CONCLUSIONS

Final Phase II excavations revealed that the Paradise Lane Site is a staging/processing site that was occupied and revisited for limited periods of time between 6500 B.C. and A.D. 1650. The main occupation of the site probably occurred between A.D. 400 and A.D. 1000. Excavation of the site was primarily aimed at determining the types of activities that took place and explaining the site's role in the regional settlement system. The principle activity at the site was tool kit overhaul which included the discard of damaged and exhausted tools, lithic reduction, tool manufacture, and tool refurbishing. A small amount of butchering activity is also indicated. Information obtained from the excavation also has implications for other research issues, such as the lithic and ceramic technologies of prehistoric groups as discussed below.

Role in Regional Settlement Pattern

A major goal of the research at the Paradise Lane Site was the determination of the site's placement in regional settlement patterns that were in operation during the Woodland I Period, particularly the Delaware Park Complex. **A Management Plan for Delaware's Prehistoric Cultural Resources** (Custer 1986b) discusses three main site types for this general time period (macro-band base camp, micro-band base camp, procurement site), and a fourth type (staging/processing) was defined as a result of excavations at the Hawthorn Site (Custer and Bachman 1984). On the basis of preliminary Phase II testing, it was suggested that the Paradise Lane Site was either a micro-band base camp or a staging/processing site. Micro-band base camps are similar to macro-band base camps only smaller, and would have been established either as part of a fusion-fission settlement system or as camps to be visited seasonally. Staging/processing sites are used during procurement activities and are generally located intermediate between base camps and procurement sites.

Figure 55 shows the Woodland I settlement model and Figure 56 shows the local settlement pattern inferred for Paradise Lane. From the relatively sedentary macro-band or micro-band base camps, work groups of adult males and females would make forays to staging/processing sites. From the staging/processing sites, individual hunting or gathering parties would make forays to specific resource procurement sites. Game and/or plant foods would be gathered and initially processed at the procurement site for transport back to the staging/processing site. Final processing and possibly initial consumption would be accomplished at the staging/processing site. The fully processed food resources would be transported back to the main base camp site for storage and final consumption. Nearby quarries and/or cobble beds might also be visited and lithic resources procured. Initial reduction and decortication would likely take place at the source and the transportable preforms would then be carried back to the staging/processing site for further reduction and shaping. These activities may have taken several days. The newly manufactured and refurbished tools would be used for procurement activities at nearby sites, for processing activities at the staging/processing site, and ultimately to replenish depleted tool kits.

In order to determine which of the site types best characterized the Paradise Lane Site, a list of attributes for staging/processing sites (Table 25) was prepared based on known local staging/processing sites of comparable ages (Custer and Bachman 1984, 1986; Riley, Watson, and Custer 1994). Custer and Bachman's (1984) list of attributes for base camps (Table 26) was also consulted. The results of the Paradise Lane data recovery excavations can be compared to these lists.

TABLE 25
Staging/ Processing Site Attributes

Attribute	Present	Absent	Abundant	Scarce	Moderate
Living structures				X	
Hearths				X	
Storage features				X	
Ceramics				X	
Specialized ground stone tools				X	
Caches		X			
Specialized tool production and tool refurbishing areas	X				
Early stage bifaces					X
Early stage debitage					X
Late stage bifaces			X		
Late stage debitage			X		
Rejected tools					X
discarded tools			X		
spatial segregation of tool production activities		X			
Processing features and activity areas	X				
Scrapers, wood/ bone/ antler-working tools			X		

TABLE 26
Macro-Band Base Camp Attributes

Attribute	Present	Absent	Abundant	Scarce
Living structures	X			
Hearths	X			
Storage features	X			
Specialized tool production areas	X			
Early stage bifaces				X
Early stage debitage				X
Late stage bifaces			X	
Late stage debitage			X	
Rejected tools				X
Discarded tools				X
Spatial segregation of tool production activities	X			
Processing features and activity areas		X		
Specialized ground stone tools				X
Caches	X			
Ceramics			X	

