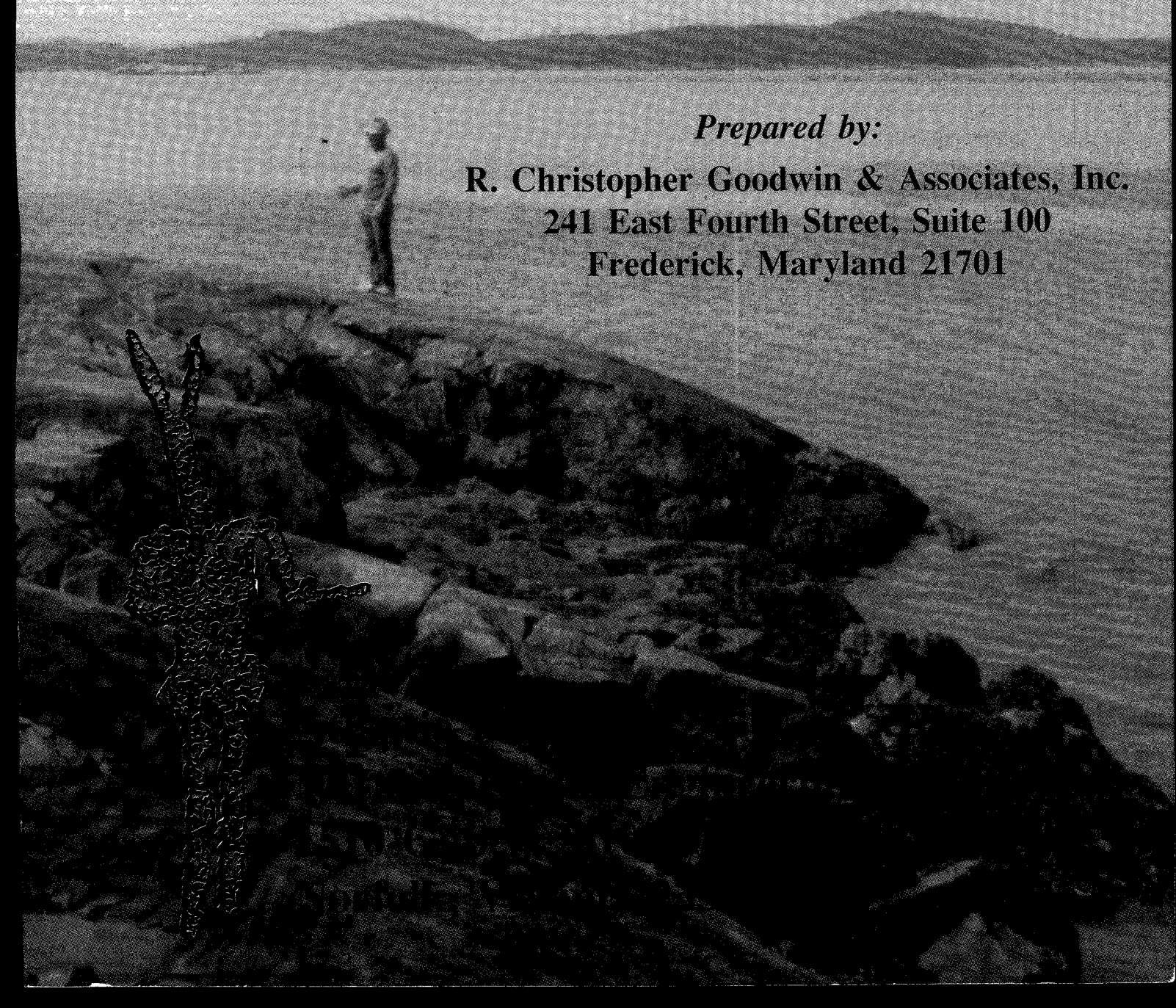
Rock Art Study On DoD Property Located in LANTOPS, EFA Chesapeake, and NORTHDIV Areas of Responsibility

Final Report



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ROCK ART STUDY ON DoD PROPERTY LOCATED IN LANTOPS, EFA CHESAPEAKE, AND NORTHDIV AREAS OF RESPONSIBILITY

FINAL REPORT

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for

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EXECUTIVE SUMMARY

This technical report presents the results of a survey of Rock Art in Areas of Responsibility for LANTDIV, CHESAPEAKE EFD, AND NORTHDIV. The study was conducted by R. Christopher Goodwin & Associates, Inc. on behalf of the Atlantic Division of the Naval Facilities Engineering Command (LANTDIV), as a component of Department of Defense (DoD) Legacy Project No. 21, Inventory of Rock Art Sites on DoD Property. The overall rock art project is designed to sensitize cultural resource managers in the DoD to the presence of rock art on installations in all regions of the United States. The study area encompassed by this component of the Rock Art project included all states from North Carolina to Maine, and from Pennsylvania and West Virginia eastward to the Atlantic coast. The Rock Art project partially fulfills cultural resource requirements imposed by the National Environmental Policy Act of 1969 (NEPA); the Archeological Resources Protection Act of 1979 (ARPA), as amended (1996); Section 110 of the National Historic Preservation Act (NHPA), as amended (1992); and Regulation 36 CFR 800, Protection of Historic Properties.

The study is divided into two major components. The main body of the study defines the general characteristics of rock art sites in the northeastern United States; provides a regional context and predictive model for rock art in the study area; analyzes potential threats to rock art sites as a result of military, civilian, or natural activities and factors; and develops recommendations for managing rock art sites on military installations, including techniques for site identification, recordation, and preservation. This portion of study serves as a basic reference for cultural resource managers on DoD installations within the study region.

The five appendices included in the study present the results of data-collection efforts and installation surveys. The tables in the first appendix summarize responses to questionnaires designed to determine the number and distribution of rock art sites for each state and for military installations within the study area. The remaining four appendices document preliminary sample surveys of five military installations: Fort Indiantown Gap, Pennsylvania; Quantico Marine Corps Base, Virginia; the Massachusetts Military Reservation (formerly Otis Air Force Base); the Naval Security Group Activity Winter Harbor, Maine; and the Naval Computer Telecommunications Station, Cutler, Maine.

The questionnaire results suggested that identification efforts for rock art sites have varied widely among the states in the study region, and that the identification of rock art on military installations has not been a priority item for cultural resource surveys. Although the sampling surveys of the five installations identified only two historic period rock art sites, areas of high potential for rock art were delineated for each installation. The results of the on-site surveys therefore provide an additional planning tool for installation cultural resource managers.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

This technical report presents the results of a survey of Rock Art in Areas of Responsibility for LANTDIV, CHESAPEAKE EFD, AND NORTHDIV. The study was conducted by R. Christopher Goodwin & Associates, Inc. on behalf of the Atlantic Division of the Naval Facilities Engineering Command (LANTDIV), as a component of Department of Defense (DoD) Legacy Project No. 21, Inventory of Rock Art Sites on DoD Property. The Rock Art project is designed to call attention to rock art on DoD installations in all regions of the United States. The study area for this component of the Rock Art project included all DoD installations in states extending from North Carolina northward to Maine, and from Pennsylvania and West Virginia eastward to the Atlantic Ocean (Figure 1).

Rock art sites are unique cultural resources that reflect prehistoric Native American belief systems. They are important to contemporary Native Americans as ceremonial sites, and to the American public as examples of the artistic expressions of the first Americans. DoD has supported and published similar regional studies on prehistoric rock art sites on military bases throughout the country (e.g., Meighan, 1993; Meighan and Trask, 1994). The Legacy Rock Art project is authorized by the National Environmental Policy Act of 1969 (NEPA); the Archeological Resources Protection Act of 1979 (ARPA), as amended (1996); the National Historic Preservation Act (NHPA), as amended (1992); and Regulation 36 CFR 800, Protection of Historic Properties.

Christopher R. Polglase, M.A., ABD, served as principal investigator for the project and supervised all aspects of the present study. Clement R. Meighan, Ph.D., principal consultant, developed the regional context and predictive model, the analyses of adverse impacts, and the recommendations for identifying and managing rock art sites on military installations. Martha R. Williams, M.A., M.Ed., supervised the field studies and authored the reports on specific installation visits.

Research Design and Objectives

The overall goal of the Legacy Rock Art Inventory is to complete an overview of rock art sites on DoD installations; to develop an inventory and identification plan for those installations where the potential for rock art sites is high; and to develop a management plan for such sites and installations that incorporates conservation, recordation, and public education programs.

The present study included the following components: (1) a record and literature search to define the characteristics of rock art sites in the northeastern United States; (2) development of a regional context and predictive model for northeastern rock art; (3) distribution of a survey to determine whether rock art sites have been recorded on military installations; (4) site visits to four military installations in the study area; (6) analysis of potential impacts to rock art sites as a result of military, civilian, or natural activity; and (7) development of management recommendations to ensure preservation and conservation of rock art sites. This study is intended to provide a reference data base and present techniques for finding, recording, and preserving rock art sites in future cultural resource management efforts on DoD installations within the study region.

Organization of the Report

Chapter I of this report describes the scope and presents the research goals of the project, and discusses the organization of the report. An generalized overview of the prehistory of the northeastern United States, the geomorphology of the study area, and a regional context on rock art are developed in Chapter II. Chapter III describes the methodology utilized to conduct the study, and Chapter IV presents a summary discussion of the results of the individual installation survey. Chapter V discusses the specialized nature of threats to rock art sites from both human and natural forces, and it outlines general recommendations for the management and conservation of rock art sites, with particular reference to sites potentially impacted by military activities.

Five appendices follow the main body of the regional report. Appendix A presents in tabular form the results of the preliminary survey of cultural resource managers of the major military commands (MACOMs) and the State Historic Preservation Offices (SHPOs) within the region. Individual reports on visits to selected military installations within the project area are contained in Appendices II through V.

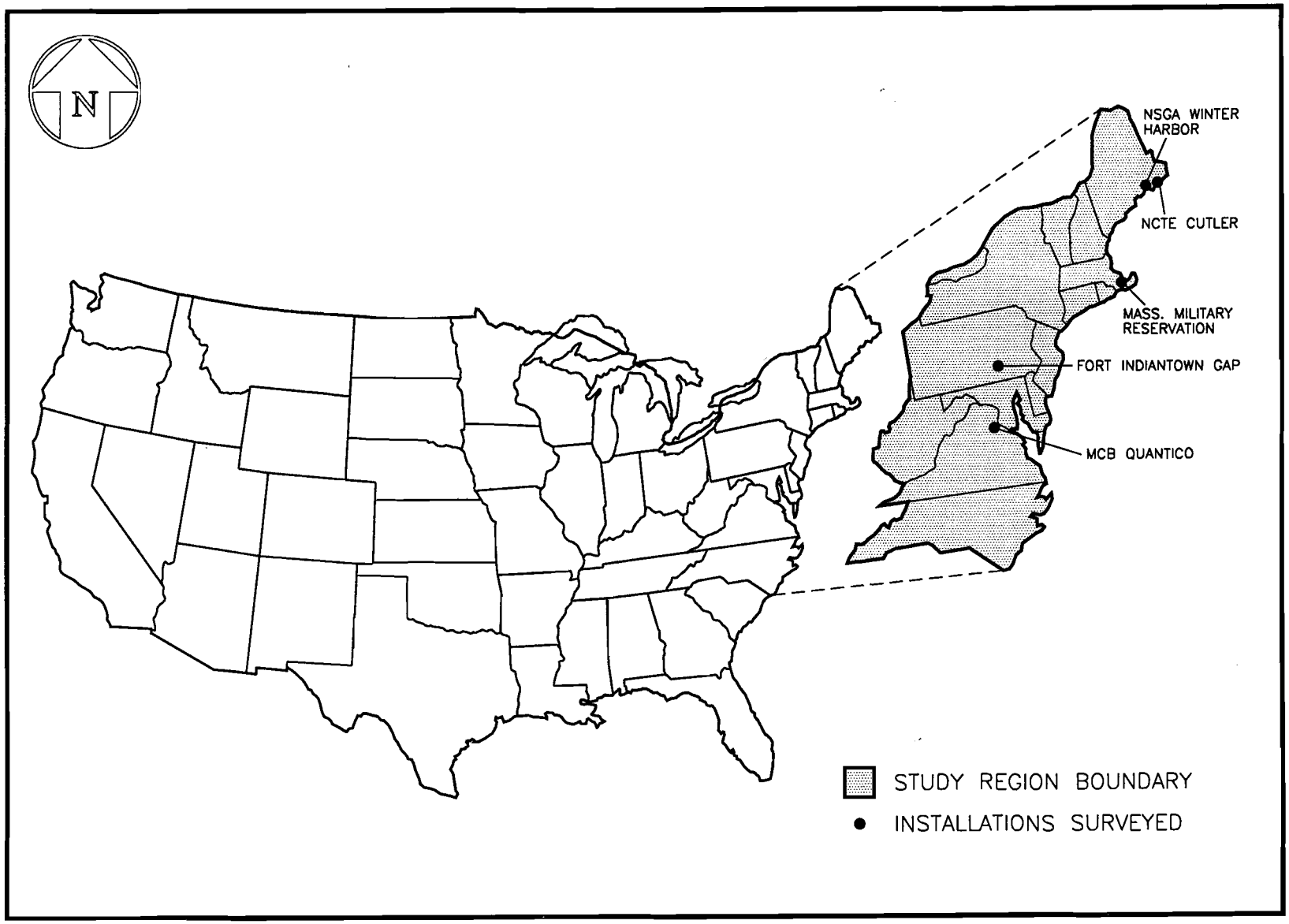

Figure 1. Map of the United States, depicting the study area included in this project and identifying the five installations surveyed during the project.

CHAPTER II

NATURAL AND CULTURAL SETTING

Regional Topography and Geomorphology

The geography of the Eastern seaboard states is dominated by three major physiographic provinces: the Atlantic Coastal Plain; the Appalachian Mountains; and, between these two provinces, an intermediate upland zone known as the Piedmont Plateau. The Appalachian Mountains are a series of southwest/northeast trending ridges of considerable complexity, characterized by extensive faulting and relatively narrow zones of varying types of rocks. The mountain ridges alternate with narrow valleys where bedrock is buried by alluvial deposits (United States Geological Survey 1974). Bedrock deposits are composed of Ordovician volcanics and many eugeosynclinal deposits of Mesozoic and Cretaceous age. Mississippian Carboniferous systems, including limestones, shales, and other deposits, also are present. For example, at the very important Meadowcroft Rockshelter site in western Pennsylvania, the cave itself is in sandstone, but the area also includes shale, quartz sandstone, limestone and coal (Carlisle and Adovasio 1982). What this geological diversity means in terms of locating aboriginal rock art sites is that valley margins often have exposed rock faces, much of which is of poor quality for executing or preserving rock art, but cliff overhangs and cave shelters where rock art may be present also occur.

The Atlantic Coastal Plain is composed of extensive Pleistocene marine deposits and alluvium that is being submerged by rising sea levels along the coast. At present, the offshore continental shelf varies in width from hundreds of miles in the Cape Cod region to approximately 100 mi off New York state, and as little as 40-50 mi along the barrier islands in North Carolina. The inundation of this "drowned shoreline" began during the Pleistocene period and continues to the present day. The process has destroyed or inundated numerous Atlantic seaboard "early man" sites that are more than 6,000 years old; however, some major sites and artifacts associated with early hunters of the Clovis tradition have been found in inland locations.

On land, the present coastal plain includes extensive deposits of Quaternary alluvium extending in a band some 40-50 mi wide from southern New Jersey through South Carolina. Bordering this band on the west is a zone of Tertiary (Miocene) marine deposits. North of New Jersey, these zones are very small and spotty and no significant coastal plain is present. From Long Island northward to Maine, coastal deposits are glacial in origin, and represent tills that were left by receding ice sheets at the end of the last glacial episode. Frequently, these tills contain enormous boulders on which rock art sites may be found; alternatively, glacial scouring and tidal erosion has exposed large expanses of bedrock that also were utilized for application of rock art. In general, however, the coastal regions of the northeastern United States are a poor place to search for rock art, except in Maine, where granitic rocks have been exposed by the erosion of the overlying glacial deposits.

The Piedmont region is a gently rolling upland, the eastern edge of which incorporates an important topographic feature: the Fall Line. The Fall Line represents the abrupt boundary between the Piedmont uplands and the coastal plain. River systems originating in the Appalachian Highlands descend through narrow mountain and Piedmont valleys to plunge abruptly over this break, which is recognized by major falls or rapid systems. Because the scouring action of these rivers frequently exposes underlying bedrock at these points, Fall Line zones often are loci of major concentrations of rock art.

The region's complex geology renders predictive modeling difficult. Large-scale geological maps are of little use in predicting probable locations of rock art sites; even local geological maps rarely identify the isolated outcrops and boulders that often were used for the production of rock art. Indeed, it is just such isolated loci that frequently were selected, perhaps because they stood out from the surrounding landscape.

The specific geological formations at the DoD installations examined during the field surveys performed as part of this project are presented separately in the separate appendices (B-E) of this report.

General Prehistoric Context for the Northeastern United States

A general text on North American archeology (Martin, Quimby and Collier 1947) devoted only 190 pages to summarizing the archeology of the eastern United States; of this only about 20 pages were concerned with the Northeast. This early regional bias has been rectified by subsequent works such as Ritchie's (1969) study of the archeology of New York State and the Archeological Society of Virginia's four-part study (Wittkofski and Reinhart 1989; Reinhart and Hodges 1990, 1991, 1992) that represent comprehensive overviews of prehistoric archeological sequences and trends for specific regions of the overall study area. However, these texts have paid little or no attention to rock art, the study of which has been left to specialists like Swauger (n.d.) and others. Yet because rock art frequently fits into the general archeological context, some understanding of basic prehistoric sequence is needed.

In general, students of Eastern North America prehistory recognize five temporal categories that serve as an organizational framework that describe cultural and technological trends in prehistory (Table 1). Exactly when the earliest, or Paleo-Indian, stage commenced still is the subject of considerable debate; in the East, a date of approximately 10,000 B.C., representing the end of the last glaciation, often is accepted. Paleo-Indian occupations are represented by a suite of stone tools, particularly by large, well-crafted, spear points in the Clovis and Folsom traditions that in the Mid-West have been found in association with the remains of extinct animals such as mammoth and bison (Deetz 1967:130). Major Paleo-Indian sites within or near the project study area include Debert in Nova Scotia; Bull Brook in Massachusetts; Thunderbird and Williamson in Virginia; Shawnee-Minisink in eastern Pennsylvania; and Meadowcroft Rockshelter in western Pennsylvania.

Following these early beginnings, there was a very long hunter-gatherer period known as the Archaic, during which prehistoric groups adapted to discrete environmental niches that developed during the gradual climatic warming associated with the emerging Holocene. Rising sea levels resulted in progressive inundation of coastal plains and stream valleys, producing the major river systems and tidal estuaries characteristic of the region today. Seasonally adjusted hunting and foraging within regional resource catchment areas are thought to have constituted the subsistence base during this period. In coastal areas, shellfish collecting emerged as a major subsistence technique (Deetz 1967:131).

The Woodland period, which generally is regarded as beginning ca. 1,000 B. C., represents the stage of cultural development achieved by most Northeastern Native American groups at the time of European contact. In general, this period was marked by the appearance of ceramic technology and, after ca. 900 A.D., by the adoption of plant horticulture and agriculture based on the cultivation of maize, beans, and squash (Deetz 1967:131), supplemented by hunting, fishing, and resource gathering activities. The accumulation of surplus resources through plant domestication permitted adoption of a more sedentary lifestyle that in turn allowed the formation of large semi-permanent and permanent villages and hamlets.

TABLE 1. CULTURAL SEQUENCE FOR EASTERN UNITED STATES PREHISTORY

Major Cultural Assemblage	Chronology	Cultural Characteristics
Paleo-Indian	? - 8,000 B. C.	Fluted points; presumed big-game hunting
Archaic	8,000-1,000 B.C.	
Early	8,000-6,000 B.C.	Hunter/gatherer; early point types, limited bone artifacts, no shell middens
Middle	6,000-4,000 B.C.	Hunter/gatherer; grooved axes and bannerstones; dogs; bone tools, including atlatl spurs
Late	4,000-1,000 B.C	Larger populations; shell middens; trade in raw materials and manufactured items; fiber-tempered pottery (S.E.)
Woodland	1,000 B.C.-A.D. 500 (later in Northeast)	Introduction of plant agriculture and ceramics
Hopewell/Adena/ Mississippean	A.D. 500-1000	Very limited in study area; large-scale agriculture; burial and temple mounds
Protohistoric/ Historic	After A.D. 1500	Early European colonization of East Coast

Adapted from Griffin (1952, 1978); Jennings and Madsen (1986); Taylor and Meighan (1978), and Willey (1966)

The occupants of the Southeast and the Mississippi and Ohio river drainage basins subsequently developed more elaborate cultures that featured large-scale architectural features, large cities, and evidence of a highly organized and stratified society. Some evidence of contact between these Hopewell, Adena, and Mississippean cultures of the Southeast and Midwest and the Woodland cultures of the Eastern seaboard has been reported in portions of the study area, including western Pennsylvania, Virginia, and North Carolina; New York; and the Delmarva Peninsula.

European contact, which may have occurred as early as 1,000 A.D. in the New England area, ushered in the Protohistoric or Contact period. Sites of this period contain artifactual evidence of cultural interaction, most notably the presence of trade goods of European manufacture.

However, while this brief review of East Coast archeology is helpful in summarizing current knowledge and providing context, it is less helpful with regard to rock art. At present, there is no evidence linking Eastern rock art sites with cultures more ancient than the last few hundred years. Recent dating studies (Dorn and Whitley 1983) in the western United States have revealed that some rock art is 6,000 years old or older, but nothing of this kind is known in the East. Present scholarship links most Eastern rock art to the relatively recent past, which may be accurate, given the greater potential for deterioration of rock art in the East. The deleterious effects of the increased moisture and heavier vegetation of the East Coast undoubtedly have eroded many very ancient elements. Swauger (n.d.), for example, recognized this point by documenting both aboriginal and non-aboriginal rock art of the historic period. While not ancient, historic period rock art is a valuable archeological resource, since at least some of it is linked to historic Indian tribes and their traditional activities.

Rock Art in the Northeastern United States

Previous Investigations

Until recently, professional archeologists devoted minimal attention to rock art, in part because their interest lay primarily in excavating sites. As a result, identification and recordation of rock art had been left largely to non-professionals, and no true body of scholarly techniques for finding, recording, and analyzing rock art sites had been developed. An inquiry about rock art sites within the study area treated in this report that were distributed to the State Historic Preservation Offices (SHPOs)(Appendix A) yielded mention of only 62 sites, fewer than half the number considered in Swauger's study (Table 2). Some state archives contain records for less than 90 per cent of the known rock art sites in the state.

This paucity of data reflects not only the lack of professional interest referred to above, but also state record-keeping practices. Few state archives separate rock art sites from other types of archeological manifestations. Archeological sites recorded in state site files may or may not have associated rock art, and rock art loci that lack other archeological components also may not be mentioned in the records. None of the SHPOs queried during the survey mentioned any rock art sites on DoD properties, but since state records are incomplete, they cannot be considered definitive.

The true pioneers in overall surveys of East Coast rock art include Mallery (1893), Grant (1967), and Wellmann (1979). Because these authors dealt with rock art for the entire United States, their summary of East Coast rock art is somewhat condensed. However, their seminal studies are valuable primary sources; Wellmann in particular is useful because the detailed bibliography in his massive compilation lists over 1000 references. Mallery (1893) discussed and

TABLE 2. RECORDED ROCK ART SITES IN THE NORTHEASTERN UNITED STATES[1,2]

State	Aboriginal	Euro-American	Uncertain	Natural	Questionable	Total
CT	0	4	0	0	0	4
MA	3	6	0	1	4	14
MD	2	1	0	1	0	4
ME	5	9	1	6	0	21
NH	0	4	1	0	0	5
NJ	15	1	2	0	0	18
NY	5	4	1	1	0	12
PA	27	37	13	8	0	85
RI	5	0	11	1	0	17
VA	3	0	0	0	0	3
VT	3	1	0	0	0	4
WV	33	5	0	0	0	38
Total	102	72	29	18	4	225

[1] Data from Swauger (1994:2).

[2] North Carolina has two recorded rock art sites (Rowland 1995, personal communication)

illustrated several East Coast sites, including in Maine, Massachusetts, New York, Maryland, Pennsylvania, and West Virginia. The New York site, an historic petroglyph which depicts an Indian holding a rifle, has been destroyed, but all of the others have been reported in more detail by recent writers such as Swauger.

While Mallery reported only a dozen Eastern rock art sites a century ago, Swauger (n.d., 1993, 1994), who generously shared his unpublished data for this report, lists about 150 (Table 2). His bibliography (n.d.) is the most comprehensive for East Coast rock art, and it will serve as the standard reference when his work is published. He summarized his findings from over 40 years of research in a 1994 paper listing "Petroglyphs and Pictographs in Fourteen Eastern States."

Swauger's site table includes the coastal states from Maine to West Virginia, as well as Ohio, which was not considered in the present study; it does not include two recorded sites in North Carolina (Rowland-White personal communication 1995). No rock art sites have been recorded in Delaware or in the District of Columbia; Pennsylvania and West Virginia have the most sites per state. As with other categories of archeological remains, Swauger's total no doubt represents only a fraction of the sites that exist. Many more remain to be discovered and documented.

A number of Euro-American sites, generally not considered as rock art because their derivation is not aboriginal, also are noted in Table 2. These are not merely graffiti or visitors' initials; they include panels of masonic symbols, various cryptic "inscriptions," and extensive and elaborate pictorial representations of various kinds. Since the East Coast was settled by Europeans long before the establishment of the United States, there is a long history during which rock art was produced by colonists and settlers. Such sites often have intrinsic historical value and should be considered as rock art resources despite their non-aboriginal origin. The motives and identities of the people who produced this art on rocks and in caves are unknown, although some non-professionals have sought to link them with visits by ancient Egyptians, Phoenicians, Hebrews, and other Old World peoples.

Swauger's table also includes a few questionable sites and several of uncertain origin. The latter are marked with simple symbols that could have been produced by Indians or by Euro-American settlers. These motifs present difficulties in classification, because ancient native sites often were embellished by subsequent visitors who either added details to the existing rock art or sometimes produced additional artistic efforts executed in the style of the original rock art. At least some of these "uncertain origin" locations undoubtedly include aboriginal rock art with additions from Euro-American settlers. The determination of the origins of such mixed sites depends upon development of dating methods that will enable a determination of when individual rock art elements were inscribed. At present, no such dating method is available, and the development of regional rock art chronologies remains a central problem common to all rock art studies. A number of dating methods have been tried and others are under study.

Swauger also made a point of documenting sites that appeared to contain rock art but that proved on closer examination to be natural in origin. While the natural provenance of such loci might appear obvious, in fact various cracks, fissures, and weathering patterns often resemble the simpler geometric elements of much rock art. Some of these natural locations have been recorded as bona fide sites by individuals who interpreted them as products of past Indian activity. A few have been identified imaginatively as "Ogham" inscriptions left by ancient Celtic explorers, but such interpretation is viewed as fanciful by those familiar with ancient Ogham writing.

Characteristics of Eastern Rock Art

Figures 2-4 depict "typical" rock art of the Eastern states; similar motifs are found as far west as Ohio and north into Canada. Figures 5 and 6 portray sample assemblages that were recorded during the last century. The number of individual drawings or rock art elements per site can vary from one or two to several hundred. Most Northeastern rock art is in the form of petroglyphs, created by pecking, incising or pounding grooves into rock surfaces with a hammerstone or other tool. The tools used for producing such petroglyphs, while commonly found in the western United States, are rare to absent in the East. Because many of these tools were just handy rocks, they have been lost or dispersed.

Rock Art Motifs. The term "style" can connote a wide variety of definitions; however, in dealing with rock art, it is most practical to define styles as "the accustomed way of doing things at a particular time and place"--in this case the accustomed way of making marks on the rocks. Since human behavior is patterned and often imitative or repetitive, there are marked regional differences in the styles of rock art produced in various time periods and regions of North America. Recognition of styles is important in assessing time differences and identifying the cultural groups who produced it. "Style" in rock art involves two major choices by the artist(s): the selection of subject matter, and selection of technique.

An artist confronted with an unmarked surface can make any kind of mark or picture he chooses. In fact, however, most artists are rarely so original that they produce marks that differ entirely from what others have done. Rather, these artists retained a set of general and widely-shared notions of art and its representation; "new" art therefore was likely to be similar to art that already was known in the culture and during the time period of each individual artist. An individual artist occasionally will produce motifs that deviate from the general cultural pattern; for example, one style of painted rock art in southern California has been interpreted as the work of a single artist who produced all known sites of that style. In the East, Figure 5A, which represents sandhill cranes in a mating dance, conforms to general styles in the region, but because it is more complex artistically, it may represent the product of an individualistic artist within the regional culture. When such individual productions subsequently were copied widely, they formed the basis of a new style that eventually became the new "accustomed way" of doing things.

It is not only selection of subject matter, but also the method by which the pictorial elements are executed, that delineates style areas. For example, while the rock art elements in nearly every area of North America include representations of humans, animals, and birds, the style of these representations is very different from region to region. In central Baja California one style shows representations in life size or bigger, painted in red and black, and with some effort at realism, although facial features are never indicated on the human figures. East Coast sites incorporate similar subject matter, but the figures are smaller, mostly pecked into the surface of the rock, and composed primarily of simple outline figures. Eastern anthropomorphic glyphs often show eyes and mouths, and both humans and animals may show internal organs and "heart lines." These two styles clearly were produced by different people for different reasons; it also is clear that the artists had no influence on one another.

Not all rock art is representational and pictorial. In some areas the great majority of the rock art is entirely geometric and composed of lines, circles, dots, and similar marks with no pictorial content at all. Needless to say, styles which lack any pictorial material are among the most difficult for modern scholars to interpret. Without ethnographic evidence, it is generally impossible to assign meaning to such rock art.

Style also is heavily affected by the technique used by the artists. The major distinctions here are between elements which are worked into the surface of the rock by chipping or

pounding, and those which are painted on the surface. Many variations are possible. For example, chipped rock art (petroglyphs) is commonly done by making shallow grooves in the rock. In some cases chipped rock art is executed using wide grooves over an inch deep; in exceptional cases, as on Easter Island, the design element may be produced by removing the background matrix and leaving the image as low relief. Carried far enough, such a technique may extend to shaping the rock into a piece of sculpture, as often is seen with small portable items; however, such examples are rare in aboriginal rock art. So far, this level of intensity in workmanship is absent on hunter-gatherer sites of the United States; however, North American artists commonly embellished the natural shape of the rock to give the impression of a three-dimensional artistic representation.

The artists of a group selected both their subject matter and technique from a wide range of possibilities. Individual and cultural choices define "styles" and allow recognition of regional and temporal variations in rock art production. In well studied areas, the evolution of styles can sometimes be traced, but for most of North America this is a task for the future because the present data base is insufficient. It also appears that some artists in the past used more than one rock art style at the same time, and they may have reserved certain styles for particular purposes. Such considerations create real barriers for the researcher who wishes to arrange styles in chronological order.

Interpreting Rock Art Sites. Understanding the meaning of rock art symbols is a difficult task; in fact, some scholars have proclaimed that it is impossible and should not be attempted. Interpretation requires determining what was in the mind of the artist. Since the producers of the rock art are long dead and were members of a very different culture, it is unrealistic to assume that any researcher ever can understand their mental processes entirely. Even contemporary native spokesmen sometimes offer superficial and fallacious interpretations of ancient rock art about which they know no more than other contemporary observers. Therefore, any discussion about deciphering the meaning of rock art must be prefaced with the caveat that efforts at interpretation almost always are subject to alternative explanations.

Despite such cautions, efforts to advance scholarly understanding should attempt to provide reasonable explanations of the pictures and symbols found in rock art. Rock art designs were not meaningless or random; they certainly served some purpose, both in the minds of the artist and for the people who originally viewed the work. The bottom line is that rock art designs represent the creative expression of the personal vision of an individual artist.

Methods of Documentation. The types of available documentation and the nature of the rock art itself determine the degree of understanding that can be attained. Documentation of rock art can be obtained from several sources. One method frequently employed to gain insights into the meaning of rock art is the study of recorded Native American mythology and folklore, in an effort to recognize in pictorial rock art traditional myths or tales that were widespread in ancient cultures. This approach emphasizes not the individual elements of the rock art, but rather the "scenes" and assemblages formed by an aggregation of elements that appear to be linked in some sort of coherent pattern. Such efforts have been used most effectively in areas where native cultures have survived to the present (Morwood and Hobbs 1992). However, critics point out correctly that these studies are often entirely speculative and that the interpretations cannot be proved scientifically. A major difficulty in seeking to link rock art with recorded traditional tales lies in the fact that most rock art is schematic and very simple, and it generally does not include sufficient pictorial detail to permit recognition of specific characters or incidents.

Still, it is possible to obtain "survival ethnography" in many areas, including parts of Mexico, the southwestern United States, and Canada. Ethnographic data can be obtained from informants who do not themselves produce rock art, but who were told about it by their elders.

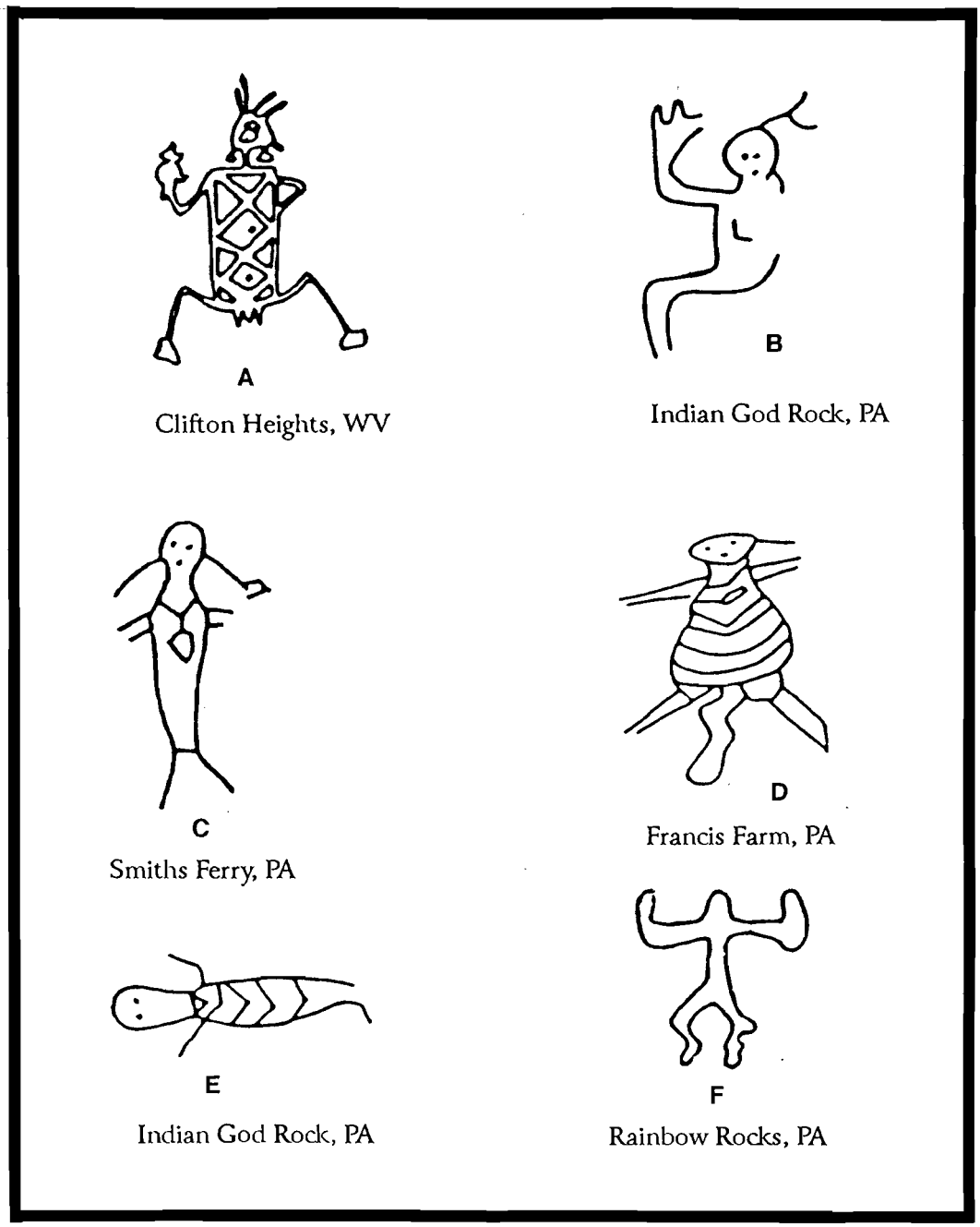

Figure 2. Representative anthropomorphic rock art elements from northeastern sites (after Swauger n.d.)

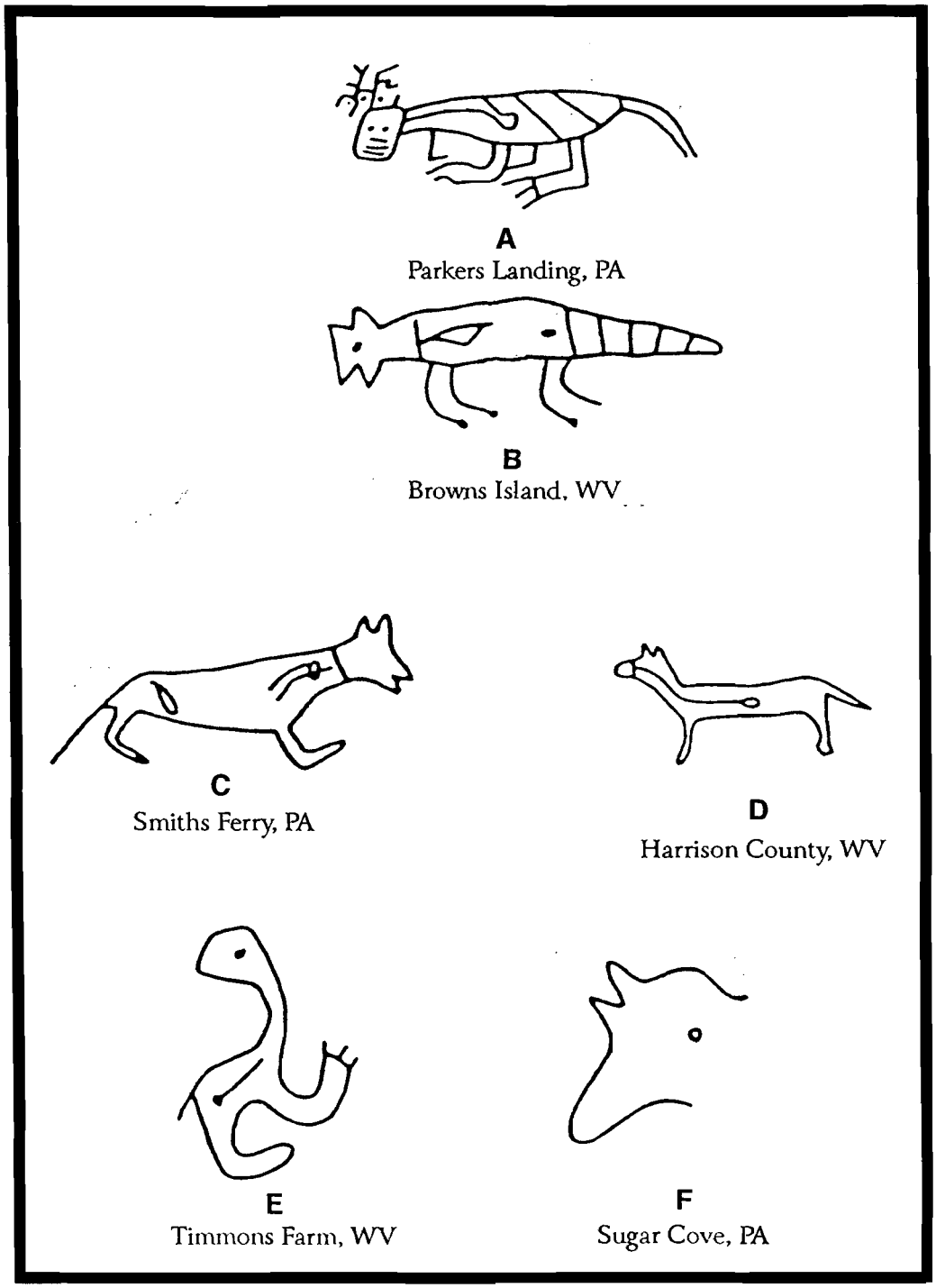

Figure 3. Representative animal rock art elements from northeastern sites (after Swauger n.d.)

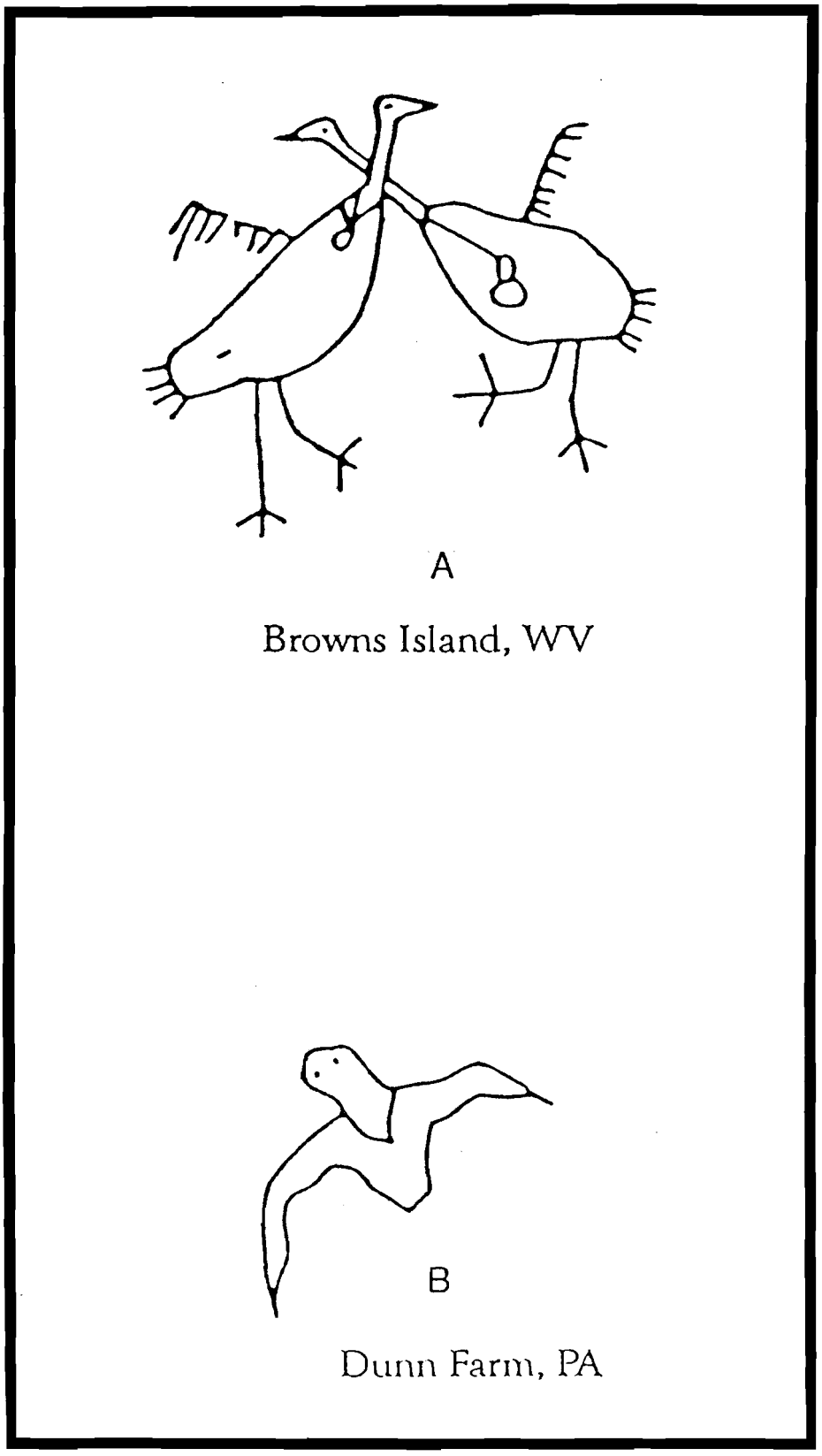

Figure 4. Representative bird elements from northeastern sites (after Swauger n.d.)

Figure 5. Rock art panel depicting animals and a possible hunting scene at Machiasport, Maine, as published by Mallery (1893:Plate XII).

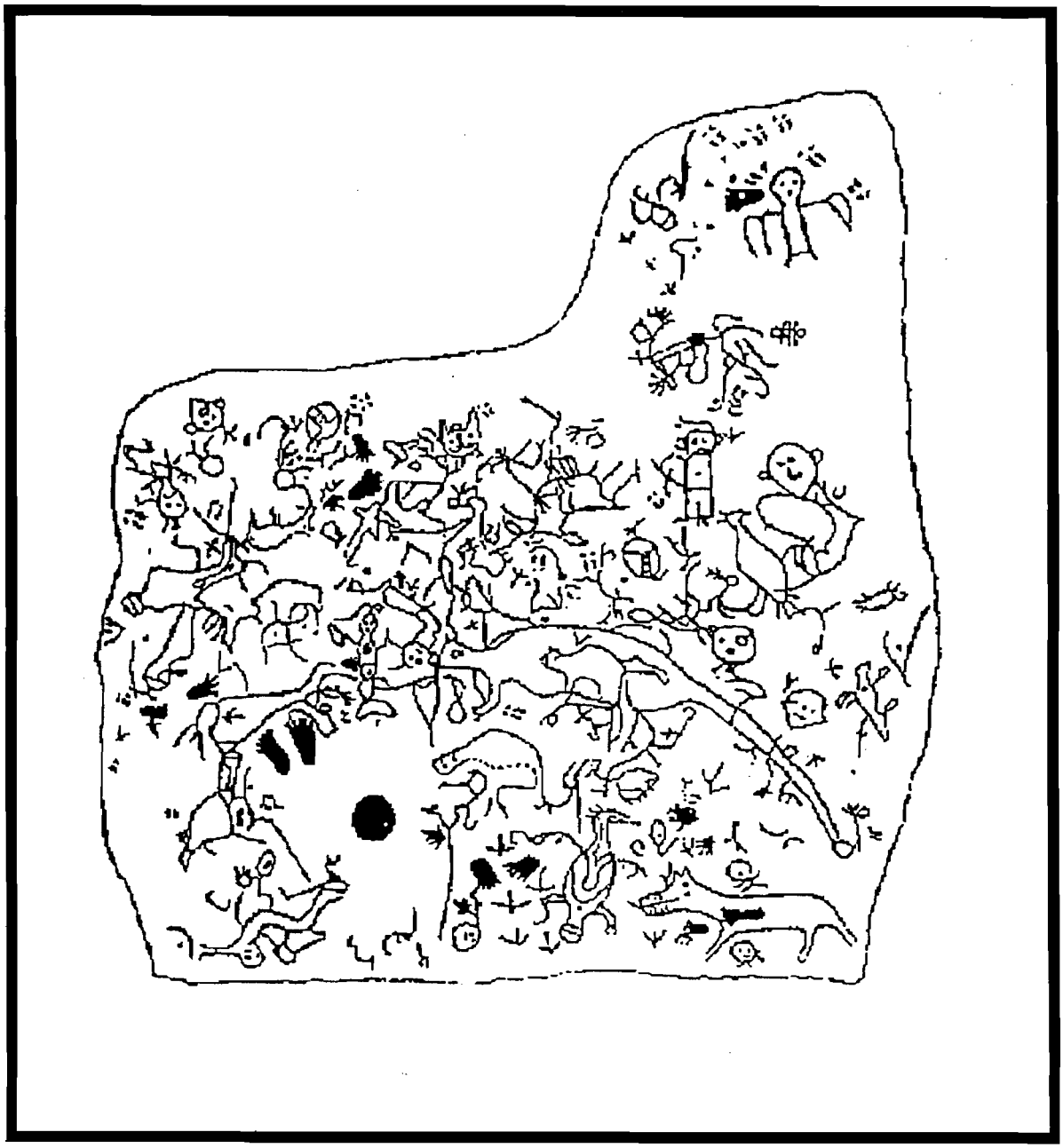

Figure 6. Panel from the Hillsboro, Pennsylvania, rock art site (after Mallery, 1893), showing superimposition of geometric and pictorial figures found on many rock art sites.

