2015

Spatial Distribution Of Debitage At A Chert Procurement Site And A Cultural History Assessment On Orange Lake In North Central Florida

Joseph Petererson Culen
University of Mississippi

Follow this and additional works at: https://egrove.olemiss.edu/etd

Part of the Archaeological Anthropology Commons

Recommended Citation
https://egrove.olemiss.edu/etd/367

This Dissertation is brought to you for free and open access by the Graduate School at eGrove. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of eGrove. For more information, please contact egrove@olemiss.edu.
SPATIAL DISTRIBUTION OF DEBITAGE AT A CHERT PROCURMENT SITE AND A CULTURAL HISTORY ASSESSMENT ON ORANGE LAKE IN NORTH CENTRAL FLORIDA

A Thesis
presented in partial fulfillment of requirements
for the degree of Master of Science
in the Department of Anthropology and Sociology
The University of Mississippi

By

JOSEPH PETERSON CULEN

August 2015
ABSTRACT

This project evaluated a 90 acre site on Orange Lake in north central Florida. A cultural resource management survey was conducted to determine what archeological evidence for prehistoric activity was present. This research was conducted in order to identify settlement patterns and determine if they corresponded with settlement strategies already identified for wetland environments in north central Florida. After a tool stone procurement zone was identified, a study examining debitage size grade drop-off trends was conducted in an effort to separate quarrying and non-quarrying activity areas.

Field work was conducted using shovel test units 50 by 50 centimeters square and 100 cm deep; utilizing a shovel and quarter inch screen. Observations during shovel test were recorded, artifacts were labeled and bagged. Unit location was recorded using Etrex GPS. Artifacts were sorted based on sets of characteristics for each artifact type. Debitage was sorted into four screen sizes. These data were evaluated using a distance drop-off model to explore the relationship between assemblage characteristics and proximity to chert sources.

Results of these tests demonstrated there was not a sole quarry location but instead that raw tool stone had once outcropped along the entire length of the shore line. Drop-off tests reinforced the knowledge that chipped stone refuse generated at a quarrying site is unique to this site type. Meaning that the proportion of debitage size grades and frequency of material changes in a predictable manner as distance increases from the original stone source.
In conclusion, raw tool stone acquisition and the manufacturing of tools from this source were of great importance for prehistoric people of the area. The discovery of evidence for habitation beginning in the Early Archaic and growing in intensity into the Mississippian showed Orange Lake was exploited throughout prehistory for access to tool quality chert and the ecotone environment of hardwood hammocks and prominent wetlands.
DEDICATION

This thesis is dedicated to all of those who believe in themselves enough to one day fulfill a yearning they have felt deep down inside. Those who have a passion and follow it never work a day in their lives.
ACKNOWLEDGEMENTS

I wish to extend a most sincere level of gratitude to Jim H. Williams and R. David Arnold. As the landowners of the project area, it is their generosity and desire to learn of the past that made this project possible.

To the many individuals who contributed to this research study, I offer my sincere appreciation and gratitude. In particular I would like to thank the members of my thesis committee. It has been a privilege to work with such dedicated professionals.

I am most indebted to Dr. Jay K. Johnson, my thesis committee chairman, advisor, and friend. From the onset of this research study, he has provided me with valuable guidance and support. I will never forget the countless hours he devoted to this research study, nor his unwavering support and crucial advice during the long road to completion.

I am very grateful to Sara M. Chavez who gave so generously her time to work with me as my partner during the entire field seasons of 2012 and 2013. Without her dedication I would not have succeeded at achieving my field survey goals. I am also thankful for her assistance with the artifact cataloguing and most of all Sara’s constant positivity in light of the obstacles.

I wish to express my sincere appreciation to my parents Gerald R. Culen and Nancy J. Peterson. They continually offered uplifting encouragement throughout the arduous process and never gave up on me even when I was about to give up on myself. Parents can be hard on us and I now know that is a quality of love. In addition, both vastly helped me during the editing and formatting process. I’d like to thank Gerald R. Culen specifically for his editorial contributions.
I’d like to thank Nancy J. Peterson specifically for devoting her time to helping me organize this thesis into an understandable and professional document.

A special thanks also goes out to the professional archeologists at South Arc Inc., John H. Davidson, Lucy B. Wayne, and Martin Dickinson. John H. Davidson was crucial in teaching me proper mapping techniques and the correct way to conduct survey work. Lucy B. Wayne offered guidance and expert advice on Florida archeology. Martin Dickinson was the inspiration to exceed the federal CRM guidelines and dig thorough precise shovel tests.

Finally, to my many friends and fellow archeologists who either helped me directly with field work or supported me with encouragement throughout this process I want to express my deep thanks: Ajay Gupta, Steven and Gloria Harris, Travis Cureton, D. Kris Holsen, Zim Padgett, Wesley Louis, Eric Griffis and Jim Mitchell.
TABLE OF CONTENTS

ABSTRACT ........................................................................................................................... II
DEDICATION ........................................................................................................................ IV
ACKNOWLEDGEMENTS ...................................................................................................... V
LIST OF TABLES .................................................................................................................. IX
CHAPTER 1 – INTRODUCTION AND THEESIS STATEMENT ........................................ 1
  Introduction to North-Central Florida Geology and the Williams’ Hill Project Area ....... 5
  Introduction to Data and Methods .................................................................................. 10
  Chapter Summaries ....................................................................................................... 11
CHAPTER 2 – LITERATURE REVIEW ............................................................................. 13
  The Cultural History of Central Florida ......................................................................... 14
CHAPTER 3 – LITERATURE REVIEW: LITHIC TECHNOLOGY ..................................... 41
  Raw Tool Stone, Chert Exploitation, and the Process of Manufacturing Stone Tools ...... 41
CHAPTER 4 – METHODOLOGY: DATA COLLECTION ..................................................... 59
  Preliminary Work ........................................................................................................... 59
  Shovel Test Procedure ................................................................................................. 61
  Additional Excavation ................................................................................................. 64
  Lab Work and Base Data Analysis ............................................................................. 66
  Statistical Analysis for Distance from Source Drop-Off Testing .............................. 71
CHAPTER 5 – METHODOLOGY: ARTIFACT CLASSIFICATION ..................................... 73
  Debitage, Core and General Tool Class Definitions ................................................ 74
  Uniface vs. Biface: ....................................................................................................... 78
  Specific Tool Type Identifications .............................................................................. 79
  Ceramics: Defining Groups and Individual Types ..................................................... 90
CHAPTER 6 – LITHIC ANALYSIS .................................................................................... 107
  Lithic Artifact Assemblage ......................................................................................... 107
  Spatial Analysis .......................................................................................................... 114
CHAPTER 7 – DISCUSSION .............................................................................................. 133
  Research Problem and Goals .................................................................................... 133
  Distance-From-Source-Drop-off Analysis Results ..................................................... 133
  Culture History at William’s Hill .................................................................................. 139
LIST OF REFERENCES .................................................................................................................... 160
VITA ........................................................................................................................................... 171
LIST OF TABLES

Table 1  Archeological timeline for north central Florida. ................................................................. 13
Table 2  Count and proportion of diagnostic artifacts for each temporal phase. ............................. 73
Table 3  Lithic and miscellaneous artifacts ........................................................................................ 80
Table 4  Ceramic artifacts from William's Hill .................................................................................... 93
Table 5  Historic artifacts recovered during field survey. ................................................................. 106
LIST OF FIGURES

Figure 1  State of Florida with Orange Lake project area as dark-blue square in between Alachua and Marion County ................................................................. 2
Figure 2  Location of project area on Orange Lake (in orange polygon near center).................. 3
Figure 3  Outline of William’s Hill survey area ................................................................. 3
Figure 4  Topographic map of William’s Hill and surrounding area ..................................... 7
Figure 5  Location of shovel tests (in blue) and other property features ................................. 64
Figure 6-Dendrogram of lithic categories ............................................................................ 68
Figure 7  Debitage density map overlaid on a topographic map of William’s Hill .................. 70
Figure 8  Attributes of a Flake .................................................................................................. 75
Figure 9  Bivariate plot, quarry distance and proportion of Size A flakes ......................... 117
Figure 10  Bivariate plot, quarry distance and proportion of Size B flakes ......................... 118
Figure 11  Bivariate plot, quarry distance and proportion of Size C flakes ......................... 119
Figure 12  Bivariate plot, quarry distance and Size D flakes .............................................. 120
Figure 13  Bivariate plot, distance from quarry and proportion of large flakes .................... 122
Figure 14  Bivariate plot, quarry distance and average flake weight ................................. 123
Figure 15  Bivariate plot, quarry distance and proportion of large flakes from shovel tests with more than six flakes .......................................................... 125
Figure 16  Bivariate plot, quarry distance and proportion of flakes without evidence of thermal alteration .......................................................... 126
Figure 17  Bivariate plot, elevation and proportion of flakes without thermal alteration ...... 128
Figure 18  Bivariate plot, elevation and proportion of large flakes ....................................... 129
Figure 19  Bivariate plot, elevation and average flake weight ............................................. 130
Figure 20  New quarry boundary along lake shore at 17.5 to 18.5 meters above sea level ....... 135
Figure 21  Artifact concentrations identified at William’s Hill ............................................. 137
Figure 22  Location of the Ridge concentration and the six judgement test units excavated across it. ........................................................................................................................................... 144

Figure 23  Alachua Concentration (A) and of Alachua period concentrations overlaid on a soils map.......................................................................................................................................... 151
CHAPTER 1 – INTRODUCTION AND THESIS STATEMENT

During the fall of 2012 a privately held previously un-surveyed 90 acre parcel of land located on the southern shore of Orange Lake in Marion County, Florida was selected to be archaeologically surveyed for cultural remains. The general area can been seen in Figure 1 as the blue polygon at the south east tip of Alachua county and the adjacent northern border of Marion county. Figure 2 provides a closer look of the Orange Lake area with the orange polygon at the center of the map representing William’s Hill. Finally the satellite image in Figure 3 shows the complete 90 acre property outlined in yellow. All three maps are provided below after the following paragraph.

Fascinated by archaeology all his life, and fearful of any prehistoric evidence being lost through looting, the property owner, Jim Williams offered this parcel for survey and thesis work so that he could learn of the history of his family’s land. In addition to fulfilling Mr. William’s expectations, I sought to examine this area for lacustrine settlement patterns. There was interest in identifying site use for the Cades Pond and later Alachua traditions in particular. This was the case because during preliminary research it was noted that this was the southern-most extent for settlement range of these two cultures. Neither of these two traditions had been previously recorded on the south eastern portion of the lake therefore the possibility of identifying one or both of these periods during project took precedence. In general however, this project undertaking focused on two distinct but connected project goals. The initial goal was to conduct a phase I survey of the parcel accompanied by phase II 1x2 meter excavation units when areas of
Interest were found. This work was crucial for identifying any prehistoric activity in the area, determining what type of activities may have taken place, and adding the newly gained knowledge to Florida’s archaeological record.

Figure 1 State of Florida with Orange Lake project area as dark-blue square in between Alachua and Marion County
Figure 2  Location of project area on Orange Lake (in orange polygon near center)

Figure 3  Outline of William’s Hill survey area.
With the completion of 226 shovel tests and two 1x2 meter phase II excavations, an ample quantity of chipped stone debitage was collected. In total 56.5 meters square of sand was excavated during shovel testing, an additional 4 meters square was removed during the phase II portion of the field work. Therefore, in total 60.5 meters square of soil was excavated during the field season at William’s Hill. In addition, a stone procurement source roughly ¼ acre in size was identified on the property evidenced by chert boulders at the surface and heavy concentrations of lithic debitage in the shovel tests falling in this chert strewn area. The quarry area is 1/360th the size of the total survey area making this a good case for a distance from source analysis for the lithic debitage. Therefore, the second and ultimately primary objective for this project is to determine if the debitage recovered across the survey area follows the trends expected to occur on and off of a quarry site. Traditionally performed on a large scale, this project area’s study of debitage distribution drop-off is considerably smaller, thus opening up the opportunity for a better understanding for how debitage was distributed in a prehistorically inhabited area near a quarry.

The lithic analysis portion of this thesis focused on measuring changes in debitage assemblages in terms of distance from chert sources within the survey area. Flakes were separated into four size categories with the larger two groups expected to drop off proportionately with each shovel test that was placed further from the quarry boundary. The opposite is expected of the two smaller groups. As distance increases away from the quarry the small and smallest size grades should increase in frequency. These theories are based on what has already been proven for biface trajectory and human behavior with in and around a stone resource area (Odell 2003; J. K. Johnson 1981).
In addition to this research problem, a general cultural assessment of the William’ Hill property area based on the lithic and ceramic types makes it possible to document the prehistoric use of the survey area through time. It is expected that all or most of the cultural indicators from the Paleo into the Mississippian will be identified during survey considering a common trend for Florida sites located near a prominent water source is that of multiple occupations (Lucy Wayne, personal communication, 2012). William’s Hill is situated amongst a prime location along an extensive lake shore dotted with sink holes, chert outcrops and home to a diversity of biomes.

**Introduction to North-Central Florida Geology and the Williams’ Hill Project Area**

The study site is bounded by Orange Lake to the north and adjacent private properties to the south, east and west. The survey area has been under cultivation as a citrus grove and more recently in row crop production. As a result of cultivation, 25 to 30 cm of the upper most ground surface has been heavily disturbed in the areas not currently wooded. Further, the citrus cultivation during the early half of the 20th century created deep disturbed divots up to 40 cm deep. Although not numerous, these divots were occasionally visible during shovel testing. For the large majority of the soil stratigraphy however, it was undisturbed with distinct soil horizons. Personal consultation with the property owner indicates site disturbance through the use of heavy equipment to me minimal. Personal visual assessment confirmed this statement except for a small area at the far south eastern corner which had been cleared for a small sand boat ramp and three historic trenches along the north shore where transport ramps had once rested during the citrus industry. These trenches can be seen marked on figure 4 in chapter 4 as the red tack symbols. Each set of two symbols indicates the beginning and end of the trench and each trench was no more than 7.5 meters wide including the adjacent fill berms.
The state of Florida has some of the richest archaeological remains of any area in the United States, extending from the late Pleistocene into historic times (Bryan et al. 2008:43-45). The reasons for these phenomena are in part due to Florida’s fair climatic conditions, rich natural resources, and diversity of ecosystems supporting a vast array of floral and faunal species.

The study area is located on the southeastern border of Alachua County and the northern border of Marion county Florida on the south shore of Orange Lake. The center line between USGS Quad maps 4418 and 4417 intersects the property which is positioned just south of the center of these two Quads. The study area is characterized by a relatively high hill that gradually slopes down towards the lake bottom for the western half of the lake shore on project. The eastern half is less abrupt, becoming a slightly sloping flat land for roughly 150 meters before falling into the lake bottom. The USGS topographic map below shows William’s Hill with in the red polygon (figure 4).

Approximately 4 miles from the project area and 2.5 miles from the opposite north shore of the lake lies another large lake known as Lake Lochloosa. Prior to modern drainage practices both of these water bodies were connected by a low lying swamp basin. To the east of the project area flows Orange Creek, a medium sized slow moving stream which drains Orange Lake into the Oklawaha River. The confluence of Orange Creek and the Oklawaha River is 8.5 miles eastward. From there the Oklawaha River flows another 13.5 miles towards the Atlantic were it connects into the Middle St. Johns River. This network of waterways linked Orange Lake to a vast expanse of north-central and eastern Florida.
USGS Topographic Map of William's Hill and Surrounding Areas

Figure 4 Topographic map of William's Hill and surrounding area.
In the central part of the Florida Peninsula, the land gradually rises on a south to north axis from both the Gulf and Atlantic coasts forming the Peninsular Arch of North-Central Florida (NCFL). The Peninsular Arch is characterized by north-south trending highlands which extend from southern Georgia approximately two thirds the length of the Peninsula. Here there are rolling sandy hills, some with a relief of nearly 200 ft. above sea level (Bryan et al. 2008: 18-19).

The area surveyed in this study is approximately in the center of the Peninsular Arch and rests near the dividing line of the Ocala Karst District and the Central Lakes District. The Ocala Karst District is composed of extensive limestone deposits from the Eocene and Oligocene epochs and the Central Lakes District is evidenced by karst seepage lakes and ponds which have developed under a cover of sand (Bryan et al. 2008:184-185).

Orange Lake in southern Alachua County on which the study area is located, is a classic example of all of the above mentioned geological features of Central Florida. This large lake basin essentially represents the saturated zone of the water table; with considerable fluctuations of water level occurring at times of inconsistent rainfall (Bryan et al 2008:184-185). The northwestern half of the lake is up to 25 feet deep in some spots with the opposite end of Orange Lake being shallower, in part due to extensive peat build up reaching as much as six feet in depth. As a result of peat accumulation shallower, the southeastern half of the lake is seldom completely full. It is considered as much a wet prairie as a lake, with connected pools of open water and islands of thick floating vegetation. Below the peat is a shallow layer of marine sand (Bryan et al 2008:61-62). The surrounding edges of the lake are bluff like sandy hills throughout most of the area with the exception of lower seasonally wet areas present along parts of the northern and eastern lake shores.
The project area is an ecotone environment of Lake Basin, lake shore line and sandy hills which supports a wide variety of native flora and fauna. The bluff like sandy hills were originally covered by the southern mixed hardwood forests made up of mixed deciduous and evergreen tree species. These trees predominantly consist of Quercus virginiana, Quercus hemipherica, Liquidambar styraciflua, Carya glabra, Sabal palmetto, and Pinus elliottii. Common understory brush includes Smilax auriculata, and Vitis rotundifolia. The lake basin and apex where the water line meets the shore line supports an entirely different ecosystem than that of the well-drained hills. Here, tree and plant varieties adapted for moist or wet conditions thrive including Nyssa biflora, Maple rubrum, Myrica cerifera, Salix floridana, Passiflora incarnate and a multitude of perennial and annual herbaceous plants. With the wide variety of plant based food resources this environment attracted a substantial faunal base as well. Prior to historic and modern land use practices, this area ran the gamut for both predatory and prey animals. Black bear, Florida panther, Red Wolf, Osceola turkey, alligator, Gray squirrel, raccoon, and shore birds and so on either once did or still do call this region home. (Monk 1965: 335-348)

About 4000-5000 years B.C. the climate of north central Florida coalesced into the conditions present to this day. Average rainfall is 100-110 inches per year but is unevenly distributed with 55 +/- of those inches falling from June to September. Most rain is the result of thunderstorm activity with frequent lightning strikes. Consequently, fire has shaped many of Florida’s floral habitats. The temperature remains above 70 on average for most of the year with the exception of the winter months. During winter, freezing can occur but frost rarely lasts more than 24 hours. This fair climate allows for a growing season which lasts around 300 days per year (Monk 1965: 338).
Introduction to Data and Methods

At the start of this study, preliminary research was required to gain a holistic view of the project at hand. Despite the rich archaeological remains identified across the region none had previously been recorded immediately in or near the Williams’ Hill parcel. Environments such as that of the project area are considered highly probable for prehistoric activity therefore with the guidance of Lucy Wayne (Ph.D. and senior archeologist at South Arc Inc.) and Jay K. Johnson it was decided to conduct a Phase I shovel testing survey accompanied by several phase II units. This type of archaeological survey was perfect for systematic data recovery allowing for spatial and temporal interpretations of the general work area.

Phase I shovel testing followed the Cultural Resource Management Handbook provided by the Florida Department of Transportation Environmental office. Shovel tests were excavated 50 x 50 cm in diameter and 100 cm in depth. The units were placed on a 50 meter grid covering the entire work area with each dug at every 50 meter interval (FDOT 2004: 4-22 to 4-24). Following the completion of 122 shovel tests an additional 95 delineation units and 9 judgmental shovel tests were added to the grid. Judgment units were critical in evaluating areas that did not fall along the broad 50 meter grid line. Delineations on normal grid were placed at 25 meter intervals surrounding original units exhibiting intriguing contents or other characteristics of interest. These additional tests were crucial for tackling the goal of delineating the cultural history associated with this property. The boundaries of eight artifact concentrations including a chert outcrop were identified. The potential for the significance of geographic features such as sink holes and the lake shore line were also explored.

At the close of the field season, 226 shovel tests and two phase II 1 x 2 meter excavation units had been dug. Artifacts for each shovel test were separated into lithic tool, debitage, quarry
reject, ceramic and other. Stone tools, quarry rejects and ceramics were catalogued and defined/described using typologies described in the methods and artifact assemblage portion of this thesis.

**Chapter Summaries**

Chapter one of this thesis plays the primary role as an introductory for the reader. Here the project area is described in detail as is the region of north central Florida in which the project lies. The thesis topics are briefly introduced indicating the emphasis on conducting drop-off testing for a stone quarry as well as discovering the culture history of the parcel. Finally the field work and methodology employed is explained.

The literature review of this thesis is divided into two separate chapters. The first, chapter two, delves into the exploration of Florida’s prehistoric cultural history from the earliest inhabitants of the Paleo Indian through the Archaic and ending with early European contact eras. Information regarding climate, settlement patterns, subsistence, tool technology and other behaviors important to this research are examined. Chapter three literature review focuses on previous work pertaining to stone quarry research, tool manufacture, and distance from source drop-off studies.

Chapter four serves as an explanation of the methods employed during field and lab work, and the intricacies of the statistical work. The methodology consisted of four phases of operation. These four phases were: (a) preliminary information collection (b) field survey and ground truthing; (c) artifact sorting and aggregate analysis; and (d) statistical analysis.

Dealing with the artifact assemblage, chapter five serves two purposes: (a) to define the parameters used in identifying the debitage and tool types encountered during this study and (b) what constitutes the assemblage and its specific characteristics. Part A provides descriptions for
general artifact categories and then specific definitions for each artifact type recovered. Part B wraps up the chapter with an explanation for the characterization of the assemblage data for lithics. The Williams’ Hill lithic assemblage was characterized using three variables; raw material, function, and the morphological macroscopic traits of the artifacts themselves.

With all preliminary data collection completed, the statistical analysis was conducted and the hypothesis tested in chapter six. A total of eleven hypothesis were evaluated using the one tailed Pearson correlation coefficient, with bivariate plots included for visual aid. The independent variables were of distance (meters) and elevation were tested against the dependent variables of flake size, average flake weight and the presence of thermal alteration.

The final chapter seven is broken into two primary sections. The first is a description and discussion of the results of the statistical work for the drop-off tests conducted on the eleven hypothesis in chapter five. This is followed by a detailed discussion of the culture history of the project area as determined by the artifacts recovered and their contextual distribution across William’s Hill.
CHAPTER 2 -- LITERATURE REVIEW

Located in north central Florida, the William’s Hill Project area is situated in a region where the prehistoric sequence is well documented. Due to this, the Chapter 2 literature review will discuss the following prehistoric periods: Paleo-Indian, Early Archaic, Middle Archaic, Late Archaic, Woodland, and Mississippian. Rather than writing an overview of the Woodland and Mississippian periods they will be broken down and discussed as the traditions found specifically around NCFL. This is because, whereas much of the knowledge known for the Paleo and Archaic tends to be generalized across states, the diverse regionalization found across the southeast during the Woodland and Mississippian allows for specific descriptions of the cultures that were present in NCFL during these later times. The following table (1) is an overview of north central Florida’s prehistoric archeological timeline.

<table>
<thead>
<tr>
<th>Period</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paleo Indian</td>
<td>12,000 B.C. to 10,000 B.C.</td>
</tr>
<tr>
<td>Transitional</td>
<td>10,000 B.C. to 8,000 B.C.</td>
</tr>
<tr>
<td>Early Archaic</td>
<td>8,000 B.C. to 5,000 B.C.</td>
</tr>
<tr>
<td>Middle Archaic</td>
<td>5,000 B.C. to 3,000 B.C.</td>
</tr>
<tr>
<td>Later Archaic (Orange Culture begins)</td>
<td>3,000 B.C. to 1,000 B.C.</td>
</tr>
<tr>
<td>Woodland (early) Deptford</td>
<td>500 B.C. to A.D. 100</td>
</tr>
<tr>
<td>Woodland (late) Cades Pond</td>
<td>A.D. 100 to A.D. 600</td>
</tr>
<tr>
<td>Mississippian (Alachua Tradition)</td>
<td>A.D. 700 to A.D. 1700</td>
</tr>
</tbody>
</table>

Table 1 Archeological timeline for north central Florida.
The Cultural History of Central Florida

Florida’s Paleo-Indian

Florida’s Paleo period is divided into four phases: early (or Clovis) 12,000-10,900 B.C.; middle 10,900-10,500 B.C.; late 10,500-9,500 B.C.; and Transitional 9,500-8,000 (Dunbar and Vojnovski 2007:173; Driskell and Walker 2007: x-viii; Milanich 1998: 1-11; 1994:38; Weitzel 2002: 9-11). According to Milanich (1998:1), from at least the 1920s onward, Florida residents have been finding Paleo-Indian artifacts in the rivers of NCFL (Milanich 1998:1; 1994: 37). In 1952-53 Wilfred Neil excavated a small wooded hill, known as Paradise Park, approximately one half mile downstream from the Silver Springs headwaters in Marion County. What is significant about the Paradise Park site is that it was one of the first excavated sites to offer an intact stratified multi-component assemblage with Suwannee points at the lowest stratum. This site has since been used as a comparison with other similar stratified sites (Purdy 2008:70-71; Neil 1958:33-41).

Other terrestrial sites including the stratified Silver Springs site, Bolen Bluff, the Lake Johnson site, and the Darby and Hornsby springs site have all yielded early style projectile points and tools from the Paleo period (Purdy 2008:53). The Wakulla Springs site in the eastern panhandle of Florida located along the northwestern shore of the spring boil was excavated in 1994-95. A Clovis, Paleo preform, and 34 other tools were found along with a child cremation dating to 10,577-10,287 years old; the oldest human remains yet found in Florida. The only other sites associated with both Paleo human remains and extinct faunal remains are Devils Den, Vero, Melbourne and Warm Mineral Springs; all of which are submerged cavern sites (Purdy 2008:68).
While elusive, open terrain sites with bone preservation have been discovered in the wetland basins of Florida. Four open terrain campsites are known and they are Ryan-Harley site in the Wacissa River basin, the Dunnigans Old Mill and Norden sites in the Santa Fe River basin, and Lewis-McQuinn site in the Suwannee River basin (Daniel et al. 1986: 24). These sites coupled with Dust Cave and the Meadowcroft Rock shelter provide evidence that Paleo-Indians in the Eastern United States had a diet of greater variability than originally expected, based on the faunal remains of small game recovered at these sites. The reliance of Paleo-Indian groups on wetlands in Florida has only recently been shown, but of the four sites above, all showed significant evidence of wetland resource procurement (Dunbar and Vojnovski 2007:167-169). For example, 51.72% of the refuse at the Ryan-Harley site was derived from wetland resources (Dunbar and Vojnovski 2007:176).

Lanceolate shaped projectiles epitomize the Paleo culture. They are made exquisitely, symmetrical, and often are basally ground presumably to facilitate hafting by preventing the edges of the stone from cutting the bindings. Also, fluting is present on some, particularly the Clovis points (Purdy 2008 96-98). Other tools include unifacial stone implements, bone pins and projectiles, Bola stones, and ivory fore shafts. Recovered bone and ivory tools have been reported as being manufactured from at least 11 now extinct Pleistocene mammal species (Purdy 2008:102). The extreme age of Paleo sites has left little in the way of preserved organic remains or other tools besides the bone and ivory implements found in inundated sites (Purdy 2008 96-98).

In NCFL and elsewhere the Clovis point type is diagnostic for the early Paleo era. The following middle Paleo saw the emergence of new lanceolate type projectiles and knives including the Simpson cluster, Suwannee and Cow House Slough types. By the late Paleo, the
projectile tool kit changed again, this time more significantly with a reduction in size and the
first appearance of side notching. It is believed this occurred because regional cultural
specialization had begun (Walker 2007:102-103). Greenbrier, Hardaway Side Notched, Beaver
Lake, Gilchrist, Union Side-Notch, Osceola Greenbrier and Dalton (rare in Florida) comprise
these new point types (Bullen 1975:44-57). Accompanying the new projectiles were microliths
which likely are suggestive of a new occupational development. The Nalcrest site in Central
Florida has yielded a variety of micro-lithic tools similar to those associated with Dalton point
assemblages elsewhere in Florida (Milanich 1994:58). At the very tail end of this tool tradition
the points change even more with a side and corner notched tool assemblage known as the
Bolen. The Bolen plain and beveled points mark the transition from Paleo into Early Archaic
(Milanich 1994:53; Bullen 1975:44-57; Powell 1990:7-14; Walker and Driskell 2007:10; Daniel

During the Paleo Indian period there was a broad array of unifacial tools made of stone.
Unlike projectiles and knives, there is no evidence to show that other paleo tools changed until
the late Paleo (Dunbar and Vojnovski 2007:174). These ‘working’ tools tend to be unifacial and
Plano-convex, with steeply flaked working edges. These tools are generally small and
lightweight consistent with a lifestyle constantly on the move. The tool kit included flake and
blade tools, spoke shaves, adzes, oblong, discoidal and end-scrapers, bifacial knives, Waller
knives, and turtle back scrapers (Milanich 1994:51; Purdy 2008 97-101; Daniel et al. 1986: 36-
37).

