DISCOVERING ANCIENT HUNTERS IN SOUTH CENTRAL PENNSYLVANIA

The Story of the Big Creek 2 Site
It may be hard to imagine what the Big Creek area was like thousands of years ago. There were no paved roads, the stream waters rose higher, and the climate was more variable than today. The environment supported many types of plant and animal species that would have attracted people to the area and made it a favorable place to set up camp.

Archaeologists have been reading the stories of the inhabitants of the area through the artifacts and other types of evidence left behind. Archaeologists call these objects and other evidence from the past cultural resources. Archaeologists examine and interpret these artifacts, just as historians examine and interpret recorded accounts of the past.

Stains in the soil like this 4,000 year old trash pit and campfire remnants are archaeological evidence of some of the activities of Native Americans. Careful excavation reveals important information, such as the construction of the pit or campfire, what it was used for and when.
Different types of cultural resources:

a) Chaco Canyon ruins in Arizona
b) Old farmstead in Rhode Island
c) Scattering of pre-contact Native American stone tools
d) Eighteenth century house foundation in Connecticut

WHAT ARE CULTURAL RESOURCES AND WHY ARE THEY IMPORTANT?

Cultural resources may be anything that shows evidence of having been made, used, or altered by humans. They represent the continuity of events from the earliest evidence of human existence to the present day. Cultural resources that are pre-written record or pre-European contact in the New World are called pre-contact or prehistoric and those that are post-written record/European contact are called post-contact or historic. Cultural resources range from Indian ruins that are thousands of years old to a nineteenth century farmstead, from a small scattering of stone tools to an abandoned cart path.

Unfortunately, these resources are fragile and nonrenewable. Unlike forests that can be replanted, once destroyed, they are gone forever. Objects from an archaeological site have little meaning unless they can be related to specific soil layers (stratigraphy) and associated with other evidence of human activity, such as a fire hearth, a trash pit, a burial pit or the structure of a building. Archaeologists call this context. Any activity that disturbs the soil may destroy context and the scientific value of the archaeological site. A trained archaeologist manages a site and records the information to preserve it for future generations.
Archaeologists in the United States are employed by universities and colleges, but primarily in private industries specializing in cultural resource management (CRM). CRM archaeologists work hand-in-hand with government and industry to preserve disappearing Native American and early European resources threatened by ground-disturbing activities. When impacts are anticipated on federal or state land, or a federal or state funded project, a CRM firm is hired to complete the necessary archaeological work. The CRM firm acts as an intermediary between those planning the development and the governmental agency in charge of making sure all cultural resource regulations and laws are followed. The first priority of the CRM archaeologist is to preserve a reasonable number of archaeological sites for future generations of scientists and the public, as well as the indigenous communities whose ancestors created the sites. In instances where adverse impacts are unavoidable, recovery of the scientific and relevant information is one method used to mitigate the adverse effect to the resource.

The Big Creek 2 Site was first discovered by CRM archaeologists from The Public Archaeology Laboratory Inc. (PAL), who were hired prior to construction in 2007 by Steckman Ridge, LP to search for archaeological sites (cultural resources) along proposed pipeline routes. The Steckman Ridge Storage Project in Bedford County, Pennsylvania consists of new facilities/piping for natural gas storage. Since gas is stored underground, the archaeologists needed to survey the areas where a new pipeline and wells would be installed. The archaeologists dug 2,633 test pits, each measuring approximately 60 centimeters (cm) in diameter and 70 cm deep. They discovered 20 archaeological sites, one of which was Big Creek 2. The remainder of the sites were either avoided or determined to be insignificant archaeological resources. Installing new pipeline would physically impact the Big Creek 2 site, therefore it was evaluated to see if it was eligible for listing in the National Register of Historic Places. The National Register is a list of the nation’s important historical and archaeological resources. The National Register is maintained by the National Park Service, part of U.S. Department of the Interior in Washington, D.C. The Big Creek 2 site was determined to be important and significant because of the information it could yield about the ancient history of America. Since the pipeline could not be redesigned to avoid the site, a data recovery plan was enacted. A data recovery plan is a large-scale archaeological excavation designed to remove important objects and information.

The National Historic Preservation Act (NHPA) was passed in 1966. It was designed to help protect important cultural resources for future generations by having eligible sites placed on the National Register of Historic Places (NRHP). The Act has largely been responsible for the growth of the CRM industry and has created a nationwide network of federal and state agencies working toward the common goal of conserving America’s cultural heritage.
The archaeological data recovery investigation of the Big Creek 2 Site involved much more than digging. There were four major steps involved as part of the study: background research, fieldwork, laboratory processing and analysis, and report writing. The first step was to conduct background research. This required consulting historic maps and local historical commissions to see if any Native American or colonial sites had been reported within or near the project area. Other research involved talking to members of the local community, going to the local library, and looking at historical maps to determine how the land was used in the past. Studies of current and past geology, plants, animals, and climate are all part of preparing for fieldwork and knowing what conditions to expect. Because Big Creek 2 is a Native American site, members of the Onondaga Nation, the Oneida Indian Nation of New York, and the Stockbridge-Munsee Band of the Mohican Nation were consulted. Once the background research was completed, a testing plan—or research design—was created based on what the archaeologists expected to find in the area and where the most likely areas to find cultural resources were.

People often ask how archaeologists know where to dig. Archaeologists find sites by a variety of means. In general, they test any known sites where artifacts have been found in the past. They will also test places close to water, on top of knolls, or on flat terraces with well-drained soils that do not appear to have been disturbed by modern activities. Notably, areas preferred by most campers today are the same that early Native Americans would have chosen.