In areas where rock art no longer is executed, there may be documentary accounts that explain the meaning and function of different types of older rock art, such as Hopi clan identifiers, the rock art associated with puberty ceremonies in southern California, or the widespread "cupule" boulders (rocks covered with small drilled pits) of California. In such cases, documentary accounts can provide a window into the minds of the artists and thus facilitate site interpretation.

In the eastern United States, the recorded ethnography, mythology, and folklore of the Indians provide information on the belief systems of Eastern tribes, and hence clues for understanding the pictorial images in their rock art. The only contemporary ethnographic study devoted explicitly to obtaining information from Native American informants about rock art in the East was conducted by Conway and Conway (1990), who interviewed descendants of individuals who had produced rock art in eastern Canada. These descendants were able to offer some information about the artists and the meanings of the rock art at the Agawa Site on Lake Superior in southern Ontario. The site includes several portrayals of men on horseback, and numerous pictures of men in canoes; it is partly historical and related to conflicts between the Ojibway and the Iroquois. Unlike much of the rock art of the northeast, where petroglyphs are the rule, the Agawa site figures are pictographs painted in red ocher.

Although the Agawa site lies outside of the study area for this project and utilizes a different technique, it is nonetheless relevant. The aboriginal groups that produced it were Algonkian speakers, as were many northeastern tribes, and it includes portrayals of mythical animals, a general motif that also occurs along the East Coast (Figure 2). Shamanic beliefs related to rock art persisted in the Great Lakes area much later than they did along the eastern seaboard. Both Mallery (1893) and Schoolcraft, who first recorded the Agawa Site in the 1850s, noted the persistence of native beliefs in the Great Lakes region. Only remnants of the old belief system have survived into the present day, but these can contribute to understanding who rendered the rock art images and why.

Problems in Rock Art Interpretation. Several cautions are, however, in order. Not every contemporary descendant of early Native Americans is a reliable informant about ancient rock art, nor is everything written about rock art by early travellers and observers reliable. When these early explorers encountered examples of early aboriginal rock art, they often crafted entirely new interpretations that had nothing to do with the meaning intended by the original artists, or they utilized rock art sites for purposes other than those originally intended. Moreover, knowledge of the general purpose of different kinds of rock art sites does not provide data about the meaning of specific artistic elements that may be present; only a limited number of a site's specific drawings or elements can be interpreted, even under optimal conditions. Some ascribed meanings will remain speculative, while others are convincing because of the historic and cultural evidence available.

Nonetheless, ethnographic and historical data sources, however limited, help to eliminate fanciful and imaginary interpretations. They also can serve to place rock art into a scholarly, unbiased, meaningful cultural context, although understanding why rock art was done does not explain individual elements of the art nor provide a "reading" of the symbols that may be present. It generally is easier to understand why the art was done than it is to interpret the individual marks and pictures at a site, and it is unrealistic to expect that we will ever be able to decipher in detail the thousands of elements present in rock art sites.

The intent of rock art sometimes eludes researchers. Although some rock art undoubtedly was sacred or related to shamanic or religious beliefs, a considerable amount was not--at least not in the sense that it was intended to be preserved as a place of worship. In fact, rock art elements that contemporary scholars might view as permanent may in fact have been intended to be temporary. Campbell Grant, one of the leading scholars of American rock art, once reported

a conversation he had with an Indian, who commented: "You white people always want to preserve everything, [but] these things were meant to pass away." His perception was that rock art had served its purpose and no longer had any value.

The use of rock art elements as symbols is a major obstacle to interpretation. Rock art motifs often carried multiple levels of meaning; recognizing what a picture represents does not necessarily equate with recognizing its meaning. To its maker, a glyph of a mountain sheep might have represented not merely a mountain sheep in nature, but a clan or totemic symbol, the commemoration of a ceremony, a prayer to find a mountain sheep, a reference to a body of myth and folklore, or even a reference to masculine or feminine sexual characteristics. It is likely that many of the animals depicted in eastern rock art, including turtles, birds, fish, and various quadrupeds, also represent clan symbols rather than simply pictures of animals in nature.

Interpreting rock art composed of squiggles, lines, dots, and geometric figures is even more difficult. Non-representational motifs are very common; on some sites, they comprise the totality of what is there. While the meaning of the activities that produced the overall site can be inferred, discerning the "meaning" of their individual geometric elements probably is impossible. "Cupule" rock art, which consists only of small pits in the rock, illustrates this point. These sites have no representational motifs, but scholars really have quite a good idea of what motivated this "art," both on the individual and the more general cultural level.

In conclusion, interpretations of rock art must be supported by evidence and reasoning. While a certain amount of reasonable speculation is inevitable, serious researchers must avoid the great body of pseudo-scientific literature about rock art that makes superficial comparisons or that leaps to conclusions based on the mind-set of an observer who is bound by non-empirical romantic or exotic beliefs. As with all scholarly or scientific explanations, the line of reasoning that was employed to arrive at conclusions about the meaning of rock art should be stated explicitly, so that other scholars can evaluate the argument and judge accordingly.

The Significance of Rock Art in Contemporary America

Perhaps most importantly, prehistoric rock art sites still hold varying degrees of significance for the descendants of prehistoric cultural groups and for Native Americans in particular. In the United States, although the tradition of making rock art is largely gone, there remains in some areas a strong identification with rock art locations and even a "use" of such sites by contemporary Indians. Those who still produce rock art and who maintain legendary connections to rock art sites derive significant benefits from visiting locations that are linked to native traditions and value systems. Rock art sites also may be incorporated into contemporary rituals or utilized to teach traditions and values to the young. For example, the Zuni of the Southwest have expressed a strong interest in preserving and understanding the rock art sites in their territory (Young, 1992). In Nevada, some contemporary Indians still make offerings of money at one rock art site, placing their contributions in the cracks and crevices of the rock. Whether or not the perception and understanding of these sites are similar to those intended by prehistoric artists, the fact is that each site has a particular and important meaning to a contemporary Native American group.

Even where there is no formal activity at rock art sites and no living person is able to "interpret" the rock art, rock art often is recognized as the work of ancient ancestors and respected accordingly. In fact, some spokesmen for Native American views believe these sites should not be visited, looked at, photographed, or recorded by non-Indians, and indeed that it is dangerous (spiritually) to be involved with such activities. In some cases, this attitude has generated political and even legal action against land managers who have rock art sites in their jurisdiction.

Ancient rock art sites also have proven to have practical political significance as evidence in land claims cases. Recognition of traditional tribal symbols in rock art sites is evidence that the people were in the area of the rock art at some time in the past. Although it is difficult to prove cultural affiliation, except in those few areas where ancient rock art symbols still are known and used by contemporary people (e. g., the Hopi of the Southwest); in some cases, personal and tribal rivalries apparently have led to the obliteration of other people's rock art.

The broader significance of rock art derives from two considerations. First, particularly in areas where rock art is no longer being produced, ancient rock art sites form an important component of the nation's cultural heritage. In terms of its scientific value, rock art provides a body of data that illuminates the history of past peoples. The intrinsic scientific and public value of rock art is recognized by Federal and state laws and regulations governing cultural resources. These laws provide the legal basis for finding, recording, and preserving rock art sites, just as with other archeological and historical properties. In regions where rock art sites are less numerous, as in the eastern United States, the few existing sites take on even greater significance. Particular attention must be paid to identifying such resources and including them in cultural resource management programs.

Rock art sites and motifs also have been recognized for their aesthetic significance. Non-aboriginal people, such as those of "New Age" persuasion, also have eagerly adopted rock art elements and other symbols of native culture as part of their own mystic and spiritual interests. Textbooks, publications, and souvenir items (cups, T-shirts, and replicas) depicting rock art designs are being sold and collected. Books on rock art, including scientific and technical volumes that present and analyze rock art, have enjoyed considerable popularity.

Finally, the recent trench in "ecological tourism" has resulted in increased visitation to publicly accessible rock art sites, thereby enhancing their indirect commercial value. Because many people like to visit rock art sites and view the artistic works of ancient peoples, they will travel a long way and spend tourist dollars in this activity; for local merchants, such tourism is attractive. If the sites are on nearby military bases, considerable demand may develop from civilians who want access to visit the sites, take pictures, and enjoy picnics or other tourist activities. This is particularly true for sites which are extensively published. At the China Lake Naval Air Missile Test Center, for example, the base has arranged numerous tours of the site through the local Maturango Museum.

CHAPTER III

RESEARCH METHODS

The goals of DoD's Legacy Rock Art Inventory are to complete an overview of rock art sites on DoD installations; to develop an inventory and identification plan for those installations where the potential for rock art sites is high; and to develop a management plan that incorporates conservation, recordation, and public education programs for such sites and installations. The present study sought to achieve these objectives with specific reference to military installations within the northeastern United States, defined as including all states north of South Carolina and east of the Appalachian Mountains (Figure 1).

The project required the development of a suitable natural and cultural context and a predictive model for rock art within the study area; generation of management recommendations for preserving rock art sites exposed to the natural and cultural environmental conditions found within the study area; and on-site investigation of at least four military installations representing each of the service branches. These objectives were achieved through a combination of archival research, including distribution of two survey questionnaires, and systematic field studies.

Archival Methods

Background information on the general prehistoric culture sequences, the geomorphology of the study area, and specifically about rock art of the study area was collected at a variety of repositories. Repositories utilized during this phase of the investigation included the United States Geological Survey in Reston, Virginia; the Library of Congress in Washington D. C.; and the Rock Art Archives at the University of California at Los Angeles (UCLA), which contain all the key references on rock art and a substantial collection of unpublished material as well. Key materials bearing on the nature and distribution of rock art sites in the Northeast also were provided by Dr. James Swauger, Professor Emeritus of Carnagie-Mellon University, who is the principal expert on eastern prehistoric rock art.

To determine the extent of identified rock art sites within the study area, particularly those on military installations, two questionnaires were circulated. One questionnaire, distributed to cultural resource managers at major service commands, requested information on known or suspected rock art locations under their jurisdiction. Because no systematic survey for rock art sites has been conducted on DoD facilities in the region, none of the respondents was able to report known rock art sites among their archeological inventories. A second questionnaire distributed to the Historic Preservation Officer for each state within the project area also requested information on the number, nature, and locations of identified rock art sites within each state. The results of these surveys are presented in tabular form in Appendix A.

Information gained through archival research and subsequent analysis of the distribution of known rock art sites within the study area was utilized to identify the target installations for the on-site surveys required by the project Scope-of-Work.

Five installations, representing at least one from each service branch, were selected for survey. Selection was based primarily on the geographical proximity of individual installations to areas in which rock art sites previously had been reported. A secondary factor governing site selection was a desire to sample as many relevant physiographic provinces as possible within the larger geographic area. Four factors acted to eliminate specific installations from consideration.

On installations located in urban settings, survival of rock art was judged to be unlikely. Bases located in the outer Coastal Plain of the Mid-Atlantic region, including most Air Force and Marine Corps facilities, also were eliminated because the probability of finding concentrations of rock outcrops or boulders suitable for the application of rock art was judged to be extremely low. Ownership of some potential installations, including three former Air Force bases, was discovered to have been transferred out of DoD jurisdiction due to the Base Realignment and Closure (BRAC) program. Finally, some installations where substantial cultural resource studies already had been completed were removed from consideration.

The final installations selected for field survey included: Fort Indiantown Gap (PA) Military Reservation (U. S. Army Reserves/Pennsylvania National Guard); Quantico (VA) Marine Corps Base; the Massachusetts Military Reservation (formerly Otis AFB); the Naval Security Group Activity (NSGA) at Winter Harbor, ME; and the Naval Computer and Telecommunications Station (NCTE) at Cutler, ME (Figure 1). The level of effort at MMR subsequently was reduced to a literature search after consultation with the contracting officer for this project.

Field Methods

For each of the identified installations, field investigations included three elements: (1) review of holdings and site files at the appropriate State Historic Preservation Office to ascertain the local or regional historic and prehistoric context for the installation, and to identify the specific character of rock art sites in the region; (2) review of previous cultural resource studies and cultural resource planning documents held by the installations themselves; and (3) pedestrian survey of previously identified sample "transects" or areas on each installation. Survey areas were identified by the project consultant based upon examination of the terrain features of each installation. A report describing the specific context and methodology and documenting the results of each field survey then was prepared.

These installation reports have been included as appendices of this larger study, and they are summarized in Chapter 4.

CHAPTER IV

RESULTS OF FIELD STUDIES

As required in the Scope-of-Work, four installations were surveyed during the field portions of this project: Fort Indiantown Gap, Pennsylvania; Quantico Marine Corps Base (MCB), Virginia; the Corea unit at NSGA Winter Harbor, Maine; and NCTE Cutler, also in Maine. In addition, a survey of cultural resource literature was conducted for the Massachusetts Military Reservation (MMR), formerly Otis Air Force Base, located on the inner portion of Cape Cod in Massachusetts. These installations represented four different geophysical settings and spanned all geographic areas of the study area from New England to the southern Mid-Atlantic. Fort Indiantown Gap encompasses nearly 20,000 ac within the Ridge and Valley/Appalachian foothill region of south-central Pennsylvania; Quantico MCB straddles the inner coastal Plain and Piedmont areas of eastern Virginia; MMR occupies an interior coastal area that was formed from Pleistocene terminal moraine and glacial outwash deposits; and NSGA Winter Harbor and NCTE Cutler both are located on coastal peninsulas subjected to direct tidal and wave action.

Fort Indiantown Gap

Results

At Fort Indiantown Gap, the underlying geology of this Ridge and Valley province is composed of steeply folded metamorphosed sedimentary rock. Three distinct ecotones were sampled: mountain ridgetops and upper slopes above 800 ft amsl; deeply incised stream gaps; and the steeply sloped upper reaches of mountain streams. Field techniques included pedestrian survey (8.52 km); windshield survey (1 km); and binocular-assisted visual examination of ridge crests. Only one area surveyed, the lower reaches of a mountain stream valley, contained naturally occurring rock outcrops or boulders that could have been used for the application of pigments or the incising of petroglyphs during prehistoric times. Other exposed rock faces had been created artificially as a result of historic quarrying activities.

No prehistoric pictographs or petroglyphs were recorded at Fort Indiantown Gap. One example of historic period rock art, a script inscription, was identified. This inscription had been incised into a quarried stone step that provided access to a stone springbox that probably was installed in 1936 by the Civilian Conservation Corps in connection with development of the Appalachian Trail. Since the incised step carried a date of 1895, it is likely that the step was moved to this location from elsewhere on the reservation or from adjoining private property.

Threats to the Potential Resource Base

Natural weathering of the unstable underlying geology in the ridgeline zones at Fort Indiantown Gap has produced large areas of rock scree along the upper slopes of ridges, and there appears to be little that can be done to retard the process. Flooding within the deeply incised stream valleys and gaps also constitutes a threat to preservation of potential rock art sites.

Four types of human activities at the installation could produce adverse impacts to both rock art sites and archeological sites: military training exercises that utilize the ridge slopes and crests as impact zones; access road construction and heavy armored vehicle traffic along such

roads; timbering and quarrying in the ridge and valley zones; and recreational use (e. g., hunting, fishing, and hiking).

Based on the records and literature review and the field survey, it appears unlikely that rock art sites are located on this installation. As a result, the threats are hypothetical.

Quantico Marine Corps Base, Virginia

Results

Three distinct environmental zones were sampled within the Quantico MCB: the inner Coastal Plain; the western Piedmont and Triassic basin; and the middle "Fall line" reaches of major watersheds. A total of 8.65 km (5.4 mi) of stream valleys and associated ridge slopes were examined. Only the intermediate "Fall Line" zone contained naturally occurring rock outcrops and boulders that could have been used as surfaces for prehistoric pictographs or petroglyphs. This zone is characterized by major concentrations of moderately to heavily weathered boulders and outcrops of metamorphosed sedimentary rock located near the ridge toeslopes just above the stream flood plains. The softer exposed shale outcrops noted along stream valleys in the Triassic Basin would not have provided suitable surfaces for rock art.

No prehistoric pictographs or petroglyphs were identified in any of the areas surveyed. The results of the survey suggest however that the areas with the highest potential for prehistoric rock art based on the presence of exposed rock were located in the middle reaches of major stream valleys at Quantico.

Threats to the Potential Resource Base

Due to the deeply incised configuration of the major stream valleys of the "Fall Line" zone, the principal threat to preservation of potential rock art sites would occur as a result of stream valley flooding or erosion due to natural weathering. Continued weathering, fissuring and surface degradation resulting from lichen and moss growth also pose potentially adverse impacts to rock art resources.

Activities at Quantico MCB pose threats to potential rock art sites include (in descending order of importance): recreational use (e.g., hunting, fishing, hiking); timbering and selective thinning in wooded areas of stream valleys; construction of access roads through the installation, and repetitive use of these roads by heavy vehicles, including armored vehicles; and, military training exercises, particularly those that utilize armored vehicles and/or involve the use of live rounds. At Quantico, the Fall Line zones of stream valleys are not utilized heavily during combat training activities. Most active training ranges are located on the crests and upper slopes of the ridges adjoining these stream valleys. Again, survey results indicate that there is not a high probability for rock art and actual impacts to sites would appear to be quite low.

Massachusetts Military Reservation (Otis AFB)

Results

Examination of archeological site files and cultural resources reports at the Massachusetts Historical Commission revealed the rock art sites in southeastern Massachusetts commonly occur either on exposed bedrock or on glacially deposited boulders associated with late Pleistocene era

glacial moraines. The northern and western portions of the MMR are dominated by glacial moraine deposits.

Most recorded rock art sites within southeastern Massachusetts, even those of Native American origin, appear to be historic; only a few glyphs are thought to predate the contact period. The most common motifs consist of groups of complete or fragmentary Roman letters or script; anthropomorphic figures are secondary. No animal or geometric designs have been recorded. Local traditions hold that these drawings and inscriptions are attributable to both Native American and Anglo-American artists.

One cluster of inscriptions has been identified at MMR, although it has not been registered officially as an archeological site. The "SAL N PRY" rock is a large boulder located in the northern section of the installation within the "moraine" zone. The rock features an undeciphered, lettered inscription in capital Roman letters, and the figure of a woman. Several other similarly inscribed rocks have been observed in the general vicinity. These results suggest that the highest potential for prehistoric rock art at MMR would occur within the glacial moraine zones at the installation, where erosion of overlying glacial till has exposed large boulders that could provide suitable surfaces for the application of petroglyphs.

Threats to the Pential Resource Base

Adverse impacts to rock art sites at MMR will result primarily from military training exercises that utilize the upland areas of the installation for encampment and bivouac sites; construction of access roads; and installation of utility lines through the moraine deposit areas of the facility. The major impact area for heavy weapons firing is located in the central portion of the installation, away from these zones. Surveys of this area would appear to be warranted and are recommended.

NSGA Winter Harbor and NCTE Cutler, Maine

Results

Three distinct environmental zones were sampled at these two coastal facilities: the outer coastal zone at NCTE Cutler; a transitional bayshore zone at both NCTE Cutler and NSGA Winter Harbor's Corea unit; and a protected tidal zone, again at NCTE Cutler. Out of a total shoreline of approximately 12.8 km (8.0 mi) of shoreline, an estimated 4.35 km (2.7 mi) were traversed by pedestrian reconnaissance; the remaining shoreline areas at NCTE Cutler were subjected to windshield reconnaissance. Two previously reported rock art sites in Machias Bay, adjacent to NCTE Cutler at Holmes Point and Hog Island, also were visited. All of the areas surveyed contained exposed rock outcrops and ledges that were utilized as surfaces for pictographs or petroglyphs during prehistoric times.

No prehistoric pictographs or petroglyphs were identified at either installation. However, given the pattern of distribution of known rock art sites in the region and the exposure of exposed outcrops to tidal and wave action, the outcrops in the most protected tidal bay areas at NCTE Cutler should be considered as high probability areas for rock art.

Threats to the Potential Resource Base

The principal threat to preservation of potential rock art sites at these installations would occur as a result of erosion due to tidal and wave activity. Evidence of the adverse impact of these forces on bedrock deposits is apparent in all shoreline areas of both installations in the form of continued weathering, fissuring and surface degradation of horizontal rock ledges.

The potential for adverse impacts to rock art settings due to human activity at both installations is low. The nature of the activities at these facilities does not require development of shorelines, and the extremely rugged nature of the coastline precludes almost any intensive development. There is a minor potential for vandalism of exposed rock surfaces along the shoreline of Sprague Neck at NCTE Cutler, because that area is utilized actively for recreational purposes, but in general, no further work need be undertaken.

CHAPTER V

MANAGEMENT RECOMMENDATIONS

Surveys of State Historic Preservation Offices and cultural resource Specialists of the Major Commands (MACOMS) with responsibility for installations within the study area for this project (Appendix A) clearly demonstrated that the identification and evaluation of rock art sites has not been a research priority either for the states or the Department of Defense. Rather, systematic studies of rock art in the northeast have been conducted either by academic institutions and/or by interested and informed individual researchers. Scopes of Work for cultural resource identification studies on DoD installations generally do not include specific requirements requiring attention to rock art sites. Professional cultural resource management firms generally do not include identification of rock art resources either in their research designs or their methodological approaches. If rock art sites are discovered during cultural resources surveys, they may or may not be reported; in at least one instance, a professionally done cultural resource survey actually noted the existence of a rock art site, but failed to register the site with the appropriate State Historic Preservation Office. Coverage of this class of cultural resources therefore has been sporadic. In short, perhaps the most serious threat to preservation of rock art sites is the absence of a data base or of systematic identification studies.

The first component of any management program for rock art resources must include site identification. Only after the sites themselves have been identified can the factors that alter the character and integrity of rock art be analyzed and programs for effective site management be developed. Therefore, this chapter first presents a general discussion of the techniques most commonly utilized to identify and record rock art sites. It then discusses strategies for managing rock art sites, with particular reference to sites occurring on military installations.

Site Identification and Documentation

The most basic step in protecting any type of cultural resource, including rock art, is the creation of an inventory of sites. Identification studies provide a data base on which development of management strategies ultimately depends.

Predictive Modeling

A predictive model is a formal judgment that attempts to forecast the nature and the distribution of archeological sites within a given area. Such models rarely are explicit, but in fact archeologists create predictive models all the time. Predictive models are based on knowledge of local geographic conditions, the known way in which archeological sites are distributed across the landscape, and on historic and ethnohistoric information. Formulation of a predictive model in advance of field surveys permits the elimination of non-productive areas, and allows survey teams to concentrate their efforts only on areas where rock art sites are most likely to occur. A formally expressed, written, predictive model also provides a summary of the factors used for predicting site density and site locations that informs other researchers about the methods used by the archeologist to arrive at his conclusions. Most importantly, an explicitly stated predictive model can provide useful information to land managers as they plan future undertakings by identifying potentially sensitive areas of installations that should be avoided.

Three major factors govern the location and distribution of aboriginal rock art. The first is geographic. Because the most obvious requirement for rock art sites is the presence of rocks, a starting point for constructing a predictive model is to review geological maps of the area of interest. However, the fact that geological maps often do not show very fine details of geological distribution creates a problem, because many rock art sites occur on single isolated boulders, sometimes far from any comparable geological feature. This phenomenon is illustrated by the erratic boulders that were deposited many miles from their point of origin by glacial activity; for example, some large boulders in New York's Central Park bear no geological relationship to the local parent bedrock material. Rock art sites sometimes are found on rocks small enough to be transported or on cobbles deposited by streams or rivers far from their parent source. One rock art boulder field in the California desert in an area where the local outcrops are entirely sandstone contains examples that have been inscribed on transported basalt rocks.

Rock art sites can occur on virtually any type of rock, from granite to soft limestone, although it rarely is found on highly altered, fractured, or crumbling rock faces. Rock types noted as basic material in the East include granite, schistose slate, and sandstone. Several writers have noted a preference for hard rocks and have commented on the amount of effort needed to make petroglyphs. Of course, petroglyphs executed on rocks subject to excessive weathering would most likely disappear in a short time.

Another important element to be considered in constructing a predictive model is site patterning, that is, the way in which other archeological resources are distributed within certain environmental zones. Certain ecotones obviously were attractive to ancient peoples because they provided needed resources such as food, water, and shelter. Rock art sites often will be found where prehistoric peoples lived. However, although many rock art sites are found in association with habitation sites, others are located away from habitation areas. A direct one-to-one relationship cannot be assumed as a matter of course.

Nonetheless, many rock art sites are concentrated around springs, on water courses, and in areas that were used for gathering plant or animal food. Almost every researcher since Mallery (1893) has noted that rock art sites often are located along the banks of streams and rivers and in coastal zones where exposed rock faces are present. Rock exposures next to watercourses definitely are good places to look for rock art sites in the Eastern U.S. When reviewing geological or topographic maps to identify these loci, one must keep in mind that archeological sites occur in relationship to conditions as they existed hundreds or even thousands of years ago; the locations of contemporary creeks, springs, and vegetation zones may not necessarily replicate those of past periods. Careful analysis of map data can indicate what past conditions were likely to be, and locations of sites can be predicted based on past conditions as well as the present geographic features.

A special consideration for predicting rock art locations lies in the ritual symbolism of rock art. Rock art often is found in caves; on prominent (sometimes spectacular) rock formations; on assemblages of striking boulders; next to waterfalls; and in other locations where the place itself was seen by by prehistoric peoples and by us as "special", due to some unusual feature of their setting.

The distribution of rock art sites is not even; it often is heavily concentrated in certain areas and, within those areas, tends to be concentrated in a few large sites. In the Northeast, these distributions and concentrations are not always obvious. In contrast to sites in the arid Southwest, rock art sites in eastern states are more likely to be obscured by moss, vegetation, and weathering. Rising sea levels along the East Coast also have inundated ancient rock art on previously exposed rocky beaches. For example, at Machiasport, Maine, near the Navy's NCTE Cutler facility, Mallery observed in 1893:

> "It was. . .evident to the present writer, who carefully examined the rock in 1888, that it lay much deeper in the water than once had been the case. At the lowest tides there were marking seen still lower, which could not readily have been made if that part of the surface had not been continuously exposed. The depression of a rock of such great size, which was so gradual that it had not been observed by the inhabitants of the neighboring settlement, is evidence of the antiquity of the peckings."

As Mallery deduced, the relative position of the petroglyphs on coastal sites reflects the relative antiquity of the rock art itself.

Site Surveys

Development of a predictive model for rock art generally must be followed by on-site survey. For a preliminary survey, a low-level helicopter ride over the area in question is the ideal rapid way to ascertain whether any likely rock is present. On rare occasions, the rock art itself can be seen from a helicopter; however, in most regions the individual rock art elements are small (less than a foot in height), and the rock faces may be obscured by vegetation.

There are two kinds of formal pedestrian field surveys. In the first, a sample area of the region in question is walked in detail and all indications of archeological sites are noted. Sample surveys are very useful as a check on predictive models, and they can be used to refine the predictions. In a total survey, all of the area involved is walked by trained archeologists and all sites are recorded. For very large regions, or for regions with a very low density of sites, conducting a total survey is too costly to be practical.

Archeological surveys nevertheless can be a cost-effective tool for planning future work, avoiding impacts to the most sensitive areas, and estimating costs of further studies. While surveys may not give an accurate count of all the sites in likely areas, they can eliminate large areas that do not contain appropriate rock surfaces, thereby eliminating worry about such resources.

Site Documentation

Once predictive models have been established and surveys have identified rock art sites, the sites must be documented. This task is critical because rock art is constantly deteriorating under natural conditions; it may be reduced or disappear entirely due to spalling, weathering, or as a result of human activity. Few long-term studies of rock art sites document their deterioration over time, but the few surviving photographs of sites taken 100 years ago show a much greater quantity and quality of rock art than now exists at those sites. Therefore, the best protection for rock art is to obtain as full and complete a record of what is there, as soon as possible. Documentation is the protection against loss of the record, and it also can serve an important management function by documenting site vandalism. Vandalism of rock art sites often includes the addition of new elements, sometimes in the style of the aboriginal rock art. As Mallery (1893:107) noted over a century ago:

> In addition to these causes of obliteration it is a pity to have to record another, which is the vandalism of some visitors to the locality who have thought it an excellent practical joke to cut

spurious figures alongside of and sometimes over those made by the Indians.

Existing rock art elements may be embellished by the addition of details such as facial features, headdresses, and genitalia that were not present in the original art. The problem arises because the addition of later elements of similar style, "...alongside of and sometimes over..." older rock art (Figure 5), also was a practice of ancient times, and is not always attributable to recent visitors. In fact, some rock art sites were altered over a period of centuries by a succession of aboriginal visitors. The confusion this adds to the record will not be eliminated until precise and reliable method is developed for dating individual rock art elements. At present, such a method is only a theoretical possibility.

Detailed documentation of a site allows cultural resource managers to track recent additions to their sites by analysis of differential weathering or style features. Ideally, if the documentation is done by trained individuals, it will allow for reconstruction or restoration of the rock art, even if something happens to remove it from rock surfaces.

Unlike excavation archaeology, which often can examine only a small percentage of the information present, it is possible to record 100 per cent of the data at rock art sites, and this should be the goal of recording efforts. The task of documenting rock art sites should not be left to non-professionals; the same quality control should be present for rock art as for excavation archeology or other cultural resource investigations. Manuals, formal training classes, and the efforts of organizations such as the American Rock Art Research Association have produced numerous trained and experienced recorders of rock art sites, and their services should be sought by installation resource managers.

Site Recordation

Obviously, destruction that happens before recording means that some of the ancient evidence will be lost forever. The majority of the sites that have been "recorded," including those studied by professional archeologists, have at best only a partial record. Even when done by trained archeologists, rock art documentation is generally an ancillary task to an excavation program and major effort is not devoted to it. In addition, most archeologists are trained in excavation techniques but not trained in rock art recording.

Documentation requires more than a few snapshots of the most elaborate rock art at a site. Considerable time, repeated visits, and the application of a variety of techniques, may be necessary to identify all of the components at a rock art site. The methods selected will be dictated by the nature, extent, and condition of the rock art itself. Because of the fragility of these resources, care must be taken to use recordation techniques that will not alter, diminish, or otherwise compromise the quality of the images at a site. Much debate, for example, centers around the enhancement of images for photography. Common recording techniques include photography; direct tracing of rock art elements on mylar or a similar substance; doing rubbings (Figure 6); or making casts of various elements at the site. The last two techniques have been used effectively for recovering images from severely eroded or weathered petroglyphs.

Recording multiple simple elements, superimpositions of one figure on another, and drawings that are rudimentary, unfinished, or partly gone can be a tedious task. Recorders often attempt to complete recordation in one visit, but this is effective only if the site is very small and the rock art elements are very visible. Many rock art elements are faint and obscure, and their visibility fluctuates according to the time of day, the season of the year, and the degree of

available light on any given day. Multiple visits to sites often yield additional elements that were overlooked during the initial recording process.

Rock art documentation should extend beyond the mere recordation of the artistic elements of the site. Information on the other characteristics of the site, such as the type of surface to which the artwork has been applied; the depth and width of incisions (for petroglyphs), and the details of the surrounding environment and landscape also should be noted. Finally, gathering historical documentation sometimes can assist in generating complete data for obscured or vandalized sites. Because rock art sites are striking, and located located in scenic and dramatic locations, many obvious rock art sites probably were known to local area residents in the past. Old photographs of mundane family outings that portray such settings sometimes can provide invaluable documentation of site conditions in earlier times. In the northeast, for example, Swauger has located photographs of rock art locations that were taken during the last century. Any rock art recordation effort should include interviews with long-time area residents, as well as a search for old photographs and notes, not only in scientific publications, but also among collections held by local historical societies.

Threats to Rock Art Resources

Threats from Natural Forces

Because most rock art sites are by definition above ground and exposed to the weather, they rarely are preserved by being buried. As a result, the elements are subject to deterioration from alternate wetting and drying (rain), freezing and thawing (snow), fading (sun), abrasion (wind-blown dust, sometimes rubbing by cattle or other animals), tidal and wave action, and the durability of the stone itself. In very humid areas, both pictographs and petroglyphs may be subject to deterioration by the growth of mosses and lichens that obscure the rock art and destroy the surface layer of rock over a period of time (Figures 7 and 8). At some sites, such overgrowth may have concealed the rock art completely, so that its removal is necessary before one even can record the art at the site (Meighan, n.d.). Some stone is heavily fissured and spalls easily; other stone is soft and easily eroded, while granite or basalt tend to be wear-resistant. No matter what the local situation, however, all rock art sites are subject to some degree of deterioration from natural causes. Leaving rock art sites alone does not "preserve" them, since natural forces are continually at work.

Threats Posed by Human Activities

Non-military Activities. Vandalism always poses a major threat to rock art sites, because visitors always seem to want to add their own graffiti to visible rock art. The Big and Little Petroglyphs are National Register-listed rock art sites at the Navy's China Lake Air Weapons Center Facility in the California desert. These sites are not accessible to casual visitors; permission and a guided tour usually are needed to visit them. Nonetheless, one rock at one of these sites has been marred by an incised picture of a Model A Ford, added by vandals in recent years. This case simply demonstrates that, although site vandalism can be controlled, 100 per cent prevention simply is not possible.

The undeveloped areas of many military bases have been set aside as recreational areas for installation personnel; Sprague Neck at NCTE Cutler in Maine, for example, is used for camping. In other cases, as at the U. S. Army's Fort A. P. Hill in Virginia, installations are opened to the public for seasonal recreational activities such as hunting and fishing. Although participants in these activities must obtain permits, once they are on base, it is extremely difficult to track their

whereabouts and monitor all of their activities. In addition, cultural resource managers who find obscure rock art sites unintentionally have brought about their destruction through their desire to display and interpret the sites to the public. As desirable as this may be for educational purposes, the effect sometimes has been the obliteration of the site by over-use and vandalism. It is no truism to state that if a path is built and marked by a sign that says "This way to the rock art," damage to or even destruction of the site is inevitable.

Military Activities. The essential training function of many military bases generally involves the extensive use of open country by heavy vehicles such as tanks and armored personnel carriers; the widespread landuse by large groups of people encamped in bivouacs or digging foxholes; and the use of weaponry ranging from small arms to artillery rockets and bombs. The impacts from these activities on all types of archeological resources are potentially very extensive. Archeologists working on training installations routinely encounter sites that are located in areas with unexploded mortar shells and dud artillery rounds. Equally severe damage to archeological resources on military bases, even those without a training function, results from the same undertakings that cause the most damage in civilian areas: road building, grading for construction of buildings, structures and airfields; shoreline modification for naval purposes or erosion control; and other landscape altering activities.

Yet despite years of intensive use, the actual damage attributable to "bombardment" of archeological resources can be surprisingly small. This is especially true with regard to rock art sites. For example, a group of small but complex and interesting rock art sites are located on rock outcrops at Hunter Liggett Military Reservation in California, in the middle of an area used for weapons training. Unexploded mortar, artillery, and tank rounds are scattered adjacent to the sites. Yet no perceptible military damage to the rock art sites has occurred, because the sites tend to be located in small depressions in the local rock surfaces. Many of these painted areas are so small that they could be obliterated by a single artillery round, yet they show no evidence of impacts by bullets or shell fragments, and are more free of ordnance damage than many sites in civilian areas, where bullet impacts are common and often represent deliberate use of rock art for target practice.

The lesson in this is that it is unwise to write off areas of military bases that have been extensively used in training or for firing ranges as empty of archeological resources, including rock art. In fact, site areas that appear "devastated" often contain archeological remains from which important information can be obtained.

Preservation and Site Management

General recommendations for the management of rock art sites on public land have been advanced by a number of individuals and agencies (e.g Lee 1991; Lambert 1988; ARARA 1988; Morwood and Hobbs 1992). However, these suggestions have been developed primarily for sites open to public visitation, as part of efforts to develop public educational programs and facilities. While some of these techniques are transferable to military installations, they do not address the special problems of preserving rock art sites on military reservations. Application of any of the methods for limiting damage to rock art sites recommended in this section must be preceded by an analysis of the destructive forces impacting that particular site.

Weathering and Natural Deterioration

Site Protection. Efforts to slow down weathering processes have had mixed success; indeed, some remedies actually have created new problems. For example, one rock art site in

Figure 7. Recordation of weathered rock art elements in the Potomac River Valley near Washington, D. C. (Photo courtesy Dr. Stephen Potter, National Park Service)

Figure 8. National Park Service ranger inspecting petroglyph elements on an exposed and lichen-covered rock face (Photo courtesy Dr. Stephan Potter, National Park Service).

Japan was completely enclosed in a building to protect it from the weather (Ogawa 1992). This treatment was intended to control major seasonal temperature and humidity variations, and it appeared to stabilize the rock art which had been deteriorating rapidly before the shelter was built. However, moss soon began to grow on some parts of the site, and conservation measures to control this problem may be needed in the future. Other sites have had roofs or shelters built over them to provide protection against rain and snow or accumulation of leaves and plant debris. Constructing such shelters is expensive and it calls attention to the site; hence, this remedy often is impractical except for sites used in public education programs.

At times, protective measures have produced unintended, counterproductive effects. The flow of rain water over rock paintings sometimes has been diverted by putting a small ridge of silicone seal above the rock art. In some areas, efforts have been made to protect the rock art by mounting a protective sheet of glass or plastic over the panels. These strategies often have produced negative effects, because they are likely to trap moisture, and may permit leaves and other debris to accumulate in contact with the art. Attempts to stabilize friable rock surfaces using chemical agents also can create an impermeable "skin" which splits off from the underlying rock, taking the rock art with it.

Efforts to deal with problems of weathering should not be subject to improvisation; if the site merits protection, remedies should be applied only after careful study and evaluation of potential negative effects. Ongoing research involved with determining the age of rock art, the nature of pigments used, and other laboratory studies, dictates that mitigative efforts should impose as little impact to the rock art as possible, so that the chemical composition of the art or the immediate rock surface are not altered.

Restoration and Enhancement. Restoring damaged or weathered rock art to its original appearance has been done in a few sites to make the rock art visible or more attractive to site visitors, although this will be a concern for site managers on military bases only occasionally. No restoration effort should be undertaken casually or by inexperienced people. This also applies to "enhancement" efforts used to make the rock art stand out from the background. Everything from chalk to green barn paint has been used to make rock art more visible. Some scholars oppose even the use of chalk to outline petroglyph elements, or moistening surfaces to enhance the contrast of pictographs to improve photographic and recordation efforts. In some cases, merely cleaning up the rock art can have the same effect of increasing contrast with the background (see Lambert, 1992, for an example).

The obvious danger in all of these procedures is the chance of altering the scientific record by failure to recognize all the details correctly, thereby creating an edited version of what is actually there. The value of chemical and physical analyses for dating, pigment identification, tool marks, etc. may be negated by well-meaning contemporary efforts at restoration and enhancement. Therefore, prudent management will minimize any physical changes to rock art unless it is determined that such changes are essential.

However, this does not mean that nothing whatever should be attempted, and some experimentation with preservation procedures may be warranted. For example, it may be valuable to attempt preservation on a small portion of the rock art, observing carefully over time to see whether the surrounding rock art shows greater deterioration than the "protected" portion. At the Davis Gulch pictograph site in Glen Canyon Reservoir, Utah (United States Army Corps of Engineers 1992), filling of the reservoir led to wave action and long-term inundation of a the site. A polymer solution was applied to one panel of the rock art site. Four years later, this panel was observed to be water resistant and somewhat harder than other portions of the same site. The Corps' report on the Davis Gulch preservation effort offers several suggestions for procedures and potential improvements in preservation techniques.

Should vegetation be removed? An important study on a Wyoming rock art site (Childers, 1994), carried out over a period of years, showed that lichens can be removed by applying a dilute solution of Clorox over a period of time. Removal of lichens not only stopped the deterioration from plant growth, but enhanced recording efforts, because elements that were invisible or mostly obscured became clear enough for detailed recording.

Because rock art sites vary so widely there is no universal preservation method. However, preservation experiments like those described above are useful and necessary, assuming that they are controlled and that objective information can be gained about the costs and benefits of such studies. Careful documentation is essential, since the outcomes require observation over a period of years, and it may well be that the initiator of the project will not be the one to conduct follow-up studies many years later.

Limiting Damage from Human Activity

Documenting Visitor Use. To facilitate determination and implementation of effective site access control, it is critical to determine how many people visit a particular rock art location, and the types of damages that they inflict on the resource.

Rock art sites in concealed and inaccessible places attract limited public use and therefore have virtually no visitation. On the other hand, well-known rock art locations that are in close proximity to picnic, camping, or other recreational sites facilities may receive over 50,000 visitors per year. Obviously, opening up any area through installation of new roads, off-road vehicle trails, or other access modes that increase traffic will increase the potential for and frequency of site visitation. Determining the numbers of visitor contacts at rock art sites can be charted in various ways, including:

•*Analysis of graffiti dates*: Frequently visited sites often show names, initials, and dates that may provide a general idea of visitation over time.

•*Census or tally*: On military reservations, security patrols can record counts of visitors to rock art sites at various seasons and from year to year. Some publicly accessible rock art locations maintain visitor logs; these logs are never complete, but they do provide an approximate count of visitors that reflects use of the location.

The nature of the impact of site visitation on the resource also should be documented, through the use of photographs and through descriptive narrative reports, preferably made by security personnel who visit identified sites on a regular basis.

Avoidance. Because military installations often exclude general access by the public, they have the potential to be among the very best preservers of archeological resources, including rock art. However, sites in areas that may be visited or utilized by both military and civilian personnel, such as public roads, installation recreational areas, and the like can present problems in site protection. "Benign neglect" and the avoidance of publicity about the locations of such sites can help to reduce the pressure. It is sometimes feasible to close or re-route roads adjacent to rock art sites, particularly if they are unimproved roads that are used only on a limited basis. In other areas, access can be reduced by planting heavy vegetation in front of the site; poison oak and poison ivy are good deterrents to casual visitors.

Limiting Vandalism. Short of posting a 24-hour guard, it is unrealistic to expect that no vandalism will ever occur. A vandalized, graffiti-covered (pencil, chalk, marker pens, and cans of spray-paint being the preferred tools) site unfortunately attracts more vandalism; a pristine site is

more apt to be left alone than one which is already marked up with people's names and initials. Therefore, when graffiti appear, some consideration should be given to cleaning and restoring the rock art. At Fort Huachuca, a substantial amount of graffiti dating back as much as 50 years ago, was removed successfully.

Small rock art sites such as caves sometimes can be protected by fencing them off, as has been done at Fort Huachuca and at numerous sites on public land elsewhere. Unfortunately, the presence of signs and fences also tends to attract vandalism by more destructive visitors. One surface site in the California desert was fenced to prevent off-road vehicles from damaging it. The fence was promptly pulled down and the site was obliterated by driving over it. At Fort Huachuca, visitors already have scaled a high chainlink fence in order to get into the sites. One or two determined vandals can do a tremendous amount of damage in a short time.

Providing Alternative Attractions. Lee (1991) discusses the use of "sacrificial sites" in Australia that are used to draw visitor attention with the idea that these sites will get the damage and other, better, locations will remain unknown and left alone. Although this approach has some value for public park land, it is not a feasible option for military installations.

In terms of military uses, however, providing alternatives makes sense. In areas subject to firing, targets can be placed slightly away from rock art sites that are likely to be in the field of fire. If no target is provided, gunners will select something to shoot at, and large rocks (with or without rock art), small caves, or areas of marked color variation may well become targets. As mentioned above, the small rock outcrops at Hunter Liggett would make ideal targets for random shooting, and it is surprising that the rock art at these locations was not severely damaged.

Educational Programs

Although ot is unlikely that rock art locations will remain entirely unknown and unvisited, preservation interests may best be served by not publicizing the location at all, while documenting the site thoroughly. However, there are two instances in which educational efforts can be useful and may in fact enhance rock art preservation.

One educational activity that also may assist in documenting and recording rock art sites is the use of classes and rock art societies to visit and provide a careful record of sites. Some colleges, junior colleges, and amateur societies teach classes in rock art recording; such volunteer groups can gain important skills and experience from visiting the location, while at the same time providing responsible recording and archival photographs and drawings. In addition to local educational institutions and museums, groups interested in documentation sometimes can be identified through the American Rock Art Research Association or such federal land agencies as the Bureau of Land Management and the U.S. Forest Service. Most such groups are in the West, where the most identified rock art is located, but at least a few active recording groups can be found in most states. Many small towns also have dedicated and efficient rock art recorders, although most also have at least one or two people who are "interpreters" not helpful to the documentation effort.

Finally and most importantly, base personnel also should be targeted for educational efforts. Various means may be utilized to convey the cultural resource preservation message, including sponsorship of Section 106 training sessions for command level personnel; and publication and distribution of informational brochures that enhance pride in the heritage of the installation while stressing site preservation (and not divulging specific site locations).

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APPENDIX I

SUMMARY OF SHPO AND MACOM SURVEY

TABLE 1A: ROCK ART SURVEY ON DOD PROPERTIES: MAJOR COMMANDS QUESTIONNAIRE/RESPONSES - AIR FORCE

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
Air Combat Command HQ ACC CEVAN Dr. Paul Green 129 Andrews Street, Suite 102 Langley AFB, VA 23665-2769 (804) 764-3056 (FAX) 804-764-5339	Phone 2/22/96	0/NA	ACC installations in NE = Pope and Langley AFBs
Air Education and Training Command HQ AETC/CEPR Mr. Jack Seigel, Command Community Planner 266 F Street West, Building 901 Randolph AFB, TX 78150-4321 (210) 652-6352	8/22/95	0/NA	No AETC bases are located within the study region.
Air Force Base Conversion Agency HQ, AFBCA/EV Mr. Jerry Cleaver, Environmental Protection Specialist 1700 North Moore Street, Suite 2300 Arlington, VA 22209-2802 (703) 696-5539 (FAX) 703-696-8833	8/31/95	0/NA	List of installation CRM contacts not included within response.
Air Force District of Washington HQ AFDW/CEV Mr. Bill Preston 1 McCord Street, Suite 300 Bolling AFB, District of Columbia 20332-5403 (202) 767-0505 (FAX) 202-404-8205	Phone 2/22/96	0/NA	
Air Mobility Command HQ AMC/CEVP Dr. Robin Burgess 507 A Street Scott AFB, IL 45433-5747 (618) 256-2233 (FAX) 618-256-2693	8/21/95	0/NA	Installations under this command within the study region: Andrews AFB (MD), Dover AFB (DE), McGuire AFB (NJ), and Plattsburgh AFB (NY); no base CRM contacts list included with the response. All bases have undergone archeological survey. Rock art was discovered at none of these, nor the eight other AFAMC bases within the U.S. but outside of the study region.

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
Air Force Material Command HQ AFMC/CEV Ms. Lynn Engleman 4225 Logistics Avenue, Suite 8 Wright Patterson AFB, OH 45433-5747 (513) 257-5878 (FAX) 257-5875	no response	-----	
Air Force Reserve HQ AFRES/CEVP Mr. Tom Pilcher 155 2nd Street Robins AFB, GA 31098-1635 (912) 327-1072	no response	-----	
Air Force Special Operations Command HQ AFSOC/CE Mr. Michael Applegate 16 CES/CEV 301 Cody Avenue, Building T-206 Hurlbut Field, FL 32544 (904) 884-2260	no response	-----	
Air Force Space Command HQ AFSPC/CEVN Dr. Gerald Kelso, Cultural Resource Manager 150 Vandenberg Street, Suite 1105 Peterson AFB, CO 80914-4150 (719) 554-5462 (FAX) 719-554-2562	8/25/95	pending (see comments)	Survey form passed on to the CRM personnel responsible for the two AFSPC installations within the study area: (Cape Cod) Mr. Casey Buechler 21 CES/CEV 580 Goodfellow St. Peterson AFB, CO 80914-2420 (New Boston) Mr. Stephen Demarrais 50 CES/CEV 500 Navstar St., Suite 19 Falcon AFB, CO 80912-5019
Air Intelligence Agency HQ AIA/LEEO Mr. Joel Edwards 102 Hall Boulevard San Antonio, TX 78243 (210) 977-2831	Phone 2/22/96	0/NA	AIA has no installations in the NE.

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
National Guard Bureau HQ ANGRC/CEVP Mr. Dick Masse Natural Resources Staff Officer 3500 Flechet Avenue Andrews AFB, MD 20331-5157 (301) 836-8862 (FAX) 301-836-8151	8/24/95	0/NA	List of installation CRM contacts not included with response.

