ARCHAEOLOGY AS RESTORATION ECOLOGY: A MODEL FROM SUNWATCH
INDIAN VILLAGE/ARCHAEOLOGICAL PARK (33My57)

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INDIAN VILLAGE/ARCHAEOLOGICAL PARK (33My57)

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Archaeology as Restoration Ecology: A Model from SunWatch Indian Village/Archaeological Park (33My57)(87 pp.)

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This research is intended to demonstrate how SunWatch Indian Village/Archaeological Park presents possibilities for how restoration ecology and archaeology can augment and inform each other by looking at both the site and the environmental restoration at the site from an historical ecology perspective. There are two major themes of this work: first, the application of archaeological data to modern environmental issues and second, the importance of viewing landscapes as both natural and cultural phenomena which interact in a series of complex relationships throughout time. I present a comprehensive overview of the site, providing the paleoethnobotanical data collected by previous researchers in order to show how such archaeological data can be used to inform restoration work. The research ends with a presentation of how SunWatch can provide a model for doing this work in other places, as well as a series of questions and criteria necessary for determining when and where it is appropriate.

Approved:

Elliot Abrams
Professor of Anthropology
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I used to ride my bike to work at SunWatch every day for two years. It was about 14 miles roundtrip with two possible routes. One took me on the bike path by the Great Miami River which is one of the dirtiest, shallowest and most uninteresting rivers I have ever seen. The other route took me from downtown Dayton through the inner west side neighborhoods which are wracked with crime, poverty, drug use, pollution and very distinct segregation along color lines. Both routes forced me for the last two miles onto an unkempt pot-holed road with heavy landfill-bound traffic, Elco steel, a plastics factory, the waste water treatment plant and Waste Management, Incorporated offices complete with dumpster graveyard. The point is that on a bike I was in a prime position to really feel and see the difference between this landscape and the landscape which emanates out from the SunWatch site. The difference was almost tangible. Most visitors comment on this difference once they actually find the site, often thinking they have taken a wrong turn or missed a sign along the way.
CHAPTER I: INTRODUCTION

In the end, the separation of people from active participation in the forest ecosystems of the eastern United States will result in an artificial ecological construct, not a restored ecology (Neumann 2002).

This thesis is an attempt to link archaeology to the dynamic field of restoration ecology by way of an historical ecological analysis. The link will be made by examining the ways that SunWatch Indian Village/Archaeological Park in Dayton, Ohio embodies a successful environmental reconstruction project. This project has the potential to bridge the gap between the reconstruction needs at SunWatch and the more rigorous restoration needs of a restoration ecology project. A definition of restoration ecology melded from several definitions presented by Gross (2001) is utilized in this study. Here, restoration ecology is an active, participatory process of assisting the recovery and management of ecological integrity through the integration of culture and nature as well as art and science while historical ecology is defined as the globally relevant interdisciplinary study of past ecosystems by charting the change in landscapes over time (Crumley 1994).

Restoration ecology provides the methodological framework that we seek to aspire to, historical ecology provides the theoretical framework and archaeology provides the material data as well as the specific temporal and geographical context.

Presented here is a vision of how archaeological sites can be viewed as dynamic landscapes forming an integral part of our modern world rather than as static museum exhibits existing only beyond dusty panes of glass or in equally dusty academic journals. It is an exploration of how we can see archaeological sites not only as cultural heritage but as natural resources which give us hints of alternative human land and resource use patterns throughout time.
Hand in hand with recognizing alternative resource patterns is applying those patterns to modern day land use decisions. Throughout this thesis many aspects of this unique site are explored by applying ideas from both historical ecology and archaeology which look at landscapes culturally, temporally and geographically in order to create living histories that are embodied at this site by the restoration of parts of the ancient landscape. These histories can facilitate a localized ecological healing process that is beneficial to many communities today.

This research starts with one critical question: How can archaeology be applied to the current environmental crisis? “Environmental crisis” is consciously used here in an attempt to bring issues such as global warming, the destruction of native forests and humans’ alienation from nature into the center of this discipline. This is done with the intent of demonstrating that archaeology is not only equipped to address these problems but also in a position to be part of the solutions to these problems. Within that question there are many other questions. How does an historical and ecological view of a piece of land lend itself to the process of ecological restoration? How do we apply archaeological data to real world problems? Then what criteria do we use to identify and prioritize those “problems”? How do we conduct truly interdisciplinary work and research that breaks down the nature/culture dichotomy as well as deepens our understanding of the formation processes which have created the world we live in today? Finally, how do we encourage and illustrate archaeological sites as dynamic, living parts of the modern world rather than links to a dead past?

These questions are important because archaeology is a destructive science that
curates vast stores of data about the past while at the same time distancing itself from modern environmental, cultural and social problems (Redman et al. 1978). These questions are also interdisciplinary making them more easily applicable and accessible to a wide variety of issues, people and organizations. Finally, these questions place human impacts and actions along a space/time continuum that is inseparable from any landscape we wish to (re)-create. All these questions will be addressed by looking at SunWatch as both a model and a teaching tool. We can look at how it was and is being done there with varying degrees of success in order to create a model for how restoration ecology can be tied to existing archaeological data sets and why it is important to do so.

As mentioned, historical ecology will be used in order to present a clear picture of a specific place, SunWatch Indian Village/Archaeological Park throughout time. Following Balee (1998), “historical ecology actually involves the empirical investigation of relationships between humans and the biosphere in specific temporal, regional, cultural, and biotic contexts” (3). This picture then will be as complete as possible, incorporating various lines of research so that formation processes are apparent. Understanding how, why and when a forest changes to a prairie for example is very different than simply presenting a prairie as a relic of a past life frozen in time. It allows us to understand landscapes as processes rather than static decontextualized moments (Balee 1998; Crumley 1994). We cannot answer the question of what we are restoring the land to until we understand the processes, both cognitive and evolutionary which created the landscape we can see, feel, hear and touch right now (Neumann 2002). As such, historical ecology will be a major aspect of this research.

This chapter serves as an introduction to the research and outlines the main
theoretical underpinnings and goals. Chapter 2 provides a comprehensive site background intended to provide an overview of the complex physical and cognitive formation processes which have made the site what it is today. Chapter 3 outlines the research history and archaeological data used to determine Native American land use in the 13th century. The focus of the chapter is the paleoethnobotanical data upon which the current environmental reconstruction project is based. Finally, Chapter 4 outlines a model, based on SunWatch, for how archaeology can inform and augment restoration work. It also addresses the ways that this kind of project can feedback into education, science and community building.
CHAPTER II: SITE BACKGROUND

The price of ignoring the complexities of environments beyond the social is descriptions of the past that are vacuous, misrepresenting the contexts and exaggerating the independence of human actions. The challenge of including in archaeological interpretations a significant range of environmental variables is also daunting (Dincauze 2000: 501).

SunWatch Indian Village/Archaeological Park, 2004

All societies impact their environments. Ten hunter/gatherers will impact their environment in a way that is very different from the half million or so people who now live in and around Dayton, Ohio, but the fact remains that both groups are agents of change within a physical, geographical location on the earth. The differences are differences of scale. Ten people utilize a much smaller area in order to meet their daily dietary and other needs. Half a million people who are not growing their own food will necessarily have a much wider sphere of impact as they become almost completely dependent on trade, long transportation times and people they will never meet to provide them with food, construction materials and many other products and services. SunWatch Indian Village/Archaeological Park in its modern and ancient context lies somewhere between the hunter/gatherers and Dayton, Ohio in 2004.

The site is an A.D. 1200 village site with an estimated population of between 200 and 500 people (Essenpreis 1982) and 20-30 structures arranged in a circular pattern (Nass and Yerkes 1995). The people who inhabited this site eight hundred years ago were agriculturalists and are now called the Fort Ancient by archaeologists. The site is highly complex with several proposed (and observable) astronomical alignments and a
“ceremonial center” on the west side. The village is arranged in concentric circles around a center pole whose sunrise shadow is the source of astronomical alignments at least three times a year [Figure 2 and Appendix E] (Heilman and Hoefer 1981).

Immediately surrounding the center pole is a large plaza area with evidence of several sweat lodges. Around this is a ring of burials, then a ring of trash and storage pits, then a ring of structures and all this is finally surrounded by a stockade showing archaeological signs of rebuilding [Figure 3]. It is presumed that the site was then surrounded by agricultural fields, forest, prairie and the Great Miami River which now lies 200 meters to the east of the village site. Approximately 2/3 of the village has been excavated by archaeologists since the 1970’s. The eastern edge of the village is thought to have been destroyed by the building of a road, but the rest of the village was well preserved in the Wea type soil (Wagner 1987). It was thought to have been abandoned by the Fort Ancient people of the 13th century 20 to 30 years after it was constructed (Heilman and Hoefer 1981). Apparently it was not reoccupied until sometime in the 19th century when European settlers moved in and began to farm. Consequently it shows a fairly clear picture of the final pre-contact habitation of the site. It is now surrounded on all sides by development; to the south a trailer park, to the west the city dump and the railroad tracks and to the north the waste water treatment plant. Two hundred meters to the east is the current path of the heavily dammed Great Miami River and a little further east is I-75.
Figure 2: Sunrise shadow showing solar alignment on August 20.
Figure 3: Site layout. The stockade is seen on the outside edges of the photo. Square shapes are structures and dots represent storage/trash pits closer to the houses and burials closer to the center pole. The blank inner circle is the plaza and the center of the photo is the center pole complex. [See Appendix E for different maps]. (Note: this map is not up to date. More excavations have taken place that are not shown on this map.)
SunWatch now consists of a museum displaying many of the best artifacts from the site, several interpretive exhibits of village life, a gift shop and a movie theater with a video explaining the excavation and reconstruction of the site. The site also contains a reconstructed prairie and garden based on paleoethnobotanical evidence from the site (Wagner 1988a, 1988b, 1990). Extensive seed analyses have been conducted on various features (mostly trash pits and hearths) so that the prairie and garden contain plants which would have been visible on the landscape 800 years ago. The village itself has been undergoing reconstruction efforts for over twenty years so that now there are five structures reconstructed in situ using some of the same materials evidenced in the excavation and subsequent lab analyses. These reconstructions provide a hands-on opportunity for visitors to experience what it might have been like to be inside a Fort Ancient structure. The reconstruction focus of this site has proven to be an invaluable tool for education and public outreach both about archaeology and about the possibility of resurrecting native landscapes.

Ecological setting

Three categories of ecological conditions are used to discuss the site formation processes. First, there are “permanent” conditions. In this context, permanent conditions include landforms, soil and the hydrology of the region. The second set of conditions are called “semi-permanent”. These include the vegetation of the region and the climate. The third set of ecological conditions are termed “human” conditions. These reflect the results of the myriad interactions between the Miami Valley’s human inhabitants and the physical world around them. They include impacts on hydrology, vegetation and
landscape. Even though these three categories are listed separately, there is considerable overlap and feedback between them depending on the time scale used. In the context of this research, the time scale does not exceed 20,000 years or the time span between the last major ice age and the present (Delcourt 2002). This distinction is made because the Wisconsinan glacial period formed the drainage system we now call the Miami River Valley (Becker and Nolan 1988).

