

TABLE OF CONTENTS

	Page
Abstract	i
DeIDOT Archaeological Series Index Information	ii
Acknowledgements	iv
Table of Contents	v
List of Figures	viii
List of Tables	xiii
List of Plates	xvii
Introduction	1
Environmental Setting	3
Paleoenvironments	8
Regional Prehistory	12
Paleo-Indian Period	12
Archaic Period	14
Woodland I Period	14
Woodland II Period	15
Contact Period	15
Previous Research	17
Phase I Survey	17
Phase II Testing	21
Phase III Research Design and Research Methods	32
Research Design	32
Field Research Methods	41
Laboratory Research and Analysis Methods	48
Feature Typology	51
Excavation Results	58
Site Stratigraphy	58
Excavated Artifacts	61
Excavated Features	68
Floated Artifacts and Ecofacts	82
Interpretations - Area A	84
Chronology	84
Diagnostic Projectile Points	84
Ceramics	88
Plow Zone Artifact Distributions	88
Analysis of Feature Functions	93
Analysis of Feature Distributions	96
Analysis of Lithic Technologies	96

	Page
Interpretations - Area B	102
Chronology	102
Diagnostic Projectile Points	102
Ceramics	102
Radiocarbon Dates	104
Distribution of Dated Features	106
Plow Zone Artifact Distributions	106
Subsoil Artifact Distributions	111
Section I	111
Section II	112
Section III	112
Section IV	114
Analysis of Feature Distributions	115
Analysis of Lithic Technologies	115
 Interpretations - Area C	 123
Chronology	123
Diagnostic Projectile Points	123
Ceramics	123
Radiocarbon Dates	126
Distribution of Dated Features	127
Plow Zone Artifact Distributions	127
Subsoil Artifact Distributions	134
Analysis of Feature Distributions	134
Analysis of Lithic Technologies	135
 Interpretations - Area D	 150
Chronology	150
Diagnostic Projectile Points	150
Plow Zone Artifact Distributions	150
Analysis of Feature Distributions	150
Analysis of Lithic Technologies	151
 Interpretation - Area E	 153
Chronology	153
Diagnostic Projectile Points	153
Plow Zone Artifact Distributions	153
Analysis of Feature Distributions	155
Analysis of Lithic Technologies	155
 Interpretations - Area F	 156
Chronology	156
Diagnostic Projectile Points	156
Analysis of Feature Distributions	156
Analysis of Lithic Technologies	156

	Page
Interpretations - Area G	157
Chronology	157
Diagnostic Projectile Points	157
Analysis of Feature Distributions	157
Analysis of Lithic Technologies	157
Interpretations - Woods Area	159
Chronology	159
Diagnostic Projectile Points	159
Ceramics	159
Radiocarbon Dates	159
Analysis of Artifact Distributions	161
Analysis Lithic Technologies	165
Interpretations - Overall Site	168
Blood Residue Analysis	168
Analysis of Ceramic Technologies	168
Surface Treatments	169
Surface Alterations and Vessel Functions	169
Ceramic Artifact Frequencies	170
Textile Impressions and Cordage Twists	170
Killens Ceramics	172
Settlement Distribution	172
Analysis of Lithic Technologies	181
Area Assemblage Comparisons	181
Area Tool Kit Comparisons	183
Projectile Point Functions	184
Flake Attribute Analysis	187
Discussion and Conclusions	191
Site Summary	191
Paleoenvironments and Prehistoric Settlement	192
Cordage Twist Data	195
Regional Lithic Technologies	195
Subsistence Systems	202
Household Settlement Patterns	204
Community Settlement Patterns	206
Regional Settlement Patterns	207
References Cited	211
Personnel	223
Appendices	225
Appendix I: Cross-Section of a Closed Depression at the Pollack Site	225
Appendix II: Killens Ware Type Description	232
Appendix III: Glossary	233

