shovel tests were employed to investigate this area, with the transects oriented perpendicular to the highway. A total of 14 apertures were opened; the spacing between transects was held at 15 meters but the interval between tests varied from 10 to 12 meters (see Figure 71). None of the shovel tests yielded cultural material.

SUMMARY AND DISCUSSION

Archaeological survey of the 13-mile segment of U.S. Route 113 resulted in the identification of eight previously unknown archaeological sites. Seven of these sites were identified within the existing right-of-way, and one site (7S-C-48) is outside the right-of-way. The sites within the right-of-way include five prehistoric components and four historic components (Table 17). Also, a number of isolated find spots were documented during the survey.

Culturally diagnostic artifacts recovered from the prehistoric sites in the project area indicate use or occupation of the area throughout the Archaic and Woodland periods. The earliest occupation is represented by several bifurcate-based points, which are considered Early Archaic (ca. 7000 to 6000 B.C.) indicators in the Middle Atlantic region. Two bifurcate-based points were recovered from 7S-F-68, although one example was from a dubious context (i.e., the dog burial); other examples were recovered from Site 7S-C-45 and from the Station 433 Survey Area. Various diagnostic points in the collections indicate occupation or use of the project area throughout the Late Archaic and Woodland periods. Prehistoric ceramics were recovered from one site, 7S-F-68, as well as an isolated find spot in the Station 745 Survey Area. All identifiable prehistoric ceramics are assignable to the Townsend series, which is associated with the Woodland II or Late Woodland Period.

As a whole the prehistoric sites were characterized by small sizes, limited variety of tool types within the artifact assemblages, and the lack of features. Between Georgetown and Milford, Route 113 passes through the Mid-Peninsular Drainage Divide physiographic zone, and this region is generally characterized by the lack of large surface waterways, although there are numerous wetlands. Because of their relatively small size and the limited variety of artifacts, most of the prehistoric sites may be classified as procurement sites, following Custer's (1986) terminology. Site 7S-F-68 exhibited evidence of more intensive occupation, and it may have been used as a micro-band base camp (Custer 1986). However, the archaeological criteria that distinguish these two site types (procurement sites and micro-band base camps) are not well developed.

Overall, the U.S. Route 113 project appears to be characterized by a paucity of archaeological resources. The predictive criteria used to stratify the alignment appear to have provided adequate coverage, and it is concluded that the project area was not used intensively by prehistoric or historic populations. The study area is within the Mid-Peninsular Drainage

Divide Management Unit, which has been classified as having only low to medium probability for prehistoric sites. Within this Management Unit, only Archaic and Woodland procurement sites are considered to have a moderate probability of occurring, while Paleo-Indian base camps, maintenance stations, and hunting sites are considered to have moderate to high probability; all other prehistoric site types are considered to have low probability (Custer 1986:184).

The lack of more substantial prehistoric occupation sites within the Route 113 survey area appears to support the probability assessments given in the Delaware State Plan (Custer 1986). However, the State Plan suggests that some Paleo-Indian site types are considered to have greater probability of occurrence than Archaic and Woodland procurement sites (Custer 1986:114); this assessment was not supported by the findings of the Route 113 survey, nor does it conform to prehistoric site occurrence patterns in the surrounding Middle Atlantic region.

TABLE 17

SUMMARY OF ARCHAEOLOGICAL SITES
WITHIN THE U.S. RT. 113 RIGHT-OF-WAY

SITE	COMPONENTS	SITE DESCRIPTION
7S-C-45	P	Archaic/Woodland procurement site
7S-C-46	P	General prehistoric procurement site
7S-C-47	P	General prehistoric procurement site
7S-F-67	H	Late 19th to 20th century farmstead (?)
7S-F-68	P, H	Archaic/Woodland procurement site or micro-band base camp; 19th to 20th century farmstead, with evidence of possible 17th or 18th century activity
7S-F-72	P, H	General prehistoric procurement site (?); late 19th to 20th century farmstead
7S-F-73	P, H	General prehistoric procurement site (?); late 19th to 20th century rural residence

