THE DEVELOPMENT OF WATERCRAFT
IN THE PREHISTORIC SOUTHEASTERN UNITED STATES

A Dissertation

by

MARK JOSEPH HARTMANN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 1996

Major Subject: Anthropology
THE DEVELOPMENT OF WATERCRAFT
IN THE PREHISTORIC SOUTHEASTERN UNITED STATES

A Dissertation

by

MARK JOSEPH HARTMANN

Submitted to Texas A&M University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Approved as to style and content by:

Donny L. Hamilton
(Chair of Committee)

Michael R. Waters
(Member)

Kevin J. Crisman
(Member)

Vaughn M. Bryant, Jr.
(Head of Department)

Vatche P. Tchakerian
(Member)

December 1996

Major Subject: Anthropology
ABSTRACT

The Development of Watercraft

In The Prehistoric Southeastern United States. (December 1996)

Mark Joseph Hartmann, B.A., University of Missouri-St. Louis

Chair of Advisory Committee: Dr. Donny L. Hamilton

The maritime and riverine past of the southeastern United States has often been ignored or poorly addressed in previous archaeological research. Historical records and archaeological data indicate that this heritage was rich and centered around the development and use of dugout canoes. Such vessels were used in all aspects of southeastern life, including subsistence, trade, transportation, and warfare. They were well-suited to the geography of the region which contains networks of interconnected braided and meandering river channels, swift tidal currents, and broad, shallow sounds.

The core of the research is the examination of more than 200 dugout canoes throughout the southeastern United States. The majority of the canoes studied were discovered in Florida, with significant finds also occurring in Louisiana, Mississippi, and North Carolina. Two major wood types were identified in dugout construction, cypress and pine, both of which were used frequently depending on which species was available in a particular region. While two major adaptive strategies are considered, inland and coastal, dugout canoe construction did not vary significantly between these environments.
The time span covered by the study begins with the Paleoindian period, although the earliest dugout canoe discovered thus far dates to the Late Archaic period in Florida. Dugout canoes continued to be important through prehistoric Southeast and into the Historic period. Variation in the canoes of the later periods is focused more on the introduction of metal tools than on any significant stylistic changes. Native American dugouts were so well-adapted that many Europeans adopted them for their own use in the meandering rivers of the inland Southeast. Unfortunately, the dugout canoe went the way of most other Native American adaptations, eventually succumbing to the pressures of the invading culture and fading almost entirely from the Southeast.
DEDICATION

This dissertation is dedicated to my family for believing.
ACKNOWLEDGMENTS

Many people have contributed to the completion of this work. I first would like to thank the chair of my committee, Dr. Donny Hamilton has stood behind me since I first attended field school in Jamaica in 1989 and has provided invaluable contacts and encouragement, he is a true friend and colleague. I am also grateful for the advice and comments made by Mike Waters in reference to this study - especially in the area of early watercraft and buried resources. Thanks also to Kevin Crisman for his comments and especially for getting me started on this project through his New World Seafaring course. Finally, thanks to my outside member, Vatche Tchakarian, for helping me through Geomorphology and for reading this entire report.

A very special thanks goes to the University of Florida's Dr. Barbara Purdy for allowing me access to her collection of notes, photographs, and canoes. This information provides much of the core data for this dissertation, making this research a possibility.

Thanks also to the following people for providing information or technical support. James Dunbar of the Florida Department of State provided information on the latest DeLeon Springs dugout; Guy Marwick of the Silver River Museum for allowing me to examine the Little Orange Lake canoe; Duke Rivet for much of the Louisiana material; and Dr. George Shannon for many details on the Red River Dugout. Elaine Sullivan graciously allowed me access to the Texas Memorial
Museum Dugout and Dr. Sam Velastro provided the radiocarbon date. Dr. Richard Callaghan provided funding to radiocarbon date more than 30 of the dugout canoes in this study. I also thank Dr. Tommy Hailey, Ms. Sheila Clifford, and Mr. John Bratten for accompanying me on many of the trips to examine the canoes and for providing invaluable support and encouragement throughout the study. Finally I want to thank the numerous people who allowed me access to their various collections and databases, I could not have done it without you.

Although all of the aforementioned people helped me with this research, any mistakes and shortcomings are mine.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>v</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>vi</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xi</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>I  INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>1</td>
</tr>
<tr>
<td>Present Status of the Question</td>
<td>4</td>
</tr>
<tr>
<td>Analytical Framework</td>
<td>6</td>
</tr>
<tr>
<td>Structure of the Presentation</td>
<td>8</td>
</tr>
<tr>
<td>II THE PHYSICAL SETTING</td>
<td>12</td>
</tr>
<tr>
<td>Cultural Framework</td>
<td>16</td>
</tr>
<tr>
<td>III NATIVE AMERICAN WATERCRAFT</td>
<td>20</td>
</tr>
<tr>
<td>Types of Native American Watercraft</td>
<td>21</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>27</td>
</tr>
<tr>
<td>Dugout Canoe Manufacture: The Problem</td>
<td>30</td>
</tr>
<tr>
<td>Indigenous Use of Dugout Canoes</td>
<td>39</td>
</tr>
<tr>
<td>Dugout Canoe Performance</td>
<td>44</td>
</tr>
<tr>
<td>Dugout Canoe Preservation</td>
<td>46</td>
</tr>
<tr>
<td>IV FIRST SETTLEMENT: THE PALEOINDIANS</td>
<td>58</td>
</tr>
<tr>
<td>The Theories: Inland vs. Coastal Entry into the Americas</td>
<td>61</td>
</tr>
<tr>
<td>V HUNTER-GATHERERS OF THE SOUTHEASTERN ARCHAIC</td>
<td>77</td>
</tr>
<tr>
<td>Late Archaic Watercraft</td>
<td>81</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>Page</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>VI  THE WOODLAND EXPANSION</td>
<td>100</td>
</tr>
<tr>
<td>VII  THE MISSISSIPPIAN PERIOD: CHIEFDOM AND CEREMONY</td>
<td>132</td>
</tr>
<tr>
<td>VIII CONTACT AND BEYOND</td>
<td>181</td>
</tr>
<tr>
<td>IX   CONCLUSIONS</td>
<td>215</td>
</tr>
<tr>
<td>REFERENCES CITED</td>
<td>225</td>
</tr>
<tr>
<td>APPENDIX 1</td>
<td>250</td>
</tr>
<tr>
<td>APPENDIX 2</td>
<td>257</td>
</tr>
<tr>
<td>VITA</td>
<td>275</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2.1</td>
<td>Southeastern Cultural Chronology (After Bense, 1994:4)</td>
<td>18</td>
</tr>
<tr>
<td>Table 5.1</td>
<td>Late Archaic period dugouts (citations in text)</td>
<td>93</td>
</tr>
<tr>
<td>Table 6.1</td>
<td>Late Woodland period dugouts (citations in text)</td>
<td>127</td>
</tr>
<tr>
<td>Table 7.1</td>
<td>Early Mississippian period dugouts (citations in text)</td>
<td>137</td>
</tr>
<tr>
<td>Table 7.2</td>
<td>Middle Mississippian period dugouts (citations in text)</td>
<td>155</td>
</tr>
<tr>
<td>Table 7.3</td>
<td>Late Mississippian period dugouts (citations in text)</td>
<td>172</td>
</tr>
<tr>
<td>Table 8.1</td>
<td>Contact period dugouts (citations in text)</td>
<td>187</td>
</tr>
<tr>
<td>Table 8.2</td>
<td>Historic period dugouts (citations in text)</td>
<td>208</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1.</td>
<td>Map of the southeastern United States showing the location of the study area</td>
<td>13</td>
</tr>
<tr>
<td>Figure 3.1.</td>
<td>Photomicrograph of <em>Pinus resinosa</em></td>
<td>31</td>
</tr>
<tr>
<td>Figure 3.2.</td>
<td>Photomicrograph of <em>Taxodium distichum</em></td>
<td>31</td>
</tr>
<tr>
<td>Figure 3.3.</td>
<td>Chert adzes used in experiments</td>
<td>33</td>
</tr>
<tr>
<td>Figure 3.4.</td>
<td>Unfinished dugout canoe from Fort Lauderdale, Florida</td>
<td>36</td>
</tr>
<tr>
<td>Figure 3.5.</td>
<td>Closeup of the root-end of the Fort Lauderdale dugout</td>
<td>37</td>
</tr>
<tr>
<td>Figure 3.6.</td>
<td>Lake Galilee, Florida</td>
<td>50</td>
</tr>
<tr>
<td>Figure 3.7.</td>
<td>Micanopy 1 <em>in situ</em>, Micanopy, Florida</td>
<td>54</td>
</tr>
<tr>
<td>Figure 3.8.</td>
<td>Micanopy 2 <em>in situ</em>, Micanopy, Florida</td>
<td>54</td>
</tr>
<tr>
<td>Figure 3.9.</td>
<td>The charred end of the Magnolia Lake dugout</td>
<td>56</td>
</tr>
<tr>
<td>Figure 3.10.</td>
<td>Magnolia Lake dugout at the bottom of Silver Spring</td>
<td>56</td>
</tr>
<tr>
<td>Figure 5.1.</td>
<td>DeLeon I <em>in situ</em></td>
<td>82</td>
</tr>
<tr>
<td>Figure 5.2.</td>
<td>Scale drawing of DeLeon I</td>
<td>84</td>
</tr>
<tr>
<td>Figure 5.3.</td>
<td>The remains of DeLeon I</td>
<td>87</td>
</tr>
<tr>
<td>Figure 5.4.</td>
<td>DeLeon II <em>in situ</em>, still partially buried in the peat that preserved it for 6,000 years</td>
<td>90</td>
</tr>
<tr>
<td>Figure 5.5.</td>
<td>Map showing the location of Late Archaic period dugout canoes</td>
<td>94</td>
</tr>
<tr>
<td>Figure 5.6.</td>
<td>Lake Galilee 4</td>
<td>95</td>
</tr>
<tr>
<td>Figure 5.7.</td>
<td>One of the thick, blunt ends of Galilee 4</td>
<td>96</td>
</tr>
<tr>
<td>Figure 5.8.</td>
<td>Scale drawing of Lake Galilee 4</td>
<td>97</td>
</tr>
<tr>
<td>Figure 6.1.</td>
<td>Map showing the location of the Swisher Lake dugout canoe</td>
<td>105</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>6.2</td>
<td>The Swisher dugout shortly after its discovery in 1978</td>
<td>106</td>
</tr>
<tr>
<td>6.3</td>
<td>Profile of the Cowpen Lake dugout</td>
<td>113</td>
</tr>
<tr>
<td>6.4</td>
<td>Scale drawing of the Cowpen Lake dugout canoe</td>
<td>114</td>
</tr>
<tr>
<td>6.5</td>
<td>The Magnolia Lake dugout at the bottom of the spring</td>
<td>116</td>
</tr>
<tr>
<td>6.6</td>
<td>The Magnolia Lake dugout during its recovery</td>
<td>117</td>
</tr>
<tr>
<td>6.7</td>
<td>Scale drawing of the Magnolia Lake dugout canoe</td>
<td>118</td>
</tr>
<tr>
<td>6.8</td>
<td>View of Dog Island of the Gulf Coast of Florida</td>
<td>120</td>
</tr>
<tr>
<td>6.9</td>
<td>The Dog Island dugout as it appeared in 1994</td>
<td>121</td>
</tr>
<tr>
<td>6.10</td>
<td>View of the underside of the &quot;platform&quot; end of the Dog Island dugout</td>
<td>122</td>
</tr>
<tr>
<td>6.11</td>
<td>Scale drawing of the Dog Island dugout canoe</td>
<td>124</td>
</tr>
<tr>
<td>6.12</td>
<td>View showing the degraded condition of the Dog Island dugout</td>
<td>125</td>
</tr>
<tr>
<td>6.13</td>
<td>Map showing the location of several Late Woodland period dugout canoes</td>
<td>128</td>
</tr>
<tr>
<td>7.1</td>
<td>Map showing the location of Early Mississippian period dugout canoes</td>
<td>138</td>
</tr>
<tr>
<td>7.2</td>
<td>Little Orange Lake 2 still partly submerged in the lake</td>
<td>140</td>
</tr>
<tr>
<td>7.3</td>
<td>Little Orange Lake 2 as it appeared in 1994</td>
<td>141</td>
</tr>
<tr>
<td>7.4</td>
<td>Scale drawing of Little Orange Lake 2</td>
<td>142</td>
</tr>
<tr>
<td>7.5</td>
<td>The Silver River dugout being examined by the author in 1993</td>
<td>145</td>
</tr>
<tr>
<td>7.6</td>
<td>Scale drawing of the Silver River dugout canoe</td>
<td>146</td>
</tr>
<tr>
<td>7.7</td>
<td>The Red River dugout on display at the museum in Shreveport</td>
<td>149</td>
</tr>
<tr>
<td>7.8</td>
<td>Scale drawing of the Red River dugout canoe</td>
<td>150</td>
</tr>
</tbody>
</table>
Figure 7.9. View of one end of the Red River dugout showing the carved interior ......................................................... 152

Figure 7.10. Map showing the location of Middle Mississippian period dugout canoes ................................................. 156

Figure 7.11. Scale drawing of the Fluker's Bluff dugout canoe ............... 161

Figure 7.12. Scale drawing of Tombigbee 1 ........................................ 164

Figure 7.13. Scale drawing of the Alabama River dugout canoe ............. 165

Figure 7.14. The Grassy Lake dugout at the time of its discovery in 1990 ... 166

Figure 7.15. Scale drawing of the Grassy Lake dugout canoe ................. 168

Figure 7.16. Scale drawing of the Hartman Lake dugout canoe .............. 170

Figure 7.17. Map showing the location of Late Mississippian period dugout canoes. ....................................................... 173

Figure 7.18. The only available photograph of Goose Lake 5 ................ 175

Figure 7.19. Scale drawing of Homochito 1 ........................................ 177

Figure 8.1. Seminole woman in Florida manufacturing a dugout canoe using a metal adze ............................................... 186

Figure 8.2. Map showing the location of Contact period dugout canoes. .... 189

Figure 8.3. The Marksville dugout on display in Marksville, Louisiana ..... 191

Figure 8.4. Closeup of the Marksville dugout showing a plugged "gauge hole." 192

Figure 8.5. Scale drawing of the Swan Lake dugout canoe. ................. 195

Figure 8.6. Lake Salvadore 2 on display at the Acadian Village Missionary Museum ....................................................... 198

Figure 8.7. Scale drawing of Lake Salvadore 2 ........................................ 199

Figure 8.8. Closeup of a charred area on one end of Lake Salvadore 2 ....... 200
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.9</td>
<td>Scale drawing of the Georgetown dugout canoe</td>
<td>202</td>
</tr>
<tr>
<td>8.10</td>
<td>Scale drawing of the Malone Lake dugout canoe</td>
<td>204</td>
</tr>
<tr>
<td>8.11</td>
<td>Map showing the location of Historic period dugout canoes</td>
<td>209</td>
</tr>
<tr>
<td>8.12</td>
<td>The Texas Memorial Museum dugout as it appeared in 1993</td>
<td>211</td>
</tr>
<tr>
<td>8.13</td>
<td>Scale drawing of the Texas Memorial Museum dugout canoe</td>
<td>213</td>
</tr>
<tr>
<td>9.1</td>
<td>Comparison of lengths and widths of complete dugout canoes</td>
<td>222</td>
</tr>
<tr>
<td>A-1.1</td>
<td>Illustration showing the major planes and lines used in taking off lines</td>
<td>251</td>
</tr>
<tr>
<td>A-1.2</td>
<td>Generic dugout canoe illustrating the terms used in this study</td>
<td>255</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

The first man once said: All the world is a canoe, and whether paddlers or passengers, we are all one people in that vessel - Chumash oral tradition (Cunningham 1989:xi)

It is an incontrovertible fact that the maritime and riverine heritage in the southeastern United States merits investigation and preservation. To date, however, little substantial research has been undertaken. Data exist on over 300 dugout canoes ranging in age from just over 6,000 B.P. through the early 20th century. Hundreds more must have been found that were either not reported or were destroyed. Indeed, Kidd (1960:417-418) reported that a number of dugout canoes ended up as curiosities in local museums or as pig troughs on farms until they finally decayed and were lost. Countless more are probably still buried, awaiting either discovery and preservation or neglect and destruction. Only through preservation and study can this maritime past be reconstructed. This dissertation starts this process by analyzing much of the extant dugout canoe data.

Statement of the Problem

The southeastern United States includes the states of Alabama, Florida, Georgia, Louisiana, Mississippi, and South Carolina; as well as portions of southern Arkansas, southeastern Oklahoma, and East Texas. The region contains the earliest dugout canoes discovered in the Americas. At least 11 dugouts from Florida date to the Late Archaic

This dissertation follows American Antiquity style.
period, with radiocarbon ages between 6,000 and 3,000 B.P. Outside the Southeast, the only other canoes dating to this period come from Ohio (Brose and Greber 1982) and North Carolina (Phelps 1989).

The geography of the region played a vital role in the development of this long maritime heritage. Large portions of this region contain networks of interconnected braided and meandering river channels, swift tidal currents, and broad sounds which are both shallow and hard to spot from the sea (Fleetwood 1982:37). The narrow, meandering nature of the streams and channels necessitated small, maneuverable boats with which to traverse the thousands of miles of coastal and inland waterways. It is not surprising that areas of the region with abundant navigable waterways "fostered aboriginally an amphibious type of culture" (Phillips, Ford, and Griffin 1951:9). While bark canoes may have been known to both the prehistoric and historic inhabitants of the region, dugout canoes are the only watercraft found in archaeological contexts.

In general, aboriginal watercraft have been treated as archaeological curiosities rather than key elements of the behavioral system that produced them. Although such craft have the potential to provide important information on past methods of transportation and other prehistoric systems, their contexts of discovery have been ignored and few have been properly preserved and analyzed. This dissertation proposes to examine these artifacts that have been, for the most part, ignored in past studies of the Southeast; and to reconstruct their place in the living systems in which they were produced.
The few dugout canoes that have been studied by archaeologists were usually described as single artifacts or as "isolated finds" divorced from their contexts within the infrastructure of southeastern Native American culture (cf. Barnett 1984; Bullen and Brooks 1968; Dreves 1979; Fuller 1976; Hotham 1979; Lewis 1976; McGahey 1974; Story 1985; Stowe 1974; Willis 1981). A few archaeologists have moved beyond simple description and attempted to place the dugout into a cultural context (Brose and Greber 1982; Fuller 1991; Kandare 1983; Purdy 1991).

Dugout canoes appear not only in the archaeological record, but also in historic documents. The first Europeans to encounter and record New World watercraft traveled with Christopher Columbus. Accounts of these voyages may be found in several sources, including one from the journal of Columbus himself under the date of Saturday, October 13, 1492:

They came to the ship in boats, which are made of a tree-trunk like a long boat and all of one piece. They are very wonderfully carved, considering the country, and large, so that in some, forty or forty-five men came. Others are smaller, so that in some only a solitary man came. They row them with a paddle, like a baker's peel, and they travel wonderfully fast. If one capsizes, all at once they begin to swim and right it, bailing it out with gourds which they carry with them.

Other historic accounts indicate that many later canoes could be propelled at great speeds, moving "as fast on the water as a running horse moves on the land" (Kandare 1983:100). An improved means of transportation would certainly have enhanced trade and the exchange of information and ideas and would have allowed the diversification of diet and better access to raw materials.
The extent of canoe manufacture prior to contact can be seen in some of the early European explorers' accounts. Juan Ponce DeLeon, the first Spaniard to land on the Florida Peninsula in 1513, was met and attacked by at least 80 dugout canoes, each carrying warriors armed with bows and protected by shields (Roberts and Shackleton 1983:63). Hernando DeSoto began his journeys in the Southeast in 1539. He was severely ill and near death by the time his expedition reached the Mississippi River, where it was attacked by a flotilla of over two hundred dugout canoes containing more than 6,000 warriors (Bourne 1922:113; Varner and Varner 1951:428).

Past trends in archaeological research have concentrated on the systems that operated within the prehistoric past. Detailed studies have examined Native American migration, trade, warfare, exchange of ideas, resource procurement, and the exploitation of aquatic and nearby terrestrial resources, but most have ignored the mechanisms by which these systems operated. This study will attempt to correct this defect by examining dugouts from a holistic point of view and placing them in their proper systemic context within the culture that created them. The integration of canoes into prehistoric societies must have been important to the smooth operation of the culture (Purdy 1991:280).

**Present Status of the Question**

Very little research has been done on the creation and use of dugout canoes in the southeastern United States. The majority of the work deals specifically with Florida (cf. Bullen and Brooks 1968; Cushing 1896; Newsome and Purdy 1990; Purdy 1991). Other work in the region is sporadic and concentrates primarily on specific canoes or
canoe finds (Barnett 1984; Fuller 1976; Hotham 1979; Lewis 1976; McGahey 1986, 1974; Stowe 1974; Webb 1975; Willis 1981). There have been several attempts to produce a classification system for dugout canoes on a very local level, but no attempt to assign the canoes to a cultural or chronological affiliation; and certainly no one has attempted to place the dugout in its proper systemic context.

One treatment of Florida dugouts has been produced by Purdy (1991) in The Art and Archaeology of Florida's Wetlands. This work, although well-written, covers Florida canoes discovered prior to 1990 in a cursory manner. The principal reason for this cursory treatment is that few southeastern dugout canoes have been dated, limiting our ability to analyze them in their proper cultural context.

Other treatments of dugout canoes have focused on making broad inferences about the vessels based on limited data. For example, Johnstone (1980:46) states that "building a dug-out with a simple tool kit . . . probably took a relatively long time. This meant that dug-outs were developed and used by settled communities." This statement, however, does not take into account any of the craft produced by the Archaic (mobile hunter/gatherer) cultures of the Southeast. Historic accounts describe the Karankawa of southeast Texas as highly mobile; and even the Lipan-Apaches called them "those-who-walk-in-the-water" because of their knowledge and skill at dugout canoe manufacturing (Atkinson 1953:143). Atkinson (1953:142) also notes that the Karankawa seldom left the "brackish" waters of their home except "occasionally, (to paddle) his hollow log up a river (to) shoot a deer, or (trade) for corn with the interior tribes."
Transportation by watercraft was highly developed by the time of European contact. However, little direct evidence remains of those craft for the years prior to contact. Thus, we are left with a widely scattered, often ignored, and yet potentially valuable source of information on trade and transportation in the prehistoric past of North America.

**Analytical Framework**

It is estimated that as much as 90 percent of the cultural materials deposited in a typical archaeological site in North America consisted of perishable materials (MacDonald and Purdy 1982:4). The moist and acidic soils found throughout the Southeast act quickly to break down any perishable items buried in them. This is especially true of wood and wood fibers - the key elements in the makeup of Native American watercraft.

Once a dugout canoe enters an archaeological context it disintegrates quickly unless it is preserved by other factors. Preservation conditions include low temperature and anaerobic environments where bacterial action is reduced. Preservation of the wood itself, however, is no guarantee of survival. Those dugouts that have been preserved and subsequently discovered often have been ignored or were examined quickly and left to decay. It is rare for a dugout canoe to be sketched and photographed and even more rare for the entire canoe to be collected and preserved. Nevertheless, in the Southeast, dugout canoes are the sole type of watercraft for which we have evidence - either archaeological or historical. Over 300 dugout canoes have been discovered in areas where the natural environment favors the preservation of wood artifacts. Of these
canoes, perhaps 100 are still available for direct study and these will be the prime source of information for this study.

There is also a large database containing documentary evidence accumulated over the years in various files and repositories throughout the Southeast. Many of the dugout canoes themselves no longer exist, having succumbed to the ravages of time and neglect. Because of this, compiling the data on these lost vessels becomes even more critical.