Archaeological sites in northeastern North America are difficult to locate. Native American sites that are older than a few hundred years are buried and not visible from the surface. The most common ways artifacts are buried are through the accumulation of ground cover (plantlife and its remnants), which decomposes into soil. Artifacts can also be moved around by the tunneling activities of ants, animals and tree roots. Other natural processes, including freezing and thawing, can move artifacts.

Finding the artifacts and features, such as spear points, pottery, and fire hearths, will reveal only part of the story. The soil in the northeast is very acidic, causing all or most organic remains, such as wood, bone, baskets, and other natural plant and animal fibers to decompose quickly. In general, the only evidence left behind is artifacts made of stone, fired pottery, and burned bone and wood (charcoal). To fill in the gaps, archaeologists must carefully record the position of each artifact and look at the collection of artifacts and features as a whole.

The archaeologists first laid out a grid at the Big Creek 2 Site before starting to dig.
SOIL PROFILE

Most soils have three major horizons: A) the surface horizon, B) the subsoil, and C) the substratum. Some soils also have an organic horizon (O) on the surface, but this could also be buried.

Diagram of a typical soil profile. After excavating, archaeologists look carefully at the different soil layers, or stratigraphy. The different colors and textures of the soil are recorded to help understand the site formation process.

A typical soil profile in the northeastern United States. Artifacts are usually found below the ground surface in the Northeast, and are usually found down to about two or three feet.

Because this documentation is so important, it is not a good idea for people untrained in the field to excavate a site. Without proper controls, digging can result in loss of archaeological resources. To learn proper archaeological methods, contact organizations listed in the Archaeological Resources section at the end of this report.
Fieldwork involves complex tasks. There is no single technique for digging. The methods used in the field vary from excavation of test pits or trenches with shovels and trowels, to the use of heavy equipment. Overall, excavations are aimed at recovering information, not items per se. As pointed out earlier, artifacts have little meaning taken out of the context or their original setting. This is why there is a tremendous amount of record keeping during a dig. Archaeologists map the sites, draw soil profiles, take photographs, and take notes describing the placement of artifacts and the soil characteristics. The goal is to collect enough information to recreate the site back in the lab if necessary.

Archaeologists make maps of the site, draw soil profiles, take photographs, and take notes describing the placement of artifacts and the soil characteristics. The goal is to collect enough information to recreate the site back in the lab if necessary.

Larger excavation units are opened after digging test pits across the Big Creek 2 Site and all excavated soil gets passed through a ¼” mesh screen, leaving artifacts and rocks behind. Taking careful notes and measuring the exact location of an artifact allows archaeologists to recreate the site back in the laboratory. Every excavation unit has a datum – or marker or reference position – in one corner, which is tied into an overall site map. Examining an artifact under a microscope, looking for indicators of how it was used.

At Big Creek 2, the PAL team began by excavating test pits across the area where artifacts were initially discovered at regular intervals within a grid pattern. The excavated soil was sifted through a screen to catch artifacts larger than 1/4 inch. Larger excavation units, measuring 2 x 2 meters square (about 6.5 feet square) were placed to investigate the areas with high artifact density more thoroughly. The archaeologists removed soil in 5 cm levels (about 2.0 inches) from the larger excavation units. All artifacts recovered from each level were placed in a bag together. Detailed notes describing the artifacts and soils were recorded. In addition, samples from each different soil layer were collected to look for microscopic materials. These samples were processed in the laboratory by sifting the soil through a series of finely meshed screens, then viewed with a microscope.
WHAT WAS FOUND AT THE BIG CREEK 2 SITE?

The archaeologists recovered thousands of artifacts from the Big Creek 2 Site. Stone flakes, also called chipping debris or debitage, were the most abundant type of material recovered. These flakes measure anywhere from about 1 cm (0.4 inches) to 5 cm (2 inches) in size. The archaeologists found over 3,500 stone flakes. Native Americans developed a very sophisticated technology for making stone tools, which they used for hunting, gathering and processing food, building canoes and making structures.

Other artifacts recovered include stone tools for scraping hides; cutting and chopping wood; stone drills for fashioning holes in pendants or weights; as well as stone projectile points that were tips of spears and arrows used for hunting. Projectile points are often called arrowheads. However arrowheads only came into use in Pennsylvania around 1,000 years ago. Prior to then, most points are thought to have been dart tips attached to wooden shafts for spears. The wooden shafts have long since disintegrated.

In addition to the artifacts, archaeologists discovered features at the Big Creek 2 Site that provided more of the story. Features are basically non-portable artifacts, which cannot be removed from the ground without destroying them, like fire pits or soil stains. Although unmovable, they are very important indicators of past activities.

Four features were uncovered at the site, including two fire pits (or smudge pits), the remains of a campfire or hearth, and a row of post molds. Post molds, or post holes, have the appearance of small round soil stains, about 2 inches in diameter, and are evidence of where wooden posts were originally sunk into the soil and then either removed or left to disintegrate. These posts would have been for a temporary structure such as a wigwam, or a drying rack. The smudge (or smoke) pits were quite small (about 10 inches [30 cm] in diameter and 10 inches deep) consisting of charcoal, pieces of burned rock, and small microflakes, which may have been swept into the pits after sharpening a tool. The pits represent areas were wood was burned. The deep and narrow shape of these pits would have created an environment low in oxygen. Any wood burned in the pits would not outright burn, but would instead smolder and smoke. Historical accounts of Native American groups indicate smudge pits were used to smoke hides or blacken pottery vessels. It’s not certain that this was the purpose of the smudge pits at Big Creek 2, but at the very least it suggests people at the campsite were trying to make smoke, maybe even to keep mosquitoes or deer flies away. We know from botanical analysis on the charcoal that the types of wood burned in the smudge
pits came from pine, beech, sycamore and elm trees, indicating these tree types were growing at or near the site.

