EARLY PALEO-INDIAN LAND USE PATTERNS
IN THE CENTRAL MUSKINGUM RIVER BASIN,
COSHOCTON COUNTY, OHIO

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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* * * * *

The Ohio State University
1986
To my mother and father Donald L. and Mary E. Lepper

for nurturing the dream;

and to my wife Karen

for seeing it through to fruition.

Their sacrifices have made this work possible.
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My wife Karen shares the dedication of this dissertation with my parents. This simple fact is an indication of the contribution which she has made to the culmination of this project. A list of specific contributions would substantially lengthen this already lengthy document, and even then I would doubtless leave something out.

In regard to "leaving something out," I would like to conclude this section with my sincere apologies to anyone whom I have slighted by my failure to acknowledge their contribution. I take full responsibility for these and any other errors of omission or commission in this document.
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CHAPTER I

INTRODUCTION TO THE PROBLEM

The archaeologist has found the territory within the present limits of Coshocton County a most excellent one. It is probably one of the most interesting fields for the scientist and antiquarian in the State (Hill 1881:180).

The initial goal of this research is to describe the archaeological record of the Paleo-Indian occupation of the central Muskingum River basin in east central Ohio. A further goal is to examine these data for evidence of patterning in the distribution of Paleo-Indian artifacts across the landscape. The ultimate objective is to develop a reliable model of the human utilization of this region between 10,000 and 8,000 B.C.

A simple description of the Paleo-Indian archaeological record is needed because so little is known about the basic structure of this record in Ohio. Diagnostic Paleo-Indian fluted points from public and private collections are described and, where possible, selected environmental attributes of their recovery sites are documented. Patterning in the specific locations of a large sample of fluted point yielding loci is evaluated for obvious biases and is developed into general statements of late Pleistocene hunter-gatherer land use.
In the present chapter, I discuss the importance of this research for understanding the earliest cultural developments in the Ohio region. The problem is placed in the broader context of eastern North American Paleo-Indian prehistory and the peopling of the Americas. The assumptions underlying previous research into this problem are summarized and fundamental problems with these earlier efforts outlined. Finally, the formidable methodological challenges of research into late Pleistocene prehistory are acknowledged and possible solutions advanced.

Background to the problem

Although the question of the antiquity of the human radiation into the New World is still very much an open one (e.g. Stanford 1982), the earliest generally accepted evidence for the appearance of humans in the Americas consists of the Clovis fluted point tradition (e.g. Dinnauze 1984). The diagnostic artifacts of this archaeological culture, i.e. Clovis fluted points, are readily identifiable, reasonably abundant, and widespread throughout North America. In the western United States this tradition has been dated consistently to between 11,000 and 11,500 years ago (Haynes 1964).

The several dates available from eastern North America tend to be somewhat later (see Table 1) and this has been
interpreted as evidence for either an eastward migration of southwestern Paleo-Indians, or the survival of a tradition with an equal (or greater) antiquity in eastern North America. If the early date from Dutchess Quarry Cave is included (Funk et al. 1970), the temporal range of the eastern fluted point tradition would extend from 10,000 to 13,000 years B.P. This range excludes the very late date for the Bull Brook site because of the poor quality of the dated sample (Griffin 1977).

There are no radiocarbon dates for fluted point components in Ohio and the early attempts at deriving a geochronological date for the Paleo-Indian occupation (Prufer and Baby 1963:49-55; Prufer and Wright 1970:264-285) are no longer given much credence (Seeman and Prufer 1982:155-156; Prufer, personal communication, 1979). Given the relatively close correspondence of radiocarbon dates from across the continent and the highly diagnostic character of fluted points, it seems reasonable to adopt an "index fossil" approach for identifying Paleo-Indian components (Mason 1962:230; Snow 1980:101).

Ohio long has been recognized as a significant center of Paleo-Indian activity in eastern North America (Shetrone 1938). Prufer and Baby (1963) documented 484 fluted projectile points from across Ohio and by 1982, Seeman and Prufer (1982) had recorded information on another 583
points. Most of these artifacts seem to represent isolated finds of one or two fluted points. Indeed, in spite of the large number of documented fluted points, Seeman and Prufer (1982:157) recognize only two substantial "sites" of this period in Ohio. One of these is the Welling site in Coshocton County and the other is the Sandy Springs locality in Adams County (Cunningham 1973). However, Prufer (1971:310) has alluded to the presence of other important Paleo-Indian sites in Coshocton County. Since the publication of Seeman and Prufer's (1982) review a third important site has been reported in Stark County, Ohio (Gramly and Summers 1986).

Seeman and Prufer (1982:165) documented 184 fluted points from Coshocton County and argued that this area was an important focus of the Paleo-Indian occupation of Ohio (1982:159). Fifty-four of Coshocton County's fluted points were recovered from the Welling site (Prufer and Wright 1970) and another 119 were products of an associated survey of the Walhonding and Tuscarawas river valleys (Prufer 1971). This wealth of data suggests that the local geomorphology and contemporary land use practices in this region favor the recovery of early cultural material.

Prufer and Baby (1963:47), Prufer (1971:310), and Seeman and Prufer (1982:158-159) attribute the high frequencies of fluted points in the Coshocton area to the presence of the
extensive outcrops of Upper Mercer chert. These outcrops obviously were important to the early Paleo-Indians for nearly half of all fluted points documented from Ohio were crafted from this material (Prufer and Baby 1963:45). The abundance of this chert resource in Coshocton County offers additional important advantages for studying Paleo-Indian land use in this region.

First, as a center of manufacturing activity, the Paleo-Indian archaeological record of Coshocton County should have a relatively high visibility. In other words, there should be abundant manufacturing debris including fluted preforms, points broken in the fluting process, and channel flakes which would facilitate the discovery and identification of Paleo-Indian components.

Second, influential models of Paleo-Indian settlement patterns have been formulated for Coshocton County and similar regions where outcrops of high quality chert were accessible. Intensive research in this area will afford an opportunity to re-examine these models and test their predictions against new data.

In summary, Ohio's long recognized potential for contributing to an understanding of eastern North American Paleo-Indian land use patterns has not been realized. Coshocton County stands out as the most likely area within Ohio to exploit this potential because of the wealth of
pertinent data documented from its rugged hills and valleys. The abundance of data here is the result of a combination of factors: 1) the research conducted in this region by Prüfer and his associates; 2) favorable geomorphological conditions; 3) favorable modern land use practices; and 4) the presence of chert outcrops which have increased the visibility of certain aspects of the Paleo-Indian archaeological record.

Summary of previous research

Several notable efforts have been made to describe and interpret Paleo-Indian land use in eastern North America (Ritchie 1957; Mason 1962; Rolleston 1964; Williams and Stoltman 1965; Funk 1972; Gardner 1974; Storck 1982; and others). The conclusions of these studies routinely have relied on interpretations developed from research in the western United States. This has been a consequence, primarily, of the history of research into the Paleo-Indian period (Meltzer 1984).

The first well documented discoveries of Paleo-Indian materials in a meaningful context were made in the southwestern United States. Similar artifacts from the eastern United States were identified and interpreted in the light of the western discoveries. Such appeals to the western data have persisted and have been accepted largely
uncritically because of certain implicit assumptions regarding the nature of the human radiation into the New World.

Uniformity in Paleo-Indian material culture (i.e. the apparent similarity of fluted points from across America) has been assumed to reflect a vast and homogeneous cultural entity (see, for example, Green 1963:163). In other words, it is thought that the widespread Clovis fluted points reflect a single "Culture" extending across 10 to 17 million square miles and lasting for somewhere between 500 and 2,000 years. One explanation for such remarkable spatio-temporal stability in material culture is that the Clovis industry was, ultimately, the product of a very small founding population which rapidly expanded and radiated throughout the Americas (Haynes 1964). The genetic and cultural homogeneity of the colonizers, and their rapidity of movement through the New World, precluded significant culture change (Martin 1973). Moreover, an inherent cultural inertia (e.g. "Romer's Rule") is often invoked as a conservative force in opposition to the diversifying forces usually attendant upon an adaptive radiation of this sort (Lynch 1978:473; Smith 1967:253).

Working from this model, investigators in eastern North America, with little or poor data pertaining to Paleo-Indian settlement and subsistence, could justify their necessary dependence on comparisons with the southwest where Paleo-
Indian materials had been recovered in association with mammoth and other megafauna. Unfortunately, the basic assumptions of the model seldom were questioned and conclusions drawn from inter-regional "comparisons" frequently involved circular reasoning which could not recognize differences between the regions:

Despite the lack of direct evidence, these [eastern] Paleo-Indians using fluted points must have been elephant (mastodon) hunters. The western Paleo-Indians who used fluted points were elephant (mammoth) hunters par excellence and it seems inconceivable that Paleo-Indians dwelling in the Upper Great Lakes during the time of the mastodons would not also be elephant hunters (Quimby 1960:30).

It is evident, then, that much of the research on the Paleo-Indian Tradition in eastern North America rests upon two assumptions:

1) Fluted points are the material remains of a widespread, biologically and culturally homogenous population; and

2) Fluted point makers were highly mobile specialized big-game hunters.

I suggest that these assumptions are no longer tenable. The proposed uniformity in material culture, upon which all else rests, is more apparent than real. All fluted points superficially may be quite similar, but recent detailed technological studies suggest that there are significant regional differences (e.g. Bonnichsen 1977; Callahan 1979;
Young and Bonnichsen 1984; see also Wilmsen 1968). Diversity in material culture is becoming more apparent as early sites with good preservation are revealing extensive non-lithic industries (Dillehay 1984; Clausen 1979). Thus, it seems that notions of cultural homogeneity have been based on superficial interpretations of an extremely limited range of the technological repertoire, i.e. the lithic industry.

Wilmsen's (1968) pioneering study comparing the artifact assemblages of Paleo-Indian sites from across North America was the first to demonstrate that important regional distinctions might be evident within the Paleo-Indian tradition: "the organization of Paleo-Indian culture included a diversified set of structural poses through which responses to ecological conditions were initiated" (1968:38). This type of analysis, however, could only hint at the variability in local settlement and subsistence patterns. It would take a series of intensive regional surveys conducted within a broad range of ecological contexts throughout the east to begin delimiting particular "structural poses" or distinct regional traditions.

Gardner (1974 and various later references) and his associates have made important advances with their definition of the Flint Run Paleo-Indian Complex in Virginia. Unfortunately, Gardner's interpretations of
Paleo-Indian subsistence are still influenced by the western view of Paleo-Indians as big-game hunting specialists:

Clovis sub-phase hunters were strongly oriented to the exploitation of such grassland adapted creatures as mammoth, camel, horse, and bison (Gardner 1974:39).

There is no clear evidence in eastern North America that these species were ever exploited by early Paleo-Indian populations.

What is important is that we as scientists and archeologists must realize that the prehistory of the late Pleistocene and early and middle Holocene is far more complex than we have previously been willing to admit. We must... address ourselves to understanding the complexity of adaptive strategies at all time periods and in the differing microenvironments exploited (Gardner 1977:262).

Methodological Considerations

Coupled with the unique significance of the Paleo-Indian archaeological record are characteristics which present unique challenges to the interpretation of this record. The first and most obvious characteristic of the Paleo-Indian occupation is that it took place a very long time ago. This simple fact has several important consequences.

First, the oldest components in any region are the least likely to have survived intact:

... these results indicate a severe attenuation of site recovery for early periods... Errors are likely to be greatest for the lowest population
densities and this, combined with progressive loss of evidence through time, means interpretation of cultural patterns for the earliest periods in any area are not only the most suspect, but may be missed altogether (Kirkby and Kirkby 1976:252).

Geomorphic processes such as weathering and erosion are altering the earth's surface daily. Archaeological data which have been subjected to these processes for extended periods of time are more likely to have been subject to their ravages. For example, George Frison demonstrated that, in the Powder River Basin of Wyoming, "most sites of Paleoindian age are missing because of past geologic activities that are as yet poorly understood" (Frison 1984:308). Closer to home, Chapman (1984:278) suggested that "the dynamics of the late Glacial sediment influx" may have destroyed much of the Paleo-Indian record in the Little Tennessee River valley. Further north, in the St. John River drainage of northern Maine, Nicholas et al. (1981:68) hypothesized that late Pleistocene terraces, and any associated early sites, had been "massively modified and/or destroyed by various erosional mechanisms" (1981:68) related to "river loading capacity" (1981:71). The specific characteristics of the Muskingum River and its tributaries will need to be taken into account, but as a working hypothesis, we may expect that the record of the Paleo-Indian occupation of the central Muskingum River basin will be depauperate.
A second consequence of the antiquity of the Paleoc-Indian occupation relates to the dramatically changing climate of the last 20,000 years. The late Pleistocene environment inhabited by the Paleo-Indians was different from the Holocene environment of the "Neo-Indians." This means that the resources available for exploitation were different and even if the same suite of resources was utilized the spatial and temporal distributions of those resources may have changed so that the respective archaeological records would appear different. In other words, a particular locality which, today, seems to offer every advantage of a good campsite, may have offered no such attractions to Pleistocene hunter-gatherers 11,000 years ago.

Finally, if the Clovis industry represents the initial radiation of humans into the New World, as some have claimed (Haynes 1969; Martin 1973; West 1983), then the evolutionary processes operating on these populations would have been unique in human experience. The magnitude of the geographic area involved suggests that the radiation must have been explosively rapid and successful: too rapid, according to the authors cited above, for significant cultural differentiation. If, however, humans had occupied the Americas for thousands of years prior to the advent of Clovis (MacNeish 1976; Bryan 1977; Irving 1985), then the
archaeologically instantaneous appearance across North America of the traits which serve to define the Clovis industry must represent either a secondary (or tertiary?) migration of a population which overran and replaced the cryptic pre-Clovis aborigines, or the rapid diffusion of a technological innovation which was adopted and adapted by local populations. In any case, something extraordinary occurred in North America 11,500 years ago. The alternative scenarios offered here suggest that models of settlement and subsistence developed from ethnographically described groups of hunter-gatherers may be inadequate for explicating late Pleistocene cultural processes.

These aspects of the Paleo-Indian archaeological record of eastern North America must be acknowledged and incorporated into research strategies aimed at discovering and interpreting late Pleistocene human land use patterns. To summarize:

1) Paleo-Indian occupations may have been destroyed or obscured by various geological processes;
2) the late Pleistocene environment was different from today's making it difficult to interpret or predict the context of Paleo-Indian activities;
3) Paleo-Indian populations were experiencing a unique set of evolutionary circumstances for
which there are no ethnographic or archaeological parallels - "There can be no repetition of this until man lands on a planet belonging to another star" (Bordes 1973:218).

In order to advance our knowledge of this critical period in American prehistory, archaeological research strategies which recognize and evaluate the geological context of Paleo-Indian materials must be developed (e.g. Butzer 1982; Nicholas et al. 1981). This is essential if we are to evaluate the completeness and representativeness of the Paleo-Indian archaeological record. Second, models of Paleo-Indian settlement patterns and land use must not be generated without due regard for the particular ecological milieu of the early populations. Related to this, settlement and subsistence models must be developed and tested for Paleo-Indian groups which make use of diverse or unusual ethnographic analogies (e.g. Fitting 1977), or which eschew entirely ethnographic analogy (e.g. Irwin-Williams 1977). Third, models of Paleo-Indian settlement patterns and land use need to be developed from the eastern North American data. These models must take into account the peculiar limitations and potentials of these data. For example, they must recognize that the bulk of the Paleo-Indian archaeological record in eastern North America is comprised of isolated fluted points (Meltzer 1984:353).
Only when we have created and tested models which are not based on data derived from western North America will we be in a position to make meaningful comparisons with that western data. Finally, the search for local pre-Clovis occupations must be pursued so that we will be able to define the evolutionary context of the Clovis industry. Until such sites are identified and described we will have to rely on further research into the Clovis phenomenon itself to elucidate its origin and evolution.

Perhaps the major methodological consequence of adopting such a research strategy is the recognition that isolated fluted points are an important source of data. The research method, variously referred to as "Non-site sampling" (Thomas 1975), "scatters and patches analysis" (Isaac 1981), "Off-site archaeology" (Foley 1981), and "Siteless survey" (Dunnell and Dancey 1983), offers the ability to maximize the information potential of the Paleo-Indian archaeological record by focusing on the distributional patterns of individual artifacts rather than on "sites." The theoretical underpinnings of this method have been described as follows by Foley:

...the archaeological record of mobile peoples should be viewed not as a system of structured sites, but as a pattern of continuous artifact distribution and density.
...information on land use patterns may in some cases be better obtained through the study of non-discrete artifact distributions in specific zones than from orthodox site distributions (Foley 1981:163).
It is hoped that these data will result in a reasonably accurate picture of Paleo-Indian land use within the diverse ecological contexts of the Unglaciated Appalachian Plateau in east central Ohio and that they will provide substantive tests of hypotheses with specific predictions for Paleo-Indian land use within this region.

This research represents an attempt to meet these challenges within the somewhat limited context of a doctoral dissertation. That I have met with only indifferent success on several counts should in no way detract from the individual importance of each of the items on this program.

In summary, this research is an attempt to describe and interpret the distribution of early Paleo-Indian fluted projectile points within the central Muskingum River basin. For the purposes of this research that area is defined as Coshocton County, Ohio (see Figure 1). The boundaries of that political unit have been chosen for reasons of convenience. This region has produced an impressive body of data pertinent to this cultural period and a variety of explanations have been proposed to account for this unusual abundance. A systematic examination of the microenvironmental associations of fluted point yielding loci will yield data which may test these alternative hypotheses. When these associations are interpreted in the light of the proposed reconstruction of the late Pleistocene
environment of the central Muskingum River basin, the resulting "settlement" patterns may provide information on the land use system of the early Paleo-Indian hunter-gatherers in this region.
### TABLE 1

Radiocarbon dates for Paleo-Indian sites in eastern North America

<table>
<thead>
<tr>
<th>Site</th>
<th>Date</th>
<th>Reference</th>
<th>Material Dated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meadowcroft Rockshelter, PA</strong></td>
<td>19,600 ± 2400 B.P. (SI-2060)</td>
<td>Stuckenrath et al. (1982)</td>
<td>basketry fragment</td>
</tr>
<tr>
<td></td>
<td>19,100 ± 810 B.P. (SI-2062)</td>
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<td>charcoal</td>
</tr>
<tr>
<td></td>
<td>16,175 ± 975 B.P. (SI-2354)</td>
<td></td>
<td>charcoal</td>
</tr>
<tr>
<td></td>
<td>15,120 ± 165 B.P. (SI-1686)</td>
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</tr>
<tr>
<td></td>
<td>14,925 ± 620 B.P. (SI-1872)</td>
<td></td>
<td>charcoal</td>
</tr>
<tr>
<td></td>
<td>13,270 ± 340 B.P. (SI-2488)</td>
<td></td>
<td>charcoal</td>
</tr>
<tr>
<td></td>
<td>13,240 ± 1010 B.P. (SI-2065)</td>
<td></td>
<td>charcoal</td>
</tr>
<tr>
<td></td>
<td>12,800 ± 870 B.P. (SI-2489)</td>
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<td>charcoal</td>
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<tr>
<td><strong>Dutchess Quarry Cave, NY</strong></td>
<td>12,530 ± 370 B.P. (I-4137)</td>
<td>Funk et al. (1970)</td>
<td>caribou bones</td>
</tr>
<tr>
<td><strong>Durst Rockshelter, WI</strong></td>
<td>11,610 ± 300 B.P. (M-812)</td>
<td>Griffin (1965)</td>
<td>composite charcoal</td>
</tr>
<tr>
<td><strong>Vail, ME</strong></td>
<td>11,120 ± 180 B.P. (Beta-1833)</td>
<td>Gramly and Rutledge (1981)</td>
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<tr>
<td></td>
<td>10,300 ± 90 B.P. (SI-4617)</td>
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<td></td>
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<tr>
<td><strong>Debert, Nova Scotia</strong></td>
<td>10,600 ± 47</td>
<td>MacDonald (1968)</td>
<td>average of 13 dates</td>
</tr>
<tr>
<td><strong>Whipple, NH</strong></td>
<td>11,430 ± 395 (C-453)</td>
<td>Curran (1984)</td>
<td>charcoal</td>
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<td></td>
<td>9,820 ± 450 (C-344)</td>
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<tr>
<td></td>
<td>10,150 ± 815 (C-345)</td>
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<td>hardwood charcoal</td>
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<td></td>
<td>10,670 ± 570 (C-345)</td>
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<tr>
<td></td>
<td>10,885 ± 665 (C-454)</td>
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<td>hardwood charcoal</td>
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<tr>
<td><strong>Shawnee-Minisink, PA</strong></td>
<td>10,590 ± 300 B.P. (W-2994)</td>
<td>McNett et al. (1977)</td>
<td>charcoal</td>
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<tr>
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<td>10,750 ± 1000 B.P. (W-3134)</td>
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<td>9,310 ± 1000 B.P. (W-3388)</td>
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<td>11,050 ± 1000 B.P. (W-3391)</td>
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<td>reference</td>
<td>material dated</td>
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<tr>
<td>--------------------</td>
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<tr>
<td><strong>Charlie Lake Rockshelter, Ontario</strong> Roberts (1984)</td>
<td></td>
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<tr>
<td></td>
<td>10,500 B.P.</td>
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<tr>
<td><strong>Hiscock Farm, NY</strong> Gramly (1985)</td>
<td></td>
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<tr>
<td></td>
<td>10,450 ± 400 B.P. (W-1038)</td>
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<tr>
<td><strong>Templeton (6LF21), CT</strong> Moeller (1980)</td>
<td></td>
<td></td>
<td>wood charcoal</td>
</tr>
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<td></td>
<td>10,190 ± 300 B.P. (W-3931)</td>
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<tr>
<td><strong>Thunderbird, VA</strong> Gardner (1974)</td>
<td>a</td>
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<tr>
<td></td>
<td>9,900 ± 340 B.P. (W-2816)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bull Brook, MA</strong> Byers (1959)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9,300 ± 400 B.P. (M-807)</td>
<td>composite charcoal</td>
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</tr>
<tr>
<td></td>
<td>8,720 ± 400 B.P. (M-808)</td>
<td>composite charcoal</td>
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</tr>
<tr>
<td></td>
<td>6,940 ± 800 B.P. (M-809)</td>
<td>composite charcoal</td>
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<tr>
<td></td>
<td>6,940 ± 400 B.P. (M-810)</td>
<td>composite charcoal</td>
<td></td>
</tr>
</tbody>
</table>

*a "Early Archaic" level*
FIGURE 1. Map of Ohio showing the location of Coshocton County.
CHAPTER II
A REVIEW OF PALEO-INDIAN STUDIES IN EASTERN
NORTH AMERICA: A VIEW FROM OHIO

There is a near mystical isolation of a field of 'Paleo-Indian studies' (Fitting 1966:131).

G.F. Wright: the paleolith problem: 1883 - 1921

In the late 1860s Dr. Charles C. Abbott, a physician, became involved seriously with the collection and study of prehistoric artifacts from his ancestral farm outside of Trenton, New Jersey. By 1876 he had collected a large series of roughhewn bifacial artifacts which he claimed were associated with glacial gravels. In that same year, F.W. Putnam, curator of the Peabody Museum of Archaeology and Ethnology, visited the locality and, in the company of Abbott, discovered "two specimens in situ" (Abbott 1883:127). In his annual report, Putnam was unequivocal in his support of Abbott:

I see no reason to doubt the general conclusion he has reached in regard to the existence of man in glacial times on the Atlantic coast of North America (Putnam 1877:11-12).

Putnam’s enthusiastic support translated into major efforts to establish the geological context of the Trenton gravels and to legitimate and encourage the archaeological research being undertaken there. By 1886 Putnam would claim
that "we have in this country the conclusive evidence of the existence of man before the time of the glaciers" (1886:501).

Among the geologists and archaeologists who visited Trenton at the instigation of Putnam was George Frederick Wright. Wright makes it clear in his autobiography that this visit was the catalyst for his own research into the problem of the earliest human occupation of America "since now glacial studies touched on the theological and Biblical questions in which I was primarily interested" (Wright 1916:141).

In 1881 Wright was employed by the geological Survey of Pennsylvania to assist in mapping the glacial boundary across that state and shortly thereafter was appointed to the chair of New Testament Language and Literature at Oberlin Theological Seminary. The Western Reserve Historical Society hired Wright to continue mapping the glacial boundary across Ohio justifying their decision on the basis of Abbott's archaeological discoveries at Trenton:

If man was in America during the Glacial epoch, then everything bearing on that epoch has historical significance, and opens a field for us to enter (Wright 1916:147).

As early as 1883 Wright was declaring his expectation that traces of paleolithic man, such as Abbott had described from New Jersey, would be found in Ohio (Anonymous 1883). In 1887 Wright published a paper in the first volume of the
Ohio Archaeological and Historical Society Quarterly with one of the stated purposes being to:

...call the attention of local observers in different parts of the State to the class of implements likely to be found within the limits of the State, and to the localities where special investigations should be inaugurated (1887:174).

In this seminal paper Wright expressed clearly the geological nature of the evidence for glacial man and outlined the criteria which should be used in documenting such evidence:

If, by good chance, any one should discover such an implement, let him, if possible, secure a photograph of it before its removal. At any rate, he should spare no pains in noting its position and describing its surroundings, and should call the attention of professional geologists to the facts as soon as possible, that everything may be confirmed in the mouth of two or three competent witnesses (1887:179).

Wright (1887:180) makes brief mention of a few suggestive finds of "palaeolithic type" implements from Ohio, one from Tuscarawas County, another from an "excavation in a cave" nearby, and several from the "vicinity of Columbus", but rejects these as evidence because "the original observations were not sufficiently accurate" (1887:180).

In the following year, Putnam presented before a meeting of the Boston Society of Natural History, "two specimens found in the gravels of the Little Miami valley in Ohio" (1888:421) by a collaborator, Dr. C.L. Metz. The first of these, the Madisonville paleolith, was found at a depth of eight feet in a glacial terrace near Metz's residence. The
second specimen, the Loveland paleolith, was found at a depth of thirty feet and reportedly was in close proximity to mastodon bones (Wright 1896:251). In addition, there were, apparently, subsequent finds at the Loveland locality (Holmes 1893a:149-150). Primarily based on the credentials of Dr. Metz, these finds satisfied Wright and constituted his first "proofs" of the presence of glacial man in Ohio.

The most significant of the Ohio paleoliths, and indeed, probably the most intriguing of all such cases, was discovered by W.C. Mills in 1889 in Tuscarawas County. The Newcomerstown paleolith was found by Mills in the face of a gravel terrace sixteen feet below the surface. The artifact was strikingly similar to known paleolithic tools from France and England and this similarity was an important factor in establishing its antiquity. Wright illustrated the find next to a similar artifact from Amiens, France and asserted that "the similarity of pattern is too minute to have originated except from imitation" (1892a:251). Holmes (1893d:158) denounced the implications of this statement and offered his own facetious interpretation as to which artifacts were being imitated and by whom. In a later reference Wright implies that he attributes the similarity to the psychic unity of man and independent invention rather than to direct or indirect diffusion (Wright 1900:166). However, ultimately he returned to his original explanation:
...the implement is so like the pattern of the French implement that it is a reasonable supposition that American fashions at that time came from Paris as they do at the present time (Wright 1914:338).

The only other paleolith from Ohio which figured at all prominently in Wright's major syntheses was found in 1892 in an upper terrace of the Ohio River near Brilliant in Jefferson County (Wright 1895). This find was discovered by Sam Huston, the County Surveyor, projecting from the vertical face of an excavation beneath eight feet of cross bedded sand and gravel. This artifact was unique in that it was small and shaped like a crudely stemmed projectile point. It was presented at the 1895 meeting of the A.A.A.S. where Putnam and other scholars "recognized it as an indubitable relic of great antiquity" (Wright 1920:649). The unique form suggested to at least one authority that it was "intermediate between that of paleoliths and modern Indian implements" (Wright 1920:649).

Wright's archaeological research into the paleolith problem reached a climax in 1892 with the publication of Man and the Glacial Period (1892). This was not a revolutionary work in the sense that it was merely a summary of previous work by Abbott, Putnam, and others. However, the dramatic response it triggered was to have enormous significance for archaeological research into the origins of the American Indian.
One of the principal factors which contributed to the explosive reception of *Man and the Glacial Period* was the publication, in the same year, of W.H. Holmes' paper on "Modern Quarry Refuse and the Palaeolithic Theory" (1892). This work concluded that the resemblance of American paleoliths to European forms of great antiquity was irrelevant. Similar forms were produced in the manufacture of stone tools from all periods and therefore, it was more parsimonious to interpret the so-called paleolithic implements as "rejects" representing an early stage in the manufacturing process of "modern" Indian tools. Holmes argued that the reputedly early forms were "not implements at all, but ordinary failures" (1892:296), and that such failures should be expected to occur at all sites where "no work save the roughing-out was undertaken, and no flaked forms save rude ones were left upon the ground" (1892:296).

Many of these observations have proven to be inaccurate (Bryan 1950), but the basic idea made good sense and should have had a salutary affect on some of the more irresponsible research being undertaken. For example, Holmes later wrote that

...when, at the instigation of Major Powell, the writer...took up the subject...the curator of prehistoric archeology in the U.S. National Museum was collecting rudely chipped stones by means of a widely distributed circular letter, largely mere shop rejects, which he classed and distributed as 'paleolithic implements' at the rate of thousands per year (1919:75).
The general conclusions which Holmes arrived at from his study were that

...the separation of a single specimen from the main body of flaked stone art in America, save upon purely geologic evidence, is wholly unwarranted (1892:296);

and that this geologic evidence

...cannot be safely observed save by geologists... [who have] especially studied gravels (1892:296).

It should be noted that Wright probably would not have disagreed with either of these general conclusions.

The response to Man and the Glacial Period began with a fairly balanced review in Science which concluded that none of the evidence for glacial man in the Americas could be accepted as conclusive (Brinton 1892). W.J. McGee, a former proponent of glacial man (McGee 1888), felt that Brinton's (1892) review was not strong enough and declared Man and the Glacial Period "an offense to science" (1892:317). In an even more caustic review, which appeared in the American Anthropologist, McGee characterized Wright as "a betiseled charlatan whose potions are poison. Would that science might be well rid of such harpies" (McGee 1893:95).

The personal nature of many of these criticisms surprised and offended practically everybody. Although not in agreement with Wright's position, E.P. Williams acknowledged his dignified silence in regard to "the statements that any sane man can see are unwarranted" (1893:98).
E.W. Claypole, an eminent geologist from England, wrote a devastating rebuttal to the "extra-scientific" personal attacks on Wright (1893a:764). He argued that the issue was not whether glacial man had ever existed on the American continent. The real issue concerned "the freedom of scientific discussion" (1892a:775):

...the onslaught...savors too strongly of the old-time, intolerant, theological method of crushing a formidable rival by dint of concerted action or force in default of reason (Claypole 1893a:764).

Claypole's barely disguised accusations of a conspiracy were answered by J.W. Powell, director of the U.S. Geological Survey, in a facile review of the debate (Powell 1893). He dismissed Claypole's article as based on "error in every paragraph" (1893:325). The editor of the Popular Science Monthly, in which both articles had appeared, considered Powell's defense a "failure" (Youmans 1893), and declared that the U.S.G.S. was in danger "... of becoming a kind of scientific hierarchy, and as such, of exercising an influence unfavorable rather than favorable to the increase of scientific knowledge" (1893:413). Claypole (1893b) defended his original article and expressed regret that Powell had not adduced a single example of the errors which had been claimed to occur "in every paragraph" and suggested that "... the inference from this omission is not difficult" (Claypole 1893b:696).
Holmes' (1893a) review of *Man and the Glacial Period* followed his earlier claims that so-called American paleoliths were not "implements" at all, but were manufacturing rejects. Wright (1893a) countered this argument with an appeal to the geological context which he had always considered crucial:

...even if they are 'rejects', if they are found in undisturbed strata of glacial age they are as good evidence of glacial man as perfect implements would be (1893a:125).

Holmes responded with a change of tactics (Meltzer 1983:22). Building onto the quarry reject analogy Holmes discussed the numerous factors which were capable of introducing objects into older strata with the assumption that one of these should be able to explain any given paleolith. This line of reasoning proved quite effective (eg. Holmes 1893b, c and d):

...in those instances where the geological context seemed sound, Holmes changed his strategy and cast aspersions on the collector ... The attitude among the BAE and USGS scientists, and this held true through the first two decades of this century ... was that if any possibility of intrusion existed, if there were any instances where more modern Native American material could have been incorporated into more ancient deposits, then the evidence had to be considered invalid (Meltzer 1983:22).

However, not everyone was convinced:

It is idle to tell us that 'gravels reset,' that 'flints may be introduced after deposition,' that 'stones may be broken by Nature so as to simulate the work of man,' etc. All this we know, but we ask the reason for suspecting that these things happened here and without detection.
Without this the objections are mere insinuations from men who will not admit that others know more than themselves; effusions of the 'omniscients' in the garb of 'agnostic's'... (Claypole 1893a:776).

Nevertheless, the skeptics prevailed and Holmes’ (1893b) conclusive demonstration of the recency of the Little Falls site in Minnesota, which was acknowledged even by Wright (1893b:267), cast the dark shadow of doubt on all the finds.

Meltzer (1983:18) concluded in his review of this tumultuous period in American archaeology that the concerted attack on Wright was the result of a conspiracy by members of the U.S.G.S. and the B.A.E. The broad political and intellectual ramifications of this situation are ably discussed by Meltzer so they need not be of concern here. Let it suffice for the moment to note that these institutions successfully imposed their own visions of archaeology and geology on American science. And while it would not be correct to claim that this goal had been completely achieved (Meltzer 1983:23) it is certainly true that after the debates of 1893 had subsided:

...no anthropologist, geologist, or paleontologist wanted to risk his career in the face of such ostracism; the subject of Early Man became virtually taboo (Wilmsen 1965:179).

The period of the Paleolith Problem, which corresponds roughly to Wilmsen's (1965) Long Chronology period, extends long beyond 1890 in Ohio. This is because Wright never surrendered his conviction that paleolithic man had, in ancient time, walked upon Ohio's mountains green. He
continued to pursue evidence for paleoliths in glacial deposits (e.g. Anonymous 1909) and published a 6th edition to The Ice Age in North America in 1920 which contained an essentially unaltered review of his previous syntheses. For Wright:

...these...discoveries of relics of glacial man in Ohio...reveal to our mental vision a state of conditions such as now prevails in Greenland, and a race of hardy hunters who were following...the retreating continental Ice Sheet in Ohio as the Eskimo are still doing in Alaska and Greenland (1914:338-339).

His persistence was not rewarded. When he died in 1921 only one of his many eulogists made even a passing reference to his work on paleolithic man (Root 1921:170-171). It was as if this aspect of his career had been an embarrassing eccentricity to be politely ignored.

Although he was the most prolific, Wright was not the only scholar pursuing research on the Paleolith problem in Ohio during the years 1883 - 1921. Before moving on to the next period I wish briefly to consider the contributions of three others: M.C. Read, N.S. Shaler, and E.W. Claypole.

M.C. Read was a special assistant of the Geological Survey in Ohio and published numerous articles on geology, archaeology, entomology, ornithology, forestry, and other subjects. In his Archaeology of Ohio he describes "a very beautiful specimen, found deeply buried in the glacial drift in Twinsburg, Summit County" (Read 1891:14). The outline of this artifact is presented on page 16 of his monograph and
it is unfortunate that the illustration is only a tracing. It is a large lanceolate projectile point with a constricted base and a pronounced basal concavity. It was reported as having "a highly polished, reddish surface, supposed to indicate great antiquity" (Read 1891:17). Read refers to "precisely similar" specimens reported from Rhode Island, Missouri, and California and concludes that such a widely distributed, peculiar, and apparently ancient form indicates:

...that the Indians occupying, at least the northern part of the United States upon its discovery by Europeans, were preceded by a more artistic people (1891:17; cf. Wormington 1957:68).

Read cautioned that the glacial deposits from which the artifact was obtained were only two or three feet thick and that "various causes may have carried it from the surface to that depth" (1891:116). He concluded his discussion with the observation that:

...the evidence of the finding of pre-glacial implements must be so certain as to exclude any other reasonable hypothesis. Such evidence is not afforded in this case (Read 1891:116).

N.S. Shaler, a geologist from Harvard University and the first director of the Kentucky Geological Survey, reported on his research activities in the 1893 American Geologist volume devoted to the paleolithc controversy. Sometime prior to 1869 Shaler conducted excavations in the "caverns of the Ohio valley" (1893:180) looking for evidence of paleolithic man. Finding nothing resembling the European
cave deposits and no prehistoric material of any antiquity, he began "extensive excavations at Big Bone Lick in Kentucky" (1893:180). He reasoned that if paleolithic man had existed on this continent, his weapons should be found in association with the fauna of the period. Failing here too he:

...searched the banks of the Ohio and its tributaries for a distance of a hundred miles or more to see if the sections of its alluvium might show human or art remains of another kind than those derived from the known indigenes of this country (1893:181).

Shaler found no evidence to support the notion of glacial man and concluded that, if humans had inhabited the Ohio Valley during the glacial period, then their habits, and consequently, their archaeological record, were very different from the early humans of Europe (1893:181). Shaler went on to offer some germane observations on certain methodological problems associated with research into this problem:

...at every state of my enquiries both in New England and in the Ohio valley I have always found accommodating persons who were ready to supply me with just such evidence as they knew I desired to obtain (1893:181); and

...if one searched these deposits of washed drift with the eye prepared to find implements, an unconscious choice was made of those having forms which would place them in this category; if on the other hand, every chipped stone was taken the variety thus gathered was so great that it soon became at once embarrassing and instructive (1893:183).

These are valuable lessons which have not been learned by some modern investigators.
The final contribution to the Paleolith problem which will be considered is an interesting paper by E.W. Claypole, an English geologist of international renown and first president of The Ohio Academy of Science. His spirited defense of Wright has been discussed adequately above (Claypole 1893a and 1893b). What is of special interest here is Claypole's (1896) painstakingly detailed account of several stone tools found between 1884 and 1885 near New London, Huron County, Ohio. One artifact, in particular, was the focus of the article. A grooved axe was reportedly found by Elmer E. Masterman beneath 22 feet of clay and sand while digging a well. The axe itself was deeply weathered reinforcing the suggestion of a considerable antiquity.

Wright (1905:20) made a vague reference to the New London finds in 1905, but in 1920 asserted that no documented paleolith was "polished and smooth, but all are rude in form and roughly flaked" (Wright 1920:622). He apparently had forgotten or dismissed the Masterman axe.

Holmes (1919:83) referred to Claypole as a "geologist of high standing" and declared the Masterman finds "interesting and important." This is an interesting paradox: a competent geologist presents a scrupulously documented report of undoubted artifacts in glacial deposits and concludes that they "must be considered the work of glacial man" (Claypole 1896:309). Wright essentially ignores the find while Holmes publishes illustrations in his magnum opus
with the comment that the discovery is "interesting and important" (1919:83).

The explanation, of course, is that finding a ground stone axe in glacial deposits is equivalent to finding a transistor radio in an Indian mound. Abbott sealed his own doom when he wrote, in defense of the undisturbed context of his paleoliths:

Now, when grooved axes and polished celts are found under like conditions, I am willing to leave the field as fast as my short legs will permit (1892:271).

In summary, George Frederick Wright pioneered research into the earliest human occupation of Ohio. His work deeply disturbed certain established figures in American archaeology and geology and they responded with vicious ad hominem attacks on Wright. The vituperative nature of these attacks obscured several valid criticisms of Wright's interpretations, but they succeeded in discrediting the thesis that humans had been contemporaneous with the glaciers in North America. Other researchers investigated the problem during this period, but their tentative conclusions failed to excite much response. Many of the finds of the Paleolith Period remain intriguing puzzles for archaeologists such as the Newcomerstown paleolith and the Twinsburg projectile point. But the Little Falls Site in Minnesota and the Masterman finds from New London
demonstrated that geological interpretations of the stratigraphic contexts of artifacts were far from obvious.

The Interregnum: 1921 - 1936

The Interregnum is what I have termed the period when "the very thought of local Pleistocene ancestors for modern Indians was virtually taboo" (Wilmsen 1965:172). In Ohio it begins in 1921 with the death of G.F. Wright; elsewhere, it began in 1890. For the purpose of considering the views of the "archaeological mainstream" in Ohio the beginning of the Interregnum more nearly approximates the earlier date.

Moorehead wrote in 1900 that "the field experience of those who have been longest out and who are really working archaeologists is, I think, fairly against the proposition" of an American glacial man (1900:402). Fowke's (1902:15-23) critical review of the evidence for glacial man left the final decision open to question. Shetrone (1919:294-295) made no mention of paleoliths beyond a reference to the absense, on this continent, of the "successions of cultures" which had been identified in the Old World. His estimate of the antiquity of the native American occupation was, however, surprisingly open-ended. He suggested that it "must have covered several thousands of years, but just how long, even in approximate terms, remains to be answered" (Shetrone 1919:295).
Elsewhere during this period important discoveries were being made. E.H. Sellards found and reported, in 1916, human skeletal remains and artifacts in association with an extinct Pleistocene fauna near Vero, Florida (Wilmsen 1965:179), and similar finds were reported from Melbourne, Florida by Loomis (Wilmsen 1965:180). Holmes, in what Wilmsen (1965:180) characterized as "one of the low points in American archaeology," declared that he felt

...it a duty to hold and enforce the view that the evidences of Pleistocene man recorded by Loomis at Melbourne, as well as those obtained by Sellards at Vero, are not only inadequate but dangerous to the cause of science (Holmes 1925:258).


The first reliable report of a fluted projectile point in direct association with extinct Pleistocene animals was made in 1902 (Williston 1902). This find was virtually ignored by archaeologists; however, it succeeded in convincing many prominent paleontologists that a Pleistocene human occupation of the Americas was indicated (Rogers and Martin 1984). It was the 1924 Lone Wolf Creek finds of lanceolate projectile points in association with an extinct form of bison (Wormington 1957:110), followed by the Folsom discovery two years later that marked the turning point for archaeological research on the problem of the earliest Americans (Wilmsen 1965).
The turning point for Ohio was delayed until 1936 when H.C. Shetrone published his study of the "Folsom fluted blades" and the related "Yuma" artifacts in the collections of the Ohio Archaeological and Historical Society. This important paper accomplished three things: 1) it brought about an increased awareness of the significance of these distinctive artifact types to researchers in the east; 2) it documented the surprisingly large numbers of these points which had been found in Ohio; and 3) it presented the first distributional analysis of these points. The conclusions of this analysis were limited to the observations that fluted points and "Yuma" points shared a common distributional pattern in Ohio, but it opened an avenue of research which was to become increasingly important in the east.