The environment and climate of Florida during the Paleo/Pleistocene period was radically
different than is appears today. Paleo Florida climatic conditions were cool and arid. These
conditions created habitats similar to Africa’s modern savannas in much of Florida’s interior
Mammals present during this period included many now extinct species such as mammoth, mastodon, and horse as well as those species still found today. During the Pleistocene vast quantities of water were tied up in glaciers resulting in lower sea levels by as much as 300ft and lower freshwater tables by as much as 50ft. As a result, many Paleo-Indian sites in Florida are now submerged (Purdy 2008:48; Milanich 1998:2). Freshwater resources were not as plentiful and those that did exist were substantially lower, exposing caverns and ledges that would have served as places to live (Purdy 2008:57). The Cavern site currently 45 feet below the surface at Silver Springs in Marion County is one such example. In addition to the sporadically located springs, rain water and underground water movements dissolved the limestone and created surface catchment basins. In many Florida Rivers and lakes there exist strings of these catchments and circular sinkholes. Orange Lake, a basin in itself, is also dotted by numerous sinkholes both in and around the lake. A strong positive correlation exists between the distribution of Paleo artifacts and these karst topographic features (Purdy 2008:93; Walker 2007:102-103).

Human presence has been documented almost state wide during this period and suggests there was a fairly large number of permanent residents as well as a possibility of seasonal migratory residents who followed grazing herds as they moved in and out of the state. Because these early people were not food producers the size of each band was probably limited to 25 individuals (Purdy 2008:104). Several Paleo-Indian settlement/subsistence models have been proposed (Purdy 2008:53-54).

Perhaps the earliest mobility/subsistence model to be developed was the classic Paleo-Indian Hunter Model. Based on archaeological findings across the United States, scholars argue that Paleo-Indian groups were likely to be highly mobile hunting specialists following large
mammal herds. Groups would have been small but highly cooperative and this type of life style would have permitted Paleo-man to only carry essential material items. The limiting factor of constant mobility is apparently evidenced in the archeological record by highly curated tool kits and the extensive use of high quality materials. Under this model, these hunting specialists concentrated on the exploitation of one or a few large terrestrial animal species. This specialization thus dominated settlement and subsistence decisions and all other lifestyle practices (Walker and Driskell 2007: xi).

A refinement of the Paleo-Indian Hunter Model was proposed by Kelly and Todd in 1988 and referred to as the High-Technology Forager Model (HTF). They contend that because of pre-adaptations to the hunting of terrestrial fauna, “early Paleo-Indians probably were generalists in relation to large terrestrial faunal resources and opportunists’ in relation to all other food resources” (Kelly and Todd 1988:233; Walker & Driskell 2007: xii).

The applicability of these two models for Florida has been argued by Dunbar, Web and others, who contend Pleistocene bone finds associated with Clovis or other paleo point types are not as common as these models would indicate they should be. Some evidence of Clovis association with mega-fauna is seen at Little Salt Springs and Sloth Hole on the Aucilla River, but not many other places. (Dunbar and Web 1996:333-340; Walker and Driskell 2007: xii).

The Oasis Model (or the Oasis Hypothesis by James S. Dunbar and S. David Webb), was originally set forth by Wilfred T. Neill and was proposed specifically for Florida (Dunbar, Webb, and Cring 1989:480; Milanich 1994:40). The Oasis Model suggests that water holes were crucial in the arid environment and would have been gathering places for animals, both predators and prey species, as well as these early humans. Humans would have hunted and butchered animals in or around the vicinity of these oases. The correlation of artifacts to these oases has

A complimentary model to the Oasis Model is Dincauze’s (1993a:285) Ecological Theory model. This suggests that Paleo-man were opportunistic hunters and gathers as they moved across the landscape from one oasis to another. The groups would have taken advantage of the mega-fauna they came into contact with on the grasslands, while also becoming generalist foragers in the forests where large grazing game were not found (Walker and Driskell 2007: xiii; Dincauze 1993a:285).

Despite the debates, several general conclusions have been made about where Paleo sites are likely to be found. Walker and Driskell (2008:234) contend Paleo-Indians carefully situated their settlements more often than not in areas juxtaposed to contrasting habitats; such as high hills and ridges overlooking prairie or freshwater environments. These ecotone sites often were chosen because they provided more than one resource or advantage such as water, a look-out point, stone and other biotic resources (Walker and Driskell 2008:234-235; Purdy 2008:64). In addition to uplands adjacent to water, stone quarry and workshop sites are also known in NCFL where chert is exposed at the surface. Paleo tools have been found in many areas possessing these characteristics in the lowest cultural strata on sites such as Bolen Bluff in Alachua County, Johnsons Lake in northwestern Marion County, and Harney Flats in Hillsborough County (Purdy 2008:95).

**North-Central Florida Archaic Traditions**

Following the emergence of a more favorable environment in which people were not confined to river and spring resources, the peoples of the Early and Mid-Archaic began
spreading into previously uninhabited niches (Purdy 2008:44 & 57; Cumbaa 1976: 49).

Populations of animal and plant species were similar to present day and the same types of species were harvested throughout the archaic onward (Weitzel 2002:13-15). The Archaic period has traditionally been divided into three periods based largely on projectile point typologies: Early (7500-5000 B.C.), Middle (5000-3000 B.C.), and Late (3000-1000 B.C.) (Bullen 1975:1-4; Milanich and Fairbanks 1987:48-51; Milanich 1994:61; Dowdy et al 2001: xii).

**Early Archaic**

The rise in sea level, loss of many animal species, and climatic change necessitated changes in the adaptations of human populations in Florida. These new life ways began about 8000 B.C. as wetter conditions developed. By 7500 B.C. stemmed point varieties had replaced lanceolate types completely. There is still unresolved debate as to whether the Bolen tradition is a part of late Paleo, Early Archaic or a transitional stage between the two periods, but what is clear is that the new projectile/knife forms of the Early Archaic contrast markedly with their predecessors. These projectile/knife forms include Kirk, Wacissa, Hamilton, Arredondo, Stansfield and Thonotosassa types (Milanich 1994:53-54, 63; Bullen 1975:37-43). Kirk and Wacissa types are the earliest after Bolen. Kirk technology is found at the same sites as Paleo-Indian assemblages and may indicate, at least initially, that Early Archaic and Paleo-Indians shared similar life ways (Neil 1958: 66; Milanich 1994:59-63).

The environment did not change quickly during the Early Archaic period but as it did change and as populations grew, visible changes in the archaeological record appeared. According to Claire and Goodyear, the reduced need for mobility coupled with a changing environment and an increasing population forced Early Archaic groups to exploit new and different environments bringing them into contact with a wider variety of lithic sources. Starting
in the latter half of the Early Archaic, people began heat treating these new materials so as to increase the workability and durability of the chert. Claire concludes that “this can be viewed as a technological adaption to a set of cultural and environmental constraints” (Claire 1987:206).

With the spread of this new thermal alteration technology several new point types appeared and gradually replaced the other styles. These new point types included the Hardee beveled, Savannah River, Florida Morrow Mountain and Sumpter types (Bullen 1975: 33-41). Interestingly, not only was there a significant change in projectile manufacture, but there was also a dramatic change in other stone tools. Unifacial tools become the minority to bifacial and flake tools. These later tools are quite different from the Paleo-Indian assemblage perhaps reflecting the adjustments made by the native inhabitants as they coped with early Holocene conditions (Milanich 1994:65). Combination scraping/chopping tools are common, as are large core and flake tools, some weighing several pounds. These larger tools further add to the theory of reduced mobility. Use-wear analysis indicates many archaic implements were used for working wood and bone. Additional tools include bifacial scrapers and knives, unifacial scrapers, flake knives, choppers, hafted end-scrapers, expanded base drills, T-drills and blunts made from reworked broken points. Based on finds at inundated sites, bone tools include pins, socketed antler points, double pointed points made of split bone, fish hooks, barbed bone points, socketed antler handles, atlatl triggers, splinter awls, deer ulna awls, and antler punches to name a few (Milanich 1994:67).

The discovery in 1982 and excavation in 1984 of Windover Pond (8000-7000 B.C.) by Doran and Dickel, has shed extensive light on the Early Archaic burial practices and possible food resources. This small pond was a burial area for as many as ten centuries. Each body was wrapped in fabric, and was then staked down with sharpened wooden sticks to the peat at the
bottom or sides of the pond. Stone, bone and wooden tools were preserved and recovered, as well as plant remains and even the contents of some of the deceased individual’s last meals. Perishable tools found were made of mammal bone, deer antler and bird bone. These tools included pins, barbed pins, awls, throwing stick weights and incised tubes of bird bone. In addition, shell tools and beads made of Sable palm berries were discovered as well as a wide array of sophisticated cordage and fabric (Milanich 1998:14-19; 1994:70-75; Kehoe 1992:163). Interestingly, bottle gourds were found associated with the burial of a young man at Windover Pond and another in Little Salt Springs. Since bottle gourds historically are cultivated plants and they do not seem to have been native to Florida, this may indicate that as early as the Middle Early Archaic, people were engaging in horticulture (Kehoe 1992:163; Doran and Dickel 1988a:282).

By 6500 B.C. changes in subsistence and settlement patterns occurred, marking the departure of former life-ways and full emergence of a new culture (Milanich 1980:48). People were hunting and collecting at new sites as well as utilizing the older site locations. Evidence from this period also suggests that a diverse diet of upland and river/marsh faunal and floral species was being exploited (Milanich 1994: 63; Goggin 1949:22-23; Cumbaa 1976: 49). This culture is viewed as a population changing from nomadic Paleo-Indian subsistence pattern to the more settled coastal, riverine and lake edge associated regimes of the Middle Archaic.

Archaeologically, this is reflected in a greater number of sites, occupation in a diversity of locales, larger sites, sites with significant numbers of burials and a greater range of tools (Milanich 1994:67-70). Evidence for this pattern exists throughout NCFL at sites such as Page/Ladsen, Harney Flats, Little Salt Springs, and Warm Mineral Springs. Milanich (1994: 64) states, “Around the extensive perched water sources of North Florida, such as Paine’s Prairie and
Orange Lake, large quantities of Arredondo, Hamilton, and Kirk points have been surface collected, while Paleo Indian points are found only in very small quantities.” Early Archaic points are also found in small numbers at upland sites which are usually devoid of Paleo material. This pattern is based directly from collections in Alachua and Marion County (Milanich 1994:64). Trisila Pond (Marion County) is one such example, where Arredondo points were found in pine flat woods. Another such site in Moriston, Florida known as “The Pit” is an extensive upland site located on top of a hill (Personal observation J Culen 2013).

**Middle Archaic**

Around 5000 B.C. climatic conditions again began to ameliorate, becoming progressively similar to NCFL’s modern conditions which appeared around 3000 B.C. This climatic change heralded the beginning of the Middle Archaic period. During this time the interior of Florida is marked with additional sites located near water sources and chert outcroppings. Freshwater shell middens indicative of long term occupation appear along the St. Johns River, Ocklawaha River and Atlantic lagoon for the first time. Marine shell middens were also created along the Gulf Coast during this period (Milanich 1998).

Archeological research with in the last few decades has revealed that it was within the Middle Archaic that the first mound complexes were built in Florida and that these earth works are indicative of a developing social complexity. Russo (2004) postulates these mounds and particularly the shell rings found along the gulf and southern Atlantic coast lines indicate a shift from egalitarian life ways to temporary hierarchal social structures. An increase in decorative items found as grave goods and in villages, including beads, pendants, shell jewelry, incised antler and carved bone also may indicate the development of stratified societies (Jefferies 2004). Although a number of shell mound sites have been identified as likely dating from this era in
recent years, three stand out in Florida in particular according to Russo, for intentional Archaic mound construction; Tick Island, Horrs Island, and Tomoka mound (Russo 1994:91-107; Piatek 1994: 109).

The Tick Island Site on the central St. Johns River basin was excavated by Bullen in 1962 and contained 175 burials. One individual even had a Newnan point stuck in his vertebra and 2 others had a Newnan associated with their skeletal remains. This is the first documented example suggesting violence among Florida Indians (Milanich 1994:82). These burials were placed in graves dug into freshwater shell midden and then covered with sand. Over time this process was repeated, with several individuals being interred at each burial episode. Other burials were laid directly in the ground and mounds were not built atop them (Milanich 1994:81-83; Kehoe 1992:162-165). Although artifacts were scarce at this site, of intrigue was the presence of baked clay balls, possibly suggestive of a connection to the Late Archaic site of Poverty Point in Louisiana (Russo 1994: 94-96).

Horrs Island, located on the south west Florida coast is composed of four shell and sand mounds built atop natural dunes dated from between 4100 to 7600 B.P. Excavations conducted by McMichael in 1982 and zooarchaeological work performed by Russo in 1991 proved this area was occupied on a permanent year round basis, a behavior not generally accepted in the archaeological community for the Preclassic people until recently (Russo 1994: 97). In fact, prior to this analysis no year-round settlements or large preceramic Archaic sites were known from anywhere in coastal North America (Russo 1994: 94).

Although, most sites are terrestrial these people also practiced burial of their dead in wet environments as did their Early Archaic predecessors. A large village site was found located on a ridge overlooking an adjacent slough on Little Salt Springs. The Little Salt Springs site is 15-
30 acres in size and contains as many as 1000 burials placed in the muck of the adjacent slough. The burials are similar to those at Windover Pond. The remains were placed on wax myrtle branches and wrapped in grass (Kehoe 1992:163).

The projectile/knife types of the Middle Archaic were produced in an unprecedented scale with hundreds of thousands of these forms recovered in NCFL alone. According to Bullen (1975:30-32) the most abundant and diagnostic point for the Middle Archaic is the Newnan, “a medium to large sized stemmed point with downward and outward sloping basal edges, contracting tang, and straight tang base. Blade edges are usually excursive but may be straight.” In addition to the Newnan, the Hillsborough, Putnam, Levy, Marion, and Alachua stemmed point types also occurred; the latter four grouped by Bullen as ‘Florida Archaic Stemmed’ (Bullen 1975:30-32).

By this time the production and use of unifacial stone tools had substantially dwindled and most of the non-projectile tools were flake/blade-like knives and bifacial tools. Thermal alteration of chert reached an all-time high and is especially prevalent in assemblages containing Newnan and Hillsborough points. An analysis of Newnan points from the type site on Newnan’s Lake (Alachua County) found that 94% were thermally altered with similar percentages found across other sites in NCFL. This is also the time in which siliceous coral reached new heights in use. The use of coral and other cherts which turned beautiful colors after heating may have served not just a technological purpose but also an aesthetic one. Thermally altered corals and cherts may also have indicated status, “with these points being perhaps the most socially visible tool class” (Claire 1987:206-207). The utilization and production of shell tools such as awls from Columella shell, adzes made of quahog clam and weights for nets saw a great increase as
well. This is likely due to increased reliance on marine resources and new technological adaptations (Weitzel 2002:15).

In NCFL, settlements are characterized by numerous small specialized sites, large villages and tool production sites. Many of the sites are small enough to be considered camps, likely visited on a seasonal basis and usually consist of only lithic scatter and the occasional tool. These probably represent hunting/resource procurement areas, however the exact type of specialized site is hard to determine other than to speculate based the location on the landscape (Milanich 1994:78). Evidence of special use sites is literally found all over Alachua and Marion counties anywhere water was available. The Kanapaha Prairie area in Gainesville, Orange Lake, Newnan’s Lake, Levy Lake, and Paine’s Prairie are covered by specialized, lithic production, and manufacturing sites. Other places are clearly quarry and resource procurement in nature such as the Wetherington site in Hillsborough County and the Senator Edwards site in Marion County (Milanich 1994:78-80; 1998: 22-25). A procurement site is classified by the presence of high quantities of debitage, blanks, performs, and unfinished points.

Many of the grander sites discovered are believed to be central-based settlements occupied by a large number of people. Most of these sites are several acres in size or greater, consisting in some cases of hundreds of thousands of artifacts and debitage. A particular site on Kanapaha Prairie is known to be at least 45 acres in size and contains incredible quantities of debitage and points in all stages of manufacture. Other large sites that may have functioned as central-base settlements are the Johnson Lake site and Haufler site in Marion County. One of the largest known Middle Archaic sites (8A1356) is located on the northern side of Paine’s Prairie in Alachua County (Milanich 1994:75-76).
Sites are also found in upland oak hammocks away from permanent water sources. Milanich (1994:79) contends that the presence of the same types of lithic materials at all site types seems to indicate the Mid-Archaic had not vastly diverged from the Early-Archaic because the same types of activities seem to have been occurring at all sites (Milanich 1998:20-25; 1994:76-80).

After about 4000 B.C. a gradual change in forest cover occurred so that areas previously covered in oaks became dominated by pine. By 3000 B.C. an increase in population led to the buildup of large sites along the St. Johns River and Atlantic Coastal lagoon. Shell middens far larger in size and number than ever seen before accumulated in these areas. The sites of this region suggest people were using riverine environments and the adjacent forests more extensively than previous populations (Milanich 1994:84-85; 1998:27-28; Kehoe 1992:162-165).

**Late Archaic**

By the Late Archaic, Indians could be found living around or at the least utilizing nearly every wetland area in the state as well as in coastal environments. Late Archaic archaeological site types have been recorded with considerable variation of both site types and locations (Sassaman 1993: 75). Villages were semi-permanent, only occupied parts of the year when resources were available for exploitation in the area and also seem to have functioned as gathering points for periodic social and economic activities (Larson 1980:29-31). Hunting, fishing and plant food collecting were still the basic subsistence practices and, like their predecessors, they followed a seasonal cycle of food resource exploitation (Larson 1980:29). With this larger Florida population and increased contact, trade routes both within and from outside Florida increased and offered new opportunity for innovation and exposure to the latest ideas (Morris 2004:17). These exchange routes of material culture and ideas into and out of
Florida have been most noted by objects recovered on sites bearing strong resemblance to Poverty Point objects. Decorated pottery balls for cooking and steatite bowls are among the most notable across the southeast. While St. Johns Plain pottery was traded from eastern Florida into Poverty Point (Hays and Weinstein 2004: 164-167).

It is not exactly clear when, but anywhere from several hundred years before or after 2500 B.C. ceramics were introduced for the first time. By 1000 B.C. they had spread across the Southeast. The earliest of this pottery has been recorded across the Savannah River drainage (Sassaman 1993: 65-67). Clay was tempered with Spanish moss, palmetto or another fibrous vegetable source for added strength, molded by hand and then fired. After 1650 B.C. geometric designs were sometimes incised in the wet clay before firing (Milanich 1987:60). This earliest pottery manufacture is known today as the Orange Culture in NCFL and is represented by five periods of change lasting until about 500 B.C. (Milanich 1994:94; Morris 2004:17). The distinction of plain and decorated types is an important device in dating Orange tradition bearing strata. Interestingly, no changes in settlement or subsistence strategies occur during the Late Archaic after the appearance of this pottery.

Unlike the Middle Archaic people whose settlements were particularly prevalent in the interior and uplands of NCFL, the Late Archaic' settlements appear there in far less frequency. In the uplands the Late Archaic is only indicated by small special-use camps or as small components within other sites. On the other hand, sites appear with much greater frequency and size within the St. Johns and Oklawaha drainages and also along the Gulf Coast from Tampa northward. This shift left Florida’s interior uplands relatively unpopulated during this time. Substantial populations did not move back into this area until after 1 A.D. Orange Lake and
other large wetlands/lakes of interior NCFL are in general an exception; large Late Archaic sites have been recorded around these areas (Milanich and Fairbanks 1987:61; Milanich 1994:85).

Tools of the early Late Archaic were not drastically different than the Middle Archaic types; appearing as less symmetrical versions of the Newnan and Marion. There was also the Seminole variety which resembled a Levy with exaggerated ears and base and the Broward which resembled a Levy that is basally less exaggerated. Once the Late Archaic was in full swing the Adena and varieties of corner notched points such as Lafayette, Clay and Culbreth appeared. By the latter half of the Late Archaic basal notched points such as the Hernando and Citrus also were manufactured and may represent a refinement of the Culbreth (Bullen 1975:3, 24-28; Milanich and Fairbanks 1987:62). The Hernando and Citrus types are very common in Alachua and Marion counties and seem to be restricted to Peninsular Florida. Non-projectile utilitarian tools do not seem to change from the Middle Archaic, with the exception perhaps of more triangular knife blades being knapped, but these could also be Hernando or Citrus performs.

Ornamental goods and tools made of out-of-state material seem to increase in number and distribution during this period. A number of Late Archaic sites on Orange, Lochloosa, and Newnan’s Lake have produced these goods; made of exotic materials like granite, slate, steatite, greenstone, and silt/sand stone (Milanich and Fairbanks 1987:62-63; Milanich 1994: 107; Willey 1998:123). Clarence Web (1977:4-5) and Rebecca Saunders (2004) have shown that some of these were traded from as far as Poverty Point, Louisiana. Evidence for exchange networks reaching as far as Michigan have been recorded in Florida as evidence by copper objects in mounds (Lucy Wayne, personal communication, 2012). These exotic goods also begin to be found on a greater number of sites and not just directly associated with burial of the dead. Items
such as gorgets, pendants, plummets, beads, stone bowls, pecked stone celts and bannerstones
have been discovered throughout NCFL (north central Florida). The fact that these are time
consuming to produce and can be heavy to transport may indicate an increase in sedentary living
(Kehoe 1992:166). The hunter – forager only subsistence way of life was in its final days at the
end of the Late Archaic. The adoption of new ceramic manufacturing techniques, a switch from
fiber to chalky and sand tempered pastes, the rise of horticulture, and the development of
regional cultures marks the beginning of the Woodland period (Milanich 1994:105; Milanich and

Post-Archaic Development of Regional Cultures

The Early Woodland period of the Eastern United States has been traditionally defined by
the further increase in sedentism, organizational complexity and most strongly, the wide spread
adoption of pottery technology (Sassaman1993: 42). Gradually fiber tempered pottery was
replaced by other types, dense village middens began to accumulate, stone tool types changed
(although slowly) and a greater quantity of exotic materials such as copper were traded
(Sassaman 1993). It has not yet been proven, but these changes are thought to have occurred as a
result of the first major applications of horticulture and increased regional interaction between
groups of the Southeast (Milanich and Fairbanks 1987:61). Bullen refers to this period as the
Transitional period (1200 B.C.-500 B.C.) and explains it to be the time when the hunter/gatherer
traditions of the Archaic had completely switched over to the many regional cultures of post 500
B.C. This process had seen its beginning in the Late Archaic but becomes more and more
evident into the Woodland era (Sassaman 1993).

The Indian groups who lived after 500 B.C. each lived within specific environmental,
physiographical, and/or geographical zones. The interior forests, lakes, and wetlands of NCFL
are one of the five major geographical cultural zones. These regions are most often divided by the ceramic types found among the archaeological sites as well as settlement strategies. The problems that arise when dealing with regional cultures in this manner is there are no clear dividing lines (Morris 2004:18-19).

**St. Johns Culture**

The St. Johns culture followed the Orange Culture in North East/Central Florida. This was a pottery using, mound building, sedentary complex, which became agricultural that shared cultural continuity from the Woodland into the European Contact period. Characteristically pottery is made of chalky fresh water sponge spiculate containing clay and usually either plain or check stamped. Occasionally, it was incised with simple lines or red slipped as is the case with Dunns Creek Red. Ceremonialism appears to be underdeveloped in burial customs compared to out of state cultures of the same time (Goggin 1998).

It is believed St. Johns had a strong influence in NCFL during the Cades Pond tradition. So strong was the influence that some archaeologists consider Cades Pond to be a western extension of the St. Johns Ib tradition; while others consider it Weeden Island (Milanich 1994: 228; Goggin 1949: 24). The presence of large amounts of St. Johns ceramics in Cades Pond burials is the reason for this belief, however it is not known with certainty the ceramics were traded in or simply copied by Cades Pond peoples. This is because the type of clay used to manufacture St. Johns ceramics is not unique to the river basin. In fact, Mitchem (1986: 69) contends sponge spiculate containing clays can be found on the bottoms of some lakes in NCFL. Either way, there was a relationship between the two cultures, but debate of the degree is disputed. In a following tradition known as Hickory Pond, St. Johns influence was also present but diminished in comparison.
St. Johns IIa does not vary vastly from Ia or Ib except this was the period that check-stamped ceramics was introduced and regional trade or contact seems to have grown. Swift Creek influence is evident as well as influences from cultures as far as Louisiana. These out of state similarities consist of stylistically similar copper masks and incised shell. St. Johns IIb shows further foreign influence in the form of trade pottery, temple mounds and Southern Cult objects. The only distinguishing factor for what is thought to be the last tradition in this culture, the St Johns IIc, is the appearance of European artifacts (Goggin 1949:24-28).

Deptford Culture

The Deptford cultures of the Woodland covered a large area of the coastal southeastern United States from the Alabama-Florida border on the gulf coast to Charlotte Harbor on the lower Florida Gulf Coast and from North Carolina to Jacksonville, Florida along the Atlantic Coast. There is some disagreement with the temporal beginning and even more disagreement about how exactly Deptford should be divided, but for the sake of this paper we shall treat it as a period succeeding the Late Archaic and predating Cades Pond. Thomas and Campbell (1985:110) suggest a beginning date of 625 B.C. while Milanich (1994:111) suggests it was post-500 B.C. General consensus has a terminal date of about 100 A.D. (some localities until 600 A.D). This culture developed out of the Late Archaic and was contemporaneous with the early St. Johns I culture found along Florida’s northeast coast and river basins. This has been shown by ceramic types from each culture found on sites of the other. For example, Deptford Cord Marked, Deptford Simple Stamped and Deptford Linear check Stamped sherds have been found as components of St. Johns I village sites (Thomas and Cambell 1985b:111; Willey 1998:354).

Deptford ceramic manufacture gradually evolved from the simple hand molding of the Orange Period which produced thick heavy bowls into more complex methods. Sand, grit or
clay lump tempered clay was stacked in coils to form the basic shape and then paddled with a mallet. This process produced thinner walled and stronger vessels; plus a greater variety of vessel shapes was possible. The overall quality of pottery as well as the design varies substantially and likely represents levels of skill or time put into the manufacture. The most common vessel shape is a deep cylindrical pot with a rounded base (Milanich 1994:129; 1973:59).

Settlement was prevalent along the Florida Gulf Coast, but was not restricted to that locality with Deptford specific sites turning up with some regularity on the peripheries of NCFL after about 1 A.D. The early inland examples could represent trade or perhaps small hunting camps occupied intermittently. This site distribution pattern of coastal villages with smaller inland specialized camps is nearly identical to Late Archaic patterns (Milanich 1994:114). After approximately 100 A.D., inland villages began to appear (but are rare) immediately adjacent to rivers rather than on high ground overlooking the rivers as was the case with hunter/gatherer Archaic bands. Settlements are always found on an ecotone so that multiple ecosystems could be exploited from one location (Milanich 1973:56). Three Deptford sites known in NCFL are Sunday Bluff and Colby in Marion County and Law School Mound in Alachua County. The first two are freshwater snail and mussel middens on the Ocklawaha River and the later a small campsite under an Alachua period mound in Gainesville (Milanich 1994:120-122; 1998: 57-59).

Interestingly, these interior villages were larger than their earlier coastal counterparts (increasing from on average 7 houses to 20); likely a result of increasing population, changes in social organization, and possibly new economic structures (Morris 2004:24-25; Milanich 1973:51-56). Houses were oval in shape, arranged in a linear fashion along the water resource and, on the basis of size (30x20ft), likely housed nuclear family units. Some settlements have
been found to be surrounded by wooden palisades and both summer and winter houses have been reported. According to Milanich (1973:56) these village structures are suggestive of a people engaged in “central-based nomadism.” Food resources in NCFL include fish, freshwater mollusks and snails, reptiles, birds, amphibians and terrestrial game (Milanich 1973:53; 1998:58)

Locally produced tools were made of stone, shell, bone and wood. Stone projectiles of this time are rare, but represented by small triangular, often crude side-notched and stemmed points. These include the Duval, Leon, O’leno, Taylor, and Columbia types. There was also overlap of the earlier Hernando point until about 200 A.D. (Bullen 1975: 11-13; Dowdy et al. 2001: 33, 42, 54, 66). The non-projectile tool kit does not vary much from the Late Archaic except on average the tools are smaller and fewer of them were produced. Hafted scrapers, side scrapers and single use flake knives are among the common types.

Some trade is evidenced by materials from the Hopewell, Weeden Island, St. Johns and Piedmont Cultures excavated from village and burial contexts (Milanich 1973:60). Burial of the dead was practiced either by cremation in villages or bundle burials in mounds. Ceremonial mound centers and shell or dirt rings are not common but do appear late in the Deptford tradition in NCFL (Milanich 1973:59). From 100 B.C. to A.D. 100 the Deptford way of life underwent a transitional stage and was replaced in NCFL by Cades Pond.

