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INDIANA DEPARTMENT OF NATURAL RESOURCES

Introduction

This Archaeology Journal is a direct result of Indiana's first Archaeology Week in 1996. On Focal Day of Archaeology Week, professional archaeologists gathered to present papers on various archaeological topics for their colleagues and the public. The articles in this first volume and number are presented in the order in which they were presented on the Focal Day.

The Division of Historic Preservation and Archaeology, part of the Indiana Department of Natural Resources, promotes an awareness and appreciation of Indiana's archaeological heritage through training, educational programs, and publications such as this. An Archaeology Journal for our state is something that the public and professionals have been seeking for some time. The division hopes to make this an annual publication in order to meet the public and professional demand for information about their historic and prehistoric heritage.

Our goal is to publish scholarly, synthesis, and educational articles in the journal, so that information is available for professionals and the public alike. We solicit, in particular, articles on Indiana archaeology, articles from the Midwest related to Indiana archaeology, articles related to topics in Indiana archaeology, and articles on methodology, theory, analysis, interpretation, etc. relevant to the practice of archaeology in our state. We hope that professional archaeologists, other professionals related to the fields of archaeology, and knowledgeable amateur archaeologists and other nonprofessional will submit articles for publication. We sincerely invite professional archaeologists to participate in peer review of submitted articles related to their areas of expertise. We also invite other institutions as partners in this publication endeavor.

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Table of Contents

Historical Archaeology in Indiana: A Brief Summary

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Historical archaeology is the study of past and sometimes present human behavior through both its material remains (artifacts, features, structures) and historical or written records. Documented information and material remains allow historical archaeologists to study past activities, adaptations, and cultural processes since written records began to be kept. In North America, historical archaeology begins with the arrival of European explorers in the New World. In Indiana, it goes back to the second half of the 17th century with French exploration and settlement, and their encounters with historic Native Americans such as Miamis, Weas, Piankashaws, and later, Kickapoos and Mascoutens. Historical archaeology, like prehistoric archaeology, studies past lifeways, past cultures and adaptations, and the topic of Culture itself--how the latter changes, its processes, how and why it works.

Historical archaeology can study many topics in many ways. For instance, one can study the various cultures inhabiting the area that became the state of Indiana, including protohistoric and historic Native American groups, and European and American settlers (e.g., to name only a few, African Americans, Asians, British, French and French Canadians, Germans, Irish, Italians, Macedonians, Scandinavians, Slovenes, Swiss, and many others).

Another way to pursue historical archaeology studies is to break topics down into scholarly or scientific subjects often studied by anthropologists, topics such as: acculturation, ideologies, cognitive behavior, religion, technology, economics, social and political organization, population (biological and demographic) characteristics, cultural ecology, settlement, subsistence, gender studies, and others. These categories, of course, can all be broken down. For example, religion can include cultural groups such as Quakers, Amish, and Mennonites, as well as religions such as Protestantism, Catholicism, Judaism, Hinduism, Taoism, Buddhism, etc.

A third way would be to break topics into categories related to historic themes or contexts of study in Indiana. These include ethnicity/race; agriculture; processing and manufacturing industry; extractive industry; service industry; commerce; social, cultural, and recreational expressions and institutions; energy; settlement and exploration; urbanization; architecture; landscape; public works; government and politics; labor; social movements/reform; the military; leisure; civic/fraternal organizations; education; religion; communications; transportation; and marine activities (Division of Historic Preservation and Archaeology n.d.). As with the above, these may be broken down into subcategories.

Another group of categories historical archaeology studies may be categorized as cultural periods. These could include proto-contact and historical Native Americans, the French period, the British period, early territorial settlement, and statehood. Historical Archaeology studies may also study site types or functions. Examples of these could include farmsteads, homesteads, mills, log cabins, canals, work camps, battlefields, villages, towns, churches, schoolhouses, roads, fords, ferries, taverns, tanneries, treaty grounds, urban houses and house lots, and landscapes, to name only a few.

There are a number of other ways to divide up the subject matter of historical archaeology, one last example being theoretical viewpoints of the past and its interpretation.

One sees historical archaeology articles under the appellations of cognitive archaeology, cultural materialism, critical theory, middle range theory, structural archaeology, symbolic archaeology, postprocessualism, and scientific archaeology.

Historical archaeology can study aspects of all of the above, and much more, from the life of an individual, to day-to-day lifeways of people, to social, economic, religious, and other activities. It can conduct scientific studies of cultures, their interactions and influences upon one another, and how culture works as a human way of adapting to the world. It can supplement the historical record, and help reconstruct the past lifeways of groups not well recorded or even recorded at all in the historical record--like slaves, miners, working class peoples, minorities, etc. Peoples' thoughts, beliefs, values, and ideas can also be studied by documents and the materials past peoples left behind.

No matter what the viewpoint, theoretical orientation, or topic of a project, all historical archaeology projects have a research problem or topic of study in mind before fieldwork begins. Historical research and records reviews of previous research and recorded information are conducted, so that the plan for research and fieldwork may be efficiently and thoroughly implemented and realized.

Historical archaeology in Indiana is in its infancy, and there are many important archaeological sites in the state related to Indiana's history--some already investigated, many others waiting for research and studies.

One can see the beginnings of historical archaeology in Indiana at least as early as the 1920s and 1930s. Groups such as the Indiana Historical Society (IHS), the Indiana Historical Commission, and the Indiana Historical Bureau supported archaeological and investigations in the state, the former creating supporting county surveys and excavation work and ultimately hiring Glenn A. Black as archaeologist, and the latter publishing reports (Ruegamer 1980:255-297). Such institutions provided both organization and support for archaeological investigations in Indiana. Many historical archaeological sites were reported or recorded as a result of the surveys and publications.

For example, Glenn Black, in his unpublished survey of Allen County--where historical accounts recorded a fort and many historical Native American Indian villages--documented reported historical Indian villages and burial sites (Black 1936). Such reports continued for various counties, a more recent example being Charles H. Faulkner's survey of Marshall County (1961), published by the Indiana Historical Bureau. Faulkner documented prehistoric and historic archaeological sites, including Potawatomi villages (including Ben-ack's village--see below) and settlements.

Eli Lilly and Glenn A. Black, in association with the IHS, were strongly interested in the history and archaeology of Indiana. Eli Lilly had contact with Warren K. Moorehead, the latter having, among other interests, concerns with Delaware culture. Both Black and Lilly were interested in historic Indians and sites--the former endeavoring to locate such sites in the northern part of the state, and the latter supporting investigations of the Walum Olum, a purported migration myth of the Delaware Indians (Ruegamer 1980:288-289).

In the 1920s, E.Y. Guernsey was associated with the IHS as a "volunteer" archaeologist. Guernsey's interest in Indiana history and archaeology is demonstrated in his map relating Native Americans to Indiana history (1932).

However, it was not until the late 1960s and 1970s when historic preservation legislation became implemented and historical archaeology developed as a discipline in universities and with a professional society--the Society for Historical Archaeology--that professional projects specifically concerned with historical archaeology sites began to occur in Indiana. Much of the work conducted in the 1970s was concerned with French occupations in the state, and some research directed toward battlefields and historical Native Americans. Additionally, much of this work was directed toward properties being preserved for posterity by governmental agencies and historical groups and associations. By the late 1970s and especially in the 1980s, historic preservation legislation and cultural resource management projects included historical archaeological sites, and a proliferation of data, especially survey information, began accumulating. Archaeologists specifically trained in historical archaeology programs began to conduct work in Indiana. Summaries of various projects representing the types and variety of historical archaeology projects conducted in Indiana follow. For convenience, these descriptions are classified generally by cultural periods, and sometimes, especially in later historical times, further divided by site types, historic contexts, or other categories

Protohistoric

Investigations of protohistoric cultures--those cultures present just before or into the beginnings of written history, and related or possibly related to cultures present in historic times--can be considered historical archaeology studies. Pre-contact groups refer to cultures preceding historical cultures. Some are possibly related to historically documented cultures. In Indiana, according to current knowledge or thought, pre-contact or protohistoric cultures include three groups: Huber (Brown and O'Brien 1990), Caborn-Welborn (Munson 1995), and Fort Ancient (Griffin 1943). The Huber Phase occupations, identified at sites in northwestern Indiana, are possibly ancestral to historically known Miamis. The Caborn-Welborn Phase refers to a cultural entity in extreme southwestern Indiana--a Mississippian culture dating from ca. 1400-1700 A.D. with evidence of European trade goods, but not direct contact with European peoples (Munson 1995; Pollack et al. 1996). The Fort Ancient groups, best known from Ohio, but extending into southeastern Indiana, are thought to be ancestral to the Shawnees (Griffin 1943).

Major studies in Indiana on such societies include work by Faulkner (1972) and Munson (1995). Faulkner conducted archaeological investigations at two archaeological sites which contained Huber components in northwestern Indiana, synthesizing and discussing Huber characteristics, settlement, and possible relationships with other cultures in the area. Huber dates of 1500-1600s A.D. were noted in his discussion (1972: Chapter V). Faulkner concludes that from "both the archaeological and ethnohistorical evidence, it appears that the Huber complex is most likely the archaeological remains of one of the Miami bands" (1972:178). Jeske (1991) investigated a Huber Phase site in Porter County.

The Caborn-Welborn Phase has been studied by Munson and others for some 25 years. She characterizes the Caborn-Welborn Phase (ca. 1400-1700 A.D.) As "the last Native American society to reside in southwestern Indiana and adjacent portions of Kentucky, and Illinois, prior to Euro-American settlement" (1995:3). Caborn-Welborn is differentiated from other cultures in the region by, among other things, dates, artifacts, and settlement pattern. Artifacts include "incised and punctated pottery with triangular motifs, small stone 'endscrapers,' and rare historic trade goods"

(1995:3). Instead of mound complexes and towns, "the bulk of the Caborn-Welborn regional population was dispersed into a number of large villages (3 or more ha.)" (1995:3). In recent survey work, Munson has proposed relationships between certain Caborn-Welborn site types (Large villages, small villages, hamlets, farmsteads, and activity areas) and soil types and landforms (1995:67-69).

Historical Native American and *Metis*

Historical Native American and *metis* occupations and their relationships to early French settlements in the state generated substantial interest and research among archaeologists. Research and investigations involving Native American sites include Wepler's studies of the locations of Miami and Delaware occupations in Indiana (1984; 1980); an archaeological and ethnohistorcal study of the War of 1812 Mississinewa campaign (Swartz 1977); the Troyer site, a 19th century Miami/*metis* occupation (Lewis 1976; Rose 1981); archaeological investigations at the Ben-ack's village (Schurr 1997); the Richardville House in Fort Wayne (Jeske 1995); the Richardville/Lafontaine House near Huntington (Cochran 1990; Stillwell 1990); the 18th century Wea Village and a Kickapoo-Mascouten occupation area, and Kethtippecanunk, an 18th century Native American and French settlement (Dobbs 1975; Jones 1984; 1985; 1989a; 1989b; 1992; Jones and Trubowitz 1987; Trubowitz 1989; 1992); Prophetstown, an 1808-1811 pan-Indian settlement involved in the Battle of Tippecanoe (Jones 1984); and a Miami village site near the Forks of the Wabash (Mann 1996; Sherman 1996).

Among the many research questions investigated by these studies are topics relating to Native American acculturation, material culture, trade, subsistence, patterns of ethnic identity, settlement patterns, rituals and beliefs and values, dress, battles, economics, politics, social organization, and adaptive changes through time.

French/French Canadian

The French and French Canadians were the first European and Euroamerican settlers in the state. It is well known that three major centers of French settlement occurred in Indiana: Post Ouiatenon (1717) in Tippecanoe County; Fort Miamis (1721) at present day Fort Wayne; and in 1732, Post Vincennes (for historical information on these posts, see Barnhart and Riker 1971). Substantive studies of French occupations in Indiana go back to the late 1960s, with Indiana University's investigations at Fort Ouiatenon (Kellar 1970). This study confirmed the location of the site as the historically known fort and produced information as to its nature (Kellar 1970:128-133). Subsequently, Michigan State University conducted a series of excavations at the fort site (Tordoff 1983; Noble 1983) beginning in the late 1970s. During fieldwork, Tordoff delineated the stockade walls and tested high magnetometry reading areas at the site (1980). Her dissertation studied the hierarchy and arrangement of the fur trade in 18th century New France, defining levels or centers of trade as ports of entry, government/economic centers, regional distribution centers, and local distribution centers (such as Ouiatenon) in the trade system (1983). From 1977-1979, Noble tested the fort site with a stratified sample to investigate cultural remains in the northern half of the site (1983). Martin (1986) studied the faunal remains and subsistence at the site. In 1984, in a survey investigating historic native American occupations, Jones surveyed the fort site and compared the material culture with the Wea village, Kethtippecanunk, and Kickapoo-Mascouten occupations (Jones 1984; 1985; 1989a; 1989b; 1992).

In Vincennes, a number of studies of French and French Canadian sites have taken place. These include Tomak's study of Fort Sackville, delineating a possible stockade line and noting much urban disturbance of the site (1972); studies at the Brouillet House site, a 19th century cabin site (Gray 1975; Orser 1979; Jones 1982); and Mann's study of French or French Canadian jackknife and long lot settlement patterns in the area (1994).

Other studies of French sites in Indiana include early settlement sites. One such study was Limp's investigations of the Bailly site, a 19th and early 20th century site in the Calumet area of Indiana (1974). Limp investigated the early 19th century occupation of the site by Bailly, who was born in Quebec in 1774 (1974). Limp investigated and delineated the main house, a kitchen, storehouse, tool house, quarters for workers, and warehouses (1974). Another investigation was at the Cicott site in Warren County (Jones and Mann 1992; Mann 1994; Mann and Jones 1994). The site is an early 19th century manifestation of a French Canadian fur trading and homestead occupation. A number of research questions were posed for the site (Jones and Mann 1992), including studies of gender roles since Cicott was married twice to Native Americans.

Territorial/Early Statehood Settlement

The area that was to become the State of Indiana became part of the Old Northwest Territory in 1787, and was established as the Indiana Territory in 1800. In 1816, Indiana realized statehood.

A number of early to mid-nineteenth century pioneer and Euroamerican sites have been investigated in Indiana. Many of these crosscut various research categories such as ethnicity, religion, site types, and other subjects of inquiry. Examples of some of these studies include the territorial Fort Knox II occupation (Gray 1988), the Packwood site (Ellis 1984), the Godeke site (Cantin 1990), and the William Conner rural residence (Huser and Mann 1991). One could easily include the previously mentioned Troyer and Cicott sites under this heading.

Gray (1988) conducted and synthesized archaeological investigations at 1803-1813 Fort Knox II, a territorial fort site north of Vincennes. Her study included a detailed history of the site, descriptions of the archaeology, an analysis of architecture, an analysis of artifacts, a study of subsistence, and a look at the lifeways at Fort Knox II (1988).

The Godeke site, in Warrick County, was a mid-nineteenth farmstead occupation. Cantin investigated refuse pit features at the site, and recovered artifacts such as ceramics, wine bottle glass sherds, pharmaceutical bottle glass sherds, tableware, iron skillet and kettle fragments, window glass, nails, architectural hardware, musket balls, gunflints, buttons, a pair of scissors, a brass comb, tobacco pipe fragments, farm tools, a marble, horseshoes, and faunal remains (1990:16-32). Cantin conducted an economic scaling of the site, concluding that the site may have fallen into "the lower end of the economic scale" (1990:37). He also found that, despite artifact frequency differences, the artifacts from the site most closely resembled Stanley South's (1977) Carolina Artifact Pattern, with kitchen artifacts outnumbering architectural items (1990:38-39). The Packwood site, an early to mid-nineteenth century cabin site, occupied by a conservative, Quaker family, was excavated by Gary Ellis and found to contain a cabin cellar and foundation walls, and artifacts such as creamware, pearlware, and whiteware, and a large amount of faunal material (1984). The artifact frequencies or patterns at this site were similar to South's (1977) Frontier Artifact Pattern, with more architectural artifacts than kitchen ones (1984:104).

Huser and Mann (1991) conducted excavations at the 1823 William Conner residence in Hamilton County. Conner was a trader, later active in Indiana politics, who dealt primarily with Delawares and whose first wife was a Native American (Huser and Mann 1991:9-10). Excavations at the site revealed much disturbance to the site, but also evidence of a mid-19th century Euroamerican occupation, architectural, and site structural information (1991).

Late 19th-Early Twentieth Century

The Archer site, in Gibson County, was a nineteenth century residence and probable farmstead site occupied by people of Upland South Scotch descent (Huser 1991). Huser noted that this site could study the Upland South cultural tradition, as well as examine their spatial and settlement patterns (1991:72).

For several years, William Wepler has been investigating the J.F.D. Lanier State Historic Site. The mansion was built 1840-1846 by Lanier, a successful banker who helped the state avoid bankruptcy in the 1860s (Wepler 1997; Pitts 1993). Investigations have taken place in the basement, formal gardens area, vineyard, chicken yard, poultry house, nearby First Street, the east wing complex, the driveway, carriage house, greenhouse, and cistern areas (Wepler 1997).

In 1996, Mark Schurr conducted archaeological test excavations at the African American Hardy-Manual log cabin site, a cabin constructed after 1861 in an African American settlement area in St. Joseph county, and later used for sugar maple making (1997:3). Unfortunately, excavations revealed that the cabin had been removed from its original location (1997:15).

Urban and Industrial Sites

Urban and Industrial site archaeology is a relatively recent field of investigation in historical archaeology in Indiana. A pioneer in this field of investigations is the geographer John McGregor. In the 1980s, McGregor recorded, primarily from historical documents, air photos, and Landsat analyses, but with some field checking, rural, industrial, and business sites in southwestern Indiana (McGregor 1985; 1987; 1988). Sites recorded included pottery-making and kiln sites; blacksmith sites; mills; meat packing sites; patent medicine businesses; saddle, harness, and carriage manufacturers; printing sites; broom manufacturers; overalls manufacturing; iron works and foundries; bakeries; furniture manufacturers; cooper sites; book binders; cabinet makers; soap manufacturers; breweries; soft drink manufacturers; gas fuel manufacturers; ice cream makers; railroad shops; box manufacturers; boilermakers; powder manufacturing; and farmsteads and homesteads (McGregor 1985), to name only a few.

A large industrial archaeology reconnaissance, testing, and mitigation project was carried out by Ball State University, at the 19th Century wooden Gronauer Lock (Zoll and Cochran 1991b; Parish 1993) and at the lock keeper's house (Zoll and Cochran 1991a; Cochran 1991), at the second lock of the Wabash Erie Canal, near New Haven, Indiana.

Another study of the Wabash Erie Canal, early transportation in Indian, and associated businesses, industries, work camps, and other sites has been conducted by Bischoff in Tippecanoe and Carroll counties (1994; 1996). In Tippecanoe County, Bischoff examined many features associated with the canal, including culverts, locks, aqueducts, canal path, feeder embankments, holding basins, reservoirs, bridges, and a wharf, as well as cabin sites, farmsteads, mills, canal settlements (1994). In Carroll County, he investigated a paper mill complex (with a large quantity of buttons and brace fasteners), the lock keeper's house for the canal lock in Delphi, a commercial area, an interesting canal construction camp, and the canal and towpath in the area (1996).

In downtown Indianapolis, a number of urban and industrial sites have recently been investigated. These include an archaeological reconnaissance of an area along the White River, where the Central Canal, the Washington Street Pumping Station, Military Park, the Kingan meat packing facility, Public School Number 5, trolley tracks, the National Road, and other historic sites were recorded in documents (Kearney 1994). Project areas were examined through documents and field survey, resulting in the documentation of a spillway, recording of a segment of the National Road, a disturbed historic structure, a disturbed foundation, remains of the historic Kingan Company meat packing plant, and a disturbed Euroamerican site (Kearney 1994). Substantial archival and historic documentation of the area was completed by Kearney (1995). Subsequent test excavations at sites in the area recorded the stratigraphy, structure and composition of the National Road, the Old Washington Street trolley tracks, and the Central Canal corridor (O'Brien 1995), as well as test excavations in the vicinity of the historically recorded location of McCormick's cabin (one of the first settlers in Indianapolis) (O'Brien 1996).

