X				H	H	H	
Salmon					H			
Perch	X							
Chub	X							
Cyprinid	X				H			

[3] Based on Baales 2004, 67; Bodu & Valentin 1997; Lauwerier & Deeben 2011, 10.

The Allerød-fauna mostly consists of thermophilous species such as aurochs, red and roe deer and elk (Crombé *et al* 2010, 467). Wild boar is uncommon in the Neuwied basin, but seems to be more common in the present-day Benelux (Baales 2002, 27; Lauwerier and Deeben 2011, 16). Evidence for red deer, the prey of choice in the Neuwied Basin, is absent in the Netherlands.

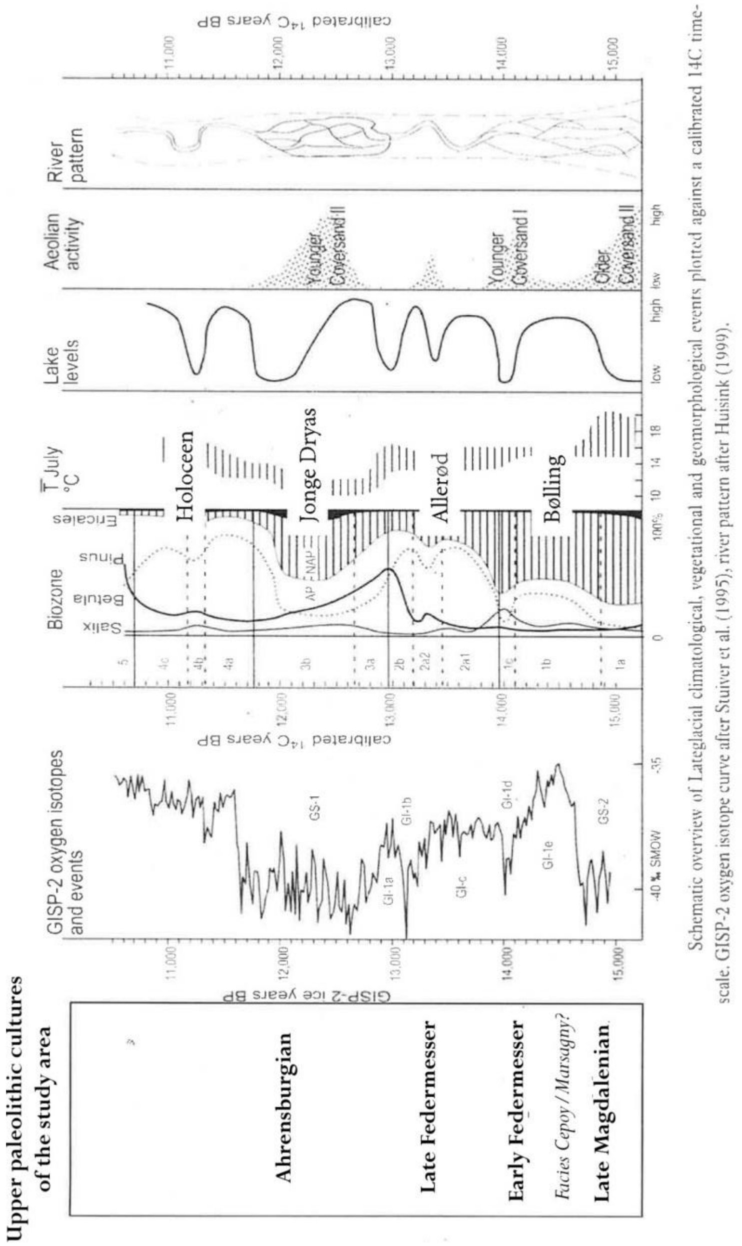


Figure 2.1: Schematic Lateglacial climatological, vegetational and geomorphological overview

After Bohncke and Hoek 2002, 134

2.2.5 Younger Dryas (10.800-10.150 BP)

The Allerød is followed by the last cold phase of the Weichselian: the Younger Dryas. Possibly resulting from a shut-down in the ocean deep-water conveyor or through meltwater pulses from melting ice sheets in the Northern Hemisphere, temperatures plummeted for the last time in the Weichselian (Lowe and Walker 1997, 364). As a result, a major and abrupt change in climate occurred. Mean July temperatures fell from between 15 and 18°C to between 10 and 11° while mean January fell from between -16 and 6°C to between -15 and -7°C (Bohncke and Hoek 2002, 127; van Geel *et al* 1989).

The vegetation of the Younger Dryas is marked by the widespread replacement of boreal shrub and woodland by scrub and tundra plants (Lowe and Walker 1997, 346). The *pinus* and *betula*-woodlands significantly diminished in size (Bohncke and Hoek 2002, 130). These arid conditions are indicated by pollen records, increased Aeolian activity (especially during the second phase of the Younger Dryas) and falls in lake levels. Finds of reindeer and collared lemmings from this period indicate the return of a tundra-like environment (De Bie and Vermeersch 1998, 30).

The cold circumstances caused rivers to change to a braiding pattern and deposition resumed for a short period of time (Berendsen 2004, 208). Varying amounts of water displacement caused river plains to fall dry during the winter. During these winters, the wind blew out the sand from the dry riverbeds, creating so called river dunes (Berendsen 2004, 203; Renes 1999, 132).

2.3. Late Paleolithic traditions

The Late Glacial period is characterized by a sequence of Upper and Late Paleolithic 'traditions'. These traditions are classified based on differences in specific lithic points. For the study area and its direct environment, the relevant traditions include the Magdalenian, Creswellian, Federmesser-groups (Azilien) and Ahrensburgian. In this section, the variations in lithic technology from the late glacial will be summarized.

2.3.1 Late Magdalenian

The first humans to recolonize the northern regions of Europe are attributed to the late Magdalenian. Magdalenian sites have been found in the Paris basin, the Ardennes massif and the Meuse-Rhine loess area. These sites include Fond-de-Fôret, Orp-le-Grand and Kanne in France, Mesch, Eyserheide, Sweikhuizen-Groene Paal in the Netherlands and Alsdorf, Beeck and Kamphausen in Germany (Rensink 2012, 251).The large sites at Gönnersdorf and Andernach in the Neuwied basin are interpreted as winter camps. Rensink interprets the majority of Magdalenian sites in the Netherlands as briefly used base camps, used by a small social unit such as a nuclear family (Rensink 2012, 260-261).

There is debate about the age of the Late Magdalenian. C^{14}-dates from sites in the Paris Basin are younger than at Gönnersdorf and Andernach (13.300 – 12.700 BP) (Rensink 2012, 262; Valentin 2008, 95). The Paris Basin sites date mostly to the second half of the Bølling, contemporary with the Creswellian in England Hamburgian in northern Germany and the northern Netherlands (*idem*). Magdalenian lithic material is characterized by blade technology with the use of the én épèron-technique, producing long, regular tools on blades (see table 2.3). These tools include lacan-burins and long blade scrapers.

A typologically important site for the Late Magdalenian was found near Bois Laiterie. Material from this site was dated to 12.665 ± 95 BP and 12.625 ± 117 (Sano *et al* 2011, 1469), slightly predating the Hamburgian northward expansion and the oldest level of the le Closeau (12.500-12.000 BP). A remarkable aspect of the technologically Magdalenian site of Bois Laiterie is its points, including angle-backed bipointes (Cheddar-points), points with oblique truncation, angle backed points (Creswell-points), a bipointe, a Curve-backed points and nine other types of laterally modified points. It is interpreted as a pool of technological and typological recipes that would one day become several distinct archaeological cultures (Sano *et al* 2011).

The youngest of Magdalenian sites date to approximately 12.200 BP and were found near Cepoy and Marsagny (12.120 ± 200 BP), Le Closeau Locus 46 (12.346 ± BP), Presle and Tureau des Gardes (12.277 ± 73 BP) (Valentin 2008, 122-125; Sano *et al* 2011, 1469; Maier 2012). This final phase of the Magdalenian, also referred to as 'facies Cepoy/Marsagny' is characterized by the presence of *Zinken* and polymorph point assemblages that include shouldered points (*pointes à dos découvertes*), triangular points (*pseudo-bipointes*) and convex/concave points, whereas backed blades are virtually absent. Technologically, both antler percussion and soft stone hammer percussion occur at the Facies Cepoy/Marsagny sites. Antler percussion is used for long, regular blades, which serve as blanks for scrapers and burins. Soft stone hammer percussion is used for somewhat more irregular blades used for point manufacturing (Valentin 2008, 122-125).

2.3.2 Creswellian

The Creswellian is a geographically isolated facies of the late Magdalenian mostly found in present-day southern Great Britain (Barton *et al* 2003, 639). The typical Creswellian industry is characterized by trapezoidal backed blades and angled backed points (Cheddar- and Creswellian points), end-scrapers on long blades, often with lateral retouche, burins on truncations, piercers/becs, scaliform-retouched 'Magdalenian' blades, truncated blades with heavily worn or 'rubbed' ends and well-made blades detached with a single preferred flaking direction with a soft stone hammer. These blades are often prepared using the en éperon-technique (Barton *et al* 2003, 633-634).

The existence of a Creswellian 'culture' on the present-day European mainland has been the subject of longstanding debate (Arts 1988, de Bie and Caspar 2000 vs Stapert 2005). In the Northern Netherlands, several sites are attributed to the Creswellian by Stapert. These sites include Zeijen, Siegerswoude II and Emmerhout. The typical Creswellian in the Netherlands (according to Stapert) is characterized by Cresswell-points, Cheddar-points and long B-points, whereas Federmesser and Gravette-points are virtually absent (Stapert 2005).

2.3.3 Federmesser-groups

The term 'Federmesser-gruppen' was introduced in the 1930s by German archeologist Hermann Schwabedissen. The first major publication on the Federmesser was published in 1954 (Schwabedissen 1954). Schwabedissen attributed all northwest-European sites with steeply backed points with a curved or straight back and backed bladelets to this culture. Schwabedissen distinguished three subgroups: the Tjonger-group, the Wehlener group and Rissener-group. The Tjonger group was already defined by A. Bohmers in 1947 (Bohmers 1947). Bohmers renamed the Kuinder culture, as defined by Popping in 1930 to Tjonger-group. Schwabedissen's subdivision was rejected by later research and the term Tjonger-groups is no longer used (Houtsma *et al* 1996). Finds attributed to the Federmesser-groups have been found from northern England in the west to Denmark in the north and the Ukraine in the east. The southernmost finds originate from just north of the Alps (Deeben and Rensink 2005, 181).

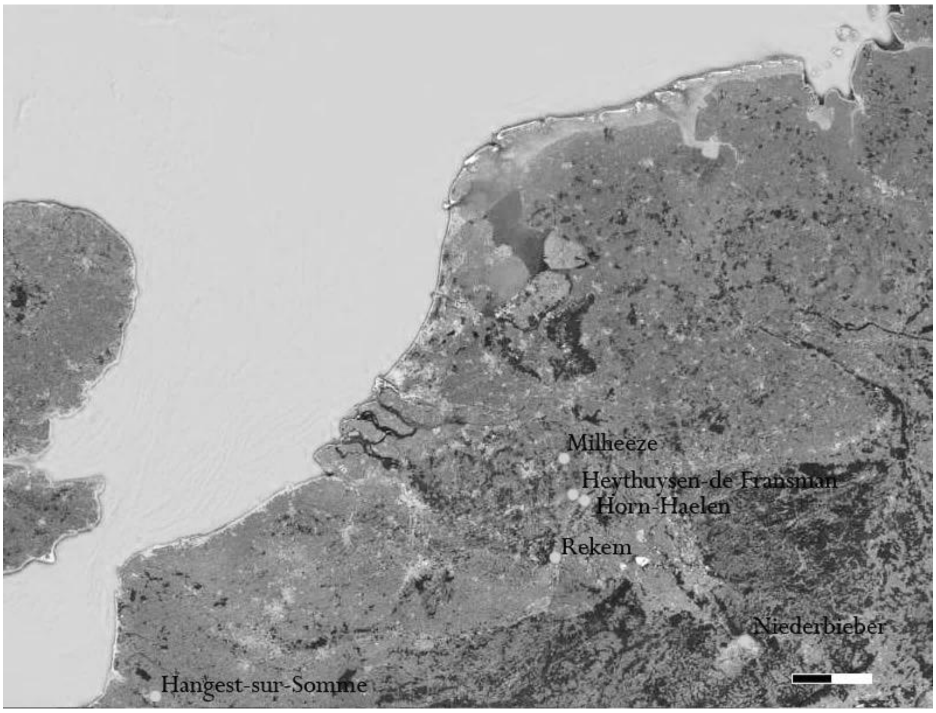


Figure 2.2: Important sites and their location (Source: Google Maps)

The Federmesser tradition is thought to have originated from the Late Magdalenian based on sites in the Paris basin through a process called Azilinisation (Bodu and Valentin 1997; Valentin 2008). Based on well-documented, stratified and dated sites in Northern France, an internal chronology for the Azilian was proposed (Bodu and Valentin 1997, Valentin 2008). During archaeological excavations in the Somme valley in northern France, led by Jean-Pierre Fagnart in 1993, three layers of Stratigraphically separated Late Paleolithic occupation were found at *Hangest III.1.* These assemblages were dated to the Allerød-interstadial (see table 2.2). The levels were referred to as *le niveau supérieur* and *le niveau inférieur.* A comparable situation was encountered by P. Bodu at *Le Closeau à Ruel Malmaison* in 1994. A third *niveau* is reported by Bodu at Conty, which was referred to as *Niveau Intermédiar.* The Hangest *Inferieur*-level is correlated with the early (*Betula*) Allerød, while the *Superieur*-level is correlated with the late Allerød (c.f. *pinus* phase-Allerød). The *inferieur*-level at le Closeau is somewhat older, dating to the late Bølling (see table 2.2).

Table 2.2: Carbon dates for the sites from the Paris basin

Site	Calibrated Date	Lab. Nr.	Dated Material
Hangest-Inferieur	11.660 ± 110 BP	OxA-4432	Charcoal
Hangest-Inferieur	11.630 ± 90 BP	OxA-4936	Charcoal
Closeau-Inferieur[4]	12.090 ± 90 BP	OxA 5680	Bone
Closeau-Inferieur	12.050 ± 100 BP	OxA 6338	Bone
Closeau-Inferieur Locus 46	12.350 ± 60 BP	GrA-11664	Bone
Closeau-Inferieur Locus 46	12.360 ± 60 BP	GrA-11665	Bone
Closeau-Superieur	10.840 ± 110 BP	OxA 6337	Bone
Closeau-Superieur	10.650 ± 75 BP	Lyon 206	Charcoal
Closeau-Superieur	10.670 ± 110 BP	Lyon 7189	Charcoal
Closeau-Superieur	10.470 ± 110 BP	Lyon 7190	Charcoal

Another series of Federmesser complexes is located in the Neuwied Basin. The basin is located in the central Rhineland in present day Germany. Around 11.030 BP, the violent eruption of the Laacher See volcano covered the entire basin in ash. This led the Neuwied basin to be known as the 'Ice Age Pompeii' with excellent preservative conditions for faunal remains (Baales and Street 1996, 282). Several well-preserved sites are known from the Neuwied basin, dating to the Allerød interstadial. These sites include Niederbieber Fläche I, III ,IV and VII, Kettig, Urbar and Andernach. A further site was discovered just outside of the basin, near Bad Breisig (Goldene Meile). All of these sites can be dated to the middle or late Allerød interstadial (Baales and Street 1996, 189; Baales 2002, 42).

The subdivision of the Federmesser or Azilian tradition for Northern France will be referred to in this thesis. However, in other regions, the subdivision and chronology of the Federmesser may be different. For example, at Champréveyres in Switzerland, a technological 'late' Federmesser horizon was found dating to 12.550 ± 130 BP - 12.120 ± 170 BP, therefore predating the early Federmesser (Azilien ancien) in the Paris basin.(Baales 2002, 51).

Bipoint phase or Azilien ancien

The youngest Magdalenian is followed by an industry characterized by segment-shaped backed points (bipointes). Based on these points, the industry is referred to as the Bipoint-Phase or Azilien ancien. This technocomplex is dated to the Older Dryas or the Early Allerød (Valentin 2008). Technologically, the industry is characterized by a regular blade technology from unipolar cores with correction surface.

[4] Bodu & Valentin 1997 ; Fagnart 1997.

Burins are abundant, a portion of which is of the Lacan-type. Backed bladelets are also common (Valentin 2008, 123-125). Experimental blade production indicates that these bladelets were struck using a soft stone hammer (Pelegrin 2000, Fagnart 2008, 125). These characteristics are mostly based on the finds from Hangest-Inferieur.

The finds from Le Closeau predate Hangest by an estimated 400 years and are typologically different, having both elements from the Cepoy/Marsagny facies and the *inferieur*-levels of Hangest. This is a logical consequence of attempting to apply strict divisions to a gradual process. The Bipointes that are typical for this phase have an arched back creating a double-pointed artifact. Both atypical Cheddar-points, Azilian points and penknife-points can be part of the same *Chaine operatoire* (Valentin 2008, 150). Bipointes are hafted asymmetrically to the axis of the shaft, creating a single barb on the arrow (Valentin 2008, 144-160).

Assemblages dating to the *Azilien ancien* were found at *Hangest-sur-somme* (11.642 ± 70BP), Conty-le Marais (11.460 ± 52BP), Niederbieber (Fläche I and IV) (11,118 ± 86BP) and Andernach 2 (11.978 ± 30BP). The sites of Amiens-Étouvier, Dreuil-Lés-Amiens and Rietberg have produced typologically comparable assemblages (Maier 2012, 152-163). The double burial from Bonn-Oberkassel, dated between 12.180 ± 100 BP (OxA-4790) and 11.570 ±100 BP (OxA 4792) and the triple burial of Neuwied-Irlich (11.910 ± 65 BP; OxA 9847) are also assigned to this period (Maier 2012, 150-164).

Late Federmesser or Azilien récent

The Azilien récent succeeds the Azilien ancien phase in the Paris basin. The Azilien récent is characterized by a less elaborated blade technology. This blade technology produces short, unstandardized blades and laminar flakes using direct hard hammer percussion (de Bie and Caspar 2000, 131; Pelegrin 2000). With the disappearance of long blades, tool types that were made on these blades also decrease in number. The various point types include straight backed points and curved backed points. Angled backed points (Creswellian points) occur less frequently, but are still present in most assemblages. Occasionally, B-Points and atypical shouldered (convex-concave) points also occur. The tip of the monopointes is oriented perpendicular to the shaft. The tip is oriented towards the axis of the blank, on the distal end. Generally, the points lack standardization, both in supports and in the outline of the backing, compared to bipointes (Valentin 2008, 154-159). This change in point typology is classically linked to the change from spear thrower to bow-and-arrow, which is supported by the appearance of arrowshaft abraders (Stapert 2005, 143)

Core exploitation contrasts sharply with the Magdalenian industry. The shaping and maintenance of cores is extremely versatile, guided by the shape of the nodule. Generally, this exploitation focuses on immediate laminar output. This led to unstandardized products and opportunistic blank selection for tools.

Pointes de Malaurie

The so-called Malaurie-point phase is a proposed continuation of the Federmesser groups in the Younger Dryas. This is based on the association of basally retouched LMP's associated with artifacts recovered in the Paris Basin. Laterally modified monopointes with basal retouche also occur in the "Azilien récent". For example, 20% of the monopointes found at Bois-Ragot (an Azilien ancien-site) were basally truncated (Fagnart 2008, 157). Artifacts from the post-Allerød period were found at *le Closeau* Locus 25. This assemblage included a sequence of highly normalized *Pointes de Malaurie* (Valentin 2008, 174). Chronological contemporaneity is possible as both Malaurie-points and Ahrenburgian Tanged Points have been found at Vieux-Moulin in France (Valentin 2008, 187). A single site near the Neuwied basin, located at the 'golden mile' near Bad Breisig, dates to a late phase of the Federmesser. The artifacts were found above the Laacher See tephra. From the ten points recovered from the site, three could be classified as Malaurie-points (Baales 2004a, 67). Based on the presence of these *pointes the Malaurie* and other *pointes des blancheres*, Late Paleolithic Federmesser-traditions supposedly continue during Younger Dryas. These traditions are also referred to as Epi-Gravettian or Epi-Laborien (Valentin 2008, 191-196).

Table 2.3: Typochronological and Technochronological development of the Late Magdalenian and Federmesser-Groups

	Late Magdalenian	**Final Magdalenian**	**Azilien Ancien**	**Azilien recent**
Technology	*Pincevent*	*Cepoy/Marsangy*	*Closeau-Inférieur*	*Closeau-Supérieur*
Platform	*Varying, mostly small*	*Varying, mostly small*	*Small*	*Broad*
Flaking Angle	*75*	*75*	*75*	*80-90*
Heel sanding	*?*	*?*	*Yes*	*No*
Abrasion	*Yes*	*Yes*	*Regular*	*Irregular*
Lipping	*Regular*	*Common*	*Common*	*Uncommon*
Bulbus	*Flat or diffuse*	*Flat or diffuse*	*Absent or barely visible*	*Pronounced*
Point of impact	*Invisible*	*Invisible*	*Invisible*	*Pronounced*
Ripples	*Small*	*Small*	*Small and close*	*Broad and pronounced*
Profile	*Slightly bent*	*Slightly bent*	*Slightly bent*	*Straight*
Blade Size (Rel.)	*Long and regular*	*Long, regular and short*	*Long, regular and short*	*Short (bladelets)*
Crested Blades	*Yes*	*Yes*	*Yes*	*No*
Core technology	*Unip. with correction*	*Unip. with correction*	*Unip. with Correction*	*Bi-or multipolar*
Percussion	*Antler*	*Antler and soft stone hammer*	*Soft stone hammer*	*Hard or soft stone hammer*
Blade Boards	*Parallel*	*Parallel*	*Parallel*	*Irregular*
Percussion type	*Antler*	*Antler + soft stone*	*Soft Stone*	*Soft / Hard Stone*[1]
Blades	*Long, Regular*	*Long Regular and Short*	*Long Regular and Short*	*Bladelets*
Typology			Early Federmesser	Late Federmesser
Points	*Various point types, Backed bladelets*	*Shouldered/Convex-Concave /Triangular*	*Bipointes*	*Monopointes*
Avg. Point Length	*?*	*?*	*4,89 ± 4,3 cm*[1]	*3,87 ± 8,3 cm*[1]
Scrapers	*Long blade-endscrapers*	*Long blade-endscrapers*	*Long blade-endscrapers*	*Short Endscrapers*
Retouche	*Marginal*	*Marginal*	*Marginal*	*Steep*
Other	*En épèron-technique*	*Zinken/Becs*	*Marginal retouche Bld.*	*Backed Bladeles*

After Vanderbeken 1998 and Valentin 2008, 128, Supplemented with information from Baales 2002, 49 and de Bie and Caspar 2000, 444.

2.3.4 Ahrensburgian

Although it is possible that the late Federmesser assemblages may be contemporary to the Ahrensburgian, it is generally assumed the Federmesser-groups are succeeded by the Ahrensburgian. The Ahrensburgian is best known from excavations in the Ahrensburger valley near Stellmoor. Thousands of antler fragments and hundreds of tanged arrowheads were recovered there. Tanged points assemblages show a remarkable concentration in the southern Netherlands, especially in present-day Brabant. The Ahrensburgian is dated to the Younger Dryas cold phase. Notable dates from near the study area include Geldrop/Mie Peels/1985-2 (10.160 ± 100 BP) and Geldrop 3-2 Oost (9.770 ± BP) (Deeben and Rensink 2005, 187-195).The Ahrensburgian industry is characterized by tanged points, curved backed pieces, B-Points (truncated microliths), A-Points (laterally modified microliths), trapezia and triangular microliths. Remarkable aspects of the Ahrensburgian flint technology are the long blades (Riesenklingen) which are reminiscent of Magdalenian technology.

2.4 Conclusion

The Federmesser-groups this thesis studies are largely confined to the Allerød, although continuation into the Younger Dryas is a distinct possibility (Lanting and van der Waals 1997). The Allerød is characterized by a gradual cooling after the quick warming of the Bølling, increase in tree vegetation, firstly a phase with birch, secondly a phase with pine. This coincided with a shift in fauna from migratory herd animals like horse and reindeer to more solitary and stationary species such as red deer and boar. A shift in lithic technology also occurred, with the shift from the Magdalenian to the Azilian technocomplex (see table 2.3).

The process of change from late Magdalenian to Federmesser or Azilian groups is referred to as *Azilianisation,* a gradual technological change from the late Magdalenian to the Azilian or Federmesser-groups preceding the Pleistocene/Holocene transition (Bodu and Valentin 1997, 341). The subdivision is mainly based on the evidence from Northern France. For the evaluation of HH and HF-I, the French sequences will be used as reference. This shift constitutes a change from blade production from well-prepared cores to short, straight blades and flakes, possibly related to a change in projectile technology from the dominant use of the spearthrower to the introduction of bow-and-arrow.

Outline of the study area

3.1. Introduction

The study area is located in the Southern Netherlands, in the northern and central parts of the Dutch province of Limburg (See Figure 3.1). The Lateglacial landscape of the research area is strongly influenced by the Meuse River. This paragraph contains a summary of the climatic conditions and sediment deposition during the Late glacial in the study area. This is contrasted with the environment of the Peelhorst, which is dominated by lakeshore settlements. Most of the evidence for the biotic attributes of the ecosystem derives from fossilized plant remains from waterlogged peat-sediments. Evidence on the fauna is rare and hard to date (Deeben 1988, 363; Deeben *et al* 2006).

Most of the information on Allerød lake characteristics is based on a particularly well-studied Peelhorst-lake near Millheeze, which was published by Bos, Bohncke and Janssen (Bos and Janssen 1996; Bos *et al* 2006). The vegetational and lake-level variations are representative for general lake-level fluctuations in the Late Glacial, as these are closely comparable to other glacial lake-level data from the Netherlands (Bos *et al* 2006, 232).

Figure 3.1: Location of the study area and key sites on height model (Source: www.ahn.nl)

3.2. Geological setting

The geology of the study area is shaped by tectonics on the one hand and fluvial processes of the Meuse on the other. The course of the Meuse follows the sinking tectonic areas of the Roer Valley Graben (Central Slenk) and the Venlo Graben. The Meuse bed is wider in the southern part of the research area, caused by the sinking tectonic area of the Central Slenk. This causes the Meuse 'terraces' to be more pronounced in that area. The north and west of the study area are dominated by a rising tectonic area called the Peelhorst.

3.2.1 The Meuse area

The valley of the Meuse consists of a series of river terraces. They are the result of fluvial downcutting and changes in alluvial architecture (alternating between a braiding and a meandering pattern). The most relevant of these terraces is the one dating to the Allerød, which corresponds with Terrace 3 according to van den Berge (1996) or floodplain level 4 according to Kasse *et al* (1995). The level was partially eroded again when the Meuse reverted to a braiding system in the Younger Dryas.

During the Pleniglacial-Late Glacial transition, increased precipitation led to the gradual establishment of vegetation. The higher humidity of the soil combined with the vegetative cover diminished Aeolian activity, and therefore stabilized the riverbanks. This caused the Meuse to become a meandering river in the Allerød (van Huissteden and Kasse 2001, 332). Most of the terraces have been covered by windblown sands during the Pleniglacial and Younger Dryas.

Due to the wet nature of the riverine area, vegetational development started earlier in this area than on the peelhorst. The coversand-dunes covering the terraces and the edges of the creekbeds were formed because of the vegetation growing there, which prevented erosion. Both the *Betula*- and *Pinus*-phases of vegetational change occurred some 200 years earlier in the Meuse area than it did in the Peelhorst area (van Leeuwarden 1982).

3.2.2 The Peelhorst area

The higher parts of the study area are located on the Peelhorst. The border between the Meuse-area and the Peelhorst-area is defined in this thesis as the edge of 'terrace 1', which was abandoned during the Saalian ice age (van den Berg 1996). The Peelhorst forms a watershed between the river Meuse and the brook system towards the west. Drainage is mostly directed towards the Meuse river, by means of brooks. The formation of longitudinal coversand ridges during the Pleni- and Late Glacial impeded drainage on a number of locations (Bos *et al* 2006, 212). Large amounts of meltwater due to the melting of the relic permafrost in the Bølling led to the formation of lakes (Bos *et al* 2006, 235).

It is possible to present a detailed landscape reconstruction based on pollen records preserved in the late glacial lake of Milheeze (Bos *et al*. 2006). The early Bølling landscape is characterized by shrubs, meadows and herbal communities, with wet meadows near the lakebed. The climate stagnated slightly during the Older Dryas, characterized by open, heliophilous herbal vegetation and minor surface erosion. During the Allerød, extensive open birch woodlands developed in the Peelhorst-area. Lake levels rose again due to the final disappearance of the permafrost. When the permafrost was wholly gone, pine trees started arriving, with a major expansion of pine during the Late Allerød (Bos *et al* 2006, 235). The Allerød lake-landscape is characterized by willow shrubs and swamp vegetation near the lake, meadows on the flank of the ridge and either a shrub/herbal vegetation (early) or *pinus/betula*-woodland (late) on top of the ridge. During the Younger Dryas, a fall in lake levels was recorded, accompanied by an increase in surface erosion due to a more open landscape. The lake became shallower due to the increased deposition of gyttja in the Younger Dryas, leading to a fen/swamp vegetation in the lake itself (see figure 3.2)(Bos *et al* 2006, 228-229).

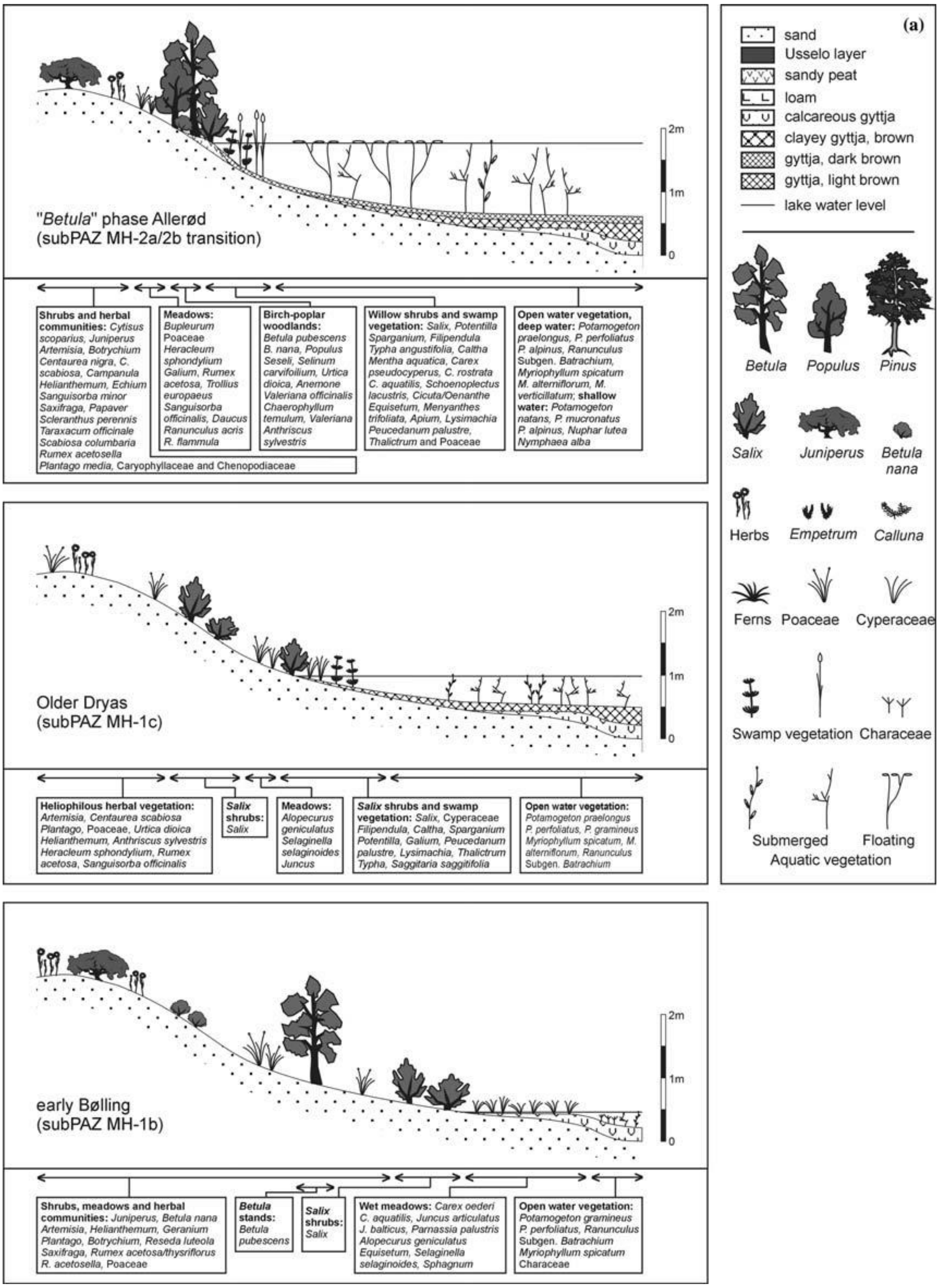


Figure 3.2: Cross-section through the lake and coversand ridge near Millheeze

(After Bos et al 2006, 228-229 (Figure 8))

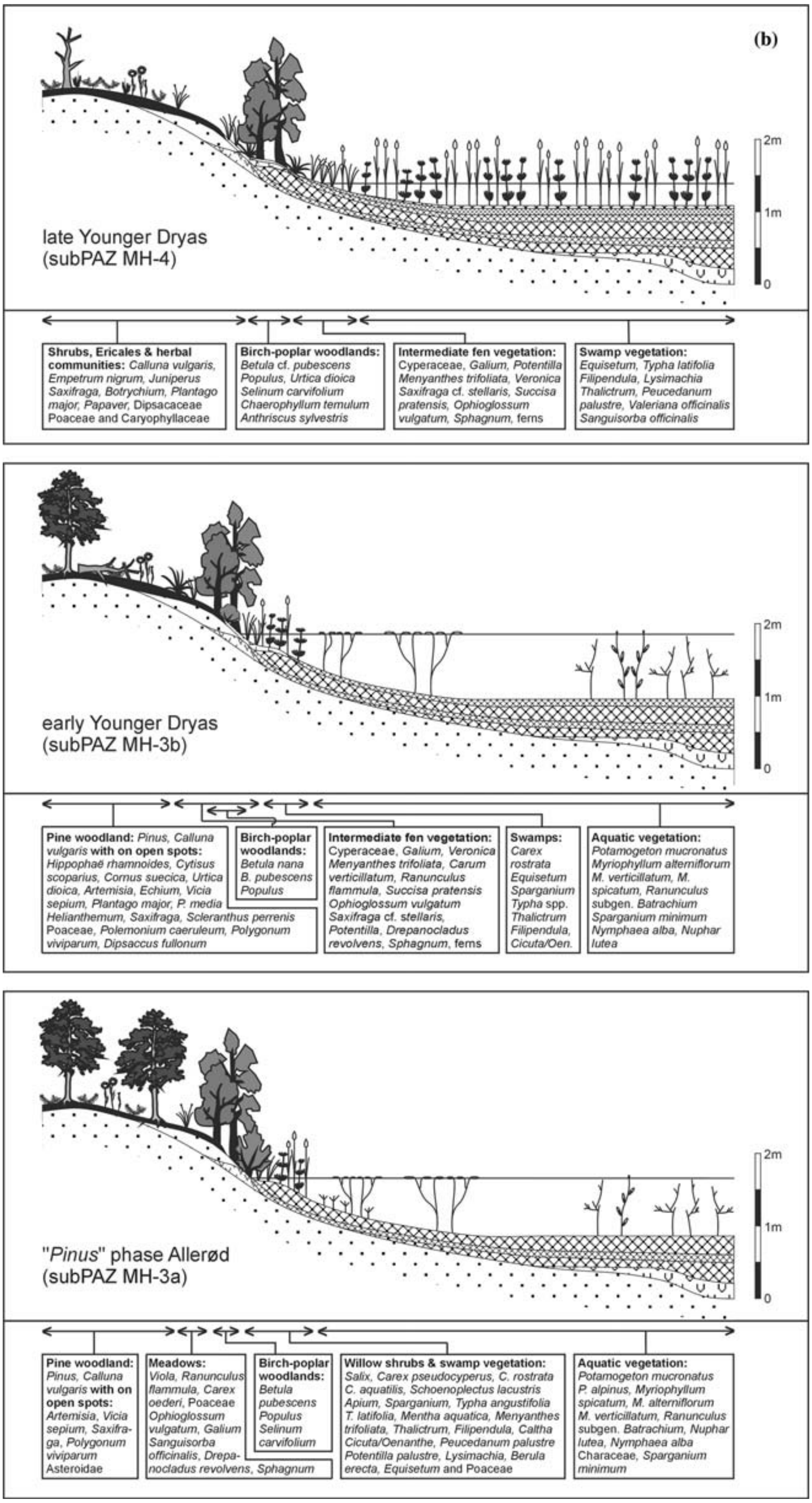


Figure 3.2: Cross-section though the lake and coversand ridge near Millheeze

(After Bos et al 2006, 228-229 (Figure 8))

3.3. Conclusion

The landscape of the study area is strongly influenced by the tectonic structure and the Meuse river and its associated terraces. The landscape of the Allerød is dominated by a meandering Meuse river with creeks flowing down from the Peelhorst. Before and during the Allerød, vegetation develops around the creeks and in the Meuse area, stabilizing the soil and stopping sedimentation. Glacial lakes on the Peelhorst were formed by the impeded drainage due to the increased vegetation and coversand ridges. Cut-off meanders developed into horseshoe-lakes in the valley of the meandering Meuse. The vegetation in the Meuse area is similar to that of the Peelhorst during the Allerød. An earlier *Betula* and later *Pinus* phase is recognized in the study area. However, van Leeuwarden (1982) has shown that changes in the vegetation on the Peelhorst occurred a few hundred years later than in the river valley (van Leeuwarden 1982; De Bie and Vermeersch 1998, 29).

Horn-Haelen

Introduction

4.1. Introduction

In this chapter, the first of the two key sites will be described: the site of Horn-Haelen located in the Meuse area. This site was selected because, based on a previous study of the J. Smeets Collection, the assemblage appeared to be unmixed (Stoop 2013). The site is located on the western bank of the river Meuse near the villages of Horn and Haelen (see figure 4.1). The area is currently used partially (the northern part) for housing as part of the windmolenbos industrial area. The southern part of the site is used as heathland. In this chapter the location, research history, stratigraphy, current use and recovered lithic material of the site of HH will be described. HH will serve as a case-study for the Meuse-category of Federmesser-sites in the study area.

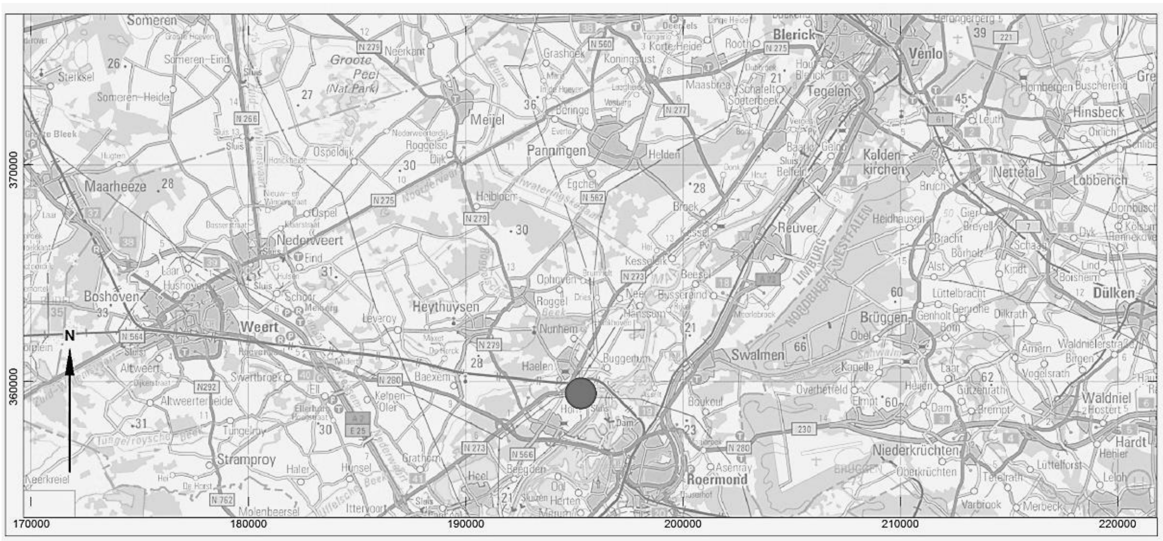


Figure 4.1: Geographical location HH

4.2 Location

The site of Horn-Haelen is located between the villages of Horn and Buggenum in the direct environment of the city of Roermond. Wouters (1953) states that the artifacts were recovered from masonry sand for the P.L.E.M. coal-fed power plant 'Maascentrale' (which has now largely been torn down, see figure 4.2).

Figure 4.2: Maascentrale Power plant in operation (ca. 1978)

Source: www.heemkundebuggenum.com

Two different coordinates are provided for the site in ARCHIS-II: one by Wouters in 1953 (W29333) and one from the Bohmers excavation in 1961 (W37204). A third coordinate is provided by Smeets in 1971 based on his surface finds (see Figure 4.3). The modern day elevation map, used in Figure 4.3, locate the 1961 research and the finds by Smeets in the area that fits with Wouters' description of the sand-winning pits. However, Wouters 1953 coordinates do not correspond with this. It is possible that Wouters recovered the first artifacts from secondary context (Wouters 1953, 3). The sand-winning pits probably destroyed virtually the whole site. The maximum extent of the site has been estimated based on the remaining local relief (see figure 4.3). Other sand-winning activities were located to the northeast of the site.

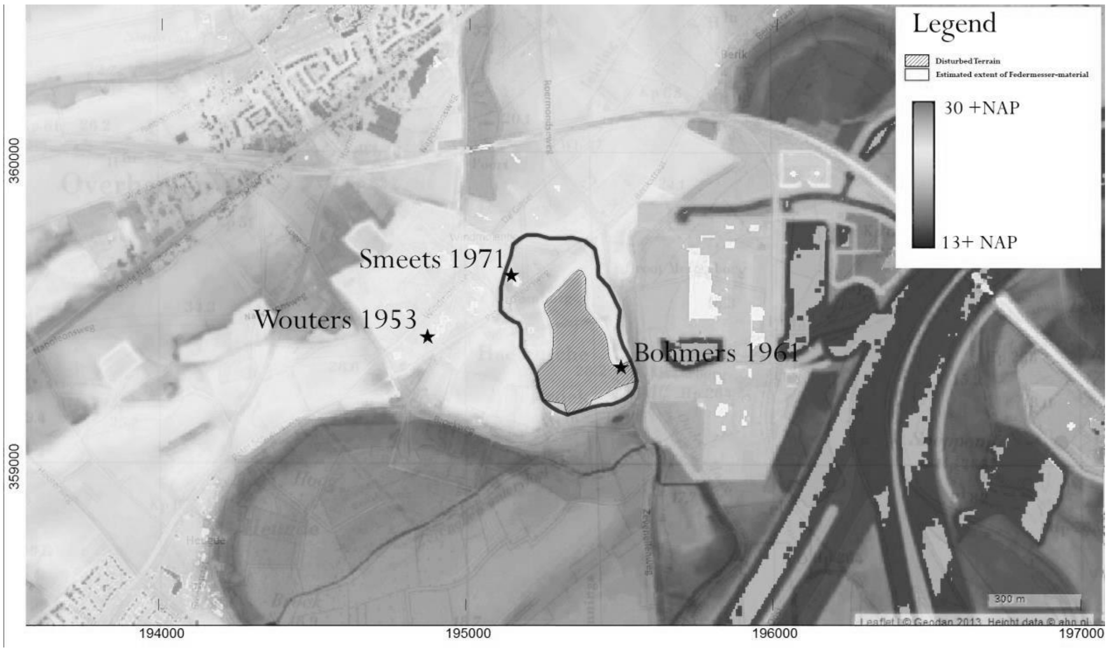


Figure 4.3: Elevation model with estimated site extent, sand-winning pits and coordinates (Dutch coordinate system) from Smeets, Wouters and Bohmers

Source: www.ahn.nl

The site of Horn-Haelen is located on the edge of the Allerød Meuse-terrace. The extent of this terrace is clearly visible on both the soil- and the geomorphological maps (see figures 4.6 and 4.7). The site is located between two old meander gulleys. Old creek beds are located to the north and northeast of the site, clearly visible as flat, shallow depressions on the geomorphological map. These fossil creek beds are filled with old clay. The gulleys are probably remnants of Meuse beds from the Pleniglacial braiding system. It is possible that these creek beds were still active during the Allerød as part of the dehydration system of the Peelhorst area. If this is the case, Horn Haelen is located just northeast of where a creek enters the Meuse riverbed.