Historical documents also provide insight into the dugout canoe and its role in the original systemic context. The importance of this role can be seen in some of the early European explorer's accounts. These include both the accounts of Hernando DeSoto's expedition (Bourne 1922), as well as that of the ill-fated Pánfilo de Narváez expedition as chronicled by Álvar Nunez Cabeza de Vaca (Covey 1961).

Finally, based on indirect evidence such as the settlement of the Channel Islands off the coast of California, we know that Native Americans were able to cross large areas of open water by at least 8,000 B.P. (Jones 1991), and perhaps earlier. Recent work suggests that people migrated to San Miguel Island as early as 11,550 B.P. (Erlandson 1993:17). San Miguel Island, the westernmost of the northern Channel Islands, is located some 40 km off the mainland, and was not connected to the mainland by a land bridge, even during the period of lowest sea levels (Masters 1985:28).

Dugout canoes in the Americas have been found as far north as Canada and as far south as Chile and to date they are the only type of prehistoric watercraft found in the southeastern United States. The dugout is perhaps the most widely used and
archaeologically identifiable form of waterborne transportation among Native North Americans. Dugouts varied in size and design depending on the body of water to be navigated, the task required of the vessels, and the size and availability of trees (Purdy 1991:280). Thousands of years of experiment, evolution, and adaptation resulted in a great diversity of watercraft manufactured by the original inhabitants of the southeastern United States.

The remains of these vessels have been and will continue to be difficult to locate and excavate. Because of this, archaeologists need to salvage as much information as possible about existing Native American watercraft. This dissertation will discuss the importance of not only preserving but also of studying the remains of native watercraft wherever they are discovered.

**Structure of the Presentation**

The goal of this research is to explain the development of the dugout canoe in the southeastern United States using both archaeological and historical records.

1. Chapter I defines the problem. This research is vital to an understanding of the prehistoric southeastern United States because all evidence suggests that aboriginal watercraft played an important role in transportation, subsistence, and trade. This study will draw on all available recorded information and by a firsthand examination of large numbers of prehistoric canoes. The value of such craft in prehistoric systems such as subsistence, trade, transportation, and warfare will be emphasized as well as their potential value as mechanisms for cultural change.
2. Chapter II considers the physiographic setting of the southeastern United States, an area separated from the rest of North America on the basis of geography, environment and culture history. The groundwork is laid for later discussion of the interrelationship between the environment and the people who lived here from the earliest Paleoindian settlers up to and including the arrival of European settlers. This includes a discussion of the types of preservation environments in which many dugout canoes survive.

3. Chapter III describes the types of watercraft used in prehistoric North America from simple logs to the most complex craft with an emphasis on the dugout canoe, the only vessel known archaeologically and ethnographically to have been used in the southeastern United States. This chapter includes information on how dugout canoes were constructed, as well as possible stylistic variations. In the past, several classification systems focused on criteria such as size, shape, and quality of finish. Along with the various typological classification schemes, a discussion of wood type and availability will be included. Finally, this chapter includes the results of a series of experiments using typical southeastern-style stone woodworking tools on samples of both cypress and pine, the two dominant wood types used in southeastern dugout canoe manufacture.

4. Chapter IV discusses the arrival of the first Native Americans, the Paleoindians, into the southeastern cultural region. While no definite evidence of Paleoindian watercraft exists here, or in any other portion of North America, circumstantial evidence may exist in the form of certain tool types (e.g. Dalton Adzes)
and evidence from other parts of the country (e.g. the settling of the Channel Islands off the coast of California). This chapter also uses new evidence (albeit entirely circumstantial) to re-evaluate the possibility for entry into the New World via a coastal route using watercraft.

5. Chapter V introduces the Archaic stage, which existed for some 7,000 years in the Southeast (ca. 10,000 - 3,000 B.P.). It is during the latter part of this period that actual watercraft are first found in the archaeological record. This chapter explores how dugout canoes contributed to the lifestyle of the Archaic peoples of the southeastern United States. This includes a description of individual watercraft and a discussion of stylistic differences related to the geographic and cultural setting in which each craft was used.

6. The beginning of the Woodland period in the Southeast (ca. 3,000 B.P.) is traditionally marked by the development and spread of pottery manufacturing. How might watercraft have facilitated this spread? During this period, we also see a population explosion in the region. What role could watercraft have played in this expansion? With some local variation, the Woodland period lasted until around A.D. 1,000 and it is from this time that we have more preserved dugout canoes than from any other period.

7. Chapter VII is devoted to a discussion of the continued population increase and the rise of complex cultures associated with the Mississippian period. While it was once thought that all Mississippian cultures practiced maize agriculture, we now know that it was not a requirement for the rise of complex cultures. It is still assumed,
however, that this complexity is based on the presence of a food surplus of some sort. There are two basic Mississippian subsistence patterns: riverine and coastal. The contributions of watercraft to both of these adaptations will be explored. It is also during this period that dugout canoes become larger. Larger dugouts may have become more popular through time, as the need for transporting more people and larger cargos grew along with increased social complexity.

8. Three major European-related events occurred during the contact period in the Southeast: exploration and settlement, the first native epidemics, and the establishment of Catholic missions. This period marks the first written descriptions of Native American watercraft beginning with some of the early voyages of Columbus and continuing through the contact period. The accounts of many Spanish explorers record their impressions of the Native American dugout canoe and with the people who paddled them. This chapter explores not only the European impact on Native America culture but also the impact that contact had on Native American boatbuilding. Was there any crossover as far as this technology is concerned? Ethnographic studies of canoes used in this century reveal that the form of aboriginal dugouts did not change considerably after contact and this will be explored.

9. Conclusions and suggestions for further study are offered in Chapter IX.

For the purposes of this study, the spatial context of this exercise will be limited to the southeastern United States. The temporal context will be broad, encompassing southeastern culture from first settlement through the contact period and beyond. The next section introduces the reader to the environment of the study area.
CHAPTER II
THE PHYSICAL SETTING

The student of prehistory in the Lower Mississippi Valley must attempt to reconstruct cultures that no longer exist, in an environment that exists only in a profoundly modified state. This is no simple undertaking (Phillips et al. 1951:36).

The Southeast corresponds physiographically to the Coastal Plain and to the southern Appalachians and yet, as Smith (1986:1) explains, "there has been little agreement concerning either the criteria to employ in defining the Southeast or the most appropriate placement of a boundary line." For this study, I have chosen a boundary originally described by Stoltman and Barreis (1983) with some modification (D.L. Hamilton, personal communication, 1994); roughly encompassing the states of Alabama, southern Arkansas, Florida, Georgia, Louisiana, Mississippi, southeastern Oklahoma, South Carolina, and East Texas (Figure 2.1). This boundary "turns the corner" at the north end of the lower Mississippi River Valley and includes the east Texas woodland environment as well as the Gulf Coastal Plain extending eastward to the Atlantic Ocean. In addition, major river valleys, such as the Tennessee and Mississippi, are included. These valleys to be an inseparable part of an "archaeological southeast" which includes the development of the most complex social and political organizations north of Mexico (Muller 1983:373).

The geography of the area has two major regions; the Interior Highlands with extensively deformed rock formations and a mix of deciduous forests and prairie
Figure 2.1. Map of the southeastern United States showing the location of the study area.
vegetation; and the Coastal Plain consisting of loose sand and gravel that was originally deposited on the sea floor (Bense 1994:24).

Archaeological sites in the Southeast are abundant and in most cases have been shaped by the natural environment (Bense 1994:3). The present natural environment has existed in the Southeast for only about the last 3,000 years. When Native Americans entered the region approximately 12,000 years ago, sea level was at least 100 meters lower than today, much of the region was covered by hardwood forests, and southern Florida was a sand dune covered desert (Bense 1994:3).

Approximately 18,000 years ago, glacial ice reached its maximum and sea level dropped almost 130 meters below present levels (Smith 1986:2). The late Pleistocene, 18,000 - 10,000 B.P., was a transitional period between full glacial and interglacial conditions, marked by increasing year-round temperatures and the melting of the glaciers and ice sheets from south to north (Bense 1994:19).

The melting of the Laurentide ice sheet provided more water vapor to the post-Pleistocene warming trend. The ice mass decreased in elevation allowing arctic air masses to penetrate southward and establish the modern western-dominated air patterns (Smith 1986:3). The Mississippi River was very different, carrying most of the outwash from the melting Canadian ice sheet, forming a braided stream because it contained high concentrations of solids and solutes. Glacial melting also had an effect on the climate and vegetational history of the Southeast. Muller (1983:373) notes that "much of the Southeast was originally forested" and by the time of European invasion "wild foods were still very important in the diet of native Southeastern Indians, even
though cultivated plants had become increasingly important as the economic basis for complex chiefdoms." Smith (1986:4) notes that south of latitude 29.5° N, "the flora has been stable . . . and the vegetation has been in dynamic equilibrium throughout the Late Quaternary."

The early Holocene environment of the Southeastern United States was episodic. The Florida Peninsula was covered with a dry-oak savannah while the Gulf Coastal Plain was marked by oak-hickory evergreen forests (Delcourt and Delcourt 1981:147). The midlatitudes were covered by temperate mixed hardwoods (Guilday 1982); the lower Mississippi Valley consisted of open savannah-floodplain forests (Goodyear 1974:13-14; Morse 1975:138); and the west was covered by an oak-savannah zone (McMillan and Klippel 1981; Figure 1.2A).

The middle Holocene (ca. 8,500 - 4,000 B.P.), or climatic optimum, was the peak of the interglacial period (Bense 1994:22). It is also during this period that strong westerly winds pushed a section of warm, dry air to the east, decreasing summer rainfall and expanding the prairies eastward (Smith 1986:5).

Although Smith (1986:5) states that by 5,000 B.P. the modern postglacial climatic regime was in place and would not change much during the late Holocene, Bense (1994:24) notes that following the middle Holocene, an "influx of tropical weather . . ., with its associated summer thunderstorms and lightning fires, virtually burned out the hardwoods on the coastal plain, leaving fire-resistant pine forests." It is also during this period that sea level stabilized within 3 meters of its present level and the modern ecosystems found along the coasts developed (Bense 1994:24).
Unfortunately, it also during this period that shoreface erosion occurring along the transgressing shorelines of the sea destroyed many archaeological sites on the continental shelf (Stright 1986:350). Some sites, especially those buried in low-energy environments such as sinkholes, lakes, ponds, bays, lagoons, floodplains, river terraces, and subsiding deltas prior to ocean transgression, may have been preserved. Recent work by Stright (1986) and Gagliano et al. (1982) indicate the preservation of archaeological sites in low energy environments where the depth of shoreface erosion is less than the depth of site burial. Through the use of such techniques as seismic data, sediment analysis, and even terrestrial site analogues (comparing terrestrial site locations to inundated site locations), such sites can be identified and investigated (Stright 1986:363).

**Cultural Framework**

As to placing the people of the Southeast into a chronological or cultural framework, Smith (1986:6) rejects what he considers an arbitrary and "confusing list of competing 'cultural chronologies'" based on archaeological criteria. Instead, he prefers a more "natural" approach based on the chronostratigraphic framework of the Southeast - originally established for the Midwest by Delcourt et al. (1980:111). Smith's (1986:6) temporal boundaries consist of an "early Holocene" (12,500-8,000 BP), a "middle Holocene" (8,000-5,000 BP), and a "late Holocene" (5,000-present), which he ties to three major climatic trends. These trends are defined as a) assuagement of the Laurentide ice sheet, and subsequent b) commencement of and c) end of the hypsithermal (warming and drying period). This method, explains Smith
(1986:6), allows for a "culture-free" chronology which may be compared to environmental trends and culturally defined local chronologies of the Southeast.

Muller (1983:375) takes a slightly different view of southeastern cultural chronology. While also noting the "literally hundreds of local archaeological phases and complexes [that] have been defined for this large and diverse province," Muller (1983:374) prefers a more traditional approach to any discussion of southeastern prehistory. This approach includes four basic stages of human occupation: Paleoindian (12,000 - 8,000 B.P.), Archaic (8,000 - 2,700 B.P.), Sedentary (2,700 B.P.- AD 700), and Late Prehistoric (AD 700 - AD 1540).

A more appropriate chronology for the purpose of this study would be one that provides specific cultural periods into which the various watercraft could be placed. Bense (1994) provides a suitable chronology that is comprehensive enough to relate particular dugout canoes to a particular cultural setting and this data is presented in Table 2.1.

Of course, the duration of these periods is somewhat arbitrary as are the state boundaries referred to in this study. Both are used here as primarily a matter of convenience. Subsistence bases within the southeast, while not applying to all of the cultures, can be said to be characteristic of most. This would include, for example, the hunter/gatherer base of most PaleoIndian and Archaic groups; the domesticates combined with hunting and gathering of the Sedentary groups; and the almost complete dependence on agriculture for the Late Prehistoric and Historic groups.
### Table 2.1 Southeastern cultural chronology (after Bense 1994:4).

<table>
<thead>
<tr>
<th>Period</th>
<th>Approximate Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Paleoindian</td>
<td>15,000? - 11,000 B.P.</td>
</tr>
<tr>
<td>Middle Paleoindian</td>
<td>11,000 - 10,500 B.P.</td>
</tr>
<tr>
<td>Late Paleoindian</td>
<td>10,500 - 10,000 B.P.</td>
</tr>
<tr>
<td>Early Archaic</td>
<td>10,000 - 8,000 B.P.</td>
</tr>
<tr>
<td>Middle Archaic</td>
<td>8,000 - 6,000 B.P.</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>6,000 - 3,000 B.P.</td>
</tr>
<tr>
<td>Early Woodland</td>
<td>3,000 - 1,950 B.P.</td>
</tr>
<tr>
<td>Middle Woodland</td>
<td>1,950 - 1,450 B.P.</td>
</tr>
<tr>
<td>Late Woodland</td>
<td>1,450 - 950 B.P.</td>
</tr>
<tr>
<td>Early Mississippian</td>
<td>950 - 750 B.P.</td>
</tr>
<tr>
<td>Middle Mississippian</td>
<td>750 - 550 B.P.</td>
</tr>
<tr>
<td>Late Mississippian</td>
<td>550 - 450 B.P.</td>
</tr>
<tr>
<td>Contact</td>
<td>450 - 270 B.P.</td>
</tr>
<tr>
<td>Colonial</td>
<td>270 - 129 B.P.</td>
</tr>
</tbody>
</table>
Bense’s (1994), Smith’s (1986) and Muller’s (1983) characterizations of the chronology of the Southeast are given in hopes of providing a clearer picture of southeastern prehistory and to provide a cultural framework into which later discussions of Native American watercraft can be woven. Future chapters will discuss each of these cultural periods in more detail with a specific view toward the role played by the dugout canoe in southeastern adaptation.
CHAPTER III

NATIVE AMERICAN WATERCRAFT

The wood is good and of use; it is God's creature. For many things are made of it; for of it is made the house in which we dwell, and of it is made the canoe. with it is gained one's livelihood. For these things of great worth are thus made of wood (Sahagún 1950:29).

The first watercraft are assumed to have been simple floating logs which prehistoric people observed and eventually utilized (Johnstone 1980:7). Unfortunately, an unmodified log or "naturefact" would be impossible to detect in the archaeological record. Easier to identify but still difficult to locate are more complex forms of watercraft including rafts, dugout canoes, bark boats and skin boats.

The production of more complex craft such as dugouts, bark canoes, and skin boats requires a highly specialized tool kit and the time necessary for construction. Johnstone (1980:7) believes that because the earliest inhabitants of North America placed an emphasis on mobility and subsistence, the tools and free time required to construct such craft may not have been available to them. Thus, he argues the earliest watercraft may have been simple rafts. Again, however, physical evidence for this kind of craft is scarce.

The earliest actual watercraft discovered in North America date to the Late Archaic period and include 11 from Florida (Purdy 1991; Bullen and Brooks 1968), 1 from Ohio (Brose and Greber 1982), and 5 from North Carolina (North Carolina Division of Archives and History 1986). Johnstone (1980:46) states that "building a dug-out with a simple tool kit . . . probably took a relatively long time. This meant
that dug-outs were developed and used by settled communities." This statement, however, does not take into account any of the dugout canoes produced by the Archaic (mobile hunter/gatherer) cultures of the Southeast. These people had not only the time and desire to build such craft, but also the ability.

As of 1996, more than 300 dugout canoes have been recovered from the waters in and around the state of Florida, many of them predating European contact. Within the southeastern study area, prehistoric dugouts have also been recovered from Alabama, Georgia, Louisiana, Mississippi, and South Carolina. Outside the study area, prehistoric dugouts have been found in Canada, California, Vermont, Michigan, Ohio, North Carolina, Kentucky, Kansas, Missouri, and Minnesota.

Types of Native American Watercraft

Greenhill (1976:91-95) categorized early watercraft into four general groups including:

Rafts

Rafts were usually made by securing logs or bundles of reeds together into a boat shape. Rafts were also made from inflated animal skins and gourds, held together with either cords or nets. One main consideration is that they are considered "platforms" (Cunningham 1989:21) and it is this feature that separates the raft from simple floats. These craft were usually not watertight and gained buoyancy from the materials of which they are constructed. These materials are lighter than water - so much so that rafts built from them could float even when fully laden. This category
also includes the "balsa canoe" as described by Cunningham (1989:35). Balsa’s are rafts despite the fact that some may be formed into a rudimentary boat shape. The term canoe, comes from the Arawak word for hollow log and it was approximated by Columbus who used it to describe the first dugouts he encountered in the New World (Cunningham 1989:9).

Skin Boats

Skin boats are made by sewing animal skins over a framework of wood or bone. A variation on this design is the basket boat, made with a wicker-like frame of plant materials over which animal skins or fabrics may be stretched. These craft are found predominantly in the North American arctic "from [the] Bering Sea to the East coast of Greenland" (Adney and Chapelle 1983:174), although certain Plains groups (i.e. the Sioux) also made skin craft from the hides of buffalo and hence the name "bull boats" (Johnstone 1980:34; McGrail 1981:8)). These craft could be taken apart and carried until the need to cross a body of water arose once more when they were quickly reconstructed (Cunningham 1989:31).

Adney and Chapelle (1983:175) note that the Inuit of the Arctic produce two basic types of skin boats: an open type (umiak) used for carrying cargos and passengers, and a small, covered type (kayak) used almost exclusively for hunting and fishing. The skin boat was both a simple and efficient means of water travel in an environment where natural building materials are both scarce and unvaried (Braund 1988:22). South of Canada, the Chumash were the only Native Americans to construct and use a hide covered "boat" similar to those used in Canada and the arctic
(Cunningham 1989:66). These vessels resembled *umiaks* more than *kayaks* simply because they were not covered (Cunningham 1989:68).

**Bark Boats**

Bark boats are made from a continuous strip of bark removed from a tree, usually white birch (*Betula papyrifera*), and formed into a boat shape (Adney and Chapelle 1983:7). Often a frame was used to aid in shaping. A common practice was to remove the bark in a single strip and then simply close both ends and seal them by stitching or lashing and coating them with gum or pitch (Cunningham 1989:65). The interior was then strengthened with pieces of wood or bone and the ends of the bark were stitched together and sealed with tar or tree resin. Although information on Native American bark canoes is limited, it may be assumed that such a highly evolved craft had a long history of development. Early European explorers were impressed by the light weight of the birchbark boats, their great load-carrying capacity, and the speed with which they were propelled by their native owners.

**Dugouts**

Dugouts were made from a single log, hollowed out and worked into a boat shape. The most common practice for producing a dugout was to light a fire on top of the log and, using stone adzes, axes, gouges, or shells, gradually scrape away the wood ash left behind. The outside of the canoe was also shaped using stone or shell tools. Planks were sometimes added to widen and deepen the dugouts (Purdy 1991; Harrington 1978). To the best of our knowledge, dugout are the sole watercraft constructed and used by Southeastern Native Americans prior to European contact.
Based on several canoe models found at the prehistoric site of Key Marco, Florida by Cushing (1896:364-365), Kandare (1983:22-23) defines four basic dugout types used at various times in the prehistoric Southeast. These models, which Kandare suggests may be toys, were well-carved and measured "from a few inches to several feet long."

The first type was "... obviously designed ... for the navigation of shallow streams" (Cushing 1896:364). This type has a flat-bottom with squared-off ends looking somewhat like a narrow rowboat. Type 2 was similar to the first except for lower gunwales, a narrower beam, and sharper and higher ends. Cushing (1896:364) notes that this type "... would have been admirably adapted to swift tidal currents, or to the running of low breakers." Type 3 was described as a "wide vessel with a wide bow and stern which looked as if it was designed to carry heavy loads over shallow water" (Cushing 1896:365). Finally, type 4, was a catamaran-like vessel (Cushing 1896:365). Full-sized craft of this type were observed and reported by Pedro Menendez and Jonathon Dickinson in the 16th and 17th centuries (Purdy 1991:273; Conner 1964).

Archaeological evidence for two full-sized catamarans also exists (Newsom and Purdy 1990:172). Both of these vessels have carved or drilled holes along the top edge of the gunwales which may have been used for some type of central support. Conner (1964) relates an historic description of such a craft: "the Calusa chief Carlos came with as many as 12 canoes and two of them fastened one to the other, with decks covered with awnings of hoops and matting."
Prehistoric canoe forms were also summarized by Swanton (1946:589-94) as typically having flat bottoms, straight sides, and frequently being as long as 30-40 feet. McGahey (in Kandare 1983:24) notes that "based on the few known archaeological specimens, [dugouts were] long and narrow with thin walls and abrupt [straight] sides. [They] had a platform at both ends and sometimes a hole at one of the ends" (presumably for mooring).

Purdy (1991:269) also defines several stylistic groups for Southeastern dugouts "based on shape, size, and fineness of finishing." Under her system, Type 1 would include the earliest and crudest canoes which are roughly hewn with blunt ends, indistinguishable bows and sterns, and largely unmodified surfaces (Purdy 1991:269). Newsom and Purdy (1990:170) note that these vessels were all manufactured of hard or yellow pine through the fire hollowing and scraping method (see below). The exception to this "rule" is the oldest known dugout in the Americas, recovered from DeLeon Springs, which will be discussed in detail in Chapter V. This canoe has been positively identified as being manufactured of bald cypress (*Taxodium distichum*) (Lee Newsom, personal communication, 1993). Some of the charred areas associated with manufacture are present on several of the dugouts and, in some cases, some of the tree bark is still in place. The canoes placed into this category include all the early dugouts ranging in age from approximately 6,000 to 3,000 B.P. All of these canoes were in poor condition when discovered and several were subsequently destroyed. Therefore, it may be unfair to consider them crudely made without further study of the fragments.
and the surviving records. It is entirely possible that the vessels she is describing as "crude" (1991:269) may simply be unfinished.

Purdy’s Type 2 is the most common form found and is coeval with, and later replaces, Type 1. These canoes were also manufactured through burning and scraping, but the finish is more refined and the bow and stern are shaped upward and smoothed on the upper surface. Purdy (1991:269-270) also notes that "the finishing of the gunwales and inside was carried out to a much greater degree." Unfortunately, only limited information on the context of discovery and descriptions of the canoes is provided. These canoes (and those of Type 1) are said to have been found "in the inland lakes and streams" (Purdy 1991:270).

Type 3 in Purdy’s classification scheme is also noted "to coexist" with the types above. This type is distinguished by a prominent overhanging bow which may have been designed for rougher bodies of water. Purdy (1991:270) notes that "these canoes have been discovered primarily on the Atlantic Coast, St. John’s River, and some of the bigger lakes" and in some cases, "the undersurface beneath the bow has been slightly shaped into a "V" -form which would also facilitate travel through such waters." Aft of the bow, the undersides are smooth and flat. One canoe that fits perfectly into Purdy’s Type 3 is the Dog Island dugout which will be addressed in Chapter VI.