TABLE 1B: ROCK ART SURVEY ON DOD PROPERTIES: MAJOR COMMANDS QUESTIONNAIRE/RESPONSES - ARMY

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
Army Corps of Engineers * Mr. Paul D. Rubenstein HQ, U.S. Army Corps of Engineers 20 Massachusetts Ave., N.W. Washington, D.C. 20314-1000	8/17/95	*	* - CRM policy and legislation is the focus of the USCoE command-level CRM branch. Mr. Rubenstein recommended that the questionnaire be sent to the New England and North Atlantic Division CRM offices, as well as the CRM office of the Wilmington District.
Army Material Command Mr. Steven P. Austin AMC Technical Support/Cultural Resources U.S. Army CoE P.O. Box 17300 819 Taylor Street Fort Worth, Texas 76102-0300 (817) 885-6385 (FAX) 817-885-7539	8/28/95	0/NA	AMC does oversee rock art within its installation system, but solely in the western U.S. List of installation CRM contacts not included within response.
U.S. Army Reserve Mr. Carl A. Divinyi NEPA Program Manager HQ, U.S. Army Reserve Command 3800 N. Camp Creek Parkway, SW Atlanta, Georgia 30331-5099 (404) 629-8218 (FAX) 404-629-8229	8/--/95	0/NA	List of installation CRM contacts not included within response.
Army Forces Command Headquarters, Army Forces Command Dr. James Cobb Fort McPherson, GA 30330 (404) 669-5702 (FAX) 404-669-7827	no response	-----	Fort Drum, NY
Information Systems Command Mr. John Murray Commander, Fort Huachuca ATTN: ASH-EE-B Fort Huachuca, AZ 85613-6000 (602) 533-3120 (FAX) 602-533-3709	(Phone) 8/11/95		There are no Information Systems Command installations within the study region. Will confirm that there are no stray properties within the study region.

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
Military District of Washington Commander, Military District of Washington ATTN: ANEN-ES (Mrs. Gordano) Fort Lesley J. McNair Washington, D.C. 20319-5050 (202) 475-2793 (FAX) 202-475-7574	no response	-----	
U.S. Army Medical Command U.S. Army Medical Command ATTN: MCFA-E (Mr. Gilberto Gonzalez) 2050 Worth Road Fort Sam Houston, TX 78234-6000 (210) 221-8077 (FAX) 210-471-6672	Phone 2/22/96	0/NA	Walter Reed Army Hospital and Ft. Detrick
Military Traffic Management Command Commander, Military Traffic Management Command c/o U.S. Army Garrison - Bayonne ATTN: MTPAL-FE (Richard Mandra) Building 101 Bayonne, NJ 07002-5301 (201) 823-6391 (FAX) 201-823-7040	Phone 2/22/96	0/NA	Installation is located upon filled land that once was part of the Hudson River. No other installations under their purview.
Army National Guard Bureau Army National Guard Bureau ATTN: NGB-ARI-C Nancy Niedernhofer Cultural Resources Program Manager Arlington Hall Station 111 S. George Mason Drive Arlington, VA 22204 (703) 607-7997 (FAX) 703-607-7993	9/15/95	0/NA	List of installation CRM contacts not included within response.
Army Training and Doctrine Command HQ, Training and Doctrine Command ATTN: ATBO-SE (Chris McDaid) Fort Monroe, VA 23651 (804) 727-4496 (FAX) 804-727-2362	9/15/95	0/NA	List of installation CRM contacts not included within response.

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
U.S. Military Academy Commander, U.S. Military Academy ATTN: DEH (Patrice Hallin) West Point, NY 10996-1592 (914) 938-6388 (FAX) 914-938-2529	response pending	—	

TABLE 1C: ROCK ART SURVEY ON DOD PROPERTIES: MAJOR COMMANDS QUESTIONNAIRE/RESPONSES - NAVY

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
Chesapeake Division Mr. Lawrence Earle Naval Engineering Facilities Command Engineering Fixed Activity - Chesapeake Washington Navy Yard 901 M Street, SE. Washington, D.C. 20374	response pending	—	
Northern Division Ms. Tina Deininger Environmental Planner Northern Division Naval Engineering Facilities Command 10 Industrial Highway Mail Stop #82 Lester, PA 19113-2090 (610) 595-0759 (FAX) 610-595-0778	8/11/95	0/NA	Ms. Deininger did include a list of CRM contacts at bases within the study region.

TABLE 1D: ROCK ART SURVEY ON DOD PROPERTIES: MAJOR COMMANDS QUESTIONAIRE/RESPONSES - MARINE CORPS

COMMAND/POC	Form returned (date)	Results (# sites/ installation)	Comments
U. S. Marine Corps Mr. Jim Omans HQMC ATTN: C-LFL 3033 Wilson Blvd. Arlington, VA 22214 (703) 696-0865 (FAX) 703-696-1020	Phone	0/NA	No Marine Corps installations within the study region encompass rock art sites.

TABLE 2. ROCK ART SURVEY ON DOD PROPERTIES: SUMMARY OF SHPO RESPONSES

SHPO	Forms sent	Form returned	List of Contacts	Known Rock Art Sites	
				Statewide	DoD Property
Vermont	1	1	N	Several	Unknown
New York	2	1	N	Several	Unknown
Maine	1	1	Y	<9	0
Delaware	1	1	N	0	0
Pennsylvania	1	1	Y	33	unknown
Connecticut (1)	2	2	Y	2	0
Rhode Island	1	1	N	10 (?)	0
Virginia	1	1	Y	2	0
District of Columbia	1	1	N	0	0
Maryland	1	1 (Phone)	N	1	0
Massachusetts	1	0	---	---	---
North Carolina	1	1 (Phone)	---	1(?)	0
New Hampshire	1	1 (Phone)	---	4	?
New Jersey	1	0	---	---	---
West Virginia	1	1 (Phone)	----	1 or 2	Unknown

APPENDIX II

SITE REPORT: FORT INDIANTOWN GAP

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Project Background

This report presents the results of a preliminary pedestrian reconnaissance of selected areas of Fort Indiantown Gap Military Reservation, located in Lebanon and Dauphin counties, Pennsylvania. This study was conducted by R. Christopher Goodwin & Associates, Inc., under contract to the Atlantic Division of the Naval Facilities Engineering Command, Atlantic Division (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeast. The primary objective of this preliminary Phase I study was to identify potential prehistoric rock art sites within Fort Indiantown Gap, one of four DoD installations proposed for sample survey.

Indiantown Gap Military Reservation occupies approximately 18,900 ac within the Lebanon Valley and the Blue and Second Mountain ranges in the Ridge and Valley physiographic province of Pennsylvania (Figure 1). Interstate Rt 81 corridor borders the installation on the south. The installation extends roughly from Swatara Gap on the east to Manada Gap to the west. The facility currently serves as a combat training center for the elements of the Pennsylvania Army National Guard and the Army Reserves. The major administrative and residential cantonment and a helicopter landing field are located on the level plain of the Lebanon Valley; active training and firing ranges and subsidiary camps and bivouac sites are scattered throughout the higher valleys between the Blue and Second Mountain ridges. The training areas of the installation are criss-crossed by unpaved tank and vehicle trails.

Christopher R. Polglase, M.A., ABD, served as Principal Investigator and oversaw all aspects of the study. Martha R. Williams, M.A., M.Ed., was the Project Manager and supervised the field surveys; she was assisted in the field Nate Lowry, M.A.

Organization of the Report

Chapter I describes the project area and the organization of the report. Chapter II describes the natural setting of the project area, and develops the regional prehistoric and historic contexts, with special emphasis on Native American rock art in south central Pennsylvania. Chapter III describes the research design and the methods utilized for the survey; Chapter IV presents the results of the survey; Chapter V considers those results from a management perspective.

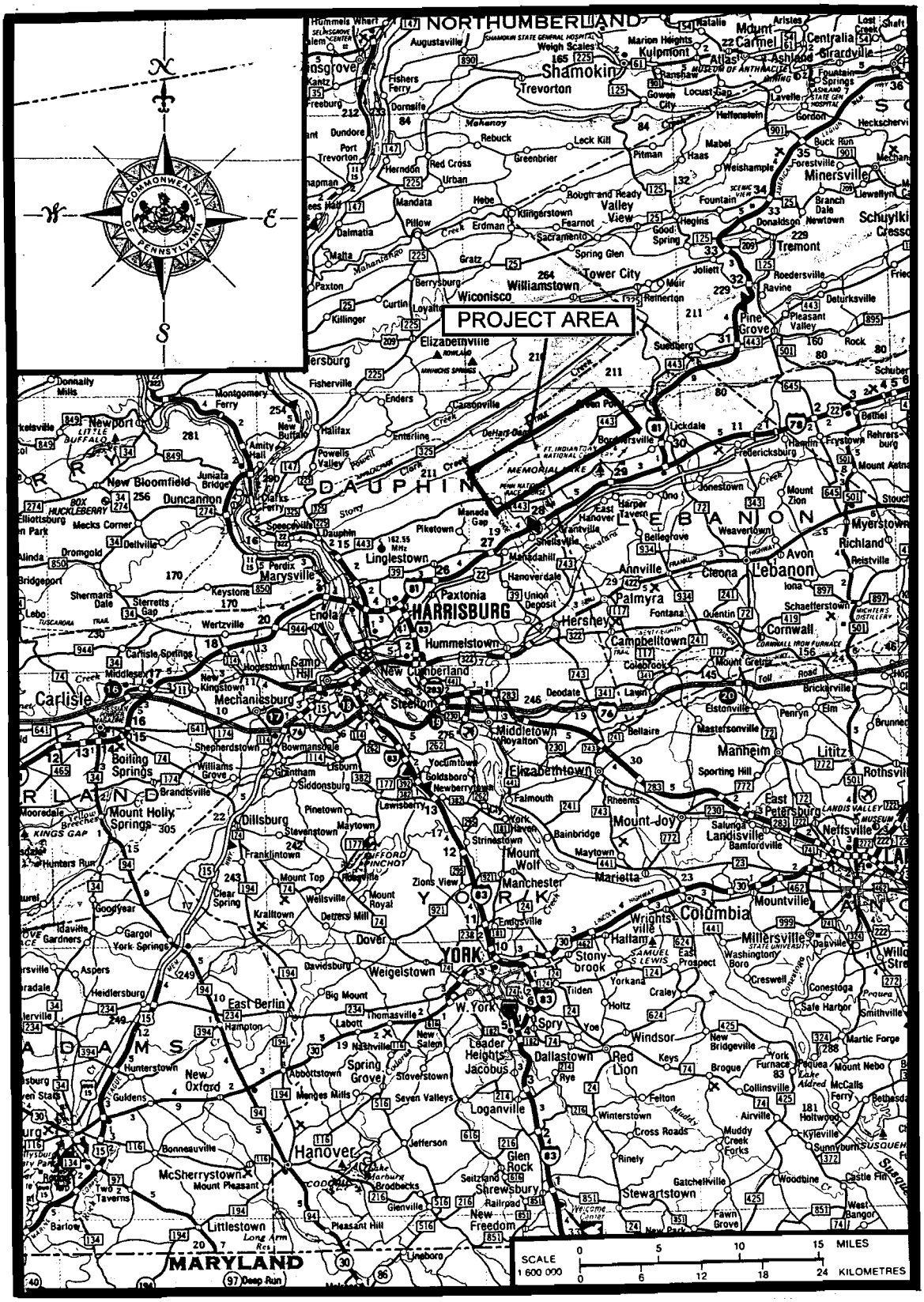

Figure 1. Excerpt from map of Pennsylvania, showing the general location of Fort Indiantown Gap

CHAPTER II

NATURAL AND CULTURAL SETTING

Natural Setting

The approximately 18,900 ac Fort Indiantown Gap tract occupies an area in the northern portions of Lebanon and Dauphin counties of Pennsylvania that straddles the interface between the Lower Piedmont and the Ridge and Valley physiographic provinces (Hatch et al. 1985:83). The installation's primary cantonment area lies within the Lebanon Valley, while its training areas are located on the ridges and in secondary stream valleys associated with the Blue Mountain system. The Lebanon Valley, a broad plain that lies between approximately 400 and 500 ft above mean sea level (amsl), is drained principally by Swatara Creek, a major tributary of the Susquehanna River (Figure 1). The ridges of the Blue Mountain system, with elevations ranging between 500 and 1200 ft amsl, are pierced by Indiantown Creek and Manada Creek, two tributaries of the Swatara, forming the distinctive gaps from which the installation derives its name. The installation lies within the Susquehanna-Delaware segment of the Ridge and Valley Province, which is characterized by short ridges and relatively narrow valleys (Hatch et al. 1985:86). Survey areas for the rock art project focused only on the ridge and intermontane valley sections of the installation; the more level cantonment areas were not inspected during this survey.

The bedrock deposits that underlie the study area are composed of sediments of unequal hardness that crumpled and subsequently uplifted; erosion cut away valleys, leaving the harder strata as ridges. The bedrock deposits derive from four periods of geological development. Bedrock underlying the valley floors is Ordovician in age and includes shale, sandstone, limestone and dolomite. The red and gray sandstones, conglomerates, and shales of the lower ridge slopes date from the Silurian period, while Devonian red sandstone, grey and black shales, limestone and chert the upper slopes. Ridgetop bedrock deposits are comprised of sandstone, shale, clay, coal and limestone of the Mississippian and Pennsylvanian periods (Willard 1933:12, Map 7). A list of lithic resources that would have been available for prehistoric utilization includes bedded and nodular cherts from the limestone and dolomite formations within the Great Valley; quartz and quartzite deposited in high order steams like the Susquehanna River; rhyolite in the Great Valley to the southwest; and jasper deposits located in Lehigh and Berks counties to the north and east (Stewart 1980:7-8; Hatch et al. 1985:98).

Soils within the Dauphin County portions of the study area, which included Manada Creek (Area A) and Manada Gap (Area B), belong principally to the DeKalb-Lehew and Calvin-Leck Kill-Klinesville associations (Kunkle et al. 1972); in Lebanon County, the corresponding associations are the Laidig-Hazleton-Leck Kill and Berks-Weikert-Bedington soils (Holzer 1991:General Soils Map). DeKalb-Lehew (Laidig-Hazleton-Leck Kill) soils are found on upper mountain slopes and ridges; the subsoils of these moderately deep, well-drained, gently sloping to very steep soils are composed of channery sandy loams or loams. Sandstone bedrock is encountered at depths of approximately 2 - 3.5 ft below the surface. Soils of the Calvin-Leck Kill-Klinesville (Berks-Weikert-Bedington) association occupy deeply (50-100 ft) dissected stream valley slopes and uplands; colluvial soils which occur on stream flood plains also are included with this association (Holzer 1991:4-5). Soils of both major associations are derived from weathered red shale and sandstone bedrock, and are mostly forested (Kunkle et al. 1972:3; Holzer 1991:5, 6).

Although the climate of this area is humid and temperate, it can exhibit some variability due to the changing landforms from the ridge and valley areas around Blue Mountain to the valleys to the south. Average daily maximum temperatures at Harrisburg are 39°F in January and 87°F in July. Annual average precipitation at Harrisburg equals 37.7 inches and is evenly distributed throughout the year. The frost-free growing season runs from mid April through October (Kauffman 1972; Shafer et al. 1989).

All of the areas surveyed at Indiantown Gap for this project are forested. Forest cover consists of mixed deciduous and coniferous species which vary in relation to elevation and other environmental factors. In general, floodplains on valley floors are characterized by mixed oak and pine woodlands; oak and hemlock forests dominate the upper ridge and mountain slopes (Hatch et al. 1985:97).

Cultural Setting

Previous Investigations. Since the 1940s, several non-professional and project-specific professional archeological investigations have been performed at Fort Indiantown Gap; by far the most consistent work was conducted by Samuel Farver, a local non-professional who reported 45 sites within and along the southern boundary of the facility (KFS Historic Preservation Group and Hunter Research, Inc. [KFS/Hunter] 1995:IV-4, 5). These investigations are summarized briefly in the Fort Indiantown Gap Cultural Resource Management Plan. Prior to the recent KFS/Hunter study, a total of 14 prehistoric and 5 historic archeological sites had been identified within the installation (Table 1)(KFS/Hunter 1995:IV/3-4, 6-7). Of these, 13 92.9 per cent) represented Late Archaic period occupations; four sites (28.8 per cent) also contained Woodland period components, including the Indiantown Gap site (36LE56), a longhouse site with associated Susquehannock cultural materials that was excavated by Longenecker.

The KFS study field-checked all 14 prehistoric sites on the installation (Table 1) by shovel-testing them at intervals of 100 ft, or 50 ft when cultural materials were encountered. No additional prehistoric sites were identified during this survey, and no rock art sites were identified (KFS/Hunter 1995:IV/3-4). All prehistoric sites were located within or adjacent to the cantonment area, or on the floodplains of major streams; because the ridge and mountain slopes were classified as low probability areas, they were not surveyed.

Utilizing historic maps, KFS/Hunter also identified the potential locations of 172 historic sites within the installation, including eighteenth and nineteenth century religious, domestic, educational, and commercial complexes. The precise locations of 72 of these historic complexes subsequently were verified either in the field or through interviews with oral informants (KFS/Hunter 1995:IV/6-8).

Rock Art in the Central Pennsylvania region. No prehistoric or historic rock art sites have been identified either in Dauphin or Lebanon counties; however, a total of nine separate rock art sites have been identified in the contiguous counties of Chester, Schuylkill, and Lancaster. These sites, which represent the typical motifs and settings in which rock art has been found in central and southeastern Pennsylvania, are presented in Table 2. Temporal and cultural affiliations have been suggested only for the Lancaster County sites, all of which were identified on a cluster of rocks in the middle of the Susquehanna River in the vicinity of the Safe Harbor power dam (Kent 1977; MacMahon 1996). Similar rock art sites were recorded by Donald Cadzow and David Landis in the Susquehanna River in York County, Pennsylvania, and at Conowingo, Maryland, prior to their inundation beneath power dam waters (MacMahon 1996).

Table 1. Previously Identified Prehistoric Sites in the Vicinity of Fort Indiantown Gap, Pennsylvania

Site Number	Chronology/Tradition	Location/Setting	Elevation	Comments
*36LE34	Late Archaic; Woodland	Unidentified	Unidentified	No further information available; site destroyed
*36LE35	Late Archaic: Laurentian, Piedmont	Unidentified	Unidentified	No further information available; site destroyed
*36LE36	Late Archaic	Unidentified	Unidentified	No further information available
*36LE39	Late Archaic: Laurentian	Unidentified	Unidentified	Broadspears reported
36LE49	Late Archaic: Piedmont	Stream head	460 ft	Koens-Crispin and Snook Kill points; bannerstone; debitage
*36LE50	Late Archaic: Piedmont	Unidentified	400 ft	Non-diagnostic points; debitage (quartz/ quartzite)
36LE51	Unidentified	Ridge top	Unidentified	Isolate: black ironstone full-grooved axe
36LE52	Transitional; Woodland	Ridge top of Indian Branch Creek	480 ft	Triangular and Orient Fishtail points; untyped stemmed notched points; polished 3/4 grooved axe
36LE53	Unidentified	Stream junction	460 ft	Unidentified points
*36LE54	Unidentified	Unidentified	Unidentified	Unidentified points; debitage; 2 axes (broken)
*36LE55	Archaic: Piedmont; Woodland	Ridge top	510 ft	Susquehanna Broadspear; non-diagnostic triangular points; ground and polished stone; debitage
*36LE56	Late Woodland/Susquehannock	Stream flood plain/slope	620 ft	Indiantown Gap site includes excavated longhouse structure; Susquehannock ceramics
*36LE57	Late Archaic: Piedmont, Laurentian	Stream junction	640 ft	Stemmed Onondaga scraper; hammerstones; non-diagnostic points; debitage
*36LE58	Unidentified	Base of ridge	Unidentified	Unidentified spearpoints and hammerstones
*36LE59	Archaic; Woodland	Base of ridge	700 ft	Snook Kill and Koens Crispin points; non-diagnostic grooved axe; celt
36LE60	Archaic; Woodland	Floodplain of Swatara Creek	460 ft	Triangular point; bannerstone halves; fishing spear; hammerstones

Site Number	Chronology/Tradition	Location/Setting	Elevation	Comments
36LE61	Archaic; Transitional	Unidentified	460 ft	Perkiomen broadspear; Koens-Crispin and Snook Kill points
36LE62	Early Archaic; Transitional	Road cut	Unidentified	Kirk point; base of Susquehanna broadspear; non-diagnostic points; grooved axe
36LE65	Woodland	Unidentified	Unidentified	Triangular quartzite points; hammerstone; celts; choppers; hoes
36LE67	Late Archaic: Piedmont; Woodland	Lake shore (former creek floodplain)	Unidentified	Snook Kill, Koens-Crispin, and triangular points; bannerstone fragments; celt
36LE68	Transitional	Lake shore (former creek floodplain)	Unidentified	Non-diagnostic points; hammerstones; jasper semi-lozenge tool
*36LE69	Late Archaic: Piedmont, Laurentian; Woodland	Unidentified	Unidentified	Broadspears reported
*36LE70	Late Archaic: Laurentian; Woodland	Creek floodplain, base of mountain	520 ft	Otter Creek and triangular point; unidentified ground and polished ornament; broad axe
36LE83	Woodland	Unidentified	Unidentified	Triangular projectile points; drills; non-diagnostic points; debitage
36LE98	Late Archaic: Piedmont	Ridge slope	Unidentified	Lehigh and Steubenville base; non-diagnostic points; debitage
36LE99	Archaic; Transitional; Woodland	Slope near stream floodplain	500 ft	Perkiomen, Steubenville, triangular points; ground and pecked stone tools
36LE101	Late Archaic: Piedmont, Laurentian;Woodland	Hill slope	480 ft	Koens-Crispin, Steubenville, Rossville, Lehigh, and triangular points; single unidentified ceramic sherd
*36LE149	Late Archaic: Laurentian, Piedmont; Woodland	Unidentified	Unidentified	Broadspears reported
36LE361	Unidentified	Unidentified	Unidentified	No further information available

* Indicates sites on installation

TABLE 2. RECORDED ROCK ART SITES IN CENTRAL AND SOUTHEASTERN PENNSYLVANIA

Name/Number	Province	Setting	Water (distance)	Geology	Comments
Landefeld Farm (36CH486)	Piedmont Upland	stream terrace	50 m.	Bedrock: mica schist	Located on rock face overhang; "only rock exposed within 1 sq. mi.;" possibly a portable type. No further information available.
Big Indian Rock (36LA184)	N/A	mid-river	0 m.	Bedrock: mica schist	Petroglyphs on all rock faces; motifs include human, animal and geometric forms. **National Register listed.**
Little Indian Rock (36LA185)	N/A	Mid-River	0 m.	Bedrock: Mica Schist	Motifs include human, animal, and geometric forms. **National Register listed.**
Walnut Island (36LA187)	unidentified	unidentified	unidentified	unidentified	Part of Safe Harbor group; no further information available.
Creswell (36LA188)	unidentified	unidentified	unidentified	Unidentified	No further information available.
36LA898	Piedmont (?)	stream valley (?)	unidentified	limestone	Possible petroglyph reported in 1920s; revisit in 1980s identified "quartz-veined limestone which may have created impression of petroglyphs"
Circle Rock Petroglyph (36LA1091)	N/A	mid-river	0 m.	Bedrock: mica schist	Upstream from Big and Little Indian Rocks; site form indicates "probable Archaic and Woodland" temporal affiliation. Motifs include human (face, full view), animal (deer, turtle, elk[?], dog/canine), and geometric (concentric circles, dots, other).
Eagle Rock Petroglyph (36LA1092)	N/A	mid-river	0 m.	Bedrock: mica schist	In vicinity of Big and Little Indian Rocks; depicts human figure throwing spear, split-tailed birds, turkey tracks
Turkey Track Rock Petroglyph (36LA1093)	N/A	mid-river	0 m	Bedrock: mica schist	Part of Safe Harbor group of petroglyphs.
Snyder Site (36SC7)	Ridge and Valley	Stream terrace	15 ft.	Bedrock: shale	Site is near stream junction at the headwaters of the Western Branch Schuylkill River; cave is in vicinity. Motif reported as a "moonfaced" carving of possible Native American origin.

All of the reported rock art sites in the Susquehanna region are petroglyphs. The glyphs represent three categories of figures: anthropomorphic, animals, and geometric/abstract. Human forms, including full figures and body parts such as heads, hands and feet, are least abundant; full figures occasionally are armed. Animals depicted include fish; mammals such as deer, elk, and canines; birds, including large split tail "thunderbirds;" and reptiles such as snakes and turtles. Geometric forms include crescents, circles, and trident shapes often described as "turkey tracks" (Pennsylvania Archeological Site Survey [PASS] files; MacMahon 1996:*passim*).

Cadzow suggested that the Safe Harbor sites were Algonkian in origin; he based this cultural ascription on resemblances between the motifs of the Safe Harbor petroglyphs and those utilized in modern Ojibway art. Swauger agreed that the glyphs were of Algonkian origin, and further characterized them as "proto-Shawnee;" the Shawnee inhabited the Susquehanna region briefly ca. 1690 (Kent 1977).

Only two rock art sites have been reported outside of the Susquehanna Valley. The Snyder site (36SC7), located in Schuylkill County near the headwaters of the West Branch of the Schuylkill River, is located in the Ridge and Valley Province. The Landefeld Farm Petroglyph Site (36CH486) is in the Piedmont Province.

Cultural Sequence

As defined by Hatch et al. (1985:100-103), the major prehistoric cultural periods for the central Pennsylvania Ridge and Valley province include the Paleoindian (ca. 12,000-7,000 B.C.), the Archaic (ca. 7,000-1,800 B.C.), the Transitional (ca. 1800-800 B.C.), and the Woodland (ca. 1000 B.C. - A.D. 1550). The following discussion of culture history and site locations in the vicinity of the project area will follow the general prehistoric outline presented in Pennsylvania's *Comprehensive State Plan for the Conservation of Archaeological Resources* (Hatch et al. 1985), supplemented with data from contiguous areas of the Middle Atlantic Region.

Paleoindian. The earliest inhabitants of central Pennsylvania are referred to as Paleoindians. The Paleo environment in the Ridge and Valley province was dominated by the gradually warming climate of the late Pleistocene/early Holocene periods. By ca. 13,000 B. C., vegetation in the mountainous environment had begun to change from a tundra and spruce forest setting typical of colder glacial climates to one dominated by typical boreal forest species, including alder, juniper, poplar, red spruce, and white pine. As the climate became progressively warmer during the Holocene period, vegetation patterns continued to shift; deciduous species such as birch, maple, beech, hickory, and chestnut, became more abundant, and the dominant coniferous species was hemlock (Hatch et al. 1985:95).

Paleolndians are thought to have been groups of mobile hunter gatherers, recognized archeologically by fluted spearpoints that typically were made from high quality cryptocrystalline stone. Paleoindian hunters usually were associated with large game, including caribou, elk, and some extinct species that were adapted to boreal environments. Subsistence patterns also included hunting of a variety of smaller game, fishing, and the gathering plant foods (McNett 1985).

It is difficult either to discuss or predict Paleoindian settlement patterns for central Pennsylvania. The number of documented occupation sites is small; most reported Paleoindian associations consist of isolated finds of fluted points. Gardner (1977) has suggested that sources of suitable stone were important variables that influenced Paleoindian settlement locations. However, the largest documented Paleoindian site in the state, the Shoop Site of Dauphin County, does not fit well with the above-mentioned model proposed by Gardner (1977). Carr (1987) has

noted that the Shoop Site is located far from potential stone sources; this settlement may have served as a locus for hunting a variety of migratory game. Based on these considerations, the Indiantown Gap project area is not expected to contain Paleoindian sites.

Archaic Period. The Archaic Period can be divided into the Early (ca. 8000-5000 B.C.), Middle (ca. 5000-3000 B.C.), and Late (ca. 3000-1800 B.C.) subperiods. In general, human groups of the Archaic Period were adjusting to evolving Post-Pleistocene forest environments. More heterogeneous faunal and floral communities were available for exploitation in the ameliorating climate of the Holocene (Raber 1985:11). During the Middle and Late Archaic, the stabilization of the present oak/hickory/chestnut forest provided forage for mast-dependent species, predominantly deer and bear (KFS/Hunter 1995:III-8). Archaic lifeways were characterized by a broadening of the subsistence base, which presumably included a greater reliance on small game and plant foods (Cleland 1976). These changes were accompanied by new technologies and classes of tools, including grinding stones.

Throughout the Archaic, human populations appear to have increased. According to Kratzer et al. (1978:7-8), the "boom" in bifurcated base projectile points of the earlier Middle Archaic may have been related to the development of subsistence strategies geared to new deciduous forests and their resources. Increasing human populations might have led to utilization of more specific territories and of more localized sources of lithic raw materials. Evidence of Early and Middle Archaic settlement in central Pennsylvania is limited primarily to small quantities of projectile points found on sites with more substantial deposits from later periods. These Early and Middle Archaic components indicate "a pattern of widely scattered, relatively small occupations" (Archaeological and Historical Consultants 1987:3-4). Studies in the Bald Eagle Creek watershed have found evidence for Early and Middle Archaic exploitation of a variety of lithic raw materials, including Bald Eagle jasper; this situation implies a settlement pattern of high mobility to reach dispersed resources (Schindler et al. 1982). No sites in the vicinity of the project area contain evidence of occupation during the Early or Middle Archaic periods. Based upon settlement characteristics for the Ridge and Valley province and for the project vicinity, it is unlikely that Early and Middle Archaic sites will be found within the project area.

During the Late Archaic, human activity included even more specialized hunting and gathering. There is evidence that each group utilized a number of different sites in a regular fashion for scheduled subsistence and other tasks. These archeological sites are found in several kinds of upland and lowland settings within restricted territories; they contain tool assemblages pointing to fishing and gathering as important supplements to hunting (Kratzer et al. 1987:8). Hatch et al. (1985:102-103) suggest that the typical settlement pattern for the Late Archaic through the Early Woodland period consisted of large group base camps on valley floors, with specialized function camps related to foraging, hunting, preliminary food processing, and lithic procurement located on mountain slopes near second and third-order streams.

Thirteen documented sites within Fort Indiantown Gap contain Late Archaic components. These display two traditions, the Laurentian and the Piedmont, suggesting that the Blue Mountain/Lebanon Valley area may have been a zone of cultural interaction. Diagnostic projectile point/knife styles associated with the northern based Laurentian tradition include Snook Kill, Lehigh, and Otter Creek points; Late Archaic stemmed points such as Savannah River/Holmes, Bare Island, and Poplar Island types represent the southern-based Piedmont tradition thought to have migrated northward from the Chesapeake Bay region. The Laurentian/Piedmont dichotomy also is discernable in terms of lithic material; Laurentian phase toolmakerss tended to use high quality cherts and jaspers, while Piedmont tradition tools generally are crafted from lower quality lithics such as quartz and quartzite (Joe Baker, personal communication, 1996).

Elsewhere in central Pennsylvania, survey along the Allegheny Front has found clusters of large Late Archaic through Late Woodland period sites at the mouths of hollows. These sites evidence great tool variability and extended occupation. Dispersed and smaller satellite camps up the hollows reflect seasonal usage related to deer and nut availability (Stevenson 1982; Hatch et al. 1985:102-103). One conclusion from these site distribution studies is that, in contrast with earlier periods of prehistory, "Late Archaic sites are frequently large and dense, and Late Archaic points are relatively common on multi-component sites" (Archaeological and Historical Consultants 1987:3-4).

Transitional Period. Sites in the region that can be dated to the subsequent Transitional Period contain steatite cooking pots, more plentiful fishing equipment, and new types of projectile points, including the various points/knives of the broadspear tradition (KFS/Hunter 1995:III-9). Additionally, rhyolite, a stone with sources in south-central Pennsylvania outcrops, became a widely-used raw material for projectile points. Transitional peoples apparently relied more heavily on riverine food resources, and that they were covering relatively long distances in their subsistence pursuits (Archaeological and Historical Consultants 1987:3-5).

Woodland Period. The Woodland Period characterizes cultures that utilized ceramics and that began to subsist, in part, on domesticated plants. Traditional subperiods in central Pennsylvania include the Early Woodland (ca. 1000-500 B.C.), the Middle Woodland (ca. 500 B.C. - A.D. 1000), and the Late Woodland (ca. A.D. 1000-1700, or historic contact).

Early Woodland sites within the central Pennsylvania region reflect a variety of cultural traditions: Orient Fishtail points generally are found in association with steatite vessels, hammerstones, and ocher; artifacts associated with Meadowood phase occupations include bird stones, shaft and sinew smoothers, and polished celts; and Adena influence in the region is represented by gorgets, pendants, slate boatstones, copper beads, and tubular pipes (KFS/Hunter 1995:III-10).

The dominant Early Woodland ceramic type is the half-moon incised, cord-marked Fayette thick pottery. The use of ceramic containers for food processing and storage could have affected population dynamics in the Early Woodland. Food storage would have promoted "more sedentary, long-term settlements while partially offsetting the seasonal fluctuation of resources" (Kratzer et al. 1987:9). Other than the introduction of ceramics and of some minor changes in projectile point forms, the artifact assemblages of this subperiod are very similar to those of the Late Archaic. Kratzer et al. (1987:10) have suggested that Late Archaic and Early Woodland settlement patterns also might have been similar.

Early Woodland sites in Pennsylvania have yielded few cultigens (Archaeological and Historical Consultants 1987:3-5), although excavations at Meadowcroft Rockshelter in the southwestern part of the state have recovered corn (Zea mays) and squash (Cucurbita pepo), indicating the early use of cultigens in that relatively remote locality (Adovasio et al. 1981).

Knowledge of the Middle and Late Woodland subperiods in central Pennsylvania is much greater than that for earlier Woodland times. Middle Woodland period sites tend to be base camps with multiple domestic structures; the diagnostic point/knife is the Fox Creek type. The first part of the Late Woodland is associated with the Clemson Island culture. Clemson Island people continued the earlier Woodland practice of agriculture, hunting, fishing, and gathering wild plants. They also made grit-tempered pottery and broad-based, triangular projectile points. Their settlements consisted of small riverine villages with several oval or sub-rectangular huts (Archaeological and Historical Consultants 1987:3-6) and semisubterranean features known as "keyhole" structures that have been interpreted variously as sweathouses (Smith 1976, 1977) or smoking facilities (Hatch and Daugirda 1980).

On some central Pennsylvania sites, Clemson Island pottery styles overlapped those of the succeeding Shenks Ferry culture; a similar overlap was present with Shenks Ferry and later Susquehannock wares (Hatch 1980:323-324). Shenks Ferry pottery is adorned with incised rather than punctated rim decorations. The Shenks Ferry cultural continued to practice agriculture and to occupy small stockaded villages with oval huts (Archaeological and Historical Consultants 1987:3-6). Seasonal farming hamlets also may have been part of this and the succeeding Susquehannock phases in central Pennsylvania (KFS/Hunter 1995:III-10).

The Susquehannock culture gradually replaced that of Shenks Ferry. The Susquehannocks were historically known Indians who began to build large stockaded villages with longhouses near the major rivers of central Pennsylvania during the sixteenth century. Characteristic artifacts of the Susquehannocks include shell-tempered pottery and small, narrow triangular projectile points (Archaeological and Historical Consultants 1987:3-6). One documented Late Woodland site (36LE56) with Susquehannock ceramics is present within the project area (Table 2).

Further down the Susquehanna River, especially in Lancaster County, several large Susquehannock villages are documented. These settlements include the Schultz Site near Manor Township (Kent 1984:319-333). The Susquehannocks occupied the Lancaster County area by 1575, after a migration from smaller villages on the upper Susquehanna. A precise understanding of this migration is lacking (Kent 1984:13). While scattered evidence for a Susquehannock presence is available from the upper to the lower Susquehanna River areas, major village sites are not known (Kent 1984:311-314). Reanalysis of the Shenks Ferry sites with Susquehannock-like pottery may assist with the explanation of Susquehannock population movements.

The end of the Late Woodland witnessed population aggregation into a few stockaded villages, but several forms of Late Woodland settlement were present (Archaeological and Historical Consultants 1987:3-6). In Clinton County, early avocational archeologist T. B. Stewart (1939) was aware of both large villages and small camps dating from this period. Later professional work in the Bald Eagle watershed of central Pennsylvania identified four site categories: 1) nucleated (and sometimes stockaded) villages, 2) hamlets, 3) isolated farmsteads, and 4) hunting/resource camps (Hatch 1980).

More recently, Hay (1982:88-9) and others (KFS/Hunter 1995:III-10) have hypothesized a bipartite model of Late Woodland settlement for the region. The first class of sites, which comprises semi-permanent villages of various sizes, occur predominantly on valley floors adjacent to prime agricultural land. Some Late Woodland sites also are located in the vicinity of outcrops of black flint (Hay and Hatch 1980; Schindler et al. 1982). Late Woodland hunting camps, the second class of sites, are scattered diffusely and found near small streams and springs. Hunting parties probably would have visited these sites on a seasonal basis when agricultural activities slackened in the larger villages.

Historic Context

Introduction

Although this survey was intended to search primarily for evidence of prehistoric rock art, the survey team was aware that the potential also existed for historically generated rock art and historic rock inscriptions. Historic, cartographic, and ethnographic research conducted by KFS/Hunter in conjunction with preparation of a Cultural Resource Management Plan for Fort Indiantown Gap identified 172 potential pre-military archeological sites and standing structures within the installation. Thus, this report also incorporates an abbreviated version of a site-specific

historic context, with major historic periods based upon chronological format established in Pennsylvania's *Comprehensive State Plan for the Conservation of Archaeological Resources* (Hatch et al. 1985).

Colonial Period

After William Penn established the proprietorship of Pennsylvania on land west of the Delaware River in 1681 (Klein and Hoogenboom 1980:21), he administered the colony as a refuge from religious persecution and a land of ethnic diversity. As thousands of English, German, and Scots-Irish dissidents flocked to Pennsylvania, Penn purchased additional land from the indigenous Native American tribes, including the Delawares, Shawnees, Susquehannocks, and other Iroquoian groups. Eventually, Native American discontent with European trading practices and additional purchases of land led to conflict and mass emigration toward Ohio.

The fertile valleys east of the Susquehanna River along tributaries such as the Swatara Creek, attracted settlers beginning in the 1720s. A group of fifteen German Palatine families who had been living at Schoharie, New York, migrated to the Lebanon Valley in 1723. As Conrad Weiser later wrote, the group proceeded

> . . .from schochary to the SusqueHana River. . .and descended the stream to the Mouth of Suartaro Creek. . . .From there they came to tulpehockin. . .others followed [and] took lands without permission of the authorities. . .and against the will of the Indians for the land had not yet been bought from Them, there was no one among the People to control them, everyone did as he liked. . . . (quoted in Wallace 1945:31).

The Tulpehocken settlement was located midway between the present cities of Lebanon and Reading; at the time of the German migration from New York, this region was virtually uninhabited. Wallace (1945:36) observes that, when Conrad Weiser arrived there in 1729, "from crest to crest of the Blue and South Mountains that flanked it the forest stretched unbroken except where some Delawares or Shawnees had made clearings for their corn, or where the Palatines were setting up their homesteads and extending their plantations." The first purchases of land on the Blue Mountain, which at that time was incorporated as part of Lancaster County, were made ca. 1736 (KFS/Hunter 1995:III-11).

The French and Indian War, which began in 1754, devastated the settlements along the Susquehanna and its tributaries. In 1755, a combined force of 1,500 French and Indians left Fort Duquesne (Pittsburgh) to raid the settlements to the east. By October, this force had reached the Susquehanna Valley, where they proceeded to raid and burn settlements at Penn's Creek (Selinsgrove), and then reportedly crossed the Susquehanna. By November, 1755, the French and their Indian allies were raiding settlements and plantations along the Blue Mountains and along Swatara Creek (Weiser 1945:404-412).

Despite repeated petitions, the Assembly in Philadelphia lagged in sending assistance to the frontier settlements. As refugees streamed east in advance of the enemy, residents of the Lebanon Valley sought to organize their own defenses. Finally, at a January, 1756, conference at Carlisle, the Assembly agreed to establish three major forts along the Blue Mountain range at Lehigh Gap, at the Schuylkill River, and at Tolihaio on the Shamokin Trail (Weiser 1945:424). Smaller defenses also were established; a force of 50 was stationed at Manada Gap (Wallace 1945:425) and Brown's Fort was located near Indiantown Gap (KFS/Hunter 1995:III-13). Despite these defensive measures, however, Indian raids continued to take their toll in the Indiantown area,

and home sites frequently were abandoned (Weiser 1945:489; KFS/Hunter 1995:III-12). The Blue Mountain frontier remained insecure until the conclusion of the war in 1763.

By 1776, approximately 300,000 European settlers inhabited the commonwealth (Klein and Hoogenboom 1980:45), principally between the Delaware and Susquehanna Rivers. By 1785, population in the area east of the Susquehanna had grown sufficiently to warrant the creation of Dauphin County by dividing off the northern sections of what had been Lancaster County; the area included that portion that now is incorporated in Fort Indiantown Gap. John Harris' Ferry was selected as the seat of the new county. The town, laid out in 200 quarter-acre lots by John Harris's son-in-law William Maclay, originally was named Louisbourg in honor of Louis XVI, but it was renamed Harrisburg in 1791.

Nineteenth Century

In its first years as a city, Harrisburg became a regional center for commerce and travel (Dean and Associates 1980:7). In 1810, the state capital moved from Lancaster to Harrisburg, thus stimulating additional growth in the region (Morgan 1874:7). By 1813, the regions east of Harrisburg had acquired sufficient population to warrant the creation of Lebanon County (KFS/Hunter 1995:III-11).

The regions east of Harrisburg, including the Lebanon Valley, remained primarily agrarian. Local crops consisted of wheat and corn (Hatch et al. 1983:107), and lumbering developed as a profitable enterprise on the wooded slopes of mountain ridges like the Blue Mountains. Home sites and agricultural complexes were located in valleys between the mountain ridges; grist and lumber mill sites were located close to streams to exploit the readily available water power (KFS/Hunter 1995:III-13).

In 1836, one industrial complex was established within the present boundaries of Fort Indiantown Gap. This was the Manada Furnace, which went into blast in 1836. A small company town, with tenant housing for furnace workers and their families, was established at the furnace. The principal reason for locating an iron-manufacturing complex in this location was the availability of large amounts of timber for charcoal, and small cabin and hut sites associated with charcoal burning dotted the mountain slopes. Iron ore was obtained from the Cornwall mines in southern Lebanon County, and limestone for flux could be acquired from quarries in the Valley approximately 10 miles south of Manada (KFS/Hunter 1995:III-14). The Manada Furnace continued to operate until 1875; in common with other charcoal-fired furnaces of the region like the one at Cornwall, it could no longer operate profitably in the era of modern hot-blast anthracite furnaces (Bitner 1990:23).

At the beginning of the century, the Susquehanna River and its tributaries, including the Swatara Creek, provided the least expensive routes for transporting lumber and agricultural goods (Morgan 1874:11). However, increased traffic demanded improvements in navigation. As a result, the Union Canal, which connected the Susquehanna River at Middletown with Philadelphia via the Schuylkill River, was constructed. Portions of the Union Canal extended along the Swatara watershed. Harrisburg also became the center of a network of railroads, serving as a hub to the Northern Central, Pennsylvania, Cumberland Valley, Philadelphia and Reading, the Dauphin, Schuylkill and Susquehanna, and the Harrisburg and Potomac railroads (Morgan 1874:11). These railways were later incorporated into the Pennsylvania Railroad and Philadelphia and Reading systems (Dean and Associates 1980:9), the latter of which served the Lebanon Valley directly.

By the Civil War period, numerous communities had been established within the Lebanon Valley itself; the principal centers of population lay in the middle of the valley along the present

day US Rt 422 and the Reading Railroad. The smaller contiguous valleys of the Blue Mountain chain also contained a fully developed complement of churches, mills, schools, roadways, and home and farm sites. By 1875, communities within the immediate Fort Indiantown Gap region included Manada Furnace, Indiantown Gap, Ranktown, Bordnersville, and Keiserstown. Of particular interest were the settlements of Africa, a community of freedmen, and St. Joseph's Spring, a resort hotel complex located on the north slope of Blue Mountain (KFS/Hunter 1995:13-14). The use of the mountain ridges adjacent to the Lebanon Valley for development of resorts was a relatively common late nineteenth century phenomenon; for example, the present resort community of Mount Gretna, located on South Mountain, was first established in 1884 (Bitner 1990:24-26).

Twentieth Century

Around the turn of the century, road systems were improved and the automobile became a viable means of quick, affordable, and efficient transportation throughout the state. Electric trolley lines also linked the smaller communities of the Lebanon Valley like Annville with major cities such as Lebanon and Harrisburg (Martha Rudnicki, personal communication, 1995). The completion of the Pennsylvania Turnpike in 1940 capped numerous decades of road system improvement; the turnpike was the first of its kind in the country (Hatch et al. 1985:105).

During the early twentieth century, however, farming began to decline in importance in the region. This agricultural decline related directly to the establishment of the installation known today as Fort Indiantown Gap, because it presented the potential for the purchase of large tracts of land at relatively inexpensive prices. The installation at Fort Indiantown Gap was established by the State of Pennsylvania in 1931 to replace an older, inadequate, Pennsylvania National Guard (PNG) facility at Mount Gretna (KFS/Hunter 1995:III-14-15).

The first PNG encampment in the Lebanon Valley region had been established at Mount Gretna as Camp Siegfried in 1885, on a tract of land encompassing 120 ac. (Bitner 1990:28-29), and the PNG presence there quickly escalated. The annual encampment at Gretna contributed materially to the development of the resort facilities there; troop parades and other activities were major events for viewing by vacationers. However, by 1930, the Gretna facility lacked sufficient room to accommodate the requirements for operating modern weapons systems and the increased numbers of troops involved. The movement of the PNG training site to Indiantown Gap, coupled with the Great Depression, were responsible for the decline of Mount Gretna as a resort (Bitner 1990:155-156).

As initial construction of the facilities at Indiantown Gap began in 1932, the state government continued to expand the installation's boundaries. By 1934, the installation encompassed 10,000 ac. Activities at the installation included field artillery, cavalry, and infantry training. Through the 1930s, both the physical plant and the scope of training were enlarged. By 1939, the installation incorporated an aircraft landing field, a quartermaster's depot, several regimental camp sites, and numerous support buildings, most of which were constructed by the Civil Works Administration (CWA) and the Public Works Administration (PWA) programs of the federal government (KFS/Hunter 1995:III-16-18). Also worthy of note was the construction of the Appalachian Trail, a Civilian Conservation Corps (CCC) project; portions of the trail extended along the boundary of the installation on the southern slope of Blue Mountain.

In 1940, as World War II began in Europe and the possibility loomed that the United States could become involved in the conflict, the Indiantown Gap facility was leased by the State of Pennsylvania to the federal government. During the war, over 1,000 temporary buildings were constructed within the cantonment, and training areas were enlarged. At the end of the war, Fort

Indiantown Gap served as a separation center until it was declared inactive in 1946 (KFS/Hunter 1995:22-24).

The outbreak of the Korean War in 1951 saw reactivation of the installation under federal authority, and in 1957 the facility became the headquarters of the 21st Army Corps, with responsibility to supervise Army Reserve units. The camp again was pressed into federal service during the 1970s and 1980s, when it served as a resettlement center for almost 200,000 Cuban, Vietnamese and Cambodian refugees (KFS/Hunter 1995:24-25; Jeff Olsen, personal communication, 1996). At present, federal responsibility for the installation is gradually being transferred back to the State of Pennsylvania.

CHAPTER III

RESEARCH OBJECTIVES AND METHODS

Research Objectives

Fort Indiantown Gap was selected as a survey venue for the Rock Art project due to its location in proximity to counties where rock art sites previously had been identified and because its topographic configuration represented an environment in which exposed rock outcrops or large boulder deposits could be expected to occur. The primary objective of the survey undertaken at Fort Indiantown Gap was to examine a representative sample of the various topographic and ecological zones within the installation and to identify rock art sites within these sample survey areas. Although the major emphasis of this study focused upon Native American rock art, historic inscriptions and motifs also were to be recorded, if found.

Archival Methods

Archival research included review of the prehistoric and historic background of the project area and vicinity, as well as examination of archeological site forms and written reports on prehistoric rock art sites in the general vicinity of the installation. Examination of archeological and historical reports and historical maps was undertaken at the Pennsylvania State Museum; at the State Library in Harrisburg; and in cultural resource management files located at the installation itself. This preliminary research was intended to determine the nature and number of previously identified sites within the installation; and, to provide a context for the interpretation and assessment of the significance of newly discovered rock art and traditional archeological sites.

Current USGS 7.5 min topographic maps of the installation also were reviewed to identify survey areas where the potential for rock art would be greatest. This phase of research and survey planning was undertaken in consultation with the primary project consultant, who identified areas of potentially high probability for rock art within the installation.

