Dutchess Quarry Sites National Register District: Management and Conservation Report

For
Commissioner of Planning
Orange County Department of Planning
Goshen, New York

By
Andy Stout, Eastern Regional Director
Will Sheppard, Eastern Field Representative
The Archaeological Conservancy
Eastern Regional Office
8 East Second Street, Suite 101
Frederick, Maryland, 21701

2012
# Table of Contents

Contents

List of Figures .................................................. 4
Preface .......................................................... 6
Introduction ...................................................... 9

I. Historical Overview ........................................ 13
   Current Setting ............................................. 13
   Past Geological Setting .................................... 14
   Pleistocene Evidence in Orange County .................. 14
   Past Cultural Setting ....................................... 16
   Paleo-Indian Sites in the New York Region ............... 17
   Prehistoric Sites in Orange County ...................... 20
   Past Research at Dutchess Quarry Caves ................. 21

I. Approaches to Conservation of DQS-NRD ................. 30
   Adoption of a Management Plan ......................... 33
   Agreements to Enhance Stewardship ...................... 34
   Parkland Designation ..................................... 35
   Conservation Easement .................................. 35
   National Historic Landmark Designation ................. 36
   County Ownership ........................................ 37
   Working with Dutchess Quarry and Supply Company ... 39

I. DQS-NRD Management Issues ............................. 42
   Site Security ............................................... 42
   Site Access ............................................... 43
   Stabilization .............................................. 44
   Permitting Future Research ............................... 45
   Potential for Future Research ............................. 47

IV. Avenues for the Interpretation of the DQS-NRD ......... 49
    IOCCNYSAA Site Tours .................................. 50
    Comparable Archaeological Sites ...................... 51
    Site Tours at DQS-NRD ................................ 53
    Improve Access ......................................... 54
    On Site Interpretation ................................... 55
    Off Site Interpretation .................................. 57
    Media Outlets .......................................... 58
    Regional Interpretation ................................ 59
    Interpretive Center ..................................... 59
    Collaborations .......................................... 62

V. Recommendations for the County and the DQS-NRD ... 65
    Initial .................................................. 65
    Short Term ............................................. 66
    Long Term .............................................. 68

Citations and Selected Bibliography .......................... 70
<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>A Chronology of Dutchess Quarry Sites NR District</td>
<td>75</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Sample General Guidelines for the Management of Archaeological Preserves</td>
<td>76</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Secretary of the Interior’s Historic Preservation Professional Qualification Standards</td>
<td>80</td>
</tr>
</tbody>
</table>

Dutchess Quarry Sites National Register District: Management and Conservation Background Research Supplement*

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix D</td>
<td>1973 National Register Nomination</td>
<td>2</td>
</tr>
<tr>
<td>Appendix E</td>
<td>1994 National Register Nomination</td>
<td>17</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Department of the Interior Bulletin 22 Archeology Site Stewardship Program</td>
<td>43</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Hartgen Archaeological Associates Report Vol 1</td>
<td>66</td>
</tr>
<tr>
<td>Appendix H</td>
<td>Hartgen Archaeological Associates Report Vol 2</td>
<td>218</td>
</tr>
</tbody>
</table>

*A single copy of this 511 page supplement will be provided to the Orange County Planning Commission as background reference material.
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Map Dutchess Quarry Sites National Register District</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Archaeologist Bill Sandy at the entrance Cave 1 in 2009</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Wm Ehlers on bench near the Caves in early 1960s</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Cumberland style fluted point from Dutchess Quarry Cave 1</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Aerial view from Google.Earth of Goshen Quarry</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Map of Proposed 1990 Quarry Expansion</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Plan view map of Cave 1</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Entrance to Cave 2</td>
</tr>
<tr>
<td>Figure 9</td>
<td>Excavations at entrance to Cave 8 in 1979</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Profile drawing of the stratigraphy of Cave 1</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Entrance to Cave 8 after initial excavations</td>
</tr>
<tr>
<td>Figure 12</td>
<td>Site steward in front of rock shelter Bear Mtn State Park</td>
</tr>
<tr>
<td>Figure 13</td>
<td>Detail map of stripped area above the caves</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Sketch of photographic overlay of Mt Lookout from the east</td>
</tr>
<tr>
<td>Figure 15</td>
<td>View southwest towards black dirt from the quarry overlook</td>
</tr>
<tr>
<td>Figure 16</td>
<td>Aerial view of Mt Lookout and Goshen Quarry</td>
</tr>
<tr>
<td>Figure 17</td>
<td>CW Peale Painting of the Walden Mastodon excavation</td>
</tr>
<tr>
<td>Figure 18</td>
<td>OPRHP Archaeological and Historic Resources Map for Goshen</td>
</tr>
<tr>
<td>Figure 19</td>
<td>Warren Mastodon skull on display Orange Co. Govt. Center</td>
</tr>
<tr>
<td>Figure 20</td>
<td>Southern section of quarry pit permitted for deepest removal</td>
</tr>
<tr>
<td>Figure 21</td>
<td>Site steward in front of rock shelter Bear Mtn State Park</td>
</tr>
<tr>
<td>Figure 22</td>
<td>Detail map of stripped area above the caves</td>
</tr>
<tr>
<td>Figure 23</td>
<td>Map of Proposed 1990 Quarry Expansion</td>
</tr>
<tr>
<td>Figure 24</td>
<td>Plan view map of Cave 1</td>
</tr>
<tr>
<td>Figure 25</td>
<td>Entrance to Cave 2</td>
</tr>
<tr>
<td>Figure 26</td>
<td>Excavations at entrance to Cave 8 in 1979</td>
</tr>
<tr>
<td>Figure 27</td>
<td>Profile drawing of the stratigraphy of Cave 2</td>
</tr>
<tr>
<td>Figure 28</td>
<td>Excavations within Cave 1 1965</td>
</tr>
<tr>
<td>Figure 29</td>
<td>Entrance to Cave 8 after initial excavations</td>
</tr>
<tr>
<td>Figure 30</td>
<td>Plan view of Prehistoric quarry Locis on Mount Lookout</td>
</tr>
<tr>
<td>Figure 31</td>
<td>Plan view Map of Cave 8</td>
</tr>
<tr>
<td>Figure 32</td>
<td>Profile drawing of the stratigraphy of Cave 3</td>
</tr>
<tr>
<td>Figure 33</td>
<td>Town of Goshen Zoning map detail for DQS-NRD</td>
</tr>
<tr>
<td>Figure 34</td>
<td>Sketch of photographic overlay of Mt Lookout from the east</td>
</tr>
<tr>
<td>Figure 35</td>
<td>A 2.14 acre Archaeological Preserve created in 1990</td>
</tr>
<tr>
<td>Figure 36</td>
<td>View southwest towards black dirt from the quarry overlook</td>
</tr>
<tr>
<td>Figure 37</td>
<td>Map of Proposed 1990 Quarry Expansion</td>
</tr>
<tr>
<td>Figure 38</td>
<td>Plan view of Prehistoric quarry Locis on Mount Lookout</td>
</tr>
<tr>
<td>Figure 39</td>
<td>Site steward in front of rock shelter Bear Mtn State Park</td>
</tr>
<tr>
<td>Figure 40</td>
<td>Plan view Map of Cave 8</td>
</tr>
<tr>
<td>Figure 41</td>
<td>Profile drawing of the stratigraphy of Cave 3</td>
</tr>
<tr>
<td>Figure 42</td>
<td>Map of Proposed 1990 Quarry Expansion</td>
</tr>
<tr>
<td>Figure 43</td>
<td>Plan view map of Cave 1</td>
</tr>
<tr>
<td>Figure 44</td>
<td>Entrance to Cave 2</td>
</tr>
<tr>
<td>Figure 45</td>
<td>Excavations at entrance to Cave 8 in 1979</td>
</tr>
<tr>
<td>Figure 46</td>
<td>Profile drawing of the stratigraphy of Cave 1</td>
</tr>
</tbody>
</table>

---

4
Figure 47 – Map of Historical and Cultural Resources in Orange County 63
Figure 48 - IOCCNYSA Tour group May 8, 2008 66
Figure 49 - IOCCNYSA Tour group June 11, 2011 67
PREFACE

The following report was generated from a scope of work entered into between The Archaeological Conservancy and the County of Orange to advise County leadership on the preservation and interpretation of the Dutchess Quarry Sites National Register District (DQS-NRD). The scope requires that a report addressing both short term and long term stewardship, management, and interpretation of the district be submitted to the Commissioner of Planning as well as a steering committee for the project.

This effort is the culmination of a series of conversations between the staff of The Archaeological Conservancy (TAC), members of the Incorporated Orange County Chapter of the New York State Archaeological Association (ICCONYSAA), and representatives of the District’s owners Orange County, New York. After visiting the site and discussing some of the history of the property, it was agreed that TAC would use its experience and expertise in archaeological site conservation, preservation, and management to help develop a Management and Conservation Plan for the Dutchess Quarry Sites National Register District (see Figure 1).

The Archaeological Conservancy is the only national 501c3 organization in the United States that is dedicated to acquiring and maintaining America’s most significant archaeological sites. TAC has been in existence for over 30 years and currently manages over 430 archaeological sites across the United States, including twelve (soon to be 15) archaeological research preserves in New York state.

![Figure 1—Map of the Dutchess Quarry Sites National Historic District from the National Register nomination form, Costella 1993.](image)
TAC staff met with Commissioner David Church and County Legislator Jeffery Berkman to develop a context to work within, and identified a framework of issues connected to the stewardship, management, and interpretation of the property. In addition to addressing these broad issues; this report also provides a complete history of the land use, zoning, administration, alterations and conservation efforts of the property. A complete compilation of all previous archaeological research conducted at the sites within the DQS-NRD, and an overview of the geology of the Mount Lookout region with a focus on the rich Pleistocene heritage of the area. The DQS-NRD is presented within the larger context of the prehistory of the northeastern United States, and a comparison of Dutchess Quarry Caves (see Figure 2) to other archaeological sites in the region is provided. The project also looked at other cultural and historic resources in the community, with a specific focus on the site interpretation program developed and used by the IOCCNYSAA.

Using this information, recommendations are made to develop a specific management plan for the DQS-NRD and to establish a management committee to oversee the implementation of the plan. The plan addresses issues such as: site conservation, security, site stabilization, and the development of a formal research policy. Other recommendations are aimed towards improving interpretation and public education through formalized site tours, improved site access, site interpretation, and the potential for linking the interpretation of DQS-NRD to existing historical, cultural and environmental heritage sites already established within the County, through the development of an interpretive center. The actions discussed in the later sections of this plan are designed to help preserve the site and to encourage limited public interpretation of the property for the benefit of future generations of Orange County and New York residents. The findings of this report are being presented to the County of Orange and to the members of the Dutchess Quarry Caves Management Steering Committee for the purpose of supporting the long term conservation and management of this significant archaeological resource.

This brings together in a single document all available information pertaining to the archeology, administration, conservation and significance of the Dutchess Quarry Caves site over the past fifty years. This report was prepared by The Archaeological Conservancy Eastern Office with the support and assistance of the staffs of the County Planning Department, the NYS Office of Parks, Recreation and Historic Preservation, the New York State Museum and NYS Office of Environmental Conservation. Other contributors included the County Historian, the County Assessor Office, the Department of Tourism, the Department of Parks and Recreation, the director of the Old Village Museum and a number of concerned and dedicated members of the Orange County community. Especially important are the contributions of the Incorporated Orange County Chapter of the New York State Archaeological Association whose membership originally
brought the sites to the attention of The Archaeological Conservancy, helped to facilitate meetings with the County and provided numerous insights into the their fifty plus years connection to the sites.

Members of the Dutchess Quarry Caves Management Steering Committee:

Jeffrey Berkman          Legislator, 20th Legislative District  
Cornelia W Bush          Orange County Historian  
David Church             Orange County Commissioner of Planning  
Harold “Ray” Decker      Inc. Orange Co Chapter of NYSAA  
Barry Kass               SUNY Orange, professor emeritus anthropology  
Doug Mackay              NYS OPRHP, archaeologist  
Andy Mills               Orange County Land Trust  
Chuck Thomas             Newburgh Free Library, archivist / archaeologist
INTRODUCTION

The Dutchess Quarry Sites National Register District consists of 13.2 acres of land on the top and western slope of Mount Lookout (see Figure 1, page 6). The district includes eight known archaeological resources consisting of the Dutchess Quarry Caves 1, 2, 7 and 8, and Goshen Quarry Loci 2, 3, 4, and 5. The district also contains four caves 3, 4, 5 and 6 which were located and tested in the 1970s but did not yield cultural material. Two other potential caves were located as anomalies by electrical resistivity and ground penetrating radar surveys. Although testing in 1978 and 1989 failed to locate entrances to these cavities, the potential for additional caves along the escarpment remain. The areas of Goshen Quarry Loci 2 through 5 retain evidence for an entire sequence of prehistoric lithic acquisition (mining) from areas of prospecting, to chert extraction, to lithic reduction and even to the use of the local chert to make tools found in Cave 1. In addition to this surviving evidence, other potential archaeological resources including a reported ‘Indian Cave’ were likely impacted to the south and east of the district by the Goshen Quarry where prehistoric artifacts had been found prior to the quarry’s operation. In addition to the land set aside for the district, the Dutchess Quarry and Supply Company Incorporated’s mined land and reclamation permit requires a 1.1 acre buffer zone along property leased to the Goshen Quarry.

The property on Mount Lookout has been owned by the County since the late 1830s. Starting in the late 1930s, the County has leased part of Mount Lookout to the Goshen Quarry to extract dolomite from the property. Members of the local community had been aware of caves and potential archaeological sites on the hilltop for several decades prior to the discovery of prehistoric artifacts in Cave 1 (see Figure 3) by members of the Incorporated Orange County Chapter of the NYSAA in 1964. This discovery led to several decades of study by the chapter, the New York State Museum and C.W. Post College. A total of eight caves were located, with four containing some evidence of human use or secondary cultural deposits. Caves 1, 2, 7 and 8 contained prehistoric artifacts and paleontological remains. Caves 3, 4, 5 and 6 did not yield evidence of cultural materials when tested by Dr. Kopper in the 1970s. The evidence which was recovered from Dutchess Quarry Cave #1 has included a Cumberland style fluted projectile point (see Figure 4) and Caribou bones which were carbon-14 dated to approximately 12,500 years before the present. Cave 8 contained cultural deposits which were sealed by talus 4000 years ago, preserving evidence of Paleo-Indian and Archaic period occupations. In the early 1990s, archaeological testing by Hartgen Archaeological Associates and Dunn Corporation as part of the Dutchess Quarry and Supply Company’s mine land and reclamation permit process identified four significant areas of prehistoric quarrying and chert procurement designated Loci 2 through 5. With this new evidence a 13 acre National Register District boundary was drawn up and approved by the County of Orange Legislature in May 1993. No activity occurred in the District for a number of years after this action, and articles in the local newspapers reflect a general concern that the District was being neglected. Since 2008, the County has begun to permit site visitation on a limited basis in partner-
Although the District has been recognized by listing on the National Register of Historic Places, the overall property remains zoned for mixed commercial and office use. In addition to the significant historical and cultural resource of the DQS-NRD, Orange County retains one of the highest concentrations of evidence from the Pleistocene and Paleolithic periods east of the Rocky Mountains.

Dutchess Quarry Sites National Register District is nationally significant for a number of reasons, not the least of which is “…since the initial exploration of cave 1 in the mid-1960s, the area has yielded data that has been a source of scientific debate and pivotal importance to our understanding of prehistory. Recognition of new features (Goshen Quarry Loci 2-5) more than 25 years later attests to the continuing ability of the caves area to yield important data as scientific methodologies and theories evolve. The relatively undisturbed nature of the caves area and edge of the escarpment means that the sites may continue to yield data critical to our understanding of prehistoric subsistence, paleontology and paleoenvironment.” (Costella 1993: 8).

More specifically, Dutchess Quarry Cave 1 remains the only known New York site which yielded a sequence of occupations covering the entire prehistoric period from the Paleo-Indian through the Late Woodland. Caves 1 and 8 are the only sites in eastern New York, and one of only three locations in the entire state, that have yielded datable Paleo-Indian subsistence remains. Caves 1 and 8 are the only sites in eastern New York that have yielded evidence of Paleo-Indian exploitation of post-Pleistocene fauna including caribou. Even though Drs. Funk and Steadman later questioned the direct association between the caribou bones and the Cumberland style fluted point (Steadman, Stafford & Funk 1989), Dr. Funk was still convinced that the caribou bones exhibited signs of human activity in the form of marrow extraction (Funk 1976). Due to collapsed talus which sealed the cultural deposits in Cave 8 approximately 4000 years ago, the cave has provide valuable information on human adaption to the changing conditions from the late Pleistocene through the early Holocene periods.

The broader Dutchess Quarry Sites National Register District has made significant contributions to the understanding of Native American lithic procurement in the region. The District contains evidence of the direct association of lithic tools found in Cave 1, with the in-situ scalloped chert beds uncovered at Loci 3. The District and the surrounding region retain the surviving landscape and physical evidence of Native American resource exploitation in a setting that provides a rare opportunity for visitors to experience and understand that association between the caves, escarpment, chert quarries and the resource rich Black Dirt region (see Figure 5). Importantly, the District is eligible for National Historic Landmark status. These caveats gain greater significance when it is considered that there are over 17,000 known terrestrial and underwater prehistoric and historic archaeological sites throughout the state of New York which record a heritage of human occupation spanning back more than 10,000 years (NYS OPRHP 2009: 50). Even with 17,000
recorded sites in New York, Dutchess Quarry Cave 1 is the only known location in the State with evidence for the entire period of human occupation of the Northeastern United States from the Pleistocene through historic times (Funk & Steadman 1994: 55).

After reviewing the history of research surrounding the Dutchess Quarry Sites National Register District in the Historical Overview section; this report will address the issues of archaeological site stewardship, management and interpretation as each relate to DQS-NRD. From the perspective of site stewardship, the County did permit 30 years of professionally supervised archaeological research which has led to national recognition for the District. The County has also taken the initial step of having the caves and prehistoric quarries listed on the National Register. In the sections of this report on Approaches to Conservation and DQS-NRD Management Issues, the County is presented with some options to help foster the long term preservation of the DQS-NRD. Site stewardship should consist of a program of site conservation which could include increased protection for the district through options such as deed covenants, conservation easements, National Historic Landmark status and the development of a management plan. The key elements of a management plan for DQS-NRD will provide the framework for addressing policy issues regarding access, research, stabilization and site security. Once formal policies are in place, a management committee should be established with the authority to oversee the District.

The Dutchess Quarry Sites National Register District presents a unique opportunity for the conservation and interpretation of a nationally significant prehistoric landscape. The physical characteristics of Mount Lookout and the caves provide a unique setting for the interpretation of Native American life in southern New York. Even with the significant changes to the landscape which have occurred, the general sense of why Native Americans utilized this location remains.

Figure 5 - An aerial view of central Orange County and even at an elevation of eight miles Goshen Quarry and the drained lands of the ‘black dirt’ region are clearly visible, image from Google Earth website.
The District provides an excellent tool for promoting the cultural heritage of the County and expanding the interpretation of the sites would enhance its public benefit. Much of the ground work for a site visitation program has been developed by the IOCCNYSAA which has led tours to the sites from 2008 through 2011. The section of this report on Interpretation presents a concise review of the tour program developed by the IOCCNYSAA and provides a comparison of this program with visitation at similar archaeological sites in the region.

The many details on prehistory, geology and the past archaeology of the Dutchess Quarry Sites National Register District are provided in the Historical Overview as a resource which could be used for site interpretation. The many details on prehistory, geology and the past archaeology of are provided in the Historical Overview as a resource to be used for site interpretation through public education, site signage and potential interpretive center. In addition to the district, the Orange County region possesses other cultural and historic resources and their potential for incorporation into regional visitation and interpretation program is provided. In the final section of this report, general recommendations provided to the County are organized into stages which could be implemented initially the short, in the short term medium and then potentially long term. The goal of all of the recommendations is to support and improve the public benefits of the DQS-NRD while at the same time providing the maximum protection to the District’s archaeological resources. Archaeological sites are finite resources (NYS OPRHP 2009: 50) and every effort should be made to protect and preserve these valuable cultural resources.

Figure 6—An aerial view of Mount Lookout and the Goshen Quarry looking southeast, image from the Orange County Planning Commission.
I. HISTORICAL OVERVIEW

Current Setting

Orange County is situated in the southeastern region of New York west of the Hudson River and to the north and east of the Delaware River as it forms the border with the state of New Jersey. The County falls within the Great Valley Sequence of the ridge and valley physiographic provenance. The region has witnessed significant geological changes over many thousands of years which have left a plentiful and unique record in the soils and landforms within the County. Mount Lookout has an elevation of 590 to 600 feet above mean sea level while the entrances to the Dutchess Quarry Caves are located at approximately 575 feet. The caves extend into the face of an escarpment which becomes less pronounced to the north as it eventually joins the surrounding topography. To the southwest, the escarpment is truncated by the mining operations which began to remove the underlying dolomite bedrock starting by the 1930s (see Figure 6). Below the escarpment is a thick talus accumulation of detached dolomite which extends 50 feet or more outward from the escarpment face (Hartgen 1992:6). This talus deposit is 25 to 30 feet deep. From the base of the escarpment the regions topography slopes gradually to the west towards the Black Dirt region which is at 400 feet above mean sea level and a thousand feet to the west of the caves. The Black Dirt region of 26,000 acres is the remains of a series of prehistoric lakes that eventually drained and formed into wetlands. These wetlands were drained by human efforts in the late 19th and early 20th centuries for use as farm land (see Figure 7). It was along the shores of these prehistoric lakes, and within the wetland deposits that followed, that the abundant evidence for the former Pleistocene environment has been preserved. The current valley is drained by the Wallkill River which flows to the north of Mount Lookout, beginning from northern New Jersey and then flowing to the Hudson River valley.