Cades Pond

Shortly after the beginning of the first millennium A.D. significant new developments occurred in the sparsely inhabited region of NCFL. As Hemmings (1978: 141) argues in Cades Pond Subsistence, Settlement and Ceremonialism that there are four criteria signifying this growth:
“1) an increase in population indicated by greater numbers and size of settlements; 2) semi-sedentary or sedentary hamlets or villages – a new degree of residential stability; 3) the appearance of intensive burial ceremonialism practiced in mound village complexes and in many lesser mound sites; and 4) participation by the indigenous population in an interaction sphere which extended from Gulf Coastal lowlands to the St. Johns Valley and well beyond.”

This tradition is first seen in the archaeological record as distinct from Deptford by A.D. 180 and lasted at least until A.D. 600 when other people (Alachua culture) from South Georgia began to move into NCFL. Cades Pond is considered a part of the Weeden Island complex, primarily because of similarities in ceremonialism practices evidenced by Weeden Island ceramics present in mound sites (Milanich 1998: 63). Named by Goggin in 1948, Cades Pond is restricted to a relatively small regional area of NCFL (Hemmings 1978: 141). It is bounded to the north by the Santa Fe River, to the south by Orange Lake, and most sites are found in the wetland rich areas of eastern Alachua and western Putnam and Clay Counties. Without exception, all the village sites are located on or close to wetlands and/or lakes. Settlement patterns do not vary much with Cades Pond because these people developed as a cultural adaptation to wetland environments. The strips of land between lakes/wetlands in Alachua County such as Newnan’s and Payne’s Prairie, Orange and Lochloosa, and Levy Lake and Payne’s Prairie all contain large village/mound sites. Although these areas also offered access to food resources in the adjacent oak and hickory forests, excavations have revealed that on average more than 80% of subsistence was taken directly from the wetland environments (Milanich 1994: 227-231). Agriculture may have also played an increasing role in food production by late
Cades Pond, but no solid evidence has yet been found to conclude this with certainty (Hemmings 1978: 141-144; Milanich 1998: 73).

In addition to nets and snares used in capturing fish and small animals, stone and bone tools were also manufactured as small projectiles and knives. Point types consist of Columbia, Taylor, Jackson, Bradford, Duval, Weeded Island and small triangular types which closely resemble Pinellas (Bullen 1975: 13-14 & 19-21; Dowdy et al. 2001: 33, 42, 92). Non-projectile utilitarian tools include nutting stones, pencil and bibulous based drills, hafted scrapers, triangular knives, and perforators to name a few. Bone tools are not unlike assemblages already listed but with the addition of basketry tools and drilled shark teeth. Shell tools traded from the Gulf as well as foreign stone and copper traded from outside of Florida also were used both as tools and ornamental objects (Milanich 1994: 230-235).

Unlike the ceramics found in mounds, the utilitarian ceramics of Cades Pond are not elaborate. Some are decorated (but don’t follow any temporal sequence) while most are plain, making dating sites within the tradition very difficult. Cades Pond mound sites contain Deptford (early on), St. Johns and Weeden island ceramics but the villages contain mostly plain sand tempered ware (as much as 95%). The Melton site on Payne’s Prairie is a perfect example of this. Of the 12,000 sherds from the village, 90 % were plain sand tempered; while the adjacent mounds contained decorated Weeden Island and St. Johns ceramics. Decorated pottery types in mounds changed over time but village assemblages offer little variation (Hemmings 1978: 144-148; Milanich 1998:

**Alachua Tradition**

By about A.D. 600 other people were migrating into the Cades Pond occupied region and by A.D. 750 agriculture had a major impact on NCFL subsistence patterns. Soon after the
earliest Alachua villages were founded, the Cades Pond Culture disappeared. The Alachua Culture was a sedentary agricultural complex characterized by extensive villages situated in regions with soils favorable for planting in the oak-magnolia hardwood forest of the middle Florida Hammock Belt. A preference for agriculturally suitable soils contrasted sharply with Cades Pond settlement preferences. Areas of Alachua and Levy County where mixed, well drained sandy soils are present were exploited. This tradition began with Hickory Pond (A.D. 600-1250) and then transitioned into the Alachua complex which lasted until A.D. 1630 (Milanich 1998: 75-77).

These two periods are divided by percentages of ceramic frequencies with Cord Marked occurring in a higher percentage than Cobb Marked in the Hickory Pond and the opposite occurring in the Alachua period (Milanich 1968:39). Pottery was mostly utilitarian made of chalky, sand/grit, and sherd tempered pastes with Alachua plain and check stamped designs being the most common. Prairie Cord Marked, Alachua Cob Marked and punctuated styles were also produced in some frequency and cob-marking has been particularly important as it shows uncontestable proof that maize was grown by these people. Prairie Fabric Marked, Alachua Net Impressed, Prairie Punctated over Cord Marked and Lochloosa Punctated also were made, but there frequencies are low making up only 1-7% of assemblages if present at all. This tradition may have ties with cultures in southern Georgia evidenced by very similar types of pottery design (Ocmulgee) and the fact these techniques were not used or copied by other Florida cultures (Goggin 1949:39; Milanich 1968: 17-19).

Subsistence patterns were quite different from Cades Pond as well. As a result of site location and because agriculture was an important enterprise, the Alachua people relied on wetland resources for a smaller portion of their foods. Fish are found in midden deposits, but
upland game such as deer, bear, opossum, raccoon, squirrel, rabbit, etc., were exploited heavily (Milanich 1998: 77).

As populations within villages expanded, new villages budded off and moved nearby. Each cluster of villages has been classified as a small chiefdom, similar to those of other Mississippian societies, except smaller and absent of several general traits such as platform mounds (Milanich 1998:77-78). Two large sites have been located on the hardwood forest track between Paine’s Prairie and Levy Lake (Rocky Point site and the Woodward Village site). Very few Alachua period mounds have been discovered and ceremonialism appears to have been limited; but village sites are numerous. Of the few known mounds, one was excavated by Bullen in 1949 at the Woodward Village site. The data (parallels in ceramics) from this work as well as additional data from the Fox Pond site indicate cultural contact was continuous between the Wilmington-Savannah Georgia people and Hickory Pond. By the Alachua period however these two groups had become culturally divergent (Milanich 1968: 17).

Stone tools consist of small triangular and ovate shaped points (Pinellas and Tampa styles), hafted scrapers, drills, and large hoe blades. Ceramic discs are common and two-hole bar gorgets and platform pipes have been found on occasion. Mounds contain cremation, flexed, skull, seated, and bundle burials but intentionally deposited utilitarian or ornamental goods are uncommon (Milanich 1968: 21-23). There is no doubt that this cultural complex was the not so distant ancestral component of the Potano and other chiefdoms of the Timucua Indian culture which occupied NCFL at the time of contact with Europeans (Goggin 1949:39-40).

**Potano, Molona, Patica, Chilili and Enecape: Timucuan Chiefdoms of NCFL**

Basically, the Patano are Alachua tradition people at the tail end of their existence. The life ways and subsistence strategies do not vary much except that reliance on agriculture had
increased (Deagan 1978:89). By the 16th century NCFL was occupied by various chiefdoms of Timucuan speaking Indians as was northern Florida and southern Georgia; totaling as many as 35 distinct groups. The total population is estimated to have numbered over 200,000 strong before contact with the Spanish. Unfortunately, little is known of any differences the five chiefdoms of NCFL may have had between each other and for all intent and purposes of this study they will not be described individually but rather as one: the Potano (Milanich 2000: 2-3).

Potano villages were located in areas of NCFL not unlike the areas preferred by the Alachua peoples. As major producers of corn, the same agriculturally favorable soils were exploited. Pinellas and Itchetucknee points continued to be manufactured as did plain, Cob Marked, Cord Marked and punctated varieties of sand/grit tempered pottery (Bullen 1975: 8-9). A typical village site may have looked like the Potano village located and excavated by Goggin in 1950 and again excavated by Milanich in 1970 on the western shore of Orange Lake. Milanich (1998: 80) describes the Richardson site as 200 meters long with circular houses roughly 25 feet in diameter spaced about every 70 feet from one another. All the houses were arranged around a central plaza with drying racks and storage pits spaced intermittently among the houses. The houses were constructed with lattice work and thatch secured around posts set every few feet apart. Inside the dwellings bedding platforms were constructed near the walls, a fire hearth was present, and one or more storage pits lined with grass were dug into the floor (Milanich 1998:80).

After European contact, the life ways and tool assemblages of the Timucua changed drastically as Europeans offered radically different material goods. Post-contact village sites usually contain European artifacts such as coins, glass beads, mirrors, bells, armor, nails, and
European ceramics such as Olive jar and Majolica (Hutchinson 2006: 30, 52-54; Milanich 2000: 13-17; Deagan 1978:112-114).

As early as the 1520’s, the Timucua had contact with Spanish explorers and around 1539 Hernando De Soto and his soldiers marched into Potano territory (Smith and Gottlob 1978:3). Within the first 20 years of the 1600’s Franciscan missions had expanded into many chiefdoms and all had been impacted by colonial endeavors. Four missions were established in Potano lands by 1606. These missions were known as Santa Ana, San Buenaventura de Potano, San Miguel de Potano, and San Francisco de Potano. After only a few years, two of these missions were abandoned as epidemics decimated native populations around them. The massively devastating diseases and hardships induced by European colonization and the slave raids led by out-of-state native slavers ensured that by 1650 the total remaining Timucua population was no more than 2,500; by 1700 it consisted of only a few hundred, and by the mid-18th century not a single Timucuan man, woman or child survived in Florida. This era represents the last days of the native-born NCFL Indian populations (Milanich 2000: 14-22; Hutchinson 2006: 16; Deagan 1978:112-114).
CHAPTER 3 – LITERATURE REVIEW: LITHIC TECHNOLOGY

Raw Tool Stone, Chert Exploitation, and the Process of Manufacturing Stone Tools

Lithic Resources North Central Florida

Without question stone has been an important natural resource for the prehistoric inhabitants of the southeastern United States. Various sedimentary, igneous, and metamorphic stone has been exploited for all manner of reasons from utilitarian tool manufacture to the construction of crypts. Undeniably, the types of stone most exploited have been those cryptocrystalline silica based cherts readily found as outcrops and exposures across the landscape, cobbles in river beds or even extracted from mines. (Odell 1996:106; Whittaker 1994: 70)

Lithic resources are found with varying abundance across nearly all areas of Florida (with the exception of the southern peninsula). Most of this chert that was exploitable by prehistoric Floridians is restricted to the Ocala Uplift and Chattahoochee Incline (Austin 1996: 212: UpChurch 1982a: 122). These geomorphic features spread across much of central and north central Florida, yet areas where this limestone has silicified can be sporadic. Where silicified limestone is present it tends to be localized with exposures occurring in areas of extensive erosional forces. Alachua and Marion counties are located within the Ocala Uplift just northeast of the heart of the old land-pebble phosphate beds and as a result residual Miocene cherts of the Hawthorne Formation are present in small patches while Eocene cherts of the Ocala Formation-Crystal River Bio zone occur in great quantity. The good-to-excellent quality microcrystalline
chert associated with the Hawthorne group is characterized by color ranging from yellow to dark brown; white, light blue and light to dark gray. The chert of the Ocala Formation in Alachua, Marion and Putnam counties has been recorded as occurring in nearly every color, however, it usually will be observed in a range of white, light creams, grays and blues. These reasonably good cherts were a significant and sought after source by prehistoric people and have been utilized from the Paleo-Indian until early historic periods. (Dunbar and Vojnovski 2007:191-192; Austin 1996: 1-2; Upchurch et al 1982a:122-124).

With regards to the area of Orange Lake, the Ocala Formation chert is by far the most prevalent. Although divided into 3 quarry-cluster sub-categories, (the Ocala, Gainesville, and Lake Panasoffkee) distinguishing between the three is challenging. Ocala Formation material is characterized as a cryptocrystalline fossiliferous chert and was formed in the Eocene as fossil bearing sediments layered upon a shallow sea floor. Parts or pockets within these sediments were than chemically replaced by silica forming a packstone or grainstone fabric. Pectin molds are common, but the diagnostic for this chert is the presence of Orbitoid Foraminifera which is a set of small marine creatures that can be readily seen as (0.10-1.5cm in diameter) rice or disc-shaped fossils throughout the limestone and chert outcrops of NCFL (UpChurch 1982a: 123). As a result of these fossils, the stone is locally known as rice grain chert. Because all three of the cluster chert types of the Ocala formation contain foraminifera, the name Rice-Grain will be used as a catch all term for this discussion. In addition to the common foraminifera fossils, examples of other ancient marine fauna may also be present including small mollusks and marine snails like Turritella martinensis (Bryan 2008:177).

Rice grain can be identified near or at the surface particularly as outcrops lining the edges of the numerous sinkholes or as surface outcrops on hills and slopes were erosion of the sandy
overburden has exposed limestone near the surface (Austin 1996:212-214). It is also exposed in river and lake beds or along river bluffs cutting through limestone deposits. Through the course of these erosional forces and sinkhole formations (common to Florida), these cherts were made available to native inhabitants as materials ranging from small nodules to large rock faces.

Certain regions of Alachua and Marion Counties are so rich in stone material that the root systems of fallen trees will uncover chert boulders in mass. This is common in Gainesville’s Kanapaha and Paine's Prairies and the Levy, Lochloosa and Orange Lake systems of Southern Alachua and Northern Marion Counties (Lucy Wayne, personal communication, 2010). Although the Ocala formation material was by far the most widely utilized chert source in these areas, other materials like silicified coral from the river bottoms of the Suwannee and Withlacoochee, Bay-Bottom Chert brought from the Tampa Bay area, Coastal Plains cherts from along the gulf of Mexico, and even exotic materials from outside of Florida are sometimes found at archeological sites in the specified region. The presence of this later material in NCFL and thus Orange Lake certainly indicates movement of people or trade from other people both inside and outside Florida (Dunbar and Vojnovski 2007:191-192). Regardless of where these lithics ultimately became a part of the archaeological record, the majority are almost certainly a product of source procurement through quarry activity.

Quarry Research

Although there has been a longstanding interest in stone tool technology and manufacture in Florida, a method for gaining a holistic view of these processes has been slow to materialize. While stone tools themselves have been studied in great depth, other aspects such as debitage analysis and quarry behavior have been often overlooked. When we look at the big picture, stone quarry source studies comprise a mere fraction of the anthropological work which has been
done. As a consequence, the archaeological record is still incomplete. Although some contend the number of studies geared towards behavioral aspects of quarry use is less than impressive, that is not to say the discipline is devoid of both old theory and new researchers. (Ericson 1984:2; Hestor and Heizer 1973; Purdy 1981b and 1984; Crabtree 1972; Odell 2003).

The first and perhaps the most celebrated of the early publications was a series of papers written and illustrated by W. H. Holmes who from 1889 to 1919 devoted his efforts towards the study of quarries, the methods by which ancient people exploited them and the activities that were centered at these sites. The widely influential theory proposed by Holmes argued that quarrying was exclusively an “extractive industry”. This meant that regardless of how the stone was extracted, it would be reduced on the extraction site into a “blank” before exportation to the village or other sites for further reduction into any other finished tool type. The resultant artifacts remaining at the quarry would then be limited to debitage such as flakes and angular shatter; broken or rejected blanks; and quarry tools including hammer stones, chisels and billets. According to Holmes, this quarry debris would occur at different sections of the site itself which was divided into “quarry pits: workshops: and trimming shops.” (Holmes 1894:12-15; Bryan 1950:8-9).

In the 30 years or so after Holmes’ 1919 publication Handbook of Aboriginal American Antiquities, no notable theories dealing with quarry manufacture arose. Instead, lithic tool typologies and the recognition for a greater diversity of flaked and expedient stone tools present at quarry sites was the focus. Holmes’ theory remained widely accepted and un-challenged until 1950 when Kirk Bryan examined the work and shortly thereafter published Flint Quarries-The Sources of Tools and, at the Same Time, the Factories of the American Indian. In his introduction, Bryan (1950:3-6) outlines his theories as;
“(1) that many of the so called ‘blanks’ and ‘rejects’ are usable tools, mainly axes, and that they were actually used; (2) that many flint quarries were not only sources of flint for export, but also industrial sites or factories to which materials such as wood and bone were brought to be worked in the presence of abundant tools.”

One theory of Holmes’ that would face a series of criticisms by Bryan (1950: 3-6) was his model of quarry site behavior including his proposal that all chipped stone artifacts left at the quarry were rejects created during manufacture. Instead, Bryan argued that bifaces in quarry contexts were tools and represented other activities unrelated to stone tool manufacture. One contributing factor for this assertion came from an observation by Henry Mercer, a contemporary of Holmes, who realized that the so-called quarry ‘rejects’ were turning up in excavations at nearby village sites. Also, according to Bryan, Holmes never strictly defined what entails a “blank” and he explained away the presence of other tool types as part of the ‘series’ in the production of the desired thin finished “blank”. Bryan (1950:3-6) also argued that Holmes had failed to consider the importance of the cores and flakes found at quarry sites.

In order to defend his idea, Bryan re-examined some of the same sites of which Holmes also worked on including the “Spanish Diggings” and “Alibates Quarry” sites. Upon doing so he argues that many of those artifacts lumped together as ‘blades’ are in fact tools created and used in industries other than blade exportation. This is accomplished through the identification of bifaces appearing to have been rechipped, those with use-wear, and those which have been broken as a result of use and not the result of stone tool manufacture. Further, “the large number of utilized flakes and utilized irregular fragments” is argued to support evidence of other industries on site than those of just “blank” manufacture (Bryan 1950:10).
Regardless of these criticisms, Holmes’ extractive industry theory has come full circle into the modern day of quarry behavior research and lithic production trajectory theory (K. Johnson 1981:6). At present Bryan’s 1950 thesis summarizing and criticizing Holmes’ theological standings is viewed as inaccurate and misrepresented. However, disregarding Bryan’s apparent misunderstanding of Holmes, his theories continue to be supported by some (Johnson 1981:2). For example, much later in 1981, Barbra Purdy substantiated Bryan’s work by describing a full range of stone implements excavated at the CCA quarry site in Florida (Purdy 1981; Ericson 1984:3). In a 3 x 3 meter excavation site Purdy and her team recovered over 10,000 lithic artifacts. Of these artifacts, 12% of the intentionally struck flakes and 15% of the angular shatter exhibited use wear. Among this plethora of utilized material only two artifacts had been manufactured bifaces. In addition to these utilized chert materials, a full range of tools including choppers to cut trees, adzes, burins and scrapers to work wood and bone have also been excavated at the CCA and Senator Edwards sites. Purdy (1984: 77-78) uses this finding to prove Florida’s ancient quarry industries were more than just for exporting stone but were where other activities separate from biface manufacture were conducted.

During the 1960s and 1970s, Don E. Crabtree’s flint knapping workshops enabled archeologists to begin to model processes of manufacture, uses of stone implements and raw material procurement (Ericson 1984: vii; Wormington 1953: viii). Yet, according to some archeologists, the utilization of quarry sites as portals for better understanding the intricacies of human behavior and culture was only fully realized in the late 1970’s and beyond. This is, in large part, because so much of the earlier work was descriptive rather than analytical.
Beginning in the 1980s and beyond quarry research became more problem oriented. In the introduction to *Lithic Resources of Florida* which he coauthored with Barbara Purdy, Ericson stated that

“To conduct a systematic analysis on a quarry is to open doors to a vast array of behavioral systems in which accounting for any one or more of the possible variables will encourage a better understanding of processes such as material extraction, stone selection, reduction, and other intra-site activities, as well as seasonal movement and uses of the landscape.” (Ericson 1984:1-2).

The primarily description based publications of earlier quarry research focused almost exclusively on tools have since been significantly broadened to include systematic investigations of stone debitage. Replication experiments and the ethnographic observations of the few modern groups in the world who still rely on stone tools have also helped to broaden understanding for human behavior at the quarry. (Purdy 1984: 72).

In regards to quarrying research for Florida specifically, few systematic studies exist. Simpson (1941) wrote one of the earlier more comprehensive accounts for Florida. Simpson conducted research in multiple counties across central and north central Florida in which he described the quarrying procedures that he observed. In areas that chert outcropped naturally, the Native Americans had dug pits or shallow trenches to expose the chert boulders. According to Simpson, large fires were set atop the chert boulders in order to break off smaller chunks suitable for spalling and reducing into tools (Simpson 1941: 32-34). Interestingly, Purdy attempted to replicate this fire-setting technique for chert removal at a prehistoric quarry in Marion County and found the action to be far too destructive to the siliceous material. A large tabular slab of chert was selected and a fire kindled and allowed to burn for approximately 30
minutes. Once the fire was removed a chert boulder was lobbed at the slab and water was poured on it. These actions thoroughly broke apart the slab but it was found that after cooling no piece could be knapped without fracturing because the heat and rapid cooling had destroyed the integrity of the chert. Purdy concluded that heat is used successfully with other types of stone like obsidian but the chert of Florida was likely not quarried with fire. If anything, fire would have been used to remove overburden of less desirable stone to expose the high quality material which would have been removed using a different technique. (Purdy 1984: 75-76)

The majority of Florida’s stone resources exist as chert boulders, nodules or slabs either suspended in the limestone matrix in which it was formed or spaced about in sand or clay substrates. It is in part because of these types of distributions that Purdy (1980, 1981, 1984) contends that Florida’s extractive industry more closely followed a description made by Holmes (1919) instead of the fire-setting claimed by Simpson (1941). Holmes named the technique ‘boulder quarrying’ in which stone, antler, wood and bone were used as picks to pry the nodules free of the clay and soil which held them. Numerous stone picks were recovered during excavations from the CCA and Edwards sites in Marion County Florida and according to Barbara Purdy (1984: 76) similar implements of antler also likely existed.

There will always be a variety of opinions for how specifically quarries were exploited and it is certain there is no one perfect explanation. What is undeniably the case is these answers depended on a set of variables. These could be any number and combination including but not limited to specific activities, the desired outcome, the time of the year, raw stone material type, what manner the raw material was deposited. All we can do as anthropologists is examine these questions objectively while maintaining a level of subjective thought so as not to overlook the human or cultural side of this field.
Quarry Characteristics

Before a stone tool can be created, raw material from which the tool is to be fashioned must be acquired. This activity will therefore be conducted across a landscape where suitable tool stone is located. Once a stone source has been found, it will be exploited through tool manufacture becoming a quarry site. When it comes to a lithic manufacturing system, the first and most logical place one should begin is at its physical origins, the quarry. After all, “the quarry is the most important site and component of the system” (Ericson 1984:1).

There is little uncertainty about the primary tasks performed at these stone resource locales and objective studies of quarry sites offer the archaeologist a glimpse into a multitude of the earlier human behavioral patterns (Odell 2003: 2-3). Reconstructing a prehistoric quarry production system is to reconstruct prehistoric human behavior for the system and thus understand a level of previous culture.

According to Andrefsky (1998), given the need and desirability for quality stone, ancient peoples are expected to use the nearest source of fine grained chert available. Fine grained materials allow for greater ease of manufacture and retains a cutting edge longer compared to lower grades. Least-cost analysis suggests that if good quality chert was available locally it would have been exploited as a raw material before engaging in relatively costly trade procurement. This has been evidenced by numerous quarry sites identified in peninsular Florida such as the Wetherington site in Hillsborough County and the Senator Edwards site in Marion County (Milanich 1994:78-80; 1998: 22-25).

On occasion across the southeastern United States, a procurement site will be incorporated as part of a large central based settlement. Central based sites are interpreted as locations where a range of activities were carried out including resource acquisition, tool
manufacture and maintenance, and habitation. These sites can be several acres in size or greater consisting in some cases of hundreds of thousands of artifacts and debitage. A particular site on Kanapaha Prairie in Alachua County Florida is known to be at least 45 acres in size and contains incredible quantities of debitage and bifaces in all stages of manufacture (Wayne: personal communication, 2012). One of the largest known central based settlement sites dates from the Middle Archaic (8A1356) and is located in Alachua County on the northern side of Paine’s Prairie (Milanich 1994:75-76). Other large quarry containing sites that may have functioned as central-based settlements are the Johnson Lake site and Haufler site in Marion County.

Both unambiguous short trajectory quarry sites and central-based long trajectory procurement containing sites have been noted all across Florida but this land based procurement pattern is not universal. Stone procurement areas are not limited to sink holes or outcrops exposed to erosional forces on land. During times of low or shallow water tables, chert was removed as nodules of broken off large exposed boulders in rivers and lakes. Evidence of this activity is observed in many locals and in NCFL, particularly, on the Santa Fe, Suwanee, and Withlacoochee rivers (Bryan 2008: 134-138, 155).

Exactly how this raw material was recovered after its location was discovered relied heavily on the geological context of the chert resource (Hatch and Miller 1985: 221). Many different types of quarrying procedures have been documented including subsurface mining through the excavation of pits, vertical shafts, and tunneling; also fire-setting to break chunks off of larger outcrops, surface collection of cobbles, and undercutting (Simpson 1941: 32-35). Regardless of how the raw stone procurement was accomplished, if it was a true quarry site several features are consistently observed. Holmes (1904) and Bryan (1950:33) each stated that inestimable amounts of waste material (debitage) will have accumulated along with numerous
incomplete, broken or ‘rejected’ (Holmes 1904) preforms and tools associated with the quarry activity itself. Accordingly, Odell (2003: 193) notes that quarry sites should contain higher frequencies of large primary flakes (both with and without cortex) and non-altered shatter and cores than other work site types. As a rule of thumb a flakes ventral surface will display the largest percentage of cortex at a quarry than anywhere else. Further, Bryan (1950:20-22) asserts that many quarries were not restricted solely to quarry activities and that such tools as axes, scrapers and perforators can also be present as evidence of other behavior such as wood, bone or hide working.

In addition, overall debitage counts and weights will also be greatest at a quarry with diminishing numbers of debitage the further one moves in distance from the source. This is simply because the original stone begins its reduction at its largest and covered in cortex before progressively shrinking as more is removed through knapping during early stage reduction. Significantly more stone must be removed to create a preform from a raw cobble than must be removed to finish out a tool from a preform, retouch a tool, or re-sharpen it. Biface production is an extremely wasteful use of raw material. “Replication experiments have shown that as much as 92% of the original nodule is discarded” (Newcomer 1971:90). Through applied archaeology, Crabtree observed that in order to create a single blade/preform, hundreds of waste flakes of all sizes will be left behind. Gould et al. (1971:161) proclaimed that several hundred flakes will be discarded before one is selected for additional modification. Agreeably, K. Johnson (1981: 101) states “the single, overwhelming characteristic of most lithic quarry-workshop sites is the incredible amount of debitage.” In other words, regardless of the primary or additional activities that may have occurred at a quarry location debitage will abound in voluminous quantity.
Biface Trajectory

Odell (2003: 91) generally defines trajectory as “a specific production system pursued by tool makers of a particular cultural group.” Biface trajectory models follow a stone nodule from initial procurement until the loss or discard of the tool (Odell 2003: 98). After procurement the material can begin as one of several core types depending on the cultures reduction strategies. Based on cores and tools recovered across NCFL the reduction strategy is determined to originate around amorphous core technology (Purdy et al 1984: 119-126). An amorphous core is defined by Holdaway and Stern (2004:179-181) as an artifact without a clearly defined shape or form that exhibit negative flake scars from which previous flakes were struck. In addition, cores must not have a ventral surface which eliminates the chance of a retouched flake appearing as a core. Amorphous cores otherwise known as ‘multidirectional’ cores have no apparent orientation of negative scars or platforms, with at least two platforms visible (Holdaway and Stern 2004; 180). An amorphous core arises after a chert nodule is selected for alteration and a series of one or more, large hard-hammer blows are delivered in an attempt to remove a suitable spall for further modification, or to set up a platform so as to eventually remove a suitable spall.

The following stages described below are a combination of trajectory steps defined by Callahan (1979: 36) and re-described by Odell (1996: 380; 2003: 100). With the arrival of an appropriate spall, the ‘initial edging’ began with percussion flaking enlisted to rough out an early stage preform. This resulted in a width to thickness ratio of 2:1 and edge angles between 55 to 75 degrees. Initial edging lead to the removal of large thick flakes and serves to provide the spall an edge were there was none or where the edge was too thin (Callahan 1979: 36).

‘Primary thinning,’ again with hammer percussion was then used to form a late stage preform with a width to thickness ratio of 3:1 or 4:1. Irregularities are removed and the edge
becomes more centered along the lateral plane. Flakes are still relatively large but have become thinner and the developing preforms blade edge now lies between 40 to 60 degrees.

Subsequently comes ‘secondary thinning’ in which through a mixture of soft hammer percussion and pressure flaking, the preform has developed a flattened cross section. The flaking is more controlled, closer together and often travels past the central preform margin. Edge angles are in the 25 to 45 degree range and width to thickness ratios fall between 4:1 and 5:1.

The post primary thinning stages that work to create the final product ready for hafting are called the shaping and specialty steps. Callahan (1979: 37) states “shaping is that stage in which the shape or outline is specified so as to prepare the biface for the subsequent hafting specialization.” According to Zim Padget, an experienced flint knapper, this is most often accomplished with pressure flaking, creating many small thin flakes with the flake scars often running parallel to one another along each blade edges (Personal communication 2014). Finally, in the case of most traditions with the exception of fluted points, the thinned and shaped specimen maybe notched, serrated, constricted, etc. to arrive at the final finished tool (Callahan 1979: 37).