*Permanent*

The most important event in the formation of permanent ecological conditions at SunWatch was the Wisconsinan glacial advance of 30,000 to 20,000 years ago. This glacial period is responsible for both the land forms and the hydrology in the area of the Miami Valley since its advance buried all pre-glacial landforms that existed there (Delcourt 2002; Wagner 1987). During that period most of Ohio including the Miami Valley and excluding the southeastern quarter of the state, was covered by the Laurentide ice sheet (Delcourt 2002). This glacial advance created moraines throughout southwestern Ohio. As the ice sheet began to melt and retreat some 16,000 years ago, the Miami Valley drainage system and associated landforms took shape. According to Wagner (1987) the soils at SunWatch were formed from Ordovician bedrock, glacial drift and loess and the site itself sits on a pocket of Wea silt loam. This is a highly productive, well-drained neutral soil with a deep root zone that is typical of prairies. It is underlain through much of the Miami Valley by stratified sands and gravels beginning around 1.1 meters below the surface.
Semi-Permanent

As the ice sheet began to retreat, the vegetation and climate were completely altered as the eastern deciduous forest began to move northward following the retreating ice sheets and the climate warmed. As we have seen, the region occupied by SunWatch was covered in ice 20,000 years ago. The ice began to retreat around 16,000 years ago and the climate followed a general warming trend for 6,000 years (Delcourt 2002). By 10,000 years ago, the SunWatch area would have been covered in a mixed conifer-northern hardwoods forest. Between 6,000 and 5,000 years ago, the warming trend peaked and the eastern deciduous forest we know today took shape in Ohio. There is some evidence from the SunWatch site that the climate was warmer in the 13th century than it is now. Shane has suggested that the presence of rice rat in the archaeological record from the site indicates a warmer climate since rice rats must forage for food throughout the year (i.e. they are intolerant of snow cover) (Wagner and Shane 1980). Their current northernmost range is 300 kilometers to the south. Finally, there is widespread evidence of a cooling trend around the world beginning in the mid to late 15th century known as the Little Ice Age. This climatic shift resulted in wet, cool summers that were inhospitable for maize agriculture and probably altered the forest composition to some extent. This will be discussed in more detail in Chapter 3.

Human

Thomas Neumann (2002), in an article on human interactions with the ecosystems of the eastern United States, discusses the impact humans have had on their environment. He states, “. . . aboriginal populations had a profound effect on the structure of the eastern
forest community. That effect was maintained over 4,000 years of interaction with the plant and animal communities, such that the participation of the human cultures was a necessary element both for ecosystem stability and for the biodiversity exhibited” (173). The ability to understand and then integrate these “profound effect[s]” in terms of ecosystems is why archaeology and restoration ecology make good partners. Humans leave behind the material evidence of past ecosystems (which included humans) for restoration ecologists and archaeologists to piece back together. The gaps inherent in the archaeological data (i.e., differential preservation rates, human preference issues, limited sampling size) can be filled in by restoration ecologists who understand the intricate workings of ecosystems and archaeologists who create ecological research designs intended to see beyond these limitations. These research designs are beneficial because they create interdisciplinary projects intended to understand past ecosystems through both cultural and natural lenses. Following is a discussion of the human impacts in the Miami Valley region generally and SunWatch specifically on three time scales; pre-1492, the recent past (pre-Industrial) and the current human impacts.

**Pre-1492**

Plant domestication and landscape modification were well underway in the eastern United States as early as 3,000 BC. The first domesticates appeared between 3,000 and 1,500 BC and included squash, chenopod, marshelder and sunflower. Around 1,000 BC, maygrass, erect knotweed, little barley and giant ragweed began to be intensively cultivated. There is evidence of maize at three different sites in Ohio, Missouri and Tennessee as early as AD 200. However, it was not until AD 800 or so that
it became the staple food crop of Native Americans throughout the region (Smith and Cowan 2003). Additionally, the prairies that existed in the eastern part of the United States – well beyond their natural habitat in the Great Plains – were almost certainly maintained by humans through the use of intentional fires (Wagner 2003, Pyne 1998).

As previously mentioned, the archaeological evidence at SunWatch dates to the 13th century. So, despite Neumann’s claim of 4000 years of history between humans and their ecosystems in the eastern United States, we have to accept the limitations of the archaeological data and focus on what they can actually tell us about this specific place at a specific point in time. It is worth noting here the obvious but possibly under-recognized fact that the environmental reconstruction at SunWatch would look much different if the site dated to BC 2000 rather than AD 1200. Douglas Sprugel (1991) points out that “at any specific point in time, the vegetation of any area has some special characteristics that make it different from other times that might equally well have been chosen” (14).

The archaeological evidence from the 13th century at SunWatch shows the presence of a fairly typical eastern deciduous forest interspersed with prairies/open, weedy fields as well as agricultural fields containing maize, squash, beans and sunflower. There were no mounds associated with the site but there is evidence that the Fort Ancient were using many of the plants, both wild and domesticated, they found around them. Many of the small seeds identified from the site are indicative of open/fallow fields or weedy areas (Wagner 1987) and some of the fauna are representative of prairie habitats (Shane 1988). The Fort Ancient people were also hunting and fishing which impacts wildlife populations and can have the effect of decreasing competition for locally
available food sources (Neumann 2002). Finally, the river habitat supported at least 13 different species of freshwater mussels that prefer “a high quality river habitat with good current, most likely riffles and shoals with a gravel bottom and minimal siltation” (Coovert 1988: 274). [These data will be discussed in more detail in Chapter 3].

The Recent Past

Conover, in her 1931 history of Dayton documents a hesitancy prior to 1795, on the part of frontiersmen in penetrating what was known as the “Miami Slaughter House” (because of Indian attacks) (1931: 15). It is important to note that the Ohio valley was occupied by the Shawnee, Delaware, Seneca and other population in the mid-1700s rather than the Fort Ancient of earlier times (Kennedy 2000: 19). As discussed below, the area was abandoned around the 15th or 16th century by the people who would have been descendents of the SunWatch villagers. The attacks accompanied by the semi-annual floods offset the development of the city of Dayton despite the fertile lands, abundant water and strategic location of the site where the city finally developed. She goes on to report that after the Treaty of Greenville was signed in 1795 between 11 tribes of Indians and General Wayne, settlement proceeded quickly, opening up the Northwest Territory to further expansion.

In the 19th century major floods were recorded in the Miami Valley approximately every twenty years in 1805, 1828, 1847, 1866, 1898 and 1913. Lesser floods were also recorded in 1814, 1832, 1882, 1883, 1884, 1893, 1897 and nearly every year from 1904 until the great flood of 1913 that destroyed downtown Dayton and lead to the construction of five dams upriver [Appendix A] (Becker and Nolan 1988). Becker and
Nolan (1988) also note that the 1913 flood created floodwaters reaching 20 feet deep in parts of Dayton. Interestingly, the most consistently deep waters were concentrated from the downtown area to the north. The area to the south of Dayton where the SunWatch site sits has average recorded depths from between 0 and 10 feet, indicating that the area may have been protected from all but the worst flooding episodes. After the 1913 flood, five dams were constructed upriver from Dayton to control floodwaters. These dam-building efforts certainly altered the flow of the rivers around Dayton, creating shallower, slower and siltier rivers.

The early settlers of Dayton, Ohio not surprisingly, recognized and utilized many of the same resources that the Fort Ancient people had 800 years earlier. Not only were early settlers amazed at the fertility of the soil and its ability to produce abundant crops but they also benefited from the ease and accessibility of transportation up and down the area’s rivers. They also quickly began harvesting and milling the large trees in the forests and later began quarrying the “limitless” limestone outcrops native to the area (Conover 1931).

The archaeological literature shows that he Muskingum, Hocking, Great Miami, Little Miami, Brush Creek and Scioto Rivers were all largely abandoned by the Fort Ancient by AD 1400/1450. At this time most Fort Ancient sites seem to be clustered around the confluences of these rivers with the Ohio River, along the Ohio River itself or to the south in Kentucky and West Virginia (Kennedy 2000, Drooker 1997). Kennedy (2000) proposes that this shift in settlement patterns is directly related to “the onset of gradual climatic deterioration [during the Little Ice Age which] . . . increased agricultural risk during the latter half of the Late Prehistoric period” (6-7). Crawford and Smith
(2003) also indicate that this cooling trend would have been disastrous for people who were largely dependent on maize agriculture. The abandonment of the region would have allowed forests to overtake failed agricultural fields and without regular burning episodes prairies would have also been replaced by forest. [Indeed, only one prairie remnant was recorded in the Dayton area – approximately 3 miles to the north of SunWatch – during early GLO surveys (Wagner and Shane 1980)]. Even if this succession did not begin until AD 1600, the early settlers would have still been treated to a 200 year old forest.

The Fort Ancient people also made good use of the fertile ground for their maize based agriculture, harvested fish from the rivers and almost certainly used them as trade routes between distant places. In addition, they harvested nuts from and built homes out of the abundant trees in the area. Finally, the limestone slabs found marking many of the burials in the village were surely quarried from the same abundant local source. It is thus that we see; though the use or definition of a certain resource may change over time, the exploitation of resources at some level is a necessity for human life. There are, of course, differences of scale as well as differences in the economic systems driving the exploitation. However, this research is not concerned with the differences between tribal economies and capitalist economies though it is certainly an important factor when considering these differences.

Malinda Lileas (1988a) has extensively documented the history of land ownership for the SunWatch property. It was purchased by Peter Recher in 1804, soon after the settlement of the region. John Vance, whose grandson-in-law finally sold the property to the City of Dayton in the mid-20th century, married into the Recher family in 1853. It was consistently farmland and inconsistently farmed from early in the 19th century until it
began to be excavated by the Dayton Museum of Natural History (DMNH) in 1970. The City of Dayton used it as a farm for the Dayton Workhouse (prison) for several years until they decided to expand the wastewater treatment plant onto the SunWatch site in 1970. By that time, two amateur excavators – John Allman from 1964-67 and Chuck Smith from 1966-1970 – had already conducted fairly extensive excavations uncovering more than 14 burials, numerous storage pits, hearths and post holes as well as thousands of pieces of pottery and stone, bone, antler and shell tools. In 1971, the DMNH signed a contract with the City of Dayton which said they could excavate for one year but with the provision that upon three days notice the City could stop excavation and begin construction on the wastewater facility expansion. This led to four years of frantic, salvage excavation which yielded enough important data to successfully apply for protection under the National Historic Preservation Act in 1974.

Current Ecological Setting

The SunWatch site now sits on a 40-acre piece of property owned by the Dayton Society of Natural History. Honeysuckle has taken over the former farmland and makes up the majority of the vegetation in many parts of the site. Some forest trees including oak, ash, wild cherry, hackberry, walnut, mulberry and others are present among the honeysuckle bushes and on the edges of the property, but very little else besides honeysuckle grows there now. Willow is prolific on the edges of the river and the Miami Conservancy District welcomes our cutting of willow trees for construction/rope-making purposes.
There are almost 7 acres of reconstructed tall grass prairies on the SunWatch site. These prairies contain at least sixty identified plant species including spring beauty, sumac, showy tick trefoil, blue vervain and many other grasses and forbs [Appendix B]. In the summer the native garden is planted and maintained on the edge of the village site. It includes corn, beans, squash, sunflower, gourds and tobacco. Grapes and some fruit trees have been cultivated in the area immediately surrounding the museum. The rest of the property is covered by the village itself and the development including and surrounding the museum.

Immediately surrounding the property are the railroad, the dump, I-75, the Great Miami River, a trailer park and other industrial development. An obvious but perhaps unrecognized fact of this development is that together, these developments have altered the shape and lay of the land around SunWatch – specifically the horizon to the west has been pushed up by the vertical growth of the landfill, the river is much shallower, slower and siltier than it would have been 800 years ago and the large trees on the eastern edge of the village (which would probably have been treeless when the village stood there) at the transition between the village and the road alter the rising sun alignments that have been identified by Heilman and Hoefer (1981).