In a historic and prehistoric contexts study conducted for the Tipton Till Plain (Cree et al.1994), information on historic industrial sites was compiled. Waite (1994) described historic mills in Delaware County. Cochran and Palyo described ceramic industry (Cochran and Palyo 1994) and gas and oil sites (Palyo and Cochran 1994) in the county.

Settlement Pattern Studies

Researchers describing historic native American settlement patterns in Indiana include Jones (1984; 1985), Wepler (1980; 1984), and Schurr (1994). Jones (1984:58-59; 1985) described locational patterns for early historic sites, including historic Native American, in Tippecanoe County. From historical documents, Wepler plotted and described Delaware and Miami settlements in central and northeast Indiana (1980; 1984). Schurr (1993) described Potawatomi settlements in the Kankakee drainage in LaPorte County.

Based upon his survey of industrial, business, and rural sites in southwestern Indiana, John McGregor proposed a settlement pattern for sites in the Wabash Valley in a 10 county area from Vermillion County to Warrick County (1994: 117). His study took an ecological perspective, assuming that there were certain environmental factors that were constant for specific site types and their associated activities (1994:118). The study delineated these factors for residential sites and industrial sites such as mills, pork packers, flatboat yards, tanneries, blacksmiths, and cabinet makers (1994).

Schurr's study, mentioned above, described general site location patterns for historic settlements in the Kankakee drainage in LaPorte County, including Potawatomi, pioneer, railroad development, and modern agricultural period settlements (1993).

Underwater Sites

During the 1980s, Gary D. Ellis carried out underwater archaeological investigations in the Indiana portion of Lake Michigan. He conducted historical and archival research and conducted underwater surveys of shipwrecks in the lake. Over 50 shipwrecks were documented from the historical data, and some 16-17 shipwrecks actually recorded in the field. One of the resources studied was the 1872-1911 Muskegon shipwreck site, a passenger-freighter vessel which was listed on the National Register of Historic Places in 1989 (1987; 1989a).

Ellis (1989b) also developed a historic context for underwater resources, so that they may be investigated, preserved, and interpreted in a framework of Indiana history and preservation.

Cemetery Studies

As Johnson (1997:1) notes, "historic cemeteries are part of our cultural landscape" and contain a large amount of information about past cultures. Historical burials--largely as a result of accidental discoveries or relocation projects--have been recovered, studied, and often reburied in Indiana, although few large-scale archaeological investigations have taken place.

Recent Investigations and Conclusions

Historical archaeology studies in Indiana have increased considerably in the last decade, and many recent projects, analyses, and reports are in progress. These include studies related to historic Native Americans, French and French Canadians,African Americans, 19th century sites, and industrial sites.

Historical archaeology in Indiana, particularly in the cases of large research projects and student projects, is increasing, and there are considerable numbers of projects on almost any of the topics above which remain to be investigated. It is an exciting time in the state for such valuable and interesting projects and studies to be undertaken. Much remains to be done in this discipline and to contribute of our knowledge of our history, heritage, archaeology, anthropology, past lifeways and cultures, and studies of Culture itself, and to preserve information and sites from the past.

Historical archaeology is interesting to people because it connects them to the past--whether to their families, neighborhoods, communities, towns, cities, businesses, historical events, etc., or to the past of others. It describes and attempts to understand past events that gave rise to current events and conditions. It is a worthwhile and enriching endeavor for the public and professionals alike.

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Why Archaeology?

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The average person is quick to say that archaeology is very interesting. There is something terribly romantic about discovering ancient artifacts and forgotten civilization. The stone tools and sherds of pottery recovered by the archaeologist conjure up visions of the dim past and the beginnings of human kind.

However, while archaeology does have its romantic aspect, it is also a demanding science that requires years of training, hard work, and long hours to accomplish. In the real world, archaeology, like all other human endeavors, can be costly in terms of time, manpower, and money.

Inevitably, these costs have led to such questions as "how much archaeology is enough?" and "What is the real value of investigating the past?" In the time I have worked for the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology, I have been asked these questions many times. Over the years, I have given these questions a great deal of thought. And now, I would like to share my answers, such as they are, with you.

Today in the United States, the vast majority of archaeological studies that are done are funded by federal, state, or corporate dollars related to major construction projects. By law, many projects that require Federal funding or permits must make an effort to minimize the environmental damage they will do. Part of that effort usually includes the identification and evaluation of archaeological sites that will be disturbed or destroyed by the proposed project.

What most people may not realize is that the laws that require these studies are, at present, the best protection we have against losing what little is left of the archaeological record. Indeed in the last 30 years, most of what we have learned about the past has come from studies done for major development projects. Unfortunately, not all construction projects are required to do environmental studies, and countless archaeological sites are lost because of it. Every year, every day, every hour, more sites are lost to modern development.

Even if a development project **is** required to conduct archaeological investigations, very few of the sites that are found will meet the federal criteria that require preservation or additional investigation of a site. Here in Indiana, we estimate that less than 2% of all the sites that are found will be preserved or further investigated. The only information we will **ever** have about the other 98% of the sites, is what little we learn from the original study. We are, in fact, for all our efforts, saving only a tiny fraction of our archaeological heritage. Doing less than we are currently doing would be virtually **zero**. We would save nothing. We would learn nothing. It would all be destroyed.

In a recent publication, Gilbert Grosvenor stated:

> Unfortunately the triumph of archaeology lies in the shadow of tragedy. As archaeologists labor to record time's irreplaceable archives . . . housing developments, farms, factories, highways--these and more are obliterating archaeological sites every day . . . The future of the past lies in our hands, a precious legacy to pass on to our descendants. But so much has been destroyed that, if we are not careful, there will be no past to leave them [Grosvenor 1989].

We cannot, of course, halt all modern development. A living culture must continue to grow and change. But we **must** make an effort to preserve some knowledge of our past **as we go forward**.

A question I've been asked more than once is "Is it really worth it?" "Is it **worth** $10,000 or $100,000 to investigate an archaeological site?" That's like asking what a great painting is worth. It's all in the eyes, or the mind, of the beholder. Each individual must decide for themselves how much it is worth.

Archaeology is a demanding, multi-disciplinary science that draws on a wide range of technology and skills. As with any other task, archaeology can only be done properly if one has the necessary opportunity training, skills, person power, and equipment. And because of this, archaeology can be expensive. But without the archaeology, most of humankind's heritage would be lost. The reason we can begin to paint a picture of life in the past, the reason we know what we know, is that **somebody** paid for the archaeology. Whether it was a federal tax payer, private corporation, or a student at a university, somebody paid for the studies that have allowed us to learn about human cultures in the past.

It will never be an easy question deciding what constitutes a fair price or reasonable expenditure to learn about our past. That's something that each individual must decide for him or herself. But learning from the past must **certainly** be worth **something**.

Who is so jaded, or so foolish, or so short-sighted, that they would say that there is no benefit from our learning about other cultures? By learning from other cultures, we are able to see an endless variety of answers to the problems that all peoples, in all times, must face.

Archaeology, perhaps more than any other science allows us to learn from other cultures, not only in other lands but in other **times** as well. The worlds of man are not only spread across the face of the planet. They are spread across the centuries, even across the millennia. As many and varied as the cultures of man are today, today's cultures are only tiny fractions of all the cultures that have gone before us.

The past does not, and **must not**, belong just to the archaeologists, or just to the artifact collectors, or just to the landowners, or to **any one special group**. If the past is to have meaning--if it is to have value and purpose--it must belong to **all individuals that want to learn about it**. The past must not be just buried and forgotten, disrespected, or destroyed. The past should be reduced neither to cold facts on dusty shelves nor to a hand-full of trinkets at a flea market.

The past is not a dead thing, it only becomes a dead thing if we ignore it. Studying the past gives us the opportunity to connect with vibrant, living beings that fought, felt, cared, and dreamed even as we do. Even though much of the archaeological record has already been destroyed there is still some left. There is still some opportunity for peoples of the past to speak to us, and to help us to learn more about ourselves and our world. Peoples of the past can still teach us new things. But we must have the commitment, the determination, and the expertise to listen to what they have to say.

Why do we do archaeology? Ask the little girl or the elderly farmer whose eyes light up when they learn that the "arrowhead" they found in their field is probably 8,000 years old and was made long before there were a bows and arrows in North America. Ask **them** what learning about the past is worth, when for a split instant, that stone tool becomes a "bridge" between the little girl and an Archaic hunter of the distant past. A bridge between two unique human beings that, because of the span of years, would not have the opportunity to lay eyes upon each other, but they can nonetheless "meet" by way of what we have learned, and can learn, about the past. In that moment, two worlds can meet. Worlds not separated by miles in space, but by the distance of years. Archaeology can help us span those years.

Now, and in the future, what we preserve of our heritage will depend not only on the technology and skills of the archaeologist, but upon their ability to share what they have learned with others. Archaeologists must expend the time and effort to encourage others in learning about the past. Archaeologists must be able to tell people what we have learned, what we are learning, and why it's so important to save at least a little bit of our ancient heritage before it's all gone. Surely, one of our best hopes for saving what is left of the past is to help others to understand, appreciate, and respect the fragile, irreplaceable, archaeological resource. Because, and make no mistake about it, every day, every hour, every minute, we lose more of what remains of the archaeological record. And archaeological sites, once they are destroyed, do not grow back. Once they're gone, they're gone forever.

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MOUNDS, MARSHES AND MYSTERIES: MIDDLE WOODLAND ALONG THE HEAD OF THE LAKE

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Fifty-five years ago, George Quimby(1941) defined the Goodall focus in northwestern Indiana and western Michigan. Since that time, there has been continued, although sporadic, interest in the spread of Illinois Havana-like material to the northeast (i.e., Brown 1964; Mangold 1981a, *in press*; Kingsley 1981; Garland 1990; Holman 1990; Garland and Des Jardin 1995). New sites are being identified and previously known sites are being reinvestigated for better understanding. New theories and hypotheses are being proposed to better explain the phenomena.

Mounds and Locations

The location of mounds is something that has often slipped through the pages of history without being recorded. Often mound locations were either of such common knowledge within an area that they seemed not to warrant recording, or the landowners kept the locations secret because they wanted the contents of the mounds for their own personal collections and/or to keep collectors away from their property. Low mounds or single, isolated occurrences may have gone unnoticed. Others were so severely vandalized that any physical stature is gone and they are now unrecognizable as such a structure. Today, only fragments of the mounds that probably existed are known and their locations recorded.

Information regarding what these unrecorded and/or vandalized mounds contained is practically nonexistent, or, when it does occur, is very fragmentary. Artifacts were traded or sold with little regard for provenience. Items from the Goodall mound group have been identified in three states (Illinois, Indiana and Michigan) with possible evidence of a fourth (New York) recently coming to light. What has been identified in museums or private collections is not always consistent with the number of items described to have been found in early reports. Skeletal remains were usually ignored by early collectors, except in the case of skulls which seemed to constitute trophies of some sort, often winding up on shelves or mantles. It was often the only bone recognized by the looters. Material from the Franz-Green mound, Porter County, Indiana, includes an adult skull and a juvenile jaw. Shaft sections from long bones such as femurs and tibias were identified by the collectors as simply "wood."

Therefore, the documentation of such structures and their contents is important. Recently, in talks with avocationals and collectors in northwestern Indiana, a previously unrecorded burial mound was identified in Jasper County. It was located approximately 2 miles southwest of Gifford in Barkley Township. A single burial was disturbed during the tilling of a low mound for a garden. Accompanying that burial were a platform pipe, of what appears to be Illinois pipestone, and two chert discs (R. Nesius, personal communication September 1996). Although the mound has likely been seriously impacted, investigations at Goodall and Bellinger mounds have established that significant archaeological data may still be retrieved from mounds thought to be totally destroyed.

Another mound location in Lake County, near Shelby, was previously known. The Brown Mound (12Le320), also known as the Brown Ranch Mound (Faulkner 1972:152), had been "potted" in the 1950s. A Havana zoned ceramic vessel that had come from that mound was included in this author's thesis (Mangold 1981a). However, it was recently learned that, along with this vessel, there had been copper items (unspecified) and chert discs accompanying the burial(s)(D.Flatt, personal communication September 1996).

A third, yet unconfirmed, mound location within the Kankakee River State Park in Newton County, near Schneider has also been reported by collectors.

This new data reinforces the hypothesis that while isolated mounds existed in and south of the Kankakee Marsh, the large groupings of mounds, e.g., Goodall, Union Mills, and Mud Lake seem to have only occurred north of the marsh. The mounds themselves, as described in early sources, also seem to be of larger size than in other areas (Faulkner 1972:152-153). The exact meaning for this choice of location is not entirely clear. Whether it is based in geographical or cultural constructs, it does show a decided preference for the area between the Kankakee River and Lake Michigan. One can infer from historic times that the morainic region of northwestern Indiana was heavily used as a route of travel around Lake Michigan.

Goodall Site (12Le9)

The University of Notre Dame field school of 1996 spent about four weeks at the site doing resistivity studies and some testing in a small portion of the site. The unusually wet spring in 1996, however, severely limited the amount of work that was accomplished. The resistivity studies failed to produce any abnormalities but this may have been due to technical problems. Their testing did confirm that some stratigraphy is still present in some of the mound remnants. A charcoal sample from one of the mound's internal stratigraphic layers has been submitted for dating but the results are not known at this time (M. Schurr, personal communication August 1996).

Near the end of the field school, one excavation unit on the edge of a suspected mound came down upon the edge of an old looter's pit. Although the excavation of the looter's pit will not be completed until the next field season, two classic Hopewell, limestone-tempered rimsherds from two slightly different vessels were recovered (M. Schurr, personal communication August 1996). As limestone-tempering was not used within northwestern Indiana or southwestern Michigan, these vessels were undoubtedly trade items.

Both rims are cambered and would represent Quimby's Type I ceramics (Quimby 1941) or the Hopewell series (Griffin 1952). One has very fine, well-rendered crosshatching with punctates applied from the left below it. The other rim is plain but with similar punctates. While the exact dimensions of the whole containers are not recoverable due to of the small size of the sherds, they do represent very small vessels, probably less than 12 cm in diameter, based upon data from other similar vessels in the region. The skill in design execution is typical of Hopewell vessels from Illinois but is rarely, if ever, found on locally- produced, grit-tempered copies.

It should be noted that the work by Notre Dame is the first professional excavation ever to occur at Goodall. Even though its name had been given to a regional expression of the Middle Woodland in the 1940s (Quimby 1941), archaeologists had never considered working at the site due to the notion that, because of the massive impacts to the site, nothing of note could be learned from it. That idea is rapidly being proven false.

Prison Farm Site (20Ia288)

One of the more important discoveries in regard to Middle Woodland studies in northwestern Indiana and western Michigan is the Prison Farm site in the central Grand River Valley (Brashler 1995). Jan Brashler of Grand Valley State University has worked at the approximately three acre site for two seasons and the site appears to be essentially a single component with excellent bone preservation. It is located in the floodplain of the Grand associated with a backwater lake. Brashler (personal communication, August 1996) favorably compares the location to those in the Illinois Valley. Zoned and dentate stamped ceramics from the site are similar, if not identical, to those occurring with the burials in the Norton Mounds. An AMS date of 60 BC was obtained from carbonized material from a noded rimsherd (E.Garland, personal communication June 1996). The use of nodes, while absent at Norton, is common at the Schultz site in the Saginaw Bay area (Mason 1981:254). While lithics are seemingly under-represented, Burlington, Wyandotte, Upper Mercer and Knife River cherts have been identified.

Eidson Site (20Be88)

Work done at the Eidson site, one of the few documented and excavated Early Woodland sites in the region, also produced a Middle Woodland era carbon date associated with Marion-like, thick sherds. There may be a slight error in the calibration of the date or simply that the use of this style of pottery continued longer in time that previously attributed. A maize copule has been dated to AD300.

Armintrout-Blackman Site (20Ae812)

This site along the Kalamazoo River is providing much needed data on the later Middle Woodland period. It is a small site in area, probably representing no more than the occupation of an extended family, that was used repeatedly over several hundred years. Ceramics include late Early Woodland and Middle Woodland; however, lithics also include Late Paleoindian, Early Archaic, and Late Woodland. Unfortunately, the site has not been accurately radiocarbon dated. The single date for the site (AD1310+/-50) does not accurately reflect its occupations as reflected by the preponderance of the cultural material recovered to date (Spero *et al* 1991). The ceramic data is very important to the overall determination of the ceramic sequence of the region.

Bellinger Mound (12Sj6)

This mound and village site were tested by the University of Notre Dame in 1994 and 1995. Even though the mound had been severely impacted by looting, considerable useful data remained and intact burials still remained. Beneath the mound floor were found Sister Creek-like ceramics and Mushroom Cordmarked, indicating a late Early Woodland/early Middle Woodland occupation of the area. The ceramics from the village area and mound fill are indicative of a Middle to late Middle Woodland presence. The first occurrence of obsidian in the Kankakee River basin was documented in the village area (Mark Schurr, personal communication 1996).

Interpretations

There is no question that there was an infusion of material and ideas from Illinois but how, from where and why? Although some attempts have been made to define a Middle Woodland settlement pattern (e.g., Kingsley 1981; Garland and Des Jardins1995), there appears to be no clear consensus.

The area between the Kankakee and Lake Michigan, especially that just north of the great marsh, as well as major islands within the marsh, appears to have been of greatest interest to these peoples. Most other Middle Woodland sites in the region also have some association with a marsh or floodplain environment. The Sinner site (20Be224) in Berrien County, Michigan, although a considerable distance from any large navigable waterway, is located at the edge of a large marsh. The Bobinski and Behner sites in the same county are located on a peninsula of land between the barrier dunes of Lake Michigan and a marshy interdunal lake (Mangold 1981b). While Moccasin Bluff is located along the Saint Joseph River, it is also associated with a marshy slough (Betteral and Smith 1973). Other Middle Woodland sites have the same marsh orientation (Kingsley 1981)

In the Galien River valley, there are only four known sites that have produced ceramics. One (the Kaiser Road site, 20Be268) produced only a single cordmarked, grit tempered sherd which may or may not be Middle Woodland. The other three have produced ceramics that are definitely or probably of that time period. The Behner site (20Be255) produced fingernail impressed sherds that probably fall into the early Middle Woodland time frame. The other two (the Sinner site, 20Be224, and the Bobinski site, 20Be282) have unquestionable Middle Woodland ceramics.

The Bobinski site had an associated group of three mounds that were obliterated by pothunting and farming during the 19th century. The Behner site is less than a kilometer west of an area where, during road construction in the early 20th century, a burial (or burials) with copper artifacts was discovered on a low promontory over an interdunal lake (Mangold 1981b).

A"mound" may also be present at the Sinner site. Along the north-south trending ridge that the site occupies, there is a notably higher, knob-like feature. On this highest point, a fragment of a conch shell (*Strombus puligis*) and a crosshatched rimsherd were found during the surface collections (Mangold 1981b). As both items are consistent with burial objects, it might be the case that this knob was used in place of or modified for use as a mound. No skeletal material has ever been found, however.

Assuming that there is a "mound" at Sinner and that the low promontory east of the Behner site was also a mound, this would then make all known sites with Middle Woodland ceramics possibly associated with burial activities. Pushing this logic a little further, *decorated* Middle Woodland ceramics would then only be associated sites having funerary activities. Some other ceramics such as the cordmarked sherd from the Kaiser Road site might be the normal utilitarian ware, if any was used at all. Dr. Elizabeth Garland (1990) has a carbon date of AD60 associated with what appears to be Marion style ceramics at the Eidson site (20Be128). It is possible that these heavy-walled wares were task-specific and their use continued into the early Middle Woodland period.

Garland (Garland & Des Jardin 1995) also sees some connection with Middle Woodland settlement and dry prairie remnants. This would account for a seemingly more interior route of dispersion along a "prairie corridor." This route may have possibly been as important as following the shore of Lake Michigan.

Previous work on ceramic styles of vessels seemed to indicate that there are two major stylistic zones, one centering on the Grand River, Muskegon and Kalamazoo River valleys and one in the area of the Kankakee and St. Joseph rivers (Mangold 1981a). Little Middle Woodland material has been found between the two areas. While all modes of decoration appear within each zone to some extent, preferences in combinations were apparently present that isolate the two areas. The northernmost has a stronger presence of crosshatched rims and Hopewell styles, and the other has more dentate stamping. This finding will have to be reevaluated as more data from the Prison Farm and Goodall sites becomes available.

