The James Hatch Site

(36CE0544)

A Native American Stone Tool Workshop in Centre County, Pennsylvania

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Credits

Authors:
Joe Baker, Katherine Peresolak, and Jonathan Burns.

Cover Images Courtesy of Millbrook Marsh Nature Center.

Introduction

On autumn Saturdays, a meadow not far from the entrance to Beaver Stadium at Penn State hosts hundreds of tailgate parties. The revelers enjoy great pre-game meals and cold beer, swap stories of past teams, share their hopes for a championship season, and file into the stadium to root for the Nittany Lions. These pre-football game gatherings have been going on for generations, and through all those joyous celebrations the fans have never known that a secret lies beneath their feet.

They are not the first people to gather here: not by a long shot.

The Ordovician limestone beneath the meadow is hundreds of millions of years old, and thanks to the marine mollusk shells that comprise it, it's rich in calcium and carbon. It also contains iron left by the ancient sea water that once covered the Nittany Valley. As the earth's tectonic plates moved and migrated and pressed against each other over the millennia, faults or cracks appeared in the limestone. Hot water from the earth's crust welled up through the faults and brought with it silica, which reacted with the calcium, carbon and iron, and left behind nodules of a shiny yellow or red mineral called Goethite, or Bald Eagle Jasper. In portions of the limestone with less iron content, smaller amounts of Bellefonte Chert, a blue-gray and very fine-grained type of flint, also formed (**Figure 1: Bald Eagle Jasper and Bellefonte Chert**).

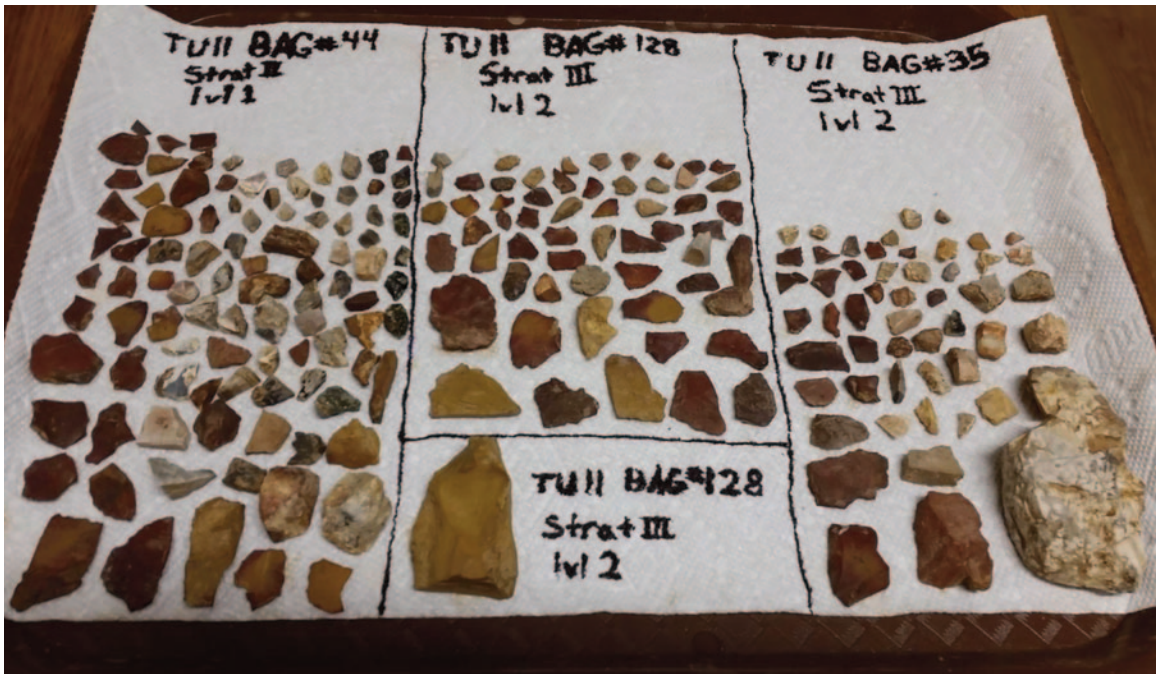


Figure 1: Bald Eagle Jasper and Bellefonte Chert

Image Courtesy of Millbrook Marsh Nature Center.

Sometime during or just after the last Ice Age (perhaps 14,000 years ago), the ancestors of modern Native American people discovered the jasper. They experimented with it, and discovered it could be used to fashion sharp, durable tools. For ten thousand years or more, they and their descendants returned again and again to this place, dug out nodules of jasper, heated them in wood fires to harden them and improve their working characteristics, and took them to the banks of a nearby stream. Camped along the stream, they patiently fashioned the stone into weapons and tools. They carried and traded these implements across much of what's now Pennsylvania, New York, Maryland, and Ohio.

Long before universities and football, this was an important place, a place that figured in the lives of countless generations of people for thousands of years. For a long time, the story of the jasper quarry and the nearby workshops and campsites that surrounded it was almost lost, known only to a few local archaeologists. Thanks to the work of archaeologists from the Pennsylvania Department of Transportation, Juniata College, and Indiana University of Pennsylvania in 2016 and 2017, the story has been rediscovered, and a window into the lives of some of the first Pennsylvanians has been re-opened.

This booklet is an invitation to look through that window, meet those people, and see a familiar landscape through new eyes.

Table of Contents

Wait...

PennDOT does Archaeology?

When most Americans hear the term "Archaeology", it's likely that Egypt or the Southwest comes to mind. So do images of elderly, bearded, fedora-wearing, pipe-smoking scholars scrutinizing pottery or human remains. This is mostly fantasy and the product of the movie industry and novelists. The reality is substantially more complex and interesting.

Wherever you live, you don't have to leave home to encounter a rich and hidden heritage. Every place has a past, and every past is important. Beneath your feet is evidence of the history of your community. Foundations, buried objects, and layers of soil all bear witness to your predecessors and to the events that shaped their lives. The lives and accomplishments of the first indigenous people to live on this continent, the record of immigrants from Europe, Africa, Asia, and every corner of the globe, the rise and fall of industries and ways of life, and historical events great and small are all part of the archaeological record of your hometown.

Image Courtesy of Millbrook Marsh Nature Center.

Most of the archaeologists who identify and study that record don't work at universities. Federal and state historic preservation laws require consideration for the buried past before publicly funded projects are implemented or permits are issued. As a result, most archaeologists work at public agencies, such as PennDOT, private-sector for-profit consulting firms, and non-profit organizations. Also, there are fewer grey beards, pipes, and fedoras than you might think. The profession now has more women than men, and it's getting younger with each passing year. They're not jetting off to the Middle East or other exotic locales to dig pyramids; they're working right here in North America.

They work hand in hand with designers, planners, and engineers involved in the implementation of every kind of infrastructure and resource extraction. Transportation is one of the largest sponsors of archaeological work in the United States, and some of the very best and most informative archaeology ever done in this country has been done by State Departments of Transportation. This kind of archaeology has been known for decades as ***Cultural Resource Management or CRM***. Lately, the term Heritage Management, referring to historic resources both below and above ground, has been gaining traction. Whatever you call it, archaeology in the public interest has been helping to tell the story of our collective past for at least forty years, and our understanding of who we are and where we came from owes a great deal to the hard work of CRM archaeologists nationwide.

Centre County Jasper: A Brief History

Archaeologists have known about the jasper quarry near Beaver Stadium since the 1970s. At that time, a regional archaeological survey program funded by the Pennsylvania Historical and Museum Commission was underway. The part of the survey that focused on Centre County and the Bald Eagle and Spring Creek Valleys was implemented by Penn State's Anthropology Department. The project was supervised by a young professor named James Hatch (**Figure 2: Jim Hatch**). Jim Hatch went on to train and mentor many archaeologists working throughout the Middle Atlantic region (a short biography of Jim can be found at the end of this narrative).

The quarry was initially recorded and mapped in the mid to late 70s. It was called the Tudek Quarry after a local resident and student, Bob Tudek, who first reported it to the faculty at Penn State. In the early 1980s, as part of the planning for improvements to Routes 322 and 26 at the foot of Mount Nittany, additional surveys by Penn State encountered a series of stone-tool manufacturing workshops scattered along the banks of Slab Cabin Run and Spring Creek above and below the little crossroads of Houserville. These workshops and the quarry were nominated to the National Register of Historic Places in the 1980s as an archaeological district, one of the first Native American National Register Historic Districts in the Commonwealth. Despite Penn State's years of work at this complex of sites, only the basics of some of the workshop locations were ever documented, and little intensive study was ever implemented. Beyond their general locations, many of the basic details of how and when these sites were occupied, used, and abandoned remained a mystery. The planning and implementation of a modest transportation project in 2015 helped solve some of that mystery.