After the use or damage of these stone tools, if they are not first discarded, they will be accompanied by one or more re-toolings (Odell 2003: 65-66). Retooling is a term used interchangeably with re-sharpening or repairing (Keeley 1982: 802) and can be performed with soft hammer percussion but is most often a pressure flaking activity. (Odell 2003: 61-65; 97-100).

It is important to note that although thermal alteration is considered a part of biface trajectory, this step may have occurred sometime during these reduction processes. Typically, it occurs sometime in the early stages after spall obtainment but before secondary thinning.
Factors including era, stone quality, convenience, desired outcome, available technology or other cultural variables will have played a role in the use of thermal alteration or the avoidance of it.

After these processes, all forms of tools are either discarded or lost in one form or another. Whether it be through discarding, breakage or loss. In general this is the bifacial trajectory path for chipped stone tools not only from Florida but of many stone exploiting peoples the world over.

**Distance from Source Analysis: Spatial Distribution of Debitage**

On archeological sites the world over where stone was utilized, retouched tools tend to constitute only a fraction of an entire chipped stone assemblage at roughly 3 to 5% (Odell 2003:118). This means that an astounding percentage of all chipped stone present at a site will be composed of un-retouched debitage debris making this waste material the dominant artifact class. Add to this knowledge the fact that the majority of this material is left where it fell or was discarded and not utilized and one can understand how important debitage analysis is for interpreting spatial distributions (Odell 2003:118-120).

Although natural unmodified lithic materials are present in some exchange systems this tends not to be the norm for Florida’s chipped stone production systems. Barbara Purdy (1981) argues that for Florida cherts such as rice grain, the cryptocrystalline nature of the stone coupled with human desire to reduce energy expenditures puts at minimum, the initial reduction stages at the quarry. The fossil foraminifera and crystal inclusions present throughout rice grain chert form weak points in the stone and a high possibility of breakage exists during manufacture. Rather than risking unnecessary energy expenditures by transporting raw material that has a tendency to fail during reduction, it seems logical to propose that at least the 1st stage of reduction be conducted on the procurement site.
The primary result of bifacial reduction is flakes and to a lesser extent, angular chunky debris called shatter. Research questions dealing with the size and quantity of these classes of debitage can be explored using statistical analysis and to determine if correlations exist between the spatial distribution of debitage and the distance from the raw stone procurement area. One of the main approaches is to develop models of lithic debitage drop-off. Using debitage variables for a given research area can allow researchers to identify the distance one or more sites is from an unknown quarry location. On the other hand, if a quarry site is known, a debitage distribution model could be created to predict the proportionate frequency of several variables including relative flake size, percent of cortex, and flake type.

Flake size is interpreted to be a measure of debitage placement within a trajectory stage. Large flakes and debris are expected to lie in or near the immediate vicinity of a procurement source (Johnson 1981: 111). This is because larger flakes are removed during early reduction from larger cores and spalls, becoming increasingly smaller as the material getting reduced shrinks and the flakes being removed become more precise. When dealing with bifacial reduction, the relationship between tool size and flake size go hand in hand (K. Johnson 1981: 102). Therefore, early stages of manufacture will result in a greater proportion of large flakes than will be present at later stage manufacturing sites. These were the typical behavioral patterns found at Florida lithic procurement sites from whence material would then be moved out across the landscape in a later reduced stage (Purdy and Ericson 1984).

With the understanding of what stone tool manufacture produces across the stages of production, excavations at the Edwards site conducted by Barbara Purdy (1981; 1984) revealed the expected drop off trend of local lithic debris the further each test unit moved from the quarry. In two excavation units, one on the quarry site and one off the out cropped stone area, a
significant negative correlation between flake counts/weight and distance from the raw source was revealed. The unit on quarry contained over 10,000 lithic artifacts with an average weight of 20 grams per specimen and the unit away from the quarry contained 4,069 lithics with an average weight of 4 grams. This second unit contained a large percentage of small finishing flakes and heat treated debitage constituting 29% of the total artifact count between the two units but only 7% of the total weight (Purdy 1984: 78-80).

A spatial distribution study conducted by Jay K. Johnson (1981) suggests that if a certain variety of chert debitage is located immediately at or near that chert varieties geologic source area than a relationship between distance from source and the source-specific chert will be present. As the distance of a given debitage assemblage increases away from its original geological source area a negative correlation should be observed in several variables. In Johnson’s report, it was the proportion for abundance of that specific variety of chert within an overall site assemblage that was expected to drop the further each of Johnson’s 13 tested sites fell from the chert quarries. This was tested by locating coordinates for both the site and source locations and then computing the respective distances. Of the seven different chert types considered, five fulfilled the hypothesis for source drop-off analysis, two of which proved to be significant negative correlations. (Jay Johnson 1981; 124-127)

Another study conducted by Anderson and Hanson (1988) used chert material type distributional patterns to support their ‘band-macroband settlement model’ for the Early Archaic era of the Savannah River Valley. This proposed that each individual ‘band’ of people engaged in seasonal movement almost exclusively along a particular drainage. Only occasional aggregation events occurred when two or more bands interacted as a ‘macroband’ motivated by economic and social callings (Anderson and Hanson 1988: 265-271). One technique Anderson
and Hanson utilized to draw their conclusions was an analysis that examined the frequency distributions of raw stone material along the Savannah River drainage. By creating a distribution map of projectile point material varieties of the Early Archaic, they were able to show a gradual distance from source drop-off of Piedmont quartz and coastal plains chert the further sites moved up or down the Savannah River away from the original geological stone sources. With this, Anderson and Hanson (1988:280) argued this material from source drop-off supported group mobility along the Savannah River drainage. Further, because the local raw material was more frequent along the drainage instead of across multiple drainages, group activities predominantly occurred within a single drainage throughout the year. (Anderson and Hanson 1988:265-280; Daniel 2001; 238-240)

In response to this ‘band-macroband model,’ Randolph I Daniel, Jr (2001: 237-265) conducted a spatial distribution analysis for rhyolite frequencies across and along the Yadkin Pee-Dee of the south Atlantic slope. He first tested this “model’s posited watershed based settlement range with respect to the frequency distributions of Early Archaic point raw material types” Daniel (2001:239). Secondly, he examined the proposed connection between tool curation and site types (Daniel 2001:239). Daniel initiated his study by conducting an intra-site spatial analysis of stone tools and lithic debris on a known Early Archaic camp along the Yadkin Pee-Dee River. He determined it had functioned as a quarry oriented base camp characterized by the extraction of Uwharrie rhyolite for tool manufacture. Palmer and Kirk projectiles of Rhyolite and non-Rhyolite materials were then examined along the river and across to neighboring river drainages. Daniel (2001:245) found that rhyolite raw material frequencies dropped off from 90% in the Yadkin Pee-Dee geological source zone to less than 30% near 200 km away running northeast/southwest along the Piedmont. Frequencies dropped from 90% to 25% following the
river out to the coast. Utilizing the distance from source drop off results, Daniel contends the band-macroband model does not hold up at least along the Yadkin Pee-Dee. Instead of bands remaining within their respectable drainages only, these groups both moved parallel to the drainage and perpendicular across other drainages.

In 1990 Shackley published a paper detailing obsidian use for several Paleo and Early Archaic sites in Arizona. Through obsidian sourcing, Shackley (1990) was able to show that these early inhabitants were exploiting locally available sources as opposed to engaging in long distance trade from other tool stone sources (Odell 2003: 66-67). This was accomplished by comparing the percentage of cortex remaining on the obsidian artifacts. A negative correlation between the distance from the obsidian source and the amount of cortex was observed. Of similar interest, Mitchel and Shackley (1995) also showed a significant distance from source drop-off for obsidian material utilized by the Hohokam. Through x-ray diffraction Mitchel and Shackley identified that the majority of obsidian on Hohokam sites originated from nearby quarries. A rapid fall off rate of obsidian from these particular quarries was found to be clear as distance increased. Both studies (Shackley 1990 and Mitchel and Shakely 1995) concluded tool stone procurement was an embedded strategy for these prehistoric groups. This meant that instead of engaging in long distance trading or direct procurement from sources outside of the foraging home range, the stone was selected for and procured with in the territory and usually as a part of other foraging/collecting activities.

Although these spatial distribution tests differ for the types of variables tested, the ultimate goals were the same. Proving that a relationship exists between either the chert,debitage, or point types and distance was the goal and it has indeed been shown that regardless of these variables, there is a clear distance from original source drop off in every provided variable.
CHAPTER 4 – METHODOLOGY: DATA COLLECTION

The methodology for this project consisted of four phases of operation developed to maximize data collection necessary for the research goals. These four phases were: (a) preliminary information collection; (b) field survey; (c) artifact sorting and aggregate analysis; (d) Statistical analysis. The first part of this chapter will discuss operational procedures conducted both before entering the field and while in the field. These steps include background information collection, the shovel testing and delineation process, additional excavations and the recognition of geologically and culturally significant features. The fourth section describes the methods utilized in processing the information and artifacts recovered during the field season. This will include initial artifact processing, the types of data analysis and how and why the early stages of analysis were conducted. The final section describes the statistical procedures which were used in this thesis.

Preliminary Work

An evaluation of the Florida master site files with permission from Vince Birdsong of Florida’s Historical Resources Department revealed numerous archeological sites on the southern shores of Orange Lake in Marion county as well as others on the northern shore between Orange and Lochloosa Lake and Western shore between Paine’s’ Prairie in Alachua county. These sites range in size, age, and occupational depth from the Paleo-Indian (12,000 B.C.) through the Timucuan Chiefdoms of the Mississippian and Contact eras. These sites
include a large Potano village on the west Shore excavated by Goggin in 1950 and again by Milanich in 1970; a series of Alachua Villages on the north shore; and a sand mound complex about 1 mile to the east of William’s Hill.

Historical maps and documents obtained through Labins, USGS and South Arc Inc., define the lake area as relatively undisturbed until the early 1900’s when, after much logging in the region, approximately 75 of the 90 acres was converted into citrus grove. A heavy freeze in the 1950’s and again in the 1960’s led to the ultimate abandonment of the region for citrus cultivation. It is clear that the area around Orange Lake shares in a rich history of human activity, yet no sites of either prehistoric or historic occupation had been previously recorded by the state in or near the project bounds for approximately ½ mile or more in any direction.

With such a limited quantity of information to begin with regarding the immediate vicinity of the project area, it was decided with the help of Lucy B. Wayne, Martin Dickinson and Jay K. Johnson to conduct a phase I systematic subsurface survey in accordance with the FDOT and DHR standards. All middle level probability zones are to be systematically shovel tested on 50 m intervals with each unit measuring 0.5 m in diameter and no less than 100 cm in depth. Only when shallow bedrock, hardpan, saturated soils, or dense modern fill renders this depth not possible may this be less (Cultural Resource Management Handbook, FDOT 2004: 4-22 to 4-24). As an exploratory process, this type of approach to field work was the best option for the systematic recovery of archeological information. It allowed for spatial and temporal interpretations of the project area as a whole.
Shovel Test Procedure

With the greatly appreciated guidance of John Davidson of South Arc Inc., a 1:4,000 scale topological map from USGS was obtained and a 50 meter grid was plotted over the entire project area oriented to true north. This was done by hand using an Alvin triangular scale ruler. The northing lines were assigned whole numbers beginning with 0 which then stepped upwards in increments of 1 for each shovel test heading northward. The southern property line did not run due east however and as a result some lines contained a northing of (-1). To avoid confusing numbers, the easting line was began at #20 and moved successively upwards in increments of 1. The first shovel test was initiated in the property’s south-west corner with an arbitrary coordinate of N1: E20.

When a shovel test landing on the 50 meter grid is positive for cultural remains it is recommended that it be delineated on a half grid scale of 25 meters in the 4 cardinal directions (Cultural Resource Management Handbook, FDOT 2004). Not surprisingly given the proximity to the wetland environment, the vast majority of the original grid tests were positive (101 of 122 shovel tests). Unfortunately, a lack of adequate labor and a very short field season meant that not all of the positive shovel tests could be delineated. Several factors were considered in selecting the areas to be delineated. These included the quantity of lithic materials (debitage) recovered in a unit; the possibility of bounding out an artifact concentration; the presence of diagnostic ceramics or stone tools in a unit; and/or a units proximity to cultural or geological features of interest such as sinkholes, stone outcrops, the lake shoreline, historic structural remains and as in one instance a natural land bridge between the lake shore and a series of connected depressions. A total of 95 twenty five meter delineation units were completed as well.
as an additional 9 judgmental test units which were placed in areas of interest that did not fall on grid for a grand total of 226 shovel tests.

In order to maintain the accuracy of the testing procedure a 2 person crew utilized a standard 50 meter tape and 2 compasses to sight back from one shovel test to the next. Using line of site, units were placed on grid, dug, and the locations recorded with a hand-held Etrex Garmin GPS. All other natural and cultural features of importance were also given coordinates. Later, Garmin DNR software obtained from the University of Minnesota was used in conjunction with Google Earth and ArcMap 10 to import data from the GPS and create several maps to illustrate the points and data collected.

In order that artifact recovery would be standardized, each shovel test was screened with ¼ inch hardware cloth, dug as a square 50 x 50 cm hole and extended to no less than 1 meter in depth unless the clay hard-pan was reached beforehand. The clay hard-pan found throughout north central Florida is a densely compacted substrate of fine clay particles and concreted sand that was deposited during the Early Pleistocene roughly 1.8 billion years ago (Bryan 2008:92). It is a general rule of thumb that cultural materials are not found in or beyond this layer and therefore further excavation is not required. In some cases shovel tests ran beyond a 1 meter depth when artifacts were recovered at the meter mark. Although this was an infrequent occurrence, when it did occur it was noted on the individual shovel test form and a description and count of what were found was written.

After the excavation of each unit a field form was filled out containing pertinent information about the test and the surrounding area. If the test was positive a field survey number (FS#) was assigned and the material was placed together in a single labeled zip-lock bag. It is important to note that although artifacts were not bagged separately per level, detailed
descriptions were made during the excavation of a unit and at its completion on a shovel test form. This included an array of descriptions such as diagnostic artifacts or concentrations of debitage recovered and at what level, stratigraphic profiles, final depth, and proximity to features on the landscape in the immediate area, and the local conditions observed. When soil stratigraphy was present (as this was not always the case) a profile was drawn with the measurements of the levels and a description of the type of substrate. The notes detailing the stratigraphic profiles and levels artifacts were recovered led to the recognition of a common trend over most of the project area in which debitage was most often present at three depth ranges. The 5-30 cm assemblages were made up of mostly raw local cherts and occasional non-local cherts; 45-75 cm contained large amounts of thermally altered local chert and from 90 cm to 1 meter or more heavily patinated local cherts were recovered. As a result of diagnostic stone tools and ceramics found accompanying these levels, it may be safe to suggest the top level represents Woodland to Mississippian, the central level is likely Middle-archaic and the bottom most, an Early-archaic tradition.

After the completion of the field season, all shovel tests, cultural features, and natural features that had been recorded with a GPS were overlaid onto a satellite image of William’s Hill. This Map can be seen below as figure 5. The blue dots with joining white numbers represent all shovel tests excavated. The red and yellow tacks were placed on historic structural remains left from the citrus industry and each are labeled with an identification. The red and purple circles with the adjacent ‘S’ symbol represent sink holes with the red indicating dry sinks and the purple indicating water filled sinks. The pink tear drops in the northwest property corner indicate groups of chert boulders exposed at the surface. Finally, the two thin yellow boxes
labeled U-1 and U-2 mark the location of the two 1x2 meter units excavated during the phase II part of this research. These two units will be discussed in the following section.

![SHOVEL TESTS AND PROPERTY FEATURES](image)

**Figure 5** Location of shovel tests (in blue) and other property features.

### Additional Excavation

At the end of the shovel test phase of the project, two 1 x 2 meter excavation units were each placed in areas near shovel tests which had contained unusual artifact concentrations. The purpose of these two units was to add controlled stratified data to the information already recorded during shovel testing.

Unit 1 was placed at a location of dense thermally altered local chert 50 meters due south of a set of chert boulder outcrops representing the NW quarry. At the time it was unclear
whether this concentration was associated with the quarry site and therefore was selected to determine if so. The area for this 1 x 2 meter unit was selected based on the sheer volume of heat-altered material found which far exceeded the density anywhere else on project. Specifically, Unit 1 was placed at the south-east corner of shovel test #194 because of all the tests on grid in the immediate area it contained the largest quantities of altered lithic debris. Although this area was located relatively close to the NW Quarry it did not display any of the same assemblage traits. Unlike the NW Quarry, this area was almost exclusively thermally altered chert and no evidence of quarry related artifacts or raw chert nodules were found during shovel testing. This excavation was dug for the opportunity to discover if this area was an extension of the quarry or a separate debitage concentration indicative of another set of activities.

Unit 1 was excavated to a depth 115 cm in 10 cm arbitrary levels with the exception of level one which was dug through the plow zone to 25 cm below surface. Aside from a Pinellas point dating from A.D. 750- A.D. 1700 found at a depth of 5 cm in the plow zone, no other diagnostic tools were recovered. A complete thermally altered preform made of local chert was recovered in level 4 and another partial in level 6. The highest concentrations of debitage were recovered from levels 3-6 with the maximum occurring at level 4. Three non-diagnostic sand-tempered sherds were found in level 1 and no features of cultural significance were found at any level.

No evidence was found suggesting this small area was an extension of the NW Quarry. The two preforms found were late stage in the trajectory. These preforms and the occurrence of nearly all thermally altered material could suggest the heat treating area where, after material was reduced at the NW Quarry it was transported for thermal alteration and further reduction.
The second unit was placed in an area where Alachua period pot sherds such as Alachua Cobb-Marked and Prairie Cord-Marked were found most frequently during shovel testing. The Alachua tradition dates from A.D. 800 to A.D. 1700 and is divided into four sub-periods based on ceramic type frequency or the presence of Spanish artifacts. Levels were dug in the same manner as Unit 1 except that the plow zone extended to 30cm. A funnel shaped feature mixed with small bits of charcoal and Alachua Cord-Marked sherds was first observed in level 3 in the west wall and extended out in a half circle to the east just past the center of the unit. The feature was followed down to 92 cm when charcoal and pottery were no longer observed. Staining from the feature extended to 102 cm. All of the pottery recovered dated from the Alachua tradition of A.D. 600 to 1600. Four diagnostic points were also recovered in levels 1 and 2 dating from the same period and no Spanish artifacts were found.

At the completion of each level in both 1 x 2 meter units the floors and western walls were photographed. After the final level was dug each of the 4 walls of both units were profiled and photographed. Given the project restraints, the combination of shovel testing and exploratory units was the reasonable choice for exploring the culture history for this area. It also has provided the appropriate data required for determining if the distance-from-source research problem can be addressed.

**Lab Work and Base Data Analysis**

After completion of the field season, artifacts were washed and sorted into lithic, ceramic, or historic categories. Historic artifacts were not common and play no role in this project. Therefore only a basic description was recorded in spread sheet form of each artifact when present. Prehistoric ceramics were identified by type and each type’s identification marks and
attributes were placed in spread sheet format using Microsoft Excel. Beyond listing the type, time range, and count per test unit, other details such as cultural affiliation, temper, inner/outer/core colors, and rim or body sherds were noted. Although all types were individually tallied, only an overall weight for pottery was recorded per shovel test. While a detailed pottery analysis was not necessary for this thesis, the information was still recorded as it may be useful in future research.

Debitage was analyzed with an aggregate analysis technique. Also sometimes referred to as mass analysis, this is a technique developed by Stan Ahler (1975) for deriving inferences on behavior from large amounts of debitage. On a far lesser note, aggregate analysis was also originally chosen for its time and cost effectiveness in assessing medium to large assemblages. The argument that aggregate analysis criteria will not imply anything about the technology of the artifacts in an assemblage was not a drawback. Instead, the readily available core and bifacial artifacts with in the assemblage proved adequate when accessing the technological basis.

Utilizing aggregate analysis protocol, lithics were divided into 4 main categories 1) debitage; 2) core; 3) implements; and 4) unmodified. Unmodified stone was simply noted and set aside. Debitage was split into flake or shatter (angular fracture) classes and then further divided based on whether the flake or shatter had been thermally altered or left raw. From there these groups of ‘thermal flake, non-thermal flake, thermal shatter and non-thermal shatter’ were separated using screens into 4 size grades. These include; ¼” to less than ½”; ½” to less than 1”; 1” to less than 2”; and 2” and above. Once everything was sorted, each group was counted and weighed for each shovel test. Thus, 16 variables for shatter and flake count and 16 variables for shatter and flake weight were recorded for each shovel test. Figure 6 below is a breakdown of this lithic cataloguing.
Figure 6 - Dendrogram of Lithic Categories

Note: Incomplete can be proximal, distal or medial.

T=Type  C=Complete  N=Non-thermal  U=UID

Dendrogram of Lithic Categories
For the reason that long thin flakes may fall through a screen size because the flake width could less than that screen size, flakes were hand manipulated to ensure they were recorded in the correct screen size class. Also, because ¼” screens were used to sieve shovel test fill, no sizes were recorded that are less than ¼”.

Cores and Core fragments were considered as separate from debitage despite their role in the lithic reduction sequence because of the importance cores can play in distinguishing quarries from other kinds of work sites. After separating complete cores from core fragments, these artifacts were divided by whether they had been thermally altered or not and typed when possible.

Stone tools are defined as stone items that have been modified by humans to serve a purpose or perform a specific task. Tools were first divided into projectile and non-projectile groups. The projectile group, a general term to include all tools with a defined hafting structure, was separated into classes in terms of completeness (complete, proximal, medial, or distal). Medial and distal fragments were determined to be a finished biface on the basis of the presence of fine secondary and retouch flaking. They were then typed if enough identifying attributes were present and when thermal alteration was present it was noted. In the non-projectile rank, classes were deemed as bifacial, unifacial, or utilized/retouched flake. These tools were then also judged on completeness, whether thermal alteration was present and typed when feasible.

Later, all stone and chert material types for each of the categories was identified and recorded in Excel. Because the 25 meter delineations were not dug consistently across the project area, only the shovel tests landing on the 50 meter grid were addressed. This step was imperative in order to show what percentage of stone was local and thus may have originated from the quarry site.
Once this series of aggregate data collection was completed, a group of maps were created in Arc Map 10 to allow for the visualization of what was actually collected. These included a density distribution map for debitage (figure 7), Alachua period pottery, and a debitage concentrations map. Also, using Excel, a set of graphs and pie charts were drawn up to display the results of the various lithic size classes and other categories.

The density map below illustrates the lithic counts per shovel test for the 90 acre parcel of William’s Hill. To put it into perspective, the green regions signify shovel tests containing 30 or fewer lithics and the hot spots seen as red and orange signify shovel tests containing 100 to 500 lithics. The black paw print looking figures are graduated symbols for each shovel test, with their size dependent on total lithic count for that shovel test.

![Debitage density map overlaid on a topographic map of William’s Hill.](image-url)
Statistical Analysis for Distance from Source Drop-Off Testing

In this final stage of the analysis, distance-from-source-drop-off tests were conducted using the accumulated aggregate data in conjunction with statistical analysis. Raw debitage counts could not be used with this analysis because collection size from one shovel test to the next does not allow for the comparison of flake screen size ratios. Shovel tests represented by a large quantity of debitage would cluster together regardless of their similarities or dissimilarity in terms of debitage screen sizes. The technique used to overcome this error was proportional conversion. The total number of each flake screen size group for each shovel test was tallied and divided by the total number of flakes for the entire assemblage from that shovel test. This allowed shovel tests with hundreds of flakes to be compared with those of only a few for similarities in debitage screen size composition.

The constraint of project size (90 acres) demanded this distance from source study be performed on a micro-scale in which trends and patterns were explored in meters. To begin, a polygon enclosing the extent of the NW quarry was created based on maximum lithic counts and locations of chert outcrops. Utilizing a distance tool in Arc Map 10, the exact distance of every shovel test from the quarry boundary was calculated in meters out to the eleventh decimal place. The distance measurements for each corresponding shovel test were then imported into Excel and incorporated into various spread sheets with the previously determined debitage data. The correlation function provided in Microsoft Excel was well suited for discovering what types of relationships if any existed between the artifact data and its distances from the NW quarry. SPSS software was used to create bivariate plots so that the correlation frequencies could be visualized for both the distance and elevation based tests. Also, the SPSS plotting was helpful in
assessing how strong the correlations truly are based on the linear distributions of points along the slope.
CHAPTER 5 – METHODOLOGY: ARTIFACT CLASSIFICATION

The word type refers to a certain kind of artifact “in which several attributes combine or cluster with sufficient frequency or in such distinctive ways that the archaeologist can define and label the artifact and can recognize when he sees another example” (Hole and Heizer 1973:201). For the purpose of systematizing descriptive data in this analysis the characteristics for what constitutes each artifact class are explained. Each explanation contains definitive attributes for each type which were derived from descriptions by Purdy (1973), Dowdy et al (2003), Powell (), Bullen (1972; 1975), Milanich (1976; 1994), Odell (2003), Goggin (1948; 1950; 1998), Wiley (1998) and personal experience. This chapter is split into two primary sections: Lithics and Ceramics. These two sections are further organized first by descriptions for the general artifact categories and second by specific definitions for each artifact type recovered. The table (2) below provides a general break down of the lithic and ceramic diagnostic artifacts recovered for each phase as well as the proportion each makes up of the total diagnostic assemblage.

Table 2 Count and proportion of diagnostic artifacts for each temporal phase

<table>
<thead>
<tr>
<th>Phase</th>
<th>Lithic</th>
<th>Ceramic</th>
<th>Total</th>
<th>Prp of Total diagnostic Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Archaic</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Middle Archaic</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>2.00%</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>2</td>
<td>24</td>
<td>26</td>
<td>13.00%</td>
</tr>
<tr>
<td>Woodland</td>
<td>4</td>
<td>12</td>
<td>16</td>
<td>8.00%</td>
</tr>
<tr>
<td>Mississippian</td>
<td>6</td>
<td>148</td>
<td>154</td>
<td>76.00%</td>
</tr>
<tr>
<td>Undetermined</td>
<td>45</td>
<td>126</td>
<td>171</td>
<td></td>
</tr>
</tbody>
</table>

Total dated diagnostics: 203
Total possible diagnostics: 374

Note: Undetermined ceramics were identified by type but could not be distinguished between Woodland and Mississippian periods.
Debitage, Core and General Tool Class Definitions

Unlike projectile types, many non-projectile tool types were manufactured across long spans of time and provide only general chronological information. Therefore, attempts to specifically date each non-projectile tool type will not be made and only a broad time frame is provided (e.g., Paleo to Mississippian). All lithic categories that pertain to this thesis will be defined including flakes, shatter and cores; and all projectile and non-projectile tool types recovered during excavation are described.

The first type to be discussed is the flake which is a debitage category that tends to represent the majority of materials recovered from stone tool production sites. Figure (8) below is a personal hand drawing of a flakes attributes inspired by George Odell (2003: 54). In this analysis flakes were not divided into classes for completeness (i.e. complete, distal, proximal, and medial). Whether complete or incomplete, if the debitage in question exhibited characteristics of a flake and no other qualities such as those associated with angular shatter then it was placed in the flake category.

According to Odell (2003:54) a flake is defined by particular characteristics on the ventral and dorsal side of a piece of debitage. The dorsal face Cortex may or may not be present on the dorsal face, depending on the stage of manufacture when the flake was detached. If the entire face is not covered with cortex, there will be negative flake scars which resulted from flake removals earlier in the knapping process.

The ventral face of a flake is readily identifiable by several prominent features. The striking platform will be located on a flakes furthest proximal end (the area in which a blow was delivered to detach the flake). As a result of the blow of force an outward protrusion known as the bulb of percussion will be evident directly below the striking platform on the ventral surface.
Figure 8 Attributes of a Flake.

Below the striking platform features called ripples or undulations can frequently be observed radiating from the bulb surface and even down the face of the flake appearing as raised areas running in a pattern concentric to the point of force (Odell 2003:55). Four other attributes useful in the identification of flakes are lances, fissures, radial striations and gull wings. Odell
(2003:55) notes that the first three of these appear as “tongues emanating from the fracture front and always point back to the origin of force application.” Sometimes (particularly in the accompaniment of excessive force) a small nick or chip called an eraillure scar will be visible situated perpendicular to a radial striation on the bulb.