Type 4 craft of this classification appear in the historic period (Purdy 1991:271). They resemble Type 2 in shape but are distinguished by metal tool marks, indicating a post-contact date of manufacture. All lines and surfaces of these vessels are sharp and cleanly cut.
A fifth type of dugout is also recorded by Purdy (1991:273). These are "composite craft" which include the catamaran types described above, as well as a type which has been cut in half and widened by the addition of a central plank or planks. The joints were fastened with a series of cleats or wooden pegs. The presence of metal tool marks places these canoes firmly in the historic period (Purdy 1991:275) and Swanton (1946) notes that these canoes "had been made by the Indians in the Spanish style."

Brief mention is also made of a sixth type manufactured by the historic Seminole Indians (Purdy 1991:275). These canoes taper in the bow to a "V" shape which Purdy (1991:275) notes was useful in travelling "through the sawgrass marsh of the Everglades."

**Materials and Construction**

Native Americans had a forest of trees to choose from, but the evidence indicates that only two species were widely used. Purdy (1991:283) notes that:

- cypress was chosen over pine in the historic period (1) because of the availability of iron tools that negated the need to use the fire-hollowing technique, (2) because the idea of using cypress was introduced in the 16th to 18th centuries by . . . Europeans, and/or (3) because of the abundance of cypress . . .

It is assumed by Pittman (1970:52-57) and others that bald cypress (*Taxodium distichum*) was too hard for the prehistoric people of the Southeast to work, and that pine (*Pinus spp*.), being a much softer wood, would have been a preferred construction material. Kandare (1983:26-27) refutes this concept, noting that 11 of the 15
supposedly prehistoric dugouts he researched were made of cypress, while only 2 were made of pine. Kandare (1983:27) does note, however, that only 4 of the 15 have been radiocarbon dated. Likewise, all 21 dugout canoes recovered from Lake Phelps in North Carolina dating between 4,380 B.P. and 550 B.P. are made of cypress (Phelps 1989). Bernardino Sahagún (1963:106), an early Spanish explorer, noted that in Mexico, the cypress:

is high, slender; it has branches. It is not forked; it is like a stone column . . . It is a long-lived one . . . which does not rot, which is not eaten by worms or gnawed. It is fine-textured, smooth, soft, compact. It has roots, a base, a trunk, a top. The trunk is thick, slender at the top. It has a bark; it can be barked.

Surely more information is needed before this debate can be laid to rest. Indeed, it should be noted that Purdy (1991) has examined more than 100 dugouts from Florida waters and has found "yellow" pine to be the construction material of preference for prehistoric Southeasterners. Unfortunately, Purdy (1991:269) and Newsom and Purdy (1990:174) give only the common names for the wood type used in the earliest dugouts and this may be confusing. In The Field Guide to U.S. National Forests, Mohlenbrock (1984) list the common name "yellow pine" as representing either Pinus resinosa (red pine) or Pinus ponderosa (ponderosa pine). Ponderosa pine, however, is found no farther east than Texas and would not have been available to the prehistoric inhabitants of Florida. Thus, Pinus resinosa seems to have been the wood of choice. Leshikar (1982:74) notes that both pine and cypress are relatively light, rot-resistant woods, both of which are soft enough to work with stone tools. Lighter craft would be easier to portage should the need arise, and the vessels would float high when compared to their
water displacement. These advantages alone indicate that both pine and cypress were
good choices for dugout canoe manufacturing.

Swanton (1946:590) suggests that bald cypress was the wood "that was almost
universally employed" in the Southeast. One historic report made in the 1730s
mentions that Native American "canoes . . . are made of pine or tulip trees, which
(before they had the use of English tools), they burned hollow, scraping and chipping
them with oyster-shells and stone-hatchets" (Catesby in Swanton 1946:592).

While woodworking tools changed with the arrival of Europeans and their iron,
the methods of dugout construction remained basically the same until very late in the
historic period (Purdy 1991:280). Thomas Harriot (1972), an early European visitor to
Virginia, provided an excellent description of the manufacture of a dugout canoe:

For whereas they want Instruments of yron, or other like vnto ours, yet
they knowe howe to make them as handsomelye, to sail with whear they
liste on their riuers, and to fishe withall, as ours. First, they choose
some longe, and thicke tree, accordinge to the bignes of the boate which
they would frame, and make a fyre on the ground about the Roote
thereof, kindlinge the same by little, and little with drie mosse of trees,
and chippes of woode that the flame should not mounte opp to highe, and
burne to muche of the lengthe of the tree. When yt is almost burnt
through, and readey to fall they make a new fyre, which they suffer to
burne vntill the tree fall of yts owne accord. Then burninge of the topp,
and bowghs of the tree in such wyse that the bodie of the same may
Retayne his iust lengthe, they raise yt vpon poles laid ouer cross wise
vpon forked posts, at such a reasonable heighte as they may
handsomlye worke vpon yt. Then take they of the barke with certayne
shells: they reserve the innermost parte of the lennke, for the nethermost
parte of the boate. On the other side they make a fyre according to the
lengthe of the bodye of the tree, sauing at both ends. That which they
thinke is sufficiently burned they quench and scrape away the shells,
and makinge a new fyre they burne yt agayne, and so they continue
sometimes burninge and sometymes scrapinge, vntill the boate haue
sufficient bothowmes [bottoms]. Thus god indueth this savage people
with sufficient reason to make thinges necessarie to serve their turnes.
It is appropriate at this point to mention one personal consideration from the perspective of a builder of European style dugout canoes. Joseph Clews, a native of North Carolina, and a dugout canoe builder reported to Pittman (1970:14-15) that he took "pride in his product, attempting to perfect to the best of his ability each dugout he construct . . . The artisan does not appear to regard the construction of a dugout canoe as a task but as a personal expression or an artistic experience."

Dugout Canoe Manufacture: The Problem

The method of dugout canoe manufacture had much to do with the type of wood selected. Many prehistoric dugouts are made of pine, a softwood tree composed of woody tissue that contains a highly combustible resin which allows for easier burning. Figure 3.1 shows a photomicrograph of red pine (*Pinus resinosa*) in which the resin canals are clearly visible. Cypress is also a softwood tree, but one that lacks resin canals and is not as suitable for fire-hollowing. Figure 3.2 shows a photomicrograph of bald cypress (*Taxodium distichum*) in which no resin canals can be seen.

Wood is an organic substance that, under ordinary circumstances, decays quickly in archaeological sites. This explains the dearth of dugout canoes in areas rife with waterways. For example, the ethnographic information from early explorers in Texas (e.g. Atkinson 1953; Berlandier 1969; Covey 1972; Shuffler 1970) reveals a great Native American dependence on the dugout canoe for transportation, trade, and warfare. Yet, to date, only four dugout canoes have been found in Texas archaeological deposits and none of them predate the time of European contact. How then is it possible to
Figure 3.1. Photomicrograph of *Pinus resinosa* (after Panshin and de Zeeuw 1970:FIG. 12-51).

Figure 3.2. Photomicrograph of *Taxodium distichum* (after Panshin and de Zeeuw 1970:FIG:12-65).
determine whether dugout canoe manufacture may have been an activity of cultures wherein wood artifacts have not survived? An analysis of the tools from such sites would be good indicators. But what traces would be left on tools used in heavy duty working on the two principal wood types identified in southeastern dugout canoe manufacturing? To answer these questions, as well as the earlier question of the relative workability between cypress and pine, experiments were conducted on unburned pine and cypress and on charred pine and cypress utilizing chert adzes hafted onto wood handles.

The Experiment

Two similar-sized pine (*Pinus resinosa*) and bald cypress (*Taxodium distichum*) limbs were selected for the use-wear/workability study. Each limb was approximately 12 cm in diameter and 1 m in length.

The tools were manufactured of chert nodules collected from the Brazos River in Texas (William Dickens, personal communication, 1994) using a combination of hard hammer percussion and pressure flaking. The edges of the tools were ground to facilitate hafting. The completed adze blades (Figure 3.3) were then hafted onto handles made from crepe myrtle collected near the Brazos River.

The angle of the blade to the haft was approximately 90°. The blades were wrapped in leaves to cushion the tools and to protect the binding from the tool edges. Binding was accomplished by wrapping the adze blade onto the haft using artificial sinew. Artificial resin was then smeared over the binding to seal it and to help keep the tool in place.
Figure 3.3. Chert adzes used in experiments.

The unburned pine and cypress were selected first and they were laid upon the ground and struck with the adze. The strokes were long overhand blows struck to the wood at an approximate right angle following the grain. Both woods proved very hard and resistant with more of a pounding effect rather than cutting. Each tool was examined both macro- and microscopically after each 500 strokes up to a maximum of 2,500 strokes. The tools used on the unburned wood samples were dulled after the first 500 strokes, but they were not resharpened because the goal was to determine the amount of damage done to the tool edges.
Unburned wood results

The tool edges were dulled quickly when used on the dry, unburned wood. There was no appreciable difference in damage to the adzes between cypress and pine. Both woods were difficult to work and produced edge damage to the tool, including the removal of large flakes from both the dorsal and ventral tool faces along with numerous cone initiation fractures, all of which were observable macroscopically. Numerous small half-moon shaped flakes were removed primarily from the ventral side of the tool along with tiny (ca. 1 mm) cone initiations on the ventral surface which could only be seen microscopically. Trace amounts of polish appeared thick and bright in patches along the bit edge of both the pine and cypress adzes and a few striations (seen at a 40x magnification) were observed running parallel to the blade within the area of the polish.

Charred wood results

The wood was laid out on the grass and glowing charcoals were placed along the wood length parallel to the grain and allowed to burn for several hours. When the coals began to cool, they were removed and the ash was scraped out using the hafted adzes. It was obvious from the outset that charred pine was much easier to work than charred cypress. There was much less charring in the cypress and it was necessary to use the adze to chop more than to scrape (the best method for working the pine).

There was significantly less tool edge damage after 2,500 strokes on charred wood. No large flakes were removed from either side of the bit edge on either adze and damage could only be seen microscopically. On the adze used to work the charred cypress, more
small (ca. 1 mm) half-moon shaped flakes were removed from the ventral side of the tool than on the pine adze. In addition, more polish was evident and it appeared more spread out and brighter than that seen on the non-charred specimens. In addition, there were more numerous striations found parallel to the adze blade on the cypress adze than on the pine adze and more on the charred cypress adze than on either the unburned pine or the unburned cypress adzes. There were, however, fewer cone-initiation scars present on the charred cypress and pine adzes than on the uncharred examples.

Microscopic traces of charcoal were also found imbedded in the bit edges of both the charred pine and cypress adzes. These inclusions were present even after vigorous cleaning following Keeley's (1980) method. It should be noted that Gaertner (1992:3) found similar traces on Dalton adzes from northeast Arkansas as well as on her own experimental tool assemblage following its use on charred woods. Unfortunately, Gaertner (1992) does not discuss the wood type used in her experiments and does not take into account possible differences in hardness or in burning qualities (i.e. the presence or absence of resin canals) - important considerations in identifying correlates in the archaeological record.

Discussion

The results of this study provide evidence that generally supports Pittman's (1970:52-57) discovery that bald cypress was hard to work, and that pine, being a much softer wood, would have been easier to work. It does not, however, support his contention that pine was chosen over cypress in the prehistoric southeast for this reason. There are
numerous archaeological examples of fire- and stone tool-hollowed dugouts of both pine and cypress from throughout the Southeast and indeed, throughout North America. The typical construction process is exemplified by an unfinished dugout canoe from Fort Lauderdale, Broward County, Florida (Figure 3.4).

Figure 3.4. Unfinished dugout canoe from Fort Lauderdale, Florida.
As can be seen in the photograph, the sides of the canoe have been "barked" (had the bark removed) while the bow (or stern) of the vessel has already been carved into a rough bluntly pointed shape. The interior or "dugout" portion has only just begun to be "dug-out" through the use of pyrotechnology. Figure 3.5 shows the same canoe from the opposite end, which is, as yet, unworked. This photograph clearly shows the bottom portion of the tree near the beginning of the root system, indicating that the lower portion of this particular tree was being used for the canoe.

Without the use of pyrotechnology, prehistoric Native Americans would have found it nearly impossible to sculpt any type of useable boat from a whole tree. The amount of time and energy would have been prohibitive. However, when fire is used

Figure 3.5. Closeup of the root-end of the Fort Lauderdale dugout.
as an additional tool, the ease and speed of dugout canoe manufacturing was significantly improved. Faster and easier construction techniques meant that more canoes could be produced, resulting in a potential increase in the movement of populations, improvement in subsistence, and enhanced trade and warfare.

Current research has shown, however, that cypress and pine in their dry, unburned state are equally difficult to work utilizing hafted stone adzes. Although, when the wood is charred, pine works far more easily. Swanton (1946:590) reported that some southeastern aboriginal groups used stone axes to bruise and soften the woody tissue of cypress trees, making them easier to burn, and therefore easier to work. During the early phases of European and Native American contact, when iron tools were being introduced to indigenous cultures for the first time, a combination of fire-hollowing and iron tool use was common.

It is clear from this study that woodworking leaves recognizable traces on the stone tools involved in that activity and that such tools have been located in the archaeological record (e.g. Engelbrecht and Seyfert 1994; Gaertner 1992; Morse and Goodyear 1973; Morse and Morse 1983). Chert tools from other archaeological contexts, especially those near waterways, should be examined for similar use-wear patterns in order to determine whether or not pyrotechnology and heavy woodworking was important to a particular society, and perhaps, that the dugout canoe was known to them. In Chapter IV the Dalton adze and its potential as a tool used in Paleoindian dugout canoe manufacturing is discussed.
Indigenous Use of Dugout Canoes

Dugout canoes have been found as far north as Canada and as far south as Chile and, as mentioned above, they are the only prehistoric watercraft found in the southeastern United States. Prehistoric dugout canoes have been found throughout the southeastern study area in numbers that far exceed any other region of the country with the possible exception of the middle Atlantic where at least 29 dugouts have been recovered from various waterways in North Carolina (North Carolina Division of Archives and History 1986). The first European explorers were met by Native Americans in dugout canoes (Leshikar 1988:27). Columbus described the canoes of the first people he encountered in the Caribbean:

They have in all these islands very many canoes like our row-boats; some larger, some smaller, but most of them larger than a barge of 18 seats. They are not so wide, because they are made of one single piece of timber, but a barge could not keep up with them in rowing because they go with incredible speed and with these canoes they navigate among these islands, which are innumerable, and carry on their traffic. I have seen in some of these canoes seventy and eighty men (in McKusick 1960:5).

The dugout canoe proved so useful that many European explorers and settlers eventually adopted them for travelling on the inland waterways of the continent (Adney and Chapelle 1983:3).

Such craft must have played a crucial role in the development of the southeastern culture. They were the "pack animals' of the region, but they were better - they didn't have to be fed, and a canoe built of cypress probably lasted for years. Pittman (1970:2) compares the role played by watercraft in the southeastern cultures to that played by the
horse in Plains cultures. The addition of the horse to sedentary cultures helped some
groups like the Crow and the Cheyenne switch to a more mobile and warlike pattern. This
affected not only their material culture, but also their mode of subsistence, and their social
and political organization. Large areas of the Plains were traversed quickly on horseback.
In the Southeast, the canoe provided a very effective mode of transportation in an area
marked by swamps, narrow, twisting channels, and miles of coastline (Pittman 1970:4).

Of course, the horse was introduced suddenly with the arrival of the Europeans.
The same may not be true for the dugout canoe. If dugouts were not a sudden innovation,
there must have been a history of development predating the earliest archaeological
evidence for dugouts in the southeastern Late Archaic. There is strong evidence to suggest
that reliable watercraft would have "enhanced food-getting, ritual, trade, and
communication systems, and [emphasis Arnold's] ... helped to stimulate new levels of
sociopolitical complexity" (Arnold 1995:733).

Perhaps the most common use of the dugout canoe by Native Americans was
simple transportation. Early historic accounts describe southeastern Native Americans as
skilled navigators. According to Wicke (1965:417),

. . . the prowess of the American Indian as a navigator has been greatly
underestimated . . . The Mississippi, with its tributaries, constituted an
extensive river highway in a country of forests. The towns built beside it
show in their cultural similarity that the river was heavily travelled.

Long distance travel on the part of Native Americans was recorded by a number
of European observers. Although the details of the trip are not discussed, Adair
(1930:287) mentions a round trip of 2,600 miles by one canoe disguised as a trading vessel during a raid. According to Swanton (1946:736), the Chikasaw crossed the Mississippi River in dugouts to attack the Caddo on the opposite shore.

MacDonald and Purdy (1982:9-10) note that "canoes can also be studied as adaptive mechanisms." Water travel would provide a high energy source for people who were basically low energy users. MacDonald and Purdy's (1982:10) study, for example, showed that "compared to an overland trip, . . . four people transporting goods in a canoe for 50 miles would save 25,000 calories - enough to sustain a small band for an entire day." Thus, water travel becomes a means of saving energy and time, both of which could then be channeled directly into subsistence, earthwork or monument building, ceremony, and even warfare. Therefore, "the efficiency of the canoe undoubtedly played a role in making possible the rise of complex societies" (MacDonald and Purdy 1982:10).

While the primary function of watercraft for Native Americans was transportation, trade was also crucial. The tremendous number of rivers and streams in North America made, in effect, "an aquatic network of highways reaching from the coast to deep inside the interior" (Kandare 1983:41). Historians and archaeologists have identified various Native American trade and transportation routes. Atkinson (1953:142) describes the Karankawa of southern Texas who seldom left the coast except to paddle their dugouts upriver to hunt or to trade with the interior tribes. Milanich and Fairbanks (1980:81) report that in Florida
The Caloosahatchee River functioned as a canoe highway to tie the Caloosahatchee area to the Lake Okeechobee Basin. When visited by the Spanish, these two areas were linked by trade and political networks.

Trade routes have also been identified through the examination of various raw materials recovered from archaeological sites. Harrington (1924:88) described the presence at sites along the Arkansas River Valley of "beads, pendants, and ear-ornaments made from conch-shells originating in the Gulf of Mexico . . . either traded in from tribe to tribe or brought up in canoes." Materials such as galena and hematite were acquired from Missouri, copper from Michigan, shells and alligator teeth from the Gulf coast, and obsidian from as far west as Wyoming.

These regions all participated in the huge Hopewell trade network or "interaction sphere" characteristic of the Sedentary cultures of the Southeast and the Woodland cultures of the Midwest. Large numbers of discrete Native American societies covering a large part of North America responded to changing environments and economic bases with similar ceremonial and social patterns involving the long distance transportation of goods that were clearly not related to subsistence (Brose 1986:2). While such trade would not depend entirely upon water travel, dugouts would certainly have facilitated trade over great distances.

Long-distance trade permitted not only the exchange of raw materials and manufactured goods, but also the exchange of new ideas. The presence of panpipes and ear spools in burials in the Southeast (items that originated in the Ohio Valley) are indicators of changes in burial practices as well as the corresponding ritual or ideological
changes that must have accompanied them (Morse and Morse 1983:163). Cultures do not make such changes rapidly, so the impact of cross-cultural contact must have been powerful. There is some indication that increased trade led to an increase in the size of dugout canoes through time (Pittman 1970:59). For example, the largest prehistoric dugout found to date comes from the Caddo area along the Red River in Louisiana (Webb 1975:7). The vessel is almost 1000 years old and is nearly 10 meters long (this canoe is described in detail in Chapter VII).

The most important role of the dugout canoe was in the area of fishing, gathering, and hunting. Kandare (1983:44) notes that "at least 50% of the total protein intake of Mississippian populations . . . was from fish and waterfowl." This importance is illustrated by a Theodore DeBry engraving that shows Native Americans hunting waterfowl with bows from their dugout canoes (Lorant 1946:247). Shellfish was also a popular comestible as indicated by the huge shell middens located throughout the Southeast. Such a resource would have been easily collected with the aid of shallow-drafted dugout canoes. Manning (1980:18) summarizes the ethnographic accounts of fishing from dugout canoes:

Dugouts were employed in many ways to catch fish. Night fishing was frequently done from dugouts. A torch was sometimes used to attract fish (Andrews and Andrews 1945:43), but fires were also built in clay basins in the canoes. With the river bottom illuminated and the fish dazzled they were easy targets for men armed with spears and dip nets (Hudson 1976:284; Lorant 1946). Dugouts were also used to inspect trot lines and to collect fish from weirs and traps (Lorant 1946:251; Jones 1873:333; Hudson 1976:284). Finally, pearls were collected with the help of dugouts; half the crew could dive for pearls while the others opened the shells (Burrage 1906:127).
Finally, Kandare (1983:46) discusses the use of dugout canoes as instruments of war, noting that many Spanish "accounts show that Mississippian populations . . . used large dugout canoes to conduct tactical and strategic military maneuvers." While the Spaniards had the military advantage on land through their use of the horse, "in dugout canoes the Spanish were militarily inferior to the southeastern natives" (Kandare 1983:46). The Karankawa of Texas would journey to war with their neighbors in their bluntly pointed dugouts crying "let us go and eat this nation" (Berlandier 1969:77).

**Dugout Canoe Performance**

In general, little has been reported on dugout canoes, and even less has been written about the performance of such craft. Various chapters in this dissertation will address specific watercraft but it may be useful to summarize some of what has already been written regarding the subject.

As to the shape of dugouts, Pittman notes that "the 'stern' of a dugout should be pointed, not squared or flat as in boats bought commercially. A squared stern creates a suction in the water causing the water to roll . . . it probably also creates some resistance in paddling the craft due to this backdrag or suction" (Pittman 1970:13). The pointed stern of a dugout does seem to create less drag, although the amount of reduction may not be very noticeable. Having a double-ended boat might also allow for easier navigation in a region marked by interlocking streams with narrow and shallow sediment-choked channels (Fleetwood 1982:37). In an area where turning would be difficult at best, having a craft that could go as easily forward as backward was a certain advantage. Pittman (1970:13)
also notes that such a vessel would be much quieter; an advantage when hunting or fishing, or when preparing to attack an enemy.

The Ringler Dugout

Brose and Greber (1982:252) note that the Archaic period Ringler dugout from Ohio was "neutrally stable to small disturbances," but this was calculated for a vessel carrying a single paddler with an estimated weight of 75 kg. The canoe is very rounded in cross-section and the vessel tended to roll over when it carried weights below 75 kg. With the addition of more weight (either in the form of additional people or cargo), the vessel became more stable. The maximum load for the canoe was calculated at 1074 kg, although this weight allowed no freeboard (Brose and Greber 1982:253). A freeboard of 10 cm was maintained with a load of 680 kg; with a weight estimate for four people of 300 kg, this left 380 kg for cargo (Brose and Greber 1982:253).

Pittman (1970:14) sees the rounded cross-section of so many prehistoric dugouts as a distinct advantage on the meandering waterways in which they were used:

In this riverine environment there are many underwater obstacles such as fallen trees . . . a flat-bottomed boat tends to lodge on these obstacles . . . a dugout will also lodge on such obstacles, but less surface area is in contact with the obstacle due to the effect of the rounded hull. For this reason it is easier to free the craft, usually requiring only a few hard strokes of the paddle

Finally, Pittman (1970:14) also writes of some unsubstantiated claims made by his informant, Joseph Clewis, a dugout canoe builder in North Carolina. Clewis claims that "a dugout has the capacity to carry more weight per unit volume than a plank boat of equal
size and volume." He also maintained that "a capsized dugout filled with water will remain buoyant enough for the individual to cling to its sides and remain afloat." Dugout canoes do seem to be well-suited to the environment in which they were used.