Figure 2: Jim Hatch

The Centre County Bike Trail Project

Prior to 2014, College Township, the Centre County Metropolitan Planning Organization, PennDOT and Penn State began work on the planning and design for a pedestrian and bicycling path that would connect the existing trail along Slab Cabin Run near Millbrook Marsh Preserve with Park Road to the north (**Figure 3: Proposed Bike Trail Connector**). The new trail would get bike and foot traffic off the narrow and dangerous Orchard Road and would also improve runoff and drainage issues on Orchard Road and Puddintown Road. It would also run through part of the complex of stone tool workshops associated with the jasper quarry.

Since the proposed Puddintown Road Bike Path used Federal Transportation Alternative Funds, it was subject to the provisions of federal historic preservation laws and regulations. The bike trail project was modestly funded, so PennDOT

Figure 3: Proposed Bike Trail Connector

deployed their student co-op field archaeology program, the PennDOT Highway Archaeological Survey Team (PHAST) to conduct an archaeological reconnaissance (**Figure 4: PHAST Crew**). PHAST is a student-staffed partnership between Indiana University of PA's Applied Archaeology Program and the PennDOT Bureau of Project Delivery. Every summer the PHAST team completes between ten and twenty mostly small archaeological projects for the Department at a fraction of the cost required for consulting services. Since PHAST began in 2010, it has trained dozens of working young professionals in the basics of CRM archaeology, and has saved the taxpayers hundreds of thousands of dollars. PHAST won a National Environmental Excellence Award from the Federal Highway Administration in 2017 and is a model program in transportation archaeology in the Eastern US.

Figure 4: PHAST Crew

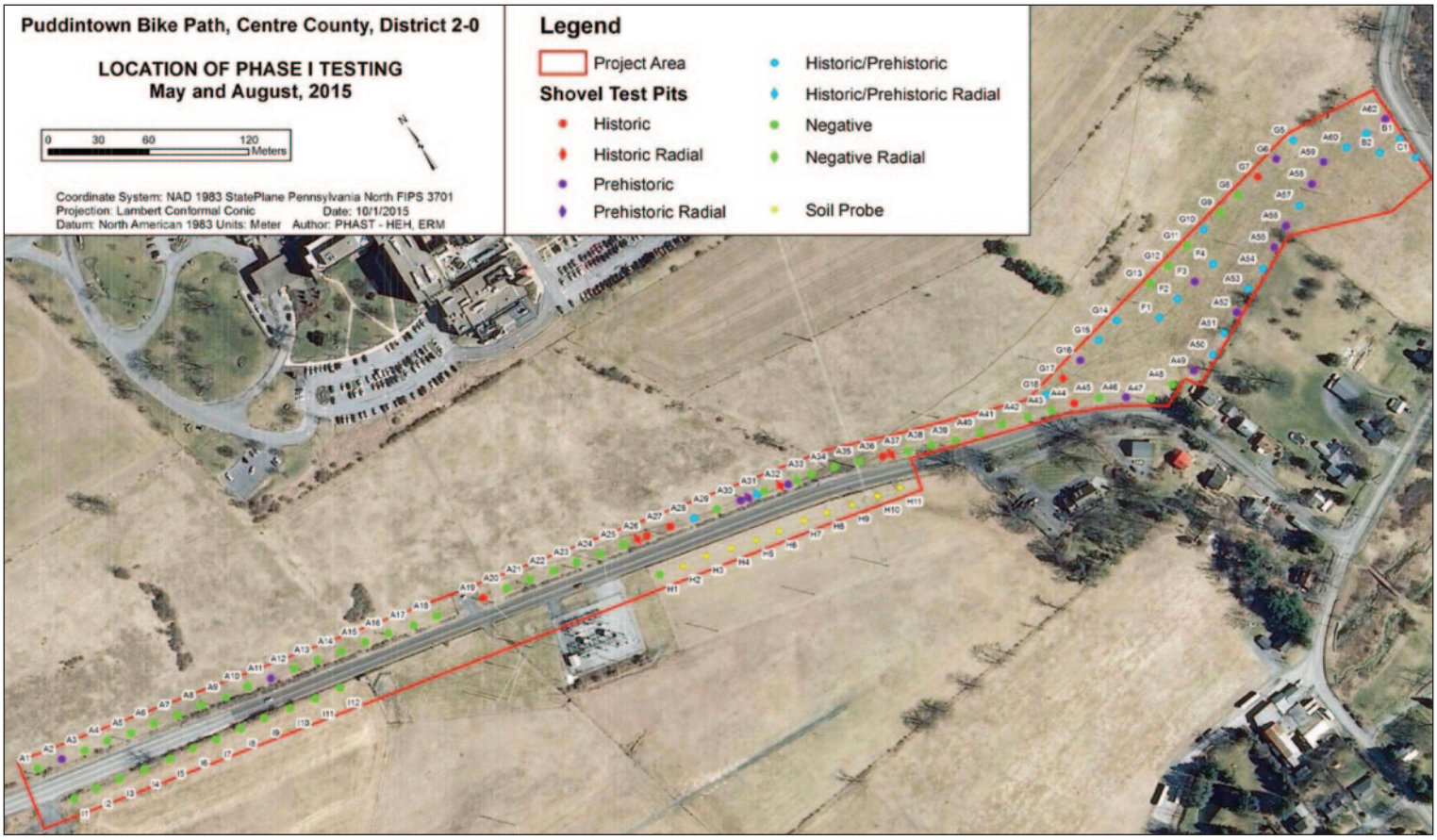


Figure 5: Phase I Shovel Testing Map

The Discovery and Evaluation of the Hatch Site

PHAST conducted a reconnaissance level, or ***Phase I***, archaeological survey of the Puddintown Road Bike Path early in the summer of 2015. Most of the survey was conducted on Penn State University pasture lands along Orchard Road (**Figure 5: Phase I Shovel Testing Map**). The crew of four graduate students excavated almost 100 ***shovel test pits STPs)*** at regular 15-meter intervals along the proposed route of the bike trail (**Figure 6: Shovel Test Pit**). STPs are 57 cm in diameter, and are hand-dug with shovels, with the soil pushed through a metal mesh screen to recover artifacts. Beginning near Beaver Stadium, the line of STPs was located parallel to Orchard Road for nearly a quarter mile, then angled away east across a low saddle and on to a flat low-lying pasture next to Puddintown Road and Slab Cabin Run.

Figure 6: Shovel Test Pit

Along Orchard Road, some soil disturbance from the nearby road was present, but most of the STPs had the typical dark topsoil (***or A horizon***) over the lighter colored subsoil (***or B horizon***) stratigraphy typical of most upland areas in Pennsylvania. For much of the survey area along Orchard Road, recovered artifacts reflected the long history of farming that took place before and after the property was owned by the university. Crewmembers were not surprised to find various common historic artifacts, such as iron nails, buried window glass, and broken pottery. There was evidence of livestock care (a plastic syringe was recovered), and the foundation remains from one or two twentieth century outbuildings. There were also occasional small flakes of jasper, reflecting sparse use of the route by Native American visitors.

When testing began in the low-lying pasture at the eastern end of the bike trail route, the artifact content changed dramatically. Large numbers of jasper flakes were found in the STPs, and, in the area closest to Puddintown Road, they were concentrated in a buried A horizon sealed deep below the modern surface (**Figure 7: Soil Profile with Buried A Horizon**). Tree-clearing and intensive plowing in the nineteenth century had exposed the slopes above the site to precipitation and wind, and the resulting erosion filled the landscape here with over a meter of new soil. The buried topsoil had not been exposed at the surface since the mid-nineteenth century, based on the ceramics and other historic artifacts found above it. The buried surface contained hundreds of fragments of jasper and very few Euro-American artifacts.