Field Methods

Survey methods consisted of pedestrian and windshield reconnaissance of four previously identified areas of the installation (Figure 2). Prior to inspection of each of these areas, the entire Blue Mountain ridge line from Manada Gap to the end of the small arms ranges at the installation was examined through binoculars to identify obvious areas of exposed rock. Area A, designated as Manada Gap, incorporated portions of the deeply dissected gap through the Blue Mountain range at Manada Creek; approximately 450 m of this area were examined by pedestrian reconnaissance, and an additional 1,000 m of Manada Gap itself were surveyed by automobile. Area B, designated as Manada Creek, included an approximately 1,200 m stretch of the deeply incised middle reaches of that stream. Area C, Indiantown Gap, incorporated portions of the gap through which Indian Creek pierces the Blue Mountain range; approximately 750 m of the creek and associated gap area were subjected to pedestrian survey. Area D was designated as Blue Mountain; pedestrian reconnaissance included examination of a track of approximately 4.5 km that included the north slope, south slope, and ridge crest.

For each area, environmental factors were noted on two types of forms developed specifically for this study. The base line survey sheet permitted characterization of the general area of survey. Data recorded included observations on the degree of surface visibility; slope and elevation ranges; terrain characteristics; vegetation; proximity to water; and area geology and lithology. The rock art recordation form permitted notation on the general rock art type; motif; coloration; lithology; orientation; and observed associated cultural remains. Grid sheets permitted the execution of scaled drawings, where relevant. General contextual photographs were take of all areas surveyed, and all discovered rock art and associated cultural features were photodocumented. Copies of these recordation forms have been appended to this report.

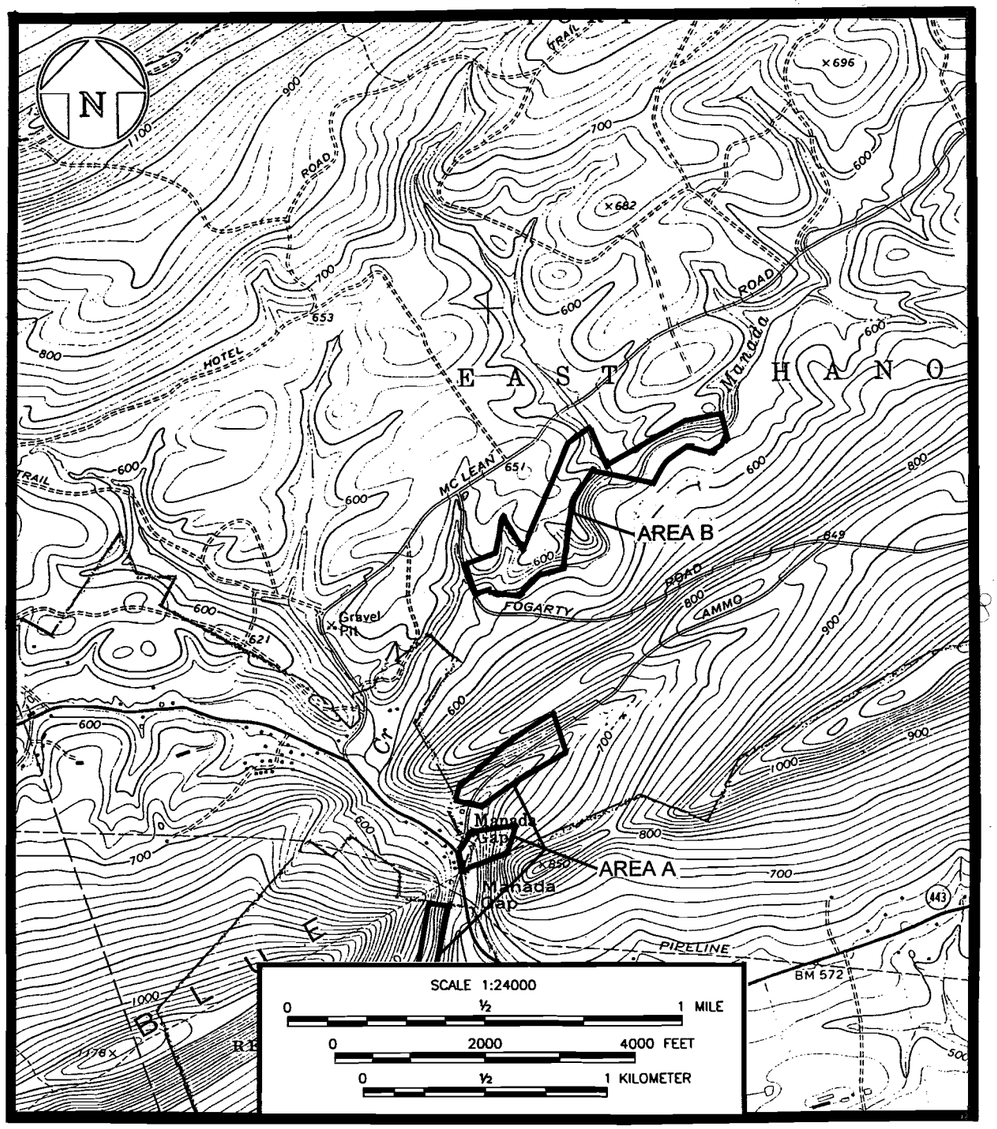

Figure 2. Excerpts from the USGS Indiantown Gap (Photorevised 1977) and Grantville (Photorevised 1975) 7.5' quadrangles, showing the four areas surveyed at Fort Indiantown Gap

CHAPTER IV

RESULTS OF SURVEY

Archival Results

Review of archeological site files at the Pennsylvania Historic and Museum Commission revealed that 30 prehistoric archeological sites previously had been identified in the vicinity of the study areas surveyed at Fort Indiantown Gap (Table 1); 14 sites are located within the boundary of the installation. These files suggests that intensive prehistoric exploitation of the Ridge and Valley portion areas of Lebanon and Dauphin Counties commenced during the Late Archaic/Transitional period, and that it declined during the Woodland period. Two traditions are identifiable on Late Archaic sites at Indiantown. The Laurentian tradition represents point styles typical of Canadian/Northern New York areas, while the Piedmont tradition is identified by the presence of projectile points/knives typically found in the Chesapeake Bay drainage to the south. The discovery of these two traditions, sometimes intermixed on the same site, suggests that the Pennsylvania Ridge and Valley province may have acted as a zone of cultural interface beginning during the Late Archaic period. At the time of European contact, elements of the Delaware and Shawnee nations occupied the adjacent Lebanon Valley (Wallace 1945).

Eleven prehistoric rock art sites have been been found in counties in the vicinity of Fort Indiantown Gap; of these, all but two are located along or close to the Susquehanna River in Lancaster County. All sites are petroglyphs; motifs represent anthropomorphic, animal, and geometric designs. No definite chronology or cultural tradition has been defined for this array of rock art. However, Swauger has posited some cultural affinity with ethnographically observed Ojibway motifs, while others have suggested a Shawnee origin for the glyphs in the Susquehanna River (Kent 1977). Validation of the latter hypothesis would date the major petroglyphs in south-central Pennsylvania to the Late Woodland or Contact period.

Permanent historic occupation of the Lebanon Valley began during the first quarter of the eighteenth century, when groups of Palatine Germans emigrated there from New York. Through the end of the nineteenth century, the Lebanon Valley/Blue Mountain region remained primarily an agricultural area. The few industrial enterprises focused primarily on extractive pursuits such as lumbering and quarrying, or were associated with primary processing of agricultural and forest derived commodities. One iron furnace was established in the region during the middle nineteenth century. Tourism and recreation became a moderately important source of revenue during the late nineteenth century, and increased in importance with improved transportation access into the region during the twentieth century. The military presence represented by Fort Indiantown Gap initially was established in 1885 at Mount Gretna; the present installation was acquired by the State of Pennsylvania in 1931.

Results

Area A (Manada Gap)

The Manada Gap survey area is located at the extreme western end of the installation, and encompasses the point at which the Manada Creek and Pa Rte 443 cut through the Blue Mountain range. A segment of the Appalachian Trail formerly extended through the area. Two discrete sub-

areas around the gap were surveyed: an approximately 450 m segment of gravel surfaced roadway that ascended a peripheral tributary drainage of Manada Creek, and an approximately 1,000 m stretch of the western side of the gap itself (Figure 2).

Elevations within both sub-areas ranged between 500 and 850 ft amsl, and natural slopes ranged from 31 to 37 per cent (28° - 33°). No naturally occurring exposed rock faces were observed. Forest canopy within these areas was predominantly Eastern hemlock (*Tsuga canadensis*), with occasional hickory (*Carya* spp.) and oak (*Quercus* spp.) trees; little or no understory growth was present within forested areas (Figure 3). The acute pitch of the slopes, together with the dense forest canopy, hindered observation of higher slope faces. Underlying bedrock, which was identified from surface scree deposits on the steeply dissected slopes, consisted of metamorphosed sandstones and shales.

Within the Manada Gap sub-area, no surfaces suitable for rock art were observed. Along Ammo Road, however, two large boulders of metamorphosed sedimentary rock were identified at the base of the steep ridge slope (Figure 4); each of these presented surfaces suitable for the application of pigments (pictographs) or incising (petroglyphs). Examination of all exposed faces of these boulders, however, revealed no rock art; further, lichens and generalized weathering had caused spalling of the cortex of these boulders. It is likely that any rock art would have been severely damaged as a result of these natural forces.

One historic period rock inscription was identified on an approximately 1 m wide stone step leading to an enclosed spring adjacent to Ammo Road. The metamorphosed sandstone step appears to have been quarried and is inscribed "S. K. 1895" (Figure 5). The spring enclosure itself was constructed in 1936 by the Civilian Conservation Corps (Figure 6), probably in connection with the development of the Appalachian Trail. Other historic features noted in this area included two mortared stone culverts leading to corrugated pipe conduits that extended beneath Ammo Road, and a square mortared stone chimney base with round flue liner that may have been associated with a former Appalachian Trail cabin shelter.

Area B (Manada Creek)

The Manada Creek survey area encompassed the middle reaches of the stream north and east of its junction with Manada Gap, in the extreme northwestern portion of the installation. The Manada Creek floodplain in this area is intersected by an unnamed gravel-surfaced tank and heavy vehicle track and asphalt-paved Fogarty Road (Figure 2). An approximately 1,000 m segment of the northern bank of the creek was examined by means of pedestrian survey.

Elevations within Area B ranged between 520 and 600 ft amsl, with natural slopes ranging between 4.4 and 28 per cent (4° - 25°). No naturally occurring exposed rock faces were observed. Forest canopy within these areas was predominantly hemlock (*Tsuga canadensis*), with occasional hickory (*Carya* spp.), red oak (*Quercus rubra*) and affiliated oak species, and black cherry (*Prunus serotina*) trees; the sparse understory growth included sassafras (*Sassafras albidum*) and wild grape in forested areas, with blackberry, poison ivy, greenbriar, and field roses prevalent within unforested flood plain areas. The steep slopes and dense forest canopy hindered observation of higher slope faces (Figure 7). Underlying bedrock, which was identified from surface scree deposits on the steeply dissected slopes, consisted of metamorphosed shales.

Within the Manada Creek sub-area, no exposed outcrops, large boulders, or rock shelters suitable for rock art were observed.

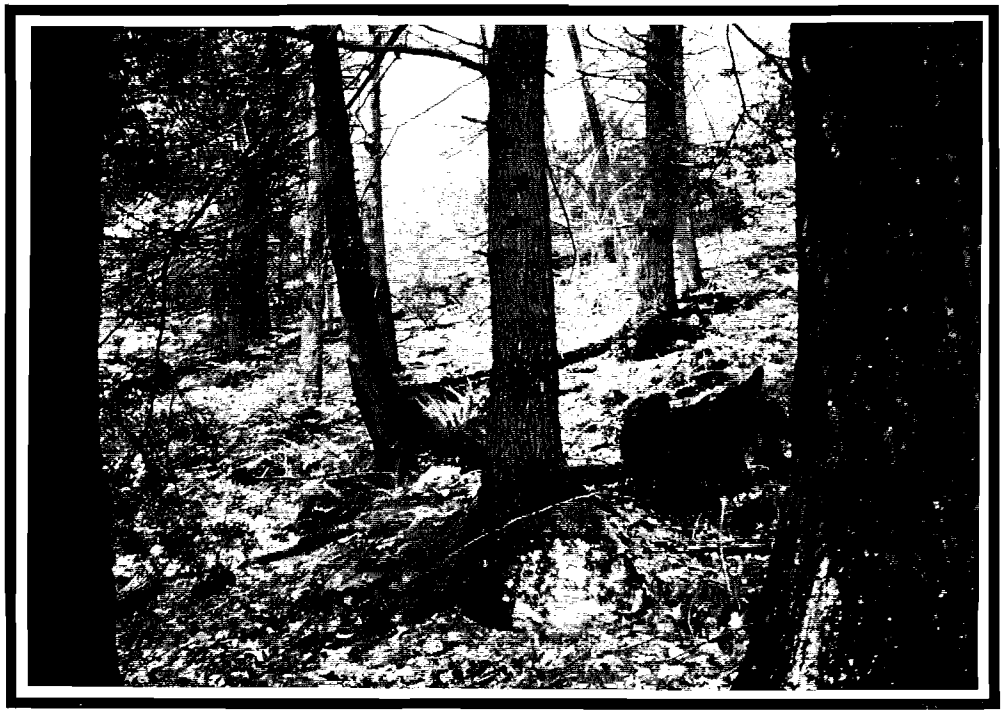

Figure 3. View of characteristic ridge slope at Manada Gap (Study Area A)

Figure 4. View of characteristic large boulders at base of ridge slopes (Study Area A)

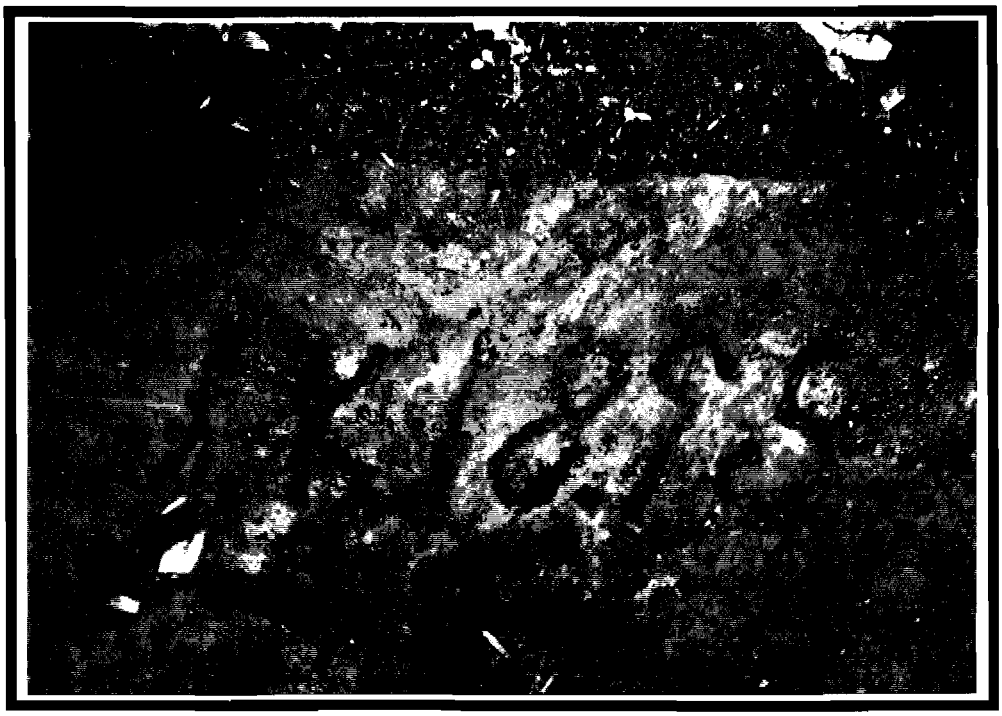

Figure 5. Historic inscription incised into stone door sill (Study Area A)

Figure 6. View of 1936 mortared stone spring box (Study Area A)

Figure 7. View of characteristic ridge slope along middle reaches of Manada Creek (Study Area B)

Area C (Indiantown Gap)

Like Manada Gap, Indiantown Gap is a deep narrow pass that has been cut through the weather-resistant sand stone and shale ridges of the Blue Mountain by hydraulic activity. The Gap is located northwest of the installation's main cantonment; Pa Rte 443, which currently extends along the base of the Blue Mountain, turns north to run adjacent to and cross Indiantown Run, a principal tributary of the Swatara Creek. An approximately 2,000 m stretch of the gap was subjected to pedestrian survey (Figure 2).

One prehistoric site (36LE56) has been recorded at the northwestern entrance to the Gap, on a low sloping bench 300 m west of the stream. Excavation by non-professionals determined that the remains represented a post-contact Native American occupation of Susquehannock affiliation. The excavated 15 x 30 ft long house contained three interior hearths; the fact that both historic and prehistoric artifacts were recovered verifies the site's interpreted temporal affiliation.

Elevations on either side of the steeply sloped Indiantown Gap range from 570 ft amsl along the Indiantown Creek floodplain to over 1000 ft on the upper slopes of the neighboring ridges. Gradients range from 37° (41 per cent) on the western slope of the Gap to 29° (32 per cent) on its eastern slope.

The sandstone and shale ridges are overlain primarily by shallow well-drained shaly and silty loams of the Weikert soils, although Rubble Land is found at the southeastern entrance to the Gap; gray shale bedrock typically is encountered 30 cm (12 in) below the surface (bs). Rubble Land (Ru) represents steep slopes on which 90% of the surface is covered with gray and red sandstone larger than 25 cm in diameter. Both varieties of soils within the Gap possess the potential for rock outcrops and escarpments.

The survey revealed a dichotomous distribution of vegetation cover. A mixture of hemlock (*Tsuga canadensis*) and deciduous trees, including white oak (*Quercus alba*) and aspen (*Populus grandidentata*), were found along the creek flood plain, with hemlock stands becoming dominant as elevation increased. Roadside vegetation in open areas included grasses, meadow flowering plants, wine berry, blackberry, poison ivy and field rose. Visibility extended up slope for a distance of approximately 100 - 150 m, depending upon existing vegetation and slope.

Pedestrian survey confirmed the terrain and geological composition expected within the Gap. Weikert shaly silt loam predominated throughout, with the exception of Rubble Land in the southeastern quadrant. Although only small outcrops in recent stream cuts were observed, a large rock escarpment was found within the Rubble land region (Figure 8). Closer inspection revealed that this area had been quarried during recent times, as evidenced by drill impressions in rock fragments (Figure 9), a drill bit imbedded within the stone face, and three vehicular access roads trisecting the escarpment at different elevations. Neither historic nor prehistoric drawings or carvings were observed on the rock face or adjacent loose stones.

Area D (Blue Mountain)

Survey Area D comprised a transect loop that encompassed the ridge top and upper slope areas of Blue Mountain immediately northwest of the small arms ranges on the installation (Figure 2). The entire loop measured approximately 5.07 km (3.17 mi) and it traversed both the northern and southern slopes of the ridge. Elevation readings for the route on the moderately sloped northern face of the ridge ranged between approximately 870 ft amsl and 1160 ft amsl; on average, the pitch of this slope measured 7.5° (8.3 per cent); on the more steeply sloped south side of the ridge, gradients measured between 17° and 25° (18.8 - 27.7 per cent).

Underlying bedrock consists of decomposing metamorphosed sedimentary rocks. Soils mapped for this area include Weickert shaly silt loam, 25 to 50 per cent slope; Hazleton extremely stony sandy loam, steep; and Laidig extremely stony loam, 8 to 25 per cent slopes. None of these soils is suitable for agriculture due to the steep slopes and stony character of the upper strata; relatively recent rock slide activity was evident. Occasional rock outcrops are associated with all soil types in this area.

Vegetation cover along the transect route varied considerably with elevation and soil type. Species present on the ridge crest and upper steep slopes included black and red oak (*Quercus velutina* and *Quercus rubra*), sugar and red maple (*Acer rubrum* and *Acer saccharum*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*) on the fringes of cleared areas, and occasional hemlock (*Tsuga canadensis*); the understory was sparse or non-existent on the higher ridge elevations. A mixture of hemlock and deciduous trees, including chestnut oak (*Quercus prinus*), yellow birch (*Betula alleghaniensis*), yellow poplar (*Liriodendron tulipfera*), and sugar maple (*Acer saccharum*) characterized the lower, more concave slope areas; in occasional open areas created by tree falls and rock slides, thick stands of sassafras, pokeweed, or ferns formed the principal understory species. Dense stands of hemlock predominated along slopes descending into dissected creek valleys. Visibility varied considerably, depending upon the amount of understory and the degree of slope in any given area.

No rock outcrops, rock shelters, or boulders of sufficient size to accommodate rock art were observed during this portion of the installation survey, and no rock art sites were identified.

One previously unrecorded historic archeological site was observed at an elevation of approximately 800 ft amsl on slightly to moderately sloped terrain. The feature consisted of a slightly raised circular mound, approximately 15 ft in diameter, surrounded by a depressed drainage ditch. Subsequent historic research revealed that this feature probably comprises the base of a charcoal burner's hut (Bitner 1990:79, 165). It is probably of mid to late nineteenth century origin, and most likely resulted from activities associated with the operation of the Manada Iron Furnace (1836-1875).

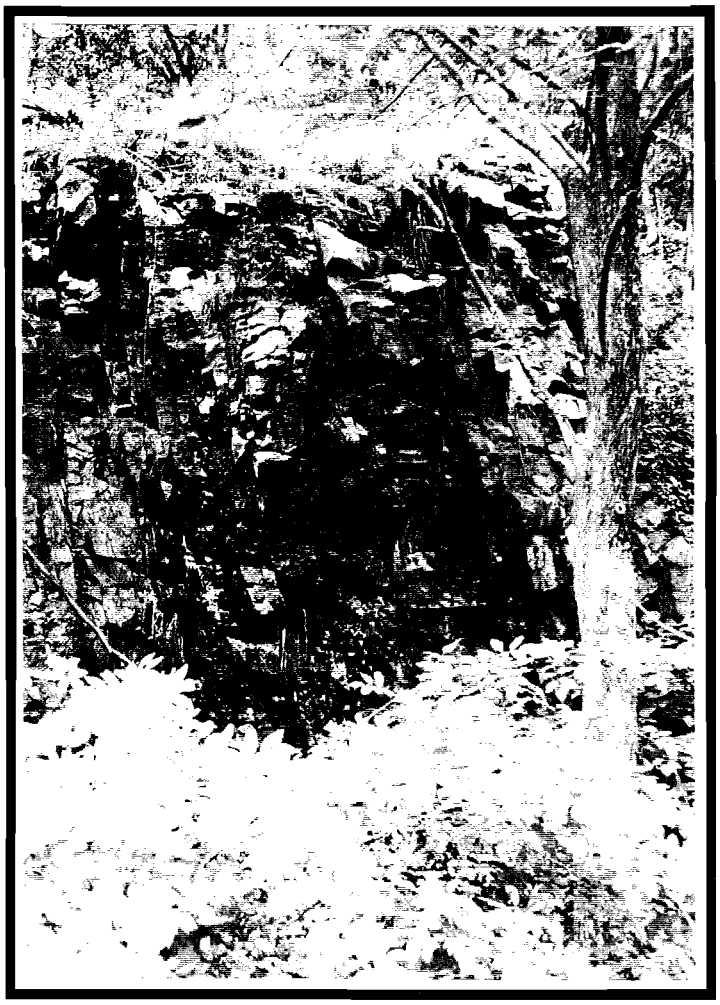

Figure 8. View of exposed rock face of historic quarry at Indiantown Gap (Study Area C), showing typical vertical uplift fault and fracture lines

Figure 9. View of drilled hole in detached quarried rock at Indiantown Gap

CHAPTER V

SUMMARY AND RECOMMENDATIONS

This report has presented the results of a preliminary reconnaissance of selected areas of Fort Indiantown Gap Military Reservation, an Army Reserve and Pennsylvania National Guard training facility located in Dauphin and Lebanon Counties, Pennsylvania. The study was conducted by R. Christopher Goodwin & Associates, Inc. on behalf of the Atlantic Division of the Naval Facilities Engineering Command (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeastern United States. The primary objective of the study was to identify potential prehistoric rock art sites within Fort Indiantown Gap.

Established in 1931, Fort Indiantown Gap occupies an 18,900 ac tract in the northern portions of the Lebanon Valley and Blue (Kittatinny) Mountain Range (Figure 1). The underlying geomorphology of the Ridge and Valley portions of the installation consists of steeply folded metamorphosed sedimentary rock. The installation's major residential and administrative cantonment and a helicopter landing field are situated on the level Swatara Creek valley. Active small arms, tank maneuver, and firing ranges; troop bivouac areas; and an Air National Guard bombing range occupy portions of the more remote mountainous sections of the facility. The installation is criss-crossed by unpaved tank and vehicle trails, as well as several paved roads.

Fort Indiantown Gap was selected as a rock art survey area for three reasons: (1) prehistoric rock art sites had been reported in three adjacent counties; (2) the Ridge and Valley sections of the installation were felt to offer several environmental zones where rock art potentially could occur; and (3) as an Army National Guard training facility, the installation partially satisfied contractual requirements of the Scope-of-Work, which mandated on-site inspection of one facility for each service branch.

Results

Results of field investigations.

Three distinct environmental zones within the installation were sampled (Figure 2). These included mountain ridgetops and upper slopes above an elevation of 800 ft amsl (Area D: Blue Mountain); the deeply incised stream gaps through the Blue Mountain ridgeline (Areas A and C: Manada Gap and Indiantown Gap); and the steeply sloped upper reaches of one stream valley (Area B: Manada Creek). The total length of the linear transects surveyed was 8.52 km; an additional 1 km was subjected to windshield survey, and the entire length of the upper slopes of the Blue Mountain ridge were examined through binoculars to identify possible rock outcrop areas.

Only one of the four survey areas contained naturally occurring rock outcrops or boulders that might have provided suitable surfaces for prehistoric period pictographs or petroglyphs; this was a concentration of moderately to heavily weathered metamorphosed sedimentary boulders located near the base of the ridge at Manada Gap (Figure 4). All other identified exposed rock faces were created artificially through historic quarrying activity at Indiantown Gap (Figure 8). No prehistoric pictographs or petroglyphs were recorded.

One example of historic period rock art, an incised inscription, was identified in the Manada Gap survey area. The inscription had been carved into a quarried stone step that provided access to a stone springbox. The springbox itself had been installed by the Civilian Conservation Corps in 1936, probably in connection with development of the Appalachian Trail. Since the incised step carried a date of 1895, it is likely that it had been moved to this location from elsewhere on the reservation.

Although the identification of traditional terrestrial sites was not a principal objective of this study, two historic archeological sites were identified. A concentration of historic features, including the previously mentioned springbox, two mortared stone culverts, and the mortared stone base of a cabin chimney, were noted along Ammo Road, approximately 300 m northeast of its intersection with Pa Rte 443. The second site was located at an elevation of approximately 800 ft amsl, on the southern face of the Blue Mountain; this site was identified as the circular base of a nineteenth century charcoal burner's hut. Neither site had been identified during previous cultural resource surveys of the installation.

The results of the survey at Fort Indiantown Gap suggest that the the areas with the highest potential for prehistoric rock art would be at the bases of concave ridge slopes where large boulders had lodged. The survey also demonstrates that even the more remote mountainous portions of the installation that have not been surveyed archeologically may contain potentially significant prehistoric and historic archeological sites.

Threats to Potential Resource Base

Natural Agents. The underlying geology of the mountainous areas of Fort Indiantown Gap is essentially unstable; large areas of rock scree that has eroded from the ridge crest and upper slopes were observed along the upper ridges of Blue Mountain. The natural weathering and erosion that produced these areas will continue, and there would appear to be little that could be done to retard the process. Along the deeply incised stream valleys and gaps, the principal threat to preservation of potential rock art sites would occur during periods of flooding.

Human Agents. Adverse impacts to both potential rock art and traditional archeological sites may result from four types of activities at Fort Indiantown Gap:

1. military training exercises that utilize the ridge slopes and crests of the Blue Mountain as impact zones;
2. construction of access roads through the Ridge and Valley portion of the installation, and repetitive use of these roads by heavy vehicles, including armored vehicles;
3. exploitation and extraction of the timber and lithic resources of the Blue Mountain ridges; and,
4. recreational use of the ridge and valley areas of the installation (e. g., for hunting, fishing, and hiking).

Recommendations

Short-term

The two historical archeological sites identified during this survey should be registered with the Bureau of Historic Preservation (BHP) of the Pennsylvania Historical and Museum Commission (PHMC).

Long-term

Identification. Prior to this study, the ridge and valley areas of Fort Indiantown Gap had not been subjected to systematic archeological survey. Therefore, it is highly recommended that a more intensive Phase I survey of this environment be undertaken. This survey should sample the lower, more gradual slopes of the Blue Mountain ridges, particularly at elevations between approximately 600 and 800 ft amsl. The most likely venues for rock art in the ridgeslope environment would be the facades of large boulders that have lodged at the base of steeper ridge slopes.

The research design and survey methodology both should focus explicitly on identifying both traditional sub-surface archeological components, but also potential rock art sites. Any rock art or traditional terrestrial sites should be registered with the BHP/PHMC.

Evaluation and Mitigation. All identified sites in the poorly understood zone of the installation should be avoided both for military training activities or recreational use. If avoidance is not feasible, standard Phase II archeological testing techniques should be applied, where warranted by the results of standard Phase I testing, to traditional terrestrial sites, to evaluate their potential eligibility for listing in the National Register of Historic Places. Rock art and terrestrial sites that meet the Criteria for Evaluation of the National Register of Historic Places (36 CFR 60.4 [a-d]) should be nominated for listing in the Register.

All identified rock art sites that cannot be avoided or that appear to be subject to severe adverse environmental conditions should be documented utilizing professionally accepted techniques for rock art recordation. Given the generally unstable nature of the geological deposits on Blue Mountain, all identified rock art sites also should be inspected on a regular periodic basis to assess the extent to which weathering and erosion are impacting them adversely.

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APPENDIX III

SITE REPORT: MCB QUANTICO

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Project Background

This report presents the results of a preliminary pedestrian reconnaissance of selected areas of the Marine Corps Combat Development Command (MCB Quantico), located in Prince William, Fauquier, and Stafford counties, Virginia. This study was conducted by R. Christopher Goodwin & Associates, Inc., under contract to the Atlantic Division of the Naval Facilities Engineering Command, Atlantic Division (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeast. The primary objective of this preliminary Phase I study was to identify potential prehistoric rock art sites within MCB Quantico, one of four DoD installations proposed for sample survey.

MCB Quantico occupies approximately 56,000 ac along the middle reaches of the Potomac River drainage (Figure 1). The US Rt 1/Interstate Rt 95 corridor bisects the installation. The installation extends from Quantico Creek in the north to Aquia Creek in the south. The facility currently serves as the principal combat training center for the United States Marine Corps; a Federal Bureau of Investigation training facility also is located within the installation. The major administrative and residential cantonment is located east of I-95; active training and firing ranges and subsidiary camps and bivouac sites are scattered throughout the Piedmont portion of the installation west of I-95. The western portion of the installation is criss-crossed by unpaved tank and vehicle trails.

Christopher R. Polglase, M.A., ABD, served as Principal Investigator and oversaw all aspects of the study. Martha R. Williams, M.A., M.Ed., was the Project Manager and supervised the field surveys; she was assisted in the field Merril Dunn.

Organization of the Report

Chapter I describes the project area and the organization of the report. Chapter II describes the natural setting of the project area, and develops the regional prehistoric and historic contexts, with special emphasis on Native American rock art in Virginia and the Potomac watershed. Chapter III describes the research design and the methods utilized for the survey; Chapter IV presents the results of the survey; Chapter V considers those results from a management perspective.

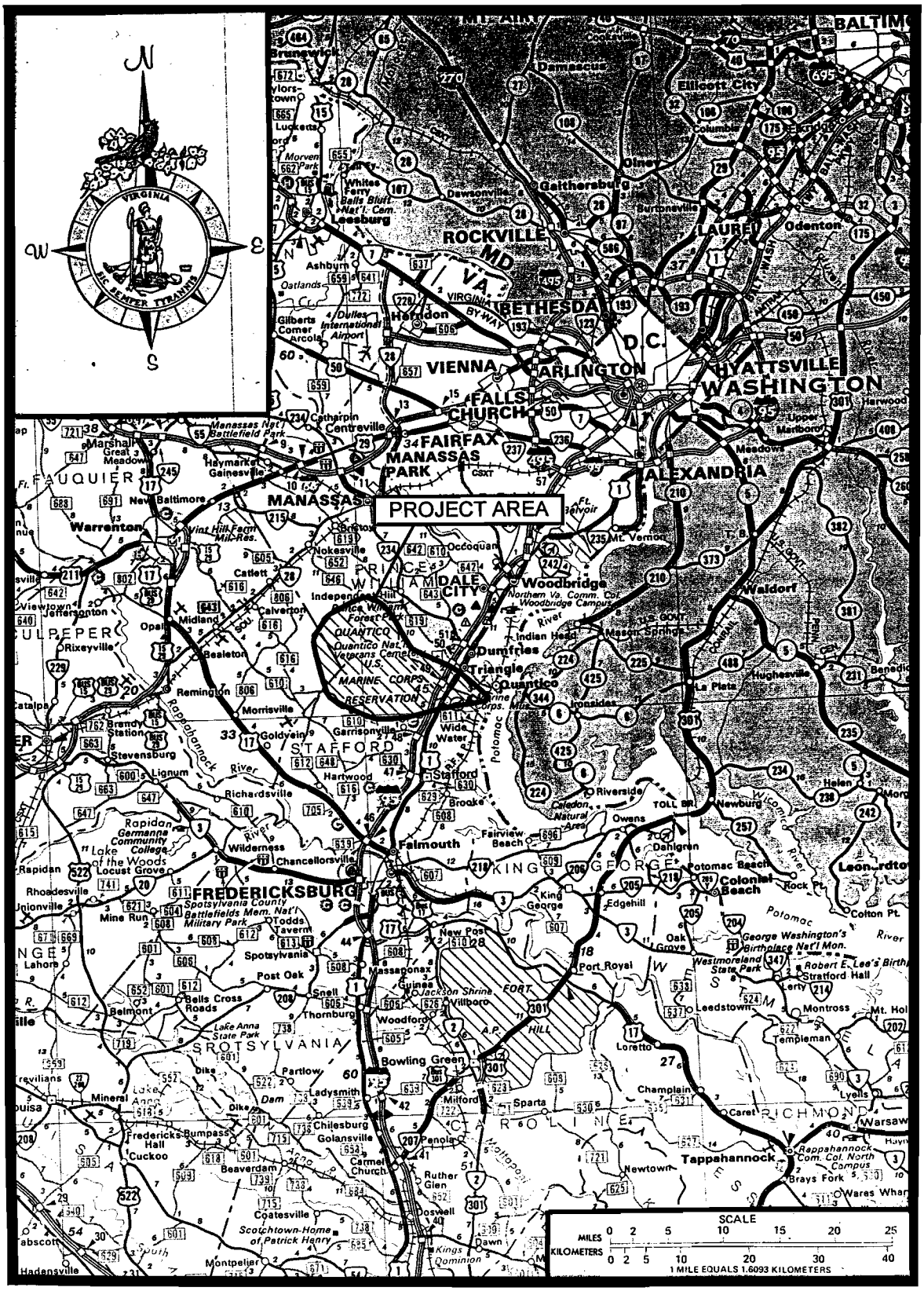

Figure 1. General location of the MCB Quantico project area in Virginia

CHAPTER II

NATURAL AND CULTURAL SETTING

Natural Setting

MCB Quantico occupies an approximately 56,000 ac tract that incorporates portions of the Atlantic Coastal Plain and Piedmont Plateau physiographic provinces in Prince William, Stafford, and Fauquier Counties, Virginia (Figure 1). The installation is divided into two main parts: Mainside, which lies between US Rt 1 and the Potomac River, has undergone intensive development as the residential and administrative center of the installation since its establishment in 1917; the westside portion of the installation, which lies west of the US Rt 1/I-95 corridor and encompasses the largest section of the facility, has been developed primarily for training areas and also houses the Federal Bureau of Investigation (FBI) Training Academy.

The Atlantic Coastal plain portion of MCB Quantico is an area of moderately sloping ridges; the Piedmont Plateau region is characterized as an area of moderately to steeply sloping ridges that are incised by the headwaters of major stream drainages. Topography and terrain throughout the reservation has been modified extensively. Large portions of the mainside section have been developed to accommodate base administrative buildings, residential housing, recreational facilities such as golf courses, minor training activites, maintenance shops and warehouses, and a helicopter and small aircraft landing field. Utilization of the major maneuver, firing range, and training range areas west of the I-95 corridor have modified the topography extensively, and several major streams have been impounded to create three reservoirs for installation water supply.

The installation encompasses all or part of the watersheds of four principal stream systems: Quantico Creek, Chopawamsic Creek, Aquia Creek, and Cedar Creek. The numerous smaller streams, drainages, and swales that dissect the Piedmont Plateau all are tributaries of these major drainage systems. Quantico, Chopawamsic, and Aquia Creeks all drain directly into the Potomac River, forming estuaries with broad alluvial floodplains and large associated wetland areas near their confluence with the Potomac.

The dominant geology within the Coastal Plain Region consists of Pleistocene deposits of silts, sands, gravels, and cobbles; these are visible along eroded bluffs and banks adjacent to the Potomac River. The underlying geological deposits of the Piedmont consist primarily of shales, sandstones, and conglomerates, with small pockets of metamorphic and igneous rocks interspersed (McClane and Voight 1996:8). Major soil associations mapped for this region include the Sassafras-Aura-Caroline Association and the Dumfries-Lunt-Marr Association. Four major associations underlie those portions of the installation in the Piedmont region: Appling-Cecil-Ashlar, Cullen-Mecklenburg-Orange, Nason-Elioak-Manor, and Gaila-Buckhall-Occoquan (Isgrig and Stroebel 1974; Elder 1989). Lithic materials available for exploitation by prehistoric peoples would have included primarily quartz and quartzite, available as stream cobbles or in occasional rock outcrops within the Piedmont region.

Vegetation throughout the installation consists primarily of mixed second-growth deciduous forests, except in cleared or developed areas. Occasional stands of Virginia pine characterize recently logged or cleared areas that have been permitted to revert to forest.

Prehistoric Setting

Previous Investigations

Within the past five years, several major comprehensive archeological investigations have been undertaken within MCB Quantico. In 1993, the William and Mary Center for Archaeological Research conducted a comprehensive systematic Phase I sampling survey of the entire installation (Huston and Downing 1993). The sample involved testing and reconnaissance within 6 north-south transects across the installation, for a total of 44.2 km (27.4 mi). Nine previously identified sites were relocated and verified, and 56 new sites were discovered on base property; 26 of these were assessed as potentially eligible for listing in the National Register of Historic Places. Supplemental work (Huston et al. 1996) involving intensive survey of 22 10-ac blocks (aa total of 89 ha [220 ac]) in 1994 and 1995 resulted in the identification and evaluation of 32 sites, 11 of which were assessed as National Register eligible.

In 1995, Gray and Pape, Inc. surveyed 12 discontiguous proposed building or development sites (26.5 ha) and 7.3 km of proposed firebreaks throughout the installation. Their survey located only scattered historic and prehistoric deposits, except at the site of the former Waller Hill Hotel, located within the administrative portion of the installation (McClane and Voight 1996).

Investigations of prehistoric rock art in the state of Virginia have been confined primarily to two sites located in the southern portions of the state. The Paint Lick Mountain site (44TZ13) in Tazewell County, which is located in the Appalachian physiographic region, consists of an array of red ochre pictographs that depict geometric (e.g., sunburst), animal (Thunderbird), and anthropomorphic figures applied to an exposed rock escarpment (MacCord 1996:13). The pictographs at the Little Mountain site (44NT13) in Nottoway County were painted in red ochre on the walls of a rock shelter; the three motifs pictured include a human hand, a "turkey track," and an unidentified form (Hranicky 1995:38-39).

To date, no rock art sites have been recorded within the boundaries of MCB Quantico, or in any immediately adjoining county. However, two petroglyph sites have been recorded in the non-tidal Potomac watershed not far from the river's Fall Line, approximately 50 mi north of MCB Quantico. One of these sites (36MO134) depicts what has been interpreted as a stylized fish (Figure 2)(Maryland Historical Trust); the other depicts a series of individuals who appear to be throwing spears (Potter 1990). Neither the dates nor the cultural affiliations of the Northern Virginia petroglyphs have been established. There are stylistic similarities between the anthromorphic glyph and motifs that appear on Late Woodland Potomac Creek pottery from Stafford County; similarities also have been noted between the stylized fish glyph on the Potomac and similar markings at Bald Friar's Rock, a Susquehanna River site in Maryland. However, regional experts are hesitant to equate the rock carvings with the either Late Woodland Potomac Focus or with the Iroquoian Susequehannocks of Pennsylvania solely on the basis of motif (Potter 1990; Potter, personal communication 1996).

Prehistoric Sequence

Paleoindian Period (10,000-8,000 B.C.). The environmental setting for the Paleoindian period was conditioned by the Late Pleistocene. The most pertinent climatic episode for the Paleoindian period is the Late Glacial (ca. 15,000-8,500 B.C.) (Custer 1984; Kavanagh 1982), which represents the terminal Pleistocene and the "last effects of the glaciers upon climate in the Middle Atlantic area" (Custer 1984:44). Pollen and faunal records suggest that, at about 9,300 B.C., a "mosaic" forest pattern typified areas south of central Pennsylvania (Custer 1984:44). This mosaic

Figure 2. Photograph of stylized fish glyph on upper Potomac River (Courtesy of Stephen Potter)

apparently consisted of mixed deciduous gallery forests near rivers, mixed coniferous-deciduous forest and grasslands in the foothills and on valley floors, coniferous forests on the high ridges, and alpine tundra in the mountains (Kavanagh 1982:8).

In general, the Paleoindian population led a nomadic existence. They appear to have traveled in small bands, following available fauna and supplementing their diets through general seasonally-directed foraging (Parker 1985:17; Virginia Department of Historic Resources 1991:22; McClane and Voight 1996:13). Given the dominant climatic conditions, the available faunal assemblage may have included Pleistocene megafauna; however, more recent interpretations suggest that large game species such as caribou, elk, deer, and moose were more readily available in the Mid-Atlantic region (Gardner 1980, Kavanagh 1982, Custer 1984, McClane and Voight 1996:13).

High-quality lithics also were an important focal point for the Paleoindian settlement system (Gardner 1979; Custer 1984; Stewart 1980). High quality crypocrystalline lithic materials such as jasper, chert, and chalcedony were utilized to produce the characteristic fluted Clovis, Mid-Paleo, and Dalton points associated with Paleo-Indian occupation (Gardner 1989:11). The tool kit also included such specialized tools as spokeshaves, hammerstones, abraders, gravers, and wedges (also known as pieces esquillees)(McClane and Voight 1996:14).

Based upon research conducted in the Shenandoah Valley, Gardner (1979, 1983) identified six site types in the Paleoindian settlement system that others (e.g., Custer 1984) have applied more broadly to the general Middle Atlantic region (Custer 1984): (1) quarry sites, (2) quarry reduction stations, (3) quarry-related base camps, (4) base camp maintenance stations, (5) outlying hunting stations, and (6) isolated point finds. McClane and Voight (1996:13) reduce this settlement pattern to two elements: base camps near quarries in major river or stream valleys, and small band transient camps along upland tributaries. Parker (1985:16) has pointed out that the present coastal plain of Virginia was a part of the interior, that the Potomac River probably represented a "broad, braided stream" that shifted course frequently as it traversed the coastal plain. The inner Coastal Plain and Piedmont areas that comprise the majority of MCB Quantico were even more distant, rendering it likely that Paleo-Indian settlement in the vicinity would have consisted almost exclusive of smaller transient camps.

Only three major Paleo-Indian complexes have been found in Virginia, in Warren, Sussex and Dinwiddie Counties (VDHR 1991:23; Michael Johnson, personal communication 1995). No substantial Paleoindian presence has been documented in the vicinity of the project area; however, some potential evidence of Paleo-Indian occupation was reported at site 44ST206, along the lower courses of Chopawamsic Creek (McClain and Voight 1996).

Archaic Period (8,000 B.C. - A.D. 1000) Some researchers treat the Early Archaic period (8,000 - 6,500 B.C.) (VDHR 1991:23) as a late transitional phase of the Paleoindian period. Their rationale for combining the two periods is that prehistoric settlement and subsistence patterns seem not to have changed substantially during this time. This notion is supported by evidence of continuity in lifeways from a number of areas in the Middle Atlantic, including Delaware (Custer 1984) and the Great Valley of Maryland and Pennsylvania (Stewart 1980), and at the Flint Run Paleoindian Complex and other sites in the Shenandoah Valley (Gardner 1979, 1980, 1983).

However, Gardner and others acknowledge technological and other cultural discontinuities between the Paleoindian period and what he terms the "Early Archaic Subperiod" (Gardner 1989:11,33). Early Archaic sites generally are recognized by the presence of side-notched and corner-notched projectile points, including Palmer, Kirk and Warren points (Gardner 1980:3; Custer 1984:43).

The dominant climatic episode for the Early Archaic period is the Pre-Boreal/Boreal (8,500 - 6,700 B.C.). This transitional period into the full Holocene involved warmer summer temperatures, with continued wet winters. Vegetation shifted in response. For the Shenandoah Valley, Carbone suggested an "expansion of coniferous and deciduous elements and a reduction in open habitats." Subarctic woodland probably covered higher elevations, with coniferous forests on the slopes and mixed coniferous - deciduous forests on the valley floors and footlands (Carbone 1976:186). Johnson (1986:2-9) has suggested that the manifestations of this environment within Fairfax County and contiguous areas of Northern Virginia were perhaps more southern in character, and that "deciduous (broadleaf) plant elements should have been more common in the County." The faunal assemblage may have included moose, bear, elk, deer, and smaller game animals (Kavanagh 1982; Johnson 1986).

By the onset of the Kirk Phase, the settlement/subsistence regime apparently had begun to incorporate a more diversified resource base. For example, Stewart (1980:6) has interpreted the use of rhyolite in the Great Valley during this phase as indicative of expansion into new environmental zones as the hunting-based economy refocused on more diverse species. In Fairfax County, Johnson (1986:P2-II) has noted an increase in sites and projectile point finds dating from the Kirk phase, and he interprets this proliferation as a response to the diversifying subsistence base.

The Middle Archaic Period extended chronologically from ca. 6,500 to 3,000 B.C. (VDHR 1991:23). Diagnostics of the Middle Archaic include bifurcate base points such as St. Albans, LeCroy, and Kanawha, as well as Stanly, Morrow Mountain, Guilford Lanceolate, and Neville points (Custer 1984; Stewart 1980); Johnson (1986) also includes the ubiquitous Halifax point as a temporal marker for the Middle Archaic.

By 6,500 B.C., the full Holocene environment had emerged. The climate was characterized by an initial warm and humid period that continued to about 5,000 B.C., followed by a cooling trend (Custer 1984:62-63). Gardner (1978:47) has summarized human adaptation in response to this Holocene environment:

> ...by 6,500 B.C., the Post-Pleistocene conditions had changed so dramatically that the adaptations of the long-lived Paleoindian-Early Archaic system could no longer function in a viable manner. The hunting emphasis was thus abandoned and general foraging rose to pre-eminence. This resulted in a major settlement shift away from primary focus on sources of cryptocrystalline stone and the distribution of generalized, but seasonally available set of resources.

The generalized, seasonally directed foraging pattern has led research to predict that small Archaic period resource procurement sites will occur in upland settings, and that larger camps will be oriented toward major water courses (McClane and Voight 1996:14-16).

The Late Archaic corresponded roughly to the Atlantic/Sub-Boreal Transition (3,000 - 700 B.C.); this warm, dry period "culminated in the xerothermic or 'climatic optimum' around 2,350 B.C., when it was drier and 20° C warmer than modern conditions" (Kavanagh 1982:9). Vegetation patterns probably included the reappearance of open grasslands, and an expansion of oak-hickory forests on the valley floors and hillsides.

Diagnostic markers of the Late Archaic in Northern Virginia include Savannah River and Holmes projectile points (Johnson 1986). In Fairfax County, Johnson (1986:P5-5) has noted that sites of this period "often are larger and more intense in both the uplands and along the main

riverine floodplains." Steatite bowls also became part of the tool kit during the later portions of the Late Archaic; these soon were followed by the steatite-tempered ceramics that traditionally have marked the beginning of the Woodland Period.

The Woodland Period. The Woodland Period extended from approximately 1,000 B.C. to A.D. 1600, a time frame that corresponded generally to the Sub-Atlantic climatic episode (ca. 940 B.C. - modern times). While it has been customary to characterize the environment after at least 3000 B.P. (Before Present) as approximating modern conditions, it also is apparent that climatic changes of varying intensities took place during this period. The episodic nature of climatic change documented by Carbone (1976, 1982) for the Shenandoah Valley appears to have continued, at least in attenuated form, into the Late Holocene. These fluctuations were minor in comparison to variations which took place earlier in the Holocene (Custer 1988:20); nonetheless, evidence indicates that "locally significant changes did occur" (Bryson and Wendland 1967:281).