Components: P--Prehistoric; H--Historic

Two criteria were used to define areas of prehistoric potential: (1) the presence of surface water and (2) elevated topography. Three prehistoric sites (7S-C-45, 7S-C-46, and 7S-C-47) were identified in settings with readily available surface water, but the most substantial of the prehistoric sites, 7S-F-68, was found on a low knoll away from a source of surface water but adjacent to a wetland area. Prehistoric material was widely scattered throughout the survey areas along U.S. Route 113, and frequently in settings that do not conform to the existing settlement pattern models (Custer 1986). For example, small quantities of prehistoric material were recovered from survey areas selected for their assumed historic archaeological potential, specifically at Sites 7S-F-67, 7S-F-72, and 7S-F-73. Overall, the survey results suggest the primary importance of surface water and wetland areas, but also indicate widespread, low-intensity use of the project area vicinity. Regional models for aboriginal settlement have repeatedly demonstrated the importance of well-drained soils and available surface water, and the paucity of sites along the Route 113 alignment is not necessarily incompatible with these models. What is actually predicted by most prehistoric settlement models are the environmental zones within which archaeological sites are likely to occur, not the precise location of individual sites, since individual sites are generally much smaller than the landforms or habitats in which they typically occur. Throughout the Middle Atlantic region, prehistoric occupation sites consistently occur on well-drained ground in proximity to watercourses, but it does not necessarily follow that all such loci will contain significant prehistoric archaeological deposits.

Historic occupational components were examined at four sites (7S-F-67, 7S-F-68, 7S-F-72, and 7S-F-73) along the Route 113 right-of-way. All of the historic archaeological sites appear to represent farmsteads or rural residences. In general, these sites are characterized by sheet refuse deposits containing a mixture of nineteenth- and twentieth-century material. The project area was only sparsely settled prior to the late nineteenth century, and there has been some depopulation of the area during the mid-twentieth century. A cluster of three MCDs between 1897 and 1905 for Sites 7S-F-73, 7S-F-72, and 7S-F-68 appears to reflect this population trend. There is limited evidence of occupation of the project area prior to the late nineteenth century. For example, Site 7S-F-67 had an MCD of 1838, but this was based on a sample of only four sherds. The recovery of delftware sherds and a gunflint from Site 7S-F-68 suggests occupation during the Colonial period, which would be the earliest known settlement in the project area.

Areas of historic potential were defined on the basis of historical cartographic sources and the existing road system. Structure locations indicated on the Beers 1868 atlas (Beers 1868) and more recent maps were designated as moderate/high potential areas for historic resources, as were crossroad locations along U.S. Route 113. The historic archaeological components at all four sites correspond to the locations of farmhouses and rural residences shown on historical maps. However, the sheet refuse deposits associated with these foci may in some cases extend for a considerable distance around the structure locations. The scarcity of historic sites within the project area appears to reflect the relatively late settlement of the Route 113 project area. Given the early twentieth-century construction date for U.S. Route 113, one should not expect to find a large number of historic sites within the right-of-way.

The most interesting aspect of the present study for historic archaeology is the identification of a shell button industry. Shell button manufacturing was one of Sussex County's important industries, carried out in both industrial and residential settings. This industry has now all but died in Sussex County, having been eclipsed by the advent of plastic buttons. Shell button manufacturing by-products were recovered during testing of three sites: 7S-F-68, 7S-F-72, and 7S-F-73. The largest concentration was found at the Jacob Sharp House (7S-F-72) in a pavement context; the use of shell button waste for pavement is common in southern Delaware and other areas of the United States (Parmalee 1967). At one site, 7S-F-73, the current occupant stated that one of the former occupants of the house operated a button shop. However, no information was obtained concerning the former occupants of Site 7S-F-72, where the largest deposit was identified.

The two shell species found in the project area are the Black Lipped Pearl Oyster *(Pinctada margaritifera)* and the Commercial Trochus *(Trochus niloticus Linne)*. Both were imported from the Indo-Pacific and were commonly used for making buttons because of their size and brilliance. Plate 75 illustrates examples of the Black Lipped Pearl Oyster and the Commercial Trochus shell button waste. The recovered by-products consist of button wasters and blanks but no actual buttons. Wasters are the residual material left after the blanks have been punched out, while blanks are the punched slugs before they are made into buttons. Wasters and blanks were found for both species, though pearl oyster wasters predominated. While freshwater shell species were also recovered archaeologically, none of the specimens exhibited any evidence of use in button manufacturing. Table 18 summarizes the button materials recovered from the three sites.

