Conclusions and Recommendations

Phase II testing failed to locate any prehistoric artifacts or cultural features. Therefore, the site is not considered to be eligible for listing on the National Register of Historic Places, and no further testing is recommended.

CONCLUSIONS AND RECOMMENDATIONS

IMPLICATIONS FOR REGIONAL PREHISTORY

The results of the Phase II prehistoric archaeological investigations of the State Route 1 Relief Route project area are applicable to two research problems: regional settlement patterns and the organization of local lithic technologies. Each of these topics is described below.

Regional Settlement Patterns

The site location data from the Phase I and II surveys of the Early Action Segment of the Route 13 Corridor can be used to examine changing land use patterns through time. Only three of the sites in the project area (7NC-J-134, 7K-C-360, and 7K-C-365A) appear to have been utilized through multiple periods of prehistory and reflect different adaptations to evolving bio-social environments. The remainder of the sites appear to contain only Woodland occupations. Nevertheless, interesting site location data are present. The body of data on Paleo-Indian and Archaic sites in the Mid-Drainage Zone of Delaware has been too sparse to enable development of specific Mid-Drainage Zone settlement pattern models. However, based on the work of Gardner (1974, 1977) in the Flint Run Complex of Paleo-Indian sites in western Virginia and on analysis of the known Paleo-Indian sites in the Coastal Plain of Delaware, Paleo-Indian settlement models have been projected for this region and can be applied to the project area. The projected settlement model most applicable to the present setting is shown in Figure 6.

Gardner's (1974, 1977) studies of Paleo-Indian sites in Virginia have shown that a consideration of the Late Glacial, Pre-Boreal, and Boreal environments prevailing during the Paleo-Indian Period is important in understanding the possible patterns of human adaptive strategies. The dominant weather pattern during these times produced little seasonal variation and little variation in vegetation communities causing Paleo-Indian bands to rely heavily on hunting. The lifestyle of Paleo-Indian hunters therefore would have required mobility between game-attractive wetlands and lithic outcrops from which to secure the raw materials for the production of hunting and processing tools. There are no such primary lithic outcrops in the project area, and only one site, 7K-C-365A, has a Paleo-Indian component. This site is located on a sandy knoll surrounded at its base by two converging low-order streams (headwaters of Muddy Branch), swampland, and additional poorly-drained wetlands. This site then seems to confirm the criteria of the present Coastal Plain site location models and shows that the Mid-Drainage Zone of the Low Coastal Plain of Delaware was indeed utilized by Paleo-Indian hunter/gatherers.

Adaptive strategies in the Archaic Period are not believed to have been significantly different from those in the Paleo-Indian Period. Although weather patterns changed to produce warmer temperatures and introduce both seasonal climatic variability and more variation in plant communities, the rise of sea level during this episode is believed to have been too rapid to enable sufficient stability in the coastal environment to support significant changes in estuarine resources (Custer 1984a, 1986b). Nevertheless, the new faunal and floral communities did provide enough variety to reduce the dependency on hunting and allow an increase in the exploitation of plant species.

The exploitation of new resources in the Archaic resulted in a broadening range of site locations, tool types, and raw material preferences. The presence of bifurcate points as well as tools and debitage of quartz, quartzite, rhyolite, argillite, and other non-cryptocrystalline raw materials in the assemblages from sites 7NC-J-134, 7K-C-360, 7K-C-365A, and 7NC-J-166 appear to support these hypotheses. The increase in variety of material types that occurred in the Archaic signifies a shift in Archaic lithic procurement strategies from a Paleo-Indian emphasis on direct procurement to an interest in secondary sources utilized in serial fashion (Custer, Cavallo and

Stewart 1983). Custer has noted an absence of Archaic sites in association with outcrops of the Delaware Chalcedony Complex (Custer 1986b:64). Many of the bifurcate points found in Delaware are made of non-cryptocrystalline materials which are available from local cobbles and cobble beds (Custer 1986b:64-65). The projected settlement pattern for the Archaic Period is shown in Figure 9. Several Archaic sites were excavated during this project.

Archaic artifacts recovered from 7NC-J-134 were largely recovered from plow zone contexts and no subsurface features were located. 7K-C-360, however, is located in an unplowed woodlot and the stratigraphic context appears to be undisturbed. Three features were identified at the site, including two possible hearth areas and a quartzite chipping feature that probably date to the Archaic Period. This site provides a good opportunity to add to the sparse record that exists for the project area during the Archaic Period. 7K-C-365A is also located on an unplowed knoll in undisturbed stratigraphic context. Diagnostic artifacts from all periods of prehistory, including the Archaic, were recovered from plow zone and subsurface contexts, and 17 soil pit features were located. What makes this site unique is its interior location which is in direct contrast to the riverine locations that make up most of the known site data on prehistoric adaptations during the later portions of Delaware's prehistory. 7NC-J-166 is located on a sandy rise between bay/basins and northeast of a channelized stream. A jasper bifurcated projectile point and a few quartz and cryptocrystalline flakes were found in the plow zone, but no subsurface features were located. The setting and presence of the projectile point fit the profile of an Archaic procurement site (Custer 1986b:83).

In the Woodland I Period, to which several of the sites in the project area date, dramatic changes in climate and temperature occurred, triggering corresponding changes in floral and faunal communities. The climatic episodes in effect during these changes were the Sub-Boreal in the early portion of the Woodland I Period and the Sub-Atlantic in the later portion (Custer 1984a). The Sub-Boreal episode is characterized by an early warm and dry period followed by a period of increasing moisture and decreasing temperature (Custer 1984a). The effects of these changes were seen in a waning of mesic forests and the spread of grasslands. The resulting xeric oak-hickory forests restricted to early stages of development would have altered the distributions of animal species inhabiting these environments and therefore would have also altered procurement and subsistence strategies. The later Sub-Atlantic episode would have moderated the temperature and moisture stress and encouraged a return to mesic forests with a rich variety of plant and animal communities (Custer 1984a). Deer, wild turkey, and other small mammals would have been readily available in these new settings. Furthermore, a moderation in sea level rise would have provided sufficient stability to support the propagation of estuarine-adapted species.

All of these changes would in turn have led to changes in technology, population growth, mobility, and social organization. The available site data for the Woodland I Period in the project area is richer than for the previous periods of prehistory and has been broken down into complexes reflecting the evolving shifts in adaptation. The early Clyde Farm and Barker's Landing complexes are, in general, characterized by an increase in size of macro-band base camps and a reduction in the variety of macro-band base camp locations. Additionally, an increase in the number and variety of procurement locales has been observed (Custer 1984a). Micro-band base camps in these complexes would have been located in special resource settings such as attractive hunting locales, rich gathering locales, and lithic procurement locales, which in the project area would likely have been secondary cobble beds. Figure 131 shows the proposed settlement system for the Clyde Farm and Barker's Landing complexes.

The reduction in macro-band base camp locations would seem to have occurred in response to the drying trend that necessitated a closer proximity to reliable sources of surface water. This trend toward circumscribed habitation areas would have resulted in increasing population densities that would explain the extensification of procurement locales. One site in the project area, 7K-C-194A, exhibits characteristics associated with Clyde Farm/Barker's Landing settlement patterns. This site, along with sites 7K-C-203, 7K-C-204, 7K-C-194, and 7K-C-195, constitute the Middle Leipsic River Valley Archaeological District which is tentatively identified as a series of macro-band base camps. The district is located on the Leipsic River and most of the site has been plowed. Diagnostic artifacts from the sites include one Susquehanna and one Koens-Crispin broadpoint, Marcey Creek/Selden Island ceramics, and one other steatite-tempered ceramic, all characteristic of the Clyde Farm and Barker's Landing complexes. In addition to Clyde Farm/Barker's Landing artifacts, the assemblages from these sites also include several contracting stemmed and notched points and bifaces as well as two Coulbourn and one

FIGURE 131

Woodland I Settlement System, Clyde Farm and Barker's Landing Complexes

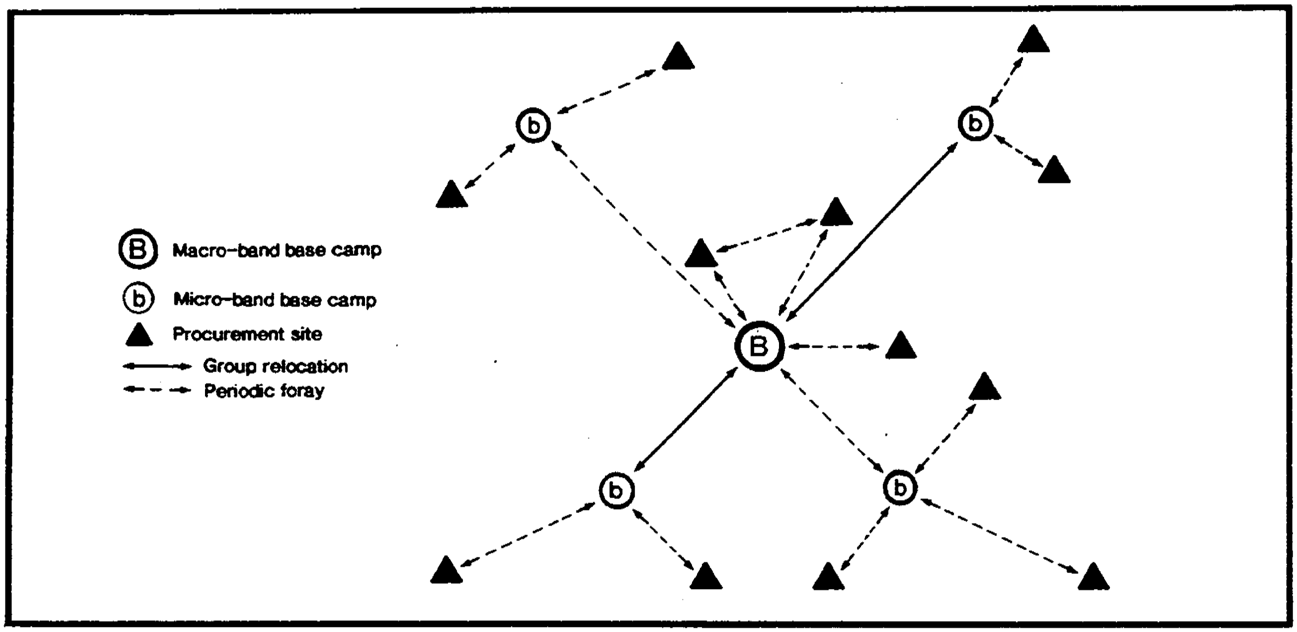
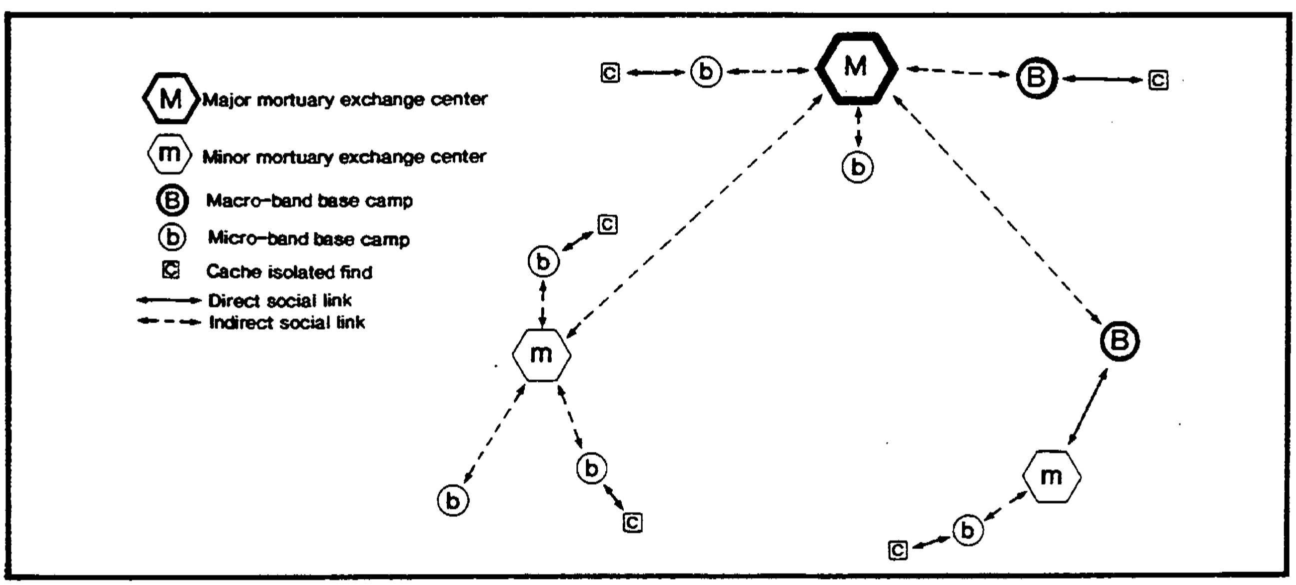


FIGURE 132

Delmarva Adena Complex Settlement System



Wolfe Neck ceramics commonly associated with the Wolfe Neck and Delmarva Adena complexes, the successor complexes to Clyde Farm and Barker's Landing. 7K-C-194A also contains several features, a sample of which located a possible hearth area within a larger pit feature. Several other soil pit features, some of which may represent semi-subterranean house pits were also located. Such structures would support theories of increased sedentism which have been postulated for the Woodland I Period.