4.3 Stratigraphy

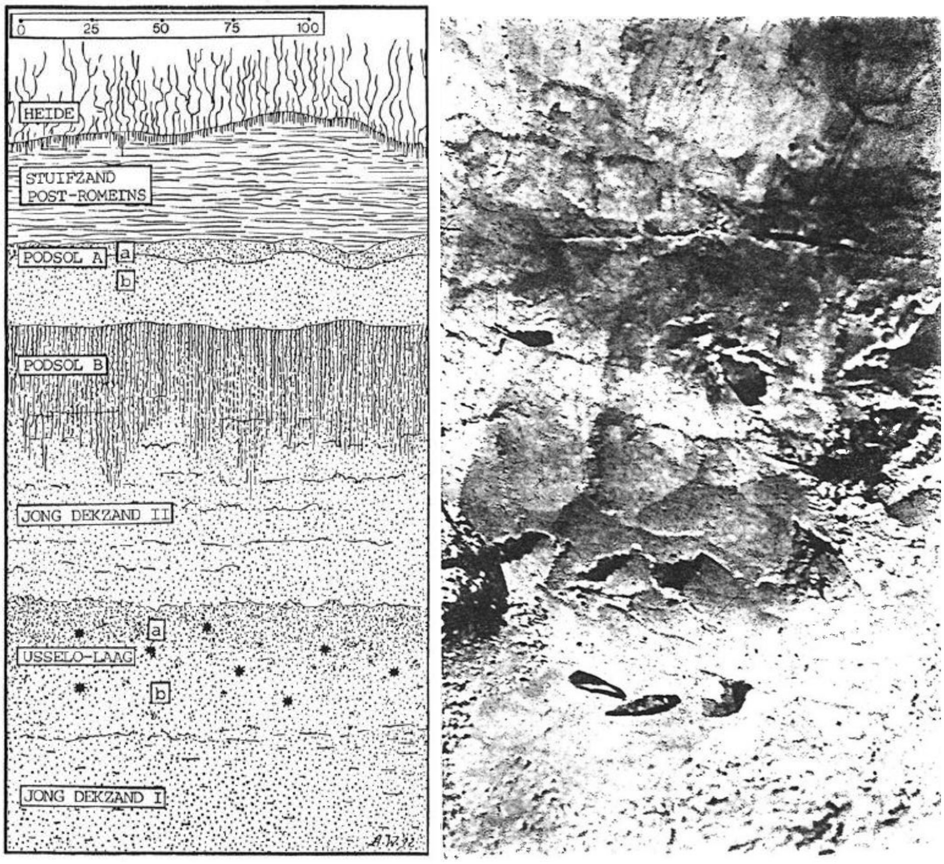


Figure 4.4: Profile Sketch HH with stratigraphy (left) and artifacts in situ (Right)

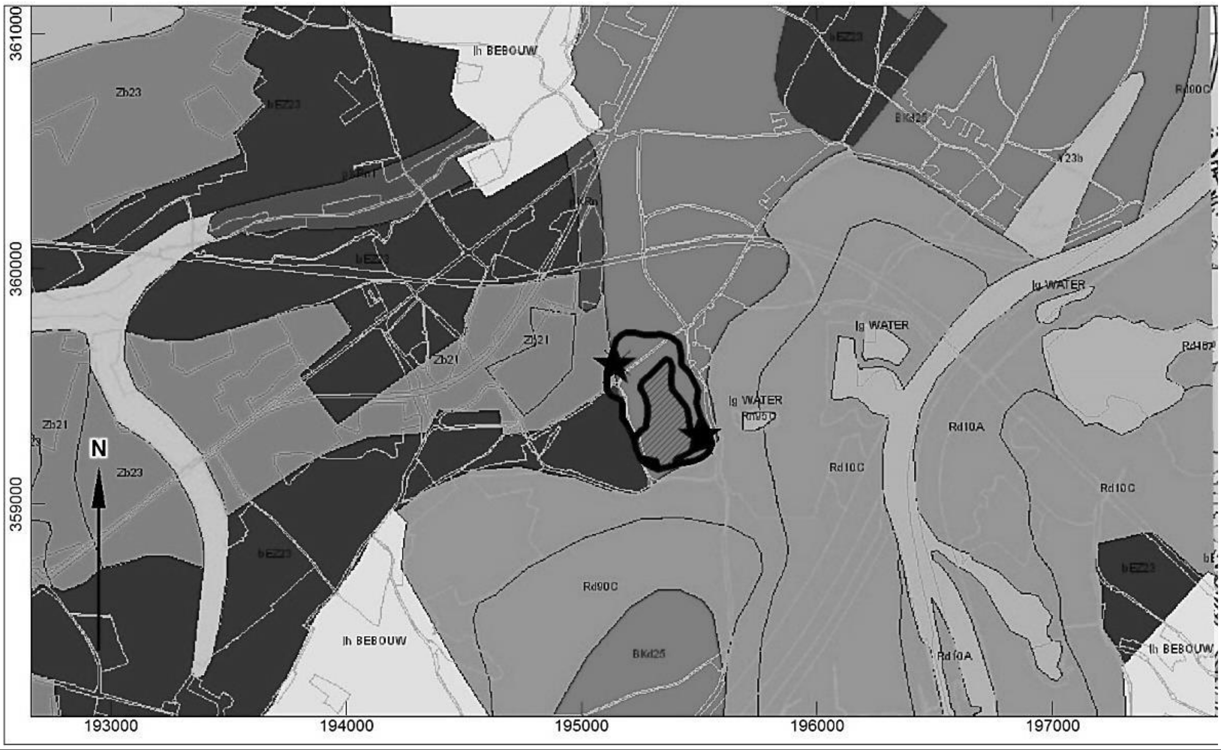
Author: A.M. Wouters (Both), currently present at the RCE Amersfoort (former ROB)

The artifacts were mostly collected from the surface or by sorting through the masonry sand from the sand pits. However, some artifacts were collected from their primary context, some 40cm beneath the surface. A scraper and a Gravettian point were found by Wouters in a charcoal-rich layer in the top of a heath-podzol profile (Wouters 1954, 4). Both a picture and a drawing of the stratigraphy are still available at the RCE in Amersfoort (See figure 4.4). The charcoal-rich layer was interpreted as an Usselo-soil, which is confirmed by radiocarbon dates (Lanting & van der Plicht 1996, 106). Some charcoal samples were taken found in the Usselo-layer in which the artifacts were embedded. Three radiocarbon dates are provided: GrN-497: 11.000 ± 320 BP, GrN-498: 10.950 ± 300 BP and GrN-7297 11.200 ± 100 BP (ZLZ, Cv,= 68,9%, $\delta^{13}C = -27,7‰$). The last sample was also treated with the Acid-Lye-Acid treatment (Arts 1986, 170; Lanting & van der Plicht 1996, 106). The first two dates probably refer to dates obtained from charcoal originating in the Usselo-layer. The third originates from a concentration of charcoal that has '*larger chunks of charcoal than elsewhere in the Usselo-Layer*' (Lanting and van der Plicht 1996, 106). This may indicate it originates from a dugout hearth, and would therefore be associated with the lithic material.

Figure 4.5: Picture from the original research in 1953

Picture courtesy of E. Rensink, currently present at the RCE Amersfoort (former ROB)

A total of three pictures are still available from the original excavation, two of which are depicted here. These were present in the archives of the RCE, the former ROB (national heritage agency) Amersfoort. The pictures were archived under ARCHIS-Waarneming 37204, corresponding to 'Bohmers 1961' on figure 4.3. This likely refers a test trench dug by Bohmers for stratigraphy. No documentation on the location of the finds by Wouters or Bohmer other than the ARCHIS-reports remains, neither does any documentation on the charcoal samples other than what is provided in Lanting and van der Waals 1996.



Legend (Steur & Heijink 1997):

Rd90C: (ooivaaggrond) Young soil in clay without influence from the groundwatertable

Zb21: (vorstvaaggrond) Primary rich riversands without loam or chalk.

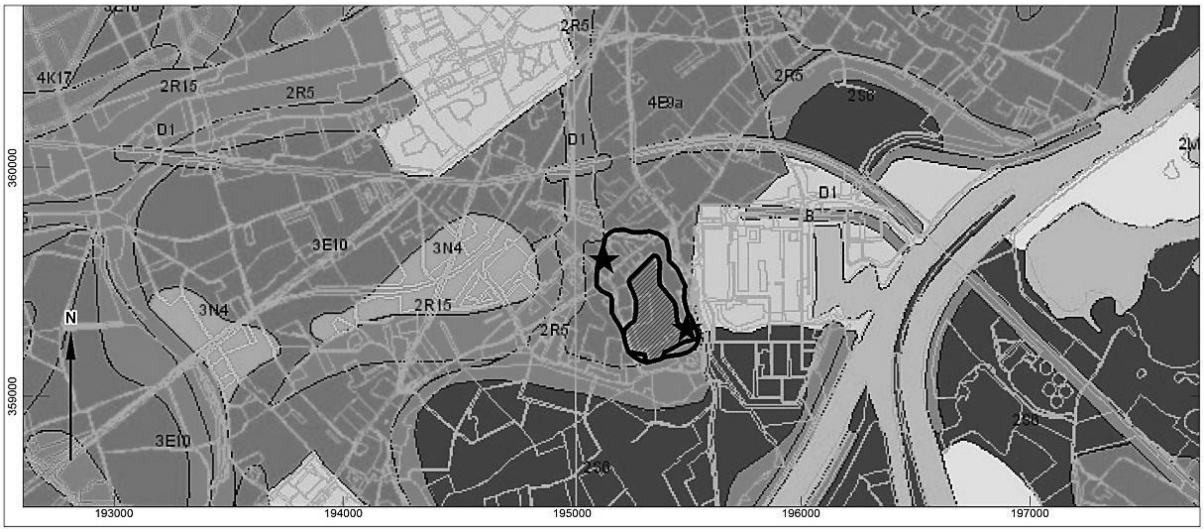
bEZ23: (hoge bruine enkeerdgronden). Thick (>50cm) layers of humic sediment resulting from human activities without influence from the groundwatertable.

pKRn: (oude rivierkleigronden) Old river clay deposits on top of sandy soil.

BKd25: (radebrikgronden) clayey deposits with lutum and iron intrusion

Y23b (moderpodzolgrond): Rich sand deposits with podzolisation and deep groundwatertables.

Figure 4.6: Soil chart HH-area (Source: Archis-II)



Legend:

3E10: low terrace with short, subtle ridges. Covered with coversand.

4E9a: low terrace with short, subtle ridges.

2R5: Flat, shallow creekbeds.

2S6: low-lying riverbeds.

3N4: Blown-out depressions.

Figure 4.7: Geomorphological chart HH-area (Source: Archis-II)

The landscape of HH is characterized by the edges of the Allerød Meuse-terrace. The extent of this terrace is clearly visible on both the soil- and the geomorphological maps (see figures 4.6 and 4.7). The site is located between two old meander gulleys. Old creek beds are located to the north and northeast of the site, clearly visible as flat, shallow depressions on the geomorphological map. These fossil creek beds are filled with old clay. The gulleys are probably remnants of Meuse beds from the Pleniglacial braiding system. It is possible that these creek beds were still active during the Allerød as part of the dehydration system of the Peelhorst area. If this is the case, Horn Haelen is located just northeast of where a creek enters the Meuse riverbed.

The current soil profile is characterized by disturbed podzolised sand deposits. The podzol-soil is covered by clay deposits of unknown age, possibly the result of periodic river flooding during the Younger Dryas or Holocene. Both the podsolization and the clay deposits postdate the Allerød period. The podzol was described by Wouters as a 'heath-podzol', which probably corresponds with the moderpodzol indicated on the soil map. Two artifacts were recovered *in situ*, ca. 40 cm beneath the podzol-horizon.

4.4 Research History

In 1947, A. Bohmers is the first to mentions a single Gravette point found in the vicinity of Horn (Bohmers 1947). In 1953, based on the article by Bohmers, Wouters starts to search for Late Paleolithic artifacts in the vicinity of Horn. The first artifact was found in the masonry sand for the construction of a power plant (Wouters 1953, 3-4). Based on the report by Bohmers and the artifact from the masonry sand, Wouters starts to search the high areas around the Haelener swamp, where he discovered the site of Horn-Haelen. Wouters published the flint material from the site in 1953 (Wouters 1953, 3-4). In this publication, the find of twelve Gravette points, at least four burins and at least five scrapers are reported. Wouters was not the only person to collect material from the site. J. Thissen also collected finds. The artifacts from the Thissen collection mentioned by Wouters in 1953 were traded into Wouters's collection later. He states this in his letter to Waterbolk: *"Also, in the first years, while i still lived in Roermond, i have traded a significant amount of artifacts with the sculptor Thissen to complement each others collections (a.o. Echt, Montfort, Neer and Horn-Haelen)"* (Waterbolk 2003, 210, translated). This was confirmed by L. Thissen, who said that no artifacts from HH are present in the collection and that these were probably sold to the *BAI (now* GIA*)* before 1960 (*pers. comm.* L.(Laurens) Thissen, 2013). After Bohmers started cooperating with Wouters around 1953, he excavated at Horn-Haelen. The year of excavation is not clear: dates on some artifacts suggest 1955, whereas Bohmers himself mentions 1961 (Bohmers 1961). These excavations took place at the location of the mason sand pits. The exact nature of the activities by Bohmers is unclear; there is no specific information in his publications nor is there any documentation on the excavations.

Another, unknown amateur-archeologist collected at the same site around 1950. This is documented by notes related to the Horn-Haelen material in the Smeets collection. The artifacts from the Smeets collection are marked with the label "HB" (Haelener Broek), which was confirmed both by Smeets' personal notes and by S. Silvrants to correspond with the site studied by Bohmers, Wouters and Thissen.

Smeets notes:

4 Juni 1971

Deze door de PLEM grotendeels afgegraven streek levert toch nog wat materiaal op. Wat door Dhr. P. Wouters als Tjonger gedetermineerd is word naast enkele afslagen vond ik hier in mei vorig jaar een RA-Steker van grijsblauwe vuursteen.

8 Juli 1971

Van een collega een hele sigarenkist materiaal overgenomen die op deze coördinaten zijn gevonden. Hieronder bevonden zich 4 gravettespitsen, 6 burijnen, prachtige korte en lange ??krabbers alle uit dezelfde periode. Als omschreven door A. Wouters, in zijn boek Meso en Paleolithicum in Midden Limburg.

Overwegend jong paleolithisch aan de oppervlakte gekomen door afgr. Rond 1950 TBV zandwinning voor de toendertijds te bouwen PLEM centrale, 1,5 sigarenkist afslagen, een vijftal burins, 2 afgeknotte klingen, 4 gravettespitsen enkele korte en lange klingkrabbers enkele met steilretouche.

4.5 *Documentation and material*

Material from Horn-Haelen is present in at least two collections: the former BAI-collection, now stored at the GIA (Groningen Institute of Archaeology) at the University of Groningen and in the Smeets collection, stored at the Leudalmuseum, St. Elisabethshof, Haelen.

Table 4.1: Artifact count from HH

Tool Type	GIA	%	Smeets	%	Total
Flake	31	33,7%	591	78,0%	622
Blade(let)	45	48,9%	117	15,4%	162
Core	16	17,4%	50	6,6%	66
Tot. Waste	92	30,6%	758	89,8%	850
Flk (Ret.)	14	6,7%	7	8,1%	21
Bld (Ret.)	12	5,7%	2	2,3%	14
Scraper	80	38,3%	31	36,0%	111
Borer	7	3,3%	1	1,2%	8
Burin	29	13,9%	28	32,6%	57
Comb. T.	2	1,0%	1	1,2%	3
Point	56	26,8%	16	18,6%	72
Other	9	4,3%	0	0	9
Total Tools	209	69,4%	86	10,2%	295
Total	**301**		**844**		**1145**

Material from the GIA-collection is stored at the University of Groningen. The material is accompanied by one counting list with statistics by Bohmers. The list counts fewer artifacts than present in the collection. The total number of artefacts in the collection that are assigned to the site of Horn-Haelen is 301 (see table 4.1).

The artifacts in the GIA collection are numbered HH(*Horn-Haelen*)-1955(*date*)-V(*find*)-XXX(*respective find number*). A total of 157 artefacts are marked with the date '1955', five others with '1953', a further 233 artefacts have no date on them, although they do have a find number. Several artifacts marked '1955' were already depicted in Wouters' 1953 publication; it is therefore probable that the date refers to the date of purchase, rather than the date of recovery. The BAI-numbers would have originally corresponded with numbered points on the excavation map. However, no such excavation map is present in the GIA-collection (Pers. Comm. K. van der Ploeg).

In addition to the artifacts, drawings are also present in the GIA collection. These include four sheets of drawings from J. Thissen dating to 1954 and a single sheet of drawings from A. Wouters from an unknown date. The artifacts depicted on these sheets correspond with the artifacts depicted by Wouters (1953). Most of the artifacts drawn by Thissen were found in the GIA-collection, with the exception of a burin (nr. 18) and a short blade endscraper (nr. 22). The artifact Nr. 26 (V434), is depicted mirrored by Wouters (1953, II-7). The number of artifacts drawn by Wouters that are absent in the GIA-collection is more significant (n=6, one third of the artifacts). Tables 4.2 and 4.3 present the GIA-find numbers and the corresponding numbers in the drawings of Thissen and Wouters.

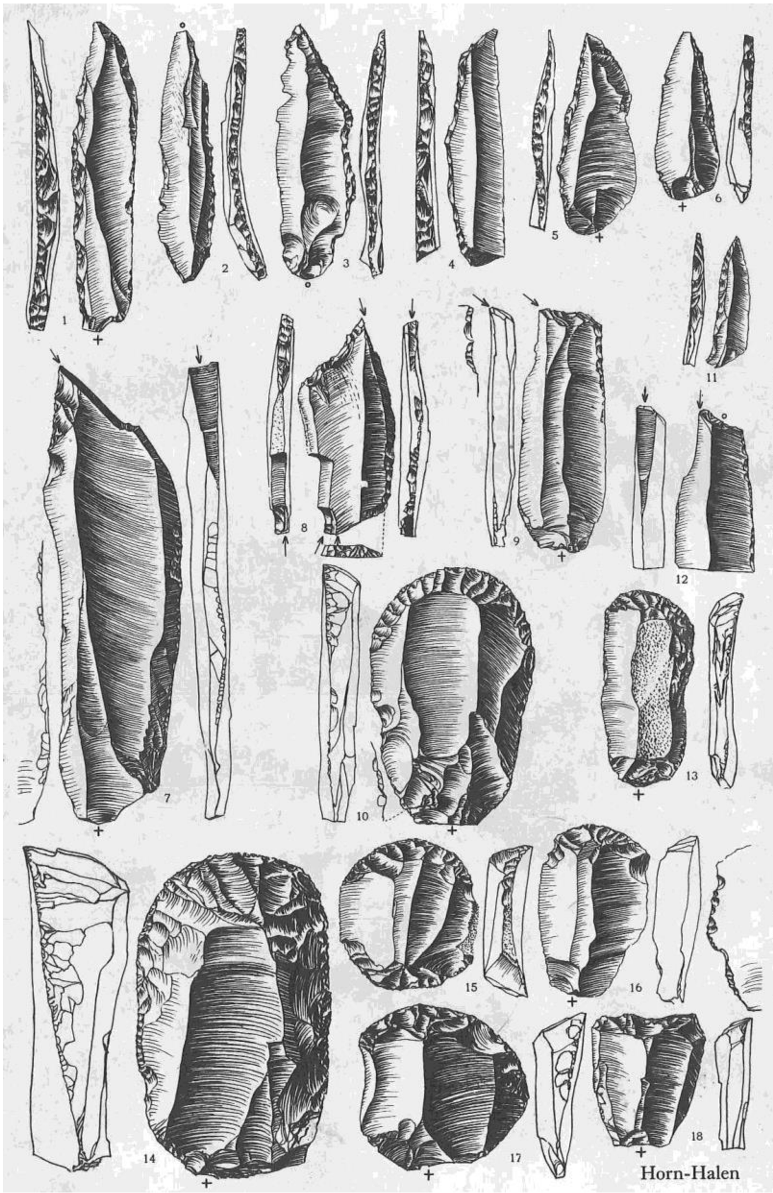


Figure 4.8: Flint artifacts from HH (Wouters Collection)

Drawn by: A.M. Wouters

The drawing was published with permission of the Rijksuniversiteit Groningen, Groninger instituut voor de Archeologie

Table 4.2: Corresponding numbers from drawings and artifacts in the Thissen collection

Dr. T.	W'53	GIA-Nr	Dr. T.	W'53	GIA-NR	Dr. T	W'53	GIA-Nr
1		399	19		423	37		461
2	I-4	397	20		451	38		453
3		400	21		439	39		457
4	I-6	401	22	II-1	-	40		448
5		401	23		444	41		452
6		402	24		437	42	V-22	426
7		395	25		436	43		430
8		398	26	II-7	434	44		419
9	I-12	414	27	II-4	326	45		436
10	I-11	(no nr.)	28		465	46		409
11		428	29	II-2	438	47		408
12		411	30	II-10	498	48		464
13		416	31	II-9	(no nr.)	49	II-5	471
14		415	32		450	50		441
15		412	33		434	51		454
16		432	34		440	52		459
17	VI-15	413	35		463			
18		-	36		469			

Dr.T. = Drawings by Thissen (Fig. 4.14), W'53 = Artifacts depicted by Wouters (1953), GIA-Nr = the corresponding number on the artifact in the GIA-collection

Table 4.3: Corresponding numbers from drawings and artifacts in the Wouters collection

Dr. W.	W'53	GIA-Nr	Dr. W.	W'53	GIA-NR	Dr. W.	W'53	GIA-Nr
1	I-3	-	7		-	13		1227
2	I-8	1249	8		1255	14		1274
3		1252	9		1259	15		1264
4	I-9	1251	10		1269	16		-
5		1261	11		1263	17		-
6		-	12		1256	18		-

Dr.W.=Drawings by Wouters (Fig. 4.8), W'53=Artifacts depicted by Wouters (1953)
GIA-Nr = the corresponding number on the artifact in the GIA-collection

The tools were all stickered, while the waste products are stored in cigar-boxes with the site name written on them. The Smeets collection contains a total of 844 artifacts.

4.6 *Blank production and technology*

Blank production is the production of flakes and blades (blanks) by means of core reduction. In an attempt to reconstruct the *Chaîne opératoire,* blank production has been studied on the material from the Smeets-collection.

4.6.1 *Cores*

A total of 66 cores was studied from both the GIA (n=16) and Smeets (n=50) collections (See table 4.4). Of the 66 cores, 27 were described as flake cores and 39 as bladelet-cores. A core was described as a bladelet-core if one or more bladelet negative removals could be observed, regardless of the number of flake negatives.

Table 4.4: Cores by collection and production type HH

	GIA	%	Smeets	%	**Total**	**%**
Flake	4	14,8 %	23	85,2 %	**27**	40,9 %
Blade(let)	12	30,8 %	27	69,2 %	**39**	59,1 %
Total	16	26,2 %	50	75,8 %	**66**	100 %

These measures are shown per core shape on figure 4.4, the core shape types in this figure correspond to those presented by de Bie and Caspar (2000). The height of the exploited surface varies from 12 to 69 mm with an average of 37,1 ± 10,0 mm. The width of the cores varies between 9 and 49 mm, with an average of 28,0 ± 8,4 mm. The thickness of the cores varies from 7 to 46 mm, with an average of 19,2 ± 7,2 mm. No significant correlation between dimension and core type is observed. It is likely that various flake cores were also used as blade cores in earlier phases of reduction, as is evident from possible blade negative removals on several flake cores.

Cores were also described according to their shape, with globular and irregularly shaped cores being the most common types. No relation between core shape and core size could be observed (see figure 4.9).

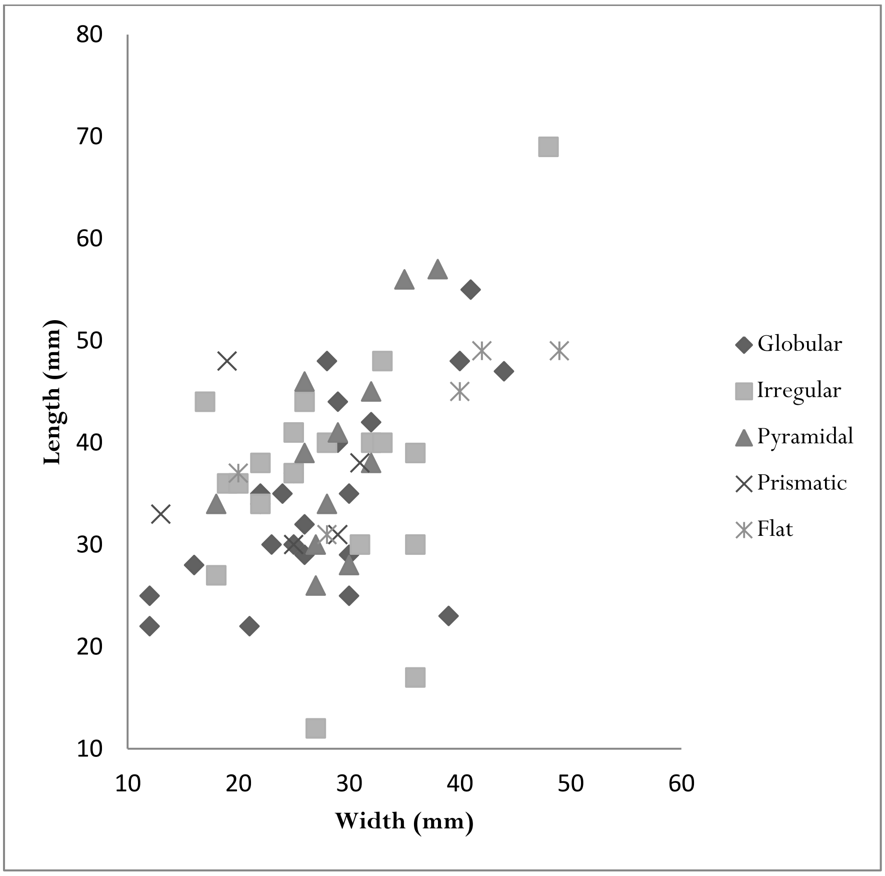


Figure 4.9: Core dimensions by shape HH

The core angles vary between 50º and 100º with a peak around 80º (see figure 4.10). The most common reduction angles were observed between 70 an 90°.

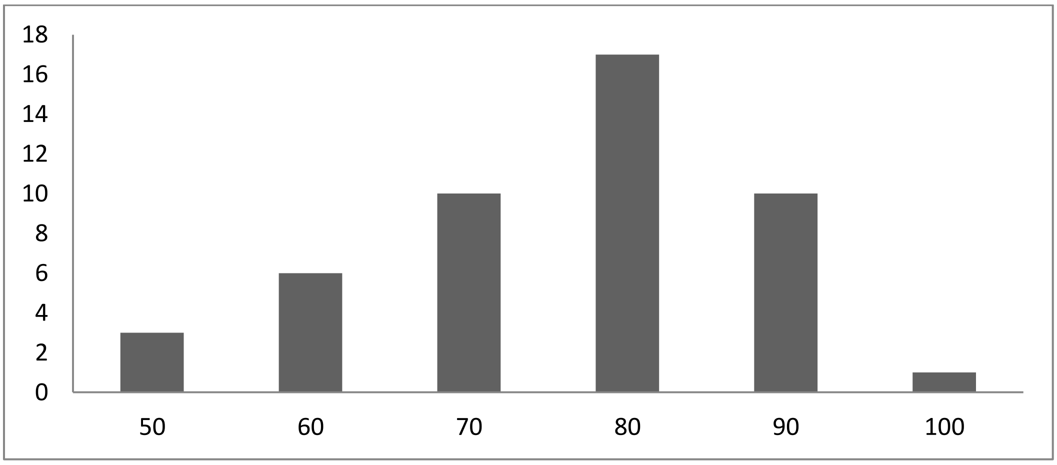


Figure 4.10: Core reduction angles HH

Most cores were exploited from one platform (unipolar), but cores with two or more platforms are also common. Core shapes are variable, with globular and irregular shapes as the most common types. The combination of unipolar, bipolar and multipolar core exploitation is indicative an opportunistic exploitation strategy. Core reduction is evenly divided between unipolar and bipolar/multipolar knapping (see table 4.5).

Table 4.5: Core Characteristics HH

	Morphology						
	Prismatic	*Pyramidal*	*Globular*	*Flat*	*Irregular*	Total	%
Unipolar	1	9	10	2	11	33	50 %
Bipolar	4	1	8	3	5	21	32 %
Multipolar	1	2	6	0	3	12	18 %
Total	6	12	24	5	19	66	100%
	Type of Production						
Blades	6	10	15	0	8	39	59 %
Flakes	0	2	9	5	11	27	41 %
Total	6	12	24	5	19	66	100%
%	9 %	18 %	36 %	8 %	29 %	100%	

The degree of standardization is very poor. Both opportunistically and systematically reduced cores occur. It is probable that several flake-oriented cores were only tested. On one core, a pseudo-crest was observed on the reduction surface, indicating that pseudo-crests were also used to modify the reduction surface rather than initial core preparation.

4.5.2 Flakes and blade(lets)

The largest category of artifacts is that of the flakes. A total of 591 unmodified flakes or fragments are present in the Smeets collection, while flakes are nearly absent in the GIA collection.

Table 4.6: Blanks by collection and production type HH

	GIA	%	Smeets	%	**Total**	**%**
Flake	31	46,3 %	591	83,7 %	**622**	80,5 %
Complete	*31*	*100 %*	*145*	*24,5 %*	*176*	*28,3 %*
Broken	*0*	*0 %*	*446*	*75,5 %*	*446*	*71,7%*
Blade(let)	36	53,7 %	115	16,3 %	**151**	19,5 %
Complete	*27*	*75 %*	*44*	*38,3 %*	*71*	*47,0 %*
Broken	*9*	*25 %*	*71*	*61,7 %*	*81*	*53,0 %*
Total	67	8,7 %	706	91,3 %	**773**	100 %

A sample of 145 complete flakes from the Smeets collection was measured in length and width. The other 446 ‘fragments’ include splinters, potlids and broken flakes. Flake length varies from 15 to 63 mm with an average of 31,9 ± 8,9 mm. Flake width varies from with an average of 23,5 ± 7,1 mm.

Thirty six blade(let)s from the GIA collection were dated to the Paleolithic based on raw material use, patination and morphology. Based on raw material use, patination and the associated artifacts in the Smeets collection, it is probable that the great majority of these blades date to the upper Paleolithic. A sample of 115 blade(let)s from the Smeets collection were studied. The material from the GIA-collection seems to have been sorted by Bohmers and is therefore not representative of the original assemblage. The blades from the Smeets collection are presumed to be representative of the blade(let)s that were originally present on the site of HH. The larger blade(let)s will be slightly overrepresented due to their visibility in surveys.

Blade length varies from 20 to 68 mm, with an average of 43,6 ± 10,6 mm. Blade width varies from 7 to 31 mm, with an average of 16,1 ± 5,3 mm. Blade thickness varies from 2 to 26 mm, with an average of 5,4± 2,5 mm (see figure 4.11).

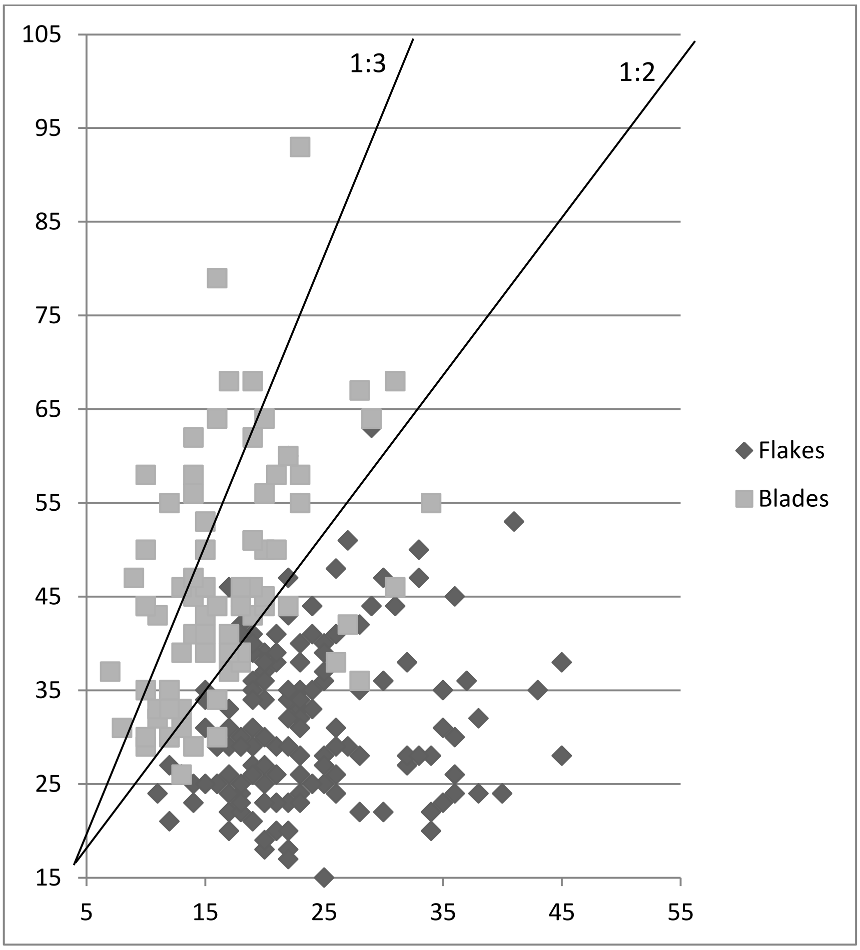


Figure 4.11: Flake and bladelet dimensions HH

Of the studied blade(let)s, 44 are in complete state (these are represented in figure 4.11). Of the remaining 71 fragments 25 % are distal (n=18), 24 % medial (n=17), 36 % proximal (n=46) and 4 % indeterminable (n=3).The proximal fragments have also been incorporated in the technological analysis for the platforms.

The length and width of the 44 complete blade(let)s and 145 flakes are presented in figure 4.11. All blanks that appear to be part of a laminar sequence have been marked as blades, while irregular products were marked as 'flakes'. Blades and bladelets are distinguished based on width, a laminar product is defined as a blade if its width exceeds 15mm. Based on these criteria, 46 % of the laminar output (n=72) was described as bladelets, while the other 54 % (n=84) are blades. Although two separate 'clouds' for the laminar and flake-component are not observed, several long narrow blades are present. At least 24 bladelets fall outside of the normal distribution, indicating these are part of a blade-oriented reduction rather than an reduction sequence oriented on laminar flakes alone.

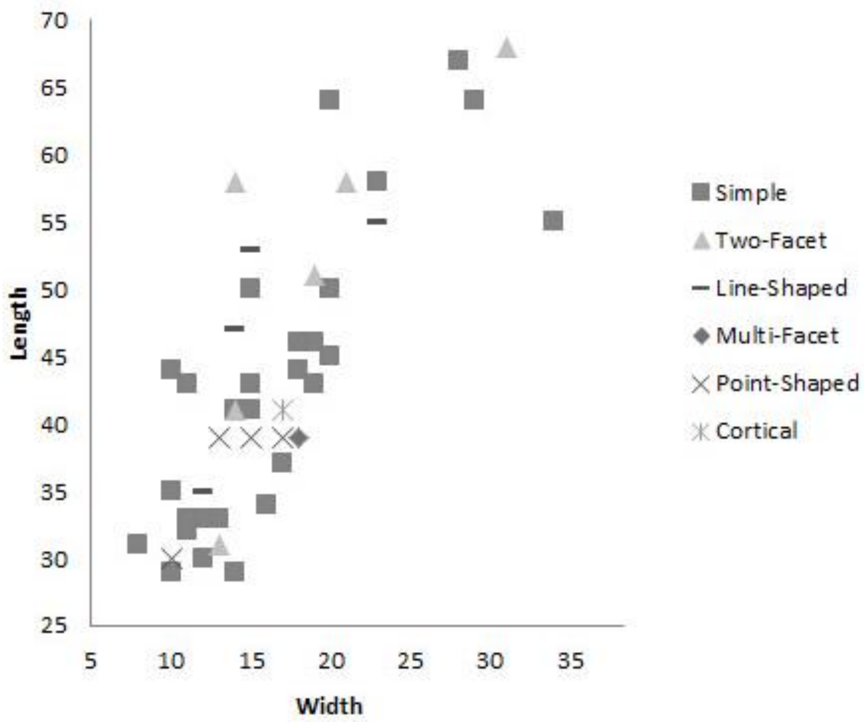


Figure 4.12: Laminar dimensions and platform types HH

For 68 bladelets, the platform type could be determined. The most common platform type is the simple, unmodified platform (n=44; 65 %), followed by the two-facet (n=13, 19 %), the line- (n=9, 13 %) and point-shaped (n=8, 12 %) platforms. Cortical (n=4, 6 %) and multi-facet (n=2, 3 %) platforms are rare (see figure 4.12). Crushing or abrasion was observed only rarely; two platforms were crushed (3 %) and six abraded (9 %), while the largest part (n=60) of the platforms were unmodified. Lipping was not observed.

The shape of the edges could be observed on 108 blades. Parallel edges (n=62, 57 %) are more common than irregular edges (n=46, 43 %) were observed in equal numbers. The profile of the bladelets was observed on 93 bladelets, a distinction was made between bent (n=11), slightly bent (n=37) and straight (n=45) profiles, no single pattern emerged.

The pronunciation of the bulb of percussion was observed on 34 blades. On four of these blades, no bulb was observed. On 18 (53 %) of the blades, a diffuse bulb was observed, while on 12 (35 %) blades, a pronounced bulb was observed.

Pseudo-cresting was observed on three bladelets, a core face and a burin. This cresting is always only on one side of the triangular cross-section of the bladelet. It is probable that these pseudo-crests are used for adjusting the reduction surface rather than core preparation.

Based on the absence of lipping, combined with the lack of long, regular blades, it is likely all blades at HH were produced using a stone hammer. Both indications for soft and hard stone hammer percussion were observed. This includes the occurrence of both pronounced and diffuse bulbs, both parallel and irregular edges and both bent and straight profiles in equal numbers.

4.7 Blank consumption and Typology

A total of 50 scrapers, 28 burins, 34 points, 1 borer and 19 other retouched pieces from the Smeets- and the GIA-Collection could be attributed to the late Paleolithic with certainity. (See table 4.2 and table 4.3). The points from the Smeets collection include only Laterally Modified Pieces, which can be dated to the Late Paleolithic. The GIA-collection also includes a series of microlithic point types which can be dated to the Mesolithic. As this study focuses on the Late Paleolithic component, these microliths will only be described typologically.

4.7.1 Laterally Modified Pieces

The implements that are classically regarded as the typical point type are the so called LMP (laterally modified pieces). A total of 31 laterally modified pieces were recovered. Another five truncated pieces (long B-Points) are also interpreted as projectile elements and could also be dated to the Late Paleolithic (see table 4.7).

Table 4.7: Point types HH

Type Bohmers	Type Caspar and de Bie	GIA	Smeets	**Total**	
Tjonger	*Curved backed point*	5	1	6	16,7 %
Gravette	*Straight backed point*	2	3	5	13,9 %
B-Point	*Truncated point*	3	2	5	13,9 %
Kremser	*Curved backed point*	1	0	1	2,8 %
Creswell	*Angle backed point*	2	3	5	13,9 %
Azilian	*Bipointe*	2	0	2	5,6 %
Gravette	*Penknife Point*	2	0	3	8,3 %
Backed Bld.	*Backed Bld*	4	3	7	19,4%
LMP-Fragment	*LMP-Fragment*	0	3	3	8,3 %
Total		**21**	**15**	**36**	

The length of the LMP varies from 20 to 80 mm, with an average of 43,7 ± 17 mm. The width varies from 7 to 20 mm, with an average of 12,4 ± 3,6 mm. The thickness varies from 2 to 8 mm, with an average of 4,8 ± 1,3 mm.

De Bie and Caspar (2000) divide LMP in slender (Width < 12 mm, Thickness < 6 mm) and large LMP (Width > 12mm and/or Thickness >6mm). According to their typology 12 out of 36 points recovered at HH can be classified as Large LMP (see figure 4.13).

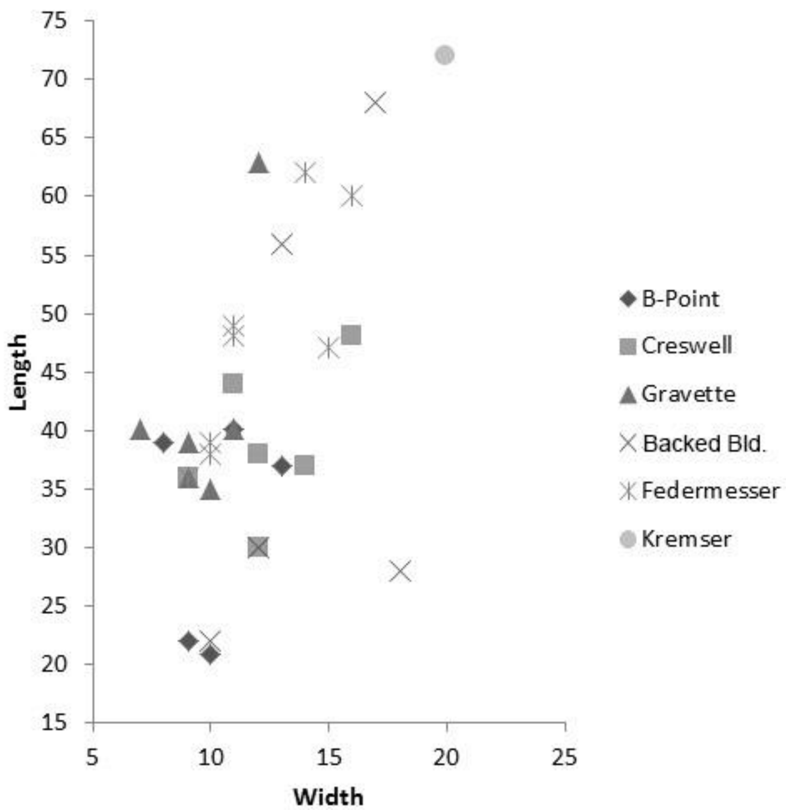


Figure 4.13: Point dimensions HH by Type

On 38% of the points where point orientation was observed, the point was oriented on the proximal side of the blank. No preference for the backed side was observed, on 46% of the LMP, the left side was backed, on the other 54% the right side was backed. For the fabrication of these LMP, blanks with a triangular or trapezoidal cross-section seem to be preferred, as these constitute 94 % of the LMP, while only 87 % of the total observed blanks have a triangular or trapezoidal cross-section. The two artifacts interpreted as *bipointes* could alternatively be described as Federmesser-points (Figure 4.14-5,6).