**Dugout Canoe Preservation**

Archaeological wood, often the only surviving example of a society's use of organic materials, can contribute a significant portion of what we understand about the society and its physical and cultural environment. Success in its preservation requires blending archaeological expectations with chemical and physical preservation of its remaining degraded structure (Peterson 1990:433).

Culture has been defined as "that complex whole which includes knowledge, belief, arts, morals, law, custom, and any other capabilities and habits acquired by man as a member of society" (Tylor 1871:1). These ideas and beliefs are expressed as behaviors by members of a given society. Archaeologists do not observe behavior directly, rather they observe the material remains of the behavior that produced them. These material remains have been exposed to both cultural and natural transformations that affect their representation in the archaeological record (Schiffer 1987). The dugout canoes on which this research is based have passed through a series of transformations which directly affect what remains for archaeological study.

Dugout canoes are manufactured of wood and are used on water. The combination of the two can provide varying results in the archaeological record. Wood is an organic substance that, under ordinary circumstances, decays quickly in archaeological sites. Extreme wet or dry conditions, determined largely by the site matrix and by climate, can
counteract this decay (Renfrew and Bahn 1996:55). With ships (and canoes), the wood will often survive in relatively good condition, although waterlogged (Hamilton 1994:23).

Renfrew and Bahn (1996:66) note that "the major archaeological problem with waterlogged finds, and particularly wood, is that they deteriorate rapidly when they are uncovered, beginning to dry and crack almost at once." Wood is that portion of the tree that normally transmits water. The cellular structure of wood is such that it resembles a collection of drinking straws glued together through which water is absorbed and carried throughout the tree. Waterlogged wood is also subject to bacterial attack and other forms of decomposition, and this degradation destroys first the water soluble constituents such as sugars and starches, followed by the cellulose, and finally the lignin. Lignin makes up approximately 25 percent of most woods and it is this that usually remains behind in waterlogged samples to support the structure of the wood (Panshin and de Zeeuw 1970:660). Purdy (1991:290) notes that lignin is resistant to hydrolysis; and Ember (1988:15) explains that most microorganisms cannot digest it. Given enough time, however, even the lignin will degrade and the wood will become more porous and open to more water. The absorbed water replaces the lignin as the supporting structure for the wood, thus waterlogged wood retains its shape only so long as it is kept wet (Hamilton 1994:24). When water saturated wood begins to dry, the water evaporates and pulls on cell walls weakened by deterioration until they collapse, causing the wood to shrink and crack.
This is a major factor in dugout canoe recovery. Often, dugout canoes are removed from their waterlogged contexts and allowed to air dry - usually with disastrous results. Purdy (1991:277) reports that canoes often:

fall apart because they are left on the bank to dry out. In some cases, canoes will not disintegrate under these conditions but usually within a day or two they will crack and split as moisture is liberated from the interstitial spaces of the wood.

According to Coles (1988:7), wood is five times as likely to preserve in a wetland environment (75% of the time) than in a dryland environment (15% of the time). Most often, decay occurs through changes in temperature or moisture content; through biological attack (insects and bacteria); and through fungal decay (Hamilton 1994:24). Most dugout canoes in the Southeast have survived in waterlogged conditions, usually in lakes, swamps, marshes, fens, and peat bogs. Here organic materials are effectively sealed in an airless (anoxic) and wet environment which favors preservation, as long as the waterlogging is more or less constant up to the time of excavation (Renfrew and Bahn 1996:64). The lower the moisture content of the environment is, the higher the level of chemical and biological activity will be, and maximum decomposition will occur (Purdy 1991:289; Florian 1982:63-64).

Doran and Dickel (1988:263) have summarized the types of wet sites found in Florida, although their descriptions are also appropriate for the entire Southeast. These include springs, streams, rivers, and lakes, and peat deposits. In the Southeast, numerous springs upwell through karst limestone, providing excellent locations for the preservation of archaeological sites. DeLeon, Little Salt, and Warm Mineral Springs all contain well-
preserved organic remains, including dugout canoes. The best conditions for the preservation of waterlogged wood include an anaerobic environment, low light and temperature, steady water or soil pressure, and steady pH levels. Purdy (1991:289) notes that "Florida's undisturbed organic deposits satisfy all of these requirements."

Streams, rivers, and lakes occasionally preserve watercraft. Major canoe finds in the Southeast have been made in Goose Lake, Little Orange Lake, Crooked Lake, Swan Lake, Goose Lake, Tucker Lake, and the Silver, Tombigbee, Alabama, Red, and Suwannee Rivers, among others. Most of the channels and lakes in Florida are located in the north-central highlands; and many of these may have been interconnected prior to the drainage projects in the 19th and 20th centuries (Purdy 1991:266). Four dugout canoes were discovered in Lake Galilee, according to Purdy (In Silver Springs and Weeki Wachee Entertainer 1982:2), "a lake you could almost spit over," adding evidence to the idea that there may have been a chain of lakes in the area, supporting an essentially lacustrine/riverine culture (Figure 3.6). Lakes and rivers (often in conjunction with peat deposits) make up the primary dugout canoe preservation environments for the rest of the southeastern United States.

Dugout canoes may also become incorporated within the channel fill sequences of oxbow lakes and streams. Oxbow lakes have been important locations for the discovery of dugout canoes and for archaeological sites in general. As Waters (1992:137) states, "the margins of oxbow lakes, whether created by neck cut-off or chute cut-off, are commonly densely vegetated. Consequently, sediments may be organic-rich, and beds of peat may
be part of the oxbow lake sequence." Vessels buried in such environments are often well-preserved.

Such vessels may have been in use when the channel was still an active part of the river system, prior to the cut-off and formation of the oxbow. However, dugout canoes could also have been built specifically for use on the lake. The Swan Lake dugout is a prime example of such a vessel (Fuller 1991). The Swan Lake canoe is a complete, well-preserved dugout discovered during dredging operations in 1989 in Steele Bayou, Washington County, Mississippi (Fuller 1991:1). The canoe was found sticking out of the bank of Swan Lake, a relict meander loop of the Mississippi River that is bisected by
Steele Bayou. It was excavated using a backhoe and none of the fill was screened until, as Fuller (1991:12) describes, one of the excavators "pulled up a sherd of Indian Pottery" from the interior of the canoe. Needless to say, the excavators changed their excavation strategy. Pottery, lithics, and a number of faunal remains were recovered from within and around the canoe and the entire find was designated as archaeological site 22WS776. The canoe was carefully documented, removed from the bank, and taken to Yazoo National Wildlife Refuge Headquarters for analysis and conservation.

The canoe itself was buried within two depositional "zones," the uppermost of which is described as "a moist layer of highly organic, dark gray silty clay muck that contained leafy plant remains" at a depth of about 170 cm below the modern surface (Fuller 1991:18). This zone is described as the remains of a freshwater marsh containing raw peat that provided an excellent anaerobic preservation environment for the canoe. The lower layer in which the canoe was deposited was composed of "a homogenous, greenish clay fine silty sand" (Fuller 1991:19). This zone contrasted sharply with the zone above and may represent a period of more active water flow.

The vessel was abandoned at some point and became buried during when the suspended silts and clays settled out of suspension and covered it (Waters 1992:142). The canoe itself is described in more detail in Chapter VIII.

Worldwide, the use of some type of watercraft probably predates the peopling of the New World (Fagan 1990:17). Circumstantial evidence certainly exists for the use of such craft in the Western Hemisphere as early as 11,500 B.P. (Erlandson 1993:17). In
Florida, Doran and Dickel (1988:283) report that peat deposits have been found at the Windover Site dating to as early as 10,750 B.P. (Beta-13907), which means that the potential for early Holocene dugout canoe preservation exists, even if the canoes themselves do not. Peat deposits are prime preservation environments; and poorly drained peat deposits are found throughout central and southern Florida. These deposits began forming around 6,000 years ago when the climate changed to a wetter environment, raising the water table. Purdy (1991:279) notes that it may be difficult to find a canoe older than 6,000 years because "the widespread development of organic deposits, in which most canoe survived, did not occur in Florida" until that time. Without the presence of extensive surface waters in the form of rivers and lakes, dugout canoes would not have been a useful adaptation. This hypothesis corresponds nicely with the age of the oldest dugout canoe in the New World, DeLeon II, which has been radiocarbon dated to 6,050 ± 60 B.P. (Beta-42456).

Renfrew and Bahn (1996:66) estimate that Florida has almost 3 million acres of peat deposits which contain more organic artifacts than anywhere else in the world; certainly more dugout canoes. To date, a total of 19 dugout canoes have been discovered at the Stricklin Peat Company near Grandin, Florida. The property, owned by Mr. and Mrs. Ollie Stricklin, has also yielded numerous wooden bowls and other artifacts all discovered during peat mining operations (Purdy 1988:xii). Doran and Dickel (1988:263) note that:
In Florida, as in many areas, the anthropological community is deeply indebted to landowners, developers, and private citizens who take the time and make the effort to contact archaeologists when prehistoric or historic sites are accidentally discovered.

What is the future of canoe finds in the Southeast? Coles (1988:14) explains that the once slow uncovering of wet archaeological sites has been accelerated by modern drainage practices. Harbor, highway, and marina developments, reservoir construction, building construction, ploughing, and commercial peat mining have all contributed to wetland drainage which, in turn, has exposed more archaeological sites and more canoes. In 1991, the number of dugout canoes in Florida was 185 (Purdy 1991:265). That number has since grown to more than 250 and more than 300 in the Southeast as a whole; and new canoe finds are being made all the time. Most wet sites in the southeastern United States are found accidentally, and this is particularly true of Florida, which has more wet sites than any other state in the study area.

A typical example of this situation occurred in August 1994 while I was researching past canoe finds in Gainesville, Florida. A phone call from a landowner in Micanopy, Florida alerted me to two canoes found buried in peat deposits during cutting operations. Unfortunately, the canoes were so badly eroded that we could only take wood samples for identification and for radiocarbon dating. The first canoe, Micanopy 1, was manufactured of bald cypress and has a radiocarbon age of 775 ± 60 B.P. (A-7535) (Figure 3.7); the second canoe, Micanopy 2, was manufactured of southern hard pine and has a radiocarbon age of 870 ± 35 B.P. (A-7534) (Figure 3.8).
Figure 3.7. Micanopy 1 *in situ*, Micanopy, Florida.

Figure 3.8. Micanopy 2 *in situ*, Micanopy, Florida.
The canoes were measured, photographed, and left *in situ*. Often there is little else that can be done. Conservation facilities are extremely limited. In fact, the Florida State Conservation Laboratory usually has at least one and no more than two dugout canoes in conservation continually (James Levy, personal communication, 1994). Funds are also limited and Barbara Purdy has resorted to conserving canoes in a small vat at the University of Florida on more than one occasion (Barbara Purdy, personal communication, 1994).

This situation has reached such a critical point that a number of dugout canoes that have not been conserved have been stored in the freshwater spring at Silver Springs, Aquarena in Silver Springs, Florida (University of Florida 1982). It was felt that it was better to keep the canoes waterlogged rather than allow them to air dry and probably disintegrate (Silver Springs and Weeki Wachee Entertainer 1982:2). These included the Magnolia Lake canoe pictured below in Figure 3.9 prior to being moved to the spring. Compare this photograph with Figure 3.10 which shows the canoe as it appeared in 1994 when visited by the author at the bottom of the spring. The canoe has an algal growth nearly covering one end which also appears to be more eroded than previously. Preserving these canoes in freshwater is better than no preservation at all, but it is not an optimal condition.
Figure 3.9. The charred end of the Magnolia Lake dugout.

Figure 3.10. Magnolia Lake dugout at the bottom of Silver Spring. This photograph shows the same end pictured in Figure 3.9.
Dugout canoes are made of wood and their preservation is uncertain even under the best of conditions. When discovered, the canoes should be photographed, drawn, and measured; and samples should be taken for wood identification and for possible radiocarbon assessment (Appendix 1 provides information on recording a dugout canoe). Unless endangered by construction or some other disturbance, the canoe should be left in situ, unless material, space, and funds are available for conservation. The preservation of these important artifacts is unique in the New World and we have the responsibility to see that artifacts that have survived the ravages of time for hundreds and even thousands of years do not succumb to the activities of modern humans.
CHAPTER IV

FIRST SETTLEMENT: THE PALEOINDIANS

. . . (A)rchaeologists . . . need to add to their repertoire a deliberate, imaginative search for signs of navigation on any stream large enough for canoe travel (Trout 1981:10).

The earliest Americans are generally believed to have entered North America via the Bering Strait Land Bridge that connected North America and Siberia during the Late Pleistocene (Grayson 1993:45; Dixon 1992:4). This land bridge was created during the Quaternary when sea level dropped, exposing the continental shelf under the Bering Sea (Waters 1992:289). The term "Beringia" is used to describe the area between the Kolyma River in eastern Siberia and the Mackenzie River in Canada's Northwest Territory (Grayson 1993:51).

The exact timing for the entry of the first people into the New World is not known. One of the most widely accepted theories has the first Americans crossing Beringia on foot sometime between approximately 35,000 and 14,000 years B.P. when sea level was low enough to create a "land bridge" joining the two continents. The best evidence we have places the earliest possible arrival no earlier than 11,500 years ago (Meltzer 1989). But is the Bering land bridge the only possible route that these early immigrants could have taken? A small but growing number of scholars have proposed an alternative to the traditional inland route through the narrow ice-free corridor that marked various stages of deglaciation throughout the Wisconsin period (Agogino 1991; Bednarik 1989; Chapman 1975; Clark 1977; Fladmark 1979; Gruhn 1994, 1988; Guidon & Arnaud 1991; Jett 1983).
Instead they suggest that, with the use of watercraft, humans could have utilized a coastal route along the southern edge of Beringia. Young (1988:107) imagines that "thousands of square miles of the land bridge . . . [were] a morass of blind channels, sloughs, cutoff lakes, and river bars." He continues that "it is hard to imagine a mammal living there who was not an accomplished swimmer or a human who was not a skilled boatman" (1988:108).

Even those who argue for an overland entry route concede the likelihood that these people may have been able to cross open water. Noted midwestern archaeologist James Griffin (1974:225) admits that "a reasonable reconstruction of other aspects of their culture would include . . . an ability to cross major streams by logs, rafts, dugouts, or skin boats." The major problem with proving this theory is a lack of definitive evidence for the use of watercraft by the earliest inhabitants of the New World.

Although we cannot rule out this hypothesis, there is as yet no clear physical evidence to support the idea. Or is there? We know that waterborne travel must have been possible as early as 28,000 BP when the first people crossed the 100 miles of open ocean to reach Buka Island in the Solomons (Fagan 1990:17). Earlier occupation sites have been discovered on Australia (50,000 BP) and New Ireland Island (32,000 BP), both of which are surrounded by large, deep expanses of open water (Fagan 1990:17). In fact, there are only two possible routes: following a chain of islands from Borneo to New Guinea with the longest gap 80 km long, or following another chain of islands from Java to Australia with the longest gap 100 km long (McGrail 1981:65). Such crossings would have required
at least rudimentary seafaring abilities and the tools to build oceangoing craft. In the case of the earliest Australians, these tools included simple stone and bone tools (Clark 1977:24). Materials recovered from early Australian sites indicate that the inhabitants were expert fishermen, taking numerous varieties of crustaceans, fish and shellfish from the nearby reefs.

To date, the earliest physical evidence for the use of watercraft in the Americas is a dugout canoe from Florida with an age in radiocarbon years of 6,050 ± 50 BP (Beta-42456). There is circumstantial evidence, however, that suggests that watercraft were a part of Early Native American technology. Recent work by Erlandson (1993:17) suggests that people had migrated to San Miguel Island as early as 11,550 ± 200 B.P. This is based on the average of two radiocarbon ages obtained from shells found at the site of Daisy Cave. San Miguel Island was never connected by a land bridge and would have required a trip across 40 km of open ocean (Masters 1985:28).

A date so close to that recognized by many to represent the earliest Clovis occupations on the American continent begs the question, "did these people have watercraft, and if so were they used in the peopling of the New World?" In order to answer such a question several things must be considered. First and foremost is what types of watercraft may have been available to possible early settlers? Second would be what types of seafaring skills would have been required for such a voyage and did these people have such skills? The third question that must be addressed is subsistence - could the coast of Beringia have supported human populations? Next is the environment - were
there barriers set up by the paleoenvironment of the region and if so, how much of a impediment would they have been to migratory human populations? Finally, how is it possible that people adapted to a maritime subsistence pattern could have switched to inland hunting and gathering - why and how did this occur?

The Theories: Inland vs. Coastal Entry Into the Americas

In the Bering Sea, Alaska and Siberia are separated by less than 60 miles. In the recent past and in some, instances, today, Inuit peoples make regular crossings of the strait in large, open boats of skin called umiaks (Bruemmer 1992). Hunters, pursuing sea mammals, often strike out deep into the strait in smaller skin boats called kayaks. That such a crossing can be made in today's environment cannot be doubted. But was such an entry possible in the distant past say, for example, at the end of the Pleistocene?

Grayson (1993:46) argues that the Eskimo (Inuit) "are a modern people with a sophisticated technology for dealing with their environment." In this statement, he is implying that prehistoric peoples did not have the technology for dealing with their environment and that only a sophisticated technology could allow survival in the harsh environment of the Bering Sea.

And yet people survived and flourished. Whether you believe that they came across Beringia via the ice-free corridor that separated the Laurentide and Cordilleran ice sheets or that they followed the southern coast of Beringia in boats, the fact that they came and were successful cannot be doubted. The Americas were settled.
The earliest clearly defined cultural tradition in North America is Clovis, defined by distinctly fluted projectile points often associated with extinct megafauna (Haynes 1982:383). But Clovis is restricted to a very narrow time span of approximately 1000 years (ca. 12,000 to 11,000 B.P.) based on stratigraphically controlled radiocarbon ages (Haynes 1987:83). The Clovis peoples quickly took advantage of the abundant resources south of the ice sheets and expanded throughout the Americas. Martin (1973) has argued that Clovis peoples were superpredators that expanded rapidly, wiping out larger species such as mammoth, horse, and camel. Bense (1994:24) refutes this idea, at least in part. She argues that the climate shift toward a warmer and drier environment caused an associated shift in vegetation patterns which, when combined with human predation, led to the extinction of the megafauna.

Where did Clovis peoples come from? Several authors (Bryan 1969; Bonnichsen 1978; Guidon and Delibrias 1986; Gruhn 1994) argue that Clovis developed from an existing population already present in the New World some 30,000 - 50,000 years ago. Yet these scholars base their arguments on associations between geologic markers and supposed stone tools (Beaton 1991:212). Not one of these sites has yielded actual human remains - a sure indicator of human presence. In every case there are problems with either dating methods, associations, or the simple credibility of finds (Beaton 1991:212).

Arguments for the invisibility of pre-Clovis sites in the archaeological record, or the failure on the part of many archaeologists to recognize pre-Clovis artifacts simply do not hold true (Irving 1985:535). As Lynch (1991:273) states:
the absence of archaeological evidence probably means the absence of populations, rather than a presence of populations able to enter but not to persist, or adaptations so marginal or restricted that they are effectively invisible.

Beaton (1991) agrees with Lynch and suggests that Australian archaeologists have had no problems recognizing the presence of early sites on their continent despite the carrying out of far fewer archaeological projects. In America, the overwhelming number of surveys and excavations should have revealed more than a handful of dubious pre-Clovis sites scattered across the New World. Clovis' acceptance as the earliest human population in the Americas is based on repeated discoveries of undeniable archaeological associations with valid determinations of age (Beaton 1991:212).

If Clovis is accepted as the earliest human population in the Americas, then where did they come from? Steele and Powell (1992:303) conducted a subjective and bivariate analysis of some of the earliest human skeletal remains in North America (ca. 8,500-10,000 B.P.). They found that the remains' "closest affinities are with Asian populations." They also found that the development of a larger, broader face and increasing brachycephalization (round-headedness typical of Asian populations), are recent developments that have occurred after populations split, and that Paleoindians are relatively recent immigrants to the New World - before modern northern Asian and North American features were completely developed. Based on linguistic, archaeological, and biological data, Meltzer (1989:471) has suggested that entry into the Americas occurred as a continuous dribble and not as discrete population waves.
Inland Entry

The most commonly proposed method for the entry of people into the Americas is via the interior of the Bering land Bridge through an "ice-free corridor (Grayson 1993:51). Much of northern North America was covered by vast ice sheets - the Laurentide to the east and the Cordilleran to the west. During the time of Wisconsin glacial maximum (ca. 20,000 - 18,000 B.P.) sea level was lowered and the land bridge became exposed. Data for this comes from a variety of sources including the oxygen-isotope record of global ice taken from deep-sea cores; from uplifted and dated marine terraces in New Guinea; and from Alaskan coastal and offshore stratigraphy (Wright 1991:114).

Migration from Alaska to the Great Plains may have been possible during this period if the Laurentide and Cordilleran ice sheets had not yet coalesced. However, as mountains and alpine glaciers grew, eastern Beringia would have been sealed off from the west, which may have better been considered part of Asia (Grayson 1993:51). During this period, the route south may have been closed off to migration by glacial ice and inhospitable conditions. Unfortunately, data for the conditions at the junction of the two ice sheets is as scarce as the data for peopling of the Americas. As the glaciers advanced and retreated, they obliterated traces of earlier regressions and transgressions and, although it is clear that the two sheets were united at some times, when they were separated is not clearly known. Many geologists now believe, however, that there was an ice-free corridor
between the two sheets for a significant portion of the Wisconsin period (Grayson 1993:51).

The Watercraft: Sailors on a Frigid Sea

Watercraft existed among the peoples of the Pacific rim long before the Paleoindian presence in the New World. Again, there is no physical evidence for early watercraft in Asia, however, the mere fact that Australia was settled as early as 40,000 years ago (and perhaps sooner) is compelling evidence for the existence of seafaring technology (Beaton 1991:214). Water crossings of at least 65 km are postulated - even with a maximum sea level drop of 150 meters (Englebrecht and Seyfert 1994:223).

Evidence also suggests that watercraft were present in Japan by at least 15,000 B.P. and perhaps earlier (Englebrecht and Seyfert 1994:223). Human remains have been found on the island of Okinawa with an associated age of 32,100 ± 1000 B.P. (Ikawa-Smith 1986). Okinawa was separated from the mainland by at least 100 km throughout prehistory.

In North America, San Miguel Island in the California Channel Islands appears to have been settled as early as 11,550 ± 200 B.P. (Erlandson 1993). Again, a distance of at least 75 km separated the island from the mainland (Masters 1985:27) and the likely presence of watercraft cannot be ignored. The Eel Point site on San Clemente Island has a reported age of 9,700 B.P. (Meighan 1989) and the island itself is separated from the mainland by almost 90 km of open ocean. Meighan postulates that San Clemente had an
almost completely maritime subsistence pattern with shellfish making up the greater part of the diet.

Clovis peoples probably lived in bands relying primarily on various megafaunal species including mammoth and bison (Agenbroad 1988:64) Other faunal species hunted by Clovis peoples may include horse, camel, and various small game. Even smaller creatures like turtles and turkeys were probably included in the Clovis diet (Agenbroad 1988:65).