Source: Custer and Bachman 1984

No living structures, hearths, storage features, or caches were present at Paradise Lane as would be expected if it were a base camp. Tool production was an important activity at the site, but these areas were not spatially segregated, as would be expected at a base camp. Ceramic sherds were present at Paradise Lane but were not abundant. Late stage bifaces and late stage debitage were present in relatively high proportions in the Paradise Lane assemblage but were not as abundant as would be expected at a base camp. There was also a moderate presence of early stage bifaces and debitage at Paradise Lane as well as rejected tools which would be expected at a staging/processing site. In addition, the range of artifacts in the Paradise Lane assemblage was not as broad as would be expected at a base camp but contained more variety than would be expected at a procurement site. Therefore, in general, Paradise Lane is more similar to staging/processing sites. However, it is anomalous for two attributes. Processing features and processing tools, such as scrapers and wood/bone/antler-working tools, are scarce at Paradise Lane. The most plausible explanation for this anomaly is that very little processing of food resources took place at the site and that the emphasis was on lithic procurement-related activities such as tool maintenance and replacement. Furthermore, because animal resources were not processed on a large-scale at the site, bone/wood/antler-working tools were not needed and were thus scarce in the assemblage.

The presence of late stage bifaces of jasper and quartz which were rejected at the Paradise Lane Site were probably originally manufactured from Delaware Chalcedony Complex or primary Piedmont upland quartz materials. The co-occurrence of these materials indicates that Woodland I groups probably wandered through areas including both lithic resources as part of their seasonal hunting and gathering round. Interestingly, it appears that groups occupying Areas A and B were at a different part of the cycle than those occupying Area C. The majority of early stage manufacture in Areas A and B consisted of cryptocrystalline materials; whereas, late stage and discarded materials consisted of both cryptocrystallines and quartz/quartzite. On the other hand, in Area C, early stage manufacture consisted largely of quartz, whereas late stage and discarded bifaces consisted mainly of cryptocrystallines. The difference underscores the inference that these areas were occupied by different groups.

The co-occurrence of the varied lithic materials from within the wandering cycle zone, the evidence of culling and discard of exhausted tools, and the evidence for manufacturing of replacement tools all seem to show that management of tool kits was a constant activity throughout the wandering cycle. As lithic sources were encountered, tool kits were evaluated. Old bifaces and points which would require more energy to refurbish than to replace were discarded. New replacement tools were manufactured and the tool kit would be ready for further transport and use. Binford (1979a) and Goodyear (1979) have suggested the use of the term "embedded procurement" to describe the pattern where tool kit refurbishing is carried out in conjunction with other subsistence activities on an "as-needed" basis. In this pattern, lithic source locations are used serially. Such a pattern has been observed at other Fall Line sites such as the Green Valley Complex (Custer et al. 1981), and the pattern is also indicated at the Patterson Lane Site (Catts, Hodny, and Custer 1989b).

Finally, it should be noted that diagnostic artifacts indicate multiple components at the site. Therefore, it appears that the characteristics of the site's topography and location are conducive to staging/processing activities. Although the site is located relatively close to an intermittent stream, it is relatively distant from sources of reliable flowing water. Therefore, the locale would not be ideally suited for a large base camp or a long-duration occupation. However, several attributes make it ideally suited for staging/processing activities. For example, the site sits on a well-drained rise of wooded

land surrounded by poorly-drained wetlands that create a game-attractive environment, also favorable for gathering resources. Furthermore, the site is located in the Fall Line/High Coastal Plain transition zone, an area rich in cobble resources, and a relatively short distance from Delaware Chalcedony Complex quarries at Iron Hill, as well as quartz outcrops of the Piedmont just north of the site area. Therefore, a variety of lithic resources would have been fairly close at hand. Finally, the site is located between two drainages, the White Clay Creek and the Christina River, where larger base camp sites were located. Churchmans Marsh lies at the confluence of these two streams and Woodland I base camp occupations at the Clyde Farm Site (7NC-E-6A, Custer 1982) and the Delaware Park Site (7NC-E-41, Thomas 1981) were present here. It is likely that several staging/processing sites, such as the Hawthorn Site (7NC-E-46, Custer and Bachman 1984), would have served the needs of groups occupying the larger base camps. A similar pattern of relationships among Woodland I Period sites was observed in central Delaware in the Dyke Branch and Muddy Branch drainages where the Dover Downs Site (7K-C-365A) and Site 7K-C-360 (Riley, Watson, and Custer 1994) functioned as staging/processing sites between procurement sites and larger base camp sites. The Paradise Lane Site served in a similar capacity.