A ‘gull wing’ resembles a constricted tear drop shape and the point of this tear drop always faces away from the source of force. Gull wings can occur anywhere below the bulb of percussion where the force front of energy created during a flakes removal ran into an impurity in the raw material. When dealing with incomplete flakes, particularly fragments lacking a striking platform or bulb of percussion, the features described above are helpful in identifying the origin of force and hence distinguishing a flake from other debitage. (Odell 2003:54-56; Crabtree 1972:64; Cotterell and Kamminga 1990: 150)

Finally, the qualities of the distal end of a flake are useful in identification especially when one can recognize types of termination. Termination types include feather, hinge, step, outré passé, and axial. Feather termination occurs when a fracture “propagating roughly parallel to the outside surface of the core gradually comes to meet it” (Odell 2003:57). A flake with this type of termination will have a thickness which tapers to a thin sharp edge around most or all of the entire edge except for the striking platform. Hinge and step fractures have similar features to each other in that through a sudden bending of energy outward or loss of energy from an internal flaw, the distal end of the flake appears incomplete or broken. In the case of hinges, the distal end is rounded and in the case of steps the end will appear broken or snapped. The termination type known as outré passé occurs when the strike force bends around the bottom of a core thus removing a portion of it. This is also common in biface reduction when the flake removes the opposite edge from where the platform was struck. Finally, axial termination transpires when the
force fracture moves directly through the middle of a nodule to the other end. This type of flake is relatively uncommon in knapping trajectories outside of bipolar technology. (Cotterell and Kamminga 1987:699-701; Odell 2003: 57-58)

During debitage sorting, an artifact that lacked the distinguishable flake attributes described above was allocated to the shatter category also called ‘angular debris’ or ‘blocky fragments’ by some analysts. There are two major stone tool production events which result in shatter. Either chunky blocks result through the fracturing process of stone knapping or from stone that fractures during the heat treating process (Odell 2003: 121-122).

Flakes with edges parallel to each other and that were 4 to 5 times as long as they are wide are classified as blades. The dorsal face exhibits scaring running parallel with the length of the blade from two or more previously removed blades and the ventral face is unifacial. Cross sections range from triangular, trapezoidal, or rectangular. Blade edges can be sharp and unaltered, but often will exhibit use wear on one or both edges. When a blade did not exhibit use-wear or post removal alteration of any kind it was included in the debitage counts. If wear was present then it was classified as a utilized blade and therefore an expedient tool and not included in debitage counts.

Flakes that did not fit into the blade class but were utilized were assigned to their own class; utilized flake. The term utilized flake is a catch all name used to describe any flake with one or more edges that exhibit use wear. Use wear is created as the sharp edges of the flake are dragged or scraped against a surface. This expedient tool type can be any shape, size or thickness with no set form and use depended on what was at hand or what task needed performing.
Of the handful of complete and partial cores recovered during shovel testing all were amorphous cores: un-patterned cores used in the creation of expedient flake tools and bifaces (Jay K Johnson, personal communication 2012). The complete core specimens consist of a blocky chert nodule or chunk with large negative flake scarring across 90% or more of the surface area. The core fragments were identified with one or more faces appearing flat or angularly broken and the other faces composed of negative flake scarring.

**Uniface vs. Biface:**

**Uniface:** Unifacial tools are produced when a spall or unmodified blank is reduced from only one of its two surfaces. This results in an absence of bifacial symmetry in which the working edge is below the medium horizontal plane. The finished profile results in one face appearing flat and devoid of flake scars while the opposing face is angled or convexly rounded and partially or completely covered in negative flake scars. Examples of such tools included end scrapers, Hendrix knives, gravers, and spoke shaves. During analysis all artifacts with unifacial characteristics were classified as unifaces and if attributes existed to type the specimen this procedure followed.

**Biface:** In the most basic of forms, bifacial tools are defined as artifacts that show intentional flaking on both of the opposing faces (Odell 2003:97). Bifaces can be identified during almost every production stage either as items that never made it to the end of the intended trajectory, items that were broken and discarded during the manufacturing process; or items that the maker found useful in the particular stage of the trajectory and therefore were not reduced further. Common bifacial tools include projectile points, axes, drills, hafted scrapers (blunts) and adzes. In this research work, the term ‘biface’ will be used generically to describe any artifact with bifacial reduction.
When sufficient detail is present for identifying a tool type, such as was the case for most projectile type tools, the artifact is described and assigned to a type. All other artifacts that appear unfinished or do not have a defined hafting area have simply been labeled as a biface. This includes preforms or modified blanks in all levels of completeness as well as all other bifacially flaked tools which do not fit a particular tool type or out of incompleteness cannot be positively identified. The table below (table 3) illustrates all lithic artifacts recovered during this project and the corresponding time frames they belonged to. Also included at the bottom of the table is the single bone artifact found.

**Specific Tool Type Identifications**

This next section specifies the typological parameters used identifiable the bifacial and unifacial tools recovered on project. Since tool types are based on an ideal form, artifacts meeting all of the ideal criteria are seldom seen (Purdy 1981:5). Considering the many factors which result in artifact variation such as material inconsistencies, personal preference and cultural conditions it is no wonder typology is not an exact science. Still, there are general trends in the shapes of stone tools which can be used in classifying them into temporally diagnostic types.

Coupled with context (when available) the basal configuration (stem, shoulders, ears, junction of stem to blade) of all projectile/knife forms is the primary set of traits used to determine a bifacial tool type. Other useful and often necessary attributes considered include flaking patterns, cross section, size, overall shape, and distal end variation. Blade form (blade edge shape) is mentioned in each description based on what most often is found for that listed point type. The problem with using blade edge as an attribute is that it usually will depend on what stage of use or re-sharpening the point was in when it was lost or discarded and can vary
Table 3  Lithic and miscellaneous artifacts.

<table>
<thead>
<tr>
<th>Lithic and Miscellaneous Artifacts</th>
<th>Prehistoric Categories</th>
<th>Artifact Type</th>
<th>Production Range</th>
<th>NCFL Tradition</th>
<th>Total Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refuse:</td>
<td></td>
<td>Flake</td>
<td>12000 B.C. - A.D. 1700</td>
<td>ALL</td>
<td>5265</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shatter</td>
<td>12000 B.C. - A.D. 1700</td>
<td>ALL</td>
<td>282</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chert Nodule</td>
<td>N/A</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Core/Core Fragment</td>
<td>12000 B.C. - A.D. 1700</td>
<td>ALL</td>
<td>12</td>
</tr>
<tr>
<td>Utilized:</td>
<td></td>
<td>Blade</td>
<td>12000 B.C. - A.D. 1700</td>
<td>ALL</td>
<td>16</td>
</tr>
<tr>
<td>Manufactured:</td>
<td></td>
<td>Newnan</td>
<td>4500 B.C. - 3500 B.C.</td>
<td>Middle Archaic</td>
<td>1</td>
</tr>
<tr>
<td>Projectile:</td>
<td></td>
<td>Marion</td>
<td>4000 B.C. - 3000 B.C.</td>
<td>Middle Archaic</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hernando</td>
<td>1000 B.C. - A.D. 200</td>
<td>Orange - Cades Pond</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Taylor</td>
<td>500 B.C. - A.D. 500</td>
<td>Cades Pond</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weeden Island</td>
<td>750 A.D. - 1700 A.D.</td>
<td>Alachua</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pinnelas</td>
<td>750 A.D. - 1700 A.D.</td>
<td>Alachua</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ichetucknee</td>
<td>1250 A.D. - 1600 A.D.</td>
<td>Alachua</td>
<td>1</td>
</tr>
<tr>
<td>Bifacial Tool</td>
<td></td>
<td>Scraper/Gaver</td>
<td>12000 B.C. - 1700 A.D.</td>
<td>Paleo - Contact</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blunt Scraper</td>
<td>12,000 B.C. - 500 A.D.</td>
<td>Paleo - Cades Pond</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cross Creek Perforator</td>
<td>A.D. 100 - A.D. 700</td>
<td>Cades Pond</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill</td>
<td>12000 B.C. - 1700 A.D.</td>
<td>Paleo - Alachua</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preform</td>
<td>12000 B.C. - 1700 A.D.</td>
<td>Paleo - Alachua</td>
<td>9</td>
</tr>
<tr>
<td>Unifacial Tool</td>
<td></td>
<td>Unifacial Scraper</td>
<td>9000 B.C. - 5500 B.C.</td>
<td>Transitional Paleo - Early Archaic</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thumbnail Scraper</td>
<td>12000 B.C. - 2000 B.C.</td>
<td>Paleo - Cades Pond</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Endscraper</td>
<td>12000 B.C. - A.D. 700</td>
<td>Paleo - Cades Pond</td>
<td>3</td>
</tr>
<tr>
<td>Other Tool (Lithic)</td>
<td></td>
<td>Abrader</td>
<td>12000 B.C. - A.D. 1700</td>
<td>Paleo - Alachua</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hammerstone</td>
<td>12000 B.C. - A.D. 1700</td>
<td>Paleo - Alachua</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burningish Stone</td>
<td>4500 B.C. - A.D. 1700</td>
<td>Middle Archaic - Alachua</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steatite Sherd</td>
<td>4000 B.C. - 1000 B.C.</td>
<td>Middle Archaic - Orange</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ochre</td>
<td>Dates Unknown</td>
<td>Paleo - Alachua</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flake Knife</td>
<td>12000 B.C. - A.D. 1700</td>
<td>Paleo - Alachua</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tool Fragments (NoID)</td>
<td>12000 B.C. - A.D. 1700</td>
<td>N/A</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proximal (NoID)</td>
<td>12000 B.C. - A.D. 1700</td>
<td>N/A</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medial (NoID)</td>
<td>12000 B.C. - A.D. 1700</td>
<td>N/A</td>
<td>4</td>
</tr>
<tr>
<td>Bone Tool</td>
<td></td>
<td>Bone Splinter Awl</td>
<td>12000 B.C. - A.D. 1700</td>
<td>Paleo - Alachua</td>
<td>1</td>
</tr>
</tbody>
</table>

greatly from example to example. As for unifacial tools, attributes such as size, shape, edge wear, and angle of the cutting surface are used in defining types. Under each heading the types
are arranged in chronological order from oldest to most recent. In case of confusion, it must be noted that no pictures of artifacts found during this study will be included. This was a personal request from the land owner out of fear that knowledge of the pictures could encourage future site looting.

**Projectiles**

*Newnan: Middle Archaic – 4500 to 2500 B.C.  N=1*

This is a small to large sized stemmed point with straight to excursive blade edges. The shoulders have sharp corners and sometimes the ears droop downward creating a barbed appearance. The base is contracting with a straight basal edge. The junctions where the stem and blade meet are sharply defined giving a “cookie cutter” look to the outline. Most exhibit fine flaking and retouch. The Newnan cluster consists of a number of related forms with the Hillsborough, Alachua, and Marion types considered as a part of this cluster. Serrations, beveling and/or grinding on the basal areas are not present. (Bullen 1975:31; Powell 1994:28; Purdy 1981:34-35; Dowdy et al 2001:80).

*Marion: Middle Archaic – 4000 to 3000 B.C.*

*N=3*

The Marion point is a medium to large sized stemmed point with straight, excursive, or incurvate blade edges. The stem is contracted and rounded. The shoulders are broad and square or slightly tapered. Ears do not droop downward but form a perpendicular or upward angle. Random flaking with fine pressure retouch is common. Serrations, beveling and/or grinding on the basal areas are not present (Bullen 1975:32). This is one of the 4 modal subtypes originally designated “Florida Archaic Stemmed” by Bullen and Dolen in 1959. (Purdy 1981:34-35; Bullen 1975:32; Milanich 1994:75-80; Powell 1994:28)
**Hernando: Late Archaic to Early Woodland – 1000 B.C. to 200 A.D.**

N=2

This is a small to medium sized, triangular point with shallow to medium U-shaped basal notches. Blade edges are most often straight, but can also be excursive or incurvate. The barbs may be rounded, pointed or squared. The center tang (base) can be squared, tapered or pointed. Rare examples are serrated. Despite these variations, the Hernando in its classic form has straight edges, squared barbs and a squared stem (Bullen 1975: 22).

**Taylor: Woodland – 500 B.C. to 500 A.D.**

N=1

This is a small to medium sized stemmed point with a triangular appearance and excursive or straight blade edges. The stem is slightly expanded and thinned with no basal grinding present. Shoulders are most often weak, but can be barbed to slightly round. The basal edge is straight to convex. Most are formed with random flaking and workmanship is average. Named by Wilfred Neill in 1963 and defined by Bullen in 1968 (Bullen 1975: 23).

**Weeden Island: Middle to Late Mississippian – 750 A.D. to 1400 A.D.**

N=1

This is a small thick stemmed point with random pressure retouch. Blade edges are straight to slightly incurve. The shoulders are strong and taper to a small rounded stem. Stems are rounded, but can also be snapped off or appear unfinished. They sometimes resemble miniature archaic stemmed points. These were originally named Cooley Points (Dowdy 2001)
Pinellas: Mississippian to Historic – A.D. 750 to 1700 A.D.

N=5

These are small isosceles triangular point with straight to convex sides. The basal edge is straight to slightly concave with some examples exhibiting serrations. Quality in workmanship ranges from expert to crude and some examples are unifacial, having been shaped from a flake with minimal retouch. These have long held the reputation as the true “arrowheads” of Florida but are simply a local variant of the Middle Mississippian types known as a Madison or Hamilton Dart. They are thought to have been used for both arrow and dart points. (Bullen 1975:8).) Powell 1994: 49).

Itchetucknee: Late Mississippian (Alachua Tradition) – A.D. 1250 to 1600

N=1

This is a small lanceolate point that has a rounded to slightly concave basal edge. The blade edges are excurvate and contract inward at the base. The cross section is bi-convex and it usually fine edgework. It is often found on sites in association with the Pinellas and Tampa point types. This is a widely distributed type found as far west as Oklahoma and Arkansas. (Bullen 1975: 9; Dowdy 2001: 84).

Bifacial Tools

Bifacial Scraper/Graver: Paleo to Contact – 12,000 B.C. to A.D. 1500

N=1

Considerable variation is exhibited in the size, shape and thickness of this tool type. The most commonly occurring specimens resemble a thumbnail scraper with a spur. The type
exhibits the same small projection found on a graver except the other tool edges are also worked. It can be unifacially flaked or bifacially flaked. Generally the angle of the blade edges is around 65 degrees.

**Preform: Paleo to Contact – 12000 B.C. to 1500 A.D.**

*N=9*

This type includes medium to large sized triangular, ovate, rectangular, or lanceolate biface. Blade edges are almost always excursive. Basal edge is straight to convex and no shoulders are present. It is characterized by broad random flaking with no retouch. Sometimes secondary flaking will be present. There is no basal grinding. Thickness will vary greatly depending on the destined point type, material, and refinement stage. Most have an “unfinished” look.

**Drills: Paleo to Historic – 10,000 B.C. to 1700 A.D.**

*N=1*

Drills resemble what the name implies with the distal half forming a 2, 3, or 4 sided ‘drill bit’ and the proximal end usually consists of a hafting structure. Drills are classified by their basal configurations, indicating the original point type before transformation into drill forms. Almost all point types have been found as salvaged or exhausted drill forms. Another common form is the Paddle or Bulb-based drill in which a narrow ovate biface was retouched to form the drill portion. A less common form is known as a ‘Pencil or Spike’ drill where no hafting structure is present. The paddle, bulb and pencil forms are believed to have been originally
manufactured for use as a drill. Drills were also used for awls, punches, scribes, designing pottery, and piercing (Dowdy et al 2001:41; Purdy 1981:12).

**Blunt Scraper: Paleo to Woodland – 10,000 B.C. to A.D. 500**

*N=1*

Also known as hafted scrapers, these tools are classified by their basal configurations, indicating the original point type before transformation into the blunt form. The distal end is usually broadly rounded and convex and does not come to a point. Some examples appear to have been salvaged by re-working the distal end after the tip was broken off. The distal ends of these are straight to convex. Almost all point types have been found in salvaged or exhausted blunt forms. Examples may be un-beveled or exhibit two-way or four-way beveling on the blade edge.

The example found during field work appears to have been an Alachua type projectile which was refashioned into a blunt after losing the tip. Alachua points date to the Middle Archaic – 4000 to 3000 B.C. They are a part of the Newnan, Marian, and Hillsborough cluster and closely resemble a Newnan type except for the stem which exhibits straight parallel sides terminating to a straight basal edge. (Bullen 1975:31; Powell 1994:28; Purdy 1981:34-35; Dowdy et al 2001:80).

**Cross Creek Perforator: Mid to Late Woodland (Cades Pond) – A.D. 100 to A.D. 700**

*N=2*

This is a small to medium sized triangular tool with straight to concave sides lacking serrations. The basal edge is straight to slightly concave and no grinding on the basal edge or
sides is present. Quality in workmanship is crude to fair and many examples are unsymmetrical. Most are manufactured from unaltered local chert. At first glance they resemble a low quality triangular projectile points. However, they were determined to be perforators by Samuel Smith (1971a). This type is diagnostic of the Cades Pond period. (Milanich 1994:232-234)

**Unifacial Tools**


*N=3*

This type includes small to medium sized, unifacial tools which are typically broad and ovate in shape. They closely resembles the thumbnail scraper, but is much broader and usually does not exhibit evidence of hafting. The tool is made from a flake. They are always unifacial on the ventral face and steeply pressure flaked at around 50 degrees on the dorsal face. This steep flaking creates a beveled appearance on the dorsal side. Most examples are not ground. They are not to be confused with a hafted scraper or modified point. Although used during all periods these tools are mainly recovered on Bolen culture sites of the Late Paleo/Early Archaic in Florida (Purdy 1983).

*Thumbnail Scraper: Paleo to Late Archaic – 12,000 to 2,000 B.C*

*N=1.*

These are small to medium sized unifacial tools which are typically ovate/teardrop in shape but may have weak to pronounced side-notches. The tool is made from a flake. They are always unifacial on the ventral face and steeply pressure flaked at around 50 degrees on the dorsal face. This steep flaking creates a beveled appearance on the dorsal side. The hafting area
is the narrow end and is characterized by grinding extending about 1/3 of the way up both blade edges. Notches also display grinding. This tool is commonly found in sites ranging from Paleo to Middle Archaic but has been recorded on later sites as well. Described by Bullen and Dolan in 1959 (Purdy 1983).

_Unifacial Scraper: Transitional Paleo- Early Archaic – 9,000 B.C. to 5,500 B.C._

_N=2_

This is a medium somewhat thick, completely unifacial tool that is circular in shape and has steep edges at around 80 degrees. Tool is percussion flaked and then finely pressure flaked to create the steep edge. The bulb of percussion is still present on the ventral face and has not been flattened. This flake tool appears to have been detached from a core using the Levalloisian technique. This is not a common tool type in Florida. (Purdy 1983)

**Other Tools: Lithic and Bone**

_Abrader: Paleo to Historic – 12,000 B.C. to Present_

_N=3_

This is a tool type that can vary greatly in appearance, but always has at least one flat surface and does not exhibit any flake removal. The stone is gritty in texture and is commonly made from sandstone, limestone, siltstone or basalt. Some abraders were made from coarse tempered sherds. Abraders were used to perform a wide variety of tasks in wood, bone, and stone working activities. .
**Flake knife: Paleo to Woodland – 12,000 to 500 B.C.  N=2**

This type resembles an un-notched Waller knife or a retouched blade. It is at least twice as long as it is wide. Many examples are 4 – 5 times as long as they are wide. They are made from a long flake. The blade edges are parallel to each other. The dorsal face exhibits flake scars running parallel with the length of the blade from two or more previously removed blades. The blade edges will exhibit retouch flaking on at least one face of one blade edge, but is usually retouched on both edges of the dorsal face and one or both edges of the ventral face. Retouch flaking will not extend more than 15% from the edge into the center of the blade. If the ventral face has retouch, on generally, the remaining 85% will be unifacial. Grinding is sometimes present on the proximal end.

**Bone Splinter Awl: Paleo to Mississippian – 12,000 B.C. to 1700 A.D.**

N=1

Typically shaped from white tailed deer tibia, these tools are long sections of bone first split from the leg bone and then worked down through grinding to a point on one or both ends. Length varies widely and diameter is typically close to that of a pencil. Cross section can be round, ovate, or angular with three to five sides. These tools were used as hand held awls or punches and were sometime mounted in socketed antler or wood handles. Not many survived in Florida’s acidic soils however large numbers found on underwater sites suggest the height of bone tool and awl production to have been during the Early and Middle Archaic (Milanich 1994: 67-69; Purdy 1973: 143-151)
Hammer stone: Paleo to Mississippian – 12,000 B.C. to 1500 A.D.

N=1

This is a rounded tool made from largely unmodified river cobbles or nodules of chert. Size varies from several ounces to several pounds or more. This artifact type is defined on the basis of heavily crushed surfaces resulting from repeated use. Fragments of these tools are often found and can be distinguished by crushing on the rounded surfaces. Evidence of intentional and controlled removal of flakes is not present.

Ochre: Archaic to Mississippian.

N=5

This class includes red, yellow or orange gritty rocky substance created by the oxidation process of natural iron rich sources. It is typically recovered as small to medium pebble sized chunks or observed as rust color staining in soil. It was widely collected and used as paints and dies and in ritual and burial practices by native groups.

Worked Steatite (Bowel): Middle Archaic to Woodland – 4000 B.C. to 1000 B.C.

N=18

Considered by some to be the first portable cooking vessels, these stone bowls were carved out of soft stone called steatite or soapstone. They vary in size and shape but most are flat bottomed bowls. Many examples had simple protrusions on two or more areas along the rim that probably served as handles. Most Florida examples were quarried and shaped in the Piedmont of North central Georgia before being traded down into Florida. Steatite recovered in Florida varies from light to dark gray. Examples of steatite vessels will usually exhibit tooling
marks from carving which are composed of numerous indented chisel marks across the outside and inside faces. Chiseling marks on the interior can range from prominent to almost undetectable. Intact steatite vessels are rare in Florida with most examples represented by individual fragments.

_Burnishing Stone: Middle Archaic to Mississippian – 4000 B.C to 1500 A.D._

\(N=2\)

These are naturally smooth or polished pebble commonly ranging in size from 2cm to 7cm in diameter. They were used in burnishing or smoothing pottery and wood. They were made from a variety of stone types but white pebble quartz is most commonly recovered in Florida. Occasionally fine grained silt stone and small chert pebbles are recovered. This artifact does no exhibit flake scaring. Some suggest these stones could have been used as micro-hammer stones for knapping but the consistent lack of crushing on the majority of examples and the typical contextual association with pottery indicates the likely use as burnishing tools.

**Ceramics: Defining Groups and Individual Types**

Like most artifacts, there are nearly limitless ways to classify ceramics. Classification is an arbitrary procedure in which “the grouping or categorizing of phenomena reflects attitudes of the classifier toward his data rather than any incumbent truths in the materials themselves” (Willey 1998:4). However, in Florida and elsewhere in the Southeast, there is a general agreement on those types which have chronological significance. The classification strategy for this thesis relied heavily upon the work of Gordon Willey (1998), John Goggin (1948), Charles Fairbanks (1973) and Jerald T. Milanich (1995). Gordon Willey (1998) and John Goggin (1948)
were instrumental in establishing Florida’s ceramic chronology during the mid-20th century. Fairbanks and particularly Jerald T. Milanich have continued to build from these earlier works and are currently among the leading authorities.

The primary analysis of pottery sherds recovered during field work was based on five criteria. These were temper, surface treatment, core color and inner/outer face color, manufacture strategy, and finally rim style. Of these attributes, only two (temper, surface treatment) proved to be substantially important in classifying Florida ceramics. Although Willey (1998) stresses the importance of core and inner/outer surface color, most Florida types do not rely on these attributes. According to Goggin (1998), nearly random variation in color is inevitable due to different conditions during the firing process or variations in clay sources. Manufacturing strategy proved to be of little consequence in defining types. While coiling could be detected on some sherds, neither hand molding nor coiling could be distinguished on most sherds. This is likely explained because breaks did not always occur along the original seam (as can be seen in coiled vessels) or because edges were too worn to positively identify. For the most part, rim types played only a minor role in classification with the exception of a cache of Lochloosa Punctated sherds in which five rim pieces fit together to form approximately 35% of the vessel’s original rim. Although rim style can be a meaningful characteristic when identifying pottery varieties, most rims recovered during this project could not be definitively determined to be diagnostic for a specific type. In light of this experience, all five criteria will be included in ‘type’ descriptions when the information is available, however only surface treatment and temper are almost always the defining criteria.

Surface treatment is the primary attribute used in distinguishing Florida pottery types. Surface treatment is the absence or presence of design or coloring added directly to the vessels
surface usually before firing. This can also include nodes or other raised appendages added to a vessel surface or rim. Some examples of surface treatment include incised, punctated, burnished, roughened, Cobb marked, cord wrapped, fabric impressed, or the addition of a slip or paint. Occasionally examples will display more than one of these styles on the same vessel.

Temper/aplastic refers to the materials often added to the clay paste. The addition of temper to a paste served one or more purposes which include binding agents, resistance to cracking during firing, or cultural expression. Common tempers were crushed shell, crushed limestone, various quartz sand grit sizes, grog and organic fibers.

In the following section pottery types will be considered in a general chronological order and arranged in series when possible. Ceramic producing cultural periods for NCFL are briefly described before their associated ceramic types are defined. Only pottery types recovered on this project are defined after each cultural tradition.

The table below outlines the ceramics recovered during field work (table 4). Ceramics are ordered by series also called ‘tradition’ and then are typed for that series and assigned a respective date. Rim sherds are separated from body sherds for the fact that rim characteristics could play a role in identification of a type. This however proved of little consequence during this study. Rather, surface treatment, temper, and structural assemblage (coiling vs. hand molding), proved most useful during the classification procedures.

**Orange Series**

The first fired clay pottery appeared in Florida towards the end of the Late Archaic (Mount Taylor period) around 2000 B.C... The Orange series first appears along the Gulf Coast from Tampa northward. In north Florida, identical material is called Norwood. The Orange culture did not occur in the southern peninsular area below Lake Okeechobee until 1000 B.C.
Table 4 Ceramic artifacts from William’s Hill.

<table>
<thead>
<tr>
<th>Series</th>
<th>Ceramic Type</th>
<th>Production Range</th>
<th>Rim Sherds</th>
<th>Total Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange:</td>
<td>Orange Plain</td>
<td>2000 B.C. - 500 B.C.</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Orange Incised</td>
<td>1650 B.C. - 500 B.C.</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Cades Pond</td>
<td>Sand Tempered Plain</td>
<td>500 B.C. - A.D. 100</td>
<td>2</td>
<td>74</td>
</tr>
<tr>
<td>(Possibly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deptford:</td>
<td>Check Stamped</td>
<td>600 B.C. - A.D. 100</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Weeden Island:</td>
<td>St. Andrews</td>
<td>A.D. 200 - A.D. 700</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Complicated Stamp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Johns:</td>
<td>St. Johns Plain</td>
<td>500 B.C. - A.D. 1565</td>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>St. Johns Plain (burnished)</td>
<td>A.D. 1513 - A.D. 1565</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>St. Johns Check Stamp</td>
<td>A.D. 800 - A.D. 1565</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>St. Johns Bold Check Stamp</td>
<td>A.D. 800 - A.D. 1565</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>St. Johns Scored</td>
<td>500 B.C. - A.D. 1300</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Dunns Creek Red</td>
<td>A.D. 100 - A.D. 600</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Alachua:</td>
<td>Alachua Plain</td>
<td>A.D. 600 - A.D. 1700</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Prairie Cord Marked</td>
<td>A.D. 650 - A.D. 1585</td>
<td>7</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Prairie Fabric Marked</td>
<td>A.D. 600 - A.D. 1250</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Alachua Cob Marked</td>
<td>A.D. 700 - A.D. 1700</td>
<td>5</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Smoothed Prairie Cord Marked</td>
<td>A.D. 700 - A.D. 1585</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Lochloosa Punctate</td>
<td>A.D. 700 - A.D. 1700</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Miscellaneous:</td>
<td>Bold Check Stamp (shell temper)</td>
<td>Unknown</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Plain (shell temper)</td>
<td>Unknown</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>
Orange series pottery has two prominent stylistic characteristics which distinguish it from later ceramics. The first is that it was tempered with plant fibers such as Spanish moss, various grass species or occasionally shredded palm fronds. During firing this organic matter burned away leaving a honeycomb like appearance across the vessel surface (Goggin 1998: 97). The second trait is that vessels were formed by molding large lumps of clay into the desired shape by hand. Vessels were sometimes pressed down onto woven matting and fabrics during the shaping process leaving impressions on many vessel bases (Milanich 1994:92). During the late phases of Orange culture when quartz or chunks of St. Johns ware were added to the paste along with fibers, a technique referred to as semi-fiber tempering. Around 1000 B.C. early coiling manufacture techniques are observed but still did not represent the majority. (Goggin 1998:97-98; Milanich 1994:92-94; Willey 1998:577)

Orange Plain

N=5

This type is the most frequently occurring ceramic on Orange period sites. During the early and middle Orange series it was exclusively fiber tempered mixed with locally available clays. Later, fiber mixed along with quartz sand appeared. Less frequently fiber was mixed with a chalky type of clay found predominantly with in the St. Johns River basin. Vessels were constructed by molding a large lump of fiber infused clay. Milanich (1994: 94) indicates most containers were shallow bowls or rectangular in form with flat bases often resembling steatite bowls. Containers height and width average 10 by 20cm. Wall thickness varies from vessel to vessel and often with in each vessel. Walls can be relatively thin at 4-7mm (Milanich 1994: 94), or as much as 14mm thick (Milanich and Fairbanks 1980:155-157). Rims are rounded or flat. No decoration is present on the outer surface or base with the exception of occasional woven mat
or basket impressions on the base. Lug-like appendages occur sparingly. Tool marks may be visible on the inner surface. Outer and inner surfaces are smoothed except for the pits left from the burnt out fibers.