**History of Reconstruction**

There is a difference between the reconstruction of a certain environmental type and the restoration of a fully functioning, representational ecosystem. As it stands now, the work at SunWatch should be considered a reconstruction of two environmental types; a tall-grass prairie and a native garden. However, there is another kind of reconstruction
project at SunWatch as well. This “reconstruction” refers to the actual building of structures in situ which are based in archaeological excavations. Structures at SunWatch include ceremonial and residential buildings, the stockade fence, storage pits and hearths. These are reconstructed according to the 800 year old “blueprint” of the site – or the post holes and features found in excavations (DeAloia and Yee 2000). The reconstruction process also involves the more intellectual process of interpreting lifeways, including patterns of resource use, environmental impacts of certain lifestyle choices and exhibits of village life. The reconstruction of structures is often done, when feasible, using the same materials that were identified in the archaeological record. This attempt to remain structurally consistent with the archaeological record is one of the reasons why the environmental restoration work was undertaken.

The “environmental reconstruction” refers to the rehabilitation of the landscape to what it might have looked like 800 years ago. This work is also based in archaeological evidence but is intended to recreate a landscape that is temporally and spatially contextualized within the presence of ancient and modern human beings. As mentioned, this work is currently focused on the prairie [Figure 4] and on the native garden [Figure 5]. While the environmental reconstruction has a long way to go before it can be called a successful restoration ecology project, it sets the stage for this kind of application.

The prairie provides some of the roofing material for the daub and thatch houses that are reconstructed on the site. It also serves as a seed bank and provides props for various exhibits including one on medicinal herbs and plants and prairie walks. The native garden provides props for tours and a seed bank that allows the garden to sustain itself year after year. Both the prairie and the garden also serve a more ephemeral, less
functional purpose in the fact that they illustrate an ecological and cultural healing process by providing an alternative land use pattern to the industrial wasteland currently in existence on the west side of Dayton.

Figure 4: Reconstructed tall-grass prairie in the northwest corner of the SunWatch prairie. Big Blue Stem seed heads in the foreground.
Figure 5: Reconstructed native garden. Sunflowers in foreground. Visible mounds contained corn, beans and squash planted in a traditional Native American arrangement.
The first house reconstruction occurred in 1981 but was soon vandalized. People broke into the site at night and burned the house to the ground. However, with the idea of experimentation already on their minds, the archaeologists decided to make the most of the situation and left the burned house in place in order to observe how it decayed over time. Some burned poles are still visible in the village sticking out of the ground at odd angles as gravity and weather reclaim them. The early reconstruction and restoration was made possible by two grants in 1975 from the Junior League of Dayton. And in 1981, The Four Seasons Garden Club, Virginia Kettering, the Kettering Fund, the Ohio Museum Association and the Tait Foundation provided funds specifically for the reconstruction and restoration work (Lileas 1988b).

Even after five years of association with SunWatch, I am still unclear what the catalyst was for implementing the reconstruction of the village and the native prairie and garden. In retrospect, it is understandable, but in 1975 the salvage work had just ended and there was no reason to believe that there would be money available to build a museum or even provide security for the site. Also, even now this kind of application of archaeological data is rare. A recent e-mail interview with J Heilman (Curator of Anthropology at the DMNH from 1970-2000 and driving force behind the SunWatch project) revealed some insights into this unique set of circumstances. They are included below:

Through 1974-75 we were just fighting to save the site. 1976 was the bicentennial year which added to the preservation thoughts throughout the entire country – good timing from our standpoint. In 1981 Joe Koestner received the “green Dayton” award but we had talked of the prairie reconstruction for several years prior to that. E.J. took his award money and put it toward the prairie reconstruction (he was the Director of
the museum at that time and probably the best one the museum has ever seen). The original vision of SunWatch was ever evolving. First we just hoped to save it from development of sewage treatment lagoons . . . then we went for state and National Landmark [status]. I would say the original plan for SunWatch was vague and murky as all such things are – the more we chatted among ourselves the more ideas came forth.

To be flat out honest as to why it worked at SunWatch is probably just because a number of people fought like hell and worked their tail ends off. I think if all of us knew what was involved, we might have quit before we began, but fortunately we did not know or refused to believe that we couldn’t do it. The volunteers were absolutely essential and carried so much weight both in physical effort and in selling the site to their friends and neighbors. It was truly a grass roots effort as well as a politically savvy effort with the city and the state. Many in the professional archaeological community were tremendously supportive as well. As we looked at other reconstructions throughout the US and abroad, none of them were really money makers. At best most considered themselves to be lucky if they could approach breaking even. I think we have EJ Koestner to thank for that and his willingness to commit the museum to the project knowing that it was not going to be a money maker. (Heilman, personal communication).

This site is, in many ways, an archaeologist’s dream; from the excellent preservation of the soil, to the single-occupation, to the fact that it was actually able to be saved from imminent destruction (which is rare indeed) and finally to the influential people, volunteers and diverse research interests involved. While it would be impossible to recreate the various conditions which made the site what it is today, it is possible to use this site as a model for how other archaeological investigations can be conducted and to further the possibility of creating a more workable preservation ethic in archaeological excavations.
My History at SunWatch

I became involved with SunWatch as an intern for an annual ten-week reconstruction and excavation project in 1999. Having had some construction experience in previous jobs, I was enthralled with the process of building these unassuming daub and thatch houses in exactly the same place they had been 800 years before. We were not only identifying post holes (typical archaeological fare) but we were then putting something in them (a totally new ball game).

Returning in 2000 as the supervisor of the reconstruction project, the rebuilding of the Winter Solstice House was my first project. We not only had to scrape away all the grass and sediment that had accumulated in the 14 years since it had been originally excavated, but we also had to re-excavate portions of the structure since some of the important “structural” post holes seemed to be missing. Re-excavation led to the discovery that the original excavators missed several post holes when they were excavating this house, thus obscuring the complete picture or “blueprint” (DeAloia and Yee 2000) of this particular structure. The post hole that was missing was the one that would have held up one side of the ridge pole. When we re-excavated in 2000, we found the missing post hole. It was perfectly symmetrically placed opposite the other ridge-pole support post. Figures 6-9 illustrate this re-excavation process.
Figure 6: Scraping the floor of the Winter Solstice House – looking for missing post hole.

Figure 7: The missing post hole discovered, just to the right of the top of the arrow.
Figure 8: The missing post hole excavated.

Figure 9: The reconstructed post (the tallest one) that belonged in the missing post hole.
We then proceeded to build the Winter Solstice house asking the following questions: What was the height of the walls? Where do we put the door? How do we represent the structure – inside and out – to the public? What significance does the winter solstice house have to an agricultural people? What ethnographic evidence exists for winter solstice celebrations? How and where will we gather enough resources to finish this house? How and where did the Fort Ancient do the same? That year, we completed the re-excavation process and the frame of the house, including all the harvesting of materials. We also spent a significant amount of time going back over old excavation notes.

My second year as supervisor, we began thatching, daubed the walls and built benches. During the whole process, I began to see what an art this kind of building can be. It can be difficult to make something structurally sound using flat, square two by fours let alone trying to create structural soundness using fresh cut un-milled trees. As I began to find my “eye” for just the right twist in a piece of wood, I also immersed myself in the tedious project of interpreting the often cloudy archaeological record through long hours spent with excavation maps and notes. This process challenged both my artistic and scientific sides.

We conducted an experiment in 2001 by trying a new thatching technique on the Winter Solstice house [Figure 10]. This was possible and helpful because we had also thatched another house using the old method earlier that summer [Figure 11]. The Winter Solstice house being bigger and needing more grass we tried a different technique that our crew developed to use less grass and less rope (which would have to have been manufactured by hand 800 years ago). This was a clear response to the issue of scarce
resources in our 2001 project. We simply did not have enough grass to finish two houses so we tried a new method which used much less grass than the traditional method and still remained structurally sound.

During my time there I gave many tours, teaching people the importance of archaeological reconstruction and talked to many interested visitors. I co-presented two papers; one at the Ohio Prairie Conference on how archaeology can be used to do prairie reconstruction and the other at the Society for American Archaeology annual meeting on the importance of involving the public in archaeology with Allison Byrnes (2001). I had heated conversations about the importance or lack thereof of archaeology to the rest of the world and identified many of the frustrations with the discipline that brought me to write this thesis. Among them, a disconnection between archaeology and the public, the lack of higher education geared at challenging students to apply knowledge gained from archaeological research to the modern world and the lack of recently published material on SunWatch.
Figure 10: The new thatching method on Winter Solstice (2001).

Figure 11: The old thatching method on Second South House (also done in 2001).
CHAPTER 3: ENVIRONMENTAL RECONSTRUCTION: THE DATA

... a mature archaeology can return to all the historical disciplines studying the last 3 million years a finer time scale, an enhanced database that integrates information from many disciplines, and a deeper understanding of the contributions, both positive and negative, of human lives in the evolution of the world we know today (Dincauze 2000: 4).

This chapter is intended to answer several questions. First, what types of archaeological data are used to identify what physically existed in the ancient landscape at SunWatch? Second, how was that data recovered? Almost all of the data used for the reconstructions comes from the excavations at SunWatch which have inspired many different research projects. Some of the most important are summarized below. The chapter ends with a comprehensive look at the paleoethnobotanical evidence.

Research History

Archaeological research at SunWatch began before any professional archaeological investigation was underway. Both Charles Smith (1968) and John Allman (1968) wrote and published articles on the site. Allman points out that “The former Vance Farm, south of Dayton on the west side of the Miami River, has long been a favorite site for Indian relic collectors of the Dayton area” (50). This being the case it is even more amazing that the site yielded as much data as it did when it began to be excavated in earnest. It is probably only because it was such a well-known collector’s paradise that it was brought to the attention of the DMNH when it was slated for destruction in 1970.

When the salvage work ended with the protection of the site in 1974, the excavation slowed down and more research oriented excavation was pursued. Many
articles have been written on or about SunWatch with topics ranging from the presence of Marginella shells from the Gulf Coast in excavations (Coovert 1988) to the presence of astronomical alignments at the site (Heilman and Hoefer 1981). Unfortunately, only a minority of these written accounts have been published in peer-reviewed journals or books. The site has inspired many academic investigations at the undergraduate, graduate and PhD level as well as papers for presentation at various conferences. The site is often referred to in books and articles written about Fort Ancient culture. Its importance in Fort Ancient archaeological research cannot be overstated. It is an impressive site with a huge amount of collected data and it is protected. All these facts together make it an important site with high potential for further research.

Research at SunWatch falls into several broad categories including paleoethnobotanical, dietary, faunal, molluscan analyses and settlement patterns. These topics will be outlined below while other research topics including mortuary analyses, ceramic analyses, archaeoastronomy and seasonality studies are included as Appendices C, D, E and F, respectively. The dietary, faunal, molluscan and ceramic analyses were conducted in the 1980s and published in 1988 in a two-volume book entitled *A History of 17 Years of Excavation and Reconstruction – A Chronicle of 12th Century Human Values and the Built Environment*. Unfortunately, the book was only sold in the SunWatch gift shop and can not be considered a peer-reviewed volume no matter how many people had input on it. However, these volumes are important because each author ties their work to other authors’ research in the book so that it provides a clear picture of how interdisciplinary research can create a more complete picture of a site.
Dietary Reconstruction

Conard (1985, 1988) used stable isotope ratio analysis (SIRA) to partially reconstruct the diet at SunWatch. He used both carbon and nitrogen isotope studies on human bone to determine the ratio of corn and meat that were in the diet of the SunWatch villagers. For a complete discussion of carbon isotope studies see van der Merwe (1982) or van der Merwe and Vogel (1978). His research led him to conclude that the SunWatch villagers (women, men and children alike) had a diet that consisted of around 60% corn. Meat consumption was not calculated as a percentage of the diet but he did conclude that some males and all children showed signs of eating more meat than women at the site. He also conducted these analyses on types of animal bone to see if there was evidence that people were provisioning these wild animals with food. He looked at 11 turkeys, 1 elk, 4 deer, 1 squirrel and 4 raccoons. His evidence seems to point to the fact that while the animals were probably not being provisioned intentionally, some were likely scavenging corn from the fields surrounding the village.