Regional Lithic Technologies

The lithic resource use at the Paradise Lane Site can be compared to use patterns seen at other sites in the Fall Line, High Coastal Plain, and Piedmont. Table 27 shows the percentage of cortex and raw material use among a variety of Woodland I lithic assemblages, and Figure 57 shows the locations of the sites from which these assemblages 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 (Parsons 1974)

TABLE 27

Comparative Lithic Resource Use

Site	Function	Total Artifacts	Cortex %	Cryptocrystalline %	Quartzite/ Quartz %	References
7NC-D-125 Area A	Staging/ Processing	10,576	1	98	2	---
Area B	Staging/ Processing	1,931	2	92	8	---
Area C	Staging/ Processing	1,096	13	54	45	---
7NC-D-129	Procurement	2,207	7	74	26	Custer et al. 1988
7NC-D-140	Procurement	133	21	75	25	Catts, Hodny, and Custer 1989a
7NC-E-9	Micro-band Base Camp	4,090	14	81	18	Custer et al. 1990
7NC-E-46	Staging/ Processing	10,512	20	22	69	Custer and Bachman 1984
7NC-E-6A Area 2A	Macro-band Base Camp	5,515	9	60	34	Custer 1982
7NC-E-6A Area 2B	Macro-band Base Camp	6,206	9	71	23	Custer 1982
7NC-D-5	Quarry Reduction Base Camp	94	0	60	32	Custer, Ward, and Watson 1986
7NC-D-19	Quarry Reduction Base Camp	653	0	74	26	Custer, Ward, and Watson 1986
7NC-D-55A	Cobble Reduction Base Camp	132	45	30	69	Custer et al. 1981
7NC-A-2	Base Camp	845	2	18	67	Custer and De Santis 1985
7NC-A-17	Staging/ Processing	279	9	23	71	Custer and Hodny 1989
7NC-F-61A	Quarry Reduction Base Camp	1,922	1	99	1	Watson and Riley 1994

was applied to evaluate percentage differences due to the various sizes of the artifact assemblages shown in Table 27. The results of the difference-of-proportion tests and preliminary quantitative data are located in Appendix III.

With regard to cortex percentage, which is an indicator of cobble resource utilization, Paradise Lane, Area A, ranks in the group of sites with the lowest frequencies of cortex in their assemblages. This group includes three quarry-related sites of the Delmarva Chalcedony Complex (Table 28; Custer, Ward, and Watson 1986). Area B ranks in the next to lowest group in terms of cortex frequency along with a Piedmont base camp associated with primary quartz use (Table 28; Custer and De Santis 1985). These positions indicate that cobble resources were not important in supplying the lithic needs of Area A and B's occupants. Area C ranks in a group of sites with moderate frequencies of cortex, and this group includes three base camps, a procurement site, and another staging/processing site (Table 28). Area C's position in between quarry-related sites and cobble-related sites indicates that although cobble resources were not a critical part of the lithic supply at Area C, cobbles were nevertheless used to supplement the curated tool kits of Area C's occupants, probably in the form of expedient tools. It is interesting to note that even though cobble resources would have been available throughout the Fall Line zone, the Paradise Lane Site, which dates to the latter part of the Woodland I Period, indicates a fairly strong reliance on primary materials, at least for staged biface technologies.

Analysis of cryptocrystalline lithic raw material use shows a distinct divergence among the Paradise Lane assemblages. Assemblages from Areas A and B are dominated by cryptocrystalline materials (Table 27) and this pattern is reflected in their high rankings in Table 28. The difference-of-proportion test indicates a significant difference between the assemblages from Area A and Area B, as well as between these sites and the next closest ranked sites; however, only the Brennan Site (7NC-F-