LIST OF FIGURES

	Page
Figure 1: Site Location	xx
Figure 2: Site Setting	2
Figure 3: Location of All Sites in the Middle Leipsic River Valley Archaeological District	4
Figure 4: Physiographic Zones of Delaware	5
Figure 5: Delaware Drainages	5
Figure 6: Environmental Changes and Climatic Episodes	9
Figure 7: Delaware Prehistoric Chronological Chart	13
Figure 8: Initial Testing of Pollack Site	16
Figure 9: Profile from Phase I Testing	17
Figure 10: Additional Phase I Testing	19
Figure 11: Areas of Prehistoric and Historic Artifacts in Phase I Testing	20
Figure 12: Profile of Sample Shovel Test Pit	20
Figure 13: Areas of Artifact Concentrations	21
Figure 14: Area A Artifact and Feature Distribution from Phase II Testing	26
Figure 15: Profile of Test Unit N41 W650, Area A	27
Figure 16: Area B Artifact and Feature Distribution from Phase II Testing	28
Figure 17: Area C Artifact and Feature Distribution from Phase II Testing	29
Figure 18: Areas D and E Artifact and Feature Distribution from Phase II Testing	30
Figure 19: Area F Artifact and Feature Distribution from Phase II Testing	31
Figure 20: Area G Artifact and Feature Distribution from Phase II Testing	32
Figure 21: Illustration of Household Cluster, Clyde Farm Site	33
Figure 22: Paleo-Indian Period Study Units and Settlement Model	35

	Page
Figure 23: Archaic Period Study Units and Settlement Model	35
Figure 24: Woodland I Period Study Units and Settlement Model	36
Figure 25: Woodland II Period Study Units and Settlement Models	37
Figure 26: Contact Period Study Units	38
Figure 27: Hypothesized Settlement Distribution within the Pollack Site	40
Figure 28: Feature Type Plan Views and Profiles	50
Figure 29: Taphonomy of Pit House Features	51
Figure 30: Typical Type 1 Feature Plan View and Profile	54
Figure 31: Typical Type 2 Feature Plan View and Profile	54
Figure 32: Typical Type 3 Feature Plan View and Profile	55
Figure 33: Typical Type 4 Feature Plan View and Profile	57
Figure 34: Typical Type 5 Feature Plan View and Profile	57
Figure 35: Typical Profile of the Pollack Site	59
Figure 36: Profile of Relationship of Features and Buried Soils, Areas B and C	59
Figure 37: Development of the Pollack Site Profile	60
Figure 38: Typical Profile from Wooded Area	60
Figure 39: Artifact Percentages for All Areas Combined	62
Figure 40: Artifact Percentages - Area A	63
Figure 41: Artifact Percentages - Area B	64
Figure 42: Artifact Percentages - Area C	65
Figure 43: Artifact Percentages - Area D	66
Figure 44: Artifact Percentages - Area E	66
Figure 45: Artifact Percentages - Area F	67
Figure 46: Artifact Percentages - Area G	67

	Page
Figure 47: Artifact Percentages - Woods	68
Figure 48: Feature Type Percentages for All Areas Combined	69
Figure 49: Feature Type Percentages - Areas A, B, and C.....	70
Figure 50: Feature Type Percentages - Areas D, E, F, and G.....	71
Figure 51: Feature Type Distributions - Area A	74
Figure 52: Feature Type Distributions - Area B	75
Figure 53: Feature Type Distributions - Area C - Northern Section	76
Figure 54: Feature Type Distributions - Area C - Southern Section	77
Figure 55: Feature Type Distributions - Area D	78
Figure 56: Feature Type Distributions - Area E	79
Figure 57: Feature Type Distributions - Area F	80
Figure 58: Feature Type Distributions - Area G	81
Figure 59: Diagnostic Projectile Points from Areas A, D, E, F, and G	85
Figure 60: Stemmed Point Types	87
Figure 61: Date Ranges - Area A	88
Figure 62: Area A Plow Zone Artifact Distribution - Total Artifacts	89
Figure 63: Area A Plow Zone Artifact Distribution - Debitage	90
Figure 64: Area A Plow Zone Artifact Distribution - Fire-Cracked Rock Count	91
Figure 65: Area A Plow Zone Artifact Distribution - Fire-Cracked Rock Weight	92
Figure 66: Pit House Architecture.....	94
Figure 67: Pollack Household Cluster	95
Figure 68: Sample Lithic Tools	99
Figure 69: Diagnostic Projectile Points from Area B	103
Figure 70: Date Ranges - Area B	104