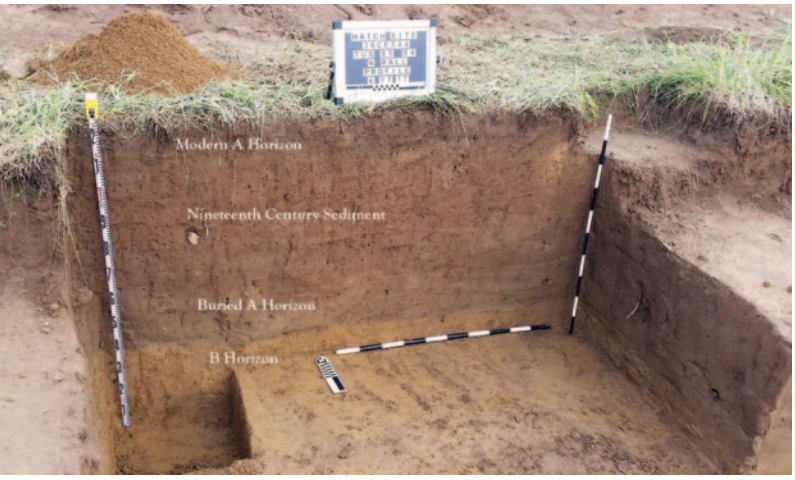


Figure 7: Soil Profile with Buried A Horizon

Following the discovery of this buried and sealed site, PHAST conducted additional testing in this area to try to evaluate the site's condition, extent, and significance.

Figure 8: Phase II Artifacts

This evaluation testing, or ***Phase II*** survey, consisted of two one-meter by one-meter test units, which allowed the crew to see more of the buried surface and better sample artifact amounts in two different parts of the project area. This testing resulted in the recovery of 500 more jasper and chert artifacts, and clear evidence that the sealed site was part of a complex of stone tool workshops associated with the quarry near the stadium (**Figure 8: Phase II Artifacts**). The site was assigned a **Smithsonian**

Trinomial Site Number by the Pennsylvania Archaeological Site Survey (PASS) and was officially designated 36CE0544. It was named the James W. Hatch Site to honor the late Jim Hatch. The site certainly contained the kinds of artifacts and information that would make it possible to reconstruct both when and how it was used and also how it was related to the Tudek Quarry. That meant the Hatch site was eligible for the **National Register of Historic Places** for the information it contained (***Criterion D***). The findings of the Phase I and II investigations were documented in a technical report in the winter of 2016 and submitted to the PennDOT Cultural Resources program, the Federal Highway Administration (FHWA) Pennsylvania Division, and to the Pennsylvania State Historic Preservation Office (SHPO). All the agencies agreed that the workshop was indeed National Register eligible, and that some effort to recover a sample of artifacts and information would be required to mitigate the expected damage to the site that would be caused by trail construction. Such a mitigation project is termed a ***data recovery excavation or Phase III*** survey. The curated artifacts, documents, and photographs from PHAST's Phase I and II work would serve as the foundation upon which the data recovery excavation was planned.

Data Recovery Excavations at the Hatch Site

The work plan developed by PennDOT, the PHMC, the FHWA, and Juniata College was focused on exposing portions of the buried surface of the Hatch Site that would be directly affected by construction of the bike trail. The nineteenth century horizon on the site surface would be removed with mechanized equipment, and the underlying buried A horizon would be carefully excavated to the B horizon beneath it. This would accomplish two goals. A substantial sample of artifacts would be recovered that would help document exactly how, and possibly when, the workshop was organized and used by its former inhabitants. Beyond the artifact sample, it was hoped that the remains of ***features*** like cooking hearths or storage or trash pits might be encountered below the A horizon. These might yield critical ***organic samples*** for ***radiocarbon dating*** and for reconstructing the local environment, diets, and other aspects of daily life of the Native Americans in this part of Pennsylvania.

The work plan called for sampling two five-meter by five-meter blocks in the portions of the site that contained the buried A horizon and had yielded the highest artifact numbers during the discovery and evaluation phases of testing. Eight square meters within these blocks were to be excavated all the way to the bottom of the soil column to be certain there were no more deeply buried Native American occupations beneath the A horizon. These eight square meters were broken into three excavation areas: one measuring one-meter by four-meters, and two measuring one-meter by two-meters. The workplan also called for the excavation of ten smaller test units on the slope just above the main site to better define the site's boundaries and try to reconstruct how Native People were using the landscape between the main workshop and quarry. A final part of the workplan called for collaboration with a soil scientist and geologist to reconstruct the site's ***geomorphology and formation history*** and to gather data necessary to reconstruct the environmental history of the site.

To accomplish these goals, Juniata College relied on Dr. Jonathan Burns, the Director of the Cultural Resource Institute at Juniata to lead the project. Jonathan relied on Field Supervisors Katherine Peresolak and Christopher Swisher, and Field Technician Assistants Kristin Kopera and Brendan Cole, to help teach and supervise a team of 11 undergraduate students working on their first archaeological project. PennDOT detailed the 2017 PHAST crew to assist with the project and focus on the hill slope test unit excavations.

Figure 9: Opening the Blocks

On May 22, 2017, with the help of a PennDOT backhoe and several of the Department's archaeologists, ground was broken on the excavation at the Hatch Site (**Figure 9: Opening the Blocks**). The backhoe removed most of the nineteenth and twentieth century deposits that covered the buried A horizon, and the crew finished the exposure of the old land surface by hand. They then superimposed a ***grid*** on each of the two five meter blocks (designated Block A and B) to allow for accurate mapping of the artifacts and features. All depth and distance measurements on-site were made using a laser-guided transit (Topcon GTS-250 series electronic total station) (**Figure 10: Surveying at the Hatch Site**).

These measures ensured that the precise, three-dimensional locations of all the discoveries could be precisely established. That's very important. Modern archaeology is not a search for old or interesting objects. It's much more like a crime scene investigation. What

Figure 10: Surveying at the Hatch Site

Figure 11: Block Excavation with Exposed Stratigraphy

archaeologists are trying to do is actual reconstruction of the details of day-to-day life centuries or millennia ago based on the nature and locations of the evidence. That requires that every object, feature, and bit of information is understood in precise context within the site. The hoped-for result is a clear picture of the world of our predecessors and an understanding of the lessons they can teach us.

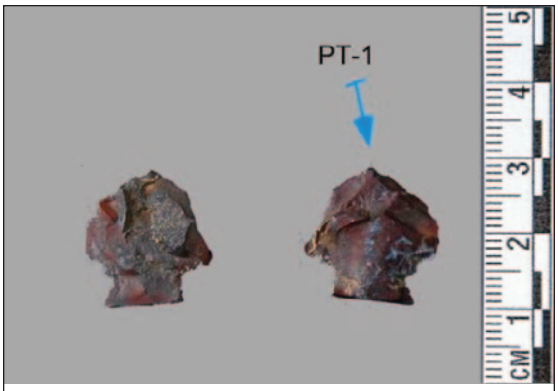
As excavation began, many questions the archaeologists had about the site began to be answered, just as new questions presented themselves. It became immediately obvious that the buried A horizon at the site had been plowed and was not completely undisturbed. This was confirmed by the presence of very few nineteenth century artifacts, by its abrupt transition to the underlying B horizon, and by the presence of a few plow scars at the top of the B horizon (**Figure 11: Block Excavation with Exposed Stratigraphy**). The B horizon bore artifacts only within its upper 10 centimeters. This was a clear indication that the archaeological deposits didn't extend very far into the B horizon, and that the buried A horizon was part of a well-preserved, stable, and ancient surface that had been exposed and lived on for millennia.

Analysis

Like all archaeological projects, the excavations at the Hatch Site produced information from a variety of sources that led to a much clearer picture of when the site was inhabited and how it was used. Some of that information revealed itself during the excavation, but most of it resulted from months of careful and specialized analysis of the excavation results in the fall and winter of 2017 and 2018.

Some artifacts discovered in the course of the excavation helped reveal when the site was occupied. The archaeologists recovered four ***projectile points***. These are the sharp tips of hunting weapons that could be thrust at a game animal, or thrown with a throwing stick or ***atlatl***, or could be the tips of arrows used with a bow. Certain projectile points tended to be manufactured in very specific shapes at very specific points in time, and archaeologists have given names to some of these projectile points. Three of the recovered points from the Hatch Site: a small corner-notched point, (Specimen # 244.1); a shallow side-notched point (Specimen # 435.7); and a straight-stemmed point, (Specimen # 140.1) don't conform readily to specific named types, but they likely date to the long span of Native American history termed the ***Archaic period*** (ca. 8,000 to 4,000 years ***BP***). One of the points (Specimen # 415.1) bore the distinctive shape of a Kirk Corner-Notched point. Kirk points, originally identified by archaeologists working in the Carolinas, reliably date to Early Archaic times, some 9,000 to 9,500 years ago.