Faunal Analysis

Shane (1988) conducted an extensive faunal analysis on over 150,000 non-human bones and teeth from SunWatch. He points out however that this analysis is only a preliminary report on his work and should not be considered a “final report” (1988: 160). Almost 20,000 of these specimens were identified to the family, genus or species level. Over 100 vertebrate taxa are represented in this assemblage including 15 species of fish, 3 species of amphibians, 7 reptile species, 50 bird species and 29 mammal species. Deer made up over 60% of the identifiable animal bones recovered at the site. [It is not clear
from Shane’s report whether the 60% is by count or by weight of deer bones recovered from the site. However, all other percentages of bone are given by count rather than weight except in a few contexts so it is assumed that deer made up over 60% of identifiable bone by count rather than weight]. His research, along with Conard’s, has provided enough data to reconstruct with some accuracy the percentage and type of food resources in the SunWatch diet. Shane uses a lower number for percentage of corn than Conard does but his estimation is illustrated in Table 1. Tables 2 and 3 show the percentage of distribution throughout the site of the three major animal food resources; fish, birds and mammals.

<table>
<thead>
<tr>
<th>Food Type</th>
<th>Percentage of diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>50.0</td>
</tr>
<tr>
<td>Deer and Elk</td>
<td>34.0</td>
</tr>
<tr>
<td>Other plant</td>
<td>10.0</td>
</tr>
<tr>
<td>Fish and shellfish</td>
<td>3.0</td>
</tr>
<tr>
<td>Bird (Turkey)</td>
<td>1.5</td>
</tr>
<tr>
<td>Other mammal</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

_Table 1: Percentage of food types in the SunWatch Diet (adapted from Shane 1988)._
<table>
<thead>
<tr>
<th>Animal Type:</th>
<th>% of Fish</th>
<th>Animal Type:</th>
<th>% of Bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td></td>
<td>Bird</td>
<td></td>
</tr>
<tr>
<td>Redhorse suckers</td>
<td>46.5</td>
<td>Turkey</td>
<td>71.4</td>
</tr>
<tr>
<td>Suckers</td>
<td>14.9</td>
<td>Passenger pigeon</td>
<td>6.5</td>
</tr>
<tr>
<td>Bass/panfish</td>
<td>11.8</td>
<td>Bobwhite quail</td>
<td>4.3</td>
</tr>
<tr>
<td>Buffalofish</td>
<td>10.4</td>
<td>Ducks and geese</td>
<td>3.6</td>
</tr>
<tr>
<td>Sheepshead</td>
<td>6.9</td>
<td>Woodpeckers</td>
<td>3.4</td>
</tr>
<tr>
<td>Catfishes</td>
<td>5.9</td>
<td>Blackbirds</td>
<td>2.7</td>
</tr>
<tr>
<td>Pike/perch</td>
<td>2.2</td>
<td>Hawks and owls</td>
<td>2.6</td>
</tr>
<tr>
<td>Other fishes</td>
<td>1.4</td>
<td>Other birds</td>
<td>5.5</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Major fish and bird types by percentage of distribution throughout site (adapted from Shane 1988).

<table>
<thead>
<tr>
<th>COLUMN 1</th>
<th>COLUMN 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals (including deer)</td>
<td>% mammals (including deer)</td>
</tr>
<tr>
<td>Deer</td>
<td>60</td>
</tr>
<tr>
<td>Squirrel</td>
<td>20</td>
</tr>
<tr>
<td>Woodchuck</td>
<td>6</td>
</tr>
<tr>
<td>Raccoon</td>
<td>4</td>
</tr>
<tr>
<td>Dog</td>
<td>2</td>
</tr>
<tr>
<td>Rabbit</td>
<td>2</td>
</tr>
<tr>
<td>Beaver</td>
<td>1</td>
</tr>
<tr>
<td>Weasels</td>
<td>1</td>
</tr>
<tr>
<td>Rice Rat</td>
<td>2</td>
</tr>
<tr>
<td>Other Mammals</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3: Comparative table showing the percentage of distribution of mammals throughout the site. Column 1 shows percentages including deer. Column 2 shows percentages excluding deer (adapted from Shane 1988).
**Molluscan Remains**

Gary Coover (1988) studied the freshwater mussels, marine shells and land and freshwater snails excavated at the SunWatch site. He identified 13 different species of freshwater mussels [Appendix G] and 12 species of freshwater snails [Appendix H] at SunWatch. 70% of the identified mussels represented species that prefer “a high quality river habitat with good current, most likely riffles and shoals with a gravel bottom and minimal siltation” (274). This indicates a rather shallow, healthy river environment with quiet pools and extensive riffles. At least one of the species represented in this sample was on the Ohio Endangered Species List in 1988 and almost all were recorded as absent at the present time from the main channels of both the Great Miami and Ohio Rivers. Coover (1988) reports these resources being used as both food and to make tools or jewelry. Shell pendants, beads and hoes were found at the site as were scrapers and discs made from shell. Three species of marine shells were also found at SunWatch. These included the Lightning Whelk, the Common Atlantic Marginella and the West Indian Dwarf Olive, all of which indicate trade between Ohio and the Gulf Coast.

**Household Archaeology**

John Nass (1987, 1989) discusses household archaeology at SunWatch. He looks at use-wear patterns on lithics, antler tine points, shell hoes, bone fish hooks, bone beamers and bone awls from features around the site. In addition to this he looks at the distribution of pit features by size and shape within the three ceramic “style zones” indicated by the ceramic refitting project [Appendix D]. Nass (1987) defines the household as “an activity group the members of which cooperate together to provide
material care, food, shelter and protection to its membership” (43). Households also involve the pooling and redistribution of resources. Finally, individual structures/households at SunWatch fit into what Nass calls “tight household clusters” which consist of several dwellings whose occupants pool resources, labor and other domestic activities while maintaining some household-specific activities (Nass and Yerkes 1995: 71). These household clusters are further defined by the ceramic “style zones”.

The use-wear analyses on various tool types showed that shell and bone tool manufacture and use could not be used to identify household clusters, i.e., tool types and evidence of use occurred randomly throughout the site. However, it appears that lithic artifacts were clustered on the west side of the village in the ceremonial center [see Appendix E for discussion of the ceremonial center]. Ceramic refitting analyses showed the presence of at least three distinct style zones at the site. These zones were delineated based on the fact that pieces of the same broken pots occurred in different pits within each zone, but did not cross-fit to other zones (Heilman 1988). Within these zones, Nass also looked at pit features by volume and shape. Each household was associated with the same types of pit features across the site. Pit volumes, however indicated that the household cluster on the west side of the village had much more storage volume in associated pit features and more features period than any other household cluster in the village. This provides still more proof that the west side was likely a ceremonial center which probably housed the “chief” or leader of this tribal society (Nass and Yerkes 1995).

In Nass’ study (1987), SunWatch is defined as a nucleated settlement which “normally include[s] satellite resource procurement and processing sites located both
adjacent to the community and at some distance from it” (74). Unfortunately he does not apply his study of household clusters within the site to the larger picture of these resource procurement and processing sites outside the village. He does discuss site catchment analyses aimed at providing some estimates of the amount of cultivated land needed to feed the SunWatch population as well as estimates on length of time the soil around the site could have remained fertile given intensive maize agriculture. However, he does not connect the dots between household organization and the labor/time needed to tend these agricultural fields and procure other resources.

His estimates of hectares of agricultural fields are provided in Table 4 (1988). These estimates are based on Conard’s proposal of a diet that consisted of 65% corn. Although this data is temptingly interesting it should be noted that there are several problems with these calculations (Kennedy 2000, Schroeder 1999). One problem is that there is no accounting for the difference in the consumption rates between children and adults. Second, the yields per hectare are questionable and do not take into consideration the deterioration in yields over time as soil fertility was depleted. However, the possibility of creating these kinds of parameters should be explored further in order to get more accurate estimates of the amount of land needed to feed a prehistoric population.
<table>
<thead>
<tr>
<th>Kcal in Diet</th>
<th>Bu. Corn Person/Year</th>
<th>Hills/Hectare</th>
<th>Population/Hectare</th>
<th>Yield Hectare/Bu.</th>
<th>Population 200 Hectare</th>
<th>Range To 284 Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>2300</td>
<td>5.9</td>
<td>4332</td>
<td>9.8</td>
<td>57.8</td>
<td>20.5</td>
<td>29.0</td>
</tr>
<tr>
<td>2500</td>
<td>6.5</td>
<td>4332</td>
<td>8.9</td>
<td>57.8</td>
<td>22.5</td>
<td>32.0</td>
</tr>
<tr>
<td>2700</td>
<td>6.9</td>
<td>4332</td>
<td>8.3</td>
<td>57.8</td>
<td>24.5</td>
<td>34.5</td>
</tr>
<tr>
<td>3000</td>
<td>7.7</td>
<td>4332</td>
<td>7.5</td>
<td>57.8</td>
<td>27.0</td>
<td>38.0</td>
</tr>
<tr>
<td>3200</td>
<td>8.5</td>
<td>4332</td>
<td>6.8</td>
<td>57.8</td>
<td>30.0</td>
<td>42.0</td>
</tr>
<tr>
<td>3500</td>
<td>8.9</td>
<td>4332</td>
<td>6.4</td>
<td>57.8</td>
<td>31.5</td>
<td>45.0</td>
</tr>
</tbody>
</table>

Table 4: Hectares of land needed to support the projected SunWatch Village population (adapted from Nass 1988).

Paleoethnobotanical Data

Flotation

Gail Wagner, a paleoethnobotanist at the University of South Carolina at Columbia, not only standardized the flotation process employed at SunWatch but also analyzed all the ethnobotanical remains from the site and published and reported the results prolifically. It is Wagner’s (1987) flotation process that is included here. In this process, a screen-bottomed wooden box is placed on a concrete block in a tank full of water. The wooden box has fine-mesh screen in two opposite sides (0.4 mm openings) and slightly larger mesh in the bottom (0.6 mm). A sample of dirt from the site is poured
into the partially submerged box. The box is carefully swished back and forth in the water until all dirt has passed through the screen. Objects with a specific gravity less than that of the water (the “light fraction”) will remain suspended and can be scooped off, artifacts heavier than the liquid (the “heavy fraction”) settle to the bottom and are caught in a screen. The light fraction includes fish scales, small bones, modern seeds, gastropods (snails), archaeological wood and smaller seeds. The heavy fraction includes charred nutshell, pottery fragments, chert flakes, animal bones and gravel. The light fraction is deposited on a square of polyester cloth. The cloth is tied into a bag and hung on a line to dry. The heavy fraction is dumped onto several layers of newspaper and allowed to dry. The dried heavy fractions are stored in a newspaper packet inside a plastic bag; the light fractions in clean glass baby food jars. Finally, the heavy fraction is further sorted into pottery, bone, lithic and botanical remains.

Float samples were taken on a regular basis from every storage and trash pit at the site as well as from burials, hearths, house floors and other features. Up to one-fourth of the pit fill is usually processed using flotation. The rest was dry screened. Over 3500 soil samples were collected at SunWatch. Wagner has only analyzed 88 of these (as of 1988) including 20 storage and/or trash pits, 6 hearth and ash pits, 6 burials, 3 sweat lodges, 4 posts and miscellaneous structures, 1 shallow basin and fill from 1 house floor. Analysis was done in a lab using a binocular microscope that magnifies objects from 7 to 30 times. The identification of remains was accomplished by comparing charred archaeological specimens to modern seeds and wood from a comparative collection. Some samples from the modern collection were burned to provide better comparison. Identification of wood was limited to fragments retaining at least one complete growth ring.
Wagner aptly points out that the selection of plant remains recovered depends on the nature of the plant material itself, the depositional process, the post-depositional history and the steps taken by archaeologists to recover the remains. In other words, the depositional record reflects both cultural actions and natural events (Wagner 1987: 26).