Recent investigations seem to indicate that the decorative method of the crosshatching of rims with hemiconical punctations immediately below possibly came into northwestern Indiana and western Michigan on limestone-tempered trade vessels which were then copied by local artisans onto grit-tempered containers. Slight to considerable stylistic variations and the differing temper allow for this distinction to be made.

Ceramics from the Goodall site (both from museum collections and recent excavations by Notre Dame) suggest that some Havana-like and Hopewell-like styles coexisted, or, at least, overlapped in time (Mangold 1981a; *in press*). To date, the only Hopewell-like ceramics found at Goodall have been limestone-tempered trade vessels. The dominant ceramics found associated with the mound burials and on the surface of the sites in the vicinity of the mounds have been Havana wares (Mangold 1981a; *in press*). The single Middle Woodland rimsherd from the Sinner site is a mixture of

Havana form and Hopewell decoration. The fine grit-tempered rim is straight and slightly thickened with a flat lip that has an interior bevel. The decoration consists of fine crosshatching extending to 1.6 cm below the lip, followed by an assumed row of hemiconical punctates (only a single one is present) at 1.8 cm (Mangold 1981a)

A similar situation apparently exists in the Grand River Valley, although vessels with crosshatched rims, both locally produced and trade items, were found with burials at Norton. Burials in Mound M contained both Havana and Hopewell-like styles indicating some contemporaneity (Griffin *et al.* 1970). Further insights will be forthcoming as investigations in the Grand and in the Kankakee proceed.

The two previously-mentioned style zones may also represent two separate intrusions into the region, possibly about the same time. Within the Grand and Muskegon, carbon dates indicate a strong Middle Woodland presence within the first century B.C. Titabawasee wares, similar to those found at Prison Farm, from the Schultz site occur only slightly later. Other fairly common, non-ceramic traits, e.g., turtle carapace dishes, also tie the Saginaw and the Grand. Unfortunately, the lack of radiocarbon dates from the Kankakee severely hinders the development of this hypothesis.

With the data coming from sites like Armintrout-Blackman and Bellinger, it is becoming clearer that a late Early Woodland/early Middle Woodland expression was already in place prior to the introduction of Havana/Hopewell.

The understanding of Middle Woodland in northwestern Indiana and western Michigan is still a far-off goal. However, every year, it comes just a little bit closer. Maybe next year there will be a big leap as excavations at these important sites continue.

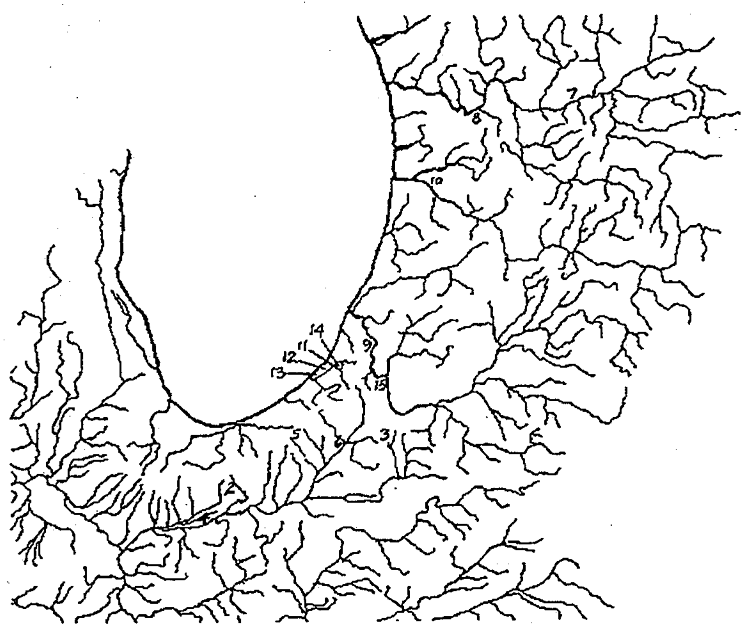

Figure 1. Archaeological sites mentioned in text.

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Swidden Cultivators of Central Indiana: The Oliver Phase in a Context of Swidden Agriculture and the Implications of Regional Climate Change

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Introduction

The prehistoric occupation of central and south-central Indiana underwent enormous changes during the Late Prehistoric period (A.D. 1000-1500): population movements, a shift to maize-based subsistence economies, and a change from widely dispersed seasonal occupations to groups living in settled village communities. At the beginning of this period, a group referred to by archaeologists as the Albee Phase (A.D. 800-1200) occupied the central Wabash valley (Anslinger 1990; Winters 1967) and the West Fork and the upper East Fork of the White River (Redmond and McCullough 1997). Albee habitation sites consist of scattered seasonal occupations that are difficult to detect archaeologically, that contained only a small number of households, and lacked substantial structures or storage pits indicating settled village life (McCord and Cochran 1994). The Albee occupation along the East and West Forks of the White River was replaced by the Oliver Phase by A.D. 1200. Oliver Phase material culture exhibits a stylistic mixture of Fort Ancient-like designs from the central Ohio River Valley and styles commonly associated with groups from northwestern Ohio and southeastern Michigan. Oliver Phase people depended upon a maize-based economy and lived in sedentary village settlements (Redmond and McCullough 1997).

Contemporary with the Oliver Phase occupation in southern and central Indiana were the Angel Phase (Black 1967; Hilgeman 1992) and Vincennes Phase (Winters 1967) Mississippian populations around Evansville and the Wabash Valley, respectively. Later, peoples associated with Oneota populations, typically centered in northern Illinois and southern Wisconsin, were present in southern and central Indiana by the fifteenth century. Groups referred to as Huber/Fisher occupy northwestern Indiana (Faulkner 1972) as far south as Hamilton County, Indiana (Cochran et al. 1993), and large Caborn-Welborn villages were present near the confluence of the Ohio and Wabash rivers (Pollack et al 1996).

Although my research has focused on the Oliver Phase peoples of central and south-central Indiana, exploring the connections and relationships among the Oliver Phase groups and the occupations of other groups in this area during the Late Prehistoric is important in explaining Oliver Phase variability over time. And understanding the population dynamics during the Late Prehistoric requires a background context that includes a consideration of the production system involved with the shift from wide-based horticultural practices to ones primarily focused on maize production, as well as climatic oscillations that affected these systems.

The first section of this paper discusses swidden agricultural systems as the most likely form of agriculture practiced in the Late Prehistoric. The Oliver Phase is used as an example of a swidden system operating in a land expansive pioneering mode, which has implications related to community structure and settlement patterns. The paper then explores the possibility of major climatic changes during the Late Prehistoric period and the consequences for maize-based subsistence economies across the midcontinental and central

Indiana. Although speculative, examining the nature of the larger context of the Late Prehistoric--the nature of the agricultural system and the climatic shifts--provides important insights into the dramatic changes witnessed during this era.

Swidden Agriculture

The terms slash-and-burn, shifting cultivation, and swidden (the term from Old English meaning a clearing in the forest) cultivation, (Norman 1979:87) all refer to a farming system that employs long-term fallowing.

A general definition for swidden agricultural systems is difficult because of the great diversity, both historically and geographically, that this term encompasses. Taking the broadest view, Norman (1979:86) presents the following definition: "the term may be applied to all systems of rainfed cropping with annuals, biennials or short-lived perennials in which a cropping period alternates with a longer rest or fallow period, during which the abandoned crop area is recolonized." Harris (1972:246) also acknowledges the difficulty of defining a system that has been used in such widely diverse habitats, but suggests that "they are universally characterized by (a) partial or complete clearance of the vegetation cover by cutting and burning, (b) the temporary cultivation of crops in the cleared area, and © the abandonment of the plot to fallow under regenerating vegetation for a longer period than the preceding phase of cultivation."

Within these broad definitions, there are several general attributes of swidden systems that have implications for settlement patterns. This agro-ecosystem (Loucks 1977) implies impermanent, or at least sedentary, settlement that is often dispersed, in contrast to both short-term fallow systems and fixed-plot horticulture. Short term fallow systems, where the fallow period is shorter than the cropping period, are typical of peasant societies and are usually associated with permanent villages and towns, implying that land is in relatively limited supply (Harris 1972:245-246). On the other hand, swidden systems often are employed by people colonizing new areas (or environmental niches) where the limiting production factor is labor rather than land (Norman 1979:88)

In addition, swidden systems usually consist of subsistence farmers practicing a small-scale form of agriculture. The plots cultivated are almost always less than 2.5 acres and usually less than an acre in size (Harris 1972; Will and Hyde 1917). Secondly, these systems are land extensive and labor intensive, in the sense that only hand tools requiring direct human effort, rather than mechanization or draft animals are used. Thirdly, a highly productive method of cultivation in terms of yield per unit of labor, swidden can be considered unproductive in terms of unit area of land (Harris 1972), although productivity can be increased by poly-cropping swidden plots. Beets (1982) has shown that multiple cropping not only extends the harvest but can increase yields over those produced in a mono-cropping situation. Finally, low densities of population are associated with swidden cultivation. It is the "productivity per unit of area, rather than a limit to productivity per unit of labor, that restricts the capacity of swidden cultivators to support concentrated populations" (Harris 1972:247-248). This restriction usually limits population densities to under 100 per square mile.

Given these broad general attributes, the diversity in swidden systems is still enormous and is not limited to groups colonizing new lands, except in the broadest cultural evolutionary terms. Spencer (1966) attempted to classify swidden systems into subtypes based on the length of the fallow period and the type of fallow-phase vegetation. But Norman (1979) states that it is impossible to generalize about cultivation frequency in shifting cultivation systems for several reasons: first, swidden cultivators do not adhere to set time-tables; second, frequency of cultivation will vary according to distance from living quarters; third, frequency of cultivation will vary because of local environmental conditions; and, finally, with intermittent cultivation frequencies, potential arable land included into the fallow sequences cannot always be recognized. Instead Norman (1979:93-94) identified two basic types of swidden systems, based on the tools, either hoes or digging sticks, used by the cultivators. The digging stick is used in heavily forested areas that are not dominated by grasses or weeds, which usually occurs in primary or old growth secondary forest where the ground flora is sparse and the soil friable (Norman 1979). For example, Pioneer migrants into lowland Guatemala have found that areas cleared of mature forest require no weeding and only a single trimming of tree sprouts (Carter 1969:93), and the planting takes place in the ashy layer left behind after the burn. The use of hoes becomes necessary in grasslands (prairie areas), or where the cropping length sequence is extended to the point where weed control becomes a problem.

Cultivators using digging sticks are slash-and-burn horticulturalists in forested area in a pioneer mode of cultivation (Harris 1972). In the pioneer mode, forest resources are treated as unlimited and expendable. Plots are shifted in a linear fashion that typically requires frequent shifts in settlement. Harris (1972) presents an example of the Iban (Freeman 1955), who prefer to clear primary forest instead of secondary growth. Swidden techniques are also employed as a convenient and efficient way to clear land. Neolithic cultivators in Europe and early Euroamerican pioneers in eastern North America employed these techniques (Harris 1972:249; Parain 1941) as did some Native American groups in the northeast (Cronon 1983). A modern example of the pioneering mode of swidden for land clearance can be seen when new areas are opened up through increased accessibility, as is the case for the Kekchi cultivators of Chichipote, Guatemala (Carter 1969).

In contrast to a pioneering mode, a cyclical pattern of swidden cultivation does not necessarily require shifting settlement, unless population growth causes soil fertility to drop, or other sociopolitical factors require movement. In this mode the shifting plots do not follow "progressive linear patterns" (Harris 1972:249), but previously cleared plots are reused after an appropriate length of fallow. This reuse typically lowers fertility and therefore output of the plot, but the inputs in initial clearing are usually lowered (Norman 1979; Nye and Greenland 1960). However, with the cyclical mode, weed and pest infestation often become a greater problem than they are in a newly cleared primary forest plot with its lower frequency of adjacent ground flora. Because of the greater inputs necessary in the maintenance of the fields in the cyclical pattern, hoes are generally associated with this mode of cultivation.

Limiting Ecological Factors

A major ephatic input into the agro-ecosystem of slash-and-burn cultivation is obtained through the burning process itself. In the tropics, the burn releases nitrogen and sulphur in the atmosphere, leaving the ash, which contains magnesium, calcium, potassium and phosphorus (Nye and

Greenland 1960; Norman 1979), thereby adding to the nutrients of the soil. The heavier or more mature the forest cover, the more nutrients are brought up from depths in the soil typically unavailable to cultivated plants and released through the ash. Burning has been shown to raise the pH of the soil, primarily in the humus layer, to stimulate bacterial activity, which increases nitrification, and to increase the cation exchange capacity of the soil (Norman 1979:268-270). With continued cropping, soil nutrients decline as does the soil's physical conditions; weeds and grasses become an increasing problem; and an increase in the frequency of diseases and of crop-specific pests becomes more likely.

Several ecological factors restrict the ability of swidden systems to maintain large numbers of people in permanent communities. First, the necessity for a substantial amount of fallow land creates a high demand for cultivatable land, which therefore "limits productivity per unit area and maintains a dispersed pattern of settlement" (Harris 1972:251). In other words, the ratio of fallow to cultivated lands limits the concentration of large populations within a particular system. Secondly, aspects of the physical environment affect agricultural production and the stability of settlement. Local factors such as pests, soil fertility, length of growing season, topography, and the presence or absence of grasses or weeds, affect the productive potential of swidden systems. Many of these problems can be avoided in the pioneering mode, but this requires shifting settlement and a low population density. Third, the nature of the crops grown is an important factor in assessing the potential for swidden systems to maintain a population. For instance, seed crop systems are less stable than root crop systems because of the greater demand for soil nutrients. A longer fallow period is required in seed crop swidden systems in order to restore these nutrients, and factors such as population growth create greater stress on these systems (Harris 1972).

Temperate Zone Swidden

Because characteristics of swidden systems are derived from studies of farming practices in the tropical regions of the world (Norman 1979; Nye and Greenland 1960; Carter 1969; Spencer 1966), the applicability of these generalizations to the different climatic regimes of temperate regions needs to be tested. Unfortunately, little information on swidden cultivators in temperate regions exists, because this type of farming no longer is practiced.

Among the few studies available, experiments involving the use of swidden plots in Denmark indicated that burning has similar effects on temperate zone soils. There, burning of cleared fields increased soil pH and significantly raised levels of phosphorous and potassium (Steensburg 1979). Steensburg cites other studies in temperate North America where pH and fertility increased after a forest was burned. In England, experimental swidden plots produced twice the net yield (emmer wheat yield minus seed sown, Table 1) as the unburned plots in the first year (Reynolds 1977).

TABLE 1: Yield Returns over Seed Sown (adapted from Reynolds 1977:313)
Annual Input: 4.00 lb. (1.8 kg) for total area (144 sq. m) 1.78 lb. (0.81 kg) for yield area (64 sq. m)

Net output (yield less seed sown)	Year	1973	1974	1975
	Burned Plots	10.3 (4.7)	9.1 (4.1)	5.9 (2.7)
	Unburned Plots	5.8 (2.6)	4.7 (2.1)	1.4 (0.6)
figures in brackets are weights in kg				

Table 1. Yield returns over seed sown (adapted from Reynolds 1977:313).

But as Harris points out (1972:250), comparisons between South American swidden cultivators and other peoples practicing shifting cultivation in tropical areas might not be valid because of the nature of the crop. For instance, manioc is not as demanding on soil as seed crops and, therefore, can sustain a more settled and larger population. The difference becomes magnified when comparing swidden systems in temperate zones to those of the tropics.

Probably the main difference between tropical and temperate zones is that the natural regeneration of soil fertility is slowed significantly because of cold winter temperatures and lower rainfall (Harris 1972). In addition, a reexamination of Table 1 shows that crop yields are substantially reduced by the third year. In terms of plot fertility life, this length is not radically different than those described for seed crop cultivation in the tropics. Harris (1972:254) points out that swidden systems (and settlements) are most stable for tropical forest vegaculture practices, and that maize- and rice-dominated systems in tropical America (Carter 1969) and Asia (Spencer 1966) demonstrate the instability of swidden systems, which results in either progressive migration of settlements or intensification of production methods. Harris (1972:254) further insists that this instability is amplified in temperate zone seed agriculture because of the increased demand for nutrients and the longer fallow period required. Therefore, temperate zone swidden systems are more likely to become maladaptive as population increases or as land becomes limited.

Whether temperate-zone swidden agriculture is more or less productive than in the topics, slash-and-burn horticultural practices have been documented for the temperate forests of Europe and the eastern United States. In Europe, during the 6th and 5th millennium B.C., agriculture diffused across Europe along two routes: north through the Balkans and central Europe, and in a southern route across the Mediterranean islands and coast into Iberia and France (Alexander 1978). Historical records indicate that slash-and-burn techniques, probably in the pioneer mode, were used for land clearance in the forested regions of Germany, Britain, and parts of Gaul (Parain 1941). Typically, only one crop was taken from the burnt-over lands (Markley 1985:597 mentions that *Germanii* legally limited cultivation in one place for one year). Swidden farming practices were more widespread in the 5th century but persisted past the end of the middle ages. Swidden was known to be practiced near Paris in the 12th century and was widespread in the Alps until the 18th century. Parain (1941) further states that on poor land on steep slopes in the Ardenne Forest and in Corsica the practice continued until the 20th century.

Barker (1985:17) cites Danish paleobotanist Iverson as the researcher that first noticed the impact swidden farming had on the European environment. By examining pollen records from lakes in Denmark, the arrival of the first

Neolithic farmers could be documented. The frequency of tree pollen fell dramatically, then charcoal, grass, and cereal pollen rose in frequency, followed by the return of tree pollen to dominance. Iverson named this phenomena landnam (land clearance), which very well could have represented the effects of swidden farmers in a pioneering mode of cultivation. Other paleobotanists have since found similar patterns in other areas of Europe. Although Barker (1985) disputes the claim for European slash-and-burn cultivators, the paleobotanical, linguistic (Markley 1989:597), historical (Parain 1941) and archaeological (Soudsky and Pavlu 1972) evidence indicates otherwise.

In eastern North America, early explorers and pioneers documented their observations of Native American agriculture, and many of these descriptions detail the aboriginal use of slash-and-burn techniques (Champlain 1922-36; Cronon 1983). In the area of southern Ontario, sometimes referred to as Huronia (Heidenreich 1971), seventeenth-century French accounts document large areas of fallowed land. Champlain (1922-1936:3:46,122,130) described the county as "mostly cleared" and possessing "good pastures in abundance." If these references refer to abandoned agricultural fields, as Heidenreich (1971) believes, then apparently extensive fallow land was present. A well-cleared landscape with extensive meadows was also reported by Sagard (1939:90). Early nineteenth-century reports document an extensive closed canopy forest over most of Huronia, suggesting that the large clearings reported earlier must have been the result of Huron farming practices (Redmond n.d.: 27).

From these early accounts, it is evident that in at least the forested regions of eastern North America, swidden horticultural practices were observed by early Europeans

(Sykes 1980; White 1983). However, it appears from the descriptions in these accounts that the observations were made at larger settlements and were of peoples with centuries of established horticultural practices in a **cyclical** mode of swidden cultivation. Agricultural intensification is evidenced by the description of hoeing and the removal of previous years' crop residue and the establishment of grasslands around large Huron settlements. Redmond (nd) comes to a similar conclusion for Huron farming practices, observing what appears to be a pattern of cyclical shifting cultivation at the tribal level. In this system, after the appropriate length of fallow (at least 30 years), any Huron group could clear and cultivate a plot, retaining ownership until the land was abandoned.

The Oliver Phase as Temperate-Zone Swidden Horticulturalists

The Oliver Phase is best described as village dwelling horticulturalists inhabiting the White River drainage of central Indiana during the Late Prehistoric period (A.D. 1100-1450). This geographical location places it between the lower Great Lakes and Fort Ancient and Middle Mississippian occupations of the middle and lower Ohio Valley. Based on the limited evidence to date, the Oliver Phase subsistence-settlement system and material culture is most similar to the Early and Middle Fort Ancient populations (Redmond and McCullough 1992, 1993, 1996; Redmond 1994) along tributary streams of the Middle Ohio Valley (Essenpreis 1982:249-253; Brose and White 1983; Nass 1988; Cowan 1987; Henderson et al. 1992).