The short-term perturbations that characterized the Late Holocene climatic structure are of interest since evidence suggests that periods of environmental change or stress are related to episodes of cultural transition (Carbone 1976; Custer 1980). Carbone (1976:200) noted three of these possible stress periods: (1) 3000 - 2600 B.P., the Sub-Boreal/Sub-Atlantic transition; (2) 1750 - 1305 B.P., the Sub-Atlantic/Scandic transition; and, 3) 870 B.P., the Neo-Atlantic/Pacific transition. Correspondences between climatic/environmental patterns and cultural sequences during the Woodland have been noted for the Shenandoah Valley (Fehr 1983) and for the Middle Atlantic as a whole (Carbone 1982).

Gardner (1982:58-60) has proposed two settlement pattern models for the Late Archaic to Early Woodland on the Inner Coastal Plain. The "fusion-fission" model suggests that macro-social population units coalesced seasonally along fresh and salt water estuaries to exploit fish runs, and then dispersed to form micro-social unit camps for exploiting other resources. The "seasonal shift" model suggests that the same population formed macro-social unit and micro-social unit camps in both fresh and salt water zones, and moved laterally between these zones on a seasonal basis (Gardner 1982:59). Johnson (1986:5-14) feels that these models also may be applicable to Fairfax County prehistory.

The Early Woodland subperiod can be dated from about 1000 - 500 B.C. (Gardner 1982). Characteristic ceramics of the period include steatite-tempered Marcey Creek and Seldon Island wares, and sand-tempered Accokeek ceramics, all of which have been identified in neighboring Fairfax County (Chittenden et al. 1988:Table P5-s). After 500 B.C., the material culture in the Piedmont appears to have diverged from that of the adjacent Coastal Plain region.

In the Potomac Coastal Plain, diagnostics attributed to the Middle Woodland period (ca. 500 B.C. - A.D.1000) include Popes Creek Net-Impressed and Mockley ceramics, as well as Fox Creek and Selby Bay projectile points. Johnson (1986:5-21) reports that Piscataway-like points also have been found in association with both Popes-Creek-like and Accokeek ceramics. However, Popes Creek and Mockley wares occur less frequently west of the Fall Line. The Middle Woodland in the Piedmont, although less well-known, appears to be marked by crushed-rock-tempered Albemarle series ceramics. Temporal changes are reflected in surface treatments, with net- and cord-marking preceding fabric impression (Gardner 1982:84). Until 1989, only two ceramic-producing sites of the sub-period had been reported in Fairfax County (Chittenden et al. 1988:Table 5-2); however, more recent excavations in Fairfax County's Piedmont region have produced an as-yet unidentified type of sandstone-tempered cord- and net-marked pottery in association with Rossville type points (Johnson 1990:personal communication). While additional sites dating potentially from the Middle Woodland period have been identified based on projectile point typology, the associations of these sites with ceramic-producing sites, and hence the implications for reconstructing the settlement system are unclear (Johnson 1986:5-26 - 5-30).

Late Woodland cultural manifestations also have been found to vary between the Coastal Plain and Piedmont regions. On the Coastal Plain, the shell-tempered Townsend series dominated after A.D. 900 (Clark 1980:18). The crushed-rock tempered Potomac Creek ware appeared somewhat later and was prevalent in the Inner Coastal Plain/Fall Line sections of Northern Virginia (Egloff and Potter 1982:112). Potomac Creek ware is thought to have been related to the historically known Piscataway Indians (Clark 1980:8). In the Piedmont, Middle Woodland cultural patterns apparently continued those of the Early Woodland. In the central Piedmont region, the ubiquitous Albemarle series continued to dominate.

Three major Late Woodland complexes have been identified in the Potomac Piedmont: the Montgomery Complex, the Mason Island Complex, and the Luray Complex (or focus) (Robinson, Fehr, and Geidel 1987:33). Each of these complexes is characterized by a different ceramic style, and by some variation in lifeways. However, the relationships between all of these Late Woodland ceramic series, as well as their specific geographic distributions and limits, have not yet been established definitively.

Johnson (1986:6-1) has summarized the social and economic characteristics that distinguish the Late Woodland from earlier periods:

> ...the intensive planting and cultivating of domestic plants [corn (maize), beans, squash, tobacco, etc.]; a shift in riverine settlements from fishing and shellfishing locales to areas with prime agricultural soils (Gardner, 1983:personal communication); the advent of semi-permanent villages; the apparent rise in inter-tribal conflict; the appearance of the bow and arrow, seemingly manifested in the triangular point type; and possibly the first appearance of complex political systems such as tribal confederacies and chiefdoms. These characteristics probably did not occur all at once at the beginning of the period, but were generally well-established throughout the region by its end.

Late Woodland peoples were the first aboriginal populations to make contact with Europeans.

Historic Setting

Previous Investigations

Numerous historic period archeological sites have been identified within MCB Quantico. These sites range in function from domestic complexes to cemeteries, and include Civil War military encampments and batteries, historic mill sites (e. g., 44ST67, the Belair Mill), and the site of the second court house for Prince William County (44PW9). Chronologically, the sites represent occupations from the eighteenth through the twentieth centuries. To date, no seventeenth century sites have been documented; however, given the pattern of historic settlement and occupation in the middle Potomac watershed, small seventeenth century domestic sites potentially could occur.

Historic Sequence

Settlement to Society (1607-1750). The recorded history of this region can be traced to the early seventeenth century, when John Smith explored the upper reaches of the Potomac River in 1608. Smith's map (Stephenson 1981:15) located several Indian villages, including Pomacecack, along this stretch of the Potomac River. Pomacecack was was depicted as a cluster

of "ordinary howses [sic]" located between the two large Indian towns of Patawomecke (on Potomac Creek in Stafford County) and Tauxenent, the Doeg village at the confluence of the Occoquan and Potomac Rivers in present-day Fairfax County. Subsequent traders visited the shoreline of the Potomac and its tributaries, but their expeditions appear not to have penetrated very far into the interior sections of the region.

The earliest land patents to be granted along this stretch of the Potomac River were issued during the 1640s and 1650s. Early patentees included such lower Tidewater landholders as Burbage, Meriweather, Higginson, Moore, Hall, Brent, Martiau, and Matthews (Harrison 1987:46; McClane and Voight 1996:24); the Brent, Martiau, and Matthews patents all were located within MCB Quantico. Most seventeenth century landowners seem to have been land speculators, and they probably did not fulfill the "seating" requirements on their grants at the time of patent personally (Parker 1985:59-60). Instead, their land grants were populated by indentured servants, slaves, and tenants. However, by 1664, the population of the region had increased sufficiently to justify the creation of Stafford County and Overwharton Parish (Parker 1985:61; McClane and Voight 1996:24).

Seventeenth and early eighteenth century European settlements clustered mainly along the Potomac and its major tributaries. In part, this was due to the threat of Indian attack, such as those that occurred during the Susquehannock Wars of the 1670s. One major exception was the Brent Town tract, a holding of 30,000 acres south of Broad Run, which was granted to George Brent, Richard Foote, Robert Bristow, and Nicholas Hayward in 1686. A protective blockhouse reportedly was built in the area in 1688, but the desired influx of settlers never materialized. In 1724, the Reverend Alexander Scott observed that plantations in the interior of Prince William County were "thin seated" (WPA 1988:20-25).

The 1722 Treaty of Albany with the Iroquois Confederacy proved to be a major factor in the expansion of Prince William's population away from the relative safety of the Potomac shoreline; after that treaty, grants for selected tracts along interior watercourses such as Bull Run, Broad Run, and Cedar Run were patented quickly (WPA 1988:116-117). As population in the region grew, Prince William County and Hamilton Parish were separated from Stafford in 1731 (Netherton et al. 1976:8-10). The town of Dumfries became Prince Willliam County's major port and a designated tobacco inspection center. By the following year, Northern Virginia's population had increased sufficiently to warrant creation of Truro Parish, north of the "Ockoquan [sic] River and Bull Run." By 1742, the boundaries of Truro Parish also had been designated the boundaries of the newly created Fairfax County (Netherton et al. 1976:9-10).

Colony to Nation/Early National Period/Antebellum Period (1750 - 1860). Eighteenth century landowners in this region transplanted the patterns of tobacco culture and slave labor into Prince William County. For example, by 1713, a tobacco warehouse had been established at Brent Town near the western border of MCB Quantico. However, by the time of the Revolution, as repeated cultivation of a single crop exhausted the fertility of the soil, residents of agricultural complexes along the Potomac River and its major tributaries began to diversify production. By the Revolutionary War, the major exports from the Quantico Creek area included not only tobacco, but also cured meat, lumber, wheat, hides, tallow, and wild animal pelts and skins (Parker 1985:89; McClane and Voight 1996:25).

The area around Quantico and Aquia figured peripherally in the Revolutionary War conflict itself. In 1776, British troops landed at Aquia and burned several private homes in the area. Later, the port at Quantico served as a supply depot for Continental forces and as the base for Virginia's fledgling naval fleet (McClane and Voight 1996:25). Finally, toward the end of the war, the residents of Dumfries and the other communities along the old post road that stretched south from

Alexandria would have seen French forces under Rochambeau as they marched south toward their participation in the battle at Yorktown.

During the early nineteenth century, the commercial and industrial aspects of the middle Potomac region's economy changed significantly. The port of Dumfries suffered irreversible decline as its waterway silted up, and the City of Alexandria became the major port-of-entry for Northern Virginia. The area from Alexandria south did not experience the turnpike-building "boom" that occurred elsewhere in Northern Virginia. The colonial period post road remained the primary overland transportation route for stage and post lines; however, because the post road between Fredericksburg and Alexandria was in such bad condition, most trade and travel still relied on the river (Parker 1985:99).

The majority of the region's antebellum residents continued to engage in agriculture or in extractive industries such as timbering, quarrying, and fishing (McClane and Voight 1996:26). A few industries were established along the Occoquan and its tributaries prior to the Civil War, including a forge and furnace and a 1000-spindle cotton mill on the Occoquan (Stephenson 1981:29; Ratcliffe 1978:30). Grist mills were the most numerous of these enterprises; they ranged in size from small neighborhood mills to a huge industrial mill at Occoquan that by 1835 produced 150 barrels of flour daily (Netherton et al. 1976:181). Besides the communities of Dumfries and Occoquan, most "towns" in the region were in reality only crossroads hamlets.

The Civil War (1861-1865). The Potomac areas of Prince William and northern Stafford County played a small but significant role in the Civil War. The Potomac River was a major transportation artery from Washington to points within the Confederacy. Therefore, when the Civil War began in April 1861, the river became one focus of the struggle to control strategic transportation links. After the Confederate victory at Bull Run in July 1861, Confederate forces occupied the outer fringes of what is today the Washington metropolitan area.

While major encampments were concentrated primarily around Centreville and Manassas to the west, Southern troops also occupied areas in eastern Prince William County in an effort to interdict Union shipping along the Potomac River. Confederate gun emplacements overlooked the Potomac at Aquia Creek, Mathias Point, Freestone Point, Cockpit Point, Possum Point, and Shipping Point; many of these sites, which were destroyed by Union forces, lay within MCB Quantico (Huston and Downing 1994:28; McClane and Voight 1996:26). Even after the their evacuation in March of 1862, Confederate guerilla forces continued to devastate farms and transportation systems in the region (Parker 1985:114).

Reconstruction and Growth/World War I to Present (1865-1996). After the Civil War, the region's total population declined. For example, in 1800, all of Prince William County had 12,733 residents; in 1870, only 7,504 individuals lived in the entire jurisdiction (McGarry 1983:27). Twenty-five per cent of the population, black and white, was illiterate (WPA 1988:54).

Farms and farmhouses had been devastated as a result of military operations. Five years after the war, the United States Department of Agriculture found that the area's "labor system (had been) overthrown, and its lands lay idle. Farm stock had been swept off by the war, and only a few agricultural implements remained" (Netherton 1976:353). The region retained its rural and agricultural character into the twentieth century, but the nature of the agriculture changed substantially. In the eastern portion of the county, stands of timber were harvested to produce pulpwood and railroad ties for the Richmond, Fredericksburg, and Potomac (RF&P) Railroad, which was completed to Quantico in 1870 (Parker 1985:119). Small agriculturally-based industries also proliferated during the post-war period; these included grist, flour, and saw mills and cheese and butter factories. The harvesting of sumac, an ingredient used in tanning and dying leather, also became an important source of income (Ratcliffe 1978:92-93).

Late nineteenth/early twentieth century development along the Potomac River also focused on attempts to promote its tourism and recreational potential. The Potomac Land and Development Company tried but failed to incorporate a town at the mouth of Quantico Creek. Somewhat later, the Quantico Company also developed the recreational potential of the area by constructing the Quantico Hotel (Waller Hall) and promoting the town as a river stop for excursion steamboats (McClane and Voight 1996:26-29).

The most significant development, however, was the establishment in 1917 of the Marine Corps temporary training camp and maneuver area at Quantico. The installation's original 5,300 acres were leased from the Quantico Company (Coletta 1985:524). From this base, enlisted personnel and officers embarked for France. During the inter-war period, the installation was designated as a permanent post that offered programs in military and vocational training, officer training, and military aviation, including a balloon and parachute school. During the 1930s, activities at the installation also focused on the perfection of amphibious assault tactics (Cannan et al. 1993:401-403).

With the onset of World War II, the training facilities were expanded greatly by the purchase of approximately 51,000 ac west of US Rte 1. The newly acquired property was used to create training areas for the Marine Corps Ordnance School, one of five training schools eventually housed on the installation during the war (Coletta 1985:528-9). Since World War II, MCB Quantico has supported training in a variety of specialized functions; its primary educational mission is reflected in the name it acquired in 1968: the Marine Corps Development and Education Command (Coletta 1985:530-31).

CHAPTER III

RESEARCH OBJECTIVES AND METHODS

Research Objectives

MCB Quantico was selected as the Marine Corps survey venue for the Legacy Rock Art project because several rock art sites previously had been identified in adjacent counties, and because the topography and geology of the installation presented a potential environment in which exposed rock outcrops or large boulder deposits could be expected to occur. The primary objective of the survey undertaken at MCB Quantico was to examine a representative sample of the various topographic and ecological zones within the installation and to identify rock art sites within these sample survey areas. Although the major emphasis of this study focused upon Native American rock art, historic inscriptions and motifs also were to be recorded, if found.

Archival Methods

Archival research included review of the prehistoric and historic background of the project area and vicinity, as well as oral interviews with persons knowledgeable about the several prehistoric rock art sites that had been identified in the northern Potomac River watershed. Reports on previously completed comprehensive archeological surveys undertaken at MCB Quantico were reviewed at the cultural resource management office on board the installation. Preliminary research was intended to determine the nature and number of previously identified sites adjacent to projected survey areas within the installation, and to provide a context for the interpretation and assessment of the significance of newly discovered rock art and/or traditional archeological sites.

Current USGS 7.5 min topographic maps of the installation also were reviewed to identify survey areas where the potential for rock art would be greatest. This phase of research and survey planning was undertaken by the primary consultant for the project, who identified areas of potentially high probability for rock art within the installation. These areas represented three general environmental zones within the installation: (1) the lower Coastal Plain; (2) the Piedmont Plateau; and (3) the Fall Line.

Field Methods

Survey methods consisted of pedestrian reconnaissance and/or visual inspection of six previously identified areas of the installation (Figures 3 and 4). Two transects were examined within the lower Coastal Plain. Area A, designated as Potomac River/Tank Creek, incorporated portions of the bluffs and ridge toe slopes along the Potomac River and Tank Creek; an approximately 2,600 m transect within this area was examined. Area B, designated as Quantico Creek, included brief inspections of two widely separated bluffs overlooking the junction of the creek with the Potomac River, and pedestrian reconnaissance of an approximately 1,000 m unpaved road cut that traversed a ridge slope between the ridge crest and the shoreline of the Quantico Creek estuary.

Two transects were located in the interior Piedmont plateau zone. Area C, Chestnut Run, incorporated an 850 m portion of the flood plain and adjacent ridge slopes along that tributary of Cedar Run. Area D was designated as Dalton Pond; pedestrian reconnaissance included examination of roughly circular 1,000 m track along the ridges and lower slopes of the headwaters of the streams feeding this impounded creek.

Two transects were located within the Fall Line zone of major watersheds at the installation. Area E, Beaverdam Creek, and Area F, Chopawamsic Creek, included portions of the middle reaches of these two streams; the Beaverdam transect measured approximately 1,100 m, and the Chopawamsic transect was approximately 2,100 m in length.

For each area, environmental factors were noted on two types of forms developed specifically for this study. The base line survey sheet permitted characterization of the general area of survey. Data recorded included observations on the degree of surface visibility; slope and elevation ranges; terrain characteristics; vegetation; proximity to water; and area geology and lithology. The rock art recordation form permitted notation on the general rock art type; motif; coloration; lithology; orientation; and observed associated cultural remains. Grid sheets permitted the execution of scaled drawings, where relevant. General contextual photographs were take of all areas surveyed. Copies of these recordation forms have been appended to this report.

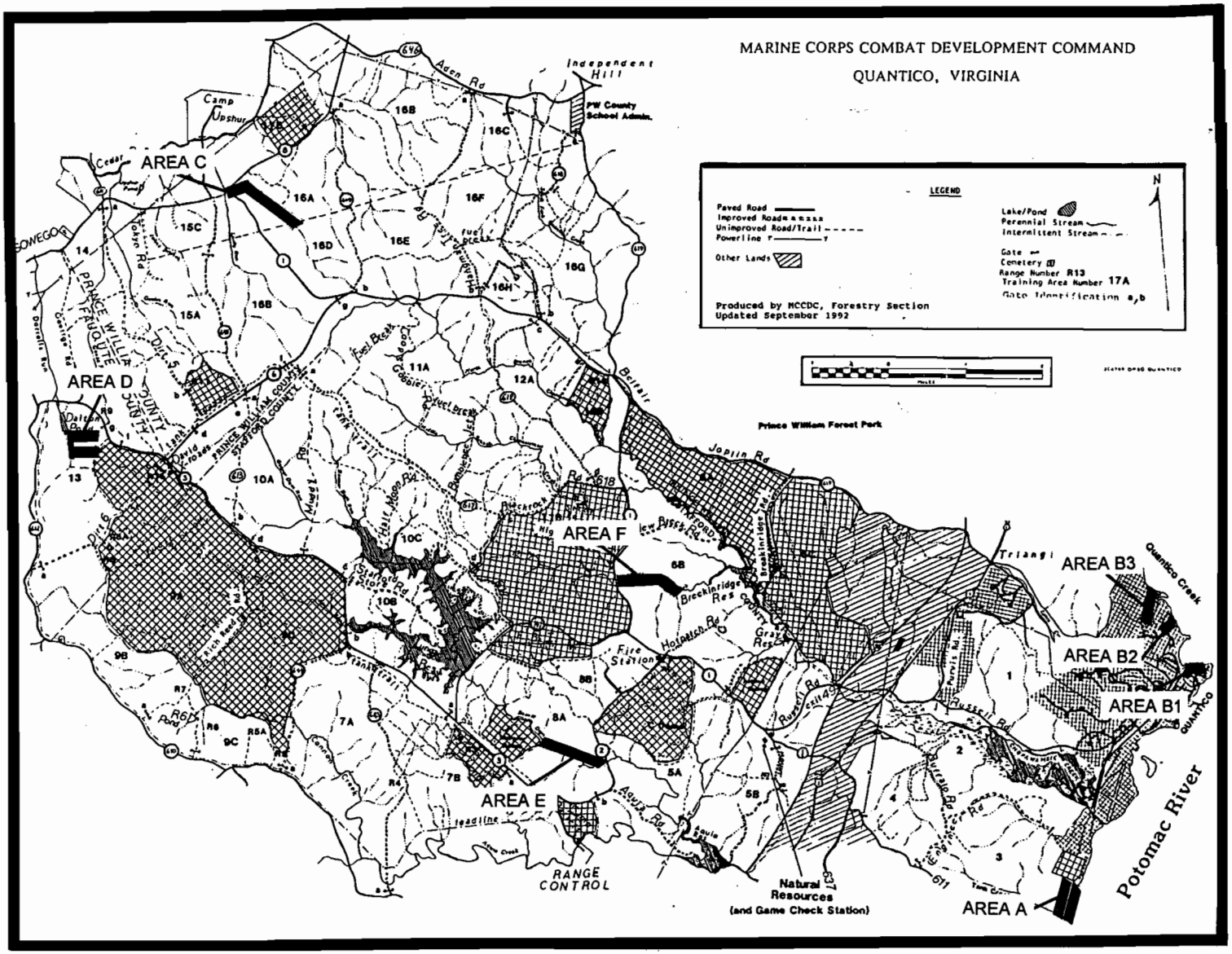

Figure 3. Overview map of MCB Quantico, showing the locations of Survey Areas A - F

Figure 4. Excerpts of the Widewater (Va), Quantico (Md-Va), Joplin (Va), and Somerville (Va) USGS 7.5' quadrangles, showing specific locations of transects A - F

CHAPTER IV

RESULTS OF SURVEY

Archival Results

Background archival research revealed that 21 prehistoric and 10 historical archeological sites previously had been identified in the vicinity of the six study areas surveyed at MCB Quantico (McClane and Voight 1996; Huston and Downing 1994; Huston et al. 1996). Comprehensive reports listing previously identified prehistoric sites in these areas of the installation (Table 1) suggested that intensive prehistoric exploitation of the Piedmont and Coastal Plain areas of Northern Virginia commenced during the Archaic period, and that it declined during the Woodland period. The majority of sites with historic period components represent nineteenth and twentieth century domestic and agricultural complexes.

At the time of European contact, elements of the Patawomeke tribe, possibly a peripheral affiliate of the Powhatan Confederation, along the middle reaches of the Potomac River (McClane and Voight 1996:20). The principal village of the Patawomeke tribe was located near the confluence of Potomac Creek and the Potomac River in southern Stafford County south of MCB Quantico. The Potomac Creek site featured an oval stockade and moat, ossuaries, and numerous items of obviously European origin, including glass beads, copper, and buttons (McClane and Voight 1996:20).

Only two prehistoric rock art sites have been been found in counties adjacent to MCB Quantico; both are located along or close to the Potomac River near the Fall Line, and both sites are petroglyphs. One petroglyph group depicts a series of human stick figures apparently utilizing an atlatl or spear-thrower (Potter to Swauger 1995); the other represents a stylized fish (Maryland state archeological site files). No definite chronology or cultural tradition has been defined for this array of rock art, although similarities between the motifs at these sites and motifs on other sites have been noted.

Permanent historic occupation of the middle Potomac began during the last quarter of the seventeenth century, when land speculators began to purchase tracts of several thousand acres. During the eighteenth century, the three-county region remained primarily an agricultural area; the few industrial enterprises focused on primarily on extractive pursuits such as lumbering and quarrying, or were associated with primary processing of agricultural and forest derived commodities. This agricultural focus persisted into the present century. Only one major town center, Dumfries, developed in the region prior to the present century, and transportation remained rudimentary.

The military presence represented by MCB Quantico initially was established in 1917, when the Federal government leased a 5,300 ac parcel from the Quantico Land Company to establish a temporary Marine Corps training center. After World War I, the installation was accorded permanent status, and its acreage increased tenfold in 1942. Since the 1920s, MCB Quantico has functioned exclusively as a training and educational facility.

TABLE 1. PREVIOUSLY RECORDED ARCHEOLOGICAL SITES IN THE VICINITY OF ROCK ART SURVEY AREAS, MCB QUANTICO, VIRGINIA

Site No.	Site Chronology	Site Function	Comments/Sources
Area A: Potomac Shoreline/Tank Creek (No sites identified in vicinity)			
44PW306	Prehistoric: unidentified	Unidentified	Location: head of drainage swale; elevated ridge. Material found included a quartz hammerstone and debitage. Probable lithic curation site.
Area B: Quantico Creek Shoreline/Ridges			
44PW4 (Possum Point)	Prehistoric: Archaic period	Unidentified	Location: confluence of Quantico Creek and Potomac River. Surface collection only (McClane and Voight 1996)
44PW386 - 392	Prehistoric: Unidentified	Unidentified series of sites, possible complex	Location: North shoreline, Quantico Creek estuary. No further information available.
44PW637	Prehistoric: unidentified Historic: 18th - 19th century	Unidentified	Location: South shoreline, Quantico Creek estuary. Cultural materials include: Historic: stoneware, porcelain, brick, glass Prehistoric: hafted quartz biface, debitage
44PW901	Prehistoric: unidentified Historic: 19th century	Prehistoric: campsite Historic: homestead	Location: Finger ridge overlooking Quantico Creek estuary. No further information available.
44PW902	Prehistoric: unidentified	Unidentified	Location: Finger ridge overlooking Quantico Creek estuary. No further information available
44PW907	Prehistoric: unidentified Historic: 18th century	Prehistoric: campsite Historic: unidentified	Location: Finger ridge overlooking Quantico Creek estuary. Sites almost totally destroyed. No further information available.

Site No.	Site Chronology	Site Function	Comments/Sources
44PW917	Historic: 1861-1862	Civil War Camp	Location: along Little Creek (small Potomac River tribuary. Historic camp sites from Confederate occupation period.
Area C: Chestnut Run Drainage			
44PW903	Prehistoric: Unidentified	Lithic scatter	Location: vicinity of Lucky Run and Chestnut Run. Site yielded quartz biface and debitage.
Area D: Dalton Pond Drainage			
44PW86	Prehistoric: Unidentified	Unidentified	Location: vicinity of David's Crossroads
44PW155	Historic: 19th - 20th century	Farmstead	Location: west of Dalton Pond. Site 50 - 74% destroyed.
44PW622	Prehistoric: Unidentified	Unidentified	Location: 1.5 km east of Camp Goettge
44PW655	Prehistoric: Middle Woodland Historic: 18th - 19th century	Prehistoric: procurement site Historic: domestic	Location: 2.2 km east of Camp Goettge Site heavily disturbed
44PW661	Prehistoric: Unidentified Historic: 19th - 20th century	Prehistoric: Procurement site Historic: domestic	Location: at David's Crossroads
44PW665	Prehistoric: Unidentified Historic: 20th century	Prehistoric: Procurement site Historic: domestic	Location: southeast of David's Crossroads
44PW666	Prehistoric: Unidentified Historic: 20th century	Prehistoric: Procurement site Historic: domestic	Location: southeast of David's Crossroads
Area E: Beaverdam Creek			
44ST175 (Beaverdam K)	Prehistoric: Late Archaic - Early Woodland	Lithic scatter	Location: southeast of Lunga Reservoir; west of MCB 1

Site No.	Site Chronology	Site Function	Comments/Sources
44ST176	Prehistoric: unidentified	Lithic scatter	Location: southeast of Lunga Reservoir; west of MCB 1
44ST177	Prehistoric: Unidentified	Lithic scatter	Location: southeast of Lunga Reservoir; west of MCB 1
44ST222	Historic: Late 19th - Early 20th century	Domestic	Location: north of Beaverdam Creek; east of MCB 1
44ST223	Prehistoric: Unidentified	Procurement camp	Location: north of Beaverdam Creek; east of MCB 1. **Phase II evaluation recommended.**
44ST236	Prehistoric: Early Woodland Historic: 18th-19th century	Prehistoric: lithic workshop; temporary camp Historic: unidentified	Location: southeast of Lunga Reservoir; west of MCB 1
Area F: Chopawamsic Creek			
44PW913	Prehistoric: unidentified	lithic scatter	Location: north of Chopawamsic Creek; west of I-95; Quartz debitage scatter

Results

Area A (Potomac River/Tank Creek)

The Potomac River/Tank Creek survey area incorporated an approximately 2,600 m transect that examined the Potomac River bluff faces and ridge slopes at the extreme southern end of the installation (Figures 3 and 4). This survey area is divided by the right-of-way of the Richmond, Fredericksburg, and Potomac (RF&P) Railroad; in addition, several abandoned roadbeds and excavated or disturbed areas were noted in the strip between the railroad and the Potomac River. An active military training course follows the base of the ridgeline west of the RF&P corridor.

Elevations within the Potomac River/Tank Creek study area ranged between 40 and 100 ft above mean sea level (amsl). Along the Potomac shoreline, the terrain rises almost vertically from the river level; slopes on the inner natural ridges are estimated to range between 10 and 40 per cent (9° - 36°). The major soil association mapped for this area of the installation is the Sassafras/Aura/Caroline Association. These deep, well-drained soils of the Coastal Plain uplands, which feature sandy clay loam, heavy clay loam or clay subsoils, were formed in Coastal Plain sediments. No naturally occurring exposed rock faces were observed; however, quartz and quartzite cobbles and gravels were observed within eroding bluff areas along the Potomac River shoreline, and in the bed of Tank Creek. These would have provided raw lithic material that could be utilized by prehistoric inhabitants of the area.

Vegetation along the river bluffs consisted primarily of mixed deciduous species including black cherry, several species of oak, and tulip poplar, with occasional Virginia pine and white cedar intermixed. Understory species along this portion of the transect included scrub maple, holly, sweet gum, jack pine, trumpet vine, honeysuckle, and poison ivy. The forest canopy along the toe-slopes of the interior ridges consisted of tulip poplar, maple and beech; understory species included sassafras, paw-paw, and small holly and black cherry seedlings.

No surfaces suitable for rock art were observed along the Potomac River/Tank Creek transect. However, an historic landscape feature that may represent a potential Civil War period gun emplacement was noted on the bluff immediately north of the confluence of Tank Creek and the Potomac River. No other pre-modern cultural features or concentrations were observed.

Area B (Quantico Creek)

The Quantico Creek survey area incorporated two discontiguous observation points overlooking the Quantico estuary, and an approximately 1,100 m transect that traversed the crest and slope of an interior ridge down to the shoreline of the creek (Figures 3 and 4). The two observation points (Areas B-1 and B-2) were located at the ends of streets that terminated on the crests of ridges overlooking the lower reaches of the estuary; in both cases, modern residential development was adjacent to these observation points. The transect (Area B-3) followed an actively used, unpaved off-road vehicle (ORV) track down the slope of the interior ridge and along the Quantico Creek shoreline.

Terrain within Area B consisted of steep ridges that had been dissected by deep, heavily incised drainage swales. In Areas B-1 and B-2, topography had been modified severely by the introduction of up to eight feet of loamy fill and construction debris that had been placed deliberately in order to create level building sites and road beds.

Elevations within Area B ranged between 0 and 150 ft amsl; natural slopes descending the ridge line averaged an estimated 45 per cent (40.5°). As in Area A, the major soil association is the Sassafras/Aura/Caroline Association. Extreme erosion along the ORV track had exposed a series of sand, gravel, silt, and clay sub-strata, with abundant quartz and quartzite pebbles and cobbles. No naturally occurring exposed rock faces or boulders were observed along the ridge line or on the ridge slope. Partially inundated planes of sandstone bedrock were exposed along the shoreline of Quantico Creek; however, the location of this material made it unsuitable for the application of rock art.

Forest canopy within the undeveloped portion of Area B was composed primarily of mixed deciduous species, including several species of oak, hickory, maple, and occasional holly and jack pine. Understory growth in undeveloped areas included dogwood, bay laurel, wild blueberry, and occasional Norway maple seedlings.

No exposed outcrops, large boulders, or rock shelters suitable for rock art were observed within the Quantico Creek study area.

Area C (Chestnut Run)

The stream valley of Chestnut Run, which is located near the northwestern border of the installation, is a tributary of Cedar Run, which forms portions of the northern boundary of the Quantico installation. This drainage valley was formed by downcutting of the reddish brown Triassic sandstones and shales of the Piedmont physiographic province; areas of eroded and decomposing shale were observed at the head of the stream drainage. An approximately 850 m transect along the flood plain of Chestnut Run was subjected to pedestrian reconnaissance; a brief visual inspection also was made along an unused tank trail or vehicular track that intersected the head of this drainage (Figures 3 and 4).

The terrain surrounding the lower reaches of Chestnut Run is characterized by gently to moderately sloping ridges on both the eastern and western sides of the flood plain. An abandoned logging or military road trace was observed to extend along the toe slopes of the ridgeline that borders the western side of the Chestnut Run flood plain.

Elevations on either side of the stream flood plain range from 200 ft amsl along the Chestnut Run floodplain to over 300 ft amsl on highest neighboring ridge crest. Gradients on either side of the run range between approximately 9° (10 per cent) near the confluence of Chestnut Run and Lucky Run to nearly 45° (50 per cent) on some adjacent upstream slopes.

The Triassic sandstone and shale bedrock is overlain primarily by soils of the Gaila-Buckhall-Occoquan association; these are very deep, well-drained to excessively drained soils with loamy subsoils that are found on upland ridges and side slopes of minor streams of the Piedmont (Elder 1987:9). In areas of Occoquan soils, bedrock sometimes is encountered at depths of less than 50 cm (20 in), and rock outcrops occasionally occur (Elder 1987:66), as they do within the Chestnut Run stream valley.

Vegetation within this Piedmont portion of the installation consisted primarily of a mixed deciduous canopy forest composed of oak, beech, and tulip poplar. The understory which was present primarily on the stream floodplain, included sassafras, paw-paw, and ferns; adjacent ridge slopes were relatively clear of understory vegetation.

The shallow bedrock of the stream valley has been exposed in several places, including within a severely eroded abandoned road cut at the upper end of the drainage, and within the

stream bed and undercut banks of the run itself. Outcrops and boulders of weathered sedimentary bedrock also were observed on the lower slopes of the surrounding ridges (Figure 5); such boulders or outcrops, if properly sheltered from natural weathering, could serve as appropriate rock art surfaces. One large (70 cm x 300 cm x 108 cm) boulder (Figure 6) was cleared of accumulated moss and lichens and inspected for rock art; however, none was identified.

Area D (Dalton Pond)

Survey Area D comprised an approximately 1,000 m transect loop that traversed the ridge slopes and portions of the floodplain at the headwaters of an unnamed drainage that feeds Dalton's Pond. This small, artificially created lake, lies in the extreme northwestern corner of the installation, in the upper Piedmont portion of MCB Quantico (Figures 3 and 4); active training areas are adjacent to this area, and a gravel-surfaced vehicle track intersects the headwaters of this drainage.

Elevations in the area ranged between 280 ft amsl near the wetlands at the head of the Dalton Pond drainage and 350 ft amsl at the top of the adjacent ridge. The estimated degree of slope varied between 30° (33.3 per cent) on the lower portions of the adjacent ridge, to nearly 50° (55 per cent) along the deeply incised drainage swales.

Soils mapped for this area are part of the Gaila-Buckhall-Occoquan association. In this portion of the installation, the overlying soils consisted of sandy and clayey loams beneath a relatively thick layer of decomposing humus. Surface soils on the ridge slopes contained moderate-sized chunks and cobbles of quartz; the source of this lithic material was not identified.

Vegetation cover along the transect route consisted primarily of mixed deciduous species including oak, red maple, shagbark hickory, tulip poplar, and occasional birch. The sparse understory was composed of seedlings of the above species and bush blueberry. Surface visibility was obscured by heavy leaf litter, but overall visibility was good.

Only one rock outcrop of sufficient size to accommodate rock art was observed during this portion of the installation survey. Just below the highest crest of the associated ridge, adjacent to the gravel-surfaced roadway, erosion had exposed numerous large quartzite boulders (Figure 7). However, no rock art was identified at this location.

Area E (Beaverdam Creek)

Survey Area D incorporated a transect that extended for approximately 1,100 m. along the north side of Beaverdam Creek, a headwaters tributary of Aquia Creek (Figures 3 and 4). The survey transect was located in the middle of the installation, immediately below the impoundment dam for Lunga Reservoir, one of several lakes that supply water for the installation. The survey route traversed the base of the ridge slopes and the drainage swales associated with the floodplain of Beaverdam Creek. No active training areas are located in the floodplain of Beaverdam Creek; however, one major asphalt surfaced road intersects the Beaverdam Creek drainage in this area.

In effect, this stretch of the Beaverdam Creek encompasses what might be termed the "Fall Line" area, an intermediate section between the more elevated Piedmont regions to the west and the Coastal Plain areas to the east. Elevations in the area ranged between 200 ft amsl on the narrow (5 - 8 m) floodplain and 280 ft amsl at the top of the adjacent ridges. The steep slopes

adjacent to the floodplain in this area rose an estimated 70° (78 per cent) or more, except within wider tribuary drainage swales, where gradients were more moderate.

Soils mapped for this area are part of the Appling-Cecil-Ashlar association. These deep and moderately deep, well to excessively drained soils are comprised predominantly of clay of fine sandy loams. In this association, slopes along larger drainages and smaller streams commonly range as high as 35 per cent. Outcrops of granite or gneiss occur on the lower parts of the steeper slopes (Isgrig and Stroebel 1974:3).

Vegetation cover along the transect route consisted primarily of mixed deciduous species including oak, red maple, shagbark hickory, tulip poplar, occasional black walnut. Clusters of bay laurel also were observed in steeply sloped areas adjacent to rock outcrops. The moderately thick understory along the floodplain was composed alder, scrub oak, holly, greenbrier, and various grasses; the ridge slopes were relatively clear of understory. Surface visibility was obscured by heavy leaf litter, but overall visibility was good.

Numerous rock outcrops of gneiss and metamorphosed sandstone were observed in this area (Figure 8). This heavily fissured, weathered sedimentary rock contained nodules of quartz and quartzite. All of these exposed rock faces were sufficiently large to accommodate rock art.

Although no rock art was observed within this study area, the transitional "fall line" area at MCB Quantico offers by far the highest potential for harboring rock art images.

Area F (Chopawamsic Creek)

Survey Area F incorporated a transect that extended for approximately 2,000 m along the southern bank of the South Branch of Chopawamsic Creek, one of the major drainages at MCB Quantico (Figures 3 and 4). The survey transect was located in the middle of the installation, and the survey route traversed the base of the ridge slopes and the drainage swales associated with the floodplain of this drainage. Training range 6B encompasses this area, but the active portions of the training range do not intrude on the Chopawamsic stream valley. A major asphalt surfaced road intersects the Chopawamsic drainage immediately west of the survey area, and an abandoned unsurfaced road trace intersects the stream approximately 150 m east of the current hard-surfaced road. Some areas of the floodplain appear to have been cleared relatively recently; deliberate cutting and erosion have combined to produce numerous tree falls.

In common with the Beaverdam Creek transect, this stretch of Chopawamsic Creek encompasses what might be termed the "Fall Line" area, an intermediate section between the more elevated Piedmont regions to the west and the Coastal Plain areas to the east. Elevations in the area ranged between 210 ft amsl on the moderately wide (10 - 20 m) floodplain and 280 ft amsl on the crests of the adjacent ridges. The moderately steep slopes adjacent to the floodplain in this area rose an estimated 45° (50 per cent) or less; grades were more moderate within tribuary drainage swales.

Soils mapped for this area are part of the Appling-Cecil-Ashlar association. These deep and moderately deep, well to excessively drained soils are comprised predominantly of clay of fine sandy loams. In this association, slopes along larger drainages and smaller streams commonly range as high as 35 per cent. Soils within the moderately wide stream valley consist of alluvial Congaree loam. Outcrops of granite or gneiss occur on the lower parts of the steeper slopes (Isgrig and Stroebel 1974:3,27).

Vegetation cover along the transect route varied between that on the floodplain and that on the surrounding ridges. Ridge slope canopy species included beech, tulip poplar and

Figure 5. Outcrop of Triassic sandstone bordering the floodplain of Chestnut Run (Survey Area C)

Figure 6. Exposed Triassic sandstone boulder on floodplain of Chestnut Run

Figure 7. Quartzite boulders near ridge crests above Dalton's Pond (Survey Area D)

Figure 8. Rock Outcrops along the floodplain of Beaverdam Creek (Survey Area E)

occasional red maple, while shagbark hickory, tulip poplar, sycamore and sweet gum were found on the floodplain. Understory species also varied with elevation; scrub oak, jack pine, bay laurel and bush blueberry were observed along lower ridge slopes, while seedling beech, Russian olive, greenbrier, and numerous ferns were characteristic of cleared areas along the floodplain.

Numerous rock outcrops of gneiss and metamorphosed sandstone were observed midway up the ridge slopes in this area, and eroding out of the stream bed below the water level (Figures 9 and 10). This heavily fissured, weathered sedimentary rock contained nodules and veins of quartz and quartzite. All of these exposed rock faces are of a sufficient size to accommodate rock art. In common with the middle reaches of the Beaverdam Creek drainage, the transitional "fall line" zone of Chopawamsic Creek presents a high potential for harboring rock art images. However, no rock art was observed along this transect.

One cultural landscape feature was observed within this transect: the remains of a possible stone bridge abutment were noted along the stream bank where the previously mentioned abandoned road trace intersected the creek.

Figure 9. Bedrock exposure at stream level in Study Area F

Figure 10. Bedrock exposure on ridge flanks, Study Area F

CHAPTER V

SUMMARY AND RECOMMENDATIONS

This report has presented the results of a preliminary reconnaissance of selected areas of the Marine Corps Combat Development Command, Quantico (MCB Quantico) located in Stafford, Prince William, and Fauquier counties in Virginia. The study was conducted by R. Christopher Goodwin & Associates, Inc. on behalf of the Atlantic Division of the Naval Facilities Engineering Command (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeastern United States. The primary objective of the study was to identify potential prehistoric rock art sites within MCB Quantico.

Initially established in 1917, MCB Quantico occupies an approximately 56,000 ac tract that straddles portions of the Atlantic Coastal Plain and the Piedmont Physiographic provinces in northern Virginia (Figure 1). The underlying geomorphology of the Coastal Plain portions of the installation consists of accumulated Pleistocene and post-Pleistocene sands, silts and gravels; metamorphosed shales, gneisses, and granites underlie the Piedmont sections of the installation. The major residential and administrative cantonment and a helicopter and light aircraft landing field are located on the coastal plain portions of the installation, east of Interstate Rte 95; the active combat training ranges and encampment areas are located in the western Piedmont portions of the facility. The training areas of installation are criss-crossed by some paved roads and numerous unpaved tank and vehicle trails; training areas include several live firing impact areas.

MCB Quantico was selected as a rock art survey area for three reasons: (1) prehistoric rock art sites had been reported in adjacent areas of the Potomac watershed; (2) the Piedmont sections of the installation were felt to offer several environmental zones where rock art potentially could occur; and (3) as an active Marine Corps training facility, the installation partially satisfied contractual requirements of the Scope-of-Work, which mandated on-site inspection of one installation for each service branch.

Results

Results of Field Investigations

Three distinct environmental zones within the installation were sampled (Figures 3 and 4). These included the Coastal Plain province (Areas A and B: Potomac River/Tank Creek and Quantico Creek); the western Piedmont and Triassic basin areas, with elevations of between 250 and 300 ft amsl (Areas C and D: Chestnut Run and Dalton's Pond); and the middle "Fall line" reaches of major watersheds within the installation (Areas E and F: Beaverdam and Chopawamsic creeks). A total of 8.65 km (5.4 mi) of stream valleys and associated ridge slopes were examined.

Two of the six areas surveyed, Beaverdam and Chopawamsic Creeks, contained naturally occurring rock outcrops and boulders that might have provided suitable surfaces for pictographs or petroglyphs during prehistoric times. Both of these survey areas are contained within the "Fall Line" zone of the installation, between the Piedmont and the Atlantic Coastal Plain. Major concentrations of moderately to heavily weathered boulders and outcrops of metamorphosed sedimentary rock were located near the ridge toeslopes just above the flood plains of the two

creeks (Figures 8 and 10). Minor areas of exposed rock also were identified along Chestnut Run and around the headwaters of Dalton's Pond.

Although no prehistoric pictographs or petroglyphs were identified in any of the areas surveyed, the results of the survey suggest that the areas with the highest potential for prehistoric rock art are the middle reaches of major stream valleys on the installation.

Threats to Potential Resource Base

Natural Agents. Given the deeply incised nature of the major stream valleys within the Piedmont "Fall Line" zone, the principal threat to preservation of potential rock art sites would occur as a result of stream valley flooding or erosion due to natural weathering. Evidence of the potentially adverse impact of excessive surface water on underlying bedrock deposits in these stream valleys is dramatically illustrated in Figure 8. Continued weathering, fissuring and surface degradation due to lichen and moss growth also constitute potentially adverse impacts to rock art resources.

Human Agents. Adverse impacts to potential rock art settings identified at MCB Quantico could result from several types of activities at the installation. These are listed in descending order of importance:

1. recreational use (e.g., hunting, fishing, hiking) within the installation;
2. lumber harvesting or selective thinning of forest canopy along stream valleys;
3. construction of access roads through the installation, and repetitive use of these roads by heavy vehicles, including armored vehicles; and,
4. military training exercises, particularly those that utilize armored vehicles and/or involve the use of live rounds. Due to their steeply sloping nature, the stream valleys of the Fall Line zone do not appear to be utilized heavily during combat training activities. Most of the active training ranges are located on the crests and upper slopes of the ridges adjoining these stream valleys.

Recommendations

Although several comprehensive archeological surveys (e.g. McClane and Voight 1996; Huston and Downing 1994; Huston et al. 1996) had been conducted at MCB Quantico prior to the present study, none specifically targeted the identification of rock art sites. Therefore, a more intensive sampling survey of the middle reaches of major stream drainages should be undertaken. Both the research design and the proposed methodology of the study should focus the identification of rock art; at least 50 per cent of the length of each stream valley should be examined. In this environmental zone, the facades of rock outcrops and of large boulders that have lodged at the base of steeper ridge slopes offer the most potential for rock art inscription.

Identified rock art sites that might be impacted adversely by undertakings at the installation should be avoided, if possible, by redirecting or relocating the undertaking. If avoidance is not feasible, rock art sites should be documented utilizing professionally accepted recordation techniques. All identified rock art sites also should be inspected on a regular basis to assess the extent to which weathering, erosion, and recreational use of the adjoining stream valleys and flood plains are impacting the resource base.

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APPENDIX IV

SITE REPORT: MASSACHUSETTS MILITARY RESERVATION

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Project Background

This report presents the results of a background literature search into the cultural resources at the Massachusetts Military Reservation (MMR), located principally in the Towns of Bourne, Sandwich, and Mashpee, in Barnstaple County, Massachusetts. The study was conducted by R. Christopher Goodwin & Associates, Inc., under contract to the Atlantic Division of the Naval Facilities Engineering Command, Atlantic Division (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeast. The primary objective of this preliminary Phase I study was to identify potential rock art sites within the reservation, which formerly comprised Otis Air Force Base.

MMR is situated at the western end of Cape Cod, immediately east of the Cape Cod Canal (Figure 1). Massachusetts Rts 6 and 28 provide the principal land access to the installation. Tenant organizations that share space on the approximately 21,250 ac installation include the Massachusetts Army and Air National Guard; the United States Air Force; the Veterans' Administration, the United States Coast Guard; and the United States Marine Corps. Approximately 5,000 ac of the facility are occupied by administrative cantonments of the tenant organizations, including the flight line and administrative and operations facilities. The range, maneuver, and impact areas of Camp Edwards incorporate approximately 14,000 ac of the installation, and a National Cemetery administered by the Veterans' Administation includes approximately 750 ac (Montgomery Consulting Engineers 1991:i).

For this project, Christopher R. Polglase, M.A., ABD, served as Principal Investigator and oversaw all aspects of the study. Martha R. Williams, M.A., M.Ed., acted as Project Manager and conducted the literature survey.

Research Design and Methodology

The Massachusetts Military Reservation was selected as a study location for the Rock Art project because of its proximity to previously identified rock art sites in the region, and because part of this installation is under the direct control of the United States Air Force (USAF). The primary objective of the research study was to document any rock art sites identified within or in the vicinity of the installation and to delineate areas of the installation that potentially could contain additional rock art sites. Although the major emphasis of the study focused upon prehistoric Native American rock art, historic inscriptions and motifs also were identified.

Preliminary discussions with cultural resources specialists at MMR indicated that direct responsibility for identifying and managing cultural resources within most of the installation lay with the Commonwealth of Massachusetts, and that extensive survey work already had been completed there. Subsequent information obtained from base environmental specialists indicated that the portion of MMR under direct USAF control had been disturbed severely and that its potential for cultural resources, including rock art, was limited. As a result, the current study was limited to a literature search; no pedestrian survey was undertaken at MMR. On-site documentation of rock art was confined to visiting the Aptuxcet site (19BAXXX) in the nearby town of Bourne.

Archival research included review of available sources about the prehistory and historic development of the project area and vicinity; examination of archeological site files and cultural resources studies conducted on or near MMR; review of specialized literature on prehistoric rock art sites in the general vicinity of the installation. Environmental, archeological, and historical reports were reviewed at the Massachusetts Historical Commission and in the environmental offices at MMR. This research determined the nature and number of previously identified sites on and near the installation and provided material for developing the prehistoric and historic contexts for the installation.