TABLE 28

Summary of Lithic Resource Use Patterns

Cortex		Cryptocrystalline		Quartzite/ Quartz	
7NC-D-5	Quarry Reduction Base Camp-0	7NC-A-2	Base Camp-18	7NC-F-61A	Quarry Reduction Base Camp-1
7NC-D-19	Quarry Reduction Base Camp-0	7NC-E-46	Staging/ Processing-22	7NC-D-125A	Staging/ Processing-2
7NC-F-61A	Quarry Reduction Base Camp-1	7NC-A-17	Staging/ Processing-23	7NC-D-125B	Staging/ Processing-8
7NC-D-125A	Staging/ Processing-1	7NC-D-55A	Cobble Reduction Base Camp-30	7NC-E-9	Micro-band Base Camp-18
7NC-D-125B	Staging/ Processing-2	7NC-D-125C	Staging/ Processing-54	7NC-E-6A(2A)	Macro-band Base Camp-23
7NC-A-2	Base Camp-2	7NC-D-6A(2A)	Macro-band Base Camp-60	7NC-D-140	Procurement-25
7NC-D-129	Procurement-7	7NC-D-5	Quarry Reduction Base Camp-60	7NC-D-129	Procurement-26
7NC-E-6A(2A)	Macro-band Base Camp-9	7NC-D-6A(2B)	Macro-band Base Camp-71	7NC-D-19	Quarry Reduction Base Camp-26
7NC-E-6A(2B)	Macro-band Base Camp-9	7NC-D-19	Quarry Reduction Base Camp-74	7NC-D-5	Quarry Reduction Base Camp-32
7NC-A-17	Staging/ Processing-9	7NC-D-129	Procurement-74	7NC-E-6A(2B)	Macro-band Base Camp-34
7NC-D-125C	Staging/ Processing-13	7NC-D-140	Procurement-75	7NC-D-125C	Staging/ Processing-45
7NC-E-9	Micro-band Base Camp-14	7NC-E-9	Micro-band Base Camp-81	7NC-A-2	Base Camp-67
7NC-E-46	Staging/ Processing-20	7NC-D-125B	Staging/ Processing-92	7NC-E-46	Staging/ Processing-69
7NC-D-140	Procurement-21	7NC-D-125A	Staging/ Processing-98	7NC-D-55A	Cobble Reduction Base Camp-69
7NC-D-55A	Cobble Reduction Base Camp-45	7NC-F-61A	Quarry Reduction Base Camp-99	7NC-A-17	Staging/ Processing-71

Note: Sites are listed in order from lowest to highest by percentage frequency; sites with no significant differences in percentages are joined by brackets. This table was prepared by using data from previous site comparisons (Custer and Hodny 1989; Catts, Hodny, and Custer 1989a), with the addition of the Paradise Lane site.

61A) shows a higher frequency of cryptocrystalline use than Paradise Lane A and B. The Brennan Site is a quarry-related site of the Delaware Chalcedony Complex where the secondary reduction of primary jasper was the main activity (Watson and Riley 1994). The results, along with the results from the cortex analysis, indicate that occupants of Paradise Lane Areas A and B were making forays to Delaware Chalcedony Complex quarries to procure the raw materials for their lithic needs and that they preferred these materials for the bifacial tools in their curated tool kits. On the other hand, Area C's assemblage shows a significantly lower frequency of cryptocrystalline materials (Table 27). However, Area C's assemblage does nevertheless contain a majority of cryptocrystalline materials and Area C of the Paradise Lane Site also ranks in a grouping with a Delaware Chalcedony Complex quarry site and a Clyde Farm Complex base camp (Table 28). The only group that ranks lower in cryptocrystalline frequency than the group containing Area C consists of Piedmont sites associated with quartz/quartzite industries and Fall Line sites associated with cobble technologies. The above results suggest that the occupants of Area C were exploiting a wider range of lithic resource alternatives than the occupants of Areas A and B.

Results of quartz and quartzite use analysis are complementary to the results for cryptocrystalline use. Paradise Lane Areas A and B again fall into different groups from the other nearest ranked sites. Only the Brennan Site (7NC-F-61A) ranks lower for the frequency of quartz and quartzite in its assemblage (Table 28). Area C also ranks separately but shows a relatively high incidence of quartz and quartzite in its assemblage. Area C ranks higher than a group containing Delaware Chalcedony Complex quarry, base camp, and procurement sites and lower than the highest ranking group which contains the two Piedmont sites, the Hawthorn Site (associated with secondary sources of quartz and quartzite), and one of the Green Valley Complex cobble reduction sites located in the northern Fall

TABLE 29

Comparison of Flake Tool Frequencies in Assemblages from Delmarva Staging/ Processing Sites

				Paradise Lane		
7NC-E-46 Area II	7NC-A-17	7K-C-365A	7K-C-360	Area A	Area B	Area C
19 (53)	20 (35)	72 (73)	92 (65)	10 (16)	4 (13)	1 (3)

KEY: ( ) = percentage of tool assemblage

Sources:
7NC-E-46 - Custer and Bachman 1986
7NC-A-17 - Custer and Hodny 1989
7K-C-365A/ 7K-C-360 - Riley, Watson, and Custer 1994

Line. The data, along with the cryptocrystalline and cortex analyses, indicate that the occupants of Area C were making forays into both the Delaware Chalcedony Complex and the Piedmont to procure the raw materials for their lithic needs and were also exploiting cobble resources in the Fall Line to supplement their curated tools kits and to serve expedient needs.