This Late Prehistoric manifestation is characterized by a great deal of diversity in both settlement size, form, and location and in ceramic style. Oliver Phase village sites have demonstrated a distribution of sedentary, nucleated village sites on terraces or floodplains of the White River and its tributaries. Smaller habitation sites are located in both the lowlands of the river valley and along upland drainages, yet small campsites (indicated by lithic scatters with triangular projectile points) are mostly found in the upland areas (Redmond 1991). Vessels from Oliver Phase sites vary from globular to subglobular jars to deep thick walled bowls; crude miniature vessels have also been recovered from some sites. Ceramic decoration also exhibits a wide range of diversity: oblique or chevron lines executed with a plain or cordwrapped dowel are common; curvilinear or rectilinear designs are executed with broad trailed lines; and a line filled triangle motif is present, which could be executed with either cord-impressed or trailed lines.

Over the past several years, the Glenn A. Black Laboratory of Archaeology (GBL) at Indiana University has conducted limited text excavations on several Oliver Phase sites. One of these sites, the Clampitt Site (Redmond 1994) in Lawrence County, Indiana, was a 14th century stockaded village. A botanical analysis found that the tropical cultigens maize and beans were well represented, with maize found in 100% of the features and beans in about 40%. While the wood and nut shells have yet to be fully analyzed from this site, it appears that the nut shell remains consist of hickory, walnut, and acorn (hardwood forest species). A wide variety of wild fruits and berries were collected but, interestingly, relatively few starchy seed cultigens such as chenopodium were recovered from the Clampitt Site (Bush 1993, 1994a). Similar results have been recovered from other sites with Oliver Phase occupations (Redmond and McCullough 1996; McCullough and Wright 1997a), with the addition of tobacco at Cox's Woods and Bundy-Voyles and squash/gourd at Bundy-Voyles (Bush 1997).

Given the preceding discussion of swidden agriculture, what insights into Oliver Phase peoples can be gained by thinking of them as swidden horticulturalists? Since the early historic accounts document the widespread use of slash-and-burn techniques by Native Americans in the eastern woodlands, and the ample evidence for tropical cultigen horticulture during the Oliver Phase, which was situated in a woodland environment, some form of land clearance was necessary. Given the level of technology--hand tools--and the advantages of swidden techniques, such as increase fertility and pest control, shifting cultivation would be the logical choice.

If the Oliver Phase peoples were swidden agriculturalists, their choice of hand tools tells us something about the type of swidden agriculture they practiced. As stated previously, hoes are typically associated with cyclical-pattern swidden cultivation, because the extended use of farming plots requires weed control. However, in Oliver Phase tool assemblages, hoes are conspicuous in their absence. A search of the GBL collections identified 424 hoes, hoe flakes, or fragments; of the 424 hoes, not a single stone hoe or hoe flake has been recovered from an Oliver Phase context. In terms of hoes made from perishable materials, there are numerous examples of shell and scapula hoes, but only a single scapula hoe has been recovered from the multicomponent Bowen site (Dorwin 1971) in Marion County. The Bowen site contained pottery from several Late Prehistoric groups, and it is uncertain if the single hoe is related to the Oliver Phase occupation or not. Four Oliver Phase sites (Jose, Bowen, Bundy-Voyles, and Sugar Creek) have bone preservation of sufficient quality to have produced evidence of bone hoes, but only the one at Bowen has been found. Similarly, no Oliver Phase shell hoes have been identified. Even if the single scapula hoe is associated with the Oliver Phase, the intensity of maize cultivation that is evident suggests that the wooden digging stick must have been the implement used, which is a technology associated with the linear or pioneering mode of shifting cultivation in forested areas. In northern Illinois, Jeske (1989) suggests the use if a digging stick technology for the Upper Mississippian Langford groups, while the contemporaneous Oneota peoples are clearly using a more intensive hoe technology.

Further evidence for conceptualizing the Oliver Phase people as linear-mode swidden agriculturalists lies in the archaeological botanical record. The low frequency of starchy, or weed, seeds in Oliver Phase features suggests that plots were abandoned frequently. Coupled with the lack of a hoe technology, the absence of weed seeds implies that weeds or grasses were evidently not a problem. The plots were probably cut out of the forest, used for a few years during their highest productivity, and not reused in a cyclical pattern. If the plots were used for extended periods, then weeds and pests would have become an increasing problem with each year. With the exception of one feature at the Bundy-Voyles site (Bush 1997) near Martinsville, seed plants of the eastern agricultural complex (such as chenopodium, maygrass, little barley, and erect knotweed) are almost completely lacking. These types of plants are essentially weeds and often grow adventitiously in areas disturbed by humans. (Even though other contemporary Fort Ancient sites in southeastern Ohio reveal low frequencies of seeds, the Oliver sites seem especially low.)

Frequent shifting of settlements is also an attribute of the progressive linear pattern of clearing plots.

Archaeological evidence suggests that Oliver settlements reflect short term occupancy. With the exception of the multicomponent Bowen site, Oliver village sites exhibit an extremely low number of superimposed features. The Clampitt site (Redmond 1994), with 21% of the surface area excavated had only five superimposed features. A similar lack of superpositioning was identified at the Cox's Woods site (Redmond and McCullough 1993, 1996), the Sugar Creek site, and the Bundy-Voyles site (McCullough and Wright 1997a). The smaller habitation sites, such as the Abner site (Redmond and McCullough 1993), reflect an even shorter term of occupancy, perhaps only a year or two. None of the 15 features identified at the Abner site were superimposed. More importantly, none of the features had been reused as trash pits, suggesting the site was not occupied long enough, or intensively enough, for midden accumulations to develop.

If we accept that the Oliver Phase peoples are in a land expansive, pioneering mode of swidden cultivation, this system has implications for community structure. First, not only are settlements short-lived, in an uncontested frontier expansion there is little impetus for political consolidation, and villages tend to fission (Sahlins 1961). Frequent fissioning of settlements is only practical in a land expansive system, either into uncontested regions or through displacements of other groups.

Social factors independent of external pressures can also instigate movement of settlements through the dynamics of village fusion/fission (Nyerges 1992). This scenario describes a society were wealth is in people. As Nyerges (1992:863) states, "On the frontier, the direct expression of and means to wealth is the control of persons, their reproduction and labor." Land is not perceived as being in short supply. As Harris (1972) pointed out earlier, labor is the limiting factor. For example, with the fluidity of village membership, individuals attempting to assert control of persons to achieve and maintain social standing often leads to conflict, resulting in a disinctigation or recombination of village population. Nyerges (1992) describes a situation where established clans for go land rights in order to recruit more people, even though they might be from outside groups or descendants of slaves. This suggests the intriguing possibility that the great amount of ceramic diversity observed on Oliver Phase sites may reflect diverse social origins in a system where wealth is in people.

In a land-expansive swidden system, not only are villages short-lived and unstable, they are likely to be small. The population of the Late Prehistoric Oliver Phase in central and south-central Indiana was limited in size. Oliver Phase material culture and village configuration are most similar to Early and Middle Fort Ancient Sites in southwestern Ohio. The Incinerator Site (Heilman and Hoefer 1981; Heilman et al. 1990), which is a circular Middle Fort Ancient village surrounded by a wooden post stockade dating about A.D. 1280, is probably the best example. A population of approximately 200 people has been estimated for the Middle Fort Ancient sites of southeastern Ohio (Nass 1988). However, the four circular Oliver Phase village sites that have been investigated (Dorwin 1971; Redmond 1994; Redmond and McCullough 1996; McCullough and Wright 1997a) reveal a diameter of about 80 meters, which is roughly one-half the size of southeastern Ohio sites.

Finally, because there is no impetus to consolidation of settlements in a land-expansive pioneering system, political centers of power are not to be expected. For Oliver Phase settlements, no political center or hierarchy of settlements is evident. None of the villages contain monumental architecture or storage facilities beyond those necessary for its inhabitants. The circular village class of settlements all appear to be about the same size, suggesting the autonomous villages consistent with non-contested pioneer expansion.

The archaeological record for the White River drainage does indicate that Oliver Phase maize and bean cultivators were pioneering a new niche. Previous Albee Phase (A.D. 800-1200) Late Woodland site distributions in central Indiana indicate a sparse population density, with the habitation sites consisting of a few scattered camps in a variety of topographical settings (Anslinger 1990; McCord and Cochran 1994). Maize was being cultivated but was not a significant portion of the diet. For instance, an analysis of the botanical remains from the Morrel-Sheets site revealed that maize accounted for only about 17% of the specimens by count, with Little Barley being the cultigan most prevelant, represented by 66% (Bush 1994b).

In the pioneering mode of expansion, swidden farming communities are essentially "moving frontiers". However, when limits to available or uncontested land are reached, a crisis develops, and groups must intensify production. Two conditions can permit the continuation of a linear mobility pattern: one, to move into climatically different areas with new innovations; or two, to seize land from weaker neighbors (Alexander 1978).

As such, swidden horticulturalists often exhibit a distinctive pattern of social organization, in that they are typically formed into "simple segmentary tribes living as decentralized autonomous communities in small dispersed settlements" (Harris 1972:256). Even though the segmentary lineage system has been attributed to societies beyond its application, the term describes a typical system of predatory expansion employed by swidden horticulturalists. Sahlins

(1961:368) states that the Tiv and the Nuer "segmentary lineage system is a mechanism for large-scale political consolidation in the absence of any permanent, higher-level tribal organization". Even though a society might not have a "segmentary lineage system organization" per se, more closely related kin groups back each other against more distant relations or outsiders. In the case of slash-and-burn agriculture, the direction of new cultivation plots is chosen tactically so that they are placed toward people who are less related. This system of predatory expansion operates best when expansion is channeled against outsiders (Sahlins 1961:337). Bohannan described a situation where the selection of new plots is always placed in the direction of the most distantly related groups in order to channel maximum support:

> always, when you make new farms, clear land towards that man whose land bounds yours, but who is most distantly related to you. When he objects, you are thus assured of the largest possible supporting group in any litigation, argument, or fight which may develop, since all the people who are more closely related to you than him will come to your aid instead of his [1954:5].

This expansion can cause a chain reaction process (Vayda 1961:249-251) initiating perturbations on contiguous groups sometimes hundreds of kilometers away from the one expanding (Alexander 1978; Vayda 1974).

But segmentary lineage systems do not necessarily have to develop (Sahlins 1961:342). Tribes moving into uncontested areas need not develop such systems of expansion because there is no impetus to do so. In uncontested areas, village fission is more prevalent. According to Sahlins, the first group into an area will not develop a segmentary lineage system, but the second group, moving into a contested area, is much more likely to have a system for mobilization.

A further consideration in systems of predatory expansion, is that by clearing land, groups make a "significant capital improvement" (Goodenough 1956:176; cited in Vayda 1961:349). If the land is in a border region or away from close kin, this would become a prime target for seizure by more distantly related, or non-kin, groups. Vayda (1961:348-349) found that, for the Maori, it was easier to expand into a neighboring group's territory to exploit the secondary forest growth taken by conquest than it was to clear primary forest.

For the Oliver Phase of central Indiana, I suggest a scenario of pioneer expansion from the central Ohio valley into the White River valley as evidenced by the prevalence of Fort Ancient style-ceramics on Oliver sites (assuming that pot sherds equal people). The groups were practicing swidden cultivation in the pioneering mode and were exploiting uncontested or weakly contested lands formerly occupied by Albee Phase groups during the first half of the Oliver sequence. During this period, Oliver settlements exhibit the greatest areal expansion. This expansion out of the Ohio River valley makes sense in terms of selecting plots away from more closely related kin in the much more densely populated southern Ohio region.

The second half of the Oliver sequence is characterized by a contraction of settlements and the appearance of palisaded villages, especially in the south. These palisades suggest increased social risk either as a result of population pressures requiring intensification of agricultural production or from the encroachment of other groups, prehaps from the north, who may have developed mechanisms of political mobilization.

Climate during the Late Prehistoric Period

One cannot discuss the relationship between climate and culture without acknowledging the pioneering efforts of James B. Griffin. Without the benefit of quantitative paleoclimatic data, such as tree rings, ice-cores, and pollen analysis focusing on the last 2000 years in eastern North America, he was able to discern that climatic fluctuations occurred during this period. Griffin (1960a, 1961) concluded that even minor phases of colder temperature were sufficient to contribute to a decline in the reliability of agriculture. This reduced reliability caused shifts from an agriculturally based community such as Aztlan in Wisconsin to more of an Oneota type of mixed hunting-gathering-agricultural economy. These conclusions for the Great Lakes region and the Upper Mississippi Valley were originally based on the distribution of the prairie vole (*Microtus ochrogaster*) 200 miles north of its present location (Griffin 1960b). Griffin supported his thesis further by citing the European colonization and subsequent abandonment of Greenland, as well as fluctuating sea levels in New England and around the world, as evidence for temperature oscillations. Even though the timing, extent, and impact of these events on the adaptations of various groups are now better understood, it does not distract from the monumental contribution of his research.

Prior to Griffin's examination of climatic changes during the later prehistoric period, research had focused on the more spectacular changes that marked the end of the

Pleistocene Epoch and was not concerned with the relatively stable Late Holocene (Griffin 1961). Since it is difficult for pollen analysis to detect short-term climatic fluctuations, a study area is required that contains plants highly sensitive to climatic fluctuations. Ecotones are the best locations to focus these efforts (Wright 1983), and varved lake sediments are needed to provide chronological control at intervals closer than can be provided by C-14 dates (Grove 1988:389-391).

The term Little Ice Age (LIA) was coined by Matthes (1939; cited in Grove 1988:3) to define a period of moderate glaciation following the warmest part of the Holocene, but Matthes assigned it to a different time period than is now commonly accepted. Also, it is now understood that the LIA was not a sustained period of lower temperature as in the Pleistocene but a series of frequent temperature fluctuations (Grove 1988, Powell 1992, Burroughs 1993; Stevens 1993). Some researchers are even doubting the validity of the concept of the LIA altogether, suggesting instead that climatic changes varied with latitude and altitude (Powell 1992), or that warm and cold fluctuations occurred on the order of decades rather than centuries (Stevens 1993). Ice cores in Greenland and the Antarctic Peninsula show no significant periods of cooling during the LIA, but alpine glaciers located at low latitudes demonstrate significant temperature fluctuations during this period. Coral in the eastern Pacific appears to indicate a warmer temperature (Powell 1992), again demonstrating temperature variations on a global scale.

For the most part, the term LIA, as now commonly used, refers to glacial advances marking the coldest period during the Late Holocene--between about 1550 to 1800. However, the global climate three centuries before this experienced a cooling trend and widespread oscillations referred to as the Neo-boreal Climatic Episode (Penman

1988; see Bryson and Padock 1981 for nomenclature). This episode was of a magnitude sufficient to disrupt the agro-ecosystems of many areas in the northern United States and Canada. It is this period of environmental uncertainty starting at about A.D. 1200, that is of primary concern here.

After A.D. 1300, Europe experienced an abrupt drop in temperature (Lamb 1982) marking the beginning of the neo-boreal episode. This followed a warming trend referred to as the medieval climatic optimum or warm period (Lamb 1984) that lasted approximately four or five centuries. Gunn and Adams (1981) speculate that broad bands of warmer and colder air oriented east-west shifted southward during colder intervals and northward during warmer intervals. They also suggest a tendency for there to be dry polar air across the northern United States during the Late Prehistoric period. Most researchers agree that the period was dominated by cooler air, but others (Davis 1983; Knox 1993; Baerreis et al 1976) contend that conditions were also moister. The fact that colder temperatures increase effective moisture because of slower rates of evaporation (Gunn and Adams 1981; Grove 1988) perhaps explains the different interpretations.

Additional evidence for the widespread climatic deterioration for the Neo-boreal period can be observed in Europe. During the latter 13th and early 14th centuries, famines from bad harvests occurred in Europe; almost all of Europe experienced failed harvests between 1314 to 1319. Supposedly, temperature extremes were also greater, with either hot or wet summers (Grove 1988:2). These changes coincided with a contraction of the boundaries of cultivation. For instance, Denmark experienced widespread agricultural decline after A.D. 1340, with the majority of settlements in portions of Jutland being completely abandoned. In Norway, one-half of the medieval farms were abandoned, and the limits of cultivation dropped 150 meters in northern Norway between A.D. 1300 and 1600 (Grove 1988:414). (While the first appearance of bubonic plaque in Europe, in the mid-fourteenth century, certainly contributed to agricultural decline, it does not explain the shift from the colder areas.)

In England, descriptions of the enlargement of rivers and marshes reflect the effects of moister conditions. In addition, abandonment of medieval villages appears to be related to increased wetness, or increased effective moisture. In eastern England around the site of Galtho, twenty-six medieval villages were abandoned in a ten-kilometer radius; most of these were surrounded by Ragsdale Series soils, which are very difficult to work when wet, even with modern equipment, due to its tendency toward compaction and waterlogging (Grove 1988:414).

In Greenland, oral tradition and archaeological evidence (Grove 1988:2-4; Griffin 1961; Fagen 1991:15-19) indicate that early Norse settlements were established in the tenth century A.D. and enjoyed a productive agricultural and fishing industry. But by A.D. 1350, the climate had deteriorated to the extent that ice flows and storms blocked passage (and communications) to Europe. The Norse occupation of Greenland lasted until 1480, but with the cooler conditions, agriculture became impossible and the fishing industry failed (Grove 1988:259-260).

Climatic reconstructions for the Holocene period in the mid-continental United States must be inferred from the upper Great Lakes, where ecotones sensitive to minor fluctuations are located, or from alpine glaciers in the western United States or Canada. Even though the dates do not necessarily coincide, the research from the upper Midwest generally supports the evidence from Europe (Lamb 1984; Grove 1988), indicating that a cooling trend occurred after

A.D. 1200 (Bernabo 1981: LaMarche 1974; Koerner 1977; Knox 1993). Pollen data from five lakes (one, Marion Lake was varved) in the northwestern part of lower Michigan indicate that cooler-moister conditions prevailed after A.D. 1200, with a growing season temperature lower on average by 1 degree C by 1700. Knox (1993) estimates that in the Upper Mississippi Valley during the transition from the medieval warm interval to the Little Ice Age, the mean annual temperature dropped 1 to 2 degrees C and that the mean annual precipitation increased 10-20%. At Hell's Kitchen in Wisconsin, the pollen data indicate a shift to cooler or moister conditions about A.D. 1100, with a drier or warmer trend occurring between A.D. 1250-1400, followed by a much cooler trend until historic times. Whether these differences represent actual regional differences in climatic conditions or relate to problems in dating, site selection, or interpretation is unclear. However, it is clear that climatic conditions related to agriculture were deteriorating during the Late Prehistoric period.

Effects of Climate Change

The literature varies on the potential effects of climatic fluctuations on agro-ecosystems. Minor fluctuations in climate can have a huge effect on the frequency and magnitude of floods. During the Late Prehistoric period in the Upper Mississippi Valley, floods which today would normally occur every 500 to 1000 years or more were occurring about every 50 years (Baker 1993). Using 114 sites with overbank deposits representing 68 Holocene floods in southwestern Wisconsin, Knox (1993) demonstrated that large and frequent floods occurred during the transition (A.D. 1250-1450) between the medieval warm interval and the

Little Ice Age. Most of these floods occurred in the summer growing season between June and July. In his study sample, floods often approached, and in a few instances exceeded, flood depths "that were 3 times the magnitude of their associated bankfull stages." (Knox 1993:431). Knox also compares this time period to conditions in northern Europe, where floods were experienced after A.D. 1150 and were even more prevalent between A.D. 1300 and 1500, although the evidence suggests that floods remained rare in southern Europe.