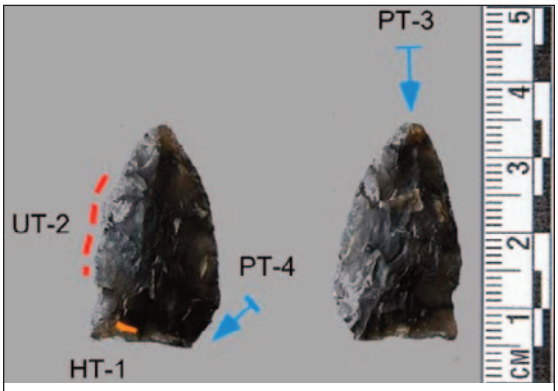
(***Figures 12, 13, 14, 15: Specimen 244.1, Specimen 435.7, Specimen 140.1, Specimen 415.1, Kirk Corner Notched***) This was solid evidence of the great antiquity of Native use of the quarry and the valley of Slab Cabin Run.



Corner Notched Point - 244.1

PT-1 Macro-impact fracture UTs & HTs indet. due to post-depositional modification

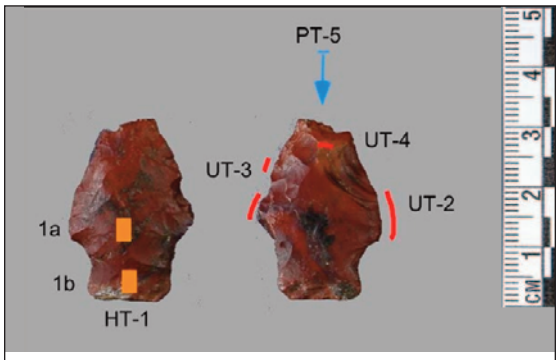
Figure 12: Specimen 244.1



Shallow Side Notched Point - 435.7

HT-1 Hafting Traces - type 5
UT-2 Butchery
PT-3 Micro-impact fracture
PT-4 Macro-impact fracture

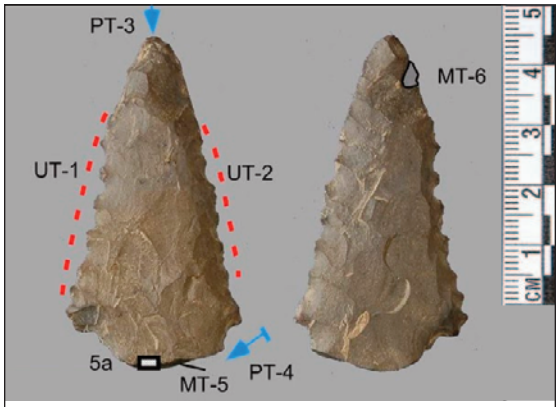
Figure 13: Specimen 435.7



Short Straight Stemmed Point - 140.1

HT-1 Hafting traces - type 11 (figs. 33-34)
UT-2 Butchery
UT-3 Butchery
UT-4 Fresh hide polish from impact
PT-5 Macro-impact fracture

Figure 14: Specimen 140.1



Kirk Corner Notched Point - 415.1

T-1 Butchery (w/spot of bone polish & fresh hide polishes)
T-2 Butchery (w/spot of bone polish & fresh hide polishes)
T-3 Micro-impact fracture
T-4 Macro-impact fracture
T-5 Plow damage creating unpainted “retouch”
T-6 Plow damanage creating inpatinated “retouch”

Figure 15: Specimen 415.1

That use may have begun even earlier. Another stone tool, an **end scraper**, (Specimen # 426.1) (**Figure 16: Specimen 426.1**), made of a high-quality jasper that appeared to be from a different quarry, would not be out of place in a Paleoindian site. Paleoindian people were living in what is now Pennsylvania two thousand years or more before the Kirk occupation! While the scraper was not definitive proof of a Paleoindian occupation, it certainly raised the possibility.

Figure 16: Specimen 426.1

All five of these stone tools exhibit signs of use, wear, repair, and breakage, suggesting they were parts of people’s tool kits for quite some time before they were abandoned at the Hatch Site. That’s typical at quarry-related archaeological sites world-wide; people abandon old broken or worn tools as they replenish their toolkits with newly made items.

In addition to the points and the end scraper, only two ***hammerstones*** were encountered at the site (**Figure 17: Hammerstones**). Hammerstones play an important role in the early stages of stone tool manufacture, with the later stages of more delicate work being done with antler or hardwood tools. This suggests that the initial processing and heat-treatment of the jasper was done at, or closer to, the Tudek quarry, and not at the Hatch Site. There was more evidence that confirmed that conclusion in the size and configuration of the rest of the site artifacts.

Figure 17: Hammerstones

Image Courtesy of the State Museum of Pennsylvania, Section of Archaeology

The bulk of the artifacts recovered from the Hatch Site were fragments of ***debitage***. (**Figure 18: Jasper Debitage**) Debitage is a term borrowed from French archaeologists that denotes the waste material left from the process of flintknapping, analogous to the shavings and sawdust left behind by a carpenter. Careful analysis of the debitage, or lithic analysis, allows archaeologists to reconstruct the process that led from rough pieces of raw material to finished artifacts, and in turn, to understand exactly how a site was used.

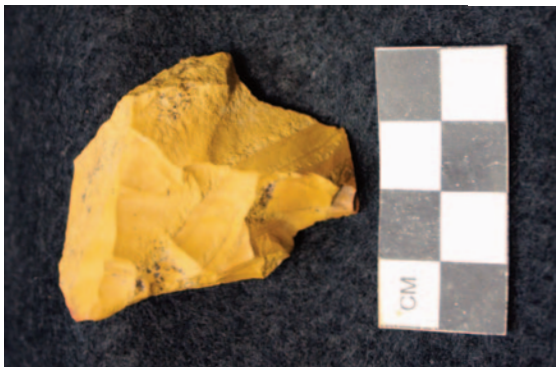


Figure 18: Jasper Debitage

A total of 7,003 stone artifacts were recovered from Stratum III at the Hatch Site (the buried A horizon) almost all of it debitage. Another 1,257 stone artifacts were recovered from the upper part of Stratum IV (the B horizon underlying the A horizon).

The recovered debitage contained some important clues about how the site's inhabitants were using it. The debitage was mostly, but not entirely, jasper. Jasper comprised just over 75% of the assemblage, with Bellefonte Chert comprising the balance (**Figure 19: Bellefonte Chert Debitage**).

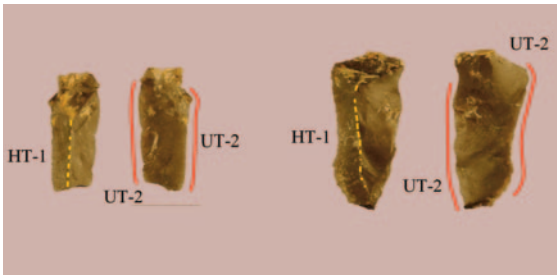


Figure 19: Bellefont Chert Debitage

This indicates that the people using the site weren't restricting themselves to jasper alone; they were utilizing two varieties of useful tool stone that could be found near the site. Also illuminating is the near absence of cortex on any of the debitage.

Cortex is the rough and weathered outer rind of a nodule of jasper or chert (**Figure 20: Cortex**). The first step in the process of chipped stone tool manufacture is the removal of this cortex to expose the smooth interior of the nodule. At the Hatch Site, 92 to 96% of the debitage had no cortex present. This suggests that the initial "roughing out" of the material took place elsewhere. The Hatch Site was apparently reserved for the later, more refined stages of tool manufacture and repair.