On Mount Lookout, most of the mountain top is covered by woods except for a section of open field found near the quarry operation to the east of the caves. This mature second growth forest has developed on top of rock outcrops and Farmington complex soils (Hartgen 1992:6) which are excessively well drained, thin soils unsuited for agriculture. The open field and brushy transition zone has developed over Pittsfield gravelly loam which is well drained, suitable for agriculture but susceptible to severe erosion. Both soil complexes develop from glacial till and Hartgen (1992:6) found the soils in both the woods and brushy areas to be shallow and stony. The bushy transition zone is from 25 to 100 feet wide and contains brambles, buckthorns, cedar and dogwoods. The soils encountered in the fields were deeper and the subsoil consisted primarily of Martinsburg Shale in the sand to small gravel
range. Bedrock is Ordovician dolostone which is a form of altered limestone containing magnesium and can be found as outcrops in the wooded area. The woods consist of mature secondary growth of red oak and maples with a few ash, black cherry, hickory and apple trees. Overall the vegetation on the hilltop is of recent origin, within the last century.

Past Geological Setting

The landscape which is now found in Orange County, New York has formed as a result of thousands of years of geological activity. The overall landscape of New York has been modified by a number of glacial episodes with the last occurring roughly 20,000 years ago. Much of southern New York would have been covered by the Wisconsin glacier. At one point in time glacial ice extended as far south and east as the current Atlantic Ocean islands of Long Island, Nantucket and Martha’s Vineyards. Eventually, as the glacier receded, the Champlain Sea formed over present day upstate New York and the St. Lawrence River valley. At other times, large lakes formed over parts of New York including Lake Iroquois, Lake Albany and Lake Hudson. The study of prehistoric pollen indicates that the initial environment was a tundra or park tundra setting with spruce, pine, and birch trees mixed with grass, sedges and herbs. The environment gradually changed as conifers of spruce, fir and pine began to replace the tundra plants. A third succession series was marked by a dominance of pine trees before it too gave way to a deciduous forest of oak, hickory and hemlock trees that developed as post-glacial annual temperatures increased. Within the Wallkill Valley, there is evidence for at least six glacial recessional moraines (Connally & Sirkin 1970). Moraines are distinct ridges of boulders, gravel, sand and clays which formed from the outwash deposits from melting glacial water. The formation of the fourth Wallkill moraine blocked water from melting ice and formed the first of several large lakes in the Wallkill Valley. Peat and marl samples indicated that post glacial lakes formed in the Wallkill Valley at 500 feet, 400 feet, 230 feet and 200 feet elevations above sea level (Connally & Sirkin 1970). The first lake formed at about 17,500 years B.P. and wave action from this lake created the basal deposits found in Dutchess Quarry Caves 1 and 8. This lake drained southward around areas of stagnant ice into the Delaware River valley. The level of this lake gradually receded and a 400 feet contour lake formed as the glacier retreated north into the Hudson Highlands. The final stage of the lakes occurred as the glacier receded north of the Marlboro Mountains and the 230 feet contour lake was drained to the north by Rondout Creek. As the glacier finally retreated out of the Wallkill Valley, the area was flooded by water and sediment from Glacial Lake Albany with this inundation reaching the 200 feet contour. The organically rich peat soils of the Black Dirt area formed from 15,887 to 13,600 years B.P. (Pretola & Freedman 2009: 4). As the level of Glacial Lake Wallkill lowered, predators began to utilize the caves on Mount Lookout as shelter. Radio carbon dates indicate that Native Americans began using the caves between 12,500 and 10,580 years B.P. (Steadman, Strafford & Funk 1997) and they continued to visit the caves into the late Woodland period.

Pleistocene Evidence in Orange County

Orange County also contains a great number of recorded and identified paleontological and archaeological sites. The distinction between these types of sites being that paleontological sites are the locations with prehistoric fauna remains; particularly mega faunal remains, which lack evidence of human cultural artifacts which archaeological sites contain. Mastodon and other
mega fauna skeletons have been found throughout New York and the surrounding region but by the 1950s it was apparent that Orange County had yielded as many of these sites as the remainder of the State combined (Ritchie 1994). This mega fauna included known extinct forms of bear, giant beaver, flat-headed peccary, fox, and horse as well as other species no longer found in New York including musk ox, caribou, moose, elk, bison and seals. Some of the largest of the Pleistocene era mega fauna were mastodons \((mammut americanum)\) which differed from mammoths \((mammutus primigenius)\) and modern elephants in their molar teeth and diet. Mastodons had pointed cusps on their molars for chopping and crushing coarser, primarily woody plants while mammoth molars were flat for chewing and grinding grasses.

The earliest historical account of the discovery of a mastodon tooth was reported near the Hudson Valley in 1705 while mastodon bones were reported on the Reverend Robert Annan farm near County in 1780. One of the more famous Orange County mastodon finds was the Walden site discovered in 1799 and may be the oldest mastodon site discovered in 1799 recovered remains (Levine 2009). The Walden site mastodon was excavated in 1801 and became famous through a painting of its recovery done by C W Peale in 1808 (see Figure 8). This skeleton is currently on display in the Hessisches Landesmuseum in Darmstadt Germany (Simpson & Tobien 1954). Other Orange County mastodons on public display include the Warren and Schaeffer skeletons in the American Museum of Natural History in New York City, the Otisville Mastodon at the Yale Peabody Museum in Cambridge, Massachusetts, the Kelly-Whitfield mastodon in the Senckenberg Museum in Frankfort, Germany and the Temple Hill mastodon in the New York State Museum in Albany (Levine 2009). The State Museum also preserves the remains of the Arborio mastodon which was uncovered in 1968 during the construction of Interstate 84. This skeleton was recovered due to the efforts of the IOCCNYSAA and produced a radio carbon date of 8050 B.C. +/- 160 years (Funk 1976: 212). This is a date which is comparable to the earliest Native American occupation in Dutchess Quarry Caves 1and 8. Also of note are the Monroe and Sugar Loaf mastodons which are both on display within Orange County. The Monroe mastodon was uncovered in 1952 and may be one of the most complete skeletons found, missing only a single toe. It is currently on display at the Old Village Museum in Monroe in the natural history building constructed specifically to house the skeleton. The Sugar Loaf mastodon was discovered in the Black Dirt region and excavated by the IOCCNYSAA in 1972 (Dumont & Ehlers 1973). The skeleton is currently on display at the Biology Department on the campus of SUNY Orange County Community College. Overall several hundred sites throughout Orange County have yielded mega faunal remains.

Until the recent discovery of a spear point and a 22,760 year old mastodon bone recovered by a clam digger of the coast of the Delmarva Peninsula, no direct evidence has been found between...
early humans and mastodons in the northeast United States, although that evidence has been found in other parts of the country. Single Clovis style fluted spear points have been found in association with mastodon bones in both Michigan and Illinois. Other evidence would include a mastodon bone recovered from the Manis site on the Olympia Peninsula in Washington State (Stewart 2011: 7). The bone was originally found in 1977 and believed to contain an ancient bone spear tip. Carbon 14 dating at the time provided a date of 14,000 years B.P. which was considered too old by most archaeologists. A reexamination of the bone by the University of Texas last year confirmed that the mastodon rib was 13,800 years old and a high resolution CT scan demonstrated that the object embedded in the rib was a projectile point made from mastodon bone. These finding support the interpretation that pre-Clovis Native Americans hunted or scavenged mastodons. In Vero Beach, Florida a carved bone was found in 2007 which has been Carbon 14 dated to 13,000 years B.P. (Picat 2009: 10). The image on the bone is a depiction of an elephant like creature, a mammoth or a mastodon, again indicating that early Native Americans coexisted with these massive Pleistocene mammals. Such evidence highlights the changing nature of archaeological interpretation and the need to preserve sites excavated in years past in order to reexamine them when new information becomes available. Our understanding of the past is not static but is continually being redefined.

**Past Cultural Setting**

Archaeologists usually define the prehistoric development and occupation of the Eastern United States in broad terms of human adaptation and climatic sequences. These periods began with the Paleo-Indian period by 13,000 to 10,000 years B.P., the Archaic periods consisting of the Early Archaic from 10,000 to 8,000 years B.P., the Middle Archaic from 8000 to 4500 years B.P. and the Late or Traditional Archaic from 4500 to 3200 years B.P. The Archaic periods were followed by the Woodland period which is also divided into the Early Woodland from 3200 to 2500 years B.P., the Middle Woodland from 2500 to 1100 years B.P. and the Late Woodland from 1100 to 450 years B.P. The Woodland period ended with the arrival of Europeans in the New World which is known as the Contact Period.

Archaeologists divide up periods in time by recognizing patterns. The time sequences are based on major climatic periods and on the ways humans utilized natural resources termed subsistence. The broad cultural patterns of subsistence are divided into three basic forms. Foragers are groups who exploit their environment by having a small population and by being mobile. They move with the seasons and with resources like large herds of animals in order to survive. Early foragers relied heavily on hunting in the Paleo-Indian and Early Archaic periods. The Paleo-Indian period had a colder more tundra like climate and foragers moved with herds of large animals including caribou, bison, elk, and deer. Based on archaeological evidence recovered to date, the earliest inhabitants appear to be large game hunters termed Paleo-Indians who inhabit a tundra like environment starting around 17,000 years before the present. Most Paleo-Indian or fluted point sites represent small bands of hunters and gathers. In the western United States, these tools were found at the kill sites of large prehistoric mammals including mammoths, mastodons and an extinct form of large bison. “In the East, direct association with megafauna are generally absent, although the bones of caribou (Rangifer tarandus) dating to 12,500 B.P. have been found with a fluted point in the Dutches Quarry Cave…” (Mounier 2003: 18). These bands utilized more than just large mammals for food. Eastern Paleo-Indian sites have produced evidence
of fish bones, Hawthorne seeds and acorns (Stanzeski 1998: 45). The mobility of these groups is reinforced by the raw material they used to make their lithic artifacts which included lithics from other regions of the eastern United States. The Paleo-Indian landscape could best be described as ‘ranges’ not territories (Funk 1976) with the human populations following large grazing herds. The tool kit of these Paleo-Indians included lithic scrapers, knives and perforators and many other items made from perishable material like bone and wood which does not survive in most archaeological deposits (Mounier 2003: 19).

The Archaic period was marked by a gradual warming of the climate and by an increase in the diversity of exploited plants and animals. During the Middle Archaic foragers remained dispersed on the landscape but gradually developed more complex tools and slowly become less mobile. Foragers of the Late Archaic and Early Woodland became more sedentary and concentrate on the exploitation of resources in a smaller geographic area. By the Middle and Late Woodland periods, the climate and landscape is similar to modern times and horticulture becomes important. Horticulturalists begin to manipulate resources around them by assisting useful species. They may harvest the smaller seeds from grasses allowing larger seeds to develop into next year’s crop. They may start fires to burn off the under growth to promote grasses or habitat for certain animals. In short, horticulturalists put more effort into exploiting their local environment, they can support a larger population, their social life is more organized and they become less mobile as a group. This period is also marked by the development of pottery and arrow technology.

The Late Woodland period includes the development of agriculturalists that modify their environment in more dramatic ways to increase production. They develop crops like maize or wheat and use animal labor to support crop growth. They dig the soil, they use fertilizers, they plant seeds, they irrigate fields, they harvest crops and they process and store food. Agriculturalists develop larger populations and more complex social organizations. Agricultural societies also out compete and displace the non-agricultural societies in which they come in contact. The Historic, Contact period is marked by the arrival of complex agriculturalists (Europeans) that dramatically change the environments and cultures they encounter.

**Paleo-Indian Sites in the New York Region**

Dutchess Quarry Caves 1 and 8 are key sites which have helped to redefine Paleo-Indian culture in the Eastern United States. At the time the fluted point was discovered in 1965, Dutchess Quarry Cave 1 was the oldest Paleo-Indian site east of the Mississippi River. Paleo-Indian sites are extremely important due to their age and the fact they represent a dramatically different climate and topography to present day New York. Most often these sites are clustered on landforms which represent ancient shorelines of ponds, lakes or seas (Ritchie 1964). Many more sites from this time period were flooded by rising sea levels in the post glacial period (Mounier 2003: 20).

Adding to the historical significance of Dutchess Quarry Caves is the role these and other eastern Paleo-Indian sites have played in changing archaeologists’ interpretation and understanding of this period in the last several decades. In the 1960s, when the Dutchess Quarry Cave 1 was discovered, Paleo-Indian or Clovis was thought to be western based culture. Archaeologists have
now found as many Clovis sites east of the Mississippi River as there are to the west (Malakoff 2008). It is now known that Eastern sites tend to be larger in terms of the numbers of artifacts found than western sites but yielded fewer intact cultural deposits. Also at the time Dutchess Quarry Cave 1 was discovered, most archaeologists considered the culture which made fluted points, term Clovis after the first site identified in New Mexico in the 1930s, to be the earliest inhabitants in the New World. This interpretation has been challenged in the last several decades as better scientific techniques have been developed and as older cultural deposits have been located (Lunday 2011). Deposits which may pre-date Clovis have been reported at sites like Meadowcroft Rock Shelter in Pennsylvania, Cactus Hill in Virginia, Gault in Texas and Monte Verde in Chile. Within the past two years Dennis Stanford and Darren Lowry with the Smithsonian Institution have reported the discovery of a 22,760 BP mastodon bone recovered of the coast of Virginia by a clam dredge. The dredge also pulled up a lithic spear point making it potentially the oldest recovered artifact in the New World. This could also be the first evidence linking Native Americans and mastodons in the northeastern United States. In many ways, these changes in interpretation and understanding of the past highlight the scientific inquiry of archaeology and the crucial importance of preserving archaeological sites for future researchers to study and interpret.

Comparable Paleo-Indian sites have been found and studied in the Hudson River Valley and in western New York along the Niagara Frontier, as well as in the Delaware Valley just to the south of Dutchess Quarry Caves in New Jersey. To the north in the Hudson River valley are a number of Paleo-Indian sites including West Athens and Kings Road located in Greene County. West Athens is a large Paleo-Indian quarry site which occupies a rocky knoll two miles west of the Hudson River. On the knoll, the site sits within a small depression not far from exposed ridges of Normanskill shale. The projectile points from this site were made from a gray to green colored flint (Ritchie 1994). The site yielded thirty eight fluted points and over two hundred bifaces yet no hearths or bone material due to acidic soils (Funk 1976: 205). Like Dutchess Quarry Caves site, the West Athens quarry site has been listed on the National Register of Historic Places. The King’s Road site may be the earliest quarry site in New York and was discovered in 1966 roughly two miles west of the Hudson River. The site is unusual for in addition to the local lithics the site contained red, yellow and brown jasper from eastern Pennsylvania, Onondaga flint from western New York and eastern Ontario, and Flint Ridge chalcedony from Ohio. The site reflects the mobility and long distance trade of Paleo-Indian populations (Ritchie 1994). Unfortunately all of the cultural artifacts were restricted to the plow zone (Funk 1976: 205) and no intact cultural deposits were found. Another example of a Hudson Valley Paleo-Indian site is Port Mobil discovered on Staten Island in the 1960s (Ritchie 1994). While the site yielded Cumberland style points similar to Dutchess Quarry Caves, most of the Port Mobil points were made from Pennsylvania jasper rather than local cherts. In addition, most if not all of this site was destroyed by industrial development. The Niagara Frontier Paleo-Indian sites in western New York include the Arc, Hiscock and Lamb sites found in Genesee County in the 1970s. All three sites appear to be transitional campsites which originally were located on the edges of prehistoric wetlands (Gramley 1999). The Hiscock site has also yielded the remains of at least twenty individual mastodons and represents the largest single collection in the northeastern United States (Funk 2004). Within New York, only three Paleo-Indian sites have produced datable organic subsistence remains to provide clues to the diet of these people. The sites are the Arch, Hiscock and Dutchess Quarry Caves 1 and 8 (Funk 2004: 117).
Paleo-Indian sites in New Jersey include the Zierdt site in neighboring Sussex County. This site has yielded fluted points and is located on a high sandy terrace above a small stream which feeds into the Delaware River (Mounier 2003: 194). The Plenge site and the Fairy Hole Rock Shelter are two additional sites found just southwest of Orange County in Warren County, New Jersey. The Plenge site has produced the largest number of fluted points (120) of any site in New Jersey (Mounier 2003). Unfortunately archaeological testing of this site has determined that all of the Paleo-Indian materials are found in the plow zone and no intact living surfaces or features appear to remain at the site. The Fairy Hole Rock Shelter is the only site in New Jersey which has produced a possible association between fluted points and one tooth from the extinct giant beaver (castoroides) (Mounier 2003: 18), although this association has been questioned by other archaeologists. A number of small Paleo-Indian sites are still being found in New Jersey near the Atlantic coast and include the BJ Site found in Ocean County and the Indian Acres Tree Farm site near Medford in Burlington County. An unknown number of very earlier Paleo-Indian sites are now submerged on the continental shelf. This land form was above sea level during the last glacial period and then became submerged with rising sea levels at the end of the Ice Age.

Figure 9 - Map of the Goshen area of Orange County depicting areas of archaeological sensitivity and historic resources, image from the New York State Office of Parks, Recreation and Historic Preservation website.
Prehistoric Sites in Orange County

Most of Orange County is considered archaeologically sensitive with a high probability for archaeological sites (see Figure 9). The New York State Museum has site files for 329 sites in Orange County while the State Historic Preservation Office (SHPO) lists 1259. The SHPO total is larger for several reasons including more recent discoveries through state and federal projects, more historic period and industrial sites and the possible duplication of some sites recorded by the Museum. Of the recorded sites, the SHPO list no Paleo-Indian sites, probably because these are listed as multi-component sites, while the Museum lists three: Dutchess Quarry Caves, Hallock and Zappavigna. Both Hallock and Zappavigna are open air sites located on low rolling terrain outside of the Black Dirt region, not far from the Wallkill River (Funk 2004). Both sites are also similar to Dutchess Quarry Caves with the majority of recovered lithics consisting of high quality local chert. The Zappavigna site is located in the crest of a ridge next to an amphitheater like depression; Dr. Funk (2004) speculated that the site was occupied as a camp to hunt caribou and other game in a spot that was sheltered from winter winds and weather. Within the County, the numerous open air camps and resource procurement sites are mainly found at or near 400 feet above sea level elevations. In addition to open air camp or habitation sites, the Wallkill Valley contains a large number of prehistoric quarry sites above 420 feet above sea level and “…a wealth of rock shelter sites…” (Henry 2009: 3-5). The SHPO lists 3 caves and 37 rock shelters in their files and the State Museum recorded 62 rock shelters in the County. Surface collections in the region occasionally contain some fluted points and usually numerous projectile points typical of the Late Archaic Period (Henry 2009). Near Fort Montgomery, recorded sites include Fisherman’s rock house (wpt18) which contained Middle Woodland pottery, smoking pipes and faunal remains including deer and sturgeon bones. Also the River Bank rock shelter (wpt 16) and the Denniston (wpt22) sites containing late Woodland pottery (Funk 1976: 175-176). A number of Late Woodland to Contact period sites have been found along the Hudson River including O’Rourke burial site (NYSM 562) and the Nicoll Farm site (NYSM 561). Nicoll farm has yielded Paleo-Indian through Woodland projectile points and excavations at the site uncovered three Middle to Late Woodland period pits containing fire cracked rocks, charcoal and the remains of deer, turtle, fish, mussels and hickory nuts (Funk 1976: 179). Refuse pits excavated at the O’Rourke site contained prehistoric artifacts like lithic tools and pottery, and historic artifacts including knives, coins and kaolin pipe stems (Funk 1976: 180). The Dead Dog Rock shelter was tested by Dr. Kopper from 1982 through 1984 and contained Archaic period features and Woodland pottery. Also a large number of rock shelter sites were excavated by James Burggraf within the Bear Mountain State Park (Funk 1976: 173). Some of this material is on display at the Trailside Museum and Zoo within the park. The IOCCNYSSAA conducted excavations for a number of years on the Hansen Rock Shelter site near the town of Minisk. This mainly Woodland site has produced the largest amount of prehistoric pottery of any site in the County. Also near the town, flotation sampling at the Minisk Historic site led to the discovery of 1650 year old beads made from fossil crinoids. These represent some of the earliest beads recovered in the State. Surface collections of archaeological sites within the County, especially in the Black Dirt area, have produced large numbers of mortars and pestles indicating the development of farming by the Late Woodland period. The Old Village Museum in Monroe has a large collection of these ground stone tools, mostly in storage. The Black Dirt region has also yielded some very large (two handed) bifacial blades which may have been used as hoes or digging tools to cut through the dense wetland soils (Doug Mackey, personal communications). One example is on display in
the lobby of the Old County Courthouse. In addition to these sites, the State Museum lists 10 prehistoric quarry sites in the County while the SHPO office records 22, with at least six of these from the historic period. All of these finds and resources together highlight the need for additional research and preservation of archaeological sites within Orange County.