Shetrone's accomplishments were dependent on the discoveries in the western United States because the fluted point had no chronological significance before the association with extinct fauna had been demonstrated at Folsom (Shetrone 1936:256). Moreover, Shetrone's (1936:256) interpretations of the Ohio material were directly drawn from the conclusions of Roberts' (1935) study of the Lindenmeier site. His inferences were general and not unreasonable, but they established a precedent which would have far-reaching consequences on our understanding of the eastern Paleo-Indian occupation.
Shetrone's (1936) primary goal was to isolate and describe the Folsom phenomena as an historical entity. He addressed this goal by first demonstrating the similarity of the Ohio fluted points with the "type specimens" from Folsom and Lindenmeier. Establishing the validity of this "index fossil" he went on to consider the spatial distribution of this form and the temporal implications of that distribution. Finally, he sought to establish the relatedness of Folsom and Yuma forms in Ohio by demonstrating their conterminous distributions.

The first independent evidence for the antiquity of fluted points in eastern North America came from the Carlston Annis Archaic shell mound in Kentucky (Webb 1950). Two fluted points were excavated from the base of the mound establishing that these artifacts were, at least, pre-Archaic.

The Parish Village site, also in Kentucky, yielded more data on the Paleo-Indian period (Webb 1951). Three fluted points had been reported as surface finds and it was hoped that the eastern U.S. had finally produced a major fluted point site. As it turned out, however, the site was multicomponent and unstratified. An "Early Hunter" component was isolated on the basis of comparisons with the artifact assemblages from Lindenmeier.

B.C. McCary, a dedicated amateur archaeologist in Virginia, built upon Shetrone's pioneering concept of
studying the distribution of fluted points within a particular region. In 1947 he initiated a survey of fluted points in Virginia (McCary 1951). This survey identified concentrations of these points in various parts of the state and eventually led to the discovery of the Williamson site (McCary 1951). A similar survey was being undertaken in Tennessee (Lewis 1953) and another amateur, A.G. Smith, felt that the successes being enjoyed by these states could be duplicated in Ohio. R.S. Baby of the Ohio Historical Society was involved as a consultant, but the actual survey effort was made by Smith and the Archaeological Society of Ohio (Smith 1952). The emphasis of this survey was to be on raw material utilization of fluted point makers and the inferences of population movements derivable therefrom. This emphasis undoubtedly reflected Shetrone's early interest in raw material use, but it also must have been influenced by the work of Witthoft (1952) at the Shoop site in eastern Pennsylvania.

It would be difficult to overestimate the importance of Witthoft's contribution to Paleo-Indian studies in the east, despite the refutation of many of his conclusions by more recent work (Cox 1972). His analysis of the Shoop material indicated that the Paleo-Indians possessed an essentially Upper Paleolithic technology. He characterized these early populations as "highly mobile hunters of large game" (1952:494) and this interpretation doubtless was derived as
much from an analogy with the Old World Paleolithic as it was from the data from the western United States.

Mayer-Oakes, of the Carnegie Museum, produced an important synthesis of the prehistory of the Upper Ohio Valley based on an intensive survey which relied, primarily on "the systematic use of amateur help" (1955:28). The portion of this study which dealt with the Early Hunter Epoch was the best documented study of its time, however, the data were scanty and did not lead to any new insights. Mayer-Oakes documented a concentration of fluted point finds in the Allegheny Valley, but cautioned that it could be "more apparent than real" (1955:205). His interpretations of the earliest occupants of the Upper Ohio Valley as "a few groups of nomadic people who roamed the eastern United States...constantly on the move following game" (1955:23) followed Shetrone and Witthoft and had little actual data to support it.

More conservative interpretations of the lifeways of these early cultures had been offered which did not rely on comparisons with the western data. Morgan (1952:83) included the makers of Folsom-like points with the "early hunting-fishing-gathering peoples who lived during the Archaic Period", and Griffin (1952:353-354) argued that there was "no reason to expect an intimate association of the earliest Paleo-Indian in the east with the same faunal
complex with which they are found in the western area". But
the romantic vision of the red-handed big-game hunter
captured the imagination of archaeologists. Clarke (1976)
and Kraybill (1977) have discussed the archaeological
community's undue emphasis on human carnivory in other
contexts, but their conclusions apply equally well to Paleo-
Indian research.

Ritchie (1957) presented a detailed analysis of the
distribution of 82 fluted points from New York State and
determined apparent habitat preferences for the fluted point
users. He documented relatively large numbers of points
from "well elevated situations" and from the "margins of low
swampy ground formerly occupied by shallow lakes" (1957:7).
He noted an apparent preference for "main waterways"
(1957:7), but added that

...the early hunters penetrated inland from the
major river valleys, following smaller tributary
streams into the rough uplands seldom used by
Archaic peoples (1957:8).

Ritchie concluded from these distributional data that the
Paleo-Indian in the northeast

...comprised a wide scattering of tiny bands,
in all likelihood limited to a few families,
of great mobility and primarily dependent for
subsistence on large game mammals (1957:8).

He did note that it was "difficult to conceive of a
primitive food-gathering society which would totally ignore"
the contributions of fish and wild plant foods as "dietary
supplements to a hunters fare" (1957:7).
Although satisfied to adopt the notions of Paleo-Indian subsistence suggested by the western record (e.g. Quimby 1958 and 1960) many eastern archaeologists were frustrated by the lack of a firmly established chronology for the Paleo-Indian period in eastern North America. Ten years after the development of radiocarbon dating there were no chronometric dates for the eastern Paleo-Indian occupation. Eastern scholars, therefore, turned to distributional patterns as potential indicators of geochronology.

The first efforts at correlating the distribution of fluted points with geological features possessing chronological significance were those of Mason (1958) and Quimby (1958) in Michigan. These studies were inconclusive largely because of the relatively small sample size (although Mason's analysis was based on 115 points, Quimby referred to only six from Michigan and Wisconsin), and because of the difficulties with interpreting negative data (Lepper 1986a). Mason noted, for example, that the bulk of his sample was from the extreme southern counties and that this certainly reflected the "more intensive surface collecting in that part of the state" (1958:3). Regardless, chronology was viewed as the crucial problem and point distributions were essentially all eastern scholars had to work with. Hyde's (1960) study of fluted point finds along the Ohio River is another example of this sort of approach,
although his results rested on a flimsier geological foundation.

In his landmark paper on "The Paleo-Indian Tradition in Eastern North America" Mason defined that tradition as

...a single culture type whose unity and cohesiveness through time can be demonstrated by reference to artifact typology, subsistence basis, and shared traits (1962:229).

The subsistence base was viewed as the key variable in this scheme. Migratory big-game hunting was "the supreme adaptation" (Mason 1962:245) which produced the remarkable homogeneity in material culture:

With the tapping of this vast energy pool man fastened himself to a vehicle for cultural specialization that cut across other ecological barriers (1962:243).

Byers (1962:249) raised one of the few dissenting voices:

I strongly feel that dogmatic statements are of no great service in this case, and that we should admit that we know only what may be a hunting phase of an economy based on hunting and collecting anything edible.

Mason (1962:234-235) also reemphasized the abundance of fluted points in the east relative to the west. This fact, in conjunction with the observation that the east also had produced a greater diversification in fluted point styles, suggested that the southeastern United States, and not the west, was the "possible 'homeland' of the Clovis complex" (1962:235).
Mason's conception of the fluted point tradition as a continent-wide Culture became incorporated in the interpretations of fluted point distributional analyses. The most thorough application of the Mason model was effected by Williams and Stoltman (1965) for the southeastern United States. This synthesis was based on a patchwork of various distributional studies (Williams 1965) and their principal conclusion was that

...the distribution of fluted points in the Southeast becomes intelligible under the hypothesis that during the Paleo-Indian Era fluted-point makers roved the countryside in pursuit of big-game, primarily the mastodon (1965:677).

In summary, this entire period of archaeological research has been designated after H.C. Shetrone in spite of the fact that he never wrote another paper on "the Folsom phenomena" after 1936. There are two reasons for this. His one paper was the final word on the Paleo-Indian archaeological record of Ohio for a quarter of a century. Moreover, all of the archaeological research into the problem of early man in eastern North America during this period was based on the fundamental approach to the data which Shetrone had pioneered. Subsequent to this, the professional archaeological literature remained silent on the subject of the earliest human occupation of Ohio until O.H. Prufer took up the problem where Shetrone had left off (Prufer and Baby 1963:1).

O.H. Prufer, a Harvard educated archaeologist, began his exploration of the Ohio Paleo-Indian archaeological record with an examination of two fluted points in the collections of the Cleveland Museum of Natural History (Prufer 1959). He had reviewed the literature on the subject of the early human occupation of eastern North America (Prufer 1960a) and was prepared to capitalize on the enormous potential which Shetrone (1936) and later, Smith (1952), had already documented for Ohio.

The Survey of Ohio fluted points was initiated by Prufer in 1960 (Anonymous 1960a; Prufer 1960b). Modeled after the efforts of Mason (1958), Ritchie (1957), and McCary (1951) the Ohio survey rapidly surpassed these earlier studies in terms of sample size. The rationale and goals of the study were later outlined by Prufer (1962c) as follows:

The picture of this ancient human occupation can only be unraveled if distribution data are available. Such data, plotted on maps, show certain patterns of concentration which in turn can be correlated with geological data. From this important chronological information as well as information on ecological and settlement patterns can be deduced, from which, in turn, a relatively well rounded picture of the Palaeo-Indian period can be pieced together (1962c:2).

In a later report, Prufer and Baby (1963:1) state simply that the survey was initiated "in order to test some of
Shetrone's notions and to gain an idea as to the number of Palaeo-Indian artifacts..." in Ohio (Prufer and Baby 1963:1).

In 1961 a National Science Foundation grant of two-thousand dollars was obtained providing an unprecedented amount of support for such a project (Prufer 1961a). At this time, the explicit goals included the task of locating "a true site of the fluted point people" (Prufer 1961a:83).

Throughout 1961 and 1962 Prufer released summary statements of his preliminary conclusions (Prufer 1961b, 1962a and 1962d). In 1961 he noted the particular contexts of fluted points from that portion of central Ohio from which he felt he had a representative sample. He observed that most had been reported from upper terraces of the Scioto and, perhaps, the Miami Rivers and that few were found on the floodplains or in the uplands (Prufer 1961b:90).

It became rapidly apparent that few fluted points were turning up in northwestern Ohio. Prufer (1961a:83) suggested that this could have been the result of "insufficient work in the area" and called upon the members of the Archaeological Society of Ohio to make a special effort at documenting finds from this region. It is interesting to note that he did not also call for an extra effort in southeastern Ohio where there was also a paucity of data, but then, the geochronological potential afforded
by the beach ridges of the Lake Plains made this an especially critical region for research modeled after Mason (1958).

By 1962 Prufer was considering the scarcity of fluted points in northwestern and southeastern Ohio as reasonable reflections of the Paleo-Indian occupation intensity (Prufer 1962a). The northwest was claimed to have been avoided by Paleo-Indians "because of the presence of water there" and later because of the generally swampy conditions (Prufer 1962a:19). The southeast was avoided due to the "very rugged nature of this region" (Prufer 1962d:262).

Prufer asserted that the "over-all distribution" of Ohio fluted points revealed "two interrelated patterns" (1962d:262). The basic pattern was a concentration of material in a broad belt immediately north of the maximum Wisconsinan glacial boundary.

Within this pattern, and extending south of the Wisconsin maximum boundary the fluted points follow the river systems of the Scioto and Miami Rivers (Prufer 1962d:262).

Interestingly, these conclusions were not new. Cotter (1937:33) had noted "a most remarkable concentration of Folsom-like occurrences..." in the central lowlands of Ohio, "...particularly along the Miami River". And Roberts, in a discussion of Paleo-Indian material from the eastern United States, had observed that

...the northern boundary of the distribution of sites attributable to these people approximates
the line of moraines left by the retreating glaciers following the climax of the last Wisconsin substage (Roberts 1945:426).

The definitive report of the conclusions of the Survey of Ohio fluted points appeared in 1963 (Prufer and Baby 1963). The quality and quantity of the data and the extent of the analyses of the material made this work the ne plus ultra of distributional studies for years to come. The conclusions were essentially unchanged from Prufer’s earlier summaries, except that a new center of Paleo-Indian activity had been identified in Coshocton County: “the center of the Upper Mercer deposits” (Prufer and Baby 1963:46).

Prufer’s Paleo-Indian research now seemed to enter a new phase. A few additional fluted point survey publications appeared (Prufer 1962b, 1962c, 1963a, and 1964), but the principal investigation narrowed to the search for “a true site of the fluted point people” (Prufer 1961a).

Supported by a second N.S.F. grant, Prufer undertook an intensive survey of the most likely region in Ohio to yield a site. Coshocton County had not only produced a concentration of fluted points, it also contained the principal known quarries of Upper Mercer chert which had provided the raw material for nearly half of all the fluted points reported from Ohio (Prufer and Baby 1963:45). If the Paleo-Indian occupation of Ohio could be said to have had a center, Prufer’s data suggested that center was Coshocton County.
Coshotocton County, and the Walhonding Valley in particular, had been "under intensive observation" (Prufert and Wright 1970:259) by Prufer since 1962. Early in 1964 a series of Paleo-Indian sites was identified on the basis of localized concentrations of surface finds of fluted points. One of these loci, the Welling site, offered the potential for undisturbed stratigraphy since it had been covered by back dirt from a 19th century railroad cut. Full scale excavations began here in 1965.

The excavation of the Welling site yielded abundant Paleo-Indian cultural material. The early artifacts were primarily restricted to a yellow clay zone beneath a 10 - 16 inch layer of brown-black soil which contained a rich early Archaic assemblage (Prufer and Wright 1970:260). The Paleo-Indian occupation was represented by 54 fluted points, 69 spurred end scrapers, a variety of flake tools, and numerous channel flakes. Comparing the site to Shoop and Bull Brook, Prufer and Wright (1970:261) concluded that the data indicated "periodic occupations...by small groups of hunters" and that four clusters of artifacts represented "single discrete" occupations.

Concurrent with the Welling site excavations Prufer (1971) carried out an intensive survey of the Walhonding and Tuscarawas valleys in Coshotocton County. The purpose of this study was "to determine the intensity of Palaeo-Indian occupancy of the region" (1971:309) and its yield was
remarkable. Information was recorded on 119 fluted points, many of which seemed to cluster in locations similar to the Welling site, "i.e. at the confluences of the Walhonding and Tuscarawas rivers" with smaller order tributaries (1971:309). Prufer also noted that "all Palaeo-Indian finds were made on the first and second terraces above the flood plain" (1971:309).

Prufer (1971:310) concluded that the "high intensity" of Paleo-Indian activity in this area was limited to quarry and workshop sites. He reaffirmed his original conclusion that the Appalachian Plateau was "not an area of substantial Palaeo-Indian penetration" (1971:310), but modified it to take into account the utilization of the chert resources of Coshocton County.

Shane and Murphy (1975) conducted a brief survey in the Hocking River Valley and claimed that their results corroborated Prufer and Baby's (1963) conclusion that the Appalachian Plateau was not intensively occupied by Paleo-Indians. Nevertheless, they were able to discern a "settlement pattern" of "small camps located on hilltops and bluffs, overlooking the more open portions of the main valley and the larger tributary valleys" (1975:331).

With the exception of the Scioto Valley survey publication (Prufer 1975), which included a brief discussion of the Paleo-Indian materials which had been documented in the area, Prufer seemed to have abandoned research into this
subject. However, an interesting footnote to his research was provided by a colleague in 1970. D.H. McKenzie (1970) performed a variety of statistical analyses on the fluted point data. Most of these were purely descriptive, however, one neglected aspect of his study concerned the distribution of fluted points in Ohio. McKenzie (1970:362) concluded that there was no statistically significant association of fluted points with any physiographic province. He further suggested that it was ill-advised to expect concentrations of fluted points in any particular physiographic province "given the minor differences between the regions" (1970:362).

Concurrent with the appearance of Prufer and Baby's (1963) study, archaeologists in many eastern states were publishing analyses of their fluted point distributions. Many of these essentially were direct applications of Mason's (1958) methods for the particular states concerned (e.g. Dorwin 1968), while others had broader goals. Rolingson (1964) outlined the aims of the Kentucky study as follows:

...the aim is to use these distinctive projectile points as a means of learning whatever possible about the life of the Paleo-Indians, including such things as their distribution over the state, their differential use of the points, the time of their occupancy, and the types of sites they lived on (1964:5).

Rolingson's conclusions, which are broadly representative of the conclusions of the other studies of
the period, were that the concentrations of fluted points within the state occurred in areas which would have had a high density of big-game animals. The latter were interpreted as the explanation of the former (Rolingson 1964:72).

Cunningham (1973) corroborated many of Rolingson's observations in his survey work just across the border in Ohio. The Sandy Springs site in Adams County, and other loci in the same area, were reported to occur in association with strategic overlooks and salt licks "suggesting that the early hunters encamped nearby in order to stalk game attracted to these frequented spots" (Cunningham 1973:125).

Surveys of Paleo-Indian remains from the opposite end of Ohio provide interesting contrasts with Cunningham's work. In north-central Ohio Brose (1975:296) identified numerous Paleo-Indian and early Archaic sites which tend to be concentrated in secondary stream valleys and upland locations. Stothers' (1982) and Payne's (1982) research in northwestern Ohio has documented fluted points "in diverse physiographic settings such as upland, bluff edge and floodplain locales" (Stothers 1982:39).

Across Lake Erie, in southern Ontario, several researchers have studied the distribution of Paleo-Indian projectile points with the aim of elucidating the settlement patterns, and other aspects of the culture, of these early populations (e.g. Deller 1979, Roosa 1977,
Jackson 1984, and Storck 1984). Much of this work has centered on surveys of the strandlines of Late Pleistocene lakes in this region utilizing survey methods reminiscent of Judge’s (1973:48) technique of "site pattern recognition" (cf. Deller 1979:3-7; Storck 1978:4). These methods have proven to be enormously productive and have demonstrated a pattern of Paleo-Indian land use which emphasized overview situations near localities where caribou movement would have been concentrated and restricted (Deller 1979:12; Storck 1982:23). It has been concluded from these data that Ontario Paleo-Indians were specialized big-game hunters focusing their efforts on Barren-Ground caribou (Rangifer tarandus) (Peers 1985). It remains to be seen, however, whether this pattern encompasses the full range of Paleo-Indian land use or represents only the hunting component of a more generalized subsistence adaptation. The answer to this question will require extensive surveys in interior areas not associated with glacial lake strandlines (see Storck 1982:4, Peers 1985:38, and Jackson 1986:9).

Since the 1970s Paleo-Indian research in eastern North America seems to have moved away from the implicit (and explicit) acceptance of Mason’s (1962) concept of Paleo-Indian subsistence; although it is clear that Mason himself maintains this view as strongly as ever (Mason 1981). This change of perspective is evident in the changing
interpretations applied to the distributions of fluted points.

Gardner's (1974 and 1981) interpretations of Paleo-Indian settlement patterns focused on lithic raw material sources rather than herds of big-game. This reorientation in the variables which were regarded as pertinent for understanding Paleo-Indian settlement and subsistence patterns was a radical departure and it suggested to Gardner that there had been no significant change in lifeways from the Paleo-Indian period through the early Archaic. Gardner (1981:51) claims this model has wide applicability.

Eisenberg's (1978) review of Paleo-Indian sites in the northeastern United States concludes that "it does not appear that Paleo-Indian life centered economically on a single or a few resources" (1978:138). His analysis of the environmental context of Paleo-Indian sites in the Hudson and Delaware River drainages suggests that these populations "were adapted to the exploitation of a number of maximally attractive microhabitats" (1978:139).

Loring's (1980) study of the Paleo-Indian occupation of Vermont noted that fluted points had been reported from high mountainous terrain to the interior lowlands in that state. He concluded that
...the diversity inherent in these find-spot localities suggests that a broad based subsistence strategy was practiced and that the Paleo-Indian hunters and gatherers were exploiting a wide range of resources (1980:35).

Meltzer (1984) presented an exhaustive analysis of fluted point variability and distributional patterns in eastern North America. He developed a model of Paleo-Indian settlement and subsistence which was based on the dichotomy between the tundra-like environments of the glaciated northeast and the complex boreal-deciduous forests of the unglaciated southeast (Meltzer 1984; 1985). Paleo-Indian groups in the northern latitudes were characterized by focal subsistence economies with high settlement mobility. On the other hand, Paleo-Indian groups in the forested southeast were generalized foragers with relatively low settlement mobility (Meltzer 1985:19).

An important contribution of Meltzer's (1984) study was his observation that the isolated fluted point constituted a large fraction of the Paleo-Indian archaeological record, especially in the unglaciated eastern forests. Based on the assumption that these isolated objects represented "sites," Meltzer (1984:355) suggested that

A great deal could be done were more known about the thousands of isolated fluted points. The precise recording and location of these points in terms of topographic setting, physiographic location, proximity to raw material source, and paleoenvironmental setting - to name a few of
the more important variables - would be a valuable first step (Meltzer 1984:355).

The most recent contribution to our understanding of the Paleo-Indian archaeological record of Ohio is an updated survey of the distribution of Ohio fluted points (Seeman and Prufer 1982). This study documented 583 fluted points which had been reported since the 1963 survey. The authors still regard the Appalachian Plateau as a region which the Paleo-Indians avoided. This avoidance is explained "in terms of cultural patterning related to the overall ecological context of the dissected Appalachian Plateau" (1982:160).

Lantz (1984) has recently reported the results of survey work in the Appalachian Plateau of western Pennsylvania which has important implications for the conclusions of Seeman and Prufer. He has documented 365 Paleo-Indian artifacts from 210 sites in 23 counties. These data suggest a substantial Paleo-Indian occupation in Pennsylvania's Appalachian Plateau.

Western Pennsylvania also has yielded data pertinent to understanding the origins of the Clovis Industry in eastern North America. In 1973 the University of Pittsburgh initiated a large scale research project in the Cross Creek drainage (Carlisle and Adovasio 1982). The centerpiece of this research was the excavation of Meadowcroft Rockshelter. The data from this site suggest that the rockshelter may
have been occupied by humans as early as 19,450 B.P. A nondescript lanceolate projectile point was recovered from a stratum dated between 13,000 and 11,000 years ago (Adovasio and Carlisle 1984:136). This point has been designated as a "Miller Lanceolate" and it is suggested that it may be "locally ancestral to the widely distributed Paleo-Indian points named Clovis" (Adovasio and Carlisle 1984:136). Numerous authors have expressed skepticism concerning the Meadowcroft data (Haynes 1980; Mead 1980; Dincauze 1981), however, the specific questions raised by these commentaries have been addressed by Adovasio et al. (1980; 1981).

The most recent period of Paleo-Indian research has been undertaken in the context of a national emphasis on preservation archaeology. Consequently, some discussion of this aspect of archaeology in Ohio, and its contribution to Paleo-Indian studies is warranted. Nicholas (1984) has argued persuasively that modern preservation archaeology has not come to terms with the unique properties of the Paleo-Indian prehistoric record. This conclusion is born out by the situation in Ohio. Although Paleo-Indian sites should, generally, be considered eligible for the National Register of Historic Places, given their importance to both local and regional prehistory (Nicholas 1984:4) only five sites from Ohio with Paleo-Indian components have been nominated. Moreover, it is clear that four of these were not nominated
because of their Paleo-Indian components, although the presence of these early artifacts was usually used to strengthen the case for significance. Only the Adams County Paleo-Indian District has been nominated on the basis of its potential contribution to Paleo-Indian prehistory.

That preservation archaeology can make a substantial contribution to our understanding of the early occupations of Ohio is suggested by the work of Eberhard (1980). In an unpublished review of the Ohio Archaeological Inventory Forms for Scioto and Franklin counties, Eberhard compared the distribution of sites with fluted point and lanceolate point components. He was able to note some interesting differences in the distributions. The fluted points tended to occur on upper terraces and bluffs near major drainages, while the lanceolate points were more common in upland environments.

Summary

The Paleolithic Period represented the initial attempts of scholars to discover the origins and antiquity of the native inhabitants of this continent. George Wright’s efforts were well intentioned, but were predicated on the assumption that the American archaeological record could be interpreted in terms of the European archaeological record. The criticisms directed at Wright were ill-intentioned and often dogmatic. Reports of possible artifacts in geological contexts
suggestive of great antiquity are not uncommon, even in recent periods (e.g. Carter 1956; Munson and Frye 1965; Leakey, Simpson, and Clements 1970). The response of the archaeological community has been less antagonistic to such claims, however, none have succeeded in demonstrating a human occupation in the Americas with an antiquity in excess of 20,000 years.

At issue is the determination of what constitutes acceptable evidence for very early human occupations and it lies at the heart of the search for the antecedents of Clovis. The debates surrounding the interpretation of the lowest levels of Meadowcroft Rockshelter suggest that the discipline has not progressed terribly far towards this determination in the last one hundred years (Haynes 1980 versus Adovasio et al. 1980).

The Interregnum is a violent rent in the history of research into Paleo-Indian prehistory. The gap it creates reflects the complete lack of continuity between the basic methods and goals which characterize the periods on either side.

Shetrone's tardy entry into the renewed search for ancient Americans was an important attempt to clarify the problem and to outline the solution. The "Folsom phenomenon" was defined and placed in a tentative spatial-temporal framework. The severely limited quality of local
data required preliminary comparisons to be made with the more complete record from the western states, but these preliminary comparisons soon solidified into dogma. Fluted point distributions were used to discover fluted point sites, to identify migration routes, and to suggest the times of these migrations.

When Prufer began his research into the Paleo-Indian occupation of Ohio, a broader range of anthropological questions were being asked of the data. The emphasis shifted from the identification of objects as indicators of the presence of early humans and the determination of their distribution in time and space, to the interpretation of what these distributions meant. A principal explanation related to subsistence.

The notion of eastern Paleo-Indians as big-game hunters began as an assumption. Western Paleo-Indians hunted big-game with similar weapons, implying similar functions. The widespread and homogeneous material culture suggested a widespread and homogeneous adaptation. Recently, scholars have used this line of reasoning to argue against the big-game hunting hypothesis:

...if...the Paleo-Indian is a unitary phenomenon, how can it represent 'big-game hunting' when it is dispersed over many ecologically divergent environments? Is the inference based on characteristics of the systems or the high archaeological visibility of a single activity? (Dunnell 1979:732).
Current archaeological research methods offer potential for developing a more accurate record of the Paleo-Indian occupation of Ohio. This potential will not be realized, however, until surveys are more narrowly focused on the discovery and documentation of Paleo-Indian occupations paying particular attention to isolated finds. Such a strategy has been recommended by Warner (1980), Nicholas (1984), and Meltzer (1984) and the goal of the research reported in this dissertation is to implement such a strategy in Coshocton County, Ohio: the supposed "center" of the Paleo-Indian occupation of Ohio.
CHAPTER III

METHODS

The practical limitations on our knowledge of the past are not inherent in the nature of the archaeological record; the limitations lie in our methodological naiveté, in our lack of development for principles determining the relevance of archaeological remains to propositions regarding processes and events of the past (Binford 1968:23).

Introduction

The primary data of this study are observations made on fluted points and the environmental situations from which these artifacts have been recovered within the central Muskingum River basin in Coshocton County, Ohio. In other words, there have been established a series of "points" on a landscape. In order to make meaningful statements about the Paleo-Indian land use practices which generated these points, or loci, we must attempt to recognize the variability between different "kinds" of loci (Binford 1983:132). In the context of this research the different kinds of loci must be inferred from different "kinds" of fluted points.

This analysis is restricted to one class of artifact, i.e. fluted points; however, it should not be assumed, as some authors have (e.g. Francis 1980:2), that we are dealing with only one class of site, e.g. kill sites, or even one
type of prehistoric activity, e.g. hunting. Fluted points have been reported from a variety of contexts including kill sites (e.g. Graham et al. 1981), workshops (e.g. Prufer and Wright 1970), habitations (e.g. Grimes 1979), caches (e.g. Anderson and Tiffany 1972), and human burials (e.g. Lahren and Bonnichsen 1974). In addition, replication studies have demonstrated the usefulness of large, thin bifaces for accomplishing a wide range of tasks (Callahan 1979:153) and functional analyses of fluted points have documented traces of a variety of non-projectile point uses including cutting and scraping (e.g. Lepper 1983a, 1984).

The problem

The goals of this research are 1) to describe the Paleo-Indian archaeological record of the central Muskingum River basin; 2) to examine this record for patterning in the distribution of Paleo-Indian artifacts across the landscape; and 3) to develop a model of late Pleistocene hunter-gatherer land use for this region. The data required to achieve these goals are a large sample of locations yielding artifacts unambiguously assignable to the Paleo-Indian period from a limited area with pronounced habitat diversity.

The documented Paleo-Indian archaeological record of eastern North America consists, in the main, of more or less
isolated fluted projectile point finds (Meltzer 1984:353). Several major sites have been discovered and investigated, but generally, these have been widely separate from one another and largely disappointing in terms of ecofactual data pertaining to Paleo-Indian subsistence. Therefore, substantive conclusions regarding Paleo-Indian settlement and subsistence patterns in eastern North America must be inferred from distributional maps of fluted projectile points.

The fluted projectile point is the only necessary and sufficient Paleo-Indian fossile directeur widely agreed upon. Other artifact types have been documented in association with fluted points, but since these are not diagnostic, they must be regarded as only of secondary importance.

Fluted point distributional studies have usually adopted a coarse-grained spatial perspective. Often counties are the smallest unit of analysis (e.g. Prufer and Baby 1983), though physiographic provinces (e.g. Rolingson 1964), and even entire states have been compared (e.g. Brennan 1982). This level of analysis, although useful for describing gross distributional patterns, is not adequate for addressing more specific questions regarding Paleo-Indian land use (Lepper 1983d).

A convenient spatial unit for a survey effort of this kind is the modern county. Modern counties are large enough
to encompass a significant range of environmental variability, but small enough to provide a manageable survey unit for a short-term research project. The most important advantage provided by the limited size of modern counties is that it permits an exceedingly fine grained analysis of the distribution of fluted points vis-a-vis environmental variability. Morse (1965) has discussed other advantages of focusing research efforts on a single county. These relate primarily to the establishment of close contacts with the local network of collectors. Without such contacts it would be difficult to evaluate the intensity with which various areas within the county had been surveyed. Also, one might miss entirely certain collections which belong to individuals who would not go out of their way to notify an archaeologist, but who are willing to cooperate when sought out.

The survey universe: Coshocton County

Prufer and Baby (1963:46) noted that the general area centered on Coshocton County had produced "ample evidence" of Paleo-Indian remains. Prufer (1971) followed-up this observation with a preliminary survey effort concentrated in Coshocton County (see Chapter II). The report of the results of this survey concluded with the recommendation for "further research in this rich area" (Prufer 1971:310).
The high density of Paleo-Indian artifacts documented in Coshocton County indicated that this area offered a high potential for obtaining the data necessary for an analysis of land use patterns. In addition, this area was doubly interesting because the high frequency of fluted points here constituted an anomaly in the overall distributional pattern of these artifacts. The Appalachian Plateau was considered to have been a region which Paleo-Indians avoided (Prufer and Baby 1963:24). Coshocton County's apparent contradiction of the general Paleo-Indian settlement pattern was initially interpreted as "a reflection of the raw material situation in this area" (Prufer 1971:310). However, Seeman and Prufer (1982:158-159) later implied that this might not be the entire answer. Nevertheless, the presence of extensive outcrops of Upper Mercer chert must have been important for the Paleo-Indian hunter-gatherers in this region and the proximity of these quarries offers an important potential advantage for archaeological research here.

It was pointed out previously that nearly half of the fluted projectile points documented from Ohio were made from Upper Mercer chert (Prufer and Baby 1963:45) and Prufer and Baby (1963:46) assert that Coshocton County was the center of these deposits. Moeller (1984) has claimed that...
in proximity to areas suitable for human habitation 10,000 years ago, and on a geological formation capable of protecting the context in which the artifacts had been deposited (1984:242).

This is basically true whether or not one accepts Gardner's (1974) notions of Paleo-Indian settlement patterns centered on lithic quarries. In regions of abundant lithic resources, the Paleo-Indian archaeological record should be more abundant and more visible for reasons discussed in Chapter I.

Data collection: strategy

Beginning with a sample of fluted points and their spatial coordinates which have been reported by amateur artifact collectors, how does one move to reliable inferences about general patterns of Paleo-Indian land use? First, it must be acknowledged that research methods built upon such a data base can only discover localities at which Paleo-Indians lost or discarded fluted points. An unknown number of activities must have been pursued by these people in which there was virtually a zero probability of contributing fluted points to the archaeological record. This research must obviously be silent regarding these activities. Nevertheless, there is evidence that fluted points were multipurpose tools which could have been employed in a variety of contexts (Lepper 1983a, 1984; Meltzer 1984). Therefore, their distributional patterns can
be expected to reflect more than manufacturing loci and big-game kill sites (see above).

The sample of fluted points and the sample of loci which yielded these specimens are "accidental samples" (Hopkins and Glass 1978:184) of the population of all the fluted points ever deposited within Coshocton County. This means that the samples are haphazard collections of observations for which no valid estimate of risks of error are obtainable (Hopkins and Glass 1978:184; Blalock 1972:527). Because fluted points in eastern North America have generally been buried by geomorphic and pedologic processes, their discovery depends upon various natural and artificial agents of weathering and erosion. Once a specimen has been brought to the surface by a tree-throw or a plow it may be observed and collected. The probability of this depends upon the frequency with which this locus is frequented by interested observers. Finally, in order for this specimen to be a useful datum in a study of Paleo-Indian land use it must be reported to an archaeologist along with reliable information regarding the location from which it was recovered. If written records of the find have not been kept, the reliability of this spatial information will generally decrease with time.

These factors prohibit the valid application of techniques of statistical inference for developing
generalizations about the distribution and morphology of the population of all of the fluted points that were ever deposited on the Coshocton landscape. However, this study of Paleo-Indian land use patterns has been conceived as an exploratory analysis. "It regards whatever appearances we have recognized as partial descriptions, and tries to look beneath them for new insights" (Tukey 1977:v):

In exploratory studies, the main goal of which is to obtain valuable insights which ultimately may lead to testable hypotheses, probability sampling either may be too expensive or lead to fewer such insights (Blalock 1972:527).

One effective tool for description and analysis is the schematic plot. Schematic plots consist of a "box" composed of two "hinges" representing quartiles, a dashed line at the median, and a small cross at the mean. A solid line extends from the hinges to "adjacent values" one step outside the hinges. A step is defined as 1.5 times the difference between the values of the opposite hinges. "Outside values," that is, values between one and two steps of the hinges, are indicated by a zero. "Far out" values more than two steps beyond the hinges are indicated by an asterisk. This is a powerful graphic device heretofore little appreciated by archaeologists (but see Birmingham 1984).
Siteless survey

Moeller (1983:27-28) regards the context of surface finds as suspicious, if not spurious, and would relegate the use of distributional studies to the identification of "cultural patterning useful for locating undisturbed, buried sites" (Moeller 1984:239). Indeed, "surface finds are important only if they are associated with subsurface, in situ ones" (Moeller 1983: 27). For Moeller, settlement pattern studies cannot begin until "large numbers of real sites, not just find spots of individual artifacts, are known in a region" (Moeller 1983:28). Moeller's notions are typical of traditional archaeology's approach to fieldwork, which accepts implicitly the reality of "sites" and emphasizes the importance of excavation for reliable data acquisition (Dunnell and Dancey 1983:268).

There is no justification for this a priori assumption that the archaeological record of late Pleistocene hunter-gatherers must be packaged in large, spatially discrete clusters of artifacts. In fact, Binford (1980) has demonstrated that, under certain conditions, we may expect the archaeological record of hunter-gatherers to be "scattered over the landscape rather than concentrated in recognizable 'sites'" (1980:9). Moreover, the notion of a "real site" is an extraordinarily difficult concept to operationalize for field research (see Brooks 1979).
Isaac (1981) has articulated a theoretical position which seems more practicable and may be more reflective of the prehistoric "reality." Isaac (1981:137) compared the archaeological record to the structure of matter as described by modern physics. The "fundamental particle" of the archaeological record is the individual artifact, the irreducible unit of spatial analysis. The "site" is a higher unit of synthesis analogous to the physicist's molecule or compound. There are other levels of synthesis, but ultimately, the record is composed of individual artifacts which may or may not be aggregated in coherent clusters. "Sites", therefore, are synthetic units which are defined, not discovered.

This basic approach to archaeological research has been given many names: "non-site sampling" (Thomas 1975), "siteless survey" (Dunnell and Dancey 1983), "off-site archaeology" (Foley 1981), and "scatters and patches analysis" (Isaac 1981). These various applications of the method have proven it to be productive. Foley (1981:163) argues that the archaeological record of hunter-gatherers must be viewed "not as a system of structured sites, but as a pattern of continuous artifact distribution and density" and that land use patterns, in particular, can be identified best through "the study of non-discrete artifact distributions in specific zones" (Foley 1981:163). Dunnell and Dancey (1983:269) suggest that if one is interested in
pursuing questions of land use, settlement pattern, or resource utilization "distributions of artifacts and artifact densities over wide areas are necessary".

**Data collection: tactics**

Since Coshocton County was selected as the focus of this research because of the wealth of material which Dr. O.H. Prufer of Kent State University had already documented for this area, the first stage of this research involved contacting Dr. Prufer and examining his files for Coshocton County. These data laid the foundation for the subsequent analyses.

The second stage of data collection involved seeking out individuals who had recovered fluted projectile points from Coshocton County. The pursuit of this goal took three directions (see Table 2): 1) information packets were sent to local newspapers which included a public appeal for information; 2) popular articles were submitted to the *Ohio Archaeologist*, a publication of the amateur Archaeological Society of Ohio, which included requests for information. Also, informal presentations of my research were given before local chapters of the A.S.O.; 3) Contact was established with Dr. Norman L. Wright, a local physician who coauthored the Welling site report with Dr. Prufer (Prufer and Wright 1970).
The results of these various efforts are summarized in Table 2. A brief examination of this table demonstrates that in this case the most effective means of acquiring data was to establish direct personal contacts with the local network of informants, including prominent members of the community, who were able to provide introductions to anyone in the county who might have a collection of artifacts. I was quite fortunate in establishing contact with Dr. Norman L. Wright early on in my survey effort. Dr. Wright is a dedicated amateur who has pursued and promoted research into the Paleo-Indian occupation of Coshocton County, Ohio for more than two decades. According to my records he personally recovered 178 fluted points, in varying stages of manufacture, from Coshocton County. He also was instrumental in introducing me to numerous individuals who owned undocumented fluted points. Thus, he indirectly contributed an additional 60 to 70 specimens to this research. A comprehensive list of informants is presented in Table 3, along with indications of their reliability, township or county of residence, and how their data were obtained for the purposes of this research. Figure 2 plots the frequency of fluted points recovered from each Coshocton County township by individual informants. This chart indicates that there is a tendency for fluted points from particular townships to be discovered by residents of those
townships. In other words, "collectors tend to collect in their 'own back yards'" (Lepper 1983d:272).

The disappointing results from the newspaper and Ohio Archaeologist appeals should not be interpreted too critically. Although these did not result in a great many offers of information, they were read widely by local collectors and "paved the way" for a positive reception when I finally met individuals with artifact collections.

Once an informant was identified, an interview was arranged to take place at a mutually convenient time and place. Usually this was the informant's residence. The specimens were drawn or photographed and measured using Prufer's standard set of measurements (Prufer and Baby 1963:66). Insofar as it was possible, the entire collection of the informant was examined. Often manufacturing rejects attributable to the fluted point tradition were not recognized as such by the informants. The informant was questioned about the context of his finds, his collection habits, and his knowledge of other persons who might own fluted points. When possible, the sites in question were visited and color slides were taken of the locality. It was rapidly discovered that the environmental information I wished to record was not easily obtained from an on-site inspection. Therefore, these data were later taken from the appropriate U.S.G.S. 7 1/2 minute quadrangle maps.
The Amateur as a source of data

The search for the earliest human inhabitants of the Americas has always depended on the discoveries of amateur artifact collectors (e.g. Agogino 1985). George Frederick Wright (1887) sought the aid of non-professionals in his quest for paleolithic implements. Mayer-Oakes' (1955) important survey relied on "the systematic use of amateur help" (1955:28) and virtually all of Prufer and Baby's (1963) raw data were obtained by "amateur archaeologists and collectors and by farmers who casually picked up specimens in their fields" (1963:2).

The fundamental dependence of professional archaeology on amateurs and collectors for researching the problem of the early Paleo-Indian occupation is a function of the absolute rarity of data pertaining to this problem (see Chapter I). The intentional discovery of even a single fluted point within the context of a conventional archaeological research program is a remarkable achievement. In order to amass a sufficient number of specimens from a sufficiently large area in a limited amount of time with limited resources requires the help of local collectors. These individuals have spent years, in some cases a lifetime, surface collecting a landscape with which they are intimately familiar. Of course data collected by non-professionals are variable in quality. Some individuals
maintain careful records and document their finds as scrupulously as most professionals. Others merely collect artifacts as curios giving no thought to their context.

A partial solution to the problem of informant reliability is to rank informants according to their goals and methods for acquiring artifacts. This requires that we move beyond the simplistic dichotomy of "us" versus "them" which characterizes the attitudes and practices of many archaeologists and amateurs. It is misleading and insulting to lump all non-professional artifact collectors into a single class of informant. For the purposes of this research informants were classed in one of three categories: "amateurs" are defined as dedicated amateur archaeologists who label artifacts and keep written records; "collectors" are individuals who keep no written records and rely on memory to attribute provenience to specimens; "finders" are individuals who have simply found and collected, for one reason or another, a fluted point. These individuals are usually farmers or land owners who have a small collection of artifacts from their property. Usually, no provenience beyond property lines or particular fields can be obtained for specimens recovered by finders.

Obviously, data supplied by amateurs are the most reliable. Only 10% of the informants utilized in this research are amateurs under this definition (Table 4).
however, these seven individuals account for 56% of the documented specimens. This should provide a solid foundation on which to build a distributional analysis.

The next most reliable class of informant is the finder. Although a finder's collection may lack some precision regarding exact provenience, it may be more accurately attributed to a particular field than a collector's because finders, generally, do not surface collect from multiple fields. Ten percent of the informants are finders and these account for only an additional 18 fluted points (Table 4).

The largest percentage of classifiable informants is collectors (Table 4). A number of these individuals appeared to be very confident of the exact proveniences of their fluted point finds. And it is likely that many of these attributions are indeed accurate. For a knowledgeable collector the discovery of a fluted point can be a momentous event and one which may leave a vivid impression of the circumstances, including the exact location of the discovery. Nevertheless, psychologists have overwhelmingly demonstrated the fallibility of the human memory.