But is the evidence for megafaunal predation on the part of Clovis peoples indicative of their sole reliance on such animal species? Perhaps the idea that Clovis people relied solely on megafauna comes from the biased sample available for archaeological interpretation. With few exceptions, most Clovis sites have been found associated with the bones of extinct megafauna - but only because the bones were discovered first (Grayson 1993:71). Grayson (1993:71) also notes that "if Clovis peoples ... spent most of their time hunting mice and gathering berries, we probably would not know it." He concludes his discussion of Clovis diet with some thoughts by noted archaeologist James Griffin who, Grayson (1993:71) reports "said years ago, the restriction of the Clovis diet to large mammals has been by archaeologists, not by the makers of the fluted points themselves." It should also be considered that ethnographic and archaeological evidence suggests that there is often dual exploitation of both the coast and the interior by human populations - especially where environments are linked by descending rivers (Lynch 1991:291).
Inuit hunting of caribou offers a possible and interesting ethnographic analogue. A widespread Inuit hunting technique involves the killing of caribou from a boat as the animal crosses a body of water (Blehr 1990:316). Siberian reindeer hunting involved spearing the animals from boats as they swam by (Gordon 1990:295). The Inuit also drove Caribou into lakes, where they then speared the animals from kayaks or canoes (Gordon 1990:282-291). In Cambodia, elephants are hunted from boats (Blond 1961:155-157). Could the same be said of Clovis hunters? Agenbroad (1988:64) notes that "Clovis kill and camp sites were located at or near water sources, springs, or small streams, an indication that animals were likewise ambushed at or near water."

**Indigenous Navigation: Ethnographic Correlates**

That indigenous peoples in prehistory had watercraft cannot be denied. Such craft have been found in securely dated archaeological contexts and have been recorded in early historical accounts. Many of these peoples lived on islands well away from the nearest continent. Why did these people leave the relative safety of the mainland and in so doing, how did they reach these islands on which they lived?

There is a chance that people reached new lands by accident. The chance of that happening with a group large enough to establish a breeding population, however, are very slim (Grayson 1993:45). Many small vessels are usually paddled by men and a man travelling to a new land alone is simply not enough to produce a new population. There are reports, however, of men being driven far out to sea by storms and then navigating their way back home (Lewis 1972:285). Once home, it is possible that these men may
have encouraged others to join them on a return trip - especially if they had found a new
land. Journeys such as those where men were driven from their fisheries off the Caroline
Islands to the shores of the Phillippines and then returning home have been recorded by
Spanish missionaries as early as the 17th century (Krämer 1919:27-32).

In Oceania, there exists a wandering spirit or perhaps it is better called "an
adventurous spirit" (Lewis 1972:277). One such group, the Tikopians, were described by
Firth (1936:32):

Fired by the lust for adventure and the desire to see new lands canoe after
canoe set out and ranged the seas . . . Fear of storms and shipwreck leaves
them undeterred, and the reference in an ancient song to the loss of a man
at sea as a 'sweet burial' expresses very well the attitude of the Tikopia.

In the early 19th century, Missionary John Williams (1846:48) recorded the story
of the Raiatean Chief Iouri who, in "an enterprising spirit, . . . determined to go in search
of other countries," and navigated his pahi (outrigger canoe) nearly 600 miles to the island
of Rarotonga.

Other possibilities include voyages by exiles. In 1813, Captain Porter was told of
big parties of men and women acting as voluntary exiles being encouraged by priests to
leave the Marquesas for legendary "lands" and of hundreds of people doing so (Porter
1822:51).

Other reasons may include being forced out or fleeing an enemy. Among the
Yanamamö of South America, for example, population pressure leads to intervillage
hostility. Eventually a fissioning of one village occurs in which a group of men and
women strike out on their own (Chagnon 1992:76). Among people adapted to a maritime lifestyle, this might include striking out across the water.

In other cases, pressure from outside groups have provided the impetus to seek new territories. Among the Chumash of California, a maritime subsistence pattern arose which centered around the *tomol* or sewn-plank boat. When Spanish missionaries entered their homeland and began baptizing people, at least one Chumash man did not stand for it. In a story related to Hudson et al. (1978:143), Kitsepayit told this story: "After he was baptized at the Mission, Sulwasunayet told us all this:

> Everything we have has been taken away from us. We have lost our rights in this land. I will go where you will never see me again . . . for all is gone, and I do not want to stay and see you suffer. I go.

He went to the sea alone in his little *tomol*, heading in the direction of the island and was ever seen again."

Are such feats of navigation accomplished purely by accident and do these accounts merely record those who were lucky enough to have reached land? Or is it possible that navigation may have been a technology not unknown to prehistoric sailors? The answer may lie in the navigation achievements of the inhabitants of the Pacific islands of Melanesia, Micronesia, and Polynesia.

Based on archaeological, linguistic, and other evidence, it is clear that these people originated in Southeast Asia. Four to six thousand years ago, a seafaring people left their homeland and sailed to the Melanesian Islands, and to the Marshall, Gilbert and Caroline Islands; they reached Tonga and Samoa and formed new settlements (Thomas 1985:54).
Here they lived for at least a thousand years, developing their unique Polynesian culture. Then, some people struck out again to the Marquesas and then on to Hawaii, New Zealand, and Easter Island.

These sailors have lived in a primarily aquatic habitat in which the sea becomes less a barrier and more a highway as navigation, without instruments, became more refined through time. Their obvious origins lie in Asia in the distant past and their settling of the islands can only have been accomplished through the use of watercraft (Lewis 1972:16).

Pacific Islanders use the rising and setting points of certain stars as a "star compass" to tell them direction (Thomas 1985:54). Other techniques include maintaining direction by the sun, by ocean swells (they recognize at least 8), and by wind. The Pacific Islanders learned to compensate for displacement from current set, leeway, and gale-drift through methods of dead reckoning and orientation and by expanding target islands. Thus, they were able to establish "island blocks," which effectively expanded the size of a given landfall by observing the characteristics and actions of sea birds, clouds, swell patterns, and phosphorescence, with the latter marking the existence of an island as far away as 80 to 100 miles (Lewis 1972). Seabirds were used to identify a landmass from as far as 18 miles away (Thomas 1985:58).

Without charts or instruments, the pilot uses a system called etak in which he envisions his point of departure and the target, using whatever reference points happen to be available in the region in which he is sailing (Thomas 1985:58). Imaginary paths are envisioned from the canoe through various reference points to the stars beyond. By
visualizing the reference point moving under a succession of stars, the navigator can structure his voyage entirely in his mind.

Mental imaging is not unique to the Pacific Islanders. Inuit hunters in the arctic view their world differently than most Europeans (Pelly 1991:59). While many European people view the area around them as an "area", most Inuit adopt a more linear approach. Dr. Robert Rundstrom (in Pelly 1991:59) has studied Inuit spatial concepts and suggests that

given the nature of the Barren Grounds terrain, linear conceptualization may be the easiest way to bring a sense of order to an otherwise chaotic landscape, an order which allows human beings to think and act as a successful part of that landscape.

The Inuit landscape is made up of lines; rivers, eskers, caribou paths, and sastrugi (small ridges of hard snow that run parallel to the prevailing winds) (Pelly 1991:61). To accept this view, non-native thinkers have to remove themselves from the landscape and take an aerial view. The Inuit do this without thinking about it - it is ingrained in them since birth. Similarly, hunters travel in a straight line seeking the tracks of their prey. If lost, the linear thinking Inuit simply continues in a straight line until they strike a familiar landmark.

Early European explorers to the arctic relied heavily on Native American cartographers, often making maps in the snow or in the air to themselves. Vilhalmur Stefansson (in Pelly 1991:61), renowned arctic explorer, described how the Inuit view the sky and how they use it for navigating on land and on sea:
When clouds of a uniform color hang low there is reflected in them a map of the earth below them. Snow-free land and open water are shown in black on the clouds; the pure white sea ice appears in white, and land covered with snow soiled by blown sand is reflected darker than the sea but lighter than the snowless land.

Often the Inuit will rely on the knowledge of older men to learn new paths through the wilderness (Pelly 1991:61). Okpik, a young hunter, learned a 300-kilometer route from his father-in-law for a journey he was about to undertake. His father-in-law explained the route as a line, and he described every landmark along the way with its own name and story. Okpik still remembers that trail (although he learned it many years ago) as a litany of descriptive place names. This idea is not uncommon among hunters and gatherers. Australian Aborigines believe that their clan totem spirits "sang" the world into existence and they can find their way through the wilderness by following these "song lines" (Chatwin 1987:286-287). To the Inuit, a journey was not measured in distance travelled, but in number of sleeps (Pelly 1991:63). To the Inuit traveller, time is fundamental to distance. A journey of two days during the winter may, in fact, require two weeks during the summer.

The Inuit have developed a strong sense of their environment. One hunter spoke of plans for a hunt. "I will go across the sea to the place where there are always caribou" (Pelly 1991:63). He knew this place in his mind - it lay in a straight line from where he was standing.
Problems with a Coastal Entry Route

Travel by land along the coast of Beringia has been ruled out because of the environment during the last glacial maximum (Wright 1991:118). The broad outlet glaciers along the coast were probably heavily crevassed and impossible to cross on foot. Wright (1991:118) does note, however, that "travel offshore by seacraft would have been possible if such craft existed - all the way to Tierra del Fuego."

Ocean currents may have played a negative role in the watercraft hypothesis. These currents have been described as rivers or streams that carry everything in their grasp across the sea (McEwen and Dickson 1978:364). In the open ocean, surface currents are controlled by a combination of the coriolis effect (rotation of the earth) and by the wind. In the North Pacific there are two major wind belts driving current circulation, the prevailing westerlies and the northeast trades which, along with the coriolis effect, drive most of the Pacific currents in a clockwise, circular pattern (McEwen and Dickson 1978:363). To the north, however, the current that circles the southern coast of Alaska and Asia is reversed and runs counterclockwise. Unless early post-Pleistocene climatic oscillations altered these wind patterns, early seafarers would have had to work against the current to move from Asia to North America via watercraft.

An Alternative Theory

Evidence suggests that Paleoindian peoples had some kind of watercraft. What forms those craft took may never be known. The oldest archaeological remains are those of dugout canoes which were probably not the best watercraft for the treacherous waters.
of the Bering Sea. The *umiak*, the best candidate for undertaking such a crossing has a long historic and presumed prehistoric past, but no physical evidence for such craft at so early a date has been found.

In a recent article (Englebrecht and Seyfert 1994) concur that no "no physical remains of Paleoindian watercraft have been identified." Nevertheless, they infer the presence of these vessels based on several lines of reasoning, including the presence of watercraft in Asia predating the settling of North America (also inferred), the early settlement of certain islands, the difficulty that Paleoindian antecedents would have encountered crossing the Bering Strait without watercraft, and the presence of certain stone tools (pièces esquillées and Dalton adzes). None of these ideas are new and many have already been addressed in this dissertation.

Kandare (1983:4) suggests that dugout canoes were in use in the southeast as early as the PaleoIndian period based on the presence of the Dalton adze. Morse (1973:26) recognized the Dalton adze as one of the earliest true adzes in the world, while Griffin (1978:227) considered it the prototype for the celt, gouge, and grooved axe of later periods. Kandare (1983:4) also suggested that these "heavy woodworking tools" present at Dalton Period sites were "used for, among other things, the hollowing out of dugout canoes." Gaertner (1992:2) agrees, noting that "the Dalton adzes . . . would have been used to build wooden structures, canoes, and bowls."
Others (Smith 1986; Chapman and Chapman 1983; Morse and Goodyear 1973), see the Dalton adze as more of a "general purpose woodworking tool" (Smith 1986:14) and caution against defining an entire woodworking industry (such as canoe manufacturing) based on the presence of a single tool type; one which could just as easily have been used in the creation of shelters, containers, snares, and weapons (Chapman and Chapman 1983:33).

As for the pièces esquilées, Englebrecht and Seyfert (1994:222) imply, based on interpretations of Leblanc (1992), that these "are commonly interpreted as wedges." And, according to Jack Holland (personal communication, 1990) they "could have been used in splitting wood for dugout construction." Englebrecht and Seyfert (1994:222) next argue that pièces esquilées are more common in Paleoindian assemblages in the north than in the south; a condition which they argue is "a distribution which would fit a pattern of bark or hide boat construction in the north and dugout construction in the south." And yet, dugout canoes have been found throughout the New World (Brewington 1963; Cunningham 1989; Kidd 1960; Leshikar 1982; McGrail 1981; Roberts and Shackleton 1983) in areas where the Dalton adze does not occur (Fagan 1995:351-354).

The notion that certain stone tools *may* have been used to produce boats is a compelling one. And yet, without more evidence, can the idea be more than just inductive inference? Induction can be dangerous because the conclusion contains more information than the premise. The problem, as Watson, LeBlanc, and Redman (1984:5) caution, is that
"the truth of the conclusion does not necessarily follow from the truth of the premises."

Thus, the presence of tools that might have been used in Paleoindian boat building does not automatically mean that they were being used for that purpose. The idea, however, is an attractive one, and one in which further study certainly is warranted.
CHAPTER V

HUNTER-GATHERERS OF THE SOUTHEASTERN ARCHAIC

From at least Upper Paleolithic times, c 40 000 years ago, waterborne craft have been essential for the exploitation of lake, river and sea, the colonisation of new lands and the sustainment of trade (McGrail 1981:5).

The southeastern Archaic was the longest period of cultural development in the region, existing between approximately 10,000 and 3,000 B.P. (Bense 1994:62). The beginning of the Archaic in the southeast is generally considered to coincide with the beginning of the Holocene Epoch and ending with the emergence of the modern climate. The generalized settlement pattern during the Archaic was one of "seasonal base camps and short-term, special-purpose camps" (Bense 1994:64). Numerous theoretical models based on hunter-gatherer settlement and subsistence have been proposed for Early Holocene populations in the Southeast (Smith 1986; Cable 1982; Goodyear 1974, 1975; Goodyear et al. 1979; House and Wogaman 1978; Morse 1971, 1973, 1974, 1975, 1976, 1977; Schiffer 1975). Each of these models represents variations on the division between seasonal base camps and short-term, special-purpose camps. These differences may, in fact, be due to changes in the environment during the Holocene.

The Archaic has traditionally been divided into three cultural periods: Early (10,000-8,000 B.P.), Middle (8,000-6,000 B.P.), and Late (6,000-3,000 B.P.). During the Early Archaic, settlements were similar to those reported for earlier Dalton peoples occupying short-term camps; and often associated with specific activities such as kill or
butchering sites or lithic extraction sites. An accurate assessment of these sites in terms of the composition of the group, season and duration of occupation, and the nature and range of activities that occurred there is difficult, at best (Smith 1986:16; Chapman 1978:76-78). As Smith (1986:16-17) notes "the behavioral correlate(s) of a number of both formal and informal lithic tool categories has yet to be convincingly established.

During the Middle Archaic Period in the southeast (approximately 8,000 - 6,000 B.P.), postglacial warming reached its maximum and a general cooling began (Bense 1994:5). Climates changed, causing an environmental switch from hardwood forests to the pine forests of today. This period marks what Purdy (1991:280) calls "the beginning of a continuing trend toward expansion and diversification of the subsistence base including a heavy reliance on aquatic resources." Most definitions of the southeastern Archaic emphasize three factors; adaptation, technology, and time (Walthall 1980:38). This was especially true of the Late Archaic when new technological innovations were being introduced; among the most important were stone vessels and fiber-tempered pottery (Walthall 1980:38); the first earthworks were constructed and long-distance trade was established (Bense 1994:5); and possibly the first dugout canoes.

The end of the Middle Archaic and start of the Late Archaic (ca. 6,000 B.P.) is also the period in which the first dugout canoe, DeLeon II (6,050 ± 60 B.P. Beta-42456), appears in the archaeological record. Dugouts would have made widely distributed resources more readily available and more easily transported. Most large prehistoric
settlements in the southeastern United States are located along inland waterways and along the coasts (Purdy 1991:279).

Purdy (1991:283) notes that "the growing availability and utilization of aquatic resources about 6000 years ago in Florida led to the development of canoe technology as a cost-efficient means to exploit both aquatic and flanking terrestrial resources." Purdy (1991:279) also admits, however, that the "organic deposits, in which most canoes have survived, did not occur in Florida until about 6000 years ago." Hence, there may have been canoes prior to this date; they may not have been preserved or they may not have been found.

Smith (1986) characterized this period as a time of increasing sedentism with reliance on local riverine resources increasing into the Late Holocene. This included shellfish which Jeter and Williams (1989:86) describe as "not most significantly for subsistence" despite the presence of huge shellfish middens along most of the streams of the Southeast. Walthall (1980:74) notes the presence of fishhooks and net sinkers in the assemblages of most Late Archaic cultures in Alabama, while also noting that shellfish middens along the major streams of the region indicate that these sites "were occupied for several thousand years." Some of the largest Late Archaic sites along the Gulf Coast are made up of enormous shell middens (Milanich and Fairbanks 1980:62).

Jeter and Williams (1989:85) note that the Mississippi River may have become a meandering stream as far north as Memphis by about 7000 BC. Prior to that it was most likely a braided stream because of the increased volume of glacial outwash from the north
(Jeter and Williams 1989:72). This is true of a number of streams in the Southeast, some of which developed extensive sand flats characteristic of braided streams (Saucier 1974:19). It would certainly be easier to navigate a canoe in a meandering stream than it would in a braided stream. The Mississippi may even have reached its next to last (present) meandering belt during the Late Archaic between about 3,000 and 2,500 B.P. (Jeter and Williams 1989:95). Other streams that changed during the period between 6,000 and 3,000 B.P. include the Arkansas River and the Red River which must have been occupied sometime before 5,000 B.P. (Jeter and Williams 1989:86).

As for trade, the Late Archaic is seen as a period of population and settlement expansion over much of the Southeast (Morse and Morse 1983:115). Brose (1979) suggested that this settlement process coincided with the establishment of an essentially modern climate and was accompanied by the development of trade relationships between populations. The resulting exchange networks fostered close relationships and helped to develop a greater reliance between trade partners. Although, as yet no exhaustive studies of this possibility have been carried out (Jeter and Williams 1989:100), Milanich and Fairbanks (1980:62), note that artifacts associated with the Archaic periods at the Poverty Point site in Louisiana were traded throughout the Southeast. Many such artifacts reached as far as the St. Johns River, including Tick Island in Florida. The presence of trade goods on an island provide compelling evidence for some sort of water travel; and the fact that Tick Island is in the St. Johns River which also fed DeLeon Springs makes for a possible connection between trade and the earliest known watercraft in the New World.
**Late Archaic Watercraft**

To date, 10 dugout canoes have been discovered that date to the Late Archaic period in the Southeast; all of them come from Florida. Other Archaic period dugouts have been found in Ohio (Brose and Greber 1982) and North Carolina (Phelps 1989). The two oldest dugouts in the western hemisphere were discovered 5 years apart in the same freshwater spring. Unfortunately, the story of their fate is a sorrowful one. In the rush to recover the canoes, they were not properly recorded. And despite being taken to the Florida State Preservation Laboratory in Tallahassee, neither canoe survived the conservation process (James Levy, personal communication, 1992). The following description of these vessels is pieced together from notes, newspaper articles, and discussions with the people involved. Unfortunately, we are left with a very scattered and incomplete record of what should have been the two most significant finds in the history of Native American water travel.

**DeLeon I**

On November 19, 1985, recreational divers Denise Morissette and L.L. "Lucky" McGee were diving at DeLeon Springs State Recreation Area in Volusia County, Florida near the St. Johns River. They were exploring the water-filled caverns of the freshwater spring when they came across a silt-covered object that caught their interest (Seacrist 1987:1). They cleared away some of the silt and peat that covered the artifact and McGee made what Ms. Morissette later described as "a rowing gesture with his arms" (Seacrist
1987:1). The object turned out to be the remains of one of the oldest dugout canoes in the New World (Figure 5.1).

Morissette reported that the canoe was found approximately 26 feet under the spring waters (7.9 meters) and was covered by peat moss that probably aided in its preservation (Seacrist 1987:2). The peat deposit in which the canoe was buried was later found to be just over 2 meters thick resting above the limestone bedrock at the opening where the spring emerges from the underground caverns. Water temperature in the spring at the time of discovery was 70 degrees Fahrenheit.

Figure 5.1. DeLeon I in situ.
On December 6, 1985, a team of divers that included Morissette, McGee, and other divers raised the dugout from the waters of the spring. Morissette noted that the canoe "had the consistency of wet cardboard" (Seacrist 1987:1). Archaeologists from the University of Florida suggested that it was "at least 1,000 years old" (Seacrist 1987:1). The canoe was discovered in one piece, although it was not complete. Both ends of the canoe were degraded and missing, as was most of the sides or gunwales of the vessel.

Dimensions recorded by Morissette for the canoe are as follows:

- length: 2.74m (108in)
- width at the approximate midsection: .38m (15in)
- width at wide end: .42m (16 3/4in)
- width at narrow end: .38m (15in)
- gunwale thickness: .02m (3/4in)
- height (interior to upper gunwale): .10m (4in)

Other information recovered from the vessel indicated that fire had been used in the hollowing process (University of Florida Dugout Canoe Files). In addition, what has been described as a "thwart" or "foot mount" was found carved into the inside bottom of the canoe near one of the ends. If this feature is a "foot mount," it may indicate that the vessel was poled rather than paddled (or a combination of both, depending upon the situation). Such a feature may have been used as a prop against which the person poling the vessel placed their foot to gain leverage.

Included below (Figure 5.2) is a drawing produced by combining information from Morissette's original sketch of the canoe with information from a more detailed sketch by an unknown artist made sometime after the canoe was raised. In both illustrations the "foot mount" can clearly be seen.
Several photographs were taken of the canoe by underwater photographer Harry Shoff while it was in situ and while it was being raised. Unfortunately, only one photograph of the canoe supported in the lifting box could be located. There are no photographs of the canoe once it reached the surface of the spring.

Wood from the canoe was collected for radiocarbon analysis and for wood identification. The wood was identified through microscopic thin section as Southern Hard or "Yellow" pine (Pinus spp.) by Lee Newsome, then a graduate student at the University of Florida at Gainesville. A wood sample was submitted to Beta Analytic of Florida who obtained an age for the canoe of 5,140 ± 100 B.P. (Beta-14893), calibrated to 5,915 ± 100 B.P. At the time of its discovery, DeLeon I was the oldest known dugout canoe in the New World.

Rangers under the direction of Captain Roy Ogles, Superintendent of DeLeon Springs State Recreation Area, participated in the recovery of the vessel but were unable to keep it from breaking up, and it fragmented into three large pieces (University of Florida Dugout Canoe Files). Ogles built a vat to hold and ultimately preserve the waterlogged canoe. Under the direction of the Florida State Preservation Laboratory and the University of Florida's Wood Conservator, Elise LeCompte, Ogles attempted to conserve the canoe using polyethylene glycol (PEG). His plans at the time included keeping the preserved canoe on display permanently at the recreation area (Seacrist 1987:1-2).
Unfortunately, the canoe did not survive the conservation process. Ogles' original plans had been to exhibit the canoe just six months after its discovery. Six months does not seem an adequate amount of time for the proper conservation of a wooden artifact described at the time of its discovery as having "the consistency of wet cardboard" (Seacrist 1987:1). In fact, Lee Newsome's analysis of the cellular structure of the wood indicated that degradation had progressed to the extent that no lignin was found remaining in the wood structure (University of Florida Dugout Canoe Files). Indeed, a message dated August 22, 1989 in the canoe files at the University of Florida at Gainesville shows that the canoe had fallen apart and it was rumored that it had been "taken out of solution too soon" (Notes on file at the Department of Anthropology, University of Florida at Gainesville).

The fragments of Deleon I are now housed at the Florida State Preservation Laboratory, Division of Archaeological Research in Tallahassee Florida. An examination of the fragments in 1994 revealed that only a very few, highly fragmented pieces of wood remain, the largest of which is 1.37m long (54in) by .22m wide (8 1/2in) (Figure 5.3).