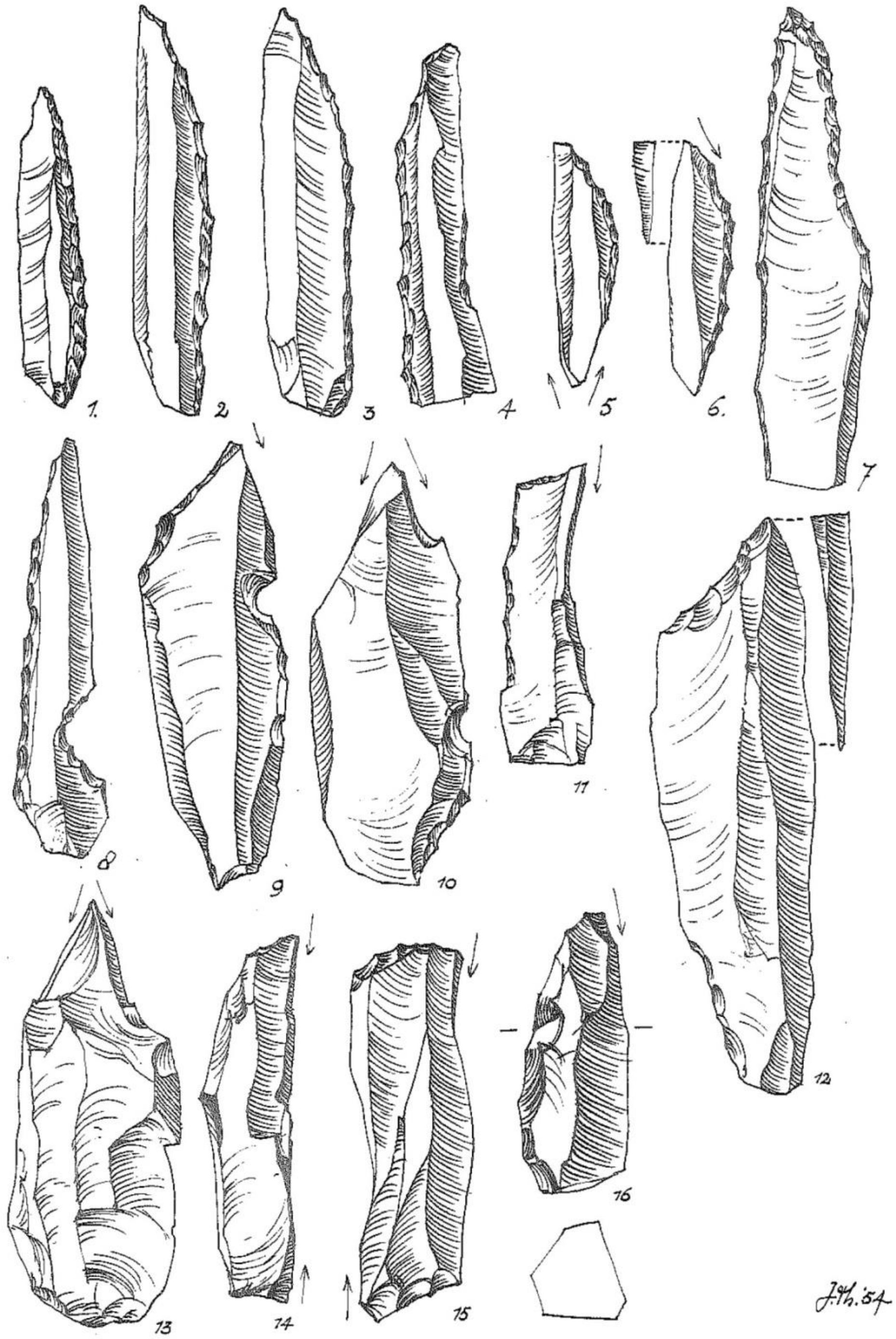


Figure 4.14: Flint artifacts HH from the GIA-collection

Drawn by: J. Thissen

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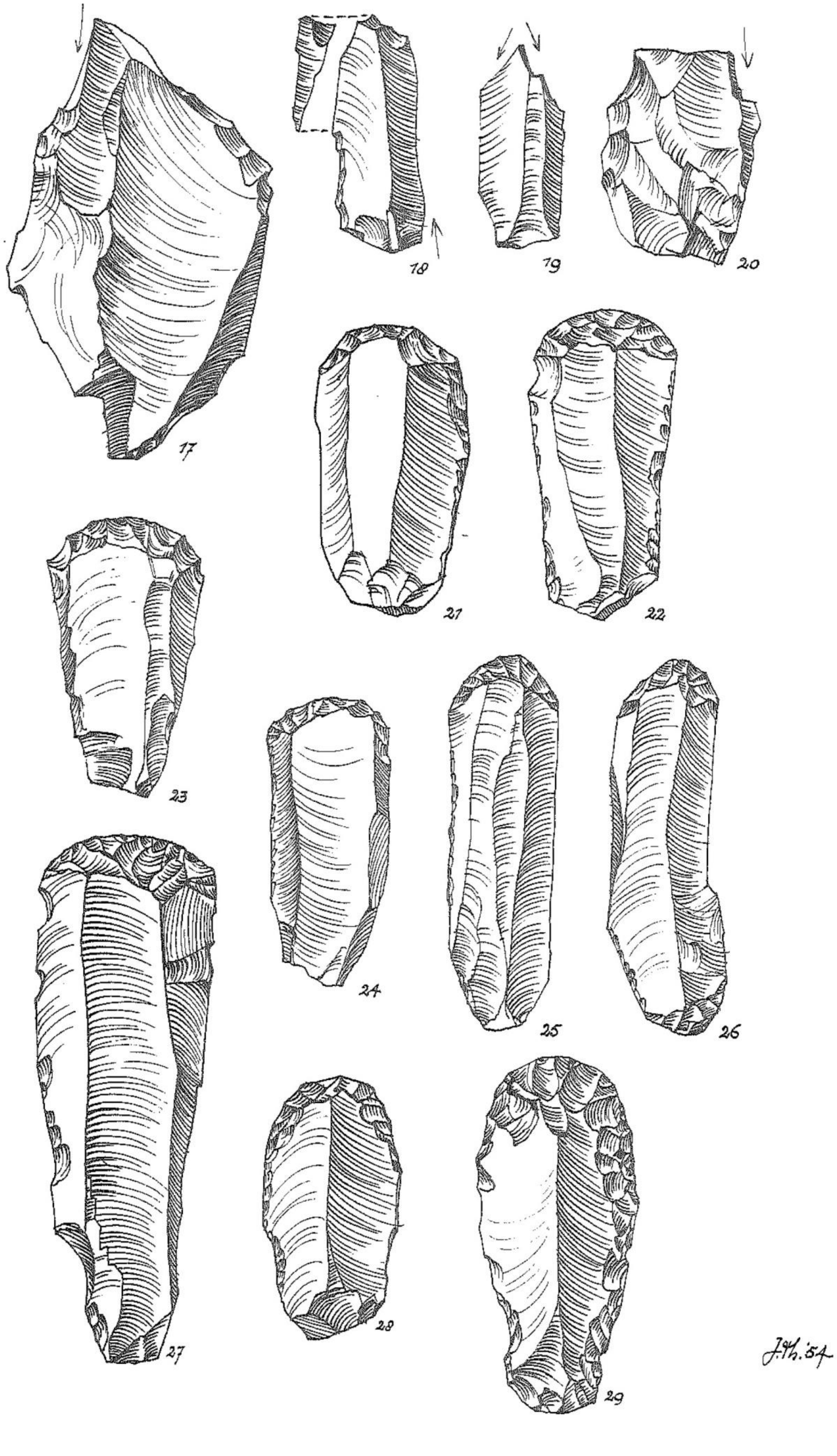
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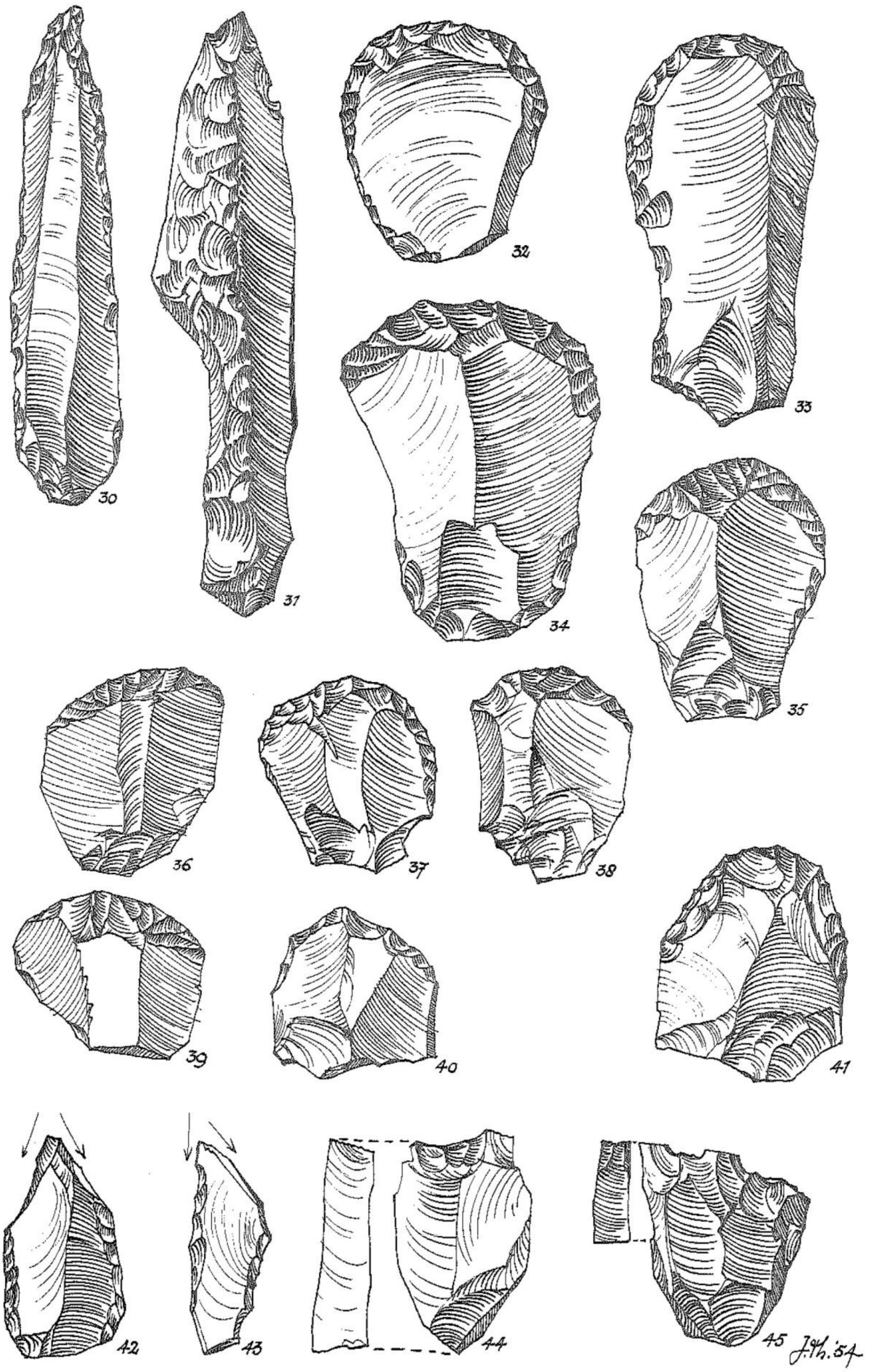

Figure 4.14: Flint artifacts HH from the GIA-collection

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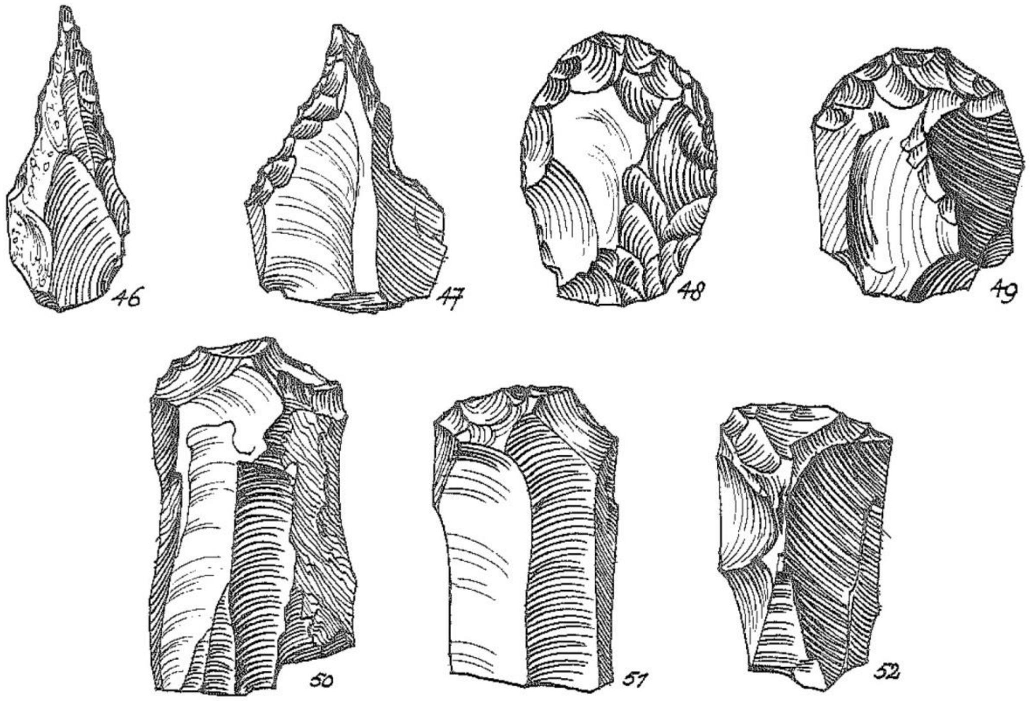

Figure 4.14: Flint artifacts HH from the GIA-collection

Drawn by: J. Thissen

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Two points (Figure 4.14-5,6) were drawn as having a 'secondary burin blow'. This lateral-edged burination has been established in various shooting experiments as form of impact fracture (de Bie and Caspar 2000, 128). These points were both classified as possible bipointes.

Figure 4.15: Notched unfinished Penknife-point from HH

A single 'penknife-point' made from RMU1 is interpreted as a semi-finished product (see figure 4.15). The artifact appears to be manufactured using the microburin blow technique (Wilde and de Bie 2010). This notch is oriented on the proximal side of the blank, seemingly to produce an arrowhead without a bulb of percussion, making it easier to haft. The origins of the microburin blow technique have already been established to the upper Paleolithic (Wilde and De Bie 2010). However, the 'true' (intentional) microburin blow technique is thought to appear later, during the Mesolithic. The artifact would argue against Wilde and de Bie's theory that microburin-like knapping accidents only produced shallow notches due to the resistant bulb of percussion when backing the point (*Idem*, 739).

4.7.2 Scrapers

The scrapers are the most numerous tool type on HH, a total of 111 scrapers were studied, 49 of which could be attributed to the Late Paleolithic based on patina, morphology and raw material use. It is highly likely that more Late Paleolithic scrapers are present among the 62 other scrapers, but as these cannot be dated to the Late Paleolithic with certainty, these are not taken into account here. Scraper types are dominated by simple flake scrapers and thumbnail scrapers, while short blade scrapers also occur frequently (see table 4.8).

Table 4.8: Scraper types HH

	GIA	Smeets	**Total**	%
Flake endscraper	12	16	**28**	57,1 %
Double Flake Endscraper	1	1	**2**	4,1 %
Short blade scraper	2	6	8	16,7 %
Long blade scraper	2	1	3	6,1 %
Thumbnail scraper	1	6	**7**	14,3 %
Core scraper	1	0	1	2 %
Total	19	30	**49**	100 %

The Length/width distribution of scrapers by type is depicted in figure 4.16. Scraper length varies between 11 and 86, with an average of 34,0 ± 12,3 mm. Scraper width varies between 11 and 40, with an average of 23,5 ± 5,7 mm. Scraper thickness varies from 4 to 20, with an average of 8,4 ± 3,2 mm (see figure 4.16).

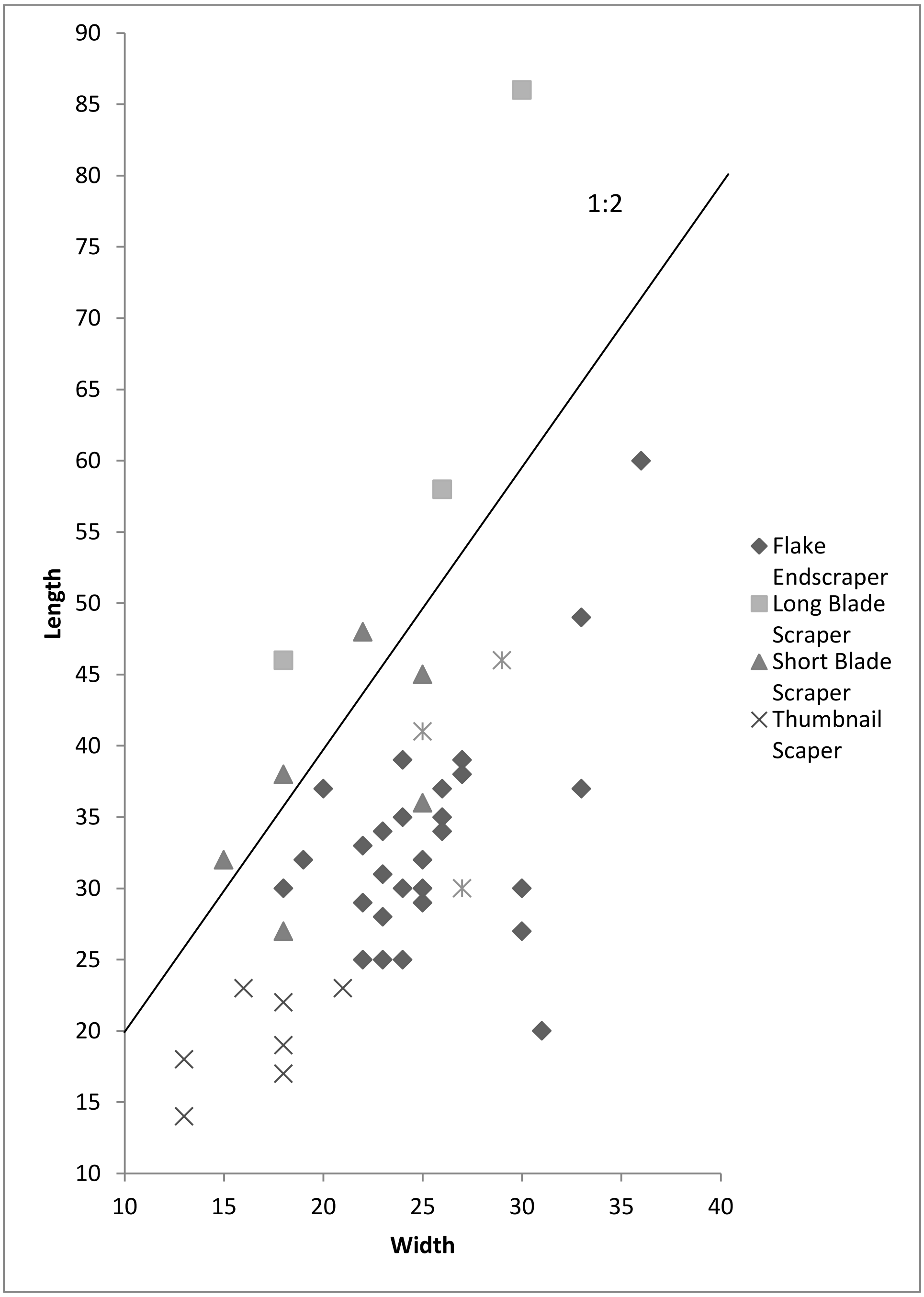


Figure 4.16: Scraper dimensions by type HH

All scrapers can be classified as endscrapers, with a steep head in the shape of a fingernail. The scraperhead is usually made on the distal end of the blank. Only on a single scraper the head was oriented on the proximal end (3% of the sample). Scraperheads are often manufactured asymmetrically to the blank axis. An asymmetrically oriented scraperhead was observed on 50 % of the sample (n=40), with a strong preference for the right side (n=34, 85%).

Six of the scrapers (15 %) was laterally retouched, three times both sides were retouched, twice the left side and once the right side. This is possibly related to scraper hafting.

Irregular and multi-facetted blanks seem to be preferred for scrapers. 39% of the scrapers is manufactured on a blank with either an irregular or multi-facetted cross-section, while these cross-sections were only observed on 22% of the blanks. Triangular blanks seem to be selected against, as on only 36% of the scrapers a triangular cross-section was observed while on the blanks this is 64%. This is probably related to selecting large, wide flakes for scraper manufacture rather than thin bladelet-like blanks. This is confirmed by comparing the average blank width (19,6 mm) with the average scraper width (23,5 mm). Scraperhead angles vary from 60-70° (see figure 4.17). Resharpening may have caused the scraping angles to become steeper as the scraper finished its use-life. Scrapers were probably used for the working of animal hides, as is shown by the use-wear studies of Rekem (De Bie and Caspar 2000, 177).

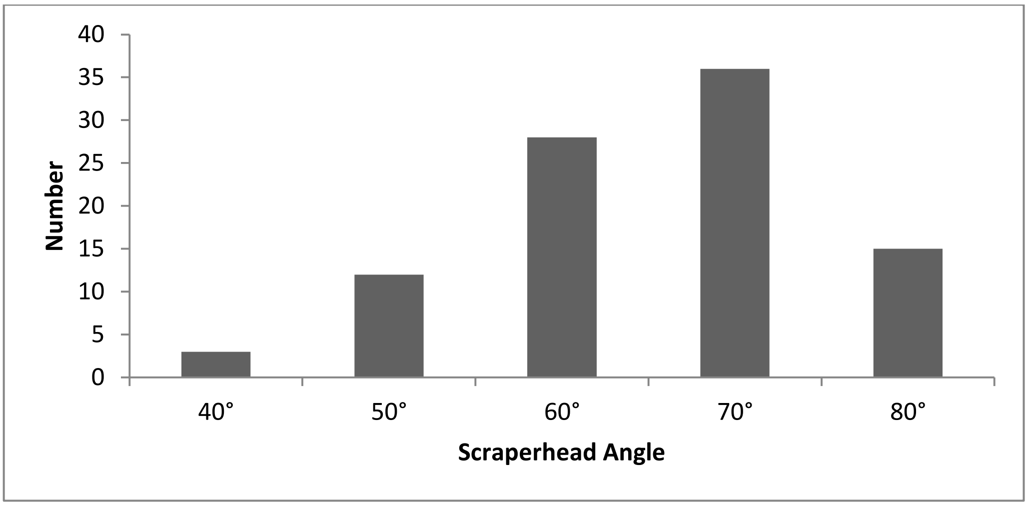


Figure 4.17: Scraperhead angles HH

To study whether cortical flakes were preferred as a modus for scrapers, the percentage of cortex on the dorsal side was also studied in a sample of 49 scrapers. On 44 (89,8 %), no cortex was observed, while on 4 (10,2 %) scrapers less than 50% of the dorsal side consisted of cortex. However, on 5 of the scrapers without cortex, natural surface from the core could be attested. This included heavily patinated core surface which had been altered by eluvial processes. This would indicate that the core surface did not fully consist of cortex.

4.7.3 Burins

A third important group of tools are the burins. A total of 57 burins were studied, 43 of which were dated to the Upper Paleolithic based on morphology, patination and raw material use. A total of 29 burins was studied from the GIA-collection, while 28 burins were studied from the Smeets collection. These burins include 53 burins on truncation, dihedral or natural breaks and four atypical pseudo-lacan burins (see table 4.9).

Table 4.9: Burin types HH

	GIA	Smeets	**Total**	**%**
Burin (various types)	27	26	53	92,9 %
Pseudo-Lacan Burin	2	2	4	7,1 %
Total	29	28	**57**	100 %

The length/width ratios of the various burins are depicted in figure 4.18. Burin length varies between 23 to 69 mm, with an average of 41,8 ± 12,1 mm. The width varies from 12 to 42, with an average of 20,4 ± 6,6 mm. Thickness varies from 3 to 12, with an average of 4,8 ± 1,3 mm.

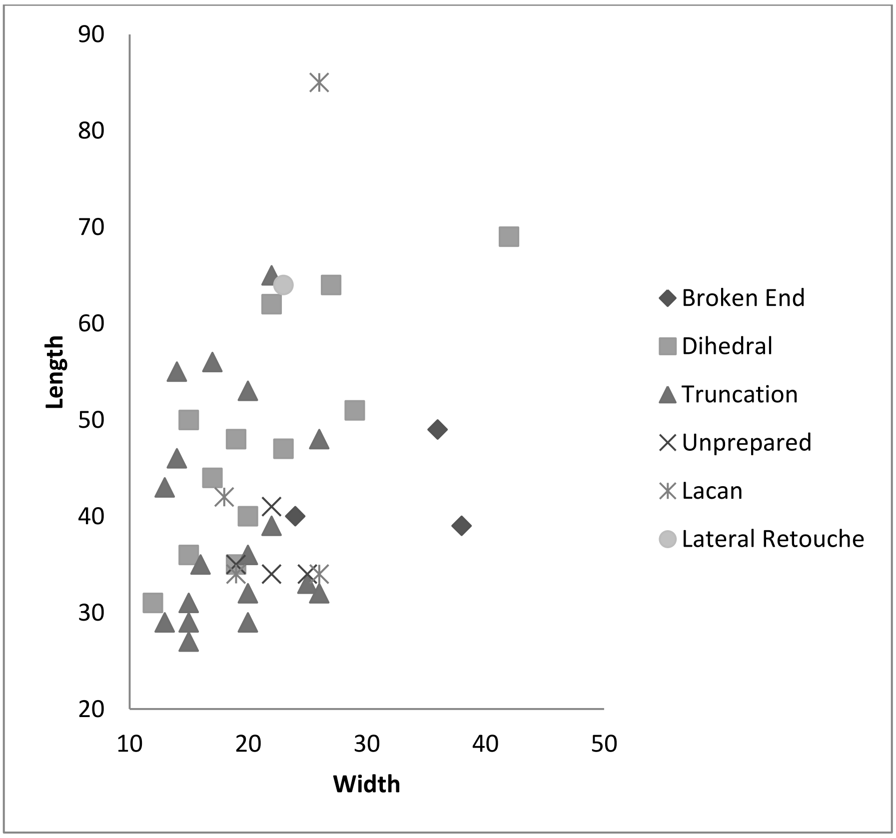


Figure 4.18: Burin dimensions by platform type HH

Like with the scrapers, trapezoidal (41%) or multi-facetted blanks (19%) were preferred for burin manufacture, constituting 60 % of the sample. Other cross-sections include irregular (22 %) and triangular (17%) blanks. As seen in table 4.10, burins are typologically classified according to the nature of their spall platforms. Core-burins are disregarded as these are very hard to distinguish from core fragments with a hinged bladelet negative. Typological criteria for burins are, however, somewhat arbitrary. Burins may have multiple, varying spall platforms. Multiple burin blows were observed on six burins, including a pseudo-lacan burin, with a burin blow on truncation at the basal side of the blank.

No clear trends can be observed when comparing the spall platform to the dimensions of the various burins, even though, some patterns were observed. It seems the smaller blanks were preferred for truncated burins, while the dihedral burins are usually made on somewhat larger pieces. Burins on broken ends also seem to have a greater width than the other platform type. The most common types of burins are the burins on truncation and dihedral burins, generally made from RMU1 (see paragraph 4.3). Typical lacan burins are described as burins with an elongated bevel that is both concave and oblique with truncation posterior to the burin blow when discarded (Tixier 1978, 74). De Bie and Caspar (2000) define pseudo-lacan burins for the Federmesser-site of Rekem. Although these types do not have the typical elongated bevel, the truncation posterior to the burin blow does allow for resharpening of the burin (ergo not being a simple burin on truncation, but not quite a true lacan-burin) (de Bie and Caspar 2000, 140-141).

Table 4.10: Burin numbers by platform type HH

Platform Type	Termination of spall scar on burin			Total
	Straight	Hinged	Plunged	
Unprepared	5	2	0	7
Break	3	1	0	4
Truncation	13	11	2	26
Pseudo-Lacan	1	3	0	4
Lateral Retouche	1	0	0	1
Dihedral	12	2	1	15
Total	35	19	3	57

A preference for the location of the burin blow was not observed; on 38% of the burins, the blow was oriented on the left side of the blank, on 31% the blow was oriented on the right side. With the other 31%, the burin bevel was oriented more or less symmetrical to the axis of the blank. Burin facets vary from 2 to 10 mm in width with an average width of 4,7 mm. The facet width does not seem to be standardized in any way, no patterns could be observed when comparing facet width with length, width, and platform type or facet obliquity. Lateral modification was observed on 15% of the burins, as burins were probably hand-held, this retouche was useful during use (de Bie and Caspar 2000, 143). Clear correlations between spall scar termination and platform type only occur on dihedral burins, where straight spall scars are the most common (see table 4.10). This can be explained though the direction of the burin blow, which was oriented to the outside of the blank. Moreover, the primary burin blow would have produced a right-angled platform for the second blow.

The lack of correlation between the criteria seems to indicate the burins were not standardized in state of rejection. Burin refitting at Rekem showed that burins are a very dynamic tool category, being a discarded product of a 'use-resharpening-reuse' cycle. In this cycle, the burin can be classified as different 'types' throughout its use-life. The burins were probably used on hard animal matter (bone), where these served as engraving tools. Secondary functions may include the working of hides and wood (de Bie and Caspar 2000, 153). De Bie and Caspar (2000, 160-163) concluded that burin typology, in the state of discard, represents the conclusion to a complex sequence of (re)sharpening, directed by functional demands, maintenance potential and courses of discard. This image is confirmed by the HH burins.

A single burin from the Smeets collection is atypical to the general trend. This burin is manufactured on a blade and the retouche was applied posterior to the burin blow. Based on this last criterion, the burin can be classified as an atypical lacan burin (de Bie and Caspar 2000, 142-143). A second pseudo-lacan burin was found in the GIA-collection

4.7.4 Truncated pieces

Seven blade(lets) from both collections are truncated on the distal end of the blade. These include two truncated blades from the Smeets collection and five more from the GIA-collection. The length of the pieces varies from 25 to 55mm, with an average of 39,4 $\pm$ 10,4 mm. The width varies between 13 and 22 mm, with an average of 17 $\pm$ 3,6 mm. Use-wear studies on truncated pieces at Rekem have produced no results. Truncated pieces could be interpreted as unfinished burins or marginally retouched scrapers. Other explanations for their occurrence include 'spontaneous retouche' during blank production (Beuker 2010, 93).

4.7.5 Borers

A total of nine borers were recovered from the HH site, only one of which by J. Smeets. It is highly probable that the majority of these borers date to the Mesolithic. Three borers could be attributed to the late Paleolithic, two from the GIA collection and one form the Smeets collection. Borer length varies from 37 to 40 mm, the width varies from 16 to 10mm. All borers were manufactured on flakes, and none had alternating retouche. In each case, the bit was oriented symmetrical in relation the axis of the blank. On one of the borers, the bit was broken off.

4.7.6 Combination tools

Two combination tools were recovered from the site, one by Smeets and one in the GIA-collection. These include a burin/borer (43x34x8 mm) and a burin/scraper (34x25x13 mm)

4.6.7 Other tool types

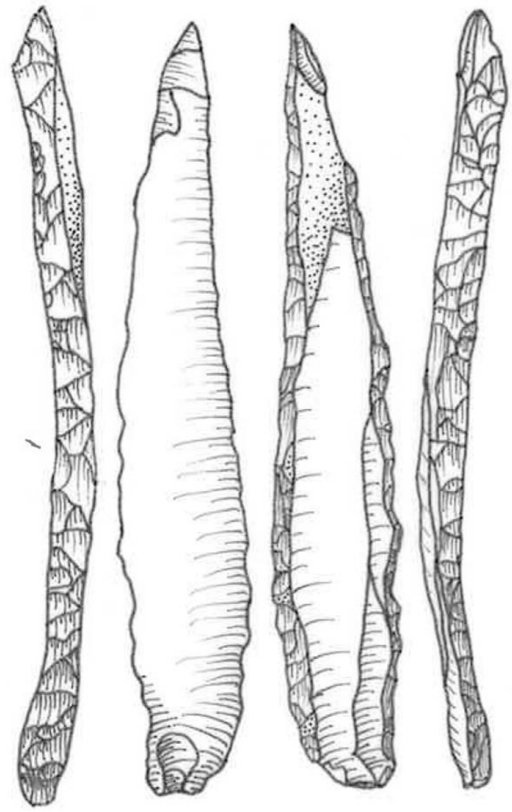


Figure 4.19: Zinken from HH (GIA(former Thissen)-collection, 1:1)

Drawing: D.D.L. Stoop

Other retouched objects include seven retouched flakes from the Smeets collection. These retouches often include marginal modification of the lateral or distal side of the blank. These retouches could be the result of 'spontaneous retouche' during blank production. Marginal lateral retouche was also observed on four blades and three flakes from the GIA collection. Other types of retouches include two denticulate blades, probably dating to the Mesolithic, also in the GIA-collection. Two laterally modified blades were classified as *zinken*. These are heavy, borer-like implements referred to in Dutch as 'Krombekstekers'. Two typical *zinken* from the GIA collection measure respectively 78x19x6 mm and 102x17x6mm (see figure 4.14-7 and figure 4.19). These are manufactured on long, regular blades with a trapezoidal cross-section.

4.7.8 Admixture

Mesolithic points (microliths) only occur in the GIA collection. These include four A-Points, eight B-Points, two C-Points, one D-Point, six triangular points, a *feuille de gui* and six trapezes. These trapezes include three asymmetric types, a rhombic type and two symmetric trapezes. Based on raw material use comparable to the Mesolithic points, at least two of the backed bladelets can also be dated to the

Mesolithic. This indicates a significant part of the material in the GIA-collection dates to the Mesolithic rather than to the upper Paleolithic. Based on raw material use and typology, at least five burins and 24 scrapers can be dated in the Mesolithic.

A small Neolithic component was also found in both. This includes a unifacal knife with flat-retouche and a round scraper in the Smeets collection. From the GIA-collection, nineteen scrapers could also be dated in the Neolithic. A single transverse point from the GIA-collection also dates to either the Mesolithic or Neolithic. Other artifacts found include a notched blade fragment and a possible strike-a-light.

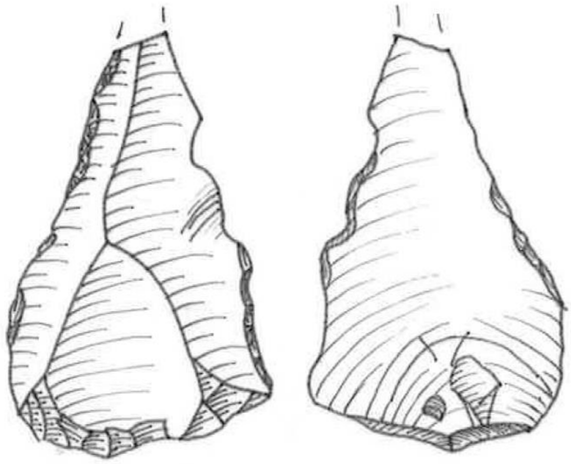


Figure 4.20: Levallois-point from HH (Smeets collection, 1:1)

Drawing: D.D.L. Stoop

In addition to artifacts from later periods, a single artifact from the Middle Paleolithic was also found at the site by J. Smeets (see figure 4.20). The artifact has been classified as a Levallois-point. This artifact clearly distinguishes itself from the rest of the material in patination and weathering. It is highly unlikely that any of the flakes can also be dated to this period. The artifact can therefore be considered a stray find.

Because of the admixture, only artifacts that can be ascribed to the Late Paleolithic based on typology, raw material use and patination are used in the samples for each tool category. The statistical analysis will therefore be mostly based on the material from the Smeets collection, where admixture is minimal.

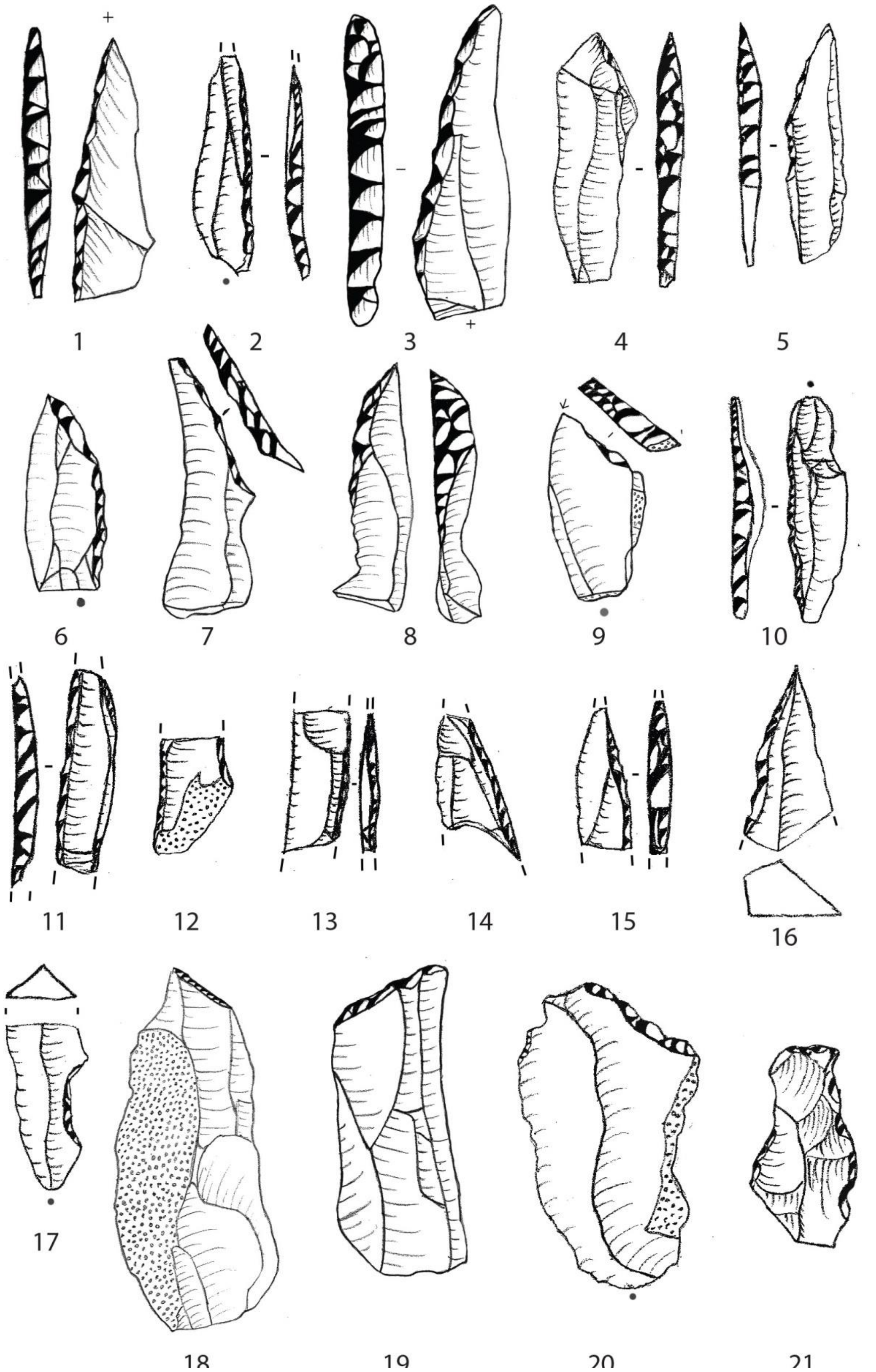


Figure 4.21: HH Flint artifacts from the Smeets collection

Drawing: D.D.L. Stoop

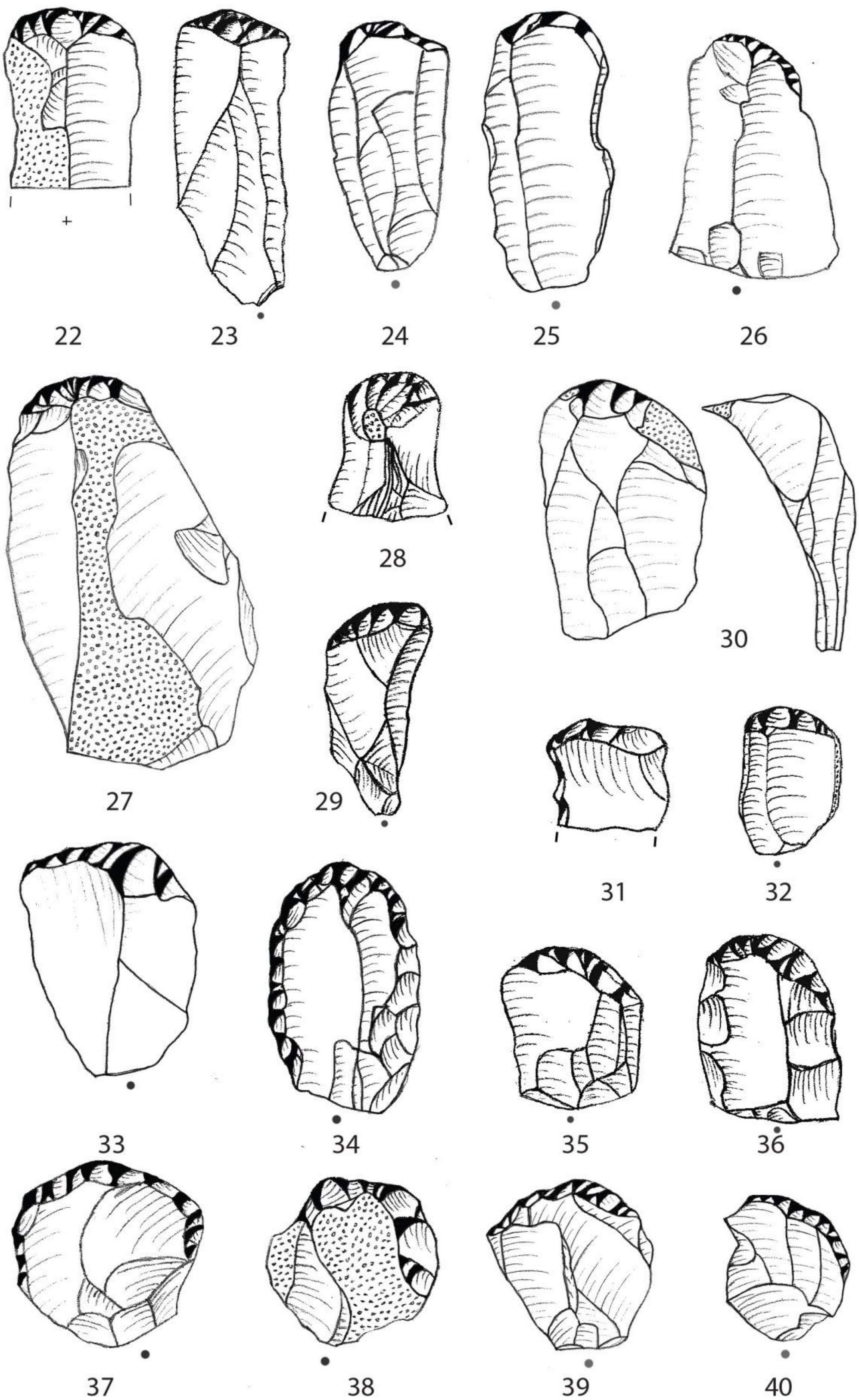


Figure 4.21: HH Flint artifacts from the Smeets collection

Drawing: D.D.L. Stoop

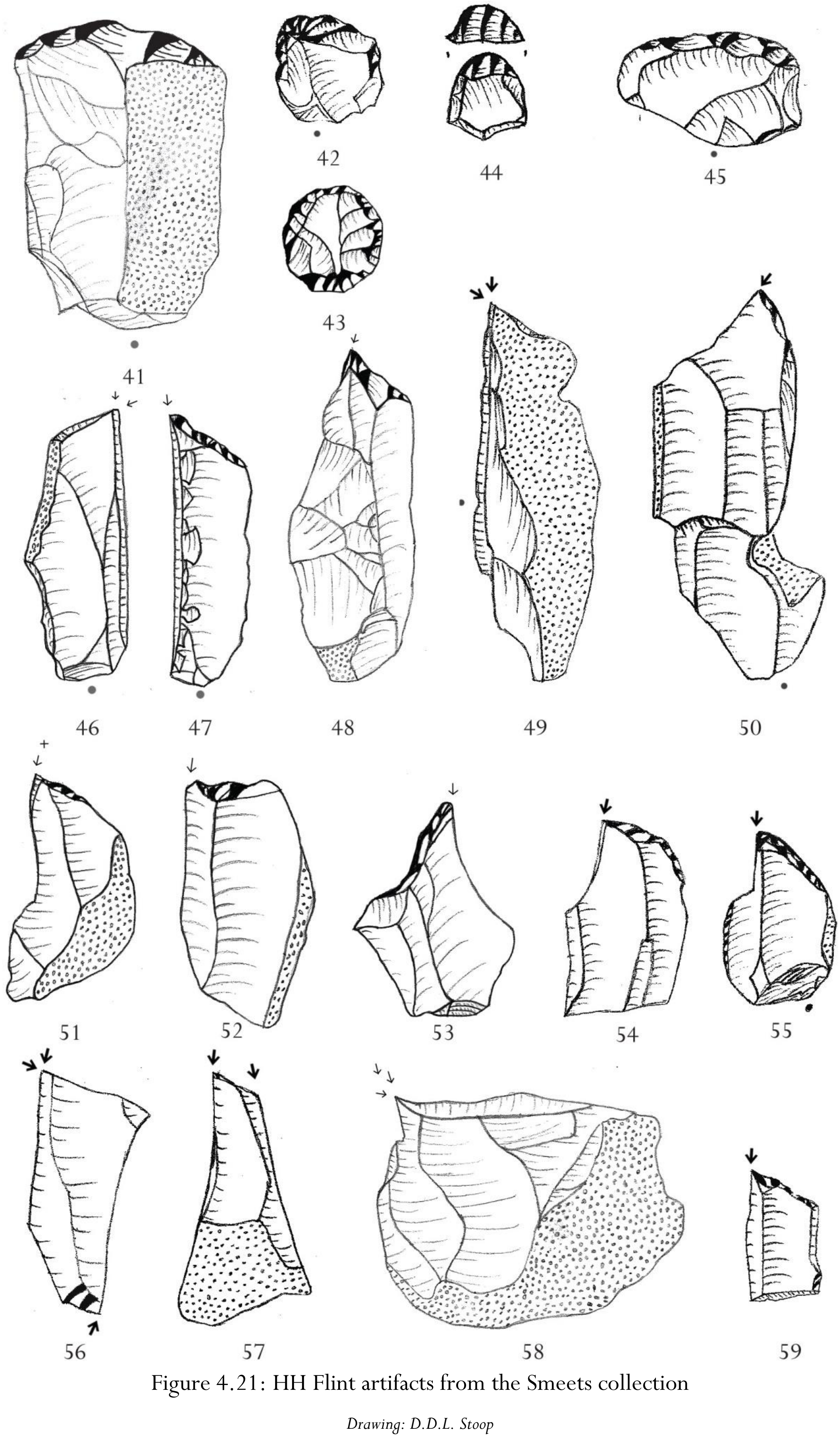


Figure 4.21: HH Flint artifacts from the Smeets collection

Drawing: D.D.L. Stoop

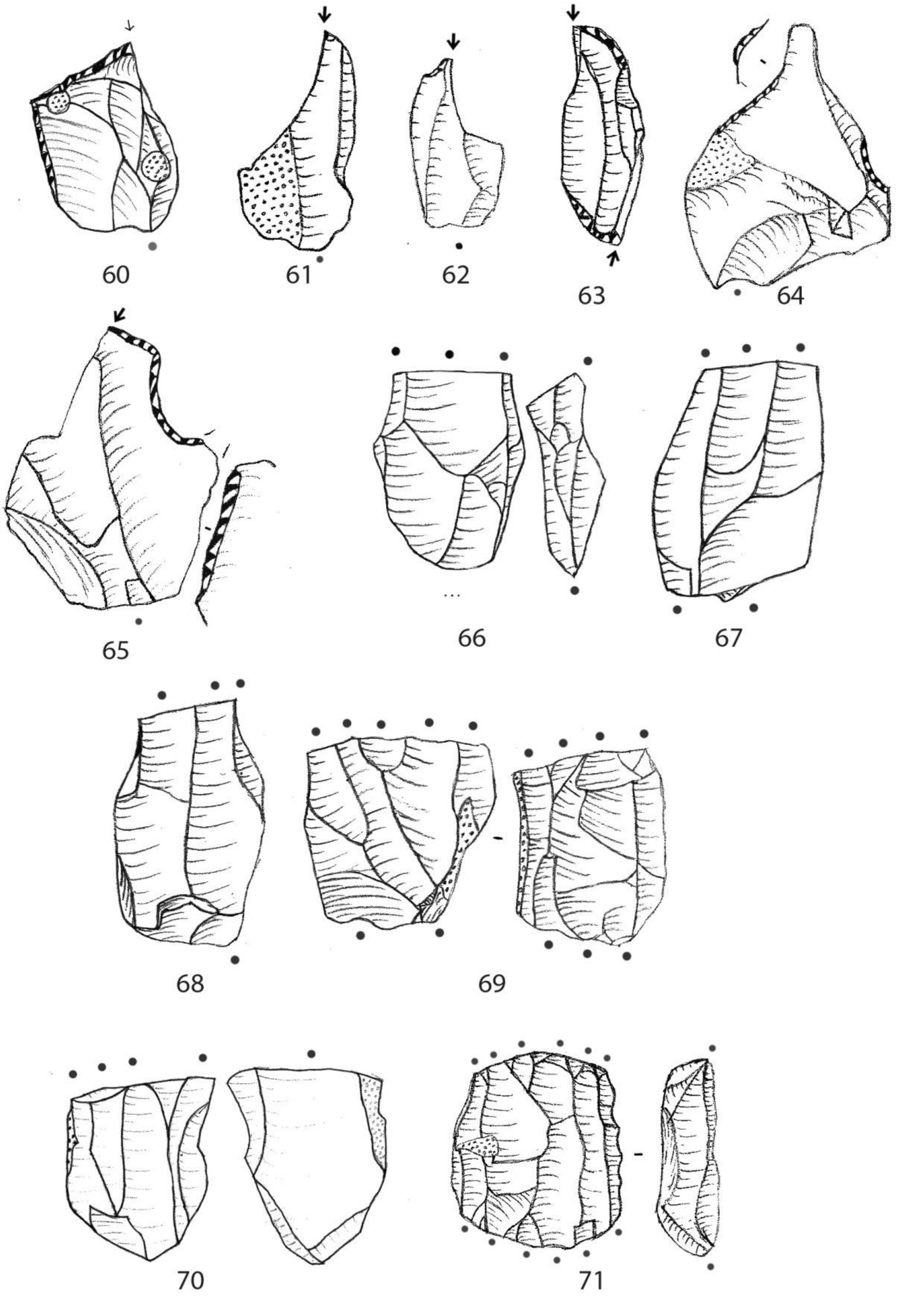


Figure 4.21: HH Flint artifacts from the Smeets collection

Drawing: D.D.L. Stoop

4.8 Raw Material Use

For the analysis of raw material, several groups were defined as RMU's (raw material units). For the HH site, the following RMU's were distinguished:

Figure 4.22: Raw material from HH,

with RMU 1 (left), RMU 3 (right, below) and RMU 6 (Right, above).