Summary

The purpose of this chapter has been to outline the methods utilized in the data collection phase of this research. The goal of this research is to describe the Paleo-Indian archaeological record of the central Muskingum
River basin in terms of a model of late Pleistocene hunter-gatherer land use. The data necessary to achieve this goal are observations made on a large sample of fluted points and on the environmental situations of these points.

In order to observe a sufficiently large number of fluted points and fluted point yielding loci, data were solicited from amateur artifact collectors. The resulting data set is an "accidental sample," but for the purposes of this exploratory data analysis, it is the best which can be obtained.

The distribution of the documented finds of fluted points within Coshocton County is analyzed within the framework of a "siteless survey" (Dunnell and Dancey 1983). This approach maximizes the information potential of isolated fluted points by recognizing that these artifacts may constitute a large fraction of the archaeological record of Paleo-Indian land use.

In spite of this study's dependence on data supplied by amateur artifact collectors, an internal analysis indicates that the majority of these data are reliable and useful for the purposes of this research. These results suggest that professional archaeologists have much to gain by collaborating with amateurs. Although this is not a new or a startling conclusion it is somewhat at variance with the attitude recently expressed by certain professionals in Ohio (Frufer and McKenzie 1975:xix).
### TABLE 2

**Sources of Data**

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<th>source</th>
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<th>percent</th>
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</table>

**Notes:**

- **a** Includes specimens found by Dr. N. Wright not included in Prufer’s files and specimens found by others with whom Dr. Wright was acquainted.

- **b** Requests for information on fluted points were published in the following local newspapers: Coshocton Free Enterpriser (January 9, 1983), Coshocton Tribune (July 25, 1984) and Newcomerstown News (November 16, 1983).

- **c** Requests for information on Coshocton County fluted points were published in two issues of the *Ohio Archaeologist*: Volumes 34(2):38, and 33(1):33.

- **d** Presentations were made at the following chapters of the Archaeological Society of Ohio: Six River Valley (April 5, 1984), Sycamore Run (May 15, 1984), and Sugar Creek (June 25, 1984).

- **e** The Johnson-Humrickhouse Museum, Roscoe Village, Ohio.
TABLE 3

Alphabetical list of individuals who have found fluted points in Coshocton County, Ohio

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<tr>
<th>number</th>
<th>last name</th>
<th>a rank</th>
<th>b home</th>
<th>c source of data</th>
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a Names not spelled out were withheld at the request of the individual.

b Rank: 1 = serious amateur: maintains records
       2 = collector: relies on memory
       3 = finder: generally the land owner
       4 = unknown
TABLE 3 - continued

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*a*

Numbers in parentheses refer to fluted point frequencies (and their percentages) documented by the various classes of informants: N = 391.

Note: 19 points, or 5%, were not referable to a particular collector.
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**Figure 2.** Relationship between informants' township of residence and townships of their fluted point finds for informants residing in Coshocton County.
Figure 2, continued.

a
# indicates the number assigned to informants in Table 3

b
Codes for home township and township of fluted point finds:

00 = Coshocton County, township unknown
01 = Adams Township
02 = Bedford Township
03 = Bethlehem Township
04 = Clark Township
05 = Crawford Township
06 = Franklin Township
07 = Jackson Township
08 = Jefferson Township
09 = Keene Township
10 = Lafayette Township
11 = Linton Township
12 = Mill Creek Township
13 = Monroe Township
14 = Newcastle Township
15 = Oxford Township
16 = Perry Township
17 = Pike Township
18 = Tiverton Township
19 = Tuscarawas Township
20 = Virginia Township
21 = Washington Township
22 = White Eyes Township
CHAPTER IV

THE CENTRAL MUSKINGUM RIVER BASIN: 13,000 - 10,000 B.P.

An understanding of both short- and long-term group movement for any hunting and gathering society must rest on the knowledge of how a particular environment varies over time and space (Yellen 1977:13).

...there is something in the mystery of the ages that holds us in awe before these hills and valleys where a wonderful procession of mankind issued from Cimmerian night and vanished into pathetic and fathomless silence (Bahmer 1909).

Introduction

The term "land use" has two aspects: the "land" or landscape or environment, and the human "use" of that environment. Our understanding of human land use patterns necessarily is dependent on our understanding of the environmental context, for the landscape is what is being used. And the environment, while it does not determine the settlement and subsistence adaptation of the human population, is systemically related to these aspects of the hominid niche (cf. Binford 1972:22). Therefore, a characterization of a particular land use system depends upon a prior adequate characterization of the environment in which that system operates.

This chapter takes up the task of characterizing the late Pleistocene-early Holocene environment of the central
Muskingum River basin. The specific time range of interest is from 13,000 to 10,000 years ago. This was a period of rapid and extensive climatic change. This extreme climatic dynamism will be incorporated in this research by viewing the time period of interest in a wider temporal framework allowing us to view the synchronic environmental characterization in the context of diachronic patterns of late Pleistocene climate change. The resulting environmental reconstructions will provide the framework for interpreting the distribution of Paleo-Indian artifacts in terms of hunter-gatherer land use, but it cannot be pretended that they are completely accurate or necessarily adequate.

The environmental reconstruction developed for this study is based principally on one pollen profile from Portage County, Ohio (Shane 1975), nearly 100 km to the north of Coshocton County. It is supported by a variety of other paleoecological data, but these ancillary references generally are either from more distant localities or are older studies with less reliable conclusions. Second and third generation regional syntheses have also been consulted.

**Physical Environment**

Coshocton County is situated almost entirely within the Unglaciated Appalachian Plateau physiographic province.
This region is a heavily dissected plateau characterized by "narrow ridges and rounded hillocks separated by steep-sided valleys" (Noble and Korsock 1975:30). It is the westernmost extension of the Appalachian Mountains and it extends from the Mohawk River Valley in central New York southwestward to the Cumberland Plateau in southern West Virginia. The original Appalachian Mountains were the product of a period of extensive folding and thrusting from the Late Pennsylvanian through the Middle Triassic periods, or roughly between 300 and 200 million years ago (Dott and Batten 1971). There followed a long period of relative stability and erosion and the modern relief of the Appalachian Mountains is thought to reflect "rejuvenation of rivers by mild but widespread Cenozoic upwarping" (Dott and Batten 1971:325).

As the appellation would suggest, the Unglaciated Appalachian Plateau in Coshocton County suffered few direct effects from the Pleistocene glaciers. Even in the extreme western portion of the county, where the Illinoian ice sheets extended into the county "...neither the erosional effect of the ice nor the topographic expression of its drift deposits is very conspicuous" (Lamborn 1954: 12).

The topography of Coshocton County can be described generally as a "rough and rugged" upland with a maximum relief of over 176 meters (Lamborn 1954: 3-7). This general
"upland" environment could be segmented into a variety of microenvironments depending on the perspective of the analyst. Since this analysis is primarily concerned with the prehistoric human use of the landscape the following classification uses variables pertinent to that concern.

The major valleys are maturely dissected with flat and generally narrow Floodplains (see Figure 3). The floodplains are bordered by steep-walled Ridge top overlooks rising 60 - 90 meters above the level of the floodplain. The abruptness of the transition is indicated by a maximum slope of 320 meters per kilometer on a Walhonding River bluff in Jefferson Township where there is a difference in elevation of 67 meters within a horizontal distance of 200 meters (Meyers 1929:5). The valley walls are breached at intervals by deep notches where tributary streams tumble out of the Uplands through natural corridors, or Interior hollows.

The uplands and ridge top overlooks are primarily resistant Pennsylvanian sandstones and shales of the Allegheny and Conemaugh Groups (Lamborn 1954:3). The soils developed in the uplands are shallow and were formed in materials weathered from the underlying bedrock. The predominant soil association in the uplands is the Gilpin-Coshocton-Dekalb Association formed in weathered shale and siltstone, whereas the Westmoreland-Gilpin Association in
western Coshocton County is distinguished by its limestone, shale and sandstone parent materials (Kelley and Powell 1975).

The stream and river valleys of the floodplains and interior hollows have been carved through less resistant layers of Pennsylvanian limestone, coal and clay (Lamborn 1954:3). In western Coshocton County these drainages have cut down into Mississippian sandstones and shale whereas, in the eastern half of the county, the underlying limestone and sandstone is Pennsylvanian bedrock of the Pottsville series. Although limestone forms less than two percent of the rocks in this region (Meyers 1929:11), certain of these limestone units were of particular importance for prehistoric populations. This subject is considered at length below.

The soils of the interior hollows are primarily of the Chagrin-Orrville Association. These are soils which have formed in "medium acid, silty or loamy sediments washed or eroded from upland soils" (Kelley and Powell 1975).

Floodplain soils are more varied due to a complex Pleistocene drainage history. The various retreating ice sheets of the Pleistocene repeatedly flooded the river valleys of Coshocton County with meltwater carrying enormous quantities of sediment. Vestiges of these deposits remain as sand and gravel terraces along the Killbuck, Walhonding, Tuscarawas, and Muskingum valleys (Lamborn 1954:25). These
terraces are characterized by nearly level, well-drained soils of the Wheeling-Chili Association, whereas the floodplain proper is comprised of either Genesee-Eel Association soils in western Coshocton County, or Chagrin-Orville Association soils in the Tuscarawas Valley (Kelley and Powell 1975).

Postglacial geomorphology

The Pleistocene glacial meltwater which flooded through the Muskingum River basin carried with it a large amount of sediment which aggraded the valleys to a depth of more than forty meters. Remnants of the Ice Age floodplain are present at the mouths of many tributary valleys where terrace benches rise abruptly to a height of more than 18 meters above the present stream level (Meyer 1929:8). Forsyth (cited in Pi-Sunyer, Blank and Williams 1975:232) estimates the age of this terrace level at about 18,000 years B.P. After 11,200 years ago, glacial meltwater was no longer a factor in the entire Ohio River drainage system (Baker 1983:118). Since that time, the loosely consolidated Pleistocene sands and gravels of the floodplain have been eroding at a relatively rapid rate (Meyer 1929:8). It is quite likely that this extensive erosion has destroyed a large proportion of the archaeological record of the Paleo-Indian utilization of the floodplains in this region (e.g. Seeman and Prufer 1982:160) as it has elsewhere in the east.
The principal valleys of the Muskingum River basin may be described as being in a mature, or early old age, stage of the fluvial geomorphic cycle; however, the smaller tributaries in the interior hollows are still quite youthful. They are, therefore, extending themselves deeper into the uplands by headward erosion. It is not likely that this erosion is either rapid or extensive enough to affect significantly the archaeological record in these areas. Moreover, deposition in upland environments is limited to the accumulation of aeolian sediments and organic debris and, in this region, these processes have not produced substantial deposits. Therefore, Paleo-Indian artifacts should not be deeply buried in upland and interior hollow settings.

**Upper Mercer Chert**

The Upper Mercer limestone in Coshocton County is commonly represented by a black chert of excellent quality. This lithology is widely distributed across the county, but aboriginal quarrying activity seems to have concentrated on particular outcrops. In view of the importance of this material for "Stone Age" populations an extended treatment of the subject is warranted here.

Meyers (1929:50) determined the thickness of Upper Mercer chert outcrops to average nearly five feet over a large area. A maximum thickness of 19 feet 3 inches was measured at the head of Flint Run in southern Jefferson
Township. This deposit gradually thins to the south through Bedford Township where it averages about two feet in thickness (Meyers 1929:50).

Stout and Schoenlaub (1945:40) described Upper Mercer chert as:

...a black flint, overlain occasionally with irregular lenses of gray flint... The purer material is vitreous, brittle, and lustrous, and breaks with a deep conchoidal fracture in any direction. It is very dense and solid, except for small irregular cavities distributed indiscriminantly throughout the mass.

This is the description which is commonly used by archaeologists to define Upper Mercer chert (e.g. Prufer and Baby 1963:45), however, it is, at best, an oversimplification. The earliest archaeological descriptions of the Coshocton County outcrops give due regard to the materials variability:

This flint varies considerably. At the pits on Mrs. Criss’s farm it is an opaque blue, with a small amount of included chalcedony and crystals. At the point east it is white, resembling a much weathered chalcedony. Nearer the river there is considerable chalcedony, and a clear yellowish or 'honey-colored' stone, much resembling that found in Europe, though less translucent. The greater part, however, is a dark variety, much of it being basanite. There seems to be no regular order in its arrangement. Sometimes the different kinds are in strata, though not always in the same relative position, while, again, three or four sorts are seen in a single large block. There may be thin seams of shale or other rock between the flint layers, or the flint may be in a solid bed, either with one color merging into another or the line of separation sharply defined, without any change in the texture of the stone (Thomas 1894:457-458).
There is much variety in the quality and appearance of the flint... By insensible gradations it passes into stone as compact and heterogeneous as fine agate... The color runs through various shades of white, black, blue, and red, and there is also the pale amber or 'honey color,' very rare in this country. Some is almost transparent, and from this it merges into complete opacity... One color may gradually blend with another, or the line of demarkation may be sharply defined without the slightest change in other respects (Fowke 1902: 624-625).

It is seldom noted that Coshocton County boasts chert resources other than the Upper Mercer. The Vanport limestone is represented by scattered deposits which include outcrops of a "cream-colored to buff, cherty to opalescent flint" (Meyers 1929:69). Meyers (1929:70) described a three foot thick outcrop of opalescent Vanport flint in Mohawk Village and Stout and Schoenlaub (1945:91) refer to deposits in southern Franklin Township and in White Eyes and Adams Townships. They present a profile described by G.W. White in southern White Eyes Township which included nine feet eight inches of "quite pure, cream colored" Vanport flint (Stout and Schoenlaub 1945:91). Vietzen (1974:128) reports a claim by Mr. Walter Richard that quarry pits were associated with these outcrops and Mr. Kenneth Spahr of Atwood Village, Ohio has reported the former presence of several quarry pits in this area which have been completely filled.
If it can now be said that all Coshocton County chert is not black, then it must be reemphasized that all black chert is not from Coshocton County. Shane and Murphy (1975:334) claim that chert from exposures in Hocking, Vinton, Perry, and Mahoning counties in Ohio and the so-called Kanawa flint of West Virginia...are also at the Upper Mercer horizon, and so great is the variability and intergradation that the only safe measure is to assume that for a given locality the Upper Mercer flint present came from the nearest known outcrop (Shane and Murphy 1975:334).

More recently, Prufer and Long (1986:18) have come to the same conclusion. Carskadden (1969:23) collected macroscopically-indistinguishable samples of chert from "ancient quarry sites at Upper Mercer, Zaleski, and Vanport outcrops in Coshocton, Licking, Muskingum, Perry, and Vinton counties." From a study of these materials Morton and Carskadden (1972) concluded that "...some caution must be used in automatically assigning all artifacts made of black flint to Coshocton County Upper Mercer quarries, or even to the Upper Mercer horizon..." (1972:28-29). This conclusion finds support in the cautionary statements of Gardner (1974:41-42) and in the research of Ives (1984).

**Climate**

The climate of this region during the period under consideration was exceedingly dynamic. Although the Wisconsinan ice sheets did not penetrate into Coshocton
County, the area certainly experienced some climatological changes as a result of the close proximity of the continental glacier.

Coshocton County is situated in the reentrant angle of the Ohio glacial boundary with the terminus of the Killbuck lobe 8 km (5 miles) to the north and the Wisconsinan margin of the Scioto lobe 16 km (10 miles) to the west. The affects of this proximity are a matter of considerable debate and much of the discussion on this point will be deferred to the review of the biological environment. It is necessary to sketch the outlines of the debate at this time, however, since it provides the framework for much of the paleoecological literature.

On the one hand, there are extreme proponents of what we might call the latitudinal compression hypothesis. These suggest that the environmental zones which modern biogeographers have defined were simply displaced southward into compressed counterparts of the modern zones. Few scholars today accept this position in its extreme form. Nevertheless, Whitehead (1973) and Delcourt and Delcourt (1979) do present maps which depict broad latitudinal "zones" of vegetation which appear to have been compressed latitudinally by the Pleistocene ice sheets.

Increasingly, biologists have come to reject this "community" approach in favor of a more "individualist" approach. This alternative view proposes that modern
biological communities are historical phenomena and that Pleistocene communities were unstable conglomerates of individual species with more or less continuously shifting distributions (e.g. Graham et al. 1983).

The implications of this debate for the Pleistocene paleoenvironment of Coshocton County are obvious. Given the former view the countryside was a treeless arctic tundra. Given the latter view the environment is not so easily pigeon-holed. Retreating to an over-used, but still useful term we can say that it would have been a mosaic environment.

This mosaic would have depended on a variety of topographical, geological, pedological and other microenvironmental variables; and nowhere in Ohio are these factors so varied as in the Unglaciated Appalachian Plateau. Whatever gross climatic pattern predominated in Ohio, the Appalachian Plateau would have afforded a wide range of microclimates further complicating the pattern of the mosaic:

A dozen strikingly dissimilar weather regimes have been described within a single small valley in the dissected Appalachian Plateau... Valley heads (coves),...variously-exposed slopes, ridges,...valley bottoms, and other sites, all have differing weather regimes at all seasons (Wolfe 1951:134).
Biotic environment

As alluded to above, there are two schools of thought regarding the nature of the late Pleistocene environment at or near the glacial margin in Ohio: the "Harsh climate" school and the "Mild climate" school. These generally correspond to the "community" approach to climatic change and the "individualist" approach respectively.

The Harsh climate model proposes that as the Pleistocene ice sheets advanced, concentric belts of tundra and boreal forest were pushed southward in front of the ice. Various lines of evidence have been advanced in support of this position. On the basis of pollen profile interpretations Whitehead (1973), Davis (1976), and Delcourt and Delcourt (1979) claim that the ice sheet was bordered by tundra. A broad zone of boreal forest is depicted south of the tundra where "few, if any, thermophilous elements persisted" (Whitehead 1973:628). Ogden (1977:20) claims that "...tundra environments have been recognized in...Ohio", but in support of his assertion he cites an article of his own as "in press." However, the editor of the journal in question has never received the manuscript. This claim cannot be evaluated until these data, cited in 1977, become available for review. Ogden (1977) refers to the recovery of collared lemming and yellow-cheeked vole from the New Paris No. 4 sinkhole in Pennsylvania as a confirmation of "high arctic elements near the margins of Wisconsin ice"
(1977:20), but fails to note the conclusions of the site's original investigators:

...none of the assembled evidence is conclusive proof for tundra as a distinct vegetation zone outside the ice margin. Even the presence of lyesotundra (the boreal woodland-tundra ecotone) cannot be claimed with certainty (Guilday, Martin and McCready 1964:183).

Graham (King and Graham 1986) has argued that the collared lemming (Dicrostonyx) is a good indicator of permafrost, however, it must be kept in mind that permafrost is not synonymous with tundra.

Pewe (1983) postulates a one hundred km wide zone of "permafrost" between Illinois and the Appalachian Mountains although he acknowledges that "physical evidence...is lacking" (1983:176). Recent work in central Illinois has documented numerous examples of ice wedge casts and patterned ground from localities as far south as St. Louis (Johnson 1986), but no clear examples of such phenomena have been reported from Ohio. Totten (1973:20) did note the presence of possible ice wedges in Richland County, Ohio, but these have been dismissed by other investigators (Black 1976:23).

Currently, the best evidence for tundra in Ohio comes from Darke County where Shane (1976) interpreted low pollen concentration values, coupled with high percentages of non-arboreal pollen, as evidence for a tundra or "open bare areas" from 14,900 to 14,700 years B.P. Since this area was
glaciated it could be expected to be bare for some time following deglaciation, but this need not imply tundra. The freshly deglaciated landscape would have appeared physiognomically tundra-like, but true tundra has been defined as an ecosystem "in which the plant cover consists of low herbaceous, dwarf shrub, or lichen vegetation in places which have summers too cold to allow tree growth" (Billings 1974:403). It is possible that Shane's (1976:107) "open bare areas" were merely expanses of water-logged, high-alkaline till with low nitrogen levels and little organic content. In other words, tree growth was limited by local edaphic factors rather than regionally cold temperatures. Such landscapes may develop dense coniferous forests within 35 - 40 years, even in cold subarctic latitudes (Crocker and Major 1955; see also Birka 1980). In Ohio's lower latitudes the recovery time would almost certainly have been less due to the higher incidence of incoming solar radiation.

The "Harsh climate" model for Ohio paleoenvironments rests on a very shaky empirical foundation. In contrast, the "Mild climate" model is supported by a wide range of complementary data. Pollen diagrams from central Ohio, and indeed, from throughout eastern North America, consistently yield evidence for deciduous tree pollen in full glacial and immediately post-glacial sediments.
Potter (1947) reported relatively high (almost 25%) percentages of oak pollen in the lowest levels of the Long Lake sequence from the Holmes/Ashland county border. The predominant pollen type in this level was spruce. Sears and Clisby (1952) reported small but significant percentages of oak and hickory pollen in association with the Orleton Farms mastodon.

Williams (1962) presented data from two central Ohio bogs which, though not dated radiometrically, indicated that oak, birch, alder, hickory, and maple trees were elements of the earliest postglacial forests. Moreover, the basal levels of both bogs yielded no evidence "that extensive herbaceous plant communities preceded the tree communities" (1962:21; see also 26 and 34).

A pollen profile from a kettle lake in Franklin County, Ohio, beginning around 13,000 years ago, demonstrated that oak pollen was consistently present throughout the sequence (Garrison 1967:102). Garrison (1967) attributed the persistent presence of deciduous genera to long distance wind transport. This mechanism is frequently cited by proponents of the "Harsh climate" school to explain away the troublesome deciduous elements in their postulated tundra environments (e.g. Delcourt et al. 1980:128). Alternatively, redeposition has been used often in the same manner. However, "the discovery of an acorn cup of Quercus rubra and fruits of Corylus cornuta in a Picea assemblage
dated to 12,420 B.P." in Iowa has finally demonstrated that at least some hardwood species were "lesser components of the late-glacial *Picea* forest" (Watts 1983:308).

Ogden, one of the major proponents of the "Harsh climate" model, was not able to find support for this scheme in his analysis of the pollen profile from Silver Lake in Logan County, Ohio. His analysis of the lowest levels in the pollen sequence (older than 9,800 ± 210) indicated that "the existence of a true arctic tundra cannot be established from this evidence" (1966:393).

The most important pollen profile for the purposes of this analysis is the Battaglia Bog study presented by Shane (1975). The critical importance of this particular sequence results from the combination of its spatial proximity to Coshocton County and its recent date of publication. The results of this study will be reviewed at length below, but it should be pointed out here that the earliest levels (16,500 to 13,600 years B.P.) yielded "no evidence of tundra" (1975:99) and contained about 10% oak pollen. Subsequent levels indicated a "slow but steady increase in diversity and numbers of temperate deciduous genera" (1975:99).

Taggart and Cross (1983) suggest that by 13,320 ± 155 years ago (Hansen and Sturgeon 1984) a temperate deciduous forest characterized the vegetation associated with a mastodon in Athens County, Ohio. Spruce and fir pollen were
present, but in small percentages. These results are corroborated strongly by Cushman's (1962) analysis of the floral remains from Meadowcroft Rockshelter in southwestern Pennsylvania.

Other paleoenvironmental indicators support the "Mild climate" model as well. Plant macrofossils, specifically leaves, recovered from sediments of proglacial Lake Monongahela in West Virginia (Gillispie and Clendening 1968)

...correspond almost exactly, on a species to species level, to the contemporary deciduous forest communities of West Virginia and notably include virtually all of the same species represented in the Stratum IIa deposits at Meadowcroft (Adovasio et al. 1980:593).

Molluscs, recovered in association with muskoxen remains in extreme southern Michigan, did not "imply a climate different from that which presently prevails in the area" (Semken, Miller, and Stevens 1964:828). Insect remains recovered from silts stratigraphically below glacial till in Garfield Heights, Ohio indicated that the climate, at about 24,000 years ago, was "not really arctic" and the fauna was "not that of the true tundra" (Coope 1968:755). An assemblage of insect remains was recovered from the eastern margin of Lake Erie which dated to 12,700 years B.P. This fauna was judged "too temperate and diverse" to reflect a periglacial tundra environment (Schwert and Morgan 1980:108). A similar conclusion was reached by Graham, Holman and Parmalee (1983) based on their research at
Christensen Bog in central Indiana. Here a "disharmonious" mixture of temperate, subarctic, and arctic animal species were found to be contemporaneous between 12 and 13 thousand years ago. Finally, the vertebrate faunal remains documented from the Late Pleistocene levels of Meadowcroft Rockshelter have been interpreted as fully temperate in character (Guilday and Parmalee 1982).

These complementary and convergent lines of evidence suggest that the general environmental changes wrought by the proximity of the Wisconsinan ice were not profound. Some northern arctic and boreal elements were introduced into Ohio forests, but southern temperate forms persisted alongside their new neighbors. The advocates of the "Harsh climate" school have primarily conducted research in the southeastern United States where a southward migration of northern floral elements can be demonstrated. Such migrations are indisputable, but the inference of migrating zones of vegetation is a Type II error of paleoenvironmental reconstruction (King and Graham 1981:136), i.e. it reflects the application of an inappropriate environmental analog.

It now seems apparent that the late Pleistocene environments of eastern North America were mosaic environments characterized by floristic diversity. It is not clear, as yet, whether this diversity was homogeneously mixed in an unprecedented melange, or isolated in discrete patches (King and Graham 1981), but it is certainly clear
that simplistic pictures of arctic tundra in Ohio, a boreal forest in Georgia, and a deciduous forest in Florida are a result of inadequate data and fundamental biases in data interpretation.

**Flora**

The character of the late Pleistocene vegetation of the central Muskingum River Basin has not been established with any degree of certainty. The best data for this general region are the pollen profile analyses of Shane (1972 and 1975) for Battaglia Bog in Portage County, Ohio. Battaglia Bog is located approximately 100 kilometers to the north/northeast of Coshocton County. Importantly, it is situated in the Glaciated Appalachian Plateau and the geomorphological effects of the Pleistocene glaciers can be expected to have influenced the development of vegetation in this region. The ice sheets had retreated from Portage County by 16,500 years ago, however, so that the landscape had over 3,000 years to recover before the appearance of fluted point using hunter-gatherer populations. Moreover, the pollen profiles of bogs reflect regional vegetation patterns as well as the local situation (Dimbleby 1969:168).

According to Shane (1975:99) the period from 13,000 to 11,000 years ago was marked by a general warming trend. *Picea* was still a dominant element in the floral communities, but temperate deciduous genera were slowly and
steadily increasing in diversity and numbers. *Quercus* had been present in relatively high percentages in the earliest levels and it increased gradually throughout this period.

At 11,000 years B.P. the Battaglia Bog profile, and most other pollen profiles in eastern North America (Shane 1972), indicates that there was a sudden and dramatic climate change (Shane 1975:100-101). *Picea* declines abruptly in the pollen diagram, *Quercus* crashes to its lowest level in the sequence, and other deciduous genera show similar declines (Shane 1975:99). *Pinus* increases in inverse proportion to the decreases of these genera and dominates the pollen sequence for an estimated 1,000 years. This “domination” may be more apparent than real for, as Shane (1975:100) notes, the “abundance and buoyancy of pine pollen” leads to over-representation in pollen sequences. Shane (1975:101) interprets the “Pine maximum” as a period of increased drying which amplified the effects of the continuing warming trend associated with the retreat of the continental ice sheets. The dramatic increases in the frequency of pine pollen documented in the Battaglia Bog sequence reflect the general deforestation resulting in more open country and the increase in “scattered suitable niches” for *Pinus*. The “openness” of the terrain is indicated by the concomitant explosion of non-arboreal pollen indicators (Shane 1975:100). Therefore, the “Pine maximum” does not
necessarily indicate the development of an "extensive pine forest" (Shane 1975:101).

After approximately 10,000 years ago the Battaglia Bog sequence documents another sudden climate shift. Quercus and other hardwoods rapidly increase to modern levels and Pinus decreases abruptly along with most of the non-arboreal genera.

Table 5 translates the sequence documented by Shane (1975) into a plausible reconstruction of the local vegetation patterns in the central Muskingum River Basin. This reconstruction represents a compromise between various lines of evidence. The pollen data from Battaglia Bog and other sites indicate that there have been significant regional climate changes. Pollen and plant macrofossil data from localities within the Unglaciated Appalachian Plateau suggest that this region may have been insulated from the brunt of these changes (e.g. Shane 1980). In fact, recent data have suggested to some investigators that, by 13,000 years ago, the Unglaciated Appalachian Plateau would have supported a deciduous forest (Gillespie and Clendening 1968, Cushman 1982, and Taggart and Cross 1983). The compromise adopted for the purposes of this research acknowledges the regional patterns documented at Battaglia Bog, but allows for local microenvironmental conditions to override gross climatic patterns. The available data can be accommodated to this view if the late Pleistocene environment was composed
of distinct and dispersed patches. For example, one valley may have protected an enclave of deciduous forest while the surrounding countryside was dominated by spruce groves.

Figure 4 withdraws further into the realm of speculation by presenting a model of late Pleistocene vegetation patterns for a typical section of the Walhonding River Valley. Figure 5 is a reconstruction of Holocene vegetation patterns included for comparison. The patchiness of the environment is evidenced by the alternating stands of pine and open prairie patches in the uplands, the deciduous groves in the protected interior hollows, and the coniferous-deciduous open woodland mosaic on the floodplain.

Tables 6 and 7 present the meager data on Paleo-Indian plant utilization from eastern North America. The bulk of these plant resources would have been available in open "disturbed" habitats which could have occurred in the uplands, ridge top overlooks, and floodplains. However, many of the tree species may have had a more restricted distribution. Under the prevailing dry conditions of the Paleo-Indian occupation walnut and hornbeam trees would have been restricted primarily to the moister interior hollows and hickory trees may have predominated in the uplands at ravine heads and on the slopes of the interior hollows.
Fauna

The earliest human inhabitants of the Appalachian Plateau would have shared this environment with a rich large mammal fauna. Guilday (1982) lists 26 species larger than 20 kilograms:

Present were 2, possibly 3 genera of muskoxen (Ovibos, Symbos, and Bootherium), bison (Bison), horse (Equus), tapir (Tapirus), 2 genera of peccaries (Platygonus and Mylohyus), an extinct moose (Cervalces), a stilt-legged deer (Sangamona), the caribou (Rangifer) as well as the elk and white-tailed deer, two genera of ground sloths (Megalonyx, Glossotherium), mammoth (Mammuthus), mastodon (Mammut) and giant beaver (Castoroides). Large carnivores included the grizzly bear (Ursus arctos), the black bear (Ursus americanus), the jaguar (Panthera onca), the dire wolf (Canis dirus), and possibly the saber-tooth cat (Smilodon, Trout Cave, W. Va.), American cheetah (Acinonyx, Hamilton Cave, W. Va.), the huge short-faced bear (Arctodus, Frankstown Cave, Pa.) and an extinct spectacled bear (Tremarctos, Grassy Cove Saltpetre Cave, Tenn.)... (Guilday 1982:23).

Table 8 lists the animal species reported from localities in eastern North America which have been claimed to represent early Paleo-Indian prey. Haynes (1980:117) has asserted that the Clovis Culture represents a specialized big-game hunting adaptation emphasizing mammoth and bison. These genera were present in Ohio during the Pleistocene, but there is no clear evidence in eastern North America that they were ever exploited by early Paleo-Indians in this part of the continent. The mastodon was much more common than the mammoth in the east and it has been proposed as the eastern Paleo-Indian's substitute (e.g. Quimby 1960).
Numerous claims have been made for Paleo-Indian mastodon kill and/or butchering sites (see Table 8), but the only unambiguous evidence comes from the Kimmswick site in Missouri (Graham et al. 1981). Caribou have often been proposed as an alternative mainstay of the Paleo-Indian diet in the east (MacDonald 1988 and Peers 1985). There are several documented associations to support this claim (see Table 8), however, these are restricted to northern North America and, in many cases, are represented by only a few small bone fragments. On the basis of the available data it seems premature to propose a caribou-centered subsistence adaptation for the Clovis Culture in eastern North America.

Ford (1974:388) has argued that the characteristic Pleistocene fauna would have been "depleted and headed for extinction" by the time the Paleo-Indians arrived in the east. Acknowledging that our understanding of the late Pleistocene landscape is tenuous, and that the extrapolation of faunal distributions in this context is largely guesswork (Ford 1977:167), Ford proposed that Paleo-Indian hunters would have been exploiting "deer and elk and other animals common to a mixed forest" (1974:388). The recovery of a white-tailed deer antler fragment from a Paleo-Indian stratum at Meadowcroft Rockshelter (Guilday and Parmalee 1982) lends some support to this view.

Recently, improved techniques of excavation and data recovery have produced an improved record of Paleo-Indian
subsistence practices (see Tables 6 - 8). It now seems clear that Paleo-Indian hunter-gatherers were exploiting a wide variety of plant and animal species (e.g. McNutt 1985).

A speculative representation of the habitat preferences of most of the important large game animals of the late Pleistocene central Muskingum River basin is presented in Figure 6. This information has been extrapolated from studies of living large mammal communities (e.g. Guthrie 1982:309) and from the reconstructed patterns of vegetation for this region and for this time period. All of the species represented in Figure 6 have been documented from Pleistocene deposits in Ohio (see especially Forsyth 1963) and all have been mentioned, at one time or another, as important potential food resources for Paleo-Indian populations in the east (see especially Brown and Cleland 1968). The representation must be regarded as tentative at best, but it will permit the derivation of hypotheses regarding the interpretation of fluted point distributions and their relationship to the preferred habitats of various prey species.

A general model of the late Pleistocene environment

The late Pleistocene environment of the central Muskingum River basin has already been described as a dynamic mosaic. The following attempt at a synchronic description of the environmental context of the Paleo-Indian
adaptation must be viewed in that light. This characterization is based on inference, extrapolation, and conjecture and is offered as a set of working hypotheses; it is a tentative model of the late Pleistocene stage on which to map the entrances and exits of the Paleo-Indian actors.

The floodplains of the major river valleys may have constituted broad, flat corridors through the generally rugged uplands. Prior to 11,200 years ago, these valleys would have been flushed seasonally by glacial meltwater leaving wide, grassy plains fringed with a mixed coniferous-deciduous woodland. When the first Europeans arrived in the Walhonding and Tuscarawas valleys large and small remnants of prairie still persisted here "scattered sparingly, like oases" (Hill 1881:472). The "White eyes plains" in eastern Coshocton County were known to have been among the "favorite hunting grounds with the savages" (Hill 1881:539,576).

The large herd herbivores of the Pleistocene would have found abundant forage here and this, combined with the better footing and low relief, would have restricted their movement largely to this zone. This would have been true especially for mammoths, horses, and musk oxen and perhaps caribou as well, on a seasonal basis. Mastodons would have been more widely distributed within the region as they preferred a more woody habitat. Even so, large herd movements, such as hypothetical seasonal migrations, would
probably have been channeled along the floodplains. Moose would also have been relatively numerous in this region.

Ridge top overlooks would have been either bald knobs or else thinly forested with pine or hardy oak trees. All of these situations persisted in isolated locales and were observed in the county by the earliest European settlers (Hill 1881:492,512,594). Ridge top overlooks would not have been the preferred habitat of any particular game species, but as an extension of the general upland environment they could be expected to have accommodated a similar range of animals.

The uplands comprise the bulk of Coshocton County and in the late Pleistocene they would have included a diverse array of habitats. The vegetative mosaic would have been most pronounced in this zone. Patches of pine forest would have been interspersed with deciduous trees and prairie pockets. Oak and hickory trees may have been concentrated at the heads of small streams or around the numerous springs in the region. This patchwork of vegetation types would have been ideal habitat for deer and elk. Small, dispersed groups of caribou may have been present on a seasonal basis.

The interior hollows would have included a variety of microenvironments resulting in numerous isolated refugia for many species. Depending on various ecological factors these hollows would have sheltered varying proportions of spruce, pine, oak, and birch. Important nut producing trees such as
hickory, walnut, and hornbeam may also have been present in favorable situations. These areas would have been the favorite winter range of deer and elk. Mastodons may have been abundant and moose and musk oxen could be expected to have spent the worst of the winter in the sheltered hollows.

This establishes the environmental framework which will be used to examine the distribution of Paleo-Indian artifacts within the central Muskingum River Basin. The reconstruction undoubtedly suffers from oversimplification and from extrapolation beyond the limits of the data (King and Graham 1981:136). Nevertheless, it provides a necessary context in which to consider Paleo-Indian land use and it is a plausible synthesis of a wide range of data. Ideally, such a reconstruction would be based on the results of an interdisciplinary research project conducted within the study area. It is to be hoped that the preliminary effort put forward here will one day be supplanted by an environmental reconstruction developed from such a project.
TABLE 5

Postulated development of vegetation zones in the central Muskingum River basin, Coshocton County, Ohio

<table>
<thead>
<tr>
<th>years B.P.</th>
<th>pollen zone</th>
<th>FLOODPLAIN</th>
<th>RIDGE TOP OVERLOOKS</th>
<th>UPLANDS</th>
<th>INTERIOR HOLLOWs</th>
</tr>
</thead>
<tbody>
<tr>
<td>16,500</td>
<td>Spruce parkland</td>
<td>Stands of pine with patches of grassland and deciduous trees</td>
<td>Spruce dominated forests with some deciduous patches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13,600</td>
<td>Spruce-fir-tamarack open woodland</td>
<td>Pine forest with extensive deciduous patches</td>
<td>Spruce-pine forest with extensive deciduous patches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11,000</td>
<td>Coniferous deciduous open woodland</td>
<td>Pine forest with patches of grassland and isolated deciduous patches</td>
<td>Pine-oak-birch woodland mosaic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9,000</td>
<td>Elm-ash-soft maple association with isolated spruce patches</td>
<td>Oak-hickory forest with diminishing patches of pine</td>
<td>North slopes-Mixed mesophytic forest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7,000</td>
<td>IIIA Swamp forest, maple and oak predominate</td>
<td>Oak-hickory-chestnut forest with prairie patches</td>
<td>South slopes-Mixed oak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5,000</td>
<td>Reconstruction by Lepper and Ericksen-Latimer from various sources, primarily Shane (1975).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 6

Plant foods identified from Paleo-Indian levels at the Meadowcroft Rockshelter in southwestern Pennsylvania:

lower stratum IIa: 11,300 \pm 700 - 16,175 \pm 975 B.P.

<table>
<thead>
<tr>
<th>plant food</th>
<th>quantity</th>
<th>common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutshell (grams):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juglandaceae</td>
<td>(0.4)</td>
<td>Walnut family</td>
</tr>
<tr>
<td>Carva sp.</td>
<td>(0.1)</td>
<td>Hickory</td>
</tr>
<tr>
<td>Juglans sp.</td>
<td>(54)</td>
<td>Walnut</td>
</tr>
<tr>
<td>Fruits and seeds (frequency):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpinus sp.</td>
<td>(1)</td>
<td>American hornbeam (nutlets)</td>
</tr>
<tr>
<td>Celtis sp. (&quot;large amounts&quot;)</td>
<td></td>
<td>Hackberry</td>
</tr>
<tr>
<td>Nyssa sp.</td>
<td>(5)</td>
<td>probably Blackgum (berries)</td>
</tr>
<tr>
<td>Prunus sp.</td>
<td>(1)</td>
<td>Plum or cherry</td>
</tr>
<tr>
<td>Rubus sp.</td>
<td>(4)</td>
<td>Rasberry</td>
</tr>
</tbody>
</table>

Data from Cushman (1982)

"The lack of acorns from the lowest levels in Stratum IIa probably can be attributed to the aboriginal inhabitants' failure to collect them" (214-216).
TABLE 7

Seeds identified from Paleo-Indian levels at the Shawnee-Minisink site (36 MR 43) in northeastern Pennsylvania:

<table>
<thead>
<tr>
<th>plant species</th>
<th>nutritional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most abundant:</td>
<td></td>
</tr>
<tr>
<td>Acalypha-like</td>
<td></td>
</tr>
<tr>
<td>Blackberry</td>
<td>high in carbohydrates</td>
</tr>
<tr>
<td>Chenopodium (Goosefoot)</td>
<td>high in protein, calcium, phosphorus, iron, Vitamin A, niacin and ascorbic acid</td>
</tr>
<tr>
<td>Hawthorn Plum</td>
<td>high in Vitamin C</td>
</tr>
<tr>
<td>Physalis (Groundcherries)</td>
<td>same notes as Chenopodium</td>
</tr>
<tr>
<td>Present:</td>
<td></td>
</tr>
<tr>
<td>Amaranth (Pigweed)</td>
<td></td>
</tr>
<tr>
<td>Smartweed (Pennsylvania)</td>
<td>high in protein</td>
</tr>
<tr>
<td>Grape</td>
<td>high in carbohydrates</td>
</tr>
<tr>
<td>Lactuca (Wildlettuce)</td>
<td></td>
</tr>
<tr>
<td>Silene</td>
<td></td>
</tr>
<tr>
<td>Hackberry</td>
<td></td>
</tr>
<tr>
<td>Ragweed</td>
<td></td>
</tr>
<tr>
<td>Sedge</td>
<td></td>
</tr>
<tr>
<td>Phytolacca (Pokeweed)</td>
<td>same notes as Chenopodium</td>
</tr>
</tbody>
</table>

Data from Kauffman and Dent (1982), N = 118 seeds

"The main ingredient, essential to every diet, which is lacking is a source of fat. This could have been added by hunting small game or the gathering of nuts" (Kauffman and Dent 1982:11).
<table>
<thead>
<tr>
<th>animal</th>
<th>locality</th>
<th>reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammut</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kimmswick, Missouri</td>
<td>(Graham et al. 1981)</td>
</tr>
<tr>
<td></td>
<td>Adams, Kentucky</td>
<td>(Walters 1986)</td>
</tr>
<tr>
<td></td>
<td>Rappuhn, Michigan</td>
<td>(Wittry 1965)</td>
</tr>
<tr>
<td></td>
<td>Pleasant Lake, Michigan</td>
<td>(Fisher 1984)</td>
</tr>
<tr>
<td></td>
<td>New Hudson, Michigan</td>
<td>(Fisher 1984)</td>
</tr>
<tr>
<td></td>
<td>Van Sickle, Michigan</td>
<td>(Fisher 1984)</td>
</tr>
<tr>
<td></td>
<td>Wattles, Michigan</td>
<td>(Fisher 1984)</td>
</tr>
<tr>
<td></td>
<td>Russell Farm I, Michigan</td>
<td>(Fisher 1984)</td>
</tr>
<tr>
<td></td>
<td>Russell Farm II, Michigan</td>
<td>(Fisher 1984)</td>
</tr>
<tr>
<td></td>
<td>Winameg, Fulton Co., Ohio</td>
<td>(Howe and Cubberley 1985)</td>
</tr>
<tr>
<td></td>
<td>Willard, Huron Co., Ohio</td>
<td>(Falquet and Hanebert 1978)</td>
</tr>
<tr>
<td></td>
<td>doubtftul occurrences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boaz, Wisconsin</td>
<td>(Palmer and Stoltman 1975)</td>
</tr>
<tr>
<td></td>
<td>Carter, Darke Co. Ohio</td>
<td>(Mills 1972)</td>
</tr>
<tr>
<td></td>
<td>Seeley, Ashtabula Co., Ohio</td>
<td>(Murphy 1983)</td>
</tr>
<tr>
<td>Cervidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hiscock Farm, New York</td>
<td>(Gramly 1985)</td>
</tr>
<tr>
<td>Rangifer tarandus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bull Brook, Massachusetts</td>
<td>(Speiss et al. 1985)</td>
</tr>
<tr>
<td></td>
<td>Whipple, New Hampshire</td>
<td>(Speiss et al. 1985)</td>
</tr>
<tr>
<td></td>
<td>Dutchess Quarry Cave, N.Y.</td>
<td>(Guilday 1969)</td>
</tr>
<tr>
<td></td>
<td>Dutchess Quarry Cave 8, N.Y.</td>
<td>(Kopper et al. 1980)</td>
</tr>
<tr>
<td></td>
<td>Holcombe, Michigan</td>
<td>(Fitting et al. 1966)</td>
</tr>
<tr>
<td>Cervus elephas</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silver Lake, Ohio</td>
<td>(Forsyth 1963; Ogden 1977; Mason 1981)</td>
</tr>
<tr>
<td>Odocoileus virginianus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meadowcroft, Pennsylvania</td>
<td>(Guilday and Parmalee 1982)</td>
</tr>
<tr>
<td>animal</td>
<td>locality</td>
<td>reference</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Castor canadensis</td>
<td>Whipple, New Hampshire</td>
<td>(Speiss et al. 1985)</td>
</tr>
<tr>
<td>Aves</td>
<td>Dutchess Quarry Cave 8, N.Y.</td>
<td>(Kopper et al. 1980)</td>
</tr>
<tr>
<td>Osteichthyes</td>
<td>Dutchess Quarry Cave 8, N.Y.</td>
<td>(Kopper et al. 1980)</td>
</tr>
<tr>
<td></td>
<td>Shawnee-Minisink, Pennsylvania</td>
<td>(Kauffman and Dent 1982)</td>
</tr>
</tbody>
</table>

---

**a**

Graham et al. (1981:116) refer to, but do not enumerate, a variety of "other fauna" recovered from the Kimmswick site which "suggest a diverse economy for the Clovis hunters."