Another effect of decreased temperature is a shortening of the agricultural growing season. Page (1949, cited in King 1993) estimated that for every 1 degree C drop in temperature, the growing season is shortened by 10 days, causing a shift in the northern extent of effective maize cultivation southward 20 miles in eastern Wisconsin and 100 miles in western Minnesota in current terms (King 1993). Penman (1988) cites Kellogg (1977:26), who arrived at the same estimate as Page, but noted that the day estimates would be greater at higher latitudes. In Europe (Lamb 1984), estimates based on crop yields indicate that the mean growing season by A.D. 1400 was three weeks shorter than in the previous century and that by the Little Ice Age proper (A.D. 1550-1700) the growing season had been reduced by as much as 5 weeks (if crop yield records are a reliable indication of growing season). During this time rainfall also increased with a corresponding lower evaporation rate because of lower temperature, both of which contribute to an increase in effective moisture.

Using extant temperature records from the Minneapolis area dating back to 1820, Penman (1988) found that the temperature and growing season--defined as the number of consecutive frost-free days--did not correlate with

Kellogg's estimate of 1 degree C per 10 days change. A correction for the latitude was calculated based on the historic records, yielding an estimate of 13 days per 1 degree C change. This correction produced frost-free day estimates similar to those proposed by Lamb for Europe. Based on these estimates, for the neo-boreal episode the growing season was about 135 days (two weeks shorter then the optimum). During the Little Ice Age proper the growing season was reduced by another week: 115 days at Lake Pepin and 125 days at LaCrosse farther south. Penman (1988) uses 140 frost-free days as the northern limit for maize cultivation.

As noted before, increased effective moisture results from periods of lower temperature. Increased rainfall associated with cooler temperature, as proposed in the above discussion, will increase effective moisture even more, with further effects on agro-ecosystems. Wet cool springs can cause the seed to rot in the ground. This is especially true of cultivers such as maize that need early planting and long growing seasons. Wet and moist conditions also encourage pests and corn diseases. These effects can compound problems in areas already at the edges of reliable cultivation, which may be much more widespread than areas directly affected by the length of the growing season.

The effects of colder-moister conditions on settlement in medieval England and Greenland has been discussed. Penman (1988) examines the changes in Oneota village locations along the Upper Mississippi Valley during the transition to the neo-boreal period. He traces changes in settlement along the shifting northern boundary of reliable corn cultivation by studying Oneota village sites in the Lake Pepin area, around 44.5 degrees latitude, and sites in the LaCrosse area, around 43.6 degrees latitude. Penman (1988) found an expansion of Oneota occupation into the Lake Pepin area around A.D. 1000: twenty-eight radiocarbon dates cluster between A.D. 1040 and 1300, with only one sample dating after A.D. 1400. Oneota occupation of the LaCrosse area may have begun as early as A.D. 1030, but radiocarbon dates cluster between A.D. 1200 and 1470. Of the 21 dated samples from sites in the LaCrosse area, only one predates A.D. 1200 and none date after A.D. 1550. Even though the full range of possible explanations has not been explored, the occupation and subsequent abandonment of areas marginal for maize cultivation are coincident with climatic perturbations. Further, the abandonment of the northern sites before the southern ones is also suggestive of progressive shortening of the growing season related to temperature decline.

Local environment

Because of the limiting conditions for paleoclimatic reconstruction discussed previously, conditions during the Late Holocene for south-central Indiana must be inferred from the Great Lakes region. One suggestive local study, which examined the relationship between climate and vegetation, was conducted at Donaldson's Woods in Lawrence County, Indiana. Lindsey and Schmelz (1965) examined change over a ten-year period by comparing the forest survey records for 1954 to conditions in 1963. The authors found that the combined density of beech and sugar maple increased in almost all size classes, and oak and hickories decreased in number in the class below 22 (d.b.h.). Further, records dating back to 1899 from the Paoli weather station, located about 13 miles from Donaldson's Woods, were examined for weather trends that might explain the reduction in oak and hickory. Lindsey and Schmelz (1965) reviewed the climatic conditions between April 1 to August 31 of each year and found that in comparing the records from 1899 to 1953 with those from 1954 to 1963, rainfall had increased an average of 1.8" and the temperature had decreased an average of 1.2 degrees F. These temperature and moisture changes during a ten-year period were sufficient to create substantial changes in forest composition. Vickery (1970) reviewed the records and found that the average length of the growing season for the period 1899 to 1953 was 172 days. For the ten year period from 1954 to 1963, the growing season averaged only 158 days, a drop of 14 days. A ten-year change of this magnitude probably fits into the normal range of variation, but the reduction of the growing season and change in forest composition related to minor fluctuations indicate what might be expected locally if similar changes occurred during the neo-boreal period. (It is unknown if the changes in forest composition suggested by the Donaldson Woods data could have seriously affected the availability of usable nut species. Documenting changes in nut harvesting intensity through the neo-boreal transition would be an avenue for future research.)

Although it is doubtful that the length of the growing season was a limiting factor in central and southern Indiana, the reduction of the growing season increased the risk of a devastating early or late frost in any given year. Certainly populations in the lower Great Lakes were contending with precariously short growing seasons. Further, with increased effective moisture and a shortening of the growing season, which required early planting, seed rot became a hazard.

The limited data available suggest a possible southward contraction of Oliver Phase settlements after about A.D. 1350 during the neo-boreal period. Table 2 shows all of the radiocarbon dates for Oliver Phase sites in Indiana; generally sites in southern Indiana tend to cluster later than those to the north. In fact, there are no Oliver Phase sites in central Indiana dating to the fifteenth century.

In addition, the only documented fortifications identified on Oliver Phase settlements are at the Clampitt and Cox's Woods sites, in the south, suggesting that the southern Oliver Phase village distribution was accompanied by increased competition over what was becoming increasingly limited agricultural resources.

Similar events were occurring across the midcontinent south of the lower Great Lakes after A.D. 1300. Evidence for increased warfare has been documented for Oneota populations in central Illinois (Milner 1991). Feurt-Clover settlements, along the eastern periphery of Fort Ancient, shifted from small villages on high terraces to large villages located on both terraces and floodplain topographic features. During the late period, a contraction of the territorial range occurred, with villages occupying only about 25% of their previous range; palisades made their initial appearance during this period of areal contraction (Graybill 1981). Similar circumstances were occurring in the Monongahela region to the east (Farrow 1986).

In Indiana, there are indications that other groups of people, or at least their potsherds, from the lower Great Lakes regions were locating in central Indiana, perhaps as a result of displacement or warfare. One group, reminiscent of the Springwells Phase of the Western Basin Tradition, has been documented at the Bowen Site (McCullough 1991, 1992) and is present at other sites (12-H-3, 4, 6, 14, 12-Ma-46, 12-We-240, 12-Al-502, and 12-Al-505) without Fort Ancient-like materials. The Springwells material, dating to between A.D. 1200 and 1300 (Stothers et al. 1994:140) is typically found along the western edge of Lake Erie and in the Maumee River drainage of northeastern Indiana and northwestern Ohio

(Stothers and Pratt 1981).

In Hamilton County, Indiana, about 20 miles north of Indianapolis, the Taylor village site has been identified with Upper Mississippian ceramics (Cochran et al. 1993). The materials recovered from this village site indicate a Huber/Fisher occupation (Oneota-like), which is more typical of lower Lake Michigan region spanning the fifteenth century (Faulkner 1971; Brown 1961; Brown and O'Brien 1990). In addition, by the mid-fourteenth century, a significant Mississippian-like occupation was present south of Indianapolis near Smith Valley (McCullough and Wright 1997a).

Summary

This exploration of swidden systems and climatic variation has produced new organizing concepts for ongoing research on Oliver Phase peoples. Although still speculative, the following overview of the Oliver Phase is presented on the general model of swidden cultivators during a period of climatic change and increased competition.

The pioneering mode of swidden cultivation is suggested by noting the technology employed (no hoes), the frequency of shifting settlements, and the lack of weedy species in feature contexts. This pioneering expansion most likely took place in an uncontested, or weakly contested, newly available area where intensive maize horticulture had not been previously conducted. This expansion occurred in an area peripheral to the main Fort Ancient culture area of the middle Ohio valley, and, by expanding away from the population centers, avoided conflict with more closely related groups over agricultural land.

In a pioneering system, labor rather than land is the limiting factor of production. It is this labor shortage that may account for the great stylistic diversity in ceramics, especially in the early part of the sequence, if the expanding Fort Ancient populations were incorporating indigenous people into their society.

The maximum areal expansion of Oliver Phase settlements occurs during the Medieval Climatic Optimum. This period of optimal climatic conditions also witnesses the maximum spread of horticultural societies in eastern North America. In many of these northern areas, this was the only time in prehistory when maize cultivation was viable.

With the advent of the neo-boreal episode, a period of climatic deterioration ensued that caused the southward constriction of areas suitable for maize cultivation in the midcontinent. Many of the areas exploited during the Medieval Climatic Optimum never again supported horticultural societies.

With a southward shift in the zone of reliable maize cultivation in the Great Lakes region, population displacement and competition for dwindling resources increased across the midcontinent. Oliver Phase settlement locations may well be a part of this larger pattern, as they contract in areal extent, appears to shift southward, and fortifications begin to appear.

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87

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	**County**	**Conventional Radiocarbon age**	**Calibrated (one sigma)**	**Calibrated (two sigma)**	**Calibrated Intercept**
Uga-4325** Melvin[1]	Bartholomew	995 +/- 90 BP	AD 981 to 1164	AD 884 to 1246	AD 1024
M-2010** Oliver Farm[2]	Marion	890 +/- 100 BP	AD 1025 to 1265	AD 978 to 1295	AD 1168
IU-121** Bowen[3]	Marion	890 +/- 130 BP	AD 1017 to 1280	AD 890 to 1385	AD 1168
IU-122** Bowen	Marion	840 +/- 130 BP	AD 1032 to 1290	AD 972 to 1400	AD 1222

[1]Wolfal and McClure 1982; McCullough 1991:66.
[2]Dorwin 1971:382.
[3]Dorwin 1971:383.

88

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	**County**	**Conventional Radiocarbon age**	**Calibrated (one sigma)**	**Calibrated (two sigma)**	**Calibrated Intercept**
M-2422** Bowen	Marion	740 +/- 110 BP	AD 1217 to 1385	AD 1036 to 1421	AD 1284
Uga-4707** Martinsville Plaza[4]	Morgan	760 +/- 65 BP	AD 1227 to 1294	AD 1168 to 1386	AD 1280
Beta-83332*** Prairie View[5]	Hamilton	800 +/- 60 BP	AD 1205 to 1280	AD 1065 to 1075 and AD 1155 to 1295	AD 1250
Beta-83333*** Prairie View	Hamilton	840 +/- 80 BP	AD 1065 to 1075 and AD 1155 to 1275	AD 1020 to 1295	AD 1220
Beta-83334*** Prairie View	Hamilton	980 +/- 80 BP	AD 995 to 1170	AD 895 to 1235	AD 1030

[4]McCullough 1991:66.
[5]Plunkett, Trudeau, and Hilton-Plunkett 1995

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	County	Conventional Radiocarbon age	Calibrated (one sigma)	Calibrated (two sigma)	Calibrated Intercept
Beta-83337*** Prairie View	Hamilton	700 +/- 60 BP	AD 1275 to 1310 and AD 1365 to 1375	AD 1235 to 1400	AD 1290
Beta-98531*** Noblesville[6]	Hamilton	740 +/- 50 BP*	AD 1260 to 1295	AD 1220 to 1310 and AD 1365 to 1375	AD 1280
Beta-104400*** Jose[7]	Marion	640 +/- 50 BP*	AD 1295 to 1400	AD 1280 to 1415	AD 1310 and AD 1365 and AD 1375
Beta-104401*** Jose	Marion	710 +/- 50 BP*	AD 1275 to 1300	AD 1245 to 1325 and AD 1340 1390	AD 1290
Beta-104402*** Bosson	Marion	790 +/- 70 BP*	AD 1205 to 1285	AD 1055 to 1090 AD 1150 to 1305	AD 1260

[6]O'Brien, Pirkl, and Bush 1996.
[7]McCullough and Wright 1997b

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	County	Conventional Radiocarbon age	Calibrated (one sigma)	Calibrated (two sigma)	Calibrated Intercept
Beta-104403*** Bosson	Marion	640 +/- 50 BP*	AD 1295 to 1400	AD 1280 to 1415	AD 1310 an AD 1365 an AD 1375
Beta-98651*** Sugar Creek	Johnson	740 +/- 70 BP*	AD 1245 to 1300	AD 1180 to 1395	AD 1280
Beta-88932*** Sugar Creek[8]	Johnson	770 +/- 60 BP*	AD 1225 to 1290	AD 1175 to 1305	AD 1270
Beta-88933*** Sugar Creek	Johnson	660 +/- 50 BP*	AD 1290 to 1325 and AD 1340 to 1390	AD 1275 to 1410	AD1300
Beta-88931*** Sugar Creek	Johnson	400 +/- 60 BP*	AD 1440 to 1520 and AD 1570 to 1630	AD 1420 to 1650	AD 1470

[8]McCullough and Wright 1997a.

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	**County**	**Conventional Radiocarbon age**	**Calibrated (one sigma)**	**Calibrated (two sigma)**	**Calibrated Intercept**
Beta-85618*** Bundy-Voyles	Morgan	730 +/- 50 BP*	AD 1265 to 1295	AD 1225 to 1310 and AD 1355 to 1385	AD 1285
Beta-85619*** Bundy-Voyles	Morgan	650 +/- 70 BP*	AD 1285 to 1400	AD 1260 to 1425	AD 1305
Beta-85617*** Bundy-Voyles	Morgan	510 +/- 70 BP*	AD 1400 to 1450	AD 1305 to 1495	AD 1425
Beta-83724*** Bundy-Voyles	Morgan	540 +/- 60 BP*	AD 1395 to 1435	AD 1300 to 1455	AD 1415
Beta-84952*** Bundy-Voyles	Morgan	480 +/- 60 BP*	AD 1415 to 1455	AD 1395 to 1505 and AD 1595 to 1620	AD 1435

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	**County**	**Conventional Radiocarbon age**	**Calibrated (one sigma)**	**Calibrated (two sigma)**	**Calibrated Intercept**
Beta-47539** Clampitt[9]	Lawrence	680 +/- 60 BP	AD 1283 to 1391	AD 1247 to 1406	AD 1298
Beta-47542** Clampitt	Lawrence	670 +/- 50 BP	AD 1288 to 1391	AD 1275 to 1403	AD 1300
Beta-47541** Clampitt	Lawrence	610 +/- 60 BP	AD 1300 to 1428	AD 1285 to 1434	AD 1322 and AD 1340 and AD 1393
Beta-47538** Clampitt	Lawrence	620 +/- 50 BP	AD 1300 to 1403	AD 1287 to 1422	AD 1315 and AD 1347 and AD 1390
Beta-47540** Clampitt	Lawrence	520 +/- 50 BP	AD 1402 to 1439	AD 1314 to 1455	AD 1421

[9]Redmond 1994:28.

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	**County**	**Conventional Radiocarbon age**	**Calibrated (one sigma)**	**Calibrated (two sigma)**	**Calibrated Intercept**
Uga-3149** Lykins[10]	Bartholomew	605 +/- 85	AD 1295 to 1421	AD 1275 to 1448	AD 1325 and AD 1336 and AD 1394
Beta-62263** Cox's Woods[11]	Orange	650 +/- 110 BP*	AD 1279 to 1410	AD 1191 to 1449	AD 1305 and AD 1367 and AD 1373
Beta-62262** Cox's Woods	Orange	570 +/- 70 BP*	AD 1307 to 1431	AD 1290 to 1449	AD 1403
Beta-98652** Cox's Woods[12]	Orange	500 +/- 50 BP*	AD 1410 to 1445	AD 1326 to 1474	AD 1425

[10]McCullough 1991:66.

[11]Redmond and McCullough 1993:102-3.

[12]McCullough and Wright 1997b.

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	**County**	**Conventional Radiocarbon age**	**Calibrated (one sigma)**	**Calibrated (two sigma)**	**Calibrated Intercept**
Beta-94795*** McCullough's Run[13]	Bartholomew	570 +/- 70 BP	AD 1310 to 1365 and AD 1375 to 1425	AD 1290 to 1450	AD 1405
Beta-94796*** McCullough's Run	Bartholomew	570 +/- 50 BP	AD 1315 to 1345 and AD 1390 to 1420	AD 1300 to 1435	AD 1405
Beta-98668*** Heaton Farm[14]	Greene	640 +/- 50 BP*	AD 1295 to 1400	AD 1280 to 1415	AD 1310 and AD 1365 and AD 1375
Beta-98669*** Heaton Farm	Greene	540 +/- 50 BP*	AD 1400 to 1430	AD 1310 to 1365 and AD 1375 to 1450	AD 1415
Beta-98670*** Heaton Farm	Greene	520 +/- 60 BP*	AD 1400 to 1440	AD 1310 to 1365 and AD 1375 to 1470	AD 1420

[13]Cochran et al. 1997.

[14]McCullough and Wright 1997b.

Table 2: Oliver Phase Dates from Central and South-Central Indiana					
Lab. No/Site Name	**County**	**Conventional Radiocarbon age**	**Calibrated (one sigma)**	**Calibrated (two sigma)**	**Calibrated Intercept**
Beta-98667*** Heaton Farm	Greene	500 +/- 60 BP	AD 1410 to 1450	AD 1315 to 1345 and AD 1390 to 1485	AD 1425

* Corrected for isotope fractionation.
**dates calibrated using Stuiver and Pearson (1993)
***dates calibrated by Beta Analytic, Inc. (Stuiver et al. 1993)

Table 2. Oliver Phase dates from Central and South-Central Indiana.

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THE ANCIENT MAYA IN THE PRESENT DAY

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I am the director of the Center for Archaeology in the Public Interest, Indiana University. This is an organization committed to paying attention to the impact of archaeological research on living people. We want to understand how the archaeological record and archaeologists themselves are perceived by the public, because quite frankly we need the public on our side. From the perspective of a professional archaeologist, there can never be enough laws and police to protect all the valuable archaeological data from development and looting. Our only hope is to convince people that archaeological knowledge is valuable, so that more than the lucky few of us who have jobs as archaeologists will want to see sites preserved.

Archaeologists affect living people in several ways, including interrupting development projects and bringing temporary unskilled jobs into places where such jobs can give economic help or cause upheaval and problems. But I want to talk about the impact of archaeological interpretation on the present day; that is, how does what archaeologists say about the past affect living people? Now I want to be realistic. I don't want to pretend that people pay much attention to archaeology. For the most part, archaeological research gets ignored by both the descendants of the people we dig up and the public at large. That's probably a good thing, because most archaeological research is scientific, which means that we are trying to figure things out using a trial and error method called the scientific method, and a lot of the stuff we speculate about turns out to be wrong. That's the way science works--it takes a very long time to get enough information and tests done to come up with conclusions about the past that hold water. This is why archaeologists often cringe when we see reporters coming or get asked to make conclusive statements about our current research. Currently, we are trying to figure something out, and within a few years we know we will have a different perspective.

Because our goal is constant modification and improvement of what we know about the past, most of us see our current perspectives as provisional and open to modification when new information comes in. But archaeological data are presented to the public, both by the media and by archaeologists themselves, as definitive, as the last word. Of course, in science there is never a last word, but people gravitate to explanations and information about the past that seem accurate and understandable. Different archaeologists will offer different conclusions, but the public will listen to the ones that are more appealing or that seem to make more sense. Archaeologists themselves are not immune to this sort of influence. Of course, we tend to pay more attention to archaeologists with big grants and long lists of accolades after their names, but on a much more ordinary level, we are members of modern culture too. We grew up in a social world that inclines us to ask certain types of questions about the past and to be happy with some answers more than others.

Most archaeologists in the United States are trained as anthropologists. This means that we ask questions about the broad social context of events in the past. We would be interested in knowing the name and historical origin of an ancient Maya king, but we also want to know what sort of economic conditions led to his enthronement rather than his brother, and why the Maya had kings at all. We want to know what the Maya ate, but we also want to know how their farming practices fitted into their local landscape and how they responded over many generations to the growth of their population.

Because we are anthropologists interested in cultural patterns and social pressures on people's behavior, modern archaeologists have begun to be somewhat self conscious. That is, we have begun to look at ourselves and ask hard questions about why we see the past the way we do. We have begun to realize that we need to analyze our own cultural context to try to separate what "feels" right from what we really know about the past. This sort of introspection is not an admission of weakness, but the beginning of a new strength. All sciences are influenced by the culture of their practitioners, and this is just a fact of life. The great strength of social sciences, like anthropology and archaeology, is that we can try to understand what we bring to our work and use that knowledge to do better.