TABLE 18

SUMMARY OF SHELL BUTTON WASTE

	PEARL OYSTER		COMMERCIAL TROCHUS	
SITE	BLANK	WASTER	BLANK	WASTER
7S-F-68	5	97	.	.
7S-F-72	62	2104	53	46
7S-F-73	.	.	2	53

PLATE 75: SHELL SPECIES USED FOR MAKING BUTTONS
The Black Lipped Pearl Oyster And The Commercial Trocchus.

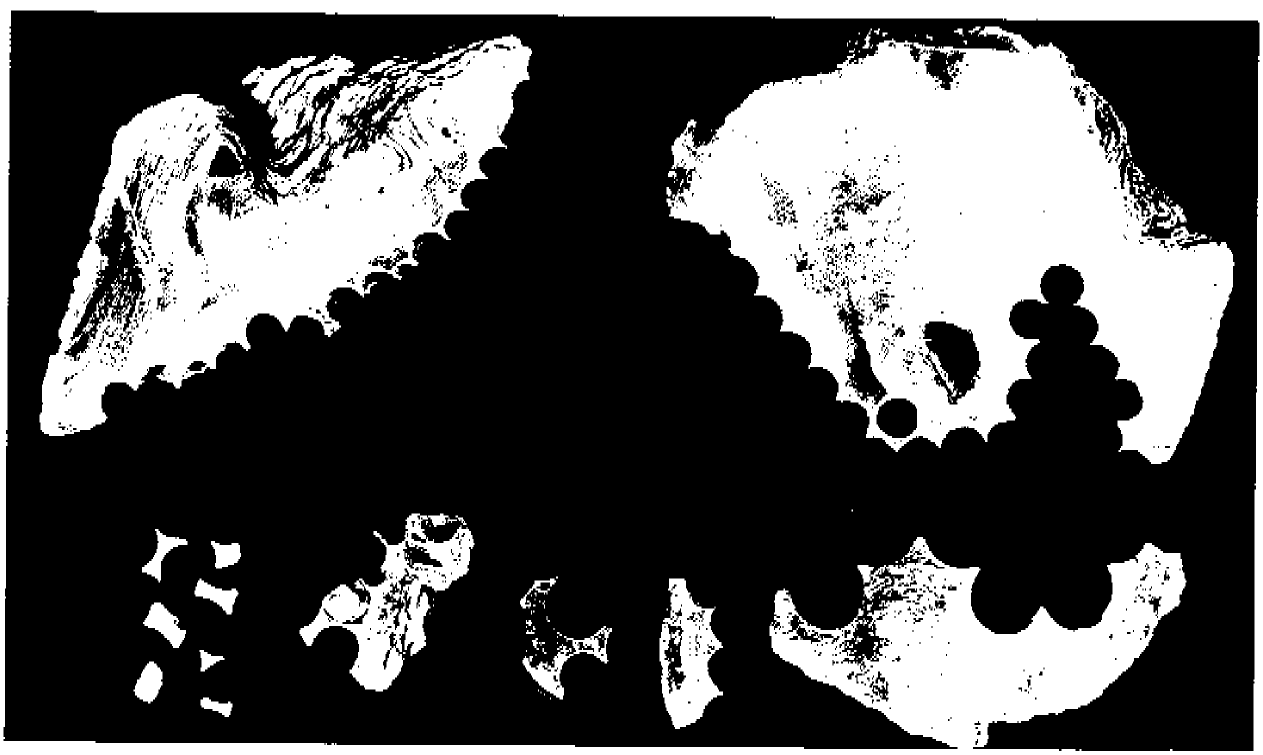

PLATE 76: PEARL OYSTER WASTERS
Pearl Oyster wasters Exhibiting punch marks of varying diameters, 3/8 - 1 Inch. Note the saw marks on the oyster shell. The tiny wasters in the lower left are typical of the specimens recovered from the Jacob Sharp House (Site 7S-F-72).