To summarize the lithic resource use patterns at the Paradise Lane Site and surrounding areas, cryptocrystalline materials were preferred at Paradise Lane Areas A and B as they were at quarry-related sites of the Delaware Chalcedony Complex, particularly for staged biface industries. Cryptocrystalline materials were also preferred at Paradise Lane Area C as they were for Fall Line/ High Coastal Plain base camp and procurement sites spanning the Woodland I Period, but quartz and quartzite were also moderately to heavily exploited by the occupants of this latter group of sites and Area C. In addition, secondary lithic resources of the Fall Line were used to serve expedient needs at Area C as well as at Woodland I base camp and procurement sites. Furthermore, the difference in lithic preferences and procurement practices at Paradise Lane further underscores the idea that Areas A and B may have been occupied by different groups than Area C.

One unusual observation in the Paradise Lane assemblages is the low frequency of unifacial tools and unretouched utilized flakes. Use-wear analysis of these types of tools has indicated that they are most often used in scraping, hide-working, and bone/wood/antler-working activities associated with the processing of hunted and gathered resources (Wilmsen 1970; Tringham et al. 1974; Keeley 1980). Assemblages from other staging/processing sites in the region include a fairly strong representation of unifacial flake and pebble tools (Table 29). The Paradise Lane Site has comparatively low frequencies of processing tools. These results indicate two things: first, that the site was occupied for brief periods of time; and second, that the primary emphasis at the site was on tool kit refurbishing and replenishment and not on the processing of animal and plant resources. Furthermore, since the bifacial tool kit appears to be highly curated, the low incidence of special purpose unifacial tools supports assertions that groups using staging/processing sites in areas rich in lithic resources used a variety of amorphous cores to manufacture expedient tools (Carr 1986).

TABLE 30

Crane Point Debitage Attribute Frequencies

Flake type		**Size**		**Platform shape**		**Platform preparation**	
Complete	9	< 2 cm	6	Triangular	20	Present	28
Proximal	27	2-5 cm	44	Flat	6	Absent	7
Medial	6	> 5 cm	0	Round	9	No observation	15
Distal	8			No observation	15		
		Scar count				**Directions count**	
Cortex		Mean	= 3.00	**Remnant Biface Edge**		Mean	= 2.00
Present	4	Standard deviation	= 0.34	Present	10	Standard deviation	= 0.57
Absent	46			Absent	40		

Sample of 50 flakes

The highly-curated nature of the general tool assemblage at Paradise Lane is somewhat curious given the fact that the Paradise Lane Site is located in an area close to both Delaware Chalcedony Complex quarries and cobble beds associated with White Clay Creek in the Fall Line. In addition, conventional wisdom holds that highly-curated tool kits based on a staged biface technology are associated with highly mobile groups of early prehistoric periods (Binford 1979b; Gardner 1989; Lowery and Custer 1990). In contrast, it is believed that more sedentary groups of the later Woodland are less structured in their procurement practices and rely on expedient core-based technologies for their lithic needs (Parry and Kelly 1987; Custer 1986c). Attribute analysis was conducted on a sample of debitage from the Paradise Lane Site in an attempt to determine whether the considerable debitage present at the site resulted primarily from the reduction of bifaces or from cores.

