CONCLUDING SUMMARY

This Phase I and Phase II underwater archeological investigation produced information useful to the inventory and evaluation of cultural resources located in the three bridge crossing areas for the Delaware Route 1 Corridor in Kent County, Delaware. The background study indicated that there was a substantial amount of riverine oriented cultural activity in the vicinity of the project area during both the prehistoric and historic periods. In terms of historic period maritime activity, shipping traffic frequented Delaware's interior waterways for more than three centuries, from the early 1600's through the middle 20th century.

The Phase I remote sensing survey compiled data on the distribution and characteristics of cultural materials as revealed by the presence of magnetic anomalies. This was accomplished by conducting a systematic marine proton magnetometer survey of the bridge crossing areas. While most of the terrain covered did not contain evidence of artifactual material, magnetic anomalies indicating the presence of ferrous artifacts and cultural features were discovered in thirty-seven locations.

During analysis of the remote sensing data, the individual anomaly targets were interpreted in terms of their potential for being historically significant. The results provided evidence showing the presence eight underwater archeological sites and seventeen isolated targets. The isolated targets were widely scattered and the magnetometer data indicated they were individual objects of limited size and magnetic mass. These targets were interpreted as not having the potential to be considered historically significant and no further investigation of them was recommended.

One of the underwater archeological sites (Site 7K-C-376 in Leipsic River) was outside the territory to be affected by the bridge construction. As a consequence, it was not recommended for evaluation as part of this investigation. Another site (7K-C-378) was found during the Phase I survey to lack the potential to be historical significant.

Six underwater archeological sites in the bridge crossings were interpreted as having the potential to contain archeologically significant cultural materials. They were evaluated in a Phase II field investigation in order to determine their eligibility for nomination to the National Register of Historic Places (NRHP).

The two sites in the Smyrna River bridge crossing area (Sites 7K-A-110 and 7K-A-111) were found to contain scatters of late 19th century to present day material. Artifacts dating to the 20th century were most abundant. Neither site was eligible for the NRHP.

There were three sites in the Mill Creek project area. Site 7K-A-112 was a scatter of 20th century refuse. Site 7K-A-113 contained the largely intact remains of a wooden row boat dating to circa 1920-1940 along with scattered 20th

century refuse. The articulated portion of the row boat hull and associated fragments were recovered for further analysis. Site 7K-A-114 consisted mostly of scattered late 19th century to recent vintage material, but also contained an articulated skeg assemblage from the stern of wooden motorized V-bottom Work Boat dating to the early 20th century (circa 1910). Vessels of that type were important to Delaware's riverine commerce from the early 1900's until around 1950, but have now largely disappeared. The skeg assemblage hull fragment was recovered. The cultural materials remaining at Site 7K-A-114 do not merit being determined eligible for nomination to the NRHP.

Two of the three sites in Leipsic River were in the bridge crossing project area. Site 7K-C-377 was a scatter of 20th century refuse and did not contain a cultural deposit of archeological significance. Site 7K-C-378 contained a circa 1940 steel anchor of the Danforth type of a size that would have been used aboard a vessel having a length of 80 to 100 feet. It was found by itself and had apparently been deposited when this portion of Leipsic River was navigated by commercial vessels. The remainder of the site consisted of scattered 20th century refuse. Neither Site 7K-C-377 nor 7K-C-378 merit nomination for the NRHP and no further study of either site was recommended.

As part of the investigation's research design a predictive model concerning the relationship between fast land physiographic features and submerged cultural deposits had been developed. This model predicted that fast land at the three riverine bridge crossing areas would be likely to adjoin underwater cultural deposits associated with their use as landings. There were fast land features in all three of the bridge crossing areas, and it was hypothesized that they would each contain more abundant evidence of cultural activity than other portions of the river crossings.

Background information showed that much of the shoreline along Delaware's interior tidal waterways is bounded by marshlands. The distribution of known historic period sites indicated that access between upland terrain and the navigable waters of the rivers was an important consideration for the establishment of settlements. Transfers of cargo and passengers between watercraft and the shore were most easily accomplished at locations were fast land was present. These landing places were major foci of cultural activity during most of the historic period in Delaware because of the major reliance on waterborne transportation along tidal waterways.

The local emphasis on using watercraft was largely due to the greater efficiency of waterborne transport compared with the available means of terrestrial transportation over the first half of the historic period. That situation, however, began changing in favor of land transportation in the second half of the 19th century. In central Delaware, terrestrial transportation (emphasizing motor vehicles) totally replaced riverine transport during the second quarter of the 20th century.

The underwater archeological site distribution model predicted that underwater evidence of cultural activity in the bridge crossing areas would be most abundant adjacent to locations where fast land terrain was present. The model proposed that a substantial portion of fast land locations along central Delaware's navigable tidal waterways would have been used as landings during the historic period, though the intensity of use would have varied a great deal from place to place.

For example, the important settlements of Smyrna Landing and the town of Leipsic were situated at fast land features and were locations of intensive cultural activity, which would be reflected in the underwater archeological deposits associated with them. Fast land features lacking settlements would also probably be associated with underwater archeological deposits, but ones that reflected their lower levels of activity. Riverine-related activity at smaller landing settlements and local farm landings would have varied over time from fairly intensive to intermittent to none, depending on the specific circumstances. Historic period activity at uninhabited fast land terrain features is likely to have been only intermittent, or even ephemeral.