During the last quarter of the nineteenth century the United States became a center for the pearl button industry (Parmalee 1967). This development followed the invention of the sewing machine and the rise of the ready-wear clothing industry. Mass production of ready-wear clothing created a market for cheap, plain buttons, a need which was met by production of the small-china button and the pearl button. Late in the nineteenth century the United States started mass-producing freshwater shell buttons. Ocean shell, which was used for ornamental buttons, was more expensive. However, judging from the diameter and the appearance of the button blanks recovered from the project area, the buttons being produced here were intended to be relatively plain, which suggests that ocean shell had become less expensive by the mid-twentieth century.

The Black Lipped Pearl Oyster was one of the most popular species used for making buttons. The shells average between 10 and 18 inches in diameter and yield hundreds of buttons. The color varies from white to black and includes all shades in between. The thickness of the hinge area usually necessitated leveling by sawing to facilitate punching blanks (Plate 76). Once punched, the blanks were split into several buttons. The blanks recovered exhibited a number of flaws such as the presence of the cortex, uneven splitting, holes, and incomplete punches (Plate 77). Recovered specimens ranged in size from 3/8 to 1 inch in diameter.

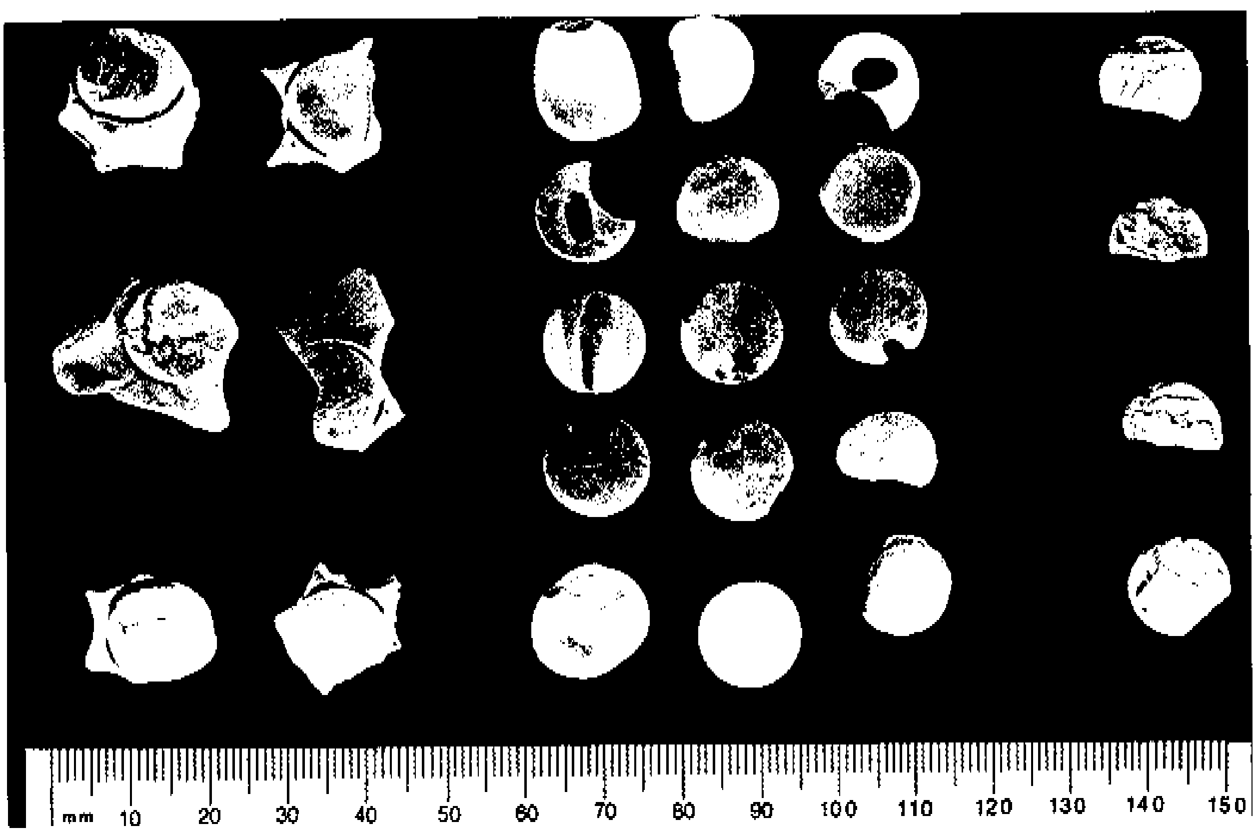

PLATE 77: PEARL OYSTER BLANKS
The blanks are Of varying thicknesses and exhibit flaws such as splitting, incomplete punches and visible cortex.