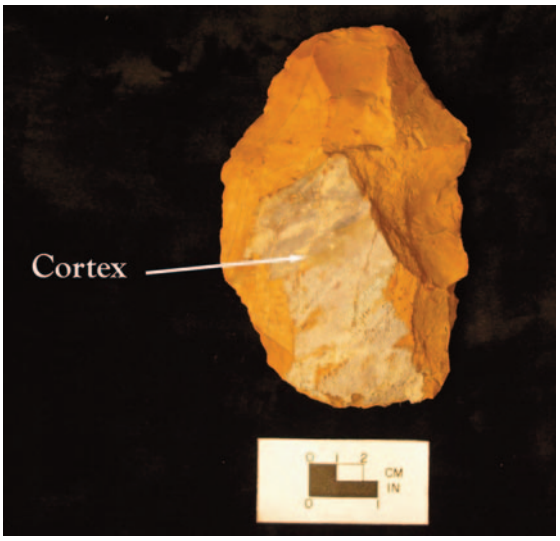


Figure 20: Cortex
Image Courtesy of the State Museum of Pennsylvania, Section of Archaeology

Optical and electron microscopic analysis of the working edges of stone tools, known as microwear analysis can sometimes reveal exactly how a tool was used, and by extension, what activities were going on at the site where that tool was recovered (**Figure 21: Microwear**). Ninety-six of the 100 artifacts subjected to microware analysis exhibited microscopic traces of use. The activities that produced the wear included: projectile impact; butchery; fresh hide scraping; dry hide scraping; antler boring; sawing of bone or wood; planing or carving of wood; bone grooving; shell sawing; adzing of wood;

Figure 21: Microwear

and soft stone (e.g., soapstone) sawing. Evidence of hafting, that is the mounting of the tools in wooden or bone handles or shafts with binding and adhesives, were observed on 58 of the 100 used artifacts (**Figure 22: Hafted Stone Tool**).

Figure 22: Hafted Stone Tool
Image Courtesy of the State Museum of Pennsylvania, Section of Archaeology

The microwear analysis clearly indicates that the site was not just a finishing factory for stone tools, but also an encampment where many of the activities of daily life took place. By inference, this suggests that the people who camped here to complete their work with the tool stone they procured at the nearby quarry stayed a while. They didn't just focus on the rapid replenishment of their tool kits. The site was a place where they felt at home and where other resources they needed (game animals, shellfish, wood, etc.) could be readily procured. It was a place their ancestors used and that their descendants would use again.

More evidence of how the site was used came from the horizontal distribution of the artifacts. Two major clusters of jasper were mapped in the buried A horizon, one 300-item cluster on the eastern margin of Block A, and the other a 480-item peak in the northwest extension of Block B. Bellefonte chert debitage distribution was densest in the eastern third of Block A, and two distinct clusters of chert were evident in Block B.

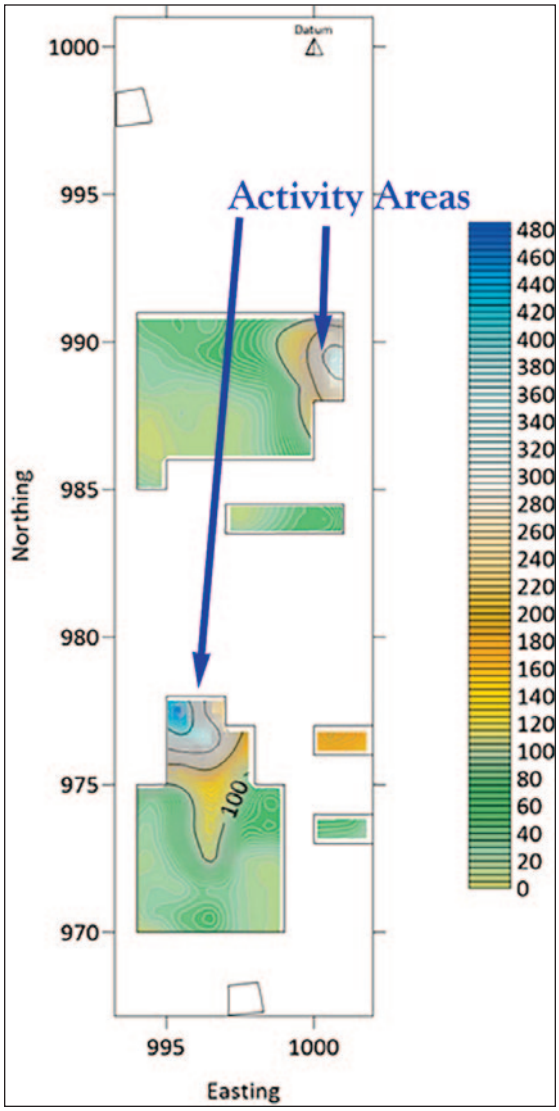


Figure 23: Activity Area Maps

The jasper debitage drops off in Stratum IV (the B horizon) with the exception of one-200 item peak in the extreme northwest corner of Block B—an area where dense distributions were encountered during the final days of fieldwork. The chert debitage in Stratum IV included very light traces of activity in Block A, but five distinct chert clusters were evident in Block B—three of these clusters peak in the upper teens.

These clusters are the preserved evidence of what archaeologists call ***activity areas*** (**Figure 23: Activity Area Maps**). These are horizontal locations where discreet evidence of specific tasks are visible; evidence that wasn't completely destroyed by plowing and is still intact millennia after the site's occupation. At many archaeological sites, these activity areas are focused around campfires, and that proved to be true at the Hatch Site.

Seven features (Features 3, 4, 5, 6, 7, 8, and 10) were identified during the data recovery. Nearly all of the features were the remains of campfires or hearths and contained charcoal that was sampled during excavation and submitted for radiocarbon assay (**Figure 24: Hearth Feature**). Radiocarbon dating uses the steady and measurable rate of decay of radioactive carbon isotopes (C14). This decay begins when the remains of any organic life form (wood, bone, etc.) stops absorbing carbon 14 after the life form dies, and the rate of radioactive decay provides a reliable date for when that death occurred.

Figure 24: Hearth Feature

Radiocarbon results at the Hatch Site indicated that it was occupied at multiple and specific points in Native American history. The features dated to what archaeologists call the ***Early Archaic Period*** (ca. 9,500 years BP), the ***Transitional Archaic Period*** (ca. 4,000-3,500 years BP), the ***Middle Woodland Period*** (ca. 2,000-1,000 years BP), and the ***Late Woodland Period*** (ca. 1000-600 years BP). There were activity areas in the excavated part of the site that could be tied to each of these periods, and those activity areas document a wide array of animal butchery and bone and antler working activities carried out at the Hatch Site from its earliest occupations to its latest. The Hatch Site's occupants were immediately employing the tools they made on-site for active hunting and processing of game.

As analysis of the excavation artifacts and results progressed, it became obvious that it wasn't just the availability of tool stone that brought generations of native people to the Hatch Site. As part of the project research design, a careful reconstruction of the local environment was undertaken. That reconstruction relied on several sources of information.

Figure 25: Millbrook Marsh

- The sediments of the nearby Millbrook Marsh Preserve (**Figure 25: Millbrook Marsh**) were sampled to extract preserved pollen, ***phytoliths***, and organic samples for radiocarbon dating. The study and analysis of preserved pollen or ***palynology*** relies on the organic preservation of pollen grains in settings that are either very wet (like bogs) or very dry (like desert environments, and some caves and rockshelters). Phytoliths are microscopic, mineralized fossils of plant tissue that can sometimes be identified by genus and species.Since bogs tend to preserve plant materials of all kinds by excluding the oxygen needed to speed decomposition, they are also excellent sources of organic material for radiocarbon dating. It's also important to note that freshwater wetlands like Millbrook Marsh hold populations of reptiles and amphibians, game and furbearing animals, waterfowl, and edible tubers and roots. They are very rich environments for hunter/gatherer people to exploit.
- Samples of fill from the hearths encountered in the site excavation were subjected to floatation ***analysis*** and ***macrobotanical identification*** (**Figure 26: Floatation Macrobotanicals**). Floatation involves placing the feature fill in a water filled tank, inside a container with a screened bottom.

Figure 26: Floatation Macrobotanicals

Any carbonized plant material like wood charcoal and burnt seeds and nut hulls (known collectively as macrobotanicals) will float to the surface where they can be skimmed off and dried. Sometimes carbonized animal bone, fish scales, and shell can be recovered from the screen at the bottom of the container. The macrobotanicals can be examined with a low power microscope and identified by genus and species. The results of floatation analysis can be used to both directly reconstruct people's diets and indirectly reconstruct the ecosystems they lived in.