Forest Data

Identifications of wood presented in Table 5 are biased toward the harder woods such as oak, hickory and ash and against softer woods such as willow, cottonwood and basswood (Wagner 1987). This is a result of differential preservation between harder and softer remains and not necessarily a result of cultural preferences. These results reflect the analysis of only 88 soil samples (out of 3500) from various features and proveniences around the site.

Plant Data: Food Resources: Nuts, Fruits, Wild Plants and Domesticates (taken from Wagner 1987)

The plant data is summarized in Table 6. Again these data reflect only the 88 analyzed soil samples from the SunWatch site. The nuts found at SunWatch include hickory, butternut, black walnut, hazelnut and acorn. Hickory was the most abundant and occurred in 83% of the total 88 analyzed float samples. Fruit seeds that have been found at SunWatch include sumac, nightshade, blackberry, grape, hackberry, hawthorn, groundcherry, plum, pawpaw and cherry. Sumac was the most abundant occurring in 43% of the 88 analyzed float samples. Nightshade is the second most abundant occurring
in 28% of the float samples. It is interesting to note that 79% of all the small seeds identified at SunWatch represent only 5 different plants: sumac, purslane, nightshade, chenopod and panicgrass. Wagner notes that many of the small seeds from the site are plants that grow in disturbed or open areas like fields and fallow garden plots. There is evidence that the houses at SunWatch had thatched roofs and that Big Blue Stem grass was used for thatching material.

The domesticates found at the SunWatch site were 8, 10 and 12 row Northern Flint corn, beans, squash, sunflowers and tobacco. Charred corn parts were found in 85% of the 88 analyzed float samples. Eight measurable beans were recovered and less than 12 fragments of charred squash rind were found. Only one sunflower achene and a few tobacco seeds were recovered from the site. Chenopod was found in 16% of the 88 float samples. It is clear from these remains that although the majority of the plant diet was coming from domesticates, the Fort Ancient villagers were supplementing their diets with readily available fruits, seeds and other plants. It must be noted as well that some of these plants have medicinal properties that most likely did not go unnoticed by the SunWatch villagers.

The prairie currently contains around sixty identified plant species [Appendix B]. Of these, ten appear in the archaeological record shown in Table 5. They are; sumac, chenopod, tobacco, grape, vervain, hawthorn, tick trefoil, hackberry, ground cherry and pokeweed. Of the tree species shown in Table 4, currently 9 of them are present on the site; oak, ash, walnut, willow, sycamore, cedar, mulberry, hackberry and basswood. Although these trees are present they are not present in abundance and so are not available for use in reconstruction at the site. Currently, Big Blue stem grass is used to
thatch the roofs of the reconstructed houses at SunWatch. This is based on the imprint of a seed head from this species in a mud dauber nest (typically and still built at the juncture between the roof beams and the top of the house walls) found during excavation. Current experiments suggest that 1-3 acres of Big Blue is needed to thatch one roof at SunWatch. If 25 houses were present at the site and we assume 2 acres of grass per house, at least 50 acres of prairie would have to be present in the near vicinity of the village. Of course, this is a very rough estimate and does not consider many variables including different house sizes, construction sequences, thatching techniques and maintenance needs. However, it provides some idea of how important the prairie would have been as a resource.

Wagner’s original research goals for reconstructing the native garden was “not so much to replicate Fort Ancient gardening practices as it was to re-create the plants themselves” (1990: 34). This is very different from simply planting corn, beans and squash together in a field. Instead, her research was intended to breed the plants backwards through time. This was accomplished by obtaining a few varieties of Northern Flint corn and then hand pollinating the various types of corn. Observations were made on how well the corn grew in the region. Additionally, measurements were taken from the cob and kernel in order to see which types most closely matched those found in the archaeological record. This was also tried with the beans. However, the archaeological beans were much smaller than beans we grow today and Wagner was not successful in breeding an archaeologically consistent strain. This research is no longer being done at SunWatch. It should be noted that although the native garden is not actually being planted in 2004, there are plans to reinstitute the project in 2005 using corn species bred at SunWatch.
<table>
<thead>
<tr>
<th>Wood Type</th>
<th>Count from Storage/Trash Pits</th>
<th>Count from Hearths</th>
<th>Total Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak (Quercus) (white and red groups and unidentified oak species)</td>
<td>138</td>
<td>25</td>
<td>163</td>
<td>33.0</td>
</tr>
<tr>
<td>Hickory (Carya)</td>
<td>58</td>
<td>25</td>
<td>83</td>
<td>17.0</td>
</tr>
<tr>
<td>Ash (Fraxinus)</td>
<td>39</td>
<td>13</td>
<td>52</td>
<td>11.0</td>
</tr>
<tr>
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<td>8</td>
<td>17</td>
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<td>15</td>
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<tr>
<td>Elm (Ulmus)</td>
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<td>2</td>
<td>7</td>
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</tr>
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<td>Eastern red cedar (Juniperus)</td>
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<td>6</td>
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<tr>
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<tr>
<td>Hornbeam (Carpinus)</td>
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<td>.8</td>
</tr>
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<td>Maple (Acer)</td>
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</tr>
<tr>
<td>Elm/Hackberry (Ulmaceae)</td>
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<td>0</td>
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<td>0</td>
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<td>.2</td>
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<td>Basswood (Tilia)</td>
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<td>.8</td>
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<td>15</td>
<td>48</td>
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<tr>
<td>Unidentified diffuse porous</td>
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<td>30</td>
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<td>Total</td>
<td>377</td>
<td>116</td>
<td>493</td>
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Table 5: Charred wood identified from storage/trash pits and hearths (adapted from Wagner 1987).
<table>
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<tr>
<th>Seed identification</th>
<th>Pits (n=20)</th>
<th>Hearths (n=6)</th>
<th>Sweat lodges (n=3)</th>
<th>Misc. (n=6)</th>
<th>Total from all features (n=41)</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purslane (Portulaca)</td>
<td>60</td>
<td>18</td>
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<td>2</td>
<td>80</td>
<td>18</td>
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<tr>
<td>Sumac (Rhus)</td>
<td>83</td>
<td>10</td>
<td>-</td>
<td>4</td>
<td>99</td>
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<tr>
<td>Nightshade (Solanum)</td>
<td>23</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>Chenopod (Chenopodium)</td>
<td>9</td>
<td>16</td>
<td>-</td>
<td>2</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>Panicgrass (Panicum)</td>
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<td>3</td>
<td>-</td>
<td>2</td>
<td>14</td>
<td>3</td>
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<td>Knotweed (Polygonum)</td>
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<td>1</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>2</td>
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<tr>
<td>Grasses (Gramineae)</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>2</td>
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<td>Blackberry (Rubus)</td>
<td>3</td>
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<td>-</td>
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<td>Tobacco (Nicotiana)</td>
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<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
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<td>2</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Grape (Vitis)</td>
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<td>-</td>
<td>-</td>
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<td>3</td>
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<td>Little barley (Hordeum)</td>
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<td>-</td>
<td>1</td>
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<td>Wild bean (Strophostyles)</td>
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<td>-</td>
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<td>1</td>
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<tr>
<td>Hackberry (Celtis)</td>
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<td>1</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Vervain (Verbena)</td>
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<td>Barnyard grass (Echinochloa)</td>
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<tr>
<td>Tick trefoil (Desmodium)</td>
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<td>Spurge (Euphorbia)</td>
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<td>Hawthorn (Crataegus)</td>
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<td>Groundcherry (Physalis)</td>
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<td>-</td>
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<tr>
<td>Heal-all (Prunella)</td>
<td>-</td>
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<td>-</td>
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<td>.2</td>
</tr>
<tr>
<td>Bedstraw (Gallium)</td>
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<td>-</td>
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<td>-</td>
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<td>.2</td>
</tr>
<tr>
<td>Poke (Phytolacca)</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<td>.2</td>
</tr>
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<td>18</td>
<td>2</td>
<td>3</td>
<td>82</td>
<td>18</td>
</tr>
<tr>
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<td>6</td>
<td>3</td>
<td>3</td>
<td>34</td>
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<td>Total</td>
<td>329</td>
<td>91</td>
<td>6</td>
<td>24</td>
<td>453</td>
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</tr>
</tbody>
</table>

Table 6: Small seeds recovered by flotation at SunWatch (various features) (adapted from Wagner 1987).
Synthesis

Michael Dove (1999), quoting Jacques Barrau, indicates that there is value in seeing ancient plants [and landscapes] in modern contexts as both “witnesses to the past” (45) as well as “mediators” between the past and the present -- carriers of cultural memory and history (46). While coming face to face with the cultural history which allows us (European transplants) to study the material remains of a population whose descendants we surely slaughtered or imprisoned can be difficult, it is also an important step in creating a science that is accountable to that memory. Any archaeologist (or ecologist for that matter) who has not faced and mourned for the horror that was the conquest of this continent should probably reconsider her career choice for she will likely perpetuate in some way, shape or form the mistakes of the past. This accountability is borne out here in the desire to provide a creative balance to the destructive science of archaeology by connecting it to the field of restoration ecology.

However, landscapes as witnesses to the past are important for another reason as well. Specifically, in order to ensure that biological diversity sustains itself into the indefinite future, it is imperative that we understand the complex processes of landscape change both at the hands and whims of humans and in relation to a changing climate. “Instead of living in the past, hoping to restore ecosystems to some state that existed under conditions that can not now be duplicated, it is important to look forward and to use our understanding of how the fundamental processes underlying changes in biological communities will affect their continued persistence” (Delcourt 2002: 213). I would add that, in order to fully realize Delcourt’s recommendation, culture and cultural communities also need to be understood in relation to the ecosystems and biological communities they interact with.
So we need to not only understand why ecosystems change as they do, but why people exploit certain resources and not others, what levels of resource extraction are sustainable, how ecosystems react to change at different rates and scales, how to identify and read available data . . . in other words we need to know everything. However, we must start with specific data and questions. The data presented here provide a good foundation for understanding land use patterns through time at the SunWatch site. We see an agricultural community established in a nucleated settlement at the beginning of the 13th century. They are exploiting forests for firewood, construction materials and food, maintaining large areas of agriculture and likely fallow agricultural fields. They are also maintaining enough prairie land to roof their houses in the original construction episode and then to maintain them over time. They are fishing, hunting and capturing birds. They are making tools, digging clay, firing ceramics, defecating/urinating, watching the movements of the sun, telling stories, cooking corn, gathering blackberries, trying to find ways to ease the pain of rapidly decaying teeth and burying their dead. They are trading up and down the rivers, building canoes and moving their village when the soil becomes depleted, the deer become scarce and/or the firewood runs out.

After they move out of the SunWatch site, amazingly no one else comes to claim this excellent spot on the river. They may have moved down river by 8 or 10 miles and started again (this is merely my own speculation of one possible scenario and is not based on anything I have read anywhere). This scenario may have allowed them to maintain some prairie land (which minimally requires a regular fire regime) at their old home while the new home became the source for wood, fields, clay, and other resources.
Forest probably begins to take over some prairie lands and wildlife move back into the region foraging in fallow fields. The soil begins the long process of amending itself as leaf litter, organic matter and flooding take effect. By 1800, trees were again the major form of vegetation, a new indigenous culture moved in to the region probably fleeing the advance of European settlers and their diseases. Land is cleared again, quarries are dug, corn and other crops are planted, dams, railroads and roads are constructed. As industrial areas are pushed further to the outskirts of the city, SunWatch is surrounded on all sides. The site is discovered, excavated and saved, then it is rebuilt and is beginning again to bear witness to the past.