*Orange Incised: N=19*

This type appears 350 years after Orange Plain at around 1650 B.C. These ceramics are essentially similar to Orange Plain except that the outer surface was decorated with incising after smoothing. Occasionally, punctations or ticks marks were also incorporated. A tool likely of wood or bone was pushed along the clays wet surface to produce shallow to deep cuts. The wet clay was pushed up along the cut (incised) edges causing a slight ridge. Incised decorations varied between three techniques: 1) straight lines (parallel or slanting); 2) hatching patterns (oblique hatched lines within a primary simple shape), nested repeating shapes of diamonds, squares or chevrons); 3) Spirals (with or without punctations) (Goggin 1998:98; Milanich 1994:94)

**Cades Pond Series**

The native groups who lived after 500 B.C. each lived within specific environmental, physiographical, and/or geographical zones. The interior forests, lakes, and wetlands of NCFL are one of the five major geographical cultural zones. These regions are most often distinguished by the ceramic types found among the archaeological sites as well as settlement strategies. The problems that arise when dealing with regional cultures in this manner is there are no clear dividing lines (Morris 2004:18-19).

The Pre-Cades Pond time frame of 500 B.C. to A.D. 100 is not well described for North Central Florida. Pottery tends to be quartz sand tempered or less frequently made of a chalky
sponge spiculate containing clay indicative of a St. John cultural influence. Milanich (1994:228) contends that Goggin’s 1951 description of a Pre-Cades Pond period is no longer viable. Instead, during the interim of 500 B.C. until A.D. 100 Interior North Central Florida was sparsely populated by small groups of Deptford peoples likely moving in from the West coast during seasonal changes (Milanich 1994:228). The establishment of permanent village sites of interior Florida by these Deptford peoples around A.D. 100 marks the emergence of the NCFL regional culture of Cades Pond.

Contemporaneous with Cades Pond were the St. Johns 1, late coastal Deptford, and early Swift Creek cultures. Each had their own regional boundaries. Trade or other cultural influences led to a mixture of non-Cades Pond ceramic types at Cades Pond sites (Willey 1998: 577). Most frequently, these non-Cades Ponds ceramics are discovered in mounds while village sites are represented by 85-95% undecorated quartz sand utilitarian ware. (Milanich 1994: 227-229)

For the purpose of this classification section all ceramics fitting the Cades Pond or Deptford tradition description for plain quartz sand tempered pottery are lumped together. Unfortunately, it can’t be determined what percentage of these sherds represent the Cades Pond or Deptford traditions because production techniques remained highly similar into the Mississippian. The presence of Cades Pond lithic implements in nearby shovel tests does indicate however an unequivocal presence of these people. Decorated ceramic types recovered from the contemporaneous Swift Creek and Deptford traditions are also described below.
Sand Tempered Plain:  \(N=73\)

Paste mixtures vary by site but will be of either uniform or various grit sizes of quartz sand (occasionally clay lumps are also present). Examples originating from the eastern and western coasts of Florida may also be mixed with mica particles but those of peninsular Florida will not. Color of sherds ranges from orange buff to tan to dirty brown. Core color is dark and uniform in color. As a result of pot being fired in open fires smoke clouds may be present. Pots were made with coil construction. The rims are generally rounded or flattened. Vessel shapes vary, usually bowls with flat or round bases (tetrapods may be added). Overall vessel size and thickness vary considerably. No decoration is applied. The outer surface may be uneven, smoothed, or rough in appearance. (Willey 1998: 354-359; Milanich and Fairbanks 1980: 81-95)

Deptford Check Stamped:  \(N=5\)

The temper used throughout Deptford period is quartz sand or grit and occasionally clay lumps accompany this sand. It is likely some of this material existed naturally in local clays while at other times it was added (Milanich and Fairbanks 1994:78-79). Pots were manufactured by placing one coil on top of the previous (coiling) and shaping them with paddles or mallets. In the case of Deptford Check Stamped, wooden paddles were carved with checkered design. Moist outer pot surfaces were then hit with the paddle resulting in rows of negatively imprinted squares. Uniformity of this checkered design varies considerably from neat and even to sloppy and overlapping. Coiling coupled with paddling techniques led to the appearance of a variety of stronger thinner vessels. Surface color ranges from orange buff to dark brown and core color is consistent and dark. Smoke clouds can be present particularly on outer surface. Rims are most often straight but do flare infrequently. Lips are rounded or flattened and sometimes
the excessive clay was pushed downward forming an outer lip. Occasionally coastal examples will exhibit scalloped lips. (Goggin 1998: 105; Milanich and Fairbanks 1980: 78-81; Thomas and Campbell 1985b:111; Willey 1998:354).

**St. Andrews Complicated Stamp: N=6**

A part of the Santa-Rosa Swift Creek Period, these sherds were likely brought to north central Florida from northwest Florida. These sherds were tempered with fine sand and mica and manufactured using the coiling technique. One or both faces are fired buff and paste core is a uniform gray black. Interior surface texture is well smoothed or slightly polished; later examples will be slightly bumpy. Exterior surface is usually decorated in its entirety on early examples using a carved wooden paddle before pot is fired. Later examples may only be decorated along a single ban near the rim. Design is often rectangles or triangles stamped side by side or in a checkered pattern. Four to ten lines run at right angles within each rectangle or triangle. Other designs consist of concentric rectangles or squares. Pot or bowl forms are indicated by the recovered sherds. Rims are slightly in-slanted or flared outward. Vessel sizes are thought to vary but walls are consistent at 4-6mm. (Willey 1998: 384-386, 436; Mitchem 1986: 70-71)

**St. Johns Series**

The St. Johns culture has its origins around 500 B.C and comes to an end shortly after European contact. This culture was focused along the St. Johns River drainage system located within the eastern reaches of North Central Florida along the Atlantic coast from Melbourne Florida into southeast Georgia. Wares are commonly found all across peninsular Florida. This series is made up of a variety of decorated and non-decorated pottery types, all of which share a
common characteristic; the paste is made from a clay containing fossilized sponge spicules. After firing, the paste took on a chalky feel. This paste tended to result in vessels that were much lighter than the preceding vessels. Checked and plain wares are more common but incised, punctate, pinched, fabric impressed and red slipped examples do occur. The frequency of the less common varieties depends on the time period. St. Johns is separated into six periods often distinguished by ceramic type frequencies as well as the appearance of other cultural artifacts or customs. Trade with and the copy of St. Johns ceramics was frequent across NCFL. (Goggin 1998:99-102; Milanich 1994: 256-259; Mitchem 1986: 69-70; Nelson 1918:94-95)

St. Johns Plain:  N=51

This ware was manufactured throughout the St. Johns tradition making it the longest spanning ware for the series. Defined by James B. Griffin in 1945 this is a plain chalky (to the touch) ware which is soft enough to be scratched with the finger nail (except in very late sand tempered forms). Early forms contain fiber tempering which represents the transition from late Orange peoples to St Johns I in that region. During middle St. Johns the addition of temper to the paste was rare consisting of small amounts of crushed shell or a red substance which Goggin (1998:101) suggests is ochre or pockets of crushed pottery. At the later end of the St. Johns II quartz sand as temper rose increasingly in popularity until the cultures demise. Vessel manufacture was coiled and breaks along the seam between two coils are common. The most common utilitarian vessel shapes were bowls. The two most frequently observed bowls had either straight sides expanding outwards or sides constricting towards the mouth. Small jars with constricting necks were also common. Vessel size and wall thickness vary but earlier wares trend on smaller and thicker forms. Basal leg supports were somewhat common numbering from
two to four (usually four). Both outer and inner surfaces are un-decorated and range in texture from rough to smooth. Occasionally outer surfaces were burnished. Surface colors range widely from light gray-black; light tan-dark brown; orange, yellow and buff. Core color tends to be uniformly dark gray or black. (Goggin 1998: 101-102; Nelson 1918: 94)

_Dunns Creek Red: N=1_

Dunns Creek was most common throughout the St. Johns Ia and Ib periods (A.D 100-600). Temper, manufacture, vessel characteristics and territorial distribution are virtually the same as St. Johns plain. Essentially, Dunns Creek is St. Johns plain with a red slip on the inner, outer or both surfaces. Vessel shapes do diverge slightly from St. Johns plain in that large bowls are more frequent for Dunns Creek. Smaller bottle and gourd shaped vessels are also common. Dunns Creek has been recovered most often in mounds suggesting red slips had a ceremonial importance.

_St. Johns Check Stamped: N=3_

These sherds are similar in all details except decoration to St. Johns Plain. Decoration is applied with a carved wooden paddle or mallet. Pattern of decoration is a repeating series of squares separated by lines. The squares appear as negative depressions in the clay and the lines in between the squares leave a positive protrusion on the pottery surface. Application was varied between sloppy with overlapping pattern to accurate and highly uniform rows of squares. This variety is classic to this culture and is found throughout the span the St. Johns Cultures. The only exception to this rule is during the first period of the St. Johns (Ia) in which it was not
manufactured until the tail end of the period, growing in importance in the Ib period. The most common vessel form is large bowl with straight out flaring sides.

*St. Johns Bold Check Stamped: N=3*

This type is similar in all details to St. Johns Plain and identical in all details to St. Johns Check Stamped except for design size and execution. Decoration is applied with a carved wooden paddle or mallet. As the name implied, it is the size of the check stamped design that distinguished this type. There is no defined size for either, rather there is a continuum of check stamp size. Bold check stamped squares tend to be less formalized with large and smaller squares occurring side by side (Milanich 1980; 1994). Also squares may be malformed and one or more sides uneven. Bold check designs occur more frequently on the Atlantic coast of Florida while standard check stamping is most often found on western coast and interior Florida.

*St. Johns Scored: N=1*

This type is similar in all details to St. Johns Plain and checked varieties except in surface decoration. The exterior of the vessel is scored with shallow straight or curvy lines, usually across the entire vessel. St. Johns Scored is a later type, dating to the St. Johns IIb and IIc periods. Incisions were likely executed with carved bone or wooden tools. This variety is widely distributed within the St. Johns range but is not a common occurrence anywhere.
Alachua Series

By about A.D. 600 people from southwestern Georgia were migrating into the Cades Pond occupied region of NCFL and by A.D. 750 Cades Pond had all but been replaced by the Alachua culture. This change is marked largely by ceramics. Alachua people’s reliance on horticulture, particularly maize, is readily documented by their cob impressed ceramics. The Alachua phase is divided into two main periods; Hickory Pond (A.D. 600-1250) and the Alachua complex which transitioned from Hickory Pond and lasted until A.D. 1700 (Milanich 1998: 75-77). The latter half of the Alachua is further distinguished as Potano I and Potano II periods.

The two main periods are distinguished on the basis of ceramic frequencies with Cord Marked representing a higher percentage than Cob Marked in the Hickory Pond and the opposite occurring in the Alachua period (Milanich 1968:39). Also, Hickory Pond is distinct in that some pottery was decorated with fabric wrapped wooden paddles, a practice not seen in Alachua. Pottery was mostly utilitarian, made of chalky, sand/grit, and sherd tempered pastes. Types are based on surface treatment with Alachua Plain, Prairie Cord Marked and Alachua Cob Marked being the most common types. Other types include Prairie Fabric Marked, Alachua Net Impressed, Prairie Punctated over Cord Marked and Lochloosa Punctated but the overall frequencies of these types are small making up only 1-7%. (Goggin 1949:39; Milanich 1968: 17-19).

Prairie Cord Marked: N=75

The aplastic used for this variety during Hickory Pond was a mixture of clay lumps and medium grit quartz sand. Later, only medium grit sand was used during the Alachua and Potano sub-periods. Vessel manufacture was coiling followed by malleting or roughening the surface.
This is thought to have strengthened the seams between the coils. Cylindrical pots and small bowls 25 cm or less in diameter were most common. Wall thickness varies. Decoration was applied by wrapping small or medium sized twisted fiber cords around a paddle and then malleting or pressing them into the wet clay surface (Milanich and Fairbanks 1980:176).

**Smoothed Prairie Cord Marked: N=1**

The only difference between this design and Prairie Cord Marked was that after malleting, the pots outer surface was smoothed over. This removed excess clay and partially filled in the negative cord markings. Whether to classify this deviation from the standard Prairie Cord Marked type as a separate type or lump it in as a possible characteristic of the Cord Marked style is debatable (Milanich and Fairbanks 1980:176; Milanich 1969: 18-19).

**Alachua Cob Marked: N=39**

This type was named by John Goggin after Alachua County, FL and included by Worth as part of his Suwanee Valley Series. Found in NCFL and south central Georgia it dates from the late Mississippian into the historic era. Aplastic is a medium sized quartz sand or grit. The outer surface is impressed with corn cobs either partially of completely stripped of kernels. Milanich (1969: 19) suggests the cob design was applied using one of two techniques. The cobs were attached to paddles and malleted upon the clay surface or the cobs were rubbed or rolled across the surface. The cob markings may be in uniform rows spaced up to 1.5 cm apart or placed randomly across the surface with the later of these two most frequent (Wiley 1949: 494). This surface treatment is typically applied to the entire exterior of the vessel including the base. Vessel forms are cylindrical pots and bowls ranging from medium to small in size. Rims are
unmodified. The inner surface is varying degrees of smoothed. Outer surface color is typically a range of tan to brown. The interior surface can be shades of brown or black and the core color is dark gray to black (Goggin 1948:3; Willey 1949:494; Milanich 1971:32; Milanich 1969: 18-19).

**Alachua Plain: N=1**

Alachua Plain has been identified across North-Central Florida and parts of South Georgia. Its production and use dates from Late Mississippian to the Historic period but reached its greatest height of production during the tail end of the Alachua period known as Potano II. It is found directly associated with Alachua Cobb Marked and included by Worth in the Suwanee River Valley series. The Temper consists of medium grain quartz sand. Coiling was the preferred means of manufacture. The inner and outer surface falls into the buff, gray or dark brown color ranges. Core color is dark and uniform. Typical vessel forms are simple bowls with unmodified rims. The surface treatment for this ware was created first by roughening the outer surface either with a mallet or by hand and then smoothing it over. The majority of the time this smoothing process resulted in a flat consistent surface with no visible lines or designs. Occasionally smoothing was not completed across a vessel surface so that patches remain rough after firing. The vessel interior is always smoothed. The exterior surface was often burnished after Spanish contact with some vessel shapes also resembling Spanish wares (Milanich and Fairbanks 1980:176; Worth 1992; Goggin 1948:2-3; Willey 1949:494; Milanich 1971:31-32).

**Prairie Fabric Marked: N=24**

Except for surface treatment, this type is identical in temper, vessel manufacture, bowl and rim shapes, and inner/outer/core colors to Prairie Cord Marked. Surface treatment is applied
with a paddle that has been covered or wrapped with a fabric. Milanich (1969:19) notes that two types of fabric were used, a plain twined open work fabric or a plain plaited fabric. The resulting impression consisted of raised geometric shapes (typically squares or rectangles with uneven sides) and negative impression of the fabric yarns. Often the crossed and linked yarns are evident. This type makes up only about 6-10% of the ceramic assemblage during the Hickory Pond period and dies out completely by the onset of the Alachua period.

*Lochloosa Punctated: N=14*

Although it makes up no more than 1-7% of the ceramic assemblage at any given time, this type was manufactured and used throughout the Alachua tradition. Temper was fine to medium sized grain quartz sand. Type of manufacture was coiling and utilitarian vessel forms were predominantly simple bowls and shallow dishes. Surface decoration consists of many small marks poked into the wet clay. This was achieved in one of two ways according to Milanich (1969:19). Most frequently a stick or bone instrument was poked across the surface. Another technique appears to have been malleting the surface with the pointed end of a paddle (Milanich 1969:19). Proximity of one punctuation to another ranges from nearly touching to scantily scattered several centimeters apart (Milanich 1969:19;)

*Unidentified Shell Tempered Sherds*

*Plain shell tempered: N=7*

*Checked stamped shell tempered: N=8*

Seven of the eight check marked sherds and all seven plain sherds were found stacked together in separate single shovel tests. Both sets represent a partial vessel resembling bowl
form. They are tempered with coarse quartz sand and non-fossilized shell. Breaks along 2 edges indicate the technique for manufacture was coiling. Outer and inner surfaces are dark brown and the core is a uniform dark color approaching black. No rim or base fragments were recovered. The check stamped examples were decorated using the carved paddling technique. Shell tempering was introduced into northwest Florida during the Pensacola culture around A.D. 1200 which later becoming the Bottle Creek culture and spread eastward (Weinstein and Dumas 2008: 202-210)

In addition to lithics, ceramics and a single bone item, several historic artifacts were also recovered. Other than a single piece of amethyst glass (late 1890’s to 1915), nothing dating prior to the mid-20th century was identified. Below, table (5) has been provided for general reference as to what historic artifacts were recovered. These items were sparse and mostly unidentifiable beyond the basic characteristics. The majority were located near the barn at the central southern edge of the property.

Table 5 Historic artifacts recovered during field survey.

<table>
<thead>
<tr>
<th>Historic Artifacts (1950 to present)</th>
<th>Category</th>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass</td>
<td></td>
<td>Clear</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aqua</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brown</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Milk</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amethyst</td>
<td>1</td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td>UID</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steel rebar</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iron pipe</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bolt</td>
<td>1</td>
</tr>
<tr>
<td>Ceramic</td>
<td></td>
<td>White ware</td>
<td>1</td>
</tr>
<tr>
<td>Plastic</td>
<td></td>
<td>UID</td>
<td>2</td>
</tr>
</tbody>
</table>
CHAPTER 6 – LITHIC ANALYSIS

The vast majority of the artifacts recovered from the project area were stone tools and stone tool production rejects. Given the outcrops of chert and the large numbers of early stage debitage that were found near the lake shore, it is clear that tool production was an important prehistoric activity. This chapter will focus on measuring that activity as well as others that are documented by the stone tools and rejects.

Lithic Artifact Assemblage

Understanding an artifact assemblage in its entirety offers an opportunity to explore intra-site behavioral patterns which would otherwise not be assessable (J. K. Johnson 1981:101). An assemblage is described as a group of artifacts found with at least a loose association to one another. The Williams Hill lithic assemblage has been characterized using three variables; raw material, function, and the morphological macroscopic traits of the artifacts themselves. All forms of artifacts including the debitage, the tools used for chert reduction, the rejects which fell out of the production trajectory along the way, and the end result of completed tools and projectiles were identified using generally accepted artifact typologies.

The successful identification of the raw material used and its source area is key in characterizing a lithic assemblage. Tools and debitage alike were separated into local or exotic material varieties. Rice grain chert is the only locally available tool stone and is available from outcrops all across Alachua and Marion Counties. This material constituted 98.63% of the
overall debitage assemblage most of which was found within the immediate vicinity of outcroppings and suspected outcroppings of this chert variety. Four types of exotic material constituting only 1.37% of all debitage were recovered including agatized coral, coastal plains chert, conglomerate, and chalcedony cherts. This information points clearly to the importance of the outcropped chert on property indicating a heavy reliance on it for tool production. The randomly scattered and notably small proportion of exotic materials may indicate exchange relations or the extent of hunter-gatherer seasonal nomadism.

Morphology was the single most important identifying feature when characterizing this assemblage. The assemblage was partitioned into four main nominal categories, 1) debitage, 2) quarry rejects and quarry tools, 3) bifaces, and 4) unifacial tools. From here, when possible, these classes were further subdivided into types based on a cluster of defined attributes for the given type. Along with personal experience, these type assignments were based on references from the works of Bullen (1953), Purdy (1984), Anderson (1981), Dowdy (2001), Milanich (1994), Goggin, and others.

Of the 5,650 lithic artifacts recovered, 5,557 are represented by debitage consisting of shatter and flakes and amounting to 98.3% of the total assemblage. Flakes make up the majority of the debitage, 94.7%. The shatter class is represented by heat treated and raw forms mostly less than 1 inch in diameter. Shatter primarily is created during earlier stages of manufacture or during the heat treating process and because these two categories were about even in count and dispersed widely across site, they offer little additional insight. The flakes consisted of a full range of sizes from above 3 inches to below ¼ inch with the majority falling into ½ inch to ¼ inch size range. This group constituted 47.5% of the total flake category. Based on personal communication with Jay K. Johnson (2015), there was also likely many thousands of flake less
than ¼ inch in size, but because of the ¼ inch screen size used during survey they could not be recovered.

Generally speaking smaller flake sizes are considered a part of later stages in biface manufacture, however it is important to note that smaller flakes are removed while setting up platforms for larger flakes to be removed during the beginning stages of manufacture. In other words, relatively smaller flake sizes by themselves are not indicative of manufacturing stage. It is the proportions of larger to smaller flake sizes that will vary from beginning on a core to finished tool.

Discounting debitage, only 94 other lithic artifacts were found. These included cores, quarry tools and rejects, and other tools including bifaces, unifaces, flakes with use-wear and a few rare types. Quarry activity or early stage non debitage artifacts make up 36% of the non debitage assemblage. Included in the group of quarry tools and rejects are 12 amorphous cores, one hammer stone, and 21 quarry rejects. The quarry rejects consist of 2 complete preforms and 19 partial preforms/blanks in early and later stages of manufacture. During sorting and identification, preform partials in earlier and later stages of reduction were separated into two groups. The groups were based on observations made for greater frequency of hard or soft hammer flake removal across the surfaces as well as crudeness. Under the manufacturing theories of Johnson (1981: 43) and Holmes (1904) both of these artifact classes are considered ‘production rejects’ or ‘quarry rejects’ and are indicative of early stage quarry oriented biface manufacture. Johnson (1981:43) defines these production rejects as “artifacts which fell out of the production trajectory due to some fault in material or workmanship.” Both preform and blank rejects were lumped together under the title ‘quarry rejects’ for this discussion on artifact assemblage.
Oddly, heat treating does not correspond with the supposed level of reduction for these preforms with heat treated and non-heat treated examples occurring in both earlier crude forms and finer worked later forms. This is likely attributed to a fact that various groups of people from different time periods who practiced differing manufacturing trajectories occupied the survey area. This could also be explained either by unseen circumstantial variables at the time of knapping or that the raw material itself may have been easier to work and thus did not need heat treating while other spalls did.

Bifaces which fall into the completed tool category including both re-sharpened and discarded specimens are represented by 14 unidentifiable medial and proximal fragments, 1 scraper/graver, 2 retooled projectiles (1 into a drill form and the other into a blunt scraper), and 16 identifiable projectiles/knives. Seventeen of these bifaces could be assigned to chronological types. Five date to the Middle Archaic including three Marions (4,000 to 3,000 B.C.), one Newnan (4,500 to 2,000 B.C.), and one blunt Alachua scraper (4,000 to 3,000 B.C.) representing the earliest positively identified projectiles found during this project. Although it cannot be demonstrated with certainty, it is likely that the large medial portion of a biface found resting on the hard pan is older (Paleo Indian or Early Archaic) based on overall patination, form and flaking pattern. The distal end of two Hernandos from the late Late Archaic into the Early Woodland and a Taylor projectile manufactured during most of the Woodland were also recovered. In addition, two Cross Creek perforators were found along with steatite bowl fragments and Orange Period ceramics supporting a Late Archaic and Woodland presence. Specifically, the Cross Creek perforators are diagnostic for the Cades Pond Culture of North Central Florida during the Mid-Late Woodland (Milanich 1994; 232-234). Moving forward in time, five Pinellas, one Weeden Island, and one Itchetucknee, were identified for the tail end of
the Woodland running all the way up into historic times in the case of the Pinellas. The latter two projectiles saw their rise and fall during the end of the Mississippian. In total, unidentifiable and identifiable bifaces in the form of projectiles/knives constitute 34.4% of the 94 non-debitage type stone tools excavated or only 0.6% of the total assemblage.

Unifacial tools were found in even fewer numbers with 2 flake knives, 3 end scrapers, 2 unifacial scrapers and 1 thumbnail scraper representing 0.15% of assemblage. Although these tools are described in the methods section as having been created and used throughout most time periods in NCFL these tools are most often recovered on Paleo, Early and Middle Archaic sites in Florida. The flake knife is the exception which truly is abundant in all time periods. This information is beneficial when analyzing a Florida collection specifically because in other parts of the country such as the upper south, thumbnail scrapers are identified in vast quantities on both early sites and on late Mississippian and proto-historic Chickasaw sites (Johnson 1997: 217-218). Unfortunately, analysis undertaken for this project could not positively identify these unifacial tools as belonging to any particular era. However, the above information coupled with depth at which they were dug and their heavy patination points to a good possibility of earlier occupations.

Sixteen utilized blades were excavated. The term blade is used here loosely to describe any sized or shaped flake of any length to width orientation in which at least one edge was used to perform a task without additional edge modification. This work is evidenced by tiny flake scars, breaks and hinges along the cutting edge sometimes accompanied by unintentional polish (Purdy 1981:13). Utilized flakes/blades are expedient tools used in completing quick tasks. They do not necessarily represent any one stage in the manufacturing process because flakes are made throughout. The utter lack of a constant form for this artifact creates difficulty in
categorizing these tools using morphology any more specifically than with the catch all name ‘utilized flake/blade’. Instead, they are classed based on function. One helpful note about these tools is that they really don’t appear until the Early Archaic with use through the Woodland (Purdy 1981: 38-39). Blades predating these fall into the category of flake knife as they were modified with retouch pressure flaking. Blade technology changed at the onset of pottery production with micro-blade industries increasing.

Some stone manufacturing industries specifically created cores to be used exclusively for bladelet production in which the flakes were at least twice as long as they were wide and had nearly parallel sides (Bordes and Crabtree 1961: 1). For example, the Maya of Central America are known to have had extensive workshops which specialized in obsidian bladelet manufacture. Sites dating from the Paleo to the Woodland of Florida have contained well documented industries focused on bladelet production (Purdy 1981: 38-41) however, excavations at Williams Hill revealed no evidence of an industry focused explicitly at producing bladelets.

The last set of stone tools include two sandstone abraders and two river polished quartz pebbles used as burnishing stones. Abraders were used for everything from platform set up during knapping to working and shaping wood, bone, shell and stone. Essentially they were a Native Americans sand paper. Burnish stones were used to condense and polish/smooth wood fibers in circumstances when the wood was under strain. The backs of bows for instance were burnished by European bowyers in the Dark Ages and modern traditional bowyers burnish to compact the upper fibers creating a strong more elastic surface capable of better withstanding surface strain when bent (Hamm 2000). Burnish stones were also used to smooth pottery vessels before firing. This technique provided a clean shine and also helped to compact the wet clay providing added vessel integrity after firing. Both of these tools are of exotic material not
naturally available from NCFL with the sandstones nearest source in Florida’s western Panhandle region and the quartz pebbles nearest source from South Georgia (Bryan 2008: 13, 27). Again these exotic materials are clear indicators of trade or extensive seasonal movements across the landscape.

Of the 66 artifacts recovered representing quarry and the biface reduction trajectory (excluding unifaces, utilized, abrader, and burnish stone), 80.3% were found along the lake shore line. This is important because it is proposed the entire shore line was once a resource acquisition location and manufacturing site. This is based on the location of the NW quarry outcrops and other isolated chert boulders along this elevation (17.5 – 18.5 meters above sea level) and the information provided by Bryan (2008) and Johnson (personal communication 2014) that chert in Florida lies in horizontal seams across the landscape. From the total of 32 finished stage bifaces in various levels of completeness or retooling found during the course of survey, 72.4 percent were found along the lake shore. Specifically indicative of quarrying activities were the 12 cores also found, 10 of which were from the lake shore elevation region. These 10 accounted for 83.3% of the total core group.

Of the 21 quarry rejects recovered during shovel testing, all were found in the proposed quarry band along the lake shore. In addition to the manufacturing debris, a chert hammer stone was recovered in a shovel test containing eight of the 21 total quarry rejects, two fragmentary finished bifaces and one complete Middle Archaic projectile with signs of retooling. The presence of quarry debris and completed projectiles in the same shovel tests may indicate that the Williams Hill Project area was not only used for stone extraction and early stage reduction but that it was further exploited as a location to reduce preforms to a finished tool product. Along this same water front boundary a fair number of the total expedient and unifacial tools were
recovered. The expedient tools included flakes/blades with use wear and/or micro retouch through pressure flaking. Twelve of the sixteen (75%) expedient tools and four of the seven (57%) unifacial tools preside from this elevation band. The quantities and proportions of these tools not strictly associated with quarry activity are affected by variables such as length of occupation, season of occupation, types of natural resources available for exploitation, settlement strategy, and so forth.

Due to the nature of this survey, (i.e., that shovel tests were not dug in levels) patterns between one time period and another are difficult if not impossible to distinguish. However, inferences for behavior surrounding the relatively large amounts of debitage, reasonable representation of quarry rejects, utilized expedient tools and retooled completed bifaces can be made. These large amounts of debitage and large sizes of that debitage coupled with evidence of preliminary biface shaping suggests quarrying activities. Further, least-cost theory supports that if these variables are present, they should be situated relatively near the chert source.