The results of flake attribute analyses conducted on debitage assemblages from Paradise Lane were compared to results of similar analyses conducted on debitage from the Fifty Site (44WR50), a hunting/processing site in the Shenandoah Valley of Virginia (Carr 1975, 1986) where the reduction of cores to produce flakes was the main tool manufacturing activity, and the Crane Point Site, a camp site located on the Eastern Shore of Maryland (Lowery and Custer 1990) with a highly curated, staged biface tool assemblage. A difference-of-proportion test was first conducted on debitage samples from Paradise Lane Areas A, B, and C to determine whether there is a significant difference among these assemblages. The results showed that no significant difference exists between the samples from Areas

TABLE 31

44WR50 Debitage Attribute Frequencies

Flake type		**Size**		**Platform shape**		**Platform preparation**	
Complete	63	< 2 cm	49	Triangular	10	Present	10
Proximal	19	2-5 cm	46	Flat	35	Absent	72
Medial	4	> 5 cm	5	Round	37	No observation	18
Distal	14			No observation	18		
		Scar count				**Directions count**	
Cortex		Mean	= 1.33	**Remnant Biface Edge**		Mean	= 0.73
Present	0	Standard deviation	= 1.22	Present	3	Standard deviation	= 0.60
Absent	100			Absent	97		

Sample of 100 flakes

TABLE 32

Comparison of Debitage Attribute Frequencies

Attribute	Variable	Area A	Area C	Crane Point/ Biface	44WR50/ Core
Flake type	complete	43%	43%	12%	63%
	broken	57	57	88	37
Remnant biface edges	present	1	1	19	3
Platform shape	triangular	25	10	81	10
	flat	7	11	12	35
	round	41	46	7	37
Platform preparation	present	13	22	88	10
Mean number of flake scars		2(1)	2(1)	2(1)	1(1)
Mean number of scar directions		2(1)	1(1)	2(1)	1(1)

KEY: ( ) = standard deviation
Source: Lowery and Custer 1990

A and B but that differences are apparent between these samples and the sample from Area C. Therefore, only the data from Areas A and C will be used in the comparisons with the Fifty Site (44WR50) and Crane Point, and the results which apply to Area A will be assumed also to apply to Area B.

Tables 8, 21, 30, and 31 show the distribution of attributes for flake samples from Area A, Area C, Crane Point, and the Fifty Site (44WR50). Table 32 shows a comparison of percentage values among the Paradise Lane Area A and C assemblages and the Crane Point and Fifty Site assemblages for select flake attributes. These attributes were selected because experimental studies conducted by Errett Callahan (Appendix II, Tables 34 and 35) showed an association of particular attributes with biface reduction and other attributes with core reduction. For example, flakes from biface reduction are more often broken than complete, contain remnant biface edges, triangular or round platforms, platform preparation, and a greater number of flake scars on their dorsal surfaces as well as a greater number of directions from which those scars were struck. On the other hand, flakes from core reduction are more likely to be complete than broken, do not show evidence of remnant biface edges or platform preparation, are more apt to have flat platforms, and contain fewer scars in fewer directions on their dorsal surfaces.

The attributes from the Area A and Area C samples do not compare closely with either the Crane Point or Fifty Site distributions (Table 32). Instead, each Paradise Lane assemblage shares some attributes of both of the compared assemblages and other attributes fall somewhere in between the biface and core frequencies. In order to assess the significance of these differences, a difference-of-proportion test was applied to the percentage data (Parsons 1974:445-448; Table 33). Again, significant differences exist across the board and indicate that the debitage assemblages from Areas A and C resulted from the reduction of both bifaces and cores (Table 33). It is interesting to see in this pattern further support of the suggestion that later Woodland groups were continuing to rely on staged biface reduction even in an area of abundant lithic resources. However, the evidence also suggests a trend away from total reliance on biface technology and toward a less structured core-based technology at least to supplement curated tool kits. The patterns may also reflect the limited duration of Woodland I

TABLE 33

Results of Difference-of-Proportion Tests for Debitage Attribute Data

Variable	Area A / Area C	Crane Point / Area A	Crane Point / Area C	44WR50 / Area A	44WR50 / Area C
Flake type					
Complete	0.00	5.58*	3.03*	2.83*	2.83*
Proximal	0.64	3.12*	3.66*	1.50	0.86
Medial	1.11	0.34	0.58	2.47*	1.43
Distal	1.61	0.16	1.13	0.20	1.80
Cortex					
Present	2.94*	1.36	3.45*	4.17*	6.40*
Size					
< 2 cm	2.26*	5.58*	7.30*	8.30*	10.10*
2-5 cm	2.26*	5.58*	7.30*	0.86	3.10*
> 5 cm	0.00	0.00	0.00	8.06*	8.06*
Platform shape					
Triangular	2.79*	1.89	4.33*	2.79*	0.00
Flat	0.99	1.03	0.18	4.86*	4.03*
Round	0.71	2.82*	3.35*	0.58	1.29
Remnant biface edge					
Present	0.00	4.21*	4.21*	1.01	1.01
Platform preparation					
Present	1.67	5.57*	4.16*	0.66	2.31*

KEY: * = Significant difference = 1.96

settlements in northern Delaware. Groups that are only semi-sedentary or seasonally settled in the area might be expected to continue practices of curating transportable tool kits while relying on readily accessible materials to supply flakes for expedient needs.