The pollen, phytoliths, charcoal, and carbonized seeds and nut hulls recovered and identified at the Hatch Site, along with the suite of radiocarbon dates associated with them, were an invaluable source of information about the world the site's inhabitants lived in. The most important conclusions of the environmental reconstruction work included:

- The oldest recovered radiocarbon dates from the Millbrook Marsh sediments indicate that the marsh itself may not have appeared until about 1400 years ago. That means that the Middle and Late Woodland inhabitants of the site had the resources of a nearby wetland available to them, but their Transitional and Early Archaic ancestors may not have. While the limestone streams of the region, like Slab Cabin Run, have likely been flowing in place throughout human history, the wetlands that surround those streams certainly evolve, expand, and retract in response to a variety of local conditions.
- The charcoal identification, floatation results, phytoliths, and the palynological analysis indicate that while wetland plants and shrubs dominated the area of the marsh, the surrounding forests in the vicinity of the site seem to have been dominated by White Pine (Pinus alba) and by a variety of oaks (Quercus sp.). Pines and oaks dominate forests that are in the young to middle ages of forest succession. This is typical of forest communities that have been burned or have otherwise had trees and overstory removed. Seeds and phytoliths recovered from the hearth features included representatives of annual weeds from the amaranth and chenopod family (Amaranthaceae) and mint family (Lamiaceae). These plants (Lambsquarters, Pigweed, False Pennyroyal, etc.) are often found in places with a substantial degree of ground disturbance, such as a heavily used and revisited encampment area like the Hatch Site seems to have been.

Taken together, the environmental data paint a picture of a local ecosystem that held the rich plant and animal resources typical of wetland environments as far back as Early or Middle Woodland times. Before that, it may not have been quite as locally productive. It is also an ecosystem that has likely been influenced to some degree by its human inhabitants. Repeated encampments, and efforts by Native people to manage forest communities by intentional burning played an important role in what local forests and meadows looked like prior to the arrival of European colonists. While Native populations were profoundly influenced by and dependent on the ecosystems around them, those same ecosystems also reflected the complex ways Native people interacted with them.

A final line of analysis focused on the chemical constituents of the jasper itself. Jasper, with its yellow and red coloration, is visually distinctive, and jasper appears in numerous archaeological sites across the Middle Atlantic region. There are a number of Native American jasper quarries in the region, and while the

color and texture of the material varies some from source to source, that variability is often not enough to reliably tie specific samples to specific quarries. As part of the analysis of the Hatch Site, samples from the Tudek quarry and other regional jasper sources were subjected to ***geochemical analysis*** (**Figure 27: Geochemical Spectroscopy**). This is a methodology that identifies the proportions of all of the trace elements present in samples of the material. It was discovered that various isotopes of iron made for a distinctive chemical "fingerprint" for Bald Eagle Jasper; a foolproof way to distinguish this Centre County jasper from other jasper sources in the Lehigh Valley, the Shenandoah Valley, and other regional sources. This important discovery will enable future archaeologists to begin the laborious task of tracing jasper samples from numerous regional archaeological sites back to their quarry sources! As that work proceeds, the routes of Native American trade and travel networks and the geographic boundaries of territories will come into focus. The result will be a much clearer picture of regional land use over time, and of the relationships between distinct Native American cultures.

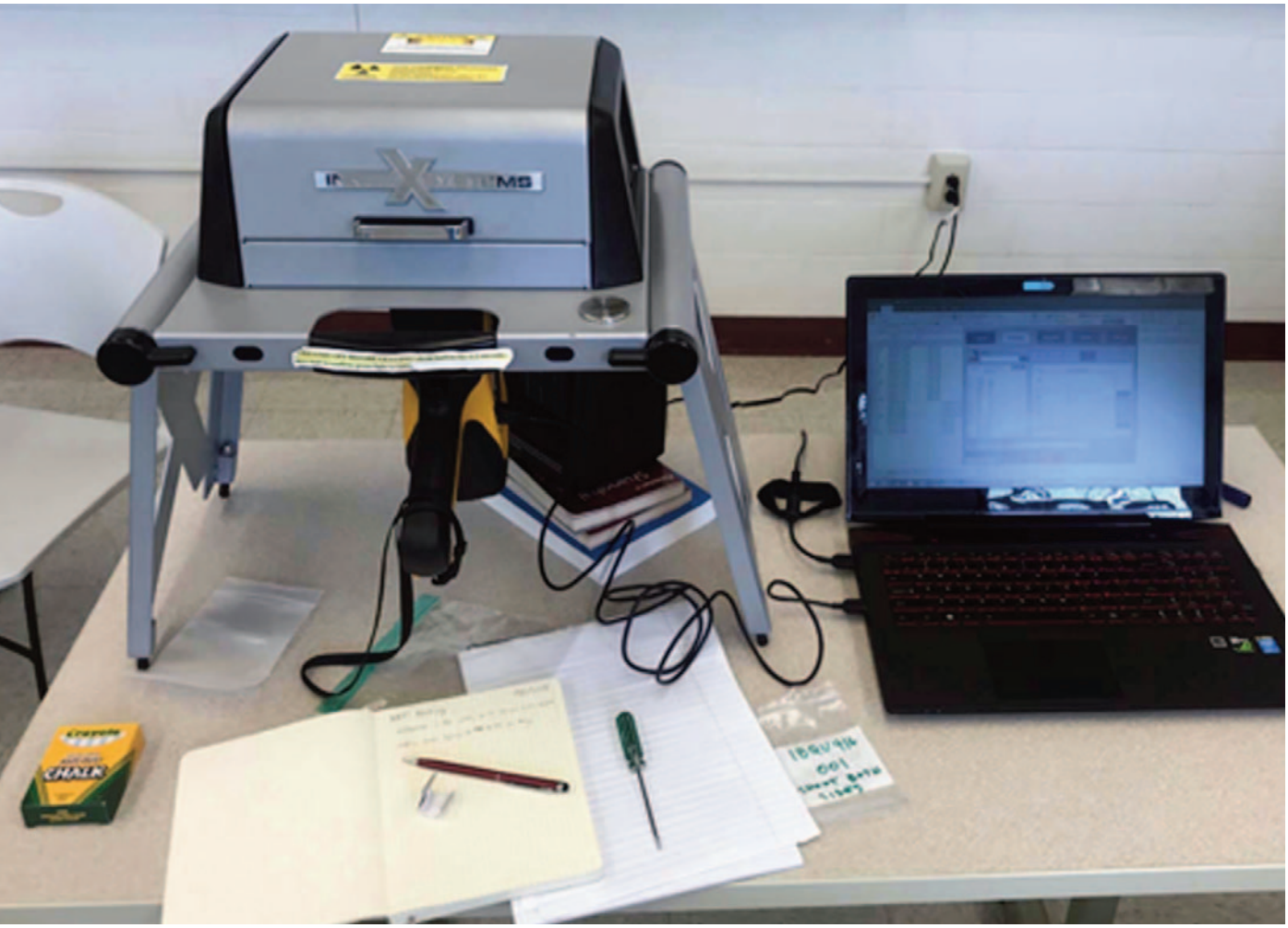


Figure 27: Geochemical Spectroscopy

Conclusions:.

The Hatch Site in Context

Like all archaeological sites, the Hatch Site is a product of both human and natural processes that created and preserved it. People were attracted to the place in Early Archaic times by the presence of many useful nearby resources including tool stone, potable water, and a rich environment that probably became even more productive as Millbrook Marsh formed in Early Woodland times. Their long-term presence and continuing interaction with the local ecosystems were probably reflected in the local forest communities and flora that grew on and around the site. Nineteenth century land use introduced plow disturbance into the site that affected but did not obliterate the evidence of Native American occupation of the site. That same early Euro-American land use deforested the hillslopes around the site and sealed it beneath a layer of sediment that preserved it for a century and a half. Twenty-first century interest in encouraging bicycle and pedestrian transit, in part to reduce automobile traffic and emissions and to protect the local and regional environment, indirectly resulted in the discovery and study of the site. In ways large and small, interactions between humans and the environment played an important role in the story of the Hatch Site.

While the Hatch Site has a record of Native American use that stretches back at least 9,000 years, the nature of that use undoubtedly changed and evolved as the lifestyles and cultural practices of the site's inhabitants changed and evolved. Like pre-agricultural populations worldwide, Native American people organized themselves along familial lines and family groups were linked by shared languages and cultural practices. These groups were initially small but grew in size and formed ever more complex societies over time. Those societies are ancestral to modern First Nations that are with us today.