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**b**

The Silver Lake "eik" and its associated "fluted" point tip are matters of some confusion. This find should be viewed with extreme skepticism until more data are available. Nevertheless, its notoriety in the published literature warrants its mention here.

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**c**

The conclusions of Kopper et al. (1980) regarding Paleo-Indian subsistence at the Dutchess Quarry Cave complex of sites are interesting if somewhat contradictory:

"While faunal analysis is not complete, it is our impression that large birds account for a significant portion of the food remains during Archaic and Paleo-Indian times and that fish were also taken in both periods" (p. 133).

The caribou bones from the two sites are compared with other recent finds of caribou at eastern Paleo-Indian sites: "These evidences of the role of big game hunting are in contrast to the fashionable current belief of many archeologists that a more diffuse economy characterized Paleo-Indian groups..." (p. 135).
FIGURE 4. Schematic reconstruction of Late Pleistocene vegetation patterns in the Walhonding River Valley, Ohio circa 13,000 to 11,000 years B.P.
FIGURE 5. Schematic reconstruction of Holocene vegetation patterns in the Walhonding River Valley, Ohio circa 6,000 years B.P.
CHAPTER V

COSHOTTON COUNTY FLUTED PROJECTILE POINTS: MORPHOLOGY

Our first observation must be that the spear itself, however elegant its construction, forms but a small part of the hunter's equipment. Far more important is his knowledge about the different species of animals available to him, where they may be located, how they reproduce, and how they may best be approached and captured (Ingold 1981:122).

...as I enter more fully into the simulated life of the neo-aborigine, I realize how small a part of primitive living is shaping the projectile point (Callahan 1979:114).

Introduction

Callahan's (1979:114) and Ingold's (1981:122) observations quoted above would seem to indicate that descriptions of projectile points can tell us very little about Paleo-Indian lifeways. The Paleo-Indian archaeological record in Ohio (Prüfer and Baby 1963:54) and throughout eastern North America (Meltzer 1964:353) is composed predominantly of isolated occurrences of fluted points. Are we, therefore, unable to learn anything of importance about the Paleo-Indian occupation of the central Muskingum River basin?

This study is founded on the assumption that fluted points were integral elements in the technological
repertoire of the Paleo-Indian cultural system. Therefore, it should be possible to make some general inferences regarding the nature of that system based on systematic observations of these conspicuous components of the archaeological record and their specific environmental contexts.

The purpose of this chapter is to describe certain aspects of the morphology of the sample of fluted points documented from Coshocton County, Ohio. In the following chapter this description is elaborated and the collection is compared with a large sample of fluted points from the broader context of entire state. The basic description is divided into three parts:

1) The "type" or "style" of the projectile points is defined. Style, in this context, refers to standardized typological characterizations presumed (or demonstrated) to have some spatio-temporal meaning.

2) The condition, or state, of the fluted point when lost or discarded is determined (refer to Figure 2). In Gardner and Verrey's (1979) terms this aspect would relate to the "life history" of the point.

3) Indications of use and/or re-use are described. This variable also relates to Gardner and Verrey's (1979) life history variable, but it is intended to
describe primarily the functional variability within this collection of fluted points.

Gardner and Verrey (1979) list other factors which are potential sources of variation in fluted points. These include the effects of different raw materials, site function, and idiosyncratic variation. The effects of different raw materials were not considered in the context of this research for two reasons. The bewildering variability in the chert outcrops within Coshocton County made it extremely difficult to identify exotic raw material types. This methodological problem was the primary reason this variable was abandoned early in the course of this research. Moreover, it was reasoned that with the abundant high-quality chert resources available within the region, raw material quality would have been relatively constant in the local prehistoric lithic technology. Given a local abundance of such generally fine raw material, Gardner and Verrey (1979:17) have concluded that this would be a source of only minor variation.

The subject of stylistic and idiosyncratic variability within this collection of fluted points is addressed; however, the attributes which might reflect such variation cannot be specified beforehand. Gardner and
Verrey (1979:18) claim that

...analysis of continuous variables should show whether variation in such things as length, width and thickness are significant, or reflect a standard distribution around a norm.

The effects of site function on fluted point morphology could not be studied directly in the context of this research because one of the principal goals of this dissertation was to determine site function from attributes of the projectile points; and sites, herein, are defined as clusters of projectile points. Therefore, since projectile points are used to define site function, it would entail a dangerous degree of circularity to attempt to conclude anything about projectile point morphology based on site function. Instead, the relationship between fluted point morphology and regional land use patterns is studied. This approach is preferable because it does not depend upon an accurate and independent determination of site function and it broadens the focus from "sites" to artifact distributional patterns within regions. These regional units of study can be defined and redefined according to the investigator's assumptions and hypotheses.

Analytical methods

Having obtained a large sample of Paleo-Indian artifacts from a limited geographic area with pronounced habitat diversity, the question then becomes how can these raw data
be translated into conclusions relevant to understanding Paleo-Indian land use? As stated above, there are two aspects to these data: 1) fluted projectile points and their attributes; and 2) the geographic locations which have yielded fluted points and the environmental attributes of those loci. Consequently, the analyses of these data will have two corresponding aspects.

The first task is to examine the projectile points themselves. What is a fluted projectile point? How variable, or how similar, are these artifacts and what can we learn from these data about the Paleo-Indian adaptation?

Stoltman and Workman (1969) have offered a useful definition of what constitutes a fluted point:

...a lanceolate-shaped, stone projectile point with at least one flake detached from the base longitudinally onto a face leaving a flake scar that is longer than any other flake scar on the point (1969:191).

The bulk of the projectile points documented in this research conform to this definition. There are, however, several specimens which fail to meet one or more of these specifications. Many examples of unfinished points were included if they exhibited characteristics (e.g. a basal nipple) which allowed them to be identified as Paleo-Indian. A few specimens of basally thinned points were included (e.g. some Holcombe and Dalton specimens) as well as some points with no basal thinning at all (e.g. Prufer's "unfluted fluted" type) in order to document these rare
early forms and to help clarify their relationship with the early fluted point tradition. These exceptions are discussed at greater length below.

Prufer (1960b:3) established a "standard analytical procedure" for describing fluted points for his "Survey of Ohio Fluted Points." Subsequently these measurements were more precisely defined by McKenzie (1970:353-355). Since Prufer's files constituted the core of my data base, and since many of the specimens Prufer had described were no longer available for inspection it was decided to maintain his basic procedures. This would insure that any new data which I was able to collect would be additive to Prufer's data set.

Table 9 lists the continuous variables which were measured as well as various ratios and numbers calculated from these original measurements. All measurements were made with a Bel-Art sliding caliper (Dial Type H73416) to the nearest tenth of a millimeter. Table 10 presents the categorical variables which were recorded and used in subsequent analyses. Most of the categorical variables treated in this research were not considered by Prufer in his original analysis, but it was usually possible to determine values for the specimens using the excellent illustrations or photographs which Prufer included on his analysis forms.
**Continuous variables**

Perhaps the most striking feature of a projectile point is its maximum length measured from the tip to the basal ears. This variable possessed undoubted functional significance since longer points would have been heavier, generally more fragile (depending on thickness and width), and would have had more cutting edge than shorter points. Such factors are critical for the performance of a "point" as a knife, thrusting spear, or projectile point. Gardner and Verrey (1979) have argued that this variable also has chronological significance in eastern North America. Based on excavations at the Thunderbird and Fifty sites in northern Virginia Gardner and Verrey (1979:33) assert that earlier Clovis points are longer than later "Middle Paleo" points. In the same paper they imply that one can expect the maximum length of a point to be affected strongly by technological factors, or, what they term "the life history of the point." They suggest that there is a greater probability that points recovered closer to the quarry source will be longer than points found at greater distances from the raw material source due to resharpeming and reuse (Gardner and Verrey 1979:17).

Because of this complex combination of factors and because of the high frequency of incomplete specimens included in the analysis, maximum length seems to be an unreliable measurement for analysis (see Judge 1973:83).
Nevertheless, it has been emphasized in the literature (e.g. Prufer and Baby 1963:59) and it is monitored in this research. Moreover, Gardner and Verrey's (1979) results suggest a number of hypotheses which can be tested with the data from Coshocton County; specifically, their suggestions that 1) in a surface collection of fluted points such as the Coshocton County material, maximum length should be bimodally distributed reflecting the longer/earlier and shorter/later components of the sample; and that 2) the fluted points from Coshocton County should be generally longer than fluted points from the rest of Ohio given the presence of the Upper Mercer chert quarries in that county.

Maximum width is another index of projectile point size, although this measure would remain relatively constant regardless of whether or not the point had been resharpened. For this reason, maximum width is a preferred indicator of overall size in fluted projectile points. The same technofunctional arguments discussed above for maximum length should apply to maximum width, but without the ambiguity of resharpening and reuse.

The distance from the base to the point of maximum width provides a general index to the overall shape of the projectile point. When taken in conjunction with the maximum length and maximum width it is possible to derive a reasonable approximation of the outline of the lateral edge margin.
Basal width is a critical variable relating to hafting technology (Judge 1973). The variance in this attribute can be expected to inform us about the relative degree of standardization in hafting techniques.

Maximum thickness is yet another measure of point size. Variation in this measurement may be expected to relate to the nature of the raw material. The distance from the base of the point to the point of maximum thickness may correlate with the overall shape of the point, or it may also relate to the nature of the piece of chert being worked.

Basal concavity depth, measured from the ears to the most distal penetration of the basal concavity, is a complex attribute. Judge (1973:172) and other authors have argued that the depth of the basal concavity is a technological by-product of the fluting process. Consequently, he expects considerable random variation in this attribute. Based on an analysis of the Debert and Vail fluted points with extremely concave bases, Gramly (1982) has suggested that the variability in this attribute is largely stylistic in nature. In this view, one might expect systematic variability in this trait from one region to another. Meltzer (1984) has adopted a compromise position suggesting that shallow concavities are a technological result of the fluting process, but that the deeply concave bases exhibited by the Debert and Vail specimens reflect a stylistic
decision made by these northeastern Paleo-Indian populations.

The length of fluting from the base is presumed to relate to the hafting technology. It also reflects, to some degree, the fluting techniques utilized for the particular specimen. Flute lengths are measured from the basal ears; the "obverse" face is distinguished from the "reverse" on the basis of "distinctive fluting or special characteristics" (McKenzie 1970:354).

Lateral grinding is important because it has been demonstrated to be the final stage in producing Folsom fluted points (Tunnell 1977:151 and Frison and Bradley 1980:51). Therefore, it may be interpreted as an indication of a finished fluted point. The length of the lateral grinding has been used as an indicator of the extent of the haft and studies of breakage patterns have tended to confirm this (Meltzer 1984). The procedure presumably relates either to dulling the lateral edges so as to prevent the sinew (?) binding from being severed during cutting or thrusting motions (Shetron 1936:253; Mason 1958:10), or the final shaping of the hafting area so as to insure a tight fit of the point into a bone foreshaft socket (Judge 1973:81, 263-264).

The minimum width was only recorded on points with a constriction in the lateral edge margins. Such a constriction is typical of the Cumberland fluted point and,
although it is one of the defining characteristics of the Cumberland point "style," it is not known if the feature is stylistic or functional. The incidence of this trait is so infrequent in the Ohio and Coshocton County fluted point samples that it is doubtful that any resolution of this problem will be possible in the context of this research.

A variety of other variables are calculated from these basic measurements in order to examine some of the more obvious interrelationships between variables. The width/thickness ratio is sensitive to technological processes (Callahan 1979). Length/width ratios give a simple measure of the over-all shape of the projectile points. Finally, a series of variables have been calculated to assess the degree of relationship between the extent of lateral grinding on opposing edges of the point and between the length and number of flutes on opposing faces of the point.

The "grinding factor" consists of the length of right lateral grinding minus the length of left lateral grinding. In order to simplify matters the absolute value of the result is recorded.

The "flute length factor" is the absolute value of the difference between the length of fluting on the obverse face and the length of fluting on the reverse face. The "flute number factor" is the absolute value of the difference
between the number of flutes on the obverse face and the number of flutes on the reverse face.

These variables are described and analyzed using standard statistical techniques emphasizing Tukey's (1977) method of exploratory data analysis. Simple descriptive statistics and summary charts and diagrams are used to look for patterning within and between variables.

Categorical variables

In addition to the quantitative measures discussed above several categorical variables were recorded for each projectile point. Prufer's (1960b) standard descriptive data were recorded although not all of these were used in the subsequent analyses. The owner of the specimen was identified and distinguished, where appropriate, from the original finder of the point and the approximate discovery date was determined. Raw material color was described subjectively but no identifications were offered for reasons which were discussed in the preceding chapter. The location of the find spot was a critical variable for this study, so an effort was made to systematize the recording of this variable.

For some points the only provenience which could be established was the county, for others the township within the county could be delimited. These specimens were included in the statistical descriptions of the Coshocton
County fluted points, but, for obvious reasons, they could not be considered in the analysis of locations. When the exact location was known the site location was recorded using the Universal Transverse Mercator coordinate system. In most cases site locations are approximate and site boundaries are delimited by agricultural fields. However, in a surprising number of cases the find-spots could be identified to within ten meters. This is due to the apparent fact that the finding of a fluted point is a momenteous event for a knowledgeable amateur. As a result, precise details of the discovery often are recalled with unusual clarity.

Each fluted point recorded by this research was assigned a nine number specimen code. The first two numbers identify the township where the point was discovered, the second two specify the site. Site number designations were made in the order in which sites were recorded. Isolated finds were not given site number designations, but were given individual specimen numbers and treated as separate localities in the environmental analysis. The next three numbers indicate the order in which points were documented from particular sites with 01 01 001 designating the first point documented from the first site recorded in Adams Township. Since a primary goal of this study centered on the determination of site function, and since, in the context of this research, "sites" were limited to clusters of fluted projectile
points, a classification of points was developed which would provide basic information on the stage of manufacture, the general style, and some indication of the function of particular points. The last two numbers of the specimen code are preceded by a period and relate to the first two of these concerns. The first number after the period is the Technology Code; this is an index of the stage of manufacture of the point. The remaining number is the Style Code which is intended to provide information on the broad temporal variability within the collection of points.

The "technology code" indicates whether the point under consideration is a complete unbroken point, a point fragment which was broken in use, a point fragment broken in manufacture, a point fragment of undetermined stage of manufacture, a preform, or a biface representing an early stage in the manufacturing process. This last category was used only as ancillary data. Callahan (1979) has demonstrated that the presence of marked end thinning on early stage bifaces is not diagnostic of Paleo-Indian technology.

"Style code" was recorded as an initial approximation of stylistic variability. Cumberland, Holcombe, and Dalton forms were identified and distinguished from the general class of "Clovis" fluted points. These distinctive forms probably have temporal ranges which extend later than the
more generalized eastern Clovis type. The final specimen code, then, might read as follows: 01 01 001.11. This would indicate that the first point documented from the first site recorded in Adams Township was a complete Clovis point (see Table 10).

The number of flutes per face is a controversial attribute. Witthoft (1952) defined the Enterline Tradition on the basis of this attribute. Later restudies by Cox (1972), Grimes (1979) and Meltzer (1984) suggest that the number of flutes relates to technological considerations; specifically, the thickness or the degree of plano-convexity of the preform (Grimes 1979:115). There appears to be no significant chronological or spatial significance to this attribute within the eastern fluted point tradition.

The presence or absence of basal grinding may have technological significance in some cases and functional significance in others. Basal grinding is often a step in preparing the base of a preform for fluting. It has also been interpreted as a functional characteristic in finished points to help keep the point from splitting the shaft under the extreme distal force of a thrown spear impacting a target. Therefore, Judge (1973:172) regards this as an unreliable attribute.

The presence or absence of a basal nipple relates to technological variability. The presence of a basal nipple indicates that the "Folsom" fluting technique was being
utilized. The basal concavities of finished specimens often are reworked extensively removing any trace of the nipple so the presence of this attribute may indicate that the specimen is unfinished, however, true Folsom points and Cumberland points often retain the basal nipple in finished points (Frurer and Baby 1963:18-19).

Two other categorical variables were considered which were not incorporated into the identifying specimen code. A "function code" was developed to facilitate the comparison of points on the basis of various categories related to fluted point usage. Some specimens were examined for evidence of use wear and the function code records the nature of any observed patterns of use wear: distal edge damage (including impact fractures), bifacial edge damage, unifacial edge damage, or combinations of the above. A separate category was established to accomodate specimens which I was not able to examine at first hand. It was also noted if specimens exhibited obvious indications of resharpening or reworking.

**Style: STYLCD**

My use of the word "style" in this context is explained above. It is to be understood that I am referring here to established conventional types which are believed to have temporal and/or spatial significance (see, for example, Bradford 1976). Therefore, the variability subsumed under
this arbitrary designation might include functional as well as stylistic variability (see Dunnell 1978b).

Five "types" of fluted Paleo-Indian projectile points were documented in the course of this research. Generalized fluted points which were not attributable to any other diagnostic "type" were termed Clovis points. This is, perhaps, an unfortunate choice of terms in that it follows in the tradition of studies which have assumed a late Pleistocene cultural unity across North America (e.g. Haynes 1964). Nevertheless, it is a convenient term and it will be maintained with the disclaimer that no genetic relationship between Ohio and New Mexico fluted points (or fluted point producers) is necessarily implied. One hundred and forty-four Clovis points were identified in this study. Figure 7 illustrates the range of variation in this type.

The Cumberland point is an eastern type which has been described by Kneberg (1956). It has been dated, at Dutchess Quarry Cave in New York, to around 12,500 years B.P. (see Table 1), although, based on similarities with the Folsom technology, many authors regard it as a much later form (e.g. Prufer and Baby 1963:19). Only two examples of definite Cumberland points have been documented from Coshocton County. Neither of these points are illustrated.

The Holcombe point was formally defined by Wahla and DeVisscher (1969) against the wishes of Fitting (1968:132). It is a small, thin point usually with short, multiple
flutes or basal thinning flakes (Wahla and DeVisscher 1969:109). Several scholars have suggested that the Holcombe point is not a part of the eastern fluted point tradition (Griffin 1978:227; Seeman and Prüfer 1982:157), however, this remains to be demonstrated. There are no radiocarbon dates for Holcombe components and the typological and geomorphological arguments which have been put forward (e.g. Roosa 1977:120) are not convincing.

The Holcombe point has a relatively restricted distribution in Ohio. They are found predominantly in the northwestern Lake Plains (McKenzie 1970:358), although they have also been reported from the Appalachian Plateau (Prüfer and Sofsky 1965; Prüfer 1971). The type has not been radiometrically dated, but it has been suggested to date from 11,000 years ago (Fitting 1966:133) to 10,000 or 9,000 years ago (Griffin 1977:10). Six examples of Holcombe points were recorded by this study. One of these is illustrated in Figure 8a.

It should be noted that small, Holcombe-like points with definite, pronounced fluting are now referred to as Crowfield points (e.g. Storck 1984:8-9; Deller and Ellis 1984:45). In fact, the specimen illustrated in Figure 8a could be regarded as a typical example of a Crowfield point (P.L. Storck, personal communication, 1986).

Dalton points are included in the Fluted Point Phase of the Flint Run Paleo-Indian Complex of northern Virginia
(Gardner and Verrey 1979). Cambron and Hulse (1983:38-39) note that this point type usually exhibits basal and lateral edge grinding and is occasionally fluted. Dalton points are unusual in Ohio (Prüfer and Baby 1963:22) so it is significant that this study documented three specimens from Coshocton County. Figure 8b illustrates a specimen which is very similar to the example presented in Cambron and Hulse (1983:38).

Prüfer and Baby (1963:22) proposed the unfortunate phrase "unfluted fluted" to describe a lanceolate projectile point similar to ordinary fluted points in all respects save one. Cambron and Hulse (1983:27) use the less distracting name of "Unfluted Clovis," but the definition is similar. These points may be contemporaneous with fluted points or they may be later. They have been included not to confuse matters, but to avoid ostracizing "the hunter who found himself with a local deposit of chert of such poor quality as to prohibit fluting" (Stuckenrath 1969:84). Seven specimens of unfluted Clovis points have been documented by this research. None are illustrated here.

In the introduction to this research it was stated that an important goal of Paleo-Indian studies should be the search for the antecedents of the Clovis Industry. The data from Meadowcroft Rockshelter suggest that a small, unfluted lanceolate point may be a local precursor to the fluted
point tradition in this part of eastern North America (Adovasio 1983). This rather nondescript point type has been termed the Miller lanceolate point by Adovasio (1983) and his colleagues. In the course of examining local collections for fluted points I observed several specimens of unfluted lanceolate points which bore a resemblance to Adovasio's Miller lanceolate type. Two of these points are illustrated in Figure 9. Although I am not convinced that this form can be identified reliably from surface contexts, I offer these data without comment for future investigators of the pre-Clovis problem to evaluate.

It should be noted at this time that, due to the extremely small sample sizes of non-Clovis fluted point types, the following statistical analyses will exclude these forms. The inclusion of these presumably later styles would only serve to hinder the search for variation within the generalized class of Clovis points.

State or Life history of the point: TECHCD

The state, or life history, of a projectile point is the crucial variable in determining the function of the site from which the point was recovered. Six possible states are distinguished for the purposes of this research. These are labeled "Technology Codes" in the following analyses.

"Bifaces" are large, complete or fragmentary, bifacially flaked blanks with pronounced end-thinning. They represent
an early stage in the manufacturing process, but are not necessarily diagnostic of Paleo-Indian technology (Callahan 1979:91). Therefore, "bifaces" were used as ancillary data only. When fluted points had been documented at a particular locality, associated "bifaces" were also documented in the hope that data on manufacturing processes could thereby be obtained. In this manner, 97 bifaces were recorded. These helped to identify chert processing loci.

The most frequent Technology Code documented in this collection of Coshocton County fluted points was the "reject," or the fluted point fragment which was determined to have been broken during the manufacturing process. These are, for the most part, secondarily thinned bifaces (Stage 4 in Callahan's [1979] terminology) with pronounced end-thinning which may have resulted in a reverse hinge fracture. Rejects may be regarded as diagnostic of Paleo-Indian technology (Callahan 1979:15; see also Nichols 1970). One hundred and three Paleo-Indian manufacturing rejects were documented by this research. This underscores the importance of this region as a manufacturing center of fluted points (e.g. Prufer 1971:310). A typical example of this type of artifact is illustrated in Figure 10a.

Complete, unbroken fluted points were the next most frequent class of artifact documented. Ninety-six of these specimens were documented. Figures 7a and 7b illustrate this condition.
Fluted points which had been broken-in-use were distinguished from points broken-in-manufacture by the presence of basal and lateral grinding. The grinding is regarded generally as the final stage in fluted point production (Prufer and Baby 1963:11; see also Meltzer 1984:272). Fifty-two fluted points were documented from Coshocton County which were judged to have been broken-in-use. Figures 7c, 7d, 8a, 8b, and 10b illustrate several specimens of fluted projectile points which were broken-in-use.

Twenty-three examples of complete, unfinished points were documented in this collection of Coshocton County fluted points. These "preforms" were identified by the absence of basal and lateral grinding. The remaining 39 points were indeterminable distal or mid-section fragments.

**Projectile point function: FUNCCD**

The variety of settings in which the fluted points documented herein were viewed made it impossible to observe and record systematic observations on use-wear. Nevertheless, certain indications of projectile point function were readily discernable under all conditions and an attempt was made to document these phenomena for subsequent tabulation and analysis. Moreover, the Johnson-Hummrickhouse Museum in Coshocton, Ohio houses a relatively
large sample of local fluted points and it was possible to analyze this collection under controlled conditions. The results of this analysis have been reported elsewhere (Lepper 1984), but they are also incorporated in the following discussion.

The majority of specimens (267 or 67%) exhibited no apparent indications of use. Another 77 (19%) were documented from drawings or photographs and were, therefore, not examined directly. No determination of function was possible in the latter case. The high percentage of seemingly "unused" points reflects two things: 1) only a small sample of points was subjected to microscopic examination, hence many of the other points may have yielded evidence of use-wear if they had been examined under proper conditions; 2) a large percentage of this collection of points are unfinished blanks or preforms. Although use-wear was observed on a few manufacturing rejects, it is likely that most of these specimens represent points which were discarded in the manufacturing process and were never "used." In this regard it is interesting to note that some points broken-in-manufacture had been recycled into other tools (e.g. Figure 10c).

Of the remaining 66 points, 26, or 39% exhibited evidence of unifacial use-wear. This use-wear mode ranged from an isolated cluster of step-fractures on an edge to the intentional production of a "spokeshave" in the edge margin
of a broken or complete projectile point. An example of the latter is presented in Figure 10d. This type of use-wear has been interpreted as a result of whittling or scraping activities (Lepper 1984).

Bifacial rounding and edge damage occurred on another eight specimens. This type of use-wear may have resulted from a sawing or cutting motion (Lepper 1984).

Seven specimens showed distal edge damage, including impact fractures such as the extreme example illustrated in Figure 10b. It is assumed that this use-wear/edge damage reflects the use of these artifacts as projectile weapons of some sort. This observation may seem trivial, but it cannot be assumed that fluted points functioned as projectile points (see Lepper 1983a and 1984).

Eight specimens exhibited evidence of re-use in that more than one type of use-wear/edge damage was identified on the perimeter of the tool. Such a relatively high frequency of multiple usages may indicate that these tools were conceived and designed as general purpose tools.

A surprising number of recycled points was documented in the course of this research (see also Lepper 1986b). Six examples of reworking were documented in this collection of fluted points. One of these points seems to have been reworked recently in an attempt to convert the fluted point into a notched form. The other modifications reflect recycling, either by the Paleo-Indian fluted point makers or
later Indian groups, of broken or exhausted points into gravers, a scraper, or a drill. An example of a point broken-in-manufacture having been reworked into a blunt "graver" is illustrated in Figure 10c. What is interesting about these forms is the emphasis on recycling of material in such close proximity to a source of high quality chert. Technologically "indulgent" (MacDonald 1971:34) strategies would have been expected in an area so close to Upper Mercer chert quarries. A related phenomenon also has been observed in Kentucky by Sanders (1983).

Resharpening was evident on fifteen specimens. This characteristic was noted only when the resharpening was obvious and unambiguous. It undoubtedly underrepresents the actual frequency of the trait in the collection.

**Summary and conclusions**

The purpose of this chapter has been to describe the collection of fluted points which have been documented from Coshocton County, Ohio. The analytical methods used to describe these artifacts have been presented and the various continuous and categorical variables have been defined.

The fluted points documented in the course of this research include 144 generalized eastern Clovis points, two Cumberland points, six Holcombe (or Crowfield) points, three Dalton points, seven unfluted Clovis points, and 248
untypable fragments or manufacturing rejects. Of these 410 total fluted points, 97 are non-diagnostic manufacturing rejects, exhibiting pronounced end-thinning recovered in association with diagnostic fluted points. Another 103 are diagnostic manufacturing rejects, 96 are finished and unbroken fluted points, 52 had been broken-in-use, 23 are unfinished, unbroken fluted preforms, and 39 are indeterminable fragments.

A relatively small percentage of these points were examined for traces of use-wear. A variety of use-wear modes were documented suggesting that fluted points had been used to perform a variety of tasks, but the small sample size limits the usefulness of generalizing from these data.

In the following chapter additional aspects of the Coshocton County fluted points will be described and studied within the framework of two levels of hypothesis testing. First, how similar are these points to fluted points from throughout Ohio, and second, are there any regional patterns in the variation of fluted points across Ohio?
### TABLE 9

Continuous variables used in the analyses

<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXLEN</td>
<td>Maximum length</td>
</tr>
<tr>
<td>MAXWID</td>
<td>Maximum width</td>
</tr>
<tr>
<td>MXWDIS</td>
<td>MAXWID's distance from the base</td>
</tr>
<tr>
<td>BASWID</td>
<td>Basal width</td>
</tr>
<tr>
<td>MAXTHK</td>
<td>Maximum thickness</td>
</tr>
<tr>
<td>MXTDIS</td>
<td>MAXTHK's distance from the base</td>
</tr>
<tr>
<td>BASDEP</td>
<td>Basal concavity depth</td>
</tr>
<tr>
<td>FLTLNO</td>
<td>Length of fluting, obverse face</td>
</tr>
<tr>
<td>FLTLNR</td>
<td>Length of fluting, reverse face</td>
</tr>
<tr>
<td>LATGNR</td>
<td>Length of right lateral grinding</td>
</tr>
<tr>
<td>LATGNL</td>
<td>Length of left lateral grinding</td>
</tr>
<tr>
<td>MINWID</td>
<td>Minimum width (when relevant)</td>
</tr>
<tr>
<td>WTRATIO</td>
<td>Width-thickness ratio (MAXWID/MAXTHK)</td>
</tr>
<tr>
<td>LWRATIO</td>
<td>Length-width ratio (MAXLEN/MAXWID)</td>
</tr>
<tr>
<td>GRNDFAC</td>
<td>Absolute value of LATGNR - LATGNL</td>
</tr>
<tr>
<td>FLTLFAC</td>
<td>Absolute value of FLTLNO - FLTLNR</td>
</tr>
<tr>
<td>FLTNFAC</td>
<td>Absolute value of FLTNNO - FLTNOR</td>
</tr>
</tbody>
</table>
TABLE 10

Categorical variables used in the analyses

<table>
<thead>
<tr>
<th>code</th>
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</tr>
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<tbody>
<tr>
<td>TWNSHP = Township</td>
<td>a</td>
</tr>
<tr>
<td>SITENO = Site number</td>
<td>a</td>
</tr>
<tr>
<td>SPECNO = Specimen number</td>
<td>a</td>
</tr>
<tr>
<td>PHYPRV = Physiographic province</td>
<td>b</td>
</tr>
<tr>
<td>COUNTY = County</td>
<td>b</td>
</tr>
<tr>
<td>PRUFNO = Prufer’s survey number</td>
<td>b</td>
</tr>
</tbody>
</table>
| TECHCD = Technology Code: index to fluted point state | 0 = Biface  
1 = Complete  
2 = Preform  
3 = Broken-in-use  
4 = Reject (broken-in-manufacture)  
5 = Fragment (stage of manufacture unknown) |
| STYLCD = Style Code: index to fluted point variability | 0 = Unknown  
1 = Clovis  
2 = Cumberland  
3 = Holcombe  
4 = Dalton  
5 = Unfluted |
| FUNCCD = Function Code: index to fluted point usage | 0 = No use wear observed  
1 = Distal  
2 = Bifacial  
3 = Unifacial  
4 = Multiple use wear modes  
5 = Reworked  
6 = Resharpened  
7 = No data, specimen not observed |
<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>MELZCD</td>
<td>Meltzer's code: typological scheme devised by Meltzer (1984) to describe the basal morphology of fluted points.</td>
</tr>
<tr>
<td>BASGND</td>
<td>Basal grinding, presence or absence</td>
</tr>
<tr>
<td>BASNIP</td>
<td>Basal nipple, presence or absence</td>
</tr>
<tr>
<td>FLTNOO</td>
<td>Number of flutes, obverse face</td>
</tr>
<tr>
<td>FLTNOR</td>
<td>Number of flutes, reverse face</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Variables pertinent to Coshocton County analysis only.

\textsuperscript{b} Variables pertinent to Ohio analysis only.
FIGURE 7. Clovis fluted points from Coshocton County, Ohio:
a) 0807003.11; b) 1001004.11; c) 0305007.31; d) 0305001.31.
FIGURE 8. Coshocton County fluted points: later point styles: a) 0805004.53; b) 1500003.34.
FIGURE 9. Possible Miller lanceolate points from Coshocton County, Ohio.
FIGURE 10. Coshocton County fluted points: a) 0305004.40; b) 0800010.31; c) 0305002.40; d) 0000008.31.
CHAPTER VI
REGIONAL VARIATION IN OHIO FLUTED POINTS

...the historian communicates a pattern which was invisible to his subjects when they lived it, and unknown to his contemporaries before he detected it (Kubler 1975:13).

Introduction

It is difficult, and not a little arbitrary, to attempt to characterize a fluted projectile point with one or several measurements. These artifacts possess an infinite number of attributes and for each attribute there must have been an optimum value given the intended function(s) of the tool. Moreover, each artifact represents a compromise between these functional constraints, the stylistic norms of the particular culture, and the abilities and inclinations of the individual flintknapper. It may be impossible to isolate, for individual specimens, the affects of each of these factors. However, in a large sample of fluted points the means and modes should reflect the primary functional constraints, whereas the range and variance may inform us about the stylistic and idiosyncratic variability in the sample.

The descriptions of fluted points, upon which subsequent comparisons are based, are divided into three parts:
1) Morphological attributes (e.g., size and shape) of the projectile points are discussed. This is the most purely descriptive section of the analysis.

2) Variables pertinent to the fluting technology are identified and discussed.

3) Finally, the presence and extent of basal and lateral grinding is noted and discussed.

Meaningful statements about Paleo-Indian land use in the central Muskingum River basin relative to the rest of Ohio depend on comparing fluted projectile points from Coshocton County with fluted points from the rest of the state. In order to achieve simultaneously the goals of describing the fluted points from the study area and comparing the variability within this region to Ohio as a whole the data will be presented in the form of a series of parallel schematic plots (see Chapter III).

The regional variability within Ohio fluted points is examined within the context of two propositions regarding Paleo-Indian land use:

1) Coshocton County was the center of the Paleo-Indian occupation of Ohio because it served as the primary source of chert for these populations; and, 2) the Appalachian Plateau physiographic region was avoided by Paleo-Indians except for brief forays into Coshocton County for the express purpose of procuring Upper Mercer chert.
General morphology: Coshocton County fluted points

Size

The general category of size includes the attributes of maximum length, maximum width, basal width, and maximum thickness. Various authors have proposed that variability in size reflects different temporal styles of fluted points. Gardner and Verrey (1979) are the strongest and most recent proponents of this view. Gardner and Verrey (1979:33) classify long and narrow points as Clovis, and short and wide points as "Middle Paleo." Based on these assertions we would expect to see bimodal distributions in the various measures of size. Meltzer (1984) has indicated that, in a large sample of fluted points from throughout eastern North America, there is no evidence for bimodality and that much of the variability in size probably relates to the life history of the points (Meltzer 1984:284). Gardner and Verrey (1979:17-18) acknowledge this, but regard the effects of "life history" as subordinate to the stylistic variability they were able to demonstrate at Thunderbird.

Gardner and Verrey (1979) offer two subsidiary hypotheses which incorporate the effects of life history and site function:

...the greater the distance from the quarry and its associated base camp, the less likely it is for a point to closely resemble its original appearance (1979:17);
...projectile points from sites well away from the quarry, such as outlying hunting camps, would be expected to show greater departure from the norm (1979:16).

Therefore, in addition to the expectation of bimodality, Gardner and Verrey (1979) would expect Coshocton County fluted points to be larger than those from the rest of the state.

Basic statistical descriptions of the fluted points reported from Coshocton County, Ohio are presented in Table 11. A large sample of Ohio fluted points have been reported in the Survey of Ohio fluted points (e.g. Prufer 1960b and etc.). These data were used to provide the basis for comparison with the Coshocton County data. Complementary descriptive statistics for Ohio fluted points are presented in Table 12. The Ohio data incorporate certain modifications and some corrections which were provided by O.H. Prufer (personal communication, 1978). These are summarized and explained in Table 13.

The data from Coshocton County yielded no evidence of bimodality in projectile point size. Instead, these variables tend to be normally distributed with a few exceptionally large specimens "pulling" the mean towards a higher value. Moreover, there is no appreciable difference between fluted points from Coshocton County and fluted points from the rest of Ohio (see Figures 11 - 14).
Shape

The second aspect of general projectile point morphology is the overall shape of the point. The variables which will be considered under this heading are the distance from the base to the point of maximum width and to the point of maximum thickness, the depth of the basal concavity, the minimum width of the specimen (when there was a constriction above the base), and the length/width and width/thickness ratios.

The distance from the base to the point of maximum thickness and the point of maximum width are highly variable (see Table 11 and 12) and presumably relate to the peculiarities of the particular piece of flint the Paleo-Indian knapper had to deal with. It was thought that the distance to the point of maximum width would be sensitive to the distinction between triangular points versus points with a convex edge margin (Prufer and Baby 1963:15-17), however, this distinction may simply relate to resharpening and reuse (Roosa 1965; Meltzer 1983).

There is wide variability in the depth of basal concavity for Coshocton County fluted points. The interpretation of this variability is ambiguous since it could be a by-product of technological processes (Judge 1973:172) or a consequence of significant stylistic diversity. The Ohio and Coshocton County specimens
certainly do not exhibit the exaggerated basal concavities such as have been documented at Debert (MacDonald 1968:71) and Vail (Gramly 1962:24-25, 29). There is some suggestion that qualitative attributes of the basal concavities may be more helpful in isolating stylistic or idiosyncratic variation (e.g. Meltzer 1983:289). This will be discussed at greater length below. Given the wide variability in the basal concavity depth measurements the schematic plots for Coshocton County and Ohio show a remarkable degree of similarity (see Figure 17).

Minimum width

The minimum width of a specimen refers to the presence of a constriction in the basal portion of the lateral edge margins. The measurement is primarily associated with the Cumberland fluted point, although it is not restricted to this type. A preliminary examination of Figure 18 suggested that the constrictions on Coshocton County specimens were significantly shallower or less pronounced than in the Ohio sample. This was interesting because in regard to all other measurements Coshocton County fluted points had proven to be indistinguishable from other Ohio specimens. Upon closer inspection of the data, however, it became evident that the sample sizes made any such conclusions tenuous and unreliable. Only six specimens from the Ohio collection and
22 from the Coshocton County sample exhibited constrictions (excluding classic Cumberland points from both samples).

Length/width ratio

Gardner and Verrey (1979:32) have used the length-width ratio as an index of the over-all shape of a fluted point. A high ratio indicates a long, narrow point and a low ratio describes a short, wide point. They assert that the length-width ratio can distinguish between long and narrow Clovis fluted points and a shorter and wider type which they have designated "Middle Paleo" points (Gardner and Verrey 1979:32). These authors argue that the two types of fluted point represent distinct, temporal sub-phases with wide geographic applicability (Gardner and Verrey 1979:43).

No evidence of bimodal size differentiation in the length-width ratio was observed in the Ohio and Coshocton County data (see Figure 19). This suggests that the sub-phases defined by Gardner and Verrey (1979) may not be applicable to Ohio.

A comparison of Coshocton County fluted point length-width ratios with those from the rest of Ohio suggests that Coshocton County fluted points may be slightly shorter and narrower than the sample of Ohio fluted points (Figure 20). The differences are so slight, however, that the distinction would not prove to be statistically significant.
Width/thickness ratio

Width-thickness ratios describe the overall cross-section of the projectile points. Gardner and Verrey (1979:32) have also used this calculation to differentiate between Clovis sub-phase points from Middle Paleo points. Clovis points are suggested to be thinner generally in relation to thickness than Middle Paleo points.

Once again, there is no evidence that such a distinction exists in the Ohio and Coshocton County fluted point sample. Figure 21 suggests that the distribution of this variable in the pooled Ohio sample is unimodal although skewed towards generally wider and thinner points. Figure 22 reflects the same pattern evident in Figure 20. Ohio and Coshocton County fluted points are very similar in shape. The Ohio sample appears to be slightly wider and thinner, but this is due to the effects of a few far out values representing specimens which are extremely wide and thin.

Fluting technology

The attribute of fluting is the *sine qua non* of the fluted point tradition and yet there is little agreement in how the term is applied or interpreted. Callahan (1979) has suggested that the term "flute" be restricted to "that last flake or series of flakes intended to become the actual hafting accommodation scar" (1979:15). This definition
excludes early stage bifaces with marked end-thinning which resembles fluting, but which is not diagnostic of Paleo-
Indian technology. Unfortunately, it does nothing to separate "true" fluted points from points which are merely "basally thinned." This remains a subjective determination. For example, Tunnell (1977:144) and Meltzer (1984:268) both express the intent to exclude basally thinned points from their analyses of fluting technology. Meltzer (1984:268) excludes Holcombe points on these grounds, whereas Tunnell (1977:144) does not. For the purposes of this analysis, I have chosen arbitrarily to include Holcombe points. The few examples documented from Coshocton County possess well-
developed flutes, although Roosa (1977:98) implies that this very fact indicates that the specimens are not Holcombe points. Perhaps it would be better to classify these fluted variants as Crowfield points.