RMU 1: A single type of flint is distinguished within the terrace-flint. This constitutes typical flint from the Maastrichtian called Lanaye-Lixhe, Gulpen-formation, Maastrichtian-formation, Meuse-flint, West-European Cretaceous-flint or Rijckholt-flint. The preferred name of Lanaye-flint will be used (de Grooth 2013, 33). It is a light or dark grey flint with white inclusions (see figure 4.22). This type flint would be exploited in great numbers during the Neolithic, but also occurs during all other periods, as the Lanaye-terrace is eroded by the Meuse, nodules of this flint type are transported downstream. Based on the cortex of the nodules it is very unlikely that the Lanaye flint found at HH was mined.

RMU 2: A translucent light-grey/bluish fine-grained homogenous flint that is often referred to as 'belgian grey' flint or *Silex de Hesbaye à grain fin*. Nodules of this flint type also occur in Meuse Deposits (de Grooth 2013, 36).

RMU 3: A highly translucent fine-grained type of flint. The flint is a deep black color which is dark brown when viewed in a lamp. The flint is well-known in the Netherlands from various Upper Paleolithic sites, where it is referred to as Obourg, North Sea Basin or Zeven Wegen-flint. The exact area of origin is under discussion. This type of raw material is common on Federmesser-sites, encompassing ca. 3,7 % of the total Federmesser-artifacts found in the Netherlands (Arts 1987, 103). It is unlikely that this material originates from the North Sea basin, as is proposed by Wouters (1984, 74). The black flint found in the North Sea is clearly distinguishable from the black flint from the southern

Netherlands (Arts 1987, 103-105). It is more likely that the material was also recovered from the Meuse terraces, as small nodules from Zeven Wegen also sporadically occur in Meuse gravels (de Grooth 2013, 36).

RMU 4: A matt black type of stone that is somewhat similar to coal. It is a deep black color and wholly opaque. Based on visual inspection, the stone is classified as *Phtanite D'Ottigny*, a black rock-type from near Brussels that has been established as a raw material source for arrowhead manufacture. The material originates from the Belgian Ardennes, but can also be deposited b the Ruhr and Lenne in the eastern Netherlands (van der Lijn 1963, 218). This type of raw material is known from archaeological contexts from the Mesolithic (Arts 1987, 89)[5].

RMU 5: A brown type of quartzite with golden 'shimmers' when put to sunlight. This RMU can be correlated with the Wommersom- or Grés-quartzite from the Tienen-region (Belgium).

RMU 6: RMU 6 includes mostly diverse locally available flints. These include various types of grey and yellow flint types with white inclusions that are found in large numbers in the Meusegravels. This so called terrace-flint is available along the entire stretch of the Meuse River in the study area[6].

Both the terrace flint and the Lanaye flints (which are probably a variety of the terrace flint) are locally available in the direct environment of the HH site. The *Phtanite D'Ottigny* and also the Obourg/Zeven Wegen/Northsea-basin flints are also sporadically found in Meuse gravels (Machiels 1994, 69). This leads to the conclusion that all raw material except RMU 4 and 5 was locally available. The percentual use of raw material per artifact category has been presented in table 4.11. Only the artifacts from the Smeets collection were incorporated because blanks and waste are sparse in the GIA collection, which would lead to an overrepresentation of the tools. RMU 4 and 5 are not presented in the table because these occur only twice in the Smeets collection (twice RMU 5). Based on this raw material use, these specific artifacts are dated to the Mesolithic.

[5] http://www.archeobase.be/fiche_phtanite.pdf on 10-05-2014
[6] http://www.flintsource.net/nav/frm_mapflint.html on 17-02-2014.

Table 4.11: Raw material use HH

Waste	**n**	*%*	*Flake*		*Blade*		*Core*	
RMU 1	**187**	89 %	130	62 %	44	21 %	13	6 %
RMU 2	**5**	83 %	2	33 %	3	50 %	0	0 %
RMU 3	**3**	75 %	2	50 %	1	25 %	0	0 %
Other	**530**	94 %	416	73 %	79	14 %	35	6 %
Tool	**n**	*%*	*Scraper*		*Burin*		**Total**	
RMU 1	**23**	11 %	9	4 %	14	**7 %**	**210**	27%
RMU 2	**1**	17 %	1	17 %	0	**0 %**	**6**	0,8%
RMU 3	**1**	25 %	0	0 %	1	**25 %**	**4**	0,5%
Other	**33**	6 %	19	3 %	14	**3 %**	**563**	72%
Grand Total:							**783**	100 %

The local terrace flint is the most abundant type of flint on the site. 98% of the flint found at HH could be collected in the direct environment of the site. The imported types of flint constitute 2 flakes, 1 bladelet and a single tool, the samples of these materials are too small for statistical analysis. Only three RMU 5 artifacts occur amongst the 783 artifacts in the Smeets collection.

The more fine-grained and homogenous Lanaye-flint (RMU1) seems to be the preferred material for tool manufacture, as 11% of the RMU1 artifacts were classified as tools. This contrasts with the 'Other' terrace-flints, where only 6% was used for tool manufacture. RMU1 seems to be especially preferred for burins, as 61% of the RMU1 tools are classified as burins. When the burins from the Bohmers/Wouters collection are incorporated, 38% of the total number of burins is made from RMU1, only 46% is made from 'Other' flints, while for the total number of artifacts, RMU1 constitutes only 27% of the material, and 'Other' flint 72%.

Only the thickness of the blades could be correlated with the used RMU. For Lanaye-flint, an average blade thickness of 4,7 ± 2,0 mm was observed, wile for the other types, the average is at 5,9 ± 2,7 mm. For the seven Lanaye-flint blades, five were observed to have a straight profile. This may indicate that, due to the higher quality of this flint type, it was suitable to produce thinner blanks.

The single blade made from RMU 3 has a point-shaped platform, which is uncommon at the site. This could be explained by greater care that was put in the rare imported material. The high quality of the flint also allows for small platforms. Point-shaped platforms require more effort than the simple and two-faceted platforms which are more common at HH. As this is the only RMU 3 bladelet on the site, it is possible that the blade was transported to the site as part of a 'mobile toolkit'.

Five of the LMP's were made from RMU1 (Lanaye flint), 19% of the total number of LMP where raw material use was observed. The other points were manufactured on 'other' flint types.

Discoloration of the flints through heating was only observed very rarely. Only 3 tools and a single blade showed signs of heating. This comprises 0,4 % of the total lithic material, which argues against the presence of surface hearths. This is likely not the product of selective collecting, as the Smeets collection includes significant amounts of burnt lithics in other assemblages (Stoop 2013).

4.9 Discussion

- *What is the context of the inventory of Horn-Haelen?*

The inventory includes material from the GIA-collection and the Smeets-collection. The GIA-collection is composed of purchased material from A.M. Wouters and J. Thissen. Both recovered artefacts from the same location in the 1950's. These artefacts were recovered from masonry pits in the Meuse terraces near the village of Buggenum. The artefacts were recovered from a charcoal-rich layer interpreted as an Usselo-soil in-between coversand-deposits. Carbondates from this charcoal confirm they date to the Allerød-interstadial. Material from the Smeets collection was collected to the north of the masonry pits and is spatially separated despite claims it comes from the same site. It was recovered in the 1970's from various fields that are now part of the windmolenbos-industrial area.

- *What is the size and diversity of the lithic assemblage?*

Dating of lithic assemblages is usually related to point typology. The occurrence of Curved backed points and straight backed points is suggestive of an attribution of the material to the Federmesser-groups. This is confirmed by a small component of atypical LMP such as angle-backed points, penknife-points and possible bipointes. The latter point types may suggest an attribution to the Azilien ancien for part of the material, dating it to the early Allerød interstadial, analogous to the French subdivision presented in chapter 3. Other earlier elements include zinken and scrapers on blades. Technological analysis was not conclusive to the applied percussion type, producing both indications for hard- and soft stone hammer percussion. As this is one of the main criteria for the Ancien/Recent-subdivision, The material can be dated to the Allerød, but not to a specific subphase. This is confirmed by stratigraphical evidence, where the artifacts are located in a charcoal-rich layer interpreted as an Usselo-soil.

Flint nodules were collected in the direct environment of the HH site, from the Meuse-deposits. Only minimal cresting was observed, indicating reduction aimed at immediate laminar output. The produced blanks have indications for both hard- and soft-stone hammer percussion while hammerstones are absent on the site. Both opportunistically produced laminar flakes and standardized bladelets have been produced at the site.

It seems the higher quality Lanaye flints were used to produce smaller bladelets, and were the preferred modus for tools. This flint seems to be especially preferred for making burins. Scrapers are made on a greater variety of eluvial flints, often with great amounts of cortex. The eluvial nodules seem to have been reduced with less care. The large, thick, flakes resulting from initial reduction were used as the preferable blank for scrapers. This is confirmed by the average thickness of burins (6,9mm) compared to the average thickness of the scrapers (8,4mm). The more slender, regular blanks of the Lanaye flints served as the preferred blank for the burins. No standardization was observed on the burins, probably the result of their extensive use-resharpening-reuse-lifecycles. Only a single pseudo-lacan burin was recovered, which was also the only tool made from imported flint. This artifact possibly represents part of a small mobile toolkit which was supplemented by the tools produced on site. The greater care invested in this imported flint is evident from its point-shaped platform, the resharpening using the lacan-technique and the usage of a secondary burin bevel on the proximal side of the artifact. For the manufacturing of the LMPs no raw material preference was observed, although the regular bladelets seem to be the preferred blanks. Points were produced using steep backing of the lateral or distal side of the blank. Distal retouche produced long b-points and angle-backed points. Angle-backed point can also be the product of resharpening a fired arrow with an impact fracture (this would omit the production of new pitch for hafting). In one case, the proximal part of the blank was removed using the microburin blow technique, producing a penknife-point. Two possible *bipointes* are characterized by impact fractures (burination) indicating they were fired during hunting. These impact fractures are not diagnostic for either perpendicular (*monopointes*) or asymmetrical (*bipointes*) hafting.

- *Is the assemblage mixed with material from later periods?*

Material from the Smeets collection is unmixed with material from the other periods with the exception of a single Levallois-point. This led the author to believe that the GIA-collection would also be unmixed, because it was supposedly recovered from the same location. Unfortunately, both were not the case. The material from the largest collection (GIA, former Wouters and Thissen collections) is strongly intermixed with Mesolithic and Neolithic material, hampering typological and technological analysis.

- *How does Horn-Haelen compare to other Meuse-sites?*

Artefacts from the HH site were recovered from a very large area, which could not be narrowed down to less than 400 x 150 meters. Spatial information is wholly lacking on the material. If we compare this to the Koelbroek-sites, where a similar Meuse meander has been excavated with modern methods, a wholly different picture arises. The Koelbroek- and Groot-boller sites are a site-complex of 19 concentrations distributed along a Meuse-meander. This may indicate the Horn-Haelen material was distributed in a similar way prior to disturbance by the sand-winning activities. Intermixing with both younger material and the lack of spatial information severely hamper functional analysis of the material.

4.10 Conclusion

Material from the Mesolithic and Neolithic is also present in the GIA-collection (Wouters and Thissens collection, purchased by Dr. A Bohmers), while only a single middle Paleolithic artifact is present in the Smeets collection. Unfortunately, the HH-site appeared to be less unmixed as was originally believed by the author, but it still remains one of the most unmixed assemblages from the Meuse area.

typo- and technochronological analysis suggest a date in the Allerød-interstadial for the largest part of the material. Typologically and technologically, both hard- and soft hammer percussion were observed among the material. While true *bipointes* are absent, possible bipointes with impact fractures were found in the GIA-collections. Based on the observed typological and technological criteria, the material could not be attributed to either the *Azilien recent* or the *Azilien Ancien.* Possible explanations for this include the palimpsest-character of the material, it is likely the site was also re-used during the Allerød-interstadial, wherein different chronological components cannot always be distinguished. Because the site, and possible subconcentrations were not spatially analyzed, it is higly likely the material originates from various *loci* which are spatially and chronologically separated. This would make surface assemblages unsuitable for the French technological subdivision.

Functionally, impact fractures on several points and a high percentage of projectile elements indicate hunting was one of the main activities on the site during the late Paleolithic. This would indicate hunting activities were undertaken in the direct vicinity of the site. The presence of the points could either result from butchering activities, or from retooling of broken arrows. The hypothesis that butchering was conducted at the site is confirmed by the presence of large LMP, which are interpreted as butchering knives.

Chapter 5: Heythuysen-de Fransman I

5.1 Introduction

The site of Heythuysen-de Fransman I is located near the village of Heibloem, north of Heythuysen, Limburg, the Netherlands (see figure 5.1). The site is important both because it constitutes the largest site in the area, but also because it is, according to all of the excavators, unmixed material from a single period. The site was selected as the case-study for a peelhorst-type site both because of its unmixed character, but also because it allowed for a chronological re-evaluation of the material. Earlier research by Pop (2008) and Verpoorte (2008) has suggested that the supposed attribution to the Gravettian by Wouters (1984) may be incorrect. In this chapter the location, research history, stratigraphy, current use and recovered lithic material of the site of HF-I will be described. HF-I will serve as a case-study for the Peelhorst-category of Federmesser-sites in the study area.

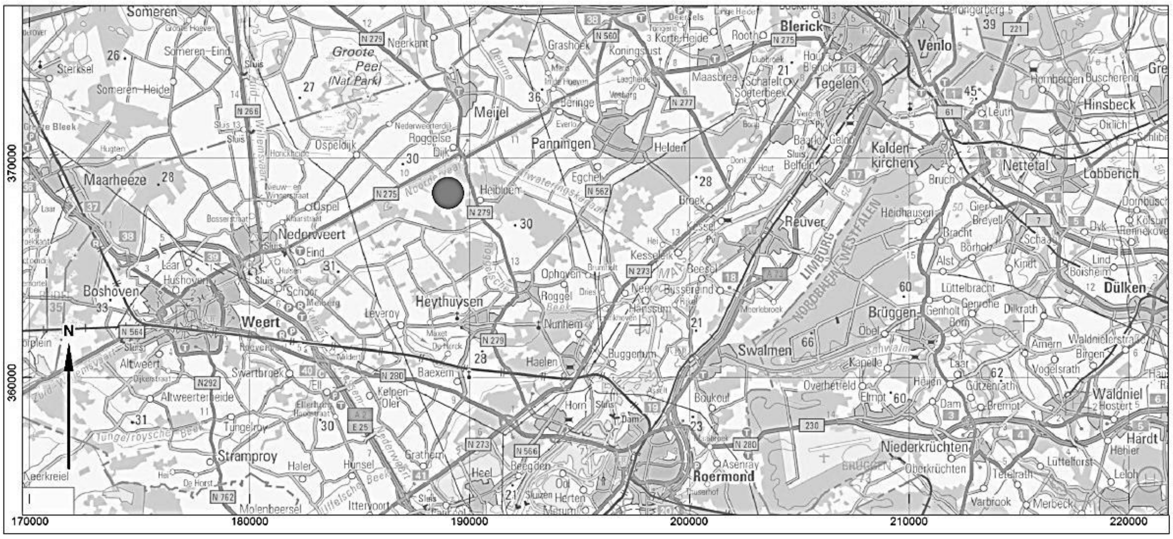


Figure 5.1: Site Location HF-I

5.2 Location

There is some discussion about the actual location of HF-I. Information on the location of the site was available from the publication by Wouters (1984) and local amateur-archaeologists S. Silvrants, J. Beeren, L. Lenders and M. Verhaeg (pers. comm 2013-2014). Because S. Silvrants is a primary excavator, his indication of the location is considered the most accurate. It is supported by information on the finds collected by M. van Hoef in the 1970's-1980's just before the terrain was leveled.

Wouters (1984) mentions three sites near the Fransman-farm. He refers to these as Ia, Ib and II. The F-Ia site corresponds to the location of the artifacts discovered in 1954 by P. Peeters. F-II, also known as Grote Moost, was discovered a year before by 'Meester' Mertens. Wouters (1984) states that the

Fransman-I site was discovered while trying to locate the Fransman-II site. Both sites have been raised to monumental status, Fransman-I under monument nr. 11193 and Fransman-II under monument nr. 8801 (see figure 5.2).

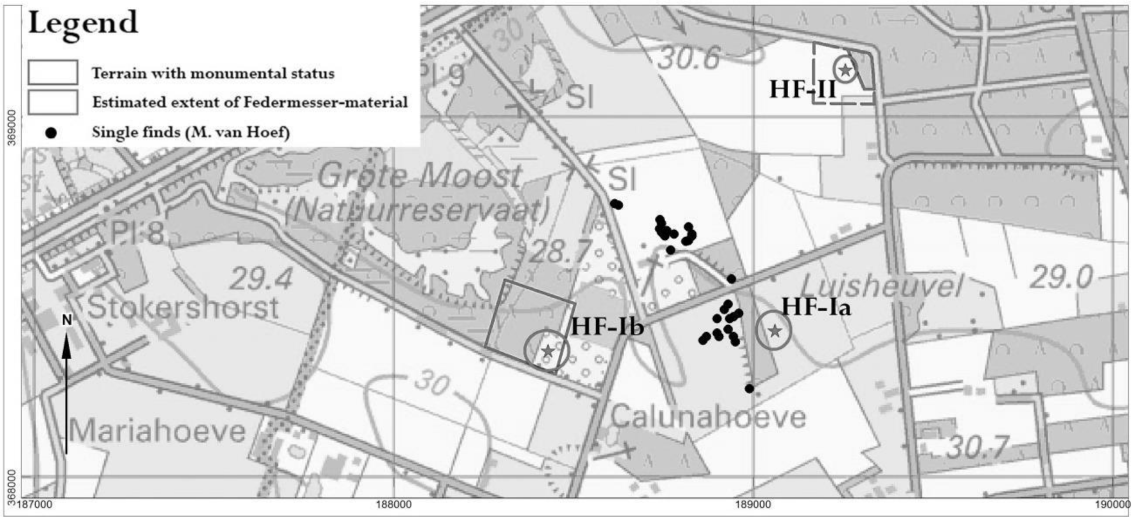


Figure 5.2: Site extent HF-I

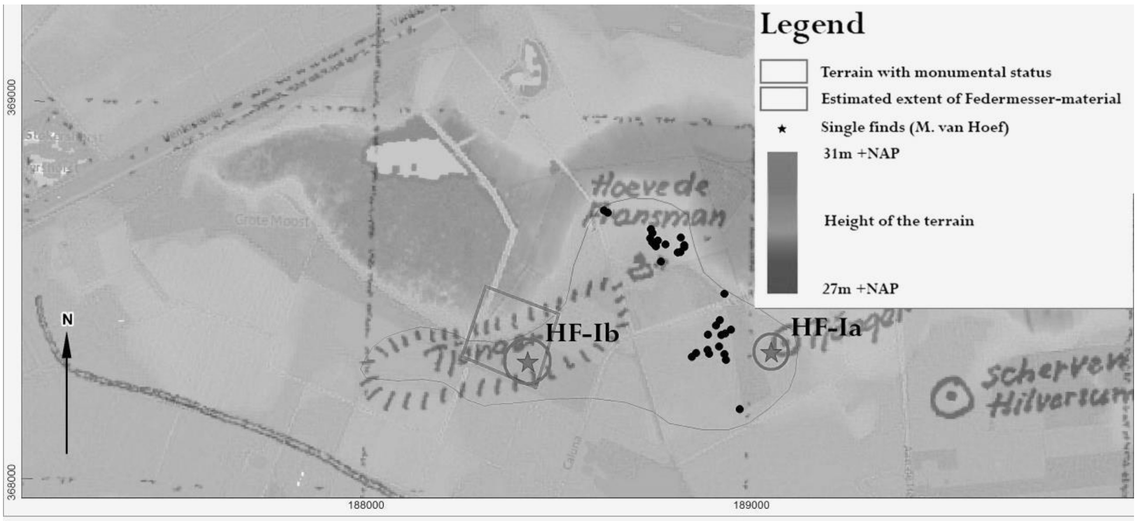


Figure 5.3: Elevation map HF-I.

The locations of both the Fransman-I and II are depicted on figure 5.2 and 5.3. The blue terrains represent the terrains with monumental status. A map by an anonymous author is also depicted (probably G. Beex, the provincial archaeologist of Noord-Brabant, placed in Livelink under ARCHIS-Wnr 29171). Based on the information by M. van Hoef, combined with an elevation model, both an estimated site extent and a maximum site extent have been postulated (see figure 5.2 and 5.3).

The Fransman-I site has been subdivided into Fransman Ia and Ib. Wouters makes this distinction only in a letter to W. Willems in 1981, where he announces to publish both in his upcoming article (the 1984 article). L. Lenders (pers. comm. 2014) provided some clarity on this; he possessed three artifacts from

HF-Ib (which he refers to as Fransman-III) and confirmed that the amounts of material from this location are very limited. Possibly some of the other material from this site ended up with the F-Ia material.[7]

On the available information it is best to distinguish two sites. Heythuysen-de Fransman I and II. HF I is a relatively large area on a higher ridge south of a lower area including the Grote Moost. HF II is a small area (ca. 40x40 meters) with a high density of artifacts (pers. comm S. Silvrants 2014) located on a ridge to the north of the low area.

The site is located in the Peelhorst area. The deposits consist mainly of wind-blown sand from the last glacial period. The concentration is located just south of a large depression in the landscape which constituted a large glacial lake as described in chapter 3.2.2. Lakes currently still exist in the area, namely the Grote and Kleine Moost-lakes (see appendix IV). The Late Glacial lakes of Grote and Kleine Moost is characterized by peat layers covered with aeolian sand deposits. To the east, the lake is bordered by valley-shaped depressions with peat sediments. These valley shaped depressions are likely the result of meltwater flows.

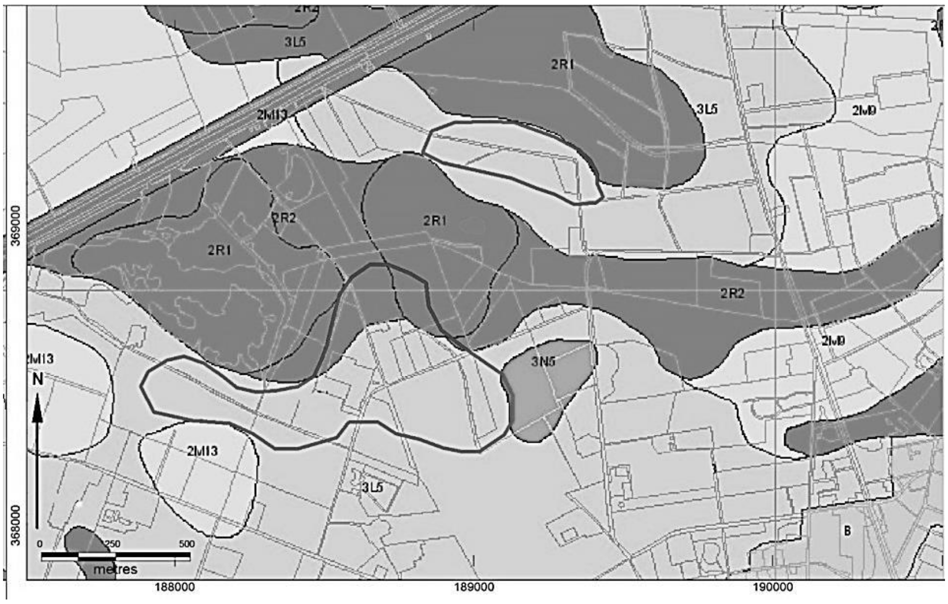


Figure 5.4: Geomorphological chart Fransman-area (Source: Archis-II)
Legend (ten Cate and Maaleveld 1977): 3L5: Coversand ridges with recent agricultural topsoil. 2R1 / 2R2:: valley-shaped depression with (2R1) or without (2R2) peat. 2M13: Flat coversand-landscape. 2M9: Flat coversands that have been partially affected by water.

[7] If this is the case, the number of artifacts would be minimal according to S. Silvrants.

3N5: Wind-blown depressions.

Both the Fransman-I and Fransman-II sites are located on podsolic soils in fine sands on higher parts adjacent to the Grote Moost lake (see figure 5.5).

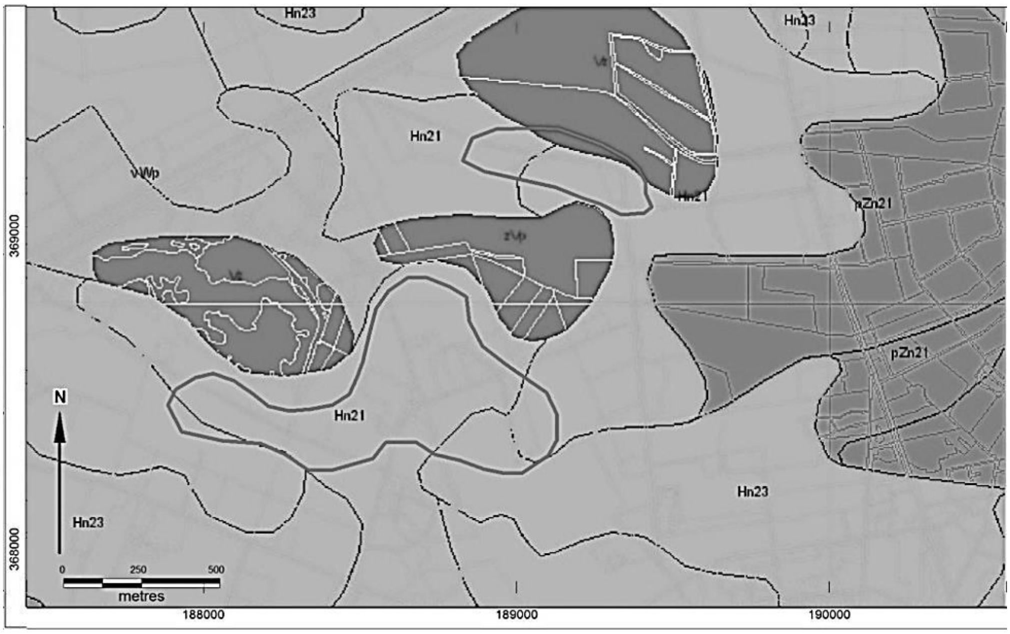


Figure 5.5: Soil chart Fransman area (Source: Archis-II)

Legend (Steur and Heijink 1997):

Hn21/Hn23: (Humus/Veldpodzolgronden) Podzolised fine-grained sands. These soils occur in demineralized sands. These soils are formed under the influence of a high groundwater table.

pZn21 (Gooreerdgronden): Sandy depostis covered with a layer of humic sediment. Rusty layers do not occur in the top 35cm.

zVp: (Meerveengrond met zanddek) sand-covered Peat-deposits on top of coversand.

Vz: (Vlierveengrond) Peat deposits on the top of coversand.

vWp: (Moerige podsolgrond) Sandy soil with podsolisation, covered by a thin layer of peat (no more than 25cm).

5.3 *Research history*

The area of the site was forested and part of the Peel swamp area till reclamation around 1900 (pers. comm J. Beeren 2013). The area was reclaimed between 1896 and 1924, later reclamations also occur from 1940 onwards. In 1911 French-speaking Belgians A. Delsaux, F. Levèque and O. Lacroix bought 195 acres of land and built the farm, named "de Fransman", from which the site name is derived (Verkennis 1999, 115). When they bought the land, it was still 'rough and uncivilized'. The first reclamation probably dates shortly after 1911. This suggests that, prior to 1911, the site was undisturbed by human activities (*Idem*).

The reclamations of the terrain in the 1940s were described by Mr. Gooden to an unknown employee of the state service (see appendix III). First, the trees were cut down, after which the stumps were pulled from the ground. The terrain was then ploughed (turned over) to a depth of 50cm. This is likely an overestimation, as most turning ploughs only disturb the soil to bout 30cm in depth.[8] To reduce the humidity of the terrain, the iron bog bank had to be 'broken', which was done somewhere around 1954. 'Claws' were mounted on the plough to break the so-called "coffee-layer" (B-Horizon). These woolers can reach a depth of up to 1,5 meters, but they do not turn over the soil as a plough does. Therefore, they barely transport artifacts vertically (see appendix III). During these activities, the first flint artifacts were recovered by P. Peeters (Wouters 1984, 72). Peeters worked as an assistant on the Casserius-farm, where he assisted in the digging of small trenches known as 'rabatten'. These trenches were used in wet areas to make part of the area suitable for agricultural use. The sand from these trenches was deposited in between two trenches, creating a series of ridges. The lower parts filled themselves with water and spruce trees were planted on the higher ridges. In a later phase, these lower gulleys were filled with sand from a nearby ridge. It was in this sand that the first artifacts were discovered.

Peeters quickly contacted other active amateur-archeologist in the region. First, P.J. Beeren was contacted, who then contacted S. Silvrants, W. Vossen and H. Verhaeg. Beeren also contacted Wouters, who in turn contacted Bohmers in prospect of a possible excavation (pers. comm. J. Beeren 2013).

Several years passed between the discovery of the site and the excavation by Bohmers in 1961. In this period, S. Silvrants, P.J. Beeren, H. Verhaeg and W. Vossen collected large numbers of artifacts. Other collectors include amongst others A.M. Wouters, M. Verhaeg, J. Beeren, L. Lenders, P. Peeters, R. van Rooij, J. Houben and Mr. Windhorst. During the first visits, artifacts were recovered while

[8] Ploughblades of such ploughs may be 50cm long, but these never fully penetrate the soil, leading to a shallower disturbance of the soil, usually about 30 cm.

systematically surveying the ridge. Occasionally, pits for sand recovery were dug on the terrain by its owner, which allowed the amateur archeologists to recover artifacts from their primary context. Silvrants started to dig out profiles in the edges of these pits, recovering artifacts from various stratigraphical layers (see figure 5.6). As this method turned out to produce more artifacts than surveying, this soon became the preferred research method. Many trenches were dug between the spruce trees by the amateur-archeologists using shovels and artifacts were collected in large numbers.

Figure 5.6: S. Silvrants (l) and P.J. Beeren (r) on the site (1950's)

Picture courtesy of J. Beeren (2013)

Bohmers conducted one or more excavations at this location the 1950's-1960's based on a short report in the news section of the KNOB (Nieuwsbulletin voor de Koninklijke Nederlandse Oudheidkundige Bond). By then, the amateur-archeologists had thoroughly excavated the terrain, making it unsuitable for excavation by the BAI. In a letter to W. Willems, Wouters states that Bohmers was 'totally amazed by the beautiful material' (see appendix III). Bohmers abandoned excavations on the site after 1961 because of the lack of recovered artifacts. During the test trenching it was concluded that the site was disturbed to such an extent, that further excavation was not considered useful. After this, the various amateur-archeologists salvaged as many artifacts from the site as possible. It was feared that the site would be completely destroyed by the coming large-scale agricultural activity (and so it was).

5.4 Stratigraphy

Figure 5.7: Wouters visits the site for his 1984 publication,

with P.J. Beeren (left), A.M. Wouters, J. Silvrants and P. Dijkstra (right),

picture courtesy of L. Lenders (2014)

Stratigraphic information on the site is available from two sources. The most recent source is a soil profile depicted in Wouters (1984)(see figure 5.7 and figure 5.8, left). A second source is a soil profile by Bohmers, available in the archaeological collection of the GIA in Groningen (no archival number, a foil drawing marked '*Fransman I, profiel in sleuf*')(see figure 5.8 right). It is unclear whether the profile was drawn during test trenching by the BAI or by Wouters in 1955 (Wouters 1984, 72-73). In addition, there is anecdotal information available from several of the amateur-archeologists who collected artifacts from the site, specifically J. Beeren (P.H. Beeren's son, who also assisted with the trenching), M. Verhaeg (H. Verhaeg's son, who also assisted) and S. Silvrants.

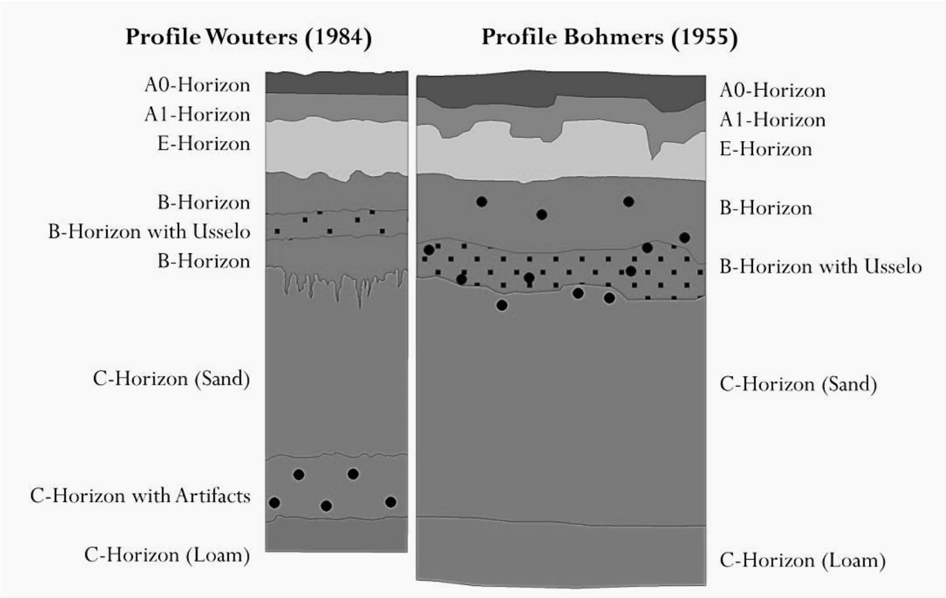


Figure 5.8: Soil profiles for HF-I, redrawn based on Wouters (1984, 71) and Bohmers (1:20)

Wouters depicts the layer from which the artifacts were recovered approximately 120cm beneath the surface. Disturbance is reported to be locally up to 1.50m beneath the surface by Wouters (Wouters 1984, 72). The stratigraphy is described as a podzolised aeolian deposit with a highly developed bog bank in the B-horizon. In the lower half of this horizon, a concentration of charcoal was observed. Specks of charcoal in the B-horizon of the soil profile are interpreted as the remains of an Usselo-soil. This soil is located 40-50 cm beneath the surface.

The fact that, according to Wouters (1984), the artifacts were recovered 60 cm under the possible Usselo-layer would imply that the artifacts predate the Usselo-soil. If this is true, the artifacts would also predate the Allerød-interstadial by a significant amount of time. On the basis of this stratigraphy, Wouters argues an interpretation of HF-I as a Gravettian site, possibly dating to the Denekamp-Interstadial (ca. 28.000 BP) (Wouters 1984).

However, according to a soil profile from the test trench by Bohmers, the artifacts were found in, and just underneath, the Usselo-layer rather than at greater depths (see figure 5.8). This corresponds with the iron concretions found on several artifacts (Silvrants 2013, pers. comm), the typochronological date of the material (Federmesser, discussed later in the chapter) and the fact that the artifacts were found on the surface in large numbers.[9] According to J. Beeren (pers. comm. 2013), artifacts were recovered in situ in trenches dug by P.J. Beeren and S. Silvrants. In these trenches, artifacts were recovered in or just beneath the Usselo layer. S. Silvrants confirmed this information and added that some artifacts also occurred in the bleached E-horizon. According to Silvrants, artifacts were recovered from the charcoal-

[9] Woolers, which could have disturbed the soil profile to a depth of 1,5m, do not transport artifacts vertically.

rich layer and the topsoil in the more elevated parts of the site, while the material was located some 10-20 centimeters beneath the charcoal-rich layer on the flanks. Silvrants attributes this to a higher degree of disturbance in the elevated parts due to ploughing, this is supported by a higher degree of vertical spread in these areas (pers. comm. S. Silvrants 2013-2014). The pits dug by the amateur-archaeologists were about 1 meter in depth, which also argues against Wouters' profile (pers. comm J. Beeren and S. Silvrants 2013).

5.5 Documentation and material

The artifacts from the Fransman-I site are dispersed among many collections, the largest of which are the private collections of P.J. Beeren, J. Silvrants, H. Verhaeg and W. Vossen (see table 5.9). There is no supporting documentation in any of the collections. Important information was obtained in interviews with Silvrants, the only surviving collector.

The Beeren collection is the largest, because P.J. Beeren owned reclamations very close to the site, which allowed him to visit frequently. Material from HF-I is labeled as "Ia". The artifacts are kept in plastic containers, boxes and large plastic shelves varying per collection. Wouters made wooden display cases for the largest parts (the tools) of all collections. The artifacts are glued to the backs of display cases similar to those used to display butterflies. In these cases the artifacts are typologically ordered, with labels for each artifact type. This style of display is typical of Wouters, who was also a crafts teacher. The Beeren collection also contains Styrofoam cases.

Silvrants later had a closet made with glass drawers in which to display the artifacts. The cases themselves are all labeled HF-Ia as are many artifacts. Numbers are inscribed on the artifacts using pencil or stickers. The flakes and waste material are stored in plastic containers. The artifacts are attached to the display cases using gum. This method was applied to the Silvrants, Beeren and Verhaeg collections. The Vossen collection is stored in ziplock bags in the Limburgs Museum, Venlo.

Table 5.1: Artifact count from the main collections from HF-I.

Tool Type	Beeren	Silvrants	Vossen	Wouters	Verhaeg	Total
Flake	1.330	298	279	99	156	2162
Blade(let)	490	175	163	54	121	1003
Core	82	15	32	13	11	153
Lump	32	0	0	0	0	32
Total Waste	1934	488	474	166	288	3350
Flake (Ret.)	39	46	8	9	19	121
Blade (Ret.)	26	18	7	15	5	71
Scraper	126	90	17	26	44	303
Borer	16	8	2	2	2	30
Burin	116	94	20	39	27	296
Comb. Tool	8	7	1	7	1	24
Point	51	32	6	27	13	129
Other	4	7	2	0	2	15
Total Tools	386	302	63	125	113	989
Grand Total	2320	790	537	291	401	4339

To ascertain the following data, the collections by P.H. Beeren, S. Silvrants, H. Verhaeg and W. Vossen were studied (see table 5.1). Data from the Wouters collection from a study by Pop (2008) was added. No selection from the material was made as all material appeared to date from the same period based on patination, technological and typological criteria. Not a single Mesolithic point or scraper could be recognized, neither was any indication for a Neolithic component. The description of the material is organized in the same way as for Horn-Haelen. The first part will focus on blank production and the second part on the retouched tools.

5.6 Blank Production and technology

5.6.1 Cores

A total of 170 cores were studied from this site, of which a sample of 92 cores was metrically analyzed. Of the 170 cores, 35 were described as flake cores, 100 as blade(let)-cores and for 35 cores the production type could not be distinguished. Due to the large size of the sample, core shapes was not documented in detail. However, globular and irregular shapes are the most common core shapes. One long, unipolar blade core with sharp reduction angle, a trapezoidal cross-section and a correction surface[10] was found in the Beeren collection.

These measures are shown per core type on figure 5.10. The height of the exploited surface varies from 14 to 92 mm with an average of 38,6 ± 11,9 mm. The width of the cores varies between 12 and 48 mm, with an average of 28,5 ± 8,9 mm. For the thickness, only 55 cores were measured. The thickness of the cores varies from 9 to 45 mm, with an average of 20,4 ± 6,7 mm (see figure 5.9). Most cores were exploited from one platform (unipolar), but cores with two or more platforms are also common.