Archaeological evidence from many Eastern Woodland sites indicates that the Early Archaic people, who are the first documented visitors to the site, were much more mobile than their descendants in Late Archaic and Woodland times, and there were fewer of them. They appear to have ranged over much wider territories and likely revisited seasonal campsites less frequently than later groups of people, so their visits to the Hatch Site may have been less regular and less carefully planned than those that followed them.

As the long centuries passed, Archaic Period people became more sedentary, their territories became more tightly defined and smaller, and their occupations of particular locations more intensive and regular. These changes were, in part, a response to population increases in the region and also reflected a growing expertise and familiarity with the important resources and places within their territories. For Late Archaic/Transitional Archaic people, the Hatch Site was probably one of a group of regularly visited seasonal camps where a variety of important resources were gathered and processed for storage and later use. They may have been at the site annually or at least frequently, stayed longer than their ancestors, and gathered nearby resources in larger, storable quantities for use later in the year.

The Woodland people, who were the last Native American occupants of the site, were part-time farmers. They maintained hamlets and villages near their fields, usually along larger streams and rivers.

Figure 28: Completed Bike Trail

Their visits to the Hatch Site were temporary forays away from their home bases, focused on both tool stone and marsh resources to be brought back to their settlements. The parallels to a twenty-first century Pennsylvania city dweller's visit to deer camp in November are probably not terribly far off base!

At the end of the day, an archaeological site like the Hatch Site is many different things. To modern Native American descendants of the site's residents, it is a place of profound cultural importance, a place that links them to their ancestors and to the natural world. To archaeologists, it is an invaluable source of information about how native people used resources and interacted with the world around them. To planners, engineers and designers it's a location that requires careful stewardship and collaboration with a variety of stakeholders to implement a successful and well-designed project (**Figure 28: Completed Bike Trail**).

For all of us, it's a place that can teach us something. No matter what continent our families came from, we have ancestors who lived lives much like those of the people who encamped along Slab Cabin Run. They lived closer to the natural world than we do today and depended on the resources of that world for tools, food, clothing, warmth, and shelter. They sat around campfires much like those encountered at the Hatch Site, and made tools, worked hides, prepared food, cared for their children, told stories, laughed, and reminisced.

Figure 29: Drone View of the Hatch Site Excavation

Places like the Hatch Site connect us to ordinary lives, familiar things, and to our shared humanity. That's what makes them so important and makes them worth studying and worth preserving. As noted in the introduction, they are windows into the lives of our predecessors, but they also tell each of us where we came from and how we got here. In that sense, they aren't just windows, but mirrors (**Figure 29: Drone View of the Hatch Site Excavation**).

Acknowledgements

This project would not have been possible without the help and contributions of a great many people. The following list is not exhaustive, but we wanted to try to recognize as many folks as possible:

- Barbara Shaffer from the Federal Highway Administration, Trish Meek from the Centre Region Council of Governments, PennDOT's Deputy Secretary for Planning and Programming Jim Ritzman, Shelley Scott from PennDOT's Bureau of Planning and Research, and Mike Keating, Juniata College's Contract and Fiscal manager, all helped to make sure the needed project support and resources were in-place and ready to go.
- The field school students who completed the field work included enrollees from Juniata College, Penn State, and Virginia Commonwealth University. They were: Safeena Basir (PSU), Caroline Cuff (JC), Haven Diehl (JC), Isaac Fisher (JC), Luke Fultz (JC), Youn Kyung Kim (JC), Luciano Legnini (VCU), Christina Nisbet (PSU), Nicholas Paslawsky (PSU), Chandler Snow (PSU), and Gabrielle Stewart (PSU). (**Figure 30: Crew Picture**)
- The 2017 PHAST (PennDOT Highway Archaeological Survey Team) crew, comprised of Genevieve Everett, Samantha Taylor, and Zaakiyah Cua, under the direction of Ross Owen, provided critical logistical help and focused their efforts on the hill slope test unit excavations.

Figure 30: Crew Photo

- PennDOT Archaeologists Joe Baker and Scott Shaffer were invaluable to field operations and logistical support before, during and after the project.
- Most days brought visitors and volunteers to the site. Staff members from the Pennsylvania Historical and Museum Commission (PHMC), PennDOT (including Deputy Secretary Ritzman and his daughter), and the Department of Conservation and Natural Resources (DCNR) spent time volunteering and touring the site. Mary Alice Gratzer and Barry Sheetz from the Bald Eagle Chapter of the Society for Pennsylvania Archaeology (SPA) visited and were very helpful contributors to the project. Other notable visitors included Bob Tudek, who discovered the jasper quarry in the 1970s, and the family of the late James W. Hatch including his widow, Diane, and their children and granddaughters.

Glossary of Archaeological Terms

Activity Areas: Horizontal locations within an archaeological site where discreet evidence of specific tasks is preserved.

A horizon: A dark organically rich soil deposit often referred to as topsoil. A horizons usually occur right below the surface vegetation, but they can also be buried and preserved under more recently deposited sediments.

Archaic Period: Archaeological term applied to Native American cultures in the Eastern US and Canada between approximately 9,500 and 3,500 years ago. Archaic period people supported themselves by hunting and gathering wild foods, and frequently or seasonally moved their encampments around established territories.

Atlatl: An Aztec (Nahuatl) term for a throwing stick. The atlatl is a hand-held flattened shaft approximately 18 inches to 2 feet in length with a hook at the far end. A dart or short spear is mounted on the atlatl, and with practice, a hunter can use it to throw the dart with great power and accuracy by increasing the hunter's arm leverage.

B horizon: A deposit of sediment that lies between bedrock and the A horizon. Typically lighter in color, it is decomposing bedrock (called "parent material" or a C horizon) that is slowly absorbing organic material and is in the process of becoming an A horizon. Farmers and landscapers often refer to it as the "subsoil" or "hardpan" or "clay".

BP: An acronym for "Before the Present", used in expressions of age in archaeology.

Chert: Chert is a silica-rich sedimentary rock often found as nodules in limestone and dolomite deposits. It's a high-quality material for the manufacture of stone tools.

Cortex: The rough and weathered outer rind of a nodule or cobble of jasper, chert or other tool stone.

Cultural Resource Management or CRM: Archaeological or historical work or analysis conducted as part of the planning and design of publicly owned, funded, or permitted projects. This work is usually a legal requirement under several pieces of federal and sometimes state legislation and regulations.

Data recovery excavation or Phase III: A large scale archaeological sampling project intended to recover the information that makes a site eligible to the National Register of Historic Places before that data is lost or destroyed during the implementation of a publicly funded or permitted project.

Datum: The primary point of a site Grid system, whose latitude, longitude and elevation are precisely known.

Debitage: A term borrowed from French archaeologists that denotes the waste material (i.e., flakes) left from the process of flintknapping, analogous to the shavings and sawdust left behind by a carpenter.

Early Archaic Period: Pre-Contact period of Native American history that dates to the time between ca. 9,500 and 8,500 years BP. The Early Archaic Period was characterized by small bands of hunter/gatherer people traversing large home territories and adapting to climatic conditions and environments that were

substantially cooler than modern conditions, more like what would be found in Central Canada now.

End Scraper: A stone tool, usually flaked on one surface only and roughly oval or tear drop shaped, with one end chipped into a single bevel edge like a chisel. End scrapers were either mounted in a wooden handle or gripped between the thumb and first finger (another term for them is “thumb scraper”). They were used to dress hides and to shape wood, bone and antler.

Features: Non-portable evidence of historic or pre-Contact land use such as cooking hearths, stone foundations, privies, or burials.

Floatation Analysis: The recovery of carbonized plant remains and other small artifacts through immersion of soil or feature fill in a screened water tank. Carbonized plant material will float to the surface (the light fraction), small and heavier-than-water objects will sink to the bottom and be trapped by the screen (the heavy fraction).

Geochemical Analysis: The identification of trace elements such as iron, manganese, carbon, and other chemical constituents of rock samples.

Geomorphology (and site formation history): The study of the origins and history of landforms such as floodplains, glacial terraces, hill slopes, etc. Geomorphology has important implications for the formation and preservation of archaeological sites.

Grid: In archaeology, a geometric device used to facilitate the description and mapping of a site. The grid typically has North-South and East-West axes, all tied to a primary point whose latitude, longitude and elevation are precisely know (the site Datum). The grid allows the division of the site’s surface into precise horizontal square or rectangular units of any size. Locations on the grid are expressed as distance and direction from the datum.

Hafting: The mounting of stone tools in wooden or bone handles or shafts with sinew or other kinds of binding, and adhesives like pitch.