The hearth feature consisted of the remains of a campfire, which could have been used for warmth or cooking. In addition to charcoal, the feature contained a charred nut shell fragment. The remains of nut shells suggests that the people were sitting around this campfire and roasting nuts, probably during autumn when nuts are ripe and ready to eat. Overlapping the campfire feature was a semi-circular row of post molds, which may have been the remains of a small support structure over the fire, like a drying or heating rack.

Native Americans in the eastern Woodlands lived in wigwams or weetus made of sapling frames covered with matting or bark. They were very mobile and easily dismantled and set up. Once dissembled, the saplings would leave behind stains in the ground, or post molds.

The remains of nut shells suggests that the people were sitting around this campfire and roasting nuts, probably during autumn when nuts are ripe and ready to eat.
Several types of tools were found at Big Creek 2, including items typically in a Native American tool kit comprising projectile points, drills, scrapers, and knives. The tool kits also included implements for making the stone tools, such as a hammerstone and deer antler for chipping away at a core and for sharpening edges.
The projectile points can be attributed to particular time periods based on their style. The points found at the Big Creek 2 Site indicated that people visited as early as 10,000 years ago during the Early Archaic period and as late as 400 years ago during the Late Woodland period.

Charcoal from the features identified at the Big Creek 2 Site was sent to Beta Analytic Laboratories in Florida for radiocarbon dating. The dates tell us that the Native Americans at Big Creek 2 Site built smudge pits around 4,000 years ago, had a fire about 1,600 years ago, and about 300 years later, someone put posts in the ground for some sort of structure.

### Relative Dating of the Projectile Points

<table>
<thead>
<tr>
<th>Period</th>
<th>Date Range</th>
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<tbody>
<tr>
<td>Early Archaic Period</td>
<td>ca. 10,000–8,500 years ago</td>
</tr>
<tr>
<td>Middle Archaic Period</td>
<td>ca. 8,500–5,000 years ago</td>
</tr>
<tr>
<td>Late Archaic Period</td>
<td>ca. 5,000–3,000 years ago</td>
</tr>
<tr>
<td>Transitional Archaic Period</td>
<td>ca. 3,800–2,800 years ago</td>
</tr>
</tbody>
</table>

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### Radiocarbon Dating of the Features Found at the Big Creek 2

<table>
<thead>
<tr>
<th>Period</th>
<th>Radiocarbon Date</th>
<th>Feature Type</th>
<th>Dimension of Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late/Transitional Archaic Period</td>
<td>ca. 3,920–3,700 years ago</td>
<td>Smudge Pit</td>
<td>23w x 28d x 27h (cm)</td>
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<tr>
<td>Late/Transitional Archaic Period</td>
<td>ca. 4,160–3,870 years ago</td>
<td>Smudge Pit</td>
<td>19w x 29d x 15h (cm)</td>
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<tr>
<td>Middle Woodland Period</td>
<td>ca. 1,820–1,530 years ago</td>
<td>Hearth</td>
<td>75w x 55d x 12.5h (cm)</td>
</tr>
<tr>
<td>Contact/Early Historic Period</td>
<td>ca. 360–190 years ago</td>
<td>Post Molds</td>
<td>Average 5cm diameter 9.5cm high</td>
</tr>
</tbody>
</table>
A major question on archaeological sites is: “How old is it?” There are several ways to determine the age of a site including radiocarbon or absolute dating, and by the styles of artifacts found or relative dating. In the case of the Big Creek 2 Site, both absolute and relative dating techniques were used to help recreate past events. Projectile points have recognizable styles that can be associated with different archaeological time periods, just as there are typical styles of clothing or cars for different historic periods. This is called relative dating because we are comparing projectile point styles relative to one another and developing a point typology. The various point styles fit into a cultural chronology of major periods in the Northeast and Pennsylvania. Points from the Big Creek 2 Site indicate that people repeatedly used the area as a campsite for nearly 10,000 years. Based on the types of projectile points recovered, it appears that the site was used most often between 8,500 and 2,800 years ago, or during the Middle Archaic and Late Archaic archaeological periods.

We were also able to estimate when people visited the site by radiocarbon-dating charcoal from the features we found. The oldest dates came from the two smudge pit features showing that they were made between about 4,100 and 3,700 years ago. Radiocarbon dates from the hearth and post molds were much younger than the smudge pits. The hearth was made between 1,800 and 1,500 years ago, and the post molds are between 360 and 190 years old. The age of the post molds indicates they were made during the archaeological period known as the Contact Period, which is when Native Americans and European settlers first began to interact. Because the post mold dates are so young, it is uncertain whether they were made by Native Americans or people of European ancestry. We know that settlement of Bedford County by Europeans was sparse until around the mid-1800s, so it seems more likely that the post molds were made by Native Americans.
The earliest evidence of human occupation in the Northeast dates from the PaleoIndian Period.

### THE FIRST ARRIVAL
Finding cultural evidence dating back 10,000 years is not as rare as one may think. People first ventured into North America at least 12,000 years ago following the retreat of the melting glaciers.