The interpretation of "flutes" and fluting technology is as subjective and inconsistent as could be expected given the lack of agreement on basic terminology. Gardner (1974) and Gardner and Verrey (1979:15) argue that flute attributes, such as the number of flutes and their lengths, "differ widely from point to point, likely varying as a result of idiosyncratic differences" (Gardner and Verrey 1979:19). Their apparent dismissal of these attributes is belied by their assertion that "Middle Paleo" points are
characterized by "more marked fluting" (Gardner and Verrey 1979:15).

Roosa (1965 and 1977) long has argued that fluting techniques are critical for identifying fluted point types. Moreover, Roosa (1977:87-88) has suggested that the number and length of flutes are the simplest index to the fluting techniques utilized for particular points or assemblages. In the more recent reference, Roosa (1977) appears to differentiate three distinct fluting techniques: Folsom, Clovis, and Enterline. Folsom type fluting is defined as "well-centered single fluting that is 30 to 40 mm long or longer..." (1977:87). Clovis fluting is observed to vary from 10 to 46 mm in length with a mean of 25.11 mm (1977:88). Finally, Enterline fluting (Witthoft 1952) is defined as multiple fluting ranging from 16 to 26 mm in length with a mean of 21.7 mm (Roosa 1977:88).

The length of fluting on Ohio fluted points varies from 14 to 68 mm with a mean of 30.4 mm (see Table 12). Following Roosa, these numbers would suggest that a large proportion of the sample reflects the Folsom fluting technique. Prufer and Baby (1963:9), however, claim that Folsom fluting is rare in Ohio.

The Coshocton County sample corresponds closely to the figures for Clovis: the range of flute lengths on the obverse face is from 7 to 49 mm with a mean of 25.5 mm (see Table 11). This would seem to corroborate Prufer and Baby's
(1963) observation for Ohio in general, however, most of the fluted points from Coshocton County have single, well-centered flutes (see Table 11). Moreover, basal nipples, a hallmark of the Folsom fluting technique (Prufer and Baby 1963:9), are quite common on unfinished specimens. They were present on 25 percent of all specimens which were broken-in-manufacture.

Meltzer (1984) has argued that the number of flutes on a particular specimen is a function merely of the thickness of the preform. In other words, the number of flutes on a given point will reflect the quality of the raw material, the competence of the flint knapper, and various other factors.

In spite of the apparent difference between Ohio and Coshocton County fluted points suggested by the mean values for flute length, the schematic plots presented in Figures 23 and 24 indicate that the differences are not profound. Figure 25 is a schematic plot of the difference in flute length between the obverse and reverse faces of Coshocton County and Ohio fluted points. This "Flute length factor" indicates that flute lengths tend to be quite variable from face to face on the same point. The distribution of this variable is nearly identical for Coshocton County and Ohio (see Figure 25).

The number of flutes per face varies between zero and five for both Coshocton County and Ohio fluted points (see
Tables 11 and 12). Ohio fluted points have a slight tendency towards more flutes per face although the schematic plots comparing the values for Coshocton County with Ohio fluted points demonstrate that this difference is minimal (Figures 26 and 27).

The "Flute number factor" is a value developed to examine the difference between the number of flutes on the obverse face and the number of flutes on the reverse face. A value of zero would indicate that both faces had the same number of flutes. Both Coshocton County and Ohio fluted points exhibit a mean value of .8 and a median of 1.0 (see Tables 11 and 12 and Figure 28). This indicates that there is a tendency for one face to have one additional flute relative to the other. The mode for both distributions, however, is zero and a difference of more than two flutes from one face to another is extremely rare.

**Basal and lateral grinding**

Basal and lateral grinding are recognized generally as diagnostic attributes of finished fluted projectile points. A variety of studies have indicated that this edge grinding was the final step in the manufacture of fluted points (e.g. Tunnell 1977:151; Prufer and Baby 1963:11), but the function of the grinding is not well understood. The generally accepted interpretation is that the grinding
functioned to dull the edges of the points so that the
binding material would not be severed during the vigorous
use of the point as a knife or thrusting spear (Shetrone
1936:16; Witthoft 1952:484; Mason 1958:9). Alternative
interpretations have been presented by Judge (1973:263-265)
and Roosa (1977:88).

The length of right lateral grinding on Coshocton County
fluted points ranges from 9 to 36.5 mm with an average of
22.5 mm, whereas the same measure on Ohio fluted points
ranges from 11 to 51 mm with a mean of 25.3 mm (see Tables
11 and 12 and Figure 29). The grinding on the left
lateral margin reflects a similar pattern (Figure 30).
These figures suggest that Ohio fluted points tend to be
more extensively ground on the lateral margins than
Coshocton County points. However, it is likely that this is
a simple reflection of the tendency for Ohio fluted points
to be somewhat longer in general than Coshocton County
fluted points (see Figure 11). To test this idea I divided
the mean values for right lateral grinding into the
corresponding mean values for maximum length. The result
should be a rough index to the average proportion of the
total lateral edge margin which is ground. Coshocton County
fluted points have approximately 40% of the lateral edge
margin ground. Ohio fluted points have approximately 41% of
the edge margins ground. This suggests that there is no
difference between the degree of edge grinding between the two samples.

The "grinding factor" is the result of a calculation which describes the difference between the extent of right lateral grinding versus left lateral grinding. There is a tendency for the grinding to be equal on opposing edge margins. The values for both Coshocton County and Ohio fluted points indicate that the difference between right lateral and left lateral grinding seldom exceeds 4 mm (Tables 11 and 12 and Figure 31).

Basal grinding is present almost invariably on fluted points which have been laterally ground. There are no more than two or three exceptions to this rule in the combined Coshocton County and Ohio samples. Basal grinding presumably functions to dull the basal edge so that it does not split or damage the haft when pronounced distal pressure is applied. Some basal grinding is a result of platform preparation related to basal thinning and fluting, however, the extent and degree of basal grinding on most finished specimens precludes this as a general interpretation of this variable.
Stylistic and Idiosyncratic Variability

A brief comparison of Table 11 with Table 12 and a cursory examination of the accompanying figures will demonstrate that, on this level, Coshocton County fluted points are indistinguishable statistically from other Ohio fluted points. More surprising, perhaps, than the similarity in means is the close correspondence between the standard deviations and the coefficients of variation tabulated in Tables 11 and 12. It might have been expected that the more limited geographic range of the Coshocton County sample would have limited the degree of variation between specimens from within the county, but this does not appear to be the case.

There are three possible interpretations of the similarities observed between the Coshocton County and Ohio samples:

1) The homogeneity in Ohio fluted points reflects a socio-cultural homogeneity in the Paleo-Indian populations which produced these artifacts;
   a) the homogeneity is "real" and the range of variation in the Coshocton County sample reflects the range of variation in the Ohio sample because the material culture of the resident Paleo-Indian groups was homogeneous;
b) Paleo-Indian material culture is actually very heterogeneous within Ohio and the apparent homogeneity between the Ohio and Coshocton County samples is a result of groups from throughout Ohio converging on Coshocton County in order to utilize the deposits of Upper Mercer chert in the manufacture of fluted points. Therefore, the Ohio sample represents an aggregate of diverse regional "styles" of fluted points and the Coshocton County sample is a similar aggregate of the same diverse styles. Statistically, these conglomerate samples would appear homogeneous;

2) The metric attributes recorded in this study are poor indicators of stylistic variability and the apparent morphological homogeneity reflects techno-functional constraints involved in the production of fluted projectile points unrelated to socio-cultural variability.

The definition of stylistic variability within a class of lithic projectile points, such as Clovis fluted points, is a thorny problem. Straus (1976) concluded, after a detailed metrical analysis of Upper Paleolithic Solutrean points from Cantabrian Spain, that there was no clear indication of
...territorially defined stylistic differences, though the Solutrean groups were no doubt socially organized along territorial lines. Standardized point morphology was probably largely determined by function and hafting method (Straus 1976:342).

Wilmsen (1974; Wilmsen and Roberts 1978) concluded, from a study of Folsom fluted points from the Lindenmeier Site in Colorado, that the metric attributes of these points are

...constrained by the requirements of hafting, the ability to withstand bending stresses upon impact, and the factors influencing piercing effectiveness. Point dimensions are therefore considered to be functional variables (Wilmsen and Roberts 1978:170).

Given the unique situation at the Lindenmeier Site, Wilmsen was able to demonstrate variability between points from two discrete loci within the site which he interpreted as stylistic (Wilmsen 1974; Wilmsen and Roberts 1978:145). These attributes included the type of retouch scar, the pattern of retouch, the direction of retouch, the frequency of fluting and the shape of the projectile point. Wilmsen found that there were statistically significant differences between the Folsom points from two separate areas of the Lindenmeier site and concluded that these differences reflected distinct social groups.

These results are provocative, but the methods are not suited to the present research for two reasons. First, Wilmsen's (1974) study dealt with Folsom points. This projectile point type is more specialized than the earlier
Clovis point and is characterized by finer workmanship (e.g. Wormington 1957:263). The fine pressure retouch of the edge margins, which Wilmsen (1974 and Wilmsen and Roberts 1978) found to be so rich with stylistic meaning, is not present on Clovis points. Second, Wilmsen's sample of points was excavated from a site context and therefore the artifacts were recovered with controlled spatial and temporal proveniences. In essence, Wilmsen's variability came prepackaged in "social" units. Moreover, a sufficiently large number of finished specimens were recovered from each area to enable Wilmsen to distinguish statistically reliable patterns of variability. This fortuitous combination of factors has not been replicated in Ohio.

Meltzer (1984) has addressed the need for the development of a stylistic classification of eastern fluted points. Utilizing collections of these artifacts from across the eastern United States, Meltzer (1984:264-265) first attempted to isolate attributes which were non-functional, or stylistic according to Dunnell's (1978:199) usage of the term. He eventually used a series of four qualitative attributes including the lateral edge morphology of the haft region, flute scar morphology, basal morphology, and corner morphology (Meltzer 1984:291-293, 300-301).
Applying this classification system to his sample of fluted points Meltzer (1984:306) produced 15 large classes which he interpreted as "important stylistic classes" (1984:303). The distribution of these classes was then plotted on maps of the eastern United States. The goal here was to observe spatial patterning in the distribution of classes and to relate these patterns to geological features of known age (Meltzer 1984:266). The result was a stylistic classification which was "sensitive to temporal and spatial variability" (1984:264). This classification scheme, with some modifications, is presented in Table 14.

The four most frequently documented classes in Meltzer's (1984:308) study were as follows:

1221: parallel-sides with flake fluting, elliptical base and no ears (N=51);
1232: parallel-sides with flake fluting, circular base with ears projecting downward (N=44);
2132: tapered-sides with blade fluting, circular base with ears projecting downward (N=35);
1222: parallel-sides with flake fluting, elliptical base with ears projecting downward (N=27).

These are also four of the six most frequently documented classes in Meltzer's (1984:308) sample of Ohio fluted points. This is not surprising since Ohio contributed more
specimens to Meltzer's (1984:308) sample than any other state.

Parallel-sided, flake fluted points with shallow basal concavities (classes 1221 and 1222) were "the most abundant and widespread of all the large classes" (Meltzer 1984:327) in Meltzer's study. This morphology conforms to the classic eastern Clovis point and it has a "pan-eastern" distribution (Meltzer 1984:327). These classes are, however, concentrated in the unglaciated portion of eastern North America and are absent in areas that were deglaciated in the very latest Pleistocene (Meltzer 1984:337-338). Based on these facts, Meltzer (1984:337) has concluded that these classes represent the "basement" cultural occupation in eastern North America.

In contrast, fluted points characterized by blade fluting, deep circular basal concavities, and downward projecting ears (classes 1132, 2132, and 3132) are concentrated in the northernmost regions of the eastern United States. These classes are believed to be later than the classic eastern Clovis type (Meltzer 1984:339) and the radiocarbon dates for the Debert and Vail sites tend to support this conclusion (see Table 1).

Finally, the diagnostic Cumberland and Cumberland-like fluted points (classes 4123 and 4133) have a very restricted spatial distribution centered on Tennessee and Kentucky (Meltzer 1984:332-334). Moreover, they "lack significant
overlap with other classes" (Meltzer 1984:339). These patterns are suggestive of synchronic stylistic variability and Meltzer (1964:343) suspects that this point form will prove to be a variety of late Paleo-Indian/early Archaic projectile point broadly contemporaneous with Dalton, Quad, Hardaway, Suwanee, and Simpson points (Meltzer 1984:342).

In an effort to study the stylistic variability in the large sample of fluted points documented herein from Coshocton County, Meltzer's (1984) classification scheme was applied to both the Coshocton County sample and the Ohio data recorded in Pruner's Survey of Ohio fluted points. The results are interesting, but problems were encountered in applying this system to data which had not been collected with such an analysis in mind. The compromises necessary to effect the classification are reflected in Table 14 and should be kept in mind before drawing broad comparisons and conclusions between these results and Meltzer's (1984) study.

The five most frequently documented classes within the collection of fluted points from Coshocton County were as follows (see Table 15):

1122 (and 1622): parallel-sides with blade fluting, elliptical base with ears projecting downward (N=20);
1222 (and 1722): parallel-sides with flake fluting, elliptical base with ears projecting downward (N=14);
2122 (and 2622): tapered-sides with blade fluting, elliptical base with ears projecting downward (N=11);
2121 (and 2621): tapered-sides with blade fluting, elliptical base but no ears (N=9);
4123 (and 4623): incurvate-sides with blade fluting, elliptical base with ears projecting outward (N=9).

The four most frequently documented classes in Prufer's Survey of Ohio fluted points reflect the same general trends (see Table 16):

1122: parallel-sides with blade fluting, elliptical base with ears projecting downward (N=27);
2122: tapered-sides with blade fluting, elliptical base with ears projecting downward (N=16);
1222: parallel-sides with flake fluting, elliptical base with ears projecting downward (N=15);
4123: incurvate-sides with blade fluting, elliptical base with ears projecting outward (N=11).

Comparing these results with the results and conclusions of Meltzer's (1984) analysis leads to some general observations:

1) The most common class in Meltzer's (1984) study is 1221, while the most common class in Coshocton County and Ohio is 1122. Meltzer has suggested that the combined classes of 1221 and 1222 represent the
"basement" Paleo-Indian cultural occupation in the eastern United States and that blade fluting with downward pointing ears were later technological innovations (Meltzer 1984:340).

2) In both Coshocton County and Ohio, the "pan-eastern" class of 1222 is very well represented. This form is concentrated in the southeastern United States (Meltzer 1984:328).

3) Point forms characteristic of the extreme northeastern United States, classes 1132, 2132, and 3132 are relatively uncommon in Coshocton County (N=7) and in the collection of Ohio fluted points (N=9). However, it should be noted that Meltzer (1984:308) identified 18 of these forms in his sample of 62 Ohio fluted points.

4) The Cumberland and Cumberland-like forms included in class 4123, which tend to be restricted in their distribution to the southeast, are relatively common in Coshocton County (N=9) and Ohio (N=11).

These observations support two general conclusions:
1) The Early Paleo-Indian occupation of the central Muskingum River basin was temporally intermediate between that of the southeastern and northeastern United States. This time transgressive relationship possibly represents a migration of peoples northward following in the wake of the Pleistocene ice sheets. This need not imply absolute contemporaneity with glacial margins, but may reflect the time transgressive development of preferred habitat types.

2) In the later periods of early Paleo-Indian prehistory, cultural developments in Ohio were more closely tied to what was happening in the southern United States. Ohio, in general, and the unglaciated regions in particular, did not participate extensively in the late specializations of the northern fluted point makers.

It must be emphasized that these conclusions are general and tentative. They are, however, based on the best available data and will provide the framework for subsequent analysis and discussion.

Before leaving the subject of stylistic variability in fluted projectile points I wish to note the possible occurrence, in the Coshocton County data, of what Roosa (1977:94) has termed "style groups." I have observed, at
three separate sites, similarities within very small sets of fluted points which could not be demonstrated to be statistically significant, but which nevertheless give the impression of having been "made by a single individual, at about the same time, and from similar or identical material" (Roosa 1977:94).

The first style group consists of two short, stubby fluted points with deep, rounded basal concavities from the Mohawk Church site (0808003.11 and 0808004.11). The length/width ratios are 1.70 and 1.71 and the basal concavity depths are 6.0 and 6.5 mm respectively. They have been crafted from high quality chert with a vitreous luster and appear to have a random flaking pattern (Crabtree 1972:86).

The second style group consists of three points from the Wolfe site crafted from the same cream-colored chert with a pearly luster (1902002.11, 1902003.11, and 1902004.11). These points are proportionately long and narrow with shallow, gently curving basal concavities and a regular parallel flaking pattern (Crabtree 1972:80). The length/width ratios are 2.67, 2.34, and 2.0 and their basal concavity depths are 2.0, 4.0, and 3.5 mm respectively.

The third style group consists of one complete point and one basal fragment from the Chili Fort site (2201001.11 and 2201002.31). These specimens have shallow, nearly V-shaped basal concavities of 2.5 and 3.5 mm respectively. They have
sharply pointed ears which project slightly outward. The raw material represented by these points is generally dull and grainy and the flake scars are therefore somewhat indistinct.

It would be difficult to come to any far-reaching conclusions based on these small samples, but they do support the general notion that clusters of projectile points with no provenience beyond that of the agricultural field from which they were collected, may represent single occupation loci. Also, the small number of finished points from these sites and their morphological homogeneity suggests that the social groups occupying the sites were small, perhaps nuclear families, small task groups, or small bands with a single flintknapper.

**Ohio fluted points: regional variation**

Ohio can be divided into a variety of artificial and natural regions for analytical purposes. This study will examine two alternative divisions based on a set of hypotheses which Prufer (1963b; 1971) and various collaborators (Prufer and Baby 1963; Seeman and Prufer 1982) have proposed to explain Paleo-Indian land use patterns in Ohio. The analytical units are based ultimately on county-level frequency data. The construction of "natural" units from "artificial" ones entails a certain clumsiness which is
reflected in the inaccuracy of the unit boundaries. This must be kept in mind when examining the following figures and tables.

The first hypothesis which will be considered is the assertion of Seeman and Prufer (1982:158) that the Upper Mercer chert quarries in Coshocton County constituted the center of the Paleo-Indian land use pattern in Ohio. A similar hypothesis lies at the heart of the Flint Run Paleo-Indian settlement model proposed by Gardner (1974 and various later references) and his associates. The primary expectation of this model for regional variability in fluted point morphology may be summarized as follows:

...the greater the distance from the quarry and its associated base camp, the less likely it is for a point to resemble its original appearance (Gardner and Verrey 1979:17).

In other words, it could be expected that fluted points recovered from contexts of increasing distance from the raw material source would be shorter than points recovered at or near the chert quarries due to the combined effects of resharpening, reworking, and recycling. In order to test this hypothesis Ohio was divided into zones of increasing distance from Coshocton County and variability in fluted point morphology was examined across these zones.

Prufer (1963b:28), Prufer and Baby (1963:24), and Seeman and Prufer (1982:161) have presented interpretations of Paleo-Indian land use which relate the activities of these
late Pleistocene hunters to physiographic variability. Therefore, physiographic provinces were important analytical units for considering the regional variability in fluted point morphology. Therefore, the Ohio data have been divided into physiographic units and a variety of figures and tables are used to compare these data. The Coshocton County data not included in Prufer's Survey of Ohio Fluted Points have been eliminated from this sample.

**Coshocton-centered model**

At present, the single most important variable in the Ohio distribution would appear to be proximity to high quality cryptocrystalline resources, specifically the Upper Mercer flint deposits of Coshocton County, Ohio (Seeman and Prufer 1982:158).

Seeman and Prufer (1982:158) argue that Coshocton County is the center of the distribution of fluted points in Ohio and present three alternative explanations for this pattern. First, they suggest that the abundance of fluted points in the vicinity of Coshocton County may reflect the discard of manufacturing rejects, although they point out that "most of the points are finished artifacts" (Seeman and Prufer 1982:159). Their second suggestion is that points "expended" in hunting were less frequently recovered "in an area close to an unlimited supply of raw materials" (1982:159). The idea here is that Paleo-Indian groups near quarries could afford to be economically "indulgent"
(MacDonald 1971:34). Finally, Seeman and Prufer (1982:159) acknowledge that the high density of fluted points in Coshocton County may be a reflection of more intensive hunting activities by Paleo-Indian groups in this area. They argue that this

...probably does not imply greater exploitative potential in the area but simply reflects support activities as groups continue to exploit the quarries over time (Seeman and Prufer 1982:159).

Seeman and Prufer (1982:159) and Gardner and Verrey (1979:17) present certain predictions, or test implications, based on the proposition that high quality chert resources constituted the hub of the Paleo-Indian settlement pattern. These relate to expected changes in projectile point morphology with increasing distance from the chert source, in this case, the Coshocton County Upper Mercer quarries.

Figure 32 presents the division of Ohio into three zones of increasing distance from Coshocton County. Table 11 presents the summary statistics for Coshocton County fluted points and Tables 17 through 19 present comparable data for the three concentric zones defined in Figure 32. The data were obtained from the Survey of Ohio fluted points (e.g. Prufer 1960b) incorporating modifications which are outlined in Table 13.

Seeman and Prufer (1982:159) and Gardner and Verrey (1979:17) imply that fluted points recovered in close proximity to the source of raw material will be longer than
points recovered at increasing distances from that source. Assuming that the Upper Mercer quarries of Coshocton County are the source in Ohio (Prufer and Baby 1963:45) then this hypothesis may be refuted. Figure 33 is a series of parallel schematic plots which demonstrate graphically that, apart from four far out values, there is a slight tendency for fluted points to increase in length with increasing distance from Coshocton County. A comparison of length/width ratios (Figure 34) reflects the same general trend in length, but demonstrates a relatively high degree of homogeneity in overall shape.

Figure 35 appears to suggest that Coshocton County fluted points are relatively narrower and thicker than the samples from any of the zones of increasing distance away from Coshocton County. There is no apparent trend in this variability and it is interesting to note that this difference was not apparent in the comparison of Ohio and Coshocton County fluted points (Figure 22).

Turning now to attributes with less functional significance the possibility that stylistic variability might correlate with increasing distance from Coshocton County will be examined. Basal concavity depth has been proposed as a likely indicator of stylistic variation in fluted points. Figure 36 presents parallel schematic plots for basal concavity depth which indicate no tendency for systematic variation in this attribute.
Tables 11, 14, 15 and 16 were examined for other attributes which might reveal interesting patterns of variation. Figure 37 illustrates the tendency for the number of flutes on the reverse face of fluted points to increase with increasing distance from Coshocton County. The interpretation of this pattern is unclear, especially since the median values are identical for Coshocton County and the three increasingly distant regions.

These data indicate that the hypothesis that fluted point length will decrease from Coshocton County outward must be rejected. The demonstration of the contrary pattern is interesting and suggests either that Coshocton County is not the center of the Paleo-Indian exploitation of Upper Mercer chert and that other centers are disrupting the expected pattern, or, that Gardner and Verrey's (1979:17) "law" is not generally applicable.

Physiographic variability model

Following Prufer (1963b:26-29) and Prufer and Baby (1963:24,62), Seeman and Prufer (1982:161) presented two propositions concerning the relationship between physiographic variability and Paleo-Indian land use. Based on their interpretation of the distribution of fluted points in Ohio and other eastern states, they asserted that Paleo-
Indian land use might be characterized by the following:

1) "avoidance of extensive lowlying areas"
2) "avoidance of heavily dissected topography"

(Seeman and Prufer 1982:161).

Seeman and Prufer claim that

...these situations were not conducive to Paleo-
Indian subsistence, either because the prey
itself was not present in high densities or
that particular features conducive to successful
hunting were absent (1982:161).

The abundance of fluted points documented from Coshocton
County represent an apparent exception to the second "rule", but Prufer (1971) has interpreted this as "a reflection of
the raw material situation in this area" (Prufer 1971:310).

He implied that Paleo-Indian land use in the Ohio
Appalachian Plateau was directed soley towards the
procurement of high quality Upper Mercer chert from quarries
in Coshocton County. Artifacts were manufactured at
workshop sites such as the Welling site (Prufer and Wright
1970) and the finished products were exported to other
regions holding "primary ecological attractions" (Prufer

This reconstruction is supported by three observations:

1) there are a large number of unfinished fluted
points documented from Coshocton County;
2) "such rejects are uncommon to the point of extreme
rarity in the remainder of the state";
3) "nearly 50% of all Ohio fluted points whose raw material has been identified are made of Upper Mercer and related flint from..." the Walhonding and Tuscarawas river valleys in Coshocton County (Prufer 1971:310).

In terms of Ohio physiographic variability and fluted point distributional patterns, these various arguments suggest several things:

1) fluted points should be infrequent in the Lake Plains;
2) fluted points generally should be infrequent in the Appalachian Plateau;
3) fluted points which have been broken in the manufacturing process should be abundant in the Appalachian Plateau;
4) fluted points which have been broken in the manufacturing process should be rare in other physiographic regions;
5) fluted points which have been broken-in-use should be most frequent in those regions which possessed "primary ecological attractions" (Prufer 1963b:29);
6) complete fluted points should be longer in the Appalachian Plateau region (see Gardner and Verrey 1979:17 and Seeman and Prufer 1982:159).
One further proposition is derivable from a synthesis of the conclusions of Prufer and Baby (1963), Seeman and Prufer (1982), and Gardner and Verrey (1979). If the Lake Plains were uninhabitable, inaccessible, or avoided until late in the period of Paleo-Indian occupation (Prufer and Baby 1963:55 and Seeman and Prufer 1982:161), and if there is a "Middle Paleo" component in Ohio defined on the basis of short and stubby fluted points with more marked fluting which post-dates the Clovis occupation (Gardner and Verrey 1979), then

7) the morphology of fluted points recovered from the Lake Plains should reflect a preponderance of short, stubby fluted points with more marked fluting.

Figure 38 presents the division of Ohio into physiographic regions. Tables 20 through 23 present summary statistics for fluted points documented from each of the four regions. A simple graphic test of propositions 1 through 5 is presented in Figure 39. Fluted points illustrated in Prufer's Survey of Ohio Fluted Points were classified as complete, unbroken and unfinished, broken-in-use, broken-in-manufacture, or indeterminable fragment. Determinations of finished/unfinished and broken-in-use/broken-in-manufacture were based on the presence or absence of lateral grinding (see above discussion). The
distribution of these various classes was then compared across the Ohio physiographic regions (see Figure 39).

It is evident from an examination of Figure 39 that fluted points are relatively infrequent in the Lake Plains physiographic region (see also Tables 20 - 23). This area has yielded the fewest specimens of every class except preforms and the overall frequency of documented preforms is so low that this apparent exception may only relate to sampling bias. It must be noted, however, that the Lake Plains is the smallest physiographic region in Ohio. If points per unit area were considered, the values for the Lake Plains would exceed those of the Unglaciated Plateau. On the other hand, the Lake Plains region has been cultivated extensively while the Unglaciated Appalachian Plateau is largely uncultivated (Lepper 1983c).

Fluted points actually are numerous in Ohio's Appalachian Plateau (cf. Lantz 1984). The Unglaciated Appalachian Plateau has yielded a relatively low overall frequency of fluted points, however, this region is sparsely populated and, as already mentioned, largely uncultivated (Lepper 1983c; 1983d). The Glaciated Appalachian Plateau, as of 1964 (Prufer 1964), had produced a large number of points. Based on an examination of Figure 39, which includes only fluted points for which metric data have been published, this region has the highest number of points per
hectare. Prufer and Baby's (1963) more inclusive tally, however, indicates that the Till Plains have the highest density of fluted point finds (Lepper 1983d:282).

Fluted points which have been broken in the manufacturing process and preforms are drastically underrepresented in this collection of specimens. This certainly relates to the fact that virtually all of these finds were reported by amateur archaeologists and artifact collectors who might not recognize or appreciate manufacturing rejects. Nevertheless, it is evident from this sample that the overwhelming majority of such points have been documented from the Appalachian Plateau. This general region seems to have served as a manufacturing center of some sort.

Although Paleo-Indian chert processing activities seem to have been centered in the Appalachian Plateau, especially the Glaciated Appalachian Plateau, a cursory examination of Figure 39 indicates that land use in this region was not limited to artifact manufacture. Fluted points which have been broken in use are most densely concentrated in the Glaciated Appalachian Plateau. This fact indicates that these artifacts are not only being crafted in this region, but that they were being used heavily here as well. Following Prufer's (1963b:29) logic, the Glaciated Appalachian Plateau must have been the region which
possessed the "primary ecological attractions" for Paleo-
Indian populations.

It has already been documented that fluted points from
Coshocton County are not longer than points from
increasingly distant zones. The hypothesis that fluted
points from the Appalachian Plateau will be longer than
points from other physiographic regions is based on the same
principle; however, it acknowledges that Upper Mercer chert,
the chert most commonly used by Paleo-Indian flintknappers
(Prufer and Baby 1963:45), is not restricted to Coshocton
County, but outcrops throughout the Appalachian Plateau

The parallel schematic plots in Figure 40 suggest that
fluted points are longer in the Unglaciated Appalachian
Plateau than fluted points in other physiographic regions.
This observation would tend to support the proposition that
the region was a manufacturing center and that fluted points
will diminish in size, through breakage and/or resharpening,
with increasing distance from the raw material source
(Gardner and Verrey 1979:17). Unfortunately, this variable
is not amenable to such a simplistic interpretation.

Returning to Figure 40, it is readily apparent that the
only physiographic province with substantially shorter
fluted points than the Glaciated Appalachian Plateau is the
Lake Plains. If it is true that the Lake Plains were not
occupied, for whatever reason, until relatively late in the
period when fluted point using populations were inhabiting Ohio (Prufer and Baby 1963:55; Seeman and Prufer 1982:161), then perhaps this difference is a reflection of diachronic variability in fluted points. "Middle Paleo" points, as defined by Gardner and Verrey (1979), are short, stubby points with marked fluting. This description corroborates Meltzer's (1984) general argument that blade fluting is later than flake fluting.

Figure 41 is a series of parallel schematic plots which indicate that fluted point proportions tend to be more similar between physiographic regions than their lengths. In other words, fluted points in the Lake Plains are not short and stubby relative to points from other regions, although they are shorter. They are miniature versions of the same points with width decreasing in proportion to the decrease in length.

Gardner and Verrey (1979) also claimed that "Middle Paleo" points exhibited more marked fluting than earlier fluted points. A comparison of measurements of flute length in Tables 20 through 23 does suggest that fluted points from the Lake Plains have longer flutes, relative to point length, than points from other regions.

One interpretation of these seemingly contradictory observations is that there is diachronic variation in the collection of Ohio fluted points, but that "Middle Paleo" points are not the temporal variants. Holcombe points are a
more likely candidate in this case. Fitting (1966), in the original site report, described them as "diminutive" fluted points (Fitting 1966:137) and Frufer (1971) has observed that Holcombe points are "normally restricted to the lacustrine area of the basins of Lake Erie and Michigan..." (Frufer 1971:310; see also McKenzie 1970:356). As mentioned previously, there may be some confusion between Holcombe and Crowfield points (see Deller and Ellis 1984:45). For the purposes of this discussion it need only be argued that these small fluted points are a later variant of the "classic" eastern Clovis form. Their restricted spatial distribution suggests that synchronic variation is also involved. Perhaps these forms reflect the late Paleo-Indian/Early Archaic stylistic diversification discussed by Meltzer (1984:342). In this view, Holcombe and/or Crowfield points would be broadly contemporaneous with Cumberland, Dalton, Quad, Hardaway, Suwannee, and Simpson points. If this is the case, the co-occurrence in Coshocton County of Holcombe/Crowfield, Cumberland, and Dalton points suggests that these populations may have interacted to a limited extent in certain interface areas.

**Summary and Conclusions:**

In order to understand the context of Coshocton County fluted point variability the collection of specimens from
this area has been compared with the results of a statewide
survey of Ohio fluted points (e.g. Prufer 1964). Both the
Ohio and the Coshocton County collections of fluted points
are what have been termed "accidental samples" (Hopkins
and Glass 1978:184-185). In spite of our best efforts,
neither Prufer's Ohio data nor the Coshocton County data
reported herein can be regarded as "probability samples"
(Blalock 1972:509). This means simply that the statistics
derived from these data are not necessarily accurate and
reliable estimators of the parameters of their respective
populations (see also Lepper 1983c and 1983d).
Nevertheless, these exploratory studies have provided
valuable insights into the Paleo-Indian occupation of Ohio.

One of the principal results of this analysis has been
the demonstration of the overwhelming morphological
similarity between Ohio and Coshocton County fluted points.
Various interpretations of this homogeneity are possible,
however, the most parsimonious explanation is that the
standardized fluted point morphology reflects the rigid
constraints of function and hafting technology.

The application of Meltzer's (1984) classification,
emphasizing "stylistic" attributes, to the Ohio and
Coshocton County collections of fluted points yielded a
large number of classes, but the modal classes were very
similar for Ohio and Coshocton County. The variability
which Meltzer's classes appear to monitor is broad, regional and temporal variability. Therefore, the similarity between Ohio and Coshocton County was to be expected. Comparing these results with Meltzer's (1984) original analysis provides insights regarding the relationship of Ohio fluted points to patterns of variability throughout eastern North America.

Ohio fluted points, including specimens from Coshocton County, commonly have pronounced blade-like fluting with downward pointing ears. Flake fluting with no ears is more common in the southeastern United States and Meltzer (1984) has argued that this is the primitive condition. Fluted points from the extreme northeastern United States are characterized by deep basal concavities in addition to blade fluting and downward pointing ears. Since these forms predominate in regions which have been deglaciated most recently, they are regarded as late. Deep basal concavities are rare in the Ohio collections. It is argued that Ohio fluted points are stylistically intermediate between the southeast and northeast with their blade fluting, downward pointing ears, and shallow basal concavities. Following these arguments, it is suggested that Ohio fluted points are temporally intermediate between northeastern and southeastern fluted points.
Meltzer's (1984) conclusions have further implications for Ohio Paleo-Indian prehistory. Cumberland-like points have been shown to be restricted spatially to the Middle Ohio Valley region of eastern North America. Meltzer (1984) and others have argued that this is a late point style. The relative abundance of such points in Ohio and Coshocton County, coupled with the extreme rarity here of the specialized Debert points of the northeast, suggests that cultural developments in Ohio are part of, or parallel to, cultural developments in the southern United States. In other words, fluted point sites in Ohio should have more in common with the Williamson site in Virginia (Benthall and McCary 1973) and Wells Creek in Tennessee (Dragoo 1973) than with the Bull Brook (Grimes 1979) or Debert sites (MacDonald 1968) in Massachusetts and Nova Scotia respectively.

Morphologically and stylistically Coshocton County fluted points have been shown to be indistinguishable from Ohio fluted points. A more intensive analysis of interregional variability within Ohio fluted points has been undertaken in order to discover patterns of differential land use. The first model of Paleo-Indian land use to be examined with these data was the notion of Prufre (1963b and 1971) and Seeman and Prufre (1982) that the Coshocton County Upper Mercer chert outcrops were a focal point for Paleo-Indian big-game hunters. One test implication of this model is that fluted points manufactured at the Coshocton chert
quarries should decrease in length with increasing distance from Coshocton County due to resharpening, repairing, and recycling (Seeman and Prufer 1982:159; Gardner and Verrey 1979:17). A comparison of fluted points from radiating zones of increasing distance from Coshocton County (Figure 32) indicates that there is a slight tendency for Ohio fluted points to increase generally with increasing distance from this supposed manufacturing center. This observation does not refute the Seeman and Prufer (1982) model. It merely suggests that either Coshocton County was not the hub of Paleo-Indian chert processing or, that Gardner and Verrey's (1979) "law" is not generally valid.

The Seeman and Prufer (1982) model of Ohio Paleo-Indian land use could be sustained by modifying it with the assumption that Upper Mercer chert throughout its distribution was the key element in the Paleo-Indian settlement system. In this view, a large portion of the Appalachian Plateau would have been exploited in the manner originally proposed for Coshocton County. This alternative model was tested by examining the distribution of fluted points between the various Ohio physiographic provinces. Figure 39 suggests that the Appalachian Plateau was intensively utilized by Paleo-Indian populations. Fluted points broken-in-manufacture are concentrated in the Appalachian Plateau, however, complete points from this
region are not substantially longer than points from other physiographic regions. The single exception is the Lake Plains and this difference is likely a function of diachronic, or temporal, variability rather than synchronic, regional variability. Therefore, the conception of Paleo-Indian land use advanced by Prufer from 1962 (Prufer 1962a) through 1982 (Seeman and Prufer 1982) is not convincingly supported.

The concentration of fluted points in Coshocton County warrants a new, more intensive study. This "anomalous" concentration of fluted points within the Appalachian Plateau may not be as anomalous as Prufer's interpretations have indicated. An intensive study of Paleo-Indian land use patterns in this region offers the potential for explaining this phenomena on its own terms. Such a study might not hold the key to an understanding of Paleo-Indian settlement patterns throughout Ohio, but I contend that without such a study, a general understanding of Paleo-Indian land use patterns in Ohio will not be achieved.
TABLE 11

Statistical Summary of Clovis fluted point attributes
Coshccton County

<table>
<thead>
<tr>
<th>attribute</th>
<th>range</th>
<th>mean</th>
<th>std. dev.</th>
<th>C.V.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXLEN</td>
<td>29 - 125</td>
<td>55.9</td>
<td>17.0</td>
<td>30.4</td>
<td>102</td>
</tr>
<tr>
<td>MAXWID</td>
<td>16 - 39</td>
<td>26.0</td>
<td>3.8</td>
<td>14.7</td>
<td>133</td>
</tr>
<tr>
<td>MXWDIS</td>
<td>0 - 46</td>
<td>20.2</td>
<td>11.9</td>
<td>59.1</td>
<td>115</td>
</tr>
<tr>
<td>BASWID</td>
<td>12 - 31</td>
<td>23.1</td>
<td>3.4</td>
<td>14.6</td>
<td>110</td>
</tr>
<tr>
<td>MAXTHK</td>
<td>3 - 11</td>
<td>7.2</td>
<td>1.3</td>
<td>17.9</td>
<td>121</td>
</tr>
<tr>
<td>MXTDIS</td>
<td>4.5 - 57</td>
<td>29.6</td>
<td>9.7</td>
<td>32.7</td>
<td>110</td>
</tr>
<tr>
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<td>1 - 9</td>
<td>4.2</td>
<td>1.5</td>
<td>36.1</td>
<td>114</td>
</tr>
<tr>
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<td>7 - 49</td>
<td>25.5</td>
<td>8.2</td>
<td>32.1</td>
<td>114</td>
</tr>
<tr>
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<td>7.5</td>
<td>31.4</td>
<td>86</td>
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<tr>
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<td>58.7</td>
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<td>79.5</td>
<td>135</td>
</tr>
<tr>
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<td>6.0</td>
<td>26.5</td>
<td>97</td>
</tr>
<tr>
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<td>6.5</td>
<td>29.2</td>
<td>99</td>
</tr>
<tr>
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<td>3.3</td>
<td>15.3</td>
<td>22</td>
</tr>
<tr>
<td>WTRATIO</td>
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<td>17.8</td>
<td>118</td>
</tr>
<tr>
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<td>0.5</td>
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<td>98</td>
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<tr>
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<td>94</td>
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<td>132.1</td>
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</table>

All measurements are in mm.
TABLE 12

Statistical Summary of Clovis fluted point attributes
Ohio (excluding Coshocton County)

<table>
<thead>
<tr>
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<th>range</th>
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<th>std. dev.</th>
<th>C.V.</th>
<th>N</th>
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</thead>
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<td>101</td>
</tr>
<tr>
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<td>26.5</td>
<td>4.9</td>
<td>18.5</td>
<td>116</td>
</tr>
<tr>
<td>MXWDIS</td>
<td>0 - 66</td>
<td>22.0</td>
<td>16.6</td>
<td>75.2</td>
<td>109</td>
</tr>
<tr>
<td>BASWID</td>
<td>12 - 35</td>
<td>22.8</td>
<td>4.6</td>
<td>20.2</td>
<td>117</td>
</tr>
<tr>
<td>MAXTHK</td>
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<td>6.7</td>
<td>1.5</td>
<td>21.7</td>
<td>124</td>
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<td>32.5</td>
<td>10.2</td>
<td>31.4</td>
<td>113</td>
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<td>1.7</td>
<td>40.5</td>
<td>116</td>
</tr>
<tr>
<td>FLTLNO</td>
<td>14 - 66</td>
<td>30.4</td>
<td>10.1</td>
<td>33.2</td>
<td>108</td>
</tr>
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<td>10.0</td>
<td>37.5</td>
<td>93</td>
</tr>
<tr>
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<td>52.9</td>
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<td>1.0</td>
<td>67.2</td>
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<td>LATGNR</td>
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<td>7.4</td>
<td>29.3</td>
<td>99</td>
</tr>
<tr>
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<td>24.6</td>
<td>7.0</td>
<td>28.4</td>
<td>89</td>
</tr>
<tr>
<td>MINWID</td>
<td>24 - 29</td>
<td>26.3</td>
<td>2.0</td>
<td>7.5</td>
<td>6</td>
</tr>
<tr>
<td>WTRATIO</td>
<td>2.6 - 7.4</td>
<td>4.0</td>
<td>0.7</td>
<td>18.6</td>
<td>114</td>
</tr>
<tr>
<td>LWRATIO</td>
<td>1.4 - 3.6</td>
<td>2.3</td>
<td>0.5</td>
<td>22.0</td>
<td>96</td>
</tr>
<tr>
<td>GRNDFAC</td>
<td>0 - 18</td>
<td>3.2</td>
<td>3.0</td>
<td>93.6</td>
<td>86</td>
</tr>
<tr>
<td>FLTLFAC</td>
<td>0 - 31</td>
<td>7.3</td>
<td>6.5</td>
<td>89.0</td>
<td>89</td>
</tr>
<tr>
<td>FLTNFAC</td>
<td>0 - 5</td>
<td>0.8</td>
<td>1.0</td>
<td>116.8</td>
<td>132</td>
</tr>
</tbody>
</table>

All measurements are in mm.
TABLE 13

Modifications to Prufer's survey of Ohio fluted points

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<tr>
<th>point #</th>
<th>modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>18</td>
<td>omitted, Kentucky provenience</td>
</tr>
<tr>
<td>19</td>
<td>omitted, Illinois provenience</td>
</tr>
<tr>
<td>29</td>
<td>omitted, Plano lanceolate point</td>
</tr>
<tr>
<td>30</td>
<td>omitted, Plano lanceolate point</td>
</tr>
<tr>
<td>32</td>
<td>omitted, Plano lanceolate point</td>
</tr>
<tr>
<td>36</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>43</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>44</td>
<td>omitted, Illinois provenience</td>
</tr>
<tr>
<td>45</td>
<td>omitted, Indiana provenience</td>
</tr>
<tr>
<td>46</td>
<td>omitted, Illinois provenience</td>
</tr>
<tr>
<td>51</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>52</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>53</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>57</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>102</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>111</td>
<td>omitted, extensively reworked</td>
</tr>
<tr>
<td>120</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>124</td>
<td>omitted, reworked into non-Paleo-Indian point</td>
</tr>
<tr>
<td>127</td>
<td>omitted, Plano lanceolate point</td>
</tr>
<tr>
<td>128-490</td>
<td>omitted, data not published</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>point #</th>
<th>modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>497</td>
<td>omitted, reworked into Plano lanceolate point</td>
</tr>
<tr>
<td>504</td>
<td>data include corrections supplied by Prufer</td>
</tr>
<tr>
<td>536</td>
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</tr>
<tr>
<td>549-555</td>
<td>omitted, data not published</td>
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</tbody>
</table>

Specimen #110 was recovered from an Adena cache, a decidedly non-Paleo-Indian context. However, it was included since it was not modified and the Adena people who buried it probably recovered it from the general vicinity of the cache.

