

**A GIS-BASED MODEL FOR PREDICTING THE LOCATION OF SUBMERGED  
PREHISTORIC ARCHAEOLOGICAL SITES IN NEW YORK HARBOR**

A Final Report to the Tibor T. Polgar Fellowship Program

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## ABSTRACT

The Hudson River has been the focus of human activity for millennia, from the earliest colonization by Native American peoples approximately 12,000 years ago to modern times. The archaeological resources of the estuary and surrounding lands are very rich, diverse, and have significant research potential. However, a portion of the prehistoric human record of the lower Hudson River Valley is virtually invisible using traditional archaeological methods. Sea level rise has resulted in the submergence of land which was once habitable by prehistoric peoples, especially in the area around New York Harbor and portions of the Atlantic Ocean adjacent to the Hudson Canyon.

The spatial analysis capabilities of GIS (Geographic Information Systems) are well-suited to investigating the problem of locating submerged prehistoric archaeological sites. In this study, the patterning of known terrestrial archaeological sites was used to assess underwater archaeological potential in and around New York Harbor. Computer models developed from a GIS database of terrestrial archaeological site information revealed geographical relationships, and identified a suite of landscape features (e.g., distance to fresh water, distance to lithic resources, slope, aspect, and soil type) that best characterized the location of most prehistoric sites. This suite of features, along with a consideration of site preservation factors and post-depositional processes, was then used to identify areas of high sensitivity for the presence of submerged prehistoric sites. Future work will entail the investigation of high sensitivity areas with remote sensing techniques and scuba diver inspection.

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## INTRODUCTION

The Hudson River has been the focus of human activity for millennia, from the earliest colonization by Native American peoples approximately 12,000 years ago to modern times. The archaeological resources of the estuary and surrounding lands are rich, diverse, and have significant research potential. Several authors have developed cultural historical frameworks for understanding human adaptations to the changing Hudson River landscape through time based on extensive archaeological surveys and excavations along the river's banks (Claassen 1995; Eisenberg 1978; Funk 1976; Kraft 1991; Ritchie and Funk 1973; Salwen 1975). However, a portion of the prehistoric human record of the lower Hudson River Valley is virtually invisible using traditional archaeological methods. Sea level rise has inundated portions of the continental shelf that are likely to have witnessed prehistoric occupation, especially in the New York Harbor region and areas of the Atlantic sea floor adjacent to the Hudson Canyon.

Researchers have long recognized the potential for the presence of prehistoric sites on the inner continental shelf in eastern North America (Cockrell 1980; Emery and Edwards 1966). Large expanses of the continental shelf in North America were dry during the last glacial maximum, about 20,000 years ago (Figure 1). During the Late Pleistocene and Early Holocene, water from melting glaciers caused global sea level rise, flooding portions of the continental shelf. Global seas have risen 90 to 130 meters over the last 18,000 years, drowning what was once inhabitable land and presumably countless archaeological sites. Rates of sea level rise have varied through both time and space, but slowed by 6,000 to 3,000 years ago, when shorelines were close to their current positions in eastern North America (Oldale 1986). The significance of lower sea levels for archaeological research is that models regarding prehistoric lifeways for any period prior to the establishment of the modern coastline are not complete without a consideration of the total exposed land mass.

Archaeological sites submerged by rising sea levels following the last glacial maximum may be an invaluable source of information regarding Native American

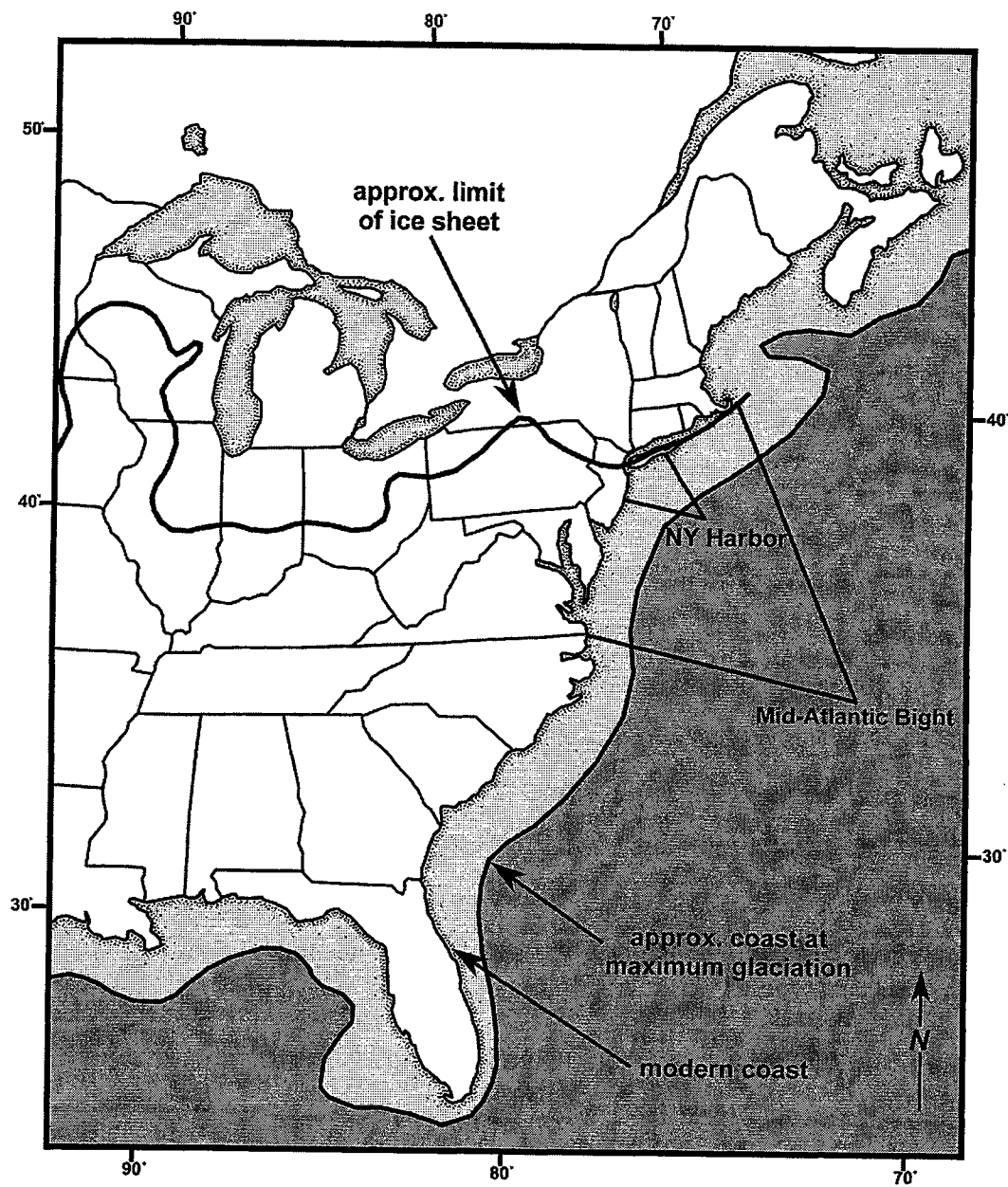


Figure 1. Location of the New York Harbor study area within the Mid-Atlantic Bight.