We know the soil is still capable of supporting agriculture and prairie as well as trees. It is our own land use decisions that create, destroy and/or manage these landscapes – they are neither fully natural nor fully cultural but rather an intersection between ecological potentials and human desires. At SunWatch, archaeologists and others have made the decision that the biodiversity of the natural landscape is as important as the cultural landscape of buildings, features and intellectual interpretations of Fort Ancient life. Finally, the archaeology ties this project to a physical place, creating a life history of a piece of land that literally has deep, familiar roots. It can almost be seen as the memory of that land made manifest by humans who took the time to listen to the stories of the data present at the site.
CHAPTER 4: SUNWATCH AS A MODEL

The value of our work as archaeologists depends upon the questions that we as researchers pose, because what we ask determines how our energy is spent and ultimately what we learn (Conard 1988).

Since the SunWatch project stands nearly alone in the field of North American archaeology, it is safe to say that anyone involved in this project is also involved in “writing the book” on physical and environmental reconstruction techniques which are based in archaeological data. It is a process requiring its participants to think creatively and critically about what archaeological data does and does not tell us. At SunWatch we seek an understanding of the necessary challenges and commitments undertaken by prehistoric people, while facing modern challenges in the process. At the same time the SunWatch project creates a more deeply rooted sense of the place which is currently occupied by SunWatch Indian Village/Archaeological Park and was previously occupied by farming settlers and even more previously occupied by the group of people known as the Fort Ancient Indians. Additionally, the work at SunWatch allows us to become engaged in a creative process of healing a piece of land.

The work being done at SunWatch is important for several reasons. First, we are currently facing an environmental crisis as we (among other things) deplete nutrients in the soil, deforest large tracts of land, burn fossil fuels and perpetuate the idea that humans are somehow apart from nature rather than integral parts of ecosystems. Norman Skillen presents the idea of dual evolution that places humans squarely inside the “natural” world. He says that evolution is both intellectual and biological, in other words cognitive/conscious and accidental/blind in the Darwinian sense (Menand 2001; Skillen
Skillen goes on to say that “Culture, being the conscious pole of this polarity, must learn to attune itself to nature” (Skillen 2001: xvii). Archaeologists are (sometimes) painfully aware of the limitations of our discipline since we work within a very limited set of “hard” data (i.e. artifacts, features) and a not so limited set of “soft” data (i.e. interpretation, analogs). The acceptance of these limitations allows archaeologists to have a practical idea of what we, as humans, can know and what we can only ever guess. Attuning ourselves to nature involves giving up the idea that we can ever fully understand or predict or control the natural world that includes ourselves. Archaeologists are in a prime position to confer on any restoration project both the opportunity to broaden the scope temporally and to accept the inevitable incompleteness and uncertainty of any data set.

Second, archaeology, as an integrated part of restoration ecology can exist as a method of bridging the gap between what we can conclude about the past, what we know in the present and how we can apply that to the future. This bridge links larger, contemporary issues to the dual evolutionary processes which have led us to this point. The process of reconstruction at SunWatch allows us to imagine how difficult and different it would have been to live in a landscape bounded by the limits of the human body (i.e. absent the power of machines). It does this even in the context of the modern world of machines and ironically in the shadow of the proliferating mountain of trash that watches over the site. It is this contrast between modern and ancient which makes the site unique. As we look down into a reconstructed trash pit three feet deep and two feet wide, we are aware of the unnaturally green landfill in the background and the machines constantly burying our modern trash. As we look to the river and explain its
importance to the Fort Ancient as a mode of transportation, we can hear trucks zooming by on I-75 and the whistle of a train coming down the tracks. Carole Crumley (1994) states “Historical ecology traces the ongoing dialectical relations between human acts and acts of nature, made manifest in the landscape. Practices are maintained or modified, decisions are made, and ideas are given shape; a landscape retains the physical evidence of these mental activities” (9). At SunWatch we can see how historical ecology illuminates the physical evidence of both the dialectical relations between cultural and natural acts over time and also the multi-scalar approach which indicates how humans have impacted and made choices about their environment as population has increased. This kind of analysis can add to the environmental data being compiled which points to the necessity of finding more sustainable, conscious and conscientious ways to inhabit space on the planet as humans.

Third, much of the work done at SunWatch is done by volunteers and interns. Stephen Packard of the North Branch Restoration Project in Chicago has said that “public experimentation in nature is in fact the most sustainable way to gain knowledge about ecosystems” and that “Only by interacting with nature can we come to appreciate that we humans are a part of nature, can we come to understand it, and, we hope, restore it” (Gross 2002: 24). The importance of public participation and the accessibility of the site to the public can not be underestimated. This facilitates not only the active engagement of those people whose support, on all levels, makes this kind of work possible, but it also creates deeper roots for a community by again bridging gaps between the past, present and future. The volunteer work base at SunWatch is an excellent example of how archaeology can reach out to the community and engage their active involvement in the
important acts of understanding the cultural heritage of a place and simultaneously restoring the ecological integrity of that place.

Fourth and finally, the work being done at SunWatch is important because it promotes and embodies an active, community-based ecological healing process on a local scale. Successful examples of this process are essential elements of what Bernard and Young (1997) call the “ecology of hope”. It is not only the healing of the “natural” world but of the people who interact with and are affected by that natural world. Examples of community building can be seen in the cooperation between the City of Dayton MetroParks and SunWatch. The MetroParks donate almost all the wood used for reconstruction at SunWatch in what has become a mutually beneficial arrangement. They give SunWatch excess maple saplings and invasive black locust trees that they are thinning to promote healthier forests. SunWatch staff, interns and volunteers use these materials to construct houses and stockades throughout the site. Community building can also be seen in the integration of the SunWatch site into the curriculum of 4th graders throughout southwest Ohio.

Feedback to Science

There is also a positive feedback to the scientific method used in archaeological excavations and analyses. At SunWatch we can see how an early vision of the reconstruction of physical structures and ecological integrity helped guide the excavation towards a broader scope. This made it possible to create the landscapes we see today using archaeological data as a foundation. This was a pioneering effort within the field of archaeology and has the ability to be repeated elsewhere in the United States and beyond
with great success. The value of an early vision of restoration can be seen in the intricate connection between the research topics undertaken at SunWatch and the reconstruction project now underway. With the reconstruction of cultural, physical and environmental aspects of a prehistoric group a possible outcome of excavation, the excavation itself becomes part of a much more holistic process, encompassing both destructive and creative forces. If we start excavations by asking ecological questions, we will gain a better understanding of ecological processes and change over time. These processes will become more and more important as humans and our capitalist system continue to destroy ecosystems and exploit resources at an unsustainable rate. Asking broader ecological questions at the start of a research project will not only lay the groundwork for successful interdisciplinary research, it will also make our research more applicable to environmental problems.

**Feedback to Education**

The educational value of the SunWatch site is significant. Over 12,000 students from the Miami Valley region visit the site every year (Byrnes and DeAloia 2001). These students are given tours which are both educational and participatory. Students get to grind corn, make music with handmade gourd rattles and play a Native American game called chunkey. Even now, I meet people in different places who vividly remember their early childhood visit to SunWatch. In addition, the study of the Fort Ancient culture has even been implemented into the required curriculum taught by 4th grade teachers in the region. Discussing a restoration project undertaken by at-risk youth in St. Paul, Minnesota, Bomar et al. (1999) say “Perhaps [the] real value of restoration [is that] it
provides a context in which science and community can come together . . . to identify some common ground. Properly done, it provides a way of developing relationships among each other, as well as with the larger biotic community” (74). This is the key to linking archaeological reconstruction to public education. It is illustrated successfully at SunWatch in the application of and accessibility to the public of the scientific study conducted at the site. It is important to not only conduct science but then to create space where the public can participate in the interesting things science can tell us about the world we live in.

In terms of education, both for archaeology students and the public alike, this site provides a connecting point between the past and the present that is often lacking in archaeological endeavors that include only the scientific methods of excavation and lab analysis. As Marquardt (1994) points out it is not that people don’t care individually about the environment or about historic preservation, but rather that existing mechanisms are insufficient to sustain discourse and cooperation at a scale beyond the individual community. He saw it as his goal as an archaeologist in Florida to foster both synchronic linkage (education about the current environment for modern people) and historic linkage (identification with the previous inhabitants of that same environment). This linkage can be seen at SunWatch. For example, telling students that Big Blue Stem prairie grass appears in the archaeological record at SunWatch often gets interested but disconnected reactions. But then pointing out the stands of Big Blue which grow all around the village in the reconstructed prairie adds a deeper, more immediate understanding of how archaeology can effect and improve our lives. It is not only archaeologists who can appreciate this effect. The public can also see the beauty and function of a healthy
prairie. The creative balance observable in the current research is long overdue in a field that is dominated by (necessarily) destructive tendencies.

Model

Since not every archaeological site can be SunWatch, it seems the next step is to create a model by which we can judge the appropriateness of combining restoration goals with the work of archaeological excavation. Erickson (1992) rightly points out that “So far, archaeology plays no part in the planning and implementation of modern development schemes; although in many, if not all cases, it can be demonstrated that prehistoric peoples fully utilized the same landscapes, sometimes very successfully” (3). Although he is talking about development in developing countries of the world, this applies to development in the United States as well. Since contract archaeology firms are employed in order to identify and then often remove archaeological sites from the path of “modern development” (roads, pipelines, etc.), it is not difficult to see how the research presented here could be applied to this large and growing sub-field of archaeology.

First, there are several questions that need to be proposed and then answered: 1. Why is the excavation taking place, 2. If it is happening to make way for development, can the development incorporate native trees and plants, 3. If on the other hand it is part of a field school or on protected (federal, park or private) property, is it feasible to expect landowners to be interested in planting native plants and trees, 4. What incentives would they have for doing so and 5. What are the criteria needed to do restoration based on archaeology?
While questions 1-3 have to be answered based on the specifics of each project, this thesis is ultimately intended to provide the general answers to questions 4 and 5. First I will address the last question as it is the easier of the two. It seems that the criteria required to do restoration based on archaeology include the following: 1. protection either through park service, private endowment or private land ownership either at an individual or corporate level (this of course involves an admittedly difficult redefinition of private property as a place where archaeological remains can be safe), 2. ethnobotanical data including seeds and wood, 3. other ecofactual remains or a time period affiliation so that analogs can be made from other sites from that period and 4. a desire to do some kind of ecological restoration whether for aesthetic, spiritual, functional or other purposes. This research has successfully illustrated how all of the above pieces can coalesce into a successful environmental reconstruction based in archaeological evidence using SunWatch as an example. It has also successfully showed the possible applications of this kind of research to restoration ecologists who are searching for more data that indicates past human/environment interactions.

The harder of the two questions is the question of incentives. Since hoping for a benevolent public that immediately sees the value of resurrecting ancient landscapes for the good of humankind can seem a daunting task I intend to list here some other possibilities for creating these incentives. Tourism, education and the sale of material resources (trees, seeds, etc.) could all provide both economic and educational incentives. However, these will not be developed in this research since I have already answered the questions of how this work can be done and why it is important to do so. Instead this research is intended to open up further opportunities for developing both economic and
cultural incentives for this kind of work. There is also room for Cultural Resource Managers, contract archaeologists and university professors to advocate with some authority for the re-introduction of native plant and tree species in development projects or landscape plans. As people begin feeling the effects of environmental degradation hitting closer to home, the marketability of “environmental sensitivity” in development projects increases exponentially. In addition, archaeology is an easy sell to most people because it carries a romantic notion of the past that is absent in most other scientific disciplines. In order to move in this direction, though, archaeology must demonstrate that it is both applicable to the modern world and a practical approach to current environmental problems.