Past Research at Dutchess Quarry Caves

The locations of caves on Lookout Mountain were known to local residents by the beginning of the 20th century. Local residents reported that a large ‘Indian’ cave was removed during the quarry operations in the 1930s (Funk & Steadman 1994: 9). The location of Dutchess Quarry Cave 1 was known locally by this time and was being visited by Boy Scouts on a regular basis in the 1940s and 1950s (Hartgen et al 1992: 7). The first archaeological investigation of the Cave 1 site began in the 1960s by George Walters and William Ehlers (see Figure 10 & 11) of the Incorporated Orange County Chapter of the New York State Archeological Society. Walters and Ehlers uncovered cultural material in 1964 which lead to extensive excavations in Dutchess Quarry Cave 1 (NYS OPRHP #A017.06.00002) between the spring of 1965 and the spring of 1967. The work was carried out mostly near the entrance of the cave by a large group of professional and avocational archaeologists and was complicated by numerous rock falls and subtle stratigraphic changes. Their efforts determined that the Cave deposits represented intermittent human occupations spanning over...
The cave is a solution cavity in the dolomite cliff (see Figure 12) approximately seventeen feet wide and extending sixty-five feet into the cliff (Funk 1976: 206). Excavations encountered three cultural strata within the cave over top of a sterile late-glacial deposit (see Figure 13). Stratum 1A was a dark lens that contained Late Woodland artifacts while stratum 1B was light brown in color and contained Middle to Late Archaic artifacts and features (Funk 1976: 206). Stratum 2 consisted of white cave earth which contained Archaic points, deer, elk and rodent remains at the top of the strata and yielded a Cumberland style fluted point made from Kalkberg flint (see Figure 4, page 10) near the bottom, possibly in association with caribou bones with a radiocarbon date of 10,580 B.C. +/- 370 years (Funk, Walters and Ehlers 1969; Funk 1976; Hartgen et al 1992). Funk (1976: 206) believed that some of the caribou bones exhibited signs for marrow extraction. The Orange County Chapter continued to test deposits deeper into the cave through 1980 (Funk & Steadman 1994). In addition to the Paleo-Indian strata in the cave, the other stratified cultural deposits yielded projectile points including broad side-notched Laurentian like points from the Late Archaic (ca. 4000 B.C.), a side notched Normanskill like point from the Late Archaic (ca. 2000-1500 B.C.), an Adena point from the Early Woodland (500 B.C.-0 A.D.) and triangular Levanna like points from the Late Woodland (800-1300 A.D.). Eleven bone samples from lime breccia deposits in the cave have provided C14 dates ranging from 17,030 to 13,430 years B.P. for the oldest deposit in the cave. The bone samples included caribou (rangifer tarandus), flat head peccary (platygonus compressus) and giant beaver (castroroides ohiensis) (Funk & Steadman 1994). The result of this efforts lead to the listing of Dutchess Quarry Cave 1 on the National Register of Historic Places in January 1974 (NR#74001289).

Shortly after the site’s listing on the National Register, Dr. J. S. Kopper of C.W. Post College in New York City began to do research at the site. Dr. Kopper led his students in extensive testing along and below the southwest facing escarpment (Funk & Steadman 1994; Hartgen et al 1992) in an effort to locate additional cultural deposits outside of Cave 1. Unfortunately, much of his data was subsequently lost after his sudden death in 1984. The information that has survived is based on his published work and unpublished papers he left with the Incorporated Orange County Chapter of NYSAA. Dr. Kopper experimented with a...
number of methods to explore the escarpment of Mount Lookout ranging from physically following horizons on the rock face, to the use of electrical resistivity survey of the hillside. From the physical method, he was able to locate Dutchess Quarry Cave 2 (see Figure 14), a rock shelter southwest of Dutchess Quarry Cave 1 which contained charcoal, a cobble hammer stone and flint flakes but no additional Paleo-Indian artifacts (Hartgen et al 1992). Dr. Kopper noted that the rock shelter height was very low, only about 45 centimeters or 18 inches (see Figure 15), and the cultural material was probably secondary refuse. Drs. Funk and Steadman (1994: 62) believed that Dutchess Quarry Cave 2 may contain buried prehistoric living surfaces in part of the cave covered by collapsed ceiling boulders but they considered the area too unstable for testing at that time.

Dr. Kopper conducted the electrical resistivity survey in 1974 and located seven anomalies (see Figure 16) which he interpreted as possible buried chambers. Excavations were conducted between 1975 and 1978 to test these anomalies and at several of the locations Dr. Kopper failed to unearth buried chambers. Chambers were located at Dutchess Quarry Caves 3, 4, 5 and 6 but none of the caves contained clear evidence of human habitation. The exact locations of these caves are not known due to the loss of Dr. Kopper’s original data (Hartgen et al 1992). One anomaly designated Dutchess Quarry Cave 7 (see Figure 17) was
found adjacent to Dutchess Quarry Cave 1 and explored by Dr. Kopper in 1977. Although Dr. Kopper did not find ‘unambiguous’ evidence of cultural material, his considered charcoal flecking and bone fragments within the calcite breccia sealing and lining the cave to be evidence of human use (Hartgen et al 1992: 8).

The most significant finding by Dr. Kopper was his work in Dutchess Quarry Cave 8 from 1979 through 1981 (see Figure 18). Dutchess Quarry Cave 8 (NYS OPRHP A071.06.00090) is located northeast of Dutchess Quarry Cave 1 and was one of the seven anomalies recorded in 1974. The cave yielded cultural material from the Paleo-Indian and Archaic periods including one fluted point and four fluted point fragments (see Figure 19). Three of the points appear to have been made from local chert and two of the points were made from Pennsylvania jasper. The cultural deposits appear to have been sealed off by talus and travertine about 4000 years ago (Kopper et. al. 1980). A caribou radius was also found within the cave’s deposits. Charcoal and breccia on the cave walls provided dates of 3930 B.C. +/- 340 years, 5270 B.P. +/- 410 years, 6480 B.P. +/- 90 years and 8290 B.P. +/- 100 years. The collection recovered by Dr. Kopper from Dutchess Quarry Cave 8 was donated to the New York State Museum in 1980. Some additional samples of refuse bone and charcoal was retrieved from other researchers and given to Dr. Steadman in 1987 (Funk & Steadman 1994). Dr. Kopper’s last research from 1982 through 1984 was centered on the testing of other rock shelter sites in the Walkill valley region. Despite this effort, no definitive Paleo-Indian cultural deposits were discovered.

Additional research was conducted at the Dutchess Quarry Caves site by Dr. Robert Funk, state archaeologist, and Dr. David W Steadman, biologist, both with the New York State Museum from 1986 through 1989. Their archeological and paleontolog-
ical investigations were again supported and assisted by the Incorporated Orange County Chapter of the NYSAA. Samples of the calcite breccia lining the walls of Dutchess Quarry Cave 8 examined by Dr. Steadman contained chert flakes, plant material, charcoal and bones from both extant and extinct species. Some of these faunal remains were deposited naturally or by predators while others were likely deposits by human activity. In 1988, Drs. Funk and Steadman reopened and expanded Dr. Kopper’s excavation in Dutchess Quarry Cave 8 (see Figures 20 & 21). This research clarified the stratigraphy and yielded another fluted point from Stratum 4, which had previously been radio-carbon dated to 8290 B.P. +/- 100 years (Funk & Steadman 1994). Dr. Steadman located two additional buried anomalies using ground penetrating radar in 1987, but excavations at Dutchess Quarry Cave 9 and Cave 10 in 1989 failed to uncover buried cave chambers. That field season, they also tested the benches outside of Dutchess Quarry Cave 1 and Dutchess Quarry Cave 8 without finding any cultural deposits.

The most recent archaeological investigation at the County’s property occurred in 1991 and 1992 with a research project required by Mined Land Reclamation Permit (NYS DEC #3-33307/2-0) for the Dutchess Quarry and Supply Company. The investigation was conducted by Hartgen Archaeological Associates (1992) and included terrain conductivity and VLF electromagnetic survey on areas of Mount Lookout adjacent to the Dutchess Quarry Caves site by Dunn GeoScience Corporation. Hartgen conducted a Phase I and II archaeological survey which consisted of detailed mapping, controlled surface collecting, shovel testing and test trenching in the study area. Their efforts located five additional prehistoric activity areas on eight acres east of the cave locations.
Hartgen Archaeological Associates (1992:4) employed several data recovery methods to test approximately 8 acres of Mount Lookout (see Figure 22) which were slated for quarry operation expansion. Within a 4 acres area of open field, referred to locally as the Alpine Meadow, the landscape was first plowed, divided into 10 meter grid units and then surface collected. Areas of artifact concentrations were then shovel tested and excavated, eventual with backhoe trenches in an effort to located intact cultural deposits; one prehistoric locus was discovered in the field. In the wooded 4 acre hill top shovel tests and test trenches were used as well as geophysical exploration above the escarpment.

Their research provided new evidence that Mount Lookout was important to Native American procurement of lithic resources in addition to the rich flora and fauna of the Black Dirt area to the south. Both Locus 1 found in the open field and Locus 4 found in the woods, were interpreted as small chert workshops. Most of the artifacts recovered consisted of hammer stones or hammer stone fragments used to work the chert. Locus 1 appears to date from the Transitional Stage between the Late Archaic and the Early Woodland periods circa 1000 B.C. (Hartgen et. al. 1992: 51) (see Figures 23). Loci 2, 3 and 5 were found in the woods and appear to consist of prehistoric chert prospecting and mining locations (Hartgen et. al. 1992: 4-5). The chert consisted of Beaver Run and Halcyn Lake/ Balmville types. Their research demonstrated that prehistoric miners explored and tested the area, essential lithic prospecting, to locate usable deposits of chert. Of the five loci (NYS OPRHP #A071.06.00089) tested, only Locus 1 lacked archaeological integrity due the later agricultural activities including plowing. Based on Hartgens’ research the National Register boundaries of the site were expanded in 1995 and all three caves containing cultural deposits were added to the register as the Dutchess Quarry Sites National Register District (NR#97000512).

Dunn Corporation conducted two surveys with different types of terrain conductivity sensing equipment and one survey with very low frequency electromagnetic instrument. No new anomalies were encountered but the surveys

Figure 22 - Map of the proposed quarry expansion in 1990, image from Hartgen 1994: 3.

Figure 23 - Lithic artifacts recovered from Loci 1, image from Hartgen 1994: 35.
tended to confirm the prior electrical resistivity work by Dr. Kopper and the ground penetrating radar study done by Dr. Funk and Steadman (Hartgen e. al. 1992: 92).

As stated by Hartgen Archaeological Associates, “…with the exception of the Dead Dog Rock shelter, 750 meters south of Dutchess Quarry Cave 1, the Dutchess Quarry Caves remain unique among prehistoric sites in the vicinity…”(Hartgen et. al.1992: 8) with a sequence of stratified cultural deposits. Despite intensive testing, no other caves or rock shelters have yield Paleo-Indian cultural deposits. There are numerous open air prehistoric sites in the region but these are primarily Archaic period sites with a few scattered Paleo-Indian projectile points. The adjacent Black Dirt region has recorded Pleistocene mammal remain but has not yielded intact Paleo-Indian cultural deposits. The Black Dirt region appears to have been heavily exploited in the Middle to Late Woodland periods. The 13 acres national register district contains significant research potential even though most of the cultural deposits in Caves 1 and 8 have been removed. The calcite breccia deposits in Cave 8 (see Figure 24) still contained fossil evidence from the late Pleistocene through the early Holocene. The bench area and escarpment still has the potential for additional caves, rock shelters and cultural deposits. The limited surface collecting and testing conducted by Hargten Archaeological Associates was done intentionally to leave as much cultural material from Loci 2 through 5 (see Figure 25) as undisturbed as possible for future research (Costella 1994: 5). This area retains a high level of archaeological integrity. The District remains historical significant for a number of reasons. First, the knowledge that past excavations at the caves has provided to North American archaeology and our understanding of the post-Pleistocene environment in the Northeast (Hartgen et. al. 1992: 114). Second the surviving association between the caves, the escarpment and the food resource rich wetland of the Black Dirt region with its easy to understand utilization by prehistoric peoples. There are few other examples of landscapes that retain this association between past resources and human occupation. Most have been destroyed by time and historic settlement or industrial activities. In addition, the National Park Service’s Earliest Americans Theme Study includes Dutchess Quarry Caves as sites considered to have the potential for National Historic Landmark status (Seibert 1992: Table 17).

By the late 1990s, Drs. Funk and Steadman (Steadman, Stafford & Funk 1997) began to question their interpretation about the association of the caribou bones at the base of Stratum 2 and the
Cumberland style projectile point found slightly higher in the stratum. They considered the flut-ed point to have been deposited later in time than and not as old as the caribou bones. Even this unresolved issue did not diminish their belief in the significance contributions that Dutchess Quarry Cave sites have made to our understanding of archaeology. The Dutchess Quarry Cave sites are the only Paleo-Indian sites in eastern New York which have produced datable subsistence remains from this time period (Funk 2004). Cave 1 has provided evidence of 25 mammal, 8 bird, 4 reptile, 2 amphibian and 3 fish species utilized by early Native Americans (Rennenkampf 1973; 3). Dutchess Quarry Cave 1 continues to be the only known locations in the state of New York with evidence for the entire period of human occupation of the Northeastern United States from the Pleistocene through historic times (Funk & Steadman 1994: 55).

Figure 25 - Map of the prehistoric quarry activity areas (loci) on Mount Lookout, image from Hartgen 1994: 110.
The following list highlights a myriad of reasons why Dutchess Quarry Sites National Register District is Nationally Significant:

- Caves 1 and 8 have made significant contributions to understanding and interpretation of the prehistory of the northeastern United States.
- Evidence from the caves has made significant contributions to the development of regional settlement models.
- Caves 1 and 8 have made significant contributions to understanding and interpretation of the post-Pleistocene environment in the northeastern United States.
- Cave 1 remains the only known New York site which yielded a sequence of occupation covering the entire prehistoric period from the Paleo-Indian through the Late Woodland.
- Caves 1 and 8 are the only sites in eastern New York and one of only three locations in the entire state that have yielded datable Paleo-Indian subsistence remains.
- Caves 1 and 8 are the only cave or rock shelter sites in New York with confirmed in-situ flut ed points.
- Caves 1 and 8 are the only sites in eastern New York that have yielded evidence of Paleo-Indian exploitation of post-Pleistocene fauna including possibly caribou.
- Due to collapsed talus which sealed the cultural deposits in Cave 8 approximately 4000 years ago, the cave has provided invaluable information on human adaptation to changing conditions from the late Pleistocene through the early Holocene periods.
- The District has made significant contributions to the understanding of Native American lithic procurement by providing physical evidence of a continuum from initial prospecting, to lithic extraction, through lithic reduction and to final utilization as tool making.
- The District contains evidence of the direct association of lithic tools found in Cave 1, occupation, with the in-situ scalloped chert beds uncovered at Loci 3, procurement.
- The District and the surrounding region retain the surviving landscape and physical evidence of Native American resource exploitation in a setting that provides a rare opportunity for visitors to experience and understand that association between the caves, escarpment, chert quarries and the resource rich Black Dirt region.
- The District is eligible for National Historic Landmark status.
II. **Approaches to Conservation at DQS-NRD**

In recent years both professional and avocational archaeologists have begun to accept that the stewardship of archaeological sites is an important responsibility of the profession (Lynott & Wylie 1995). Due to the fragile nature of archaeological deposits and sites, also termed the archaeological record, these sites should be treated as a public trust. Due to the finite nature of archaeological resources (NYS OPRHP 2009: 50), every effort should be made to protect and preserve these valuable cultural resources. The Society for American Archaeology which is the largest organization of professional archaeologists working in the Americas and with a mission to promote research, public and professional education and archaeological ethics, considers its long standing principles of archaeological ethics to include stewardship, which is defined as the long term conservation and preservation of the archaeological record. The archaeological record consists of more than just the artifacts left by past cultures. It includes the cultural deposits in which artifacts and faunal remains are found. The archaeological record also includes all the data and records archaeologist collect when they excavate a site. It is crucial that this information be recorded and retained for future researchers or else much of the evidence for past human activities would be lost.

Understanding and knowledge of past cultures does not come from a single, isolated object; but is derived from interpreting the context in which the object is found. The understanding of this responsibility has led to a philosophy termed Conservation Archaeology (Lipe 1974). This is a deliberate philosophy to limit excavations in order to preserve buried material for the future when improved research techniques and approaches may provide an even better understanding these resources. Conservation Archaeology also promotes the scientific value of archaeological resources, the importance of keeping exact records during excavations, and to discourage artifact collecting for personal gain. Conservation of archaeological sites is essential for “…once destroyed historic and archaeological sites cannot be replaced…” (NYS DEC & OPRHP 2009: 49). Conservation of the Dutchess Quarry Sites National Register District is warranted since the District is of national significance for a number of reasons, not the least of which is the surviving landscape and physical evidence of Native American resource exploitation that provides a rare setting for visitors to experience and understand that association between the caves, escarpment, chert quarries and the resource rich Black Dirt region. In addition, the site’s eligibility for designation as a National Historic Landmark reinforces the need to conserve and further protect this significant County resource.

The location of Mount Lookout appears on historic maps starting as early as 1779. The land on which the Dutchess Quarry Sites National Register District lies was originally part of the County poor farm. The area appears to have been owned by the County as early as 1839 when the designation ‘Poor House’ appears on the Burr map (Hartgen et. al. 1992: 9) and the area continues to be labeled the County Farm on maps into the 20th century. By 1850 a small settlement had developed at the location of present day Routes 6 and 17A which contained two blacksmith shops, a tavern, and several houses. The current roads which circle Mount Lookout included a number of 19th century farms and house sites most of which were removed by the mid-20th century. The Poor House or County Farm had a variable number of buildings during the 19th century and may have had its own railroad station by 1903. The historic Orange Farms cemetery located along Quarry Road (aka Orange Farm Road) to the west of the Dutchess Quarry Sites National Regis-
The Dutchess Quarry Sites National Register District is located on County Tax Map Parcel 20-1-10.21 which consists of 101 acres. This parcel occupies land on both sides of Quarry Road and also contains a large water tank structure and an unoccupied early 20\textsuperscript{th} century house, number 13 Quarry Road. All of the land west of State Route 17A, north and west of Quarry Road and Orange Farm Road (County Route 68) and south of the Pulaski Highway (County Route 6) is currently zoned for commercial and office mixed use (see Figure 26). The County began its own quarry operation at the base of Mount Lookout in the 1920s to provide gravel for road construction. Eventually County officials decided that it would be more cost efficient to lease the quarry and to just purchase gravel ballast. Since 1938, the County has leased 55 acre to the Dutchess Quarry and Supply Company. The County seriously considered selling the parcel containing the Caves to the quarry company around 1990, but ended up rejecting that idea due to public opposition.

In terms of Orange County’s ownership and stewardship of the Dutchess Quarry Sites National Register District, it is important to note that there have been a number of positive achievements. One of the most notable achievements is that the County allowed professional and scientific archaeological investigations of the caves starting in the 1960s. It was the County that allowed the Incorporated Orange County Chapter of the New York State Archaeological Association, under the supervision of Dr. Funk, to excavate Cave 1 from 1964 through 1974. It was the County that permitted Dr. Kopper to conduct research on the property from 1974 to 1981 leading to the discovery of Cave 8. It was the County that allowed Drs. Steadman and Funk to continue excavations from 1986 to 1989 and working with the NYS Department of Environmental Conservation that supported the 1991 investigations by Hergarten Archaeological Associates and Dunn Corporation leading to the discoveries of prehistoric
quarry Loci 1 through 5. Although some of the documentation of these research projects has been lost due to the untimely death of Dr. Kopper, each phase of research was done with the best, scientific methods available at the time.

One cannot stress enough that this research has greatly added to North American archaeology and has been a cultural benefit to all New York State residents. The County permitted Dutchess Quarry Cave 1 to be listed with the National Register of Historic Places in 1974, highlighting its significant contributions to archaeology and to provide the site greater protection from federal and state projects. By 1990, the National Register status triggered an environmental review by the NYS Department of Environmental Conservation with the proposed expansion of Goshen Quarry. The County established a two acre preserve to protect Cave 1, and later the County Legislature agreed to a Mitigation / Avoidance plan in May 1993 which was developed by Dunn Corporation. The plan established a 13.2 acre Dutchess Quarry Sites National Register District, and a 1.1 acre buffer zone which was accepted by the National Park Service as the new National Register boundaries in 1995 to include Dutchess Quarry Cave 8 and the prehistoric quarries Loci 2 through 5 above the caves.