Based on a set of handwritten notes found in the University of Florida at Gainesville's canoe files, core samples had been taken by Ray Ogles adjacent to the in situ location of DeLeon I. At least one of these cores was examined in 1989 by an unknown person. Despite the fact that the author is unidentified, the notes provide valuable data on the subsurface deposits in the area where DeLeon I and subsequently, DeLeon II were
Figure 5.3. The remains of DeLeon I.

discovered and provide important information on the context of the two dugouts. The data is presented in the following generalized description of the stratigraphy of DeLeon Springs.

Description of DeLeon Spring

1. 0-10 cm - composed of white sand and shell fragments that is noted to be "probably disturbed." A single "bird bone" was discovered in this zone.
2. 10-50 cm - noted as a "viviparous midden" with preserved plant material, charcoal and a single hickory nut mixed together. The charcoal was noted to increase around 35 cm while the shell content increased near 50 cm. The notes also mention that "no ceramics [were] observed; although why ceramics might have been present is not discussed either.

3. 50-110 cm - composed of a mixture of white sand mixed with charcoal and having a "salt and pepper appearance." Again, the charcoal seems to be concentrated in the "center" but no exact measurement is given. Both charred and uncharred plant matter was recovered including seeds, hickory nut fragments, and fish bones. This section was noted as corresponding to the "same depth as [the] canoe." At approximately 100 cm a single Curcurbit (gourd) seed was discovered along with fish vertebrae (genus and species not identified); while a single turtle bone was found just beneath the seed. At 110 cm, the sediment changed to a lighter, homogenous sand with less debris and charcoal in it. The sediment seemed more "cemented" with nothing more of significance except for "a couple of fish bones and scales."

110-115 cm - noted to be the beginning of a shell layer with organic stains, some plant material, and charcoal. The shell appeared to be "freshwater viviparous" in origin.

115-155 cm - this was recorded as "shelly limestone bedrock?" that "gets very white" between 115-120 cm. Between 120-155 cm, the shells are described as "marine" with the entire zone having a "crushed" appearance. This is noted to be a sharp boundary
between a freshwater and a marine environment that may represent an unconformity or "hiatus" in deposition.

A second core was taken nearby and was also described by the same (unidentified author) who noted stratigraphy similar to the first core with charcoal and bone between 35 cm and 120 cm. Above this layer is a 35 cm thick sand lens; while below 120 cm, the sediments switch to marine shell. The author suggested that radiocarbon ages be assessed on the cores but this was (apparently) never done (University of Florida at Gainesville Dugout Canoe Files).

DeLeon II

On July 5, 1990, a second dugout canoe was discovered at DeLeon Springs (Elwood 1990:4C). The vessel was found by another diving student who was investigating the spring's "boil" area - the hole in the spring floor where the water pours out. L.L. "Lucky" McGee, who had found the remains of DeLeon I in 1985 was the student's diving instructor and immediately recognized the shape of the artifact and reported it to park officials.

The canoe was discovered approximately 20 to 25 feet below the surface of the spring (Figure 5.4). A crew of divers that included park personnel and volunteers removed the canoe from the peat deposit in which it had been buried and placed it into a cradle for lifting (Elwood 1990:4C). The cradle was lifted out of the spring using a borrowed crane.
Figure 5.4. DeLeon II in situ, still partially buried in the peat that preserved it for 6,000 years.

At the time of its discovery, the canoe was described as being "about 11 feet long [3.35 m], and 19 inches wide at its widest part [.48 m]" (Elwood 1990:4C). It was also described as resembling "a flat piece of wood with only the slightest curve" (Elwood 1990:4C). A wood sample was collected for identification and for radiocarbon assessment. The canoe's age in radiocarbon years was assessed at 6,050 ± 60 B.P. (Beta-
42456); and in a letter to James Dunbar (archaeologist with the state of Florida) dated July 25, 1990, Lee Newsome identified the wood type as bald cypress (*Taxodium distichum*) and she again comments on the degraded condition of the wood (University of Florida Canoe Files). Dunbar (in Elwood 1990:4C) was quoted at the time of recovery as stating that the canoe "has structure, but you could literally take a part of it in your hand and crush it."

Photographs were taken of the recovery of the canoe by Don Carson, a photographer with *The News-Journal*, a local newspaper. Unfortunately these photographs have since been lost. Despite concerted effort on the part of the author to contact park personnel and *The News-Journal* and *Volusian* (the two newspapers that printed photographs of the recovery) none of the photographs could be located. The only pictures left showing the recovery of DeLeon II are those actually printed in the newspapers.

Once again, tragedy struck. The canoe was transported to the Florida State Preservation Laboratory in Tallahassee where it was decided that sucrose, rather than polyethylene glycol (PEG) would be used in the conservation of the canoe (James Levy, personal communication, 1994). The ill-fated canoe was not to survive the treatment. Sadly, the temperature was not controlled properly and the sugar hardened in the vat along with the remains of DeLeon II and another canoe. The pieces were broken up and are now being stored at the laboratory. James Levy (personal communication, 1994) plans to reassemble the fragments in the future, a daunting task considering the condition of the fragments.
DeLeon II is the oldest dugout canoe in the New World; it is also the oldest
dugout canoe to be made of cypress. Its date puts it at the Middle/Late Archaic
boundary. The other dugouts from Florida all fall well within the Late Archaic period
and are summarized in Table 5.1.

In 1991, Purdy (269) described what were then the earliest dugout canoes in the
New World. According to her description, these canoes "are roughly hewn with blunt,
largely unmodified ends and outer surfaces. The bow and stern are indistinguishable
. . . Canoes of this type are all made of hard (or yellow) pine. They average 15 feet
(3.6 m) long by 16 inches (40.6 cm) wide. The canoes in this discussion include
DeLeon I, the Ringler dugout from Ohio (Brose and Greber 1982), and three others
from Florida that date between 3,100 and 4,000 B.P. (Purdy 1991:268).

For the most part, this description is accurate. Since 1991, however, several
more Late Archaic dugouts have been discovered that shed more light on this basic
typology. First, DeLeon II is made of cypress and not pine. Other Late Archaic
dugouts that are made of cypress include 5 from North Carolina (North Carolina
Division of Archives and History 1986). Obviously, there is some choice involved in
wood type and it may be that cypress was more readily available in the mid-Atlantic
region than in the Southeast.

As for size, only six of the ten southeastern Late Archaic dugouts have known
length dimensions and are nearly complete canoes (DeLeon I, DeLeon II, Lake Galilee
4, Florahome 4, Stricklin 18, and Lakeland). The average length for these canoes is
4.11 meters, while the average width for these canoes is .51 meters. Height of the
Table 5.1. Late Archaic period dugouts.

<table>
<thead>
<tr>
<th>Canoe</th>
<th>Location</th>
<th>Age</th>
<th>Wood Type</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeLeon II</td>
<td>Florida</td>
<td>6,050 ± 60 B.P.</td>
<td><em>T. distichum</em></td>
<td>3.55 m</td>
<td>.48 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta-42456</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DeLeon 1</td>
<td>Florida</td>
<td>5,140 ± 100 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>2.74 m</td>
<td>.38 m</td>
<td>.10</td>
<td>2 cm gunwale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta-14893</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Galilee 4</td>
<td>Florida</td>
<td>4,990 ± 50 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>4.47 m</td>
<td>.457 m</td>
<td>.213 m</td>
<td>12 cm side 6 cm thick</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(No Lab #)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harney Flats</td>
<td>Florida</td>
<td>3,950 ± 70 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta-14262</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florahome 4</td>
<td>Florida</td>
<td>3,880 ± B.P.</td>
<td><em>Pinus spp.</em></td>
<td>4.32 m</td>
<td>.65 m</td>
<td>.20 m</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta-31847</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Monroe</td>
<td>Florida</td>
<td>3,750 ± 60 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beta-38451</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stricklin 18</td>
<td>Florida</td>
<td>3,505 ± 60 B.P.</td>
<td>Unknown</td>
<td>4.08 m</td>
<td>.42 m</td>
<td>Unknown</td>
<td>.15 m bow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7775</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakeland (IMC)</td>
<td>Florida</td>
<td>3,350 ± 60 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(No Lab #)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakeland</td>
<td>Florida</td>
<td>3,040 ± 100 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>5.7 m</td>
<td>.68 m</td>
<td>.25 m</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I-1661)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florahome 5</td>
<td>Florida</td>
<td>2,965 ± 50 B.P.</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7539</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 5.5. Map showing the location of Late Archaic period dugout canoes.
vessels cannot be determined; most of them are so badly deteriorated that any such measurement would not be accurate and would only represent the remaining portion of the canoe.

In general, these canoes are round- and thick-bottomed with relatively massive, blunted ends. One of the best preserved dugouts from this period is Lake Galilee 4 (Figure 5.6). Unfortunately, contextual information on this canoe is severely limited. The only information on this canoe is contained in the University of Florida Dugout Canoe files housed at the Department of Anthropology in Gainesville. The canoe is described as "having both ends present" but it is also "badly eroded" with the "sides mostly gone."

Figure 5.6. Lake Galilee 4.
The canoe was recovered from Lake Galilee, Putnam County, Florida in 1990 and is supposed to be undergoing preservation in 'turpentine and linseed oil.' Where this conservation is taking place (if at all) is not clear. The dugout is also described as having evidence of fire scarring on "both upper and lower surfaces, including rounded fire areas on the deck." There were no visible tool marks. The canoe exhibits the very thick, blunt ends typical of dugouts from this period (Figure 5.7). Finally, the canoe is described as having a "C"-shaped cross-section. Figure 5.8 is a drawing made of the canoe based on descriptions and photographs.

Figure 5.7. One of the thick, blunt ends of Lake Galilee 4.
Figure 5.8. Scale drawing of Lake Galilee 4.
The Late Archaic in the Southeast offers the first evidence for trade and for the transmission of exotic materials designed for use in a ceremonial context. Despite Brose and Greber's (1982:257) argument that "exchange, at least in its earlier stages, was geographically restricted for any group," materials found at Poverty Point, Louisiana included raw materials imported from the Appalachian Mountains, Illinois, the Great Lakes, the Rocky Mountains, and the Ouachita Mountains. This material was most likely moved along the major river systems such as the Arkansas, Mississippi, Ohio, Tennessee, Tombigbee, and Red, and may have been exchanged through down-the-line exchange as well as between specific local centers and neighboring culture areas (Bense 1994:101).

Canoes in the Late Archaic are relatively small, carrying perhaps one or two paddlers and cargo. Brose and Greber (1982:256) note that the Ringler dugout would have been difficult to portage based on its weight (320 kg). But the Ringler dugout is made of oak, a wood that is somewhat heavier than the pine and cypress used in most of the southeastern dugouts. Even DeLeon II, made of bald cypress, would probably have weighed less than the Ringler dugout. From personal experience, it took three people to manipulate the remains of several dugout canoes of a size similar to those mentioned here. And those were dried fragments, not complete canoes that had absorbed some of the water in which they were used. Thus, it would seem that these canoes were limited to the streams in which they were originally launched. This includes, of course, other connected streams, lakes, and springs. Travel by canoe would have been limited to watershed boundaries. Because of the difficulty in lifting or carrying such heavy craft, Brose and
Greber (1982:256) suggest that trade in the Late Archaic "was likely to involve long voyages by single populations only along the middle section of the major river systems." Trade between watersheds would have had to be carried out via land routes.

Certainly the watershed boundary would put a restriction on the carrying of a single cargo by a single canoe. Dugout canoes during the Late Archaic may have been only a single part of a much larger exchange system. There is nothing to suggest that materials did not move on land as well as by water and indeed, this seems to make the most sense. Not all of the items exchanged during the Late Archaic were procured along waterways. Some would have been moved a distance on land prior to being moved by water. Before the advent of the horse, this must have been accomplished by people, and trade was limited to what a single individual could carry. The argument presented here is that watercraft should be considered as one of a number of mechanisms for exchange, for this use would have facilitated such trade by allowing for faster travel and the carrying of cargos between resource bases and between trading partners.
CHAPTER VI

THE WOODLAND EXPANSION

In the early morning while it was still dark, a man was sent down to the beach to listen to the surf. If the ocean was calm, the crew from each village would proceed (Gould 1968:27).

The Archaic period had been one of adaptation as populations adjusted to their individual environments, developing a uniquely southeastern way of life. Sedentism increased as base camps were occupied nearly year-round. The use of wild plant foods was increasing, and the first cultivated plants emerged (Doran et al. 1990:354). There is also evidence to suggest that aquatic resources played an important role (Bense 1994:107) and the first archaeological evidence for Native American watercraft appears.

The Woodland period, beginning around 3,000 B.P., continued the adaptations that began in the Archaic lasting until approximately 950 B.P. (A.D. 1,000). Bense (1994:110) characterizes the Woodland stage in the Southeast as a period of "more:" more people, more sites, more artifacts, and more elaborate mounds and burial rituals. Like the Archaic, the Woodland period is divided into three broad cultural stages; Early (3,000 - 1,950 B.P.), Middle (1,950 - 1,450 B.P.), and Late (1,450 - 950 B.P.). These dates are conventions commonly used by southeastern archaeologists and it is acknowledged that not every society in the region passed into and through the Woodland way of life at the same time.
Early Woodland

Smith (1986:28) views the Early Woodland period as the beginning of the Late Holocene (ca. 5,000 - 2,000 B.P.) and the period of his "Container Revolution;" the introduction of pottery throughout the Southeast. The spread of pottery may not be as important as the change in function for ceramic containers. During the Archaic, pottery seems to have been used more for heated rock or slab cooking; while changes in manufacturing technology such as coiling and the addition of different temper materials other than fiber during the Early Woodland allowed for greater variety and different uses (Bense 1994:110).

The Early Woodland is a period in which almost all artifacts associated with the Southeast are increasing in number in the archaeological record. In terms of watercraft, however, the opposite is the case. Whereas records exist for ten dugouts from the Late Archaic, there are none that have been dated to the Early Woodland Period. Of course, of the more than 300 dugout canoes from the southeast, only 68 have absolute dates in radiocarbon years and of those, most have only limited data in terms of their contexts of discovery. Thus, the problem may be more one of visibility than of actual occurrence.

It is not inconceivable that watercraft were involved in the rapid spread of pottery throughout the southeast. That this spread occurred quickly is the reason Smith (1986) considers it a "revolution." Watercraft would have allowed not only the containers themselves to be spread rapidly, but also the concepts and technology associated with Early Woodland pottery manufacturing.
Evidence for exchange networks during the early stages of the Woodland period indicate numerous reciprocal, down-the-line exchanges between trade partners located both nearby and long distances away (Smith 1986:30). There is a gradual intensification of these types of trade throughout the period continuing into, and reaching its apex in, the Middle and Late Woodland periods (Fagan 1995:408). Goad (1980) suggested that the variety and volume of goods exchanged increased as did the distances that these goods were transported, while Smith (1986:31) suggests that the mechanism by which these goods were moved "are less evident." And yet, there is a substantial increase in population throughout the period (Bense 1994:110), with most sites occurring along major and minor streams throughout the region (Alterman 1983; Chapman 1982; Hanson 1982; Smith 1986) suggesting the possibility, at least, that watercraft may have been involved.

**Middle Woodland**

During the Early and Middle Woodland, the center of cultural development in the Eastern Woodlands was in the Midwest (Bense 1994:120). Between approximately 2,500 and 1,650 B.P., the Adena and Hopewell ceremonial and mortuary complexes developed in the central Illinois and Ohio valleys. The development of any such complex in the Southeast prior to this period is not evident anywhere in the archaeological record (Brose 1979; Goad 1980; Smith 1986).

During the Middle Woodland, mortuary patterns became more complex and long distance trade in exotic goods escalated. This is primarily based on the spread of Hopewellian traits that probably originated with the earlier Adena cultures (Fagan
1995:411). In fact, the Hopewell exchange system or "Interaction Sphere" extends across the entire Eastern Woodlands. Within this enormous area, local groups participated to varying degrees, with the greatest participation along major waterways (Brose and Greber 1979). Fagan (1995:414-415) describes copper artifacts produced in Ohio moving into Tennessee and the Deep South; while Hopewell platform pipes made from Ohio pipestone are found in Wisconsin, Iowa, New York, and Illinois. Local exchange in non-exotics was probably also an important component of exchange among Middle Woodland peoples (Goad 1979:240). Indeed, she suggests that most of the exchange during this period in the Southeast was regional, with overlapping networks occasionally transporting artifacts and raw materials long distances.

Major Hopewell centers are found throughout the southeastern United States; Crystal River and Fort Center in Florida, Mandeville in Alabama, and Marksville in Louisiana (Bense 1994:FIGURE 6.15). Based on subsistence data, most sites appear to be located along coastal zones and along interior streams (Smith 1986:44). At coastal sites, the subsistence evidence points toward a broad-based economy that took advantage of fish, shellfish, and terrestrial resources (Fagan 1995; Milanich and Fairbanks 1980; Purdy 1991). Settlements along the banks of small and large rivers and streams show clear links to earlier Archaic populations (Bense 1994:148; Fagan 1995:423). Again, however, watercraft data from this period of southeastern prehistory is limited.
Only a single dugout canoe has been recovered that dates to the Middle Woodland cultural period. The Swisher dugout was recovered in 1978 along the shore of a "10-acre, sand-bottomed lake located in the central Florida highlands" of Putnam County (University of Florida Dugout Canoe Files) (Figure 6.1). The canoe was in relatively good condition when it was discovered (Figure 6.2) and was described by Raymond Willis as a shallow craft that was well-made and showed three distinct fire-hollowing "pits" along the floor (University of Florida Dugout Canoe Files). One end of the canoe was noted to have a "hand-fashioned longitudinal hole just high-off center from the axis of the craft" (University of Florida Dugout Canoe Files). Such holes are present on much later, Contact period craft and have been interpreted as mooring holes (McGahey 1974:4; Stowe 1974:198).

The canoe was also described as having a "bluntly-rounded bow and stern with slight platforms" (University of Florida Dugout Canoe Files). What are described as platforms, however, seem to be just relatively thick, blunted ends. Much later canoes have true "platforms" and these will be discussed in greater detail in Chapter VIII. Some basic dimensions were taken from the canoe:

- Length overall: 5.57 m
- Width: .40 m
- Height: .36 m
- Side thickness: 5 cm
- Deck thickness: 3 cm
Figure 6.2. The Swisher dugout shortly after its discovery in 1978.

Samples of wood were taken from the Swisher dugout for wood identification and for radiocarbon assessment. Ray Willis and Lee Newsom of the University of Florida identified the wood as southern hard pine (*Pinus spp.*), based on cellular analysis (University of Florida Dugout Canoe Files); while the age of the canoe was reported to be 1,635 ± 60 B.P. (UM-1625). The canoe was preserved in polyethylene glycol and is currently on display at the Florida State Museum; it appears (as of 1994) to be in relatively good condition. Finally, Willis (University of Florida Dugout Canoe Files) states that the
canoe resembles the Cowpen Lake canoe that was discovered only 12 miles from the site of the Swisher Find. The Cowpen Lake dugout, however, is somewhat younger, with an age in radiocarbon years of $1160 \pm 60$ B.P. (UM-1459), and is discussed in more detail below.

**Canoe Burials**

Between 1,850 and 1,450 B.P., the Copena mortuary complex developed in the Tennessee Valley region of Alabama (Walthall 1980:117). In 1974, Walthall excavated a cave in Blount County, Alabama and uncovered burials that had been "deposited in long wooden troughs or canoe-shaped coffins, a practice also noted at one of the Wright Mounds" (Walthall 1980:118). Smith (1986:48) does not equivocate, stating that "primary extended burials [are] placed in submound pits and wooden dugout canoes." Artifacts buried with the dead included "copper ornaments, marine-shell cups, and wooden bowls and trays that may have once contained offerings of food" (Walthall 1980:118). The Wright site and mounds are one of the best-known Copena sites in the Southeast (Webb and DeJarnette 1942). The site is located more than one-half mile from the present river channel, and Walthall (1980:129) notes that "the addition of new subsistence techniques in areas where the floodplain was broad may have required the abandonment of riverbank settlements in favor of locations back from the river in the interior bottomlands." If such is the case, the "canoes" in which some of the Wright population were placed would have been difficult to use, unless one were willing to carry a several-hundred-pound canoe over half a mile. Of course, the canoes may have been used for burials if the people had moved
inland and no longer had a use for them; but that does not explain their presence in cave burials (Walthall 1980:118). One possibility that Walthall apparently does not consider is that the Wright site was once located along the river channel. The site may then have been buried in an active floodplain and the river has since meandered away.

If the Copena artifacts are dugout canoes, they would represent the first canoes used as burial containers in the Southeast. Canoes have been used for burials in the northwest, where Roberts and Shackleton (1983:123) report that Commodore Charles Wilke's 1837 expedition to the Northwest encountered more than 3,000 canoe graves. Northwest canoe burials occur outdoors and were usually associated with broken grave goods; while the canoes themselves had holes knocked in the bottoms of them. In California, canoes were owned by the privileged few, which permitted them control over the collection, transportation, and trade of marine resources (Arnold 1995:739). It is not difficult to imagine these individuals going to their graves buried in the craft that brought them such high status.

This is also the period in which "Big Men" are hypothesized to have developed in the Southeast (Fagan 1995:424). This may be tied to an elaboration of mortuary customs (Smith 1986:43). Data from Copena burial sites indicate a limited-access mortuary pattern superimposed on a more egalitarian society with the "canoe" burials having higher status than that of the general populace (Smith 1986:48). Arnold (1995), in fact, argues that advances in water travel is directly linked to sociopolitical evolution; noting that, among the maritime Chumash of California, "only wealthy individuals and chiefs owned canoes."
Historic observers reported that in the same region there were only a few canoes per village, with about one for every 40 or 50 people (Heizer 1938:212-213; Hudson et al. 1978).

The presence of a single dugout canoe and the possibility of others from burial contexts again may be more of a problem of visibility and of preservation than of actual numbers. The pattern noted by Arnold (1995), Heizer (1938), and Hudson et al. (1978) for the west coast may be used as an ethnographic analogy between maritime-adapted foragers to show that, although dugout canoes may not have been abundant, they certainly played an important role in the society. Big Men (and Big Women) have been found buried with substantial ceremonial offerings in mound centers located along major north-south river valleys and along natural trading roads (Bense 104:149; Goad 1979). the demand for exotic and high prestige items led to the expansion of long-distance trade during the Middle Woodland, and the dugout may have played a significant role in that development.

**Late Woodland**

It has long been argued that, after about 1,500 B.P., the Hopewell exchange system collapsed and such things as long-distance exchange and personal prestige became less important (Fagan 1995:424-425). Walthall (1980:165) agrees with the notion that mortuary ritualism and ceremonialism declined, noting however, that "new religious systems emerged." The general population actually increased and Smith (1986:51) argues that there was "a gradual increase in the dietary importance of maize across the southeast."
Yet, Bense (1994:165) disagrees, suggesting that "maize cultivation was important only in the very northern fringe of the southeast." Nevertheless, it is true that many of the key traits once used to define classic Mississippian culture (maize agriculture, platform mounds, wall-trench houses, and shell-tempered pottery), are in place by 1,200 B.P. (Bense 1994:162).

During the Late Woodland, the pattern of base camps with small, seasonally occupied satellite sites continued (Bense 1994:166; Smith 1986:51-52). There is a decided absence of exotic materials and status items and, according to Smith (1986:52) "the 'big men' of the preceding time period were no longer in evidence." Overall, the subsistence pattern was based on generalized hunting, fishing, and foraging (Bense 1994:170); while political organization is based more on the integration of scattered tribal groups by weakly developed descent groups (Smith 1986:53).