The Commercial Trochus shell averages about 5 inches in diameter and yields approximately 50 button blanks. In most cases each blank made a single button as this species was prized for its exterior surface markings. The surface markings are characterized by a swirl of deep pink (Plate 78). All of the measurable specimens averaged 1/2 inch in diameter.

PLATE 78: COMMERCIAL TROCHUS BLANKS AND WASTER
All of the recovered specimens measured 1/2 inch in diameter.

In addition to the materials recovered from the project area, examples of shell buttons were found in front of a button factory in Georgetown. These buttons were made from pearl oyster and trochus shell, and they demonstrate what the buttons made from the by-products probably looked like (Plate 79). One unusual aspect of the trochus shell buttons is that the cortex is on the back of the buttons. According to Kelso (1971), these shells were desired for the pattern on the cortex and should have been finished in reverse fashion.

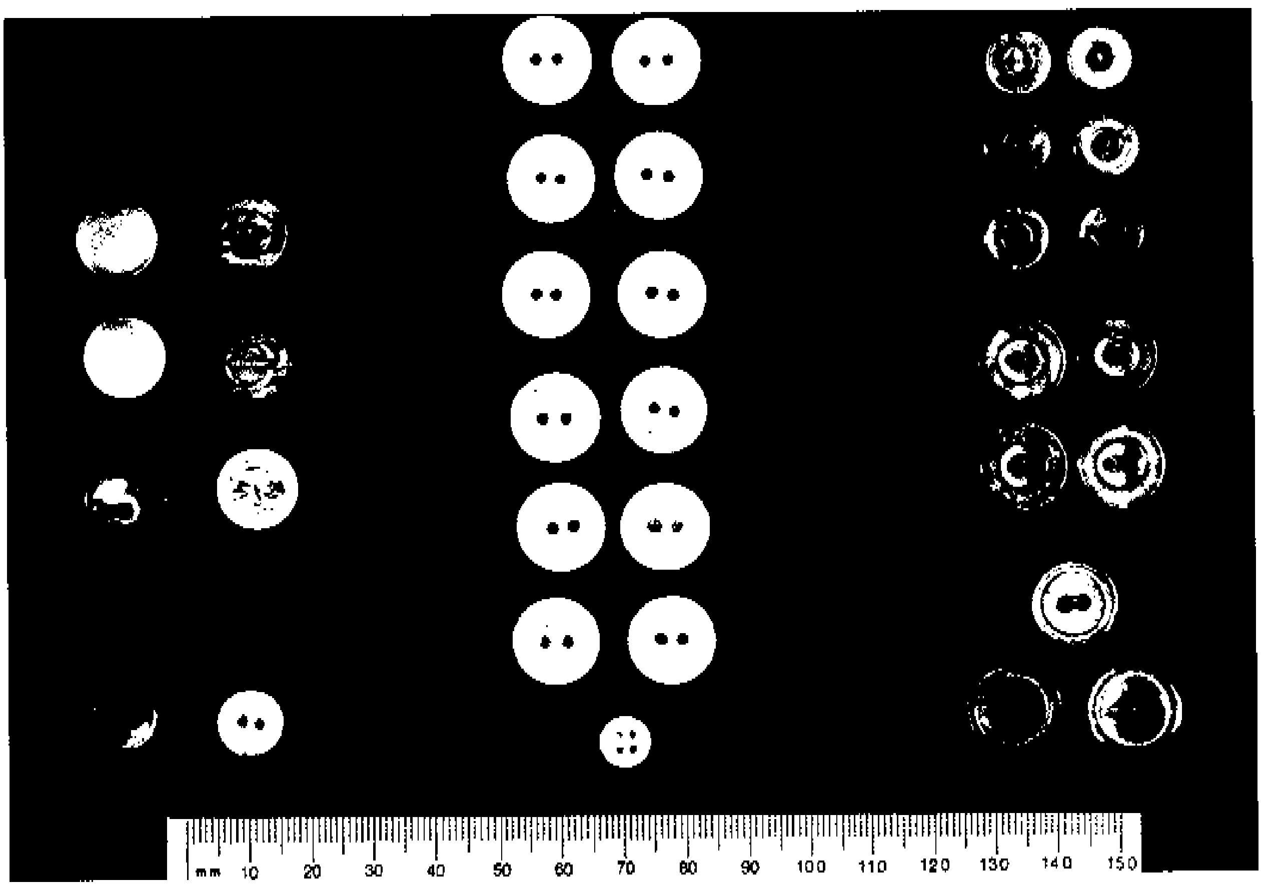

PLATE 79: PEARL BUTTONS FROM A GEORGETOWN BUTTON SHOP
These examples exhibit a range of treatments in terms of attachment, size and decoration. Those in the top left hand column have been dyed pink and have a self-shank. The two smaller ones at the bottom have been dyed a dark color on the face while the underside shows the original tint. Those in the center column are cut from Trochus shell; note the cortex is on the underside. All of these buttons measure 1/2 inch except the small one at the bottom which measures 5/19 inch in diameter. The right hand column contains buttons which may be dyed or cut from the outer lip of the Pearl Oyster which tends to be darker in color.

The actual survey results of this study, that is, the presence or absence of prehistoric and historic sites in each survey area, may be used to evaluate the predictive criteria used to select areas for field survey. Although only one of the 46 survey areas was actually designated as having low potential, areas of moderate to high historic potential may be treated as having low potential for prehistoric sites, and areas of moderate to high prehistoric potential may be classified as having low potential for historic sites. The survey results may then be summarized in a 2x2 contingency table (Table 19). [The work at the Jacob Sharp House, Site 7S-F-72, at Station 156 is excluded from this analysis, as that area was not included in the original field survey design.] Since the cell frequencies are so small, Fisher's Exact Test is used to determine the probability of the observed site distribution. Statistically, the results indicate that the distribution of prehistoric sites