Diagnostic artifacts from a range of Woodland I complexes combined with information from features identified at various sites stand to serve as bases of data that can be used in comparison with other Woodland sites to clarify the adaptations within these complexes as well as the transitions from one complex to another. Moreover, further excavation of the site can help to confirm the hypothesis that this site represents a macro-band base camp and thereby provide insight into the attributes that are characteristic of this site type in the Woodland I Period for the Mid-Drainage Zone. This data could then be used in comparison with similar sites in other physiographic settings.

Settlement patterns and basic adaptations of the Clyde Farm and Barker's Landing complexes persist into the Delmarva Adena and Wolfe Neck complexes, with changes occurring in emerging trade and exchange systems and the development of ranked societies (Custer 1984a). The only sites in the project area with artifacts diagnostic of these complexes are the multi-component 7NC-J-134, discussed above, 7K-C-194A of the Middle Leipsic River Valley macro-band complex, also discussed above, and 7K-C-368, tentatively identified as a micro-band base camp located at the confluence of an ephemeral stream and the Little River. The Delmarva Adena settlement system model is shown in Figure 132. Later Webb complex ceramics were also present at 7K-C-368.

After about A.D. 0, more moderate climates alleviated the pivotal conditions that led to such circumscribed settlements and the consequent development of social hierarchies to manage the new complexities of life. It appears that these environmental alterations may have facilitated the devolution of these complex societies to simpler forms. These changes and their corresponding technological shifts mark the beginning of the Carey complex. The only significant change evident in the project area for this time period is a progressive move inland of macro-band base camps along the tidal drainages following the inward advance of the tidal/fresh water interface zone. A settlement model showing the Carey Complex settlement system appears in Figure 133.

Carey complex settlements in the Low Coastal Plain persist beyond A. D. 500, a time when settlement changes occur in other areas. This post A. D. 500 Low Coastal Plain adaptation is known as the Late Carey complex. One site in the project area, 7K-C-364, contained one Mockley and one other unidentifiable shell-tempered ceramic associated with this complex. 7K-C-364, tentatively identified as a "staging/processing" type of procurement site as described by Custer and Bachman (1984) for the Hawthorn site (7NC-E-46), is located in the midst of a cluster of procurement site loci. Bachman et al. (1988:27) have suggested that where such a cluster exists, a "staging/processing" type of procurement site can also be expected. This placement of the site also puts 7K-C-364 reasonably close to two possible micro-band base camps (7K-C-359 and 7K-C-368) from which the procurement forays might have originated. This evidence from the project area indicates that the model created by Custer and Bachman (1984) for the Churchman's Marsh area of northern Delaware during the Woodland I Period may also be valid for central Delaware.

By A.D. 500, more significant settlement pattern changes occur in central Delaware and mark the beginning of the Webb Complex. As settlements became more sedentary and subsistence resources more varied throughout the earlier Woodland I Period, population steadily increased. By Webb Complex times, this population pressure resulted in the disappearance of macro-band base camps in central Delaware and a proliferation of micro-band base camps as the traditional social networks began to break down (Custer 1984a, 1986b). A settlement model for the Webb Complex is shown in Figure 134. Two sites in the project area, sites 7K-D-22 and 7K-C-368, contained Hell Island ceramics, a type associated with Webb Complex settlements. Both sites have been tentatively identified as micro-band base camps. 7K-D-22, which also contained two argillite points dating to the Woodland I Period, is located near the confluence of two minor tributaries and the Little River east of Dover, a setting which Custer has determined to be a likely Mid-Drainage Zone micro-band site location (Custer 1986b:131). Two soil pit features were also identified at the site.

FIGURE 133

Carey Farm Complex Settlement System

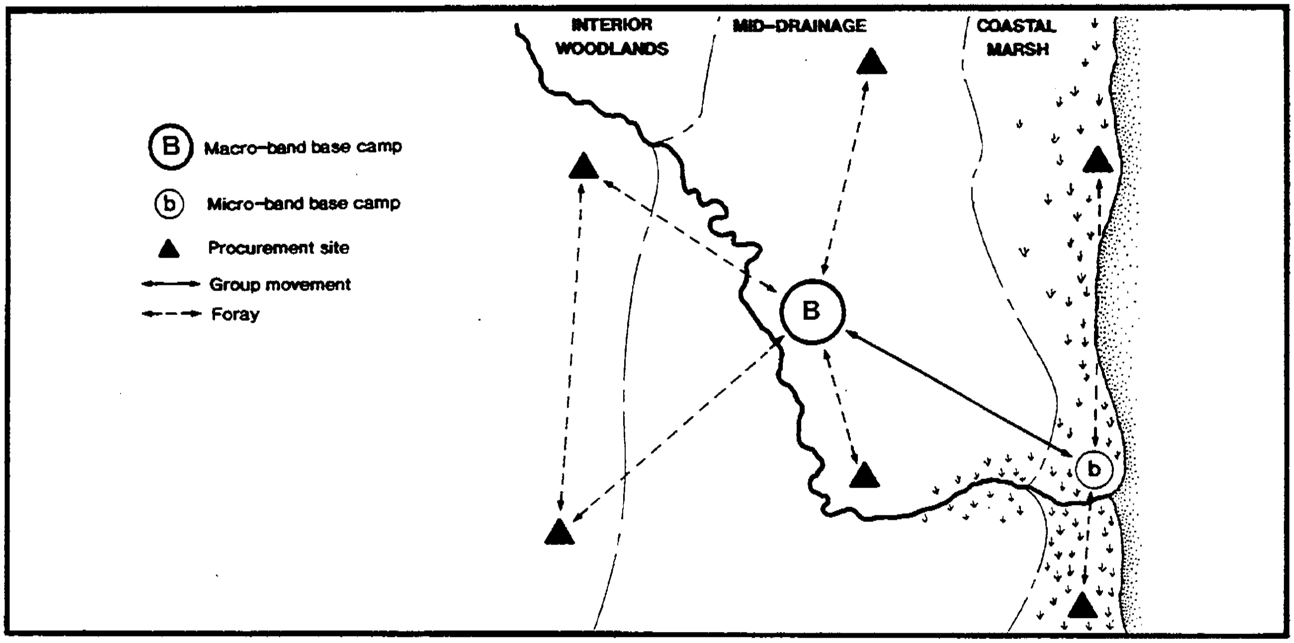
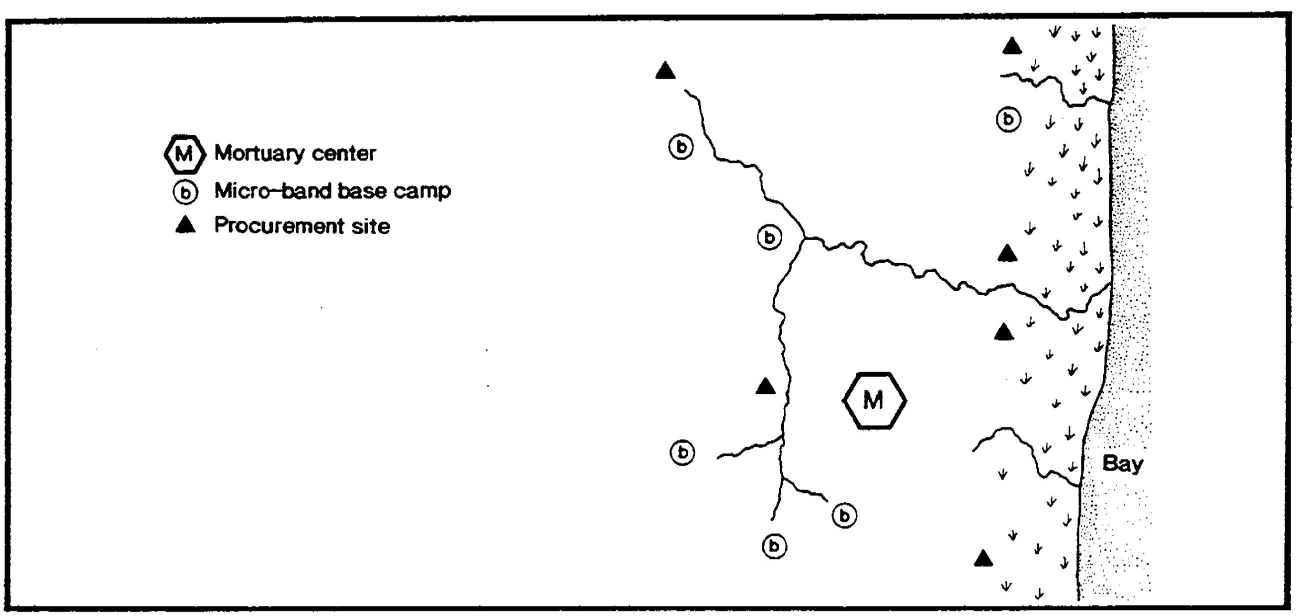


FIGURE 134

Webb Complex Settlement Pattern



7K-C-368, which also contained Wolfe Neck ceramics, is located in a woodlot at the confluence of an ephemeral stream and the Little River, a resource rich and desirable Woodland I base camp setting. No clearly definable prehistoric subsurface features were present. There is a third micro-band base camp in the project area which does not contain artifacts diagnostic of any particular culture complex. This site, 7K-C-359, is located next to a stream floodplain on the south side of Dyke Branch, a tributary of the Leipsic River. A resource-rich floodplain setting near the confluence of a low order stream and a tidal drainage would have been an appealing base camp locale (Custer 1986b:131). Several soil pit features and an oyster shell concentration were located and partially excavated. Evidence of shellfish exploitation indicates the likelihood that this site was occupied at a point in time after the rate of sea level rise stabilized sufficiently to support the propagation of such estuarine resources. Evidence for the Delmarva Peninsula suggests that this level of stability would not likely have occurred prior to the Woodland I Period (Custer 1984a:91). These three sites lend evidence in support of theories suggesting an increase in micro-band base camps in unique resource-rich settings at the end of the Woodland I Period.

Changes in adaptation continued into the Woodland II Period as a moderate climate similar to modern times enabled a variety of plant, animal, and estuarine resources to flourish. Processing and storage of wild and domesticated plant products enabled increased sedentism at Slaughter Creek and Minguannan complex sites (Custer 1986b:150), and subsistence technologies, social organization, and settlement patterns were altered in response to the new subsistence practices. These alterations are reflected in artifact assemblages from Woodland II sites which have been found to contain triangular points, plant processing tools, and shell- and grit-tempered ceramics with more complex decorations.