The major exception to this is the Weeden Island culture that extended from Mobile Bay in Alabama east to central Florida (Walthall 1980:165). The Weeden Island stage began between 1,650 and 1,350 B.P. and was one of a few cultures that continued placing elaborate trade goods in burial mounds (Bense 1994:170). Populations in the Weeden Island culture lived near lakes, rivers, and wet prairies (Fagan 1995:427), where the coastal societies focused on marine resources; while in the interior, people tended to focus on upland and wetland food resources (Bense 1994:172).

Because of the nature of Weeden Island mortuary customs, it is believed that they were related to the preceding Hopewell complex (Bense 1994:172). It is interesting to
note that the Weeden Island type site is located on an island in Tampa Bay, Florida (Bense 1994:170) and was originally named by Gordon Willey (1945). The presence of island settlements is compelling evidence for the use of watercraft by Weeden Island peoples. And indeed, 15 dugout canoes have been recovered from Florida alone that are dated to the southeastern Late Woodland Period. This is the largest number of dated dugout canoes from any cultural period in the Southeast; and none have been found outside of Florida. Weeden Island ceramics and burial practices were discovered in southwestern Alabama, while Coles Creek material from Louisiana was found at Weeden Island sites (Walthall 1980:166). This is a strong argument for a continuation of exchange, if only at the regional level. If, as Arnold (1995) and others (c.f. Heizer 1938; Hudson et al. 1978) argue, the presence of canoes is related to a well-developed sociopolitical complex, then the Weeden Island area is the place to find canoes during the Late Archaic. Again, of course, the differences in the numbers of dugouts from specific periods can be misleading as not all of the canoes located have been dated and there are problems associated with their discovery and preservation.

Cowpen Lake

In 1978, a dugout was discovered buried in a peat deposit in the middle of sandy-bottomed Cowpen Lake, Putnam County, Florida (University of Florida Dugout Canoe Files). The canoe was described by Raymond Willis, then a graduate student at the University of Florida conducting research on dugouts, as resembling the Swisher dugout described earlier. The Cowpen Lake canoe, however, was discovered in very poor
condition, making such a comparison difficult, at best (Figure 6.3). The canoe was found broken in two pieces and the sides were missing. The ends that are present are relatively thick and blunt. Evidence for fire-hollowing is present, even to the extent that a hole has been burned through the "longitudinal center which was very uniform and apparently intentionally made" (University of Florida Dugout Canoe Files). This is interesting because the hole is burned completely through the canoe. It is hard to believe that such a hole (visible in the photograph at the junction between the two broken ends) would be made intentionally. Ethnographic accounts indicate that carrying fire in a canoe may have been a common practice. Purdy (1991:282) notes that "the Indians of Virginia and Tierra del Fuego are pictured in early historic documents carrying fire in their canoes. Bennett (as quoted in Purdy 1991:282) records the fate of one explorer "...they killed him with a hatchet while he fanned a fire trying to cook a fish in the middle of the canoe." Perhaps the hole burned through Cowpen Lake represents a similar fire that got out of hand and burned its way through the deck; or, it may represent a manufacturing error - a fire that got out of control while the dugout was being constructed.

Wood samples were taken and identified as pine (*Pinus* spp.) by Willis through microscopic thin section. A sample of the wood was submitted to Beta Analytic for radiocarbon assessment and an age of 1160 ± 65 B.P. (UM-1459) was obtained. The canoe was broken into two pieces, but when joined, an overall length for the canoe of 5.58 meters was secured (Figure 6.4). The maximum width of the canoe was 41 centimeters and its height was 30 centimeters. These measurements are not completely accurate owing
Figure 6.3. Profile of the Cowpen Lake dugout.

to the degraded condition of the vessel and thus represent best estimates. The canoe was not conserved but in 1983, it was submerged beneath the fresh spring waters of Silver Springs Aquarena, Florida. A visit to the spring in 1994 showed the canoe, like most of the canoes stored there, to be in relatively poor condition. The primary problem with the Cowpen Lake dugout is that the pieces have become separated and it will be difficult to join them again considering the limited description available for each of the fragments. Ideally, these canoes should be buried in the bottom sediments of the spring, a proposal which has met with resistance on the grounds that they would no longer be visible to the
Figure 6.4. Scale drawing of the Cowpen Lake dugout canoe.
tourists passing over them in glass-bottom boats. Without a better program of conservation, tourist visits to the canoes will last only so long as the canoes survive.

**Magnolia Lake**

The only dugout that has held up relatively well in the fresh spring waters of Silver Springs is the Magnolia Lake Dugout. Figure 6.5 is a 1994 photograph of the canoe as it lay submerged under approximately 8 meters of water in the spring. The largest end of the canoe is shown and just to the right of the end, near the photographic scale can be seen a 17 cm diameter circular charred area which Purdy (1991:Figure 199B) claims is evidence for the practice of carrying fire in a canoe. It may also be a charred area related to its method of manufacture. A number of the canoes observed show similar areas along both the inside and outside of the canoe. Some of these may represent the behavior of fire carrying, while others are surely manufacturing marks (see Lake Salvadore 2 in Chapter VIII).

The Magnolia Lake Dugout has not gone unscathed in the spring waters, however. When it was discovered, both ends of the canoe were present (Figure 6.5). Since it has been submerged in the spring (approximately 11 years), one end has degraded and is now gone.

At the time of its recovery, the canoe’s length had been recorded as 6.43 meters (University of Florida Dugout Canoe Files); that length is now 5.79 meters, a difference
of .64 meters (Figure 6.6). The canoe is also covered with an algal growth that could not be removed by hand.

The Magnolia Lake dugout was originally found "floating near the west shore-line of the sand-bottomed lake near keystone heights, Florida" (University of Florida Dugout Canoe Files) in Clay County. The wood was originally described as "unknown" but "probably pine." Subsequent analysis by Phil Dering of Texas A&M University (personal communication, 1994) confirmed the wood type as pine (Pinus spp.). An age of 1060 ± 50 B.P. (Beta-2789) was obtained from a wood sample submitted to Beta Analytic, placing
this canoe firmly in the Late Woodland period of the southeastern United States. Figure 6.7 is a drawing of the canoe made from descriptions, photographs, and a firsthand cursory examination while it rested at the bottom of Silver Springs, Florida. At the time of its discovery, the canoe was in reasonably good condition, although the sides had eroded significantly. There was no evidence for fire-hollowing, other than the circular charred area mentioned previously (University of Florida Dugout Canoe Files). During the subsequent 1994 visit, no additional charred areas or tools marks were noted.
Figure 6.7. Scale drawing of the Magnolia Lake dugout canoe.
Dog Island

In response to a 1978 request for information on dugout canoes in Florida by the Florida State Museum, Mr. Jimmy Vaughn of Thomasville, Georgia reported a canoe located "at a small snack shop on Dog Island off Carrabelle, Florida" (Newsom 1985:1). The canoe had apparently been found in 1963 eroding out of a sand dune on the north shore of Dog Island, a shoal island located off the Gulf Coast of the Florida panhandle approximately 60 miles southwest of Tallahassee, Florida (Figure 6.8). The island itself contains the Nature Conservancy's Jeff Lewis Wilderness Preserve now owned by the Nature Conservancy. The island was also noted to be "approximately 6000 years old [with a] beach [that] has been steadily eroding" (University of Florida Dugout Canoe Files). Because of this erosion, the "snack shop" was threatened and the canoe was donated to the Florida Department of State in 1983.

At the time of this move the canoe was identified as having been made of cypress (Taxodium distichum), although subsequent microscopic thin section analysis revealed that the canoe was actually made of southern hard pine (Pinus spp.) (Phil Dering, personal communication, 1994). A wood sample was taken for radiocarbon analysis which yielded an age of 1,240 ± 80 B.P. (I-13149). The canoe was also noted to have been "wet upon recovery" and "allowed to dry thoroughly" (University of Florida Dugout Canoe Files). When it arrived at the Florida State Conservation Laboratory in Tallahassee, it was described as "dry and 'checked' [and was] painted with Plex-Seal" (University of Florida Dugout Canoe Files) for preservation.
Figure 6.8. View of Dog Island off the Gulf Coast of Florida.
At the time of its discovery, the canoe was apparently complete. Owing to the lack of proper conservation upon initial discovery, however, the canoe suffered greatly (Figure 6.9). It is currently being stored at the Florida Department of Archaeological and Historic Resource Management in Tallahassee, Florida.

Figure 6.9. The Dog Island dugout as it appeared in 1994.
The canoe has a distinctive "overhanging" end which Purdy (1991:270) suggests is "possibly a modification for larger and rougher bodies of water. These canoes have been discovered primarily on the Atlantic coast, St. Johns River, and some of the bigger lakes . . . [with] the extended, overhanging bow . . . designed to override large waves" (Figure 6.10).

Figure 6.10. View of the underside of the "platform" end of the Dog Island dugout.
Roberts and Shackleton (1983:69) report on a similar, although undated, canoe from Florida, noting that "each platform is perfectly suited to support a person with a pole or fishing spear." Purdy (1991:270) also notes that on some canoes, the overhanging ends have been shaped into a slight "V," a shape which would expedite travel through rougher waters. Hudson (1981:275) agrees that the "v-shaped" hull is more marine adapted and that a "U-shaped" hull would not function well in any sea "that exceeded a near calm." The Dog Island canoe does have an overhanging end, but it has a very rounded hull; more "C-shaped" than "U-shaped" (Figure 6.11).

The sides and one end of the Dog Island canoe are degraded, leaving only the deck and one end relatively intact (Figure 6.12.). It also has what appears to be a charred area, 25 centimeters in diameter, located near the degraded end - more evidence of either fire carrying or of manufacturing. The canoe is 5.3 meters long, with an overhanging end of .78 meters and a maximum width of .58 meters. Both the Cowpen and Magnolia Lake dugouts are longer, as indeed are the majority of the other Late Woodland dugouts.

This repudiates Jobson and Hildebrandt's (1980:165) assertion that there are two types of canoe; the river dugout and the seagoing dugout, and that the difference between the two "was based on differences of sheer size - the oceangoing canoes being roughly twice as large as the others." The larger dugouts used in their study were all manufactured during the historic period with metal adzes and axes and this may, in fact, be responsible for the differences seen in the overall size of these canoes. Certainly the Dog
Figure 6.11. Scale drawing of the Dog Island dugout canoe.
Island dugout appears to have been used in Gulf Waters, even if only along the coast itself. However, it does not appear to be any larger than the other craft that plied the inland waters.

The Dog Island canoe was undoubtedly used in the waters of the Florida Gulf Coast, but could such a small craft have operated efficiently in these waters? Jobson and Hildebrandt (1980) say no, that only larger craft would have been suited for plying the relatively rougher ocean waters. Gould (1968:35) counters by stating that it is dangerous
to take any canoe into the ocean; while Hudson (1981:274) suggests that size has nothing to do with seaworthiness, rather it is the shape of the hull itself that is most important. The overhanging end of the canoe was also an important consideration. Incoming waves from a head sea can slow the progress of a blunt-ended canoe; while rougher seas can overpower a canoe, making it extremely difficult to maneuver and susceptible to capsizing (Hudson 1981:276). Of course, to a culture adapted to life near the sea, a capsized canoe may not have been such a crisis. One of Hernando de Soto’s chroniclers, Garcilaso de la Vega, related in the 16th century, that

being good swimmers, twelve or thirteen Indians, depending more or less upon the size of the canoe, take their vessel between them and turn it so as to have its mouth straight downward. Then, as it come up full of water, all simultaneously give it a shake, and when the water in falling is collected on one side, they immediately give it a shake in the opposite direction. After two such shakes, not a drop of water remains in the canoe, and the Indians re-enter it. And all this they accomplish with such haste and facility that the vessel had hardly been upset before they have it turned over and put in position again (In Varner and Varner 1951:598).

Columbus recorded a similar event on one of his voyages in which

if overset they soon turn them right again by swimming; and they empty out the water by throwing them from side to side like a weaver’s shuttle, and when half emptied they lade out the rest with dried calabashes cut in two, which they carry for that purpose (related in McKusick 1970:8).

Historical accounts such as these indicate that Native Americans did traverse ocean waters in dugout canoes so the arguments of Jobson and Hildebrandt (1980) and Gould do not seem valid. Table 6.1 summarizes the data on Late Woodland dugout canoes, while Figure 6.13 shows the location of several Late Woodland period canoes.
Table 6.1. Late Woodland period dugouts.

<table>
<thead>
<tr>
<th>Canoe</th>
<th>Location</th>
<th>Age</th>
<th>Wood Type</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dog Island</td>
<td>Florida</td>
<td>1240 ± 80 B.P. I-13149</td>
<td><em>Pinus spp.</em></td>
<td>5.3 m</td>
<td>.58 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Tucker Lake 2</td>
<td>Florida</td>
<td>1225 ± 70 B.P. A-7786</td>
<td><em>Pinus spp.</em></td>
<td>5.4 m</td>
<td>.43 m</td>
<td>.15 m int.</td>
<td>Unknown</td>
</tr>
<tr>
<td>Zellwood 1</td>
<td>Florida</td>
<td>1185 ± 60 B.P. Inst. Marine Sci.</td>
<td><em>Pinus spp.</em></td>
<td>4.7 m Largest Piece</td>
<td>.43 m Largest Piece</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Hampton Lake 1</td>
<td>Florida</td>
<td>1180 ± 50 B.P. Beta-2814</td>
<td>Unknown</td>
<td>6.3 m</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Loch Low</td>
<td>Florida</td>
<td>1160 ± 80 B.P. WO-3-590-6072</td>
<td><em>Pinus spp.</em></td>
<td>6.67 m</td>
<td>.33 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Cowpen Lake</td>
<td>Florida</td>
<td>1160 ± 60 B.P. UM-1459</td>
<td><em>Pinus spp.</em></td>
<td>5.58 m Incomplete</td>
<td>.41 m</td>
<td>.30 m</td>
<td>Unknown</td>
</tr>
<tr>
<td>Wildcat Lake</td>
<td>Florida</td>
<td>1160 ± 50 B.P. G-1975</td>
<td><em>Pinus spp.</em></td>
<td>6.85 m Complete</td>
<td>Unknown</td>
<td>.21-.27 m</td>
<td>Unknown</td>
</tr>
<tr>
<td>Little Shady Lake</td>
<td>Florida</td>
<td>1135 ± 50 B.P. A-7776</td>
<td><em>Pinus spp.</em></td>
<td>4.25 m</td>
<td>.33 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lake Kissimmee</td>
<td>Florida</td>
<td>1135 ± 40 B.P. A-7537</td>
<td><em>Pinus spp.</em></td>
<td>.68 m Fragment</td>
<td>.39 m</td>
<td>Unknown</td>
<td>8 cm bottom 14 cm stern</td>
</tr>
<tr>
<td>Pine Lakes</td>
<td>Florida</td>
<td>1120 ± 50 B.P. Beta-32994</td>
<td><em>Pinus spp.</em></td>
<td>4.08 m</td>
<td>.37 m</td>
<td>Stern</td>
<td>Unknown</td>
</tr>
<tr>
<td>Magnolia Lake</td>
<td>Florida</td>
<td>1060 ± 50 B.P. Beta-2789</td>
<td><em>Pinus spp.</em></td>
<td>6.43 m</td>
<td>.38 m</td>
<td>Unknown</td>
<td>5 cm gunwale</td>
</tr>
</tbody>
</table>
Figure 6.13. Map showing the location of several Late Woodland period dugout canoes.
Hudson (1981:275) discusses the problem of racking as it would relate to a longer hulled canoe in the open ocean. Racking occurs when the canoe alternates between sagging (supported by waves at the bow and stern causing a sag amidships) and hogging (supported by a wave amidships causing the bow and stern to sag as the center is thrust upward). Repeated shifting between the ends and amidships can rack or break up a stiff-hulled dugout canoe, especially if factors such as passenger weight and cargo are considered. Such conditions would tend to favor a smaller, more easily handled craft - especially one with overhanging ends. What may be a more likely factor in considering the type of watercraft used in the ocean is the function of the vessel. Larger vessels may be more efficient (regardless of the increased risk) because they can carry more cargo. A simple fishing voyage may not require such a large vessel, but only one that is relatively well-suited to the waters in which it will be used. The Dog Island canoe may be one such craft - well-suited for plying the nearshore waters of the Gulf, but capable, if necessary, of venturing farther out to sea. It is unknown whether the canoe was paddled to Dog Island intentionally, or whether it drifted to the island along an offshore current. There is no mention of any archaeological sites on the island, although it is noted for its fresh and saltwater wetlands; nearly 200 species of birds; and almost 400 species of plants, certainly making it an exploitable habitat for early inhabitants and well worth a trip by canoe.

Most of the canoes discovered from Woodland sites have been found in inland contexts. Most of the craft were designed and operated in rivers, streams, and lakes and were designed to carry both crew and cargo. For open boats such as dugout canoes, lakes,
oceans, and the ever-changing zones of erosion, transportation, and deposition in a fluvial environment presented very different demands (Brose 1986:19). And yet, canoes found in lakes do not seem to differ markedly from those discovered in riverine contexts, and even these are not markedly different from oceangoing canoes.

Based on the fact that it was discovered on an island in the Gulf of Mexico, the Dog Island dugout appears to have been used on the ocean rather than on an inland lake or stream. Other than slightly overhanging ends, however, it does not appear to have any other significant differences from its inland cousins. In fact, it is smaller than most and does not have a V-shaped hull, an oceangoing requirement according to some scholars (Hudson 1981; Jobson and Hildebrandt 1978). Perhaps the Dog Island canoe was designed as an inland craft and then adapted for use along the Gulf shore or even out into the Gulf waters. No other craft from the Woodland period meet the Jobson and Hildebrandt's (1978) criteria for an oceangoing dugout (sharply pointed prow for pushing through waves, V-shaped hull for cutting through water more efficiently, and flared gunwale to keep from taking on water in rough seas). It is unfair to apply modern boatbuilding knowledge to ancient craft. The fact remains that islands were settled and ocean resources were exploited (Bense 1994; Fagan 1995; Smith 1986; Walthall 1980; Willey 1945). This clearly demonstrates that dugouts were general purpose artifacts that were not significantly modified regardless of the aquatic environment in which they were used. This is obvious, despite the "ideal" attributes that, on paper at least, would improve its performance.
During the latter stages of the Woodland period, leaders of ruling kin groups began to centralize their power and hereditary ranking lineages and communities began to emerge, setting the stage for the development of the powerful Mississippian chiefdoms to come (Bense 1994:182). Communities throughout the Woodland period are placed along resource-rich stretches of coastline and major inland waterways. The advantages of having boats capable of navigating such waters are incalculable and their presence has probably been underrepresented in the archaeological record. The dugout canoe was important in transportation, economics, and subsistence, and may even have played a major role in southeastern social evolution.
CHAPTER VII

THE MISSISSIPPIAN PERIOD: CHIEFDOM AND CEREMONY

The Cacique came with two hundred canoes full of Indians with their bowes and arrows, painted and with great plumes of white feathers, and . . . the canoe wherein the Cacique was, had a tilt over the sterne, and hee sat under the tilt; and so were other canoes of the principal Indians. And from under the tilt where the chiefe man sat, hee governed and commanded the other people (Elvas, 1541 in Roberts and Shackleton, 1983:64).

The Mississippian period is the most complex stage of prehistoric culture in the southeastern United States. It is marked by the development of chiefdoms, large mound centers, and the development of the Southeastern Ceremonial Complex (Bense, 1994:184). Agriculture, long-distance trade, and an increase in warfare are also considered to be key traits of the Mississippian Period (Walthall, 1980:185). According to Jennings (1974:246) "in areal extent of influence, ceremonialism, public works, technology, population density, and general richness, the Mississippian is exceeded by no other aboriginal American culture north of Mexico."

By 1,000 B.P., the Mississippian adaptation appeared almost simultaneously across much of the Southeast (Fagan, 1995; Smith, 1978). Mississippian settlements focused along both large and small river valleys, settling in floodplains because of the rich soils available for agriculture. But not all Mississippian societies practiced maize agriculture - particularly in the Southeast. All that was required to reach the chieftain level of political development was some sort of food surplus; for some this simply meant intensifying pre-existing patterns of hunting, fishing, and foraging (Bense, 1994:186). Regional debate
focuses on whether trade and contact or population movement between regions was responsible for triggering this increase in social complexity: it was probably a combination of both (Walthall 1980:185).

Holmes (1903:80ff) first defined the term "Mississippian" in relation to unique ceramics produced by late prehistoric cultures distributed in and around present day Illinois, Missouri, Arkansas, Kentucky, and Tennessee. The Mississippian cultural tradition, like those that preceded it, is split into three conventional divisions of Early (950 - 750 B.P.), Middle (750 - 550 B.P.), and Late (550 - 450 B.P.) (Bense 1994:4). The Mississippian period also saw the development of large civic/ceremonial centers such as Cahokia in Illinois, Etowah in Georgia, Moundville in Alabama, and Spiro in Oklahoma (Walthall 1980:185).

Rivers were very important to the Mississippian peoples of the Southeast. Smith (1985) showed that riverine subsistence varied depending upon the season. Freshwater mollusks remained an important staple. Fish were taken year round with an increase during the spring spawning season. Migratory waterfowl had both a fall and a spring peak as the birds traveled north and south. Wild and domesticated plants and wild animals made up the rest of the yearly subsistence.

Along the coasts, populations were more scattered and they relied more on wild food sources and swidden agriculture (Bense 1994:188). Hunting, fishing, and foraging continued much the way it had during the Woodland period. Bense (1994:191) notes that
"coastal agriculturists had to continually shift fields, and people spent much of the year in small groups tending scattered plots and collecting marine and terrestrial wild foods.

Most Mississippian settlements are located in a pattemed manner with the location being a compromise between a set of resource factors weighted on the cost of the transportation and on communication links with larger communities (Chisolm 1968:103). Walthall (1980:191) suggests that sites were located in alluvial valleys to exploit the fertile and easily tilled soils, while Steponaitis (1978) views the pattern of settlement in terms of the cost of transporting materials and information from minor to major centers. In each of these cases, the location of settlements along bodies of water invites the notion that boats capable of traversing these waterways were important to the people living there.

Throughout the Mississippian Period, both raw materials and finished products were exchanged through trade networks connecting regional centers. Walthall (1980:190) considers two basic types of trade in operation: long distance trade of exotics such as copper, galena, and marine shell, and the local redistribution of craft goods and certain foodstuffs. Many of the exotic goods served as status indicators in Mississippian chiefdoms and they may also have served as gifts given by the ruling elite to the leaders of minor centers and outlying areas in exchange for their allegiance (Bense 1994:192).

Smith (1986:58) suggests that the political influence of large centers declined rapidly as one moved away, although noting that control may have been restricted to single drainages (perhaps the limit of water travel). Arnold (1995) argues that advances in water transportation played an important role in the rise of complex societies such as chiefdoms.
Indeed, she (1995:733) claims that "control over all or selected uses of advanced watercraft then, represented one path by which social inequality could emerge, heralding organizational changes involving unequal control over products of labor."

Water travel during this period may also have provided a more efficient means of collecting and moving resources. Little (1985) shows that travel by water may have taken less than half the time as travel by land and that perhaps as much as 450% more cargo could be carried by the expenditure of the same amount of energy. MacDonald and Purdy (1982:9-10) noted that four people traveling by water for 50 miles would save 25,000 calories over the same group travelling by land. The simple fact is that four people in a canoe can transport far more cargo than four people on foot. Finally, Brose (1986:19) concludes that "wherever it could, most aboriginal trade in the eastern woodlands moved by water, and in the prehistoric period it is most likely that it would have been by water craft such as dugout canoes."