is unrelated ($p = 0.277$) to the classification of survey areas as having either moderate to high or low potential. This result reflects the widespread occurrence of prehistoric material in the project area, including areas surveyed because of their presumed sensitivity for historic resources. The results of the historic site distribution are also statistically insignificant, in terms of validation of the predictive model, although the small sample of historic sites permits only a subjective evaluation of the survey design.

Finally, it was anticipated that data pertaining to regional geomorphic processes would be obtained during the field survey, as it is known that Holocene aeolian deposition may have buried some Pleistocene occupation surfaces in the Delmarva Peninsula (Curry and Ebright 1989; Foss et al. 1978). A bucket auger was used in selected areas to extend the shovel test profiles, but in no case was there a deeply buried A-horizon beneath aeolian deposits. The soils throughout the project area are dominated by sands, but it was not possible to determine whether any of the surficial soils represent aeolian deposition without particle-size analysis of soil samples. Analysis of the vertical distribution of artifacts does clearly indicate that significant vertical translocation of cultural materials has occurred within the study area. Figure 72 portrays histograms for the distribution of prehistoric and historic artifacts according to excavation levels. Prehistoric artifacts were recovered from Levels 2 through 8 (20-90 cm below surface), and historic artifacts were recovered from Levels 2 through 7 (20-80 cm below surface). The most deeply buried historic artifacts were recovered from Shovel Tests No. 1 and No. 4 at Site 7S-F-68 (Station 210 Survey Area), and these profiles showed no evidence of recent fill deposition. One might have expected the prehistoric artifacts to have been found at noticeably greater depths than the historic artifacts, given the obvious difference in chronological deposition. The vertical artifact distribution patterns may be attributed to the predominance of easily mixed sandy soils throughout the project area.

TABLE 19

STATISTICAL EVALUATION OF PREDICTIVE MODEL

PREHISTORIC SITES

	SURVEY AREA POTENTIAL LOW	MOD./HIGH	TOTAL
Prehistoric Site Absent	6	34	40
Prehistoric Site Present	2	4	6
TOTAL	8	38	46
	FISHER EXACT TEST:		0.277

HISTORIC SITES

	SURVEY AREA POTENTIAL LOW	MOD./HIGH	TOTAL
Historic Site Absent	36	7	43
Historic Site Present	1	2	3
TOTAL	37	9	46
	FISHER EXACT TEST:		0.093

Note: Survey areas classifed as moderate/high potential for historic sites are defined as low potential for prehistoric sites, and vice versa.