Settlement patterns of the Minguannan complex are similar to Woodland I patterns (Figure 135) with macro-band base camps appearing to be larger than those associated with Woodland I occupations. The Slaughter Creek settlement pattern consists of two main site types: base camps and seasonal camps which would correspond to macro-band base camps and micro-band base camps respectively (Custer 1986a:143). No projections have been made with regard to procurement sites. Various settlement models for the Slaughter Creek Complex have been proposed with consideration to particular environmental settings and given seasons. These proposed models are shown in Table 34. When these models were compared to known sites, Models III, IV, and V proved most accurate and support the theory that lifestyles in Woodland II times became more sedentary (Custer 1986a:144). Model IV (Figure 136) as described by Thomas et al. (1975:64) seems to best approximate the Slaughter Creek Complex settlement pattern in Kent County. Again, a continuity between Woodland I settlement patterns and Woodland II Mid-Drainage Zone patterns is apparent.

Four sites in the project area contain artifacts associated with both of the Woodland II complexes. 7NC-J-134, located on the north bank of Duck Creek, contained two Minguannan ceramics and three Townsend ceramics. In addition, this site, as discussed above, contained artifacts from Archaic and Woodland I occupations. Two sites in the Middle Leipsic River Valley Archaeological District, 7K-C-203 and 7K-C-194A, contained Slaughter Creek and Minguannan complex artifacts. 7K-C-203 contained five Townsend ceramics and 7K-C-194A contained a triangular point, one Townsend ceramic, five Minguannan ceramics and two other grit-tempered ceramics. Finally, 7K-A-107, located on Snow's Branch, contained one Minguannan and one Townsend ceramic. This site, along with sites 7K-A-105, 7K-A-106, 7K-A-108, and 7K-A-109, appears to constitute a micro-band or "seasonal" base camp. Its location on a major tributary of the Leipsic River is a desirable base camp setting in both Woodland I and Woodland II periods. In addition to the Minguannan and Slaughter Creek Complex ceramics, diagnostic artifacts from the sites which made up the Snow's Branch complex include projectile points diagnostic of the Woodland I Period.

Minguannan ceramics have only recently been distinguished as distinctive Woodland II ceramic types (Custer 1986b:139). Consequently, their distribution has not been well-defined, and although they are known from sites in northern Delaware and surrounding areas, they are not commonly found in sites south of the C & D Canal. Their presence as far south as 7K-C-364 on Muddy Branch south of the Leipsic River extends the known southern terminus.

Several sites in the project failed to produce diagnostic artifacts that could help to place the occupations in temporal context. However, examination of the types and distributions of cultural materials has enabled some tentative inferences to be drawn regarding their possible functions. One such category of sites prominent in the

FIGURE 135

Woodland I Basic Mid-Drainage Settlement Pattern

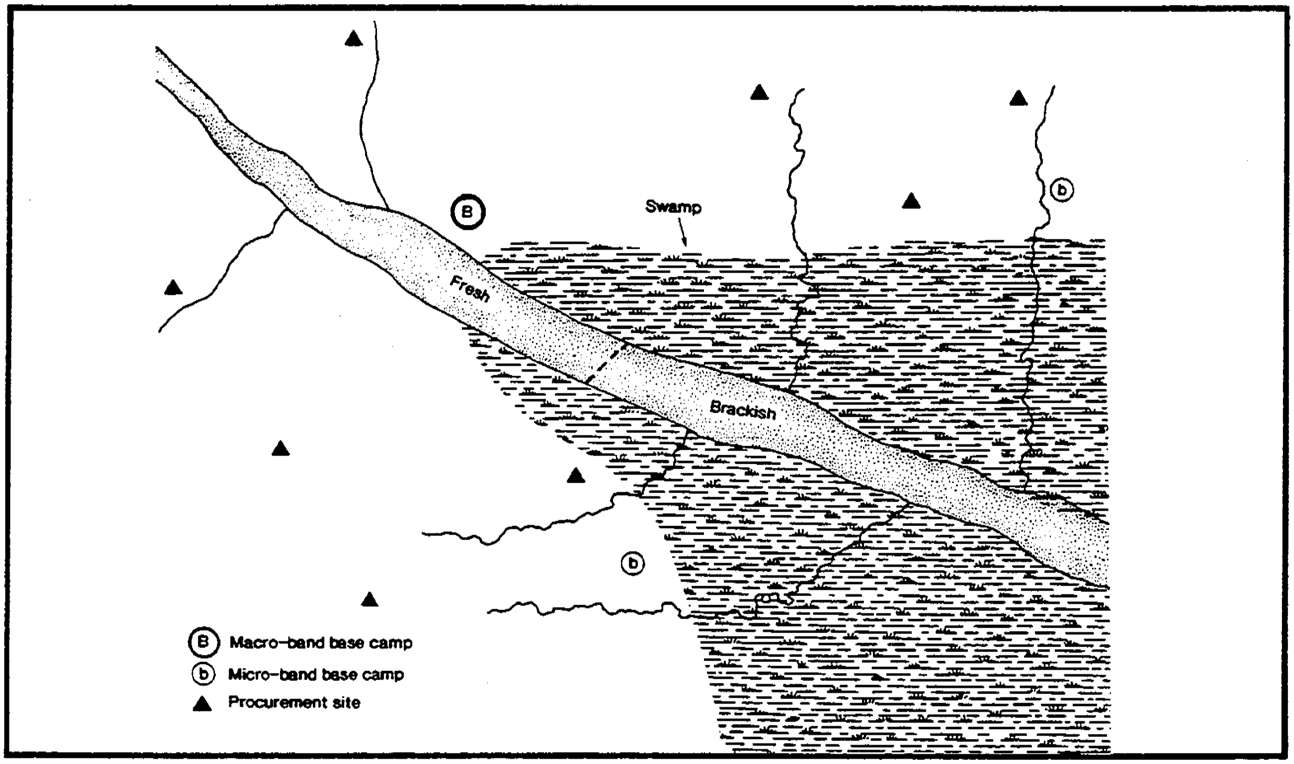


FIGURE 136

Woodland II - Model 4

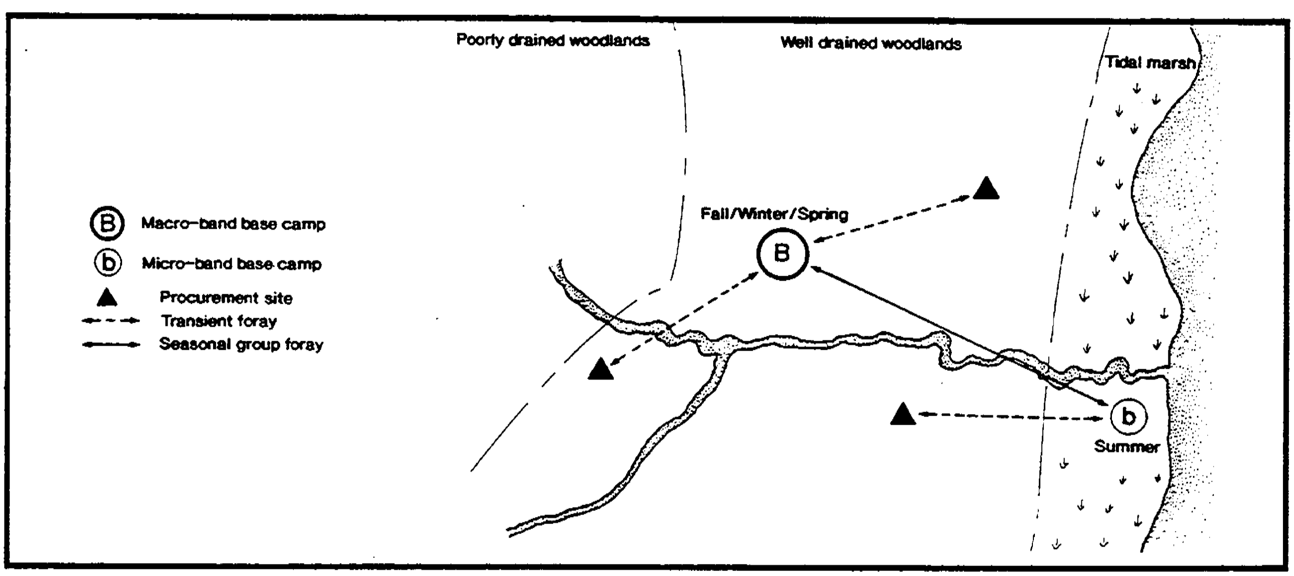


TABLE 34

SLAUGHTER CREEK COMPLEX SETTLEMENT MODELS (Thomas et al. 1975:60-65)

Model	Winter	Spring	Summer	Fall
1	micro-band base camp; interior	micro-band base camp; mid-drainage	micro-band base camp; coastal	micro-band base camp; mid-drainage
2	macro-band base camp; interior	micro-band base camp; mid-drainage	macro-band base camp; coastal	macro-band base camp; interior
3	macro-band base camp; interior	macro-band base camp; coastal		macro-band base camp; interior
4	macro-band base camp; mid-drainage		micro-band base camp; coastal	macro-band base camp; mid-drainage
5	macro-band base camp; mid-drainage			

landscape throughout all periods of prehistory are procurement sites. In addition to 7K-C-360, 7NC-J-166, and 7K-C-364 discussed previously, three additional sites in the project area (7K-C-362, 7K-C-363, and 7K-C-367) have been tentatively identified as procurement sites. These sites cannot be dated to any specific culture complex, although 7K-C-367 did contain two projectile points diagnostic of the general Woodland I Period. A proliferation of procurement sites has been noted in the region for the Woodland I Period. The three additional sites are located on gentle rises along minor and ephemeral drainages and woodlands, settings which would have been game attractive and therefore appealing procurement locales in all phases of prehistory.

The remaining sites in the project area produced too little information to enable a determination of their functions in prehistory either temporally or spatially. Most of these sites are located in the northernmost segment of the project area while the remainder are located in the southernmost segment. Another important research goal of the Phase II testing was to acquire data that would help to illuminate prehistoric utilization of bay/basin features. Several of the sites in the project area are located in the vicinity of these features. Unfortunately, Phase II testing only produced significant information on two of the sites (7NC-J-166 and 7K-A-105-109). 7NC-J-166, which contains artifacts diagnostic of the Archaic Period, is located away from the immediate vicinity of other types of reliable surface water. A dependable water source, however, would have been necessary to support surrounding plant life and to attract migrating animals. Since this site indeed seems to have been utilized for procurement purposes, it appears that bay/basins provided the necessary resource to support the Archaic occupation and utilization of the site.

The Snow's Branch Complex (7K-A-105, 7K-A-106, 7K-A-107, 7K-A-108, and 7K-A-109) is situated in a much different setting. In fact, these sites are located immediately on a reliable source of water and in the near vicinity of the larger Leipsic drainage and its surrounding marshlands. Although no artifacts were recovered from the immediate vicinity of the bay/basins, this complex of sites is tentatively interpreted to represent a micro-band base camp, and diagnostic artifacts recovered from the site complex indicate an occupation dating to the Woodland I Period. Furthermore, the complex is located relatively close to the Middle Leipsic River Valley sites which are tentatively interpreted to represent a macro-band base camp. With population density steadily increasing in the Woodland I Period, with more micro-band base camps developing and settlements becoming more sedentary, and with activities becoming more diverse, there may have been a greater demand placed on the local tributaries which utilization of nearby bay/basins may have helped to alleviate. Bay/basins, then, may have been utilized at the smaller base camps to supplement other resources. It is also possible that they were useful in attracting small game that would have been procured on an "opportunistic" or as-needed basis from the adjacent base camp.

Regional Lithic Technologies

Phase II testing reveals a similar pattern of supplementary utilization with regard to lithic procurement in the project area. Attribute tests were conducted on six sites in the project area (7NC-J-134, 7K-C-367, 7K-C-359, 7K-C-363, 7K-C-364, and 7K-D-22) in an attempt to determine whether the debitage from the sites originated from bifaces or from cores. 7K-C-360, 7K-C-365A, and the Middle Leipsic River Valley site complex were excluded from the present analysis in order that more extensive research can be undertaken at these sites and presented in the final comprehensive reports detailing their excavations. The attributes used in this analysis were selected from a variety of debitage attributes described in the work of Verrey (1986); Magne (1981, 1985); Gunn and Mahula (1977); Lowery and Custer (1990). The attributes and a further explanation of the methods used to conduct the analyses are listed in Appendix II. A random sample of jasper and chert flakes from each of the six sites was selected. Tables 3 (7NC-J-134), 13 (7K-C-359), 16 (7K-C-363), 19 (7K-C-364), 30 (7K-C-367), and 33 (7K-D-22) show the distribution of attributes for each of the sampled sites.