Most of these achievements were accomplished as a result of the initiative sparked by the local community. As noted by Hartgen (et. al. 1992: 113), “…preservation of the Dutchess Quarry Caves has…been dependent on … the stewardship of the Orange County Chapter of the N.Y.S.A.A. and the Dutchess Quarry and Supply Company.” While supporting the long term archaeological research of the property and the establishment of the DQS-NRD are major achievements, it is also apparent that the County’s stewardship of the District has not been the result of a carefully planned process. Going forward, the County has an opportunity to improve its stewardship of the DQS-NRD by developing a management plan possibly modeled after the example provided with this report and by establishing a management committee to oversee such a plan.

Today, Dutchess Quarry Sites National Register District contains 13.2 acres of land which occupies the western slope, the west facing escarpment and the ridge top of Mount Lookout. An initial step Orange County could take to enhance their stewardship of the DQS-NRD would be the development and implementation of a Management Plan for the District. While the adoption of a management plan for DQS-NRD would be an important step, it is one of several options available to the County which would expand their stewardship of the District. The County could also explore potential agreements such as Parkland designation, conservation easement or even National Historic Landmark status. The following is a discussion of the benefits of each possible type of agreement as well as a history of the County’s ownership of the District. In addition the final sections will look at the history and the issues arising from the operation of Goshen Quarry on Mount Lookout adjacent to the DQS-NRD. Each of these options or potential actions is presented with the ultimate focus on fundamente the conservation of this significant archaeological resource.

of Mount Lookout. The district includes eight known archaeological resources consisting of the stratified cultural deposits found in Dutchess Quarry Caves 1 and 8, secondary cultural deposits found in Caves 2 and 7, and five loci or areas of human activity designated Goshen Quarry Loci 2, 3, 4, and 5. Loci 2 and 5 consist of chert exploration. Loci 3 and 5 are evidence of chert ex-
traction areas with Locus 3 consisting of a sixty by seventy five foot area. This locus is a ‘scree’ or natural u-shaped depression which contains four subtle pits, chert debris, hammer stones and in situ scalloped areas on the walls of the chert bed. Three scrapers and two utilized flakes found in Cave 1 were made from the same chert material found in Locus 3. One of the scrapers was found in the Late Archaic deposit of Cave 1. Locus 4 consists of a small, eighteen foot radius lithic reduction area. Archaeological integrity remains high in most of the District with the exception on cultural deposits excavated from Caves 1 and 8 (Costella 1993: 5). Two other potential caves were located as anomalies by electrical resistivity (1974) and ground penetrating radar (1987) surveys, but testing in the 1980s failed to locate entrances. In addition to the land set aside for the district, the Dutchess Quarry and Supply Company Incorporated’s mined land and reclamation permit requires a 1.1 acre buffer zone along property leased to the Goshen Quarry.

Adoption of a Management Plan

The most effective tool that The Archaeological Conservancy, and other federal and state agencies such as the National Park Service and the Bureau for Land Management, has developed over many years of preserving archaeological sites is having a clear and concise Management Plan for the property containing important archaeological resources. A management plan provides the basis for effective policies to conserve and protect important archaeological deposits. Preservation of sites is crucial as “…archaeological sites require protection because of their religious, cultural, educational or historic values. They must be protected from disturbance when changes are made in the use of land and guarded against pilferage and unauthorized collecting…” (NYS Open Space and Conservation Plan 2009: 50).

A number of historical impacts have already altered and affected the archaeological integrity of Mount Lookout (see Figure 27). Some archaeological deposits within the caves, along the escarpment and the talus slope have been altered or removed by years of archaeological research. Other deposits have been impacted directly above the caves through clearing, grading and top soil removal by the modern quarry operation. The escarpment itself has been truncated by years of dolomite mining and the probable loss of cultural deposits within the existing modern quarry operation (Hargten et. al.)
Even though many of these activities occurred decades in the past, each helps to highlight the continuing vulnerability of the DQS-NRD and the potential threats to the District going forward. The best way to meet these threats is through a clear management plan to conserve these resources.

A cultural resource management plan for the Dutchess Quarry Sites National Register District could ensure that the district will be managed for future generations and that any future archaeological investigations will be conducted according to the highest standards of problem-oriented scientific research, in accordance with the Secretary of the Interior’s Standards and Guidelines for Archaeology and Historic Preservation. The Archaeological Conservancy manages all research preserves according to the principles of Conservation Archaeology, which mandates that parts of the preserve be saved for future generations, and research is welcomed but carefully controlled, disturbs only a small portion of the site, and all findings are published to maximize knowledge gained with as minimal damage as possible. A management plan should also insure the long term care of the District by addressing such issues as site security, access, documentation and mapping, stabilization, erosion control and groundcover, and public educational programs.

The plan can also establish a Management Committee to oversee the implementation of the management plan and as with the policies developed by The Archaeological Conservancy, uphold the Secretary of the Interior’s Standards for the Treatment of Historic Properties. The plan will consider such matters as stabilization, site security and protection, nondestructive use of the property, research, curation, access, and other issues relevant to prudent management and conservation for the public good. With the County’s adoption of a management plan for the Dutchess Quarry Sites National Register District, the County should establish a management committee to oversee and implement the plan. This committee should be responsible to the County Executive and County Legislature until such time as specific County Department would be given that authority. The County may decide that the management committee should serve as an advisory committee to the County Legislature and remain separate from other County agencies. A sample manage plan has been provided in the appendices of this report as a blueprint to work from and the components of this plan as they would relate to the DCS-NRD is provided in the following sections of this report.

**Agreements to Enhance Stewardship**

In addition to developing and implementing a management plan for Dutchess Quarry Sites National Register District, the County has several other potential options which could enhance the stewardship of this significant cultural resource. The New York State Office of Parks, Recreation and Historic Preservation recommends management agreements, conservation easements, deed covenants, permit conditions, or acquisition as ways to assure long term protection of archaeological resources (NYS Open Space and Conservation Plan 2009: 50). Acquisition is not necessary in this case since the District is not privately owned but is on land which has been in the County’s possession for over a century. Adding a deed covenant which would restrict mining and any development of the DQS-NRD should be considered if the County were to transfer fee simple ownership of this land to another organization or agency. The County could also consider entering into management agreements with other groups in the community to support the preser-
vation of the District. Developing a formal agreement with the IOCCNYSA to provide volunteers to help with the maintenance, protection and surveillance of the District is another possible option to explore. If the current lease between the County and Dutchess Quarry and Supply Company does not contain specific language to protect the integrity of the DQS-NRD, the County could consider the possibility of adding such language. If revising or modifying the lease agreement with the quarry company is not practical, the County may seek to have specific language added to the next NYS Department of Environmental Conservation permit for the quarry operation due for renewal in 2013. At the present, National Register listing provides for the assessment and mitigation of this cultural resource during the permit process but the County may request language to establish reclamation goals that improve and protect the DQS-NRD and which could enhance future visitation to the District.

**Parkland Designation**

In discussions with County Planning Commissioner David Church, he stated that one option municipalities in New York have available to protect natural and historic areas is to designate these resources as parklands. The County could add additional protection to the Dutchess Quarry Sites National Register District on Mount Lookout by designating the area a municipal park. This process would require a resolution by the County Legislature to dedicate the land for use as a park. Even without a formal resolution, municipally held property may become ‘implied’ parkland if there has been any intention or action to preserve the land for the public good (NYS OPRHP 2011). The County Legislature took action in 1990 to establish a 2.14 acre preserve to protect Cave 1 (see Figure 28) and in May 1993 accepted a larger 13.2 acre preserve as part of the Dutchess Quarry and Supply Company’s mined land and reclamation permit process (see Figure 1, page 6). These conservation actions may meet the definition of implied parkland. Parkland land status would protect the District from future development and any changes or restrictions to that use would require a review by the NYS OPRHP, their recommended action to the State Legislature and State Legislative action to alienate or convert this land’s use status.

**Conservation Easements**

Another option the County might pursue to further safeguard the Dutchess Quarry Sites National Register District is to consider deeding a conservation easement to the New York State Office of
Parks, Recreation and Historic Preservation (OPRHP). Even with the County’s ownership of the DQS-NRD, a preservation easement would afford DQS-NRD greater legal protection and would help ensure that future activities and research at the sites provide the greatest public good with the least adverse impacts. Even though DQS-NRD is listed on the National Register, the OPRHP current authority is only advisory to other State or Federal Agencies. For example, the OPRHP made recommendation during the Mining Reclamation Permit process for Goshen Quarry in 1991 through 1993 but it was the Department Environmental Conservation which was responsible for implementation. By deeding an easement, The OPRHP would be given the opportunity to review and comment on any archaeological research in the preserve or any other proposed changes in its use. A conservation easement would prohibit a number of uses within the preserve including commercial, industrial and residential, as well as from the dumping or storage of ashes, trash, waste, garbage, chemical waste and other hazardous materials. Of added importance to the DQS-NRD is the restrictions a conservation easement would provide against dredging, mining, excavation and filling which are serious threats considering the closeness of the district, less than two hundred feet, to the quarry’s operation.

**National Historic Landmark Designation**

Although National Historic Landmark Designation would not provide any added legal protection, it could enhance the preservation efforts of the Dutchess Quarry Sites National Register District greater protection. This status would afford the District greater recognition and make it eligible for state and federal grants, the Historic Preservation Fund, assistance from the National Park Service (NPS) technical preservation services and the NPS heritage tourism programs. The Landmark designation process would start with a letter of Inquiry to the NPS Northeast Regional office in Philadelphia, where the staff will evaluate the request and provide a nomination form if the District is deemed eligible. The cave sites were included in the National Landmark Theme study which evaluated the earliest Native American habitation sites in the eastern United States and which identified the caves as potentially eligible for NHL designation (Seibert 1992: Table 17). These earliest inhabitant sites are considered to be one of the most significant and threatened group of cultural resources. For DQS-NRD, the nomination could concentrate on Criteria 6 which evaluates properties that have yielded information of major scientific importance, shedding light upon periods of occupation over large areas of the United States and have yielded data affecting archaeological theories, concepts and ideas in a major way. The contributions to archaeology and the interpretation of the prehistory of the northeastern United States that DQS-NRD has made deserve repeating. Once again “…the area (District) has yielded data that has been a source of scientific debate and pivotal importance to our understanding of prehistory” (Costella 1993: 8). Information from the National Register nomination would need to be expanded to include a detail discussion of the District in comparison to other Paleo-Indian sites in the region as well as a detailed look at the ecofacts recovered from the caves and how these findings have help to interpret the late Pleistocene and early Holocene environments (see Funk 2004: Introduction). While the integrity of Caves 1 and 8 are low due to past excavations in the caves, the caves could still be eligible for NHL on Criteria 1 based on the role both have played in the history of archaeology in the northeastern United States. This section would detail the changing interpretation of the peopling of North American, the Clovis culture, and pre-Clovis evidence over the last fifty years and highlight the role Dutchess Quarry Caves has played in these interpretations and debates. Also, “…the relatively undisturbed nature of the caves area and edge of
the escarpment means that the sites may continue to yield data critical to our understanding of prehistoric subsistence, paleontology and paleo-environment.” (Costella 1993: 8). The District contains direct evidence of the association between lithic tools at an occupations site Cave 1, and the procurement site with the in-situ scalloped chert beds at Locus 3. The setting of the District is also unique as it retains “…readily understood pattern of prehistoric utilization…” (Costella 1993: 6) between the caves, escarpment, chert quarries and the resource rich Black Dirt region (see Figure 29). Each of these factors helps to define DQS-NRD as a National Historic Landmark.

**County Ownership**

One goal archaeologists and government agencies usually pursue in an effort to protect significant archaeological sites is to work to have these sites transferred from private to public ownership. Archaeological resources in the United States on private lands are subject to the whims of the owners. The Archaeological Conservancy was established because there was no systematic program to protect archaeological sites on private lands in the United States. Sites on public lands are subject to a number of federal and state preservation laws that provide limited protection. In the State of New York, all publicly held lands fall under the doctrine of ‘public trust’ (NYS OPRHP 2011) and all actions taken in regards to these properties must be done for the public good. In this case, Dutchess Quarry Sites National Register District has been in public ownership for more than a century and should remain in public trust. The County could implement additional safeguards for its long term protection. It is important that Dutchess Quarry Caves have already been listed on the National Register of Historic Places, but this is only one step in the site protection process. In terms of archaeological resources, “…listing on either the National or State Register provides only limited protection. Additional protection is needed through management agreements, conservation easements, deed covenants, permit conditions, or acquisition to assure long term protection…” (NYS Open Space and Conservation Plan 2009: 50). The common misconception is that listing on the National Register provides legal protections to a historic property. The listing can provide some economic benefits by insuring eligibility for tax breaks or grant opportunities, but federal law only requires that state or federal agencies evaluate and mitigate the potential impacts of their projects or issuing of permits may have on National Register eligible sites. It was the NYS Department of Environmental Conservation mining permit process that required Dutchess Quarry and Supply Company to conduct archeological testing in 1991 prior to any expansion of the quarry operation. The company had to evaluate and mitigate impacts to Cave 1 before DEC would allow any expansion of the quarry operation. Eventually the mine permit was modified to allow deeper extraction within the existing pit.

While the County has owned the land surrounding Mount Lookout for at least 170 years, the hilltop and the archaeological sites which it contains have always been secondary or residual land. The property was acquired by the County to serve as the Poor Farm a place to send indigent members of the community. These persons were to provide labor for the County in return for food. This system continued throughout the 19th century before portions of the farm were
developed by the County Departments of Public Health and Social Services during the 20th century. Mount Lookout remained secondary land used occasionally for logging and pasture before dolomite quarrying started in the 1930s. During this time period, the maintenance and protection of the hilltop area was never a major consideration of the County departments responsible for the overall properties. It is the County Planning Department which has initiated this management and conservation study. The land containing the Dutchess Quarry Sites National Register District has never been under the jurisdiction of a County department or agency with historic preservation as one of its designated roles and the County could consider making that assignment.

The County has two departments which have the specific role of preserving and maintaining the historic and cultural heritage of the County. The first is the Office of the County Historian headed by Cornelia Wendell Bush. The County Historian is to serve as the County’s Historic Preservation Officer and is tasked to collect and preserve materials relating to the County. In practice this has entailed collecting documents of a historical or genealogical nature. The past Historian did develop an exhibit on the Ice Age history of the region which was displayed in the Old Courthouse building. This exhibit has been dismantled and the large reproduction skull of the Warren Mastodon donated to the County is currently on display in the County Government Center (see Figure 30). The other old displays and exhibits will be loaned to the Old Village Museum in Monroe, according to Ms. Bush. The Historian’s Office is also tasked with coordinating the efforts of the numerous historic societies and organizations within the County. With this departments limited staff and due to the unique and park like setting of the Dutchess Quarry Sites National Register District it would be difficult for the County Historian’s office to meet the management needs of the property. It may be useful to have the County Historian serve on any committees established to oversee the District or to develop an interpretive center as discussed in a later section of this report.

The other department with the specific role of preserving and maintaining the historic and cultural heritage of the County is the Department of Parks and Recreation headed by Richard Rose. Parks and Recreation has a number of responsibilities which include the tasks of preserving open space and historic resources within the County (www.orangecountyny.parks.com). The department currently manages 3300 acres of Parkland which annually attract 800,000 visitors. The department is responsible for a number of different types of properties including a senior center, an equestrian area, an arboretum, recreational parks, athletic fields, ponds, and golf courses. Parks
and Recreation also manages the Brick House, the Hill-Hold, Neversink and Farmer’s museums as well as the National Register of Historic Places listed Algonquin Park and the National Historic Landmark designated D & H Canal Park. In the case of Algonquin Park and D & H Canal parks, Commissioner Rose stated that the department has no formal policy or procedures in place to manage these significant cultural resources. Of the museum properties, two are run by the department while several are managed by non-profit ‘Friends’ organizations and one is operated by a completely separate organization. In addition, the department also recently opened the eleven mile long Heritage Trail bike and hiking path which passes through the communities of Monroe, Chester and Goshen, two miles north of the District. On paper, the Department of Parks and Recreation would be the most likely candidate to manage Dutchess Quarry Sites National Register District, even though this department would still need experienced consultation to effectively manage such a significant and unique cultural resource.

Parks and Recreation Commissioner Richard Rose also indicated that the County currently owns a number of properties which have been acquired as open space. These parcels are not under the authority of Parks and Recreation but are managed by the County Executive and the County Legislature. If the administration of Dutchess Quarry Sites National Register District were to continue under the more general control of the County Executive and Legislature, it would be recommended that a management committee, as discussed above, be empowered to administer the site.

**Working with the Dutchess Quarry and Supply Company**

The connection between Orange County and the Dutchess Quarry and Supply Company has had a long and sometimes contentious history. Dutchess Quarry and Supply Company which owns two other quarries in Dutchess County, operates the Goshen Quarry (NYS DEC Mine 30034) on 49.6 acres of land (Tax Parcel 18-1-47.22). The company leased this land prior to acquiring the ‘quarry lot of Durland farm’ in October 1982 and since 1938 has leased an adjacent 55 acres from Orange County. The quarry is one of six active quarries in the County larger than thirty acres each. The company also owns an additional 5 acres of land (Tax parcel 20-1-9.22) which consists of the former railroad right of way to the west of Dutchess Quarry Caves and the Orange County Farm Cemetery. The quarry operation consists of several smaller buildings, a large conveyor system, retention ponds and numerous piles of rock material. In recent years the quarry has fenced the property to improve public safety as part of the requirements of Mine Land Reclamation Permit (#3-33307/2-0) and in response to concerns raised by IOCCNYSAA members and the community. The quarry is currently operating under a mined land and reclamation permit from the NYS Department of Environmental Conservation which is scheduled to expire in August 2013. The Company’s current mined land and reclamation plan allows the removal of dolostone to continue from the original elevation of 550 feet to an overall depth of 40 feet above sea level. The last inspection of the operation by DEC was conducted on October 26, 2009 and that summary report noted that the quarry operation had excavated areas outside the permitted boundaries to the southwest. The company also removed topsoil from an area of Mount Lookout to within fifty feet to the cave locations. In addition to these encroachments, historical accounts report that a large ‘Indian’ cave was located along part of the escarpment that was destroyed by quarrying in the 1940s. Without continued oversight, the quarry operation could still pose a serious threat to the Dutchess Quarry Sites National Register District.
One aspect of the quarry operation which requires monitoring is the use of explosives to remove the dolomite. A blasting assessment conducted by Explosive Technologies International (ETI) on August 29, 1991 provided results that indicated the vibration within the caves remained within the limits that the OPRHP recommend for safe blasting near residential structures (Hartgen et. al. 1992: 88). Following the results both ETI and OPRHP recommended that a program be established to periodically monitor blasting near the caves. Hartgen (et. al. 1992:115) also noted that a process of photographing the condition of the caves as a blast monitoring program had found no effect on the integrity of the caves. The company is still required by DEC to photograph the caves after every blasting, possibly as many as ten times annually. The results of these monitoring programs are not readily available to the general public. Of concern would be the cumulative effects that continued blasting may have on the entire rock structure supporting the Dutchess Quarry Caves. The archaeological deposits in both caves survived until the 1960s specifically because prior rock falls have occurred at the entrances to the caves. Additionally as quarry operations have continued in the last several decades, more of the supporting hillside has been removed and the quarry has expanded to be closer to the escarpment. By 1980, the top elevation for the quarry pit was listed as 531 feet above sea level and the deepest section of the pit floor was at 162 feet above sea level (US Geological Survey) for a total of 370 feet of rock removed. When blasting continued in 1990, Dutchess Quarry & Supply Company began to work a 490 feet quarry elevation face down to 330 feet while working this area back to within 165 feet of the caves’ escarpment. According to Halena Duda, the District 3 Mined Land Supervisor, the current permit and plan allows the operation to go deeper in stages but that the deepest extraction (see Figure 31) will be in the southern most area of the pit furthest from cave sites. The permit does not allow the quarry pit to become wider than its current dimensions.

Within the State of New York, the Mined Land Reclamation Law (MLRL 6 NYCRR 422.2) requires miners to return lands affected by mineral extraction to productive conditions. Since 1975,
mine permits are subject the State Environmental Quality Review Act (SEQRA) and the State Historic Preservation Act (SHP) which requires permit applicants to evaluate and mitigation any adverse effects of their operations to National Register eligible cultural resources. The listing of Dutchess Quarry Cave 1 on the National Register initiated a cultural and environmental review in 1990 when Dutchess Quarry and Supply Company requested a modification of their permit to expand the quarry operation. In the first effort to mitigate adverse effects the County Legislature accepted a plan to preserve 2.14 acres of land (see Figure 28, page 35) around Cave 1. The County also contemplated selling their remaining property to the quarry with the exemption of the cave preserve, a right of way for access and another 1.8 acres containing a water tank. Public concerns and the discovery of additional archaeological resources on Mount Lookout convinced the County not to sell the property. During this process, DEC required the quarry to conduct archaeological testing on the eight acres to be added to the quarry pit. This research located Goshen Quarry Loci 1 through 5 and noted that the 2.14 acre preserve did not protect most of the escarpment and Cave 8. This led to a mitigation plan drafted by Dunn Corporation to preserve 13.2 acres (see Figure 1, page 6). This plan was accepted by the County Legislature in 1993 and became the National Register boundaries in 1995. Dutchess Quarry and Supply Company current permit is up for renewal in 2013 which would be the next time the reclamation plan may be modified. Currently the reclamation type listed for Goshen Quarry is lake or pond. The County should remain active in the permit and reclamation process and may seek to have a more detailed reclamation plan developed.