The earliest evidence for human occupation in the Northeast dates from the PaleoIndian Period. The environment was much colder and drier than today and can be described as tundra-like. The Paleo-Indian hunters moved into the area when the glacial ice sheets began to retreat. They collected plants and hunted mastodon, bison, elk, caribou and smaller animals. PaleoIndian archaeological sites are usually identified by a suite of distinctive stone tools and by the equally distinctive technology used to make them. The most readily identifiable tool form is the fluted point, a *[lanceolate-shaped point](https://www.nps.gov/archaeology/lanceolate-shaped-point.htm)* that has been thinned by the removal of one or more flakes from the base toward the tip, leaving an elongated flake scar (or “flute”) on each side.

Most animals had value beyond food to the early Native Americans, and many tools on Paleo-Indian sites were used to process animal remains. For example, caribou hides made warm and durable clothing. Animal tendons were used to sew clothing together, bind tools to handles and tie together wooden posts and frames used for a variety of things. Tools, such as awls, were made from animal bones, and teeth were used to make jewelry or decorate clothing.

There are only five recorded sites dating back to this time period in Bedford County, all of which were discovered on river floodplains. However, several well-documented Paleo-Indian sites have been identified elsewhere in Pennsylvania. These sites yielded stone tools including knives, *scrapers, hammerstones*, and fluted spear points, as well as caribou bone and some charred seeds. Because the PaleoIndians moved around so often, they didn’t leave much evidence behind.

### THE ARCHAIC PERIOD
Around 10,000 years ago, the climate warmed, causing the glaciers to melt. People began settling down for longer periods of time, leaving behind more cultural material. Many archaeologists refer to the Archaic period as a time of Native American colonization and settlement in the northeastern United States. Although the mastodon and bison had disappeared, many more types of plants and animals were available, such as oak trees and white tailed deer.

The Archaic people began producing a wider variety of stone tools to process their new resources. Special tools, such as axes and gouges, were made for woodworking. People settled in more diverse settings as the land became available.

The Archaic period is typically subdivided into Early, Middle, and Late periods. Similar to the PaleoIndian Period, the earliest Archaic sites are poorly represented in the region. There are currently a total of nine recorded Early Archaic sites in Bedford County, all located in the northern half of the county.
People settled in various areas along large rivers as well as in the uplands and would stay at campsites for longer periods of time, as is evident from the post molds we find from their wigwams.

Sites of this age have been found along rivers as well as in some upland settings. The earliest evidence of human occupation at the Big Creek 2 Site dates to the Early Archaic period. We know this because we recovered two spear points, called a Palmer notched and a Kirk, which have been found at other sites dating to this period.

The Middle Archaic period began approximately 8,500 years ago in the Northeast and coincided with the return to cooler, wetter conditions. The development of oak and hemlock-dominated forests began around 6,000 years ago. Diverse types of tools have been recovered from Middle Archaic sites. The presence of adzes, gouges, and grooved axes suggests heavy wood-working and possibly the appearance of dugout canoes. In general, there are many more Middle Archaic sites in Pennsylvania and Bedford County, reflecting an increase in populations, intensified use of upland locations, and the use of seasonal base camps near major streams. At Big Creek 2, Middle Archaic people left behind nine spear points that can be dated to this period. Archaeologists in Pennsylvania call these points bifurcate-base, Stanly, and Otter Creek types.

During the Late Archaic period, starting around 5,000 years ago, the climate was warmer. People settled in various areas along large rivers as well as in the uplands, and would stay at campsites for longer periods of time, as is evident from the post molds we found from their wigwams. Extensive trade networks, increased burial ceremonialism, and the development of new technologies characterize this time period in the Northeast. It is during the Late Archaic period that we see the first evidence of containers, which were made by carving *steatite* or soapstone. We assume that Native Americans had containers during the Archaic Period prior to stone bowls, but they were made of material such as birch bark and wood that deteriorated. The Late Archaic time period is the best represented archaeological period in Bedford County, and a total of 124 recorded sites have been attributed to this period. At Big Creek 2, the Late Archaic period
Native Americans began making fired clay pottery in the Northeast about 3,000 years ago. The first styles were plain and called Vinette I, followed by more elaborately designed pots with collared necks and castellated rims.

is represented by several points called Brewerton, Lamoka, Susquehanna and Orient Fishtail. Also, we know from the radiocarbon dates that the two smudge pits were made during the Late Archaic period.

LIFE IN THE WOODLAND PERIOD
Following the Archaic period, archaeologists identified the Woodland period as a time of continued development for local Native Americans. In general, the Woodland period is described as a gradual cultural transformation from a hunting and gathering way of life toward a more sedentary existence associated with the introduction of farming and making fired clay vessels for cooking and storing food. This is sometimes referred to as the container revolution. By making the coiled clay vessels, the Woodland peoples had many more options for storing and cooking food. Just as the stone spear points can be dated based on their style, so can the clay pottery of the Woodland period. Like the Archaic period, the Woodland period can be subdivided into Early, Middle and Late periods.

In general, the cultural and settlement patterns did not change dramatically in the Early Woodland period, beginning around 3,000 years ago. The biggest change is the introduction of pottery, which had thick walls, flat or pointed bottoms for placing on or in the ground, and very little design embellishment. While there are 32 Early Woodland period sites in Bedford County, archaeologists did not find any evidence to suggest that people were using the Big Creek 2 site during the Early Woodland period.

During the Middle Woodland period, beginning approximately 2,000 years ago, people began growing their own food. Although some people still relied solely on hunting and gathering, many people began to supplement their diet with farming, also called horticulture. The pottery becomes more stylistic and may reflect family connections. People began growing crops, such as maize, beans, and squash, which they would store in large pits for the winter. This new diet led to all sorts of changes in terms of organization of labor and social stratification in the Northeast. The large number of sites found and the types of stone tools recovered suggests increasing population and extensive long-distance social interaction and trading during the Middle Woodland period.
Middle Woodland people left two spear points behind at the Big Creek 2 Site that archaeologists call Fox Creek types. By radiocarbon dating charcoal from the hearth feature, we also know they made a fire.