Future Work

Since SunWatch recently received a one million dollar endowment which will sustain it into the indefinite future, it seems a most appropriate time to explore a long-term strategy of how the goals of ecological restoration and the environmental and physical reconstruction of the 13th century landscape can interact. This could include such things as a planned forest restoration project intended to replace some of the fields of honeysuckle with eastern deciduous forest trees. This could be done both to combat the invasive honeysuckle takeover but also to implement a program of sustainable forestry, using some of the trees to provide the natural resources necessary for reconstruction of the village. Firewood and construction materials could be sustainably gathered on-site. This would not only integrate the possibilities of restoration and the
reconstruction of the landscape – but it would also provide a model for sustainable forestry practices.

This could also include instituting a wetland reconstruction project somewhere on the property which could potentially clean water coming down from the landfill. There is an old creek bed that runs through the back of the property that could be made into a wetland filter system with cat-tails and other water plants and creatures. This would also provide resources for reconstruction while doing its small part to clean up that area of town.

It should be clear from the data presented in Chapters 2 and 3 that much of the information necessary to conduct a more integrated restoration project already exists if the time, money and labor can also be secured. Future work could also include research on more ethnographic evidence of possible building styles/techniques as well as the construction of at least one structure using only natural materials (i.e., no nails, screws or store-bought rope). This last suggestion in particular could go a long way in providing better estimates of house occupation times, maintenance needs, resource needs, and even more precise population estimates and occupation estimates. This could then be applied to other archaeological sites.

Finally, more effort can be put into connecting the archaeological record to the environmental reconstruction at the site. This could include new flotation and seed identification on the many unanalyzed soil samples, the re-invigoration of the experiments with Native gardening techniques and plants or more rigorous research into matching the SunWatch prairie to both the archaeological record and the ecological
habitat of the watershed that includes the Great Miami River and the entire Miami Valley region.

**Conclusion**

This research is intended to demonstrate how SunWatch Indian Village/Archaeological Park embodies the possibilities of combining restoration and archaeological goals by looking at both the site and the environmental restoration at the site through an historical ecology perspective. This site was chosen because it currently includes a partially reconstructed 13th century Indian village, a restored prairie and a native garden, all of which are based on archaeological data. There are two major themes of this work: first, the application of archaeological data to modern environmental issues and second, the importance of viewing landscapes as both natural and cultural phenomena which interact in a series of complex relationships throughout time. A comprehensive overview of the site was outlined in Chapter 2, followed by the presentation and discussion of the research history and the paleoanthro botanical data collected by previous researchers in Chapter 3. This information was provided in order to show how some types of archaeological data can be used to augment restoration work. The research ends with a presentation of how SunWatch can provide a model for doing this work in other places, as well as a series of questions and criteria necessary for determining when and where it is appropriate.

No original data was collected for this research. Instead, an attempt was made to illustrate how previously collected data from other sites might be manipulated in new ways in order to provide a creative balance to the destructive act of excavation. This
creative balance is visible in the environmental reconstruction of landscapes based on archaeological data commonly gathered from most sites during routine excavations. However, this research is also intended to encourage archaeologists to include the possibility of restoration/reconstruction in their research designs. This ensures that the proper ecological data will be collected to enable this sort of project at some future date. The juxtaposition of archaeological data and environmental restoration creates many opportunities, among them education, community building and a feeling of connection between people and the place they call home. At SunWatch all of these things can be seen.

It is important for both the restoration and the reconstruction to stay as closely tied to the archaeological evidence as possible. However, it is not my intention that the archaeological record be used to provide a rigid guideline that can not be changed. Instead, it should be seen as a yardstick to measure the success of a project. After all, neither the archaeological site nor the reconstructed landscape are static moments frozen in time, but dynamic systems that exist in the current world and must be able to adapt to current conditions as well as the desires of human actors. Allen and Hoekstra (1987) express this nicely saying “a restoration is not to some ideal pristine system, but only to one whose processes can indeed fit into the available area at hand” (293). Again, it is our own land use decisions that create or destroy these landscapes – they are neither fully natural nor fully cultural but rather an intersection between ecological potentials and human desires.

Finally, there is value in understanding that humans have been dealing with environmental issues for as long as they have inhabited the earth. This perspective can
reinvest us with a sense of place that is rooted in the past but looking toward the future. This is significant because it pushes archaeology as a discipline to start looking at our current and future problems as both inter-related and solvable. In a review of the book *The Historical Ecology Handbook*, Stephen Jackson (2001) stated “The critical question for restoration ecology is a philosophical one – should we manage for museum pieces frozen in time, for dynamic but stationary systems (perhaps equally anachronistic), or for dynamic systems capable of evolving in response to changing circumstances, whether natural or anthropogenic?” This question seems equally critical for both archaeologists and for archaeology as a discipline. We need to continually question why we are doing what we are doing and how we will make ourselves relevant to those outside our discipline.
BIBLIOGRAPHY

Allen, T.F.H and T.W. Hoekstra

Allman, John C.

Balee, William

Becker, Carl M. and Patrick B. Nolan

Bernard, Ted and Jora Young

Bomar, Charles R., Patricia Fitzgerald and Cathy Geist

Byrnes, Allison and Sara DeAloia

Conard, Anthony


Conover, Charlotte Reeve
Coovert, Gary A.

Crawford, Gary W. and David G. Smith

Crumley, Carole L.

DeAloia, Sara and Sandra Lee Yee

Delcourt, Hazel R.

Dincauze, Dena Ferran

Dove, Michael R.

Drooker, Penelope B.
1997 *The View From Madisonville*. Memoirs of the Museum of Anthropology No. 31, University of Michigan, Ann Arbor.

Eargle, Sarah Evans
1998 Mortuary Data as Indicators of Social Organization at the Incinerator Site (33My57). Unpublished M.A. Thesis, Department of Anthropology, University of South Carolina, Columbia, South Carolina. (Ms. on file at the Department of
Anthropology, Boonshoft Museum of Discovery, Dayton, Ohio).

Erickson, Clark  

Essenpreis, Patricia S.  

Fitting, James E. and Charles E. Cleland  

Giesen, Myra Jane  
1992  Late Prehistoric Populations in the Ohio Area: Biological Affinities and Stress Indicators. Unpublished Ph.D. dissertation, Department of Anthropology, Ohio State University, Columbus, Ohio. (Ms. on file at Department of Anthropology, Boonshoft Museum of Discovery, Dayton, Ohio).

Gross, Mathias  

Heilman, James M.  

Heilman, James M. and Roger Hoefer  

Jackson, Stephen  
2002  Finding Your Way Back Home or at Least Learning How It Looked, *Diversity and Distributions* 7: 301-305.

Kennedy, William E.  
Lileas, Malinda


Marquardt, William H.

McNeely, Donald C.

Menand, Louis

Nass, John P., Jr.
1987 *Use-Wear Analysis and Household Archaeology: A Study of the Activity Structure of the Incinerator Site, an Anderson Phase Fort Ancient Community in Southwestern Ohio*. Unpublished Ph.D. dissertation, Department of Anthropology, Ohio State University, Columbus, Ohio. (Full dissertation on file at the Boonshoft Museum of Discovery, Dayton, Ohio.)


Nass, John P., Jr. and Richard W. Yerkes
Neumann, Thomas W.

Pyne, Stephen J.

Ramey, Linda, James Johnson and Susan Nelson

Ramsey-Styer, Darwin-Tamar
1995 Seasonal Behavior at the Incinerator Site (33My57): An A.D. 1250 Fort Ancient Village Site in Southwestern Ohio. Unpublished Master’s Thesis on file at the Department of Anthropology, University of South Carolina, Columbia, South Carolina. (Thesis on file at the Department of Anthropology, Boonshoft Museum of Discovery, Dayton Ohio.)

Redman, Charles L., Edward Curtin, Nina Versaggi and Jeffery Wanser

Schroeder, Sissel

Shane III, Orrin C.

Skillen, Norman
Smith, Bruce D. and C. Wesley Cowan  

Smith, Charles J.  

Sprugel, Douglas G.  

van der Merwe, Nikolaas J.  

van der Merwe, Nikolaas J. and J.C. Vogel  

Wagner, Gail E.  
1987 *Uses of Plants by the Fort Ancient Indians*. Unpublished Ph.D. dissertation, Department of Anthropology, Washington University, St. Louis, Missouri. (Ms. on file at the Boonshoft Museum of Discovery, Dayton Ohio).


Wagner, Gail E. and Orrin C. Shane III
**APPENDIX A:** Ten highest floods of the Great Miami River 1893-1913.

(Adapted from Becker and Nolan 1988: 206).

| 240k |       |       |       |       |       | 220k |       |       |       | 200k |       |       |       | 180k |       |       | 160k |       |       | 140k |       |       |       | 120k |       |       |       | 100k |       |       |       | 90k  |       |       |
|------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|     |

The ten highest floods of the Great Miami River between the start of record keeping in 1893 and the flood of 1913. The left column indicates thousands of cubic feet per second (cfs) of water. Normal flow fluctuates between 500 and 1000 cubic feet per second while the river tends to leave its natural channel and spill over the banks at around 2000 to 3000 cfs. The bottom row indicates the years that flood waters were measured.
## APPENDIX B: Current Prairie Plants

Adapted from Ramey et al. (2003)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Latin Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Blue Stem</td>
<td><em>Andropogon gerardii</em></td>
</tr>
<tr>
<td>Black-eyed Susan</td>
<td><em>Rudbeckia serotina</em></td>
</tr>
<tr>
<td>Bloodroot</td>
<td><em>Sanguinaria canadensis</em></td>
</tr>
<tr>
<td>Blue Vervain</td>
<td><em>Verbena hastata</em></td>
</tr>
<tr>
<td>Butterfly Weed</td>
<td><em>Asclepias tuberose</em></td>
</tr>
<tr>
<td>Canada Wild Rye</td>
<td><em>Elymus Canadensis</em></td>
</tr>
<tr>
<td>Celandine Poppy</td>
<td><em>Stylophorum diphyllum</em></td>
</tr>
<tr>
<td>Common Blue Violet</td>
<td><em>Viola papilionacea</em></td>
</tr>
<tr>
<td>Common Milkweed</td>
<td><em>Asclepias syriaca</em></td>
</tr>
<tr>
<td>Cup Plant</td>
<td><em>Silphium trifoliatum</em></td>
</tr>
<tr>
<td>Daisy Fleabane</td>
<td><em>Erigeron annuus</em></td>
</tr>
<tr>
<td>Dutchman’s Breeches</td>
<td><em>Dicentra cucullaria</em></td>
</tr>
<tr>
<td>Dwarf Larkspur</td>
<td><em>Delphinium tricorne</em></td>
</tr>
<tr>
<td>False Boneset</td>
<td><em>Kuhnia eupatorioides</em></td>
</tr>
<tr>
<td>Gray-headed Coneflower</td>
<td><em>Ratibida pinnata</em></td>
</tr>
<tr>
<td>Great Lobelia</td>
<td><em>Lobelia siphilitica</em></td>
</tr>
<tr>
<td>Heart-leafed Umbrellawort</td>
<td><em>Mirabilis nyctoginea</em></td>
</tr>
<tr>
<td>Heath Aster</td>
<td><em>Aster ericoides</em></td>
</tr>
<tr>
<td>Hoary Mountain Mint</td>
<td><em>Pyenanthemum iceanum</em></td>
</tr>
<tr>
<td>Horse Nettle</td>
<td><em>Solanum carolinense</em></td>
</tr>
<tr>
<td>Indian Grass</td>
<td><em>Sorghastrum nutans</em></td>
</tr>
<tr>
<td>Ironweed, New York</td>
<td><em>Veronica noveboracensis</em></td>
</tr>
<tr>
<td>Joe Pye Weed</td>
<td><em>Eupatorium maculatum</em></td>
</tr>
<tr>
<td>Large-flowered Trillium</td>
<td><em>Trillium grandiflorum</em></td>
</tr>
<tr>
<td>Maximilian Sunflower</td>
<td><em>Helianthus maximilianii</em></td>
</tr>
<tr>
<td>Mayapple</td>
<td><em>Podophyllum peltatum</em></td>
</tr>
<tr>
<td>Miami Mist</td>
<td><em>Phacelia purshii</em></td>
</tr>
<tr>
<td>New England Aster</td>
<td><em>Aster novaeangliae</em></td>
</tr>
<tr>
<td>Nodding Wild Onion</td>
<td><em>Allium cernuum</em></td>
</tr>
<tr>
<td>Ohio Spiderwort</td>
<td><em>Tradescantia ohiensis</em></td>
</tr>
<tr>
<td>Oxeye</td>
<td><em>Heliopsis helianthoides</em></td>
</tr>
<tr>
<td>Partridge Pea</td>
<td><em>Cassia fasciculata</em></td>
</tr>
<tr>
<td>Pokeweed</td>
<td><em>Phytolacca Americana</em></td>
</tr>
<tr>
<td>Prairie Dock</td>
<td><em>Silphium terebinthinaceum</em></td>
</tr>
<tr>
<td>Prairie Trillium</td>
<td><em>Trillium recurvatum</em></td>
</tr>
<tr>
<td>Prairie Brome</td>
<td><em>Bromus kalmii</em></td>
</tr>
<tr>
<td>Purple Coneflower</td>
<td><em>Echinacea purpurea</em></td>
</tr>
<tr>
<td>Queen of the Prairie</td>
<td><em>Filipendula rubra</em></td>
</tr>
</tbody>
</table>
Rattlesnake Master
Rue Anemone
Shooting Star
Showy Tick Trefoil
Side-oats Grama
Smooth Ground Cherry
Smooth Sumac
Solomon’s Seal
Spring Beauty
Stiff Goldenrod
Sweet White Violet
Switch Grass
Tall Goldenrod
Toothwort, cut-leaved
Venus’s Looking-glass
Virginia Bluebell
Wild Bergamot
Wild Blue Phlox
Wild Geranium
Wild Petunia
Wild Sweet Potato
Woodland Sunflower