	Page
Figure 71: Distribution of Dated Features - Area B	107
Figure 72: Area B Plow Zone Artifact Distribution - Total Artifacts.....	108
Figure 73: Area B Plow Zone Artifact Distribution - All Debitage.....	108
Figure 74: Area B Plow Zone Artifact Distribution - Debitage with Cortex	109
Figure 75: Area B Plow Zone Artifact Distribution - Debitage without Cortex	109
Figure 76: Area B Plow Zone Artifact Distribution - Fire-Cracked Rock Count	110
Figure 77: Area B Subsoil Excavation Blocks	110
Figure 78: Area B, Section I - Subsoil Total Artifact Distribution.....	111
Figure 79: Area B, Section I - Subsoil Artifact Distribution - Flakes without Cortex ...	111
Figure 80: Area B, Section I - Subsoil Artifact Distribution - Flakes with Cortex	111
Figure 81: Area B, Section I - Subsoil Artifact Distribution - Tools, Ceramics, and Fire-Cracked Rock	112
Figure 82: Area B, Section II - Subsoil Total Artifact Distribution	112
Figure 83: Area B, Section III - Subsoil Total Artifact Distribution	113
Figure 84: Area B, Section III - Subsoil Artifact Distribution - Flakes with Cortex	113
Figure 85: Area B, Section III - Subsoil Artifact Distribution - Flakes without Cortex	113
Figure 86: Area B, Section III - Subsoil Artifact Distribution - Fire-Cracked Rock, Biface, and Flake Tool	113
Figure 87: Area B, Section IV - Subsoil Total Artifact Distribution	114
Figure 88: Area B, Section IV - Feature Locations	114
Figure 89: Sample Bifaces	118
Figure 90: Diagnostic Projectile Points from Area C Plow Zone Excavations	124
Figure 91: Diagnostic Projectile Points from Area C Features and Subsoil Units	125
Figure 92: Date Ranges - Area C	126
Figure 93: Distribution of Dated Features - Area C - Northern Section	128
Figure 94: Distribution of Dated Features - Area C - Southern Section	129

	Page
Figure 95: Area C Plow Zone Artifact Distribution - All Artifacts	130
Figure 96: Area C Plow Zone Artifact Distribution - All Debitage	131
Figure 97: Area C Plow Zone Artifact Distribution - Debitage with Cortex	132
Figure 98: Area C Plow Zone Artifact Distribution - Debitage without Cortex	133
Figure 99: Location of Subsoil Test Units in Northeast Corner of Area C	134
Figure 100: Area C - Subsoil Total Artifact Distribution	135
Figure 101: Area C - Subsoil Flakes with Cortex Distribution	136
Figure 102: Area C - Subsoil Flakes without Cortex Distribution	137
Figure 103: Area C - Subsoil Tool Distribution	138
Figure 104: Area C - Features in Subsoil Excavation Block	139
Figure 105: Date Ranges - Area D	150
Figure 106: Area D Plow Zone Artifact Distribution - All Artifacts	151
Figure 107: Area E Plow Zone Artifact Distribution - All Artifacts	153
Figure 108: Date Ranges - Area F	156
Figure 109: Date Ranges - Area G	157
Figure 110: Diagnostic Projectile Points from Woods Area	158
Figure 111: Date Ranges - Woods Area	159
Figure 112: Woods Area - Excavation Units and Feature	161
Figure 113: Woods Area - Total Lithic Artifact Distribution	162
Figure 114: Woods Area - Flakes with Cortex Distribution	162
Figure 115: Woods Area - Flakes without Cortex Distribution	163
Figure 116: Woods Area - Bifacial Tool Distribution	163
Figure 117: Woods Area - Core, Hammerstone, and Mortar Distribution	164
Figure 118: Woods Area - Ceramic Distribution	164
Figure 119: Woods Area - Fire-Cracked Rock Distribution	165

	Page
Figure 120: Varieties of Cordage Twists	170
Figure 121: Artifact Densities (Features/Acre)	173
Figure 122: Artifact Densities (Artifacts/Feature)	173
Figure 123: Artifact Densities (Artifacts/Unit)	175
Figure 124: Pre-Woodland I Points/Acre	175
Figure 125: Woodland I Points/Acre	177
Figure 126: Woodland II Points/Acre	177
Figure 127: Pre-Woodland I Point Percentages	178
Figure 128: Woodland I Point Percentages	178
Figure 129: Woodland II Point Percentages	179
Figure 130: Pre-Woodland I Point Percentage/Area Percentage Comparisons	179
Figure 131: Woodland I Point Percentage/Area Percentage Comparisons	180
Figure 132: Woodland II Point Percentage/Area Percentage Comparisons	180
Figure 133: Tool Kit Comparison Among Site Areas	185
Figure 134: Regional Comparison of Tool Kits	196
Figure 135: Lithic Assemblage Sample Site Locations	198
Figure 136: Woodland I Period Settlement Model	207
Figure 137: Woodland II Period Settlement Model	208