Specimen #499 was reworked but included because it was reworked into a characteristic Paleo-Indian tool. Moreover, the basal portion was not modified leaving those attributes usable for this analysis.
TABLE 14

Summary of Meltzer’s classification system

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension A</td>
<td>lateral edge morphology of the haft region</td>
</tr>
<tr>
<td>1.</td>
<td>Parallel</td>
</tr>
<tr>
<td>2.</td>
<td>Tapering</td>
</tr>
<tr>
<td>3.</td>
<td>Triangular</td>
</tr>
<tr>
<td>4.</td>
<td>Incurvate</td>
</tr>
<tr>
<td>Dimension B</td>
<td>flute scar morphology</td>
</tr>
<tr>
<td>1.</td>
<td>Blade</td>
</tr>
<tr>
<td>2.</td>
<td>Flake</td>
</tr>
<tr>
<td>3.</td>
<td>Mixed</td>
</tr>
<tr>
<td>4.</td>
<td>Unknown</td>
</tr>
<tr>
<td>5.</td>
<td>Unfluted</td>
</tr>
<tr>
<td>6.</td>
<td>Blade - both faces observed</td>
</tr>
<tr>
<td>7.</td>
<td>Flake - both faces observed</td>
</tr>
<tr>
<td>Dimension C</td>
<td>basal morphology</td>
</tr>
<tr>
<td>1.</td>
<td>Straight</td>
</tr>
<tr>
<td>2.</td>
<td>Elliptical</td>
</tr>
<tr>
<td>3.</td>
<td>Circular</td>
</tr>
<tr>
<td>4.</td>
<td>Triangular</td>
</tr>
<tr>
<td>5.</td>
<td>No information</td>
</tr>
<tr>
<td>Dimension D</td>
<td>corner morphology</td>
</tr>
<tr>
<td>1.</td>
<td>Ears absent</td>
</tr>
<tr>
<td>2.</td>
<td>Ears/project downward</td>
</tr>
<tr>
<td>3.</td>
<td>Ears/project outward</td>
</tr>
<tr>
<td>4.</td>
<td>No information</td>
</tr>
</tbody>
</table>

After Meltzer (1984:291-293; 296-300) with some modifications.
TABLE 15

Distribution of Meltzer's Classes
Coshocton County fluted projectile point data

<table>
<thead>
<tr>
<th>MELZCD</th>
<th>frequency</th>
<th>MELZCD</th>
<th>frequency</th>
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<tr>
<td>1121</td>
<td>3</td>
<td>2322</td>
<td>1</td>
</tr>
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<td>2332</td>
<td>1</td>
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<tr>
<td>1124</td>
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<td>1132</td>
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<td>2621</td>
<td>5</td>
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<td>1</td>
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<td>9</td>
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TABLE 16

Distribution of Meltzer's Classes
Ohio fluted projectile point data

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### Table 17

Statistical Summary of Ohio Clovis fluted points grouped by zones of increasing distance from Coshocton County: two counties away

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All measurements are in mm.
### TABLE 18

Statistical Summary of Ohio Clovis fluted points grouped by zones of increasing distance from Coshocton County: two to four counties away

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All measurements are in mm.
### TABLE 19

Statistical Summary of Ohio Clovis fluted points grouped by zones of increasing distance from Coshocton County: four to six counties away

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All measurements are in mm.
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All measurements are in mm.
### TABLE 21

Statistical Summary of Ohio Clovis fluted points grouped by physiographic province:

**Till Plains**

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All measurements are in mm.
TABLE 22

Statistical Summary of Ohio Clovis fluted points
Grouped by physiographic province:

Glaciated Appalachian Plateau

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All measurements are in mm.
**TABLE 23**

Statistical Summary of Ohio Clovis fluted points
grouped by physiographic province:

**Unglaciated Appalachian Plateau**

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*All measurements are in mm.*
FIGURE 11. Parallel schematic plots of maximum length for Ohio and Coshocton County fluted points.
FIGURE 12. Parallel schematic plots of maximum width for Ohio and Coshocton County fluted points.
A statistical comparison of Ohio and Coshocton County fluted projectile points.

FIGURE 13. Parallel schematic plots of the basal width of Ohio and Coshocton County fluted points.
A STATISTICAL COMPARISON OF OHIO AND COSHOCTON COUNTY FLUTED PROJECTILE POINT ATTRIBUTES:

FIGURE 14. Parallel schematic plots of maximum thickness of Ohio and Coshocton County fluted points.
A STATISTICAL COMPARISON OF OHIO AND COSHOCTON COUNTY
FLUTED PROJECTILE POINT ATTRIBUTES:

FIGURE 15. Parallel schematic plots of the distance from the base of the point of maximum width for Ohio and Coshocton County fluted points.
FIGURE 16. Parallel schematic plots of the distance from the base of the point of maximum thickness for Ohio and Coshocton County fluted points.
FIGURE 17. Parallel schematic plots of the depth of basal concavity for Ohio and Coshocton County fluted points.
FIGURE 18. Parallel schematic plots of the minimum width for Ohio and Coshocton County fluted points.
FIGURE 19. Histogram of length/width ratios for Ohio fluted points.
A STATISTICAL COMPARISON OF OHIO AND COSHOCTON COUNTY
FLUTED PROJECTILE POINT ATTRIBUTES:

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FIGURE 21. Histogram of width/thickness ratios for Ohio fluted points.
FIGURE 22. Parallel schematic plots for the width/thickness ratios of Ohio and Coshocton County fluted points.
A STATISTICAL COMPARISON OF OHIO AND COSHOCTON COUNTY
FLUTED PROJECTILE POINT ATTRIBUTES

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FIGURE 24. Parallel schematic plots of the fluted length on the reverse face for Ohio and Coshocton County fluted points.
FIGURE 25. Parallel schematic plots of the flute length factor for Ohio and Coshocton County fluted points.
FIGURE 26. Parallel schematic plots of the number of flutes on the obverse face of Ohio and Coshocton County fluted points.
FIGURE 27. Parallel schematic plots of the number of flutes on the reverse face of Ohio and Coshocton County fluted points.
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FIGURE 29. Parallel schematic plots of the length of lateral grinding on the right lateral edge of Ohio and Coshocton County fluted points.
FIGURE 30. Parallel schematic plots of the length of lateral grinding on the left lateral edge of Ohio and Coshocton County fluted points.
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FIGURE 36. Parallel schematic plots of the depth of basal concavity of fluted points from Coshocton County (A) and zones of increasing distance from Coshocton County.
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FIGURE 39. Block chart showing the patterns of fluted point manufacture and use across the Ohio physiographic provinces.
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FIGURE 41. Parallel schematic plots of the length/width ratio of fluted points from Ohio physiographic provinces.
CHAPTER VII
COSHOCTON COUNTY PALEO-INDIAN LAND USE

The material remains of past civilizations are like shells beached by the retreating sea. The functioning organisms and the milieu in which they lived have vanished, leaving the dead and empty forms behind. An understanding of structure and function of ancient societies must be based upon these static molds which bear only the imprint of life. Of all of those aspects of man's prehistory which are available to the archeologist, perhaps the most profitable for such an understanding are settlement patterns (Willey 1953:1).

Introduction

The first phase of this research was concerned with identifying and describing fluted projectile points from Coshocton County, Ohio. The second phase is concerned with the context of these various finds. Both the archaeological and environmental contexts are of interest. First, the archaeological context must be established. Was the point found with other points? If so, do the associated points show evidence of use, or are they manufacturing rejects? What statements can be made from these observations about the activities which took place at that locality?

Second, the environmental context of fluted point yielding loci must be defined. Human activities take place within a spatial context. A fundamental assumption of this
research is that the environmental attributes of places where fluted points have been recovered will reflect the habitat preferences and the land use patterns of the Paleo-Indians who used those artifacts. In other words, the location of a fluted point find may be viewed as a place where something happened. The attributes of the fluted point itself, the attributes of any associated fluted points, and the attributes of the environment in which the point was found provide fundamental clues concerning what might have happened. The purpose of this chapter is to develop from these clues a model of Paleo-Indian land use for the central Muskingum River basin.

Archaeological Context:

...the archaeological record as it comes down to us is in no sense a simple 'map' of where humans discarded things, much less a map of where they used things or where they went. However, it is a partial image, albeit distorted and blurred, and with care and caution inferences can be drawn about the spatial configuration of daily life and about aspects of the use of the landscape (Isaac 1981:134).

The Paleo-Indian archaeological record of Coshocton County, Ohio appears to consist of numerous fluted projectile points in various stages of manufacture from a variety of locations throughout the county. In order to interpret this record in terms of late Pleistocene hunter-
gatherer land use we must determine something about the variability between loci which have produced fluted points. This variability must be sought between the fluted points themselves and between the various combinations of different kinds of fluted points. A primary goal of this research is to translate techno-functional variability between fluted points into "settlement" types which can then be examined in their environmental context. The environmental context of these functionally diverse loci are described and compared in terms of selected environmental attributes. The selection of attributes is made on the basis of multiple working hypotheses proposed by various authors to explain or describe Paleo-Indian settlement patterns. The ultimate goal is to develop a model of Paleo-Indian land use for the central Muskingum River basin which can be compared with results obtained from similar studies in other regions.

Many authors have offered settlement typologies which have attempted to partition the Paleo-Indian archaeological record into ethnologically meaningful units. These efforts are necessary for accurate comparative analyses, but the archaeological record should not be forced to conform too rigidly to ethnologic expectations.

Funk (1972) argued that the Tuluaqmiut Eskimo settlement pattern described by Campbell (1968) provided a useful analogy for interpreting Paleo-Indian sites in the
northeast. Claiming that the reconstructed environments, as well as the reconstructed lifeways, of the Paleo-Indians were similar to those of the Tuluuqmiut, Funk (1972:30-31) went on to identify known Paleo-Indian sites as representatives of the various settlement types defined by Campbell (1968). Bull Brook and Debert were classed as Type I, or "headquarters localities," Potts and Kings Road as Type II "fall-winter hunting camps," Dutchess Quarry Cave as a Type III "hunting or fishing camp," and Williamson as a Type IV "non-food collecting station." No correlates are mentioned for Campbell's Type V "courting, visiting or trading" centers or VI "overnight camps" (Campbell 1968:17).

There are numerous problems with Funk's analysis. First of all, the underlying analogy has proven to be very weak. The late glacial environment of the Northeast was probably not all that similar to the Alaskan arctic, and there is no compelling reason to suggest that the lifeways of the Tuluuqmiut were similar, except in the broadest terms, to those of the Paleo-Indians. Moreover, a basic goal of Campbell's paper was to demonstrate the depauperate nature of the archaeological record of hunter-gatherer societies. Campbell concluded that, of the six types of Tuluuqmiut sites, only Types I and V would normally "...possess sufficient cultural debris to permit discovery by archaeologists..." (1968:18). Not only was Funk (1972) unable to document a single Type V settlement, one of the
two types which should have yielded a substantial archaeological record, but he could "identify" examples of Types III and IV, types which Campbell (1968) was unable to recognize after only five years of abandonment.

An alternative to such simplistic ethnographic analogies was explored by Judge (1974). Exploiting the relative richness of the Paleo-Indian archaeological record of the Plains and Southwest Judge examined 24 of the best-reported sites for that region. Site function had been established for these sites on the basis of well preserved faunal remains and Judge simply compared artifact frequency distributions between the general categories of camp site, kill site, processing site, and quarry site. Judge (1974:18) found that projectile point frequency was correlated with site function and that projectile point condition (i.e. complete point versus basal fragment, etc.) was an important ancillary factor. Other useful indicators included scraping tool frequency, gross artifact frequency, and the presence of faunal remains. These conclusions have important implications for this research because they suggest that site function may be derivable from an artifact inventory restricted to projectile points. Disregarding the other variables which Judge used in his analysis, the relationships between projectile point frequency, condition, and site function will be examined briefly.
Camp sites, as defined by Judge (1974), have a low relative frequency of projectile points (although there is such a high frequency of artifacts in general that this translates into quite a few points). A large proportion of these points are basal fragments.

Kill sites have a high frequency of projectile points with a large proportion of these being complete, re-usable points. Interestingly, Clovis "kill sites" were found to deviate from the general pattern of Paleo-Indian kill sites by their extremely low artifact frequencies. Judge (1974:27) suggested that these should be regarded as "unsuccessful kill sites." Alternatively, such low artifact frequencies may relate to extremely high curation rates (Binford 1979). In support of this latter view, Fisher (1984a and 1984b) has presented convincing evidence for Clovis period mastodon kill sites in Michigan which yielded no stone tool remains, and similar sites have been investigated in the West (Agogino and Sweetland 1985). In this regard, the consistent presence of complete, re-usable points at western kill sites is puzzling. Gorman (1975:219) has offered the intriguing suggestion that "the deposition of Clovis points among mammoth remains may have been deliberate," but in the absence of better data, Judge's "unsuccessful kill" interpretation seems more plausible.

Processing sites have high frequencies of projectile points with a large proportion of point bases. These are
differentiated from Camp sites by lower overall artifact frequencies and the presence of abundant faunal remains (Judge 1974:20). Obviously, these types would not be distinguishable in an analysis based only on projectile points.

Finally, Quarry sites have a very low frequency of projectile points. Only a small proportion of these are complete, re-usable points.

These conclusions must be viewed with considerable caution because of the sample's restricted regional scope and "unrestricted" temporal scope. In other words, the results obtained from a study of the combined fluted and Plano tradition settlement patterns in the Plains and Southwest may not be applicable to understanding the distribution of fluted points in the eastern Woodlands. Moreover, the circularity inherent in this classification scheme and the requirement of preserved faunal remains to differentiate Processing sites from Camp sites further limits its utility.

The most intensive analysis of Paleo-Indian settlement patterning in the eastern United States has been conducted in the Shenandoah Valley of Virginia (Gardner 1974). The site typology developed by Gardner and his colleagues for the Flint Run complex is the result of several years of multi-disciplinary investigation of more than 20 sites, 2 of
which have revealed stratified living floors (Gardner 1974 and 1983).

Gardner's (1974-1983b) various summaries define essentially five different types of Paleo-Indian sites:

1) quarry areas
2) lithic reduction stations
3) quarry related base camps
4) periodically revisited hunting sites
5) sporadically visited hunting sites.

The defining criteria include artifact frequency and variety, amount and size of debitage, and the presence of features.

Gardner (1977:262) has argued that "most of the Paleoindian sites and concentrations of point distributions in the East will, with ecological variations considered, be able to fit this model." Bull Brook, Debert, and Shoop are interpreted as hunting sites, Williamson as a combination quarry - lithic reduction station - quarry related base camp, and Wells Creek Crater as a quarry related base camp (Gardner 1977:262).

Significantly, for the purposes of this analysis, Gardner (1983b:57) notes that "projectile points can be expected usually only at the three categories of sites which are not involved soley in initial lithic procurement and modification." Quarry related base camps should yield points in various stages of manufacture and with varying
degrees of use and resharpening. Exhausted points discarded here may be made of non-local materials. Gardner (1983b:57) cautions that the resulting morphological and lithological variability in the projectile points may be misinterpreted as stylistic variability and evidence for extensive mobility.

Periodically revisited hunting sites and sporadically visited hunting sites in close proximity to the quarry area should yield projectile points approximating "the archeologist's 'classic' type" (Gardner 1983b:57). "Deviations from this 'norm' will accelerate as distance from the quarry increases (or as use increases independent of quarry distance)" (Gardner 1983b:57).

The heart of Gardner's settlement typology is his hypothesis of "lithic determinism" (Gardner 1983a):

The main key to understanding Paleoindian site distribution is the distribution of the types of lithic material which they preferred... The locations of this material can be considered the epicenters of the Paleoindian exploitative area (Gardner 1983b:57).

The use of Gardner's terminology requires an explicit acceptance of this underlying hypothesis; however, the fact that the Welling site can be defined as a quarry related base camp does not test the applicability of Gardner's hypothesis in Coshocton County. This suggests that a more purely descriptive classification, one which carries less
theoretical baggage, might be more useful at the level of this analysis.

A further problem with Gardner's settlement typology is that the defining criteria necessitate either excavation, or the controlled surface collection of a single component site. These criteria cannot be met in Coshocton County in the context of this study. All known Paleo-Indian localities in this area are multicomponent and an extensive program of subsurface testing to evaluate the potential for undisturbed Paleo-Indian occupations is beyond the scope of this dissertation. Such a program, however, would be an obvious sequel to this research.

Lantz (1984) has reported recently the results of an extensive survey of Paleo-Indian materials from western Pennsylvania. The close geographical proximity of this area and the parallel ecology suggest that these results are relevant to the interpretation of the Coshocton County data. Equally significant in this regard is Lantz's (1984:212) determination that the Coshocton County Upper Mercer chert was the "most preferred lithic source" for the Paleo-Indian materials documented in western Pennsylvania.

Lantz (1984: 210-212) defined five types of Paleo-Indian sites on the basis of rather inexact criteria which, for the most part, merely describe the topographic context of the sites. Camp sites were identified as "...combinations
of Paleo-Indian points, point bases, preforms, and various tools" (1984:211) and three types of Camps were recognized: lowland waterside camps, upland camp sites, and trail camps. There is a suggestion that the lowland waterside camps represent kill sites whereas the upland camps are "bivouac or habitation site locations" (1984:211). The trail camps seem to be variants of the other types which are associated with historically documented Indian trails. Site functions inferred for trail camps include "major camp sites," "small camps," and possibly "kill sites" (1984:211). Two additional site types are mentioned: the quarry site and the tool reduction station, however, only one locality is interpreted as a "workshop near a quarry source" (1984:212).

A number of problems become evident with this framework when it is used as a basis for comparison. The settlement types are loosely defined and the defining criteria combine descriptive with contextual attributes such that intersite comparisons become circular reaffirmations of the original analytical units. For example, a comparison of the elevations of lowland waterside camps with upland camp sites would not yield surprising results.

In summary, although most scholars recognize the need to express archaeological data in units of a "higher" order (which are either presumed to have some ethnological meaning or are simply units created for convenient analysis) there
is neither an accepted procedure for generating such units nor an agreed upon terminology for designating the units so defined (see Brooks 1979). Past efforts along these lines in Paleo-Indian studies have relied on simplistic ethnographic analogies (e.g. Funk 1972), or have required an amount and a quality of data which are not generally available for Paleo-Indian localities in eastern North America (e.g. Judge 1974 and Gardner 1977). What is needed is a simple, replicable, and widely applicable index to techno-functional variability between Paleo-Indian localities.

Isaac (1981) has proposed that the archaeological record of hunter gatherer land use systems should be treated as "a patterned array of points in space." He employs an analogy with physics to structure the record hierarchically with individual artifacts serving as "the fundamental particle[s]," or "the irreducible units of spatial analysis" (1981:137). Various scholars have independently explored the potential for studying the archaeological record at this level (e.g. Thomas 1975, Foley 1981, and Dunnell and Dancey 1983). Their results suggest that this perspective is not merely valuable, but essential for documenting and interpreting the land use systems of mobile hunter gatherers (see Chapter III).

The bulk of the evidence for the Paleo-Indian occupation of eastern North America consists of more or less isolated
projectile points (e.g. Gardner 1981 and Brennan 1982). Such finds have been tallied and measured extensively, but their potential for defining Paleo-Indian land use patterns has not been exploited fully.

Judge's (1974) conclusions suggest that projectile points may be sufficiently reliable indicators of site function that they could provide the basis for a techno-functional classification of Paleo-Indian localities. The principal advantage of an approach based on projectile points is that it permits the incorporation of isolated point finds into an overall land use study. This approach recognizes explicitly that the manufacture, use, and abandonment or loss of fluted points had a geographical context within the Paleo-Indian settlement system. The failure to incorporate these data may limit or distort our view of Paleo-Indian land use patterns, or it may make such patterns undiscernable: "The isolated fluted point may constitute a large fraction of the archaeological record as it was created" (Meltzer 1984:354).

Settlement Typology

An outline of the procedure for developing a settlement typology for this analysis is presented in Figure 42. It involves a simple technological classification of fluted points beginning with the distinction between broken and
unbroken projectile points (see Figure 42). Broken specimens were identified as points broken-in-use or points broken-in-manufacture based on the presence or absence of lateral grinding. It is generally acknowledged that this edge grinding was the final step in fluted point production and that its presence is a reliable index of finished points (Tunnell 1977:151; Frison and Bradley 1980:51; Young and Bonnichsen 1984:144-145).

Locations which yielded only points broken in the manufacturing process were classified as chert processing loci. Locations which yielded only points broken-in-use, or points bearing evidence of having been used, were termed food procurement/processing loci. If both manufacturing rejects and "used" points were documented from a single locality, then it was regarded as a workshop/occupation. Large workshop/occupations were differentiated arbitrarily from small workshop/occupations by virtue of having more than ten points reported for the particular locality. The class of undiagnostic bifaces with pronounced end-thinning was not considered in the classification process unless particular specimens showed evidence of utilization. Finally, locations yielding only complete projectile points with no apparent indications of use were listed as undetermined activity loci. It is possible that these unbroken/unworn specimens reflect food procurement/processing activities since a likely context for the
loss/abandonment of a fully functional, isolated point would be that of an unretrieved weapon tip. Alternatively, Gramly (1986) has presented a compelling argument that such finds might represent ceremonial offerings or grave goods.

This typology is not without certain problems. First and foremost among these is the problem of sampling adequacy. A food procurement/processing loci consisting of two points broken-in-use would become a small workshop/occupation if, at a later date, someone were to find the base of a fluted point broken-in-manufacture at the same locality. The typology potentially may therefore reflect collecting intensity rather than important aspects of the Paleo-Indian settlement system (cf. Brooks 1979).

A related problem concerns what Binford (1982:11) has referred to as the "tactical aspects of land use." It could be argued that the diversity of activities documented for workshop/occupations indicates that these functioned as residential base camps; however, it is also possible that at least some of these loci represent food procurement/processing loci superimposed over former chert processing loci or vice versa. Regardless, this typology maximizes the information potential of surface collected fluted points. It differentiates between localities where fluted point production failures were discarded and localities where functioning fluted points ended their use-life. It is operationally simple and replicable and the terminology
explicitly eschews unwarranted ethnological connotations. The question remains, however, can these units contribute to our understanding of late Pleistocene hunter-gatherer land use?

In order for "settlement" types to be useful tools for the evaluation of the relationship between Paleo-Indian activities and their environmental matrix, the units must be meaningful with regard to Paleo-Indian land use, yet practicable with regard to the available data. The criterion of "meaningfulness" for settlement types depends upon the accurate determination of site function.

The determination of the function of a given site begins with the definition of that site. The loci described in this research are primarily amateur reported surface finds of fluted projectile points. In many cases the most precise provenience information which could be obtained for a find was the particular farm or agricultural field from which it was collected. Under these circumstances it is virtually impossible to establish the association and contemporaneity of two (or more) finds from the same large field. The two artifacts may be referrable to the same occupation, or they may represent distinct events widely separate in time. I have, for analytical purposes, adopted the definition of sites proposed by Prufer and Baby (1963). They defined sites as "localities which have yielded more than a single
surface specimen" (1963:31). This approach is especially useful from the perspective of the study of Paleo-Indian land use. Even if the two points in question were not deposited in the course of a single behavioral episode, it does not mean that their spatial association is fortuitous. The repeated occurrence of finds in a limited area provides clues to the long term patterning of Paleo-Indian land use.

In certain circumstances it may plausibly be argued that a collection of fluted points from a large field represents a contemporaneous assemblage. The three sites in the present sample where this has been possible were described in the preceding chapter. In each case these sites yielded points which were so similar in terms of overall morphology, flaking pattern, and raw material, that they give the impression of having been "made by a single individual, at about the same time" (Roosa 1977:94). The identification of "style groups" (Roosa 1977:94) within such imperfectly provenienced collections strengthens the interpretation that these multiple finds are attributable to a single site.

Environmental Context

Hunter-gatherer land use is an exceedingly complex phenomenon. Ethnographers have had a great deal of difficulty in simply describing the land use patterns of modern hunter-gatherer groups:
The Athapaskan hunter will move in a direction and at a time that are determined by a sense of weather (to indicate a variable that is easily grasped if all too easily oversimplified by the one word) and by a sense of rightness. He will also have ideas about animal movement, his own and others' patterns of land use... But already the nature of the hunter's decision making is being misrepresented by this kind of listing. To disconnect the variables, to compartmentalize the thinking, is to fail to acknowledge its sophistication and completeness (Brody 1981:37).

Winterhalder (1981) has argued similarly that the "constellation of environmental factors significant to foraging decisions is a nonrecurrent phenomenon" when viewed from the scale of an individual's lifespan (1981:80-81).

Unlike ethnography, archaeology operates on a much larger temporal scale than an individual hunter's life span. Winterhalder's comment implies that some relationships between the environment and foraging patterns may be apparent at the scale of hundreds or thousands of years and, if so, then the archaeological record may retain clues to that constellation of environmental factors significant to Paleo-Indian "foraging decisions" (Winterhalder 1981:81).

Recent "archaeological" analyses of ethnological data have lead numerous authors to propose various environmental factors as general determinants of hunter-gatherer land use (e.g. Jochim 1976 and Butzer 1982). Jochim has stated these in terms of "primary goals which operate in settlement placement among hunter-gatherers" (1976:50). They include:
1. Proximity of economic resources;
2. Shelter and protection from the elements;
3. View for observation of game and strangers.

Regional studies of Paleo-Indian settlement and subsistence patterns have been conducted which have examined the relationship of Paleo-Indian sites to sundry variables which can be classified according to these broad goals (see especially Judge 1973, Storck 1982, Seeman and Prufer 1982, and Lantz 1984). For comparative purposes, the particular measures of these earlier studies are used, but they are considered in the framework provided by Jochim's (1976) three general themes. Tables 24 and 25 summarize these variables and give their abbreviations which have been adopted in the subsequent computer analyses.

Proximity of economic resources

The resources upon which hunter-gatherer populations depend include water, food, fuel, and lithic raw materials. The distribution of plant and animal food resources are dependent on a variety of topographic and edaphic factors (Butzer 1982:246). For the purposes of this research these factors are condensed into a simple description of the landform. The landforms in Coshocton County are classified according to criteria relevant for describing human land use and this simplified landscape typology is used to describe the context of fluted point find spots.
Landforms distinguished in this analysis are: floodplains (including floodplain terraces), ridge top overlooks, interior hollows, and uplands. In addition, the surrounding topography within an arbitrary radius of 0.8 kilometers (following Lantz 1984) is described in order to obtain an idea of the range of environmental variability in the vicinity of fluted point finds. Each quarter of the circle defined by this radius is described according to its predominant landforms.

Water may be regarded as the key resource for human populations. Consequently, it should not be surprising that many of the environmental attributes used by students of prehistoric hunter-gatherer settlement patterns and land use have emphasized the nature and nearness of water. This study monitors the horizontal and vertical distance to the nearest fresh water, the direction to this water source, and its stream order designation. In addition, the distance and direction to the nearest navigable water, as well as the distance and direction to the nearest stream confluence, is recorded.

Elevation provides a useful summary of local relief and this variable was particularly emphasized by Lantz (1984) in his analysis of the distribution of Paleo-Indian remains in western Pennsylvania. The present study records the
elevation of the find spot as well as the maximum and minimum elevations within the arbitrary 0.8 kilometer radius used by Lantz (1984). The range between this maximum and minimum is calculated and a special measure of local relief used by Lantz (1984:215) also is used. This variable is termed here "site elevation" and refers to the difference between the elevation of the find spot and the minimum elevation within the 0.8 kilometer radius referred to above.

Shelter and protection from the elements

Certainly many of the environmental characteristics considered above relate to whether or not the fluted point find spots were sheltered or protected. Two variables have been specified, however, to examine the degree to which the sheltering and protecting aspects of the environment were conditioning the location of settlements. The exposure of the site refers to how the particular locality is oriented with regard to solar radiation. A locus can have a northern exposure, a southern exposure, or a direct exposure in which case the site is situated on a broad, flat landform with essentially no restriction to incoming solar radiation.

The orientation of the locality with regard to prevailing winds is also considered. A find spot is recorded as either exposed to or sheltered from the prevailing westerly winds of the region.
View for observation of game and strangers

Many of the characteristics discussed above are also relevant in the context of whether or not the loci provides a view of the surrounding landscape. For example, ridge top overlooks would provide better views of game and strangers than would interior hollows, and higher elevations would generally be more panoramic than low elevations. Nevertheless, the hypothesis that Paleo-Indian sites are preferentially located on topographic prominences which offer a view of the surrounding countryside is widespread in the literature and warrants special attention in any land use study.

The horizontal and vertical distance, as well as the direction, to the nearest overview situation is recorded for each fluted point find spot. The "overview" is usually overlooking a "major plains-like area," or "hunting area" (Judge 1973:126) implying that the Paleo-Indians were monitoring the movements of megafauna. The only regions in Coshocton County which may have been "plains-like," in Judge's (1973) terms, during the late Pleistocene would have been the floodplains. Broadened and scoured by glacial meltwaters, the major valleys may have provided "relatively unencumbered routes for animal migration" (Seeman and Prufer 1982:159). Therefore, the orientation of the fluted point
yielding loci with regard to this "hunting area" has been recorded.

**Coshocton County Data**

Four hundred and ten fluted projectile points have been recorded in this survey. Three hundred and fifty-four of these have reasonably precise provenience data, and this information is tabulated in Tables 26 and 27. Clusters of points, or sites, are listed separately for ease of reference. Table 28 is a list of all sites in order of point frequency. Figure 43 presents the distribution of the points within Coshocton County. An additional 27 fluted points are plotted on Figure 44. The only provenience information which exists for these specimens is the township in which they were found. Two aspects of the distribution are overwhelmingly apparent: 1) the majority of points have been recorded from the vicinity of the floodplains of the Walhonding and Tuscarawas rivers, and 2) the densest concentration of points occurs in the vicinity of the Upper Mercer chert outcrops near Nellie.

The following analyses of the distribution of fluted point yielding loci in Coshocton County include information on several types of fluted point which are generally acknowledged to represent temporally distinct point styles (see Chapter V). Figure 45 presents the distribution of 13
projectile points attributable to "styles" considered to be later than the generalized eastern Clovis point. These points are included in this analysis in order to maximize the sample size of points and localities. The inclusions are justified because Gardner (1974) has included some of these forms within the Fluted Point Phase of the Flint Run Complex. The separate distribution pattern is provided in Figure 45 in order to avoid confusion. Interestingly, all but two of these points were documented at sites yielding more generalized eastern Clovis forms. The two exceptions were both Holcombe (or Crowfield) fluted points which occurred together at the Cyclops-Jones site (0603).

The 354 fluted points with a reliable provenience have been documented from 67 localities (refer to Figure 46). Six of these localities, or 9%, are large workshop/occupations. Three of these sites are in such close proximity that they could be encompassed within a one kilometer diameter circle centered on the town of Nellie. Two of these, the Welling and the Nellie Heights sites, may actually represent one continuous site which has been artificially segmented by recent gravel operations (Prufer and Wright 1970:259). Because the division has been recognized in the literature (e.g. Blank 1970) and in the records of the collectors, it was decided to continue to treat the material separately for the purposes of this analysis. If the sites can be demonstrated to be
continuous, then the data on intrasite variability may later prove to be of use.

The three associated large workshop/occupations are centered on Nellie and a fourth also occurs in Jefferson Township. A fifth occurs in the adjacent Bethlehem Township and the sixth is attributed to Virginia Township although there is some question regarding the exact location of this last site.

Mr. Marion Haight was the principal collector of this site which he called the Silo Bluff site. He was secretive about the exact location (Prufer, personal communication, 1982), and when he reported his finds to Dr. Prufer the only provenience information he would divulge was the township. Mr. Haight is now deceased and his collection has been sold. Fortunately, Dr. Norman Wright had once accompanied Haight to the Silo Bluff site and one of the points attributed to this site was discovered by Dr. Wright on that occasion. Wright locates this site on a wide, high terrace of the Muskingum River in Franklin Township, not Virginia. Wright's recollection of his one visit to the site is not exact; however, the locality he identified is only one kilometer from Virginia Township. It is possible that Haight either mistakenly attributed his site to Virginia Township or deliberately misled Prufer about it's exact location. The artifacts from this locality have been
catalogued as Virginia Township finds although the Franklin Township locality is used in the land use analysis.

Eight, or 12%, of the fluted point yielding loci were identified as small workshop/occupations and these tend to be a bit more widely distributed. Three have been documented from Jefferson, two from Newcastle, and one from Bethlehem townships. These are the three adjacent townships which together contain the Walhonding River Valley. A seventh small workshop/occupation is in Lafayette Township in the Tuscarawas River Valley and the eighth, interestingly, is in the uplands of White Eyes Township.

Sixteen chert processing loci were identified. These comprise 24% of the total sample of localities. Half of these occur in the Walhonding River Valley: four from Bethlehem, three from Jefferson, and one from Newcastle townships. Six are situated in the Tuscarawas Valley: 4 from Oxford, 1 from Lafayette, and 1 from Tuscarawas townships. The remaining 2 are in Franklin and Virginia townships.

Eighteen food procurement/processing loci, 27% of the total, were widely dispersed throughout the county. They have been documented in 11 of the 22 townships. If we also interpret the remaining 19 localities, designated as undetermined activity loci, as food procurement/processing loci, then that site type would account for 55% of all localities.
Land use analysis

White (1985) succinctly stated the goal of his analysis of Upper Paleolithic land use in the Perigord of France as follows:

...it was my goal to seek patterning in the specific locations of a large number of Upper Paleolithic sites within the boundaries of the Perigord, in an attempt to improve our knowledge of the parameters of site choice.... It was hoped that, if patterning in the location of sites became apparent, it would provide insight into subsistence, resource scheduling, and social demography (1985:80).

This statement would need only a slight rewording to make it apply to the present analysis. The key to discovering the sort of patterning White refers to is, of course, to select those variables for analysis which were considered by the particular prehistoric populations in making settlement decisions. This cannot be known prior to the analysis so a variety of alternative methods are used to decide upon which features of the environment will be examined and which will be ignored. The criteria which White (1985:82) used to choose relevant variables included induction, advice from other scholars, working hypotheses based on ethnographic analogies, and practical considerations of data availability. The variables selected for analysis in this study were a result of four basic considerations:
1) to test the Seeman and Prufer Paleo-Indian land use model (Seeman and Prufer 1982; also Prufer and Baby 1963 and Prufer 1971);

2) to compare the results with Judge's (1973) Rio Grande Valley study, since some authors have suggested his conclusions are relevant to Ohio (e.g. Seeman and Prufer [1982:160] and Falquet [1976:5-6]; see also Jackson [1984] for an application of Judge's conclusions to Ontario Paleo-Indians);

3) to compare my results with Lantz's (1984) analysis of site distributions in western Pennsylvania;

4) and finally, to include the basic variables which are called for on the original Ohio Archaeological Inventory form so that my results could be incorporated into that data base.

It follows that significant aspects of patterning have probably been ignored, because I failed to collect data that would have revealed them, or because patterned relationships were sufficiently subtle that they went unobserved in the field (White 1985:82).

The categorical variables used in the environmental analysis are listed in Table 24 while the continuous variables are presented in Table 25. Further discussion of particular variables are presented below.
Proximity of economic resources

Landform

Figure 47 presents the distribution of these site types by landform. A number of conclusions can be drawn from this distributional pattern. It must be noted at the outset, however, that the overwhelming preponderance of material recovered from the floodplains undoubtedly reflects, to some extent, the higher archaeological visibility of this area (see below). Even so, with this cautionary note in mind, some statements may be made regarding the distribution of site types within the various landform zones.

Five of the six large workshop/occupations occur on the floodplain. The single exception is the Nellie Heights site which is currently situated on a ridge top overlook. As already mentioned, however, this site may represent a continuation of the Welling site which has become isolated on its prominence by relatively recent landscape modifications.

Small workshop/occupations have been documented from all landforms. Five from the floodplains and one each from the ridge top overlooks, interior hollows, and uplands.

Chert processing loci occur predominantly on the floodplains. A few such sites have been documented in the interior hollows and in the uplands, but none are known on ridge top overlooks. Interestingly, food procurement/
processing loci exhibit an apparently similar distribution pattern.

Looked at in another way, the floodplains were extensively utilized for habitations, manufacturing activities and food procurement. Ridge top overloads were used only infrequently and seemingly only for workshop/occupations. Interior hollows and upland situations were utilized primarily for food procurement although upland chert outcrops were exploited and at least one small workshop/occupation was situated in each of these zones.

Some idea of the topographic variability surrounding fluted point producing loci may be gained by examining the distribution of these same landforms within an arbitrary 0.8 km radius. Large workshop/occupation sites are centered within a 0.8 km catchment area which includes the floodplain and one or two other landforms. Upland and/or interior hollows are the most frequently represented. In no case is a large workshop/occupation situated within a homogeneous topographic setting, nor are any known from complex areas partaking of all four landform zones. In contrast, one of the eight small workshop/occupations occurs deep within the uplands, more than 0.8 km removed from other landform zones, and one is situated solidly within the floodplains. The remaining six are all located near the boundaries of two landform zones, only one of which includes an interior
hollow. Chert processing loci and food procurement/processing loci occur in a diversity of topographic situations. Three of the former and one of the latter are within 0.8 km of all four landform types, but the catchment areas of the majority of both types encompass only one or two landform zones.

Drainage system

The Walhonding River basin holds more than half of the Paleo-Indian localities in Coshocton County. This is the longest stretch of major river valley in the county and the entire 37.6 km length of the Walhonding River is contained within the county’s bounds. Therefore, it is to be expected that this area would be over-represented, to a degree, in the sample of drainages. A glance at Figure 43, however, suggests that the Walhonding River basin has produced fluted points in quantities out of all proportion to its size. Most of the workshop/occupation sites occur here as well as most of the food procurement/processing loci. The principal outcrops of Upper Mercer chert are found in the uplands south of the Walhonding River, but only 24% of the loci here were exclusively devoted to chert processing activities. These eight loci comprise half of all the chert processing stations within the county, but this
activity clearly does not dominate the settlement system within the drainage area.

The Tuscarawas River basin ranks second in importance with sixteen, or 24%, of Coshocton County's fluted point localities situated within its boundaries. This is significant especially since only 34.4 of the 207.8 km total length of the river is located within the county. Two small workshop/occupations and three food procurement/processing loci are located here. This area is the other major center of chert processing activities within Coshocton County with six, or 38%, of those site types occurring here.

The eastward flowing Walhonding and westward flowing Tuscarawas rivers join in central Coshocton County to form the Muskingum River. This major tributary of the Ohio River flows southward for 179 km. Eighteen kilometers, or 10%, of this length is in Coshocton County. In this short span there are 11 fluted point yielding localities: one large workshop/occupation, two chert processing loci, three food procurement/processing loci, and five undetermined activity loci. A variety of activities are therefore suggested for this region, but it would be presumptuous to attempt to generalize, from this sample, the Paleo-Indian exploitative patterns of the entire Muskingum Valley.

The remaining valleys of Killbuck Creek, Wills Creek, and the Mohican River together account for 6 fluted point yielding loci. The valley of Killbuck Creek shelters one
large workshop/occupation and one food procurement/processing locus. The 11.4 kms of the Mohican River Valley in Coshocton County contain one food procurement/processing locus and one undetermined activity locus while the Wills Creek basin has had but two undetermined activity loci identified within its confines.

Proximity to Water

Water is a key resource, both for human populations and the flora and fauna upon which humans depend for food. Ethnographic and archaeological research has documented repeatedly the critical importance of this resource for the location of human settlements. Figure 48 is a set of schematic plots representing the distributions of this variable for the various site types. These results suggest that water is an especially critical variable for the location of large workshop/occupations. These six sites are situated an average of seven meters from the nearest water which can be a stream of almost any size (see Figure 49). Vertical distance to water reflects a similar pattern (see Figure 50) with sites ranging from zero to 18 meters above the nearest water.

Small workshop/occupations are less tightly linked with water. The distances range from an average of 226 to a maximum of 366 meters. These sites are, on the average, 45
meters above the nearest water. They are associated with a variety of stream orders (see Figure 49).

Chert processing loci are characterized by a greater horizontal distance to water and a wider variance in the distribution of this variable (see Figure 48). In regard to the vertical distance to the nearest water, however, this pattern is reversed: chert processing loci tend to be closer to the elevation of the water source than the small workshop/occupations (see Figure 50). These sites tend to be associated with large seventh and sixth order streams and small first and second order streams, but none have been documented in close proximity to intermediate stream orders (see Figure 49).

Food procurement/processing loci tend to occur at even greater horizontal distances, and lower vertical distances, to the nearest water (Figures 48 and 50) than either the small workshop/occupations or the chert processing loci. These sites also appear to be associated predominantly with either very small or very large streams (Figure 49).

There is no apparent pattern to the distribution of the various site types relative to major stream confluences (Figure 51). This indicates that Prufer's (1971) and Seeman and Prufer's (1982) claims that Paleo-Indian sites in Ohio are situated preferentially at stream confluences is inaccurate.
Elevation

Paleo-Indian localities in Coshocton County tend to occur at consistently low elevations. Large workshop/occupations occupy an especially narrow range of low elevations (Figures 52 and 53). Small workshop/occupations appear to have been situated in the most diverse elevational settings (Figure 52), although when the broader context is examined, the difference is observed to be slight. When you subtract the lowest available elevation within 0.8 km from the highest elevation within that distance, you find that both sorts of workshop/occupation loci tend to occur in general settings of low elevational diversity compared to other site types (Figure 53).