This investigation encountered underwater archeological sites at each of the fast land physiographic features in the bridge crossings. These included Site 7K-A-110 in Smyrna River, Site 7K-C-376 in Leipsic River, and Sites 7K-A-113 and 7K-A-114 in Mill Creek.

The Phase II evaluation of the submerged cultural materials at those locations documented extensive refuse deposits, though they were predominantly of 20th century vintage. These included, however, the remains of two sunken vessels and one dock. While the watercraft were both of 20th century vintage, one appeared to be nearly a century old (the V-bottom Work Boat at Site 7K-A-114) and the other was of a vernacular small craft that had not been investigated archeologically previously in Delaware (Site 7K-A-113). The dock at Site 7K-C-376 appears to be of 20th century vintage though the potential presence of an earlier component should be considered, pending further investigation.

The findings of the Phase II investigation of the three bridge crossings concluded that no cultural properties eligible for nomination to the National Register of Historic Places were present. As a consequence, no further archeological investigation of the project area was recommended prior to the proposed bridge construction.

Even though no National Register eligible sites were found to be present in the project area, the investigation of these underwater archeological properties represents an important step forward in the management of Delaware's submerged cultural resources. Perhaps more importantly, the knowledge documented in this report may prove to be useful to archeologists and nautical researchers in Delaware as well as elsewhere as a useful contribution to the field of underwater archeology.

FUTURE RESEARCH DIRECTIONS

Compared to the level of effort devoted to investigating terrestrial sites, research concerning underwater archeological materials and sites remains lilliputian. This is not so much from a lack of submerged cultural properties or the absence of effective methods for locating, investigating, and recovering them as it is from a limited appreciation for the wide distribution, abundance, and research potential of underwater archeological resources.

It is widely recognized that settlement during both the prehistoric and historic periods was often concentrated along watercourses. It comes as no surprise that numerous large and small aboriginal sites as well as a wide variety of historic period settlement, commercial, and farmstead sites are located along navigable waterways.

Shipwrecks are the category of underwater sites that is probably most widely appreciated and acknowledged among archeologists and cultural resource managers. Others categories are lesser known and often overlooked. Among these are the submerged archeological components adjoining waterfront prehistoric and historic sites. Submerged aboriginal middens, remains of prehistoric watercraft, abandoned docks and wharves, old boatyard launching ways, and underwater refuse deposits are just a few of the wide variety of other archeological site types that may exist under the water adjacent to or nearby terrestrial sites. It would be of great benefit to cultural resource management to expand the consideration of impacts to underwater archeological sites beyond merely the limited population of sunken vessels.

There are several possible future research directions that would be of substantial benefit to the development of underwater archeological studies. Three of them were of concern to this investigation. One is associated with prehistoric cultural resources and the other two are related to the historic period.

The development of methods for determining the presence or absence of prehistoric sites in submerged environments has barely begun. Because of the chronology of late pleistocene and holocene sea level rise, much of the Earth's terrain that may have been most attractive to settlement by ancient peoples is presently underwater. A small number of researchers have made limited progress towards identifying and investigating submerged prehistoric sites (see Purdy 1988; Johnson and Stright 1992). However, there are still no established efficient procedures for reliably determining the presence or absence of submerged (and possibly buried) prehistoric settlement sites along interior tidal rivers and streams, in lakes, or in coastal waters.

The effectiveness of sub-bottom sediment profiling, sediment sampling equipment, and other potentially useful tools and techniques for underwater prehistoric site survey and investigations needs to be assessed. Two important

goals of that work should be identifying the configuration and chronology of inundated and probably buried formerly subaerial topography, and developing effective means for determining the presence or absence of submerged prehistoric archeological sites.

More research attention should also be directed to identifying and evaluating non-shipwreck underwater archeological sites dating to the historic period. While sophisticated equipment and reliable procedures have long existed for finding and investigating sunken vessels, methods for locating and evaluating other types of underwater sites are much less advanced. This is especially true for work concerning intermittently submerged terrain, such as tidal mud flats.

A major aspect of the field work involved in this investigation has been termed "mud flat archeology." It is noteworthy that little attention has been focused by archeologists towards the conduct of research in wetlands and intermittently submerged terrain. Incorporating several new approaches as well as methods used in both underwater and terrestrial archeological investigations, mud flat archeology is a new frontier for research. It is one that clearly deserves more consideration. Mud flat archeology can provide access to a substantial and productive, but almost unexplored, repository of information that has the potential to be important to both history and prehistory.

Another research direction that bears more investigation is the intrasite patterning of artifacts and features associated with scattered shipwreck sites. Some work has been done concerning the relationship between environmental factors and the regional patterning of shipwreck distribution (e.g. Koski-Karell 1979, 1984). However, the processes by which the fragmented components of individual shipwrecks are distributed over underwater terrain, and the spatial and functional patterning that results, are not well understood.

The limited research into this problem has largely focused on just one class of sunken vessels, Spanish galleons (see Mathewson 1983). Marine salvors of such galleons have long been intensely interested in this problem, and have made remarkable progress in their investigations of it (see Lyon 1989). It is a research direction of substantial importance, since a great portion of archeological shipwreck sites consist of or include scattered cultural deposits.

In the vast and largely unexplored subaqueous world, there is an abundance of cultural resources as well as answers to research questions most archeologists have not even begun to fathom. Progress in underwater archeology has been less steady and resolute than terrestrial archeology, however, and there is much work to be done. Rapid and remarkable advancement is certainly possible if archeologists in the underwater field host the anchor of their self-imposed restraints and embark on a voyage to the future.