LIST OF TABLES

Table 1: Phase I Testing - Summary Catalog	18
Table 2: Summary Catalog - Phase II Testing	23
Table 3: Phase II Testing by Site Areas	41
Table 4: General Artifact Totals for All Site Areas	61

	Page
Table 5: Artifact Counts and Densities by Site Area	61
Table 6: Summary Catalog of Excavated Artifacts by Site Area - Artifacts from Test Units	63
Table 7: Summary Catalog of Excavated Artifacts by Site Area - Artifacts from Features	64
Table 8: Summary Catalog of Excavated Artifacts by Site Area - Total Artifacts	65
Table 9: Feature Types by Site Area	69
Table 10: Feature Dimensions - All Areas Combined	70
Table 11: Feature Dimensions by Area	72
Table 12: Summary Catalog of Flotation from All Areas	82
Table 13: Seeds in Flotation Samples by Site Area	82
Table 14: Varieties of Seeds and Uses	83
Table 15: Raw Material Types Among Debitage from Flotation	83
Table 16: Diagnostic Projectile Point Types from the Pollack Site	84
Table 17: Diagnostic Ceramic Types from the Pollack Site	88
Table 18: Total Lithic Artifact Assemblage and Raw Materials - Area A	96
Table 19: Total Lithic Artifact Assemblage - Cortex Percentage - Area A	97
Table 20: Total Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area A	98
Table 21: Tool Types - Area A	98
Table 22: Total Lithic Artifact Assemblage and Raw Materials - Area B	115
Table 23: Total Lithic Artifact Assemblage - Cortex Percentage - Area B	116
Table 24: Total Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area B	117
Table 25: Tool Types - Area B	117
Table 26: Lithic Artifact Assemblage and Raw Materials - Area B, Subsoil Units	120

	Page
Table 27: Lithic Artifact Assemblage - Cortex Percentage - Area B, Subsoil Units.....	120
Table 28: Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area B, Subsoil Units	121
Table 29: Lithic Artifact Assemblage and Raw Materials - Area B, Features	121
Table 30: Lithic Artifact Assemblage - Cortex Percentage - Area B, Features	122
Table 31: Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area B, Features	122
Table 32: Total Lithic Artifact Assemblage and Raw Materials - Area C.....	136
Table 33: Total Lithic Artifact Assemblage - Cortex Percentage - Area C.....	137
Table 34: Total Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area C	140
Table 35: Tool Types - Area C.....	141
Table 36: Lithic Artifact Assemblage and Raw Materials - Area C, Subsoil Units.....	145
Table 37: Lithic Artifact Assemblage - Cortex Percentage - Area C, Subsoil Units.....	145
Table 38: Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area C, Subsoil Units	146
Table 39: Lithic Artifact Assemblage and Raw Materials - Area C, Features	146
Table 40: Lithic Artifact Assemblage - Cortex Percentage - Area C, Features	147
Table 41: Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area C, Features	147
Table 42: Total Lithic Artifact Assemblage and Raw Materials - Area D	151
Table 43: Total Lithic Artifact Assemblage - Cortex Percentage - Area D	152
Table 44: Total Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area D.....	152
Table 45: Tool Types - Area D	152
Table 46: Total Lithic Artifact Assemblage and Raw Materials - Area E.....	154
Table 47: Total Lithic Artifact Assemblage - Cortex Percentage - Area E.....	154