During the Late Woodland period, around 1,000 years ago, there is evidence of large semi-permanent village settlements in the Northeast. These large settlements were located adjacent to fertile lands, particularly along broad floodplains that would have been good for farming. Farming, however, did not replace the tradition of making seasonal rounds for food, so small task-specific camps were still common during this period. Artifacts found on Late Woodland sites include triangular arrowheads called Levanna and Madison points, which were used with bows. More elaborate pottery was made with rounded bottoms for better heat distribution when hanging over fires. The maize, or corn, they grew took much longer to cook than the corn we eat today. Grinding stone tools such as mortars, pestles, and milling stones, and tools used for farming, such as hoes, are also found on Late Woodland village sites. Many of these large villages were protected with palisades, and there is also evidence of some warfare. The climate was actually cooler during the Late Woodland, which may have affected the crops and made people more protective of their resources.

There are 53 recorded Late Woodland sites in Bedford County, located in a variety of settings along stream terraces, riverine floodplains, the base of hills, hilltops and in rockshelters. The Late Woodland people in Bedford County relied on horticulture as well as hunting and gathering, and some lived in fortified villages. At Big Creek 2, only one triangular arrowhead was found that told us people visited the site during the Late Woodland Period.

Beginning around 1,000 years ago, Native Americans made triangular stone arrowheads to use with a bow and arrow. Once the Europeans arrived, Native Americans traded furs and maize for metal objects, such as pots, which they used to make arrowheads.

**THE END OF A TRADITIONAL WAY OF LIFE: EUROPEAN SETTLEMENT**

Initial contact between the Native peoples of Pennsylvania and Europeans occurred about 450 years ago. Archaeologists refer to this time as the Contact period. Contact with European populations slowly but completely disrupted Native American social, economic, and political culture. Diseases introduced by Europeans contributed to the reduction of Native American populations, and likely reached into the interior of Pennsylvania by the 1630s. Colonization and land-taking around present-day Philadelphia by European settlers, beginning in the late 1600s, eventually drove the remaining Native American people westward to the Susquehanna, Allegheny, Juniata and Ohio River valleys.

There are several Native American trails or paths in Pennsylvania that were used during the pre-contact and Contact periods. Closest to the Big Creek 2 site is the Raystown Path, extending between Raystown (currently Bedford) and Paxtang (Harrisburg), and a trail leading between “Standing Stone” in present day Huntingdon and “Opessa’s Town” in Maryland. Archaeological sites dating to the Contact period, which typically include stone tools as well as artifacts made of metal and glass that were obtained from Europeans through trade, are scarce in the region.

The Lenape, Delaware and Shawnee were the indigenous people in the area. The nearest known settlements of the Lenape and Shawnee were at Old Town, near Bedford and Wolfsburg, and a Shawnee settlement that was near Schellburg.
WHAT KIND OF STONE WAS USED TO MAKE THE TOOLS AND WHERE DID IT COME FROM?

The Native Americans at Big Creek 2 used a variety of stone types to make their stone tools. Most of the stone, such as Bedford chert, quartzite and quartz, is common in the area. These materials could have been gathered within 10 miles of the hunting camp. Stone from much farther away was also found at the site and included jasper, rhyolite, black chalcedony, and Flint Ridge chert.

Archaeologists also found Flint Ridge chert that came from up to 250 miles away in Ohio. The jasper and black chalcedony at the site probably came from sources 70 miles away to the north. Rhyolite, which was the most common type of non-local stone found at the site, came from South Mountain in southern Pennsylvania, and in neighboring areas of Maryland. South Mountain is located about 50 miles to the southeast of the Big Creek 2 Site. It is clear that the people who used the hunting camp had trading connections to other areas and might have been making trips to get some of these materials themselves.

The archaeology also revealed that the people using the Big Creek 2 hunting camp may have preferred different types of stone through time. For instance, projectile points dating to about 3,800 to 2,800 years ago, during the Late Archaic period, were all made of the rhyolite or jasper that came from distant places. In contrast, projectile points dating to the earlier time periods were more commonly made from the local types of stone.

LOCATION OF LITHIC SOURCES

The stages for making a stone spear point: start off with a large stone or core, start reducing it by taking off larger flakes, then smaller ones, until finally very small finishing flakes. This process produces thousands of pieces of chipping debris.
STONE TOOLS & CHIPPING DEBRIS

In terms of the types of artifacts, most of the tools recovered at Big Creek 2 were projectile points and chipping debris. All the chipping debris at Big Creek 2 was less than 5 cm in size and the result of people maintaining or repairing finished tools that they already had with them in an easy-to-carry toolkit. Finding mostly spear points and small pieces of chipping debris suggests that the Big Creek 2 site was a short-term hunting camp.