**Spatial Analysis**

The lithic analysis section of this study began with the thesis that chipped stone refuse generated near a quarry site or source area will differ from that generated at non-quarry sites. According to Johnson (1989:132), early and middle stage tool manufacture occurred predominantly within a source area. During these initial production stages all sizes of lithic debris are created, however early-stage debitage which is characterized by attributes such as ventral cortex, relatively few ventral flake scars, and most important to this analysis, relatively large size flakes (<1”) will occur in greater frequency than at any later stage reduction site. In
addition, a larger overall mass of waste material should be observed at a quarry as opposed to later stage or retouch oriented sites on the basis of sheer reduced raw material volume.

This analysis was conducted using Microsoft Excel and SPSS software programs. These two programs enabled the search for correlations between the variables of 1) flake size; 2) lack of thermal alteration; 3) average flake weight; and 4) distance from source area (meters). The distance from the source area identified as the NW quarry in this study is the independent variable and the flake size, thermal alteration, and flake weight are the dependent variable. Flake sizes were separated using the techniques described in the methods section. The proportions for flake size were found by dividing the counts of each of the four categories by the total combined sum of all size categories present for the respective shovel tests.

Proportions for the four flake size groups were used rather than raw counts because each is considered an interrelated part contributing to form a whole. By using ratios, it is possible to determine the degree to which a specific flake size is represented within each shovel test; each variable now represents a proportional relationship. Following the expectations of the hypothesized relationship between distance from source and debitage assemblage composition, the proportion of larger debitage should steadily decrease as distance from a quarry source increases while the proportion of smaller debitage steadily increases. In test units that were negative for lithic debris, no useful proportions could be generated so this problem was addressed by removing these negative shovel tests from the correlation testing. This action ultimately reduced the experiment group of shovel tests from 226 to 188.

The first four hypotheses represent the group of original exploratory correlations between distance and individual flake size proportions. Previous work on drop off analysis (K. Johnson 1981: 124-127) indicates a strong negative trend will be detected for the two larger groups of
flakes as one moves further from the quarry site. Regardless of direction, the further away from
the NW quarry area, the lower the ratio of 1”+ flakes will be. The two smaller flake groups, ¼
and ½ inch screen, are expected to display a positive correlation (if other later stage site types are
nearby) despite the large numbers excavated in and around the quarry. The following
hypotheses are tested using this scheme and the results are given using the one-tailed Pearson
Correlation coefficient.

Hypothesis Set 1. (H1-H4)

H1  Despite the sheer volume of relatively small lithic refuse at the NW quarry, an
increase will be observed in the proportions of small flake classes recovered in the ¼ inch screen
(size ‘A’) as the shovel test distance from quarry increases.

Ho Flake proportions for the ¼ inch screen will either not show a positive correlation or
will show a negative correlation with distance from the NW quarry.

This one-tailed Pearson correlation coefficient reveals a statistically significant negative
correlation of $R = -0.147^*$. The asterisk located at the end of the coefficient is a flag SPSS adds
as an indicator of significant relationships. The probability (p-value) of the null hypothesis being
true is 0.022. Since this probability is less than our preset level of significance alpha= 0.05, we
could reject the null on the basis of significance if this were a non-directional hypothesis.
However, the fact the correlation returned is negative indicates a failure to reject the null
hypothesis.
Figure 9  Bivariate plot, quarry distance and proportion of Size A flakes.

\[ R = -0.147 \times \alpha = 0.05 \text{  } \text{Sig} = 0.022 \text{  } N = 188 \]

**H2**  Despite the sheer volume of relatively small lithic refuse at the NW quarry, a significant increase will be observed in flake proportions from the ½ inch screen (size ‘B’) when compared against shovel test distance.

**Ho**  Flake proportions for the 1/2 inch screen will either not show a positive correlation or will show a negative correlation with distance from the NW quarry.
Figure 10  Bivariate plot, quarry distance and proportion of Size B flakes.

\[ R = 0.044 \  \alpha = 0.05 \  \text{Sig} = 0.247 \  N = 188 \]

The level of significance of 0.247 is far above the predefined estimate that the probability has occurred by statistical accident (Error I). Once again, following the hypothesized relationship between distance and flake size, this should have been a negative correlation. The null hypothesis is not rejected.

Due to the theory that a medium-large flake size is prone to represent early stages of blank and preform manufacture,
H3 Flakes from the 1 inch screen (size C) will show a medium to highly significant negative correlation as distance from the NW quarry increases.

Ho Flake proportions for the 1 inch screen (size C) will not show a negative correlation or will show a positive correlation with distance from the NW quarry.

Figure 11 Bivariate plot, quarry distance and proportion of Size C flakes.

$R = 0.047 \quad \alpha = 0.05 \quad \text{Sig} = 0.259 \quad N = 188$

The level of significance of 0.259 is far above the predefined estimate that the probability has occurred by statistical accident. In addition, the correlation is positive when, if the distance
to source pattern that was predicted held, it should have been negative. The null hypothesis is not rejected.

The 2 inch screen (size D) represents the largest flake size category and is expected to almost exclusively exist where quarry activity and early stage manufacturing occurred therefore;

H4 There will be a significant statistical negative relationship occurring between the 2 inch screen (size D) as distance increases from the quarry boundary.

Ho. Either no correlation will be discovered between 2 inch screen (size D) and increasing distance or a positive relationship will occur.

Figure 12  Bivariate plot, quarry distance and Size D flakes.
The presence of double asterisks adjacent to the correlation value and the fact that the level of significance is well below the alpha indicates a high statistical significance between these two variables. However the correlation value is positive and thus the null hypothesis is not rejected.

An overview of these four tests reveals that none of the flake size groups behaved as predicted. In an effort to better understand the relationships between small vs large flakes, the next test was performed by combining the two smaller size categories into one group (‘A’+’B’) which was named ‘Prpsmall’ and the two larger categories into another group (‘C’+’D’) termed ‘Prpbig’. Perhaps these less specific divisions would have a healthier impact on the statistical results. Only the information for the Prpbig group is provided here because the two groups’ correlations are an exact opposite of one another.

Hypothesis Set 2 (H5-H8).

According to the current distance from source drop off theories, the proportions of larger size flakes should reduce considerably the further away one moves from a quarry activity location.

H5 There will be a significant statistical negative relationship occurring between the proportions of larger size flakes (size C+D) as distance increases from the quarry boundary.

Ho. Either no correlation will be detected between proportions of larger size flakes (size C+D) and increasing distance or a positive relationship will occur.
The results of the combined largest screens (size C+D) proportions (prpbig) indicate there is a significant positive correlation in this test therefore the null cannot be rejected.

As explained earlier, the average flake weight for each shovel test was also correlated in order to explore if debris mass could be the determining factor for the expected drop-off trend rather than frequency. According to Purdy and Ericson (1984), the desire to reduce energy expenditures suggests that the closer a given flake assemblage is to the original stone source the
larger the average flake weight will be. Average weight was found by dividing the combined weight of all flakes in a given shovel test by the combined total number of all flakes within the same test. Once again the correlation is expected to exhibit a negative trend.

H6 The correlation coefficient for average flake weight per shovel test will demonstrate that as distance away from the NW quarry increases, average individual flake weights will decrease.

Ho Either no relationship between average flake weight per shovel test will occur or the correlation result will be positive.

![Average Flake Weight Per Shovel Test Compared to Increasing Distance](image)

Figure 14 Bivariate plot, quarry distance and average flake weight.

\[ R = 0.241 * \alpha = 0.01 \text{ Sig} = 0.000 \text{ N=188} \]
The above calculations represent the strongest correlation achieved thus far, nevertheless the linear equation is positive. Therefore, the null is not rejected.

Operating under a suspicion that low flake count outliers across the work area and particularly closer to the quarry area may be affecting the statistics in an unexpected manner, all test units containing fewer than six flakes were removed for the following test (H7). The category ‘Prpbig’ was used in this experiment.

H7 With the deletion of shovel tests containing fewer than 6 flakes, the computed correlation between distance and proportion of large flakes will be negative.

Ho Either there will be no correlation or there will be a positive correlation.

The removal of all test units containing fewer than 6 flakes from the analysis positively increased the correlation result found in H5 by 8.1%. This proves that shovel test sample size is not a factor sabotaging the hypothesized results. Once again, the null hypothesis cannot be rejected.

Up until this point, all correlations have been run on the proportions found with the combined categories of both thermally altered and non-altered lithic materials. Thermal alteration has been observed as having been conducted in both early and in later stages of the manufacturing process. However, it was atypical to have been carried out directly in the quarry itself. Therefore, non-altered materials would be expected to drop in proportion as the distance from source area increases. Unaltered flake frequencies were found by dividing the total sum of this category by the overall flake count per shovel test.
Figure 15  Bivariate plot, quarry distance and proportion of large flakes from shovel tests with more than six flakes.

\[ R = .211^* \quad \alpha = 0.05 \quad \text{Sig} = .012 \quad N = 115 \]

H8  As the distance from the NW quarry area increases, the frequency of non-altered material will decrease.

Ho  The presence or absence of thermal alteration is not dependent on distance. Either no correlation will exist or the correlation will be positive.
Figure 16  Bivariate plot, quarry distance and proportion of flakes without evidence of thermal alteration.

\[ R = -.007 \quad \alpha = 0.05 \quad \text{Sig} = .461 \quad N = 188 \]

Although the correlation is negative (\( R = -.007 \)) as predicted, it is not significant. Therefore, the null hypothesis is not rejected.

As a result of the preceding tests, one of two conclusions is suggested. First, there is no relationship between distance from NW quarry source area and flake size, average weight, or thermal alteration. Secondly, there may be undetected chert sources in the survey area. The quarry site and the six other concentrated lithic areas fall on or immediately near the natural lake shoreline extending out to the furthest test units at 800 meters along the lake shore. There is evidence that chert outcropped at this same elevation all along the lake shore but the majority of the outcrops are no longer evident. On the other hand, elevation rises moving south away from the shoreline and the lithic artifact assemblage counts from the higher elevations are generally
smaller, decreasing significantly. The next group of hypothesis will test elevation compared to 
(1) unaltered flake frequencies; (2) Prpbig proportion; and (3) average flake weight. This will 
verify if a change in elevation is the deciding factor for the spatial distribution of debitage rather 
than distance.

Set 3 (H9-H11)

H9  As elevation changes from the lake shore the proportion of unaltered flakes per 
excavation unit will decrease. The resultant correlation will be significantly negative

Ho  There will either be no correlation between elevation change and proportion of 
unaltered flakes or the correlation will be positive.

Note:  Symbols representing shovel tests containing one or more 2”+ (D) flakes have been added 
for reference. The small dots represent all other sizes.

Although the correlation is negative as predicted, it is not significant. The null 
hypothesis cannot be rejected.
H10  Elevation had a direct effect on the distribution of artifacts. As elevation changes the proportional make up of larger flakes (size C+D) per test unit will decrease. The resultant correlation will be significantly negative.

Ho  Elevation has no direct effect on the distribution of larger flakes (size C+D) per excavation unit. There will be no relationship with elevation or the correlation will be positive.
Figure 18 Bivariate plot, elevation and proportion of large flakes.

\[ R = -0.206** \quad \alpha = 0.05 \quad \text{Sig} = .002 \quad N = 188 \]

The results of this correlation have been flagged by SPSS as highly significant. The level of significance of .002 is below the predefined estimated that the generated probability has occurred by statistical accident. Further, the linear correlation is negative, therefore the null hypothesis is rejected in favor of H10.
H11 As elevation changes, the average flake weight will decrease. The correlation between flake weight and elevation will be significantly negative.

Ho There will be either no correlation between average weight and elevation or the relationship will be positive.

Figure 19  Bivariate plot, elevation and average flake weight.

\[ R = -0.269** \quad \alpha = 0.05 \quad \text{Sig} = 0.000 \quad N = 188 \]

The results of this correlation have been flagged by SPSS as highly significant. The level of significance of .000 is below the predefined estimated that the generated probability has occurred by statistical accident. The coefficient has a strong statistical significance. Further, the linear correlation is negative, therefore the null hypothesis is rejected in favor of H11.
The statistic tests of the original set of hypothesis (H1-H4) and the modified set (H5-H8) all of which examined the relationship between distance and flake assemblage composition all proved to be inconclusive. In fact, in six of these 8 (H1, H3-H7) the correlation was exactly the opposite of what had been expected. Of the two hypothesis (H1, H8) which did display the predicted correlations, the probability that the null could be rejected fell far above the preset level of significance. There is no choice but to conclude that distance from the NW quarry in particular is of no relevance in terms of flake assemblage composition in the study area. That is, the predicted relationship between flake size and distance to the quarry area was not found to be true.

However, that is not to say the distance from source theory is not significant. In fact, when the source area is defined in terms of a specific elevation rather than a single point along that contour, the predicted relationship between source distance and flake assemblage characteristics proves to be true. This alternative definition of the source area is based on the fact that chert is a sedimentary rock which, unless disturbed after formation by natural forces, is always deposited in horizontal layers. With this in mind, the consideration that the NW quarry and the six other debitage concentrations are all located directly along the lake shore at the same elevation (17.5-18.5m ASL) suggests the possibility that chert once outcropped all along the project areas shoreline. This is important because it supports the hypothesis that the entire lake shore line sharing this elevation had at one time exposed chert at the surface.

This proposition is supported in two ways. In the first place the final set of hypotheses (H9-H11) all show the expected relationship between distance from the newly defined source area and debitage size. This is especially so in the case of H10 and H11. The distance to debitage correlations for these two tests reveal a significant drop in both the proportion of large
flakes and in average flake weight the further the shovel tests move upwards in elevation. Couple this with the fact that the debitage composition for all seven lithic densities have similar proportions in flake sizes suggestive of early and middle stage reduction. This information points to the likelihood of other previously existing shoreline outcrops which were presumably visible to the Native Americans and were either quarried out then or have been covered up by erosion or agriculture.
CHAPTER 7 -- DISCUSSION

Research Problem and Goals

The goals of this research project fell into two separate but not unrelated categories. The original task was to conduct an archaeological survey along a 90 acre shoreline section of Orange Lake in North Central Florida following the standards of Florida’s cultural resource management specifications and determine what prehistoric information remained. In order to meet these standards, a grid of shovel tests was excavated 50 meters apart along north/south transects across the entire parcel. When time permitted or when above average artifact counts in a shovel test occurred, a series of 25 meter shovel tests were dug until the artifact concentrations returned to average or below. After preliminary shovel testing, two 1 x 2 meter excavations were conducted in areas of interest. Upon the completion of the field season, artifacts were washed and sorted using morphological criteria to subdivide the entire lithic assemblage. Lithic artifacts representing debitage were analyzed with an aggregate analysis technique while diagnostic stone and ceramic artifacts were categorized into their respective groups and time periods.

Distance-From-Source-Drop-off Analysis Results

The research problem generated from this work focused on lithic debitage size frequencies as an indicator for early or late biface manufacture. It was anticipated that chipped
stone refuse generated at a quarry site or source area will differ from that generated at non-quarry based archaeological sites. This expectation prompted a series of distance-from-source-drop-off test to be conducted using statistical correlation to compare the frequency of large/small lithic flakes to the distance they were recovered from an identified quarry site on the edge of the survey area. Ideally, the frequency of large flake sizes should have decreased as the distance from the source area increased (J. K. Johnson, personal communication, 2012).

A quarry location was identified in the northwest corner of the project which was the only location within the survey area where a chert outcrop was surrounded by a dense debitage scatter. As mentioned above, the frequency of large primary flakes is expected to drop as distance from source area increased. In accordance with size, the average weight of an assemblage of flakes is expected to drop with increased distance. These two intertwined theories formed the basis for hypothesis 1–7 during the statistical component of the lithic analysis. An eighth hypothesis sought to support an idea that in Florida thermal alteration of lithic material occurred at a later stage than the initial reduction on a quarry site. Therefore, the proportion of thermal alteration in each of the shovel test assemblages was examined in relation to distance from the quarry site.

In none of these eight tests were the research expectations met. Further research uncovered a strong and likely possibility for this failure. Chert formations found across NCFL were formed in horizontal strata across great areas, not in sheets but as horizontal deposits of various sizes of boulders. Pockets in the limestone bedrock were filled with silicone and hardened. Over time the surrounding limestone dissolved leaving horizons of buried chert boulders across vast regions. This led to the realization that chert once would have outcropped along the entire length of the Orange Lake shoreline.
In order to explore this possibility, a set of three hypotheses were tested. The perimeter drawn around the small NW quarry on the lake shore was expanded to include the entire shoreline between 17.5 and 18.5 meters above sea level. This new quarry boundary can be seen as the yellow polygon in the map (figure 20) below with the original NW quarry boundary seen in aqua. This new lake shore polygon is the zone in elevation where it is predicted that chert resource once were exposed based on the outcrops at the NW corner, isolated boulders identified along the majority of the projects 1.3 km shore line, and what is known of chert formation and deposition within Florida.

Figure 20  New quarry boundary along lake shore at 17.5 to 18.5 meters above sea level.
The proposition that chert was once exposed across the length of the shore line was supported by three hypotheses which examined the relationship between elevation and thermal alteration, flake size, and flake weight. All three correlations behaved as predicted. The distance to debitage correlations for H10 and H11 are particularly valuable revealing a significant drop in both the proportion of large flakes and average flake weight the further the shovel tests move upwards or downwards in elevation away from the bank. These findings reveal that the shoreline of William’s Hill did most likely contain raw stone material and it was utilized for biface manufacture following the same processes generally excepted for quarrying sites.

Eight dense concentrations (including the NW quarry) of artifact material were uncovered across the project area (figure 21 below). The Alachua concentration (A) primarily consisted of Mississippian sherds. The lithic concentration (1) south of the NW Quarry was heavily laden with chert debris however, nearly all of the material had been thermally altered and no evidence for quarry activity was uncovered. Therefore this concentration may be indicative of a later stage of manufacturing and thus a different type of site use.

The six concentrations located directly on the lake shore all share similar traits, the most significant, but certainly not the only thing they all share in common is they are all in direct vicinity of the natural Orange Lake shoreline. They also all contained artifacts considered to be trademarks for tool stone quarry activity and early stage biface manufacture. In this case, according to ‘Least Cost theory’ (Purdy 1984) prehistoric stone knappers would not have lugged heavy raw stone boulders 200, 400, or 850 meters (furthest debitage concentration from NW corner) to work elsewhere when it could be reduced to a more manageable size at its original procurement location. Therefore, all six concentrations along the lake shore must be evidence
that other sources of chert were once visible all along the lake shoreline or at minimum in those six zones.

In addition to the “drop-off” test results and the lake shore concentrations, further support for the claim of this lake shore quarry zone came from the visual recognition of chert boulders at the surface and within some shovel tests. Although very sparsely spaced, all noted boulders and nodules were only seen along the lake shore. The reason so little outcropping material is still visible then must be explained and can be done so through two scenarios.

Figure 21  Artifact concentrations identified at William’s Hill.
The strongest argument and likely explanation is that of resource exhaustion. Across the many thousands of years that people exploited the resources of William’s Hill they must have required a large quantity of raw chert material to produce all nature of formal and informal tools. With chert representing the most durable material available, this reliance on local raw chert could have very well exhausted the stone resources located at or just below the surface.

The other explanation for the lack of surface material would be the result of more modern events. Deforestation of this entire property through logging and then the subsequent nine decades of intensive agriculture could have affected chert outcrops in one or two ways. After the loss of vegetation and repeated plowing, water and wind born erosion from the hill slope above the shore could have been sufficient to cover some of the outcrops. In conjunction with this, the loose boulders may have been dug and hauled elsewhere so as not to interfere with the farming equipment.

In light of what was learned from the thesis research it can be definitively said that the NW quarry was a raw stone workshop, however as has been shown, it was not the only source of raw tool stone as originally speculated. There is no doubt Williams Hill was a significant staging area for chert procurement and biface manufacture. When tool stone of high quality is available at the local level, as seems to be the case at William’s Hill, the lithic assemblage will be primarily dominated by this stone and relatively absent of foreign sources. Of all the lithic artifacts recovered, an astounding 99.4% were of the locally available rice grain chert. Clearly the local chert resources were considered of favorable quality for the occupants of this region to have not engaged in long distance trade for other chert varieties available to the south, north and west of the project area. With this said, the identification of a concrete quarry boundary and the positive sourcing of lithic artifacts was a success. After the quarry boundary adjustment, the
hypothesis for drop-off trends proved accurate. Thus, the project goal of determining if trends in debitage based on size, weight and, thermal alteration could be identified on a small area of 90 acres was accomplished.

**Culture History at William’s Hill**

Of the 5676 lithic artifacts recovered 5557 of them fell into the debitage categories suggesting a heavy emphasis of chipped stone tool production. Other activities were also in evidenced across the survey area as documented by the discovery of both formal and informal tools including diagnostic bifaces. Informal expedient tools such as flake knives, scrapers and utilized flakes/blades indicates a practice of other specialized activities typically found on non-manufacturing oriented sites. The presence of completed hafted bifaces in various stages of retooling represents continued or seasonal occupation of the area rather than a location purely visited for raw stone acquisition. Numerous pot sherds representing the earliest forms of pottery produced in Florida onward into the Mississippian period were found spread across much of the project area with two heavy concentrations identified as specific period sites. The lake shore line is backed by gently sloping well drained sandy soils ideal for horticulture and occupied by a range of nut trees and capable of supporting a diverse array of fauna. This ideal and convenient location of raw tool stone along the lake shore, fresh water, and a diverse ecosystem is most certainly the reason for the multiple temporal occupations identified at William’s. Over time from the Early Archaic into the Late Archaic and eventually the Mississippian, the settlement and food exploitation strategies of Florida’s prehistoric inhabitants changed. With a little luck and a lot of work many of these periods in time were indeed discovered at William’s Hill.
The earliest component found at William’s Hill dates from 9,000 to 5,500 B.C. This is a time characterized by a transition from the Paleo Indian lifeways into those of the Early Archaic. Little is known of the transitional phase except that it is marked by the divergence away from traditional lanceolate projectiles towards smaller notched varieties. This is likely a mark of regional specialization or changes in hunting strategy (Walker 2007: 102). By 7,500 B.C. the Early Archaic was in full swing and by 6500 B.C. the people of the Early Archaic had completely diverged from their earlier predecessors, abandoning the nomadic habits and adopting a less nomadic lifestyle along the riverine and lake edge environments of NCFL (Milanich 1994: 63; Goggin 1949: 22-23; Cumba 1976: 49).

No diagnostic points were recovered for this stretch of time (transitional Paleo to Early Archaic), however, two unifacial scrapers were excavated which match Purdy’s 1983 description for the tool type. This tool type is completely unifacial with steep edges around 80 degrees and is believed to have been used for a number of scraping purposes. The presence of these tools suggests that at least temporary or seasonal settlements for the people of the Early Archaic in this area. Both unifacial scrapers were removed from the deepest level of the standardized project shovel test at the 75-100cm range. Although recovered from two separate shovel tests, these tests fell within close range of one another very near the lake shore line. As previously mentioned, artifacts removed from shovel tests were not bagged per level, however trends during the recovery of diagnostic tools and debitage attributes were recognized and recorded during shovel testing. For example, flakes and tools recovered from the 75 cm or deeper range were heavily patinated local rice grain chert with no thermal alteration. This is important because it is widely supported in Florida archaeology that thermal alteration did not come about until the better end of the Early Archaic and was not widely adopted until the Middle Archaic (Claire
1987: 205-206). It cannot be said definitively, but based on the two unifacial scrapers recovered and the nearly complete lack of thermally altered debitage at the same observed levels across the project area, there is a plausible indicator for Early Archaic occupation.

In contrast to the meager representation of diagnostic artifact recovery for the Early Archaic, Middle Archaic and later periods are well represented at Williams’ Hill. Around 5000 B.C. there was an explosion in the number of sites located along all variety of water sources as climatic conditions resulted in a wetter environment, yet still drier than present conditions of Florida today. Specialized site uses diversified from that of the past with both small camp sized sites and large sites consisting of several acres or more. Referred to as central-based settlements these large sites were occupied by a relatively larger number of people than would have been seen during the earlier periods and were where a variety of activities took place. These central-based settlements were often in close proximity to both a tool stone source and a fresh water source (Milanich 1994: 75-77). The number of Middle Archaic artifacts recovered, the fact they were well dispersed across much of the 90 acre survey area, and the local availability of both raw stone material and fresh water, suggest William’s Hill is a good candidate for this type of settlement pattern during the Middle Archaic and perhaps later.

The Middle Archaic is well represented at William’s Hill with 5 diagnostic bifaces recovered. One Newnan (4,500-3,500 B.C), three Marions (4,000-3,000 B.C.) and one Alachua (4,000-3,000 B.C. fashioned into a blunt scraper) were found spread along a broad plain in the general vicinity of the lake shore. These tools were consistently recovered from an average depth of 50 cm and were often accompanied by heavy concentrations of thermally altered debitage. Of particular interest, a number of the largest size grades for flakes were regularly noted at this depth, possibly indicating an increased focus on quarry activity during the Middle
Archaic. In one instance, a complete Marion was recovered from the single densest shovel test during the whole of field work containing a wide range of debitage sizes, a core, three core partials and the proximal end of a late stage biface. The Marion appears to have been re-sharped at least once therefore its presence among early stage manufacturing materials might be an example of a worn out tool being replaced by newly manufactured ones (Keeley 1982: 804). In contrast to this Marion and another re-sharpened Marion point, the third Marion and a Newnan point appear to be first stage bifaces. These tools were completed and never used enough to warrant a touch-up. The exact duration for the Middle Archaic occupation of this area is difficult to determine. Although there were no specific concentrations, the broad spread of Middle Archaic points indicate that they utilized the entire shoreline. They certainly participated in stone procurement, thermal alteration and the manufacturing of stone tools at William’s Hill. Since the Alachua point was retooled into a hafted scraper it is likely that other day to day activities also took place alongside the exploitation of the chert for tools.

By the Late Archaic (3000 B.C.), groups of people were occupying permanent villages located along many coastal wetland environments of Florida and to a lesser extent the interior wetlands of NCFL. The population had steadily been increasing, opening new routes for trade and interaction among groups. By about 2000 B.C. the invention of fired ceramics took the Southeast by storm and had spread throughout the region by 1000 B.C. In addition to this significant invention, the style of bifaces also changed, veering away from the stemmed varieties of the Newnan and Marion to the corner and eventually basal notched forms. These early pottery producing groups of people who resided in NCFL have come to be known as the Orange Culture. This new pottery was produced consistently until around 500 B.C. when it was replaced with

Bifaces diagnostic for the first half of the Late Archaic were not recovered during shovel testing. Two incomplete Hernando projectiles dating from the second half of the Late Archaic to the first half of the Woodland periods (1000 B.C. – A.D. 200) were recovered. A concentration of Orange period pottery was discovered on a small ridge along the lake shore. The Ridge concentration is located on the upper, most flat section of a narrow ridge running north/south parallel to the eastern lake shore. The Ridge concentration is shown below in figure (22) and can be seen outlined by the blue polygon. The dots with in the polygon are the judgment shovel test locations. The ridge extends into the lake and is separated from the current shoreline by an unbroken line of sink holes roughly 15 meters wide with the exception of a narrow land bridge between the ridge and shore at both the northern and the southernmost ends of the ridge line. Given the location of this ridge, it likely represents a previous shoreline before the water table rose to its current level. Based on elevation data this area was likely favored over other areas with lake shore access due to its direct association with a deeper section of the lake which is less clogged with peat accumulation. The sink holes directly behind this site once would have likely provided raw material for stone tool production as is evidenced by several isolated boulders still visible, as well as providing another source of fresh water.

This ridge is quite narrow ranging from 5 meters at its narrowest to roughly 15 meters at its widest and as a result would not have been sampled using the 50 meter grid. Therefore in order to test this high probability area a series of shovel test were placed running the length of the ridge. Of the six judgmental shovel tests placed along this ridge, the three located at the eastern end of the ridge line contained all 24 Orange period sherds recovered on survey. A total
of five Orange Plain (2000 B.C. – 500 B.C.) and 19 Orange Incised (1650 B.C. – 500 B.C.) are represented. In addition the unit containing the five Orange plain sherds also yielded a stack of 18 steatite bowl fragments, 16 Lochloosa Punctated and one St. Johns Plain pottery sherd. Steatite bowls are regarded as a later Middle Archaic development growing in popularity during the Late Archaic and declining during the Woodland. The other sherds represent the later Woodland and Mississippian eras referred to as the Cades Pond and Alachua traditions of NCFL. A fourth judgmental test due North along the ridge line also contained a number of Alachua period ceramics.

The location for the Orange period wares was quite small, that of a camp, bounded on two sides by water. No other Orange period artifacts were recovered anywhere else on the property. The small site size and the location of these Orange period artifacts fits what is known about Late Archaic settlement patterns of interior north central and north western Florida. Large
Late Archaic sites are relatively uncommon in these areas. Normally the Late Archaic components are represented by either small camps or as small components in larger multi-occupational sites. This is suggestive of seasonal mobility or smaller populations in general as compared to those represented on the western and eastern coasts. Whether this site is the product of a short-term single use camp or of repeated use by a small group is unclear. However the extremely small size of this site and the fact only three Orange period vessels represent the 24 sherds recovered would seem to not favor the idea that this is a location that underwent long term use. On the other hand the presence of the Woodland and Mississippian ceramics and the possibly older steatite sherds does indicate the importance for exploitation of this small area over an array of different cultures. (Milanich 1994: 86-87).