Current USGS 7.5 min topographic and environmental maps of the installation subsequently were reviewed to identify areas where the potential for rock art would be highest.

Organization of the Report

Chapter I describes the project area, the research design and methodoloy adopted for the study, and the organization of the report. Chapter II describes the natural setting of the project area; discussess previous cultural resources studies within and in the vicinity of MMR; summarizes documentation on previously identified rock art sites in the region; and develops the regional prehistoric and historic contexts for the inner portions of Cape Cod. Chapter III summarizes the results of the study and considers those results from a management perspective.

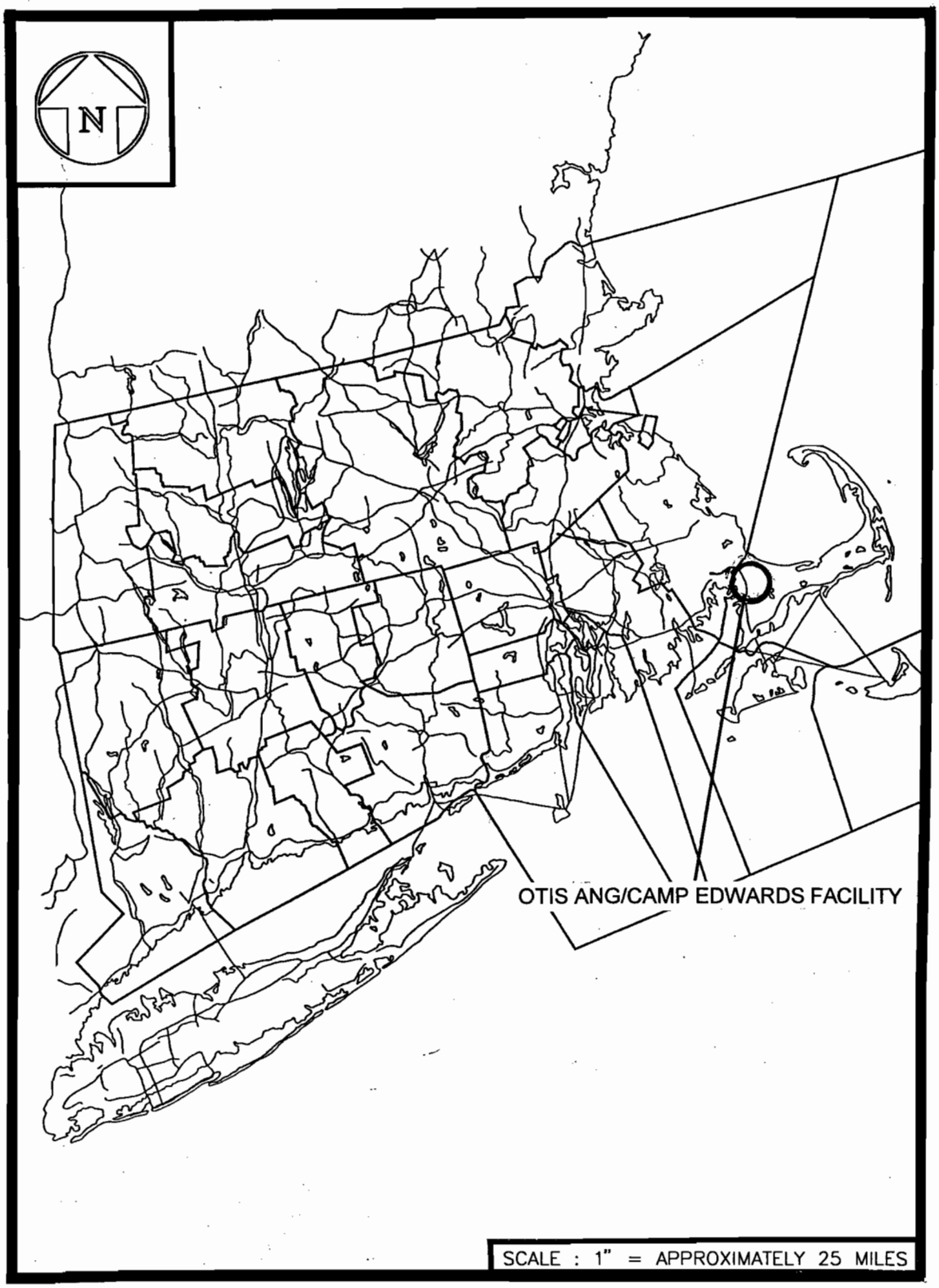

Figure 1. Map of Massachusetts, showing the general location of the Massachusetts Military Reservation

CHAPTER II

NATURAL AND CULTURAL SETTING

Natural Setting

The Massachusetts Military Reservation (MMR) occupies a 21,250 ac site at the western (inner) end of Cape Cod in the southeastern portion of Massachusetts. The reservation incorporates portions of the Towns of Bourne, Sandwich, and Mashpee, in Barnstable County.

Geology and Pedology

The significant landforms of this portion of southeastern Massachusetts are the result of Pleistocene glacial activity and subsequent colluvial activity during the post-Pleistocene period (Mahlstadt and Loparto 1987:8; James Montgomery Consulting Engineers 1991:3.5-1). During the Wisconsin glaciation, lobes of glacial ice extended across Cape Cod; two of these lobes, the Buzzard's Bay lobe and the Cape Cod Bay lobe, were directly responsible for geological formations at the MMR. As these glaciers receded, they deposited moraines consisting of up to 100 ft of poorly sorted, non-stratified glacial sediments overlying previously deposited sand and gravel outwashes. Sediment size within these moraine deposits ranges from silt to boulders. Moraine soils belong principally to the Plymouth-Canton-Carver association, and consist generally of a fine sandy loam mantle over a glacially deposited gravelly sandy loam till. Surface deposits are very stony (Montgomery Engineering 1991:3.5-1 - 3.5-7).

Colluvial wash from the receding glacial lobes created a second distinctive landform known as a pitted outwash plain. This landform is composed of between 130 and 200 ft of coarse sand and gravel with minor amounts of silt that were later covered by windblown sands and silts during the post-glacial period. Two types of anomalies interrupt the otherwise level terrain of the outwash plain: kames or knobs, which are isolated hills of rock debris that were left by the retreating ice sheets, and kettles, the depressions formed as sand and gravel settled into holes formed when large isolated blocks of glacial ice thawed. Some of these kettles remained filled with meltwater, forming permanent ponds or wetland areas (Mahlstedt and Loparto 1987:10; Montgomery Engineering 1991:3.6-9). The principal associations of the outwash plain are Agawam and Enfield soils, which consist of a surface layer and subsoil of sandy or silty loam (Montgomery Engineering 1991:3.5-1 - 3.5-7).

MMR encompasses portions of the Buzzard's Bay moraine, which extends along the western boundary of the installation, and the Sandwich moraine, which extends along the northern perimeter of the facility (Figure 2); maximum elevations in the moraine areas of the MMR are 270 ft above mean sea level. The moraine areas at MMR are utilized principally for training activities. The Mashpee pitted outwash plain comprises the southeastern portion of MMR; the administrative cantonments and the Otis flightline are located on this landform, which averages approximately 50 ft amsl in elevation. Portions of the outwash plain reportedly have been disturbed to a depth of at least 4 ft, thereby eliminating most possibilities for archeological resources (Chris Faux personal communication 1996).

Vegetation

The dominant vegetational community at MMR is a pitch pine/oak forest fire community. Principal species present are pitch pine, pin oak, and scrub oak, with black and white oak hardwood forests on well drained uplands. Prevalent understory species include sheep laurel, bayberry, pin cherry, greenbrier, low bush blueberry, and huckleberry (Montgomery Engineering 1991:3.6-1). Within the maintained cantonment areas at MMR, European lawn grasses and ornamental shrubs have replaced the natural vegetation; in disused previously developed areas of the installation, herbaceous meadow vegetation predominates.

Prehistoric Context

Previous Investigations

Archeological site files at the Massachusetts Historical Commission indicate that a total of 32 archeological sites have been identified within or in the vicinity of the MMR; 19 of these occur within the boundaries of the installation (Table 1). Temporal and cultural affiliations have been determined for 15 of these sites; these indicate that, while the earliest period of occupation in the general region dates from the Middle Archaic, intensive prehistoric settlement of this section of Cape Cod did not begin until the Late Archaic period. In terms of function, sites range the gamut from small tool manufacturing and curation stations to large complex village sites. Kettle ponds and upland swamps or wetlands frequently form the focal points for these interior sites.

Two professional archeological investigations have been conducted within the boundaries of the MMR. Davin and Gallagher (1987) systematically examined 33 200 m^2 sample "blocks" at on the installation. The block areas selected for survey were determined by background research, a disturbance study, pedestrian reconnaissance, and accessibility; most of the sample blocks were located in the moraine areas along the northern and western perimeters of the installation. Within each survey block, subsurface testing was conducted at 20 m intervals along randomly selected and systematically placed transects within each block. A total of 675 shovel tests and several 1 m test units were excavated during the survey.

As a result of the study, 11 archeological sites were identified (Table 1) (Davin and Gallagher 1987:69-89). Six sites represented major concentrations of prehistoric activity. The study found that areas around wetlands and kettle ponds constituted the most highly sensitive environments for prehistoric settlement. The survey also located one example of rock art (discussed below), but it was not registered as an official archeological site.

In 1991, the Office of Public Archeology of Boston University conducted a survey of a proposed wastewater treatment system (Macomber 1991). State archeological site files indicate that this survey located six prehistoric sites, all of which represented isolated finds of modified lithic material.

Rock Art in Southeastern Massachusetts. Many outcrops and glacially deposited boulders in southeastern Massachusetts have been identified ethnographically as significant regional cultural landmarks. For example, Wampett Rock, a cave site in adjacent Plymouth County, was found to contain prehistoric lithics and a burial (Shaw and Merrick 1982:7). Chamber Rock or Sacrifice Rock, located near the Cape Cod Canal, reportedly was regarded as sacred by Native Americans of the contact period (Herbster 1994:66). Neither of these sites, however, contained any inscriptions or petroglyphs.

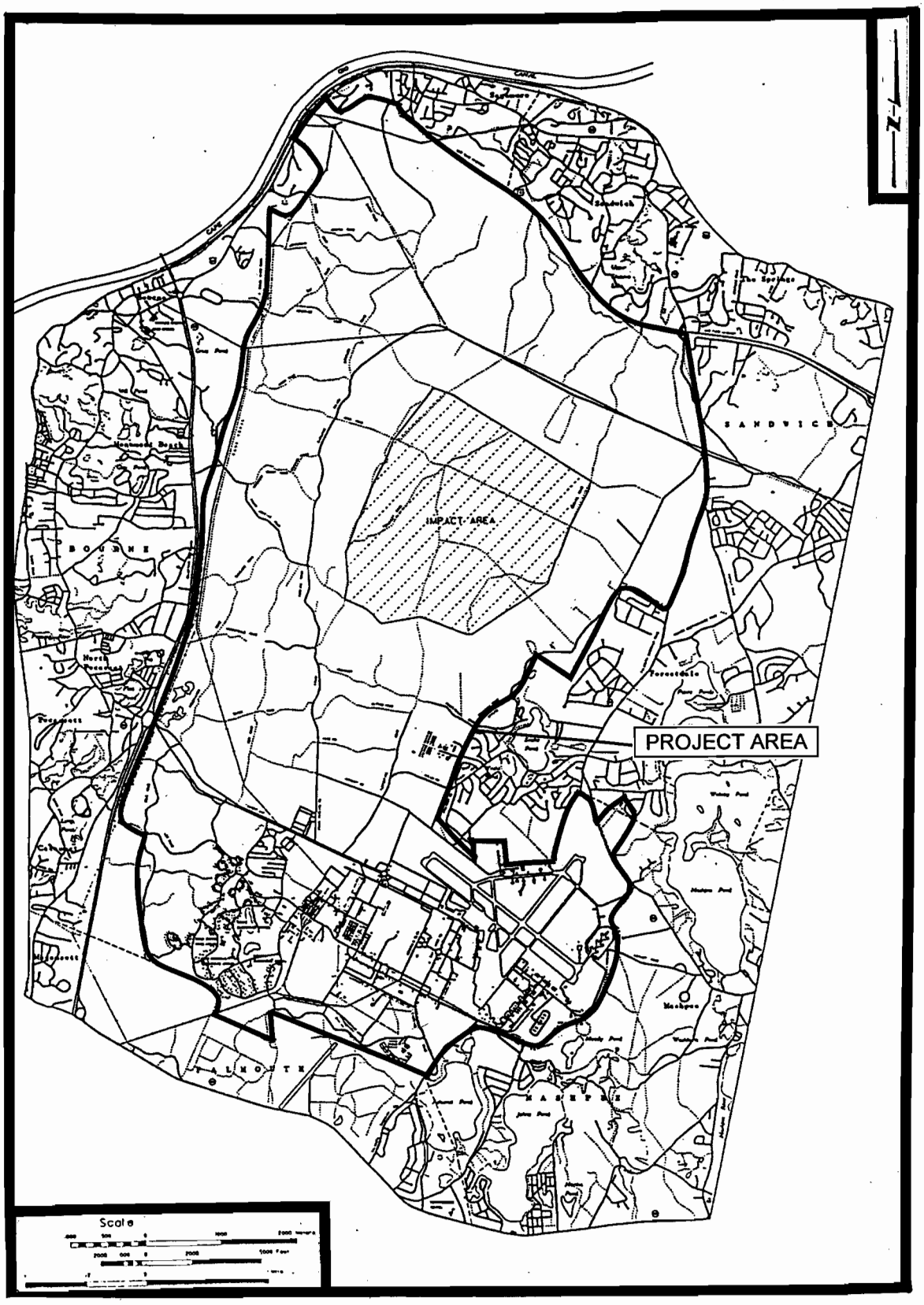

Figure 2. Installation boundary map for the Massachusetts Military Reservation in the towns of Sandwich, Bourne, and Mashpee, Massachusetts

TABLE 1. PREHISTORIC ARCHEOLOGICAL SITES ON AND IN THE VICINITY OF OTIS ANG FACILITY, BOURNE, SANDWICH, AND MASHPEE, MASSACHUSETTS

Site Name/No.	Site Type	Chronology	Distance to Water	Elevation	Comments
Aptucxet Petroglyph 19BN218	Petroglyph	ca. 1658	N/A		Inscribed stone was once doorstep of Indian Meeting House founded by Tupper; now preserved at restored Aptuxcent Trading Post
Dean Farm Site (19BN219)	Unidentified	Unidentified	Stream: <50 m	50 ft amsl	No further information available
Shellheap Site (19BN270)	Unidentified	Unidentified	Tidal estuary: adjacent	0 - 10 ft amsl	Features found included pits, burials, faunal material. Private collector
Crow Farm (19BN279)	Unidentified	Late Archaic through Late Woodland		10 - 20 ft amsl	Diagnostic points: Large triangles, Woodland Stemmed and lanceolate, Meadowood, Cape Stemmed, small stemmed, small triangles, Susquehanna Broadspear
Cataumet (19BN493)	Unidentified	Late Woodland	Freshwater stream .7 km northwest	50-60 ft amsl	Large felsite triangular point
Deer Horn Hill Top (19BN513)*	Probable tool manufacture	Late Archaic/Early Woodland	Pond 1.4 km SE	206 ft amsl	Pentagonal quartz point; quartz debitage, quartz core
19BN540	Unidentified	Unidentified	0 m. to Back River	0 - 10 ft amsl	Avocational archeologist reports "artifacts eroding constantly out of river bank." No further information available
Town Neck Road (19BN547)	Unidentified	Unidentified	Cape Cod Canal adjacent	10 ft amsl	No further information available
Sandwich Fish Hatchery (19BN571)	Unidentified	Possible Late Archaic, Early Woodland, Late Woodland	Adjacent wetlands	20-30 ft amsl	Large and small triangular points; edge tools
Ashumet Pond Knoll Site (19BN608)	Tool maintenance and manufacture; food processing	Unidentified	Ashumet Pond adjacent	50-80 ft amsl	Fire cracked rock, felsite and quartz fragments
Ashumet Beach Site (19BN609)	Primary lithic processing	Unidentified	Ashumet Pond adjacent	50 ft amsl	Fire cracked rock; quartz core; quartz biface; hammerstone; multiple flakes. Raw lithic material is beach cobbles

Site Name/No.	Site Type	Chronology	Distance to Water	Elevation	Comments
Ashumet Find Spot #2 (19BN610)	Unidentified	Unidentified	Ashumet Pond adjacent	50 ft amsl	Isolated milky vein quartz debitage
Ashumet Find Spot #1 (19BN611)	Unidentified	Unidentified	Ashumet Pond adjacent	50 ft amsl	Isolated quartz flake scatter
*Spruce Swamp (19BN631)	campsite/resource procurement/tool manufacture	Late Archaic/Early Woodland	10 m	100 ft amsl	Varied lithic material includes felsite, chert, rhyolite, quartz, jasper, quartzite, argillite, hornfels. Diagnostics include Atlantic point; grit-tempered ceramic. Abundant debitage and broken tools.
*Raccoon Swamp 2 (19BN632)	temporary camp	Unidentified	Swamp adjacent	140-150 ft amsl	3 point fragments; rhyolite, felsite, quartzite, and quartz bifaces; abundant debitage. Chert is very high quality.
*Raccoon Swamp #1 (19BN633)	campsite/tool manufacturing	Late Archaic	Swamp adjacent	140-150 ft amsl	Small stemmed projectile point is diagnostic. Fire cracked rock, biface fragments, lithic debris including rhyolite, quartz, felsite, chert, quartzite)
*Block 5 (19BN634)	Unidentified	Unidentified	N/A	150-200 ft amsl	Isolated lithic scatter with broken felsite point and quartz debris
*Block 10 (19BN635)	Unidentified	Unidentified	N/A		Isolated lithic scatter
*Block 26 (19BN636)	Tool curation (?)	Unidentified	N/A		Lithic scatter
*Block 25 (19BN637)	Unidentified	Unidentified	100-150 ft amsl	Upper Pond 1.5 km west	Isolated hornfels debitage fragment
*Block 15 (19BN639)	Unidentified	Unidentified	160 ft amsl	Deep Bottom Pond northwest	Isolated quartz flake
*Opening Pond (19BN640)	Tool curation	Late Archaic	80-150 ft amsl	Kettle pond adjacent	Diagnostic: quartz small stemmed point; felsite biface; quartz and felsite debitage
*Orchard Road (19BN641)	Temporary base camp; resource procurement site	Late Archaic through Middle Woodland	120-200 ft amsl	Swamp adjacent	Diagnostics: grit-tempered ceramics; stemmed felsite projectile point. Faunal material present. Lithics include felsite, argillite, rhyolite, quartzite, hornfels, jasper, chert and quartz (predominant).

Site Name/No.	Site Type	Chronology	Distance to Water	Elevation	Comments
*Round Swamp (19BN642)	Multicomponent camp and lithic workshop	Middle Archaic through Late Woodland (7,000 - 450 BP)	180-200 ft amsl	Swamp adjacent	Diagnostics: ceramics, Starklike point, small stemmed point, Squibnocket triangle, Jack's Reef corner-notched, Levanna. Abundant debitage. Intensive recurrent occupation with possible hearths present
*Triangle Pond (19BN649)	Unidentified	Unidentified	90 ft amsl	Spring: 10 ft	Fragment porphyritic felsite
*19BN651	Unidentified	Unidentified	50 - 100 ft amsl	Kettle pond adjacent	Quartz biface preform
*19BN652	Unidentified	Unidentified	100-150 ft amsl	Osbourne Pond 1.3 km south	Isolated crystal quartz flake
*19BN653	Unidentified	Unidentified			Isolated lithic
*19BN654	Unidentified	Late Archaic - Early Woodland			Quartz small stemmed projectile point base
*19BN655	Unidentified	Late Archaic - Early Woodland (?)			Isolate
*19BN656	Unidentified	Late Archaic/ Transitional			Isolated small stemmed projectile point base
Bourne Pond Canal Locus (19BN689)	Possible village	Late Woodland (?)		Bourne Pond adjacent	Site possibly associated with nearby Grove Field ossuary. Rhyolite, quartz, quartzite, felsite debris

Several rock art sites have been reported in southeastern Massachusetts (Table 2), although no systematic survey for rock art has been conducted in the region. The largest concentration is located around Assawompsett Lake in the town of Middleborough (Lenik 1996). These rock art sites have been attributed to historic period Native Americans, although some potentially earlier glyphs also have been identified. Lenik's chronological and cultural assessments are based upon local ethnography; on the fact that many glyphs apparently represent signatures or samples of Roman lettering; and because many glyphs appear to have been incised with metal tools rather than pecked with other, harder, lithic materials (Lenik 1996:27-33).

The Aptuxcet Rock Art site, located in the Town of Bourne approximately 5 mi northwest of MMR, actually represents an incised quarried stone that currently is on display at the Aptuxcet Trading Post Museum. Local tradition holds that this stone reportedly served as a door sill for the Bournedale Indian Church. The meaning and origin of the inscriptions on the Aptuxcet stone have been the subject of much debate. Barry Fell attributed them to the Phoenicians, while others concluded that they represented Norse runes (Cape Cod *Independent* 1975). However, in correspondence with the curator of the museum, Professor James E. Knirk of the University of Oslo in Norway has concluded that "the most logical explanation" is that the inscribed lines and characters represent "an attempt at writing Roman letters by someone not very educated (perhaps an American Indian)."

One rock art site has been located within MMR. The so-called "SAL N PRY" rock is a large (44 ft in circumference) boulder which has been inscribed with Roman letters and the figure of a woman. Two other boulders in the vicinity also are marked with Roman letters ("SLP" and "CSPN"). These inscriptions reportedly represent the work of an eccentric eighteenth or nineteenth century Anglo-American (Davin and Gallagher 1987:60-62).

Cultural Sequence

Paleo-Indian Period (12,000 - 9,000 BP). At approximately 15,000 BP, New England was covered by the ice sheets of the Wisconsin glaciation. Sea levels world-wide were 130 m lower and 5 - 15 mi further east than at present (Borns 1971:2). Portions of Cape Cod probably became ice free and open to colonization by prehistoric peoples at approximately 13,500 BP, when the glaciers had receded sufficiently to reveal more extensive land masses (Borns 1971:1-2, Figures 1 and 2). The exact nature of the vegetational communities present during this period is debated. According to Davin and Gallagher (1987:18), palynological data suggest a mixed pine and birch forest community, while Funk (1983:303-304) hypothesizes a spruce-dominated environment.

The initial prehistoric occupants of the New England region probably migrated into the region from the south and west following the receding glaciers (Funk 1983:309). The most thoroughly documented Paleo-Indian site in Massachusetts is the Bull Brook Site on the northeastern Massachusetts coast; a C-14 date of ca. 7,000 BP has been obtained for this site, but many experts consider it too recent (Funk 1983:312). Closer to the project area is the undated Wapanucket #8 site (Funk 1983:12) south of Boston, and the Hathaway Pond site in Barnstable County, which yielded a spot find of an Eden point (Davin et al. 1994:38). Two additional Paleo-Indian points, including one Plano-like, also have been recovered from Cape Cod, although their provenience is uncertain (Mahlstedt 1987:24-25).

In other areas of New England, Paleo-Indian sites have been found to cluster in well-drained areas adjacent to wetlands or former wetlands. It is generally believed that Paleo-Indian subsistence strategies centered on hunting, with caribou and other cold-adapted fauna constituting the primary quarry (Cultural Resources Group 1995:10); however, most researchers now acknowledge that a general hunting-foraging strategy probably describes Paleo-Indian subsistence

TABLE 2. RECORDED ROCK ART SITES IN SOUTHEASTERN MASSACHUSETTS

Site Name	Geological Context	Chronology	Comments
Chestnut Street (Assawompsett)	Bedrock outcrop	Contact Period	**Motifs**: handprint; six-sided star or sun; lightly incised arrow. All apparently cut by metal instrument.
Hand Rock (Assawompsett)	Glacial boulder	Unidentified	**Motifs**: a handprint and wrist; southern orientation. Considerably defaced and modified during 20th century. Lenik (1996) interprets as a shamanistic device to indicate a sacred place.
Great Rock (Assawompsett)	Granitic bedrock	Contact to Historic aboriginal	**Motifs**: two handprints incised onto western face; also inscribed with historic period initials. Ethnohistoric tradition associates site with Wampanoag Indian sachem Tuspaquin
Betty's Neck (Assawompsett)	Boulders	Contact to Historic aboriginal; possible earlier components	**Motifs**: (pecked and infilled) handprint; footprint (outline); wigwam (historic aboriginal dwelling; carved with metal tools); 3 signatures (one dated 1749)
North Shore (Assawompsett)	Boulders/pebbles	Archaic and Contact Periods	**Motifs**: Thunderbird motifs on pebbles and boulders; anthropomorph; ship motif (historic period)
Aptuxcet Site (Bourne)	Quarried door sill	Contact period	**Motifs**: partial Roman lettering; part linear designs.
*SAL N PRY Rocks (Sandwich)	Glacial boulder	Historic period	**Motifs**: Roman lettering; female anthropmorph. Reportedly Euro-American in origin

*Located on Massachusetts Military Reservation

practices more accurately (Funk 1983:312-313); Mahlstedt 1987:25). Evidence from the Bull Brook site also indicates that larger sites may have occupied repeatedly as centralized base camps. Internal spatial patterning was present on this site, and well-defined activity/living loci, possibly associated with specific family units, were articulated (Funk 1983:314).

Archaic Period. As in other areas of the Eastern Woodland, researchers in Massachusetts recognize a traditional tripartite division of the Archaic period: the Early Archaic (9,000-8,000 BP); the Middle Archaic (8,000 - 6,500 BP), and the Late Archaic (6,000 - 3,000 BP).

Early Archaic. Although many scholars now hypothesize that the Early Archaic period represents an essential continuation of earlier Paleo-Indian subsistence strategies and settlement patterns, they also recognize a distinctive set of diagnostic bifaces, including the Palmer, Kirk, Stanly, and bifurcate types (Funk 1983:317). By approximately 8,500 BP, a moderating climate permitted the expansion of deciduous hardwood species such as oak into the previously spruce-dominated landscape (Davin and Gallagher 1987:18). The distribution of Early Archaic sites in southern New England suggests that prehistoric peoples of this time period had begun to exploit a variety of environmental niches and ranged over a broader area than previously believed (Mahlstedt 1987:26).

In Massachusetts, the Early Archaic period is poorly understood, largely because it is represented only by a thin scattering of bifurcate base point sites across southern New England. The Early Archaic sites reported on Cape Cod all are located in regions that would have represented interior upland settings during this time period (Mahlstedt 1987:26). No Early Archaic occupations have been identified within or in the vicinity of MMR (Davin et al. 1994:39).

Middle Archaic. Mahlstedt (1987:27) notes a sharp increase in occupation on Cape Cod during this period, which is recognized by the presence of diagnostic Nevill, Stark, and Archaic Stemmed points. Thirty-four Middle Archaic sites have been documented for Cape Cod; however, none have been investigated intensively. Middle Archaic sites on the inner and middle cape tend to cluster around creeks and interior ponds, or near the headwaters of freshwater streams and outwash channels at some distance from the coast; these probably represent winter occupations. Summer sites surround Coastal Plain tidal marshes, ponds and bays (Tuck 1983:35). The location of some sites near the headwaters of streams suggests that the harvesting of anadromous fish may have become a significant element in the Middle Archaic subsistence strategy (Mahlstedt 1987:29).

Two sites with Middle Archaic components have been reported in the vicinity of MMR, including the Round Swamp site on the installation. Both are located in the vicinity of kettle ponds (Davin et al. 1994:39).

Late Archaic. The date of ca. 6,000 BP represents the beginning of the Late Archaic period in Massachusetts. During this time, cultural variation, regionalization, and stylistic diversity are first discernable in the archeological record (Mahlstedt 1987:30). The environment in the Northeast was characterized by the "oak-chestnut-deer-turkey" biome, with birch, hickory, maple and walnut as secondary species (Funk 1983:320; Davin and Gallagher 1987:19). Late Archaic sites far more numerous and larger than previous periods. Their distribution suggests that bands occupied limited territories, perhaps stream drainages, and that Late Archaic peoples moved seasonally around these territories to obtain various food resources (Funk 1983:320). Faunal and botanical evidence demonstrate reliance on a variety of resources including game, fish, and nuts.

At least four major Late Archaic cultural traditions are recognized in Massachusetts. The small stemmed point tradition (ca. 5,000 - 2,000 BP) is the most frequently represented cultural association found on Cape Cod. The geographic distribution of small stemmed point sites

suggests that virtually every type of environment was exploited, including lakes and ponds; streams or rivers; estuaries and salt marshes; bluffs and scarps; and, coves or bays. Mahlstedt has observed that the "highly evolved and well-adapted settlement system" associated with this tradition was based on the exploitation of a "wide range of natural resources." Some researchers suggest that the increasing reliance on shellfish may have produced an "incipient sedentism" (Mahlstedt 1987:33-34).

The Laurentian tradition, dated ca. 6,000 - 5,000 BP, initially was based in the St. Lawrence River Valley, and is recognized by the presence of Brewerton, Vosburg, and Vergennes points. In Massachusetts, elements of this tradition are considered to be intrusive into the mainstream cultural expressions of the Archaic period (Mahlstedt 1987:30-31; Funk 1983:321-322).

The Susquehanna tradition (ca. 3,900 - 2,800 BP) was a Mid-Atlantic based tradition characterized by the presence of cremated remains in burials and by broad projectile points like the Wayland Notched, Atlantic, and Susquehanna Broad points, and Coburn blades. There are 41 documented Susquehanna period sites on Cape Cod, primarily on the middle and outer Cape (Mahlstedt 1987:32)

The Orient phase, commonly believed to have originated as an indigenous development produced by blending the Susquehanna and small stemmed traditions, is viewed as transitional into the Early Woodland period (Mahlstedt 1987:37). The most characteristic point is the narrow, slender Orient Fishtail type (Funk 1983:332); soapstone (steatite) vessels also appear for the first time on Orient phase sites. In Massachusetts, this phase also is sometimes called Coburn (Funk 1983:332).

Funk also includes a fifth tradition, the Squibnocket, which is represented by a quartz-based lithic technology that dominated southern New England. Characterized by small stemmed and triangular points, choppers, plummets, notched atlatl weights, hammerstones, paintstones, and bone awls, the dates for this tradition extend from 2,500 to 1,800 BC. People of the Squibnocket cultural tradition exploited white-tailed deer and other mammals, as well as fish and freshwater mussels. At the Massachusetts type site, Wapanucket #6, excavation revealed a series of circular lodges, measuring 9 - 20 m in diameter. The entries to these dwellings were oriented towards the southwest; each dwelling had a single hearth and one or more storage pits. Burials were placed in pits within the domestic compound (Funk 1983:327-28).

Woodland Period (3,000 - 450 BP). The Woodland Period in the East generally is subdivided into three phases: Early, Middle, and Late. One major characteristic of the period is the first appearance of ceramics, which typically included collared pots that later were decorated with castellated rims, embossed effigy faces, and incised motifs (Snow 1978:66). Ceremonial burials were common. Although the horticulture/agriculture was practiced in areas where environmental conditions permitted, subsistence strategies still relied partially upon a diversified round of hunting, fishing, shellfish collection, and plant collection (Snow 1978:66). Settlement tended to concentrate in larger villages, as increasing agricultural yields permitted the adoption of a more sedentary lifestyle. On Cape Cod, Early, Middle, and Late Woodland commonly are found as identifiable components of the same site, suggesting a pattern of recurrent occupation. For example, components dating from the Middle Archaic through the Middle Woodland periods have been identified at the Round Swamp site at MMR (Davin et al. 1994:38-40).

Early Woodland. In general, the Early Woodland period is poorly represented in eastern New England, and the situation is particularly confused in Massachusetts. Many sites with Early Woodland ocmponents also contain an array of material from other traditions and time periods. Late Archaic components frequently are found in association with artifacts traditionally assigned to the Early Woodland, such as Meadowwood and Rossville points. Data from some sites

suggests that ceramics may have been produced even before the Early Woodland period. Potential Adena-influenced materials similar to artifacts found further west in Pennsylvania and New York sometimes appear in New England Early Woodland contexts. However, the preponderance of evidence suggests that an "insular" type of existence, dependent upon locally available lithic materials, prevailed during the Early Woodland period on Cape Cod (Mahlstedt 1987:40-42).

One culturally distinct Early Woodland phase, the Lagoon Phase (ca 2,590-2,360 B.P.), has been isolated on Martha's Vineyard. The archeological signature of this maritime adaptation consists of the remains of small flimsy dwellings and a faunal assemblage reflective of a subsistence strategy that included reliance on deer, shellfish, and finfish. Elements of Lagoon artifact assemblages sometimes are found on other sites in the region (Funk 1983:337).

Middle Woodland. The Middle Woodland period in the Northeast extended from ca. 1,900 - 1,000 B.P. It is generally characterized across New England by a well defined set of artifact types and mortuary practices, most of which first were identified and named by Ritchie, based upon his work in New York State. In New England, the Point Peninsula tradition is recognized by the presence of Vinette 2 series ceramics. Jack's Reef pentagonal points are considered diagnostic of Middle Woodland occupations (Davin et al 1994:40). However, substantial amounts of regional and local diversity are evident. In eastern Massachusetts, Middle Woodland occupations have been defined at the Peterson and Cunningham sites on Martha's Vineyard (Funk 1983:346-347).

Late Woodland. The Late Woodland period represents the zenith of prehistoric occupation on Cape Cod and the islands of Martha's Vineyard and Nantucket. The diagnostic indicator for the period is the ubiquitous large, triangular, Levanna point (Davin et al. 1994:40). In southeastern Massachusetts, Late Woodland sites are found in every conceivable ecotone, both interior and coastal. However, only five per cent of all Late Woodland sites are located on the inner Cape, close to the MMR project area (Loparto and Steinitz 1987:65).

Many Late Woodland sites appear to reflect seasonal and functional specialization. Most Late Woodland sites also exhibit evidence of occupation during previous periods (Mahlstedt 1987:41-42).

On Cape Cod, no true village sites have been identified archeologically. The primary evidence for the Late Woodland period has been derived principally from burial sites, which contain both cremations and intact, flexed inhumations. Both ossuaries and single burials are present (Mahlstedt 1987:44).

Contact Period (1500-1620). Initial encounters between Native Americans and Europeans on Cape Cod probably occurred during sporadic visits by fishermen and coastal explorers, perhaps as early the fifteenth century. By that time, this region was controlled by the Pokanuket or Wampanoag tribe, an Algonkian-speaking people whose principal settlement was located on the eastern shore of Narragansett Bay. The nature and extent of Wampanoag control over local groups on Cape Cod, such as the local Mattacheeset and Cummaquid groups of the Barnstable/Sandwich/Yarmouth area, is unclear (Loparto and Steinitz 1987:56-65). Verrazano, who encountered the Wampanoags in 1524 when he landed near what is now Newport, Rhode Island, provided an extensive description of this cultural group. He commented that they were the "goodliest" people and of the "fairest conditions" that he had encountered during his voyage. The French expedition, which was well received, set the tone for European/Native American relationships that persisted for more than a century (Morison 1971:304-205). However, at the onset of the seventeenth century, the formerly cordial relations turned hostile when subsequent expeditions captured the local Indians and took them back to Europe (Loparto and Steinitz 1987: 56).

Historic Context

Plantation Period (1620-1692)

Sustained European colonization of the Cape Cod area began in 1620, with the well known Pilgrim colony at Plymouth. Because the Dutch had established a power base at Amsterdam (New York) and on Long Island, this section of the Massachusetts coast was not exempt from seventeenth century international rivalries. The Dutch may have established the earliest settlement at Aptucxet to counterbalance the growing English influence in the region (Loparto and Steinitz 1987:56); however, by 1627, the proprietors of the Plymouth colony had preempted this location completely (Jenkins and Adams 1984:1).

Early land grants in the Sandwich area, which were established in the 1630s, occupied a one mile by ten mile strip along the shore of Cape Cod Bay. Settlement centered around three tidal marsh "necks": Shawme, Scorton, and Scusset (Jenkins and Adams 1984:1). The proprietors of the settlement all were emigres from Boston while ordinary settlers were drawn from the communities of Plymouth and Duxbury (Loparto and Steinitz 1987:70). On their grant, the proprietors planned to settle up to 60 families, each of which would receive a houselot of between four and ten ac (Jenkins and Adams 1984:2; Loparto and Steinitz 1987:76). Initially, the proprietors retained exclusive rights to the marsh and meadow areas of their grant, but their monopoly of these resources was successfully challenged by area residents during the 1640s. Thereafter, Scorton and Shawme Necks were set aside as common lands (Jenkins and Adams 1984:2). By 1650, Sandwich had a population of 50 families.

For these early settlers, the principal means of earning a livelihood was agriculture. Livestock, corn, oats, rye, and wheat were the primary commodities produced. Although marine resources were exploited, they did not provide a principal means of livelihood during this early period (Jenkins and Adams 1984:4-5). Interior areas such as those comprising the MMR were peripheral to the main settlement nuclei, and were utilized primarily for exploitation of timber and other forest resources (Davin and Gallagher 1987:44). Although former Indian trails along the northern and southern coastlines of Cape Cod and connectors across the Cape in the Shawme-Mashpee area were utilized by English settlers, the favored method of inter-settlement communication and transport was by canoe (Loparto and Steinitz 1987:59-60).

Relationships with the indigenous Native American population in this area remained generally cordial and mutually beneficial; for example, the native groups around Herring Pond, known as the "Black Ground" Indians, were employed as navigators and harpooners during the seventeenth century (Shaw and Merrick 1982:11). Many Indians embraced Christianity, and their conversion determined the pattern of rights and privileges that they enjoyed. Indian rights and education were encouraged by the town leaders in the region. Despite the toll taken by European-introduced diseases, a substantial native population remained in the area throughout the Plantation period.

As the European population increased, the interests of the local Indians became secondary (Loparto and Steinitz 1987:69). Continued displacement of the indigenous population in 1658 to the establishment of reservations. The largest of these was a 50 sq mi (ca. 13,500 ac) Indian "plantation" around Santuit Pond in Mashpee (Jenkins and Adams 1984:6; Loparto and Steinitz 1987: 72; Davin 1990:32). The Mashpee reservation, which incorporated some of the area currently included within the MMR, was used as an internment facility for captives take during King Philip's War (Loparto and Steinitz 1987:66).

While some Indians relocated to reservations like Mashpee, others remained in small communities known as "praying towns." The residents of these isolated informal Native American

settlements accepted European religious and economic customs, but did not relocate (Loparto and Steinitz 1987:73). During the seventeenth century, between 10 and 17 such towns were established in the Plymouth colony; in the MMR area, these included settlements at Sandwich, Pispogutt, Mannamit, and Weesquobs (Conkey et al. 1978:177).

By 1692, all active native resistance to European colonization had ceased. Indian settlements and reservations continued to focus on perpetuating Christian/European culture and values by establishing schools and meetinghouses. The Mashpee reservation obtained self-government and became an autonomous district in 1763 (Loparto and Steinitz 1987:87).

Colonial Period (1692-1775)

The colonial period was marked by a steadily rising Anglo-American population and by the formation of more independent towns on Cape Cod (Loparto and Steinitz 1987:78, 88-90). At Sandwich, the population expanded eastward towards Barnstable, south towards the flatter plains area, and westward to Buzzards Bay (Jenkins and Adams 1984:6).

Most immigrants to Cape Cod came from elsewhere in New England, undoubtedly attracted by the peculiarly tolerant acceptance of religious diversity and the distrust of centralized authority that characterized the population of the Cape (Loparto and Steinitz 1987:86). As a result, the population of the region was composed of diverse religious and ethnic/racial groups, including Baptists and Quakers, as well as Native Americans, African-Americans, and Euro-Americans (Loparto and Steinitz 1987:85-86).

The excellent harbors of Cape Cod and the islands fostered the growth of a maritime-based economy. Intercolonial coastal trade increased between the three major ports in the region (Nantucket, Edgartown, and Barnstable) and major markets in Salem, Boston, Newport and New York. Fishing and whaling developed into important economic pursuits, and the numerous tidal creeks developed as centers for shipbuilding and fish processing. By 1728, regular ferry service had been established between the mainland and Martha's Vineyard and Nantucket (Loparto and Steinitz 1987:78-80).

In Barnstable and Sandwich, agriculture continued as a major pursuit (Loparto and Steinitz 1987:83). Principal products included livestock, orchard produce, flax, corn, potatoes, and tobacco (Jenkins and Adams 1984:8).

Federal Period (1775-1830)

The Federal Period on Cape Cod was one of generally rising economic prosperity punctuated by brief slumps resulting from the blockades of the American coast by the British during the American Revolution and the War of 1812, and by the federally imposed Embargo of 1807. These actions not only interdicted the Cape's vital maritime economy, they also depleted the region's agricultural resources and generated devastating inflation. The Revolution also occasioned population loss, as Loyalists fled to British enclaves in the Canadian maritime provinces and economically disaffected residents emigrated to other states (Jenkins and Adams 1984:12).

After declining immediately after the Revolution, Cape Cod's population rebounded and increased steadily, particularly in the western Cape. Most of the region's population was distributed in coastally oriented villages; interior towns like Mashpee and Sandwich were less densely settled. In keeping with the area's maritime orientation, merchants and seamen became

the social and economic elite of the region. The growing population included diverse religious and ethnic elements. Following emancipation in Massachusetts, the numbers of free African-Americans increased, and many intermarried with the local Native American population. For Native Americans, however, the era was one of deterioration; the Mashpee Indians lost autonomy over their reservation in 1788 (Loparto and Steinitz 1987:94, 101-105).

Once British threats to free navigation had been eliminated, maritime activity burgeoned. By the 1820s, commerce provided the primary economic underpinning of the region. Scheduled packet service linked Cape Cod and the islands of Nantucket and Martha's Vineyard with Plymouth, Boston, New Bedford, and New York. Additional lighthouses were established along the region's coastline, and construction of a canal to permit intracoastal shipping to avoid the treacherous trip around Cape Cod was under discussion. Agriculture formed the second most significant component of the region's economy; the indigenous Mashpee population began farming at this time (Davin 1990:33).

Manufacturing enterprises also began to proliferate. Many industries supported or were derived from the marine orientation of the economy, including shipfitting, fish processing, whaling, shipbuilding, and salt-making. The number of agriculture-dependent establishments such as mills also continued to grow.

However, a more diversified industrial component began to develop. The Boston and Sandwich Glass Company, located in the town of Sandwich, became the largest manufacturing undertaking on the Cape at this time. The town also boasted a brickworks, a barrel-stave manufactory, a cotton mill, and, eventually, a marble-cutting mill (Jenkins and Adams 1984:15, 19-20; Loparto and Steinitz 1987:92-101). By the 1820s, two iron works, a woolen factory, a nail factory, a carriage factory, and several foundries had been established in the Bourne area northwest of MMR (Davin et al. 1994:66). The emerging industrialism affected less densely populated interior areas as the available timber resources were exploited to produce turpentine, charcoal, cordwood, tar, and masts. The Sandwich Glass Works demanded so much wood for fuel that approximately 20,000 ac of oak-pine forests in the area were deforested (Davin and Gallagher 1987:57-58).

Early Industrial Period (1830-1870)

The economy of Cape Cod and the islands reached its peak during the 1850s. Coastal trade, saltmaking, and whale oil processing remained dominant economic pursuits. The Sandwich Glass Works remained the largest single non-agricultural enterprise on the Cape. Agriculture remained the major economic component of interior areas like Sandwich and Mashpee (Loparto and Steinitz 1987:110-117). After mid century, the regional economy entered a period of decline. The gradual establishment of railroad service to the Cape facilitated the overland transfer of goods and products, and led to a reduction in packet boat service (Loparto and Steinitz 1987:113, Map 3).

However, the decline of the area's maritime based economy was mollified somewhat by the emergence of the first tourism in the region. Initially motivated by the growth of the religious camp meeting/revival movement of the 1840s, tourism fostered the first round of speculation in Cape Cod real estate. By the 1860s, visitors and vacationers provided a substantial portion of the area's revenues (Loparto and Steinitz 1987: 126-127).

The area's Native American and African American population, living in semi-isolation at Mashpee, developed its own unique economy. Prior to the Civil War, this was characterized by unorganized individual or family efforts at subsistence agriculture; hunting, fishing, and whaling;

and in making baskets and brooms. After the Civil War, these crafts were industrialized; the Mashpee Manufacturing Company, chartered in 1867, produced baskets, brooms, and wooden wares commercially. Mashpee residents also participated heavily in the developing commercial cranberry industry, which began during the 1880s (Davin 1990:35-36).

Late Industrial Period (1870-1915)

Between the Civil War and World War I, the United States developed an urban national economy dominated by large corporations and conglomerates. As a result, the Cape Cod region became peripheral to the growing urban areas of New York and Boston; the area's farmers and fishermen plied their trade not to supply world markets, but to supply the needs of these urban areas (Loparto and Steinitz 1987:128). Mass production also caused the collapse of local manufacturing enterprises such as the Sandwich Glass Company, and industrial employment opportunities in the region gradually evaporated.

Area residents adapted to these changes by developing new enterprises. Regional agriculture changed fundamentally. The commercial cultivation and marketing of cranberries began during the 1870s. Other farmers also converted their properties from traditional mixed agricultural modes to dairy farming (Jenkins and Adams 1984:29). Although some industries collapsed, new ones arose to take their place; the Pacific Guano Works was established at Bourne to process nitrates imported from South America, while the Keith Car Company at Bourne converted from producing carriages and sleighs to manufacturing wooden railroad boxcars (Jenkins and Adams 1984:25; Davin et al 1994:70).

By far the most significant economic trend was the continued growth of the area's recreational and tourism potential, stimulated by continued improvement of transportation links in the region. Road and railroad access into the Cape improved significantly. The long-discussed Cape Cod Canal, financed by the Boston, Cape Cod, and New York Canal Company, finally was completed in 1914; the Army Corps of Engineers assumed responsibility for operating the waterway in 1918 (Davin et al. 1994:99-100).

The tourist industry grew immeasurably during this period. Buzzard's Bay and Bourne on the western Cape, and the islands of Martha's Vineyard and Nantucket, became fashionable resorts. Many wealthy Bostonians and New Yorkers commuted daily between the Cape and Islands and their jobs in urban centers. Increasing tourism prompted investment in facilities by both public and private capital. State forests and game preserves provided sporting opportunities, while privately established hotels catered to tourist needs (Jenkins and Adams 1984:25-29). The Shawme-Crowell State Forest, which today forms the northern perimeter of the MMR, was established in the interior areas of the towns of Sandwich and Mashpee (Montgomery Consulting Engineers 1991:2.1-1).

From 1911-1935, portions of the Shawme-Crowell Forest were utilized in by the Massachusetts National Guard for training activities. These temporary encampments eventually led to the establishment of the Massachusetts Military Reservation.

Modern Period (1915-present)

The social and economic trends initiated during the preceding period continued during the modern period. Recreation and tourism continued to drive economic development, and improved transportation access to the area accelerated such development even further. In particular, transportation facilities were designed to accommodate an every-increasing number of

automobiles; new roads were built, old roads were upgraded, and two major bridge spans were constructed across the Cape Cod Canal at Bourne and Sagamore. Employment opportunities in traditional fields such as maritime related jobs, agriculture, and manufacturing continued to decline.

The Massachusetts Military Reservation, initially designated as Camp Edwards, was established in 1935 to provide National Guard and Reserve Training; Otis Field, a grass landing strip, was created in 1937. Portions of the installation's 21,000+ acres were purchased from private landowners such as the Coonamesset Sheep Ranch, reportedly the largest such enterprise in the eastern United States (Jenkins and Adams 1984:31); some acreage also was acquired from the Shawme Crowell State Forest. The 63 original buildings and 2 turf runways were constructed primarily by the WPA (Montgomery Consulting Engineers, Inc. 1991:2.1-3)

The threat of American involvement in World War II led to tremendous expansion of the installation's capacity; after its lease by the federal government in 1940, the facility was enlarged to accommodate up to 30,000 troops and a large hospital was built. In addition to serving as a venue for training infantry, coastal artillery, and army engineer amphibious units, MMR was an internment facility for German POWs and an advanced flight training facility for carrier-based Navy pilots. In connection with the latter function, the existing runways at Otis Field were lengthened and an additional runway was constructed. The installation's large military hospital was fitted as a major orthopedic rehabilitation center for military personnel disabled in action (Montgomery Consulting Engineers, Inc. 1991:2.1-3).