Although the closure of Dutchess Quarry (see Figure 5, page 11) is not likely to occur in the near future, it is recommended that Orange County begin the process to develop a long term plan for the reuse of this land. Before environmental protection laws were enacted in the 1960s and 1970s many older quarry operations were simple left abandoned or used as community landfills. With current laws requiring the reclamation of mine lands, many communities have worked to develop parks and recreation areas on partially refilled quarries. Dutchess Quarry and Supply Company has completed the reclamation of mine land in Orange County at the Midway Pit in Walkill which was reclaimed for industrial use. The general plan for Goshen Quarry is that once the deepest permitted level is reached, that section of the pit will be allowed to fill with ground water. The upper benches or steps and most of the remaining property would be planted in ground cover. There are a number of potential options for the use of reclaimed mine lands including resorts, golf courses and even solar farms. Near Toronto, Canada a local county is working with the mine company to reclaim the site of a quarry with a recreational lake at the deepest part of the quarry. The property will also contain picnic areas and athletic fields in other areas of the old operation. Their proposal also calls a large nature preserve area in one section of the old mine and for commercial development lots along an adjacent highway. With advanced planning, the preservation of Dutchess Quarry Sites National Register District and the reclamation of the quarry could eventually serve as a key cultural and recreational asset to the entire County.
III. DQS-NRD MANAGEMENT ISSUES

Archaeological site management works toward the conservation of the site and its cultural deposits in practical terms, such as: property security, site stabilization. Effective site management depends on the development of a clear and formal management plan. A site management plan is also most effective when responsible individuals are recruited to form a management committee to implement and monitor the management of the site. With the adoption of a management plan, it is important to establish a committee with the responsibility to oversee and foster the long term preservation of the Dutchess Quarry Sites National Register District. An effective committee would represent the different segments of the community with an interest in the preservation of the district. Considering the long association between the IOCCYNYSAA and the Dutchess Quarry Cave sites, the input from an officer of this organization could be an important asset to a management committee. Once a management committee is in place, key issues addressed in management plan could include improving site security, development of a site access policy, stabilization of the hillside and the development of a research policy to promote problem-orientated research. While public access may be an important tool for education and cultural tourism within the County, the most important factor in determining how much access to allow to an archaeological site is considering the potential harmful impacts from visitation to the site. Greater publicity, awareness and access to the DQS-NRD should only be pursued once a system is in place to assure the integrity of the archaeological resources is not impacted in a negative way.

Site Security

Whether the County decides to limit site visits, maintain the current level of visits or increase the available of the Dutchess Quarry Sites National Register District to public visitation, the County should consider improving several key elements of site security. Security could be improved by the installation of a physical barrier to restrict unauthorized access, and by increased surveillance through the development of a site steward program. The County should also consider the development of an explicite site access policy. Since the initial discovery of Dutchess Quarry Cave 1 in 1964, the Incorporated Orange County Chapter of the NYSAA has served as defacto site stewards, monitoring activities around the caves to prevent pot hunting (Hartgen 1992: 21). For the most part, security of the site has relied on the difficult and isolated typography of the hillside. Currently, much of the parameter of the District is secured by chain link fences which run along the western boundary with the propane facility at 200 Quarry Road and the eastern and southern boundaries along the buffer zone with Goshen Quarry. A large gate could be placed across the old quarry path at the edge of Quarry Road to secure the main access point to the property. Heavy posts should be installed to support a metal pole gate. This gate would provide both a physical and a visual deterrent to unauthorized access to the District. While researching the DQS-NRD, several members of the local community mentioned that they had visited the District on their own by simply hiking up from the old quarry path.

A program to recruit and train Site Stewards could be implemented as a key element of site security. The National Park Service (Kelly 2007) and a number of State governments have developed site steward programs. The recruitment of site stewards is also a major security component for all archaeological site preserves managed by The Archaeological Conservancy. Site stewards consist of designated and trained volunteers who will be responsible to regularly monitor for any
activity near or in the caves. Two potential sources for site stewards are already in place in Orange County. As Hartgen and Associates pointed out twenty years ago in their site report the “…preservation of the Dutchess Quarry Caves has…been dependent on… the stewardship of the Orange County Chapter of the N.Y.S.A.A…” (Hargten et. al. 1992: 113). The chapter still plays an important role in the preservation of the site and in organizing tours. In addition to the local archaeological society chapter, the Trail Side Museums and Zoo organization at Bear Mountain State Park has developed a successful Native American Site Steward Program. The volunteers in this program (see Figure 32) regularly monitor and patrol Native American rock shelter sites in Bear Mountain, Sterling Forest, and Harriman State Parks. This program is supported by the NYS Office of Parks Recreation and Historic Preservation (2009: 37) and was developed in response to looting, vandalism and other illegal activities which were compromising the archaeological integrity of these significant cultural resources. It is likely that some IOCCNYSAA members already take part in the Bear Mountain Program. As a reference guide the Secretary of the Interiors Brief 22 on developing and implementing archeological site stewardship programs has been provided in the appendices of this report.

Site stewards for Dutchess Quarry Sites National Register District should monitor the caves and the surrounding hill side for signs of ground disturbance, looting, and vandalism. Other unauthorized uses would include general trespassing, illegal dumping along Quarry Road and the old quarry path, and the use of all-terrain vehicles on the property. Site stewards should report any unauthorized activities immediately to the responsible County Agent. The County Sheriff’s Office could also be informed of the cultural significance of the property and be asked to monitor the access area along Quarry Road during their regular patrols. Site condition information collected by site stewards could also be used to determine any adverse effects visitation may have on the archaeological resources within the District.

**Site Access**

The main purpose of setting a Dutchess Quarry Sites National Register District access policy is to have a formal procedure in place to evaluate requests to access the District. At the minimum this policy should address potential requests by professional archaeologists, Native American groups and the general public to access the District.

The County could consider permitting qualifying institutions and professional archaeologists’ access to the district for research purposes. Professional archaeologists requesting access should meet the Secretary of Interior guidelines for professional archaeologists (see appendix). The County and the Management Committee should establish a Research Review Subcommittee to...
review all research requests. The County should require that any professionals requesting permission to conduct research within the District do so by submitting a written proposal and research design. All results of any research conducted within the District should be published and made available to the public and other professional archaeologists. The County may consider permitting professional archaeologists to visit the District unescorted with written permission. Anyone entering the District unescorted should have their written letter of permission with them at all times. Site stewards should also be notified in advance of any approved research project within the District.

The County could permit Native Americans and others with cultural affiliations to the sites to have unrestricted access to the district for religious and traditional purposes, as long as there is a formal written request. Requests should state the names, addresses, and phone numbers of all visitors, as well as the intended time of visit. Once approved, the visitors could be allowed to visit parts of the district unaccompanied, but due to the difficult terrain of the hilltop, a representative to the management committee or site stewards should be available on site to assist the group. No disturbance or collection of the cultural resource should be allowed and the County may notify adjacent landowners and site stewards in advance of any planned visits to the District by Native American groups.

While members of the general public may make visitation requests, these should be reviewed on a case by case basis. No individuals should be permitted to visit the District without prior written permission and members of the general public should always be escorted. The County may also consider having visitors sign an insurance waiver and indemnification release form to limit potential liability. It would be prudent to have most members of the general public simply wait until the next scheduled site tour to control the number of visitors to the district.

In each type of visitation, it would be useful to have a handout to accompany visitors to the District. The handout or brochure could provide information on past archaeology in the District, the significance of the sites and the general geology of the area. The brochure could also describe the importance of site conservation, how the visitor can get more information and provide site etiquette. Visitors should be gently reminded to stay on trails, be extra careful on rocky surfaces, and were protective head gear while visiting the caves. They should also be reminded NOT to pick up or remove any artifact they might notice in the District. Guides should stress the importance context in interpreting archaeological finds. Visitors should be encouraged to photograph artifacts and note their location but the artifacts should remain on the ground. Visitors should also be reminded not to add their own artifacts to the site; all trash should be placed in proper receptacles. Finally, the District should be monitored after every visit to determine if the archaeological resources of the District have been impacted in any way.

**Site Stabilization**

The management committee will need to address site stabilization issues including erosion control, ground cover and forest management. Any actions must take into account that ground disturbing activities can affect the archaeological integrity of the District. There are stabilization problems in certain areas of the District. There is a stripped area in the southeast corner of the District with piles of talus material which could be removed or redistributed in the disturbed area.
(see Figure 33). The property is very thick with vegetation in some areas and brush clearing may be desired. A program of forest management should be considered for the District. This could be as simple as cutting up downed trees and keeping trails passable or it may eventually require selective cutting of trees to improve the health of the forest. If visitation is to continue in the District, the trails should be cleared and the branches pruned back periodically to maintain access. Erosion control efforts may be needed in areas of exposed surfaces along trails and at the lookout area near the quarry. The caves should as be monitored on a regular basis to detect any adverse effects of blasting in the adjacent quarry. One concern raised by the local community is the effect that blasting at the quarry may have had on the relative humidity within the caves. The management committee may want to establish a program to regularly monitoring the humidity level in the caves. The potential for adverse effects on the archaeological resources within the District should be carefully considered before any stabilization action is taken within the District.

Permitting Future Research

The County, as owners of the Dutchess Quarry Sites National Register District, has the final say in determining if future archaeological research is permitted within the District. The Archaeological Conservancy as the only national, non-profit organization which manages archaeological research preserves has developed a series of basic guidelines to help evaluate research requests. These guidelines are based on the standards provided by the Secretary of the Interior for archaeological and historic preservation and have worked effectively for over thirty years. They are provided here as a template which the County may decide to use to develop its own research policies for the DQS-NRD.

A prerequisite to any new archaeological testing at the caves or the surrounding hill top could be a formal, written research proposal. The adoption of a management plan would provide the prerequisites needed for a successful research proposal, the criteria for professional oversight of the research, a clear plan for the curation and storage of recovered artifacts and excavation documents, and should promote a public education component to the research. Again the Secretary of the Interiors Guidelines for archaeological and historic preservation provide a minimum standard for research and insure that the results of such research will be consistent with other professional archaeological research conducted in the region. The general goal of any research within the Dis-
strict should be the maximizing of results from excavations while minimizing the impacts. A well designed research plan will provide the most information with the least amount of actual excavation. The management committee should consider establishing an archaeological research review subcommittee to be responsible for evaluating research requests.

The research policies for the Dutchess Quarry Sites National Register District could require a formal application for any archaeological research made in writing. This application should include a detailed research plan, an endorsement of the research by the institution or organization employing and funding the investigator, and evidence of compliance with County’s insurance policy. All research should have institutional or organizational affiliation, and a Principal Investigator with the minimum of a graduate degree in anthropology or archaeology and preferably with a Ph.D. Request for non-invasive research which might include remote sensing technology, mapping, aerial photography, and zero collection surface survey could be submitted in letter form. The letter should state the questions being addressed, the work to be done, the personnel involved, sponsoring organization, dates of the project, the expected research benefits, and a timetable for a report.

For more invasive field work such as surface collecting, testing, or controlled excavation a comprehensive research design should be submitted, comparable to that required by the National Science Foundation or the National Endowment for the Humanities. The research design should include the relation of the proposed work to previous investigations at the District or in the area, the specific area(s) of the District designated for investigation, all proposed field procedures, the techniques to be used for acquiring and analyzing data, a timetable for the field report, the analysis and reporting of the results, a detailed budget for field work, analysis and publication, and for costs associated with artifact and sample curation, a copy of a negotiated curation agreement, and other details that the County may specify. Curriculum vitae for the principal investigator and any other professional staff should be included with the application. The research design should be oriented to problem solving rather than mere data gathering.

Once a research request is received, the DQS NR District Archaeological Research Review Subcommittee should be consulted in a timely fashion and permitted the opportunity to review and comment upon the proposed research. The research review subcommittee will evaluate the qualifications of the researcher(s), review the application and determine if it is acceptable. The subcommittee will come to a majority decision on the merits of the proposal and recommend to the County to either accept of the proposal as submitted, to accept subject to modifications specified by the committee, or to reject the proposal with specific reasons stated.

The research review subcommittee should appoint a member to monitor the research project during the field work and to report back to the subcommittee and the County periodically or at its conclusion. Any changes in the permitted research design, such as extending the excavations beyond areas indicated in the application or modifying the data collection procedures would be permitted only after additional approval by the research review subcommittee. Failure to obtain such approval should result in revocation of the research permit and banishment from the site. The District must be left in a safe, stable, and secure condition during interruption in the work and at its completion, both at the expense of the investigator. All excavations units and areas must be backfilled.
Within 90 days after the conclusion of any field season the principal investigator should provide a written report of results to the County and the research review subcommittee for review. This report will include a map of the District indicating the location(s) of field work and discussion of results. It may include a request for modification of the original proposal if a subsequent field season has already been approved. Failure to submit a preliminary report in a timely manner would be grounds for denying future research on the property. Within a reasonable period of time following completion of the analysis of the data (usually a year or less), one or more papers or scientific reports will be presented at professional meetings and will be submitted for publication. Copies of papers presented at meetings and of their published versions, as well as any other published reports, will be sent to the County, the appropriate State Historic Preservation Officer, and, if requested, to members of the research review subcommittee, and to any other organization or institution that the County may specify.

The collections from a field program will include all artifacts, samples or specimens for analysis (faunal or floral identification, pollen study, dating, etc.) and all related documentation whether written, taped or digitally recorded and including maps, diagrams, drawings, and photographic negatives with one print of each. The collection remains the property of the County until it is transferred to the New York State Museum, unless otherwise specified, where it will be professionally curated. Collections will not belong to the excavator, and the excavator’s institution may or may not be chosen as the permanent repository. All costs associated with preparing and curating collections shall be the responsibility of the researcher. The excavator, through his/her institution or sponsoring organization, should be allowed to borrow a collection until analysis is complete. The research review subcommittee should be informed as to the location of the collection and to any portion loaned to others persons or institutions. The excavator should be permitted to duplicate any and all documents relating to the collection for his/her permanent use and possession. Duplication of artifacts, however, should require permission from the research review subcommittee. Any artifacts recovered from the Dutchess Quarry Sites National Register District are the property of the County. It is recommended that artifacts should be donated to, and permanently curated by, the New York State Museum in Albany. All documentation must remain in the same repository as the rest of the collection and be stored in accordance with proper archival standards.

Potential for Future Research

There are a number of potential avenues for future research within the Dutchess Quarry Sites National Register District should the County decide to permit further testing by archaeologists and paleontologists. Some of this research potential was spelled out in the 1994 National Register nomination as “…the relatively undisturbed nature of the caves area and edge of the escarpment means that the sites may continue to yield data critical to our understanding of prehistoric subsistence, paleontology and paleo-environment.” (Costella 1993: 8). Although much of the cultural deposits have been excavated within Caves 1 and 8, the other components in the District still retain research potential. Cave 8 contains lime breccia deposits lining the walls of the cave that still holds evidence of extinct and extant faunal species, plant materials, charcoal and chert flakes. An area of Cave 2 may contain cultural deposits which were buried by a later roof collapse. This area was not accessed by Dr. Kopper who believed this area of the cave to be unsta-
ble so no further excavations were attempted. If this area could be stabilized, then additional cultural deposits could be tested and studied. Also if Cave 2 represents secondary deposits there may be evidence of living surfaces on the bench in front of this rock shelter. The District also contains the two anomalies designated Caves 9 and 10 located by Dr. Kopper in 1974 north of Cave 8 which were also located with ground penetrating radar by Drs. Funk and Steadman in 1987 and Dunn Corporation in 1991. The anomalies have the potential to be additional solution caves. One of these anomalies appears to be as large as Cave 1 but Drs. Funk and Steadman were unable to locate a cave entrance in 1989. Within the last several years a geologist visiting the caves noted that a chert layer is found 4 feet above the roofs of Caves 1 and 8 (Harold Decker, personal communication). The 1989 testing did not go deep enough to uncover this chert layer and there remains the potential that a cave entrance remains buried more than four feet below the talus. There have also been several attempts to locate living surfaces on the bench in front of Cave 1 but the results were inconclusive. In areas of the bench there may be as much as fifteen feet of talus and excavation backfill from the earlier excavations in the cave. There is still the potential that the bench contains evidence of human activity although buried under a considerable amount of fill. Another potential research effort could be the relocation and reexamination of caves 3, 4, 5 and 6 tested by Dr. Kopper. Utilization of newer technology may provide data that would not have been available to Dr. Kopper in the mid-1970s. Although Hartgen Archaeological Associations (1992) were unable to locate intact cultural deposits at Locus 1 within the Alpine Meadow, additional testing in the meadow may yielded archaeological data or deposits. It should be noted that the meadow is outside of the National Register District. Hartgen’s research at Loci 2-5 was designed to do the least amount of collection and excavation necessary to evaluate the National Register eligibility of these resources. They left as much material undisturbed as possible for future researchers, following the principals of Conservation Archaeology. David Johnson, the current president of the IOCCNY-SAA, also believes another Archaic site is located near the buffer zone between the District and Goshen Quarry possible under talus debris from the quarry. Overall the District retains a significant amount of intact cultural deposits and research potential.

---

**Figure 34**– Photographic overlay sketch showing the modern features of Mount Lookout, image from Hartgen 1992: 85.
IV. AVENUES FOR THE INTERPRETATION OF THE DQS-NRD

A critical element in the process of archaeological site conservation is to find ways to get the local community involved in the protection of their cultural heritage through public outreach and education. Important aspects of providing for the long term preservation of Dutchess Quarry Sites National Register District could include the expansion of community support through public education. This has been the primary goal of the Incorporated Orange County Chapter of the NYSAA over the last several decades. Public education efforts such as these will help a community to understand that “...the archaeological, historical and cultural resources of our State provide our State citizens and our country, with tangible reminders of the importance of our regions rich and varied history. Whether they are rural communities, urban landscapes, historic working landscapes or archaeological sites, the presence and knowledge of such resources provide a community and its citizens with continuity and context for their daily lives, and contribute to the overall quality and enjoyment of life. They also can give our communities unique characteristics and a special sense of place, fostering our pride in the places where we live.” (NYS Open Space and Conservation Plan 2009: 49). A excellent example of this point is the County’s website which states that “…the earliest carbon dated settlement in North America, over 12,500 years old, is found in Orange County…” (About us/www.orangecounty.ny.us) The County’s cultural and historic heritage is seen as a point of pride and should be promoted. This view of public education is also supported by The Archaeological Conservancy, the Secretary of the Interior, the Society for American Archaeology and the Society for Historic Archaeology., The number one recommendation to engage the public in outreach is to provide tours of archaeological sites. Education is also a major goal of the State of New York’s Historic Preservation Plan stressing “…increased awareness of, connection to, archeological resources at the local level is a critical step toward their preservation and appropriate stewardship…” (NYS OPRHP 2009: 38). Both the National Park Service and the US Department of Defense consider public education and vigilance as the two most effective means for archaeological site preservation. Public interpretation and visitation to Dutchess Quarry Sites National Register District presents an opportunity to support these goals and the long term conservation of these resources.

The physical characteristics of Mount Lookout and the Caves provide a unique setting for the interpretation of Native American life in southern New York (see Figure 34). Even with the changes to the landscape which have occurred, the general sense of why indigenous people utilized this location remains. The District provides an excellent tool for promoting the cultural heritage of the County and expanding the interpretation of the site would also enhance its public benefit.

Due to the fragile nature of archaeological deposits, off-site interpretation often provides the best avenue for both protecting the site and informing the public. With the principal of site stewardship, professional archaeologists are bound by professional ethical standards to keep site location information confidential and site visitation to a minimum in order to assure the integrity of the resource. However, Dutchess Quarry Caves are one of the rare sites in the Eastern United States which could provide an opportunity for public visitation if it were strictly managed, limited in scope and duration and perhaps supported by an off-site component in the form of an interpretive kiosk, brochure or some other educational component. The caves on Mount Lookout could pro-
vide an opportunity for visitors to experience the setting people occupied thousands of years ago and to discover the methods archaeologists use to learn about the past.

Current interpretation of the Dutchess Quarry Sites National Register District includes the site tour program implemented by the Incorporated Orange County Chapter of the New York State Archaeological Association. The following section also looks at two similar archaeological resources in Virginia and Pennsylvania to serve as comparisons to DQS-NRD. In the early discussions over the scope of work this report, the County’s representatives asked TAC to include some possible improvements to the current site tour program, to evaluate the potential of a County owned house near the District as an interpretative center and to discuss the potential of incorporating the interpretation of DQS-NRD into a broader regional program. To these ends, possible scenarios to improve site tours, site access, on and off site signage and avenues for regional interpretation are provided for the County’s consideration.