In sum, the results of regional comparisons of lithic resource use indicate that Woodland I groups visiting Paradise Lane preferred primary cryptocrystalline materials for their lithic needs, but to some extent supplemented their tool kits with microcrystalline quartz and quartzite procured from the Piedmont region to the north and with secondary resources locally available in the streams of the Fall Line. Furthermore, the curated transportable tool kits of the site's occupants consisted primarily of bifacial tools, suggesting that unifacial tools needed for processing activities at staging/processing sites throughout the region were manufactured on an expedient basis. Finally, debitage analysis showed that groups visiting the Paradise Lane Site were using both biface and core technology to produce their stone tools and that this trend may be related to the shift from highly mobile settlement patterns toward more sedentary patterns.

Cordage and Textile Data

This report provides an opportunity to analyze a sample of late Woodland I ceramic sherds in light of hypotheses previously advanced by Petersen and Hamilton (1984) and Adovasio (1983) regarding the relationship between technological practices and social/linguistic group identities. Several such

studies have shown that textiles and cordage twists, as revealed through clay impressions, can be used to identify ethnic groups. However, it must be taken into account that the ceramic samples from Paradise Lane Areas A and C are neither large nor ideal.

The limited data from Paradise Lane indicate two distinct yet roughly contemporaneous industries at the site. The assemblage from Area A is characterized by Z-twist cordage; whereas, the assemblage from Area C is characterized by S-twist cordage. Adovasio and Carlisle (1982:144) have suggested that cordage twist patterns are generally population specific, and although some degree of idiosyncratic behavior can be expected, textile industries of specific cultural groups will be dominated by either the Z-twist or the S-twist pattern. Therefore, the data suggest that two distinct groups occupied the Paradise Lane Site even though the ceramic assemblages from Areas A and C are both dominated by Hell Island types. There are other characteristics of these assemblages that support such an inference. For example, the temper of the Area A ceramic assemblage is quite uniform and consistent, whereas the temper of the Area C ceramic assemblage is inconsistent, in some cases containing organic matter, shell, or clay in addition to the typical agents of finely crushed quartz and mica. Furthermore, as previously discussed, the lithic assemblages from both areas are quite different from one another.

In their studies of the Paintsville Reservoir perishable industry in Kentucky, Adovasio and Carlisle (1982:45) have observed that S-twist producers and Z-twist producers co-existed in the same region during the Middle Woodland/Late Woodland. However, at some point near the end of the Late Woodland, S-twist producers were replaced by Z-twist producers. Custer (n.d.) has noted a similar temporal phenomenon in Delaware where S-twist industries are dominant prior to A.D. 1000 at which point Z-twists begin to become more common. Furthermore, recent studies have suggested that there may have been a population movement, or migration, during late Woodland I times in the coastal Middle Atlantic region (Custer 1989:308-311). The Paradise Lane Site may represent a locus of social interaction along the course of social/technological transition. Such a transition would appear to coincide with a transition in lithic technology from a biface-based industry to a core-based industry. Further studies of larger and better samples of textile and cordage twist data will be necessary to determine whether technological discontinuities match the population discontinuities in late Woodland times.

Cultural Resource Management Recommendations

Final Phase II excavations at the Paradise Lane Site recovered significant data on changing patterns of prehistoric life at the time of the Woodland I/Woodland II transition. The changes are manifested in both the lithic and ceramic assemblages from the site and indicate both social and technological shifts which may have led to broader changes that mark the beginning of the Woodland II Period. The transition from biface to core technology, and from highly mobile to more sedentary settlement practices is reflected in the artifact assemblage. Furthermore, cordage twist data from the ceramic assemblage may be correlated with a terminal Woodland I migration. Future archaeological investigations in northern Delaware should focus on obtaining further evidence to corroborate these interpretations. The final excavations at Paradise Lane constituted full data recovery, and no further work is recommended at the site.