Further support for this hypothesis comes from the temporal diversity of chipped stone tools recovered along this narrow ridge line. Diagnostic stone tools excavated from the six shovels tests range in age from the Middle Archaic through the Mississippian. Within the small confines of the Orange period camp a small projectile categorized as a Taylor was found in judgement test C, the same unit the incised Orange tradition sherds were found. This projectile dates from the culture considered to have gradually replaced the Orange beginning after 500 B.C.

Roughly 20 meters northwest of the Orange artifact camp (judgement test G) the Alachua style hafted scraper previously described for the Middle Archaic was recovered along with the distal half of a Hernando dating from between the second half of the Orange period to the first half the Cades Pond. Another 5 meters Northwest at the furthest judgmental unit (E) a crude bifacial tool specifically diagnostic for Cades Pond (Cross Creek Perforator) and a small dart point (Weeden Island) diagnostic for the Mississippian era Alachua Tradition were excavated.
Although not dateable, seven expedient utilized flakes, a bone awl and an end scraper were also recovered from the six Ridge concentration shovel tests.

Stone refuse excavated from the Ridge concentration is highly suggestive of quarry activities and early stage biface manufacture. All but one of the six shovel tests displayed higher ratios of large flakes over small flakes and all of the judgmental test pits contained one or more complete or incomplete preforms, cores and/or finished bifaces. A total of 7 bifaces, 3 cores, 3 unidentifiable tool fragments, 9 preform partials, and one hammer stone were recovered, clearly pointing to an emphasis on quarry activity and biface manufacture during one or more time periods.

In locales across Florida such as William’s Hill, it is quite common for the same site to have been occupied over a long duration through many cultural changes. The evidence for repeated site use on the Ridge concentration is substantial based on the stone, ceramic and bone artifacts recovered. No doubt these materials indicate a wide range of behaviors during site use. Of the eight concentrations of lithic and/or ceramic artifacts discovered at William’s Hill this was the most diversified in terms of multiple components.

The end of the Orange period is marked by the complete replacement of fiber tempered pottery with sand temper ceramics throughout most of NCFL including the Williams Hill survey area. To the east along the St. Johns River, soft sponge spiculate tempers were favored over sand but both tempers had all but completely replaced fiber tempered ceramics by 500 B.C.

With this new form of pottery manufacture came a time when regionalization developed and became clearer in the archaeological record. Five geographical zones can now be defined on the basis of ceramic characteristics and settlement strategies. The interior forests, lakes and wetlands of NCFL are one of these geographical zones and the post Orange peoples that lived in
NCFL during this time have come to be known as first the Deptford/Pre-Cades Pond period which later developing into the Cades Pond period.

The Deptford culture is found predominantly along the Florida Gulf coast and Florida’s east coast reaching from Jacksonville, Florida into North Carolina. This culture was contemporaneous with the beginning of the St. Johns culture which was developing on the St. Johns and Oklawaha waterways of Eastern Florida. Neither, culture settled NCFL with any great numbers, not unlike what appeared to be the case during the Orange period. However signs of occupation from both is available as small specialized camps perhaps occupied intermittently. By 1 A.D. inland Deptford villages were appearing but were still scarce. All discovered examples of these settlements are on an ecotone along a prominent water source. This short window of a few hundred years when Deptford groups were moving into NCFL is considered by some as the roots from which the Cades Pond people drew their ideals.

Little evidence for an early Deptford occupation was identified in the analysis of the William’s Hill material and said materials distribution. A large number of non-decorated quartz sand tempered sherds were recovered from three sparsely scattered areas and from single isolated shovel tests. However, these artifacts could not be definitively labeled Deptford because this style of ceramic manufacture remained unchanged and in use from 500 B.C. into the Mississippian. A shovel test about 50 meters northwest of the Ridge concentration has provided the only definitive proof for either Deptford peoples moving through the area or trade from outer Deptford peoples into the area. This is represented by five Check Stamped sherds of a single vessel. Considering the only other possibly Deptford era artifact recovered was the Taylor point from the Ridge concentration, there is a better possibility that trade occurred between the late Deptford culture of the Gulf coast and a Cades Pond group of the interior. The Taylor projectile
dates to both the Deptford and Cades Pond periods. Also, trade is the most likely scenario of the two considering Cades Pond sites have been recorded in far greater frequency than Deptford sites throughout Alachua and Marion counties and several Cades Pond relics were found during shovel testing including two Cross Creek perforators diagnostic to Cades Pond. One of which of these perforators was found in close proximity at a shovel test 25 meters east of the Check Stamped Deptford sherds.

By A.D. 180 the Cades Pond Tradition can clearly be distinguished from is roots of the Deptford period. The Cades Pond culture is limited to a small region of NCFL and William’s Hill falls right at its southern border. These people were completely reliant on wetland environment; without exception every Cades Pond site has been located on wetlands or lakes. Cades Pond groups are known to have frequently traded or copied the sponge spiculate containing wares of the St. Johns as well as the decorated sand and mica tempered wares of the Swift Creek culture of North West Florida. As such, Cades Pond mound sites will often contain examples of each and can serve as a good indicator for a Cades Pond era site when other diagnostic tools are absent. Villages may also contain these foreign wares but with much less frequency. Up to 95 % of the village refuse can be composed of non-decorated sand tempered ceramics. The stark lack of variation of this plain ceramic style makes dating assemblages lacking foreign decorated wares nearly impossible.

The extant of this culture in NCFL is quite small (restricted between the Santa Fe River to the North and Orange Lake to the South) and a number of positively identified sites have been recorded. As previously stated, a large number of sand tempered plain sherds were recovered during the current project. Circumstantial evidence seems to indicate that at least some of these plain sherds are of Cades Pond origin based on the regional location of these sherd scatters, their
distribution along the lake shore line, the high ratio of plain to other foreign or temporally different wares at two of the four scatters, and the identification of other artifacts dating to the era found at William’s Hill. In addition, a single sherd of St. Andrews Complicated Stamp (A.D. 200 – A.D. 700) of the Weeden Island complex was recovered and a number of St Johns Plain wares.

The St. Andrews sherd is of great importance as its date range of production coincides with the duration of the Cades Pond culture almost exactly, indicating trade or replication by a Cades Pond group. Although not recovered in association with any other possibly Cades Pond ceramics (excepting a single sand tempered plain sherd 15 meters to the south), the St. Andrews sherd was recovered from a judgement unit on the Ridge concentration only 15 meters north from where the Taylor projectile was found, 25 meters south from where one of the Cross Creek perforators came from and 150 meters south from the other Cross Creek perforator. All of these are Cades Pond markers. The St. Johns Plain sherds (n=50) are likely be Cades Pond period artifacts although they could also date to the earlier Deptford period. However, that being the case, there should have been more than a single Deptford checked stamped sherd from the site. However, St. Johns Plain was produced and traded from the Deptford period through to European Contact. In sum, not enough data was recovered to indicate whether a permanent Cades Pond habitation was present or that the lithic artifacts were simply a product of short term exploitation of the area of William’s Hill. What is certain is that Cades Pond people where indeed present for some duration exploiting William’s Hills access to wetland resources.

Somewhere around A.D. 600 the earliest Alachua period artifacts appeared in NCFL. By A.D. 750 agriculture had taken a firm hold as the dominant subsistence strategy for NCFL. Not long after the first Alachua villages were founded, the Cades Pond culture disappeared, likely
assimilating into the Alachua lifeways. Settlements shifted from the poorly drained soils lining the many wetlands into the well-drained hardwood forests where soils suitable for growing crops were prevalent. With this culture shift came about new styles of ceramics differentiated by the variety of surface treatments. The Alachua culture is divided into two eras; Hickory Pond (A.D. 600-1250) and Alachua (A.D. 1250-1700) with the latest portion of the Alachua named the Timucua after Spanish contact. These two halves of the Alachua Complex are the same in most regards except most notably that the frequency of production for Cord Marked pottery was higher than Cobb Marked during Hickory Pond and vice versa during the Alachua. Also, a technique in which fabric was wrapped on a board and paddled into the wet clay before firing is strictly a Hickory Pond characteristic. At least four other different surface treatments were also produced but are rare.

The Alachua tradition is remarkably well represented at William’s Hill with six concentrations/scatters of artifacts and isolated shovel tests in close proximity to the scatters. Four of these concentrations of Alachua ceramics and lithics are nestled upon the large sloping hill overlooking the lake. This is the characteristic location for sites dating to that period. Here the soils are deep well drained Arredondo sands still recognized today as suitable for agriculture. Of particular interest is the largest and densest Alachua concentration (labeled Alachua Concentration (A) to avoid mix up) located furthest away from the lake shoreline on the slightly sloping lower terrace (4-5 meters higher in elevation from lake shore) just below the crest of the hill. A density map created for Alachua period ceramics is provided below in figure 23. A shovel test at the heart of this concentration uncovered a dense midden filled with charcoal,debitage and Alachua complex pottery. Unlike the sandy soils tested everywhere else on project, this soil was dark brown indicating a high organic content. Subsequent delineations in the area
uncovered a zone containing Alachua materials roughly 50 by 75 meters in size in which a total of 15 Alachua sherds were recovered in five shovel tests.

Figure 23  Alachua Concentration (A) and of Alachua period concentrations overlaid on a soils map.

In order to explore this site in more detail, a 1 x 2 meter unit (unit 2) was sunk on the eastern edge of the shovel test containing the midden material. Excavated in 10cm levels except for the plow zone (0-30cm), the midden material was followed to 40 cm where a large funnel shaped feature composed of dark charcoal laden sand and artifact refuse was uncovered. The feature was in the west two meter wall and extended out in a half circle to the east just past the center line of the unit. The original shovel test had been dug directly over the other half of the feature. The feature was followed down to 92cm and staining extended another 10 cm further.
Only Alachua period sherds were recovered from unit 2, totaling 5 Alachua Cobb Marked, 52 Prairie Cord Marked and 5 Prairie Fabric Impressed. The Cobb Marked were all removed from Level 6 (70-80 cm) and the Fabric Marked all from level 7 (80-90 cm). Levels 1, 3 and 4 contained only Cord Marked sherds. Five small triangular Pinellas dart projectiles diagnostic for the Alachua tradition from levels 1, 2 and 5 with three of the five Pinellas recovered from level 2 alone. Debitage was also found in abundance in all levels with 83% of the 135 pieces consisting of small size grade items suggestive of late or final stage biface manufacture. A small chert nodule was removed from level 3 (40-50 cm) possibly used as a hammer stone. With the exception of the Alachua concentration (A) local, debitage counts were considerably low on the remainder of the hill slope until it got close to the shore line and debitage was nearly non-existent on the crest of the hill.

Cord marked sherds out number Cobb marked sherds from the Alachua site, making up 76% of their combined number. Given the previous work conducted by Goggin (1949) and followed up by Milanich (1998) regarding Cord/Cobb frequencies, there is definitive proof for a Hickory Pond settlement during the first half of the Alachua Tradition. To further support this conclusion, five Fabric Impressed sherds were recovered from the site, one from a shovel test and the other four from the deepest ceramic producing level of Unit 2. This surface decoration is exclusive to the Hickory Pond era. The two smaller scatters on the hill closest to the Alachua Concentration (A) also followed this pattern with ratios of Cord to Cobb Marked at 13:1 and 3:1. The fourth hill scatter at the northwest corner of the property had a ratio of 1:1 with three of each found 50 meters apart. This fourth set was considered a scatter and not isolated finds because a Pinellas projectile was found at 25 meters between them. The midden material, ceramics.
debitage and tools are a clear indicator this was a permanent or long term settlement of the early Alachua (Hickory Pond) people.

In addition to the Alachua materials, 39 sand tempered plain, 36 St. Johns Plain and 1 Dunns Creek Red sherd were found in the survey area. The scatter of these other ceramics was concentrated in the Alachua Concentration (A) but were spread out beyond this encompassing the remainder of the terrace and lower, towards the lake. This spread completely linked the Alachua Concentration (A) to the second densest Alachua period concentration on the hill forming one large ceramic scatter 200 x 200 meters. These ceramics also nearly linked the other two small Alachua scatters nearer to the lake shore with the second densest Alachua concentration and in turn the Alachua Concentration (A). Had delineations of 25 meters been conducted throughout the hill (as they had near the two densest concentrations) they likely would have formed one continuous scatter of ceramics anddebitage. Based on currently available shovel test results and the above prediction, the scatter is 200 meters at its widest on the terrace of the hill and 450 meters long running northwest terminating at the lake shore where the NW quarry was originally identified.

As previously mentioned, St. Johns Plain and Sand Tempered plain ceramic types are possible indicators for Cades Pond habitation as is Dunns Creek Red, however the cultural continuity over a long period of time for the first two ceramic types make them difficult to date without associated diagnostic artifacts. Dunns Creek Red had reached its height of production by the St. Johns Culture during Cades Pond but did continue in use with lessened production through the Alachua. As was the case with Cades Pond, the first two wares are also common on Alachua Period sites. Alachua Plain, quite undistinguishable from the lump-all Sand Tempered Plain was used in great frequency by the latter half of the Alachua tradition and trade or
replication of St. Johns Plain occurred throughout the tradition. With this knowledge we are able to propose two possible explanations for the artifact scatter along the hill towards the northwest: 1) cultural continuity 2) difference in settlement preference.

The first possibility is that this area represents cultural continuity from the Cades Pond people into at least the Hickory Pond and likely the Alachua. At least some of the Plain and St. Johns wares found on the hill could have originated during Cades Pond in which this group then assimilated with the newly arriving Alachua culture. The location and topography of William’s Hill would have been favored by both peoples with the agriculturally suitable sands on the hill (Alachua) and the direct access to a large lake/wetland environment (Cades Pond). The discovery of Cades Pond lithic tools, the Deptford Check Stamped and the St. Andrews Complicated Stamp sherds along the eastern lake shore does provide absolute evidence that the Cades Pond were at the least conducting activities by the water. Had St. Johns or Plain sherds been documented on the hill in strata below the Alachua material this would have provided the proof needed to conclude that cultural continuity is the explanation for the diverse ceramic scatter on the hill.

Unfortunately, these data was not recorded during shovel testing. Further, the fact that no diagnostic ceramic or lithic tools dating from the Cades Pond period were found anywhere else other than on the eastern lake shore weakens the argument that Cades Pond had settled the hill prior to Alachua. Granted, shovel tests placed at 50 and even 25 meters are quite a distance apart thus and if diagnostic Cades Pond material was sparsely present on the hill, it could have been missed.

The second possibility is that the hill scatter is composed solely of an Alachua complex village represented both by Hickory Pond and Alachua. The sand tempered plain sherds could
have been produced during the latter half of the Alachua Tradition. Further, the high ratio of Cord marked and the presence of Fabric Impressed was produced by the earlier Hickory Pond. In accordance with this, the St. Johns Plain is representative of interaction of these people with the St. Johns culture to the east. Based on this information and the fact that this concentration rests back from the lake shore on soils suitable for cultivation, the Alachua Concentration (A) could have been an exclusively Alachua occupied village. While on the other hand, the lake shore where the Cades Pond artifacts were recovered was favored by those people for the very close direct access to the lake. Perhaps settlement location preference is the explanation with the Cades preferring direct contact with the ecotone and the Alachua moving further back into the hardwood forest for agriculture but still close enough for convenient stone and water access and to supplement their diet with wetland resources. In short, further research and excavation is needed to rule out one or the other of these two possibilities.

Possibly adding to the explanatory mysteries of site complexity detailed above is the characteristics of the two other Alachua period concentrations not previously discussed that were discovered during the archaeological survey. These are located along the eastern shoreline in the same areas as where Cades Pond artifacts were found, including the Ridge concentration. The Ridge concentration apparently was highly favored by the Alachua people as it was by the Cades Pond, Orange, and Archaic peoples before them.

Directly on the southern half of the Ridge concentration (same half as the Orange, Steatite, St. Andrew Complicated Stamp, 1 St. Johns Plain sherd, and Taylor projectile and bone awl) a total of 32 Alachua Complex sherds representative of 4 vessels were recovered from only two judgement tests. These included 9 Lochloosa Punctated, 1 Cord Marked, 16 Cobb Marked and 6 Fabric Impressed sherds. The northern most Ridge concentration judgement test pit
produced a Weeden Island projectile diagnostic for the whole duration of the Alachua Complex. Based on count alone, the large group of Alachua Tradition sherds within only two tests has highly skewed the ratio between Cord and Cobb Marked because all 16 of the Cobb marked were found in one shovel test and are a part of one vessel. The 6 Fabric Impressed, 9 Lochloosa and 1 Cord were found in the other shovel test representing 3 vessels. The ratio of 1:16 Cord vs Cobb is no indicator phase assignment because there are remains of only one vessel each. The Lochloosa is a neutral ceramic because it was produce during the entire complex. Regardless, on the basis of the six Fabric Impressed sherds, it is clear that the site was at least occupied during the Hickory Pond phase.

The final concentration of Alachua period material is north above the Ridge concentration beginning 150 meters up and terminating another 100 meters further north. This is more a scatter than a concentration with three shovel tests 50 meters apart each running parallel the lake. The furthest south contained 2 Cobb Marked sherds, the middle an Itchetucknee projectile point and the final contained 13 Fabric Impressed and one Alachua Plain sherds. If the identification of the Alachua Plain is accurate it supports both Hickory Pond and Alachua era occupations. The Itchetucknee projectile point also supports the latter Alachua era because this projectile was not manufactured during the Hickory Pond phase. Of course, with only a single lithic tool from the latter Alachua and only the possibility that the Sand tempered Plain sherds on the Hill and elsewhere are indeed Alachua Plain, there is not substantial evidence to support with certainty that the Hickory Pond people remained on site after the transition into the later Alachua era. To add to this argument, after contact with the Spanish, European trade goods appeared on late Alachua sites and act as superior temporal markers. However no European artifacts were found anywhere at William’s Hill that predated the early 1900’s.
The Hickory Pond settlement is well represented at William’s Hill. Given the small project area (90 acres) it is highly unlikely that the concentrations along the eastern shore and the hill were occupied by different Hickory Pond groups. A quick look at the topographic and soils map reveals an explanation to the artifact distribution. The Alachua Concentration (A) rests on a flat terrace of which itself and surroundings along the slope are ideal soils for cultivation, the standard for Alachua period settlers. The ‘path’ of ceramic scatter leading northwest dead ends at the lake shore at the originally proposed NW quarry. This is an area were raw tool stone is still visible on the surface. Heavy quantities ofdebitage were found here indicative of quarrying activity and early stage biface manufacture. The Hickory Pond people must have preferred this outcrop for one or more reasons such as ease of access, specific attributes of the stone itself, and/or lack of availability elsewhere along the shore because earlier cultures had already exploited the other outcroppings.

At the Ridge concentration and northward on the eastern shore the lake bottom is considerably deeper and closer to the shore line than anywhere else offering closer and easier access. These deeper places might also have remained clear of aquatic vegetation and been less prone to peat accumulation offering essential access to the rest of the lake via canoe. In addition, both this deep section and the many sinkholes along the eastern shore would have provided a reliable source of fresh water. Like the NW quarry this area would have also once been laden with chert outcrops both in the sinkholes and along the shore. This is evidenced by a handful of isolated boulders still lining a few of the sink holes. The discovery of the three partially complete Alachua Complex vessels at the Ridge concentration where the deepest part of the lake along the William’s Hill property is located is suggestive that this might have been a key location where the Hickory Pond people would have come for access to water.
This research has recovered evidence for more than 8000 years of occupation within and around the vicinity of William’s Hill. The vast majority of the shovel tests were positive for prehistoric artifacts but the lake shoreline and hill terrace in the vicinity of the Alachua concentrations were the primary locations for human activity. Chipped stone tools and projectile types from the Early Archaic onward, coupled with the presence of the earliest form of Florida pottery through to the Mississippian period were recorded and in many cases multiple temporal occupations were represented within a single shovel test. These results came as no surprise as there is a pattern that diverse and overlapping traditions are observed in the prehistoric chert quarries, workshops, and settlements throughout Florida (Purdy 1981:6).

Raw tool stone acquisition was a major activity in the survey area. This is evidenced by the consistent abundance of artifacts related to stone tool production. A total of eight artifact concentrations were identified and with the exception of the Alachua Site, seven contained or completely consisted of dense debitage indicative of stone procurement activities and early stages of biface manufacture. These quarry workshops are scattered along the shore line in pockets between 50 and 100 meters long and 50 meters or less wide. The zones along the shoreline not considered to be concentrations were still found to contain the same artifacts, just in less frequency. It is clear this survey area was favorable to prehistoric inhabitants as an important stone resource.

The William’s Hill project has added to what was already known about the prehistoric occupation of the Orange Lake vicinity. The Alachua Concentration (A) identified on the hill and the Cades Pond site along the eastern shore are the only sites for those two periods recorded on the southeastern side of the lake. Prior to this study, quarry sites had not been recorded on the south side of the lake and the geologic surveys had never reported chert outcrops in the area.
From a broader perspective, the analysis of the horizontal distribution of debitage supported the distance-drop off model relative to flake size, weight, and thermal alteration. Earlier studies have demonstrated this on a regional scale. This is the first study to examine the phenomenon on a local scale.
LIST OF REFERENCES
Ahler, Stan

Anderson, David G. and Patricia A. Logan

Anderson, David G. and Glen T Hanson

Andrefsky, William Jr.

Archaeological Consultants, Inc. (ACI).
2005 Cultural Resource Assessment Survey Oak Water Village RV Resort Marion County, Florida. ACI, Sarasota.

Austin, Robert J.

Bartram, William.

Behm, Jeffery A.

Bond, Stanley C., Jr.
1992 Archaeological Excavations at 8SJ42, the Crescent Beach Site, St. Johns County, Florida. The Florida Anthropologist. 45:148-161.
Bordes, Fancios and Don E. Crabtree

Brush, Nehemiah.

Bryan, Jonathan R., Thomas M. Scott, and Guy H. Means
2008 *Roadside Geology to Florida*. Mountain Press Publisher.

Bryan, Kirk
1950 *Flint Quarries*. The Peabody Museum.

Bullen, Ripley P.


Bullen, Ripley P. and Edward M. Dolen.

Bureau of Land Management
1855 General Land Office Record. Downloaded from http://www.glorerecords.blm.gov.

Callahan, Erret

Campbell, Thomas N. and Tammy J. Campbell
1984 *Indian Groups Associated with Spanish Missions of the San Antonio Missions National Park*. Special Report 16, Center for Archaeological Research, University of Texas, San Antonio.

Carbone, V. A.
Carter, Clarence, Ed.

Chapin, George M.

Cockrell, W. A., and L. Murphy.

Colson, B.R.

Cotterell, Brian and Johan Kamminga

Crabtree, Don E.
1972  *An Introduction to Flint Working.* Idaho State University Museum.

Culberson, Linda C.

Cumbaa, Stephen L.

Daniel, Randy

Dincauze, D.

Dowdy, Kevin and Richard Reed
Dunbar, James S.  

Dunbar, James S. and Pamela K. Vojnouski  

Ericson, Johnathan E. and Barbara A. Purdy  

Fairbanks, Charles H.  

Florida Division of Historical Resources (FDHR).  

Florida department of Administration  

Florida Department of Transportation (FDOT)  

Gannon, Michael.  

Goggin, John M.  


Johnson, Kenneth W. and Bruce C. Nelson.  

Johnson, William G.  

Keeley, L. H.  

Kehoe, Alice B.  

Kelly, G. Wietzel  

Kelly, Robert L. and Lawrence C. Todd  

Larson, H  
1979 *Aboriginal Subsistence Technology on the Southeastern Coastal Plain During the Late Prehistoric Period.* University of Michigan.

Loucks, L. Jill  

Marion County Chamber of Commerce.  
1927 *Marion County Florida: The Kingdom of the Sun.* Pamphlet issued by the Marion County Chamber of Commerce. The Board of County Commissioners of Marion County and the City Council of Ocala.

Milanich, Jerald T.  


Milanich, Jerald T. and Charles H. Fairbanks.  

Milanich, Jerald T., Ann S. Cordell, Vernon J. Knight, Jr., Timothy A Kohler, and Brenda J. Sigler-Lavelle. 

Mitchell, D and M. S. Shackley  

Mitchem, J and D. L. Hutchinson 

Monk, Carol D. 
1965 *The American Naturalist: Tree Species Diversity in the Eastern Deciduous Forest With Particular Reference to North Central Florida.* Botany Department and Institute 
Ecology, University of Georgia. Vol 101, No. 918.

Mullins, Sue A.  

Mykel, Nancy.


Neill, Wilfred T. 

Newcomer, M. H. and W. H. Worminton

Odell, George H.


Piatek, Bruce J.

Powell, John

Purdy, Barbara.


Rice, Prudence.

Russo, Michael


Sassaman, Kenneth E.

Saunders, Rebecca
Schmidt, Walter.  

SEARCH.  
2000  A Cultural Resource Assessment Survey of a Proposed RV Resort (DRI) on Orange Lake, Marion County, Florida.  SEARCH, Jonesville.

Shackley, Steven M.  

Simpson, J. Clarence  
1941  *Source Materials for Florida Aboriginal Artifacts*.  Florida Academy of Sciences.  5:32-34

Smith, Hale G. and Mark Gottlob  

Smith, Rhea M.  
1933  Anthropology of Florida.  *Florida History Quarterly* 11(4):151-172

Smith, Samuel D.  

Ste. Claire, Dana.  


United States Department of Agriculture (USDA).  

United States Geological Survey (USGS).  
1969  McIntosh, Florida.
Upchurch, Sam B., Richard N. Strohm, and Mark G. Nuckels.  

Walker, Renee B. and Boyce N. Driskel (editors)  
2006  *Foragers of the Terminal Pleistocene in North America*. University of Nebraska Press.  Lincoln, NE.

Weinstein, Richard W. and Ashley A. Dumas  

Wiley, M. K.  

Whitaker, John C.  
1994  *Making and Understanding Stone Tools*. University of Texas Press, Austin Texas
VITA

JOESPHER CULEN

EDUCATION

M. A., Archeology, to be awarded August 2015.
Thesis: Spatial Distribution on Debitage at a Chert Procurement Site and a Cultural History Assessment on Orange Lake in North Central Florida Overall


A.A., Santa Fe Community College, Gainesville, Florida, May 2004

PROFESSIONAL EXPERIENCE

Assistantship, August 2010 – May 2012
University of Mississippi, Department of Anthropology and Sociology.
- Analyze and catalog prehistoric and historic artifacts recovered in northern Mississippi in the University of Mississippi Anthropology Lab.

Field Technician.
University of Mississippi, Dr. Jay K. Johnson, August 2010 – August 2014.
- Preformed archaeological field survey work and excavation.

University of Florida, School of Forest Resources and Conservation, June 2, 2009 – September 30, 2009.
- Experimented with several concepts of environmental restoration
- Identified and recorded understory vegetation in experimental plots
- Selected and marked trees for stand maintenance

SouthArc, Inc. August 20, 2007 – December 1, 2008
- Phase I and II archaeological surveys
- Phase III excavations
- Performed mitigations
- Analyzed and cataloged lithic, faunal, ceramic and historic artifacts in lab
- Wrote a comprehensive identification guide to lithics of north central Florida
- Performed equipment repairs and maintenance in the office and field

- Lead field crews in the absence of the main field manager
- Phase I and II archaeological surveys
- Equipment repairs and maintenance in the field
VOLUNTEER WORK
Hurricane Landing, COE funding through Center for Archaeological Research UM. Spring 2015
- Mapped a set of middens at Hurricane Mound on Sardis Lake in Lafayette Ms.
- Cleared, cleaned, and aided in excavation of three of the Middens.

Mitigation at the Wilsford Site for Kriss Holsen. Fall 2014
- Assisted in surface collection.
- Aided in operation of a Grad-601 magnetic gradiometer.
- Performed a trench excavation with Mr. Holsen.

Survey work at the Shady Grove (22Qu525) site for Steven Harris. Fall 2012
- Surface collection
- Aided in operation of Leica Total station and Grad-601 magnetic gradiometer.

Florida Museum of Natural History, Paleontology department, 2005
- Excavated, cleaned, sealed and reconstructed fossil bones from casts

Florida Museum of Natural History, 2004
- Excavated paleo-faunal remains in Newberry, Florida

Florida Museum of Natural History, 1998-2000
- Mentored under Diane Kloetzer and Andy Hemmings
- Sorted and identified archeological samples
- Inventoried, cataloged and curated artifacts
- Kept records and entered data
- Worked in field on excavations at Indian Pond

4-H at the University of Florida, 1995-2014
- Assisted with various county and state volunteer projects
- 4-H camping program

Green Earth Inc., 1993-1997
- Prairie and up-land forest restoration in Southern Illinois
- Invasive species removal
- Re-established native plant species
- Site maintenance and trash removal