Beginning in 1948, the United States Air Force (USAF) took control of the entire installation, renaming it Otis Air Force Base. During the Cold War years, the function of the facility changed frequently. In addition to continuing its role in training reserve and National Guard units, the installation served as a center for the Air Defense Mission; as a base for an Airborne Early Warning and Control Wing and Fighter Interceptor Squadrons; and as a BOMARC missile activity site. In 1956, the USAF leased 19,700 ac of the complex back to the Commonwealth of Massachusetts, and in 1976, these lease agreements were renegotiated further (Montgomery Consulting Engineers, Inc 1991:2.1-3). Today, the Commonwealth of Massachusetts owns approximately 20,000 ac of the facility, while the USAF retains direct title to approximately 1,250 ac.

CHAPTER III

SUMMARY AND RECOMMENDATIONS

This report has presented the results of a background literature search of the Massachusetts Military Reservation (MMR)(formerly, Otis Air Force Base), the Massachusetts Army and Air National Guard training facility located in Barnstable County, Massachusetts. The study was conducted by R. Christopher Goodwin & Associates, Inc. on behalf of the Atlantic Division of the Naval Facilities Engineering Command (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeastern United States. The primary objective of the study was to identify potential prehistoric rock art sites within this installation.

Established in 1935, MMR occupies a 21,250 ac tract on the western (inner) end of Cape Cod (Figure 1). The geomorphology of the installation is dominated by two types of glacially induced features: the Cape Cod and Buzzards' Bay terminal moraines, located along the northern and western boundaries of the installation, and the Mashpee glacial outwash plain, which is the principal landform in the southeastern portion of the facility. The residential and administrative cantonments and the current Air National Guard landing field are situated on the level outwash plain. Active small arms, tank maneuvering, and firing ranges; and troop bivouac areas occupy the elevated upland portions of the installation.

MMR was selected as a rock art survey area because prehistoric rock art sites had been reported in adjacent municipalities, and as a former Air Force installation, MMR partially satisfied contractual requirements of the Scope-of-Work, which mandated on-site inspection of one facility for each service branch. Due to the extensive archeological sampling that reportedly already had been completed on the installation, and because of the high degree of previous disturbance reported within the Air Force-controlled portion of the installation, the level of investigation at MMR was reduced to a literature search. No field investigations were conducted at MMR.

Results

Examination of archeological site files and cultural resources reports at the Massachusetts Historical Commission revealed a generalized pattern of rock art within the larger region of southeastern Massachusetts. Rock art sites commonly are found either on exposed bedrock or on large glacially deposited boulders associated with terminal glacial moraines of the late Pleistocene period. The majority of rock art sites within the region (Table 2) apparently date from the historic period; only a few glyphs are thought to predate the contact period. The most common motifs consist of groups of complete or fragmentary Roman letters or script; anthropomorphic figures are secondary. No animal or geometric designs have been recorded. Both custom and local tradition hold that these drawings and inscriptions are attributable to both Native American and Anglo-American artists.

One cluster of inscriptions has been found within the confines of MMR, although it has not been registered officially as an archeological site. This is the "SAL N PRY" rock, a large boulder located in the northern section of the installation, within the "moraine" zone. The rock features an undeciphered, lettered inscription in capital Roman letters, and the figure of a woman. Several other similarly inscribed rocks have been observed in the general vicinity.

These preliminary results suggest that the highest potential for prehistoric rock art at MMR would occur within the glacial moraine deposits along the northern and western boundaries of the installation (Figure 3). In these settings, erosion of overlying glacial till would have exposed large boulders that could provide suitable surfaces for the application of petroglyphs.

Threats to Potential Resource Base

Adverse impacts to both rock art and traditional archeological sites will result primarily from military training exercises that utilize the upland areas of the installation for encampment and bivouac sites. Construction of access roads and installation of utility lines through the moraine deposit areas at the installation also will affect such sites.

Recommendations

Short-term

The "SAL N PRY" rock art complex previously identified by Davin and Gallagher (l987:60-62) should be registered with the Massachusetts Historical Commission (MHC) as one or more archeological sites.

Long-term

Identification. Only selected sample areas of the MMR have been subjected to systematic archeological survey, and no cultural resources planning document has been prepared for the installation. None of the surveys thus far completed at MMR (Macomber 1991, Davin and Gallagher 1987) have been designed to look specfically for rock art sites. It is highly recommended that a more intensive Phase I survey of the installation be undertaken. Both the research design and survey methodology both should focus on identifying not only traditional sub-surface archeological components, but also potential rock art sites. Any rock art or traditional terrestrial sites should be registered with the MHC.

Evaluation and mitigation. Identified terrestrial archeological sites and rock art sites within MMR should be avoided both for military training activities or recreational use. If avoidance is not feasible, standard Phase II archeological testing techniques should be applied to evaluate their potential eligibility for listing in the National Register of Historic Places. Rock art and terrestrial sites that meet the Criteria for Evaluation of the National Register of Historic Places (36 CFR 60.4 [a-d]) should be nominated for listing in the Register.

All identified rock art sites that cannot be avoided or that appear to be subject to severe adverse environmental conditions should be documented utilizing professionally accepted techniques for rock art recordation. All identified rock art sites also should be inspected regularly to assess the extent to which weathering and erosion have impacted them adversely.

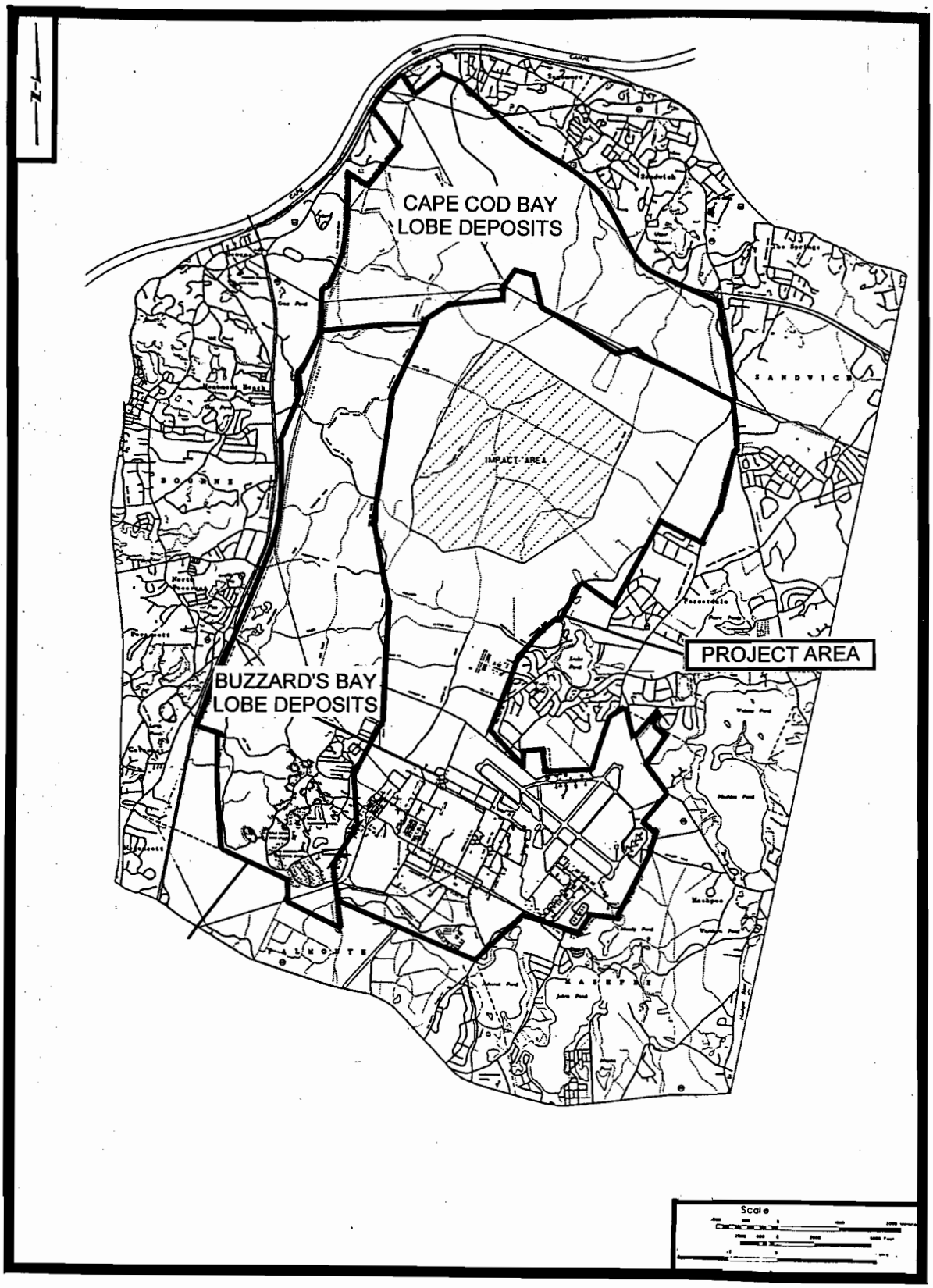

Figure 3. Limits of glacial moraine deposits at the Massachusetts Military Reservation

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APPENDIX V

SITE REPORT: NSGA WINTER HARBOR AND NCTE CUTLER

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Project Background

This report presents the results of a preliminary reconnaissance of selected areas of the Naval Security Group Activity (NSGA) Winter Harbor and Naval Computer Telecommunications Facility (NCTE) Cutler, Maine. These naval communications installations are located in Hancock and Washington counties, respectively. The study was conducted by R. Christopher Goodwin & Associates, Inc., under contract to the Atlantic Division of the Naval Facilities Engineering Command, Atlantic Division (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeast. The primary objective of this preliminary Phase I study was to identify potential prehistoric rock art sites within NSGA Winter Harbor and NCTE Cutler, two of four DoD installations proposed for sample survey.

Both of these installations are located along the northeastern coastline of the Gulf of Maine, a large embayment of the Atlantic Ocean (Figure 1). US Rts 1 and 1A provide the principal land access routes to installations, both of which occupy coastal peninsulas. The administrative cantonment of NSGA Winter Harbor is located on Big Moose Island, at the end of the Schoodic Peninsula; a residential housing component is located in the Village of Winter Harbor and an antenna array and operations facility occupy an adjacent peninsula near the village of Corea. The principal components of NCTE Cutler, located southeast of the town of Machias, are situated on the peninsula formed by Machias and Little Machias Bays. The installation has three discontiguous components: a residential and administrative area, a VLF transmission facility, and an HF transmission facility.

For this project, Christopher R. Polglase, M.A., ABD, served as Principal Investigator and oversaw all aspects of the study. Martha R. Williams, M.A., M.Ed., was the Project Manager and supervised the field surveys; she was assisted in the field by David S. Robinson, B.A.

Organization of the Report

Chapter I describes the project areas and the organization of the report. Chapter II describes the natural setting of the project area, and develops the regional prehistoric and historic contexts, with special emphasis on Native American rock art of northeastern coastal Maine. Chapter III describes the research design and the methods utilized for the survey; Chapter IV presents the results of the survey; Chapter V considers those results from a management perspective.

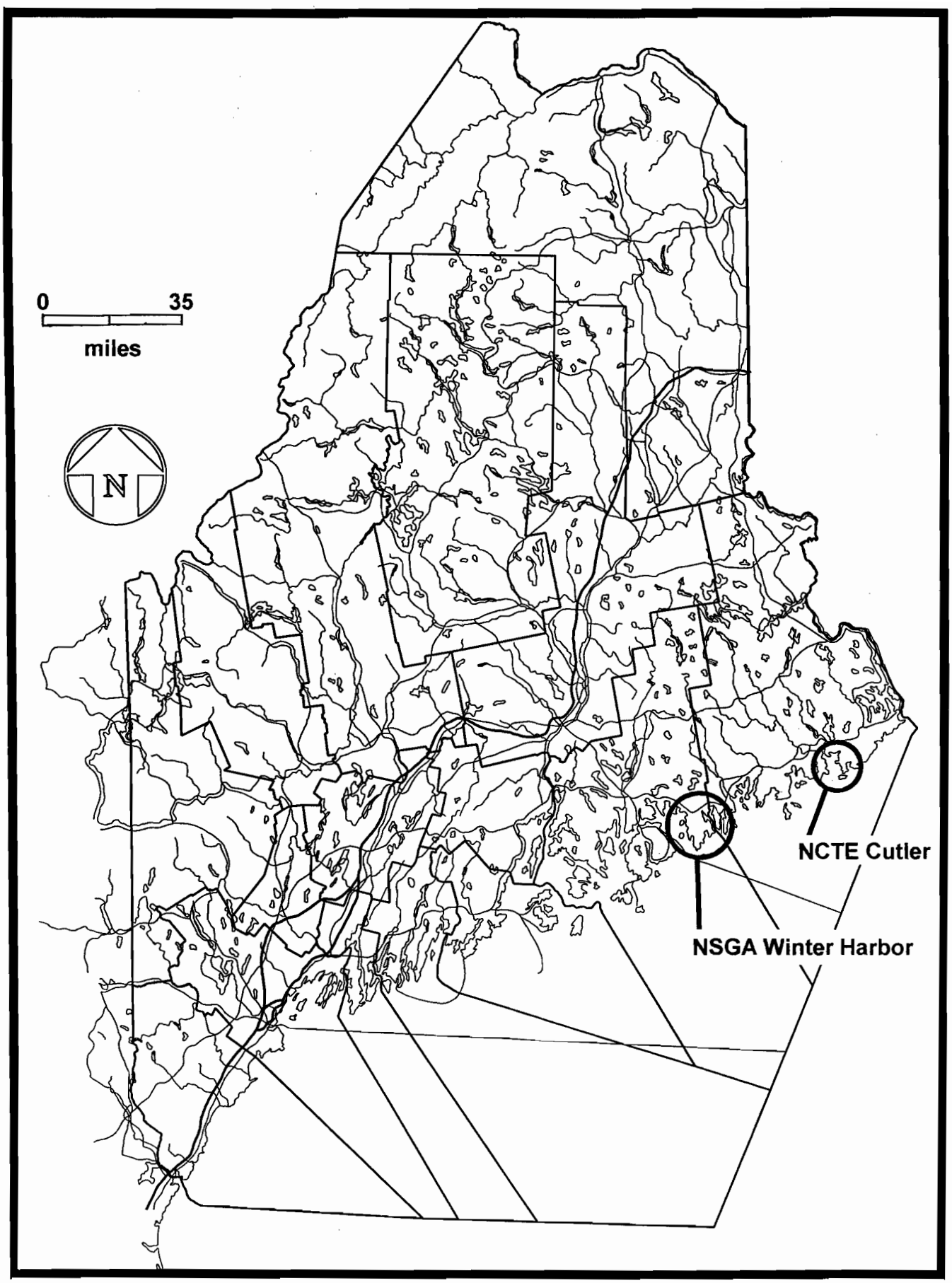

Figure 1. Location of Naval Security Group Activity (NSGA) Winter Harbor and Naval Computer Telecommunications Station (NCTE) Cutler in the state of Maine

CHAPTER II

NATURAL AND CULTURAL SETTING

Natural Setting

The installations at Naval Security Group Activity (NSGA) Winter Harbor and at Naval Computer Telecommunications Center (NCTE) Cutler are located along the coastline of eastern Maine between Frenchman's Bay and the Canadian border. This jagged portion of the Atlantic coastline is characterized by numerous coves, inlets, and bays which are separated by headlands or points. The administrative cantonment at NSGA Winter Harbor and the operations facility at NCTE Cutler occupy the Schoodic and Thornton point peninsulas, respectively; the administrative and residential cantonment at NCTE Cutler and the Corea antenna field operational facility at NSGA Winter Harbor occupy more protected shoreline sites along Machias and Frenchman's bays.

Geology

The numerous coastal coves and bays of eastern Maine coastline are the result of geological faulting events, glacial activity, and subsequent coastline erosion during the post-Pleistocene period (Conkling 1981:79; Naval Security Group Activity [NSGA] Winter Harbor Master Plan 1993: V-2; Behr 1995:7). Bedrock geology typically consists of metamorphosed volcanic rocks punctuated by igneous basaltic dikes and localized beds of sandstone and siltstone (United States Department of Agriculture [USDA] 1984:6-8). Lithic types that occur in cobble and boulder form along bayshore beaches include gabbro, diorite, meta-sediments and meta-volcanic rocks. Analysis of random lithic samples collected at NCTE Cutler during this survey illustrated the diversity of lithic types present in this coastal environment; samples were identified as metamorphosed limestone, phyllite (metamorphosed slate), mica schist, and gabbro (Katherine McGrath, personal communication 1996). The basal rocks along coastal and bay shorelines have been heavily fractured and eroded by wave activity (Behr 1995:7). Because geological bedding planes frequently are nearly vertical, wave action and erosion have created brittle needle-shaped rock outcrops (Conkling 1981:39, 75).

Three types of coastal environments are represented on the peninsulas occupied by the two installations. The wave-dominated zone comprises that portion of the peninsula exposed most directly to direct oceanic action is characterized by cobble beaches that form in bedrock gaps and by high ramps and bluffs of bedrock from which the overlying unconsolidated glacial sediments have been washed. the tide dominated zones at the heads of embayments are not exposed to direct oceanic storm waves; this zone is characterized by alluvial mudflats and salt marshes with low energy beaches occasionally punctuated by eroded scarps of underlying bedrock. A so-called "mixed energy zone" represents a transitional environment that can contain geomorphological characteristics of the two extremes (Cultural Resources Group 1995:8).

Pedology

Sand, gravel, and cobble tills of glacial origin form the principal overlying soils in the region. Lyman, Schoodic and Tunbridge soils predominate at the NSGA Winter Harbor's Schoodic

Point facility. These generally shallow stony and sandy soils have been augmented by the addition of Udorthents, highly disturbed soils associated with construction. At Corea, wet organic hydric soils such as the Waskish and Sebago types dominate the activity grounds; rocky shallow Schoodic soils are found at the southern end of the Corea facility, while Wonsqueak and Bucksport mucks are found in localized depressions (NSGA Winter Harbor Master Plan 1993:V-1 - V-8; Behr 1995:7).

Soils at NCTE Cutler are dominated by the clayey Lyman-Scantic and Peru associations. Brown silty loams overlying yellowish brown silty clays underlie the administrative section. A gravelly kame or glacial moraine stretches immediately north of the VLF antenna array area; immediately south of the moraine area, heavy wet soils predominate; several coastal heaths or peat bog areas are present immediately north of the VLF antenna area. Glacial tills composed of gravelly and rocky outcrops comprise the primary pedological underlayment of the antennae fields (Naval Facilities Engineering Command [NAVFACENGCOM] Northern Division 1990:9).

Elevations within the NSGA Winter Harbor administrative area range from 20 to 90 ft amsl; at the NSGA Corea operational facility, the terrain is somewhat flatter, with elevations ranging from 10 to 60 ft amsl (NSGA Winter Harbor Master Plan 1993). Elevations at NCTE Cutler range from 35 ft amsl at the northern boundary of the administrative complex to a high of 120 ft amsl in the northeastern corner of the VLF antenna field (NAVFACENGCOM Northern Division 1990:8).

Vegetation

In general, the northeastern coast of Maine is dominated by subarctic ecosystems (Conkling 1981:33). Both installations visited contain a variety of vegetational communities. Dense evergreen woodlands are present at the NSGA Winter Harbor Schoodic Point facility and on Sprague Neck at NCTE Cutler; these woodlands consist primarily of red and white spruce, balsam fir, northern white cedar and tamarack, with minor concentrations of pine and birch. Understory species include blueberry, laurel, and mountain cranberry. At NSGA's Corea operations unit, the predominant vegetational community is that of a coastal wetland bordered by vestigial spruce woodland; Corea Heath, an environmentally unique ecotone known as a coastal raised peatland, has been designated by the Navy as an ecological reserve (Behr 1995:1); two similar heaths are present at NCTE Cutler. Other vegetative communities present include maritime spruce fir; jack pine woodland; northern white cedar seepage forest; small clusters of early successional hardwood forest community at Corea Heath; and pitch pine woodland communities (Mittelhauser et al. 1995:39-42).

In the administrative and residential areas of both facilities, European lawn grasses and ornamental plantings predominate, although in many cases, native species have been utilized in an ornamental capacity. The effects of human modification also are evident in the 2,000 ac antenna field at NCTE Cutler. Today, this area is covered by meadow grasses, stands of dwarf aspen, blueberry barrens, and occasional marshy areas. However, until the 1950s, the peninsula was at least partially wooded; when the government acquired the property, landowners reportedly logged the peninsula completely before moving away (Douglas Hartsell, personal communication, 1996). The installation now maintains the area as clear to accommodate the 26 1,000 ft transmission towers and their stabilizing guy-wires.

Climate

The cool humid continental climate of Maine's northern Atlantic coast is influenced most strongly by its position adjacent to the Gulf of Maine, which is fed by the Arctic Nova Scotia

current (Conkling 1981:1). The average annual temperature is 44° F; winters are moderately severe, and summers are cool and brief. Coastal Maine is subject in summer to frequent fogs; in the winter, northeast and northwesterly storms can be intense. At both installations, keeping transmission antennae free of ice is a major concern during the winter months (NAVFACENGCOM Northern Division 1990:8).

Prehistoric Context

Previous Investigations

Maine Historic Preservation Commission archeological site files indicate that, excluding rock art sites, a total of 29 prehistoric occupation loci have been identified in the vicinity of NSGA Winter Harbor and NCTE Cutler (Table 1). Most of these sites are shell middens; few have yielded sufficient data to permit either cultural or chronological ascription. Those few sites that have contained diagnostic artifacts or assemblages suggest that Maine's extreme northeastern coast was not settled intensively until the Late Archaic period. One previously recorded site (Sprague Neck North [No 062.002]), a reported clam shell midden (Thomas Shea, personal communication 1996), is located within the boundaries of NCTE Cutler. No further information is available about this site.

Professional archeological investigations of Maine's northeastern coastline has been somewhat limited; academic institutions such as the University of Maine appear to have recorded most of these sites, many of them on the basis of information supplied by collectors. One Phase I archeological survey has been conducted at NSGA Winter Harbor (Cultural Resources Group 1995). The nature of the terrain and soil conditions on the installation confined systematic archeological investigation to specific areas of the installation that had been identified by predictive modeling and examination of historic maps. Survey was confined to pedestrian reconnaissance of the baseball field area at Schoodic Point, portions of the Winter Harbor housing area, and portions of the Corea antenna site; very limited soil coring also was conducted on the beach areas at Corea. The survey strategy did not include investigation for rock art sites. No archeological sites were recorded (Cultural Resources Group 1995:57-60).

No systematic archeological or cultural resource surveys have been conducted at NCTE Cutler.

Rock Art of Coastal Maine. Maine's recorded rock art sites have yielded over 350 separate and distinct designs, and they constitute the largest available collection of recorded rock art in the Northeast. Attributed to Algonkian speaking cultural groups, Maine's petroglyphs represent a culturally homogenous sample with time depth of at least 3,000 years (Hedden 1996:7). While two rock art sites (Emden and Grand Lake Stream) have been recorded in interior settings, the most extensive concentrations of prehistoric rock art have been recorded along the upper Maine coast at Machias Bay within 5 mi of NCTE Cutler (Hedden 1987, 1988a, 1988b, 1989, 1996).

A total of 7 rock art sites have been located in the vicinity of NCTE Cutler (Table 2). Originally reported by Mallory in 1888, all are located on eroding metamorphosed sedimentary rock scarps on the island and mainland shorelines of Machias Bay, generally away from habitation sites.

Establishing a chronology and cultural associations for these glyphs has been difficult. A relative chronology, primarily for the anthropomorphic forms, has been established by analysis of various bodies of data, including: rates of sea level rise in the Passamaquoddy Bay-Machias

TABLE 1. ARCHEOLOGICAL SITES ON AND IN THE VICINITY OF NSGA WINTER HARBOR AND NCTE CUTLER, MAINE

Site Name/Number	Site Type	Chronology	Environment	Elevation	Comments
NSGA WINTER HARBOR					
Hog Island 044.005 (1-4)	Shell Midden	Unidentified	Island shoreline	0 ft amsl	Series of four sites containing flakes, cores, mammal and fish bone. No diagnostics.
South Jones Cove 044.006	Shell Midden	Late Archaic, Ceramic	Mainland shoreline	0-10 ft amsl	Burial present. Artifacts include stone tools, bone tools, groundstone, faunal remains, ceramics
North Jones Cove 044.013	Shell Midden	Archaic, Middle and Late Ceramic	Mainland shoreline	15 ft amsl	Features found included burials, hearths, gravel surface. Artifacts included ceramics, bone tools, faunal remains, bifaces, scrapers, and groundstone
Stave Island Harbor 044.017	Shell Midden	Unidentified	Mainland shoreline	6 ft amsl	Artifacts include stemless, basally thinned projectile point, fishbones, flakes
North Myrick Cove 044.018	Shell Midden	Unidentified	Mainland shoreline	13 ft amsl	Artifacts include single flake
Black-Eyed Susan 044.039	Shell Midden	Unidentified	Mainland shoreline	9 ft amsl	No artifacts or features found
Geodesic Site (044.040)	Shell Midden	Ceramic period	Mainland shoreline	7 ft amsl	Ceramic period stemmed biface; many flakes
Taft Point (044.044)	Shell Midden	Unidentified	Mainland shoreline	3 ft amsl	No further information available
Bridge Point Site 044.045	Shell Midden	Ceramic; Post-contact aboriginal	Mainland shoreline	0 ft amsl	Prehistoric stone and bone; large assortment of historic material Within Acadia National Park boundary
Mosquito Harbor W. 044.046	Shell Midden	Unidentified	Mainland shoreline	0 ft amsl	No artifacts recovered. Within Acadia National Park Boundary
Myrick Cove West 044.047	Shell midden	Unidentified	Mainland shoreline	0 ft amsl	No further information available. Within Acadia National Park boundary
Fraser Point (044.049)	Shell Midden	Unidentified	Mainland shoreline	0 ft amsl	Artifacts: flakes and biface

Site Name/Number	Site Type	Chronology	Environment	Elevation	Comments
Pond Island SE (044.050)	Shell midden	Unidentified	Island shoreline	0 - 10 ft amsl	Artifacts: flakes, biface, bone. Within Acadia National Park boundary
Pond Island SE #2 (044.051)	Shell midden	Unidentified	Island shoreline	0 ft amsl	No artifacts present. Within Acadia National Park boundary
Schoodic Point S (044.052)	Midden deposit	Late Archaic (?)	Mainland shoreline	0 ft amsl	Artifacts: biface, flakes, "other stone artifacts". Within Acadia National Park boundary.
Gouldsboro Bay West (045.001)	Unidentified	Unidentified	Mainland shoreline	0 ft amsl	No further information available
Newman Cove North (045.002)	Unidentified	Unidentified	Mainland shoreline	0 ft amsl	No further information available
Long Mill Cove North (045.003)	Shell midden	Unidentified	Mainland shoreline	0 ft amsl	Thin shell deposit only. No artifacts recorded
Young's Point (045.008)	Shell midden	Unidentified	Mainland shoreline	10-20 ft amsl	"Midden almost destroyed by house construction"
NCTE CUTLER					
*Sprague Neck North (062.002)	(Reported) shell midden	Unidentified	Mainland shoreline	0 - 5 ft amsl	No further information available.
Randall Point East (062.003)	Shell midden	Unidentified	Mainland shoreline	0 ft amsl	Artifacts reported: 2 small stemmed quartz bifaces; more artifacts in private collections
Machias State Park (062.224)	Shell midden	Unidentified	Mainland shoreline	0 ft amsl	"Site potted and eroded out. Artifacts in private collections"
Wash 8 (062.006)	Shell midden	Middle Ceramic	Mainland shoreline	0 ft amsl	Hedden (1990) reported "whole pot, platform pipe, large bones" (mammoth? whale?)
Unnamed (062.007)	Shell midden	Unidentified	Mainland shoreline	5 ft amsl	No further information available
Salt Island West (062/010)	Shell midden	Unidentified	Mainland shoreline	12 ft amsl	"2 large piles of chips left by pothunters"
Bare Island NE (062.022)	Unidentified	Unidentified	Island shoreline	0 ft amsl	Artifacts include 9 flakes of "weathered finegrained volcanics"

*Within boundaries of NCTE Cutler

TABLE 2. ROCK ART SITES IN THE VICINITY OF NCTE CUTLER, MACHIAS, MAINE

Site No.	Site Name	Elevation	Chronology	Comments
062.001	Clark Point/Birch Point	2 ft amsl	Ceramic Period	Approximately 100 analyzable petroglyphs plus many fragmentary glyphs. Site on on-going erosion scarp
062.008	Randall Point, S.W.	0 ft amsl	Unidentified	Petroglyphs reported by private collector; site on on-going erosion scarp
062.011	Clark Point E	0 ft amsl	Ceramic Period	10 distinct petroglyphs with early and late features; site on on-going erosion scarp
062.023	Hog Island, N.	0 ft amsl	Ceramic Period	One of three petroglyph panels; depicts "meander with appendages;" site on on-going erosion scarp, and is exfoliating
062.024	Hog Island, N.	0 ft amsl	Ceramic Period	One of three petroglyph panels; depicts rectangular bodied anthropomorphic figure; site on eroding scarp
062.025	Hog Island, N.	0 ft amsl	Ceramic Period	One of three petroglyph panels; depicts constricted waist anthropomorphic figure; site on eroding scarp
062.029	E-NE Hog Island	0 ft amsl	Middle to Late Ceramic Period	Petroglyphs present; site on eroding scarp

*Data from Maine Historic Preservation Commission archeological site files

Bay area; degree of patination or weathering of petroglyph surfaces; differential positioning and superimposition of design motifs; and relative positioning with relation to hypothesized erosion rates of overlying glacial till deposits. Tentative concusions regarding cultural attribution and interpretation of the Machias Bay petroglyphs were based upon known archeological sequences in the region and on comparison with ethonographically and archeological obtained stylistic motifs elsewhere in the eastern United States and Canada (Hedden 1996:9-12).

A summary of Hedden's typology and chronology is presented in Table 3. Representative samples of glyphs from Holmes Point and Hog Island are presented in Figures 4-8.

Cultural Sequence

Paleo-Indian period. At approximately 15,000 BP, all of New England still was covered by the ice sheets of the Wisconsin glaciation. Sea levels world-wide were 130 m lower and five to fifteen miles further out than at present. Coastal Maine probably did not became ice free and open to colonization by prehistoric peoples until approximately 13, 500 BP, when glaciers receded sufficiently to reveal somewhat more extensive land masses in Cape Cod and in Nova Scotia (Borns 1971:1-2, Figures 1 and 2). As glaciers receded, the landscape segued from a tundra environment to mixed poplar, spruce, and jack pine forests; by 11,000 BP, Bourque contends that tundra had vanished from all [areas] but northern Maine" (Bourque 1995:16).

It is probable that the initial prehistoric occupants of the New England region migrated into the region from the south and west, following the receding glaciers (Funk 1983:309). Initial Paleo occupations in the region are signified by the presence of spearpoints that resemble those of the Plains-based Llano fluted point tradition. The most thoroughly documented Paleo-Indian site in the Canadian Maritime/Down East Maine region is the Debert Site at the head of the Bay of Fundy in Nova Scotia, which was occupied ca 10,700 BP. Other sites with Paleo-Indian occupations have been located at Quaco Head, New Brunswick, and at Ellsworth and Brassua in Maine.

Maine's Paleo-Indian sites tend to cluster in well-drained areas adjacent to wetlands or former wetlands; Bourque (1995:15) hypothesizes that such clusters may indicate a seasonally based settlement pattern. It is generally believed that Paleo-Indian subsistence strategies centered on hunting, with caribou and other cold-adapted fauna constituting the primary quarry (Cultural Resources Group 1995:10); however, most researchers now acknowledge that a general hunting - foraging strategy probably describes Paleo-Indian subsistence practices more accurately (Funk 1983:312-313); Bourque 1995:16).

Archaic Period. The traditionally accepted Early and Middle Archaic periods are not well understood in the regions along Maine's northeastern coastline, primarily because land subsidence and coastal erosion probably have destroyed many early sites (Bourque 1995:17). Early and Middle Archaic sites have been located most frequently in deeply buried contexts along major rivers or near lakes (Cultural Resources Group 1995:11), and are confined primarily to western and southern Maine. The state-wide distribution of Middle Archaic sites also favors the southwestern portion of the state, a distributional bias that Bourque (1995:17) suggests may indicate continuing population influx from more southern and western sources.

Few stone projectile points are found in Early and Middle Archaic contexts, suggesting to some researchers that bone projectile points were more commonly utilized. The most diagnostic stone tool for the period is a thumbnail endscraper. Those recognizable stone points that are found are similar in form to points from southern New England or the Mid-Atlantic region; Spiess (1990:110) has suggested that their morphology and the somewhat exotic lithic raw materials may represent evidence of some sort of trading network. The discovery of scattered

Table 3. A Typology of Anthropomorphic Petroglyph Styles in the Machias Bay Area (from Hedden 1996)

Style Number	Estimated Date	Motifs	Interpretation
1	Unidentified	Rectangular anthropomorph executed with thin precise lines; often found in pairs. One of the pair may be headless	Figure with head is interpreted as shaman; headless figure is spirit.
2	Unidentified	Anthropomorph with doubled legs and single torso; can be either rectangular or trianguloid.	No interpretation
3	2,000 BP	Anthropomorph with single head and multiple torso elements	Multiple torso may represent Algonquian "shaking tent" enclosure used by shamans during publicly conducted spirit communications activities. Most common motif in Machias area.
4	500 A.D.	Anthropomorph with thin torsoed, broad shouldered, very elongated body with short arms and legs. Inner torso may be partially infilled with incised lateral or slanted lines. Elaborated headdress.	No interpretation
5	900-1,400 A.D.	Frontally oriented triangular bodied anthropomorphic figures; bird-like attributes; angled or splayed out arms; digits on hands. Variable line width.	May connote Iroquois displacement of Algonkian populations. Absence of sexual imagery in Machias Bay figures may reflect absence of horticulture in eastern Maine. Transitional to next style.
6	after 1,400 A.D.	Anthropomorphs with triangular torsos; can be outlined or solidly infilled; more angular than style 5. Illustrate active rather than static activity.	Frequent association of moose motifs with these figures may reflect onset of colder conditions.

Middle Archaic occupations on islands in Penobscot Bay, coupled with the presence of stone gouges used for canoe manufacture and stone plummets or netsinkers in Middle Archaic contexts, also suggests that, by ca. 7,500 - 6,000 BP, marine resources were being exploited by resident populations (Spiess 1990:110; Bourque 1995:17).

The date of ca. 6,000 BP represents the beginning of the Late Archaic period in eastern Maine. During this time, cultural variation, regionalization, and stylistic diversity are first discernable in the archeological record (Funk 1983:320). At least four major cultural traditions are recognized in Maine: (1) the Laurentian (ca. 6,000 - 5,000 BP), a tradition initially based in the St. Lawrence River Valley; (2) the small stemmed point tradition (ca. 5,000 - 2,000 BP), represented by a quartz-based lithic technology that apparently centered in southern New England; (3) the Moorehead ("Red Paint") phase (ca. 4,500 - 3,700 BP), a coastally-centered northern New England/Canadian Maritime phase characterized by the abundant use of powdered hematite in shell midden burials; and (4) the Susquehanna tradition (ca. 3,900 - 2,800 BP), a Mid-Atlantic based tradition characterized by the presence of broad projectile points and cremated remains in burials (Sanger 1973; Spiess 1990:112-114; Bourque 1995: 17-23; Cultural Resources Group 1995:11-12).

Ceramic Period. Because so little evidence of plant domestication and horticulture has been documented in Maine, the term "Ceramic" has come to replace the more traditional "Woodland" to designate the period following the Archaic. Ceramic period sites are primarily focused on the coastline and seem to be associated with exploitation of marine resources, particularly shellfish. The defining artifact type is a coarse cord-impressed ceramic known as Vinette I (Bourque 1995:23).

Although the typical coastal Ceramic period site is a shell midden (Cultural Resources Group 1995:13), structural features indicative of permanent dwellings have been found on coastal sites (Snow 1978:68; Bourque 1995:24). Faunal remains from well-preserved midden contexts indicate a renewed reliance on a wide variety of marine resources, including shallow-water fish, marine mammals, water fowl and shellfish (Bourque 1995:24); an increase in moose rather than deer bone in these middens also suggests a somewhat cooler environment with a corresponding modification in both vegetation and available fauna (Spiess 1995:119).

Contact Period: Although Basque and Portugese fishermen and Verrazano visited the Maine coastline during the sixteenth century, the degree of European contact with Indians of the Maine coast prior to 1600 is debatable. It is known that Verrazano visited Casco Bay in 1524 and received a hostile reception. The English Gosnold expedition of 1602 met natives who reportedly were sailing a Basque shallop, carrying European trade goods, and wearing European clothing. An exploratory party from the Sagadahoc colony in 1607 met savages calling to them in "Broken inglyshe." However, other researchers argue that acquisition of European trade goods really came through the French-dominated Canadian Maritime provinces whose aboriginal occupants served as quasi-middlemen for coastal Maine aboriginal groups (Cranmer 1990:5).

Relatively little data about the Contact period has been documented through archeological investigations. Most knowledge comes through European descriptions of the aboriginal occupants of the region. For example, Champlain reported agriculture in the Saco and Kennebec Rivers and Casco Bay regions (Bourque 1995:Figure 1-4; Cultural Resources Group 1995:13). Indian dwellings in the Down East area were described by members of the Champlain expedition of 1604 as "houses made of pickets and covered with the bark of trees or with skins" (Collier 1953:4); this likely referred to the conical or domed wigwams that characterized Native American dwellings throughout New England. Early ethnographic accounts also provide views of aboriginal subsistence practices; for example, the extensive Native American reliance on seasonally available waterfowl and seabirds was documented by early European observers (Conkling 1981:131-132).

Historic Context

Colonial Era (1607-1776)

The first intensive European explorations of the eastern Maine coastline were sponsored by the French, who explored the Castine area and inland along the Penobscot River in 1604 under the leadership of Samuel de Champlain. In 1613, French Jesuits from Nova Scotia attempted to establish missions on Mount Desert and at Frenchman's Bay, but these initial settlements subsequently were leveled by the English in the first clash between the powers in the New World (Collier 1953:28). British attempts to settle and establish hegemony in the region also began relatively early. An English colony was established at Popham in 1607 for the purpose of mining precious metals, establishing a base for the fur trade, and beginning to secure English rights to the region; however, the Popham venture lasted only 15 brief months (Cranmer 1990:6).

These tentative early beginnings were followed quickly by an English expedition sponsored by Ferdinando Gorgas in 1605 (Collier 1953:3-4). In 1612, the English established a trading post in the Penobscot area known as Fort George; by 1626, traders from the Plymouth colony had established a semi-permanent trading settlement, but they were dislodged from the area by the French three years later (Collier 1953:15). Henceforth, the French dominated the area through the remainder of the seventeenth century into the eighteenth, although traders from Massachusetts interacted with these French settlements regularly (Collier 1953:16).

The area around Gouldsboro, adjacent to Winter Harbor, was settled as early as 1700 by migrants from the Saco River region of southern Maine. Early occupants of this coast survived largely through fishing and lumbering, augmented by limited subsistence farming (Leamon 1995:146; Cultural Resources Group 1995:13). Coastal islands were utilized to graze livestock, particularly sheep and hogs. The falls of the Machias River were harnessed to provide power for sawmills that produced boards, shingles, and clapboard for export. As a result, Machias developed into an early population center and a nucleus that prompted settlement of other coastal communities such as Gouldsboro and Jonesport (Leamon 1995:145-146). Except for Machias, however, the area east of Schoodic Point remained sparsely settled through the eighteenth century (Conkling 1981:31, 38).

Revolutionary Period

Although most of the residents of Maine supported the American cause, those who lived in the eastern coastal communities were of mixed emotions about the Revolutionary War. Some, like Ichabod Jones, a leading merchant of Machias, openly traded with the British; others living on the isolated and ill-defended coastline feared attacks from British vessels. The result was a somewhat mixed set of actions.

For example, Castine was a center for American raids against British shipping. Machias Bay was the scene of the first naval battle of the Revolution, which occurred in 1775 when a group of Patriots attacked and captured a British military vessel, the *Margaretta* (Collier 1953:17-18). Patriots from Machias, with their Indian allies from the Maliseet and Passamaquoddy tribes, also launched two attacks against British settlements in Nova Scotia (Erickson 1978:124; Leamon 1995:155). On the other hand, residents of militarily vulnerable coastal towns like Gouldsborough temporarily toyed with the idea of seceding from Massachusetts and declaring neutrality (Leaman 1995:159). The American settlement at Bar Harbor, then known as Eden, actually surrendered to the British (Collier 1953:28).

Federal Period

Hancock County, created in 1789-90, originally included all territory between Penobscot Bay and the Canadian border; this area remained in dispute until the 1840s (Collier 1953:23; Cultural Resources Groups 1995:13). As Maine was still considered to be part of the state of Massachusetts, the Massachusetts model of local political divisions known as "towns" was adopted along the Maine coast; these divisions actually incorporated sufficient territory to accommodate several centers of population. The town of Gouldsborough was one of five originally established by the Massachusetts General Court within the boundaries of Hancock County; within Gouldsborough, seven coastal villages, including Winter Harbor, Prospect Harbor, and Corea, evolved (Cultural Resources Group 1995:13).

During the War of 1812, the British foraged in the Penobscot River area and reoccupied Castine in 1815 (Collier 1953:23). In fact, the entire Maine coast east of Penobscot Bay came under the influence of Great Britain, despite the fact that the Americans had constructed fortifications at Eastport (Fort Sullivan) and Machias (a gun battery)(Leamon et al. 1995:182).

As before, subsistence for Down East residents continued to revolve around exploitation of natural resources, particularly marine resources. Fishing and fish processing became an increasingly important component of the local economy, and local shipbuilders supplied a variety of craft from 15-ton chebacco boats to 40-ton banks schooners (Conkling 1981:56-57). Merchant shipping also provided substantial employment; the importance of this line of work was demonstrated when, in reaction to the Embargo Act of 1807 which ostensibly shut off all trade with Britain, the small coastal communities once again became centers of illicit trade with British Canada (Conkling 1981:198).

Antebellum and Civil War Periods

During the 1840s, the area around Bar Harbor began to develop as a sort of tourist mecca, catering to the numerous nationalistic landscape artists of the period (Collier 1953:30). Most inhabitants of the sparsely populated coastline east of Penobscot Bay, however, continued to support themselves by a combination of fishing and limited farming focused on the production of cranberries, dairy products, meats, and hides. Industrial enterprises were small, and included shipbuilding, lumber production, and commercial production of ice (Cultural Resources Group 1995:13). Populations remained small and continued to cluster in villages located at suitable harbor sites.

Industrial Era (1870-1939)

The post-Civil War period brought about major changes for residents of coastal Maine; the trend toward economic consolidation profoundly affected the way in which Maine's traditional small enterprise system operated (O'Leary et al. 1995:391). Among the most significant was the cessation of the Federal bounties that previously had supported the state's off-shore fisheries. However, technological advances in fishing and fish preservation techniques, such as the invention of the purse seine and refrigerated boats, permitted exploitation of other species such as mackerel and flatfish. Lobstering and sardine harvesting also developed into commercially viable enterprises during the postbellum period, and canneries soon dotted the Maine coastline (Conkling 1981:55-69). The development of the inshore fisheries replaced the incomes lost through the decline of offshore fishing (Lipfert et al. 1995:420-425).

The recreational potential of the Maine coastline also was developed during the immediate post-Civil War period. By the 1890s, Bar Harbor had become a summer social capital for wealthy Bostonians and New Yorkers (Collier 1953:30). Development of Bar Harbor encouraged similar ventures near Winter Harbor; the Gouldsborough Land and Improvement Company acquired extensive tracts of property on the Schoodic Peninsula and on Grindstone Neck. From the 1880s until the stock market crash in 1929, numerous summer "cottages" were built on Grindstone Neck, and the area experienced a period of prosperity.

Private benevolence and public funding continued to support the tourist base in Eastern Maine. In the 1890s, a New Yorker named John Moore purchased much of the outer Schoodic Peninsula and arranged for construction of the first road to Schoodic Head, built for the benefit of visitors to the area (Cultural Resources Group 1995:15-16). The Congressional establishment of Acadia National Park in 1929, and CCC development of its amenities in the 1930s, helped to soften the severe economic blow delivered by the Depression to a tourist dependent economy in 1929; in subsequent years, a total of 1,500 ac on the Schoodic Peninsula opposite the main National Park was donated to the national government by the Moore heirs and other residents of Winter Harbor (Cultural Resources Group 1995:16).

Continued development of the recreational potential of the area led to increased recreational and commercial marine traffic. Recreational yachting grew in importance, and regular steamer service between the island resorts and major cities was established. The first buoys were placed along the coastline in 1875, and Lifesaving Service stations were established along the coastline; the station on Cross Island, opposite Thornton Point at NCTE Cutler, was established in 1879 (Conkling 1981:39, 196).

During World War I, the Navy established the Winter Harbor facility as a transmitter station. Originally situated at Otter Cliffs on Mount Desert Island, across Frenchman's Bay near Bar Harbor, the facility was relocated to the Schoodic Peninsula (NSGA Winter Harbor Master Plan 1993:V-1; Behr 1995:3).

Modern Era

Today, Down East Maine remains relatively isolated from the major development corridors in the state, particularly in terms of its accessibility via commercial carriers. As late as the 1960s, Hancock and Washington counties were considered to be two of the state's poorest (Condon 1995:542). In Hancock County, tourism constitutes the largest industry, and it is centered on Acadia National Park and the adjacent resort of Bar Harbor. Service, retail and manufacturing provide most of the jobs for the area, and many are tourism dependent. Major industrial employers in the two-county area include a paper manufacturing company, the Jackson Laboratory, a cannery, and sand and gravel mining operations. Although the sardine and lobster fisheries are well known enterprises (Collier 1953:30), agriculture, forestry and fishing collectively provide the least amount of employment in the region (NSGA Winter Harbor Master Plan 1993:IV-2 - 3). The harvesting of wild blueberries provides a substantial seasonal income for Washington County residents.

CHAPTER III

RESEARCH OBJECTIVES AND METHODS

Research Objectives

NSGA Winter Harbor and NCTE Cutler were selected as the United States Navy survey venues for the Legacy Rock Art project because several rock art sites previously had been identified in the region, and because the topography and geology of the installation presented an environment in which exposed rock outcrops or large boulder deposits suitable for rock art applications were expected to occur. The objective of the preliminary survey at the two installations was to examine a representative sample of the various topographic and ecological zones and to identify and characterize rock art sites, if any, within these sample survey areas. Although the major emphasis of this study focused upon Native American rock art, historic inscriptions and motifs also were to be recorded.

Archival Methods

Archival research included review of secondary sources related to the history, prehistory, and archeology of the northeastern Maine coast. Archeological site files for USGS 7.5 min quadrangle maps adjacent to the facilities were reviewed at the offices of the Maine Historic Preservation Commission in Augusta. Installation master plans, environmental assessments, and one cultural resource assessment conducted at NSGA Winter Harbor were obtained from the cultural resource management offices of the respective installations. The data obtained from this research were utilized to develop regional prehistoric and historic contexts, to become familiar with the types and locations of previously identified rock art in the area, and to characterize the region's environmental setting.

Current USGS 7.5 min topographic maps of the installation also were reviewed to identify potential survey areas. This phase of research and survey planning was conducted by the primary consultant for the project. Selected target areas represented three general environmental zones: (1) the unprotected Atlantic coastal zone; (2) the protected tidal bay zone; and (3) an intermediate zone.

Field Methods

Survey methods consisted of windshield and pedestrian reconnaissance of selected segments of coastal frontage at the two installations (Figures 2 and 3). At NCTE Cutler, the unprotected Atlantic coastal zone was sampled at Cape Wash, Big Holly Cove, and Quaker Head. The protected tidal bay zone was sampled by inspecting the beach area immediately adjacent to the residential/administrative component and the rock outcrops adjacent to Sprague Neck at NCTE Cutler. All other areas surveyed, including a .8 km portion of the coastline at NSGA Winter Harbor's Corea operations facility, were representative of the transitional zone environment.

To become familiar with the characteristic rock art motifs and the types of geological surfaces on which rock art had been applied, the team also visited two previously identified rock art sites: Hog Island, located approximately 1/2 mi west of NCTE Cutler in the middle of Machias

Bay, and Holmes Point, located on the western mainland shoreline directly opposite NCTE Cutler. Selected glyphs at these sites were photographed (Figures 4 - 7) and/or recorded by taking rubbings on heavy muslin. Elements of the environmental setting at each site also were documented.

For each area or stretch of coastline surveyed, data were noted on two forms developed specifically for this study. The base line survey sheet was designed to standardize notations on the environmental characteristics of each area surveyed. Data recorded included the degree of surface visibility; slope and elevation ranges, where relevant; terrain characteristics; vegetation; proximity to water; and area geology and lithology. General contextual photographs were taken of all areas surveyed.