These site assemblages were then compared to assemblages from two other sites: the Fifty site and the Crane Point site. The Fifty site is a Late Paleo-Indian/Early Archaic hunting and processing site in the Shenandoah Valley of Virginia (Carr 1975, 1986) where primary lithic resources are readily available. The artifact assemblage from this site was determined to have been derived from cores. The Crane Point site is a comparably dated base camp site on the Eastern Shore of Maryland (Lowery and Custer 1990) where lithic resource availability is low. The artifact assemblage from this site was determined to have been derived from bifaces. Table 35 shows the distribution of the attributes for the sample of 50 flakes from Crane Point, and Table 36 shows the distribution of the same attributes for a sample of 100 flakes from the Fifty site. Table 37 shows a comparison of percentage

TABLE 35

CRANE POINT SITE
DEBITAGE ATTRIBUTE FREQUENCIES

Flake Type		**Platform Shape**	
Complete	9	Triangular	20
Proximal	27	Flat	6
Medial	6	Round	9
Distal	8	No Observation	15
Cortex		**Remnant Biface Edge**	
Present	4	Present	10
Absent	46	Absent	40
Size (cm)		**Platform Preparation**	
<2	6	Present	28
>2, <5	44	Absent	7
>5	0	No Observation	15
Scar Count		**Directions Count**	
Mean =	3.00	Mean =	2.00
Std. Dev. =	.34	Std. Dev. =	.57

TABLE 36

FIFTY SITE DEBITAGE ATTRIBUTE FREQUENCIES

Flake Type		**Platform Shape**	
Complete	63	Triangular	10
Proximal	19	Flat	35
Medial	4	Round	37
Distal	14	No Observation	18
Cortex		**Remnant Biface Edge**	
Present	0	Present	3
Absent	100	Absent	97
Size (cm)		**Platform Preparation**	
<2	49	Present	10
>2, <5	46	Absent	72
>5	5	No Observation	18
Scar Count		**Directions Count**	
Mean =	1.33	Mean =	.73
Std. Dev. =	1.22	Std. Dev. =	.60

TABLE 37

COMPARISON OF FLAKE ATTRIBUTE FREQUENCIES

Attribute	Variable	Fifty	Crane Point	7NC-J-134	7K-C-367	7K-C-359	7K-C-363	7K-C-364	7K-D-22
Flake Type	Complete	63	18	45%	52%	60%	52%	52%	37%
	Distal	19	54	32	20	10	25	18	17
	Proximal	4	12	13	12	20	12	21	19
	Medial	14	16	10	16	10	12	9	7
Cortex	Present	0	8	30	26	47	30	34	21
	Absent	100	92	70	74	53	70	66	79
Size (cm)	<2cm	49	12	68	90	73	93	85	85
	2-5cm	46	88	32	10	27	7	15	15
	>5cm	5	0	0	0	0	0	0	0
Platform Shape	Triangular	10	40	20	22	25	25	25	30
	Flat	35	12	15	8	17	13	10	7
	Round	37	18	22	34	38	25	38	39
	No Observation	18	30	43	36	20	37	27	24
Remnant Biface Edge	Present	3	20	3	0	2	0	0	0
	Absent	97	80	97	100	98	100	100	100
Platform Preparation	Present	10	56	7	4	18	3	5	8
	Absent	72	14	50	64	62	60	67	68
	No Observation	18	30	43	32	20	37	28	24

FIGURE 137
Comparison of Flake Attributes

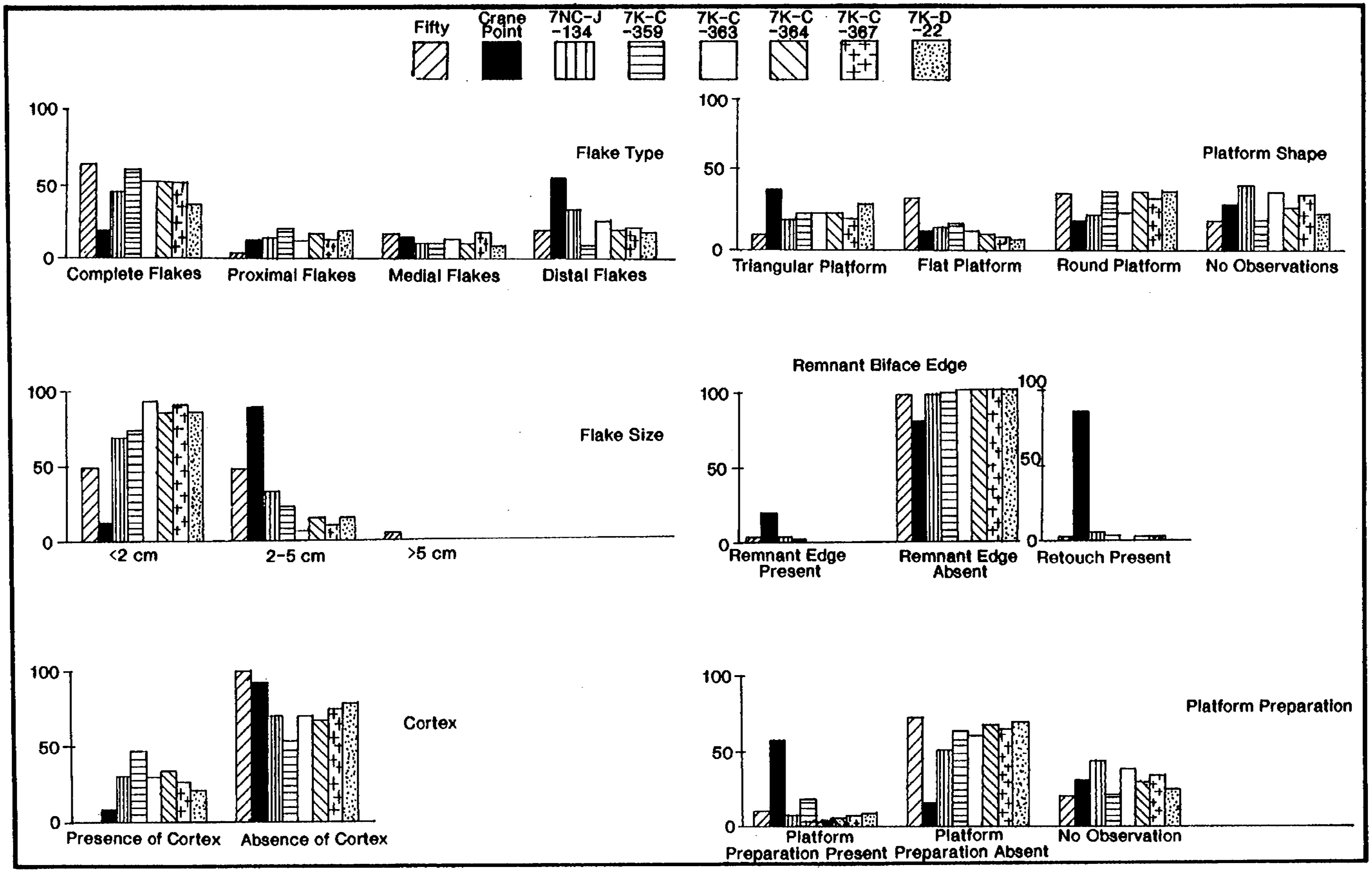


Table 38

DIFFERENCE OF PROPORTIONS TEST

SITE	FLAKE COMPL	FLAKE PROX.	FLAKE MED.	FLAKE DIST.	CORT. YES	CORT. NO	SIZE >5CM	SIZE 2-5CM	SIZE <2CM	PLAT FORM TRIAN.	PLAT FORM FLAT	PLAT FORM RND	BIF. EDGE YES	BIF. EDGE NO	PLAT. PREP YES	PLAT. PREP. NO	RETOUCH YES	RETOUCH NO
** SITE CRANE POINT																		
44WR50	5.20	4.38	1.85	0.33	2.87	2.87	1.61	4.95	4.43	4.33	2.98	2.38	3.49	3.49	6.11	6.71	10.58	10.58
7NC-J-134	3.01	4.56	0.34	1.90	2.87	2.87	0.00	5.95	5.95	2.30	0.46	0.48	2.79	2.79	5.67	3.98	8.58	8.58
7K-C-367	3.56	4.47	0.58	0.52	2.40	2.40	0.00	7.80	7.80	1.95	0.67	1.82	3.33	3.33	5.87	5.13	8.46	8.46
7K-C-359	4.46	3.71	0.34	0.94	4.45	4.45	0.00	6.43	6.43	1.68	0.69	2.34	3.19	3.19	4.11	5.08	8.78	8.78
7K-C-363	3.65	4.78	0.05	1.16	2.87	2.87	0.00	8.56	8.56	1.68	0.21	0.89	3.63	3.63	6.18	4.92	9.20	9.20
7K-C-364	4.00	4.08	0.58	0.31	3.45	3.45	0.00	8.63	8.63	1.89	0.37	2.49	4.63	4.63	7.11	6.12	10.78	10.78
7K-D-022	4.54	4.38	1.03	0.15	2.01	2.01	0.00	8.63	8.63	1.22	1.03	2.60	4.63	4.63	6.49	6.24	10.98	10.98
** SITE 44WR50																		
7NC-J-134	2.22	0.93	1.52	2.67	5.81	5.81	1.76	1.79	2.39	1.78	2.74	2.03	0.12	0.12	0.72	2.80	1.06	1.06
7K-C-367	1.29	1.08	2.55	0.94	5.34	5.34	1.61	4.39	4.89	2.00	3.55	0.36	1.24	1.24	1.28	1.00	0.00	0.00
7K-C-359	0.36	0.15	1.52	0.74	7.52	7.52	1.76	2.43	3.02	2.53	2.50	0.17	0.52	0.52	1.51	1.36	0.52	0.52
7K-C-363	1.41	1.22	1.86	1.75	5.81	5.81	1.76	5.20	5.72	2.53	2.99	1.57	1.35	1.35	1.55	1.57	1.10	1.10
7K-C-364	1.57	0.35	1.43	0.77	6.40	6.40	2.26	4.76	5.41	2.79	4.23	0.15	1.75	1.75	1.34	0.77	0.58	0.58
7K-D-022	0.87	0.00	0.93	0.59	4.84	4.84	2.26	4.76	5.41	3.54	4.86	0.29	1.75	1.75	0.49	0.62	1.42	1.42
** SITE 7NC-J-134																		
7K-C-367	0.73	0.21	0.94	1.38	0.46	0.46	0.00	2.74	2.74	0.26	1.13	1.45	1.30	1.30	0.61	1.47	0.84	0.84
7K-C-359	1.65	0.98	0.00	2.92	1.88	1.88	0.00	0.60	0.60	0.66	0.26	1.99	0.58	0.58	1.93	1.29	0.46	0.46
7K-C-363	0.73	0.28	0.29	0.81	0.00	0.00	0.00	3.48	3.48	0.66	0.26	0.43	1.43	1.43	0.84	1.10	1.75	1.75
7K-C-364	0.86	1.22	0.21	1.98	0.52	0.52	0.00	2.49	2.49	0.73	0.95	2.15	1.84	1.84	0.44	2.13	1.57	1.57
7K-D-022	1.47	0.93	0.67	2.16	1.28	1.28	0.00	2.49	2.49	1.39	1.63	2.27	1.84	1.84	0.31	2.26	2.26	2.26