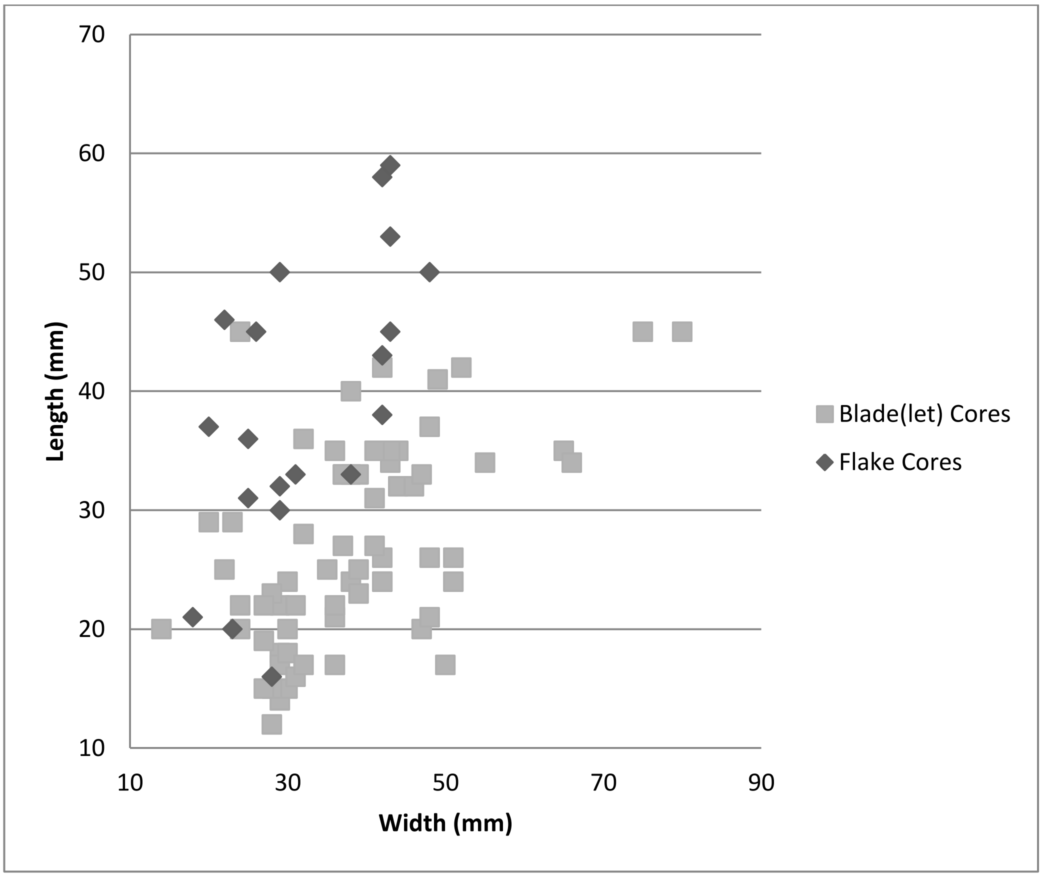


Figure 5.9: Core dimensions by production type HF-I

5.6.2 Flakes and blade(let)s

The largest category of blanks is that of the flakes. A total of 1920 unmodified flakes or flake fragments were studied. Due to their large number and the limited available time, only a very small amount of metric data on these flakes was documented. Only the dimensions of those flakes described by Wouters (he sorted the artifacts for his publication) as complete blades were measured. A total of 918 blades were studied from all collections. Due to the limited time, a sample of complete blade(lets) from the

[10] A second platform on the opposed side of the core used for removing steps and hinges. This is similar to a bipolar core, however, these cores are exploited unidirectionally.

Beeren and Verhaeg collections was analyzed metrically. This sample constitutes 208 blades. Not each parameter was described for each individual artifact.

Blade length varies from 20 to 117 mm, with an average of 53,2 ± 17,5 mm. Blade width varies from 9 to 46 mm, with an average of 19,2 ± 6,4 mm. Blade thickness varies from 2 to 15 mm, with an average of 6,7 ± 2,9 mm (see figure 5.10).

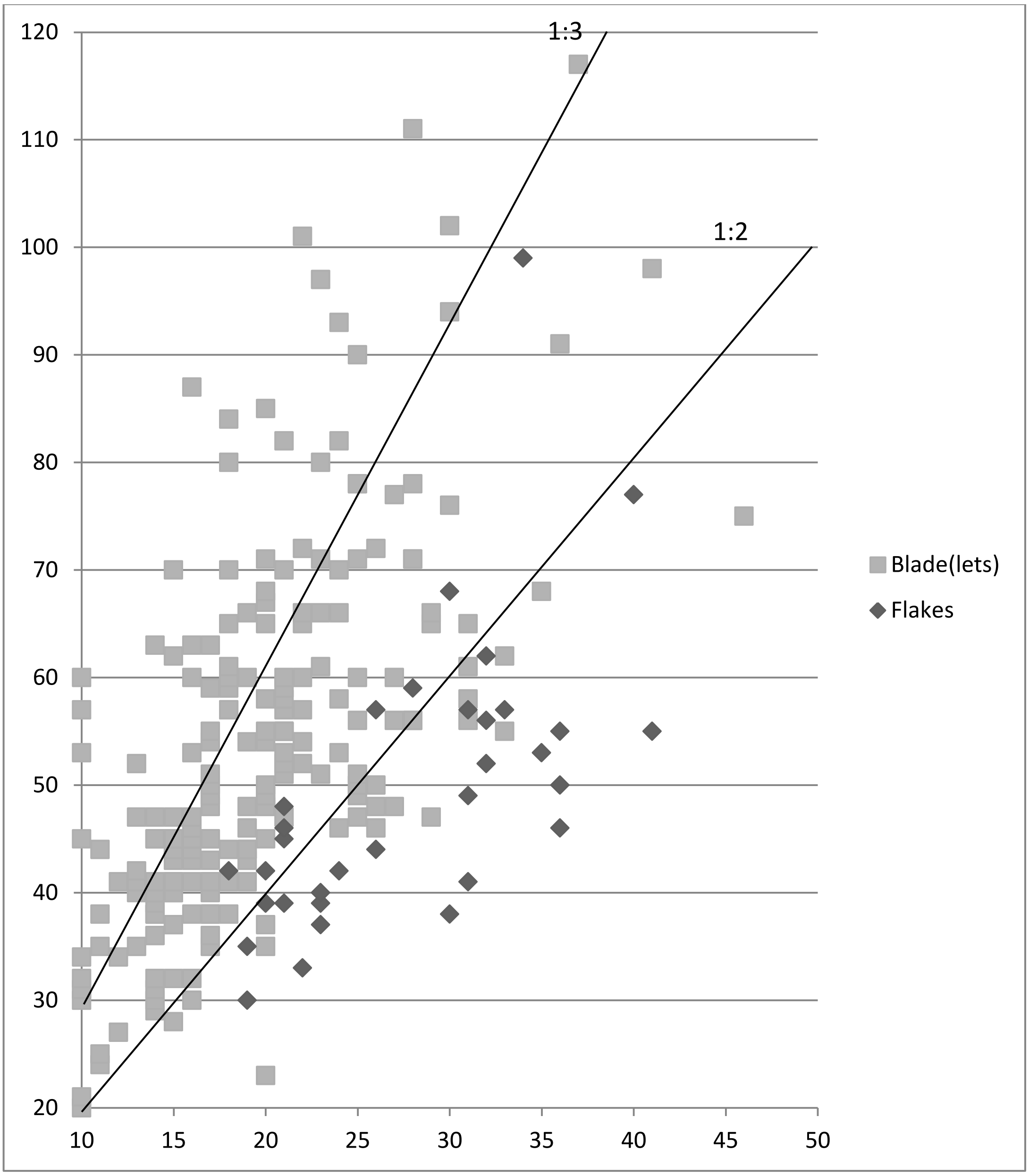


Figure 5.10: Flake and bladelet dimensions HF-I

Of the studied blade(let)s, 307 are in complete state (these are represented in figure 5.10). Of the remaining 611 (blade-)fragments 28 % are distal (n=170), 25 % medial (n=152), 40 % proximal (n=245) and 1,5 % indeterminable (n=44).The proximal fragments have not been incorporated in the technological analysis for the platforms.

The length and width of a sample of 208 out of 307 complete blade(let)s is presented in figure 5.11. Based on these criteria, 28 % of the laminar output (n=58) were described as bladelets, while the other 72 % (n=151) are blades. At significant number of blades (roughly those with a length greater than 70mm) clearly diverge from the average blade dimension 'cloud', indicating a structured blade-oriented reduction rather than a reduction sequence oriented on laminar flakes alone for part of the material. A large component of these long, regular blades could not have been produced using a simple reduction strategy aimed at immediate laminar output.

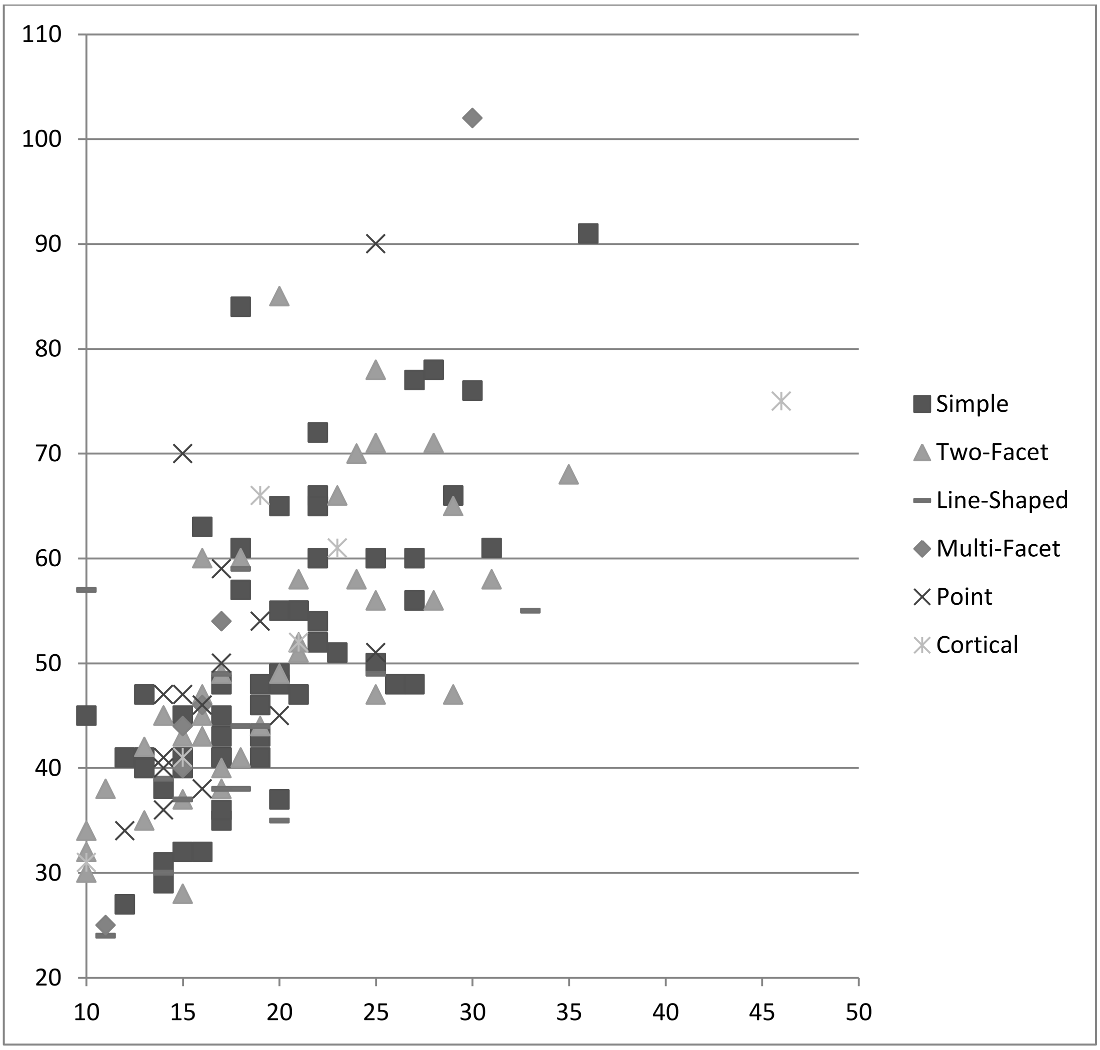


Figure 5.11: Laminar dimensions and platform types HF-I

For 139 bladelets, the platform type was determined. The most common platform type is the simple, unmodified platform (n=58; 42 %), followed by the two-facet (n=39, 28 %), point- (n=15, 11 %) and line-shaped (n=14, 10 %) platforms. multi-facet (n=7, 5 %) and Cortical (n=6, 4 %) platforms are rare (see figure 5.12). The flakes mostly have pronounced bulbs and spall scars are common. The spall scar of 154 blanks was studied. On 45 % (n=70), no scar was observed, 42 % (n=64) had a spall scar on the ventral face and 13% of the blanks (n=20) have a so-called *esquillement de bulbe*. This equillement is considered to be the prime indicator for soft stone hammer percussion (Pelegrin 2000). The large majority of the flake morphology corresponds to the morphology observed on experimentally manufactured hard stone hammer percussion flakes (see figure 5.12). The flake technology has only been compared visually, the technological data for the flakes were not quantified due to the large sample and limited time.

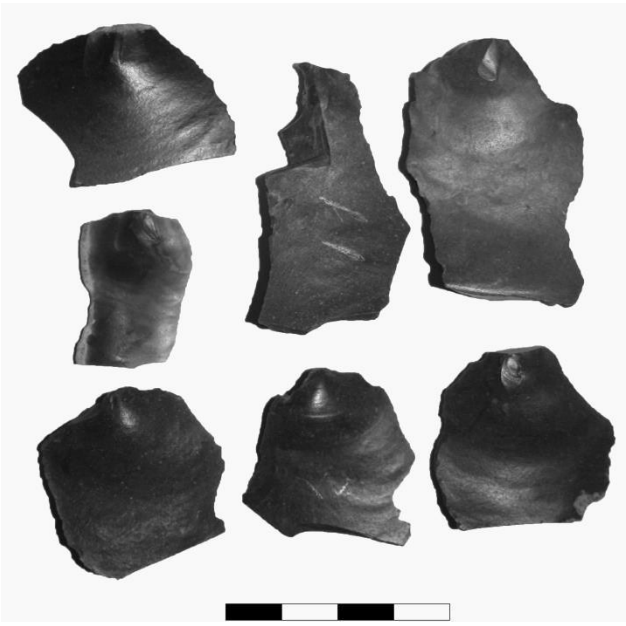


Figure 5.12: Flake percussion at HF-I

The shape of the edges could be observed on 154 blades. Irregular edges (n=60, 39 %) are more common than parallel edges (n=94, 61 %). Pseudo-cresting was observed on 21 bladelets.

It is possible hard hammer percussion was preferred for the flakes early in the reduction, while soft stone hammer percussion was used to produce the long, regular blades in later phases.

As was stated in chapter 2.3.3, blade technology and percussion types can indicate a difference in chronology. Long, regular blades are generally dated to the Magdalenian, while irregular, short ones are more typical for the Federmesser-groups. It is therefore strange to find a long, regular blade component in a supposed Federmesser-assemblage. To study the applied percussion types for these large blades, a sample of blades longer than 70cm (the blades that fall outside the 'normal distribution', see pharagraph 5.2.2) was compared to the rest of the blades and to the flakes. However, no significant patterning was observed related to the esquillement or the pronunciation of the bulb of percussion (see table 5.2). The pronounced bulbs of percussion related to the hard stone hammer percussion are common on the long blades, as are the points of impact. Lipping was not observed on any blades, excluding antler percussion. Based on this analysis, it was not possible to distinguish whether these blades were manufactured using a hard or a soft stone hammer.

Table 5.2 Long blade characteristics HF-I

	Boards		**Esquillement**		**Bulb**		
Blanks	Parallel	Irregular	yes	no	Pronounced	Shallow	Absent
Bld >70mm	11	6	3	14	7	6	2
Bld > 70mm	48	88	15	117	56	58	23
Bld >70mm	65 %	35 %	18 %	82 %	47 %	40 %	13 %
Bld > 70mm	35 %	65 %	11 %	89 %	41 %	42 %	17 %

5.7 Blank consumption and Typology

A total of 947 tools were studied. The various characteristics of these tools will be discussed in this chapter.

5.7.1 Pointed Laterally Modified Pieces and other point types

A total of 118 laterally modified pieces are documented among the studied material. Fifty-two can be classified as large LMPs. Another 4 truncated pieces (long B-points) and 7 shouldered points are present in the studied collections (see table 5.3).

Table 5.3: Point types HF-I

Type Bohmers	Description	**Total**	
Tjonger	*Curved backed point*	25	19,4 %
Gravette	*Straight backed point*	29	22,5 %
B-Point	*Truncated point*	4	3,1 %
Kremser	*Curved backed point*	4	3,1 %
Creswell	*Angle backed point*	2	1,6 %
Gravette	*Penknife Point*	3	2,3 %
Shouldered	*Convex-Concave Point*	1	0.8 %
Shouldered	*Shouldered Point (var.)*	6	4,7 %
Backed Bld.	*Backed Bld*	35	27,1 %
LMP-Fragment	*LMP-Fragment*	20	15,5 %
Total		**129**	

The shouldered points can also be classified using Stapert's (2005) typology for the Hamburgian. There are five type A2 points, one type B2 and one type A1 (convex/concave point).

A sample of 118 out of 129 has been used for further metric analysis because of the high degree of fragmentation on some points. The length of the points varies from 17 to 91 mm, with an average of 39,8 ± 14,2 mm. The width varies from 6 to 27 mm, with an average of 13,2 ± 4,3 mm. The thickness could only be analyzed on 33 points, because most of these were glued to display cases, and could therefore not be held and measured. The thickness varies from 2 to 11 mm, with an average of 4,9 ± 1,9 mm (see figure 5.13).

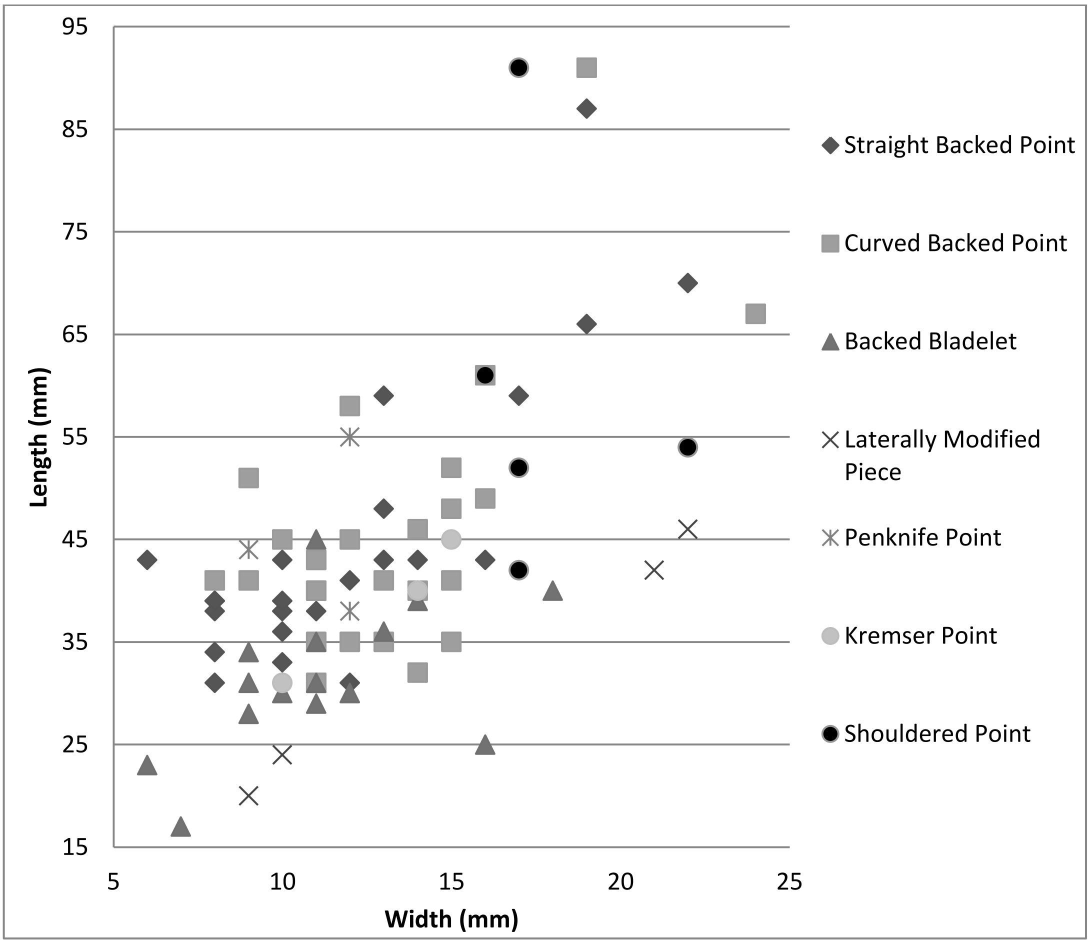


Figure 5.13: Point dimensions by type HF-I

Straight backed LMP vary greatly in length and width with both very short (< 35 mm) and long examples (> 55 mm) occurring. Backed bladelets are relatively small, also in complete state. Curved backed points also vary across the entire spectrum, while shouldered points are generally large. Seven points have a burin-like fracture near the tip. Shooting experiments have shown these burin fractures to be diagnostic for impact. This would indicate these arrowheads were fired prior to discard at the site.

5.7.2 *Scrapers*

A total of 292 scrapers were studied, 285 of which were in complete state. These scrapers include mostly simple flake endscrapers and thumbnail scrapers supplemented with ca. 15 % of scrapers manufactured on blades (see table 5.4)

Table 5.4: Scraper types HF-I

	Total	**%**
Flake endscraper	181	61,6 %
Double Scraper	15	5,1 %
Short blade scraper	20	6,8 %
Long blade scraper	18	6,1 %
Thumbnail scraper	60	20,4 %
Total	**294**	100 %

The Length/width distribution of scrapers by type is depicted in figure 5.15. Scraper length varies between 12 and 96, with an average of 32,9 ± 12,5 mm. Scraper width varies between 8 and 45, with an average of 24,4 ± 7,2 mm. Scraper thickness varies from 3 to 18, with an average of 9,0 ± 2,7 mm (see figure 5.14).

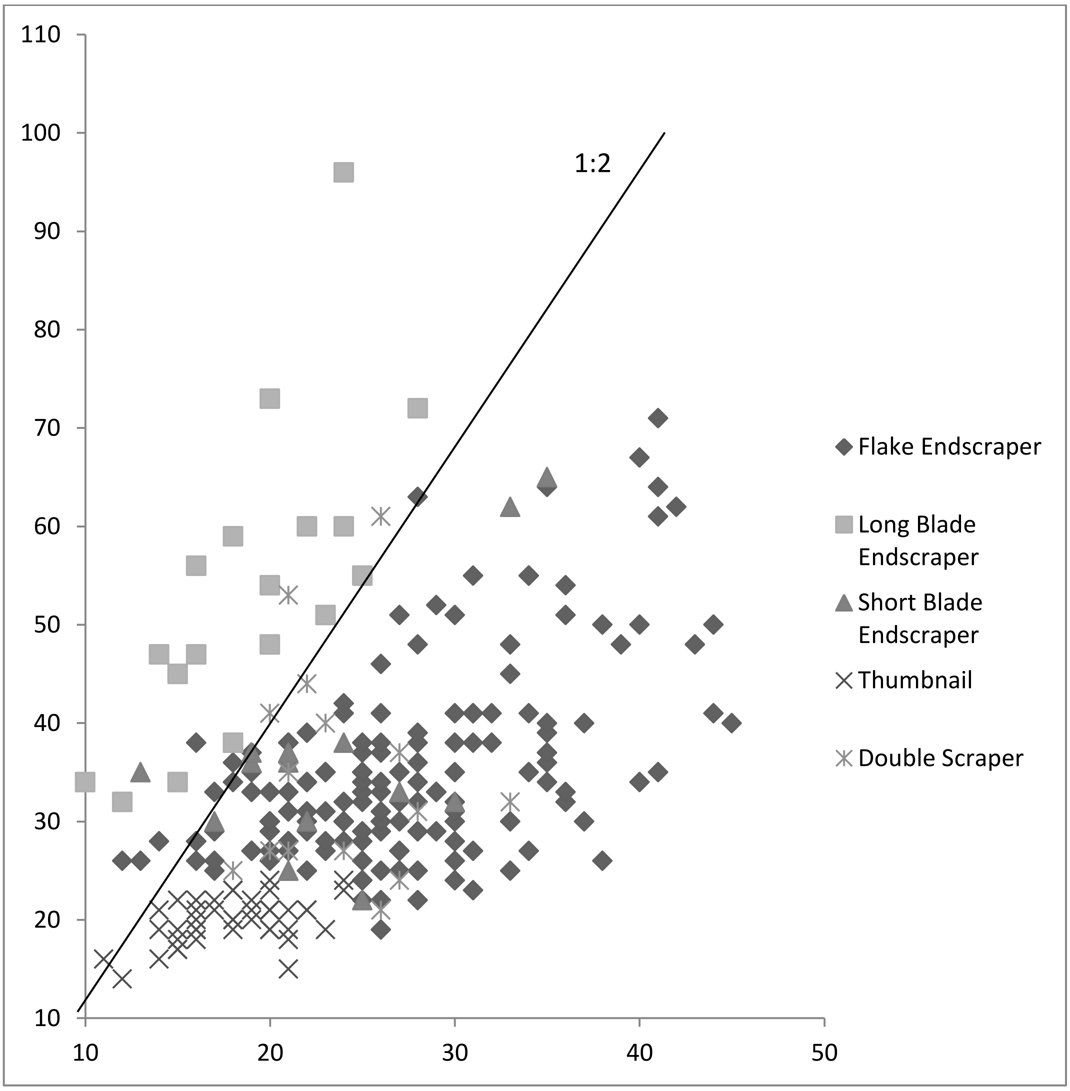


Figure 5.14: Scraper dimensions by type HF-I

In addition to classification based on modus and size, scrapers were also sorted according to the shape of the scraperhead. 150 (64%) of the 235 analyzed scrapers can be classified endscrapers, with a steep head in the shape of a fingernail. Other types include fan-shaped scraperheads (n=12), side scrapers (n=16), round scrapers (n=7) and hollow scrapers (n=2) and unstandardized types (ad hoc, n=48). The scraperhead is usually made on the distal end of the blank. Scraperheads are often manufactured asymmetrically to the blank axis. Asymmetrical scraperheads were observed on 32 % of a sample of 44 complete scrapers. The same asymmetry observed on the scrapers of HH was also observed at HF-I.

5.7.3 Burins

A third important group of tools are the burins. A total of 292 burins were studied, all of which have been metrically analyzed. These burins were mostly manufactured on flakes. For the 222 out of 292 burins of which the modus could be determined, 142 (64 %) were manufactured on flakes, while 80 (36 %) were manufactured on blade(let)s.

The length/width ratios of the various burins are depicted in table 5.16. Burin length varies between 16 and 90 mm, with an average of 39,9 ± 12,8 mm. The width varies from 9 to 56, with an average of 20,8 ± 7,3 mm. Thickness varies from 3 to 26, with an average of 9,2 ± 5,4 mm.

The spall platform was analyzed in less detail than for the Horn-Haelen. Four categories were distinguished: burins on truncations, burins in natural ends and breaks, dihedral burins and (pseudo-)lacan-burins burins, which will be described separately. Eleven burins that fall outside of these categories are so called bec-type burins, where the ventral face of the blank was used as a spall platform (see figure 5.15).

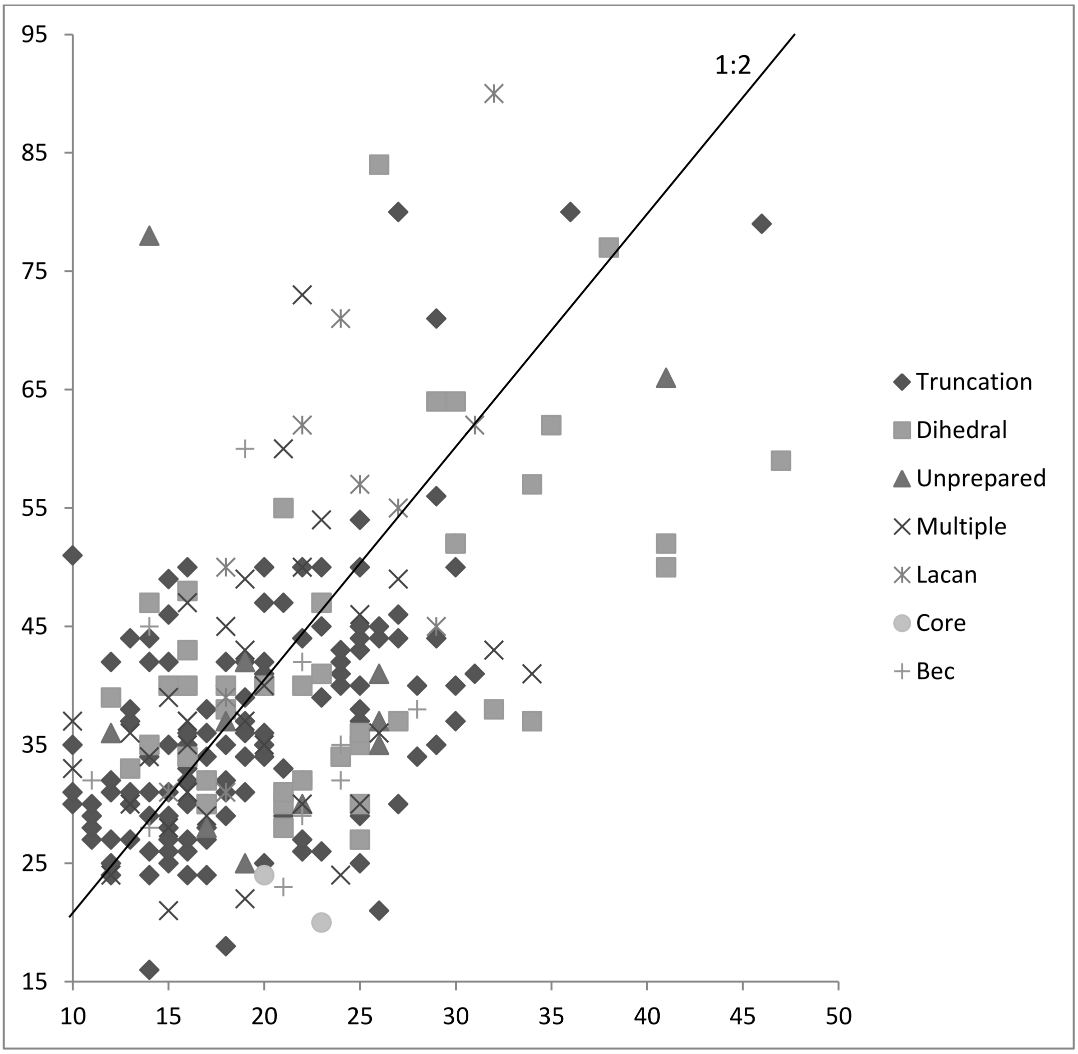


Figure 5.15: Burin dimensions by platform type HF-I

The spall platform types include mostly truncated platforms (n=143) and dihedral platforms (n=42). Unprepared platforms are rare (n=12), as are platforms on the ventral face (n=11). For 35 burins, the platform type could not be determined for various reasons. 36 burins had multiple burin spall removals from different spall platforms (if multiple spalls were removed from the same platform this was considered resharpening and not as a 'multi-burin'). These include 26 double burins of various types of opposing platforms and 10 burins with more than two platforms. Tool re-use was also attested in relation to scrapers. For three of the scrapers on truncation, a scraperhead served as a spall platform.

For 11 burins, platform retouching was observed to be posterior to the burin blow. These burins were classified as (pseudo-)lacan burins. Both the pseudo-lacan types described by die Bie and Caspar and the typical lacan burins were observed. These 'true' lacan burins include convex-concave spall platforms on blades with a pointed bevel, manufactured on relatively large flakes or blades. Seven of these 'true' lacan types were observed. Two of these burins have retouche on the basal side of the burin spall (with hinging termination on retouche). Two other lacan-type burins have another spall platform on the basal part.

Other noticeable types include two pointed becs, similar to *zinken* or Magdalenian needle-point borers on blades. A true *zinken* or 'krombeksteker' was also present (72x18mm). In addition to the burins, at least 29 bladelets and 6 retouched bladelets can be interpreted as burin spalls.

5.7.4 Truncated pieces

A total of 26 truncated pieces were studied, three of which were manufactured on flakes, while the other 23 were made on blades. Truncated flakes were distinguished from B-points based on width and steepness of the retouche. Two of the truncated blades were truncated both on the proximal and distal end of the blade. The length of the blades varies from 28 to 70mm, with an average of 45,9 ± 12,6 mm. the width varies from 12 to 41 mm with an average of 20,6 ± 7,73mm. Basal notching was also observed on three truncated pieces.

5.7.5 Borers

A total of 28 borers were found at HF-I. A total of 11 borers were manufactured on flakes, while 15 borers were manufactured on blades. For the other two borers, blank type could not be determined due to breakage. Borer length varies from 21 to 76 cm, with an average of 39,0 ± 12,9 mm. Borer width varies from 12 to 34 cm, with an average of 20,0 ± 6,0 mm (see figure 5.16).

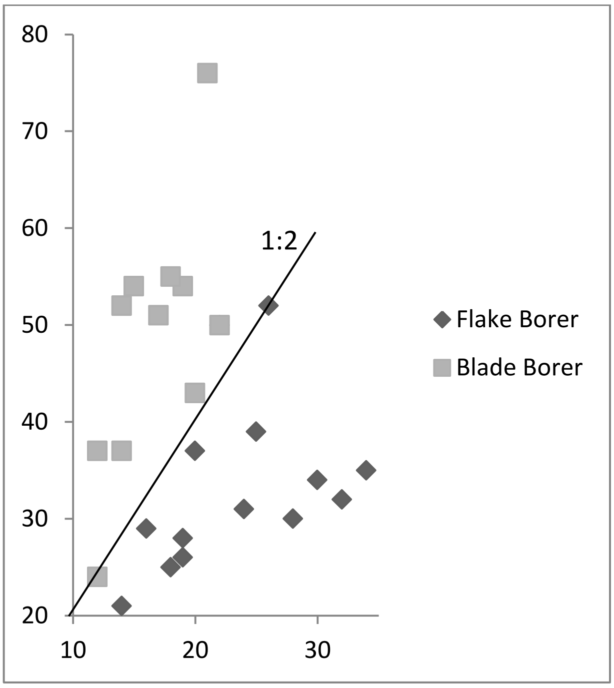


Figure 5.16: Borer dimension by blank type HF-I

On a single borer a possible burin spall negative was observed. This spall negative would have been ventrally retouched after the tool lost its function as a burin. This is interpreted as re-use of the specific tool. The burin would have been classified as a lacan-type burin (of the true type). A single borer could alternatively be classified as a reamer, because the bit is relatively flat.

5.7.6 *Combination tools*

Combination tools from the site include scraper-borers (n=2), burin-truncations (n=2), burin-borers (n=6) and burin-scrapers (n=14). Rare combination tools include two backed blade-burin combinations and a single tang-burin, which may alternatively be described as a burin-bec (Pop 2008, 39).

5.7.7 *Other tool types*

In addition to the main categories of tools discussed before, a variation of more diverse tools and waste categories occur at the site. They include two backed 'knives' (resp. 50 x 21 and 45 x 20 mm. These 'knives' are large LMP-like implements with very steep retouch. These knives are characterized by Wouters as 'Abri-Audi knives'.

A single microburin was found in the Silvrants collection. One *ausgesplitterte stuck, splintered piece* or *piece esquille* was documented. Another remarkable artifact is a rounded core-like artifact with small flaking negatives on both sides. This artifact has been interpreted as a strike-a-light based on comparison with similar artifacts from later periods. Twenty-five flakes and twenty-five blades were marginally retouched. Specific types of retouch were attested on three denticulate flakes, a denticulate blade, a notched flake and three notched blades.

5.8 A cortical engraving and other finds

One flake from the Silvrants collection was engraved in the cortex with a ladder-like motif. This engraving is very superficial and hard to notice with the naked eye (see figure 5.17, left). The engraving was applied to a cortical flake made from RMU 3. Wouters published on engraved flint from the Federmesser-groups and on the Fransman in particular in 1991 (Wouters 1991). Engraved tools and waste products are known from Budel-II, Oostelbeers, Nederweert-de Banen and Deurnese peel (*idem*).

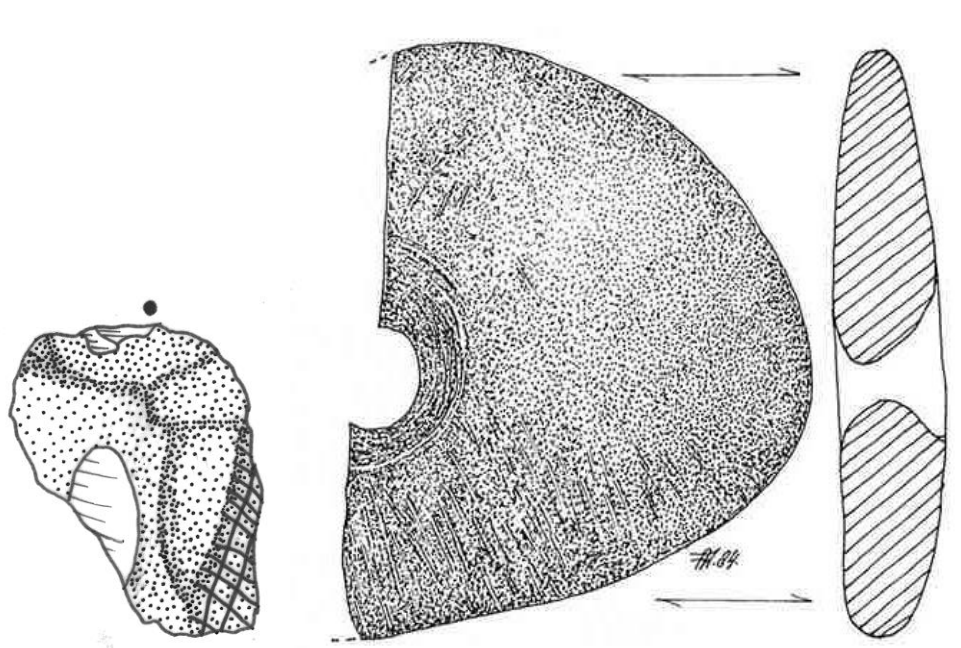


Figure 5.17: Flake with engraved cortex (Left) and rondelle (Right) from HF-I

Drawing: D.D.L. Stoop (Left) and A.M. Wouters (Right; Wouters 1984, 113)

Five artifacts from non-flint stone types were found. These include two hammerstones, two '*retouchoirs*' and a *rondelle*. This so-called rondelle is a flat, polished lydite of slate with a conical hole in the centre. Both of the *retouchoirs* are also made from lydite and are similar to the rondelle (see figure 5.17, right). Perforated pieces of lydite are known with engraving from the Ahrensburgian sites of Geldrop-1, Geldrop 3-1, Vessem-Rouwven and Mook (Deeben and Rensink 2005, 190). The perforation could be interpreted as a talisman, or a way to carry the retouchoir from a piece of clothing. Lydite occurs naturally in the Ardennes and the Central-german Fichtelgebirge. The material from the Fichtelgebirge is eroded by the Rhine and lydite nodules are deposited near the Dutch Rhinebeds (van der Lijn 1963, 231).

5.8 *Raw material use*

Due to the infiltration of iron particles in the artifacts, it was often impossible to determine the nature of the used raw materials. It was therefore not feasible to distinguish various types of eluvial flints. In addition to the raw material units defined for Horn-Haelen, two more raw material units were defined:

RMU 7: A yellow, fine-grained translucent flint type with a honey-like translucent color (see figure 5.18). On one of the artifacts, part of the original surface of the core was still present. This was not cortex, as drawn by Wouters, but an old surface which was severely eroded by natural processes. This surface showed severe rounding and small pits, indicating exposure to weathering for a long time. According to Silvrants (pers.comm. 2013), this point was studied by Prof. Modderman and described as northern flint from the ice-pushed ridges. Further research is needed to support this interpretation.

Figure 5.18: Point from RMU 7 (erratic flint) HF-I

RMU 8: A light greyish flint type with white intrusions. These include both large, white milky features and small white dots. This flint can possibly be interpreted as Chalcedony.

A total of 5997 artifacts were manufactured on local Meuse type flints (RMU 1, 2 and 6), most of these flints have red coloring due to the infiltration of iron (see table 5.5). At least 27 of these artifacts were made from RMU 2, but the total percentage of this flint type could not be determined. The presence of typical RMU 1 flints was attested in at least 16 cases, although the iron infiltration made it impossible to determine the exact amount of RMU 1 artifacts. The fine-grained flint varieties seem to be more resistant to iron infiltration and are also more easily distinguishable from other categories even when infiltrated with iron. Therefore, only RMU 3 was distinguished in table 5.13. This category encompasses RMU 3 (n=297), RMU 7 (n=3) and RMU 8 (n=1). Among the waste products, 6% were made from RMU3, while for the tools this constitutes 12%. RMU 3 seems to have been preferred for the manufacturing of burins, points and 'other' tool types, while it is less common for scrapers. The presence of such a large amount of high quality glass-like flint is also typical of early traditions such as the Hamburgian (Smit 2010, 63).

Table 5.5: Percentages of RMU 3 in various artifact categories at HF-I

	Flake	Blade	Core	Waste	Scraper	Burin	Point	Other	Tools
RMU 3	*146*	*53*	*2*	*204*	*25*	*44*	*15*	*8*	*92*
%	*7%*	*5%*	*1%*	*6%*	*8%*	*15%*	*11%*	*13%*	*12%*
Other	*1941*	*938*	*168*	*3077*	*271*	*250*	*122*	*54*	*697*
%	*93%*	*95%*	*99%*	*94%*	*92%*	*85%*	*89%*	*87%*	*88%*
Total	2087	991	170	3281	296	294	137	62	789

Three artifacts could be attributed to RMU 7. These include a flake and two Gravette points. Based on this small component and the fact that most were made into tools, it is likely this flint type was brought into the site as a finished product. Only two artifacts from RMU 8 could be recognized, both shouldered points, indicating that these points were brought in.

Table 5.6: Cortex on different tool types and blanks at HF-I

Cortex	Scrapers		Burins		Points		Other		Blanks	
	N	%	n	%	n	%	n	%	n	%
0 %	113	63 %	139	76 %	67	94 %	20	71 %	457	75 %
<50 %	39	22 %	32	17 %	4	6 %	2	7 %	81	13 %
>50 %	26	15 %	12	7 %	0	0 %	6	21 %	69	11 %
Total	178		183		71		28		607	

To determine preference for the manufacturing of tools related to the position of blanks in the reduction sequence, the percentage of cortex on the dorsal side was also studied in a sample of 178 scrapers, 183 burins, 71 points, 28 other tool types and 607 blanks (see table 5.6). Flakes with >50% cortex seem to be preferred as blanks for scrapers and "other" tools, while flakes with <50% cortex are also common among burins. Points are almost exclusively manufactured on blanks without cortex. The percentage for cortical flakes burins coincides with the percentage of cortical flakes among blanks, indicating no preference was used for these tools.

A total of 39 tools and 744 waste products show signs of heating. This comprises 12,4 % of the total lithic material. In total, 9 % of the tools were heated, while 14,6 % of the waste products showed signs of heating..

5.9 Discussion

- *What has actually been found at Heythuysen-de Fransman-I?*

A large number of flint artifacts were recovered from HF-I. This material all dates to the late glacial. In addition to these flint artifacts, four lydite retouchoirs were also recovered.

- *What is the research history, age and stratigraphic position of the finds?*

The site was discovered by P. Peeters and subsequently picked clean by J. Silvrants, P.H. Beeren, H. Verhaeg and W. Vossen. Wouters later visited the site, studied the material and published on it (Wouters 1984). Significant numbers of blades and flakes have both been attested at the site, roughly two flakes were found for every blade. However, mostly bladelet-oriented cores were found as waste products, for every flake core, three blade cores were found. Moreover, it is likely blade-oriented cores were used as flaking cores when their potential for producing blades was gone. This indicates that the majority of the production was oriented on bladelet and blade production. When the dimensions of the various blades are plotted, a cloud of laminar products becomes evident that contradicts pure a laminar-flake oriented reduction. It is likely that both typical laminar-flake oriented reduction and systematic blade production occurred at the site. Based on a 1:3 length/with ratio, 28 % of the laminar output can be classified as true blades rather than laminar flakes.

Multi-facetted platforms are rare, most of the blades were produced using simple or two-faced platforms. Abrasion and crushing were not observed, although blades were not studied extensively. *En épèron*-technique is absent on the site, lipping was also not observed. This argues against the use of antler percussion techniques. Due to the admixture of the material, it is hard to distinguish between soft stone- and hard stone hammer percussion. Both the pronounced, heavy bulbs indicative of hard stone hammer percussion and the *esquillement du bulbe*, which is considered a prime indicator for soft stone hammer percussion were observed (Pelegrin 2000). It is not unlikely that a combination of both techniques was employed for the production of these long blades. Visual inspection of the platforms of the laminar blade component in comparison to experimentally manufactured soft stone hammer percussion blades seemed to indicate this technique was used for the production of the long blades (Pelegrin 2000). This indicates a combination of hard and soft stone hammer percussion similar to that observed at HH, although the laminar component is significantly more pronounced.

Scraper types include a large amount of small scrapers on flakes typical for the Federmesser-groups. These are short steeply retouched endscrapers on irregular thick flakes and laminar flakes. A preference was observed for cortical flakes for the manufacturing of scrapers, possibly related to blank thickness.