**IOCCNYSAA Site Tours**

While Drs. Funk and Steadman were conducting research, they would periodically lead tours of the sites. These tours ended in 2004 with the death of Dr. Funk and the departure of Dr. Steadman. For several years there was no activity at the District. Over the last four years, a new program of tours has been conducted once a year depending on weather conditions. These tours are currently led by members of the Incorporated Orange County Chapter of the New York State Archaeological Association with organizational assistance from archaeologist Stephanie Tice and permission from County Executive Edward Diana. The tours have been conducted on April 24, 2008, May 3, 2008, May 2, 2009 and June 11, 2011. The county is extremely lucky to have this valuable asset at their disposal and all parties should be commended in managing and conducting these wonderful education opportunities.

The IOCCNYSAA site tours are roughly organized into four areas of concentration. Tours begin along Quarry Road, follow the old quarry path up the hillside, stop and discuss the prehistoric quarry pits in the woods, stop at the overlook at the chain link fence above the quarry and repels down the escarpment to visit Caves 1 and 8. The meeting area along Quarry Road provides some limited space for parking and room to organize visitors into small groups of a dozen or less to hike up to the caves. At this location to the northwest and below the caves, the Chapter guides provide an overall introduction and offer prehistoric technology demonstrations (see Figures 35). The tours follow the old quarry path up the hillside to the north which was the original access to the quarry operation, for a distance of approximately one thousand feet. During the hike from the old path to the top of Mount Lookout, the tour guides stop near the Alpine meadow and then in the woods near the prehistoric chert quarrying pits. This provides an opportunity to explain archaeological testing methods and the information these pits provide on prehistoric lithic prospecting and quarry activities. It also gives the participants a chance to rest. A section of an archaic beach is also pointed out to the group as they travel south through the woods. The third
general stop of the tour is at an overlook area next to the chain link fence erected around the rim of the quarry. At this point, the guide describes the quarry, points out geological features visible in the quarry and the geology of the valley and Black Dirt region visible to the south. After this point the groups are then led to the west to reach the escarpment. This requires a short but steep descent (see Figure 36) down the rocky hillside with assistance and a safety rope. The rope is stretched between trees above and below the slope to serve as a hand rail. Once on the talus bench, the group visits both Cave 1 and Cave 8 where everyone is required to wear hard hats while in the caves. Features noted in the caves include painted lines to mark the original soil levels before excavations were conducted in the caves, the composition of the caves soils, veins of black chert which are the fossilized remains of prehistoric algae and the low acidy of this limestone environment which aids in the preservation of organic remains. The trail through the woods from the old dynamite shacks to the caves is about eleven hundred feet. The trail through the District is only opened once a year at the most and there are many low hanging branches. The trail has many potential hazards due to roots, rocks and irregular surfaces. The overall distance hiking to the caves and back covers 4200 feet or eight tenths of a mile over difficult terrain which can make the tours strenuous (see Figure 37).

Comparable Archaeological Sites

The University of Arkansas has compiled a list of one hundred and forty seven archaeological sites (www.uark.edu/misc/aras/map.html) which are open to public visitation. Only five sites are listed in the Northeast region of the Country. While this list is not complete it does highlight the sparse number of archaeological sites open to public viewing in the eastern United States. A greater number of archaeological sites are open to the public in the Midwest and the Southwest where many sites retain large architectural features like earthen mounds or adobe structures. Most eastern archaeology sites possess few if any features which are visible above ground. Across the United States,
there are only a handful of sites from the late Pleistocene/Early Man period open to public visitation. These include Mammoth Cave National Park in Kentucky, Russell Cave National Monument in Alabama, Lubbock Lake Landmark in Texas, Mastodon and Graham Cave State Parks in Missouri and the Calico Early Man site in California. The two eastern archaeological sites which have been open to public interpretation and are both comparable to the DQS-NRD are the Thunderbird site in central Virginia and the Meadowcroft Rock Shelter site in western Pennsylvania.

The Thunderbird site has made significant contributions to our understanding of Paleo-Indian culture in the eastern United States since its discovery in the late 1960s. The nearly 2000 feet long site consists of a buried Pleistocene terrace along the South Fork of the Shenandoah River just south of the town of Front Royal. Field schools conducted by Dr. William Gardner with Catholic University from 1971 through 1986 provided a stratified cultural sequence from Paleo-Indian through the end of the Early Archaic and the only known stratified sequence of Paleo-Indian projectile points in Eastern North America. Research at the site was supported by grants from the National Science Foundation and the National Geographic Society and uncovered the post-mold pattern for a house believed to be one of the oldest known structures in North America. Thunderbird Research Corporation was established in the 1970s as a non-profit organization to manage and interpret the site and the site was designated a National Historic Landmark in 1977. A visitor center and small museum was established near the site and tours to the site included crossing the Shenandoah River by duck boat. Visitation to the site declined by the early 1990s with the end of excavations at the site. The site was backfilled to protect the archaeological deposits which left no physical evidence above ground for visitors to view. Eventually the museum was closed and the collection from the site was donated to the Smithsonian Institution in 2005. Thunderbird Research Corporation transferred the property in May 2011 to The Archaeological Conservancy and the site is being managed as an open space archaeological research preserve.

The other archaeological site which is comparable to Dutchess Quarry Caves is the Meadowcroft Rock Shelter near Avella, Pennsylvania. The rock shelter is located on the north bank of the Cross Creek roughly 30 miles southwest of Pittsburgh. The site was discovered in 1955 and protected by the owner Albert Miller until the 1970s. In 1973 Dr. James Adovasio with the University of Pittsburgh began excavations of the site. His excavations continued with the University of Pittsburgh through 1989 and then with the Mercyhurst Archaeological Institute in 1993-1994 and 2007. Dr. Adovasio uncovered a deeply stratified, multi component site with Native American occupations extending from Paleo-Indian period through the American Revolution. The site has yielded pre-Clovis radio carbon dates of 16,000 years B.P. and charcoal samples of 19,000 years, B.P. The pre-Clovis occupation and dates of the site are still considered controversial by some archaeologists. Despite these debates, the site was listed on the National Register of Historic Places in 1978 and was designated a National Historic Landmark in 2005. For many years tours of the site were conducted by a local history museum and wooden walkways were erected to access the site. Eventually the rock shelter was covered by an open air pavilion. Management and interpretation of the site was incorporated into the Senator John Heinz History Center in 1993. The Heinz History Center also operates a museum building in downtown Pittsburgh and the Fort Pitt Museum.

The rock shelter was closed to the public in 2008 and reopened in 2010 after a multi-million dollar renovation. Improvements included the paving of the access road leading to the site, upgrad-
ing the hiking trails, wooden walkways were replaced and enlarged, an enclosed viewing shelter (see Figure 38) was erected over the excavations and a new visitor center was built. Interpretation at the site has also been expanded with the construction of a model 16th century Woodland village and a separate model 19th century Historic village centered on the Miller family farm. The site is open to school groups and a curriculum guide is available on the Heinz History Center web site. These improvements were financed through state grants, county funds and private donors. The Heinz Center has also installed two kiosks each with panels, maps and television monitors that display seven separate videos addressing different aspects and questions on the peopling of America. One kiosk was installed at the Pittsburgh International Airport and the other at the Meadowcroft Visitor Center.

Both sites are comparable to Dutchess Quarry Site National Register District in terms of the roles each has played in defining the early prehistory of eastern North America and both provide lessons for the development of visitation at the District.

The program at Thunderbird was very successful and nationally recognized for a time but eventually it was not sustainable. With an emphasis on research, it became difficult to attract visitors once active research ended at the site. Visitation was also hampered by the lack of access to the site from a main road. The Shenandoah region has a number of cultural, environmental and historic resources which attract tourists, but the Thunderbird Museum set up to facilitate visitors to the site, was not able to build a strong connection to other resources. The museum and site visits to the property eventually ceased completely.

Like Dutchess Quarry Caves, Meadowcroft is a rock shelter cave site which provides a visual setting that open air sites in the eastern United States cannot. The Meadowcroft site demonstrates that even difficult hillside terrain can be improved by trails, walkways and shelters to make these types of archaeological sites more accessible to the general public. The site also demonstrates that it takes a large financial commitment and the collaboration with other cultural and historic resources in the region to maintain even a limited program of visitation. The site is only open for part of the year and has only remained open since the 1980s through an emphasis on public education through school age programs. Meadowcroft has also benefited from the combined resources of the Heinz History Center and the Commonwealth of Pennsylvania.

Site Tours at the DQS-NRD

There are a number of reasons why Orange County might consider formalizing the current site visitation program developed by the IOCCNYSAA or increasing visitation opportunities to Dutchess Quarry Sites National Register District. The District does present a unique opportunity for the visitation and interpretation of a nationally significant prehistoric landscape. As archaeol-
ologists who work for the conservation of archaeological sites on a daily basis, successful conservation and management usually means anonymity. The Archaeological Conservancy most often recommends managing archaeological preserves in a natural state with as little recognition and visitation as possible. Considering that the District is restricted to a small section of Mount lookout, is well known and recognized regionally for its contributions to archaeology over the last fifty years, and lies adjacent to the easily located Goshen Quarry, complete anonymity is not really an option in this case. Again it needs to be stressed that any increase in visitation or public interpretation would need to be carefully implemented and monitored to avoid harming the archaeological resources of the District.

While there may be hundreds of archaeological sites around the United States owned by non-profit groups, municipalities, states and federal agencies that are open to the public for regular daily visitation, there are very few such sites located in the northeastern section of the country, especially sites from this time period. Additionally, Dutchess Quarry Sites National Register District is one of the most significant sites in New York archaeology, it is eligible for Historic Landmark Status and it location provides a rare opportunity for visitors to really experience the past. The physical characteristics of Mount Lookout and the Caves provide a unique setting for the interpretation of Native American life in southern New York. Even with the changes to the landscape which have occurred, the general sense of why Natives utilized this location remains. The site provides an excellent tool for promoting the cultural heritage of the County and expanding the interpretation of the site would enhance its public benefit.

Tours of the site could continue once a year if possible and continue to build on the strong partnership between the IOCCNYAA and the County. A curriculum guide could be developed between the IOCCNYAA and the County based on the tour format presented at the beginning of this section. This type of guide would have two functions. The first to record the practical aspects of tours to the site including where to meet, what to bring, clothing to wear and to state the physical requirements needed to hike to the caves. The second function is to create a simple script for docents or guides to use for giving tours. The guide could follow step by step the locations to visit and in detail the information to be provided to the visitor. The guide can also be a tool to collect not only background information, but recollections and anecdotes from the members of IOCCNYSSAA to help record and save these stories. The guide would also serve as useful tool for training new docents, for providing a consistent experience for visitors and could provide much of the same background information which could also be used for kiosk displays.

**Improved Access**

The current site tours led by the IOCCNYSSAA have highlighted a few problems and issues which could be addressed to improve visitation to the District. If the County decides to continue these tours, the following improvements could be made to enhance the visitor experience. Once again changes or increase in visitation to the District would also need to be part of a broader program with increased monitoring, surveillance and site security. The current parking area consists of pulling off of Quarry road in an open area near the entrance to the old quarry path. This area is undeveloped and is best used in dry weather. Also moving visitors from the parking area to the District exposes the visitors to traffic along Quarry Road (see Figure 39). One way to possible improve this situation could be to establish a gravel parking area at the bottom of the old quarry.
path. This area could also be maintained and the grass cut periodically. Second, the trails are only cut by volunteers in advance of scheduled tours by the IOCCNYSAA. Even with this effort the trail crosses difficult terrain over uneven ground with low hanging branches, roots, stumps and rocks as potential obstacles. The County could consider clearing and reopening the gravel old quarry path leading up to the dynamite shacks. Any low hanging branches could also be pruned along this path and the wooded trail as it leads to the caves The trail in the woods could be widened and maintained on a regular basis. This would improve access for visitors and make surveillance by site stewards more efficient. Efforts could be made to smooth out rough areas, remove roots and other obstacles and possible mulch the trail to help level the surface. At the escarpment, the descent down to the bench in front of the caves is difficult and IOCCNYSAA ties a safety rope between trees to provide a hand rail (see Figures 40). Future plans could be developed to either install wooden posts to secure the rope on a more permanent basis or to eventually mount some type of metal hand rails to be used by visitors. Long term, a set of wooden steps and walkways similar to Meadowcroft Rock shelter could be erected starting above the escarpment and leading down to the bench in front of the caves. Observation platforms or decks could also be installed above the caves and at the quarry overlook for visitors. These types of improvements may necessitate the County to administer the District more like a community park with an appropriate level of staffing. With this potential in mind, the County may consider installing a gravel parking lot higher up the old quarry path near the dynamite shacks. This area appears to have been graded in the past and would shorten the hike to the caves by half. The first parking area, proposed above, at the Quarry Road could then become overflow parking. It should also be noted that the limited space within the caves, especially cave 8, will limit groups of visitors to no more than approximately twelve at a time. Anyone entering the cave should be wearing a hard hat or other protective head gear. For school groups, bicycle helmets might serve as an alternative to hard hats. The dynamite shacks may be used for storage of equipment for clearing and maintaining trails and for extra hard hats for tours. Improved access to the District should only be done in conjunction with the development and implementation of a site stewards program.

**On Site Interpretation**

On several occasions County Legislator Jeffrey Berkman expressed his interest is seeing the interpretation of Dutchess Quarry Site National Register District improved by the use of visual aids for the general visitor. While the IOCCNYSAA tour guides provide a great deal of information, there are few visual cues for the visitor. A review of site brochures and interpretative kiosks is provided as possible options to enhance the existing interpretation of the District.
One option to help improve on site interpretation could be the development of a handout or brochure. If and when the County permits visitation to the Dutchess Quarry Sites National Register District, it could be useful to have a handout to accompany visitors to the district. This brochure should promote the conservation of archaeological sites; provide information on the archaeology of the caves and prehistoric quarries, the significance the National Register District and the general geology of the region. The brochure could also describe sources where the visitor can get more information and provide some basic rules for site etiquette. Visitors should be encouraged to stay on trails, be careful on rocky surfaces, and should be required to wear protective head gear while visiting the caves. They should also be reminded not to pick up or remove any artifact they might notice in the District. Guides should stress that a great deal of archaeological value is lost when an object is removed from original context. Visitors should be encouraged to photograph artifacts and note their location but the artifacts should remain on the ground. Visitors should place any trash in a proper receptacle and not add their own artifacts to the District. The DQS-NRD should also be carefully monitored after site visits to insure that the District’s archaeological resources have not been impacted by the visit.

A common practice at historic sites, environmental centers and many public parks is to provide interpretative panels or kiosk for public education. Possible options for kiosks might include a general interpretative kiosk placed off site to promote the natural and cultural heritage which is unique to Orange County. This kiosk could also briefly describe the Dutchess Quarry Cave sites and provide a contact to get more information on the site or participate in scheduled group tours. Another option might be a set of kiosks placed on the hilltop near the caves which could provide greater detail about the sites discovery, exploration, interpretation and preservation. To aid in site security, any kiosks should be placed on Mount Lookout in areas where the panels are not easily visible from the surrounding roads. These kiosks should enhance site tours and could consist of a panel mounted near the dynamite shacks as an introduction to the District. This panel could describe the history of the District and the conservation efforts that have led to its preservation. A panel in the woods could be placed to describe the prehistoric quarry activities on the hill top and the archaeological methods used in the 1990s. One panel could be placed near the quarry overlook to provide information on the geology of the region. A local artist may be recruited to develop a depiction of what the view from this location would have been like 10,000 years ago. A fourth panel could be placed near the caves to provide a history of the excavations and the interpretation of the caves. Images of the excavations and artifacts could be utilized on this panel. Each panel should also provide one or more of the caveats which makes the District nationally significant. Overall, the goal should be to create a story line that connects to the visitor’s sense of place and common experience rather than a more traditional time line approach (Moyer 2007: 270).

If the County decides to improve signage in the District, descriptive panels or small outdoor kiosks are typically used for outdoor interpretation. These are usually a printed panel embedded in fiberglass. This process was developed by the National Park Service in the early 1980s and these displays hold up well to the weather and are difficult to damage. The panels are fairly inexpensive incase they become damaged or vandalized and need to be replaced. A general rule of thumb on the content of a panel is one third text to two thirds images for displays mounted in a group or sequence, and fifty to fifty (see Figure 41) for a single stand alone, interpretive display
(Neal 1983). Visitors spend more attention to exhibits that catch their eyes and only read on average forty percent of a display’s text (Moyer 2007: 273). The actual content for these displays could be taken directly from the Overview section in this report which provides a chronology of research at the sites and the caveats that make the District nationally significant. The placement of any kiosk should be considered carefully as the added public education will also increase public attention on the District and should be part of a larger program of increased surveillance and security.

**Off Site Interpretation**

A short term goal to improve public education could be the placement of a display panel in a high traffic area. Since the Dutchess Quarry Sites National Register District is not in an area easily accessible to most County residents, another means to improve the interpretation of the site could be to install a display or kiosk at an offsite location. The District is a significant cultural resource and a public display would be an effective way to promote the preservation of this resource. One advantage of archaeology is that even though “…it’s fair to say that…most of the general public doesn’t connect with the minutiae of scientific research. However, many people are easily engaged in scientific questions when they revolve around the discovery of the past…” (Lepofsky 2011: 17). This public interest in the heritage of the County is even evident on the County’s website which highlights the Pleistocene and Paleolithic history of the region. The placement in a public space of a large panel to elaborate on this heritage would be an effective way to bring this information to the public. One possible location might be in the Government Center building with the reproduction skull of the Warren mastodon (see Figure 30, page 38). While the building has a great deal of pedestrian traffic, the skull itself is mounted in a secluded alcove on the main floor. A display panel could describe a brief history of Pleistocene finds in the County and an overview of Dutchess Quarry Caves. The panel might also have a depiction of the prehistoric Wallkill lakes to give the viewer a better perspective on the dynamic changes to the County over the centuries. Long term, the County could consider developing an interpretive center which could exhibit the artifacts recovered from the caves and prehistoric quarry areas and serve to promote cultural and historic heritage tourism in the County.

One of the public benefits that archaeology can provide is an opportunity for teachers and students to use archaeology to reinforce the principles of math, science, geography, history and human diversity in exciting and informative ways. Including children in public outreach is especially important, because they take that information home and help connect the whole community (Britt 2007: 164). The late Pleistocene and early Holocene characteristics of Dutchess Quarry Sites National Register District would fit well with the fourth grade standards in Social Studies. The NYS Education Department standards set the teaching of the first inhabitants of the State as
the first unit of Grade 4 social studies. This topic is then repeated again in greater detail at Grade 7. The development of a school age program for Dutchess Quarry Caves could be done with the Social Studies Curriculum coordinator within the local school district. In general, the curriculum would provide key learning points, lesson plans and activities to introduce students to archaeology. Goals should include the development of vocabulary skills, critical thinking skills and connecting scientific findings with our knowledge of the past. Dutchess Quarry Caves could serve as a case study on how to conduct archaeological investigations and a means to inform students on the historical significance of the District. The major understandings that the Department of Education intend to meet are that Native Americans were the first inhabitants in the region and that geographical factors and the environment shaped their settlement patterns. There is a great deal of available source material for developing school age curriculum for archaeological sites including a guide for the Meadowcroft Rock Shelter on the Heinz History Center website. The story of the archaeology conducted within the District and the setting the caves provide for understanding the past, make the District an excellent learning tool for teaching archaeology and the story of the first inhabitants of the region.

**Media Outlets**

An element of public education which is becoming increasingly important to archaeology is the role of media outlets. The general public can learn about archaeology from television, newspapers, radio and the internet. Media access to news about the Dutchess Quarry Sites National Register District needs to be coordinated through the management committee and should not be discriminatory. The exact locations of the caves should be kept as confidential as possible. The County or any related organization should not sponsor or condone the preferential access to news, nor should it allow any researcher to give preferential access to news about research to any media outlet.

There is already a great deal of information on the Dutchess Quarry Caves site available from multiple sources on the internet. In fact, a search for “Dutchess Quarry Caves” on the search engine Google provides results with links to a description of the site in Wikipedia, National Register listing information on the NYS OPRHP website (www.nysparks.com), the National Register of Historic Places website (www.nationalregisterofhistoricplaces.com) and the National Park Service (www.nps.org) website. The caves also have a community listing page on Facebook (www.facebook.com/pages/Dutchess-Quarry-Cave/) which is based on the Wikipedia site information and, as the website advertises, community pages on Facebook are not affiliated or endorsed by anyone associated with the topic. Additionally, the IOCCNYSAA maintains a web site (http://ioccnysaa.blogspot.com) to provide ongoing updates on the activities and research by the chapter. Their web site includes a number of pages with photographs and descriptions from past tours they have led to the Dutchess Quarry Caves site.

While no direct location information is available on the internet for the cave sites, GIS/GPS coordinates and map locations are readily available for Dutchess Quarry, also listed as Goshen Quarry and Mount Lookout on a number of websites including Wikipedia, Facebook, freebase.com and even the United States Geological Survey listing of active mines. On Google Earth (see Figure 5, page 11), the drained lands of the Black Dirt region are visible at one hundred miles above the earth and Goshen Quarry is clearly visible at eight miles. With a limited amount
of detective work, individuals’ intent on looting or vandalizing the sites and caves would have no problem locating them from Orange Farm Road. The easy availability of general site location information on the internet again highlights the importance of having a site stewardship program to provide regular surveillance of the site.