I do Maya archaeology. I have been digging archaeological sites in Belize for 15 years, and I'll be back in the field by next March, 1997. During the last 25 years what we know about the ancient Maya has increased dramatically, and most Mayanists find themselves awash in new data that are almost too overwhelming to interpret. Under these conditions there has been a tendency to fall back on explanations that "seem" right, without enough reflection on why they seem so. One analyst, Richard Wilk, embarrassed us well a few years ago simply by plotting archaeologist's explanations for the Maya collapse on a historical time line. Modern explanations of the Maya collapse favored environmental over-exploitation around

Earth Day, population pressure with the rise of the Zero Population Growth movement, and warfare at the first moratorium of the Vietnam War. Wilk wasn't saying that environmental degradation, population pressure and warfare had no relation to the Maya collapse, only that modern economic and political contexts were affecting archaeologists' interests and perspectives.

Although Wilk's work pointed out to us that we ought to keep an eye on ourselves, the biases in archaeologists' perspectives that he identified don't pose any great danger to life as we know it. But sometimes archaeologists do have a much more serious impact on the world, and this is especially so when we develop our ideas in a public context and these ideas get used to set political policy or to develop economic strategies. This is why I often take some of my anthropological colleagues to task for overstating their case. I'm not upset about people having the wrong conclusions, since scientific conclusions change all the time. I'm annoyed about the fact that very provisional and preliminary conclusions are being publicized as the truth supporting political agendas in the present day. And archaeologists are not keeping a very close watch on their own motives.

Now I want to say some things, different from the ones you usually get from National Geographic, about the ancient Maya that may give you a new perspective on that culture. Now my goal of changing your opinion about the ancient Maya assumes that you have some ideas about who they were. First, I'll jog your memory a bit, and then I'll just go ahead and tell you what your opinion is. I know that's pretty high-handed, but it might not be as bad as it sounds, because archaeologists have worked very hard to give you a particular opinion, and now we have a lot of help from National Geographic Explorer and the Discovery Channel, but not out of some desire to mislead you. The popular opinion of the Ancient Maya is very close in many ways to the opinions archaeologists hold about the Maya, and I have spent a lot of time studying what archaeologists think about the Maya and trying to see where their ideas come from.

Here is a passage from a book by Linda Schele and David Freidel (1990) that I think will sound familiar to you. Of course, some of you will have read this book, so the passage will seem familiar because you really have heard it before. But I am betting that this would sound familiar to Americans, and after I read it I'll speculate about why.

> The principal language of our reality here in the west is economics. Important issues in our lives, such as progress and social justice, war and peace, and hope for prosperity and security, are expressed in material metaphors. Struggles, both moral and military, between the haves and the have-nots of our world pervade our public media and our thoughts of the future. The Maya codified their shared model of reality through their shared religion and ritual rather than economics. The language of Maya religion explained the place of human beings in nature, the workings of the sacred world, and the mysteries of life and death, just as our religion still does for us in special circumstances like marriages and funerals. But their religious system also encompassed practical matters of political and economic power, such as how the ordered world of the community worked.
>
> While we live in a model of the world that vests our

> definitions of physical reality in science and spiritual reality in religious principles, the Maya lived in a world that defined the physical world as the material manifestation of the spiritual and the spiritual as the essence of the material. For them the world of experience manifested itself in two complementary dimensions. One dimension was the world in which they lived out their lives and the other was the abode of the gods, ancestors, and other supernatural beings. This manner of understanding is still true for many of the contemporary descendants of the Maya [Schele and Freidel 1990:65].

Now even if you never read anything about the Maya, and don't own a television, I suspect that you find this passage interesting, but believable. We modern Americans see ourselves as practical, socially fragmented, and very individualistic, and our way of life is in sharp contrast to ancient ways of living that were much more tuned to sharing and community values and the forces of nature. Americans, and many Europeans, expect that ancient people were less individualistic, more altruistic, more religious and devout and altogether more naive and innocent of the jaded problems of selfishness, greed, and loss of faith and family values that plague our modern world.

In talking about the way Americans and Europeans write history, a scholar named Edward Said has pointed out that in order for us to see ourselves as progressive and modern, we must envision an alternative that is traditional and primitive. Both the views of ancient people as depraved primitives and as noble savages can be understood as the counterpoints to our long standing traditional western ideas of rational economic man burdened by the cross of civilization. In other words, in claiming that the ancient Maya were not at all like modern people--not at all like ourselves--we are actually saying more about ourselves, that is, how we see ourselves, than we are saying anything about the ancient Maya. If you think back about the passage included above, there's not a single scrap of archaeological data (or any other kind of data) in it at all. It's merely an assertion that the Maya were different, which leads to some pronouncements about their inscrutability and mysteriousness with a bit of speculative reconstruction of blood sacrifice and ritual that underscore the essence of Maya culture as exotic and weird.

So what? What difference does it make that archaeologists exoticize their subject matter. After all, if the Maya turned out to be ordinary, National Geographic and the Discovery Channel would lose interest, and lots of very good research would grind to a halt. I admitted earlier that most of the time people pay no attention to what archaeologists say.

The first reason it matters is that it gets in the way of our ability to understand the past and learn from it. For example, there seems to be an endless font of interest springing from the public and from archaeologists alike in Mesoamerican practices of sacrifice. Discussions of sacrifice that get the most play usually attempt to cast this gory behavior as part of an authoritarian and rigid set of cultural beliefs. How many times have you heard that the Aztec believed they had to sacrifice people in order to make the sun rise in the morning or that the Maya killed the losing team of ball players, who considered death an honor? Both of these claims have that "not like us" appeal of the totally irrational explanation of other people's behavior.

Both of them rest largely on speculation. We know the Aztec sacrificed lots of victims, but we don't know what most Aztec people actually believed about the reliability of the sun. It is utterly unclear whether Maya ball players were sacrificed at all, much less willingly. But what if Aztec sacrifice is compared to deaths in Dachau or Auschwitz, or Bosnia or Yugoslavia? Some of these events were certainly as bloody as Aztec sacrifice and could easily be considered the product of irrational beliefs. Perhaps a better question would be to ask under what conditions, political, economic, moral, and ideological, does human life become cheap? Returning to the quotation from Schele and Freidel, how will we ever know if the Maya had a shrewd economic strategy or an ultimate economic failure if we decide a priori that all their motives were religious and cosmological?

The second reason it matters that archaeologists pay close attention to the ramifications of their claims is that people sometimes do pay attention--archaeologists get the attention of the public when their claims about the past have meaning, especially political or economic meaning, in the present day. Here I want to turn to the real crux of this paper.

For example, the Maya are still seen as a race that failed. The argument goes like this: The Maya once had a great civilization that controlled huge territory, wrote their own history, created monumental art and architecture, and developed the study of astronomy and mathematics. Maya people still exist today, but their greatness was lost in the 9th century when Maya civilization collapsed. Maya people today are living in the past, carefully hoarding the few pure bits of their collapsed civilization through their rituals and beliefs. It is up to modern scholars to revitalize Maya culture by interpreting Maya writings so we can give them back their history.

If I were a Maya Indian, I think this patronizing attitude would make me furious. But Maya people have been exploited and disenfranchised for so long that many will tolerate any sort of attempt to help, no matter how misguided. For example, a famous scholar of the Maya has recently gotten funding to teach living Maya people to write hieroglyphic Maya script. These are people who are barely literate in Spanish and have little or no access to health care or education or jobs, but the foreign archaeologist has decided that the Maya have a right to learn to write a dead script. Clearly, the human rights of living Maya are still defined by archaeologists in terms of their connection to a glorious past. Archaeologists and ethnographers have had this sort of condescending attitude toward the Maya for many years, creating a sort of archaeological myopia that makes it seem reasonable to encourage living Maya to distance themselves from the present day and cling to anachronistic ancient ways.

Many Maya have a different perspective. Maya people don't need to be given back their history. They need to be given back their autonomy. They don't need to learn to write hieroglyphs. They need a chance to go to school so they can get jobs to feed their families and learn how to function in the modern political structure of Central America. They need to have enough land so that they don't have to watch their children starve. The Maya are not living in the past--they are living in grinding poverty. The Zapatista rebellion in Mexico is very much a rebellion against the anthropological and archaeological perspectives that have so marginalized the living Maya by focusing on their past.

In conclusion, I can't resist pointing out that the recent fighting in the Gaza Strip between the Israelis and the Palestinians was directly related to an Israeli archaeological excavation under a sacred Palestinian shrine. The Palestinians felt the Israelis were threatening the integrity of a sacred place, as they certainly were metaphorically, if not literally. Far from leaving you with the impression that archaeology is an irrelevant ivory tower activity for dusty old professors, perhaps you will wish, as I sometimes do, that archaeology didn't matter quite so much. But the fact that it does is not something we dusty old professors can continue to ignore.

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CREATING INDIANA'S COMPUTERIZED ARCHAEOLOGICAL DATABASE

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It is such a simple premise, really: It would be beneficial to have all the archaeological site form information in a computerized database. Beneficial in what ways though?

Records checks will be comprehensive, easier, and faster because all site information will be available in one location. A basic component of a records check is determining if sites have been previously recorded within the area of question, be it an area slated for road construction, office park development, or an area to be surveyed for research. As it stands now, it is nearly impossible to be 100 percent certain one has checked all sites.

Due to historical reasons relating to the development of the discipline of archaeology in the state, not every site form is housed in one location. Fortunately, this situation is changing. The Division of Historic Preservation and Archaeology (DHPA), since the early 1980s, has received a copy of virtually every completed site form. Unfortunately, for site forms predating the early 1980s, it is hit or miss in terms of whether our office has copies.

In order to consolidate all known archaeological site records at one location, and to make them available for research and historic preservation to qualified professionals, the Division of Historic Preservation and Archaeology received an Intermodal Surface Transportation Efficiency Act (ISTEA) grant to create a statewide computerized archaeological site database for the total site inventory of Indiana. Many institutions and agencies contributed matching funds for this project, including the Indiana Department of Natural Resources, the Indiana Department of Transportation, the Indiana Historical Society, and the Glenn A. Black Laboratory of Archaeology.

As part of this project, we are visiting site form repositories to photocopy site forms the DHPA is lacking. One of our initial tasks was to inventory all of the site forms and all of the reports we have in our office. We created a list for each county detailing the site forms we have and the site forms we need. Thus far we have photocopied the files of the Archaeological Resources Management Service at Ball State University and the Glenn A. Black Laboratory of Archaeology at Indiana University. As of late September 1996, we had photocopied approximately 4,500 site forms, with many more to go. Dr. Christopher S. Peebles and Noel Justice from the Glenn A. Black Laboratory of Archaeology, Indiana University, and Donald R. Cochran from Ball State University, were generous in their willingness to help us in this endeavor.

So how exactly will all of this make records checks comprehensive, easier, and faster to do?

Comprehensive, because all site forms can be examined. On paper and on the computer DHPA will have information on every recorded site. There will be less uncertainty about sites located in a project area.

It is also easier and faster to search a computer database of site forms than it is to search through numerous file cabinets of paper site forms. For instance, assume an archaeologist is doing a records check for a project and needs to find all the sites located on the U.S.G.S. Indianapolis East Quadrangle map, in a certain section, township, and range. Unless the person was fortunate enough to have all the sites in this area already marked on a map, the only way to answer the question (prior to the computer database) was to get all the paper forms and go through them one by one examining quadrangle map names and section-township-range information until a match was found. The advantage of an electronic database is that the computer will perform this same function in a fraction of the time.

For the 774 recorded sites in Marion County, there are a total of 814 records in the database. The reason there are more computer records than recorded sites is that resurveyed sites have more than one record. I performed the computer database search looking for sites on the Indianapolis East Quadrangle, in the chosen section, township, and range, and the entire process took less than a minute. The database found 57 records meeting the criteria I entered. Not only did the computer give me the sites located within the established parameters, but the computer records also contain the same information as the paper site forms.

By way of comparison, DHPA has Marion County sites indicated on maps, so I used the mapped locations to determine which sites met the criteria of having locations on the Indianapolis East quadrangle, in the chosen section. Simply counting the number of sites took a couple of minutes, and I can't guarantee the count is accurate because it's easy to miss one or two, or count one twice, when there are many sites in a small area. In addition to counting the sites, I would still need to jot down the site numbers, go to the file cabinet and pull out the paper site forms--many steps to search by hand. I preferred the computer database search.

A third way to find the sites located within the project area is by flipping through each paper site form looking for those on the Indianapolis East Quadrangle in our chosen section. I don't know how long it would take to do this, because I didn't want to look through 774 site forms. But, I have no doubt it would have taken longer than a minute or two.

As a result of a database grant project funded by the Office of Surface Mining, which our office completed in the late 1980s (Ellis et al. 1990), the present project was able to start with 11,092 site records from 21 counties already in a computer database (Figure 1). Many of the fields of that database don't have the same format as the fields of the present database. For instance, because of software limitations, much of the old database had to be entered in code form. So instead of entering Early Archaic in word form, it was coded as EA. We have succeeded in transferring all the old data into the FileMaker Pro software of the new database, but until all of the coded entries are changed into words, the old database is not entirely compatible with the new database. This is a small price to pay for having 11,092 fewer records to enter.

Since early April 1995, when we began data entry of the more than 30,000 sites not on the old database, we have entered (as of September 26, 1996) 3,270 records from the counties of Boone, Clark, Dearborn, Hamilton, Hancock, Johnson, Marion, and Rush (Figure 2). My co-workers, Karin Bergman and Chad Harvey, have toiled seemingly endless hours photocopying, mapping, and entering site information. As mentioned, this project was made available through the Intermodal Surface Transportation Efficiency Act of 1991, more commonly referred to as ISTEA. The project is administered by the Indiana Department of Transportation.

Another component of the project is to map all the recorded sites on 7.5' U.S.G.S. quadrangle maps. Again, I need to thank the labs at Indiana University and Ball State University for helping with this aspect of the project. They have allowed us to trace site locations onto DHPA's maps for the counties we did not have mapped. This has been a big time saver and will help us consolidate all site information in one office.

An important undertaking is the revamping of the archaeological site form. We desired to standardize certain fields, but, at the same time we wanted to maintain flexibility. For example, field 53 (Figure 3a) of the present site form is very open ended and states the following: "Describe how the site subsurface was explored and data recovered." We have found much variation in the way people filled this out. To make this field less ambiguous and to make the information practical for a computer search, we have modified the database field (Figure 3b). The most common methods can be easily checked off. In addition, flexibility is built into the form with the choice of "Other." Also, the new form and the computer database have a field labeled "Subsurface Exploration Comments" for those who prefer essay to multiple choice (Figure 3c).

Another example of modifying an open-ended field on the present form, but still allowing flexibility, is #60: "Remarks and/or Significance Recommendations." Figure 4a depicts the present appearance of the field, and again, we see much variation in the way information is recorded. Figure 4b shows the modified form with three specific areas to be addressed: the National Register of Historic Places, the Indiana Register of Historic Sites and Structures, and Recommendations for additional work. The "Remarks" field on the new form allows for comments not conforming to the above structure.

An important goal of the project is to establish a way for site forms to be filled out on the computer, outside of our office, and submitted to DHPA electronically. This will save time for an individual completing a site form, as well as saving our office time. We will be able to forgo entering the site information into the database because it will be accomplished already.

An additional application of the database is research. For practically any question one can think to ask a site form, the database can provide an answer. Some answers take longer than others, but none will require the time needed to search through the paper site forms by hand.

Focussing on the 814 Marion County database records, I performed a few searches to provide a glimpse of the kinds of information available in the database. Table 1 depicts a breakdown of Marion County by Cultural Period.

Additional database searches reveal other Marion County statistics. There are four records listing Riverton as the culture. Stone artifacts were described in 535 records. Historic ceramics were listed on 118 forms. Of the records with survey methods recorded, 127 were explored with shovel probes. Records with site areas greater than 1,000 square meters numbered 214. But, keep in mind the limitations of a computer database. It can search only through information that has been entered. Most likely, there are more than four Riverton sites in Marion County. The search represents the four forms that had Riverton recorded.

Searches can be more complex than these examples. For the 93 Archaic records in Marion County (Figure 5), I also searched to find how many records have an Archaic component <u>and</u> are classified as a habitation site. The locations of four records satisfying the search criteria can be viewed in Figure 6. An additional search I performed was to find how many records have an Archaic component <u>and</u> have White River recorded as the nearest water source. Eleven records meet the criteria, and their locations are shown in Figure 7. Next, I searched for records that have an Archaic component, and have White River as the nearest water source, and have Genesee soil recorded as the soil type. Figure 8 illustrates the locations of the two records containing these characteristics.

As one can see, there are a variety of questions that can be asked, and asked in any number of ways.

Another dynamic of the database is the ability to interact with a Geographic Information System (GIS). Since archaeological sites are inherently location based, they can be worked easily into a GIS. A major component of any GIS is the ability to visually represent locational data. All the figures in this paper were created on our GIS.

We are using the ArcView software package and have access to other data sets through the Division of Management Information Systems of the Department of Natural Resources. One such data set is the "Natural Regions of Indiana" compiled by Michael Homoya. Combining the archaeology database with the Natural Regions information in a GIS we can ask ArcView to show all the archaeology sites within the Southern Bottomlands Natural Region (Figure 9). Not only does ArcView graphically represent the sites, but with ArcView we can also examine a database table identifying the sites shown on the map. So, one can examine particular characteristics of the sites within this Natural Region. This discussion barely scratches the surface of the variety of things that can be accomplished with a GIS.

We've got a lot of work ahead of us in the time that remains for this project. There are many site forms to photocopy, many sites to map, and much data to enter. When the project is completed, however, I think the benefits in terms of site management and research will be appreciated widely.

UPDATE (as of August 31, 1997)

Since this paper was presented, much progress has been made on the database project. Presently, site forms photocopied from other institutions total 8,665. We have traced site locations from 267 quadrangle maps in 31 counties. The conversion of the data from the previously existing database has been completed, and all codes have been changed. The 11,092 records now reside with all other counties in our master database. We have entered additional site forms for a total of 22,455 site records in Indiana's computerized archaeological database.

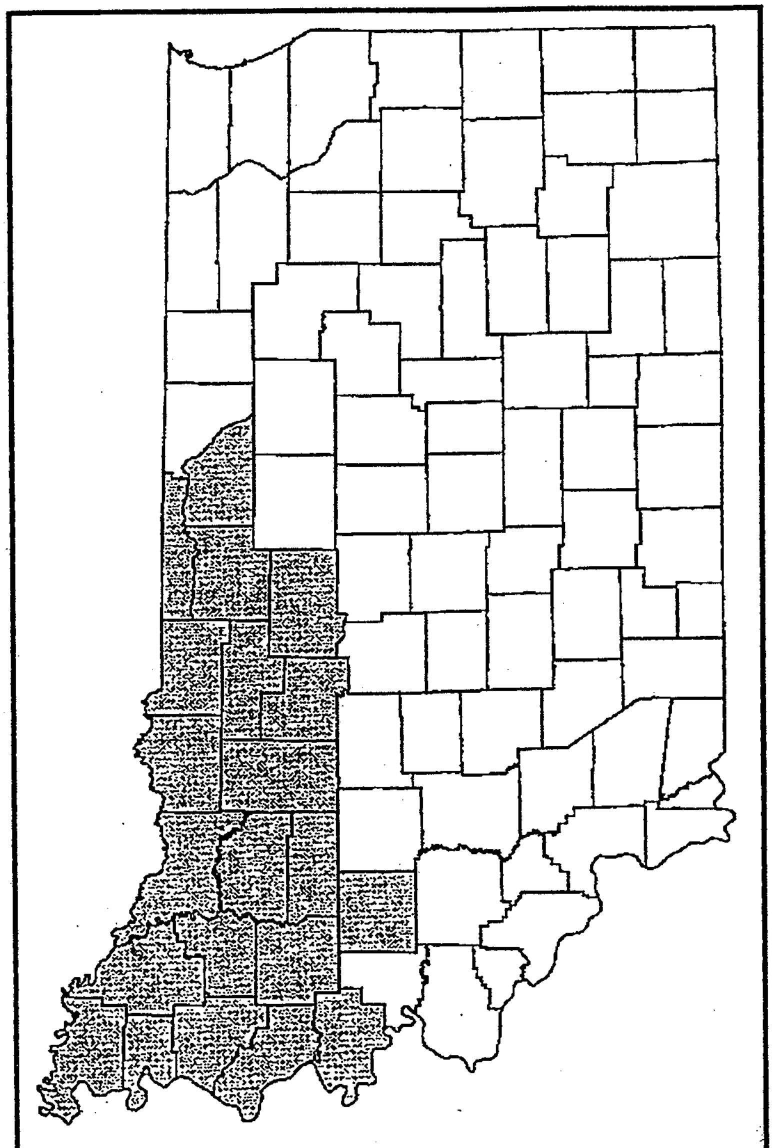

Figure 1. Site forms from the highlighted counties were entered in the previous OSM grant database (see Ellis, et al. 1990).