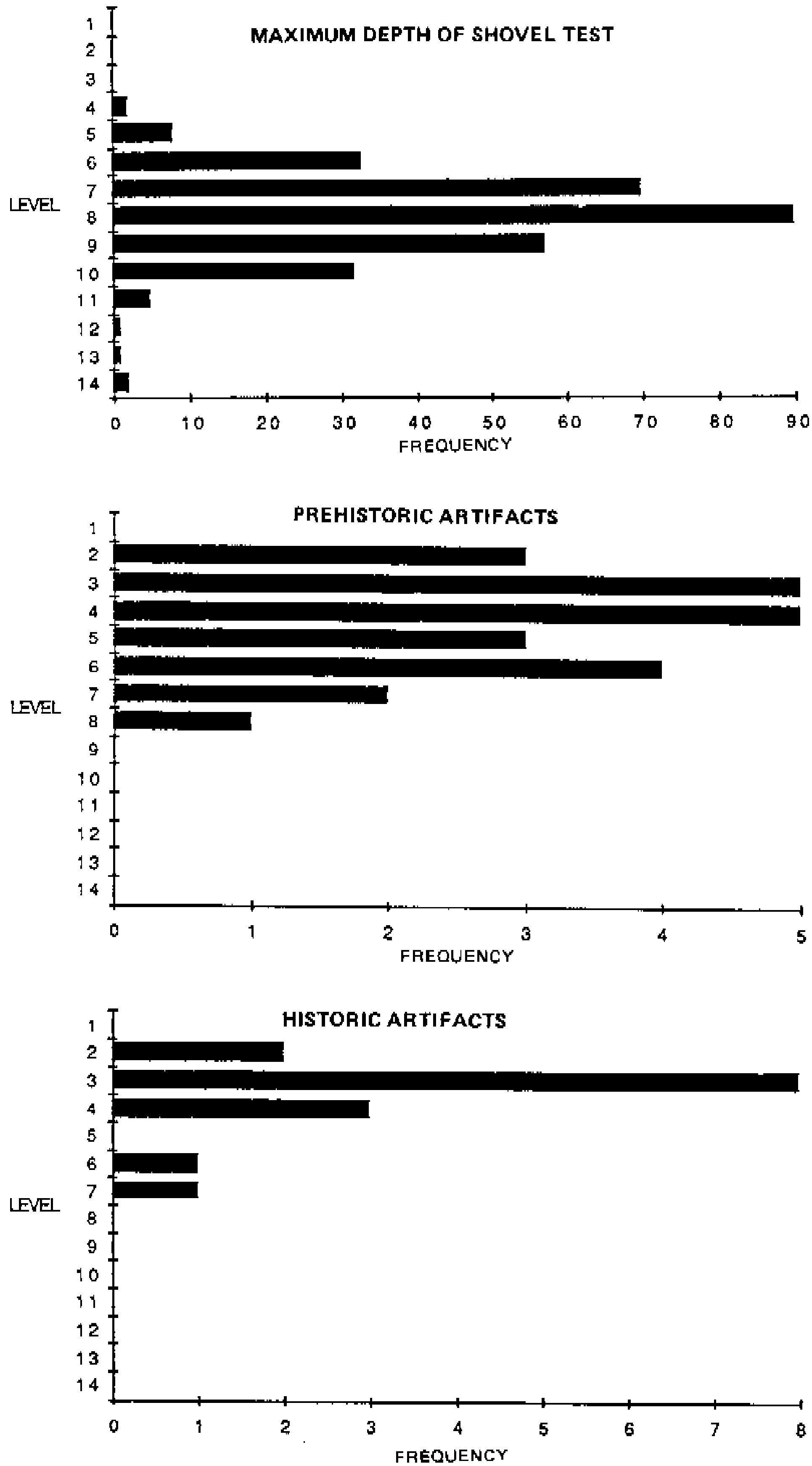

FIGURE 72: Vertical Distribution of Artifacts