Only 6 % of the scrapers could be classified as long blade scrapers, while over 80% constitutes small, unstandardized flake scrapers and thumbnail scrapers. The burins are mostly manufactured on flakes with maximum dimensions of 50 cm in length and 30 cm in width. The burins outside these boundaries vary great in dimensions and include more dihedral burins, while the smaller burins are generally manufactured on truncation.

The great portion of small, opportunistic unstandardized burins, small flake-endscrapers and combination tools on small blanks all correspond to lithic technology for the Federmesser-groups described by de Bie and Caspar (2000) and Deeben and Rensink (2005) for the southern Netherlands and Belgium. Together with a large portion of small LMP, backed bladelets, a flake with engraved cortex, stratigraphical position in a charcoal-rich layer interpreted as an Usselo-soil this argues strongly for a date in the Allerød interstadial for the majority of the assemblage.

The point types are largely indicative of the typical Federmesser-assemblages, with straight backed points and curved backed points being the dominant types (Deeben and Rensink 2005, 183). At HF-I, these are supplemented with rarer derived types such as penknife points, Creswellian points, Kremser points, B-Points and LMP-fragments (fragments of the aforementioned point types or backed bladelets).

From the typo-and technochronologcal analysis, most of the material can be attributed to the Federmesser-groups, and therefore most likely to the Allerød-interstadial. This is supported by the stratigraphical evidence.

Some of the curved backed points and straight backed points are atypically large, which caused Wouters (1984) to describe them as Châtelperronian points. These large LMP are interpreted as butchering knives by de Bie and Caspar (2000). However, compared to the large LMP found at Rekem, some of the large point-like artifacts from HF-I are still atypically large and common. The average LMP length at HF-I is 39,8 ± 14,2 mm, while at Rekem, average LMP length is 38,7 ± 8,3mm (de Bie and Caspar 2000, 124), at Kettig, points are significantly shorter, with an average length of 28mm. This shows that, average point dimensions vary little in Belgium and the Netherlands, while they are significantly smaller in the Rhineland. At HF-I, LMP are less standardized than at Rekem, with more dimensional variation. The inferred Châtelperronian points are manufactured on more standardized, regular blades than the large elements from Rekem. Based on de Bie and Caspar's typology, almost half of the LMP recovered at HF-I can be classified as large LMP. These include seven large implements whose length exceeds 60 mm and could therefore be classified as Châtelperronian points. The Châtelperronian points are also likely associated to the large backed '(abri-audi)'knives' which are typologically closely associated.

Large backed point types such as these Châtelperronian points and backed knives do not occur in younger assemblages such as the Ahrensburgian and Mesolithic, but they do occur in older lithic traditions such as the Final Magdalenian, Gravettian and Azilien Ancien (see also chapter 2.3). This would suggest at least part of the material from HF-I predates classic Federmesser.

A second atypical element is constituted by the shouldered points (See figure 5.19, nrs. 1,2,4,5 and 6). These shouldered points also occur frequently in the contemporary northern Hamburgian. Shouldered point assemblages in the North were found at Meiendorf (12.360 ± 110 BP (K-4328)) and Stellmoor (12.190 ± 125 BP (K-4261), 12.180 ± 130 BP (K4328)) among others (Lanting and van der Plicht 1997, 96). The southernmost sites of the Hamburgian were found some 105 Kilometers to the North of the site, near Stroe. The occurrence of shouldered points in final Magdalenian assemblages was already discussed in chapter 2. Shouldered points also occur at Presle (12.140 ± 160 BP (Lv-1472)), Amien-Étouvier, Dreuil-Lès-Amiens, and Tureau des gardes (12.277 ± 73BP (AA-44214, AA-44215 and AA-44216, average)) a.o. (Maier 2012, 153-160). Although typical shouldered points are rarely found in excavations in the Southern Netherlands and northern Belgium, they are known from surface assemblages. Shouldered points are known from Budel-II, Lommel (various sites), Neer-II and HF-Ia (Wouters 1981a; Wouters 1981c; van der Lee 2009; Rensink and Deeben 2005). The occurrence of typical shouldered points would argue or a date somewhere before 12.000 BP, as suggested by the aforementioned dates of shouldered point assemblages in northwestern Europe.

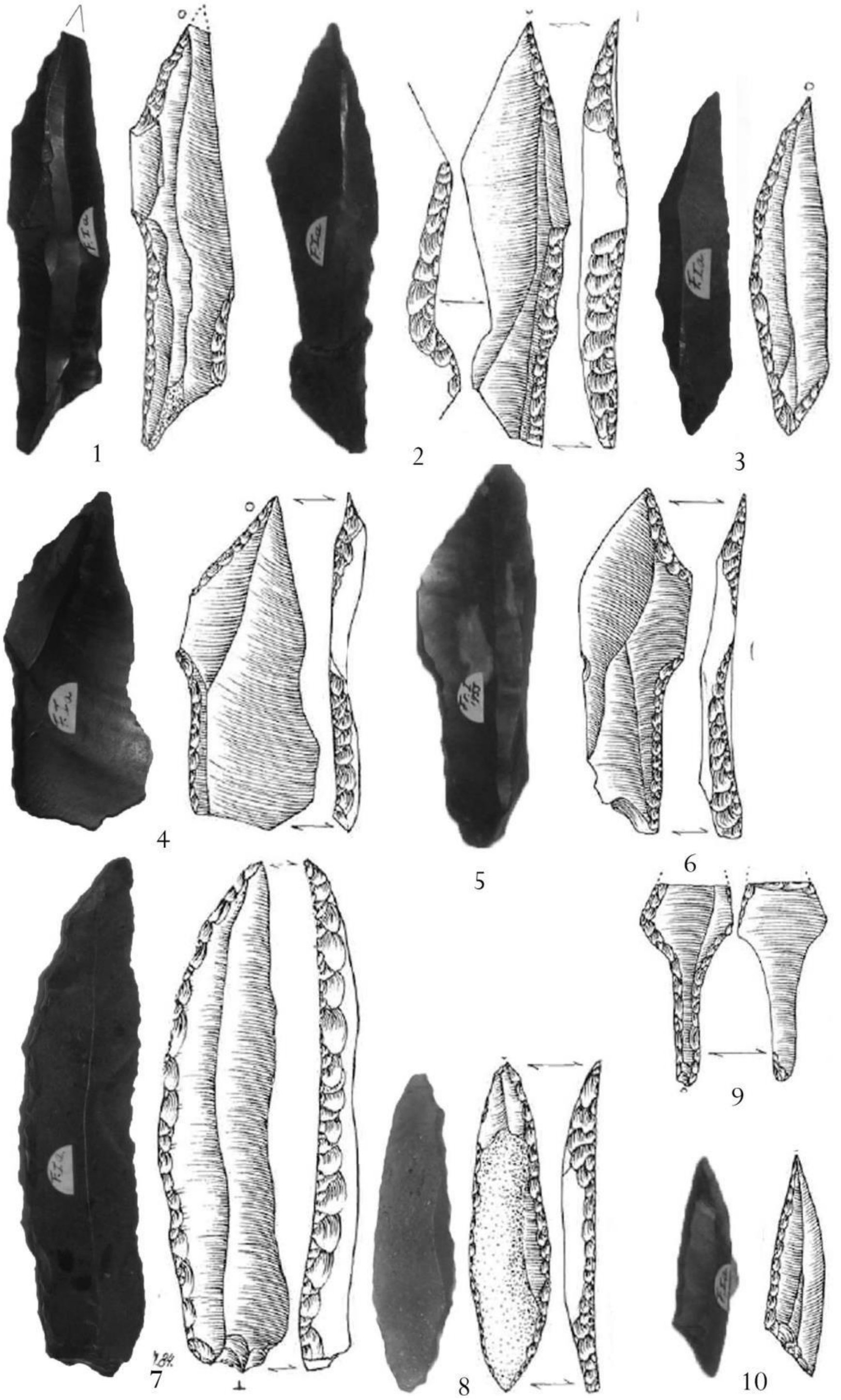


Figure 5.19: Atypical artifacts from HF-I (1:1)

Drawings by A.M. Wouters (1984, 77-81), Photos by the Author

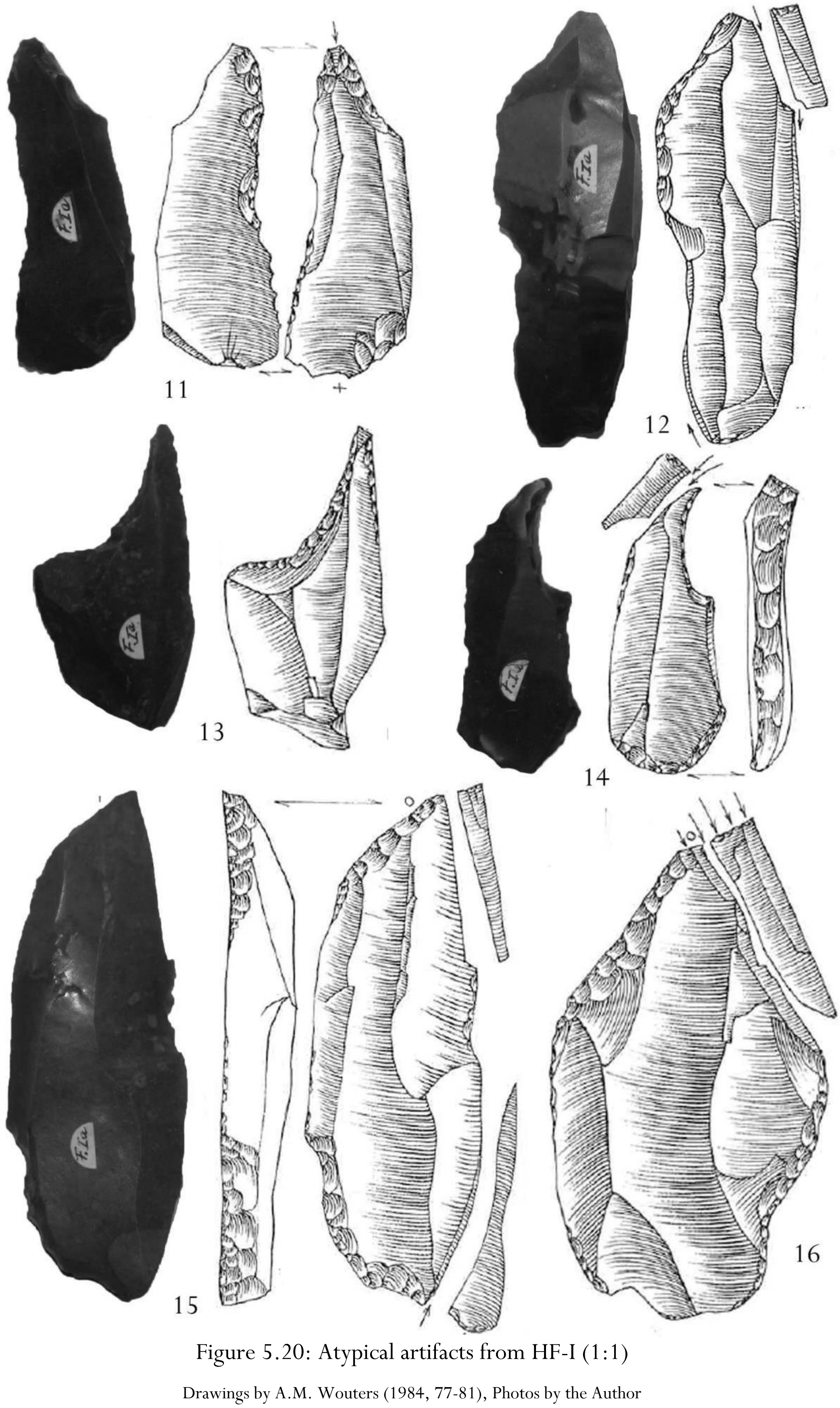


Figure 5.20: Atypical artifacts from HF-I (1:1)

Drawings by A.M. Wouters (1984, 77-81), Photos by the Author

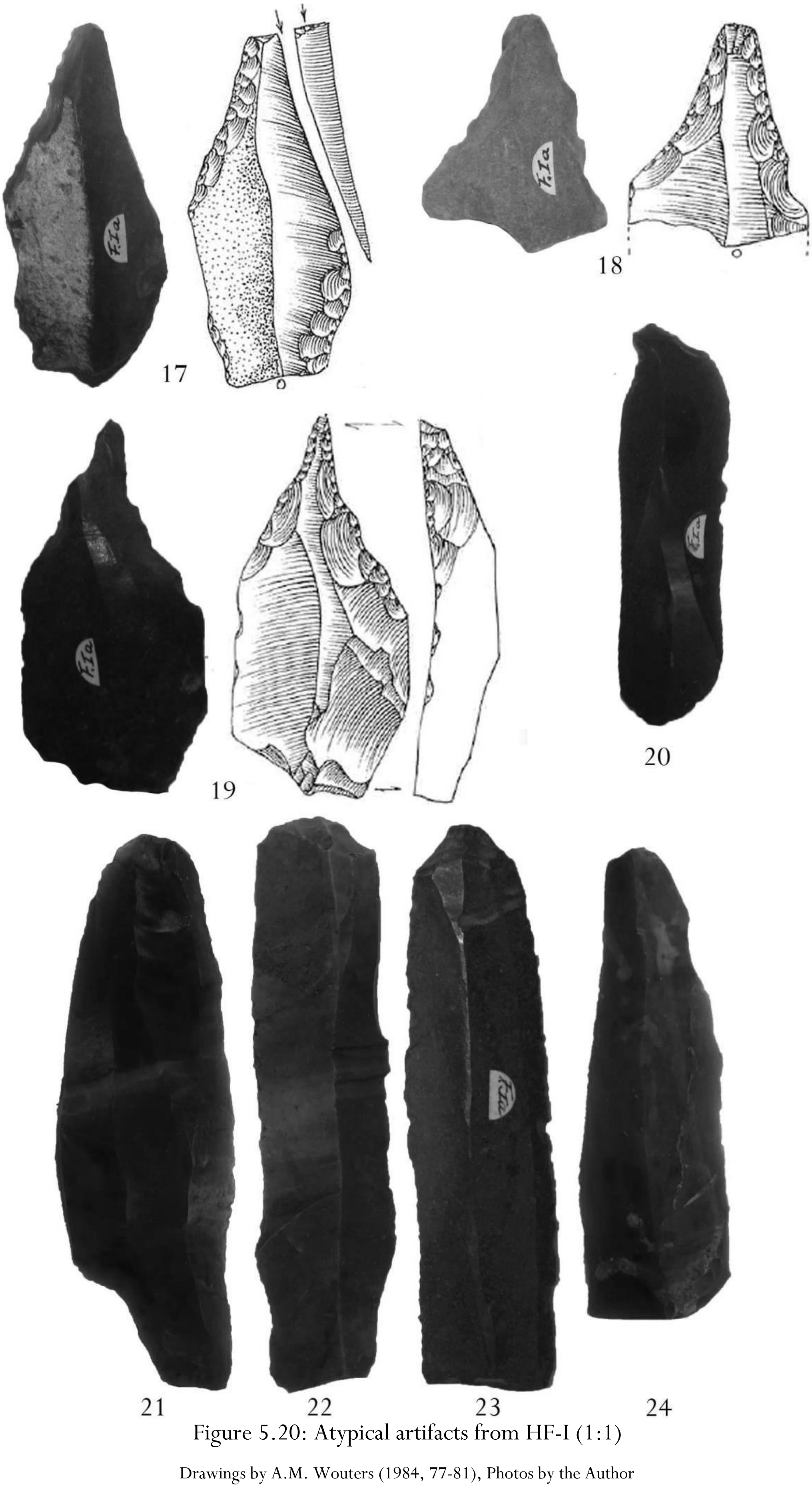


Figure 5.20: Atypical artifacts from HF-I (1:1)

Drawings by A.M. Wouters (1984, 77-81), Photos by the Author

Typical lacan-burins also occur with large dimensions (see figure 5.19 11-17). The occurrence of typical lacan-burins is usually associated with a Final Magdalenian component, although these also occur in the Azilien ancien (Valentin 2008, 125). At the Federmesser-site of Rekem, typical lacan burins are wholly absent (de Bie and Caspar 2000). The occurrence of these typical lacan burins also argues for a date of part of the assemblage in the early Allerød or Bølling interstadial.

A third argument for an earlier component is the presence of a 'true' laminar component (see figure 5.19, 21-24) and the occurrence of a typical *zinken* and various atypical variants interpreted as borers (see figure 5.20, 20). Borers are also generally rare in Federmesser-assemblages, while at HF-I a total of 28 borers were found, which could alternatively be described as atypical *zinken* on flakes and small blades. The presence of both typical and atypical *zinken* also supports a date for part of the material in the transitionary period between final Magdalenian or early Federmesser-groups (see chapter 3).

However, the én éperon-technique has not been observed on any of the blades at HF-I, neither were any indications for the application of organic percussion. Blades were manufactured with a hard- or soft stone hammer. Technological analysis was inconclusive in distinguishing these, possibly due to the admixture of older material on the Federmesser-site. A final argument for the older phase is the abundance of fine-grained glass-like flint used for the fabrication of large artifacts. This is also typical for early assemblages such as the northern Hamburgian (Smit 2010, 63).

This argues against Wouters (1984) interpretation of the site as a Gravettian assemblage. Gravettian blade technology focused on the production of long, slender blades. These blades are regular and struck using soft percussion, based on the small bulb (Otte 1979). No small bulbs were observed, neither was any indication for soft percussion. The proximal part of Gravettian blades is often very narrow, as a result of abrasion (*Idem*). Neither point-shaped or line-shaped platforms were observed in large numbers, abrasion was not observed at all. Gravettian cores are mostly prismatic and bipolar. Exploitation occurs on a single surface rather than around the entire core. This leads to cortex occurring on the 'back' of the discarded cores. These cores are described by Wouters as cores of the 'Perigordian' type. Only two cores that could possibly be interpreted as the 'Perigordian' type were attested at the site, 1,1 % of the total number of cores. In a Gravettian reduction sequence, the first blade was prepared using transverse flaking (crested blade). The angle of the core platform with the exploitation surface is often steep (*Ibidem*). Levallois-cores also occur occasionally on Gravettian sites. The Levallois-technology was not observed at HF-I, neither were typical long crested blades. Therefore, technologically, no association to the Gravettian could be noted. Typologically, two broken tools were interpreted as Font-Robert points. Because neither was complete, this could not be determined with certainty. Both of these points were analyzed by A. Verpoorte and E. Pop, who reclassified them as a fragmented needle-point borer and a combination burin/bec. For the first tool, where the 'tang' was still intact, this is based on torsion fractures not depicted by Wouters in his drawings (Pop 2008) (see figure 5.20, nr. 9). Flat retouche, heavy massive chopper tools, and animal-shaped art were not observed.

- *What is the size of the site in terms of amounts of finds and spatial extent?*

A total of 4339 flint artefacts and four lydite artifacts were recovered by five collectors from an elevated area maximally 40 x 40 metres in surface.

- *What is the content of the lithic inventory and how 'clean' or 'mixed' is it?*

The inventory includes only artefacts that can be dated to the Late glacial, respectively to the Federmesser-groups and the Final Magdalenian. No indications for Mesolithic or Neolithic admixture were observed. The two components cannot be clearly distinguished based on typology, patination and raw material use.

- *How does Heythuysen-de Fransman-I compare to other, published data for the Peelhorst-area?*

Published data for the Peelhorst area is largely lacking, the only sites that have been published (minimally) are Millheeze (Arts 2012) and Nederweert-de Banen (Koutamanis 2012). Compared to Milllheeze, HF-I is different in the spatial aspect. Although the artefacts recovered at Millheeze are far more numerous, Millheeze consists of at least 35 concentrations covering some 250.000 m^2, while HF-I consists of merely one concentration covering 1.600m^2. The site of HF-I contrasts in its extremely high density of artefacts. Moreover, at Millheeze, the concentrations are located north of the glacial lakes, while at HF-I the concentration is located south of the lakes. A similar dispersed pattern of many smaller sites was observed at Nederweert-de Banen (Koutamanis 2012).

- *Can it be interpreted as a base camp?*

Seven points show signs of impact, indicating that these were brought in after a hunting trip rather than being production-mishaps. This would suggest a number of these points were not produced on the site itself but brought in after hunting trips. Furthermore, compared to scrapers and burins, a larger percentage of points seem to have been made from imported flint, indicating these points were imported to the site rather than being fabricated there. Based on these indications, it is possible that the lithic industry on the site was mostly aimed at the production and use of scrapers and burins, rather than points. This is confirmed when comparing the site with the lithic inventory of HH, where points are more numerous. The lithic inventory of HF-I is dominated by scrapers, indicating processing activities were of importance at the site. Unfortunately, the only spatial data on the site is that the artifacts were recovered from a 40x40m zone. This makes it impossible to distinguish between various loci, or to attest any kind of site investment such as structure stones or hearth-cleanings. Therefore, the lithics may very well be indicative of a pile-up of functionally variable site types from technologically indistinguishable periods. The location choice on the border of a glacial lake may indicate that fishing was important, based on the occurrence of pike-bones at the comparable site of Millheeze (see chapter 2.2.4). Ultimately, it was impossible to determine the site function of HF-I.

5.10 Conclusion

A re-evaluation of the material has led to the conclusion that the stratigraphy provided by Wouters is false and that the material was actually located in, or just beneath, the B-Horizon of the profile, in the same layer as charcoal associated with the Allerød-interstadial was found. A typological re-evaluation of the flint artifacts demonstrates the material belongs largely to the Federmesser technocomplex. No characteristics were noticed to support an attribution to the Gravettian. The site can therefore be re-interpreted as a Federmesser-site with admixture from the Final Magdalenian/Early Federmesser transitionary period.

The flint artifacts include mostly locally available flint types found in Meuse deposits. The cortex is partially removed before the nodules are brought into the site. These pre-cores are worked in a simple way aimed at immediate output of laminar flakes for the largest part of the assemblage. The platforms observed on these laminar flakes suggest hard-hammer percussion was the main technique used for removing these flakes. Typical crests were not observed, neither was any standardization of the laminar output. Abrasion, heel sanding or systematical core technology were also largely absent. The laminar flakes were mostly used for the production of burins and scrapers, while points or borers are relatively rare on the site.

Due to their quality and potential for resharpening, combined with parallels from the nearby site of Rekem, it is inferred that a small component of the tools were part of a mobile toolkit (mobilia) and imported to the site rather than fabricated on an as-needed basis. These tools are often made on high-quality imported flint, mostly the fine-grained translucid black variety.

Chronologically, the largest part of the material can be attributed to the Federmesser-culture, and therefore to the Allerød-interstadial. Based on the occurrence of shouldered points, lacan-burins, zinken and a ‘true laminar component’, part of the material is dated to the earliest part of the Allerød or more likely, the Bølling interstadial.

The most frequently occurring tool class is the scrapers, followed by burins. Points are noticeably smaller in number. This would indicate processing activities were of some importance on the site, more so than hunting activities. However, in the absence of well-documented spatial data, it is impossible to determine any degree of site investment. According to Silvrants, all the material was found in a relatively small area, with extremely high artifact densities. This would possibly indicate that much of the material can be assigned to the same period of occupation, assuming people would not sit in the *exact* same spot years later. Unfortunately the exact site function could not be determined due to the lack of spatial data[11].

[11] It is questionable whether site function could be determined even if high-resolution spatial data was available

Survey of Federmesser sites in Central Limburg

Introduction

6.1 Introduction

In this chapter, the distribution of Federmesser sites in the study area of central Dutch Limburg will be discussed. The information is based on an inventory of amateur collections. Location choice and assemblage size were studied to make inferences about mobility patterns. Before interpreting any type of mobility, there are many problems that hinder knowledge of hunter–gatherer land use systems based on surface collections. These will be discussed first (Crombé *et al* 2010, 455).

For the desktop study, all Late Palaeolithic sites in the national archaeological database for the Netherlands (ARCHIS-II) as well as several additional amateur collections were incorporated.

Using both ARCHIS and the collections of various amateur-archaeologists, a database of these sites has been created. For each site, a name has been assigned based on the closest village or town, followed by a placename and optionally followed by a number in roman numerals if more sites occur on roughly the same location. Also, the geomorphology of the location was studied, the distance to- and nature of the nearest freshwater source, the distance to the Meuse river and whether it concerns a Peelhorst- or Meuse-site.

6.2 Issues with surface collections

There are several problems with the interpretation of sites in the research area. After initial deposition the sites have undergone a great deal of degradation and selection. Sites are affected by post-depositional processes. Artifacts undergo weathering and deteriorate in the sandy soil and internal spatio-temporal patterning is affected by bioturbation and other pedological processes (see figure 6.1). Problems regarding the studies of surface scatters were already summarized by Lewarch and O'Brien (1981, 308) as follows: "*Surface materials suffer from severe post-depositional, natural and cultural processes; surface materials suffer from severe destructive agricultural activities; there is a lack of a positive relationship between distributions of surface and subsurface materials; subsurface materials do not adequately reflect the complexity of archaeological phenomena; surface assemblages lack analytical potential, especially for chronological control; surface assemblages suffer from bias due to amateur (or professional) collecting; and analysis of surface materials fail to produce positive results*" (Lewarch and O'Brien 1981, 308 in: Smit 2010, 23)

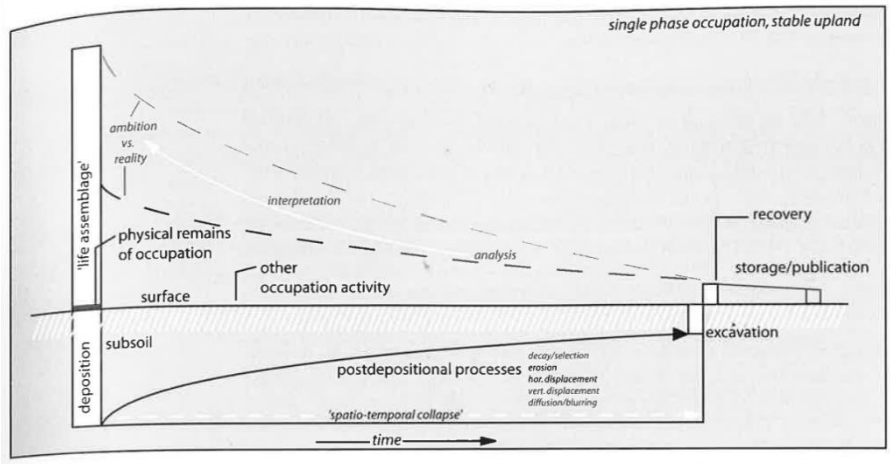


Figure 6.1: Schematic representation of postdepositional and distortive processes for upland sites with a single-phase of occupation. after Amkreutz 2013, 75 (Fig 4.5)

The re-use of the same location leads to palimpsest situations. The location can be reused several years later, but also several millennia later. As sedimentation is virtually absent in the sandy uplands after the Weichselian, collections are normally mixed assemblages with material from different periods.

Agricultural activities since the middle ages have disturbed the horizontal distribution of lithic scatters. Frequent ploughing moved artifacts from their original location. In the study area, movement of sand for lily-cultivation and during sand-and-gravel extraction was important disturbing factors. Leveling during the 1970s was another disturbing factor. Natural heights in the landscape were leveled to enlarge and flatten fields. As these high locations were often favored by hunter-gatherers, such activities destroyed many more sites.

Most sites are discovered by amateur-archeologists during unsystematic surveys. Especially in the early years (1950s – 1960s), these surveys were so fruitful that material was collected selectively. The 'ugly' artifacts such as flakes were left and mainly tools were considered to be valuable additions to the collections. The exact coordinates of finds were rarely documented. The artifacts are usually piled up in boxes with a fieldname, referring to the site.

The many issues with surface collections have already been extensively studied by many authors. Recent summaries of these issues and debates have been provided for the Netherlands by Smit (2010, 23-27) and Amkreutz (2012, 75).

6.3 Source material

For the desktop study, all Late Palaeolithic sites in the national archaeological database for the Netherlands (ARCHIS-II) as well as several additional amateur collections were incorporated. The following collections were (partially) studied: the collections of J. Smeets, M. van Hoef/van Rijt, J.

Beeren (partially), H. (Driek) Beeren, L.L. Mertens, C. Dirks, T. van der Linden, H. Reijnen, P. van Pol, J.H. Becking, P.J.(Sjeng) Beeren (partially), H.(Harrie) Verhaeg (partially) S.(Sef) Silvrants (partially) and A.M. Wouters (partially). Additionally, data from an unpublished study of the archaeological collection of J. Driessen by J. Deeben were incorporated. The total database includes 65 sites attributed to the Federmesser tradition. Unfortunately, most of these collections produced few Palaeolithic artefacts.

Sites were classified in three groups: Single finds, small-medium sites (<500 tools) and large sites (>500 tools). Several sites have been grouped together into site clusters because the clusters result from excavation. If, for example, sites like Blerick-Koelbroek had been collected as a surface site, they would have likely been regarded as a single site. To compensate for the overrepresentation of sites in the same area, these sites were grouped together. This clustering has reduced the sample to 51 sites. Another ten sites are disregarded because they concern a single find. In these cases, it is not clear whether these finds indicate occupation or off-site activities. The sample used for the basic site location analysis consists of 41 sites.

The full catalogue of Federmesser sites for the study area is added in appendix II. These sites are plotted on a height model for the Netherlands (AHN), combined with the waterways of 10.950 BP as published by Vos *et al* (2011). This was supplemented with an estimation of the locations of glacial lakes, based on topographical maps and the border between the Meuse- and Peelhorst-area.

6.4 Site location analysis

The distribution of sites is presented in figure 6.2. A large number of sites are clustered in the Meuse area, especially around site 42 (Haelen-Houterhof). The large numbers of sites at that location is probably the result of research intensity. A second cluster near site 15 (Blerick-Koelbroek) is the result of the IPP research in Blerick-Koelbroek. A comparable cluster of sites near a horseshoe-shaped lake (cut-off meander) is located at site 9 (Lottum-Horsterdijk). Despite the higher research intensity, sites seem to be more numerous in the southern part of the research area, although not in the southernmost part.

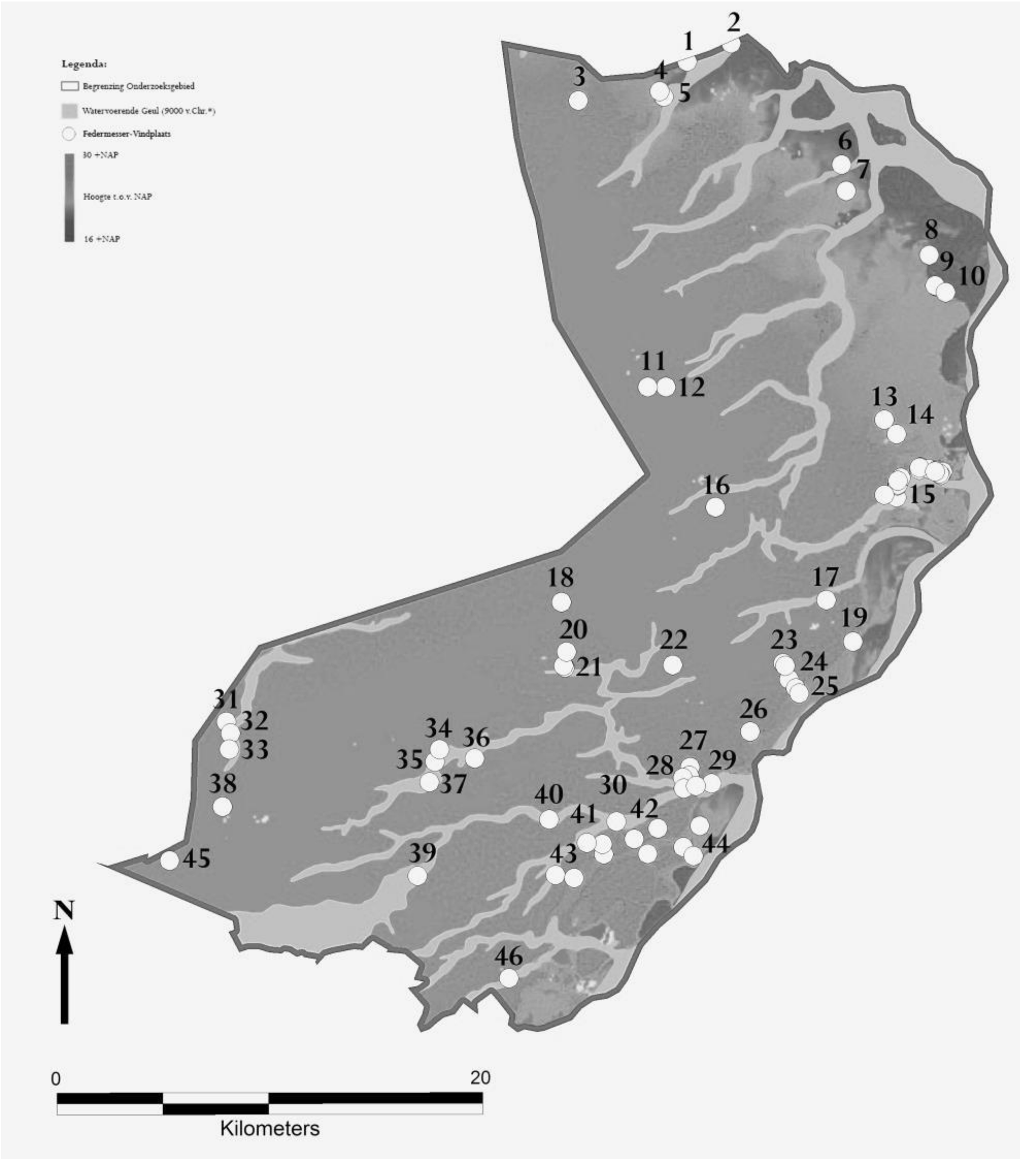


Figure 6.2: Distribution of Federmesser-sites in the study area.

Federmesser-Sites (legend figure 6.2):

1: Overloon-Houtklef
2: Loobeek-Esakker
3: Merselo-Zwarte Water
4: Venray-Venrays Broek-I
5: Venray-Endepoel-I
6: Horst-Meerlosche heide
7: Meerlo-Op de Hees
8: Broekhuizen-Broekhuizerbroek
9: Lottum-Horsterdijk-II / Horst-Hoog Broek
10: Lottum-Horsterdijk-I
11: America-Zwarte Plak II
12: America-Zwarte Plak
13: Venlo-Oude Berkt
14: Venlo-Witte Berg
15: Blerick-Boekend / Venlo-Tradeport / Blerick-Koelbroek
16: Koningslust-Sevenumsedijk
17: Baarlo-I
18: Meijel-Langstraat
19: Baarlo-Napoleonsbaan
20: HF-I-II
21: HF-I-I
22: Panningen-Melkweg
23: Kessel-Heldense Bossen
24: Kessel-Broek
25: Kessel-Dijk
26: Neer-Spanjersbaan
27: Neer-Boshei/Neer-II
28: Neer-Leumolen
29: Neer-Kinkhoven
30: Heythuysen-aan de Watermolen
31: Weert-Kuikvensedijk
32: Weert-Maarheezerhuttendijk
33: Weert-Schaapsdijk
34: Nederweert-Sarsven
35: Nederweert-De Banen
36: Leveroy-Leveroyschedijk
37: Nederweert-Kwegt
38: Budel-Boshoverheide
39: Ell-Wetselerberg
40: Baexem-Weijerbroek
41: Baexem-Op den Bosch; Baexem-Beekkant
42: Haelen-Bosrand; Haelen-Bedelaar-Zuid; Haelen-Houterhof
43: Baexem-Abenhofweg; Baexem-Kasteelweg
44: Haelen-Buggenum; Haelen-Hornerweg; HH
45: Weert-Zuidwillemsvaart
46: Ittervoort-Loretokapel

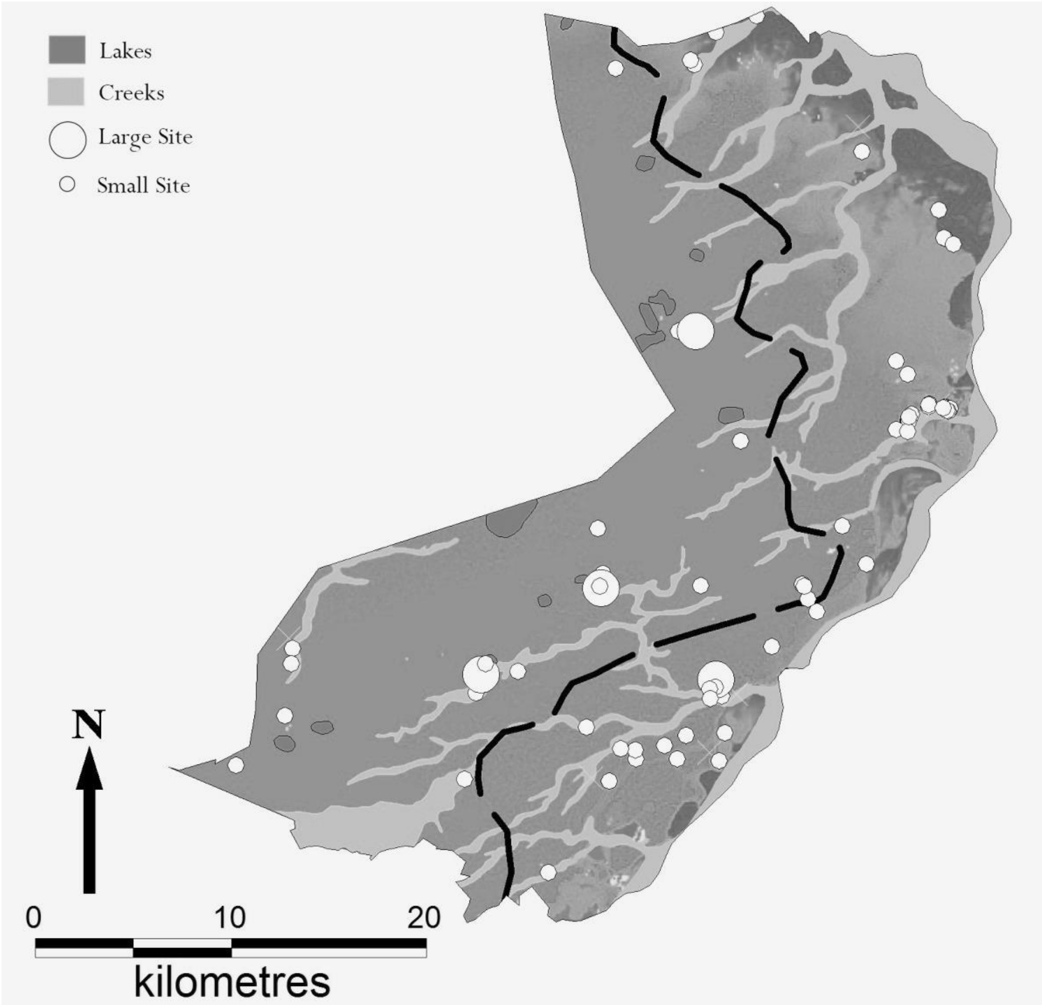


Figure 6.3: Distribution of Federmesser-sites in the study area by site type.

(Water courses after Vos et al 2011).

Sites in the Peelhorst and Meuse area were compared in terms of geomorphology, distance to freshwater and distance to the Meuse River. The 41 sites were divided into 15 Peelhorst-sites and 26 Meuse sites (see figure 6.3).

The Meuse sites are located an average of 3,6 kilometers from the Meusebed. These sites are located between 100 and 800 meters from freshwater, with an average distance of 198 meters. The nature of this freshwater includes creeks (n= 15) and Meuse-meanders (n=11). Whether these meanders were active during occupation could not be determined.

Peelhorst-sites are located an average of 12,6 kilometers from the Meusebed. These sites are located between 100 and 1500 meters away from freshwater, with an average distance of 394 meters. The nature of this freshwater includes creeks (n=5) and lakes (n=10). It should be noted that no extensive research was done on the location of glacial lakes, therefore some fossil lakes could also be present that were missed in the study. This would reduce the distance to freshwater for several sites, and therefore the average distance significantly.

The location of the sites was also studied relative to the local geomorphology. The Dutch geomorphological system (ten Cate and Maarleveld 1977) was used for analysis of the geomorphological position of sites. The local geomorphological codes for the various site locations in the two areas were compared. These codes include relief classes, form classes and form groups.

The higher the classification in relief class, the higher the local relief contrasts are. Meuse sites vary in relief class between class 2 and 5, while on the Peelhorst, virtually only class 3 occurs (see figure 6.4). Classes 3 to 6 are described as flat, low-lying relief, while class 2 is a flatland relief. It can be concluded that relief is generally very flat in the entire study area, with slightly more height variation in the Meuse area than the Peelhorst area. This variation is likely the result of downcutting by creeks and Meuse meanders.

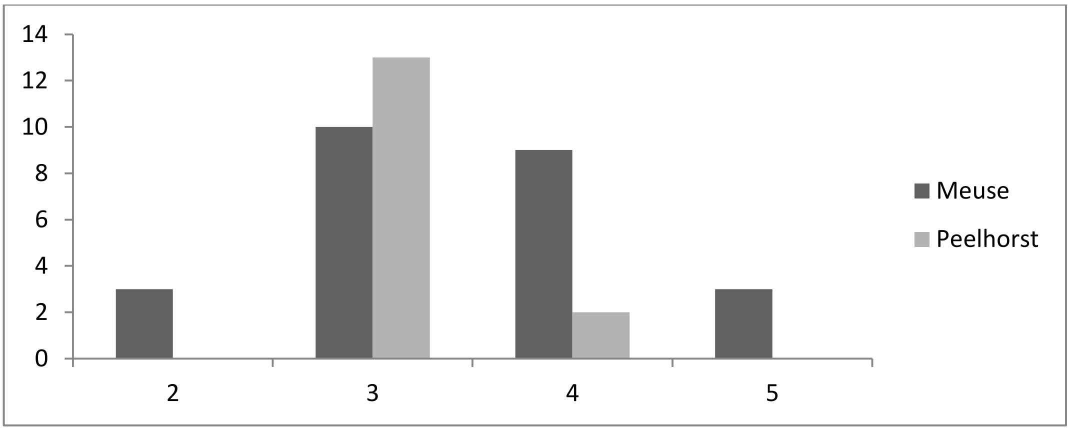
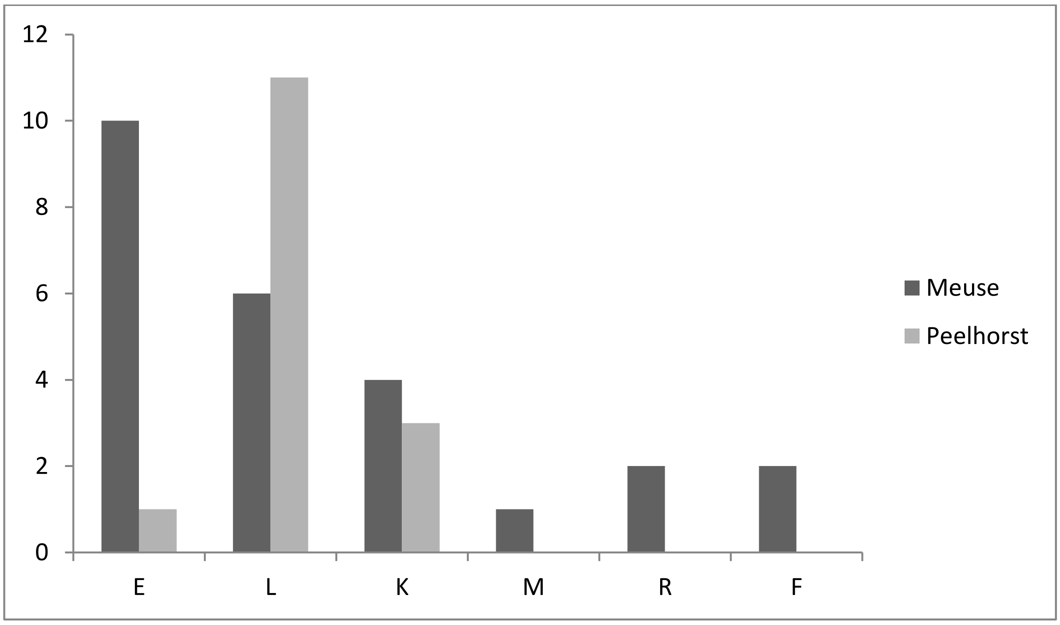


Figure 6.4: Meuse- and-Peelhorst sites by geomorphological relief class

Secondly, the form groups were analyzed. The most common types include type E (Terraces) and type L (Low hills and ridges). Type K (isolated low hills) also occurs several times, while types M (plains), R (shallow depressions) and F (plateau-like features) occur only once or twice.