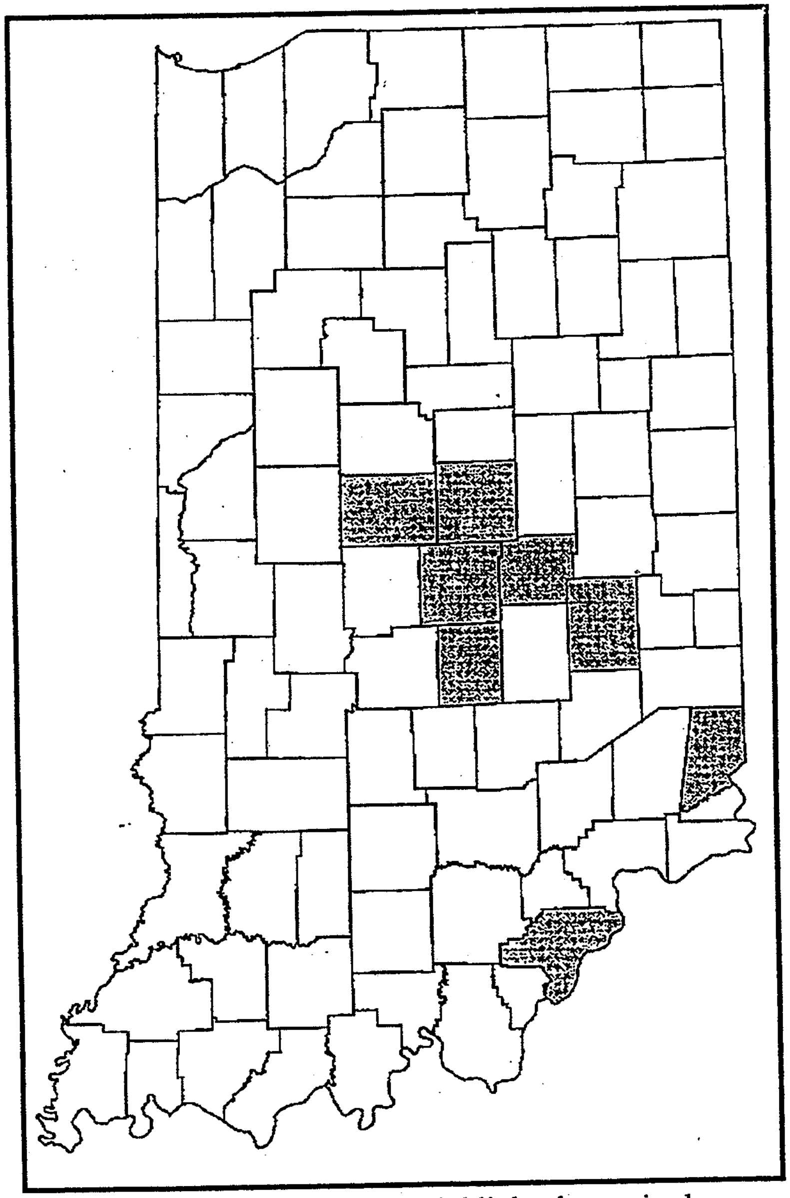

Figure 2. Site forms from the highlighted counties have been entered as a result of the ISTEA grant project as of September 26, 1996.

53. Describe how the site subsurface was explored and data recovered

Figure 3a. Field #53 of the paper site form.

Subsurface Exploration Methods:

64. Shovel Probes ○ Yes	65. Probe Intervals (m.)	66. Probes Screened ☐ Yes ☐ No	67. Probe Screen Size
68. Cores ○ Yes	69. Core Intervals (m.)	70. Cores Screened ☐ Yes ☐ No	71. Core Screen Size
72. Augers ○ Yes	73. Auger Intervals (m.)	74. Augers Screened ☐ Yes ☐ No	75. Auger Screen Size
76. Hand Excavation ○ Yes	77. Level Type ☐ Arbitrary ☐ Natural		78. Level Depth (cm.)
	79. Excavation Screened ☐ Yes ☐ No		80. Excavation Screen Size
81. Column Samples ○ Yes	82. Mechanical Equipment ○ Yes		83. Other ○ Yes

84. Percent Of Observed Subsurface Artifacts Collected

Figure 3b. Standardized data entry screen of the computer database.

85. Subsurface Exploration Comments

Figure 3c. Field #85 of the computer database.

60. Remarks and/or significance recommendations

Figure 4a. Field #60 of the paper site form.

Investigator's Significance Recommendations:

100. NRHP Eligibility ☐ On Register ☐ Potentially Eligible ☐ Ineligible ☐ Eligible ☐ Potentially Ineligible ☐ Indeterminate

101. IRHSS Eligibility ☐ On Register ☐ Potentially Eligible ☐ Ineligible ☐ Eligible ☐ Potentially Ineligible ☐ Indeterminate

102. Recommendations ☐ Additional Study ☐ No Additional Study ☐ Avoid Site

103. Significance Remarks

Figure 4b. Standardized data entry screen of the computer database.

CULTURAL PERIOD	NUMBER OF RECORDS
Unidentified prehistoric	303
Paleoindian	5
Archaic	93
Woodland	31
Mississippian	1
Historic	232
not indicated	227

Table 1. Recorded Cultural Periods in Marion County from the 814 records on the computer database.

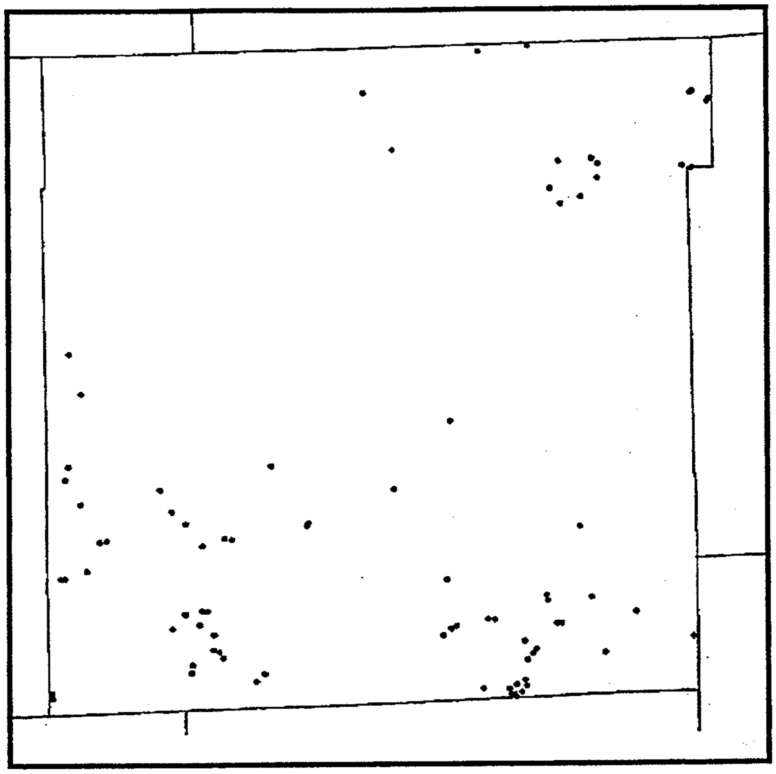

Figure 5. Location of Archaic sites within Marion County.

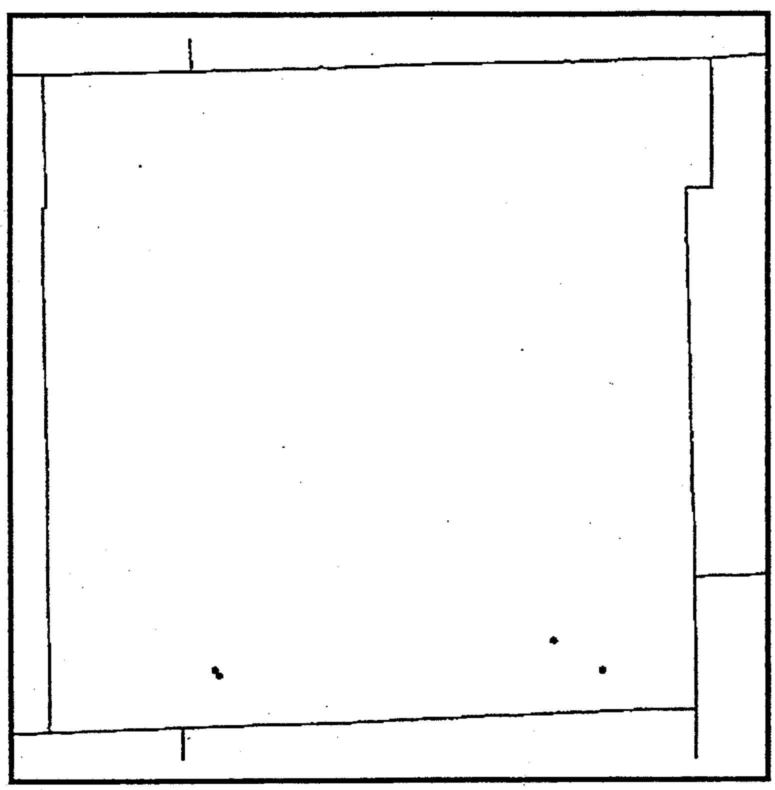

Figure 6. Location of Archaic habitation sites in Marion County.

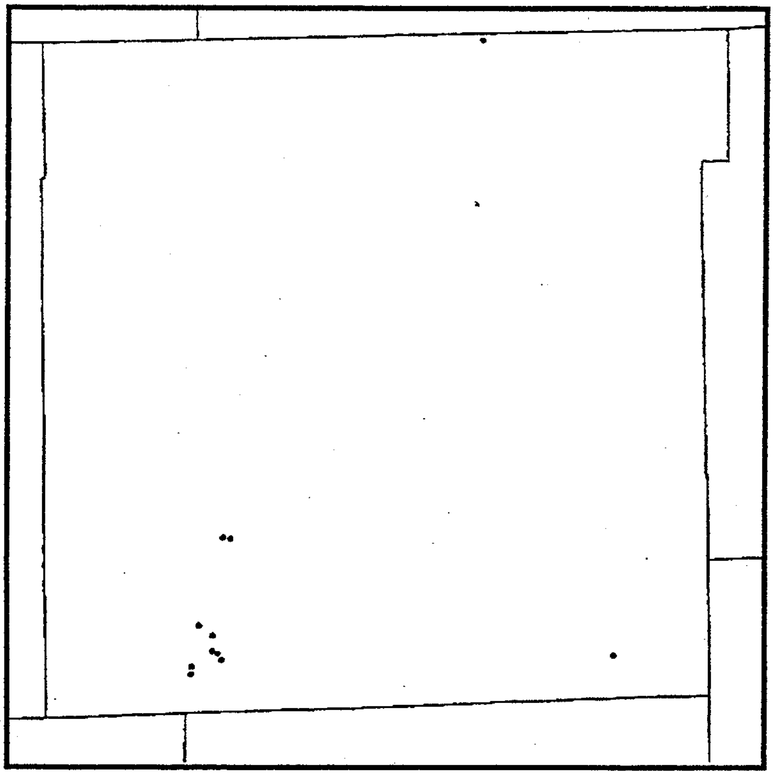

Figure 7. Location of Marion County Archaic sites having the White River as the nearest water source.

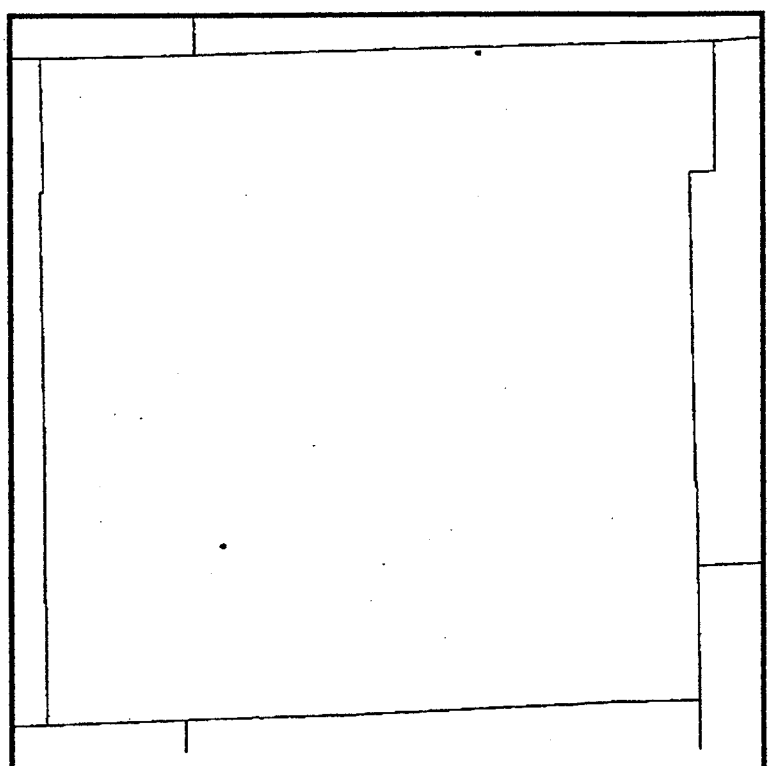

Figure 8. Location of Marion County Archaic sites on Genesee soil and having the White River as the nearest water source.

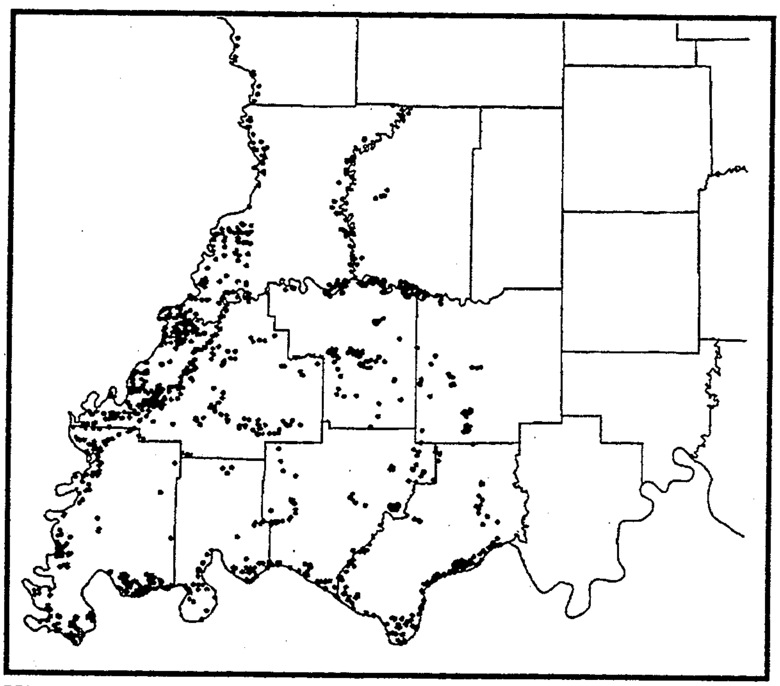

Figure 9. Location of sites in the Southern Bottomlands Natural Region (region after Homoya 1985).

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Homoya, Michael A.

1985 Map Showing the Natural Regions of Indiana. Drafted by Roger L. Purcell, Indiana Geological Survey. *Proceedings of the Indiana Academy of Science* 94:Plate 1.

Making the Scruffy Sherds Speak: Intensive Surface Survey in Greece

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Indiana University--Purdue University, Indianapolis

It is a great honor to be included in this first statewide celebration of archaeology in Indiana and to report on what I and others have been doing archaeologically not only in Indiana, but around the world. Many of you have probably recognized that my title is adapted from the popular series on archaeology that the late Paul MacKendrick of Wisconsin, initiated in 1960 with a book on Italian archaeology entitled *The Mute Stones Speak* (1960). In this book and the popular mind Classical Archaeology--a branch of archaeology that claims to be classical only in the sense that it concerns the so-called classical civilizations of ancient Greece and Rome--is generally connected with monumental stone ruins, like the Roman Forum or the Athenian Acropolis.

Though these impressive and historically significant ruins play an important part in our teaching and research, much of what my fellow archaeologists and I have studied for years is not these glorious works of art, but the humble yet equally eloquent potsherds and other battered, unattractive materials on which we rely to make the ancient world yield tell its full story about life in all its aspects. Though we are fortunate to work in a historical period and have the Greek and Latin authors available to answer many questions--and pose many others we might not have thought of on our own--we lack the extensive documentation available to American historical archaeologists working on a far more recent and accessible time. Indeed, for many regions, periods, and aspects of the classical world archaeology is our principal or sole source of information.

Before turning to the scruffy sherds and how they can be made to talk, I would like to refer to an account written in 1771 by one of the founders of our field, the German scholar Johann Joachim Winckelmann. He was describing the early excavations of Herculaneum--one of the Roman cities near Naples buried by the eruption of Vesuvius in 79 AD--conducted under the direction of a Spanish engineer, Roch Joachim Alcubierre, who as Winckelmann wrote "knew as much about antiquities as the moon knows about lobsters," but was given the task of plundering the site for its treasures by the Spanish king of Naples (Etienne 1992:146-149). Winckelmann relates that Alcubierre's men found there a Latin inscription in large bronze letters and took them down from the wall without first recording the text. The letters were simply tossed in a basket, presented to the king, and displayed in his museum, where they provided a kind of ancient word game to visitors, trying to restore the original text. As Winckelmann writes, with a touch of sarcasm, "some imagined they made the two words IMP. AVG." for the Emperor Augustus (Etienne 1992:146-149).

I think Winckelmann's protest at this thoughtless plundering of the archaeological record serves as an appropriate metaphor for all archaeological work. As attractive and interesting individual artifacts--like the bronze letters--may be in and themselves, if we remove them from their original setting without recording how they were originally placed, they are prevented from speaking their message. In doing this we might have the individual letters, but will have destroyed the words, the sentences and paragraphs of meaning these objects have to tell if treated properly. Every act of improper excavation, or even casual collection of surface remains, represents a scrambling and silencing of the rich voice of the past as it is has been preserved to us, and we cannot bring it back again, try as we might.