THE NUMBER AND TYPE OF STONE TOOLS FOUND AT BIG CREEK 2 SITE

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Projectile Points</td>
<td>70</td>
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<tr>
<td>Bifaces</td>
<td>60</td>
</tr>
<tr>
<td>Utilized Flakes</td>
<td>50</td>
</tr>
<tr>
<td>All other tools</td>
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THE NUMBER AND SIZE OF CHIPPING DEBRIS FOUND AT BIG CREEK 2 SITE

<table>
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<th>Size Range</th>
<th>Count</th>
</tr>
</thead>
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<td>1-3 centimeter</td>
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<td>3-5 centimeter</td>
<td>2,500</td>
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<tr>
<td>5-7 centimeter</td>
<td>2,000</td>
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Projectile Points

Bifaces

Chipping Debris
Based on information gathered during the archaeological investigation, Big Creek 2 was a campsite that was used over a period of thousands of years by Native American hunter-gatherers. Hunter-gatherers made their living by searching for and obtaining animal and plant foods directly from their environment, without farming. They were typically egalitarian societies, meaning there was very little difference between people in terms of wealth and power. They shared food and worked together as a community. It is important to realize that all human populations throughout the world have at one time or another been hunter-gatherers, and a few groups still make their living this way today. The knowledge we have about modern hunter-gatherer societies allows us to speculate about how the pre-contact Native Americans might have lived. In general they lived in groups of 25 people or fewer, and would congregate once a year with several other groups.

During the Archaic Period, when the Big Creek 2 Site was primarily used, people would travel from one site to another in a regular cycle timed to the changing seasons. We suspect, for example, that during the fall, families moved to camps on the river terraces where they could hunt deer and gather acorns and other nuts for winter food. In the spring and summer, they might have moved to camps on streams where they could fish and gather roots, berries and mussels. By coming back to their sites repeatedly over thousands of years, a great deal of waste material was left which can be found by archaeologists.

Native Americans would use specialized-task camps for short periods of time, away from their seasonal base camp. The smaller camps were usually along smaller streams and in upland areas. These small camps were used by only a few people for a few days or even hours while on a special trip to obtain food or other necessary provisions to take back to the main base camp. Examples of short-term camps include camps for nut collecting, hunting and fishing, and quarrying where stone was collected for making tools.

If the Big Creek 2 Site was a larger base camp where many people lived for long periods, archaeologists might expect to find many features such as dwelling evidence from wigwams, fire places, storage and garbage pits, and a wide variety of tools.

Archaeologists were able to infer that Big Creek 2 was a short-term campsite, based on the identified artifacts and features. The location of the site along a very small stream in an upland area also suggests this.

Archaic Native Americans would set up small temporary camps to carry out special tasks such as hunting.
If it was a short-term camp used by only a few people, archaeologists would expect to find fewer tools, a smaller variety of different kinds of tools, and few features.

Based on the identified artifacts and features, archaeologists were able to conclude that Big Creek 2 was a short-term campsite. Most of the tools recovered at Big Creek 2 were projectile points.

The location of the site along a very small stream in an upland area also suggested it was a short-term campsite. The size of the chipping debris at Big Creek 2 also suggests it was a short-term camp. Making stone tools from scratch often leaves behind thousands of pieces of chipping debris. At larger base camps, chipping debris size typically ranges from large to small, evidence of the early to late stages of making stone tools. Finding only small pieces of chipping debris is evidence of late stage tool manufacture, typical of short-term camps. This is partly because rocks big enough to make tools from scratch are heavy, and people probably didn’t want to carry them to a place they were only going to stay for a short period. Instead, these items would have been left at the base camp. All the chipping debris at Big Creek 2 was less than 5 cm in size and was the result of people maintaining or repairing finished tools that they already had with them in an easy to carry toolkit.

For example, in the field a person might sharpen a dull cutting tool by chipping off a few flakes along its edges.

In addition, the small assemblage features at Big Creek 2 (e.g., fire hearth, smudge pits, and a few post molds) and an absence of large storage pit or house structure features typical of larger base camps indicated it was a short-term campsite.
WHAT WERE PEOPLE DOING AT BIG CREEK 2?  
WHAT DID THE ARTIFACTS TELL US?

A combination of information was used to determine what people were doing at the Big Creek 2 Site. Since so many of the tools recovered were projectile points, we think the Big Creek 2 Site was used as a hunting camp. Most of the points also had broken tips, which is damage typical of hunting use.

In order to find out what people were hunting, the archaeologists analyzed a sample of the tools for protein residues. When people hunt or butcher an animal, blood is left behind on the points or tools. Body proteins like blood are quite sticky, and depending on preservation conditions, can stay on a tool for thousands of years. These residues can be analyzed to find out what kind of animal they came from, or the family or group of animals. Unfortunately, conditions at Big Creek 2 were not very conducive to preserving these proteins, and only a few of the tools still had identifiable residues. Protein residues identified came from rodent (rat or mouse), horse, bear, deer (possibly deer, elk, or moose) and a canine species such as wolf, coyote, or dog.

So were the people at Big Creek 2 really hunting mice and horses? This seems very unlikely. Rodents don’t provide much of a meal and the kinds of horses here today in the United States didn’t exist until Europeans brought them over as explorers and colonists. Proteins from animals can get on tools in other ways than through their blood, and it’s possible that the rodent or horse proteins came from modern urine. The tools with residues from bear (most likely black bear in this area), deer and canine species more likely reflect what Native Americans at the site were hunting and butchering.

The artifacts from Big Creek 2 also told us that inhabitants spent time repairing their hunting equipment. Many of the tools we found had been sharpened or reworked from one tool type into another.

Archaeologists also examined the type of wear on the tools. Using tools on different materials leaves unique patterns of wear, such as damage or polish, and sometimes an archaeologist can tell the difference between tools used to scrape leather, cut meat,
process vegetal materials or scrape wood. Wear analysis told us that the tools were used on hard materials like wood or bone, as opposed to soft material such as flesh. People may have been using these tools for making new wooden shafts for projectile points, which often break while hunting. Also, some of the notching and broken edges on the tools used as knives could have happened while butchering an animal, which involves cutting hard, bony joints. Studies of modern-day hunter-gatherers show that they often cut larger prey into pieces, making it easier to carry back to a base camp.