The rock art recordation form permitted notation on the general rock art type; motif; lithology; orientation; and observed associated cultural remains. Grid sheets facilitated the execution of scaled drawings, where relevant. Copies of these recordation forms have been appended to this report.

At the request of the Maine Historic Preservation Office, the Sprague Neck clam shell midden at NCTE Cutler also was inspected for evidence of cultural remains; no subsurface testing was conducted at this site.

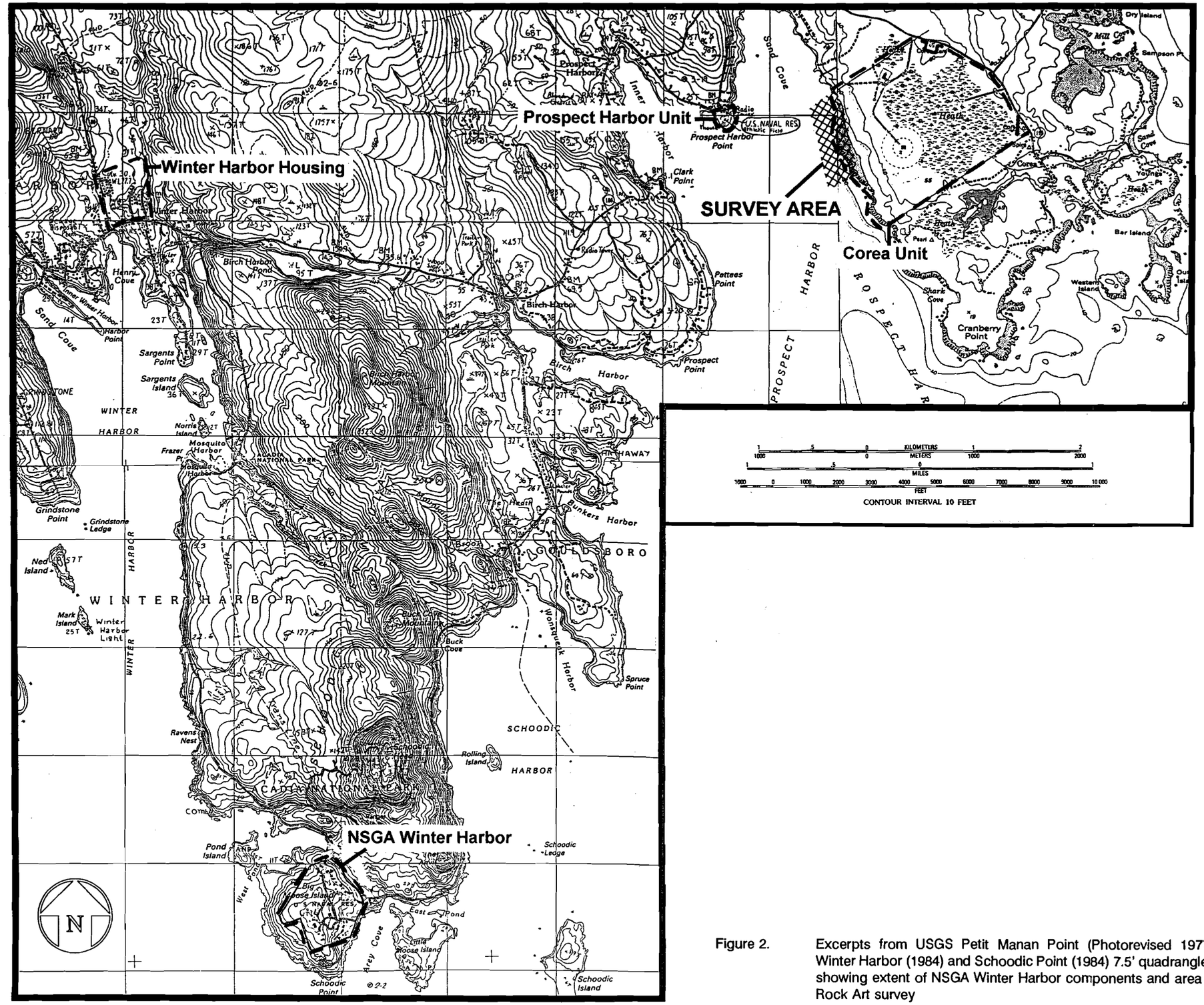

Figure 2. Excerpts from USGS Petit Manan Point (Photorevised 1977), Winter Harbor (1984) and Schoodic Point (1984) 7.5' quadrangles, showing extent of NSGA Winter Harbor components and area of Rock Art survey

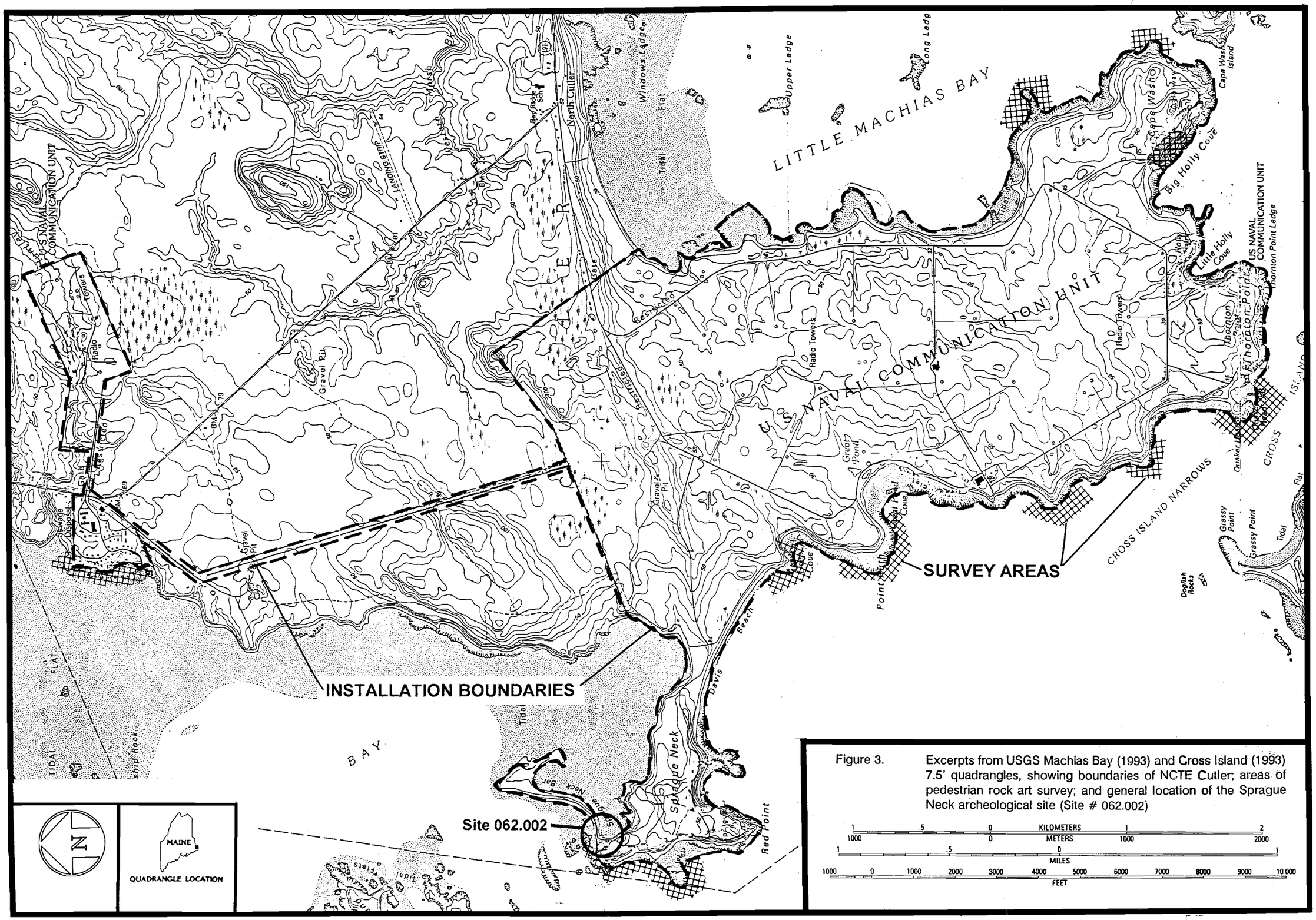

Figure 3. Excerpts from USGS Machias Bay (1993) and Cross Island (1993) 7.5' quadrangles, showing boundaries of NCTE Cutler; areas of pedestrian rock art survey; and general location of the Sprague Neck archeological site (Site # 062.002)

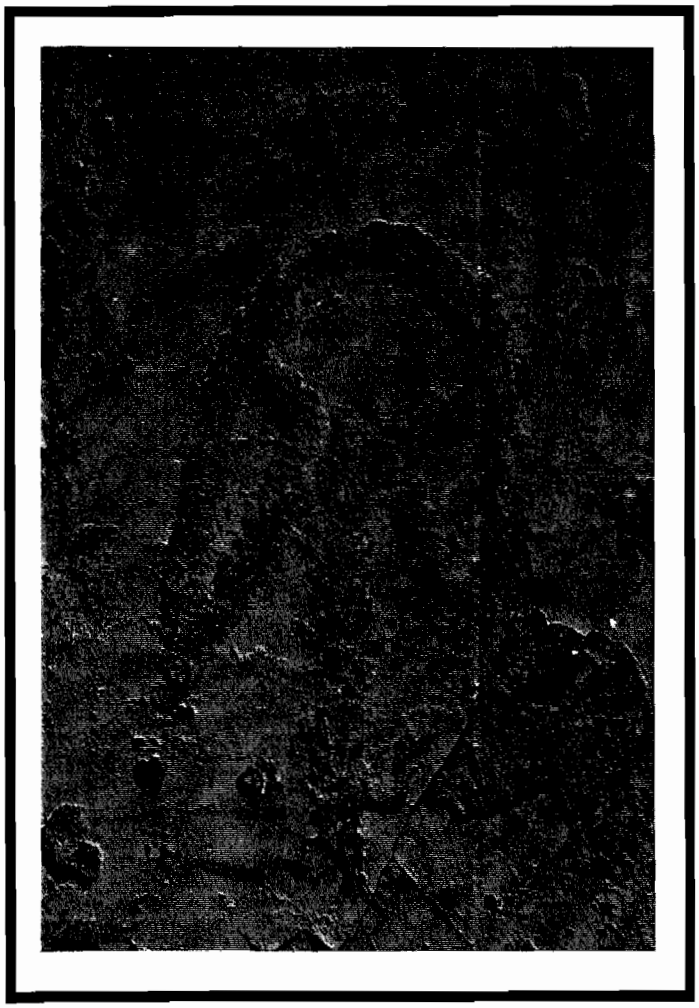

Figure 4. Photograph of locally named "Pretty Little Girl" glyph at Holmes Point (Site #062.008)

Figure 5. Photograph of stylized fish glyph at Holmes Point (Site 062.008)

Figure 6. Photograph of panel of four anthropomorphic glyphs (#s 8, 9, 10, 11 [Hedden 1996:Figure 4]) at Holmes Point

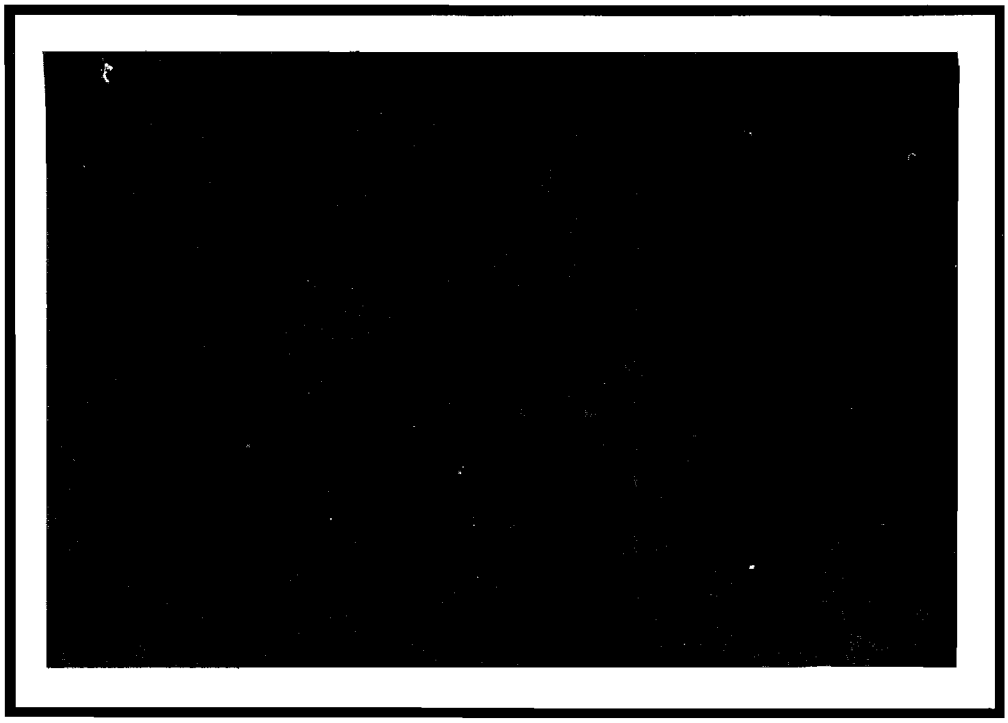

Figure 7. Photograph of two anthropomorphic glyphs at Hog Island (Site 062.024) representing Style 4 "spirit familiar" figures (Hedden 1996:16)

CHAPTER IV

RESULTS OF SURVEY

Archival Results

Background archival research revealed that 29 prehistoric archeological sites and 7 rock art sites previously had been identified in the vicinity of NSGA Winter Harbor and NCTE Cutler; no historic archeological sites have been identified or investigated in the vicinity of either installation (Maine Historic Preservation Commission Archeological Site files). One terrestrial site, the Sprague Neck clam shell midden (#062,002), has been reported at NCTE Cutler.

Review of secondary sources on Maine prehistory suggested that intensive prehistoric exploitation of the state's northeastern coastline commenced during the Late Archaic period, and continued through the Ceramic period. By the time of European contact in 1604, the region was inhabited by the Passamaquoddy tribe.

Seven prehistoric rock art sites have been identified in the Machias Bay region of Washington County adjacent to NCTE Cutler (Table 2); all are located within the protected tidal zone of Machias Bay, and all are petroglyphs. In general, the rock art sites are found on flat or gently sloping ledges of metamorphosed shale, a soft rock surface that permitted relatively facile inscription, but which also is subject to erosion. All or part of these ledges are inundated during high tide periods. The Machias petroglyphs portray anthropomorphic, animal and geometric images (Figures 4 - 7), and they represent sites of recurrent ritual activity. Hedden (1996) has created a typology and chronology of the anthropomorphic glyphs (Table 3); he maintains that these glyphs span the period from the Late Archaic through Contact.

Although French and British explorers and colonizers occupied the northeastern Maine coast sporadically during the seventeenth century, permanent historic occupation of the region was delayed until the mid-eighteenth century. Until the post-Civil War era, the region remained relatively isolated, and coastal residents depended upon a combination of subsistence agriculture, maritime trade, fishing and whaling, and extractive pursuits such as lumbering and quarrying. Only one major town center, Machias, developed in the region during the eighteenth century; smaller towns and coastal hamlets remained the principal nucleated settlements into the present century. Since the late nineteenth century, tourism has grown to become the major pursuit and employer in the region.

The present NSGA Winter Harbor facility on the Schoodic Peninsula was established in 1935, when the former Naval transmission station at Mount Desert was relocated to a 25.96 ac tract acquired from the Department of the interior. At present, the Schoodic Point administrative and residential facility encompasses 96.82 ac. During the 1950s and 1960s, as the functions of the installation expanded, a total of 23 ac within the Village of Winter harbor was acquired to accommodate additional residential housing for installation personnel. The Corea operations center, which houses the massive Wullenweber antenna array, is a 451.5 ac parcel that was acquired in 1952 (Master Plan 1993:V-4). The mission of the Winter Harbor facility is to operate a High Frequency Direction Finding Facility and Advanced Tactical Ocean Surveillance System, and to provide communications and related support, including communications relay, security and manpower assistance to Navy and other DoD elements in the region (Master Plan 1993:V-1).

NCTE Cutler was established ca. 1958 on nearly 3,000 ac tract that originally was settled ca. 1785 by farmers and fishermen from nearby Machias. The installation has three major components: an administrative/residential area (54.9 ac) that includes a portion of the eastern shoreline of Machias Bay; a 127.7 ac High Frequency (HF) antenna field located on an inland tract directly east of the administrative area; and a Very Low Frequency (VLF) antenna field (2805.12 ac) that occupies almost all of the peninsula formed by Machias Bay and Little Machias Bay. The three-fold mission of NCTE Cutler is: (1) "to manage, operate, and maintain those facilities, equipment, devices and systems necessary to provide requisite communications for the command, operational control, and administration of the Naval Establishment; (2) to manage, operate, and maintain those facilities of the Defense Communications System as assigned; and (3) to perform such other functions as may be directed by the Chief of Naval Operations" (USDA 1984:2).

Archeological Results

Zone A: Atlantic Coastal Zone

The Atlantic Coastal Zone, defined as those areas at NCTE Cutler that are relatively exposed and open to direct tidal and wave action from the Atlantic Ocean, incorporated three topographically defined areas: the semi-detached island of Quaker Head, Big Holly Cove, and Wash Point. Overlying soils in this portion of the installation represent remnants of glacially deposited sands and gravels; these are underlain by rhyolite and basalt flow and tuff and minor amounts of shale (USDA 1984:Figure 3).

Quaker Head comprises an island that is connected to the main peninsula during periods of low tide by a cobble and sand spit (Figure 8). Elevations on the island range between 0 and 20 ft amsl. The island is thickly vegetated; stands of scrub aspen and an occasional fir tree form the "canopy," while wild dwarf blueberry, mountain cranberry, various ferns, and meadow grasses constitute the "understory." A complete pedestrian reconnaissance of was conducted on all bedrock shelves and outcrops around the perimeter of the island; however, only the protected northern shoreline contained horizontal ledges suitable for rock art. No examples of rock art were observed at Quaker Head.

The shoreline rock formations at Big Holly Cove were examined visually from the VLF antenna field perimeter road. The headland at Big Holly Cove rises nearly 80 ft above the cobble beach which is exposed only at low tide. Wave action and erosion have created nearly vertical escarpments, and intrusive dikes of softer sedimentary rock have eroded out to form caves in the cliff faces. No horizontal bedrock ledges suitable for rock art were observed at this location.

An extensive horizontal rock outcrop on the eastern flank of Cape Wash also was examined by pedestrian survey. This location is totally submerged at high tide, and constant water action has fractured most of the horizontal rock ledges extensively. Heavy deposits of seaweed and sea grass on the eroded and cobble strewn surfaces not only hampered pedestrian access, but also reduced visibility considerably. The outermost ledges at this location do provide suitable rock art surfaces; however, none was observed. It is likely that tidal erosion has obliterated any rock art that might have existed at one time.

Transitional Zone

The "transitional zones" along the sides of the Cutler and Corea peninsulas are not exposed to constant and direct oceanic wave action, but because they border broad stretches of open water, they also do not constitute the most protected shorelines along the peninsulas. At

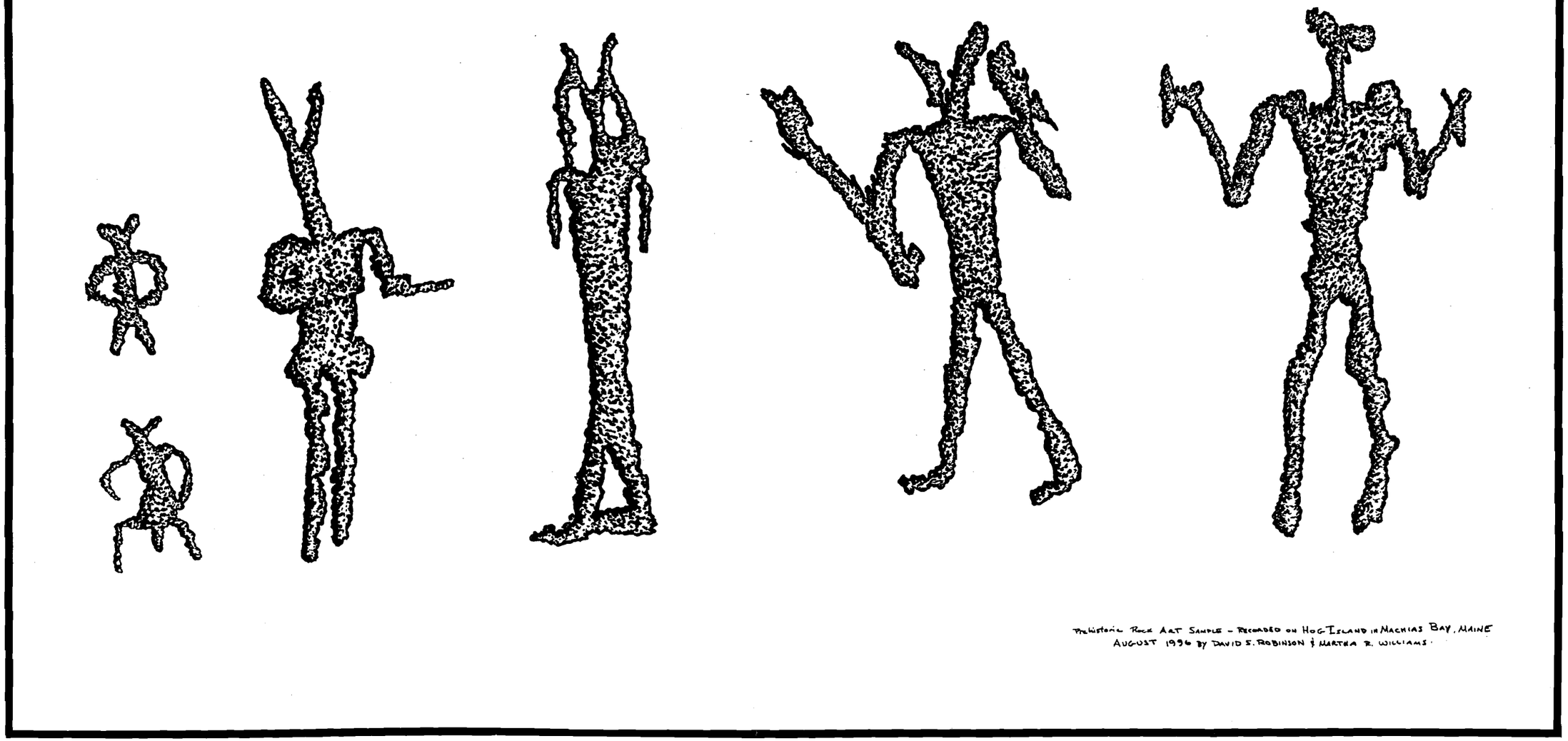

Figure 8. Representative anthropomorphic glyphs from Hog Island and Holmes Point (David Robinson)

NCTE Cutler, six alternating bands of rhyolite/basalt and gabbro/diorite bedrock underlie the peninsula (USDA 1984:Figure 3). Exposed rhyolite, basalt and shale outcrops that form "points" alternate with cobble-strewn sand beaches and tidal flats along these transitional bay shorelines (Figure 9). Although similar geological data were not available for the shoreline at NSGA Corea, observation of the nature of the shoreline there suggests that a similar geological underlayment is present (Figures 10 and 11).

An approximately .8 k (.5 mi) stretch of the Prospect Harbor shoreline at NSGA Corea (Figure 2), and six exposed rocky "points" along the Machias Bay and Little Machias Bay shorelines, including a portion of the exposed ledges at Sprague Neck (Figure 3, Figure 12), were subjected to pedestrian reconnaissance. Few horizontal surfaces suitable for rock art were observed at these locations, and no rock art was identified.

Tidal Bay Zone

One area of the shoreline at NCTE Cutler, the beach adjacent to the administrative cantonment near the head of Machias Bay, was included in this environmental and geological category. This portion of the bay shoreline is characterized by extensive mud flats at low tide, and beaches are composed of silt and cobbles (Figure 13). Silt is deposited through erosion of the overlying glacial tills along the shoreline and from alluvial sediments washed down by tributary creeks and rivers.

Rock outcrops in this zone are less frequent, and geological bedding planes are primarily horizontal. Due to their distance from the mouth of the bay, the shorelines within this zone are subjected to relatively little wave action. Although some erosion from tidal action does occur, it is less destructive of the exposed rock ledges. All of the reported rock art sites at Machias Bay, including Hog Island, which lies approximately 1 mi southwest of this beach, are located within this protected tidal zone.

The entire 600 m stretch of the bay shoreline encompassed within the boundaries of NCTE Cutler were subjected to pedestrian reconnaissance. No rock art sites were identified. A peculiar set of geological features, known locally as the "devil's footprints" (Figures 14 and 15), was observed in some exposed and waterworn basaltic dikes; however, these "footprints" appear to represent naturally-occurring inclusions in the bedrock and are not culturally significant. Similar features were noted in bedrock formations at Hog Island.

Sprague Neck Shell Midden (Site 062.002)

Although survey for standard terrestrial sites was not an objective of this project, the archeological team did examine the reported location of a clam shell midden, the only previously reported site at NCTE Cutler. The site is located at the landward end of Sprague Neck spit (Figure 2), a long northward curving deposit of sand and cobbles located on the northern shore of Sprague Neck. No direct evidence for the midden itself was observed; however, one apparently cultural artifact was recovered from the beach. This was a waterworn fine-grained greenish gray cobble that exhibited multidirectional flaking and bipolar damage. Analysis of this lithic material suggested a fine-grained metamorphosed quartzite or anhydrite. Because this specimen was collected from the surface of the beach rather than excavated, its association with the reported midden deposit is debatable.

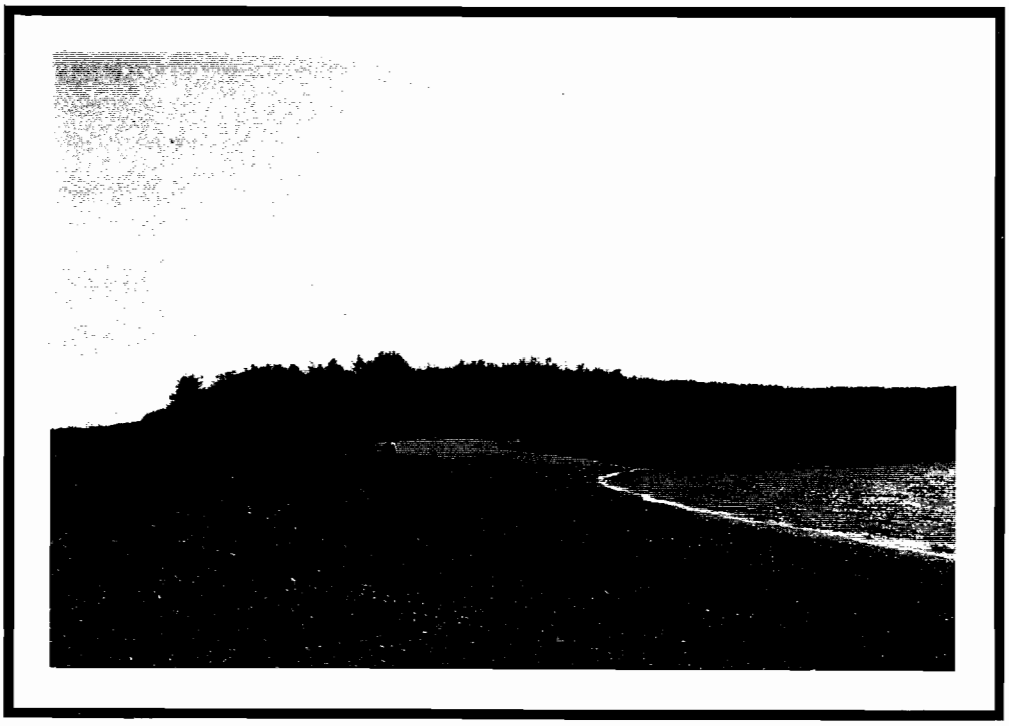

Figure 9. NCTE Cutler: photograph of Quaker Head and connecting sand and cobble spit at low tide (view southwest)

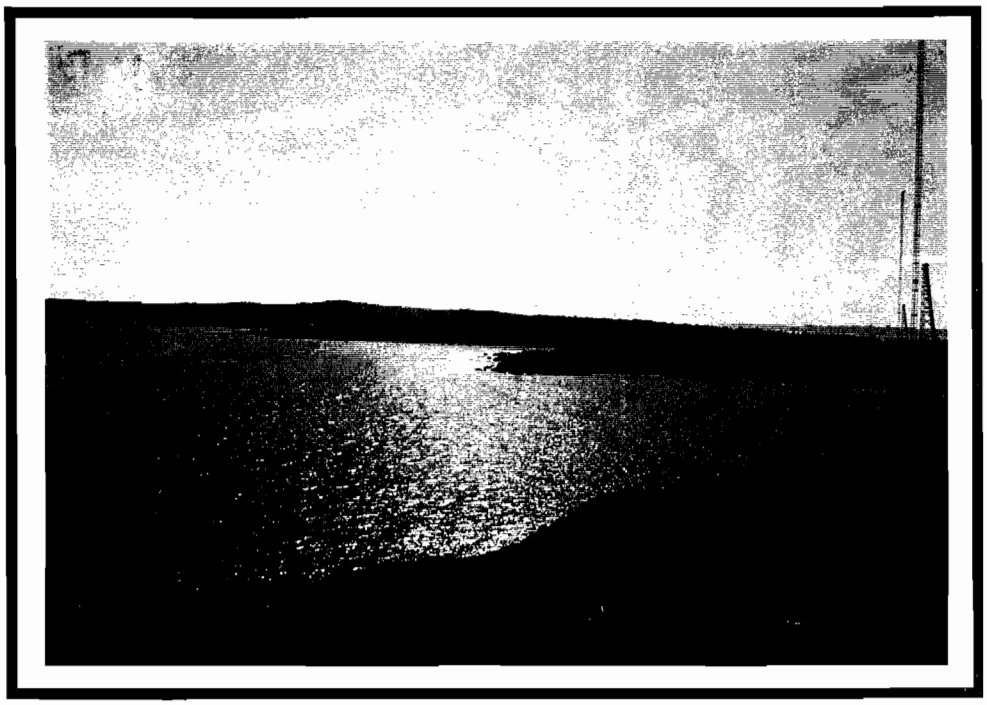

Figure 10. NCTE Cutler: photograph of "transitional zone" Machias Bay shoreline, showing alternating eroded rock outcrop "points" and crescentic coves and beaches (view northeast)

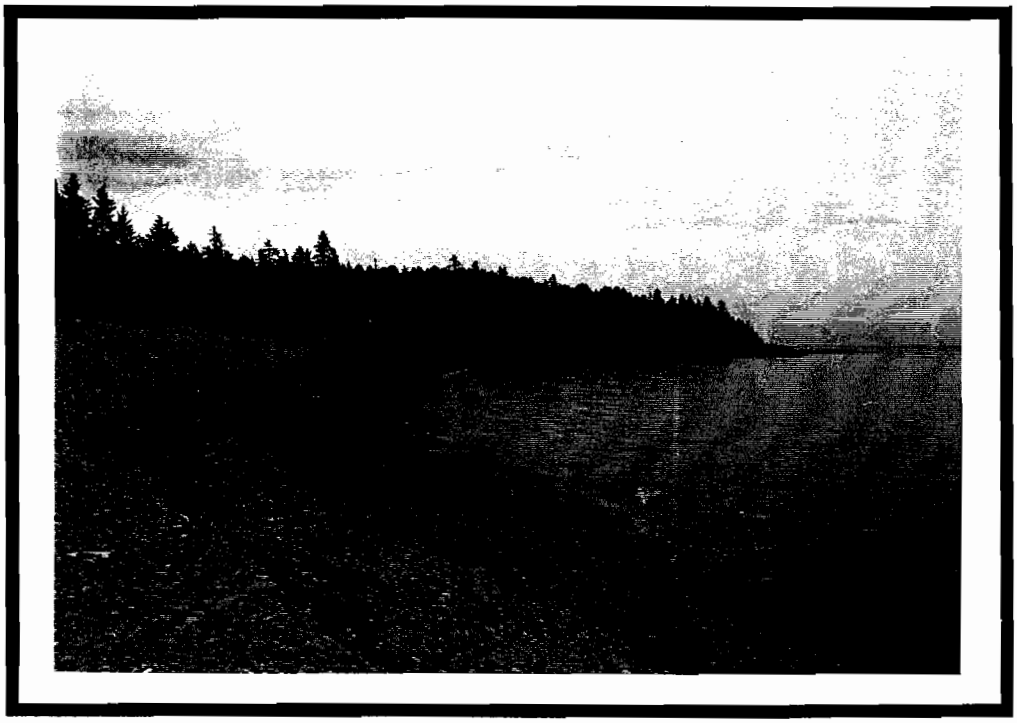

Figure 11. NSGA Winter Harbor, Corea unit: photograph of crescentic cobble beach cove along Prospect Harbor shoreline

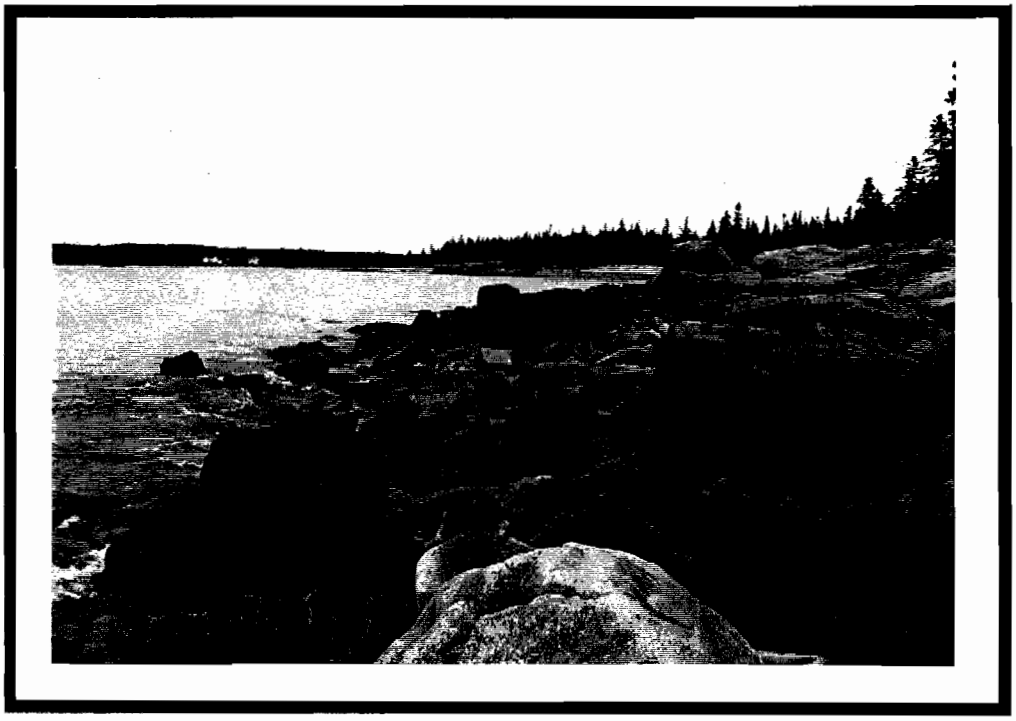

Figure 12. NSGA Winter Harbor, Corea unit: photograph of typical exposed rock ledges along Prospect Harbor shoreline

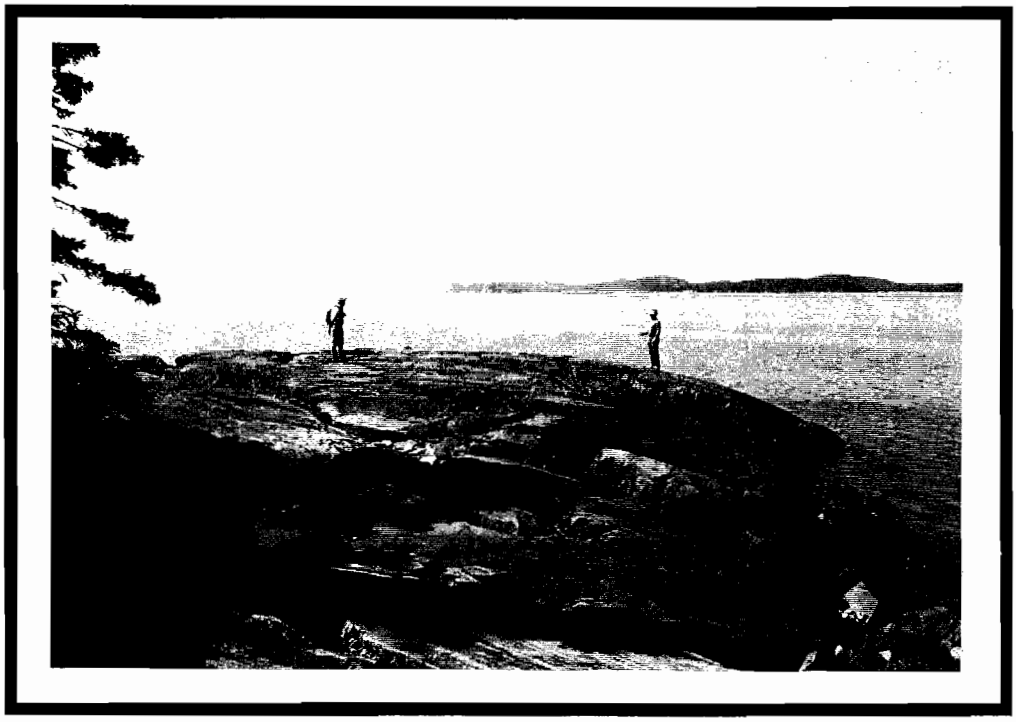

Figure 13. NCTE Cutler: photograph of exposed horizontal rock ledges at Sprague Neck (view southwest)

Figure 14. NCTE Cutler: photograph of cobble-strewn mud flats and exposed rock outcrops at administrative unit shoreline (view southwest)

Figure 15. NCTE Cutler: photograph of naturally occurring intrusions known as "devil's footprints"

CHAPTER V

SUMMARY AND RECOMMENDATIONS

This report has presented the results of a preliminary reconnaissance of selected areas of the Naval Security Group Activity Winter Harbor and the Naval Computer Telecommunications Unit Cutler, located in Hancock and Washington counties in Maine. The study was conducted by R. Christopher Goodwin & Associates, Inc. on behalf of the Atlantic Division of the Naval Facilities Engineering Command (LANTOPS), as part of a Legacy Cultural Resources Demonstration project on Rock Art on Department of Defense (DoD) Installations in the Northeastern United States. The primary objective of the study was to identify potential prehistoric rock art sites within these two installations.

NSGA Winter Harbor occupies three discontinuous tracts that encompass portions of the Schoodic Peninsula, the Cranberry Point peninsula, and the Town of Winter Harbor, along the northeastern coast of Maine (Figures 1 and 2). NCTE Cutler occupies three discontinuous parcels totaling approximately 3,000 ac on the Thornton Point peninsula between Machias and Little Machias Bays (Figures 1 and 3), approximately 45 mi northeast of NSGA Winter Harbor. The underlying geomorphology of the Maine coastline in this region is comprised of various types of glacially altered volcanic rock, including rhyolite, basalt, shale, gabbro, granite, and diorite. Overlying soils consist of glacially deposited till, composed of sand, silt and cobbles.

NSGA Winter Harbor and NCTE Cutler were selected as rock art survey areas for three reasons: (1) prehistoric rock art sites had been reported in Machias Bay immediately adjacent to NCTE Cutler; (2) coastal rock formations similar to those on which sites had been reported were expected to be present at both installations; and (3) as active Naval communications facilities, the installations partially satisfied contractual requirements of the Scope-of-Work, which mandated on-site inspection of one installation for each service branch.

Results

Results of Field Investigations

Three distinct environmental zones within the two installations were sampled (Figures 2 and 3). These included the an outer coastal zone at NCTE Cutler; a transitional bayshore zone at both NCTE Cutler and NSGA Winter Harbor's Corea unit; and a protected tidal zone, again at NCTE Cutler. Out of a total shoreline of approximately 12.8 km (8.0 mi) of shoreline, an estimated 4.35 km (2.7 mi) were traversed by pedestrian reconnaissance; the remaining shoreline areas at NCTE Cutler were subjected to windshield reconnaissance. In addition, two previously reported rock art sites in Machias Bay, at Holmes Point and Hog Island, were visited. All of the areas surveyed contained naturally occurring rock outcrops and ledges that might have provided suitable surfaces for pictographs or petroglyphs during prehistoric times.

No prehistoric pictographs or petroglyphs were identified in any of the shoreline areas surveyed. However, given the pattern of distribution of known rock art sites in the region and the exposure of exposed outcrops to tidal and wave action, the outcrops in the most protected tidal bay areas at NCTE Cutler should be considered as high probability areas for rock art.

Threats to Potential Resource Base

Natural agents. The principal threat to preservation of potential rock art sites at these installations would occur as a result of erosion due to tidal and wave activity. Evidence of the adverse impact of these forces on bedrock deposits, in the form of continued weathering, fissuring and surface degradation, is apparent in all shoreline areas of both installations.

Human agents. The potential for adverse impacts to rock art settings identified at NSGA Winter Harbor and NCTE Cutler is considered low. The extremely rugged nature of the coastline precludes almost any intensive development. There is a minor potential for vandalism of exposed rock surfaces along the shoreline of Sprague Neck, because this area is utilized actively for recreational purposes.

Recommendations

Only one comprehensive archeological survey (Cultural Resources Group 1995) has been conducted at NSGA Winter Harbor, and no comprehensive cultural resources investigations have been undertaken at NCTE Cutler. The 1995 survey of Winter Harbor also did not focus on identification of rock art sites. Both the research design and the proposed methodology of any future cultural resource studies undertaken at Winter Harbor should include provisions for survey and identification of potential rock art sites in appropriate locations. At NCTE Cutler, survey for rock art sites should be included in a general Phase I cultural resources survey of the installation. Special emphasis should be placed on inspecting all of the outcrops along Sprague Neck, especially at Red Point, which was not surveyed during this project.

Identified rock art sites that might be impacted adversely by tidal action should be documented utilizing professionally accepted recordation techniques, including rubbings, castings, and photographs. All identified rock art sites also should be inspected on a regular basis to assess the extent to which weathering, erosion, and recreational use of adjoining areas are impacting the resource base.

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APPENDIX VI

RESUMES OF KEY PROJECT PERSONNEL

CHRISTOPHER R. POLGLASE, M.A., A.B.D.

VICE PRESIDENT- ARCHEOLOGICAL SERVICES, MID-ATLANTIC REGIONAL OFFICE

Mr. Christopher Polglase received his baccalaureate degree from William and Mary in 1980, his M.A. from SUNY Binghamton in 1985, and he currently is A.B.D. at that institution. At SUNY Binghamton, Mr. Polglase served as a teaching, research, and graduate assistant. Also at that institution, he edited the multi-volume report on excavations at the Utqiagvik Village site in Barrow, Alaska. A member of Sigma Xi, the Archeological Society of Virginia, the Society for Archaeological Sciences, and the Society for American Archeology, Mr. Polglase received considerable cultural resource experience with the Public Archeology Facility at SUNY Binghamton, where he served as crew chief on numerous Phase I-III projects. In Virginia, Mr. Polglase served as crew chief for three seasons at Fort Christanna, an early eighteenth century frontier outpost in Brunswick County, and as field supervisor for the Phase I study of the proposed Roanoke River Parkway. He also has participated in large multi-season excavations in Barrow, Alaska, and in Italy.

At R. Christopher Goodwin & Associates, Inc., Mr. Polglase has worked on numerous archeological projects in Maryland, Pennsylvania, Virginia, North Carolina, West Virginia, Puerto Rico, Florida, and the District of Columbia. He has directed data recovery at numerous prehistoric sites in Howard, Charles, Anne Arundel, and Frederick Counties, Maryland, and he has directed Phase II archeological investigation of prehistoric and historic period sites in Central Maryland, West Virginia, Northern Virginia, Washington, D.C., and Tidewater Virginia. Two of those projects, excavations at Russett Center and at the 10,000 year old Garman Site, received the Excellence in Archeology Awards from the Anne Arundel County Trust for Historic Preservation in 1991 and 1992. His recent projects have included: Phase I/Phase II archeological investigations for the Moorefield Local Flood Control Project, West Virginia; preparation of the cultural resource management plans for the Department of Energy's Morgantown, West Virginia, Energy Technology center and for Aberdeen Proving Ground; Phase II archeological evaluation of Civil War earthworks in Newport News, Virginia; Phase I survey of the Virginia Natural Gas Company Northern Trunk Line project; and Phase II evaluations of four prehistoric sites in Howard County for the Maryland Department of Transportation. In addition, he has directed the preparation of multi-disciplinary historical and cultural resource planning materials for the U.S. Army Corps of Engineers, the Atlantic Division of Naval Facilities Engineering Command, and for the Maryland Port Administration.

His research interests include lithic analysis, obsidian analysis, and long-distance exchange; in addition to numerous technical reports, he has published papers in the *Journal of Archeological Science*, *Preistoria Alpina*, and the *Journal of Middle Atlantic Archaeology*. He has presented professional papers to the Society for American Archeology, the Archaeological Society of Maryland, the Middle Atlantic Archeological Conference, the Archeological Societies of Maryland and Virginia, the Eastern States Archeological Federation, the Center for Medieval and Early Renaissance Studies, and the Valle dei Cavalieri.

MARTHA R. WILLIAMS, M.A., M.ED.

HISTORIC SITE SPECIALIST

Ms. Martha R. Williams, a graduate of Lebanon Valley College, holds advanced degrees in Education from the University of Pennsylvania and in Applied History from George Mason University. Her extensive experience in education, cultural resource management, and historical archeology includes a field school at Colonial Williamsburg (1972); employment with the National Park Service as an archeological laboratory technician; appointment as a field archeologist for the 1991, 1992, 1994, and 1995 excavations at Fort Raleigh, North Carolina; and as a volunteer archeologist at the APYA's Jamestown Rediscovery project. As co-director of the Fairfax County High School Seminars in Historical Archaeology (1973-1987), she managed 15 archeological projects, ranging from Phase I reconnaissance studies to Phase III data recovery efforts. In 1987, she co-authored the Heritage Resources Management Plan for Fairfax County, Virginia.

Since joining R. Christopher Goodwin & Associates, Inc., Ms. Williams has served as historian, project manager, and public interpretation specialist for numerous studies conducted by the firm. She has co-authored reports for projects in Anne Arundel, Baltimore, Charles, Frederick, Harford, Prince Georges, St. Mary's, Talbot, and Washington Counties, and Baltimore City in Maryland; in Arlington, Fairfax, Henrico, Halifax, Westmoreland, and Prince William Counties in Virginia; and in the District of Columbia, Pennsylvania, North Carolina, Mississippi, and Puerto Rico. As public interpretation specialist, she designed and executed successful public information activities for the company's Stadium Project in Baltimore; the Drane House project in Garrett County, Maryland; the Icehouse Square project in Gettysburg, Pennsylvania; at the Gott's Court site in Annapolis, Maryland; at Pemberton Plantation in Salisbury, Maryland; and for two public information and training projects under the Legacy Program of the Department of Defense.

Ms. Williams also is actively involved with professional preservation organizations. She has served as Vice-President of the Archeological Society of Virginia, and currently sits on the ASV Board of Directors. She also serves on the Archeological Advisory Board of the Jamestown Rediscovery project. She has written for numerous publications, including the *Yearbook* of the Historical Society of Fairfax County, *Museum News, Interpretation* (NPS), the *Quarterly Bulletin* of the Archeological Society of Virginia, *American Antiquity*, and the Journal of Mid-Atlantic Archaeology. In 1991, she received a Distinguished Service Award from the Fairfax County History Commission for her contributions to local history and preservation. She was recognized in 1992 by the Society for Historical Archaeology for her two-year service as Chair of that organization's Committee on Public Education, a position that she currently holds. In 1994, Ms. Williams was an invited participant in the "Save the Past for the Future II" conference, sponsored by the Society for American Archeology.

R. Christopher Goodwin & Associates, Inc. produced this publication as a demonstration project for the Legacy Resource Management program. The Legacy program, an innovative cultural and natural resources initiative, was created by the Department of Defense Appropriations Act, 1991 (P.L. 101-511). The Legacy Program recognizes the Secretary of Defense's commitment to leadership in resource protection, conservation and restoration. Demonstration projects, designed to explore new and improved ways of preserving our natural and cultural resources, are an important part of the Legacy Program.

The kind cooperation of preservation officers from the installations visited is gratefully acknowledged.

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