Legend:

E: Terraces

L: Low hills and ridges

K: Isolated low hills

M: Plains

R: Shallow depressions

F: Plateau-like features

Figure 6.5: Meuse- and Peelhorst-sites by geomorphological formgroup

For a total overview of form classes per site, see appendix III. The most frequent form classes from the Meuse area include K17 (n=4) (isolated coversand ridges), L5 (coversand ridges, n=4) and E9 (coversand-topped terraces, n=7), for the Peelhorst area, L5 (n=7) and L8 (low dunes, n=4) are dominant (see figure 6.5). It can be concluded that Meuse-sites are generally located on terrace ridges, while Peelhorst-sites are located mostly on low hills and ridges.

The distribution of sites per size category is depicted in figure 6.3. The small circles represent the smaller sites (<500 tools)) and the large circles the large sites (>500 tools). In total, four sites were classified as large sites, with collections containing over 500 tools. These four sites include: HF-I, Neer-II, Horst-Zwarte Plak and Nederweert-de Banen. Three out of four large sites are located on the Peelhorst, on average 10,3 kilometers from the Meusebed, while the small and medium sites are located on average 7,3 kilometers from the Meusebed. Three out of four large sites are located next to glacial lakes, while this is true for only 18% of the smaller sites. The large sites on the Peelhorst on which Deeben's model is based become evident, supplemented by a fourth large site at Neer-II. Neer-II contrasts with the other three large sites because it is located near flowing water rather than a lake.

6.5 *Discussion*

The sites were divided into Peelhorst and Meuse sites, based on the border of terrace level 1. When Peelhorst and Meuse sites are compared a total of 26 Meuse-sites and 15 Peelhorst-sites emerges. These include one large site for the Meuse area and three large sites for the Peelhorst area.

In the Meuse area, the sites are located next to creeks and Meuse meanders, where they are located on average some 200 meters from the water. Peelhorst sites are located mostly next to lakes and creeks. The distance to freshwater is somewhat greater in the Peelhorst area, possibly because the ridges are located somewhat farther away from the lake due to a reduced variation in relief. These larger distances to freshwater are likely related to severely reduced wetness in these areas due to drainage and reclamation in the recent periods. Significantly higher water levels during the late glacial were attested for Nederweert-de Banen (Koutamanis 2012). Other Peelhorst-sites should be no exception, nullifying the contrast in distance to freshwater

6.6 *Conclusion*

Both Meuse- and Peel-sites are located in the higher areas in the landscape. Sites in the Meuse area are usually located on higher terrace or coversand ridges, while Peelhorst sites are located on coversand ridges and dunes. Small differences were observed in distance to freshwater, but this is likely the result of higher groundwater tables in the Peelhorst area during the late glacial. Drainage during reclamation projects significantly lowered groundwater tables in the peel-area during more recent periods.

Interpretation and discussion

7.1 Introduction

In this thesis, the late glacial sites from middle Limburg attributed to the Federmesser-groups have been studied. Two of these sites have been re-analyzed typologically and technologically in order to determine site function and chronology. The determination of site functions is vital to test hypotheses such as the Forager/Collector model, which is dependent on the archaeological distinction of various site types such as base camps and special activity sites. To test this, HF-I and HH have been re-evaluated. Additionally, a database of known sites and their location and size has been provided.

7.2 The two key-sites

7.2.1 Horn-Haelen:

The first site that was analysed was the Meuse-site of HH. The material was dated to the Allerød interstadial based on stratigraphical evidence (Usselo-soil). This date was confirmed by typological and technological analysis of the material. The site was partially mixed with material from later periods. Due to the lack of spatial information, it could not be determined whether the site originally consisted of horizontally separated scatters. Unmixed material from the Smeets collection suggested at least some spatially separated scatters occurred on the north side of the area in which the artefacts were recovered. Based on the analogy of the Koebroek-sites (Deeben 2012), it is likely the HH material originates from a number of small, separate scatters that may vary chronologically and spatially. The site was previously assigned to the Creswellian by Bohmers (1957), but the use of this term for Dutch assemblages has been heavily critized more recently (Kramer 2012 a.o.). It is more likely assemblages previously assigned to the Creswellian may actually be more similar to the Azilien Ancien, to which part of the Horn-haelen assemblage may be attributed.

HH is significantly larger than the excavated sites at Blerick-Koelbroek (Deeben 2012), with a greater diversity in tool types and higher numbers. However, as HH is a surface assemblage, there is no indication of the number of loci of which it is composed. Because of this intermixing no specific site function could be determined for HH. The occurrence of points with diagnostic impact fractures indicates hunting activities were conducted at the site. The occurrence of large LMP is considered to be indicative of butchering activities, while scrapers and burins indicate processing activities.

7.2.2 Heythuysen-de Fransman-I:

The second site that was analysed is the Peelhorst-site of HF-I. The lithic material mostly consists of Late Federmesser similar to the azilien recent mixed with a Final Magdalenian component. This is confirmed by stratigraphical evidence. The material originates from a relatively small area (ca 40x40 meters) on an elongated coversand-ridge south of a glacial lake. Whether the spatial restriction indicates contemporaneity is unclear, although the intermixing of Late Magdalenian with Federmesser-material would suggest this is not the case. A site function could not be determined.

7.2.3 Site Comparison

The lithic inventory of both sites has been compared. In both collections, scrapers are the most frequent tool type. At HH, 24,4 % of the tools can be classified as points, nearly double the percentage observed at HF-I. At HF-I, burins are more numerous, as are combination tools and retouched blanks.

Table 7.1: Typological comparison of HH and HF-I

	HF-Ia		**HH**	
Flakes	2162	65,2 %	591	72,2 %
Blade(let)s	1003	30,2 %	162	19,8 %
Cores	153	4,6 %	66	8,1 %
Total	**3318**	**100 %**	**819**	**100 %**
Points	129	13,0 %	72	24,4 %
Scrapers	303	30,6 %	111	37,6 %
Burins	296	29,9 %	57	19,3 %
Borers	30	3,0 %	8	2,7 %
Ret. Blanks	192	19,4 %	35	11,9 %
Comb. Tools	24	2,4 %	3	1,0 %
Other	15	1,5 %	9	3,1 %
Total	**989**	**100 %**	**295**	**100 %**

In the Smeets collection from HH, 89,8% of all the artifacts were blanks or cores, while at HFI, only 77,0 % of the artifacts were described as blanks or cores (see table 7.1). This is likely related to the availability of raw material in the direct environment of the Meuse, which allowed knappers to be more wasteful with their material. A second also a possibility this is the result of selective recovery of material, in which smaller flakes were selected against at HF-I. Core dimensions are equal for both sites (37 x 28 x 19 at HH vs 38 x 28 x 20 at HF-I).

At HH, 46 % of the laminar output could be classified as bladelets, while at HFI this constituted only 28 %. This indicates lithic technology at HF-I is more oriented on the production of regular blades. This is supported by the number of flakes, which is also significantly higher at HH. This is also supported by the cores, where at HH 59 % of the cores were used for blade(let) production, while at HF-I this constitutes 25,9 %. In addition to differences in production type, the high quantity of flaking cores at HH may also be a product of nodule testing.

No preference for blades as blanks for burins and scrapers has been observed. At HF-I 80% of the scrapers are manufactured on flakes, while at HH this is 78 %. For the burins, 36 % was manufactured on blades at HF-I, while this was 40 % at HH.

High quality flint such as RMU 3 seems to be preferred for burin manufacture at both sites. RMU 3 is more common on HF-I, where it constitutes 6,9 % of the total assemblage. At HH only 3 artifacts from RMU 3 were observed (0,3 %).

7.3 Site function and mobility

Federmesser-sites are generally smaller and more dispersed throughout the area compared to Ahrensburgian or Magdalenian sites in the Netherlands (Deeben and Rensink 2005). Both large and small sites are present in both areas, with the larger sites being located mostly to the southeastern side of glacial lakes. All of these large sites constitute surface collections; none of these sites have been professionally excavated. It is a distinct possibility these larger sites constitute palimpsests resulting from frequent re-use of these 'persistent places' (Vanmontfort *et al* 2011). This problem was already elaborated by Holdaway, Shiner and Fanning(2004), stating that it is impossible to archaeologically identify artifacts or clusters of artifacts which are the result of a single occupation (Holdaway *et al* 2004). It was concluded that the re-use of sites as persistent places negates Deeben's argument that the larger sites constitute base camps, while the smaller sites can be interpreted as extraction camps. As Baales's model is largely based on faunal evidence and environmental data, it is not dependent on the study of lithic material alone to address subsistence.

To determine whether or not a site such as HF-I is a base camp, it is important to study how long the site was inhabited, by how many people and what activities happened there. Because sedimentation does not occur during periods in which the site is uninhabited, different occupational phases are usually located in the same stratigraphical layer. Intermixing of assemblages from different periods, or different periods of occupation from the same period has been a major problem in Stone Age archaeology. Excavations and other research at large sites or site-complexes such as Rekem, Blerick-Koelbroek, Millheeze and Nederweert-de Banen a.o. show these consist of spatially separated concentrations (de Bie and Caspar 2000; Deeben 2012; Arts 2012; Koutamanis 2012). Post-depositional processes have mixed these sites, so they look like a single large site when surveyed. The refitting of artifacts on well-excavated sites has been used to study whether or not different loci within a site are contemporary (de Bie and Caspar 2000). This is especially important to this debate as intra-site refits are the main argument for contemporaneity of different loci at Rekem (de Bie and Caspar 2000). Based on the presence of small children, maintenance of hearths and occupation floors, and the fleshing of hides, Rekem is interpreted as a possible base camp. There are, however, doubts as to whether refits between various loci represent contemporaneity. Loci from different periods may appear simultaneous through scavenging or storing the material when the people returned to the site (Bordes 1980, 132-133; Ingold 1982; Deeben 1988, 367).

It seems impossible to determine whether various loci are cotemporaneous, and therefore it is very hard to classify a site as a base camp. It can be concluded that lithic analysis of scatters such as HF-I and HH is insufficient to determine site function. It is debatable whether lithic analysis of meticulously excavated sites such as Rekem and Geldrop is even suited to this purpose. Therefore, reconstruction of settlement dynamics based on lithic technological, typological or spatial analysis is considered to be unfeasible.

7.5 Alternative hypotheses

Binford has "*suggested that foragers may be found in environmental settings with very different incidences and distributions of critical resources. In settings with limited loci of availability for critical resources, patterns of residential mobility may be tethered around a series of very restricted locations such as water holes, increasing the year to year redundancy in the use of particular locations as residential camps. The greater the redundancy, the greater the potential buildup of archaeological remains, and hence the greater the archaeological visibility.*" (Binford 1980, 9).

As an alternative to the interpretation of large sites as base camps, these could also represent the aforementioned 'persistent places' (Vanmontfort *et al* 2010). If all large sites are palimpsest, they are the result of re-use of the specific locations in the landscape. The patterning of these, apparently popular, locations may be more fruitful for research on land-use than attempting to apply ethnographic site types to archaeological assemblages.

A study in sandy Flanders attested dense occupation along the northern dry bank of the extensive late-glacial Moervaart lake (Crombe *et al* 2011). This lake represented a rich biotope in terms of productivity, diversity and predictability in the area. The site clustering could represent a higher frequency of re-occupation by small groups and/or large aggregations. Crombé *et al* (2011) note that the generally small size of the assemblages in the sandy Flanders area points to very temporary occupations by small groups. Only minor functional differences between these small sites were observed (Crombé *et al* 2011, 461-462). At Korhaan, lithic artifacts were recovered in a zone stretching as far as 3 kilometers, which was interpreted as a continuous site complex, or a 'lithic landscape' (Vanmontfort *et al* 2010, 46).

In the Peelhorst area, resources are clustered around glacial lakes such as the Grote Moost, while in the Meuse area, resources are dispersed among a series of creek beds and Meuse-meanders. This difference is supported by palaeo-ecological evidence. The development of more closed, forested environments started significantly earlier in the Meuse area than in the Peel-area. This would lead to variations in resource availability between both areas during the Lateglacial (Hoek 1997; van Leeuwarden and Janssen 1987; Deeben 2012, 70). This would have also caused differences in re-use between the Peelhorst and Meuse-area. The glacial lakes such as Grote Moost may have functioned as limited loci of availability for freshwater, leading occupation remains to pile up at these locations in the same manner as the large site-complexes in Belgium were formed.

This pattern is very similar to that observed in the study area of this paper. The HF-I site could also be classified as a 'persistent place' in the study area. The large amounts of material near the glacial lakes may be related to limited loci of availability in these regions rather than to site function. In the Meuse area, where resources are more readily available, the possible locations for use as a 'base camp' are more abundant. This in turn decreased the number of times a specific site is re-used, leading to smaller, more dispersed archaeological assemblages, such as those excavated at Blerick-Koelbroek (Deeben 2012).

The seasonal availability or exact nature of these resources was not determined further than the general overview given in chapter 2. It is possible that the Meuse area represented a more stable environment due to the higher degree of forestation, while the Peelhorst was occupied more variably. More high-resolution climatological and faunal data may prove fruitful to study these possible differences between these areas.

7.6 *Conclusion*

Do the new data from HF-I-I, HH and other sites support the difference in site function suggested by Deeben (1988)?

Frequent re-use of the site would argue against attributing a function to a site based on numbers of tools alone. This means that loci of resources like glacial lakes would much faster become palimpsest due to frequent re-use as a 'persistent place'. Mobility models of Deeben and Baales cannot be tested because they assume an ethnographic resolution of the archaeological data.

Are there alternative hypotheses available to explain these patterns?

The 'persistent place' hypothesis would also lead to the same pattern and lithic inventory. If processing activities are related to the region of the peelhorst rather than to site function as a base camp, HF-I would still be a palimpsest of various processing camps, but not be a base camp. This corresponds better with Grove's (2009) model for hunter-gatherer responses to climate change, which argues for a more mobile and diverse strategy. This strategy would resolve in the formation of site-complexes or 'lithic landscapes' as defined by Vanmontfort *et al* (2010, 46-47).

Implications for further research

This study has shown that the analysis of lithic material is insufficient to reconstruct settlement dynamics because site-types such as base camps assume an ethnographic resolution to archaeological data. To further explain the patterning of Federmesser-sites in the study area, more studies on faunal remains or on botanical remains from microregions may be a more prosperous avenue. This could yield additional data on the exact nature of the available resources for each area and their seasonal availability. A larger dataset would also allow for higher resolution environmental reconstruction on a longer time scale.

Abstract

The archaeology of the late Paleolithic in the Netherlands studies human behavior during the termination of the last glacial period. These studies focus mostly on lithic material due to preservative conditions. One of the 'groups' defined on the basis of this lithic material is the Federmesser-group, or Azilien. This tradition is generally dated to the Allerød warm period (11.800-10.800 BP). This thesis focuses on Federmesser-mobility patterns in the western Meuse area of Limburg, the Netherlands. Specifically, the sites of Horn-Haelen and Heythuysen-de Fransman will be addressed. Here we show that Heythuysen-de Fransman may actually have a different chronological position than was previously assumed. Based on assemblage size, a differentiation was made between Meuse sites and Peelhorst sites, interpreting the sites on the peelhorst as Base camps and the Meuse-region sites as extraction camps. In this thesis it is suggested that larger Peelhorst-sites may actually consist of a palimpsest of various sites related to clustered resources in this area, as opposed to the Meuse area. However, lithic typology does suggest processing activities were more important on the Peelhorst, while hunting activities dominate in the Meuse area. Through the analysis and publications of the lithic inventories of Horn-Haelen and Heythuysen-de Fransman, the author hopes to contribute to the dataset of published upper Paleolithic sites in the Netherlands. The author also hopes to contribute to the larger debate on mobility strategies for the Late Paleolithic, on which little has been published for the Netherlands in the last 20 years.

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Appendix I: Typological criteria

Appendix I.*1: Introduction*

The criteria on which artifacts are typologically attributed to a specific type may vary from person to person. This can lead to a discrepancy in tool types, where the number of tools from the same site may vary based on the person who described them. This would lead to problems when comparing the respective number of tools from each site. To prevent this, a rigid framework for the basis on which tool types were classified as they were is given in this appendix.

Appendix I.*2: Artifact description and typology*

In the field 'Description' a typological classification of the artifact based on varying typologies. These typologies vary per artifact and are not direcly based on a single typology. In this pharagraph, the criteria for these various classifications are given.

For the point types, the types include:

straight backed points	Gravette-points
curved backed points	Federmesser/Tjonger points
angle-backed points	Creswell-points)
penknife points	Gravette points with truncation or notching on the opposed lateral side of the basal end of the point
bipointes	Azilian points, curved-backed bipointes
angle-backed bipointes	Cheddar-points
Kremser points	Backed points where both sides are backed, with one side optionally only on the distal end of the point
shouldered points	Truncated point with basal notching
B-Point	Truncated point

Mesolithic points have been described according to the typology by Beuker (2010). The typology for Federmesser-points (above) was largely adapted from de Bie & Caspar (2000), supplemented with other point types. The typology was exclusively based on the shape of the retouche, not on the shape of the modus. Therefore no Pergordian or Châtelperronian points (cf. Wouters 1984) were described, as the criteria for these types are based on artifact size. Backed bladelets were also included in the point category.

For the scraper types, the types include:

Thumbnail scrapers	A scraper whose greatest length does not exceed 15m,
Short blade endscraper	A scraper manufactured from a blade whose length does not exceed twice its width
Long blade endscraper	A scraper manufactured from a blade whose length exceeds twice its width
Flake endscraper	A scraper manufactured on a flake
Double scraper	A scraper with two scraperheads

The criteria for the scrapers are based both on size and the used blank type. The size criteria for the thumbnail scrapers overrule the other types.

For the burin types, these types include:

Burin on truncation	A burin where the spall was removed from a truncated platform.
Burin on lateral retouche	A burin where the spall was removed from lateral retouche
Burin on break	A burin where the spall was removed from a break.
Burin on natural end	A burin where the spall was removed from a natural end.
Dihedral burin	A burin where the spall was removed from another spall negative.
Atypical Lacan burin	A burin where the truncation was made posterior to the burin blow.
Typical Lacan burin	A burin where the truncation was made posterior to the burin blow. The bevel is pointed and the truncation has a convex/concave shape.

The criteria for the burins are based on the nature of the used spall platform. If al burin has two platforms, both are noted. If three or more platforms are present, it is characterized as a 'multiple burin'. For Heythuysen-de Fransman, the categories Burin on Break and Burin on natural end have been combined. The categories burin on truncation and burin on lateral retouche were also combined.

Appendix I.3: Database criteria

In the database, a number of criteria were used for describing each specific artifact. Due to time constraints, not each criterion could be applied to each artifact. Most of the artifacts from Horn-Haelen could be analyzed indefinitely, leading to a greater number of criteria for this site. The criteria that have only been used for Horn-Haelen are marked in **Blue**. Most of the criteria are based on those used in the study of the Federmesser-site of Rekem (De Bie & Caspar 2000). Not each criteria is included in appendix III simply because the paper would be too small. For the complete database, the author can be contacted.

Collection: The name of the person or institute currently in possession of the artifact

Site: The site where the artifact was recovered

Number: The number of artifacts in the specific category, flakes are often piled under one entry due to their high number.

Material: The material used to manufacture the specific artifact, this is usually flint (SVU). Other possibilies include hardstone (SXX) and Sandstone (SZA).

ABR-Algemeen: The general coding for the artifact in the Dutch archeological register (ABR)[1].

ABR-Specifiek: The specific coding for the artifact in the Dutch archeological register (ABR)[2].

Description: A typological description of the artifact (see previous pharagraph).

Length: The length of the artifact in milimeters measured from the point of impact along the longest axis. This criterion was only recorded if the artifact is complete.

Width: The width of the artifact in milimeters, measured along its greatest width.

Thickness: The thickness of the artifact in millimeters measured at the point of its greatest thickness.

Fragment Type: If the artifact is broken, this column the present portion of the artifact. For this column, four possibilities have been defined:

- Complere — The artifact is complete
- Broken-Proximal — The artifact is broken, only the proximal end remains
- Broken-Medial — The artifact is broken, only the medial end remains
- Broken-Distal — The artifact is broken, only the distal end remains
- Broken-Indet — The artifact is broken, the nature of the fragment cannot be determined

RMU: An indication of the source area of the flint the artifact is made from, in Dutch.

Begindat: The ABR-code for the oldest period in which the artifact could date.

Einddat: The ABR-code for the youngest period in which the artifact could date.

Modus: An indication of the modus of the artifact (Blade / Flake)

Cortex: An indication of the portion of the dorsal face of the artifact that is covered in cortex.

Burnt: Whether the artifact was secondarily heated (yes/no).

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[1] http://www.cultureelerfgoed.nl/sites/default/files/u4/ABR_website2.pdf

Notes: Free notespace

Bladelets:

Boards: Whether the boards of the blade or bladelet are parallel (P) or dissimlar (A).

Platform: The category of flaking platform, from with two supplemented types after Verneau (Beuker 2010, 73-74; Verneau 1999). These types include:

- Simple (G): A flat, unmodified heel.
- Two-faced (T): A two-faced heel with a rib as point of impact.
- Cortical (C): A flat heel of cortex.
- Facetted (F): A multi-faced heel, with one of the ribs as a point of impact
- Linear (L): A simple heel with a length smaller than 1mm
- Point-shaped (P): a simple heel with a length and width smaller than 1mm

Bulb: The pronunciation of the bulb of impact, differentiated in weak (Z), pronounced (P) or absent (-). This is a subjective criterion.

Scar: Whether the flaking scar is attached (A) or loose (L) from the platform or absent (-).

Heel Alteration: Whether the heel (proximal-dorsal side of the bladelet) was modified prior to the removal. This side can be modified by Abrasion (A), Sanding (S). If the heel was not altered it is classified as unworked (U).

Cross-section: The cross section of the medial part of the bladelet. This cross section can be classified as Triangular (T), Trapezoidal (P), Multi-Facetted (M) or Irregular (I)

Profile: The degree of curving in the bladelet, when studied from the lateral side. The profile curving is divided into Straight (S), Slightly Bent (SB) and Bent (B).

Borers

Drill Bit Type: Whether the drill bit is of the Borer (with alternating retouche) or the Bec (with only dorsal retouche)-type.

Orientation: Whether the drill bit is symmetrical or asymmetrical to the left (L) or right (R) compared to the modus.

Point Orientation: Whether the drill bit is oriented on the Proximal (P) or distal (D) end of the modus.

Burins

Spall Platform: The nature of the spall platform, whether the burin blow was struck on a Truncation (T), Broken End (B), Double Truncation/Dihedral (D), an unprepared end (U) or if the platform is of the Pseudo-Lacan-type (L).

Burin faced width: The greatest width of the burin facet.

Burin facet angle: The curvature of the burin facet, differentiated in Right-Angled, Oblique-Angled or Right-Angled

Burin tip location: Whether the burin tip is located to the left or right of the axis of the modus.

Spall scar termination: The termination of the spall scar, Straight, Hinged or Indeterminable.

Lateral retouche: The presence and location of any lateral retouche.

Cores

Reduction Angle: The angle on which the last bladelet removed from the core relative to the platform was struck.

Shape: The shape of the core according to Caspar & de Bie's subdivision;

Globular (G), Irregular (I), Pyramidal (P), Prismatic (M) and Flat (F).

LMP's

Point Orientation: Whether the point is oriented on the distal (D) or proximal (P) side of the blank.

Backed Side: Which side (L/R) is the backed side of the point, when viewed with the tip upwards.

Scrapers

Scraper Angle The angle of the scraperhead relative to the ventral face.

Height of the head: The greatest height of the scraperhead.

Head Orientation: The orientation of the scraperhead relative to the axis of the blank.

Head Orientation #2 The orientation of the scraperhead on the Proximal or distal side of the Blank.

Backed side: Whether the scraper is retouched laterally

Appendix II: Site database

Name	Geom.	Dis. FW	FW	Type	Dis Me	RD X	RD Y
Blerick - Boekend-I	4L5	100	Meander	M	2,69	205850	377670
Blerick - Boekend-II	4L5	100	Meander	M	2,63	205880	377780
Blerick - Groot Boller	5F12	100	Meander	M	2,48	206750	377500
Blerick - Koelbroek-II				M	3.92	204810	376920
Blerick - Koelbroek-III				M	3.92	204830	376960
Blerick - Koelbroek-IV				M	3,65	204970	377280
Blerick - Koelbroek-V				M	4,38	204190	376490
Blerick - Koelbroek-VI				M	3,81	204770	376380
Blerick - Koelbroek-VII				M	3,65	204820	377150
Haelen - Hornerweg	3E10	300	Meander	M	1,85	194675	360015
Lottum - Horsterdijk-II	4E9	100	Meander	M	3.53	206620	386270
Venlo - Tradeport-II				M	2,26	206940	377560
Venlo - Tradeport-V				M	2,67	206580	377590
Baexem - Abenhofweg	3E11	200	Creek	M	5,26	188650	358700
Baexem - Kasteelweg	2R15	100	Creek	M	4,63	189536	358569
Blerick - Boekend-III	4L5	100	Meander	M	2,27	206280	377700
Horst - Meerlosche heide	3L5	100	Creek	M	4,04	202240	391935
Ittervoort - Loretokapel	3E10	100	Creek	M	3,54	186450	353880
Kessel-Eik - Heide	4K17	200	Meander			198580	366300
Nederweert-Eind - Steutenweg	3L5	100	Lake	P		183253	365287
Neer - Kinkhoven	4E9	100	Meader	M	2,48	195430	363150
Overloon - Houtklef	4K14	200	Creek	M	3,13	195000	396750
Weert - Kuikvensedijk	3L5	300	Creek	P	21,54	173200	365850
Baarlo - Napoleonsbaan	4E10	150	Meander	M	2,1	202680	369620
Baarlo-I	3E11	400	Creek	M	4,5	201440	371570
Baexem - Beekkant	2R15	100	Creek	M	3,39	190925	359675
Baexem - Beekkant-Noord	3K17	800	Creek	M	4,73	190870	360140
Baexem - Op den Bosch	2R5	100	Creek	M	5,33	190130	360200
Baexem - Weijerboek	3E10	100	Creek	M	7,2	188370	361290
Blerick - Koelbroek-I	3L8	100	Meander	M	3.92	204800	376950
Broekhuizen - Broekhuizerbroek	2M13	100	Meander	M	3,01	206350	387700
Budel - Boshoverheide	4L8	1000	Lake	P	19,25	173000	361880
Ell - Wetselerberg	3E11	100	Creek	P	10,06	182170	358660
Haelen - Buggenum	4E9	400	Creek	M	1,98	195440	361010
Haelen - Houterhof	4L5	100	Meander	M	3.09	193000	359700
Horn - Haelen	4E9	200	Meander	M	1,29	195140	359600
Horst - Hoog Broek	4E9	200	Creek	M	3,51	206670	386240
Horst - Op de Hees	3L5	400	Creek	M	4,65	202450	390690
Kessel - Broek	5E9	100	Meander	M	1,99	201000	367900
Kessel - Heldense Bossen	4L9	200	Meander	M	2,68	199240	368500
Kessel - Spurkt	5E9	100	Meander	M	1.09	200150	367200
Koningslust - Sevenumsedijk	3L8	1000	Creek	P	10,18	196250	375900
Leveroy - Leveroysedijk	3K14	200	Lake	P	11,88	184875	364155
Loobeek - Esakker	3L5	100	Creek	M	0,92	197075	397600
Name	Geom.	Dis. FW	FW	Type	Dis Me	RD X	RD Y

Lottum - Horsterdijk-I	4E9	100	Meander	M	3,2	207100	385950
Meijel - Langstraat	3L5	1500	Lake	P	11,9	188980	371450
Merselo - Zwarte Water	3L8	200	Creek	P	8,55	189870	394920
Nederweert - Kwegt	3L5	200	Lake	P	12,59	182742	363047
Nederweert - Sarsven	3L5	200	Lake	P	13,02	183230	364560
Neer - Leumolen	3K17	200	Creek	M	3,88	194690	362750
Panningen-Melkweg	3L5	200	Creek	P	6,05	194200	368530
Roggel - Lange Pad	3K17	200	Creek	M	3,48	195280	362880
Venlo - Oude Berkt	5F12	200	Meander	M	3,8	204200	380000
Venlo - Tradeport-I	4E9	100	Meander	M	2,67	206640	377630
Venlo - Witte Berg	3L5	200	Creek	M	3,34	204770	379320
Venray - Endepoel-I	4F12	200	Creek	M	4,92	193900	395100
Venray - Venrays Broek-I				M	4,95	193700	395350
Weert - Maarheezerhuttendijk	3L5	100	Creek	P	21,85	173400	365320
Weert - Schaapsdijk	3K14	200	Lake	P	20,47	173330	364550
Weert - Zuidwillemsvaart	3L8	600	Lake	P	20,25	170500	359350
America - Zwarte Plak	4K19	200	Lake	P	14,09	193940	381520
Heythuysen - De Fransman-I	3L5	200	Lake	P	10,18	189120	368400
Nederweert - De Banen	3L5	200	Lake	P	13,03	183000	364000
Neer - Boshei	3K17	100	Creek	M	3,85	195350	362870

Geom.	Geomorphological code of the soil
Dis. FW	Distance to nearest freshwater
FW	Nature of nearest freshwater
Type	Type of Site
Dis Me	Distance to the Meuse river
RD X	X-Coördinate in the dutch system
RD Y	Y-Coördinate in the dutch system

Name:	*America – Zwarte Plak*
Alternative Names:	-
Coördinates:	*193.940 / 381.520*
Collections:	H. Ludwig, A. Wouters, J. Driessens
Category:	3
No. of Tools:	9 +
Literature:	Deeben 1992, 20, Arts 1987
ARCHIS:	W 5203, W 427299
Geomorphology:	4K19
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Lake

In 1959 A. Wouters. A. Bohmers and H. Ludwig encountered an Usselo-layer with in-situ flint artifacts at this location. A grub hut was also stated to have been found. The site is located on a small intact part of peat in the middle of reclaimed land. The BAI (Probably Bohmers) intended to excavate on this location, for this reason the site was closed off. In 1967 J. Driessens ascertained that part of the site was destroyed. Shortly before this, large amounts of sand were removed from the location; this was transported to Griendtsveen for road construction. During an inspection the Usselo layer was confirmed 0.50m under the surface. In the layer several flakes were found. During a coring survey for the actualization of the Monument register, RAAP found several flint artifacts dating to the late Paleolithic. Deeben mentions four sub concentrations for this site. Based on his inventarisations Arts (1987) classifies the site as a large site, which has been copied for this thesis.

Name:	*Baarlo - Napoleonsbaan*
Alternative Names:	
Coördinates:	*202.680 / 369.620*
Collections:	L. Lenders
Category:	2
No. of Tools:	2+
Literature:	-
ARCHIS:	W 15775, W 15778
Geomorphology:	4E10
Distance to Freshwater:	ca. 150 m
Nature of Freshwater:	Meander

In 1982 N. Arts reported flint artifacts from the L. Lenders collection from this site. The material dates to the late Paleolithic. No further information is given. In a second report, a single Creswellian point, a double endscraper and several flakes and blades are mentioned.

Name:	*Baarlo - I*
Alternative Names:	*58EN25*
Coördinates:	*201.440 / 371.570*
Collections:	J. Driessens
Category:	2
No. of Tools:	37
Literature:	Deeben and Stoop *in prep*
ARCHIS:	-
Geomorphology:	3E11
Distance to Freshwater:	ca. 400 m
Nature of Freshwater:	Creek

During surveys by the amateur-archaeologist J. Driessens, artifacts attributed to the Federmesser-groups were found near the Village of Baarlo. These artifacts were found in a zone of ca. 21,5 x 14,2 meters. The soil was highly disturbed, leading to the loss of spatial information. The assemblages includes an atypically high percentage of scrapers (59%, n=20 of the tools).

Name:	*Baexem - Aberhofweg*
Alternative Names:	-
Coördinates:	*188.650 / 358.700*
Collections:	J. Berghs
Category:	1
No. of Tools:	37
Literature:	-
ARCHIS:	W 30734
Geomorphology:	3E11
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

A predominately Mesolithic site which was investigated by amateur-archeologist J. Berghs from 1958 up to 1968. Bloemers notes several Neolithic sites on the site. From the Mesolithic he mentions a.o. two burins and several artifacts from wommersom-quartzite. Only a single artifact can be attributed to the late Paleolithic; a steeply backed point. This can be interpreted both as a Gravette-point or an A-Point, both of which cannot be directly associated with the rest of the material. Therefore this site is classified as a single find.

Name:	*Baexem - Beekkant*
Alternative Names:	-
Coördinates:	*194.750 / 362.980*
Collections:	M. van Hoef & W. Betten
Category:	2
No. of Tools:	
Literature:	Rensink 2007
ARCHIS:	W 29330, W 414593
Geomorphology:	2R15
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

During the construction of waterworks the amateur-archeologists M. van Hoef and W. Betten found a number of flint artifacts. On the basis of some backed elements and a Gravettian point, the larger part of this material can be attributed to the Federmesser-groups. Some Mesolithic and Neolithic elements are also present. The lithic material has been described by E. Rensink in an internal RCE-report. The assemblage includes a backed point, three backed blades, a long scraper, a short scraper, a burin-flake, a worked flake, a worked bladelet, a truncated blade, twenty bladelets, 87 flakes, 3 core fragments, 1 complete core and 74 splinters. One round scraper can be dated to the Mesolithic. The absence of cortex on a lot of artifacts indicates the cores were prepared at another location. Because the site has not been completely excavated its size is unknown, and the function cannot be determined. It is most likely a lookout-site for the nearby creek, which was already active during the late glacial.

Name:	*Baexem - Beekkant-Noord*
Alternative Names:	-
Coördinates:	*190.870 / 360.140*
Collections:	Tholen Brothers
Category:	2
No. of Tools:	3 +
Literature:	-
ARCHIS:	W 29326, W 29378
Geomorphology:	3K17
Distance to Freshwater:	ca. 800 m
Nature of Freshwater:	Creek

Bloemers reports flint artifacts found by the Tholen brothers in several concentrations in the direct environment of the coordinates. The flint material was recovered between 1960 and 1970, these finds were spread over a large area, with several seperate concentrations. Most of the material was dated to the Neolithic. Only two points can be attributed to the late Paleolithic; a Cheddar- and a Tjonger-point. It is probable that several other artifacts also date to this period, but this was not typologically determined. In a second report from the Tholen brothers, another Gravettian point is mentioned from the same area.

Name:	*Baexem - Kasteelweg*
Alternative Names:	-
Coördinates:	*189.536 / 358.569*
Collections:	-
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	W 25639
Geomorphology:	2R15
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

For this location, a single find of a Paleolithic blade is mentioned in ARCHIS, found by RAAP. No associated artifacts are mentioned in the report. This will be described as a single find.

Name:	*Baexem - Op den Bosch*
Alternative Names:	-
Coördinates:	*190.130 / 360.200*
Collections:	Unknown
Category:	2
No. of Tools:	17
Literature:	-
ARCHIS:	W-29352
Geomorphology:	2R5
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

Bloemers states in ARCHIS that the artifacts were probably collected on an asparagus-field. The finder is noted as 'private'. Based on this information it is probable that the information is based on an inventarisation of a private collection. Among Mesolithic material, 3 Tjongerian/Gravettian points and a single burin can be attributed to the late Paleolithic. This implies that some of the 11 scrapers, the 8 blades and the 2 backed bladelets may also be attributed to this period.

Name:	*Baexem - Weijerbroek*
Alternative Names:	-
Coördinates:	*188.340 / 361.330*
Collections:	J. Houben
Category:	2
No. of Tools:	4+
Literature:	-
ARCHIS:	W 30723
Geomorphology:	3E10
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

J. Houben reports the find of a Tjongerian point in a ditch next to a road in 1971. It is possible that a Federmesser-site was partially destroyed during the digging of the ditch. In 1976 J. Houben reports several new finds from this location. He mentions a Tjongerian (Federmesser, CBP) point, a beaked burin, a core, three flakes and a scraper. Houben dates all these finds to the late Paleolithic. That all flint material is dated specifically to the late Paleolithic implies that the location was not used during the Mesolithic (a presumably unmixed site).

Name:	*Blerick – Boekend-I*
Alternative Names:	*52GZ31*
Coördinates:	*205.850 / 377.670*
Collections:	J. Driessens, J. Numan
Category:	2
No. of Tools:	7+
Literature:	Deeben 2012, 70.
ARCHIS:	-
Geomorphology:	4L5
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

The first site in the environment of Blerick-Boekend was discovered by J.Driessens in 1966. The site is located on the edge of a Meuse terrace. Driessens dug a test it on the site, where he encountered artifacts in the C-horizon between 25 and 60cm beneath the surface. The coversand was rich in iron. In the Driessens collection, a total of three backed bladelets, four burins, two combination tools (Burin/Scraper) and two scrapers were found. Other artifacts were recovered by J. Numan.

Name:	*Blerick – Boekend-II*
Alternative Names:	*52GZ33*
Coördinates:	*205.880 / 377.780*
Collections:	J. Driessens, J. Numan
Category:	2
No. of Tools:	?
Literature:	Deeben 2012, 70.
ARCHIS:	-
Geomorphology:	4L5
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

The second site in the environment of Blerick-Boekend was discovered on the southwestern part of a field in 1966. The site has a distribution of 80 x 50 meters perpendicular to the edge of a Meuse-terrace. Both an A-Point and an unspecified point were recovered. Two burins, two scrapers, tow retouched flakes and a retouched bladelet were also found. The waste products include forty flakes, fourteen blade(lets) and four cores. One of these cores was used for the production of bladelets, the other three for flakes.

Name:	*Blerick – Boekend-III*
Alternative Names:	*52GZ38*
Coördinates:	*206.280 / 377.700*
Collections:	-
Category:	2
No. of Tools:	?
Literature:	Deeben 2012, 70.
ARCHIS:	-
Geomorphology:	4L5
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

The third site in the environment of Blerick-Boekend was discovered in the path of the N273 highway. The site was destroyed during the construction of this road. Most of the finds date to the Neolithic; a single Federmesser-point was also recovered. Two other surface sites were also discovered during fieldwork in 1989, referred to here as Blerick-Boekend-IV and Blerick-Boekend V.

Blerick-Boekend-IV	*205.850 / 377.770*
Blerick-Boekend-V	*206.230 / 377.630*

Name: *Blerick – Groot Boller*

Alternative Names: -

*Coö*rdinates: *206.750 / 377.500*

Collections: -

Category: 2

No. of Tools: ?

Literature: Deeben 2012; Machiels 1994.

ARCHIS: W 28851

Geomorphology: 5F12

Distance to Freshwater: ca. 100 m

Nature of Freshwater: Meander

In 1990, flint artifacts were recovered from this location by W. Alberts. These finds were done during digging activities related to sand-winning pits. The artifacts were found in a depression with coversand. The artifacts were situated in an intact soil profile (E-Horizon) mixed with sherds dating to the Iron Age. In 1994 the ROB conducted a research on this location. Several test ditches were dug. The site is described as a small Federmesser-site. On the basis of this report 3 Federmesser sites and 2 Ahrensburgian sites are located in this area. The other sites are indicated in this thesis as Venlo-Tradeport I- V.

Name:	*Blerick – Koelbroek*
Alternative Names:	-
*Coö*rdinates:	*See Below*
Collections:	J. Driessens
Category:	2
No. of Tools:	?
Literature:	Deeben 1992, 70; Deeben 2012.
ARCHIS:	W 29142, W 29144, W 37080
Geomorphology:	3L8
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

Blerick-Koelbroek-1	*204.800 / 376.950*
Blerick-Koelbroek-2	*204.810 / 376.920*
Blerick-Koelbroek-3	*204.830 / 376.960*
Blerick-Koelbroek-4	*204.970 / 377.280*
Blerick-Koelbroek-5	*204.190 / 376.490*
Blerick-Koelbroek-6	*204.770 / 376.380*
Blerick-Koelbroek-7	*204.820 / 377.150*

J. Driessens notes a small concentration of flint material dating to the late Paleolithic and Mesolithic period. Resulting from 11 visits, Driessens summarizes 1 notched scraper, 3 Tjongerian-like points, 4 worked pieces, 119 flakes, 3 burins and 4 scrapers. The finds are located 150m to the west of an old Meusebed. In 1989 J. Deeben conducted a test pit research which constituted that the site was disturbed. A total of seven (sub-) sites were distinguished by Deeben during his fieldwork. Apart from the two excavated sites (Boekend – Koelbroek 2 & 3), five other surface sites were also found (Boekend-Koelbroek 1 & 4 t/m 7).

In 1989 a coring study was conducted on this site. The site has been studied using 20cm corer in a 2x2m. Several late Paleolithic sites were confirmed at this location. The research was conducted by J. Deeben acting for the university of Amsterdam. In his Horster Historiën article, J. Deeben mentions a research on this site in 1989. On the find of relatively few late Palaeolithic artefacts, it is concluded that the location was used for a short period of time, by a few people. (small extraction camp)

Name:	*Broekhuizen – Broekhuizerbroek*
Alternative Names:	-
*Coö*rdinates:	*206.350 / 387.700*
Collections:	J. Driessens
Category:	2
No. of Tools:	2
Literature:	-
ARCHIS:	W 45228
Geomorphology:	2M13
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

In 1966 this site was discovered by J. Driessens. He found several artefacts, some of which can be dated to the late Palaeolithic. In total, 80 flakes, 12 blades and 2 scrapers were found. How much of these can be attributed to the late Palaeolithic is not clear.[1]

[1] ARCHIS-Waarnemingsnummer

Name:	*Budel - Boshoverheide*
Alternative Names:	-
*Coö*rdinates:	*173.000 / 361.880*
Collections:	T. Looijmans
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 15769
Geomorphology:	4L8
Distance to Freshwater:	ca. 1000 m
Nature of Freshwater:	Lake

A report in the ARCHIS mentions several fragments of flint artifacts dating to the late Paleolithic. These artifacts were found by T. Looijmans and described by N. Arts.

Name:	*Ell – Wetselerberg*
Alternative Names:	-
*Coö*rdinates:	*182.170 / 358.660*
Collections:	Houben
Category:	2
No. of Tools:	7
Literature:	-
ARCHIS:	30668
Geomorphology:	3E11
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

On an old ROB-fiche Houben reports several flint artifacts found in a quarry (probably more like a ditch). The find circumstances, on the other hand, state that the material was found during a survey. Finds from both the Paleolithic and the Neolithic period are reported. Houben reports four Tjongerian (CBP) points, a Kremser-point, thirteen blade(fragments) and two burins. Fifteen flakes and six scrapers could date to either the Neolithic or the Paleolithic period. Considering that from the Neolithic only a single axe fragment is found, it is probable that the greater part of the material dates to the late Paleolithic.

Name:	*Haelen - Hornerweg*
Alternative Names:	-
*Coö*rdinates:	*194.675 / 360.015*
Collections:	-
Category:	1
No. of Tools:	1
Literature:	Keijers 2009
ARCHIS:	W 428293
Geomorphology:	3E10
Distance to Freshwater:	ca. 300 m
Nature of Freshwater:	Meander

For this location, a single find of an late Paleolithic Tjongerian point is mentioned in ARCHIS, found during a survey by RAAP.

Name:	*Haelen - Bedelaar-Zuid*
Alternative Names:	-
*Coö*rdinates:	*192.360 / 360.380*
Collections:	-
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	W 29422
Geomorphology:	4K17
Distance to Freshwater:	ca. 500 m
Nature of Freshwater:	Creek

H. Harsema reports a single find of an unknown artifact dating to the late Paleolithic period from this location. No further information is given.

Name:	*Haelen - Bosrand*
Alternative Names:	-
*Coö*rdinates:	*193.480 / 360.880*
Collections:	-
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	W 29424
Geomorphology:	3K17
Distance to Freshwater:	ca. 400 m
Nature of Freshwater:	Creek

H. Harsema reports a single find of an unknown artifact dating to the late Paleolithic period from this location. No further information is given.

Name: *Haelen - Buggenum*

Alternative Names: -

*Coö*rdinates: *195.440 / 361.010*

Collections: -

Category: 2

No. of Tools: ?

Literature: -

ARCHIS: W 29307

Geomorphology: 4E9

Distance to Freshwater: ca. 400 m

Nature of Freshwater: Creek

P. Abrahams reports several fragments of flint, mostly related to flint working. Some of these artifacts have been made into scrapers. Abrahams dates these to the late Paleolithic.

Name:	*Haelen - Houterhof*
Alternative Names:	-
*Coö*rdinates:	*193.000 / 359.700*
Collections:	-
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 29319
Geomorphology:	4L5
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

On an old ROB-Fiche, a Tjongerian (Federmesser) site is mentioned from this location, no further information is given.

Name:	*Heythuysen – De Fransman-I*
Alternative Names:	-
*Coö*rdinates:	*189.120 / 368.400*
Collections:	S. Beeren, A. Wouters, S. Silvrants, H. Verhaeg, W. Vossen and others
Category:	3
No. of Tools:	?
Literature:	Wouters 1984, Pop 2008.
ARCHIS:	-
Geomorphology:	3L5
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Lake

See Chapter 5

Name: *Heythuysen – De Fransman-II*

Alternative Names: *Heythuysen-de Fransman-Grote Moost*

*Coö*rdinates: *189.120 / 368.400*

Collections: S. Silvrants, L.L. Mertens, L. Lenders

Category: 2

No. of Tools: ?