	Page
Table 48: Total Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Area E	154
Table 49: Tool Types - Area E	155
Table 50: Total Lithic Artifact Assemblage and Raw Materials - Area F	156
Table 51: Total Lithic Artifact Assemblage and Raw Materials - Area G	157
Table 52: Total Lithic Artifact Assemblage and Raw Materials - Woods Area	166
Table 53: Total Lithic Artifact Assemblage - Cortex Percentage - Woods Area	166
Table 54: Total Lithic Artifact Assemblage - Raw Material Percentage by Tool Type - Woods Area	167
Table 55: Tool Types - Woods Area	167
Table 56: Ceramic Surface Treatments	168
Table 57: Ceramic Surface Alterations	169
Table 58: Ceramic Artifact Frequencies	170
Table 59: Cordage Twist Data - Vessel Counts	171
Table 60: Artifact and Feature Densities by Site Area	172
Table 61: Projectile Point Distributions by Area	176
Table 62: Raw Material Use - Total Assemblage	181
Table 63: Raw Material Use - Bifacial Tools	182
Table 64: Raw Material Use - Unifacial Tools and Cores	182
Table 65: Biface Stage Comparisons	183
Table 66: Total Artifact Cortex Percentages	183
Table 67: Cumulative Tool Percentages Among Site Areas	184
Table 68: Projectile Point Breakage Patterns	184
Table 69: Flake Attribute Data	188
Table 70: Flake Attribute Summary	190

	Page
Table 71: Correlation of Environmental Data and Settlement Intensity	193
Table 72: Environmental Reconstructions - Coastal Plain	194
Table 73: Delaware Cordage Twist Data	195
Table 74: Comparative Lithic Resource Use Data	199
Table 75: Cortex Percentage Ranking	200
Table 76: Cryptocrystalline Percentage Ranking	200
Table 77: Quartzite/Quartz Percentage Ranking	201
Table 78: Lithic Resource Use Classification.....	202
Table 79: Comparison of Plant Food Remains.....	203
Table 80: Percentage Frequency Distribution of Artifacts per Feature.....	205

LIST OF PLATES

Plate 1: Site Location - Aerial View Looking West During Phase III Excavations ...	1
Plate 2: Leipsic River and Alston Branch Confluence - Aerial View Looking North Prior to Excavations	3
Plate 3: Wild Rice.....	6
Plate 4: <u>Amaranth</u> (Pigweed) Growing in Well-Drained Soil.....	7
Plate 5: Phase II Testing - Aerial View of Eastern End of Site	22
Plate 6: Phase II Test Unit Intervals.....	23
Plate 7: Site Sub-Areas - Aerial View Looking East During Phase III Excavations..	24
Plate 8: Sample Artifacts from Phase II Testing	25
Plate 9: Excavating One-Meter Test Units in Area C	42
Plate 10: Mechanical Removal of Plow Zone Soils	43

	Page
Plate 11: Phase III Excavations in Areas D, E, and F	44
Plate 12: Profile of Soils in Typical Pit Feature	44
Plate 13: Aerial View of Covered Pit Features in Area C	45
Plate 14: Profile of Feature C93 (Type 2)	46
Plate 15: Excavating and Recording Features	47
Plate 16: Fire-Cracked Rock in Feature	48
Plate 17: Blood Residue Analysis	49
Plate 18: Wooden Framework of House Reconstruction	52
Plate 19: House Reconstruction with Bark Covering	52
Plate 20: Type 2A House Feature from the Leipsic Site	53
Plate 21: Opening Plan View of Feature C462 (Type 1)	53
Plate 22: Opening Plan View of Feature B19 (Type 2A)	55
Plate 23: Opening Plan View of Feature B50 (Type 3)	56
Plate 24: Examples of Main Diagnostic Point Types from the Pollack Site	86
Plate 25: Hammerstones from Area A	100
Plate 26: Modern Flintknapping Tool Kit	101
Plate 27: Artifacts from Dated Features - Area B	105
Plate 28: Hammerstones from Area B	119
Plate 29: Hammerstones from Area C	142
Plate 30: Stone Anvil <u>in Situ</u> (Feature C12)	143
Plate 31: Stone Anvil from Area C	143
Plate 32: Edged Cobble Tool from Area C	144
Plate 33: Stripping Plow Zone from Bay/Basin Feature	148

	Page
Plate 34: Excavation of Trench Through Bay/Basin Feature	148
Plate 35: Profile of Bay/Basin Trench	149
Plate 36: Ceramics from Woods Area	160
Plate 37: Ceramics and Cordage Twist Impressions	171
Plate 38: Examples of Projectile Point Tip Damage	186
Plate 39: Examples of Transverse Medial Fractures	187
Plate 40: Flakes from Experimental Production of Stone Tools	189
Plate 41: Bifaces Replicated by Errett Callahan for Experimental Study of Debitage .	190



Pollack Site Field Crew - Summer 1991