**Regional Interpretation**

During discussions with Commissioner David Church and County Legislator Jeff Berkman, one avenue they specifically wanted the Conservancy to look at is the potential for developing an interpretive center which could serve to display materials associated with the Dutchess Quarry Sites National Register District. The potential center could also support the historical and cultural heritage of the County. The goal of regional interpretation would fit into the vision of the County’s Comprehensive Plan which includes a priority to enhance the ‘Quality of Life’ within the County through “…tourism of the County as a whole and it’s historic, cultural, educational and natural resources…”(Diana, Pillmeier & Church 2010:65) as a vital economic tool. Historic and cultural tourism improves local economies by attracting non local visitors who support lodging, meals, retail and travel services (NYS DEC & OPRHP 2009: 47). In 2008, New York State parks and historic sites brought in an estimated $739 million dollars in revenues and $29.5 million dollars in taxes to the State. This highlights the potential of archaeology and historic preservation can support a community sense of pride. One key is to achieve a balance between cultural tourism and archaeological site conservation. Public outreach should support conservation since “…a public that is well educated about archaeology will be our strongest allies not only in protecting archaeological sites but also in promoting the notion that heritage preservation is fundamental to the well-being of people…” (Lepofsky 2011: 19). The goal of regional interpretation could be met by developing an interpretive center in the Goshen area and by promoting collaboration with other cultural and historic organizations within the region.

**Interpretive Center**

The Archaeological Conservancy’s staff was specifically requested to evaluate a vacant house that the County owns on Quarry Road near the Dutchess Quarry Sites National Register District as a potential interpretive center. This white house at 13 Quarry Road (see Figure 42) consists of a two and one half stories, 3 bay, double pile dwelling and dates from 1920 to 1935 based on the cube style balloon frame construction and the colonial Dutch revival details. The house is roughly three thousand square feet of space and may not have a heating system even though the house was last used as a retirement residence. The building was updated to be handicap accessible but it is now unoccupied and is currently being monitored by the County Office of Social Services. Its corner location at Quarry Road and Jessup Switch Road makes the
structure open and accessible, with a potential for a large number of parking spaces. John McCarey, the Director of County Tax Office, noted that several non-profits have requested to use the building in the past but the poor condition of the house has been an issue. Even with a brief, exterior survey of the structure a number of structural issues are visible. Large areas of the exterior paint have peeled off, a section of the roof is damage and probably rotted, and the main entry porch has badly rotted (see Figure 43 & 44).

The positives of this building would have as an interpretive center included the fact that the County already owns and controls the property. The building has been modified to be handicap accessible and the surrounding land would provide excellent parking (see Figure 45). Unfortunately, the building has as many negative elements as it has positive ones. The negatives of the building include the limited interior space, which is not designed for the traffic flow of visitors or for the mounting and displaying of exhibits. The building is also in a poor state of repair including potential damage to the roof, damage to the siding and paint, and a front entry porch which would need to be replaced. The location of the house is not ideal for an interpretive center to support the cave sites. Quarry Road from the house to the entrance of the old quarry path is narrow, has poor visibility and lacks sidewalks. From a practical term, any tours of the District starting from this location would add approximately 1200 feet or two tenths of a mile to walk to the caves. The house’s location on a secondary road several miles from a major highway also makes it a low traffic area for the casual visitor or tourist.
If the County decides to pursue an interpretive center, it may want to locate the facility closer to high traffic areas like State Route 17 or the Interstates 84 and 87 corridors. A location near or along the Heritage Trail established by the County Park and Recreation Department could be a way to enhance the experience of users of that trail and provide a central location to promote natural and cultural heritage. Starting with a new space could provide a better opportunity to develop exhibits to interpret the Pleistocene history of the region and to highlight the archaeology of Dutchess Quarry Caves. Materials on the Pleistocene previously exhibited by the County in the old courthouse were removed within the last year. Most of the other materials are currently on loan to the Museum Village of Old Smith’s Cove in Monroe. The large, replica of the Warren mastodon skull has been moved to County Municipal Building where it is on display in an alcove on the main level. The content of this material would be appropriate for interpretive panels but the exhibits themselves are not (see Figure 46). Most of the exhibits consist of photocopied images and text glued to poster board. This medium is effective for temporary displays but will deteriorate over time. Also, some of the posters and painting were damaged by water leaking through the roof of the old Courthouse. The County could display the Warren Skull reproduction, numerous other fossils and possibly a small scale display or diorama of the post Ice Age conditions of Orange County. The County could also request the State Museum to loan materials from the Dutchess Quarry Caves excavations for display (see Figure 4, page 10 & Figure 19, page 24). A similar recommendation was made by Hartgen Archaeological Associates (1992: 115-116) to consolidation collections from the caves and to develop a museum. The center could emphasize the significance of the District, describe the history of archaeology and its increasing focus on scientific methods. Per Dr. Robert Schmick Director of Museum Village in Monroe, the museum, the Walkill Historical Society and the County in the Old Courthouse building all have large collections of Native American artifacts recovered from the region. Some or all of these materials could serve for displays in a center that highlights the history and prehistory of the County. Panels and exhibits in the center could also support the County’s Open Space Network goal to promote and protect the Walkill River valley corridor connecting the black dirt region and farms in the south with significant County parks and reservoirs in the northern section of the County (Diana, Pillmeier & Church 2010: 96).

Interpretation of the Dutchess Quarry Caves should focus on the sites’ relationship to the Pleistocene environment of the Wallkill valley. The occupation of the caves to access the abundant resources of the postglacial lake connects the site directly to the ‘Black Dirt’ area which formed as the lake drained (see Figure 29, page 37). Focus on this interpretive center might also serve as a catalyst to bring back other artifacts and cultural materials which have been taken from the County. Considering the tremendous amount of historic and prehistoric material which has been found in Orange County over the last 300 years, the County should consider developing a mechanism to promote the retention and return of Orange County artifact and object. This might be
accomplished by expanding the policies and responsibilities of the County Historian. This type of effort might be coordinated with another existing County office or non-profit organization. The County Parks department is currently responsible for four museums and there are a number of other historic institutions and societies in the region. A third option would be to recruit and establish a separate non-profit group to serve as an agent to accept the donation and collection of objects originally found or used in the County. This organization might take the form of a “Friends of Orange County’s Heritage” which could also serve to help promote collaboration between historic organizations in the County and promote historic tourism as well.

Collaborations

The long term success of visitation to Dutchess Quarry Sites National Register District will require a coordinated effort to network with other cultural, historical and environmental resources in the region. These resources include parks, historic sites, dozens of other historical and conservation organizations and a large and very active archaeological society in the IOCCNYSSAA as well as. The importance of collaboration is a key lesson to be learned by comparing the operation of museums at the two similar National Historic Landmark sites of Thunderbird and Meadowcroft Rock Shelter. Both museums were started by local non-profit groups who had close ties to the original archaeologists researching the sites. Once the main researchers were no longer active at the sites, public visitation and interpretation steadily declined. At Thunderbird, this led to the closing of the museum and the eventual divesting of the property. In the case of Meadowcroft, the local group became part of a consortium of history sites which has allowed the site to remain open to the public on a limited basis. For a site visitation program to succeed at Dutchess Quarry Sites National Register District it will need to be part of a broader coalition of natural and cultural heritage organizations in the region.

The main emphasis here is not to describe every historic, cultural or environmental organization in the County (see Figure 47) but discuss a few the entities with the resources or experience to support a regional program. One source would the Orange County Department of Tourism which already works to promote the key attractions in the County. As part of a program that includes site security and vigilance, tourism can serve as a partner in preservation rather than an adversary (Slick 2002: 221). The promotion of tourism needs to be collaboration between the local sites and organization. The objective should not be to just get visitors to one site but to attract as many visitors to the whole region as possible, then the County and all the organizations benefit from tourism (Slick 2002). Other key organizations which support tourism and recreation in the region are the Palisades Parks Conservancy, the Wallkill River National Wildlife Refuge and the Hudson Valley National Heritage Area. As part of the US Fish and Wildlife Service, Wallkill River National Wildlife Refuge which abuts the County in New Jersey just south of Pine Island has developed a long term plan to improve visitor services in the region (Henry 2009). Elements of this plan could be adapted to the Dutchess Quarry Sites National Register District. The Palisades Interstate Park Commission and its non-profit support group the Palisades Park Conservancy oversees 110,000 acres of parks, forests, wildlife habitats and cultural resources including eight historic sites in the region. The Commission was given a bi-state federal charter in 1900 to preserve, educate and provide recreation opportunities to the citizens of the New York and New Jersey. The Conservancy operates the Trailside Museums and Zoo at Bear Mountain State Park and developed a site stewardship program to help preserve rock shelter in all of their holdings.
The County also falls within the Hudson Valley National Heritage Area established by the National Park Service and an act of Congress in 1996. The area is managed by the Hudson River Valley Greenway through the National Park Service and is designed to coordinate the efforts of residents, government agencies, non-profits and private partners to promote public stewardship and economic activity. Each of these regional organizations has resources that the County could use to develop and operate a program to interpret Dutchess Quarry Sites National Historic District.

Bicycle, automobile and hiking trails are also an important component to outdoor recreation in the County. County Parks Department has developed the Heritage Trail and there is a section of the Appalachian Natural Scenic Trail which passes through the southeast corner of the County. Regional automobile trails include the Upper Delaware Scenic Byway in western Orange County which promotes the protection of the regions character, beauty and heritage while supporting economic development through tourism and recreation. The Hudson Valley National Heritage Area promotes automobile themed tours of Revolutionary War sites, great house estates and a school of art trail. A heritage trail through the center of the County could connect these two corridors with Dutchess Quarry Caves and an interpretive center as part of this path. The New York – New Jersey Trail Conference and the NYS OPRHP also provide trail guides and routes through the region. The placement of an interpretive center near the Heritage Trail could also be a means to develop and link the center, Dutchess Quarry Sites National Register District and other paleontological sites into an ‘Ice Age Orange County Heritage Trail’. The trail could include brochures and signage near these sites to attract tourists and educate the public on the amazing heritage of the region. These types of trail routes provide more opportunities for self-directed learning, which can get visitors more involved in conserving archaeological sites (Moyer 2007: 271). A local group in the village of Montgomery has proposed the development and construction of the Peale Museum of Discovery at the site of the Walden mastodon excavations. To date, their main effort has been to develop maps and interpretive materials on mastodons discovered in Or-
ange County (Levine 2009) and to make this material available to the public on the internet (www.montgomeryny.org). Their efforts may eventual be incorporated with Dutchess Quarry Caves, an interpretive center, and signage at other mega fauna recovery sites to establish a thematic heritage trail.

Ultimately these options could be tailored to help fulfill the Orange County’s Comprehensive Plan actions to “…promote tourism of the County as a whole and it’s historic, cultural, educational and natural resources as vital economic development tools…” (Orange County 2010: 65) and to “…utilize the unique, rich historic resources of the County to strengthen and expand related business…”(Orange County 2010: 66). Efforts to meet the needs of tourism should always be tempered by the fact that owners of archaeological sites are only caretakers, minding these resources for future generations.
V. RECOMMENDATIONS FOR THE COUNTY AND DQS-NRD

After reviewing the history of the County’s ownership of Mount Lookout including the Dutchess Quarry Sites National Register District, the County’s connection to the Dutchess Quarry and Supply Company, and the programs of the Incorporated Orange County Chapter of the New York State Archaeological Association, The Archaeological Conservancy has presented Orange County with a number of options to enhance and improve the conservation, management and interpretation of the DQS-NRD. Other observations based on this review process are that the County has achieved some successes in terms of preservation and protection of the DQS-NRD. The County has permitted over thirty years of scientific research which has not only helped to define the Paleo-Indian time period in New York but for the eastern United States. The County has also acted in the interest of the ‘public trust’ to establish the 13.2 acre DQS-NRD. This process has also highlighted the high level of support there continues to be in the local community to protect and preserve the DQS-NRD. In terms of specific recommendations, the County could consider to take action on many of the options which have been discussed in this report. Ultimately, the County will need to decide to either continue to react to management and conservation issues as they arise, to formalize and enhance the current interpretation program based on the research and efforts of the IOCCNYSAA or to potentially develop a broad interpretation program which utilizes DQS-NRD as part of a larger cultural heritage objective.

Initial Stage

In the short term, the next year or so, the County could concentrate on formalizing and enhancing the basic programs which are already available to the County. Whether the County contemplates any other actions based on this report, The Archaeological Conservancy would recommend three basic steps to enhance the stewardship and preservation of the Dutchess Quarry Sites National Register District. The County should consider building on the existing relationship and resources which the IOCCNYSAA can provide to DQS-NRD. Orange County could and should develop a specific plan for the management of the Dutchess Quarry Sites National Register District, possible modeled after sample provided in the appendices of this report. The key elements which should be addressed in the management plan are oversight, site security, site access, public education, site stabilization and a research policy. As a supplement to this action, the County should establish a management committee to oversee such a plan. The current steering committee organized to review this report may be used to form the basis for the DQS-NRD management committee. The County should consider including the County Historian as the County Historic Preservation Officer to serve on committees related to the DQS-NRD.

With a management plan and committee in place, the County would be in a better position to evaluate other options to enhance their stewardship and interpretation of the Dutchess Quarry Sites National Register District. TAC would also recommend an increase in the level of site security for the DQS-NRD. This could take the form of barrier or gate to limit access to the old quarry path and a regular program of routine surveillance within the District. The County could install heavy metal posts and a metal gate to restrict access up the old quarry path which leads from Quarry Road up the hillside to the old dynamite shacks. The County should develop a site steward program similar to programs used by The Archaeological Conservancy and the Native American Site Stewardship Program utilized for Bear Mountain, Sterling Forest and Harriman.
New York State Parks, which is already in place in Orange County. It is also recommended that the County work closely with the IOCCNYSAAC membership which has already served as defacto site stewards for several decades. Without regular surveillance and adequate site security, ultimately all the other possible actions discussed in this report have as much potential to cause harm as to be beneficial to the DQS-NRD.

Short Term

After establishing a DQS-NRD management committee, the County will need to determine the level of support and the feasibility for maintaining or even expanding the site visitation program developed by the IOCCNYSAAC. Actions that the DQS-NRD management committee might take on behave and with the support of the County could include the adaptation of a research policy for the Dutchess Quarry Sites National Register District and through the management committee establish a research review subcommittee to evaluate the merits of all research requests. All research should be problem orientated and promote the principals of Conservation Archaeology. Any person or persons seeking to access the DQS-NRD should do so in writing, be subject to management committee approval and should be accompanied by a designated representative of the County or management committee when at the district. The management committee of DQS-NRD should regularly monitor the District and address site stabilization issues as they arise. The management committee should also designate a representative to regularly monitor internet search engines and known web sites with information on the Dutchess Quarry Caves site to insure that the information available is accurate and to request that any confidential information which would affect the security of the site be removed. Due to the rapidly changing nature of the internet, this should be a regular and ongoing process.

The County could take some limited measures to improve access to the caves and promote site tours on a limited basis to the District. The cave sites provide one of the few opportunities in the region to view an archaeological site and to truly experience how past humans would have occupied and lived at the site (see Figure 48). A graded and gravel parking area could be provide near the entrance to the old quarry path. This area should be secured by the gate discussed above and would provide a much safer staging area for site tours. The County could improve access to the Dutchess Quarry Sites National Register District by cutting and maintaining the old quarry path and the trail through the woods to the sites. A trail to the District could be widened and maintained on a regular basis. With some basic improvements tours of the caves could be scheduled at more regular intervals. Access to the site should still be restricted to guided tours. Eventually, efforts could be made to place support posts or a railing at the escarpment leading down to the caves, if only to improve the safety of the area for site stewards monitoring the caves.
Potential actions by the County over the next two to five years which could enhance the stewardship and conservation of the Dutchess Quarry Sites National Register District might include designating the District as parkland, granting a conservation easement to the New York State Office of Parks, Recreation and Historic Preservation, or by seeking National Historic Landmark status with the National Park Service. Dutchess Quarry Sites National Register District Orange County could assign the land on Mount Lookout containing the DQS-NRD to be administered by a single County Agency with the specific task of maintaining the land as an archaeological preserve. This agency may consist of a County Department such as Parks and Recreation, a newly formed advisory board to the County Legislature, or through the establishment of a non-profit agency such as a “Friends of Dutchess Quarry Sites”. To which ever entity becomes responsible for DQS-NRD, it is recommended that the County Attorney provides that Agency with copies of all leases and agreements pertaining to Goshen Quarry. All mining permits and reports on file with the NYS Department of Environmental Conservation should also be provided too, and retained by, this designated entity. The lack of this information on the local level has led to a number of misunderstandings between the local community, the County and the quarry operation.

If initial improvements prove to be beneficial to the Dutchess Quarry Sites National Register District and the community, the public benefits of the District might be expanded through increased interpretation and more regular visitation along the model of Meadowcroft Rock Shelter. The County could open the site on a limited basis for tours lead by the IOCCNYSAA after some basic improvements to the trail, parking, escarpment and site security. These tour programs and modifications could eventually be expanded to include school age programs. The County could consider installing a display or kiosk in a public space within the Village of Goshen to promote the natural and cultural heritage of Orange County and the DQS-NRD.

**Long Term**

While The Archaeological Conservancy was tasked to provide the County with a number of regional or long term options in terms of site interpretation, some of these actions may be inappropriate for the Dutchess Quarry Sites National Register District with its current level of administration. With improved site security and with a program in place to monitor the District on a routine basis, the County could consider improving the interpretation of the DQS-NRD through the installation of kiosk display panels at key locations with the District. Interpretive materials developed and utilized for display kiosks could also be made available to a large audience outside of Orange County through the use of the internet. A long term goal for public education could be the development of a school age curriculum on the

![Figure 49 - IOCCNYSAA tour stopping in the woods to review the prehistoric quarry loci June 11, 2011. (http://ioccnysaa.blogspot.com)](http://ioccnysaa.blogspot.com)
model of Meadowcroft Rock Shelter. Tours of the District (see Figure 49) should be guided and the area may not be suitable for self-guided public visitation. Longer term access improvements to the cave sites may include installing wooden steps and walkways from the trail down to the escarpment near the caves. Observation platforms or decks could also be installed above the escarpment and at the overlook area near Goshen Quarry. The County may consider developing a gravel parking area up the hill near the location of the dynamite shack. This area was cleared and graded in the past. By placing the parking further up the hill, the walking distance to the site would be cut in half, improving the visitor experience. This area would still be secured by the gate at the bottom of the hill at Quarry Road. This new parking should be made large enough to accommodate school buses. These types of improvements would require expanded oversight of the District and a significant financial commitment.

Over five to ten years the County could develop goals to promote greater cultural, historic and environmental tourism within the County. The County could initiate a study of potential locations for an interpretive center in a high traffic location near the Route 17 corridor or in the building a 13 Quarry Road. The center could serve two missions, to display and promote the cultural resources of Dutchess Quarry Sites National Register District and to promote the unique environmental, geological and historic heritage of the County. It is recommended the County work with other organizations in the region to promote archaeological site conservation, site visitation and archaeological interpretation to increase cultural tourism in the County. This work should explore ways to link multiple properties into a thematic heritage trail network. As part of a regional interpretive center, the County could develop a supporting website which would provide similar information to that on site kiosks and on displays in the center. This website should also provide links to other museums, historical and scientific organizations with interpretive displays in the County. This site could also provide information on bicycle or automobile tours of significant sites within the County. At present a number of County Departments currently operate their own web sites.

Also long term, the County could consider working with Dutchess Quarry and Supply Company to develop a reclamation plan for the reuse of the adjacent quarry site. The current plans for a lake could be expanded to include recreational access to the lake, additional open areas for hiking and picnicking and possible area for athletic fields. The property is zoned commercial mixed use and the company may be able to develop retail or commercial space along State Highway 17A (Seward Road). Shops or food services geared towards outdoor recreation could enhance the reuse of the property. The quarry site could eventually be a recreational, cultural and economic resource for the whole County.

Even though many of these actions are ambitious and require significant investment, the County may consider seeking grant funding for some of the options presented in this report. Orange County may be eligible for Environmental Protection Fund grants administered through the State. Starting in 2011, EPF grants became parts of the New York State Consolidated Funding Application with the grants reviewed by a Regional Economic Development Council and the NYS OPHP which is also responsible to administer awarded grants. Last year $13 million dollars were allotted to parks, historic preservation and heritage area projects. Municipalities can receive matching grants up to a maximum of $400,000 for the development of parks and recreational facilities or for the acquisition and restoration of historic properties. Dutch Quarry Sites
National Register District meets several of the criteria including being owned by the County and recognized as historically significant. These grants could provide matching funding to improve public access and interpretation within the District and for a larger off site interpretation program.

All of these efforts would allow Orange County to capitalize on its past conservation and preservation successes and promote Dutchess Quarry Sites National Register District as a cultural resource. These efforts should always take into consideration the archaeological integrity of the District with controlled, limited public access and increased site security. The County and the management committee should always be mindful of the fact that the DQS-NRD is a significant cultural resource and its long term preservation should not be compromised for potentially short term exploitation.
CITATIONS and Selective Bibliography

Anonymous
1860 Natural Resources Map of Orange County, New York.