Literature: -

ARCHIS: -

Geomorphology: 4L5

Distance to Freshwater: ca. 200 m

Nature of Freshwater: Lake

J. Beeren mentions ca. 1000 artifacts from the Fransman-II site in 1970 dating to the late Paleolithic. However, upon inspection of his collection, no material from this site was found. It is likely that he referred to Heythuysen-de Fransman-I instead. J.H.F. Bloemers checked the field in 1970 under good circumstances but this did not yield any finds. Klok states that only the eastern part of the site is protected, the Fransman/Moosthoeve is being disturbed yearly (he probably means the Fransman-I site). Klok says that the soil is ploughed to a depth of 30cm yearly, after which the topsoil is removed for grass sods (for footballstadia for example). Through this process the soil is deepened yearly, and the site is slowly being destroyed. R.H.J. Klok states that the Groote Moost site (Fransman) is an Ahrensburgerian site in 1983, he does not mention any Gravettian component. He also mentions two Mesolithic sites. In the same report, G. Beex mentions two Tjongerian sites and some bronze age and roman finds on the location, he does not mention Ahrensburgerian or Mesolithic components.

In RAAP-report 85 J.P. van der Gaauw states that on the site a single fragment of flint was found during surveying by the company. This may have been related to recent visits by amateur-archeologists (based on footprints). In 6 mega-corings (30cm corer), not a single fragment of flint was found. He says that the site is probably relatively small, although more sites may be present on the ridge.

In 1981 W.J.H. Willems says in a registration form that the Fransman-I is largely destroyed by agriculture and treasure-hunting. He also says that A.M. Wouters is going to publish the

Fransman-I site. The BAI does not know where exactly the Bohmers-excavation took place, but they are sure it was on the Fransman-I site. During a field inspection in 1982, the site is considered to be partially destroyed by ploughing and reforesting. Nevertheless the site is considered to be one few undisturbed sites from the late Paleolithic.

In 1982 Mr. Joosten starts to oppose the archeological protection of the site. At this point, the site is his property for 3 years. The site is used for agriculture, with disturbance to 35 cm below the surface. In the future, Joosten would like to extend activities and disturbance to 50 cm below the surface. Joosten complains about a number of rules for the monument.

In 2003, Staatbosbeheer requests guidelines for the preservation of the site related to a change in policy. On this, Willems states that there should be no deep-ploughing and better preservation of the fens because of the possible presence of organic material from the late Paleolithic in the adjoining fens.

Upon inspections of the various collections from HF-I, some artifacts from HF-II were also observed, although these were not studied. S. Silvrants and L. Lenders both stated HF-II is a very small concentration of 'ugly' Federmesser-artifacts that are relatively sparse. Most of the material was apparently collected by 'Meester' L.L. Mertens. This collection has also been studied by the author, this material includes a perfectly round hammerstone, three bladelet cores, a blade with flat retouche and a pointed blade (spitskling). The latter two artifacts likely date to the middle Neolithic. According to Silvrants, it is likely that some of the material from HF-II was mixed with the HF-I material.

Name:	*Heythuysen-aan de Watermolen*
Alternative Names:	-
*Coö*rdinates:	*191.460 / 361.450*
Collections:	D. Stoop
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	-
Geomorphology:	3K17
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

During a survey by the author a single broken laterally modified point was recovered.

Name:	*Horn – Haelen*
Alternative Names:	*Haelen-Haelensbroek, Horn-Melemborg*
*Coö*rdinates:	*195.140 / 359.600*
Collections:	A.Wouters, GIA, J. Smeets, J. Thissen
Category:	2
No. of Tools:	?
Literature:	Wouters 1953
ARCHIS:	-
Geomorphology:	4E9
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Meander

See Chapter 4

Name:	*Horst – Hoog Broek*
Alternative Names:	-
*Coö*rdinates:	*206.670 / 386.240*
Collections:	J. Driessens
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 29119
Geomorphology:	4E9
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

J. Driessens dates this site to the middle- and late Paleolithic period. From the late paleolithic, a burin with a fitting spall and a notched blade were found.

Name: *Horst – Meerlosche Heide*

Alternative Names: -

*Coö*rdinates: *202.240 / 391.935*

Collections: G. van Ass

Category: 1

No. of Tools: 1

Literature: -

ARCHIS: W 28224

Geomorphology: 3L5

Distance to Freshwater: ca. 100 m

Nature of Freshwater: Creek

In 1961 G. van Ass found a single Creswellian point on this location. He attributed this to the Creswellian culture. Because the creswellian is no longer considered to be present in the area, it likely dates to the Late Paleolithic instead.

Name: *Horst – op de Hees*

Alternative Names: -

*Coö*rdinates: *202.450 / 390.690*

Collections: J. Driessens

Category: 2

No. of Tools: 36

Literature: Stapert 1979

ARCHIS: -

Geomorphology: 3L5

Distance to Freshwater: ca. 400 m

Nature of Freshwater: Creek

The site is located on an asparagus-field on the north side of a former fen. The site is located on a slope bordering the fen. In total 188 artifacts were found on the site, 46 of which tools. D. Stapert suspects the material dates to the Creswellian. The material includes five points, eight burins, 2 composite tools, 3 borers, 2 notched blades, a truncated blade and 15 retouched blades a.o.

Name:	*Ittervoort - Loretokapel*
Alternative Names:	-
*Coö*rdinates:	*186.450 / 353.880*
Collections:	H. Heijmans
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	W 15698
Geomorphology:	3E10
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

In 1981 H. Heijmans found several flint artifacts at this location. Among these artifacts were multiple artifacts such as scrapers and bladelets. Exact numbers are not given. Some of these artifacts can be dated to the late Paleolithic. Only a single Gravettian point is suspected to date to the Late Paleolithic (pers. Comm. H. Heijmans)

Name:	*Kessel - Broek*
Alternative Names:	-
*Coö*rdinates:	*201.000 / 367.900*
Collections:	J. Smeets; W. Vossen
Category:	2
No. of Tools:	?
Literature:	Stoop 2013
ARCHIS:	W 415374
Geomorphology:	5E9
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

N. Arts mentions an unknown number of late Paleolithic flint on this location, present in the Smeets collection. In this collection, both Ahrensburgian and Federmesser-finds are present. The Federmesser-culture is represented by two Gravettian points. Because of the palimpsest-situation, other finds cannot be attributed to the Federmesser-component (Stoop 2013, 59-60). N. Arts also reports multiple fragments of flint material found by W. Vossen.

Name:	*Kessel - Heldense bossen*
Alternative Names:	-
*Coö*rdinates:	*199.240 / 368.500*
Collections:	J. Smeets
Category:	2
No. of Tools:	?
Literature:	Stoop 2013
ARCHIS:	W 415373
Geomorphology:	4L9
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Meander

A late Paleolithic component in the Smeets collection was attested by N. Arts. The material cannot be located in the collection by the author, it was probably not stickered.

Name:	*Kessel-Eik - Heide*
Alternative Names:	-
*Coö*rdinates:	*198.580 / 366.300*
Collections:	J. Smeets;
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 15506
Geomorphology:	4K17
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Meander

A late Paleolithic component in the Smeets collection was attested by N. Arts. The material cannot be located in the collection by the author, it was probably not stickered.

Name:	*Kessel - Spurkt*
Alternative Names:	-
*Coö*rdinates:	*200.150 / 367.200*
Collections:	W. Vossen
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 15479
Geomorphology:	5E9
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

N. Arts dates this site to the late Paleolithic. This dating is based on material from the W. Vossen collection. No further information is given.

Name:	*Koningslust – Sevenumsedijk*
Alternative Names:	-
*Coö*rdinates:	*196.250 / 375.900*
Collections:	C.C. Engels
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 28538
Geomorphology:	3L8
Distance to Freshwater:	ca. 1000 m
Nature of Freshwater:	Creek

In 1961, C.C. Engels reports several artifacts in a bog ore-layer ca. 40cm under a Heath-podsol. He states this is the same location where F.C. Bursch found artifacts belonging to the 'warhammer-people' (SVB). He mentions three scrapers, blades and blade fragments and lithic waste (some of which is burned).

Name:	*Leveroy - Leveroysedijk*
Alternative Names:	-
*Coö*rdinates:	*184.875 / 364.155*
Collections:	J. Hanssen
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 418877
Geomorphology:	3K14
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Lake

In 2008 H. Verheijen reports a site discovered by J. Hanssen in 2008. As a single flake is not descriptive enough to date so specifically, it is more probable that more material was found here. Because of the specific date it is probable that it does not concern a single find, as the description implies.

Name: *Loobeek – Esakker*

Alternative Names: -

*Coö*rdinates: *197.075 / 397.600*

Collections: J. Hanssen

Category: 2

No. of Tools: 4

Literature: Stoepker *et al* 2000, 181

ARCHIS: W 31938

Geomorphology: 3L5

Distance to Freshwater: ca. 100 m

Nature of Freshwater: Creek

In 1990 a test pit of 60m in length was dug at this location. The research was followed by a full-scale excavation of 1400m2. Subsequently, sieving research took place. A the site, 5 cores, 2 core fragments, 27 blades and 58 flakes were found. The tool types include; 1 backed blade, 1 possible Tjongerian point fragment, a burin (A-type), a burin spall and a trapeze were found. Based on these data, dating for (part of) the material in the late Mesolithic is most probable.

Name:	*Lottum – Horsterdijk – I*
Alternative Names:	*52GN20*
*Coö*rdinates:	*207.100 / 385.950*
Collections:	J. Driessens
Category:	2
No. of Tools:	9
Literature:	-
ARCHIS:	-
Geomorphology:	4E9
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

The site of Lottum-Horsterdijk is located on the edge of a Meuse-terrace. It encompasses a mixed assemblage of Paleolithic, Mesolithic and Neolithic artifacts. Based on patination and typology, J. Deeben was able to distinguish the late Paleolithic component of the material. This component includes a Federmesser point, a B-Point, A burin, four scrapers, a combination tool (burin/scraper) and a notched flake.

Name:	*Lottum – Horsterdijk – II*
Alternative Names:	*52GN13*
*Coö*rdinates:	*206.620 / 386.270*
Collections:	J. Driessens
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	-
Geomorphology:	4E9
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

In 1967, a concentration of artifacts was found by Amateur-archaeologist J. Driessens along a creekbed near Lottum. This concentration measures about 100x50 meters and is located on an elevated ridge parallel to the creekbed.

Name:	*Meijel – Langstraat*
Alternative Names:	-
*Coö*rdinates:	*188.980 / 371.450*
Collections:	J. Pouls
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 15753
Geomorphology:	3L5
Distance to Freshwater:	ca. 1500 m
Nature of Freshwater:	Lake

In 1982 J. Pouls found several flint artifacts on this location. N. Arts attributed these artifacts to the late Paleolithic, no further information is given.

Name: *Merselo – Zwarte Water*

Alternative Names: -

*Coö*rdinates: *189.870 / 394.920*

Collections: G. van Ass

Category: 2

No. of Tools: 38

Literature: -

ARCHIS: W 16148

Geomorphology: 3L8

Distance to Freshwater: ca. 200 m

Nature of Freshwater: Creek

W. Willems reports multiple fragments of flint found at this location. These were found by G. van Ass during reclamation works. The finds include 18 scrapers, 18 burins, 3 points, 1 backed blade, 2 Gravettian points and 83 bladelets. These finds were done in so-called 'leadsand' beneath a podsol-profile. The finds are stored in the museum in Venray. The site is mixed with Mesolithic material.

Name:	*Nederweert-De Banen*
Alternative Names:	-
*Coö*rdinates:	*183.580 / 364.180*
Collections:	W. Nouwen, GIA, Houben Brothers, C .Emans
Category:	3
No. of Tools:	38
Literature:	-
ARCHIS:	W 15515, W 15554, W 15964, W 29183, W 29193, W 9345.
Geomorphology:	3L5
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Lake

N. Arts reports an excavation by the BAI (by Bohmers) from an unknown date. Several flint artifacts dating to the late Paleolithic period are mentioned. The site is dated to the Tjongerian (Federmesser) period by Dr. Bohmers and others (probably also A. Wouters). Finds are reported to have been recovered from 1953 to 1969. An excavation by Dr. Bohmers is reported to have taken place in 1955 and 1956. The coordinates indicate a stretch of surface finds ca. 1750m long with mostly late Paleolithic and Mesolithic finds. The sites are located next to three fens. Bohmers reports a total of 632 scrapers, 456 burins, 224 points and 21 combination tools. Other indeterminable tools and tool fragments are stated as being 'countless'. The lithic waste was not counted, but weighed instead. This amounted to 40 – 50 kilos of lithic waste (cores, flakes , blades etc.). A second ARCHIS-report mentions several flint artifacts found by W.J.H. Nouwen. In livelink five tools are reported; 1 unknown point, 1 broken point tip, 1 RA-Burin, one Retouched blade, one notched blade. The waste products include 1 lump, 1 crested flake, 2 core renewal flakes, 1 flake core, 7 flakes and 3 blades. From the Verheijen collection, multiple fragments of flint are mentioned, the report states; 'multiple fragments of flint tools, among which many scrapers, two fragments of flint arrowheads (1x Creswellian point, 1x Tjongerian). 23 of the burins are described as 'beaked burins'. Three pieces of ochre were found. The points include 154 broken point fragments, 63 complete points, 6 Creswellian points and 1 Kremser-point. Most of the material is said to have been found by the Houben brothers. Wouters also states the owner of the 'Philomena-hoeve' has a large collection of artifacts from the site, which implies even more artifacts were found at the site. C.J. Emans has found a single indeterminable flint arrowhead at the site, A. Wouters also has a single find from the site; a backed blade fragment. It can be concluded that vast amounts of late Paleolithic lithics were recovered from this site.

Name:	*Nederweert - Kwegt*
Alternative Names:	-
*Coö*rdinates:	*182.742 / 363.047*
Collections:	H. Verheijen
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 418867.
Geomorphology:	3L5
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Lake

J. Hanssen reports a Tjongerian base camp on this location. This information is based on artifacts from the collection of amateur-archeologist H. Verheijen.

Name:	*Nederweert-Sarsven*
Alternative Names:	-
*Coö*rdinates:	*183.120 / 364.130*
Collections:	H. Verheijen
Category:	2
No. of Tools:	1
Literature:	-
ARCHIS:	W 15968, W 29182
Geomorphology:	3L5
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Lake

In ARCHIS four reports from this site are found. The oldest one dates from 1968, then there are three more reports from 1976, 1981 and 1983. In 1983 multiple flint tools from the late Mesolithic are mentioned. A single broken Tjongerian point (CBP) is also mentioned. The entire site is then dated to the late Paleolithic. These finds are done by H. Verheijen.

Name:	*Nederweert-Eind - Steutenweg*
Alternative Names:	-
*Coö*rdinates:	*183.253 / 365.287*
Collections:	J. Hanssen
Category:	2
No. of Tools:	1
Literature:	-
ARCHIS:	W 418849
Geomorphology:	3L5
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Lake

H. Verheijen mentions a single late Paleolithic flake from this location, found by J. Hanssen. As a single flake is not descriptive enough to date so specifically, it is more probable that more material was found here. Because of the specific date it is probable that it does not concern a single find, as the description implies.

Name:	*Neer-II*
Alternative Names:	*Neer-Boshei*
Coördinates:	*194.400 / 363.240*
Collections:	P.H. Beeren, J. Smeets, S. Silvrants, L.L. Mertens, W. Vossen, A.M Wouters, Leclercq, J. Thissen, P. Simons, P. Peters, L.Lenders, M. van Hoef., P. Loven and others
Category:	5
No. of Tools:	unknown
Literature:	Bohmers 1957; Harsema 1973; Wouters 1982b; Wouters 1983; Kramer 2012; Stoop 2013
ARCHIS:	W 418849 a.o.
Geomorphology:	3K17
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

The site A. Wouters indicates as Neer-II corresponds with the sites known among amateur-archeologists as Boshei. Who actually first discovered the site is unclear, but finds are already present in pre-world war collections from L.L. Mertens and D. Beeren. The site was first published on by A. Wouters in 1952 (Wouters 1952). Statistics on the recovered flint were to be published by A. Bohmers. Bohmers initially attributed the site to the Creswellian based on point typology. He based his study on artifacts from the Thissen and Wouters collections from the site, both of which he purchased for the BAI. The material was assigned to the Creswellian by A. Bohmers, which was later argued against by Kramer (2012). In the BAI collection, finds from the Wouters (n=353) collection, the Thissen (n=74) collection and 262 artifacts from Bohmers' 1962 excavation are still present. In 1962 the B.A.I. also did some research (fieldwalking) on the site and other sites in the region. The results of these surveys remain unpublished. Wouters later published on the site again in 1982, as the amount of artifacts recovered from the site had increased greatly (Wouters 1982).

In his publication, Wouters mentions finds in the collections Mertens, Leclercq, Thijsse, Beeren and Loven. From 1949 onward, Wouters started to collect artifacts from the site as well, together with J. Thissen. In the 'golden years' (mostly the '70's,) artifacts were also collected by J. Beeren, S. Silvrants, H. Verhaeg and J. Smeets among others. From these collections alone, over 3000 tools were studied by Wouters.

In 1959, a test trench was dug on the site, showing there was some sabulous clay in the soil, resulting from the illuviation of decalcified loess. This would then result in the blueish-white patination on the artifacts. Mentions of trenching on the site were also done by J. Beeren and S. Silvrants. J. Beeren recovered several LMP-fragments and Silvrants several joining flakes (refitted). These were recovered *in situ* from trenches dug by the amateur archaeologists.

Most amateur-archeologists in the Leudal region collected large amounts of flint from the Boshei-site. A complete overview of all the material collected there would be near-impossible.

Wouters subdivides Neer-II into three subcomponents; N.II-A (The presumed Creswellian component; W15533; 194,600/363,150)), N.II-B (an assumed older component with zinken, W15484'194,660/363,240) and N.II-C (W15512, 194,660/363,240) the Ahrensburgian component). NII-B is an older component than N.II-A, which may be date to the sameperiod as the HF-I material. The 1983 publication is the most complete overview of Paleolithic points recovered from the location up to date. It is unfortunate that despite describing these points in great detail and including various drawings, point totals are not provided.

Wouters describes all the different point-types on the site. Also, he describes several other point types based on broken point fragments. As he notes that he studied 112 points from Neer-II, 68% of which were complete, this would mean he studied 76 complete points from the late Paleolithic. Later studies showed that the Neer-II assemblage is mixed with both Mesolithic and Neolithic material. Artifacts were recovered from the site in an area roughly 1,6 x 0,5 kilometers, although the subsites described by Wouters are spatially more limited (Stoop 2013, 26-41). The neer-II (mostly NII-B) assemblage includes several *zinken* and shouldered points, as well as pseudo-lacan and possibly true lacan burins (based on drawings) (Kramer 2012). This may indicate that it is typologically related to HF-I. Similarities of the Neer-II material to Hamburgian artifact assemblages were already noticed by Kramer (internal report BAI).

In an article from 2012, E. Kramer discusses the Neer-II site as a Creswellian site. In his article Kramer 'reveals his opinion on the Neer II Creswellian' (Kramer 2012, 194). For this research, he studied the material purchased by Bohmers in 1955 (probably partially from the Wouters collection). When Bohmers attributed the Neer-II artifacts to the Creswellian, he had access to the finds from Thissen, Beeren and Wouters made until 1955/1956 (Kramer 2012, 198.).

Concludingly, Neer-II is a vast site that encompasses many different sites from many different periods. The material includes many late Paleolithic artifacts. These can be attributed to both the Federmesser-groups and the Ahrensburgerian, with a possible earlier component. Currently, the name Neer-II or Neer-Boshei refers to an area of 1,5 x 0,5 kilometers of both horizontally and vertically highly mixed assemblages from the entire span of the stone age. Based on the presence of 11 shouldered points and three Azilian points, the mixed material may also include Early Federmesser or Magdalenian-VI-components (Wouters 1982, 58-59) (A third Azilian point was found by the Author in the collection of D. Beeren (J. Beeren's uncle).

Name:	*Neer-I*
Alternative Names:	*Neer - Kappertsberg*
*Coö*rdinates:	*197.840 / 365.240*
Collections:	Numerous
Category:	2
No. of Tools:	1
Literature:	Stoop 2013
ARCHIS:	W 415376
Geomorphology:	4K17
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Meander

ARCHIS mentions late Paleolithic flint on this location, present in the Smeets collection.
P. van der Gaauw reports a destroyed late Paleolithic site near Neer in 1994. This site should correspond with the site that A. Wouters indicates as Neer-I. Part of the soil was removed, destroying the site. A. Wouters dates this site to the Ahrensburgian. In RAAP-Report 85, the site is considered to be completely destroyed (van der Gaauw 1994, 87). Even though large amounts of flint were collected from this site by Smeets, only a single Gravettian point is present in his collection. Five burins are also found, but these could also date to the early Mesolithic (Stoop 2013, 76-82).

Name:	*Neer-Kinkhoven*
Alternative Names:	-
*Coö*rdinates:	*196.020 / 363.000*
Collections:	Smeets
Category:	2
No. of Tools:	1
Literature:	Stoop 2013
ARCHIS:	W 415361
Geomorphology:	4E9
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

ARCHIS mentions late Paleolithic flint on this location, present in the Smeets collection. In his notes, Smeets mentions a single Gravettian point, which is no longer present in the collection. Even so, other tools such as burins seem to indicate a late Paleolithic component (Stoop 2013, 36).

Name:	*Neer - Leumolen*
Alternative Names:	-
*Coö*rdinates:	*194.690 / 362.750*
Collections:	Houben brothers
Category:	2
No. of Tools:	?
Literature:	Stoop 2013
ARCHIS:	W 28885
Geomorphology:	3K17
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

In this northern part of the Leudal area, flint artifacts were found by the Houben brothers. The ARCHIS mentions a burin, two scrapers, two hammerstones, five bladelets and some flakes. Houben dates these to the late Paleolithic.

Name:	*Overloon - Houtklef*
Alternative Names:	*52BN5*
*Coö*rdinates:	*195.000 / 396.750*
Collections:	J. Driessens
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	-
Geomorphology:	4K14
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

The site of Overloon-Houtklef is located on an elevated ridge near a depression. Only a single artifact was recovered from the site by Driessens. This artifact is described as a retouched bladelet from Obourg-flint. The artifact has a brown patina.

Name:	*Panningen – Melkweg*
Alternative Names:	*58BZ7*
*Coö*rdinates:	*194.200 / 368530*
Collections:	J. Driessens
Category:	2
No. of Tools:	3
Literature:	-
ARCHIS:	-
Geomorphology:	3L5
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

The site of Panningen-Melkweg is located on the northern edge of a slight depression in the landscape. The artifacts were recovered in a zone of approximately 90 x 60 meters. The location is described as a 'torn meadow'. The site was visited by Driessens three times. During these visits, a total of six artifacts were recovered, including a Tjongerian point, a Backed Bladelet, a truncated blade, two bladelets and a retouched core renewal flake.

Name:	*Roggel - Lange Pad*
Alternative Names:	-
*Coö*rdinates:	*195.280 / 362.880*
Collections:	J. Smeets
Category:	2
No. of Tools:	5+
Literature:	Stoop 2013
ARCHIS:	W 414731
Geomorphology:	3K17
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

Apart from a single LMP-fragment, several burins, laminar scrapers and bipolar core technology seem to indicate an Late Paleolithic component. The finder attributes this to the Creswellian (Stoop 2013, 68-69). According to documentation at the GIA, Bohmers excavated twice near the Lange Pad, in 1959 (W37205) and 1962 (W28876). According to Silvrants, this section of the large Neer-II site-complex is the best preserved due to the forestation

Name:	*Venlo/TB/1995*
Alternative Names:	-
*Coö*rdinates:	*206.850 / 377.530*
Collections:	-
Category:	2
No. of Tools:	?
Literature:	Deeben 2012
ARCHIS:	W 37083
Geomorphology:	5F12
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Meander

In 1995, this site was excavated by the IPP (Institute for Pre- and Protohistory). The site was mentioned in the notes of J. Deeben, no further information is given. The finds are described as an unknown number of flint artefacts from 3 separate concentrations.

Name:	*Venlo – Tradeport*
Alternative Names:	-
*Coö*rdinates:	See below
Collections:	-
Category:	2
No. of Tools:	?
Literature:	Machiels 1994; Deeben 2012
ARCHIS:	W 37267
Geomorphology:	4E9
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Meander

During the clearing of a terrain for the construction of an industrial area in 1990, several flint artefacts were found by W. Alberts. Because of the great haste in which the excavation was subsequentially conducted, the artefacts were collected through shovelling rather than sieving. The site is located on a slope next to an old Meuse-meander. The site was not mixed with material from later period, despite being close to the Meusebed. The concentration was oval shaped, measuring 3x2 metres horizontally and 30-40cm vertically. A total of 455 artefacts were recovered. The flint used is al light greyish flint with white inclusions, probably originating from Southern Limburg. A single blade of Wommersom-quartzite was also found. The burins show remarkable similarity. With six of eight burins, the burin flake was based on a truncated platform. Based on the absence of Usselo-soil or charcoal, the site has only been dated typologically. The occurrence of Malaurie-points and Wommersom-quartsite leads the author to believe the site is relatively young (Malaurie-point phase). Based on Belgian and French parallels, the site could possibly date in the Younger Dryas. Apart from the sites indicated as Blerick - Groot Boller, Venlo – Tradeport and Venlo/TB/1995, four other sites are also mentioned by Deeben for this area. These sites are referred to here as Venlo – Tradeport-II t/m V. Two of these sits can be attributed to the Ahrensburgian.

Venlo – Tradeport-I	*206.640 / 377.630*
Venlo – Tradeport-II	*206.940 / 377.560*
Venlo – Tradeport-III	*206.840 / 377.430*
Venlo – Tradeport-IV	*206.770 / 377.480*
Venlo – Tradeport-V	*206.580 / 377.590*

Name:	*Venlo –Witte Berg*
Alternative Names:	-
*Coö*rdinates:	*204.770 / 379.320*
Collections:	J. Driessens
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	-
Geomorphology:	3L5
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

J. Driessens notes a single Gravettian point found at this location. The find is located on a sandy ridge on the south side of a creek bed. `

Name:	*Venray – Endepoel–I*
Alternative Names:	*52BN4*
*Coö*rdinates:	*193.900 / 395.100*
Collections:	J. Driessens
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	-
Geomorphology:	4F12
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Creek

Eighteen pieces of flint were recovered in a zone of 50 x 75 meters on a slight elevation (20 – 22.5 +NAP) in the landscape. After the field became a meadow in 1967, artifact recovery was no longer possible. The elevation was located close to an old creek meander of the Loobeek. The recovered material includes three scrapers, a burin, a backed blade, nine flakes and a blade. A piece of sandstone was also recovered, which was probably related to flintworking. The artifacts have a brown patina related to the iron in the soil.

Name:	*Weert – kuikvensedijk*
Alternative Names:	-
*Coö*rdinates:	*173.200 / 365.850*
Collections:	W. Nouwen
Category:	1
No. of Tools:	1
Literature:	-
ARCHIS:	W 15566
Geomorphology:	3L5
Distance to Freshwater:	ca. 300 m
Nature of Freshwater:	Creek

ARCHIS mentions several fragments of flint artifacts dating to the late paleolithic. These artifacts were found by W.J.H. Nouwen and described by W. Willems. Arts describes the site as a late Paleolithic settlement location. On an accompanying list, a single Creswellian point is listed from this location.

Name:	*Weert – Maarheezerhuttendijk*
Alternative Names:	-
*Coö*rdinates:	*173.400 / 365.320*
Collections:	F. Raemakers
Category:	2
No. of Tools:	?
Literature:	-
ARCHIS:	W 15983
Geomorphology:	3L5
Distance to Freshwater:	ca. 100 m
Nature of Freshwater:	Creek

Arts mentiones several fragments of flint artifacts dating to the Late Paleolithic from this site. These artifacts were found by F. Raemakers and described by W. Willems.

Name:	*Weert – Schaapsdijk*
Alternative Names:	-
*Coö*rdinates:	*173.330 / 364.550*
Collections:	Nouwen
Category:	2
No. of Tools:	2
Literature:	-
ARCHIS:	W 15555
Geomorphology:	3K14
Distance to Freshwater:	ca. 200 m
Nature of Freshwater:	Lake

ARCHIS lists one short endscraper, a used blade and a notched blade, a Lump, nine flakes and three blades from the Nouwen collection. This material is dated to the late Paleolithic. The material is described by W. Willems.

Name:	*Weert – Zuidwillemsvaart*
Alternative Names:	-
*Coö*rdinates:	*170.500 / 359.350*
Collections:	Nouwen
Category:	2
No. of Tools:	3
Literature:	-
ARCHIS:	W 418835`
Geomorphology:	3L8
Distance to Freshwater:	ca. 600 m
Nature of Freshwater:	Lake

J. Hanssen reports three late Paleolithic scrapers from this location. These scrapers were found during the washing of flower bulbs. The use of the site for flower cultivation indicates that the site is probably damaged.

Appendix III:

Supplementary documentation from Heythuysen-de Fransman I

Source: ARCHISII, Waarnemingsnummer 29171, in livelink

RIJKSDIENST VOOR HET OUDHEIDKUNDIG BODEMONDERZOEK

AFDELING BESCHRIJVING EN MONUMENTENZORG

MEMORANDUM VAN: B

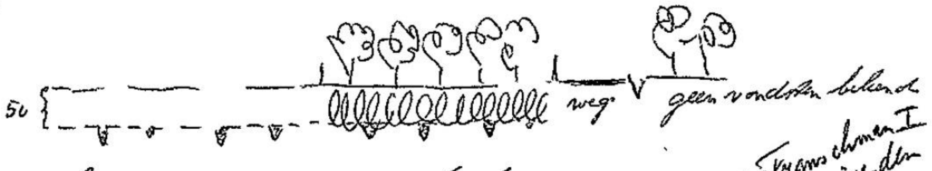
Datum: 27/12/'82

Onderwerp: Overleg Willem → Franschman II

berust op waarnemingen v/d amateur archeoloog Beeren of Clijnen

(1) Palaeolithische laag zit op ± 50 cm. onder huidige maaiveld. Is in het bosperceel [illegible] en op het bouwl. nog intact (door Willem is hier met een amateur samen geboord). In het bosperceel zijn de vele vondsten gedaan - zelfs concentraties konden hier worden waargenomen. Op het bouwland lag ook vuursteen matr. Ws. is dit door natuurlijke processen in de ploegvoor [illegible] gekomen. Toont echter wel de voortzetting v/d palaeolithische laag aan.

Franschman I en II zijn belangr. palaeolithische sites. Dit soort sites wordt alleen maar bekend door grondverstoringen. Fr. I is totaal vernield.



bovenste 40 cm. reeds verstoord als gevolg v. ploegen. De vuursteen hiervan is als gevolg v. natuurlijke processen uit de vondstlaag omhoog gekomen.

De vindpl. Franschman I leverde tienduizenden stuks werktuigen

Memorandum from G. Beex about Heythuysen-de Fransman I (1982)

A.M.WOUTERS
LAAUWIKSTRAAT 34
6663 CK. LENT
080= 233513

LENT,6 juni 81

Geachte Heer Willems,

Zojuist is No.X van de "Archaeologische Berichten" klaar gekomen en overhandigd aan de drukker.
Nu wacht me weer een ongelooflijke stapel onbeantwoorde correspondentie, waarvan ik Uw schrijven van 28-IV 1.1. maar het eerst beantwoord. Excuses voor het lange wachten.
Van Sjeng Beeren hoorde ik dat U intussen op de gevraagde vindplaatsen bent geweest.
De "FRANSMAN II",ontdekt door meester Mertens-een Tjonger I,A component van het grote "Perigordiencomplex" is nog niet vergraven -althans zover IK dit weet-.
58A 189.05 / 368-59
De meest interessante"Fransman I,A en I,B" zijn volkomen verstoord.Ze waren tijdig door mij aan het B.A.I. gemeld;Bohmers groef een proefsleuf en was ook volkomen perplex van het prachtige materiaal.Ik heb de tekeningen voor onze gezamenlijke publikatie (alleen al 144 bladzijden met tekeningen) nu via het Bestuur van de Universiteit Groningen,na jaren vechten weer retour. Hetzelfde geldt voor tientallen zeer belangrijke Jongpaleo-sites uit Midden Limburg.
Op de Fransman kwamen duizenden afslagen en artefacten te voorschijn,die nu over meerdere collecties verdeeld zijn.Vooral na de ruilverkaveling is er door deze amateurs nog gered wat er te redden was. Voor het ZUIDEN was in"mijn tijd" NOOIT geld beschikbaar,voor een wèrkelijk goede opgraving. Dat lag helemaal niet aan Bohmers,zoals men wel eens suggereerde.
Inderdaad zal ik e.e.a. zo goed mogelijk publiceren;maar eerst moet de Neer II (Boshei)-collectie in No.XI er maar eens uit.Deze is niet zo belangrijk omdat er ter plaatse van„Midden-Paleolithicum tot heden„"artefacten" te vinden zijn. De Fransman I,A en I,B zijn gesloten,volkomen niet verontreinigde complexen geweest.De laag is hier en daar nog wel "terug te vinden" -we waren er onlangs met Silvrants,Verhaeg en Beeren en vonden inderdaad hier en daar tussen de beruchte "kraters" nog in situ-plekjes,maar als opgravingsproject zie ik 't niet zo erg meer zitten.Mogelijk is in het aangrenzende "ruderaal-bosje" nog iets aanwezig.Het zal dan wel een wortelhakkerij worden.Jammer...jammer...maar dat heb ik de laatste jaren al zo dikwijls uitgeroepen.
Ik zal het artikel waarschijnlijk brengen onder:"Oudere componenten van het grote Perigordien-complex uit Midden-Limburg" (Of Limburg,want ik heb nu ook een kleine groep uit Zuid-Limburg).
Ik wil namelijk af van "Federmesser" en"Arched Bladelet Compl.".Er is m.i. sprake van één groot complex,dat in TIJD en RUIMTE zich laat vervolgen vanaf het Vroegste Perigordien (Chattelper.) tot aan het einde van de Weichsel,en dat tendele de wortels gaf aan mengculturen en aan bijv.de echte Maglemose-groepen van de "Nordische Kreis".Een belangrijk bewoningsgebied van deze lieden moet-fluctuerend-in de Noordzeevlakte gelegen hebben.(Interessante gegevens betreffende silexherkomst uit opgevist materiaal komen steeds dichter bij mogelijke oplossingen.)Zowel Tjonger,ABC,Wehlener, Creswell etc. zijn de"aflopende" jongste facies van dit P.C. geweest. (Gravettecomplex mag voor mijn part ook).

Beste groeten,

Ad Wouters.

Letter from A.M. Wouters to W. Willems (provincial archaeologist of Limburg at the time)

RIJKSDIENST VOOR HET OUDHEIDKUNDIG BODEMONDERZOEK
AFDELING BESCHRIJVING EN MONUMENTENZORG

MEMORANDUM VAN: B.

Datum: 28/12/82

Onderwerp: Overleg dhr. Gooden te Meijel beroep gem Heythuizen

Perceel 174 is evenals perceel 163 en 165 sedert lang familie-bezit. Grootvader v. G. was al eigenaar.
Ca. 1940 is het bos benoorden het pad (163, 166, 165 e.a) geïnundeerd. Perceel 174 bleef droog. Toen de bomen dood gingen N v/d weg heeft men het bos gerooid ook op perceel 174. De percelen N v/h pad werden toen ontgonnen door de Heide Mij en het perceel 174 door Dijlemans uit Bladel. Stobben werden uit de grond getrokken en daarna werd met een (wentel) ploeg ± 50 cm. omgezet. Vervolgens werd met het monsteren v. 'blauwe' onder de ploeg de nog dieper zittende 'koffielaag' (oerbank) gebroken. → is inspoelingslaag B2 v/h huidige bodemprofiel
In de strook a/d O-zijde (± 20 m.) werd de teeltlaag afgehaald en werd met een shovel tot 1.50 m. diepte het perceelsgedeelte uitgelaagd om het te schuiven op (het drassige) perceel 163. 'Vuur uit zand' en beslist geen vondsten v. vuursteen.
(Perceel 104 is na egalisatie door SBB gekocht v/e boer die in kader v/d sanering ophield met bedrijf)
Na ontgronding is teeltlaag teruggezet en is geëgaliseerd van W naar O.
Of er nog iets v/d jonger laag intact is is zeer de vraag. Vondsten uit het perceel zijn niet bekend.

Report by G. Beex about a conversation with Mr. Gooden on disturbance on the Fransman-I site.

Appendix IV:

Pictorial report on the field visits at Heythuysen-De Fransman and Horn-Haelen

Appendix IV.1 Introduction

For this thesis, the author also visited the locations of the old excavations to ascertain the current situation of the sites and to determine their exact location. In my opinion, it would also have been strange to write my master thesis on two sites without ever visiting them, especially since I chose sites so close to my home. During these field visits, several pictures were taken of the various sites and important locations in their vicinity. In this appendix, a subset of these pictures will be presented, accompanied by a map depicting their location and the direction in which they were taken.

Appendix IV.2 Pictures Horn-Haelen

A total of three pictures were taken at the site of Horn-Haelen, which is still visible on the map as a depression in the landscape near the Willem Alexander power plant. The locations from which the three pictures were taken is show in figure IV.1.

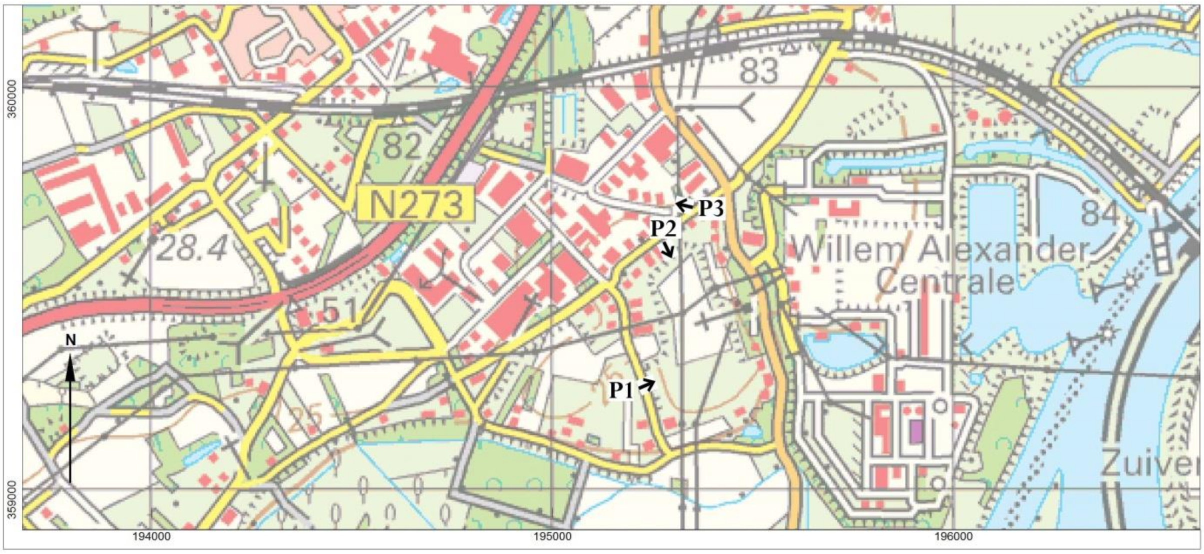


Figure IV.1: Picture locations Horn-Haelen

Horn-Haelen Picture 1: Melemborg sand-pits eastern view

The depression caused by the large-scale masonry pits in the Melemborg area is still clearly visible in the field and on the maps as a depression of fields. The western side of the area is bordered by a thin treeline parallel to a road next to the Meuse river. This picture shows the large scale of the area in which the artifacts are possible to have originated.

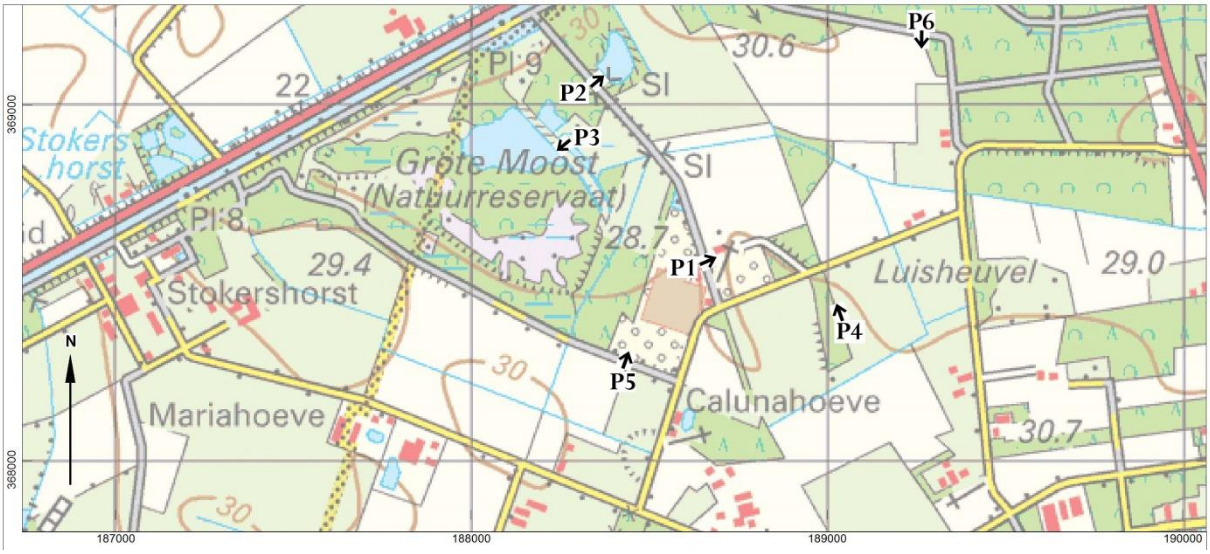
Horn-Haelen Picture 2: Melemborg sand-pits northern view

From the northern side, the large surface of the sand-winning pits of the Melemborg area are broadly visible. This picture was taken from the assumed location where Smeets recovered his artifacts 20 years later. On the left side of the picture, the current power plant is still visible. This picture also shows the power lines which originate from the power plant.

Horn-Haelen Picture 3: Windmolenbos industrial area

This picture shows part of the current windmolenbos industrial area. This area corresponds to the fields surveyed by J. Smeets in the 1970's. It is just north of the sand-winning pits shown in the previous two pictures.

Appendix IV.2 Pictures Heythuysen-de Fransman



A total of six pictures were taken at the site of Heythuysen-de Fransman, which is still visible in the vield as a small elevation in a heathfield near the farmstead. The locations from which these six pictures were taken is show in figure IV.2.

Heythuysen-de Fransman Picture 1

The farm which was bought by the three Wallonian brothers still stands on the same location today, bearing the nickname given to it by the local population. It is now part of a large agricultural company in the region.

Heythuysen-de Fransman Picture 2: Kleine Moost lake

The smaller lake of the Kleine Moost is located close to the Fransman farm, some 100 meters north of the farm. The lake is planned for reclamation in the second half of 2014. The relief suggests that concentrations of lithic material may still be found in its direct environment (Roymans and Sprengers 2013).

Heythuysen-de Fransman Picture 3: Grote Moost lake

The largest of the Peelhorst lakes which are still unreclaimed is the Groote Moost natural reserve. It is located some 200 meters from the HF-I site and gives an impression of the Peel-landscape that dominated the area after the Late Glacial. A lake such as this would have presumably been located closer to the site during the Late glacial. This is also still visible as a depression in the landscape just north of the site itself. The lake has been closed off to the public and is plagued by mosquitos and gad-flies.

Heythuysen-de Fransman Picture 4: Heythuysen-de Fransman Ia

The location of the original Heyhuysen-de Fransman Ia site is still visible as an elevated part of land in the relief. The site was visited with two of the original collectors of the site (on the left). This shows L. Lenders and S. Silvrants revisiting the site. Part of the site is still forested, but the largest part of the site is used as a meadow (right). The forest on the left is propably what Wouters meant in his letter by '*het zal wel een houthakkerij worden*' (see appendix III).

Heythuysen-de Fransman Picture 5: Heythuysen-de Fransman II

On the occasion of the visit at HF-Ia, the site of HF-II was also visited. The forest that still has monumental status is shown on the left of the picture. According to the collectors, this part of the site has always yielded only small amounts of material. The largest part of the already small assemblage was recovered from the heath shown in the center of the picture.

Heythuysen-de Fransman Picture 6: Heythuysen-de Fransman Ib

The somewhat enigmatic site of HF-Ib or HF-III is currently used as a nursery garden. Some artifacts were collected by W. Vossen in a foxhole in this area. These artifacts were not recovered from his collection and were likely intermixed with the HF-Ia material. L. Lenders did have three blades from this location and was able to point out its exact location in the field.