Table 38 continued

DIFFERENCE OF PROPORTIONS TEST

SITE	FLAKE COMPL	FLAKE PROX.	FLAKE MED.	FLAKE DIST.	CORT. YES	CORT. NO	SIZE >5CM	SIZE 2-5CM	SIZE <2CM	PLAT FORM TRIAN.	PLAT FORM FLAT	PLAT FORM RND	BIF. EDGE YES	BIF. EDGE NO	PLAT. PREP YES	PLAT. PREP. NO	RETOUCH YES	RETOUCH NO
** SITE 7K-C-367																		
7K-C-359	0.84	1.13	0.94	1.48	2.23	2.23	0.00	2.21	2.21	0.37	1.36	0.47	0.92	0.92	2.32	0.25	0.43	0.43
7K-C-363	0.03	0.05	0.66	0.62	0.46	0.46	0.00	0.64	0.64	0.37	0.89	1.03	0.00	0.00	0.19	0.43	1.10	1.10
7K-C-364	0.00	1.35	1.27	0.30	1.00	1.00	0.00	0.85	0.85	0.41	0.40	0.48	0.00	0.00	0.27	0.37	0.50	0.50
7K-D-022	0.58	1.08	1.73	0.45	0.69	0.69	0.00	0.85	0.85	1.04	0.22	0.60	0.00	0.00	0.93	0.49	1.42	1.42
** SITE 7K-C-359																		
7K-C-363	0.92	1.25	0.29	2.16	1.88	1.88	0.00	2.94	2.94	0.00	0.51	1.57	1.00	1.00	2.64	0.19	1.43	1.43
7K-C-364	0.98	0.15	0.21	1.37	1.59	1.59	0.00	1.81	1.81	0.00	1.23	0.04	1.30	1.30	2.72	0.68	1.05	1.05
7K-D-022	0.37	0.15	0.67	1.22	3.41	3.41	0.00	1.81	1.81	0.68	1.92	0.08	1.30	1.30	1.98	0.82	1.84	1.84
** SITE 7K-C-363																		
7K-C-364	0.04	1.50	0.54	1.06	0.52	0.52	0.00	1.58	1.58	0.00	0.65	1.69	0.00	0.00	0.50	0.90	0.78	0.78
7K-D-022	0.66	1.22	1.01	1.22	1.28	1.28	0.00	1.58	1.58	0.68	1.33	1.81	0.00	0.00	1.18	1.03	0.00	0.00
** SITE 7K-C-364																		
7K-D-022	0.71	0.35	0.52	0.19	2.06	2.06	0.00	0.00	0.00	0.79	0.76	0.15	0.00	0.00	0.86	0.15	1.00	1.00

values among the sites for the flake attributes, and Figure 137 shows a graphic comparison of the attribute distributions. In order to assess the significance of the differences among the assemblages, the difference-of-proportion test (Parsons 1974:445-448) was applied to the percentage data. Table 38 shows the results of the difference-of-proportion test.

The general trend indicated by the data suggests that the assemblages from the sites in the project area are very similar to one another and are, overall, more similar to the Fifty site assemblage than the Crane Point assemblage. Two notable exceptions to these trends, however, are presence of cortex and flake size. There was virtually no presence of cortex observed in the Fifty site assemblage and very low presence of cortex noted in the Crane Point assemblage. The sites in the project area, however, show comparatively substantial percentages of cortex present in their assemblages, indicating that local cobbles were important sources of raw material for the production of expedient tools for augmenting tool kits assembled from primary resources. In terms of flake size, again there is a similarity among the assemblages from the project area but a statistical difference between those sites and the Crane Point site and between all but two of those sites and the Fifty site. The two exceptions, 7NC-J-134 and 7K-C-359, were statistically similar to the Fifty site in flakes which measured between 2 cm and 5 cm, but different in terms of flakes that measured less than 2 cm. None of the flakes in the project area assemblages measured greater than 5 cm. The overwhelming majority of flakes from all of the project area sites measure less than 2 cm. Those from the Fifty site largely measure between 2 cm and 5 cm, while those from the Crane Point site showed a nearly equal distribution between those measuring 2 cm to 5 cm and those measuring less than 2 cm. Therefore, the project area sites, in terms of size, more closely line up with the Crane Point site than with the Fifty site. The small size of the flakes at the project area sites then may reflect both biface thinning and refurbishing practices and the production of supplementary tools from small cobbles or pebbles.

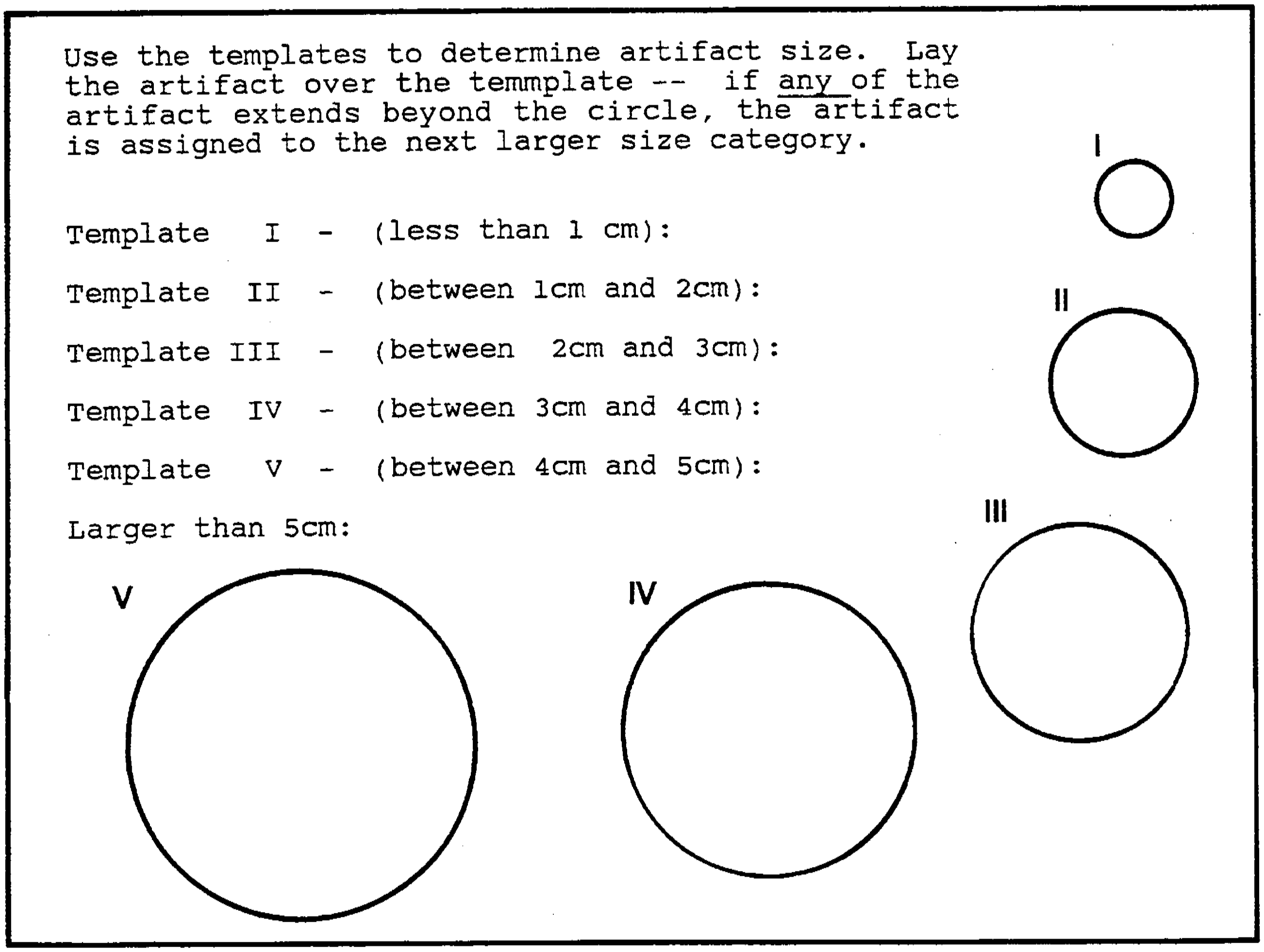
Although on the surface it appears as though the project area sites reflect core utilization, the data suggest that much of the core utilization was in the form of cobble cores rather than cores prepared from primary resources. Furthermore, the data seem to suggest that prepared tool kits were also important to the Woodland adaptation in the Coastal Plain of Delaware. Therefore, the data may be indicating that local cobbles were being used on an expedient basis or to augment prepared tool kits while the prepared tool kits were being highly curated for specialized tool needs. Diagnostic artifacts from sites in the project area largely date to the Woodland I and Woodland II periods which are generally characterized by more long-term settlements than either the Paleo-Indian or Archaic periods. Long distance lithic forays may have become less critical to a lifestyle less dependent on hunting, and therefore these lithic forays may have become less frequent, resulting in a greater reliance on local cobbles for expedient needs. Furthermore, reduction of the need for hunting may have enabled some caching of artifacts from trade, which appears to have increased commensurate with the emergence of ranked societies in the Woodland I Period, or from seasonal visits to primary lithic sources. The Woodland Period also saw an increase in population and in social complexity which resulted in new and more diverse activities. Such activities may have encouraged greater exploration and exploitation of local resources.

Using methods described by Patterson (1990), a flake size distribution analysis of seven sites in the project area (7NC-J-134, 7K-C-359, 7K-C-363, 7K-C-364, 7K-C-365A, 7K-C-367, and 7K-D-22) and five other sites in Delaware (7NC-D-125A, 7NC-D-125B, 7NC-D-125C:core area, 7NC-D-125C:non-core area, and 7NC-F-61A) was conducted to determine whether this method is a valid indicator of bifacial reduction patterns. Patterson (1990:550-558) conducted experiments designed to show that by-product flakes from an archaeological site, whether from a single manufacturing event or from a variety of different manufacturing episodes, will produce the same characteristic exponential curve when plotted on a semi-log graph (Patterson 1990:551). Patterson argues that the log of the percentage of flakes is a linear function of flake size and that when the percentage of flakes is plotted against size the result will be a higher percentage of small flakes (Patterson 1990:551). Because Patterson does not explicitly state the base of his logarithmic function, it was assumed for this analysis that Patterson is referring to the natural log (ln), with base "e," where "e" is equal to 2.71828.

In a test of Patterson's method, flake assemblages from the sample of twelve sites were analyzed and plotted. Flake sizes were tabulated in accordance with categories denoted by a standard template (Figure 138), and all measurements were recorded in millimeters. The natural log of the percentage of flakes for each size was calculated as follows:

FIGURE 138

Size Template



ln (F(s))

s = size

F(s) = number of flakes/total x 100

= percentage of total flakes of size s

This value was then plotted against size (Figure 139). The slopes of the regression line of each site were then compared. In order to prevent unnecessary skewing of the data, the first (0-10 mm) and the last (>50 mm) size categories were eliminated (Figure 140). Because the majority of flakes of Size I were recovered from flotation samples, this size category resulted in inordinately small quantities of flakes. Size VI was eliminated because it did not encompass a finite range of sizes. Both of these size categories, then, are "outliers" and are, therefore, poor representations of the Size I and Size VI components of the assemblages.

In examining the graphs of the twelve sites, a number of interesting trends were observed. These trends indicate the further potential of this type of analysis in combination with other types of analyses in illuminating patterns of lithic resource utilization and the effects of such patterns on social organization, settlement and subsistence.