Eryngium yuccifolium
Anemonella thalictroides
Dodecatheon meadia
Desmodium canadense
Bouteloua curtipendula
Physalis Subglabrata
Rhus glabra
Polygonatum biflorum
Claytonia Virginica
Solidago rigida
Viola blanda
Panicum virgatum
Solidago Canadensis
Dentaria laciniata
Specularia perfoliata
Mertensia virginica
Monarda fistulosa
Phlox divaricata
Geranium maculatum
Ruellia Streps
Ipomoea pandurata
Helianthus divaricatus
APPENDIX C: Mortuary Practices

Many people have researched SunWatch mortuary practices, including Donald McNeely (n.d.) and Myra Jane Giesen (1992). Some of their findings are summarized here. According to Giesen (1992), 168 burials have been excavated from the site. At least 77 of these burials were under the age of 5 years old (McNeely n.d.). The preliminary studies of the skeletal remains point to a population that suffered bad dentition and poor health. Almost every skeleton showed signs of some pathology including arthritis, tumors and even spinal bifida. Most of the burials were found between the ring of storage pits and the central plaza area though some infant burials were excavated from trash pits and several adults were found between the structures and the stockade. Most high status burials were defined as such due to the presence of grave goods and/or limestone burial slabs. The burials with the most elite grave goods also seemed to be closest to the center pole.

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
<th>Indeterminate</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age at death</td>
<td>28</td>
<td>36</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Number</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>With slabs</td>
<td>21</td>
<td>75</td>
<td>26</td>
<td>72</td>
</tr>
<tr>
<td>With grave goods</td>
<td>8</td>
<td>28</td>
<td>16</td>
<td>44</td>
</tr>
</tbody>
</table>

*Table 4: Number, age and status of excavated burials at SunWatch. (adapted from McNeely).*
APPENDIX D: Ceramics

Heilman (1988) has conducted the most extensive ceramic analysis at SunWatch analyzing over 37,000 pot sherds. Ceramic tempering at SunWatch does not follow the same pattern as is common for Fort Ancient sites of this time period. At SunWatch almost 92% of the ceramics were tempered with crushed granite rather than the shell that is most often associated with Anderson phase Fort Ancient sites. Mica, shell and quartz were the other tempers used to make up the remaining 8% of the recovered ceramics. During the early analysis of the ceramic assemblage Heilman noticed that pieces of the same broken pot could be found in several different trash pits. Following this, researchers began to connect the “cross feature fits”. All sherds were divided by temper type, vessel part and decoration and then refit in order to discern depositional patterns. Heilman found that based on this refitting, “the circular village can be divided into pie shaped wedges. Broken pottery fragments fit back and forth within these pie shaped wedges but they do not cross into other wedges that are adjacent to them” (1988: 248). This led Heilman to conclude that the village was arranged in a residence pattern with “clan” type kin groups sharing space within these pie-shaped wedges. [Nass argues that kinship is not necessarily a precursor for sharing space within these tight household clusters 1987.]
APPENDIX E: Archaeoastronomy at SunWatch and the West Side Ceremonial Center

Heilman and Hoefer (1981) have conducted the most extensive research on SunWatch astronomical alignments. These alignments and the artifacts and features found on the west side of the village have prompted them to also identify the west side of the village as a ceremonial center with ritual significance. Three solar alignments have been proposed and observed. These are sunrise alignments which use the large reconstructed cedar center pole as a front site. Two of the alignments are visible on April 24 and August 20 as the shadow of the center pole at sunrise falls directly on the hearth in the largest house in the village (H I/71), better known as “Big House”. The third observed alignment is on the Winter Solstice (December 21) and follows the same sunrise pattern to create a shadow that bisects the hearth in another large house on the west side (H II/87) or the Winter Solstice House. Considering the maize based economy of the Fort Ancient villagers it is assumed that April 24 represented a safe planting date and August 20 represented the date when the first harvestable green corn could have been collected which in many native cultures was celebrated in a “green corn ceremony”.

Winter Solstice is the shortest day of the year and would have been an important moment to observe in order to ensure that the sun would return to its summer pattern of long days and abundant growth. All three of these alignments are still visible, though they are somewhat altered by the growth of trees to the east of the village which would have been cleared 800 years ago.

Besides the alignments and their corresponding houses, the west side of the village contains other interesting artifact assemblages pointing to non-domestic use patterns. Besides the two solar alignment houses, the third house on the west side (H
II/78) is also unusual in that its post holes are almost twice as deep as the post holes throughout the rest of the village (almost two feet deep) and has an abundance of chipped stone artifacts – so many that the chipped stone raised the level of the floor significantly over the occupation of the site. This house has come to be known as the Men’s Lodge based on the traditional association of men with lithic tool production. The trash pits on the west side contain more exotic material than other parts of the village including lenses of burnt corn, pipes, large bone hair pins and shell discoidals (Heilman and Hoefer 1981). These trash pits also contain an abundance of large raptor remains including hawks, owls and falcons as well as many species of woodpeckers and bright plumaged song birds (Shane 1988).

Alignments shown through Big House.

Site Layout
APPENDIX F: Seasonality

The villagers at this site are thought to have followed the Miami-Potawatomi pattern where men and women left the village in the winter to hunt leaving primarily old people and children behind to tend the village (Fitting and Cleland 1969). Ramsey-Styer (1995) has looked at seasonal behavior at the SunWatch site. She analyzed nine trash pits assigned to three seasons (spring, summer and winter) by Shane (Wagner and Shane 1980) who used faunal remains as the basis of this assignment. Specifically he used young white tail deer mandibles from trash pits by looking at dental eruption, degree of bone reabsorption and dental wear in deer under 2 years old. “The season of kill was then determined by assuming an average birth date of June 1, based on modern research carried out in Michigan, New Hampshire and Pennsylvania. By adding the age of the deer at death to the average date of birth, Shane was able to estimate which season the animal was most likely killed in” (Ramsey-Styer 1995: 44, my emphasis).

The pits are thought to have been filled quickly – within one season – since they “have distinct, easily recognizable layers, [indicating] the pit overhang was not exposed to weathering and did not have as much time to crumble and mix with the garbage” (Ramsey-Styer 1995: 22). Given all the assumptions this research is based on, Ramsey-Styer found that gardening and fishing seemed to be the only two activities that were done seasonally at the site. Hunting and hideworking occurred year round as did lithic and bone tool manufacture. While this research is interesting, there is currently not enough evidence from other sites to be sure that the assumptions used to make seasonal assignments are accurate. Since these assumptions form the basis of this study, it was
only included as a point of interest. As such, many more studies of different sites need to be conducted in order to make statements based on seasonality of sites like SunWatch.
**APPENDIX G: Freshwater Mussels**

(From Coover, 1988: 261-298)

Also included in Coover’s analysis, but not here, is a description of the river ecology/habitat preferences of each species and a list of fish associated with each species.

<table>
<thead>
<tr>
<th><strong>Common Name</strong></th>
<th><strong>Latin Name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elk-Toe, Ridged Wedge-Mussel</td>
<td><em>Alasmidonta marginata</em></td>
</tr>
<tr>
<td>Floater, Common Floater, Floater Mussel</td>
<td><em>Anodonta g. grandis</em></td>
</tr>
<tr>
<td>Purple Warty-Back, Purple Pimple-Back</td>
<td><em>Cyclonaias tuberculata</em></td>
</tr>
<tr>
<td>Spike, Lady-finger, Lady-finger Mussel</td>
<td><em>Elliptio dilatata</em></td>
</tr>
<tr>
<td>Wavy-rayed Lamp-Mussel</td>
<td><em>Lampsilis fasciola</em></td>
</tr>
<tr>
<td>Pocketbook, Plain Pocketbook Mussel</td>
<td><em>Lampsilis ventricosa</em></td>
</tr>
<tr>
<td>Fat Mucket, Fat Mucket Mussel</td>
<td><em>Lampsilis radiata siliquoidea</em></td>
</tr>
<tr>
<td>Fluted Shell, Fluted Mussel</td>
<td><em>Lasmigona costata</em></td>
</tr>
<tr>
<td>Black Sand-Shell, Black Sand Mussel</td>
<td><em>Ligumia recta</em></td>
</tr>
<tr>
<td>Club Shell</td>
<td><em>Pleurobema clava</em></td>
</tr>
<tr>
<td>Kidney Shell, Kidney Shell Mussel</td>
<td><em>Ptychobranchus fasciolare</em></td>
</tr>
<tr>
<td>Rainbow Shell</td>
<td><em>Villosa iris</em></td>
</tr>
<tr>
<td>Fingernail Clam</td>
<td><em>Sphaerium solidulum</em></td>
</tr>
</tbody>
</table>
APPENDIX H: Freshwater Snails

(From Coover, 1988: 261-298)

This list is also accompanied by a list of habitat preferences not included here as well as a caveat which states that “the snails could have entered [the refuse pits where they were found] on their own either at the time of occupation or at a later date” (1988: 293).

1. *Allogona profunda*
2. *Anguispira alternata*
3. *Haplotrema concavum*
4. *Mesodon clausus*
5. *Mesodon elevatus*
6. *Mesodon inflectus*
7. *Mesodon thyroidus*
8. *Mesodon zaletus*
9. *Succinea ovalis*
10. *Triodopsis albolabris*
11. *Triodopsis denotata*
12. *Triodopsis tridentata*