**WHY WAS BIG CREEK 2 A GOOD PLACE TO CAMP?**

Location is everything. The Big Creek 2 Site is near a source of water where two streams come together. It is also located at one end of a ridge gap within the Ridge and Valley province of Pennsylvania. As the name suggests, this province is made up of valleys separated by steep ridges. Native Americans relied on gaps in the ridges for travel instead of traversing steep hillsides. Having a campsite at a ridge gap made it easy to travel and provided easy access to the resources in more than one valley.

We believe people moved between valleys through the ridge gap. While surveying the area around the Big Creek 2 Site, archaeologists found several small sites that contained just a few pieces of debitage or broken tool fragments, suggesting the Native Americans were moving through the area to other areas.
THE STORY OF THE BIG CREEK 2 SITE

Overall, the archaeological finds at Big Creek 2 helped to reconstruct the Native American history of the Big Creek 2 site. The location of the hunting camp at a ridge gap made it an especially popular spot that was visited by generations of people over thousands of years. During those years, small groups would travel here, possibly during the late fall or early winter, to hunt deer or other animals. They probably camped by the stream for no more than a few days at a time before returning home to their families, hopefully with food for the winter.
**Absolute dating:** The determination of age with reference to a specific time scale, such as a fixed calendrical system also referred to as chronometric dating. Examples of absolute dating are tree-ring dating and radiocarbon dating.

**Anthropology:** The study of humanity — our physical characteristics as animals, and our unique non-biological characteristics we call culture. The subject is generally broken down into three subdisciplines: biological (physical) anthropology, cultural (social) anthropology, and archaeology.

**Archaeology:** A subdiscipline of anthropology involving the study of the human past through its material remains.

**Archaeologist:** Anyone with an interest in the aims and methods of archaeology. At a professional level, the archaeologist holds an advanced degree in anthropology or archaeology. The professional archaeologist is one who is capable of collecting archaeological information in a proper scientific way, and interpreting that information in light of existing scientific theories and methods.

**Artifact:** Any portable object that shows evidence of modification by humans. Examples of artifacts are spear points chipped from stone, animal bones burned during preparation of a meal, fragments of pottery vessels, and coins. Whether ancient or recent, artifacts are the traces of human behavior, and therefore one of the prime categories of things studied by archaeologists.

**Atlatl:** Also called a throwing stick, a tool used to increase the force behind a thrown spear. The butt of the spear shaft would fit one end of the atlatl and lie along it facing the direction of the throw. The thrower would hold the other end of the atlatl and the spear shaft together, then in throwing, release the spear shaft but not the atlatl, so that the spear would be launched from the end of the atlatl rather than from the hand, artificially extending the length of the thrower’s arm for corresponding increase in the force of the throw.

**Botanical material:** Remains of vegetation found at a site, such as nutshells, seeds, kernels, etc. In acidic soils such as in the Northeast, these are usually not well preserved unless charred or burned.

**Biface:** An artifact that has been knapped (chipped) on both its surfaces; often an unfinished tool. Knives and projectile points are examples of bifacial tools.

**Context:** Archaeological context refers to the setting from which archaeological objects or artifacts are taken. Usually the meaning of artifacts cannot be discerned without information about their setting. One example is determining how old an object is, given that the age of artifacts excavated from a site varies with their depth in the ground. Unless the depth of an object is carefully recorded against a fixed point of reference, it may be impossible to relate objects to the dimension of time. Another example is finding an artifact in a ceremonial pit versus a trash pit will give that object different meaning.

**Core:** A lithic artifact used as a blank from which other tools or flakes are made.

**Cultural chronology:** An outline of the major cultural developments through time — adaptations, subsistence and settlement patterns, technological innovations, etc. Archaeologists have come up with cultural chronologies for major areas around the world, usually presented in a chart from earliest to latest traits.
Cultural resources: The remains that compose our nonrenewable heritage from the past, including both the archaeological and the historical records. Archaeologically, even the smallest fragments of cultural objects potentially hold important information concerning past lifeways. Archaeologists have developed specialized techniques to recover, analyze, and preserve this information in the form of physical remains. While some artifact from ancient sites may appear insignificant to those outside the cultural group, such items may indeed hold important meaning to the descendants of those who created the artifacts. Therefore, it is vital that the broadest and most inclusive definitions of material culture be used when identifying and consulting on Native American issues.

Cultural Resource Management (CRM): Development of programs and policies aimed at conservation of archaeological properties and information. Such programs exist within the federal and state governments, academic institutions and private agencies.

Data: Relevant observations made on objects, serving as a basis for study.

Data recovery: An archaeological data recovery is officially defined as the “systematic removal of the scientific, prehistoric, historic, and/or archaeological data that may provide an archaeological site with its research or data value”.

Debitage/chipping debris: A term meaning the characteristic types of stone flakes produced from manufacture of stone tools by chipping (as, for example, stone spear or arrow points). One of the most common types of pre-contact Native American artifacts, these distinctive flakes frequently alert the archaeologist to the presence of a site.

Ecofact: The nonartificial remains found in an archaeological site, such as seeds, bones, shell, and plant pollen.

Feature: In archaeology, a structure that cannot be removed from the ground without destroying it. Many things of archaeological interest are portable, such as fragments of bone, pottery and stone tools (artifacts). However, archaeological sites frequently contain human made things that are not portable, but are part of the earth itself. Examples of these features are hearths, foundations of buildings, storage pits, burial pits and canals.