Chert processing loci are located on generally low elevations, although a few finds have been documented at relatively high elevations. The range in elevational contexts surrounding chert processing loci are the most diverse of any site type, but the variance is exaggerated somewhat by one extreme value (Figure 53). Finally, food procurement/processing loci occupy sites with elevations comparable to those of chert processing loci (Figure 52). However, when the range in local elevations is considered, it may be observed that these sites occur in contexts of less diversity in elevation (Figure 53).
Shelter and protection from the elements

The advantages of south-facing slopes for human occupation have been presented eloquently by White (1985:110-118). The principal advantage, and the basis for most of the others, is the high incidence of solar radiation. This produces more heat on south-facing slopes which, in turn, results in a dryer substrate, more productive and more thermophilous vegetation, and more hours of illumination. These factors combine to produce a more comfortable habitation locus with optimum natural lighting conditions and maximal access to a variety of vegetal resources.

Given the natural advantages afforded by south-facing slopes it would be surprising if Paleo-Indians did not preferentially exploit such environments. In fact, strict south-facing occupations are rare. The vast majority of sites in Coshocton County have a direct exposure, i.e. they are not oriented to any cardinal point, but are equally exposed in all directions. Such an orientation, however, possesses most of the advantages of south-facing slopes. It is significant that only one location, an undetermined activity loci, was documented on a north-facing slope.

The orientation of fluted point loci with regard to the prevailing winds is related directly to their exposure. Most of the loci are exposed to prevailing winds.
View for observation of game and strangers

Seeman and Prufer (1982:160) among others, have advocated the view that Paleo-Indian sites were associated with elevated situations which commanded wide views of potential hunting areas. This aspect of land use was related to the presumed big game hunting specialization of the Paleo-Indian populations. The results of this study do not support such a conclusion. Figure 44 demonstrates that none of the Paleo-Indian site types in Coshocton County can be characterized by close proximity to an overview situation. In fact, all of the site types, regardless of function, have approximately the same median value for distance to the nearest overview: 610 meters. This does not suggest that overview locations were being sought out by Paleo-Indian hunters as favorite habitation sites. This observation corroborates Gardner’s (1983b:6) conclusion that the "'belle vista' or overlook phenomenon has proved to be of no value" in predicting the locations of Paleo-Indian sites in Virginia.

A related aspect of land use concerns the relationship of Paleo-Indian loci to hunting areas. Judge (1973:126) defined "hunting areas" as large, flat, and unbroken regions which could "...accomodate large concentrations of gregarious animals. Grasses were probably abundant in these areas, as were sources of water..." (1973:126). The
floodplains of Coshocton County offered the most potential for "hunting areas" in this region and sites were recorded as either sheltered or exposed to the floodplain. Two-thirds of all loci were exposed to this hunting area. These included all of the large workshop occupations, half of the small workshop/occupations, two thirds of the chert processing loci, and only half of the food procurement/processing loci. Apparently, the Coshocton County Paleo-Indian hunters were taking no pains to conceal themselves from herds of megafauna migrating up and down the Walhonding-Tuscarawas river valley.

A model of Paleo-Indian land use for Coshocton County

Figure 46 is a map of Coshocton County showing the distribution of the various site types. A visual inspection of this map reveals a suggestive pattern. Large workshop/occupations are situated primarily on floodplain terraces of major river valleys in close proximity to a major break in topography. In other words, they occur back from the present main channel of the Walhonding or Muskingum rivers very near the dramatic floodplain-upland ecotone. Large workshop/occupations are oriented towards low elevation situations. The elevation of these sites is, on the average, only ten meters above the lowest elevation within a 0.8 kilometer radius. Large workshop/occupations occur
within 0 - 18 meters of a source of fresh water, usually a first or third order drainage. These streams are, on the average, within five meters of the peripheries of the large workshop/occupations.

The large workshop/occupations are not apparently located so as to provide maximal protection from the elements. All of these sites have a direct exposure, and all are exposed to the prevailing westerly winds.

Given the low elevation, floodplain settings of large workshop/occupations it is apparent that these sites generally were not being situated in localities which provided a view for observation. These sites do have a low average horizontal distance to overview situations, which may indicate that proximity to overviews was a factor in site placement; however, they also have the highest average vertical distance to an overview of all site types (see Tables 29 through 32).

Small workshop/occupations have been documented in all of the landform types defined for Coshocton County, although they are most frequent on the floodplains. In contrast to large workshop/occupations, however, the topographic situations of these smaller sites tend to be more homogeneous. In other words, these sites tend to occur well within distinct topographic zones instead of being situated at topographic transition zones.
Small workshop/occupations usually are situated near a source of fresh water, but distance is not as critical as it appears to be for large workshop/occupations. The drainages which are most closely associated with small workshop/occupations are somewhat bimodally distributed between very small, first order streams and large sixth order streams.

Many small workshop/occupations have been documented from high elevation settings. Indeed, the average elevation for these sites is 265 meters, the highest average for any site type. And, whereas large workshop/occupations usually are within 10 meters of the lowest elevation within a 0.8 kilometer radius, the average for small workshop/occupations is more than 20 meters.

All small workshop/occupations are located in settings with a direct exposure, but one of the eight sites is situated such that it would have been sheltered from the prevailing winds. Although two of the small workshop/occupations are sheltered with respect to Judge's (1973) "hunting area", this simply means that they are located far enough into the interior hollows or uplands that they are out of sight of the floodplains.

Chert processing loci are situated on the floodplains or in interior hollows at relatively low elevations, around the perimeter of those uplands which held the principal outcrops
of Upper Mercer chert (Figure 46). They are not restricted in their location by the immediate proximity of a water source, but the closest source of water tends to be either first or seventh order streams. Most of the chert processing sites have a direct exposure, although two face the south.

Food procurement/processing loci occur in a variety of topographic situations. These sites do not seem to be associated strongly with any particular aspect of the environment considered here. They are not closely tied to sources of water, they occur in association with almost every stream order (although sixth and first order streams are most frequently represented), and the elevations of these loci are the most variable of any site type. It is apparent from an examination of Figure 46 that food procurement/processing loci are distributed more widely within Coshocton County than any other site type. Finally, it is interesting to note that 17 percent of these sites occur in settings with a southern exposure. This is the highest percentage for any of the site types.

Evaluation of the model

Sampling bias

Recently in the literature I have criticized the conclusions of a number of distributional studies of fluted
points in the mid-continental United States (Lepper 1983a; 1983b; 1985; 1986a) on the grounds that the data were compromised by potentially severe biases. The conclusions of the present study are based on precisely similar data, i.e. surface finds of fluted points collected by non-professional informants. Therefore, why do I think the patterning I have observed in the Coshocton County data reflects Paleo-Indian land use rather than biases inherent in the data?

The data reported in this study are most certainly affected to some extent by the same biases discussed in my critiques of previous studies. For example, at the termination of the data collection phase of this research, six townships in Coshocton County had not yielded a single documented fluted point. These six townships all occur in upland topography with essentially no substantial floodplain development. If these townships are compared with the six townships which contain the Walhonding and Tuscarawas river floodplains, it can be readily seen that cultivation and collector biases may be contributing to these distributional lacunae.

Estimates of cultivated acreage in corn per township for 1982 were obtained from the Coshocton County Field Office of the U.S.D.A. Soil Conservation Service, and these figures provide an index to the total amount of cultivated acreage per township. Population figures for the townships were
obtained from the 1980 census at the Coshocton County Engineers Office.

The average number of acres in cultivation per township for the floodplain townships is 2100, whereas there are only an average of 1400 acres in cultivation in upland townships. This means that there are half again as many acres in cultivation, on the average, in floodplain townships as in upland townships.

The average population per floodplain township is 3700, whereas the average population per upland township is 530. The extraordinarily high population of Tuscarawas Township (which contains the city of Coshocton) is clearly exaggerating the average for floodplain townships; however, if this township is eliminated the average is still 1400 people per floodplain township. Therefore, there are, on the average, more than two and a half times as many people in floodplain townships as in upland townships.

The combined effects of the greater cultivation intensity and the higher population density in the floodplain townships must increase the probability of fluted points being discovered, collected and reported here. In this analysis, however, I have attempted to control the sampling biases in two ways: 1) restriction of the spatial scale of the study; 2) analysis of functional site types rather than point frequencies.
By restricting the scale of this study to a single county the extreme regional differences in physiography and modern land use are eliminated. For example, with the entire state of Ohio as a research universe it is difficult to compare data collected from the topographically monotonous and intensively cultivated Lake Plains with similar data from the topographic extremes of the sparsely cultivated rugged hills of the Unglaciated Appalachian Plateau (Lepper 1983b). Coshocton County is situated almost entirely within the Unglaciated Appalachian Plateau and the local variations in topography, modern land use, and modern population density are not as extreme within this physiographic region as they are between physiographic regions. Consequently, the effects of modern land use biases are not as extreme. Moreover, one can hope to determine and control for the activities and habits of local collectors within the context of a single county (see Chapter III):

We have no evidence now because we have no control and this is primarily why we are focusing on one county where we can control the factors (Morse 1985:22).

The examination of the distribution of functionally distinct localities within a limited spatial area makes it possible to discern general patterns of Paleo-Indian land use within a large sample of provenienced fluted points. If
frequency data were merely tabulated and plotted the most important sites would be those which yielded the most points. Conversely, sites with few points would be less important. Unfortunately, low frequencies of reported artifacts is a poor index to the "importance" of a site since there are so many factors which may contribute to reported artifact density (Brooks 1979; see also Lepper 1983d, 1985). It would be reasonably safe to argue that sites which have produced dozens of fluted points (such as Welling and Nellie Heights) are "important" under almost any definition. It would not be acceptable to assume that the report of a single projectile point from a given locality is "unimportant" without a great deal of systematic investigation. The single point might be the initial find at a site which might eventually yield hundreds of artifacts, or, more importantly for the study of land use patterns, certain "types" of sites might characteristicly yield small numbers of points. Research methods which emphasize dense concentrations of artifacts and ignore "isolated finds" may be ignoring entire classes of activity.

Note on the interpretation of isolated finds

Although this analysis is founded upon the assumption that the environmental attributes of places where fluted points have been recovered will reflect the habitat preferences and the land use patterns of the Paleo-Indians
who used those artifacts, there is a strong possibility that some fluted points owe their spatial provenience to "recycling" processes that have no bearing on Paleo-Indian land use activities. There are a few documented examples of fluted points being collected by post-Paleo-Indian period peoples. Some of these points were reworked to correspond to the projectile points forms utilized by the collectors (e.g. Prufer and Baby 1963:19-20).

There is generally no difficulty in recognizing these modified specimens. However, other specimens seem to have been collected and preserved as a curiosity or ritual object (e.g. Roberts 1932, 1945; Weigand 1970; Potter and Aageson 1974). There is one documented case within Coshocton County of an unaltered fluted point being recovered from a decidedly non-Paleo-Indian context. A large fluted point (0000019.11; Specimen # 110 in Prufer's survey) was discovered in, what appeared to be, an Adena cache (Brown 1966).

Where it is evident, such occurrences can be factored out of the land use analysis, but even if several specimens of this nature are not detected and are included in the analysis, it is assumed that their effects on the reconstruction of Paleo-Indian land use will be minimal. The large sample of localities documented for Coshocton County insures that general patterns of land use should
still be discernable and that non-Paleo-Indian recycling processes will appear as extraneous noise.

**Summary and Conclusions**

The purpose of this chapter has been to develop a model of Paleo-Indian land use for the central Muskingum River basin. This model is based on a series of observations made on a large number of fluted points and the environmental contexts in which these points have been documented.

The observations recorded for the fluted projectile points have been used to define a "settlement" typology based on techno-functional variability. Manufacturing loci are differentiated from fluted point usage loci and from complex loci where both chert processing and food procurement/processing appear to have been undertaken. This typology has some problems. However, relative to similar typologies, it is operationally simple, replicable, and applicable to data sets of highly variable quality. When placed within their environmental contexts, the distribution of these site types can elucidate patterns of Paleo-Indian land use by defining the different kinds of environments in which these different activities were enacted.

The definition of "kinds of environments" is limited by the attributes used to measure environmental variablility. The features of the environment considered in this study
relate to ethnologically defined goals of hunter-gatherer settlement systems and can be subsumed under three general headings: 1) proximity of economic resources; 2) shelter and protection from the elements; 3) view for observation and strangers (Jochim 1976).

Large workshop/occupations are oriented primarily towards providing the maximum access to economic resources. They are situated on broad, flat floodplain terraces away from the main river, but immediately adjacent to a small stream. They occur at or near the floodplain-upland ecotone in close proximity to the outcrops of Upper Mercer chert as well as the diverse food resources of the floodplains, uplands, and interior hollows. Invariably they are exposed directly to the prevailing winds, and their placement in low elevation situations would not have provided a strategic view for the site occupants.

Small workshop/occupations occur in a diversity of locations and appear to be oriented to an equally diverse set of goals. At least one is situated in an interior hollow sheltered from the elements, whereas another is located on a prominent ridge-top, directly exposed but providing a view for observation. In contrast to large workshop/occupations, the smaller sites are not situated at topographic ecotones, suggesting that they have more specialized functions.
Chert processing loci tend to be located between chert outcrops and large workshop/occupations. They occur around the periphery of the uplands on upper floodplain terraces or just inside interior hollows. None of these sites have been documented in overlook situations and few seem to take shelter and protection from the elements into account in their positioning.

Food procurement/processing loci are widely distributed throughout all of the topographic zones in the county with the exception of ridge top overlooks. However, fluted points appear to be used and broken-in-use most frequently on the major floodplains. Sampling bias is undoubtedly a contributing factor here. The fact that a large number of food procurement/processing loci have been identified in both the uplands and interior hollows, in spite of the markedly reduced archaeological visibility in these areas, argues strongly for the importance of these landform zones in the Paleo-Indian subsistence system. A relatively high percentage of these sites occur in settings with a southern exposure suggesting that incoming solar radiation is being maximized for either warmth or light.

In sum, the land use pattern described by this analysis for the Paleo-Indian occupation of the central Muskingum River basin conforms surprisingly well to models of generalized hunter-gatherer settlement and subsistence (e.g.
Binford 1980:6). This is surprising for two reasons: 1) the various "settlements" are limited to clustered and isolated fluted projectile points, and 2) the Paleo-Indian settlement and subsistence system has long been regarded as somehow unique, especially in terms of high mobility and an extraordinary dependence on big-game (especially megafauna) hunting (e.g. Cleland 1966, 1976; Mason 1962, 1981). The description of a "settlement" pattern with large and small multiple activity "camps," specialized chert processing sites, and small, widely dispersed food procurement sites is not different from what might be expected for Archaic sites in the same general region (e.g. Chapman 1984).
<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVAT</td>
<td>Elevation of locality</td>
</tr>
<tr>
<td>MINELV</td>
<td>Minimum elevation within 0.8 km</td>
</tr>
<tr>
<td>MAXELV</td>
<td>Maximum elevation within 0.8 km</td>
</tr>
<tr>
<td>ELVRNG</td>
<td>MAXELV - MINELV</td>
</tr>
<tr>
<td>SITELV</td>
<td>ELEVAT - MINELV</td>
</tr>
<tr>
<td>DISWAT</td>
<td>Distance to nearest water</td>
</tr>
<tr>
<td>DISNAV</td>
<td>Distance to nearest navigable river</td>
</tr>
<tr>
<td>DISCON</td>
<td>Distance to nearest stream confluence</td>
</tr>
<tr>
<td>VERTWA</td>
<td>Vertical distance to nearest water</td>
</tr>
<tr>
<td>OVERVU</td>
<td>Distance to nearest overview</td>
</tr>
<tr>
<td>VERTVU</td>
<td>Vertical distance to nearest overview</td>
</tr>
<tr>
<td>DISTWN</td>
<td>Distance to nearest modern town</td>
</tr>
<tr>
<td>DISROD</td>
<td>Distance to nearest modern road</td>
</tr>
</tbody>
</table>

*a* Nearest water" was operationalized as nearest water documented on the appropriate U.S.G.S. quadrangle map.
TABLE 25
Categorical variables used in the environmental analyses

<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWNSHP = Township:</td>
<td></td>
</tr>
<tr>
<td>03 = Bethlehem</td>
<td></td>
</tr>
<tr>
<td>04 = Clark</td>
<td></td>
</tr>
<tr>
<td>06 = Franklin</td>
<td></td>
</tr>
<tr>
<td>07 = Jackson</td>
<td></td>
</tr>
<tr>
<td>08 = Jefferson</td>
<td></td>
</tr>
<tr>
<td>10 = Lafayette</td>
<td></td>
</tr>
<tr>
<td>11 = Linton</td>
<td></td>
</tr>
<tr>
<td>14 = Newcastle</td>
<td></td>
</tr>
<tr>
<td>15 = Oxford</td>
<td></td>
</tr>
<tr>
<td>18 = Tiverton</td>
<td></td>
</tr>
<tr>
<td>19 = Tuscarawas</td>
<td></td>
</tr>
<tr>
<td>20 = Virginia</td>
<td></td>
</tr>
<tr>
<td>21 = Washington</td>
<td></td>
</tr>
<tr>
<td>22 = White Eyes</td>
<td></td>
</tr>
<tr>
<td>SPECNO = Specimen number (isolated finds only)</td>
<td></td>
</tr>
<tr>
<td>SITENO = Site number: Arbitrary site designation where siteno refers to the nth site recorded for a given township.</td>
<td></td>
</tr>
<tr>
<td>SITETYP = Site type, index to techno-functional settlement variability and site size:</td>
<td></td>
</tr>
<tr>
<td>A = Large Workshop/occupation (&gt; 10 points)</td>
<td></td>
</tr>
<tr>
<td>B = Small Workshop/occupation (&lt; 10 points)</td>
<td></td>
</tr>
<tr>
<td>C = Chert processing loci</td>
<td></td>
</tr>
<tr>
<td>D = Food procurement/processing loci</td>
<td></td>
</tr>
<tr>
<td>E = Undetermined activity loci</td>
<td></td>
</tr>
<tr>
<td>STMOKD = Stream order</td>
<td></td>
</tr>
<tr>
<td>RIVCOD = River code:</td>
<td></td>
</tr>
<tr>
<td>1 = Muskingum</td>
<td></td>
</tr>
<tr>
<td>2 = Walhonding</td>
<td></td>
</tr>
<tr>
<td>3 = Tuscarawas</td>
<td></td>
</tr>
<tr>
<td>4 = Killbuck Creek</td>
<td></td>
</tr>
<tr>
<td>5 = Wills Creek</td>
<td></td>
</tr>
<tr>
<td>6 = Mohican</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 25 - continued

<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Floodplain</td>
</tr>
<tr>
<td>2</td>
<td>Ridge top overlook</td>
</tr>
<tr>
<td>3</td>
<td>Interior hollow</td>
</tr>
<tr>
<td>4</td>
<td>Upland</td>
</tr>
</tbody>
</table>

**DIRWAT** = Direction to nearest water:
(see below)

**DIRNAV** = Direction to nearest navigable water:
(see below)

**DIRCON** = Direction to nearest confluence:
(see below)

**DIROVU** = Direction to nearest strategic overview:

<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>irrelevant</td>
</tr>
<tr>
<td>1</td>
<td>north</td>
</tr>
<tr>
<td>2</td>
<td>northeast</td>
</tr>
<tr>
<td>3</td>
<td>east</td>
</tr>
<tr>
<td>4</td>
<td>southeast</td>
</tr>
<tr>
<td>5</td>
<td>south</td>
</tr>
<tr>
<td>6</td>
<td>southwest</td>
</tr>
<tr>
<td>7</td>
<td>west</td>
</tr>
<tr>
<td>8</td>
<td>northwest</td>
</tr>
</tbody>
</table>

**EXPOSR** = Exposure:

<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Direct</td>
</tr>
<tr>
<td>2</td>
<td>Northern</td>
</tr>
<tr>
<td>3</td>
<td>Southern</td>
</tr>
</tbody>
</table>

**OKWIND** = Orientation from prevailing winds:

<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sheltered</td>
</tr>
<tr>
<td>2</td>
<td>Exposed</td>
</tr>
</tbody>
</table>

**ORHUNT** = Orientation from hunting area:

<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sheltered</td>
</tr>
<tr>
<td>2</td>
<td>Exposed</td>
</tr>
</tbody>
</table>

TABLE 25 - continued
<table>
<thead>
<tr>
<th>code</th>
<th>attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>NETOPO</td>
<td>Northeast quarter of surrounding topography within 0.8 km radius: (see below)</td>
</tr>
<tr>
<td>NWTOP0</td>
<td>Northwest quarter of surrounding topography within 0.8 km radius: (see below)</td>
</tr>
<tr>
<td>SWTOP0</td>
<td>Southwest quarter of surrounding topography within 0.8 km radius: (see below)</td>
</tr>
<tr>
<td>SETOP0</td>
<td>Southeast quarter of surrounding topography within 0.8 km radius:</td>
</tr>
<tr>
<td>1</td>
<td>Floodplain</td>
</tr>
<tr>
<td>2</td>
<td>Ridge top overlook</td>
</tr>
<tr>
<td>3</td>
<td>Interior hollow</td>
</tr>
<tr>
<td>4</td>
<td>Upland</td>
</tr>
<tr>
<td></td>
<td>or combinations of the above, e.g. 12 = half of the quad is floodplain and half is ridge top overlook.</td>
</tr>
</tbody>
</table>

"Irrelevant" means that, for example, the site is located on a strategic overlook and that it would be difficult to assign an orientation to the site.
<table>
<thead>
<tr>
<th>site code</th>
<th>point freq.</th>
<th>site name</th>
<th>UTM co-ordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>0301</td>
<td>29</td>
<td>Three Rivers School site</td>
<td>418820 4465600</td>
</tr>
<tr>
<td>0302</td>
<td>11</td>
<td>James Speakman site (Cs 60)</td>
<td>420500 4463500</td>
</tr>
<tr>
<td>0303</td>
<td>2</td>
<td>Glen Pew site</td>
<td>418300 4465050</td>
</tr>
<tr>
<td>0304</td>
<td>2</td>
<td>Ashman-Findley site</td>
<td>415820 4465750</td>
</tr>
<tr>
<td>0305</td>
<td>7</td>
<td>Cooper site (Cs 63)</td>
<td>420100 4465500</td>
</tr>
<tr>
<td>0306</td>
<td>3</td>
<td>Lapp site</td>
<td>421700 4462150</td>
</tr>
<tr>
<td>0401</td>
<td>3</td>
<td>Eppley site</td>
<td>420680 4474000</td>
</tr>
<tr>
<td>0601</td>
<td>1</td>
<td>Cochrane site</td>
<td>427070 4452750</td>
</tr>
<tr>
<td>0602</td>
<td>2</td>
<td>Cochrane-Ross site</td>
<td>426620 4452000</td>
</tr>
<tr>
<td>0603</td>
<td>2</td>
<td>Cyclops-Jones</td>
<td>423900 4449370</td>
</tr>
<tr>
<td>0701</td>
<td>6</td>
<td>Lowery site</td>
<td>415680 4459640</td>
</tr>
<tr>
<td>0801</td>
<td>64</td>
<td>Welling site</td>
<td>409660 4455180</td>
</tr>
<tr>
<td>0802</td>
<td>67</td>
<td>Nellie Heights site</td>
<td>409280 4465180</td>
</tr>
<tr>
<td>0803</td>
<td>30</td>
<td>West Nellie site</td>
<td>409080 4465750</td>
</tr>
<tr>
<td>0804</td>
<td>18</td>
<td>Buxton farm site</td>
<td>410880 4465150</td>
</tr>
<tr>
<td>0805</td>
<td>5</td>
<td>Lewis Allen site</td>
<td>411870 4465050</td>
</tr>
<tr>
<td>0806</td>
<td>3</td>
<td>McConnell site</td>
<td>408560 4466600</td>
</tr>
<tr>
<td>0807</td>
<td>3</td>
<td>Foster site</td>
<td>413620 4464700</td>
</tr>
<tr>
<td>0808</td>
<td>6</td>
<td>Mohawk Church site</td>
<td>408900 4464700</td>
</tr>
<tr>
<td>0809</td>
<td>4</td>
<td>S.S.A.-Wright site (Cs 68)</td>
<td>410770 4463800</td>
</tr>
<tr>
<td>site code</td>
<td>point freq.</td>
<td>site name</td>
<td>UTM co-ordinates</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>----------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>0810</td>
<td>9</td>
<td>W.R.-Wright site (Cs 70)</td>
<td>410460 4463280</td>
</tr>
<tr>
<td>0811</td>
<td>2</td>
<td>Valley View Cemetery</td>
<td>414000 4464125</td>
</tr>
<tr>
<td>1001</td>
<td>6</td>
<td>Fairfield Cemetery site</td>
<td>436180 4457350</td>
</tr>
<tr>
<td>1401</td>
<td>2</td>
<td>Honey Run site (Cs 19)</td>
<td>406040 4468000</td>
</tr>
<tr>
<td>1402</td>
<td>5</td>
<td>Mitchell-Wright site (Cs 22)</td>
<td>404600 4467300</td>
</tr>
<tr>
<td>1501</td>
<td>2</td>
<td>Waggoner Cemetery site</td>
<td>441300 4457850</td>
</tr>
<tr>
<td>1502</td>
<td>3</td>
<td>Hogue site</td>
<td>444700 4457500</td>
</tr>
<tr>
<td>1601</td>
<td>2</td>
<td>Lost Gamertsfelder farm site</td>
<td>-</td>
</tr>
<tr>
<td>1802</td>
<td>3</td>
<td>DeVore site</td>
<td>400240 4476350</td>
</tr>
<tr>
<td>1901</td>
<td>2</td>
<td>Porteus Mound site</td>
<td>426250 4453640</td>
</tr>
<tr>
<td>1902</td>
<td>4</td>
<td>Wolfe site</td>
<td>436180 4457350</td>
</tr>
<tr>
<td>2001</td>
<td>11</td>
<td>Silo Bluff site</td>
<td>424000 4450500</td>
</tr>
<tr>
<td>2201</td>
<td>3</td>
<td>Chili Fort site (Cs 10)</td>
<td>435890 4468500</td>
</tr>
</tbody>
</table>

322

a Zone 17
## TABLE 27

Coshcocton County Paleo-Indian Localities
Part II: isolated finds

<table>
<thead>
<tr>
<th>specimen code</th>
<th>site name</th>
<th>UTM co-ordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>0300001.50</td>
<td>Prairie Chapel locality</td>
<td>422360 4461680</td>
</tr>
<tr>
<td>0300005.40</td>
<td>Ashman-Jones locality</td>
<td>416250 4465380</td>
</tr>
<tr>
<td>0300006.00</td>
<td>Wright-Pope locality</td>
<td>416230 4464800</td>
</tr>
<tr>
<td>0300007.00</td>
<td>Dice Hedricks locality (Cs 67)</td>
<td>418860 4463600</td>
</tr>
<tr>
<td>0300008.31</td>
<td>Ncrth Randle locality</td>
<td>420640 4463100</td>
</tr>
<tr>
<td>0700001.11</td>
<td>Crooked Run locality</td>
<td>422530 4461100</td>
</tr>
<tr>
<td>0700002.31</td>
<td>Jones-Miskimens locality</td>
<td>424800 4460750</td>
</tr>
<tr>
<td>0800001.11</td>
<td>North Welling locality</td>
<td>409660 4465300</td>
</tr>
<tr>
<td>0800005.11</td>
<td>Tellier locality</td>
<td>414840 4465100</td>
</tr>
<tr>
<td>0800007.31</td>
<td>Ashman upland locality</td>
<td>415300 4462900</td>
</tr>
<tr>
<td>0800008.11</td>
<td>Mohawk Village locality</td>
<td>408180 4463540</td>
</tr>
<tr>
<td>0800009.30</td>
<td>Ashman-Veigel locality</td>
<td>409980 4465940</td>
</tr>
<tr>
<td>0800012.11</td>
<td>North Warwaw locality</td>
<td>414780 4465740</td>
</tr>
<tr>
<td>0600015.11</td>
<td>Chase-Warsaw locality</td>
<td>415420 4465530</td>
</tr>
<tr>
<td>1000001.40</td>
<td>Hughes locality</td>
<td>436400 4459850</td>
</tr>
<tr>
<td>1000002.31</td>
<td>Shurtz-Apple locality</td>
<td>435300 4457600</td>
</tr>
<tr>
<td>100003.11</td>
<td>H.B.R.-Brown locality</td>
<td>432110 4460800</td>
</tr>
<tr>
<td>1100003.11</td>
<td>Marlatt overlook locality</td>
<td>439460 4452150</td>
</tr>
<tr>
<td>1100004.10</td>
<td>Twomile Run locality</td>
<td>441260 4445400</td>
</tr>
<tr>
<td>1400001.40</td>
<td>Dutch Run locality</td>
<td>407000 4468700</td>
</tr>
</tbody>
</table>
TABLE 27 - continued

<table>
<thead>
<tr>
<th>specimen code</th>
<th>site name</th>
<th>UTM co-ordinates</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Plains locality #3</td>
<td>443840 4457680</td>
</tr>
<tr>
<td>1500003.34</td>
<td>Plains locality #1</td>
<td>442400 4458500</td>
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<tr>
<td>1500005.11</td>
<td>Plains locality #2</td>
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<tr>
<td>1500006.20</td>
<td>B.D.-Brown locality</td>
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</tr>
<tr>
<td>1500007.40</td>
<td>Plains locality #4</td>
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<td>1500008.11</td>
<td>Young locality (Cs 47)</td>
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<td>1800001.11</td>
<td>Cavallow locality (Cs 30)</td>
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<td>Porteus Mound #2 (Cs 41)</td>
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</tr>
<tr>
<td>1900002.14</td>
<td>Enslee locality</td>
<td>428500 4456600</td>
</tr>
<tr>
<td>2000001.20</td>
<td>Holsworth-Jones locality</td>
<td>419240 4447550</td>
</tr>
<tr>
<td>2000002.15</td>
<td>King locality</td>
<td>422900 4446600</td>
</tr>
<tr>
<td>2100001.51</td>
<td>Wakanomika locality</td>
<td>410200 4451160</td>
</tr>
<tr>
<td>2100002.31</td>
<td>Jones-Bower locality</td>
<td>409060 4452440</td>
</tr>
<tr>
<td>2200003.11</td>
<td>Fresno locality</td>
<td>437200 4464450</td>
</tr>
<tr>
<td>2200004.31</td>
<td>T.R.-Brown locality</td>
<td>431950 4461440</td>
</tr>
</tbody>
</table>

a
Zone 17
### Table 28

Coshocton County Paleo-Indian Sites listed in order of point frequency

<table>
<thead>
<tr>
<th>site code</th>
<th>point frequency</th>
<th>cumulative frequency</th>
<th>cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0802</td>
<td>67</td>
<td>67</td>
<td>21</td>
</tr>
<tr>
<td>0801</td>
<td>64</td>
<td>131</td>
<td>41</td>
</tr>
<tr>
<td>0803</td>
<td>30</td>
<td>161</td>
<td>50</td>
</tr>
<tr>
<td>0301</td>
<td>29</td>
<td>190</td>
<td>59</td>
</tr>
<tr>
<td>0804</td>
<td>18</td>
<td>208</td>
<td>65</td>
</tr>
<tr>
<td>0302</td>
<td>11</td>
<td>219</td>
<td>58</td>
</tr>
<tr>
<td>2001</td>
<td>11</td>
<td>230</td>
<td>71</td>
</tr>
<tr>
<td>0810</td>
<td>9</td>
<td>239</td>
<td>74</td>
</tr>
<tr>
<td>0305</td>
<td>7</td>
<td>246</td>
<td>76</td>
</tr>
<tr>
<td>0701</td>
<td>6</td>
<td>252</td>
<td>78</td>
</tr>
<tr>
<td>0808</td>
<td>6</td>
<td>258</td>
<td>80</td>
</tr>
<tr>
<td>1001</td>
<td>6</td>
<td>264</td>
<td>82</td>
</tr>
<tr>
<td>0805</td>
<td>5</td>
<td>269</td>
<td>84</td>
</tr>
<tr>
<td>1402</td>
<td>5</td>
<td>274</td>
<td>85</td>
</tr>
<tr>
<td>0809</td>
<td>4</td>
<td>278</td>
<td>86</td>
</tr>
<tr>
<td>1902</td>
<td>4</td>
<td>282</td>
<td>88</td>
</tr>
<tr>
<td>0306</td>
<td>3</td>
<td>285</td>
<td>89</td>
</tr>
<tr>
<td>0401</td>
<td>3</td>
<td>288</td>
<td>89</td>
</tr>
<tr>
<td>0806</td>
<td>3</td>
<td>291</td>
<td>90</td>
</tr>
<tr>
<td>0807</td>
<td>3</td>
<td>294</td>
<td>91</td>
</tr>
</tbody>
</table>
### TABLE 28 - continued

<table>
<thead>
<tr>
<th>site code</th>
<th>point frequency</th>
<th>cumulative frequency</th>
<th>cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1502</td>
<td>3</td>
<td>297</td>
<td>92</td>
</tr>
<tr>
<td>1802</td>
<td>3</td>
<td>300</td>
<td>93</td>
</tr>
<tr>
<td>2201</td>
<td>3</td>
<td>303</td>
<td>94</td>
</tr>
<tr>
<td>0303</td>
<td>2</td>
<td>305</td>
<td>95</td>
</tr>
<tr>
<td>0304</td>
<td>2</td>
<td>307</td>
<td>95</td>
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<td>2</td>
<td>309</td>
<td>96</td>
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<tr>
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<td>2</td>
<td>311</td>
<td>97</td>
</tr>
<tr>
<td>0811</td>
<td>2</td>
<td>313</td>
<td>97</td>
</tr>
<tr>
<td>1401</td>
<td>2</td>
<td>315</td>
<td>98</td>
</tr>
<tr>
<td>1501</td>
<td>2</td>
<td>317</td>
<td>98</td>
</tr>
<tr>
<td>1801</td>
<td>2</td>
<td>319</td>
<td>99</td>
</tr>
<tr>
<td>1901</td>
<td>2</td>
<td>321</td>
<td>99</td>
</tr>
<tr>
<td>0601</td>
<td>1</td>
<td>322</td>
<td>100</td>
</tr>
</tbody>
</table>

**total = 322**

33 sites, \( \bar{x} = 9.7 \) points per site
<table>
<thead>
<tr>
<th>attribute</th>
<th>range</th>
<th>mean</th>
<th>std. dev.</th>
<th>C.V.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVAT</td>
<td>241 - 259</td>
<td>247.7</td>
<td>6.1</td>
<td>2.5</td>
<td>6</td>
</tr>
<tr>
<td>MINELV</td>
<td>226 - 241</td>
<td>237.5</td>
<td>6.1</td>
<td>2.6</td>
<td>6</td>
</tr>
<tr>
<td>MAXELV</td>
<td>287 - 329</td>
<td>314.0</td>
<td>16.9</td>
<td>5.4</td>
<td>6</td>
</tr>
<tr>
<td>SITELV</td>
<td>6 - 18</td>
<td>10.2</td>
<td>6.1</td>
<td>59.8</td>
<td>6</td>
</tr>
<tr>
<td>ELVRNG</td>
<td>52 - 88</td>
<td>76.5</td>
<td>12.9</td>
<td>16.9</td>
<td>6</td>
</tr>
<tr>
<td>DISWAT</td>
<td>0 - 18</td>
<td>6.5</td>
<td>8.1</td>
<td>125.3</td>
<td>6</td>
</tr>
<tr>
<td>DISNAV</td>
<td>0 - 619</td>
<td>309.5</td>
<td>273.6</td>
<td>88.4</td>
<td>6</td>
</tr>
<tr>
<td>DISCON</td>
<td>274 - 1847</td>
<td>813.8</td>
<td>572.7</td>
<td>70.4</td>
<td>6</td>
</tr>
<tr>
<td>VERTWA</td>
<td>0 - 18</td>
<td>5.0</td>
<td>7.0</td>
<td>140.3</td>
<td>6</td>
</tr>
<tr>
<td>OVERVU</td>
<td>24 - 762</td>
<td>494.3</td>
<td>269.1</td>
<td>54.4</td>
<td>6</td>
</tr>
<tr>
<td>VERTVU</td>
<td>46 - 69</td>
<td>57.3</td>
<td>9.5</td>
<td>16.6</td>
<td>6</td>
</tr>
</tbody>
</table>
### TABLE 30

Small workshop/occupations (B): summary statistics

<table>
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<tr>
<th>attribute</th>
<th>range</th>
<th>mean</th>
<th>std. dev.</th>
<th>C.V.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVAT</td>
<td>238 - 329</td>
<td>264.9</td>
<td>30.2</td>
<td>11.4</td>
<td>8</td>
</tr>
<tr>
<td>MINELV</td>
<td>232 - 256</td>
<td>244.4</td>
<td>6.9</td>
<td>2.8</td>
<td>8</td>
</tr>
<tr>
<td>MAXELV</td>
<td>287 - 347</td>
<td>324.5</td>
<td>19.4</td>
<td>6.0</td>
<td>8</td>
</tr>
<tr>
<td>SITELV</td>
<td>0 - 73</td>
<td>20.5</td>
<td>25.7</td>
<td>125.5</td>
<td>8</td>
</tr>
<tr>
<td>ELVRNG</td>
<td>43 - 100</td>
<td>80.1</td>
<td>17.1</td>
<td>21.4</td>
<td>8</td>
</tr>
<tr>
<td>DISWAT</td>
<td>0 - 366</td>
<td>228.0</td>
<td>140.0</td>
<td>61.9</td>
<td>8</td>
</tr>
<tr>
<td>DISNAV</td>
<td>244 -3047</td>
<td>1297.1</td>
<td>1164.3</td>
<td>89.8</td>
<td>8</td>
</tr>
<tr>
<td>DISCON</td>
<td>305 -3047</td>
<td>1596.1</td>
<td>1050.2</td>
<td>65.8</td>
<td>8</td>
</tr>
<tr>
<td>VERTWA</td>
<td>0 - 304</td>
<td>44.8</td>
<td>105.0</td>
<td>234.6</td>
<td>8</td>
</tr>
<tr>
<td>OVERVU</td>
<td>0 -1829</td>
<td>679.1</td>
<td>587.3</td>
<td>88.5</td>
<td>8</td>
</tr>
<tr>
<td>VERTVU</td>
<td>0 - 67</td>
<td>31.6</td>
<td>24.1</td>
<td>76.3</td>
<td>8</td>
</tr>
</tbody>
</table>
TABLE 31

Chert processing loci (C): summary statistics

<table>
<thead>
<tr>
<th>attribute</th>
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<th>mean</th>
<th>std. dev.</th>
<th>C.V.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVAT</td>
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<td>27.6</td>
<td>10.9</td>
<td>16</td>
</tr>
<tr>
<td>MINELV</td>
<td>226 - 287</td>
<td>238.6</td>
<td>14.0</td>
<td>5.9</td>
<td>16</td>
</tr>
<tr>
<td>MAXELV</td>
<td>232 - 488</td>
<td>309.3</td>
<td>59.0</td>
<td>19.1</td>
<td>16</td>
</tr>
<tr>
<td>SITELV</td>
<td>3 - 70</td>
<td>14.3</td>
<td>18.3</td>
<td>128.1</td>
<td>16</td>
</tr>
<tr>
<td>ELVRNG</td>
<td>6 - 253</td>
<td>70.6</td>
<td>57.8</td>
<td>82.0</td>
<td>16</td>
</tr>
<tr>
<td>DISWAT</td>
<td>0 - 640</td>
<td>257.4</td>
<td>224.6</td>
<td>87.2</td>
<td>16</td>
</tr>
<tr>
<td>DISNAV</td>
<td>0 - 3047</td>
<td>726.6</td>
<td>755.9</td>
<td>104.0</td>
<td>16</td>
</tr>
<tr>
<td>DISCON</td>
<td>0 - 3047</td>
<td>1204.9</td>
<td>832.9</td>
<td>69.1</td>
<td>16</td>
</tr>
<tr>
<td>VERTWA</td>
<td>0 - 304</td>
<td>27.2</td>
<td>75.7</td>
<td>278.5</td>
<td>16</td>
</tr>
<tr>
<td>OVERVU</td>
<td>305 - 2256</td>
<td>808.6</td>
<td>545.8</td>
<td>67.5</td>
<td>16</td>
</tr>
<tr>
<td>VERTVU</td>
<td>0 - 82</td>
<td>48.1</td>
<td>22.8</td>
<td>47.5</td>
<td>16</td>
</tr>
</tbody>
</table>
TABLE 32
Food procurement/processing loci (D): summary statistics

<table>
<thead>
<tr>
<th>attribute</th>
<th>range</th>
<th>mean</th>
<th>std. dev</th>
<th>C.V.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVAT</td>
<td>229 - 378</td>
<td>255.5</td>
<td>37.5</td>
<td>14.7</td>
<td>18</td>
</tr>
<tr>
<td>MINELV</td>
<td>223 - 256</td>
<td>238.1</td>
<td>9.1</td>
<td>3.8</td>
<td>16</td>
</tr>
<tr>
<td>MAXELV</td>
<td>274 - 384</td>
<td>313.0</td>
<td>24.4</td>
<td>7.8</td>
<td>18</td>
</tr>
<tr>
<td>SITELV</td>
<td>0 - 122</td>
<td>17.4</td>
<td>31.5</td>
<td>180.5</td>
<td>16</td>
</tr>
<tr>
<td>ELVRNG</td>
<td>33 - 128</td>
<td>74.9</td>
<td>20.8</td>
<td>27.6</td>
<td>18</td>
</tr>
<tr>
<td>DISWAT</td>
<td>0 - 1219</td>
<td>309.8</td>
<td>326.2</td>
<td>105.3</td>
<td>18</td>
</tr>
<tr>
<td>DISNAV</td>
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<td>1080.9</td>
<td>919.9</td>
<td>85.1</td>
<td>18</td>
</tr>
<tr>
<td>DISCON</td>
<td>0 - 3047</td>
<td>1423.3</td>
<td>1023.6</td>
<td>71.7</td>
<td>18</td>
</tr>
<tr>
<td>VERTWA</td>
<td>0 - 134</td>
<td>13.8</td>
<td>32.0</td>
<td>232.3</td>
<td>18</td>
</tr>
<tr>
<td>OVERVU</td>
<td>152 - 3047</td>
<td>853.6</td>
<td>710.3</td>
<td>83.2</td>
<td>16</td>
</tr>
<tr>
<td>VERTVU</td>
<td>12 - 82</td>
<td>45.8</td>
<td>17.7</td>
<td>38.7</td>
<td>18</td>
</tr>
</tbody>
</table>
FIGURE 42. Flow chart depicting the procedure for classifying fluted point yielding localities. Figure drawn by Karen Lepper.
FIGURE 43. Schematic map of Coshocton County showing the 
distribution of fluted point finds.