This brings me to my main topic, intensive survey in Greece, in which I have been trying to decipher the message of the scruffy sherds for the past 14 years on projects in the Southern Argolid[1] (the region of the Franchthi cave and Halieis, both excavated by Indiana University), the Cycladic island of Keos (Cherry et al. 1991), and most extensively in the Nemea valley, which hosted one of the four great athletic festivals in antiquity (Wright et al. 1990:579-659; 1996). Our permits to conduct these surveys allowed only the collection of remains found on the surface, and we were not permitted to

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[1]See the popular account C. N. Runnels and T. H. Van Andel, *Beyond the Acropolis: A Rural Greek Past* (Stanford, 1987). More academic are M. H. Jameson, C. N. Runnels, and T. H. Van Andel, *A Greek Countryside: The Southern Argolid from Prehistory to the Present Day* (Stanford, 1994); *Artifact and Assemblage: The Finds from a Regional Survey of the Southern Argolid, Greece*. vol. 1 The *Prehistoric and Early Iron Age Pottery and the Lithic Artifacts* , ed. C. N. Runnels, S. H. Langdon, and D. J. Pullen (Stanford, 1995); vol 2 on the historic period, ed. M. Munn (in preparation); S. B. Sutton, *Contingent Countryside: Settlement, Economy, and Land Use in the Southern Argolid since 1700* (Stanford, in press).

dig trenches, as is often permitted in other countries. Greek law, recognizing the importance of preserving proper context for an artifact, makes it illegal to move an archaeological object without a proper permit. This law is, unfortunately, not always easy to enforce, as seen from this pile of material from the ancient city of Phlius pushed out of the way by farmers (**Figure 1**) whose tale will be difficult or impossible to recover, if anyone ever undertakes the task. Increasing urbanization and associated projects

Figure 1. Architectural members and other worked stone piled along a road near Phlius.

like the new subway line in Athens present some risk to archaeological remains in Greece, as does purposeful illicit looting of unexcavated tombs and other sites for the antiquities market. The greatest dangers, however, are probably touristic development of the coast with new hotels and vacation homes, and the introduction of modern farming. In contrast to traditional plowing which disturbs less than a foot of topsoil, efficient new plows that penetrate as much as 3 feet below the surface are now destroying at a very fast pace remains that long lay safe in the ground, including this Classical grave near Phlius encountered in a field recently plowed for conversion from cereal crops into a more profitable vineyard **(Figure 2)**. For this reason intensive survey is necessary to identify, record,

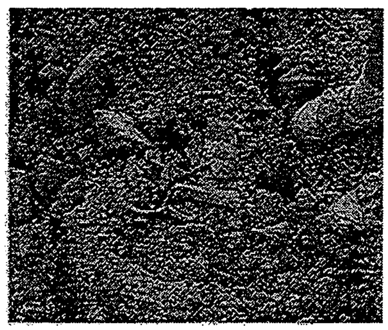

Figure 2. Human remains and a coin from a Classical grave disturbed by deep plowing near Phlius.

this and if possible protect the many large and small sites of all periods scattered across the Greek landscape before they are lost forever.

In our intensive surveys small teams of about five members walk in parallel lines, spaced about 10 yards apart, across the landscape searching for artifacts. The individual areas they walk are called Tracts, and usually correspond to modern farming fields. Each Tract is identified with its own number, and its location is mapped. All finds are identified by the number of the Tract in which they were found **(Figure 3)**. Indeed, as the teams walk, they do discover durable ancient remains: fragments of pottery, roof tiles and other ceramic objects, as well as

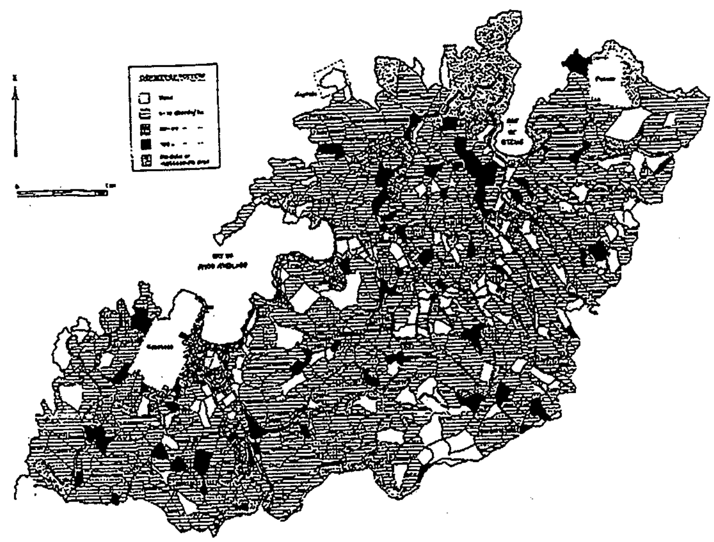

Figure 3. Map identifying the tracts of the survey in north-western Keos and showing the density of pottery sherds found on each (after Cherry et al. 1991:Figure 3.3).

worked stone, occasional pieces of metal including coins, and even human remains when ancient burials have been disturbed. Tile and potsherd are counted as they are encountered in the field, and all potentially datable materials are collected in plastic bags, labeled, and taken to the museum for study. Areas of high artifact density are declared Sites and subjected to further, more intensive mapping and artifact collection.

Washed and laid out on the tables in our workrooms (**Figure 4**), these finds, which are primarily potsherds and fragments of tile which survive and are identifiable even in small fragments, begin to tell their tales. While some are nondescript and remain mute, a significant number tell

Figure 4. Potsherds and loom weights spread out for study in an abandoned schoolhouse in Koilada which served as the workroom of the southern Argolid survey.

clearly and beyond all doubt when and where they were made. Compare these three distinct groups of sherds found in the Southern Argolid which clearly proclaim their age and place of origin: three fragments of Archaic black-figure made in Athens during the sixth or early fifth centuries B. C. (**Figure 5**); a collection of Classical Athenian black-glaze pottery and lamps dating from the fifth and fourth centuries B. C. (**Figure 6**); and a collection of distinctive Late Roman fine and coarse fragments and a complete north African lamp decorated with a cross dating from the fourth, fifth, and sixth centuries after Christ (**Figure 7**). Other types of remains, including stone tools, millstones and grinders (**Figure 8**), architectural blocks, and even occasional pieces of sculpture help complete the picture, though they are not usually as common or as precisely dateable as the scruffy sherds

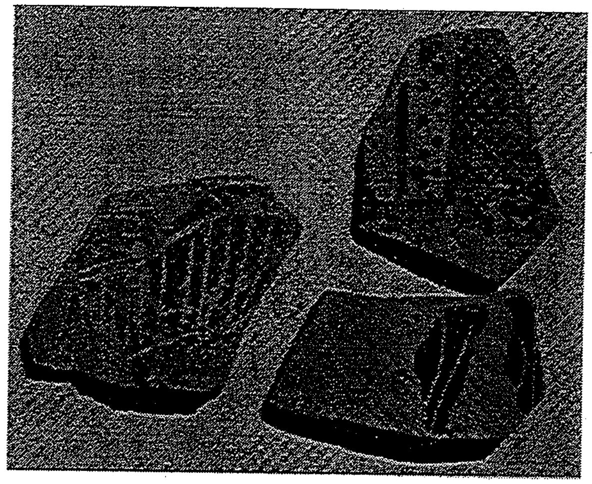

Figure 5. Fragments of Archaic Attic black-figure pottery dating from the sixth and early fifth centuries B.C.

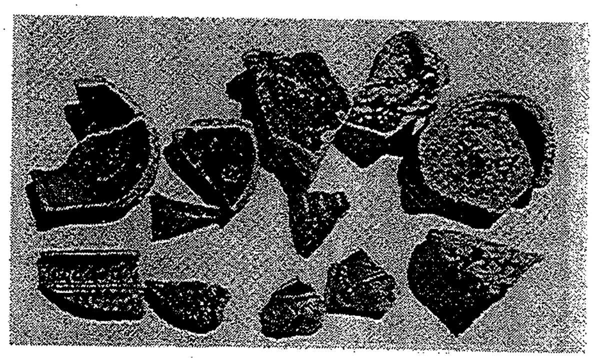

Figure 6. Fragments of Classical black-glaze pottery and lamps dating to the fifth and fourth centuries B.C.

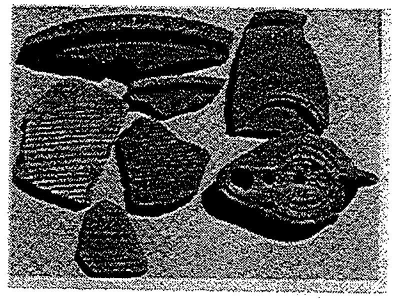

Figure 7. Fragments of Late Roman red-slip and combed coarse pottery and an intact lamp dating from the fourth, fifth, and sixth centuries.

The discovery, mapping, and study of these materials tell us not only the location and size of the ancient sites, but also their date, duration, and even what they were used for. They reveal the presence at definable moments of the past of small isolated farmsteads, traces of what seem to be just storage sheds, both pagan shrines-- one identified by a sherd with the scratched dedication DII to the god Zeus---and Christian chapels, burial sites, and even whole

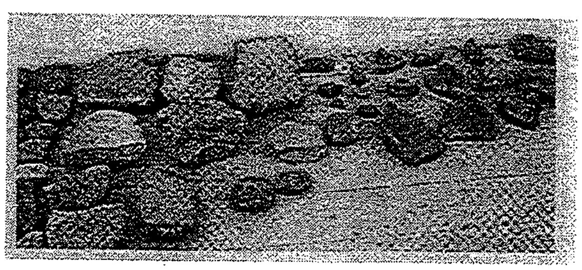

Figure 8. Fragments of prehistoric and historic mortars and grindstones from the survey of the southern Argolid.

villages and towns whose presence was previously unknown. In a few places we have found remains of kilns and workshop debris that show pottery was actually made at these sites both for local use and long distance trade. Even at sites whose location has long been known, our humble surface collections can help to clarify the dates of their use, the extent of their growth and contraction at various times, and the duration and interruption of their settlement. In most cases the new sites we have identified, and even some of those long known, will never be excavated, and our collections and mapping probably represent the only permanent record that we will ever have of them. Yet they are crucial to document the unwritten record of or human past.

Collaboration with scientists, particularly geologists and biologists, allows us to reconstruct changes in the natural environment and to connect it with the changing pattern of human settlement. We can see how humans adapted to the natural environment and gradually how they modified it over time, often with striking results as we see how farming practices and larger populations of farmers spreading across the landscape at sometimes caused periods of extensive erosion, and other times did not. It is his information that is most useful to use today.

Results of Southern Argolid survey, as published by Jameson, Runnels, and van Andel show changing patterns of human use of that area, the ebbs and flow of population and settlement. In the Middle Palaeolithic area (around 50,000 years ago) the sea level was much lower and the area hosted small seasonal bands of hunters **(Figure 9)**. The introduction of agriculture around 6500 B.C. at the start of the Neolithic Age led to a gradual increase in the number of sites and settlers which led, during the Early Bronze Age

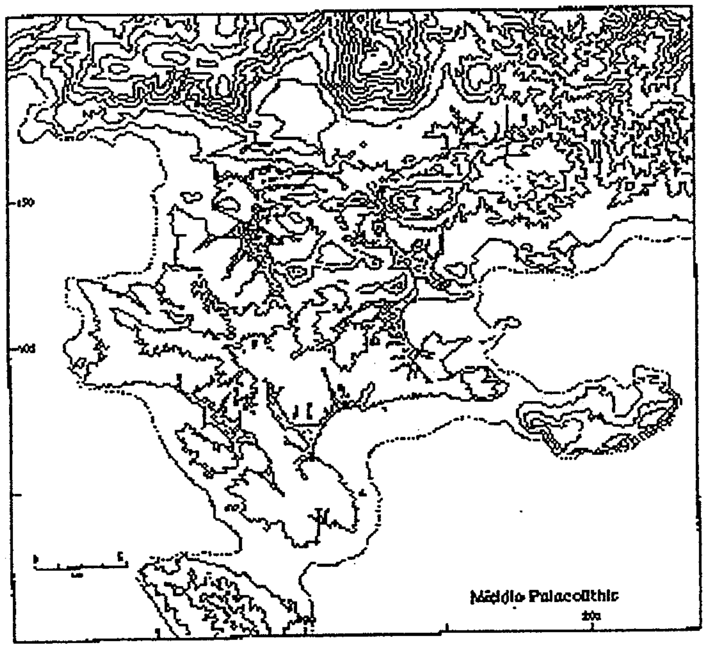

Figure 9. Southern Argolid survey sites of the Middle Palaeolithic period (after Jameson et al. [n. 3], Figure 4.5).

(around 2500 B.C.), to extensive erosion (**Figure 10**) and ultimately to agricultural techniques that were less destructive during the late Bronze Age. After virtual abandonment during the early Iron Age resettlement of the countryside in the early historic period reaches a climax during the late Classical and early Hellenistic periods, the later fourth and early third centuries B.C., the lifetime and aftermath of Alexander the Great, when the area hosted two proper cities on the great natural harbors at Halieis in the

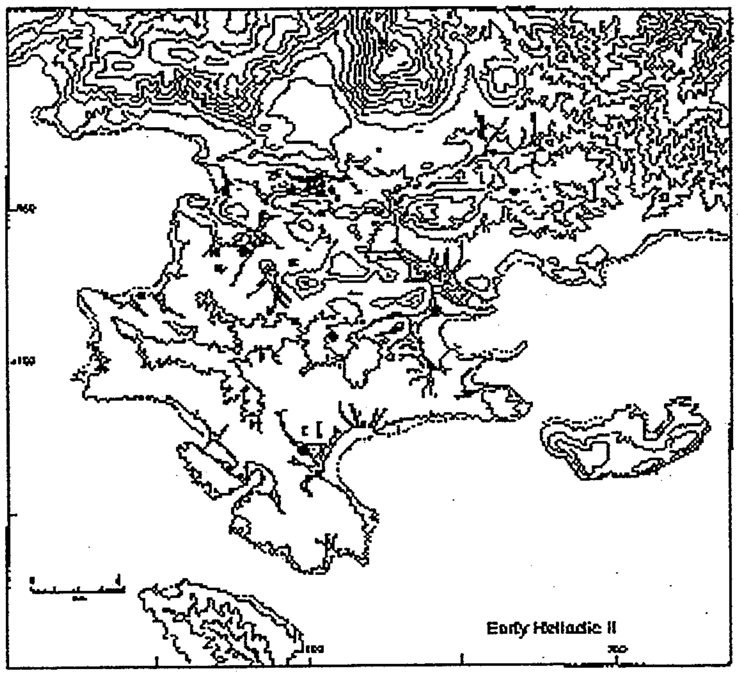

Figure 10. Southern Argolid survey sites of the Early Helladic II period (after Jameson et al. [n. 3], Figure 4.13).

south and Hermion on the east, other large settlements, and numerous smaller ones (**Figure 11**). During the later Hellenistic period and early years of the Roman Empire (**Figure 12**) people pull back into one city, Hermion, and a few smaller sites. Yet during the Late Roman period, the fourth and fifth centuries B.C., in strong contrast to what one expects from written sources, the countryside fills up again as small inland and coastal sites appear to participate in the export of the region's agricultural produce (**Figure 13**). The succeeding Mediaeval and Modern periods each have different and distinctive patterns that reflect changing

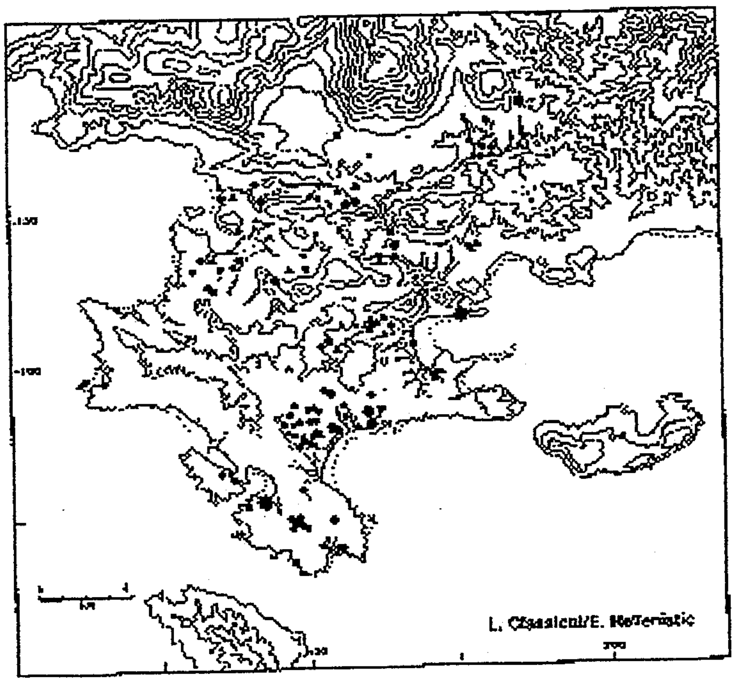

Figure 11. Southern Argolid survey sites of the Late Classical/Early Hellenistic period (after Jameson et al. [n. 3], Figure 4.23).

political and commercial environments.

This brief survey can hardly do justice to the complexity of changing patterns of land use and settlement this survey has documented over many centuries or the discussion of the many factors that can be brought forward to explain them. It does, however, make clear what can be learned from a few battered potsherds found baking in the sun. The story they have to tell is interesting, complex, and important. Our ability to decipher it properly depends

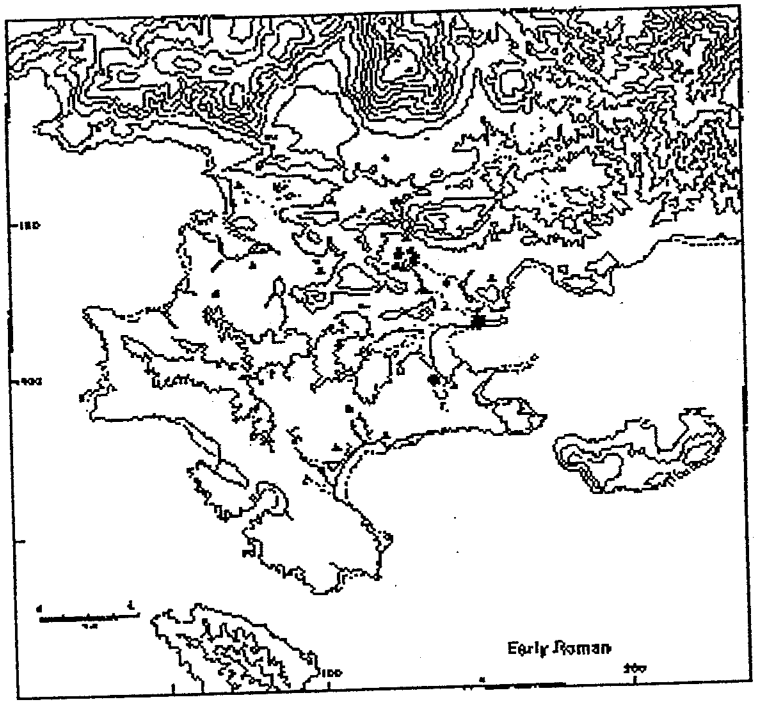

Figure 12. Southern Argolid survey sites of the Early Roman period (after Jameson et al. [n. 3}, Figure 4.25)

entirely on making sure we keep the letters with which it is written in order before me move them. We can understand what the scruffy sherds and all other archaeological materials have to say only if we collect and study them in a way that records and takes full advantage of their archaeological context. This lesson is perhaps even more important here in Indiana than in Greece, since here historical records are available only for the past few centuries, while Hoosier prehistory is long and fragile.

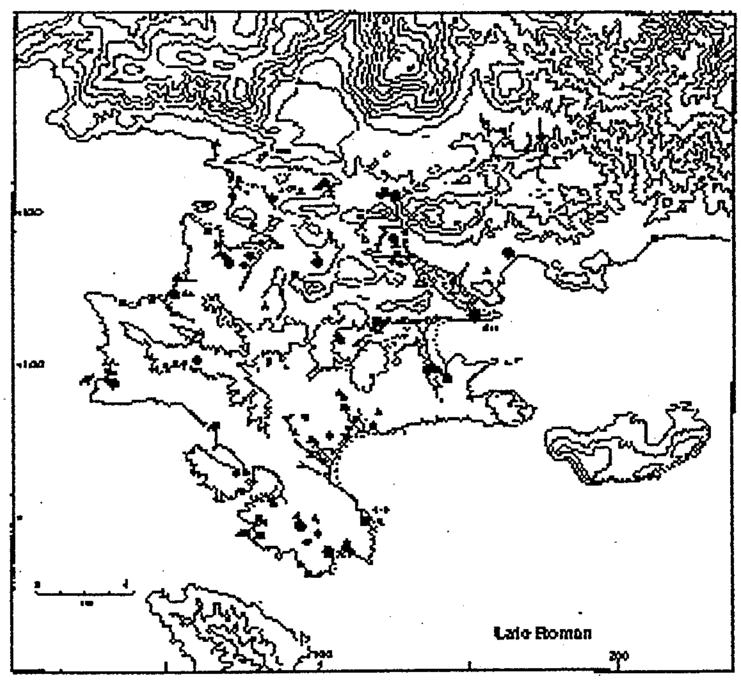

Figure 13. Southern Argolid survey sites of the Late Roman period (after Jameson et al. [n. 3], Figure 4.27).

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