FIGURE 139

Semilog Graph of Sites
(without Flake Sizes <10mm and >50mm)

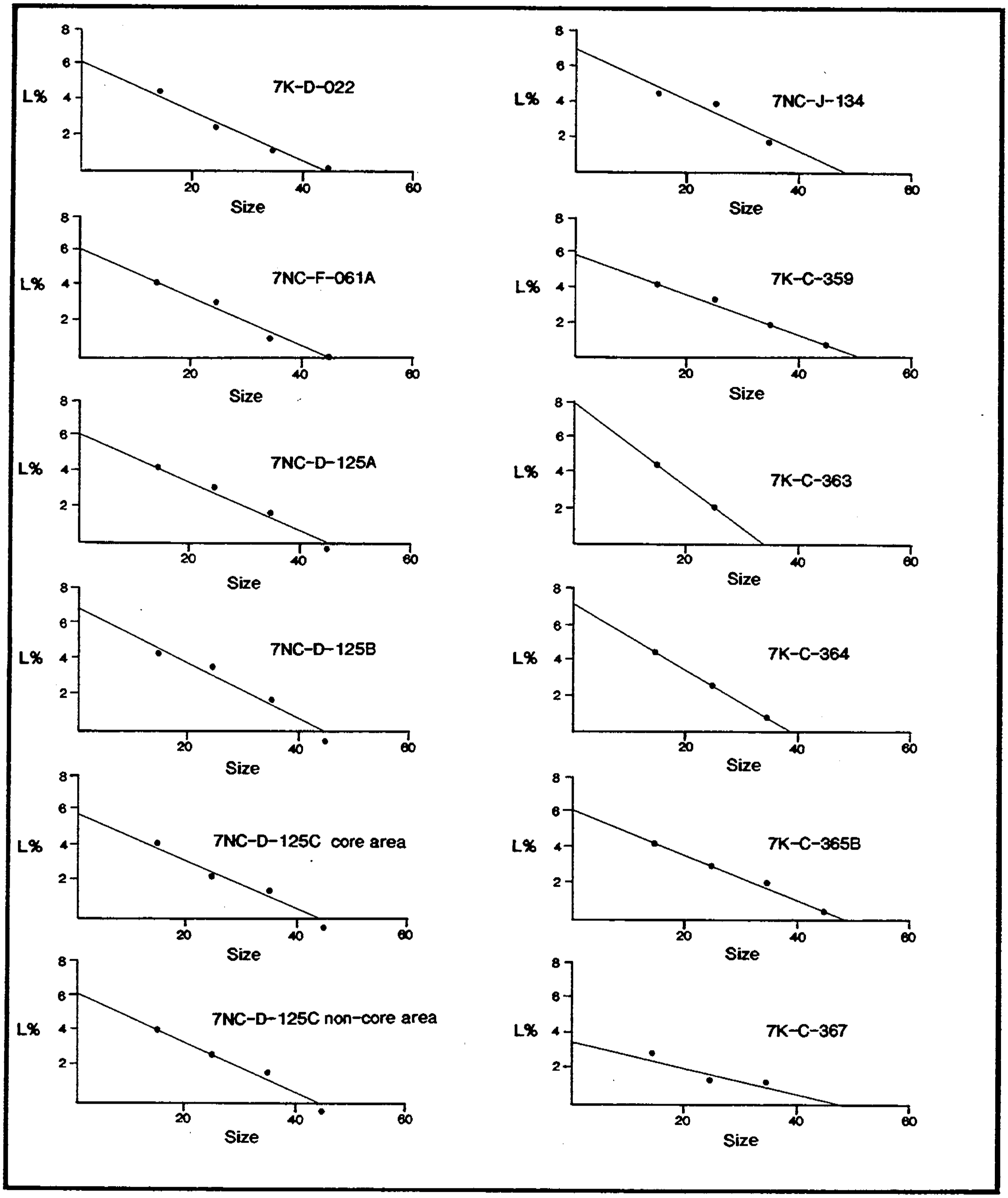


FIGURE 140

Semilog Graph of Sites

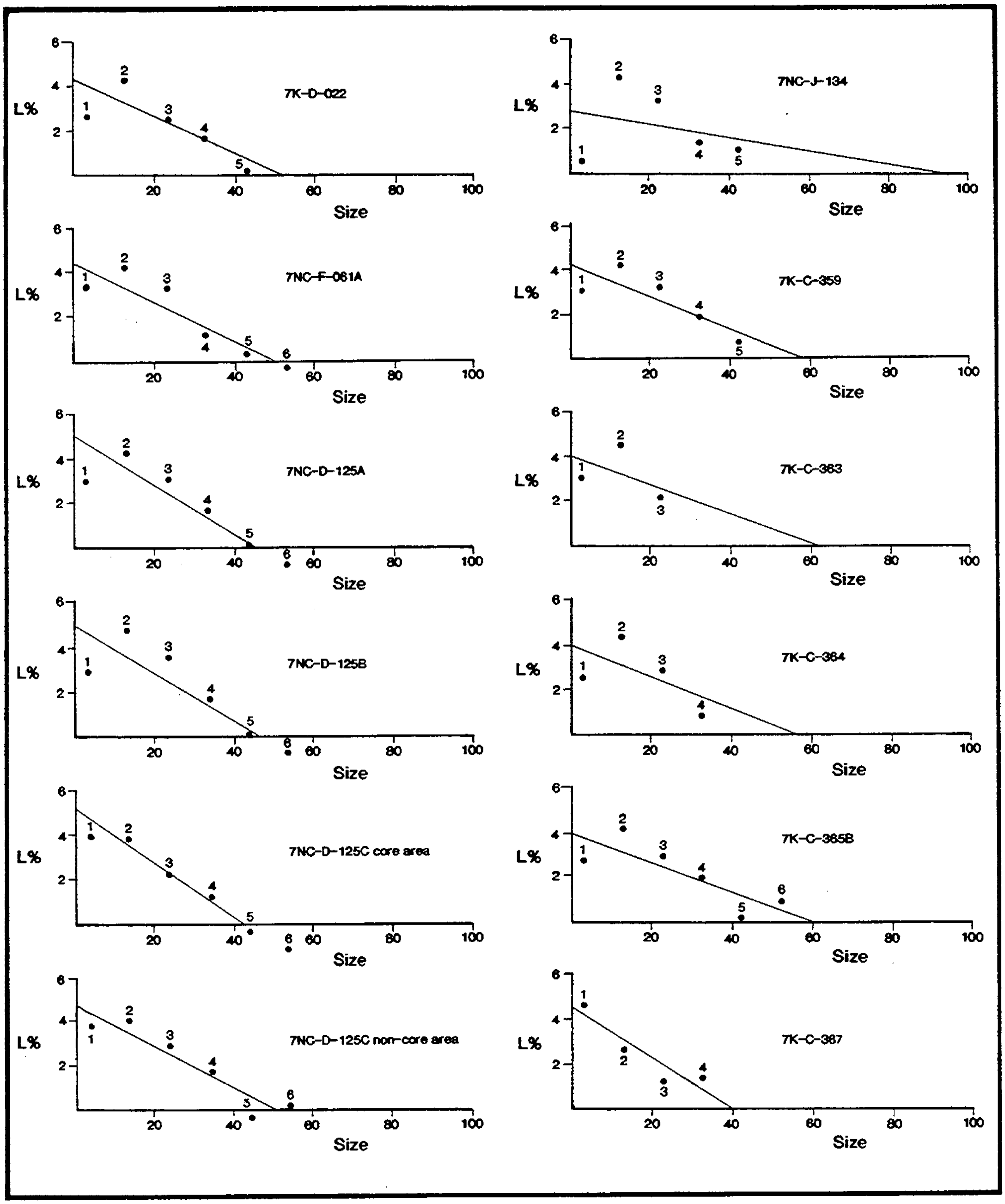
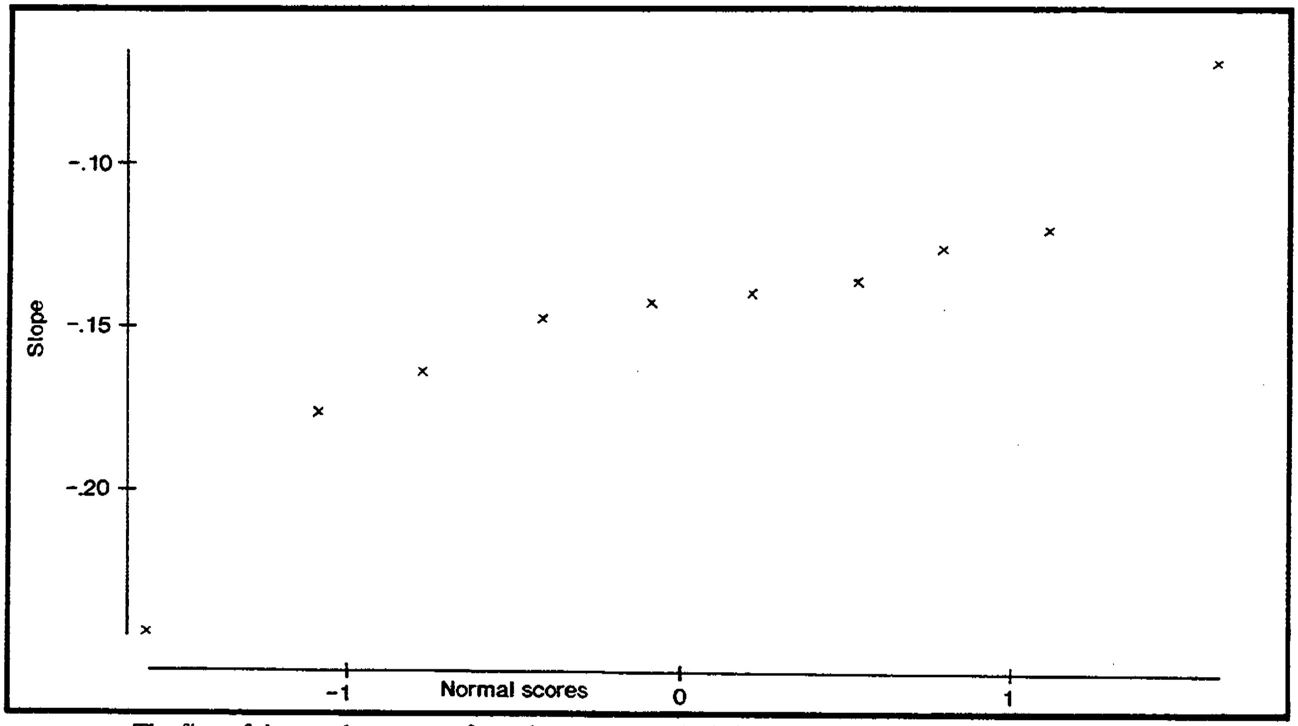


FIGURE 141

Normal Probability Curve for Slope of Site



The first of the trends apparent from the present analysis is that each site possesses a distinct slope. If the sites and their slopes were similar, a normal probability graph of the sites would produce a bell-shaped curve. As can be seen in Figure 141, a probability graph taken of the twelve sites shows that the sites are not similar.