<table>
<thead>
<tr>
<th>symbol</th>
<th>fluted points per unit</th>
<th>unit frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>.</td>
<td>01</td>
<td>35</td>
</tr>
<tr>
<td>□</td>
<td>02 - 03</td>
<td>10</td>
</tr>
<tr>
<td>□</td>
<td>03 - 09</td>
<td>16</td>
</tr>
<tr>
<td>□</td>
<td>10 - 30</td>
<td>5</td>
</tr>
<tr>
<td>□</td>
<td>&gt; 30</td>
<td>2</td>
</tr>
</tbody>
</table>

*a Distribution of Clovis points and all manufacturing rejects and point fragments unassignable to a particular style.*
FIGURE 44. Schematic map of Coshocton County showing the distribution of fluted point finds lacking a specific provenience data beyond township.

KEY

\[ \text{△} \] Complete point

\[ \text{▲} \] Point broken-in-use

\[ \text{□} \] Point preform

\[ \text{■} \] Point broken-in-manufacture

\[ \text{○} \] Point fragment

\[ a \] Sample includes only Clovis points, non-diagnostic point fragments and preforms.
FIGURE 45. Schematic map of Coshocton County showing the distribution of later fluted point styles.

KEY

△ Holcombe points

〇 Dalton points

〇 Unfluted fluted points

\textsuperscript{a}

In addition to those specimens which are mapped, data were obtained on two Cumberland points and one additional Holcombe point for which provenience, beyond Coshocton County, was not determinable.

\textsuperscript{b}

This term retained from Prufer and Baby (1963:22).
FIGURE 46. Schematic map of Coshocton County showing the distribution of postulated locality types.

---

**KEY**

- • Undetermined activity loci
- △ Food procurement/processing loci
- ◯ Chert processing loci
- ○ Small workshop/occupations
- ⭕ Large workshop/occupations
COSHOCTON COUNTY PALEO-INDIAN LAND USE:

SITE DISTRIBUTION BY LANDFORM
PERCENTAGE BLOCK CHART

FIGURE 47. Block chart showing the distribution of the various site types by landform.
FIGURE 48. Parallel schematic plots for the distance to the nearest water of the various site types.
FIGURE 49. Histogram of site types by stream order.
FIGURE 50. Parallel schematic plots for the vertical distance to the nearest water of the various site types.
FIGURE 51. Parallel schematic plots for the distance to the nearest stream confluence of the various site types.
FIGURE 52. Parallel schematic plots for the elevation of the various site types.
FIGURE 53. Parallel schematic plots for the range in elevation within a 0.8 km radius of the various site types.
FIGURE S4. Parallel schematic plots for the distance to the nearest overview of the various site types.
CHAPTER VIII
THE COSHOCTON COUNTY PALEO-INDIAN LAND USE SYSTEM:
A SYNTHESIS

...when a point is found, the archaeologist possibly cannot help but dreamily look off into time and space and wonder: 'which way did the herd go?' (McLeod 1982:111).

It is a common tendency for those of us with a romantic taste in history to exaggerate evidence... how many arrow-heads and other objects interesting to the archaeologist have been dropped carelessly by the farmer's boy miles from where he found them (Wilcox 1933:53).

Introduction

Thus far I have presented the outlines of a static Paleo-Indian "settlement pattern" for the central Muskingum River basin. Inferences regarding the dynamic underlying "settlement system" must be based upon the careful interweaving of several distinct threads of data: 1) fluted point variability (Chapters V and VI), 2) the spatial distribution of that variability (Chapter VII), 3) the reconstruction of the environmental context (Chapter IV), and 4) general principles of hunter-gatherer cultural ecology.

"Settlement pattern" has been defined as "the geographic and physiographic relationships of a contemporaneous group of sites within a single culture" (Winters 1969:110). The
application of this term to the Coshocton County data requires two crucial assumptions: 1) the sites are contemporaneous and 2) the sites are attributable to a "single culture." The first assumption is certainly false. Given the wide temporal range of dated fluted point components in eastern North America (Table 1) there is no reason to expect that the archaeological record of Coshocton County would not reflect the one to two thousand year duration of the fluted point tradition. Moreover, the distinct "styles" of fluted points documented from this region suggest that more than a "single culture" might be represented. However, these apparent problems with the Coshocton County data may conceal real advantages.

Indeed, the "settlement pattern" I have documented for this region does not represent a synchronic Paleo-Indian ethnography. The small population density inferred for this period and the generally depauperate nature of the Paleolithic archaeological record (see Chapter I) render this virtually impossible. However, these data may represent long term Paleo-Indian land use patterns which potentially will reflect the "constellation of environmental factors significant to foraging decisions..." (Winterhalder 1981:80).

Winters (1969) has defined "settlement system" as a term which "refers to the functional relationships among the
sites contained within the settlement pattern" (1969:110). The Paleo-Indian land use system developed from the preceding land use pattern is likewise intended to describe "...the behavioral dynamic responsible for producing the static pattern" (Binford 1978:253).

A Paleo-Indian land use system

A fundamental distinction between the Paleo-Indian localities of the central Muskingum River basin is that some represent loci where only one sort of activity was undertaken (i.e. either chert processing or food procurement/processing), whereas others represent loci where more than one kind of activity occurred. This distinction between "Multiple Activity Locations" and "Limited Activity Locations" (Wilmsen 1970:75) is also basic to hunter-gatherer settlement and subsistence systems. The base camp, or "residential base" is "the hub of subsistence activities, the locus out of which foraging parties originate..." (Binford 1980:9). The archaeological record of such sites reflects "the preparation and consumption of food and the manufacture of tools for use in other less permanent sites" (Binford and Binford 1969:71). The "work camp" (Binford and Binford 1969), "extraction station" (Yellen 1977), or "location" (Binford 1980) "is a place where extractive tasks are exclusively carried out" (Binford 1980:9). Base camps
are situated in "favorable camping areas" (Wilmsen 1970:75) primarily chosen for factors such as "living space, protection from the elements and central location with respect to resources" (Binford and Binford 1969:71). Special purpose work camps occur "in specific locations where, of course, the desired resources are available" (Yellen 1977:83).

One possible interpretation of the observed dichotomy between the workshop/occupations and the more specialized chert and food procurement/processing loci is that the former represent hunter-gatherer base camps and the latter work camps. If this is true, then the geographic positioning of workshop/occupations should reflect the daily needs of Paleo-Indian hunter-gatherer bands and the distribution of the specialized work camps should reflect the distribution of "desired resources."

Chert Processing Loci

Chert processing loci would appear to present the most obvious demonstration of this pattern. They tend to be situated in close proximity to chert outcrops and near one or more workshop/occupations. The largest proportion of the chert processing loci ring the uplands in the southwest quarter of Coshocton County (Figure 46). This is the area with the most prominent outcrops of Upper Mercer chert and
with many documented quarries. Another cluster of chert processing loci occurs in the Tuscarawas Valley bordering White Eyes and Adams townships (Figure 46). It was noted in Chapter IV that Vanport Flint outcrops occur in these townships, and that quarry pits have been reported in association with these outcrops. Therefore, it seems reasonable to propose that chert processing loci represent manufacturing sites occupied for short periods of time by task groups exploiting the local chert outcrops from a nearby base camp. It is likely that these extraction camps were occupied during the spring, summer, or early autumn, due to the periodic unavailability of chert sources beneath the cover of winter snow and ice, and the general unworkability of cryptocrystalline materials at low temperatures (Kelly 1983).

Food Procurement/Processing Loci

The interpretation of food procurement/processing loci requires a bit more extrapolation. Hayden (1978) has argued, based on ethnoarchaeological research among the aborigines of the Australian Western Desert, that "the role of chipped stone tools in plant procurement and processing can be largely disregarded" (1978:187). With regard to bifacially retouched artifacts such as the fluted points documented in this research, the same could be said for
small animal procurement (Hayden 1978:187). If these are adopted as working assumptions, then the distribution of food procurement/processing loci translates into the distribution of "large" mammal procurement/processing sites (see Hayden 1978:187). If this is the correct interpretation of these loci, then it should be possible to infer something about the habitat preferences of prey species from the distribution of the food procurement/processing loci. Knowing the habitat preferences of the target species permits inferences regarding the nature of the prey.

Food procurement/processing sites are dispersed widely throughout the uplands, hollows and floodplains of the central Muskingum River basin. These are usually small sites comprised of an average of two projectile points per site, and indeed nearly 30% of the food procurement/processing loci consist of isolated points. If the 19 undetermined activity loci are also interpreted as food procurement/processing loci, then this percentage would rise to nearly 70%.

Small sites with few artifacts, dispersed widely throughout the diverse habitats of the unglaciated Appalachian Plateau, suggest that white-tailed deer was the principal prey of Coshocton County’s Paleo-Indians (cf. Ford 1977:157). White-tailed deer occur in a wide variety of habitat types and do not normally aggregate in large herds.
Small social groups of from three to 18 individuals do occur in the spring, but these aggregations are temporary and unpredictable (Chapman 1938:465). Deer generally inhabit small home ranges of from one to three square kilometers which increase to between five and seven square kilometers during the fall-winter rutting season. These facts have important implications for understanding the procurement of white-tailed deer by prehistoric hunter-gatherers. Hunters using stalking and ambushing techniques "must usually go to the deer" (Goodyear, House, and Ackerly 1979:153) resulting in game procurement sites scattered "almost randomly" across the landscape (Hayden 1978:187).

On the other hand, if mammoths, mastodons, or other herd herbivores were the intended prey, then it could be expected that procurement sites would be restricted to favorite entrapment situations along the floodplains (e.g. Frison and Todd 1986:105 and Gramly 1982:55). Such sites, like their counterparts in Colorado, Arizona and New Mexico, could be expected to yield several projectile points. Seeman and Prufer’s (1982:160) assertion that such sites may have been present on the floodplain but were dispersed by fluvial erosion is not convincing. Paleo-Indian sites in this region have been documented on floodplain terraces, and the likeliest areas for big-game entrapment, i.e. "major stream confluences" (Seeman and Prufer 1982:160), are the most likely areas to have preserved Pleistocene land surfaces
Therefore, examples of these sites could be expected to have been documented in this analysis if they were ever present in the study area.

The class of food procurement/processing loci probably includes kill and/or butchering sites, "small staging camps" occupied by task groups "who were hunting and monitoring a nearby hunting catchment" (Goodyear, House, and Ackerly 1979:153), and unsuccessful kill sites. This last category of site represents the wounding of a target animal which eludes capture and dies without being discovered by the hunters. The result might be the deposition of a fluted point at a locality which was never visited by a Paleo-Indian. Without more information on hunting techniques it is impossible to estimate how often this situation might have occurred, but Yellen (cited in Lee 1979:221) estimates that 50 percent of all animals wounded by !Kung San hunters escape and are never eaten. The !Kung San utilize small poisoned arrows which undoubtedly differ markedly from fluted point tipped spears or atlatl darts in terms of effective range and other relevant properties. Nevertheless, a certain percentage of the food procurement/processing loci and the underdetermined activity loci probably are attributable to unsuccessful kills. The distribution of such sites may still contain useful information on the habitat preferences of prey species and
the relative distribution of hunting activities within a region.

One final point needs to be made. Although Hayden's (1978) ethnographic experiences have led him to the generalization that chipped stone tools were not used to procure or process plant materials or small game, this may not have been true for Paleo-Indians and their generally large fluted points. There is archaeological evidence to suggest that these artifacts functioned as multipurpose tools (Lepper 1983a, 1983b, 1984, 1986b). Moreover, Callahan's (1979) experiments have demonstrated that large "Clovis-like...bifaces" (1979:153) can perform a wide range of functions including "dicing wild greens, fruits and roots" (Callahan 1979:153). It is therefore possible that some of these localities represent the procurement and/or processing of small animal or plant resources. It is interesting to note that the class of food procurement/processing loci has the highest proportion of sites with a south-facing aspect. These would have been the localities with the most thermophilous vegetation in the region, but they also would have been the most favorable sites for increasing the efficiency of food drying and hide preparation (White 1985:118).
Workshop/Occupations

It has already been suggested that the workshop/occupation sites documented in this research reflect the multiple activities undertaken at Paleo-Indian base camps. The frequency of fluted points reported from workshop/occupations ranges widely from two to 67. Some of this variability certainly relates to collector biases. Some localities which heretofore have yielded only a few points may in the future yield many more. Yet sites such as the Welling site (0801), which has produced 64 fluted points, and the Nellie Heights site (0802), for which 67 fluted points have been documented, are qualitatively distinct from sites such as the nearby Foster site (0807), which has yielded but three fluted points. Therefore, there appear to be both large and small base camps represented.

The discovery of such a dichotomy is perfectly compatible with what could be expected based on hunter-gatherer cultural ecology. According to Martin (1974) "Pedestrian foragers... are characterized by a seminomadic type of settlement pattern... wherein community segments disperse and nucleate according to the seasons" (1974:11). Studies of a number of hunting and gathering groups occupying a diversity of environments have demonstrated a central pattern of concentration and dispersion:
The concentration-dispersion pattern with its flexibility of group structure and rules of reciprocal access reveals the underlying spatial dynamic of the foraging mode of production (Lee 1979:361).

Lee (1979:361) lists three advantages of this pattern which may account for its near universality. It allows a higher population density than could be supported if every group range had to contain all of the key resources it required. It contains a mechanism for responding to local imbalances in food resources and it provides opportunities for simple resolutions to both inter- and intra-group conflict situations.

Recent archaeological investigations which have explicitly addressed the problem of defining hunter-gatherer settlement systems support this ethnological generalization. A distinction between large and small base camps has been identified by Price (1978) for the Mesolithic of the Netherlands, by White (1985) for the Upper Paleolithic of France, and by Soffer (1985) for the Upper Paleolithic of the Central Russian Plain. It therefore seems reasonable to interpret the large and small workshop/occupations as a reflection of the seasonal pattern of concentration and dispersion of Paleo-Indian hunter-gatherers. It may be possible to infer the seasonality of occupation based on the orientation of the different classes of base camp relative to the late Pleistocene environment of the central Muskingum River basin.
Large workshop/occupations tend to be more closely associated with Upper Mercer chert quarries and with satellite chert processing loci. If chert procurement is predominately a summer activity then large workshop/occupations probably were occupied during that season. It has been noted previously that large workshop/occupations are not situated in locations providing shelter from the wind. If these loci represented winter population aggregations it could be assumed that they would have been located in environments which maximized protection from wind chill, even if the average winter temperatures were no colder than they are today.

Small workshop/occupations are more widely dispersed within Coshocton County. At least one locus, the Mohawk Church site, is situated in a sheltered interior hollow. This less strict emphasis on chert outcrops and the discovery of small workshop/occupations in a variety of topographic situations, including areas which would have been sheltered from the elements, suggests that these loci might represent dispersed winter base camps. The occurrence of points broken-in-manufacture at small workshop/occupations suggests that the occupation of these sites was not limited to the depths of winter. However, the degree of manufacturing activity undertaken at these sites appears to be limited. The ratio of points broken-in-manufacture to
points broken-in-use at small workshop/occupations tends to be one to one, whereas this ratio averages six to one for large workshop/occupations.

Ethnographic analogy offers independent support for the summer concentration and winter dispersion settlement model. The Mistassini Cree of the Canadian boreal forest are geographically the closest hunter-gatherer society to Coshocton County which has been ethnographically documented. The Cree bands aggregate at favorable fishing locales during the summer months and disperse into nuclear family units for the long cold winters (Rogers 1972). Similarly, the Shawnee Indians, who inhabited much of Ohio at the time of European contact, are reported to have concentrated in large villages during the spring and summer months and dispersed into small camps located in sheltered valleys for the winter (Callender 1978). Although the Shawnee were limited horticulturalists, and both the Cree and Shawnee settlement patterns were affected by the introduction of the European fur trade, these comparisons suggest that a summer concentration, winter dispersion settlement model would have been feasible for Paleo-Indians in the late Pleistocene boreal/deciduous woodland of the central Muskingum River basin.

This model represents an attempt to extract as much information as possible from a very limited data base.
Undoubtedly there are cases in which the extrapolations exceed the limitations. For example, the co-occurrence of fluted points which have been broken-in-manufacture with fluted points which were broken-in-use has been used to define Paleo-Indian base camps. It is obvious that such an interpretation is tenuous and uncertain (see Johnson and Holliday 1984:67). This overly simplistic criterion would result in the definition of base camps on the basis of spatially congruent but temporally discrete chert processing and food procurement/processing loci.

Binford (1983) has presented convincing arguments which suggest that the use of certain localities might change as the long term land use patterns of a hunter-gatherer population changed. In other words, a locality which served as a chert processing site for a nearby base camp might later serve as a hunting camp for task groups ranging out of a more distant base camp. If this has occurred extensively in the central Muskingum River basin, then the identification of "base camps," as they have been defined in this study, is almost hopelessly problematic. However, there is reason to suggest that the Paleo-Indian land use patterns in Coshocton County may not have been this fluid:

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).

Many authors have suggested that high quality cryptocrystalline raw materials were "critical resources" for early Paleo-Indian populations (e.g. Gardner 1974, 1977). Goodyear (1979) has proposed that this apparent dependence on or preference for high quality cherts reflects a strategy of maximizing the use-life of tools and the flexibility of the tool kit. He argues that this strategy would provide a significant "adaptive advantage" (1979:5) only in the context of a highly mobile, big-game hunting economy. Gardner (1977), however, has documented a preference for high quality cryptocrystalline raw material among Paleo-Indian groups with relatively low settlement mobility. Meltzer (1985) suggests that high mobility and large ranges as indicated by the extensive use of non-local raw materials was characteristic only of Paleo-Indian groups subsisting in low diversity, periglacial landscapes. Populations in the unglaciated eastern forests appear to have tethered their seasonal round to a source of high quality chert and to have found abundant forage within a somewhat limited range of the quarry. In the "species rich environment" (Meltzer 1985:17) of the late Pleistocene boreal-deciduous woodland (see Chapter IV), silex "was likely the only resource of sufficient density and spatial
consistency to promote reuse of a particular locality" (Meltzer 1985:17).

The abundant Paleo-Indian archaeological record of Coshocton County has been regarded as anomalous. In a state where the average number of fluted points documented from a county was ten (excluding Coshocton County), the 184 specimens which Seeman and Prufer (1982) recorded from Coshocton County stood out as a remarkable exception. It is even more remarkable now that this study has raised that total to 410. Seeman and Prufer (1982) attempted to explain this peak in the frequency of fluted points in terms of an equivalent peak in Paleo-Indian activity.

Their first suggestion is that Coshocton County served as the manufacturing center for Paleo-Indian groups from across Ohio and that the large numbers of fluted points reflect the production and discard of numerous manufacturing failures (see also Prufer 1971). They reject this proposition, however, since most of the points documented from Coshocton County were finished artifacts (Seeman and Prufer 1982:159).

An alternative explanation they propose is that "this concentration of points resulted from a disinterest in the recovery of points expended in hunting" (Seeman and Prufer 1982:159). The idea here is that it was not perceived as
cost-effective for Paleo-Indians to expend time and effort in retrieving and resharpening points when the raw material for replacing them was so close at hand. MacDonald (1971:34) has referred to such behaviors at or near chert quarries as "indulgent" technologies. Seeman and Prufer (1982:159) note that an analysis of the relationship between fluted point length and distance from the Coshocton quarries "would aid in evaluating the likelihood of this alternative" (1982:159). In Chapter VII, I have demonstrated that there is a very slight tendency for fluted point lengths to increase across Ohio with increasing distance from Coshocton County. If the retrieval, resharpening, and re-use of points became increasingly important with increasing distance from Coshocton County, then one should expect to see in the archaeological record a marked trend towards decreasing point length with increasing distance from the presumed quarry. Therefore, this alternative may be rejected.

The third and last explanation Seeman and Prufer (1982) advance for the high frequency of points here is that it "reflects relatively intensive hunting [by Paleo-Indian bands] when compared with most other areas of the state" (1982:159). Although this proposition is in direct opposition to their general notions of Paleo-Indian land use (Prufer 1971, and Seeman and Prufer 1982:161), it is the
only other alternative for an analysis based on the assumption that artifact frequencies are intrinsically meaningful and interpretable directly in terms of prehistoric activity. That Seeman and Prufer subscribe to this assumption is indicated by their discussion of "the matter of collector bias" in the interpretation of the distribution of fluted points (Seeman and Prufer 1982:161; cf. Lepper 1983:274 and Lepper 1985).

The high frequency of fluted points documented from Coshocton County is certainly the result of a number of interrelated factors. Fundamentally, however, it is perfectly consistent with the dynamics of hunter-gatherer land use described by Binford (1980) and others.

The subsistence resources of the late Pleistocene Unglaciated Appalachian Plateau have been described as diverse, extensive, and generally dispersed (see Chapter IV). Harpending and Davis (1977) suggest that the optimal settlement strategy for exploiting such an environment would be dispersed residential bases and relatively restricted ranges. Since abundant food resources would have been available within the foraging range of these residential bases, it may be expected that Paleo-Indian hunter-gatherers simply "mapped on" to available resources "through residential moves and adjustments in group size" (Binford 1980:10). The archaeological consequences of "foraging
strategies" are residential bases of varying size and locations, or extractive camps (Binford 1980). The archaeological evidence for locations "may be scattered over the landscape rather than concentrated in recognizable 'sites'" and "few if any tools may be expected to remain at such places" (Binford 1980:9).

If this pattern characterized Paleo-Indian land use in the Appalachian Plateau, then the archaeological record of this occupation should be exceedingly ephemeral. An analysis restricted to the distribution of fluted projectile points could be expected to identify a few residential bases, based on clusters of broken or discarded points, and a very few, widely scattered and isolated projectile points representing locations. This is the pattern which would hold for the entire Appalachian Plateau, and probably all of Ohio, except for "settings with limited loci of availability for critical resources" (Binford 1980:9).

The extensive and accessible outcrops of Upper Mercer chert in Coshocton County would have constituted a critical resource with a relatively restricted spatial availability. In this context the patterns of residential mobility would have been tethered to the chert quarries, perhaps on the seasonal basis proposed above. This tethering would increase the redundancy in the use of particular localities as residential base camps. "The greater the redundancy, the
greater the potential buildup of archaeological remains, and hence the greater the archaeological visibility" (Binford 1980:9).

In other words, the "anomalous" frequency of fluted points from Coshocton County is partially a result of the extreme redundancy in the Paleo-Indian land use system associated with the Upper Mercer chert quarries and the consequent increase in the archaeological visibility of the land use pattern. There need not be anything intrinsically unique about the amount or range of activities engaged in by Paleo-Indians in Coshocton County relative to other areas in the Appalachian Plateau, or even other areas in Ohio. It was demonstrated in the previous chapter that Coshocton County probably was not the center of Paleo-Indian fluted point manufacture. There is no evidence that the Paleo-Indian technology was any more "indulgent" in Coshocton County than in any other region in Ohio. Finally, there is no evidence that Paleo-Indians engaged in more intensive hunting in the Coshocton County area relative to other regions in Ohio.

The most parsimonious explanation of the high frequency of fluted points reported from Coshocton County relative to other Ohio counties involves three factors: 1) the high archaeological visibility of the Paleo-Indian settlement pattern due to the high redundancy in their land use system
surrounding the Upper Mercer quarries, 2) the unusual
dedication of a local amateur, Dr. N. L. Wright (see Chapter
III), and 3) the intensive research efforts of professional
archaeologists in this area (e.g. Prufer 1963b; Prufer and
Wright 1970; Prufer 1971; Pi-Sunyer, Blank, and Williams
1975).

Comparative Data

Lantz (1984) conducted an intensive study of the
distribution of Paleo-Indian projectile points and tools
from the Appalachian Plateau of Pennsylvania. He noted
Seeman and Prufer's (1979:158) observation that the largest
number of fluted points in Ohio had been documented from
Coshocton County "near the quarries", and asserted that,
because western Pennsylvania lacked major quarries, his own
research in that region would reveal "the true land usage by
our Paleo-Indian hunters" (Lantz 1984:219). Lantz appears
to be following Prufer's (1971:310) conclusion that the
large number of fluted points documented from Coshocton
County is an anomaly in the Paleo-Indian settlement pattern
which is explained by the availability of Upper Mercer chert
in this area. The idea here seems to be that chert
procurement was an unusual or exceptional activity which
interrupted, and was outside of, the normal Paleo-Indian
settlement-subsistence system. In other words, if the
Paleo-Indian presence in the Walhonding and Tuscarawas river valleys merely related to the acquisition of raw materials, then the distribution of their sites in this area would not be relevant for understanding the "true land usage" of Paleo-Indian hunter-gatherers.

This is a puzzling position for Lantz to adopt since Prufer (1971) was using this argument to support his hypothesis that the Appalachian Highlands "were not an area of substantial Paleo-Indian penetration" (1971:310).

Lantz's (1984) research, however, documented hundreds of Paleo-Indian projectile points and tools from 210 sites in 23 counties within the Appalachian Plateau of western Pennsylvania (Lantz 1984:210). These data do not support the hypothesis that this region was in any way avoided by Paleo-Indian hunter-gatherers.

A closer examination of Lantz's (1984) results offer interesting comparisons with the Coshocton County data. In the Unglaciated Appalachian Plateau of western Pennsylvania Lantz (1984) identified "major camp sites," other "small camps" and/or "kill sites" (1984:211) located "in high valleys or back from higher order streams and adjacent to small runs and spring heads" (Lantz 1984:215). Lantz (1984) observed that the "greatest association of Paleo-Indian sites was with first order streams" (1984:214).

These results are partially duplicated in the central Muskingum River basin. First order streams are the most
commonly represented water source in association with Paleo-
Indian sites in Coshocton County and, for some types of
site, proximity to water is crucial. However, high order
streams are also extremely important in the land use pattern
documented in Coshocton County.

With regard to relief, Lantz (1984:215) noted that
Paleo-Indian sites in the Unglaciated Appalachian Plateau
occurred in a variety of situations. Forty-three percent of
these sites were nine meters or less above the lowest relief
available within a 0.8 kilometer radius. This is
substantially less than the 61% of Coshocton County fluted
point yielding loci which occur nine meters or less above
the lowest relief available within 0.8 kilometers. One
factor in the large difference observed between these areas
relates to the large number of points from western
Pennsylvania documented "in intermediate and upland
locations" (Lantz 1984:211). These upland sites suggested
to Lantz (1984:211) that "a more diversified fauna" was
being pursued in the unglaciated plateau. This conclusion
is corroborated by the land use model proposed herein for
Coshocton County. The almost complete absence of quarry
sites and tool reduction stations in western Pennsylvania
(Lantz 1984:212), and the extensive utilization of Upper
Mercer chert by Paleo-Indians in this area (Lantz 1984:212),
suggest that the contrasts between the land use patterns of
these two areas are complimentary, not contradictory.
I suggest that the central Muskingum River basin Paleo-Indian land use model will also prove to characterize the land use system of Paleo-Indian populations throughout Ohio, western Pennsylvania, and indeed perhaps throughout the midcontinent region of North America. It is not likely that the full range of Paleo-Indian settlement types occur within the limits of Coshocton County, nor that a complete seasonal round could be encapsulated in such a small area.

Table 33 presents an excercise in thinking about the scale of Paleo-Indian land use relative to the scale of this study. Using Nunamiut Eskimo land use as a model, Coshocton County would represent only a fraction of the range of a single band and the entire state of Ohio might only circumscribe the range of four bands. It is not being claimed here that the Nunamiut land use system is analogous to the Paleo-Indian system for the late Pleistocene central Muskingum River basin (see Chapter VII). This is intended simply as an example of the potential for very large ranges among certain hunter-gatherer societies.

If Binford (1979) is correct in his assertion that the "procurement of raw materials is embedded in basic subsistence schedules" (1979:259), then the spatial distribution and relative proportions of Upper Mercer chert from Paleo-Indian contexts may simply reflect "the mobility scale of the adaptation appearing as a consequence of the
normal functioning of the system..." (Binford 1979:261). In other words, the widespread distribution of Upper Mercer chert in eastern North America may indicate the range limits of Paleo-Indian hunter-gatherers.

Upper Mercer chert has been reported from Paleo-Indian sites across the northeastern United States. All of these identifications have been based on visual inspection only, and this method is far from definitive (Chapter IV). Nevertheless, if we assume the identifications are correct, an interesting pattern emerges.

In north central Wisconsin, a few isolated fluted points have been identified as having been made from Upper Mercer chert (Mason 1981:89). An isolated point find from western Michigan (Wright 1981), the bulk of the large assemblage from the Gainey site (Simons et al. 1984:267), and one point fragment and two percent of the debitage from the Holcombe site in southeastern Michigan (Fitting et al. 1966:127) have all been identified as Upper Mercer chert. Lantz's (1984:212) observation that Ohio Upper Mercer chert was the "most preferred lithic source" for Paleo-Indian artifacts in western Pennsylvania has already been noted; in addition, he reported that a fluted point of this material had been documented in northeastern Pennsylvania (Lantz 1984:213). Lantz (1984) concluded that the "Coshocton flints were being transported possibly as cache blades or preforms for distances of up to 322 km" (Lantz 1984:213). Several
localities in New York have yielded Paleo-Indian artifacts said to have been crafted from Upper Mercer chert (Mason 1981:89). One scraper from the Potts site (Funk et al. 1969:14), one end scraper and two side scrapers from the West Athens Hill site (Funk 1973:21), one fluted point from the Hiscock farm site (Gramly 1985:3), and several fluted points and other tools from the Lamb site (Gramly 1986) have all been identified as Upper Mercer chert.

All of these reports of Paleo-Indian artifacts made from Upper Mercer chert have one thing in common. All of the occurrences documented from outside of Ohio of which I am aware, have been found north of the central Muskingum River valley. Following Binford (1979), this distributional pattern could be interpreted as the range limits of highly mobile hunter-gatherers. Alternatively, the scattered finds of this material could relate to the exhaustion and eventual discard of tools fabricated from Ohio Upper Mercer chert at northern sites as Paleo-Indian bands dispersed northward through or from Ohio. Binford (1979:260) has referred to the discard at one site of items which had been manufactured previously at some other location as an archaeological "founder effect."

Again, assuming that the identifications of Upper Mercer chert are accurate, it is likely that both of the interpretations apply to different sites. The predominance of Upper Mercer chert in collections of Paleo-Indian
artifacts from throughout western Pennsylvania, coupled with the continuous environment of the Appalachian Plateau, strongly suggests that this region is a part of the range of the Paleo-Indian hunter-gatherers whose activities extended into the central Muskingum River basin. The large quantities of Upper Mercer chert documented from the Gainey site in southeastern Michigan also suggests that the inhabitants of this site were closely tied to the sources of this material in eastern Ohio.

On the other hand, the isolated fluted point finds of Upper Mercer chert in Wisconsin, western Michigan, eastern Pennsylvania, and New York probably result from the founder effect. These finds would therefore relate to the gradual northward dispersal of Paleo-Indian groups through Ohio.

It is interesting to note that the trail of Upper Mercer chert artifacts which leads northwards roughly parallels the temporal changes in fluted point morphology described in Chapter VI. In other words, the distribution of Paleo-Indian artifacts crafted from Upper Mercer chert supports the model of a unidirectional gradual movement of people from the southeast to the northeast.

Summary and Conclusions

In 1971, Prufer presented the results of a survey of Paleo-Indian remains in the Walhonding and Tuscarawas
valleys of Coshocton County, Ohio. After describing certain aspects of the distribution of 173 fluted points, he observed that "further research in this rich area is warranted" (Prufer 1971:310). This call went largely unheeded for more than ten years, until the inception of the present research effort.

The purpose of this study has been to build on Prufer's data and to attempt a reconstruction of the Paleo-Indian land use system in the central Muskingum River basin. This attempt is an exploratory effort, and the result is an initial approximation of the Paleo-Indian settlement system in eastern Ohio. It is acknowledged that this "settlement pattern" analysis is based on data which are biased in unknown (as well as known) ways, and which lack fine chronological control, clear associations of artifacts or ecofacts and reliable estimates of site dimensions or artifact density. These are formidable limitations, and some may argue that the conclusions of this research are not warranted from the data. However, the assumptions of this research have been made explicit, the methods are replicable, and the conclusions are testable.

The keystone of this analysis of Paleo-Indian "settlement" patterning is the differentiation between "Multiple Activity Locations" and "Limited Activity Locations" (Wilmsen 1970:75), and the equation of these loci
with residential base camps and specialized extraction stations, respectively. If these determinations are reasonably accurate, then the patterning in the geographic positioning of the various site types will reflect the general, long term land use strategies of Paleo-Indian hunter gatherers in this region.

Chert processing loci tend to be situated at favorable locations between outcrops of Upper Mercer chert and large workshop/occupations. It appears that chert was being quarried during spring, summer and autumn months by task groups radiating out from large base camps. Chert blanks were transported from the upland quarries to level, open areas out of the hills. Fluted points, preforms, and probably other tools, were manufactured here, then transported to the large base camps where finishing touches were applied.

The large workshop/occupations may represent summer base camps where relatively large segments of the population aggregated to exploit the chert outcrops and the diverse and abundant floral and faunal resources. Small workshop/occupations are widely scattered throughout Coshocton County. These sites may represent the dispersal of the summer "macar band" into smaller family groups for the lean winter months.

Food procurement/processing loci most likely represent dispersed hunting camps and kill sites. The distribution of
these loci suggests that white-tailed deer was the preferred prey and that small task groups, perhaps individual foragers, were hunting this and other species on an encounter basis.

There are indications that this pattern may characterize Paleo-Indian land use throughout the Appalachian Plateau and perhaps throughout much of eastern North America. The results of Lantz's (1984) survey of Paleo-Indian artifacts in western Pennsylvania indicate that there are strong similarities between the Paleo-Indian land use patterns of the central Muskingum River basin and other sections of the Unglaciated Appalachian Plateau. This entire region may be included within the range or territory of a single Paleo-Indian macroband. The similarities between these sections of the Unglaciated Appalachian Plateau with regard to many aspects of Paleo-Indian land use are heightened by the shared dependence on Upper Mercer chert. However, the essential elements of the general pattern are duplicated in different regions across eastern North America (Gardner 1981). The most elegant formulation of this model of Paleo-Indian land use has been advanced by Gardner (1983b) based on intensive research in the Shenandoah Valley of Virginia (see Chapter VII).

Custer, Cavallo, and Stewart (1983) have argued that the Paleo-Indian land use described by Gardner (1974) for the Flint Run Complex relates to patterns of lithic resource
distribution. They present a general model which predicts that regions like Flint Run, where lithic resources are densely concentrated in a few locations, will exhibit a cyclical settlement/lithic procurement pattern:

According to this model, groups cycle their movements around specific quarry sources. The catchment area for any wandering range is determined by the state of the curated tool kit. Within this system, groups schedule their movements so that they can return to quarry sites to replenish their tool kits as they become depleted (Custer, Cavallo, and Stewart 1983:269).

This model follows Gardner's (1983b) notions of a "lithic determinism" which locked Paleo-Indian hunter-gatherers into a restricted catchment area centered on high quality chert outcrops. The basis for the cyclical model, as distinct from a simple serial model (Custer, Cavallo, and Stewart 1983:271), seems to be the dense concentration of sites around the particular chert source, the large size of some of the sites suggesting periodic reoccupations, and the apparent depletion of the tool kit with increasing distance from the quarry (Custer, Cavallo, and Stewart 1983; Gardner 1977; Gardner and Verrey 1979).

In the central Muskingum River basin there is a dense concentration of sites centered on discrete outcrops of Upper Mercer chert, and a few of these sites are exceptionally large suggesting periodic reoccupation (e.g. Prufer and Wright 1970:261). It was demonstrated in Chapter VI, however, that there is no evidence for the depletion of
the tool kit, i.e. a decrease in the size of fluted projectile points, with increasing distance from Coshocton County. Importantly, such a relationship has not been quantitatively demonstrated for Flint Run either.

Elsewhere in this chapter it was suggested that these "unusual" or "anomalous" patterns could be explained as a function of the higher archaeological visibility which results from extreme redundancy in the Paleo-Indian land use system. This redundancy was suggested to be associated with the restricted availability of high quality chert. It is not necessary to assume that Paleo-Indians restricted their mobility to relatively small territories centered on favorite chert quarries. The low site frequency and minimal artifact density throughout the majority of the Appalachian Plateau is the pattern which would be expected if Paleo-Indian populations were generalized foragers "mapping onto" food resources through high residential mobility (Binford 1980). In areas such as the Walhonding Valley with a concentrated source of high quality chert, the basic synchronous settlement pattern would not change. But, whereas the biotic resource distributions of the overall region would be shifting and changing from year to year, the chert outcrops would remain fixed and predictable. A good residential camp from which to exploit the outcrops of Upper Mercer chert would remain the same from year to year. A good residential camp from which to hunt white-tailed deer
within a region could vary widely from year to year, or even month to month. Therefore, the Paleo-Indian land use system in the Walhonding Valley and similar areas would be highly redundant relative to areas at increasing distances from the chert sources. Base camps might be reoccupied over and over again.

This diachronic redundancy would result in a relatively high archaeological visibility for the land use system situated around the fixed, predictable chert source. The land use system of the same groups foraging in the heterogenous environments of the Appalachian Plateau away from localized chert outcrops might leave only a diffuse and indistinct impression in the archaeological record.

This interpretation explains the extraordinarily dense concentration of Paleo-Indian material in the Walhonding Valley in Ohio and in the Shenandoah Valley of Virginia. The general model may be applicable to understanding Paleo-Indian settlement and subsistence patterns throughout the unglaciated portion of eastern North America. (In the far northeast, Paleo-Indians appear to have been specialized "collectors" [Binford 1980] and their settlement patterns reflect this specialized subsistence system [see Meltzer 1985; also MacDonald 1968, Gramly 1982, Storck 1982, and Bonnichsen 1986]). It is an explicitly uniformitarian explanation in that it does not rely on the postulation of unique and unusual behaviors for Paleo-Indian hunter-
gatherers. There are indications that Paleo-Indians were unusually selective regarding the quality of their raw material, but the evidence for a "lithic determined" settlement system such as Gardner (1983b) has proposed is more parsimoniously explained by ethnologically derived principles of hunter-gatherer settlement systems (Binford 1978:9):

Only present processes can be directly observed. Therefore, we are better off if we can explain past events as a result of processes still acting. This again is not an argument about the world; it is a statement about scientific procedure (Gould 1977:150-151).
**TABLE 33**

Demographic expectations for designated regions assuming a Nunamiut type of system of land use

<table>
<thead>
<tr>
<th>place</th>
<th>Area in sq. miles</th>
<th>No. of Minimal Bands Expected</th>
<th>No. of Persons</th>
<th>No. of Breed Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coshocton County</td>
<td>562</td>
<td>.05</td>
<td>2</td>
<td>.003</td>
</tr>
<tr>
<td>Ohio</td>
<td>41,222</td>
<td>4.12</td>
<td>124</td>
<td>.25</td>
</tr>
</tbody>
</table>

*a* After Binford (1983b:43, Table 1)
APPENDIX A

Coshotoon County fluted projectile point data
## Coshocton County Fluted Projectile Point Data

**Sorted by Township**

| Township | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**Notes:**
- The data includes various measurements for different fluted projectile points, sorted by township.
- Each row represents a different township, with columns indicating specific measurements or categories.
- The data seems to be recorded in a tabular format, likely for archaeological or historical study purposes.

---

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### COSHOCTON COUNTY FLUTED PROJECTILE POINT DATA

**SORTED BY TOWNSHIP**

| TOWNSHIP | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

*Footnotes or additional information may be provided here.*
APPENDIX B

Ohio fluted projectile point data
## Ohio Fluted Projectile Point Data

**Sorted by Prufers Survey Number**

<table>
<thead>
<tr>
<th>OBSV</th>
<th>COUNTY</th>
<th>POLKED</th>
<th>CLEARED</th>
<th>MEASUREMENT</th>
<th>SHAPE</th>
<th>CIRCLE</th>
<th>TOTAL</th>
<th>PAPERS</th>
<th>LINN</th>
<th>RUSK</th>
<th>HARRIS</th>
<th>HENDERSON</th>
<th>EP</th>
<th>NEFF</th>
<th>EATRE</th>
<th>DOW</th>
<th>SUMNER</th>
<th>STEWART</th>
<th>JOHN</th>
<th>PFC</th>
<th>NUNN</th>
<th>BASS</th>
<th>CUTHBERT</th>
<th>W.</th>
<th>J.</th>
<th>L.</th>
<th>M.</th>
<th>N.</th>
<th>S.</th>
<th>D.</th>
<th>F.</th>
<th>G.</th>
<th>H.</th>
<th>I.</th>
<th>J.</th>
<th>K.</th>
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<td>57</td>
<td>92</td>
<td>32</td>
<td>92</td>
<td>1</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>22</td>
<td>0</td>
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<td>3</td>
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<td>27</td>
<td>34</td>
<td>18</td>
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<td>24</td>
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<td>0</td>
<td>24</td>
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<td>1</td>
<td>0.84</td>
<td>0.94</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

...
APPENDIX C

Coshocton County Paleo-Indian land use data
| T | W | S | E | N | O | R | D | O | W | M | I | Y | P | O | Q | V | P | O | Q | V | O | R | D | O | W | M | I | Y | P | O | Q | V | P | O | Q | V |
| S | E | S | I | O | D | S | I | O | D | S | I | O | D | S | I | O | D | S | I | O | D | S | I | O | D | S | I | O | D | S | I | O | D | S | I | O | D |
| 61 | WASHINGTON 00 001 B CLOVIS ISOLATE 0 4 SW A HUSKINGUM 0 SW G OTHER B MEDIUM DUTY |
| 62 | WHITE EYES 00 003 B CLOVIS ISOLATE 0 4 S C TUSCARAWAS S N G OTHER C LIGHT DUTY |
| 63 | OXFORD 00 003 C OTHER ISOLATE 0 4 M C TUSCARAWAS N S G OTHER B MEDIUM DUTY |
| 64 | TUSCARAWAS 00 002 C OTHER ISOLATE 0 4 W A HUSKINGUM N W G OTHER C LIGHT DUTY |
| 65 | VIRGINIA 00 002 C OTHER ISOLATE 0 4 SE A HUSKINGUM NE W O CONESVILLE D MEDIUM DUTY |
| 66 | FRANKLIN 01 000 D CLOVIS SITE 0 4 W A HUSKINGUM W S G OTHER O UNIMPROVED DIRT |
| 67 | TUSCARAWAS 01 000 F MIXED 0 4 W A HUSKINGUM S SE G OTHER C LIGHT DUTY |
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