Britt, Kelly M.
2007 “Archaeology-the “Missing link” to Civic Engagement?” in Archaeology as a Tool of Civic Engagement.
Barbara Little & Paul Shackel, editors, AltaMira Press, Lanham, MD.

Burr, D. H.

Connally G. E. & L.A. Sirkin

Costella, Martha A.


Decker, Harold
2006 An Introduction to The Dutchess Quarry Caves Complex. Manuscript of file Incorporated Orange County Chapter, New York State Archaeological Association, Middletown, NY.

Devine, Joseph

Diana, E.A., M. R. Pillmeier, & D. E. Church
2010 Orange County New York Comprehensive Plan, Strategies for Quality Communities. Orange County Department of Planning, Goshen, NY.

Dumont, E.K.& W.F. Ehlers

Funk, R. E.


Funk, R.E., D.W. Fisher, & E. M Reilly, Jr.
Funk, R. E., G. Walters, & W.F Ehlers

1965 “Fluted Point Discovered in Orange County Cave” in New York State Archaeological Association Bulletin 34: 2-4.

Funk, R. E., G. Walters, W.F Ehlers, Jr., J. E. Guilday, & G.G. Connally

Funk, R.E & D. W. Steadman

Gramly, R.M.

Gramly, R.M. & R.E. Funk
1990 “What is known and not known about the Human Occupation of the Northeastern United States until 10,000 B.P.” in Archaeology of Eastern North America 18: 5-31.

Guilday, J. E.
1969 “A Possible Caribou-Paleoindian Association from Dutchess Quarry Cave, Orange County, New York” in New York State Archaeological Association Bulletin 45: 24-29.


Henry, E.

Incorporated Orange County Chapter New York State Archaeological Association
2008 Dutchess Quarry Caves Tour Guide. Manuscript of file Incorporated Orange County Chapter, New York State Archaeological Association, Middletown, NY.


Kelly, Sophia
2007 Developing and Implementing Archeological Site Stewardship Programs. Brief 22, Department of the Interior, Department Consulting Archeology Program, National Park Service, Washington, D.C.

Haynes, C.V.
Kopper, J.S.,


Kopper, J.S., R.E. Funk & L. Dumont
1980 “Additional Paleoindian and Archaic Materials from the Dutchess Quarry Cave Area, Orange County, New York”. In *Archeology of Eastern North America* 8:125-137.

Lepofsky, Dana

Lipe, William D.

Lunday, Elizabeth
2011 “Making a Case For the Pre-Clovis” in *American Archaeology* 15 (3); 20-25.

Lynott, Mark J. & Alison Wylie, eds.

Malakoff, David

Maymon, J.H., M. Williams, C.A. Child, Jr. & B.A. Stone

McNott, C., B.A. McMillan & S. Marshall

Meltzer, D.J.

Mounier, R. A.

Moyer, Teresa S.

Muller, E. H.
Neal, Arminta  

NYS Dept. of Environmental Conservation & NYS Office of Parks, Recreation & Historic Preservation  

New York State Office of Parks, Recreation & Historic Preservation  


Picat, Iris  

Pretola, J.P. & J.A. Freedman  

Rennenkampf, Lenora M.  

Ritchie, William A.  


Sauthier, C. J.  
1779  Map of the Province of New York.

Seibert, Ericka K. Martin, editor  

Sidney, J. C.  

Simpson, Gaylord and George H. Tobien  

Slick, Katherine  
Stanzeski, A. J.

Steadman, D. W., & R. E. Funk

Steadman, D. W., R. E. Funk & T. W. Strafford, Jr.

Steadman, D. W., T. W. Strafford & R. E. Funk

Stewart, Tamara

Storch, P.

Yaro, R.D., R. Lane, D.M. Kooris, J. Cox & D. Starobin
2007 Southeastern Orange County Land Use Study; Illustrating Smart Growth for SE Orange County. The County of Orange and The Orange County Planning Board, Goshen, NY.
### APPENDIX A - A CHRONOLOGY OF Dutchess Quarry Sites NR District

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20,000 BP</td>
<td>Wisconsin glaciers cover most of the region</td>
</tr>
<tr>
<td>17,500 BP</td>
<td>Glacial melt along Pellets Island, New Hampton and Wallkill moraines form large lake in Wallkill valley, basal deposits form Caves 1 &amp; 8</td>
</tr>
<tr>
<td>12,500 BP</td>
<td>Lakes receded and predators using the caves for shelter / Caribou C-14</td>
</tr>
<tr>
<td>10,580 BP</td>
<td>Natives using the caves by this time which continues into the late Woodland period in Cave 1</td>
</tr>
<tr>
<td>4000 BP</td>
<td>Roof collapse seals Paleo-Indian and Archaic deposits in Cave 8</td>
</tr>
<tr>
<td>1839</td>
<td>County ‘Poor’ farm depicted on historic maps</td>
</tr>
<tr>
<td>1938</td>
<td>County leases road ballast mine to Dutchess Quarry &amp; Supply Company</td>
</tr>
<tr>
<td>1930-1940s</td>
<td>Boy scouts visiting Cave 1</td>
</tr>
<tr>
<td>1940-1950s</td>
<td>IOCCNYSAA members locate prehistoric cultural material in Cave 1</td>
</tr>
<tr>
<td>1964</td>
<td>Chapter conducts intensive excavations at Cave 1 entrance</td>
</tr>
<tr>
<td>1967-1973</td>
<td>Chapter continues excavations deeper into Cave 1</td>
</tr>
<tr>
<td>1/18/1974</td>
<td>Duchess Quarry Cave 1 listed on the National Register of Historic Places</td>
</tr>
<tr>
<td>1974</td>
<td>Dr Kopper locates 7 possible chambers during electrical resistivity survey</td>
</tr>
<tr>
<td>1975-1978</td>
<td>Dr Kopper tests anomalies locating cultural material in Caves 2, 7 &amp; 8; Caves 3,4,5, &amp; 6 no cultural remains, exact locations unknown</td>
</tr>
<tr>
<td>1977</td>
<td>Dr. Kopper conducts altimeter survey to determine original face of hillside</td>
</tr>
<tr>
<td>1979-1981</td>
<td>Dr. Kopper directs excavations in Cave 8</td>
</tr>
<tr>
<td>1982-1984</td>
<td>Dr. Kopper tests other rock shelter locations in the Wallkill Valley including Dead Dog Rock Shelter</td>
</tr>
<tr>
<td>1986</td>
<td>Drs. Funk &amp; Steadman sample the lime breccia deposit in Cave 8</td>
</tr>
<tr>
<td>1987</td>
<td>Dr. Steadman locates two anomalies using ground penetrating radar</td>
</tr>
<tr>
<td>1988</td>
<td>Drs. Funk &amp; Steadman remove the cultural deposit from Cave 8</td>
</tr>
<tr>
<td>1989</td>
<td>Dr. Steadman unable to locate entrances to anomalies Caves 9 &amp; 10; test benches outside the caves and find no cultural deposits</td>
</tr>
<tr>
<td>1990</td>
<td>Plans by Goshen Quarry to expand initiates environmental review process</td>
</tr>
<tr>
<td>1990</td>
<td>County sets aside 2 acres to protect Cave 1, contemplates selling rest of property</td>
</tr>
<tr>
<td>1991</td>
<td>Dunn GeoScience Corp conducts terrain conductivity and VLF electromagnetic survey around Mount Lookout</td>
</tr>
<tr>
<td>1991-1992</td>
<td>Hartgen Archaeological Associates conducts CRM test on 8 acres east of Caves and locate 5 prehistoric quarry activity areas</td>
</tr>
<tr>
<td>1993</td>
<td>County accepts mitigation / reclamation plan to include 13.2 Historic Preserve and 1.1 acre buffer zone</td>
</tr>
<tr>
<td>1995</td>
<td>National Register boundaries expanded to 13.2 acres to include Caves 1, 2, 7 &amp; 8 and Goshen Quarry Loci 2, 3, 4 &amp; 5.</td>
</tr>
<tr>
<td>2008</td>
<td>County and IOCCNYSAA start series of annual site tours</td>
</tr>
</tbody>
</table>
APPENDIX B - SAMPLE GENERAL GUIDELINES FOR THE MANAGEMENT OF ARCHAEOLOGICAL PRESERVES

Purpose

For the past 30 years, The Archaeological Conservancy (TAC) has acquired archaeological and historical properties for the purpose of preserving them from damage and destruction in order that through a long future they may be studied to increase our understanding of the lives of their occupants and of the past in general. TAC has developed general guidelines to manage archaeological preserves according to the principles of Conservation Archaeology, which mandates that major parts of the preserves be saved for future generations. To this end, research should be welcomed so long as it is carefully controlled and thoroughly documented to minimize damage and maximum increase in knowledge.

General Policies

Acting on behalf of Orange County, New York, the Orange County Department of Planning will be responsible for implementing the following policies:

1. A management committee and plan that addresses specific elements and concerns will be established for the preserve. This Cultural Resource Management Plan will be consistent with the general purposes and policies of the Secretary of the Interior’s Standards for the Treatment of Historic Properties. They will consider such matters as stabilization, site security and protection, nondestructive use of the property, research, curation, access, and other issues relevant to prudent management and stewardship for the public good.

2. Provision will be made in the plan for adequate ground cover, minimum erosion, stabilization, and disturbance (from planting, mowing, grazing, etc.) and for fencing and monitoring when appropriate and necessary. The County will consult with local agricultural agents as to suitable ground cover, methods of plowing and planting to avoid disturbance below the existing plow zone, and the best frequency of harvesting or mowing. In areas where ground cover is difficult to establish, other suitable measures will be taken to prevent or retard erosion including reintroduction of native vegetation where possible.

3. Permission will be required for all visits to the preserve, such as those by interested students, local groups, or professionals. Requests for such visits will be made in writing to the appropriate agent as determined by the County. Visitors to a preserve ordinarily will be accompanied by a site steward and will be asked to give their names and addresses along with the time and date of their visit. Access to a preserve by Native Americans or any other group having historic ties to that preserve will be given special consideration although it, too, must be arranged through the appropriate County agent.

4. Research will be permitted when appropriate to a problem-oriented program, but permission will be required with the conditions stated below. Field schools and other training programs are allowed if they are problem oriented, adequately supervised, and meet all stipulations for a permit.

5. If human remains are encountered all work must stop and the remains will be treated with dignity and respect. The Orange County Coroner must be notified and their office should contact the NYS Office of Parks, Recreation and Historic Preservation to develop a plan of action before any research can proceed.
6. Because the Conservancy believes in the widest possible dissemination of information about archaeological investigations, researchers, visitors, and other users are encouraged to fully cooperate with the scientific media as well as popular media, including newspapers, magazines, journals, and electronic media. In all such contacts, Orange County shall be identified as the owner of the archaeological preserve.

   Media access to news about archaeological preserves and research thereon shall not be discriminatory. The County should not reserve preferential access to news for its own publications, nor should it allow any researcher or user to give preferential access to news about research or use on the preserve to any media outlet.

**Procedures for Applying for a Research Permit**

1. Formal application will be made in writing to Orange County via the appropriate County agent, with (a) a detailed research plan (see check list attached), (b) an endorsement of the research by the institution or organization employing and funding the investigator, and (c) evidence of compliance with the County’s insurance policy. All research must have institutional/organizational affiliation, and the Principal Investigator must have a graduate degree in anthropology/archaeology, preferably a Ph.D.

2. A request for non-invasive research (such as a magnetometer survey, mapping, aerial photography, and zero collection surface survey) may be submitted, with the approval of the County, by stating in letter form, the questions being addressed, the work to be done, the personnel involved, the sponsoring organization, the dates of the project, the expected research benefits, and a timetable for a report. Whenever appropriate, the research should follow the procedures outlined below in Sections 4 and 5.

3. For more invasive field work (surface collecting, testing, or excavation) a comprehensive research design will be submitted, comparable to that required by the National Science Foundation or the National Endowment for the Humanities, including (a) the relation of the proposed work to previous investigations at the preserve or in the area, (b) specific area(s) of the preserve designated for investigation, (c) the proposed field procedures, (d) techniques for acquiring and analyzing data, (e) a timetable for the field report, the analysis and reporting of the results, (f) a detailed budget for field work, analysis and publication, and for costs of curation of artifacts and samples for curation, (g) a copy of a negotiated curation agreement, and (h) such other details as the County may specify.

   The research design should be oriented to problem solving rather than mere data gathering. Curriculum vitae of the principal investigator and any other professional staff should be included.

4. In the event of more than one request to conduct research at the same time, the County may require the applicants to coordinate their plans before the applications receive further consideration; or the County may appoint a Review Committee to consider them and select only one for approval.

5. Review Committee. The County will appoint a minimum of a three-member committee to evaluate the qualifications of the researcher(s) and to review the application and determine if it is acceptable. It is recommended that the County appoint a member from the staff to the NYS Offices of Parks, Recreation and Historic Preservation to serve on the review committee. In addition the committee should include, insofar as is possible and practical, (a) a representative of a state or local archaeological society or other organization and (b) a recognized authority on the archaeology and/or history of the area and problems of the research being proposed, who is not involved in the project or associated
with its sponsors. The committee could also include a non-professional avocational archaeologist, historian, or other appropriate specialist, who is interested in the local or regional archaeology and history, or a nationally recognized authority on archaeological research design and excavation procedures. One member will be designated by the County to serve as chairman. Members of the Department of Planning may serve on review committees.

6. Each Review Committee member will receive a copy of the proposal and within 30 days will discuss it with the other committee members in person, by mail, and/or telephone conference, and the committee will agree on a recommendation to which a majority of the members must agree. The chairman will notify the County committee’s recommendation, which may be (a) the acceptance of the proposal as submitted, (b) acceptance subject to modifications specified by the committee, or (c) rejection, with specific reasons stated. The County agent will communicate to the applicant the results of the review. In the case of (b) the same committee will review the revised application, if one is submitted. In the case of (c) the County may, but need not necessarily, invite rewriting and resubmission.

7. The County may approve a project on the condition that the project receives adequate funding.

**Research Procedures**

1. Compliance. The County may appoint a member of the Review Committee to monitor the research project during the field work and report to the County periodically or at its conclusion.

2. Changes in the permitted research design, such as extending the excavations beyond areas indicated in the application or modifying the data collection procedures, are possible, but only if they have prior approval by the County. Failure to obtain such approval can result in revocation of the research permit and banishment from the site.

3. The preserve must be left in safe, stable, and secure condition during interruption in the work and its completion, at the expense of the investigator. All excavations must be backfilled.

4. Each backfilled area must be identified by including, at the investigator’s expense, well-fired ceramic tiles (about 3”x 3”) that name Orange County and give the date of the backfilling.

5. Preliminary Report. Within 90 days after the conclusion of any field season the principal investigator will provide a written report of results to the County. This report will include a map of the preserve indicating the location(s) of field work, and discussion of results. It may include a request for modification of the original proposal if a subsequent field season has already been approved. Failure to submit a preliminary report in a timely manner may be grounds for denying future research on a County preserve.

6. Final Report. Within a reasonable period of time following completion of the analysis of the data (usually a year or less), one or more papers or scientific reports will be presented at professional meetings and will be submitted for publication. Copies of papers presented at meetings and of their published versions, as well as any other published reports, will be sent to Orange County, the appropriate State Historic Preservation Officer, and to any other organization or institution that the Orange County may specify. All reports, papers, and presentations should acknowledge Orange County’s ownership of the preserve.
Ownership and Disposition of Collections

1. Ownership. The collections from a field program will include all artifacts, samples or specimens for analysis (faunal or floral identification, pollen study, dating, etc.) and all related documentation whether written or taped or digital and including maps, diagrams, drawings, and photographic negatives and one print of each. The collection remains the property of Orange County until it is transferred to an appropriate repository. Collections will not belong to the excavator, and the excavator’s institution may or may not be chosen as the permanent repository. All costs associated with preparing and curating collections shall be the responsibility of the researcher.

2. Borrowing Collections. The excavator, through his/her institution or sponsoring organization, may borrow a collection until analysis is complete and when doing so must inform the County of the location in which it will be kept, and of any change in its location. Portions of the collection may not be loaned to others, except that for analysis and identification specimens and artifacts may be sent temporarily to appropriate laboratories.

3. Duplication of Documents. The excavator may duplicate any and all documents relating to the collection for his/her permanent use and possession. Duplication of artifacts, however, will require permission from the designated agent of the County.

4. Final Repository. The collections will be deposited in a public institution that, except for unusual circumstances, will be located within the state. Private curation facilities may be considered provided they meet minimum standards for curation and are accessible to researchers. Proper procedures for storage, curation, preservation, and retrieval of the collection must be followed by the permanent repository. The documentation must remain in the same repository as the rest of the collection and be stored in accordance with proper archival standards. In the case of breaches of proper storage and/or other procedures by the repository, as judged by the Orange County Department of Planning, the collection may be transferred to another repository. The deaccessioning of any part of the collection by the repository will result in that part of the collection being transferred to another facility deemed appropriate by Orange County Department of Planning.

Public Education

At the conclusion of a research project the investigator should assist local museums and related organizations in updating and expanding any information they are disseminating to the public in the light of new data and conclusions. Publication of a report on, or description of, the research in a popular medium is encouraged but not required.

Divestiture

Orange County may grant approval for the divestiture of the preserve if the County has reason to believe that the successor organization will preserve the archaeological site(s) and if the organization agrees to a management plan (either an existing plan or a plan to be developed in conjunction with the successor organization) that includes allowing research to be conducted on the preserve and adhering to other basic principles of the general management guidelines. If the successor organization ever decides to divest itself of the preserve, it should agree to give Orange County the right of first refusal to reacquire the preserve. Nothing in this policy precludes the divestiture of lands that have no archaeological values.
APPENDIX C - SECRETARY OF THE INTERIOR’S HISTORIC PRESERVATION PROFESSIONAL QUALIFICATIONS STANDARDS

The federal professional qualification requirements are published in the "Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation, 48 CFR 44716." They include the following:

History

The minimum professional qualifications in history are a graduate degree in history or closely related field; or a bachelor's degree in history or closely related field plus one of the following:

1. At least two years of full-time experience in research writing, teaching, interpretation or other demonstrable professional activity with an academic institution, historical organization or agency, museum, or other professional institution; or
2. Substantial contribution through research and publication to the body of scholarly knowledge in the field of history.

Archaeology

The minimum professional qualifications in archaeology are a graduate degree in archaeology, anthropology, or closely related field plus:

1. At least one year of full-time professional experience or equivalent specialize training in archaeological research, administration or management.
2. At least four months of supervised field and analytic experience in general North American archaeology; and;
3. Demonstrated ability to carry research to completion.
4. In addition to these minimum qualifications, a professional in prehistoric archeology shall have at least one year of full-time professional experience at a supervisory level in the study of archeological resources of the prehistoric period. A professional in historic archeology shall have at least one year of full-time professional experience at a supervisory level in the study of archaeological resources of the historic period.

Architectural History

The minimum professional qualifications in architectural history are a graduate degree in architectural history, art history, historic preservation, or closely related field, with coursework in American architectural history; or a bachelor's degree in architectural history, art history, historic preservation, or closely related field plus one of the following:

1. At least two years of full-time experience in research, writing, or teaching in American architectural history or restoration architecture with an academic institution, historical organization or agency, museum, or other professional institution; or
2. Substantial contribution through research and publication to the body of scholarly knowledge in the field of American architectural history.
Architecture

The minimum professional qualifications in architecture are a professional degree in architecture plus at least two years of full-time professional experience in architecture; or a State license to practice architecture.

Historic Architecture

The minimum professional qualifications in historic architecture are a professional degree in architecture or State license to practice architecture, plus one of the following:

1. At least one year of graduate study in architectural preservation, American architectural history, preservation planning, or closely related field; or
2. At least one year of full-time professional experience on historic preservation projects. Such graduate study or experience shall include detailed investigations of historic structures, preparation of historic structures research reports, and preparation of plans and specifications for preservation projects.

Historic Preservation Planning

The minimum professional qualifications in Historic Preservation Planning are a graduate degree in Planning, or a closely related field, with coursework in Historic Preservation, plus a minimum of two (2) years of full-time professional experience in Planning, or a Bachelor's degree in Historic Preservation Planning or a closely related field with related coursework, plus a minimum of four (4) years of full-time professional experience in Historic Preservation Planning. Relevant professional experience in Historic Preservation Planning involves work that enabled professional judgment to be made about the identification, evaluation, documentation, registration, protection or treatment of historic and archaeological properties in the United States.

Historic Landscape Architecture

The minimum professional qualifications are a Masters degree in Landscape Architecture with relevant coursework plus two years of full-time professional experience and relevant products and activities, or a four-year or five-year Bachelors degree in Landscape Architecture plus three years of full-time professional experience, or a State Government-recognized license to practice Landscape Architecture plus two years of full-time professional experience.

Professional experience must demonstrate application of the theories, methods, and practices of Landscape Architecture that enable professional judgments to be made about the identification, evaluation, documentation, registration, or treatment of historic properties in the United States. Relevant work products must demonstrate the successful application of acquired proficiencies in the discipline to the practice of historic preservation.

*Full-time professional experience is defined as one continuous year or discontinuous periods (full or part-time) adding up to the equivalent of a year of full-time experience.