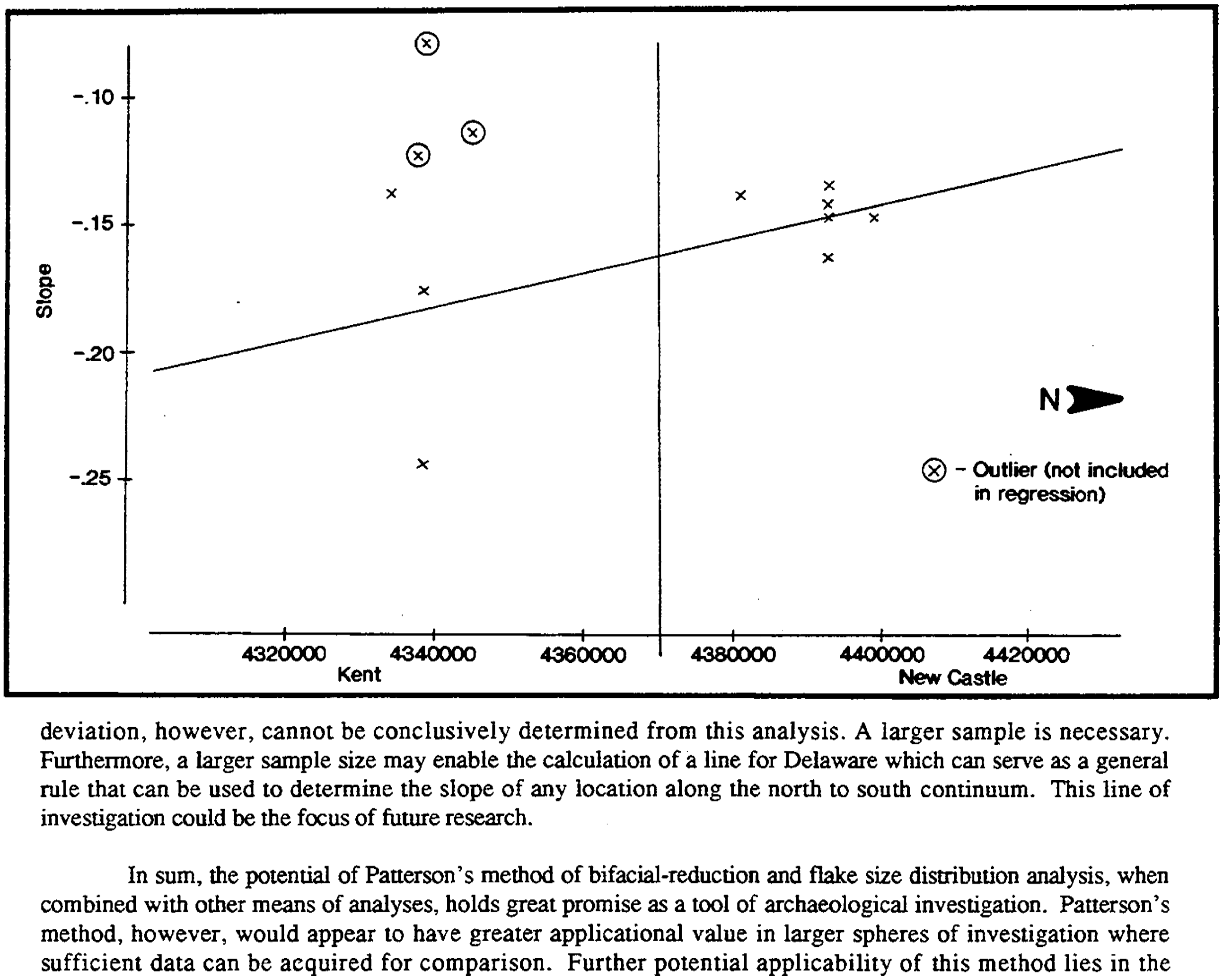
Another trend observed in the data may have the potential of helping to identify site type. The graph of the sample sites indicates that all twelve sites show negative slopes. This orientation signifies that the number of smaller flakes is greater than that of larger flakes. Debitage at a quarry site would be expected to have a greater number of large flakes than sites farther away from such a source. It is, therefore, hypothesized that the graph of a site located at a primary outcrop where reduction activity took place would produce a positive slope. However, the graph of such an assemblage from a cobble reduction site may or may not produce a positive slope, depending on the size of the cobbles, though based on the present data, they appear likely to produce negative slopes. Through other means of analysis, three sites in the sample, including 7K-C-365B previously discussed in this report, and 7NC-D-125C:core and non-core (Riley, Hoseth and Custer n.d.), have been identified as cobble reduction sites. All three of these sites show negative slopes.

A final pattern emerging from the data is an apparent correlation between the north to south orientation of the sites and the steepness of the regression line of the sites. An examination of nine of the twelve sites in the test sample shows that as the sites proceed from north to south their slopes decrease. (Because the slopes are negative, the relationship between slope and line steepness is inversely proportional, whereas positive slopes are directly proportional to line steepness). This increase in line steepness from north to south indicates that the percentage of smaller flake size also increases from north to south.

Examination of the plot of north to south orientation versus slope (Figure 142) indicates that there is a distinct similarity among the New Castle County sites, whereas the Kent County sites appear to be more irregular and varied. The two northernmost Kent County sites are most similar to the New Castle County sites. The three "outliers" of the sample (7K-C-359, 7K-C-365B, and 7K-C-367) are Kent County sites. The reasons for their

FIGURE 142

North-South Orientation vs Slope



deviation, however, cannot be conclusively determined from this analysis. A larger sample is necessary. Furthermore, a larger sample size may enable the calculation of a line for Delaware which can serve as a general rule that can be used to determine the slope of any location along the north to south continuum. This line of investigation could be the focus of future research.

In sum, the potential of Patterson's method of bifacial-reduction and flake size distribution analysis, when combined with other means of analyses, holds great promise as a tool of archaeological investigation. Patterson's method, however, would appear to have greater applicational value in larger spheres of investigation where sufficient data can be acquired for comparison. Further potential applicability of this method lies in the determination of the directional movement of specific lithic materials, such as argillite or Iron Hill jasper, and flake size variability.

The lithic resource use at selected sites in the project area can be compared to the patterns at other sites in the Coastal Plain as well as sites in the Piedmont and Fall Line physiographic zones. Table 39 shows percentage of cortex and raw material use among a variety of Woodland Period lithic assemblages and Figure 143 shows the locations of the sites from which these percentages were derived. A difference-of-proportion test was used to compare percentages of cortex, cryptocrystalline use, and quartz and quartzite use among all of the sites. The difference-of-proportion test was applied to evaluate percentage differences because of the varied sizes of the lithic artifact samples shown in Table 39. Results of the paired comparisons for the three variables are listed in Appendix V. Table 40 lists the sites in rank order by percentage frequency and sites with no significant differences in percentages are joined by brackets.

With regard to cortex percentage, the Low Coastal Plain State Route 1 Relief Route sites fall largely in between two extremes: Those with the lowest percentages of cortex utilization and those with the highest

TABLE 39

COMPARATIVE LITHIC RESOURCE USE

Site	Function	Total Arts.	Cortex %	Crypto %	QtQz %	Ref
7K-A-105	Micro. B.C.	59	32	70	12	
7K-A-107	Micro. B.C.	82	28	70	22	
7K-C-203	Macro. B.C.	164	37	62	27	
7K-C-204	Macro. B.C.	124	27	54	37	
7K-C-194	Macro. B.C.	43	26	70	21	
7K-C-195	Macro. B.C.	8	25	50	13	
7K-C-194A	Macro. B.C.	1796	25	53	38	
7K-C-360	Procurement	400	18	44	42	
7K-C-359	Micro. B.C.	160	26	63	33	
7K-C-363	Procurement	133	21	76	19	
7K-C-364	Staging/Pro.	1742	32	56	39	
7K-C-367	Procurement	117	18	72	12	
7K-D-22	Micro. B.C.	725	18	67	33	
7NC-J-165	Micro. B.C.	739	36	46	53	1
7NC-E-81	Procurement	149	9	68	12	2
7NC-D-100	Procurement	293	41	51	46	3
7S-G-123	Cobble Red. B.C.	164	54	65	23	4
7NC-A-17	Hunting/ Staging	279	9	23	71	5
7NC-E-9	Micro. B.C.	4090	14	79	18	6
7NC-D-137	Procurement/ Staging?	58	50	55	45	7
7NC-D-138	Procurement Staging?	54	0	65	24	7
7NC-D-140	Procurement Staging?	133	52	47	25	7
7NC-D-55A	Cobble Red. B.C.	132	45	16	69	8
7NC-D-55B	Cobble Red. B.C.	2304	29	8	88	8
7NC-D-54	Cobble Red. B.C.	1288	28	32	59	8
7NC-A-2	Base Camp	845	38	18	67	9

Key:
Ref - References
Crypto - Cryptocrystalline
QtQz - Quartz/Quartzite
Cobble Red. B.C. - Lithic Reduction Base Camp
Micro. B.C. - Micro-band Base Camp
Macro. B.C. - Macro-band Base Camp

References:
1 - Coleman et al.(1988)
2 - Catts et al.(1988)
3 - Shaffer et al. (1988)
4 - Custer and Mellin (1991)
5 - Custer and Hodny (1989)
6 - Custer et al.(1990)
7 - Catts et al. (1989)
8 - Custer et al. (1981)
9 - Custer and De Santis (1985)

TABLE 40

SUMMARY OF LITHIC RESOURCE USE PATTERNS

Site Number	Cortex	Cryptocrystalline		Quartz and Quartzite	
7NC-D-138	P/S(?)-0	7NC-D-55B	C-8	7K-A-105	mbc-12
7NC-E-81	P/S(?)-9	7NC-D-55A	C-16	7K-C-367	P-12
7NC-A-17	H/S-9	7NC-A-2	BC-18	7NC-E-81	P/S-12
7NC-E-9	mbc-14	7NC-A-17	H/S-23	7K-C-195	MBC-13
7K-C-367	P-18	7NC-D-54	C-32	7NC-E-9	mbc-18
7K-C-360	P-18	7K-C-360	P-44	7K-C-363	P-19
7K-D-22	mbc-18	7NC-J-165	mbc-46	7K-C-194	MBC-21
7K-C-363	P-21	7NC-D-140	P/S(?)-47	7K-A-107	mbc-22
7K-C-195	MBC-25	7K-C-195	MBC-50	7K-D-22	mbc-23
7K-C-194A	MBC-25	7NC-D-100	P-51	7S-G-123	C-23
7K-C-359	mbc-26	7K-C-194A	MBC-53	7NC-D-138	P/S-24
7K-C-194	MBC-26	7K-C-204	MBC-54	7NC-D-140	P/S(?)-25
7K-C-204	MBC-27	7NC-D-137	P/S(?)-55	7K-C-203	MBC-27
7K-A-107	mbc-28	7K-C-364	H/S-56	7K-C-359	mbc-33
7NC-D-54	C-28	7K-C-203	MBC-62	7K-C-204	MBC-37
7NC-D-55B	C-29	7K-C-359	mbc-63	7K-C-194A	MBC-38
7K-A-105	mbc-32	7S-G-123	C-65	7K-C-364	H/S-39
7K-C-364	H/S-32	7NC-D-138	P/S(?)-65	7K-C-360	P-42
7NC-J-165	mbc-36	7K-D-22	mbc-67	7NC-D-137	P/S(?)-45
7K-C-203	MBC-37	7NC-E-81	P/S(?)-68	7NC-D-100	P-46
7NC-A-2	C-38	7K-A-105	mbc-70	7NC-J-165	mbc-53
7NC-D-100	P-41	7K-A-107	mbc-70	7NC-D-54	C-59
7NC-D-55A	C-45	7K-C-194	MBC-70	7NC-A-2	C-67
7NC-D-137	P/S(?)-50	7K-C-367	P-72	7NC-D-55A	C-69
7NC-D-140	P/S(?)-52	7K-C-363	P-76	7NC-A-17	H/S-71
7S-G-123	C-54	7NC-E-9	mbc-79	7NC-D-55B	C-88

Note: Sites are listed in order from lowest to highest

Key:
P/S - Procurement/Staging
H/S - Hunting/Staging
mbc - Micro-band Base Camp
MBC - Macro-band Base Camp
P - Procurement
C - Cobble Reduction Base Camp
BC - Base Camp
= percentage

percentages. Sites with the lowest cortex utilization include three sites from the High Coastal Plain (7NC-D-138, 7NC-E-81, 7NC-E-9) and one Piedmont site (7K-A-17). Sites in the project area with low cortex percentages include 7K-C-367, 7K-C-360, 7K-C-363, 7K-D-22, 7K-C-195, and 7K-C-194A. Although there is a statistical difference between the Piedmont/High Coastal Plain sites with low cortex percentages and the Low Coastal Plain project area sites, the project area sites themselves all group together.

At the other end of the spectrum, the sites with the highest cortex utilization include a Low Coastal Plain cobble reduction base camp (7S-G-123), four High Coastal Plain sites (7NC-D-55A, 7NC-D-140, 7NC-D-137, and 7NC-D-100), and one Piedmont site (7NC-A-2). This group of sites contains the highest presence of cortex and is statistically different from two statistically different medium range groupings including one group containing three Low Coastal Plain project area sites (7K-A-105, 7K-C-364, and 7K-C-203) and one High Coastal Plain site (7NC-J-165), and another group containing four Low Coastal Plain project area sites (7K-C-359, 7K-C-194, 7K-C-204, and 7K-A-107) and two Fall Line cobble reduction sites (7NC-D-54 and 7NC-D-55B).