Grid: A system of numbered squares printed on a map, forming the basis for references to a particular place.

Hammerstone: A stone with scarring or pitting on its end from banging, that functioned as a hammer. Hammerstones were often used to split cobbles and flake cores in stone tool manufacture.

Hearth: A place where a fire is built, often ringed by stones.

Indigenous communities: The original or first peoples to settle a region. In the Americas, they are also known as American Indians, Native Americans, and First Nations.

Lanceolate-shaped point: Term used for knapped stone points, made without a stem, shoulders, notches, or other features that aid in attachment to a shaft.

Midden: A deposit of refuse; a garbage dump.

Pre-contact: Refers to the time period before European settlement, which in Pennysylvania dates back to at least 10,000 years ago.
**Post-contact:** Refers to the time period after initial European settlement, which differs depending on the geographic area in question.

**Projectile point:** The bifacially chipped stone head of an arrow, dart, or spear.

**Radiocarbon dating:** A form of absolute dating, this is the calculation of the appropriate age of an organic sample by comparing the amount of carbon-12 with that of its unstable isotope, Carbon-14. C-14 in all organic matter starts to decay at a known rate once an organism dies. This technique works only on organic material such as wood, bone, fibers, shell, etc. Dirt, rocks, and other non-organic material cannot be radiocarbon dated.

**Relative dating:** Determining chronological sequence without reference to a fixed time scale. Dates expressed relative to one another (for instance, earlier, later, more recent, etc.). Examples of relative dating are stratigraphy and typology.

**Research design:** Systematic planning of archaeological research, usually including the formulation of a strategy to resolve a particular question; the collection and recording of the evidence; the processing and analysis of these data and their interpretation; and the publication of results.

**Scraper:** A stone tool with flaking at the working edge used to work animal hides (deflesh), bone, wood, etc.

**Site:** A distinct clustering of artifacts and other remains left behind by human behavior.

**Soil profile:** The vertical wall of soil left between excavated areas as a record of the soil’s layering.

**Steatite:** A soft stone also called soapstone because of its greasy, soapy feel. Steatite was often carved into stone bowls by the Native Americans.

**Stratigraphy:** A number of normal processes caused the earth’s surface to be built up over time in layer cake fashion. Sometimes this is caused by floods or wind carried soil. In other cases it may result from people piling up refuse of one kind or another. The layering effect here is called stratigraphy, and is a major interpretive tool of the archaeologist. Within a given stratigraphic sequence the most deeply buried layers are usually the oldest, and within the same level are usually from the same points in time. Stratigraphy is therefore a means of telling time (in a relative sense) for the archaeologist on an ideal archaeological site.

**The National Register of Historic Places:** The National Historic Preservation Act (NHPA) was passed in 1966. It was designed to help protect important cultural resources for future generations by having eligible sites placed on a list called the National Register of Historic Places (NRHP). The Act has largely been responsible for growth of the CRM industry and has created a nationwide network of federal and state agencies working toward the same goal of conserving America’s cultural heritage.

**Test pits:** Small, systematically excavated archaeological tests. The function of the test pit is to provide a sample of a site’s contents at a particular point.

**Toolkit:** Cluster of artifacts that occur together as a consequence of having been used together in certain activities, such as making spear points.

**Typology:** The systematic organization of artifacts into types on the basis of shared attributes.
ARCHAEOLOGICAL RESOURCES

Archaeological Institute of America
www.archaeological.org
The AIA promotes a vivid and informed public interest in the cultures and civilizations of the past, supports archaeological research, fosters the sound professional practice of archaeology, advocates the preservation of the world’s archaeological heritage, and represents the discipline in the wider world. A nonprofit organization, the AIA also seeks to educate people of all ages about the significance of archaeological discovery and is committed to preserving the world’s archaeological resources and cultural heritage.

The Society for Pennsylvania Archaeology, Inc.
www.pennsylvaniaarchaeology.com
The SPA was organized in 1929 to promote the study of the prehistoric and historic archaeological resources of Pennsylvania and of neighboring states; to encourage scientific research and to discourage exploration which is unscientific or irresponsible in intent or practice; to promote the conservation of archaeological sites, artifacts, and information; to oppose the manufacture and sale of fraudulent antiquities; to encourage the establishment and maintenance of sources of archaeological information, such as museums, societies, and educational programs, and to promote the dissemination of archaeological knowledge by means of publications and forums; and to foster the exchange of information between the professional and the avocational archaeologists. Membership is on a calendar-year basis and is open to all persons, avocational and professional, who are in agreement with the purpose of the society.

Pennsylvania Archaeological Council
The Pennsylvania Archaeological Council (PAC) is a statewide organization of professional archaeologists dedicated to promoting Pennsylvania archaeology.

University of Pennsylvania
www.penn.museum
Museum of Archaeology and Anthropology
3260 South Street, Philadelphia, PA 19104
(215) 898-4000

Philadelphia Archaeological Forum:
www.phillyarchaeology.org
Philadelphia is a city with a rich archaeological heritage. PAF advises historians, architects, government officials, tourism concerns, and others about archaeological matters. Through its educational programs, PAF shares information about the city’s archaeology with the general public. The Philadelphia Archaeological Forum is dedicated to the protection and preservation of these resources.

Pennsylvania Historical and Museum Commission
www.portal.state.pa.us/portal/server.pt/community/archaeology/2051
Report archaeological finds!

PAC, the Pennsylvania Historical and Museum Commission (PHMC), and the Society for Pennsylvania Archaeology (SPA) jointly sponsor Archaeology Month.