Hammerstones: Usually rounded cobbles, fist sized and smaller, used to flake tool stone. Hammerstones are especially important in the early stages of stone tool manufacture, with the later stages employing smaller and lighter tools like antler, bone and hardwood billets. Hammerstones are usually very hard rocks like quartzite, basalt and granite, and they appear battered and pockmarked from use.

Late Woodland Period: The last period of Native American history before the arrival of the Europeans. (ca. 1000-600 years BP). Late woodland people lived most of the year in settled communities with post and bark houses, sometimes protected by log palisades. Some of these towns had more than 1,000 residents. They had extensive gardens of maize, beans and squash, and continued to hunt game, harvest fish, and harvest wild plants. Their technology included archery and the production and use of expertly made ceramics. Their trade and contact networks extended from the east coast to the Mississippi Valley and beyond.

Lithic Analysis: The scientific study of stone tools and debitage used to reconstruct the technological details of daily life before the invention of metallurgy.

Macrobotanical Identification: The analysis and identification of carbonized plant remains such as seeds and nut hulls, usually recovered via flotation analysis.

Microwear Analysis: High resolution optical or scanning electron microscopy of the working edges of stone tools. The magnification frequently reveals distinctive wear patterns that can reveal what specific tasks a tool may have been used for.

Middle Woodland Period: During Middle Woodland times (ca. 2,000-1,000 years BP) ancestral Native Americans in the Middle Atlantic region were living in small hamlets supported in part by domesticated crops and by a great deal of hunting and gathering. Middle Woodland people made and used ceramics, and they participated in trade networks that connected the Chesapeake tributaries like the Susquehanna and Potomac valleys with the Ohio Valley.

National Register of Historic Places: The National Register of Historic Places is the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966. Buildings, sites, districts, structures, or objects can be found eligible for listing on the register under one or more of four criteria including:
A. association with events that have made a significant contribution to the broad patterns of our history; B. association with the lives of persons significant in our past; C. embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; D. yielding or being likely to yield information important in prehistory or history.

Organic Samples: Formerly living materials such as wood charcoal, bone, or shell.

Paleoindian: Traditionally, the term refers to ancestral Native Americans who lived in North America between 14,000 and 10,000 years ago, at the end of the last glacial period of the Pleistocene. Paleoindian people hunted big game, some of it possibly extinct Ice Age species, and gathered plant resources. They are believed to have had very large home territories and very low population densities. For decades, Paleoindian people were thought to be the earliest cultures of the Western Hemisphere, but discoveries since the late 1990's in North and South America have pushed the dates for the first Native American people much further back into the Pleistocene to as long ago as 23,000 years ago.

Palynology: The study and analysis of preserved pollen, usually recovered from bogs or other anaerobic contexts.

Phase I: An archaeological reconnaissance study intended to simply identify whether or not archaeological sites are present.

Phase II: An archaeological test excavation intended to gather enough information to determine if an archaeological site meets one or more of the eligibility criteria for the National Register of Historic Places.

Phytoliths: Microscopic, mineralized fossils of plant tissue which can be preserved, recovered and identified in some soil conntexts.

Projectile Points: Flaked stone weapon points intended for mounting on shaft weapons like spears, darts or arrows.

Radiocarbon Dating: A method of estimating the age of an organic sample by measuring the rate of decay of the radioactive isotope Carbon14 to more stable forms of Carbon.

Shovel Test Pits (STPs): STP's are shallow (usually less than a meter in depth), small (usually 57 cm in diameter if round, or 50 cm square) excavations that are hand-dug with shovels, with the soil pushed through a metal mesh screen to recover artifacts. They are typically employed in some sort of regular pattern in Phase I archaeological surveys to locate shallow sites and define their horizontal boundaries.

Smithsonian Trinomial Site Number: A naming convention for archaeological sites employed in most US States. In the case of the Hatch site, 36CE0544, the 36 is Pennsylvania's place in alphabetical order of the states, CE is the designation for Centre County, and the Hatch site is the 544th site recorded in the county.

Transit: A surveying instrument that allows the user to accurately ascertain and record the distance, direction, and elevation of any point visible from wherever the transit is set up. Modern transits work by emitting a beam of laser light that strikes a reflector and bounces back to the transit.

Transitional Archaic Period: Pre-Contact period of Native American history that dates to ca. 4,000-3,500 years BP. Transitional Period people were living in climatic conditions that were somewhat warmer and wetter than modern times. They were primarily mobile hunter/gatherers living in regularly used, seasonal campsites in well-defined territories. There is much evidence of long-distance trade in certain kinds of tool stone during the Transitional period (metarhyolite, jasper, steatite, etc.). Many of their largest encampments were located on the banks of large streams and rivers, but their sites extend well into all of the upland areas of the Middle Atlantic region.

A Note on James W. Hatch (April 24, 1948 - December 11, 1999)

My father, Jim Hatch, knew from an early age that he wanted to be an Archaeologist. From that point forward it profoundly shaped his life both professionally and personally. It was during his undergraduate work as an anthropology student at the University of Georgia where he got his first taste of what it was to work at an excavation. The Corps of Engineers

had plans to dam up a section of the Coosawattee River in Georgia and a team of Archaeologists, including students from the University of Georgia and the University of Illinois, spent that summer excavating the area before it was flooded. That site would be the first of many sites that he would work on. He called the experience "thrilling" when interviewed by an Atlanta-area newspaper that year about his work on the site. That site was also where he met a certain University of Illinois student who would soon become his wife.

After completing his PhD in Anthropology at Penn State, he was immediately hired by the department, where he taught for 25 years. His work included exploring Mississippian settlement systems in his home state of Georgia, investigating Late Prehistoric and Protohistoric period sites in Pennsylvania, and identifying jasper and obsidian sources throughout the eastern United States. While he enjoyed research, his true professional passion was teaching others about Archaeology and Anthropology. He took as much joy in teaching an introductory, undergraduate class in a 500-seat lecture hall as he did guiding a budding future archaeologist through their PhD or Master's defenses. His commitment and proficiency at teaching earned him the 1990 College of Liberal Arts Distinguished Teaching Award. He did all this while also serving as the driving force in the growth and development of the Matson Museum of Anthropology in the 80's and 90's, and while working with numerous archaeological organizations throughout the state and country.

In his professional career, nothing thrilled Jim more than leading students on an excavation. During his time at Penn State he oversaw field schools from Bedford, PA to Copan, Honduras. Almost every summer of his career was spent sharing that thrill of a dig with curious students while also teaching the importance of honoring and respecting the past as a step to progressing towards the future. Jim once said "my legacy will be my students" and many of his students, including those that went on his field schools, have gone on to become important archaeologists and anthropologists in their own right.

I believe my father would have been truly honored to have his name attached to this important site and this important work. This project encompasses so much of who he was and what he believed in. He would have appreciated seeing the collaboration of people from multiple academic and government organizations working together to honor and respect the past on the journey towards creating something for the future. He would have taken pleasure in the fact that this was happening in a city that he called home, by the campus he taught at, just down the hill from the hospital where his two children were born. But most of all I believe he would have been proud of the fact that former students of his provided important energy and experience needed to execute the project and that they did so while also sharing the thrill and importance of this type of work with students of their own.

Chris Hatch Chair - Theatre Department
Hobart and William Smith Colleges

For Further Reading

On Native American History and Archaeology in Pennsylvania

The First Pennsylvanians: The Archaeology of Native Americans in Pennsylvania
Kurt W. Carr and Roger W. Moeller
Penn State University Press, 2015

On Cultural Resource Management

A Citizen's Guide to Section 106 Review
Advisory Council on Historic Preservation
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Small is Beautiful: Native American Occupations at Site 36MG378, Montgomery County, Pennsylvania
Andrew Wyatt & Barbara J. Shaffer

Don't Judge the Ground by its Cover: The Shannon Site
Emma K. Diehl

Remembering Our Agricultural Past: An Archaeological Study of a Pennsylvania German Farmstead in Berks County
Robert H. Eiswert

Nineteenth Century Quakers on the Frontier: Archaeological Data Recovery Excavations at the Snook Farm Site, 36BD217
Barbara J. Shaffer, Robert H. Eiswert, Cristie L. Barry, Charles A. Richmond, and Brenda L. Weller

Excavations at the Swartz Site: A Native American Settlement on French Creek
Allison Brewer and Steven Barry


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