The low cortex presence apparent at the northern sites may be explained as a result of the sites' close proximity to primary outcrops of the Delaware Chalcedony Complex. The ready availability of these primary resources would have enabled the assemblage of prepared tool kits. Their ranking among sites in terms of cryptocrystalline utilization, with the exception of 7NC-A-17, supports this inference. 7NC-A-17, on the other hand, shows a low incidence of cryptocrystalline utilization and a very high incidence of quartz/quartzite utilization. Custer and Hodny (1989) determined that the quartz/quartzite materials at this site were derived from primary sources and appeared to have been the preferred materials for use at this hunting/staging site. Low cortex percentages at this site then appear to result from utilization of primary resources. Similarly, low cortex percentages at the High Coastal Plain procurement sites would also appear to result from their location in relatively close proximity to primary resources, specifically the cryptocrystalline outcrops of the Delaware Chalcedony Complex which would have enabled hunters to appear at these locales with prepared tool kits. Table 40 shows that these sites do rank high in terms of cryptocrystalline use. The sites from the project area which contain low percentages of cortex also include procurement sites and would appear to reflect a similar practice of basic reliance on prepared tool kits while utilizing local cobbles to augment the existing tool kits and for manufacturing additional tools on an expedient basis.

The site with the highest cortex presence (7S-G-123) is located at the southern end of the Low Coastal Plain in Delaware, a far distance from primary lithic outcrops, but a known location for cobbles of various materials, particularly cryptocrystalline. As can be seen in Table 40, an examination of raw material prevalence at the site places cryptocrystalline use high in the ranking. A high incidence of cortex is also observed at one of the Fall Line sites where cobbles are plentiful and their utilization is expected. The remaining sites in this group include three High Coastal Plain hunting/staging sites. These sites, located south of the Fall Line Transition Zone, are uniquely situated to enable access to both quartz/quartzite cobbles that have been carried into the Christina River from the Piedmont Uplands and to cryptocrystalline cobbles carried by White Clay Creek from the Delaware Chalcedony Complex. This nearly equitable utilization is reflected in the distribution of raw material preferences presented in Table 40. The final site in the group of sites with the highest incidence of cortex is a Piedmont base camp (7NC-A-2). Although occupants of this site may have had access to primary quartz and quartzite resources (the prevalent material types of the site), these materials were also available locally from secondary sources (Custer and De Santis 1985).

The remainder of the sites fall in between these lowest and highest extremes and consist primarily of Low Coastal Plain sites from the project area. Although these sites also register relatively high incidence of cortex, they are nevertheless statistically different from the sites with the highest percentages. The former sites consist primarily of base camps and one hunting/staging site. Two of these sites, however, which are not from the project area are cobble reduction base camps in the Fall Line Zone. The Fall Line is a cobble rich locale which contains deposits from the Delaware Chalcedony Complex. The sites from the project area which fall into this medium-high range show high cryptocrystalline utilization which would be expected at sites south of the Fall Line.

Further examination of raw material preferences illuminated by the distribution of compared sites shows that the cobble reduction base camps and a hunting/staging site of the Piedmont and High Coastal Plain, as expected, produced the lowest cryptocrystalline percentages and the highest quartz/quartzite percentages. This result would be due to the sites' close proximity to secondary cobble sources of quartz and quartzite carried by the Christina River and to an apparent preference for these materials for expedient tool use at hunting/staging sites (Custer and Hodny 1989:69-70). The highest preferences for cryptocrystalline resources, as expected, are found at sites south of the Fall Line where secondary sources of cryptocrystalline would be more plentiful to supplement tool kits prepared from seasonal visits to primary cryptocrystalline outcrops of the Delmarva Chalcedony Complex.

TABLE 41

LITHIC USE CLASSIFICATION

CRYPTOCRYSTALLINE:	CORTEX: High		CORTEX: Low	
High	7K-A-105	(mbc)	7K-A-107	(mbc)
	7K-C-203	(MBC)	7NC-E-81	(P)
	7S-G-123	(C)	7NC-D-138	(P)
			7NC-E-9	(mbc)
			7K-C-367	(P)
			7K-D-22	(mbc)
			7K-C-363	(P)
			7K-C-359	(mbc)
			7K-C-194	(MBC)
Medium	7NC-D-100	(P)	7NC-D-54	(C)
	7NC-D-137	(P)	7NC-A-17	(H/S)
	7K-C-364	(H/S)	7K-C-360	(P)
	7NC-J-165	(mbc)	7K-C-195	(MBC)
	7NC-D-140	(P)	7K-C-194A	(MBC)
			7K-C-204	(MBC)
Low	7NC-D-55A	(C)	7NC-D-55B	(C)
	7NC-A-2	(C)		

KEY: mbc - Micro-band Base Camp
MBC - Macro-band Base Camp
P - Procurement Site
C - Cobble Reduction Base Camp
H/S - Hunting/Staging Site

When all of the sites listed in Table 39 are considered as a whole, they can be classified into groups based on the use of cobble materials, as revealed through the cortex percentage and the cryptocrystalline percentage (Table 41). The cortex percentage is divided into two categories based on the groups shown in Table 40 (low < 29%; high > 29%). The cryptocrystalline percentage is divided into three categories (low < 22%, medium > 22% <61%, high > 61%) based on the groups shown in Table 40.

The high cortex and high cryptocrystalline sites (7K-A-105, 7K-C-203, and 7S-G-123) consist of two Low Coastal Plain base camps and one cobble reduction base camp where cryptocrystalline cobbles were utilized. Interestingly, both of the Kent County sites are part of larger base camps where cortex percentage is low and cryptocrystalline percentage is low to medium at the other site components. What these distributions may represent are instances of discrete cobble reduction activity areas within the base camp setting. 7K-A-105 is located on Snow's Branch which may have provided a source of cryptocrystalline cobbles. Similarly, 7K-C-203 is located on the south bank of the Leipsic River which may also have been such a source. The position of these sites in a grouping with a Low Coastal Plain cobble reduction base camp supports the possibility of such specialized activity areas at the Kent County base camps. This problem could be the focus of future research designed to test such attributes. The high cortex and low cryptocrystalline sites (7NC-D-55A and 7NC-A-2) consist of a northern Fall

Line cobble reduction base camp and a Piedmont base camp where cobbles from a variety of raw materials may have been used on an expedient basis or for specialized tools. The high cortex medium cryptocrystalline sites (7NC-J-165, 7NC-D-140, 7NC-D-100, 7NC-D-137, and 7K-C-364) consist largely of procurement sites from the High Coastal Plain, a procurement/staging site from the Low Coastal Plain, and a base camp at the High and Low Coastal Plain interface. The High Coastal Plain procurement sites are situated south of the Fall Line where cobbles of a variety of materials are available.

A lithic procurement strategy described by Shaffer et al. (1988:39) for 7NC-D-100 may be applicable to the remainder of High Coastal Plain sites in this group, and at least partially applicable to the procurement/staging site in the Low Coastal Plain project area. Shaffer et al. (1988:39) explain that cobble deposits derived from Pleistocene glacial outwash are noted for New Castle County and consist of large cobble beds related to Paleo-channels of the Delaware River. These beds are surrounded by smaller deposits of the same materials (Custer and Galasso 1980:9). Procurement strategies for groups utilizing these resources during the Woodland I Period have been described as "embedded procurement" (Goodyear 1979; Binford 1979) or "serial lithic procurement" (Custer, Cavallo and Stewart 1983). Using these strategies, lithic procurement would be incorporated with other procurement activities, without special trips to quarries or intensive episodes of tool manufacture. The Low Coastal Plain hunting/staging site (7K-C-364) showed a relatively high incidence of quartz and quartzite utilization which may indicate that these materials were preferred for specialized tool types. Quartzite tools have durable edges that are good for chopping, gouging, and gross cutting of wood, bone, or animal tissue as might be utilized in the activities of a procurement/processing camp. The High Coastal Plain micro-band base camp in this group (7NC-J-165) showed a prevalence of quartz in its artifact assemblage and appears to have been the site of specialized cobble reduction activities (Coleman et al. 1988:74).

The low cortex, high cryptocrystalline sites include a mixture of High and Low Coastal Plain procurement sites and base camps. This pattern seems to suggest a preference for primary jaspers and cherts from the Delaware Chalcedony Complex, particularly for procurement activities in both the High and Low Coastal Plain. The presence of these materials in Low Coastal Plain settings is likely due to curation whereas their presence in High Coastal Plain settings could be due to either curation or recent quarrying. The only site that falls into the low cortex, low cryptocrystalline category is a northern Fall Line cobble reduction base camp (7NC-D-55B). The apparent preference for non-cryptocrystalline materials at this site is expected and has already been discussed as has its relatively close proximity to primary lithic resources in the Piedmont. The low cortex, medium cryptocrystalline sites include a variety of site types, including a cobble reduction base camp from the Fall Line (7NC-D-54), a hunting/staging site from the Piedmont (7NC-A-17), a procurement site (7K-C-360), and three of the sites (7K-C-195, 7K-C-194A, and 7K-C-204) which are components of the Leipsic River Valley macro-band base camp complex. With regard to the procurement sites, 7K-C-360 contained a quartzite chipping feature indicating that sources of this material were imported into the site, and 7K-A-17 contained a significant percentage of quartz and quartzite materials that were determined by Custer and Hodny (1989) to have derived from primary sources. At the base camp sites, it appears that cobble-derived non-cryptocrystalline materials were used to augment curated tool kits based on primary cryptocrystalline materials. In sum, analysis of lithic resource utilization at the sites found in the State Route 1 Relief Route project area reveals trends in Woodland I Period regional resource use.

A further area of heuristic potential in these sites exists in the quartzite chipping features identified at 7K-C-360 and 7K-C-365B. Both sites are located in similar settings on elevated knolls adjacent to poorly drained soils, and both appear to possess good stratigraphic integrity. If further excavation can succeed in dating these features, they may provide valuable insight into patterns of lithic resource utilization and its effects on social organization and mobility.

Phase II testing in the project area has added significant information to the existing body of data for prehistoric adaptations in the Mid-Drainage Zone, particularly during the Woodland I Period. Further excavations at the Middle Leipsic River Valley Archaeological District, at Dover Downs, and at 7K-C-360 will help to refine the determinations of these sites' functions. Identification of the site functions will help to refine site location models, settlement models, and theories about lithic technology, and clarify the ways in which the Mid-Drainage Zone was utilized by prehistoric groups.

TABLE 42

SUMMARY OF DELAWARE ROUTE 1 CORRIDOR SITES REQUIRING NO FURTHER WORK

CRS #	Site Number
N-12094	7NC-J-172
N-12095	7NC-J-173
N-12021	7NC-J-166
N-12093	7NC-J-171
N-10623	7NC-J-134
N-10624	7NC-J-135
K-06399	7K-A-97
K-06400	7K-A-98
K-06401	7K-A-99
K-06418	7K-A-105
K-06419	7K-A-106
K-06420	7K-A-107
K-06421	7K-A-108
K-06422	7K-A-109
K-06033	7K-C-203
K-06034	7K-C-204
K-06024	7K-C-194
K-06025	7K-C-195
K-06406	7K-C-373
K-06382	7K-C-359
K-06385	7K-C-362
K-06386	7K-C-363
K-06387	7K-C-364
K-06389	7K-C-366
K-06388	7K-C-365B
K-06390	7K-C-367
K-06391	7K-C-368
K-00487	7K-D-22
K-06403	7K-D-113
K-06402	7K-D-112

CULTURAL RESOURCE MANAGEMENT RECOMMENDATIONS

Table 42 lists the archaeological sites located and identified by Phase I and Phase II testing which require no further research because they are not eligible for listing on the National Register of Historic Places or are not within the right-of-way. Table 43 lists the archaeological sites identified by this survey where further work, in the form of Phase III data recovery excavations, is necessary.

Three sites--the Middle Leipsic River Valley Archaeological District (7K-C-203, 7K-C-204, 7K-C-194, 7K-C-194A, and 7K-C-195), the Dover Downs site (7K-C-365A), and 7K-C-360--are eligible for listing on the National Register of Historic Places under Criterion D. Determinations-of-Eligibility for each of these sites are included in Appendix IV.

TABLE 43

SUMMARY OF DELAWARE ROUTE 1 CORRIDOR SITES REQUIRING FURTHER WORK

CRS #	Site Number	Work Required
K-06024	7K-C-194A	Data Recovery
K-06383	7K-C-360	Data Recovery
K-06388	7K-C-365A	Data Recovery