**Early Mississippian**

Except for maize, and later bean, and squash agriculture, there was nothing dramatically new in the way Eastern Woodlands people lived in the late first millennium A.D. However, increased diversity and intensive river floodplain adaptation reached new heights, leading to the development of the Early Mississippian period chiefdoms. Along the Gulf Coast, the lower Mississippi Valley, and in southern Florida the Late Woodland way of life endured into Mississippian times (Bense 1994:199).
And yet, most societies throughout the eastern woodlands were connected by trade, with prestige items such as copper and shell being exchanged between Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Mississippi, Ohio, Oklahoma, and Wisconsin (Bense 1994:199) and even as far off as Wyoming for obsidian (D.L. Hamilton, personal communication, 1996). That Mississippian peoples engaged in widespread interaction is readily recognized in the similarity of pottery types found throughout the region, as well as by the distribution of raw materials from their source areas (Jeter and Williams 1989:191). Morse and Morse (1983:205-208) reviewed the evidence for the exchange of cherts from Missouri, Illinois, and Tennessee and found a wide pattern of distribution. How these goods moved is a subject for much speculation, but considering that southeastern archaeologists have found large Mississippian period sites at almost every major river intersection, the use of watercraft must have been essential (Kandare 1983:6; Lafferty 1977:7). Successful trading helped to gather material wealth, allowing for the resources to construct more elaborate mounds (Bense 1994; Fowler 1978). In the American Bottom (the Mississippi River floodplain around Cahokia), chiefdom centers were strategically located along major waterways to afford the best access for canoe-based trade. To date, 15 Early Mississippian dugout canoes have been discovered in the southeastern United States, and data for these vessels are presented in Table 7.1. Locations for known Early Mississippian canoes are depicted in Figure 7.1.
Table 7.1. Early Mississippian period dugouts.

<table>
<thead>
<tr>
<th>Canoe</th>
<th>Location</th>
<th>Age</th>
<th>Wood Type</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Orange</td>
<td>Florida</td>
<td>945 ± 35 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>4.2 m</td>
<td>.51 m</td>
<td>.43 m</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lake 3</td>
<td></td>
<td>A-7538</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red River</td>
<td>Louisiana</td>
<td>915 ± 67 B.P.</td>
<td><em>T. distichum</em></td>
<td>9.355 m</td>
<td>.58 m</td>
<td>.45 m</td>
<td>Varies?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UGA-5294/5295</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silver River</td>
<td>Florida</td>
<td>880 ± 45 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>4.4 m</td>
<td>Not Measurable</td>
<td>.46 m</td>
<td>6 cm gunwale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7533</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tucker Lake 4</td>
<td>Florida</td>
<td>870 ± 50 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>1.12 m</td>
<td>.38 m</td>
<td>.45 m</td>
<td>5 cm (?)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7787</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micanopy 2</td>
<td>Florida</td>
<td>870 ± 35 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>4.5 m</td>
<td>.35 m</td>
<td>Unknown</td>
<td>3 cm gunwale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7534</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Pond</td>
<td>Florida</td>
<td>855 ± 45 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>4.10</td>
<td>.42 m</td>
<td>.47 m ext.</td>
<td>10 cm bottom</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7541</td>
<td></td>
<td></td>
<td></td>
<td>.23 int.</td>
<td></td>
</tr>
<tr>
<td>Suwannee 3</td>
<td>Florida</td>
<td>850 ± 50 B.P.</td>
<td><em>T. distichum</em></td>
<td>6.0 m</td>
<td>.785 m</td>
<td>.59 m</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7771</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goose Lake 3</td>
<td>Florida</td>
<td>845 ± 65 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>3.4 m</td>
<td>.655 m</td>
<td>.36 m ext.</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7782</td>
<td></td>
<td></td>
<td></td>
<td>.28 m int.</td>
<td></td>
</tr>
<tr>
<td>Lake Griffin 3</td>
<td>Florida</td>
<td>840 ± 55 B.P.</td>
<td><em>T. distichum</em></td>
<td>.68 m</td>
<td>.25 m</td>
<td>fragment</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7781</td>
<td></td>
<td></td>
<td></td>
<td>fragment</td>
<td></td>
</tr>
<tr>
<td>Grandin</td>
<td>Florida</td>
<td>825 ± 50 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>4.9 m</td>
<td>.405 m</td>
<td>.30 m</td>
<td>4 cm bottom</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7531</td>
<td></td>
<td></td>
<td></td>
<td>incomplete</td>
<td>2 cm gunwale</td>
</tr>
<tr>
<td>Micanopy 1</td>
<td>Florida</td>
<td>775 ± 65 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>4.25</td>
<td>.38 m</td>
<td>Unknown</td>
<td>2.5 cm gunwale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7535</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Orange</td>
<td>Florida</td>
<td>750 ± 55 B.P.</td>
<td><em>Pinus</em> spp.</td>
<td>3.5 m</td>
<td>.58 m</td>
<td>.46 m ext.</td>
<td>11 cm bottom</td>
</tr>
<tr>
<td>Lake 2</td>
<td></td>
<td>A-7538</td>
<td></td>
<td></td>
<td></td>
<td>.23 m int.</td>
<td>3 cm gunwale</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 7.1. Map showing the location of Early Mississippian period dugout canoes.
Little Orange Lake 2

A dugout canoe was discovered on September 29, 1990 on the south side of Little Orange Lake in Putnam County, Florida (University of Florida Dugout Canoe Files). The canoe was located on the south side of the lake near the canal that connects Little Orange Lake to Lake Holden (Figure 7.2). A motorboat struck the left side of the floating canoe and damaged it slightly, leaving vertical "prop-marks" along the gunwale (Guy Marwick, personal communication, 1994). Other than this damage, and a small hole near the left gunwale "where it had been exposed to the air prior to discovery" (University of Florida Dugout Canoe Files), the canoe is intact, making this the most complete dugout found in the southeastern United States. Unfortunately, this is the only information that exists regarding the canoe's context of discovery. The canoe measured 3.48 m in length, .58 m wide, .46 m high, with an inside depth of .36 m. The thickness of the gunwales varies between 2.7 cm at 60 cm abaft the intact end and 3.3 cm amidships; while the bottom averages 11 cm thick. Wood samples taken from the canoe indicated that it was manufactured of pine (*Pinus* spp.) and it has an age in radiocarbon years of 750 ± 55 B.P. (A-7538).

The dugout was taken to the Florida State Conservation Laboratory where it was conserved using a combination of turpentine and linseed oil (James Levy, personal communication, 1994). Once the wood was stable, it was loaned to the Silver River Museum of Natural History in Ocala, Florida, where it is currently on display (Figure 7.3). An examination of the canoe in 1994, showed it to be in relatively good condition,
although one end shows some evidence of deterioration that was not present at the time it was discovered. This damage can be seen on the far end of the canoe in Figure 7.3., as can the slight damage to the gunwale on the side near where the scale is placed.

The bow and stern of the vessel angle up slightly from the bottom and it exhibits a slight inward curvature toward the top. This can best be seen in the section drawing taken approximately amidships (Figure 7.4). The canoe has a distinct "C-shape" to the hull, a shape very similar to the much older Ringler Dugout from Ohio (Brose and Greber 1982). It must be remembered, however, that the sides rarely preserve in most prehistoric dugout canoes so that it is difficult to say whether or not this was a common practice. The
Figure 7.3. Little Orange Lake 2 as it appeared in 1994.

shape of the hull could also be the result of wood deformation brought about by the shrinking of the wood as it dried. Intentionally manufacturing a canoe this way may have allowed for more cargo to be carried in the vessel without the necessity of opening up the top of the dugout and exposing the interior (and the passengers and cargo) to a greater chance of getting wet. This is, of course, highly speculative, but it does seem to have been carved intentionally. According to Blackburn (1981:323), this type of construction was
used in later wooden warships to provide extra space below the top deck for the placement of heavier guns. But tumblehome in warships is not used so much for extra space as for the improved stability it confers to the vessel (Kevin Crisman, personal communication, 1996). Such construction in a dugout canoe may have been intended for the same purpose.

The ends of the canoe are thick and blunt, although the angle on one end may be a slight attempt at platforming - raising one end as was seen in the earlier dugout from Dog Island, Florida. Both the interior and exterior of the vessel show evidence of charring in the form of small burned areas. There are no visible tool marks. The ends are very thick, although the vessel looks to have been completed. Whether or not this is typical of construction for the period is difficult to say. This canoe is far more complete than any others from the Mississippian period, and so it may be unique or it may represent a common type of construction. Indeed, it was very difficult for three men to move the canoe so that measurements could be taken. Canoes of this length would probably have a crew of only two or three with their cargo. It is difficult to imagine that such a craft could ever have been portaged and Brose and Greber (1982:256) speculate that navigating dugouts of extreme weight would be difficult in high velocity fluvial systems. Such craft may have been well-suited for travel along lakes rather than down swiftly-moving streams in which returning upstream may have been difficult. Larger dugout canoes may have had larger crews and may have been more easily navigated in streams, depending, of course, on how they were manufactured.
Silver River Dugout

In August of 1993, I made a trip to Silver Springs Aquarena in Ocala, Florida. I travelled to this freshwater spring to view the canoes placed at the bottom by the University of Florida. During this trip, another dugout canoe was revealed to me (Figure 7.5). This canoe had been discovered by Aquarena personnel in the Silver River "floating in the eel grass" and was being kept wet in the waters of the spring (Leon Cheatham, personal communication, 1993). The canoe appears to be split longitudinally along the centerline of the deck and one end is degraded. There were no visible tool marks of any kind, although three recent nails were discovered near the intact end. Chéatham (personal communication, 1993) stated that Silver River Aquarena personnel had placed the nails there to make towing the canoe easier. It was difficult to examine the canoe given the fact that the surviving portion is 4.4 meters long and the canoe was floating. Additional considerations were the presence of both snakes and alligators in the spring, forcing a more cursory examination. Because only one side was present, an overall width was not obtainable, however, the height of the side present was measured at .50 meters amidships, with the widest part near the bow measured at .52 meters. The interior height of the vessel was .46 meters measured from the interior of the bottom. The gunwales averages 6 centimeters thick while the bottom averaged 10 centimeters thick.

Based on my quick examination, the canoe appeared very similar to those carved by the historic Seminole Indians of Florida. The surviving end of the Silver River Dugout appears to represent half of the high, sharp cutwater designed to part the eel and sawgrass
Figure 7.5. The Silver River dugout being examined by the author in 1993.

of the Everglades (Roberts and Shackleton 1983:68). On these vessels, the bow has the
cutwater and the stern has a flattened shape similar to the overall underside (Figure 7.6).
Thus, it would appear that the bow of this vessel has survived while the stern has not. A
wood sample taken from the canoe was identified by Phil Dering of Texas A&M
University (personal communication, 1994) as pine (Pinus spp.). The wood was also
submitted for radiocarbon dating and an age of 880 ± 45 B.P. (A-7533) was obtained.
Figure 7.6. Scale drawing of the Silver River dugout canoe.
This is equivalent to A.D. 1070 or some 700 years before the Seminoles arrived in Florida (Burt and Ferguson 1973:43).

Either there was a problem with the date obtained (unlikely) or this is a very unique canoe. The shape of it indicates that either the Seminoles were copying a form that was in use when they arrived (and a shape that had a long history) or this particular shape is so well-suited for travel in this region of Florida that the Seminoles developed vessels that copied an earlier form. The canoe is currently being kept submerged in the spring waters to preserve it until conservation facilities and funding allow for preservation and proper study.

**Red River Dugout**

The largest example of a prehistoric dugout canoe known to archaeologists comes from the southeastern United States. In August of 1983, Mr. John Paul Hobbs discovered a dugout canoe eroding out of the bank of the Red River just north of Shreveport, in Caddo Parish, Louisiana (Louisiana Department of Culture, Recreation, and Tourism 1983:1). Mr. Hobbs reported the find to his friends, Mr. and Mrs. Kendall Kelly, who, in turn, notified Dr. Clarence Webb, noted avocational archaeologist. Webb, along with the Kellys spent the next six weeks digging the canoe out of the riverbank (Van Osdell 1983:11).

The canoe was discovered buried in sand and clay deposits within the current active channel of the Red River (Louisiana Department of Culture, Recreation, and Tourism 1983:2). Jeter and Williams (1989:207) suggest that, based on Saucier’s (1974) work, as early as A.D. 1,000 (the approximate time of the deposition of the Red River
dugout), the river itself was in a different meander belt than today; one that trended more
toward the southeast. In 1986, Pearson suggested that the Red River occupied its present
meander much earlier and the channel in which the dugout was discovered is the same in
which it was initially deposited. Webb noticed some "leafy green material in the same
level in which the canoe was found (Louisiana Department of Culture, Recreation, and
Tourism 1983:2), and one would suspect that this may be peat or some other anaerobic
material that aided in the canoe's preservation.

The vessel was described as having a flat bottom with a straight bottom line, slight
"tumblehome" (the sides curve inward near the top of the gunwale), and blunt ends (Figure
7.7). Samples of the wood were analyzed by the United States Forest Products Laboratory
in Madison, Wisconsin and found to be Bald cypress (Taxodium distichum) (Louisiana
Department of Culture, Recreation, and Tourism 1983a:1). Radiocarbon samples, sent to
the University of Georgia, indicated an age for the craft at $885 \pm 70$ B.P. (UGA-5294) and
$945 \pm 65$ B.P. (UGA-5295), with an average age of $915 \pm 67$ B.P. Based on these dates
and its location, the canoe was assigned to the Caddoan cultural tradition that existed in
southern Oklahoma, western Louisiana, and northeastern Texas. The age of the canoe
suggests that it is one of the earliest of the Early Mississippian period dugouts in the
southeast.

Webb made a sketch of the canoe which I used, along with photographs and a
personal examination of the vessel to produce Figure 7.8. When it was discovered, the
canoe was in excellent condition and was nearly intact (Hines 1983:12-F).
Again, however, there is an unfortunate story associated with the Red River dugout. Hines (1983:12-F) reports that the canoe weighed 2,000 pounds and the excavators "decided to slice the canoe in three pieces . . . to make it easier to transport." The sections of the canoe were then hoisted up a "30-foot bank," knocking off "several pieces" of the gunwales. Following this abuse, the canoe was taken to a private residence where it was "put into a tank . . . to undergo stabilization [and] during that time it was treated with a chemical that absorbs water and stiffens the wood" (Van Osdell 1983:11). Hines (1983:13-F) identifies
Figure 7.8. Scale drawing of the Red River dugout canoe.
Charles Pearson of Coastal Environments Inc., in Louisiana as the conservator, and he used polyethylene glycol (PEG) to treat the canoe. The vessel was then transferred to the Louisiana State Exhibition Museum in Shreveport where it was put on permanent display. Dr. George Ward Shannon, Director of the museum (personal communication, 1992) stated that future plans for the canoe included renewed conservation because the original treatment had been done improperly. This is not surprising considering that, according to McCrocklin (1983:16) the canoe initially only underwent five months of treatment. Considering the size of the canoe, this length of time does not seem long enough to ensure proper conservation.

The principal dimensions of the canoe were recorded by Clarence Webb (1983):

Length overall: 9.355 m
Width at bow: .55 m
Width amidship: .57 m
Width at stern: .64 m
Height at bow: .50 m
Height amidship: .45 m
Height at stern: .70 m
Thickness of deck: .15 m
Thickness of sides: .08 m

One of the more intriguing aspects of this canoe (apart from its size) is the nature of its manufacture. This is a true double-ended canoe and both ends have carved into their interiors what appear to be seats or pedestals (Figure 7.9). These features can also be seen in the plan view of the drawing in Figure 7.8. Historic accounts abound with stories of Big Men or Caciques seated in their canoes under awnings issuing orders to the paddlers and
Figure 7.9. View of one end of the Red River dugout showing the carved interior.

to other canoes (Bourne 1922:113). The carved seats on the Red River Dugout are raised above the bottom and could well have carried an important passenger such as a chief or a commander.

The spot along the Red River in which the canoe was found is only 5 miles upstream from the Mounds Plantation Site, and it lies equidistant between the Crenshaw and Gahagan Mound sites, each about 75 miles upriver and downriver respectively (Webb 1985:1). Each of these sites are related to the Caddo I cultural tradition (Alto-Gahagan)
first identified by Davis and later summarized by Gregory (1980). Caddo I sites are characterized by large civic/ceremonial centers associated with mounds, although smaller hamlets with no mounds are also occasionally found (Jeter and Williams 1989:200). Webb (1985:1) notes that "all of these early Caddo centers show evidence of considerable [long distance] trade in copper, lithics and ceremonial objects [an] excellent tie-in with river traffic."

The size of the canoe may also be significant. This is by far the largest dugout canoe yet found in the New World. Some of the canoes from the Late Woodland in Florida approach 7 meters in length but the Red River canoe is nearly 10 meters long. Such large canoes were reported by some of the earliest European explorers in the Americas (e.g. Columbus, De Vaca, De Soto) but these are from much later periods, almost 500 years after the Red River dugout was built. Not one of the later, larger vessels described by the explorers has ever been identified archaeologically.

Considerable energy was expended to produce such a large vessel. My own experiments conducted on the workability of cypress show that this wood is much more difficult to work than pine; it must have taken months, if not longer, to complete the Red River dugout. Arnold (1995:733) examined several coastal North American societies in the Northwest (all of whom used dugout canoes) and determined that

where large-capacity, reliable watercraft were developed that enhanced food getting, ritual, trade, and communication systems, and where the opportunities to own or operate such watercraft were limited, advanced boat technology helped to stimulate new levels of sociopolitical complexity.
Most models of the development of complex, large-scale societies are linked to redistribution systems and to differential access to goods (Crapo 1993:109; Harris 1995:150-151; Kottak 1991:219). Evidence for the use of watercraft in large-scale societies is best illustrated in Malinowski's *Argonauts of the Western Pacific* in which men sail across the open sea in canoes to exchange shell ornaments. The purpose of this exchange is not to "buy" anything, but simply to establish trade partners. While these exotics are valued, more important may be the more mundane items that are carried and exchanged at the same time; flour, fish, yams, coconuts, weapons, tools, and raw shell (Harris 1995:89). This system of "Kula" helps to validate or establish political rank among the members of the society - those with better access and larger canoes can carry and obtain more of the valued items. Such men become leaders as well as accomplished navigators (Campbell 1983:203). The development of such large craft in the southeastern United States may play a similar role in the development of the complex societies associated with the Mississippian cultural tradition.

**Middle Mississippian**

To date, 12 Middle Mississippian period dugout canoes (750-550 B.P.) have been discovered in the southeastern United States. Data for these vessels are presented in Table 7.2 while known canoe locations are depicted in Figure 7.10. To the north, the large center at Cahokia was declining while civic/ceremonial centers were increasing in the riverine environments of the Southeast (Bense 1994:220). The largest, and perhaps the best known
Table 7.2. Middle Mississippian period dugouts.

<table>
<thead>
<tr>
<th>Canoe</th>
<th>Location</th>
<th>Age</th>
<th>Wood type</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stricklin 14</td>
<td>Florida</td>
<td>740 ± 60 B.P.</td>
<td>Unknown</td>
<td>4.3 m ext.</td>
<td>.44 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hebu-38450</td>
<td></td>
<td>3.9 m int.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluker's Bluff</td>
<td>Louisiana</td>
<td>728 ± 50</td>
<td><em>T. distichum</em></td>
<td>3.81 m</td>
<td>.457 m</td>
<td>.178 m</td>
<td>2.54 cm base amidship</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15St-75002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grassy Lake</td>
<td>Florida</td>
<td>720 ± 55 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>5.1 m</td>
<td>.36 m</td>
<td>.36 m</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7772</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keuka Lake</td>
<td>Florida</td>
<td>690 ± 50 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>4.6 m</td>
<td>.34 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7778</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hartman Lake</td>
<td>Florida</td>
<td>660 ± 70 B.P.</td>
<td>Unknown</td>
<td>3.84 m ext.</td>
<td>.40 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hebu-44218</td>
<td></td>
<td>2.74 m int.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stricklin 10</td>
<td>Florida</td>
<td>630 ± 10 B.P.</td>
<td>Unknown</td>
<td>1.62 m incomplete</td>
<td>.5 m</td>
<td>.43 m ext.</td>
<td>.21 m int.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hebu-20206</td>
<td>Destroyed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Georges Lake 2</td>
<td>Florida</td>
<td>610 ± 50 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>4.12 m</td>
<td>.5 m</td>
<td>.49 m</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7774</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tumbigbee 1</td>
<td>Alabama</td>
<td>605 ± 60 B.P.</td>
<td><em>T. distichum</em></td>
<td>6.1 m</td>
<td>Exterior: .48 m</td>
<td>Interior: .24 m</td>
<td>.24 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10Ga-695</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gunwale: 1 cm</td>
</tr>
<tr>
<td>Goose Lake 2</td>
<td>Florida</td>
<td>590 ± 45 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>5.878 m</td>
<td>.60 m</td>
<td>.22 m</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7783</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tucker Lake 1</td>
<td>Florida</td>
<td>575 ± 60 B.P.</td>
<td>Unknown</td>
<td>5.09 m</td>
<td>.39 m</td>
<td>.31 m</td>
<td>18 cm Deck</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A-7784</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hall Lake 1</td>
<td>Florida</td>
<td>575 ± 50 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>4.24 m</td>
<td>.25 m</td>
<td>.35 m</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UMu-1451</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 7.10. Map showing the location of Middle Mississippian period dugout canoes.
Middle Mississippian chiefdoms in the Southeast is Moundville, Alabama. This is the type site for the Mississippian Moundville cultural phase that covered most of the Black Warrior River Valley in Alabama. By 700 B.P., during the Moundville II phase, the site of Moundville became the dominant center in this portion of the Southeast (Bense 1994:223).

Kandare (1983) investigated the possibility of dugout canoe use during the Moundville II and III Phases of the Mississippian Period (ca. 750 - 450 B.P.) along the Black Warrior River. This work focuses on the identification of dugout canoe landings (sites where canoes were launched, landed, and stored) during this period of southeastern prehistory (Kandare 1983:101). In fact, Kandare argues strongly that landing sites were a conscious part of most Moundville Phase settlements, noting both ethnohistoric accounts from the De Soto chroniclers as well as archaeological evidence in the form of moats and canals. It is known that southeastern Mississippian peoples were adept at the construction of moats and canals and such features have been found at numerous sites in Florida (Cushing 1897:29; Gilliland 1975:18), Alabama (Kandare 1983:66), and Arkansas (Morse 1981:19).

One of the most interesting aspects of Kandare's (1983) work is his study of the logistics of canoe travel between Moundville Phase sites. Much of this is based on the earlier work of Sears (1968), who pointed out the fact that river travel was important for Moundville peoples. Peebles (1978) found that 18 of 19 known Moundville sites are located along navigable waterways, and Steponaitis (1978) suggests that the minimization
of movement costs (time and effort) between Moundville sites was an influencing factor for the placement of settlements along the Black Warrior River in prehistoric Alabama. Welch (1991) agrees, suggesting that Moundville peoples were moving a large amount of exotic or tribute goods by water and that Moundville settlement sites were placed to reduce transportation costs; the idea being to minimize the energy expended and maximize the amount of material moved.

Kandare (1983:76) calculated that each of the Moundville Phase minor centers along the Black Warrior River were within one day's canoe travel of Moundville itself. It has been argued that most Mississippian sites are constructed along rivers and streams to take advantage of the rich floodplain soils available for agriculture (Bense 1994:190; Fagan 1995:432). While this is true, it is also undeniable that Mississippian peoples built and used dugout canoes and this requires proximity to some sort of navigable waterway. Water was important not only for agriculture, but also for transportation.

At Spiro, Oklahoma (as well as at other Mississippian sites), elaborately carved pottery, shell, and other artifacts have been recovered that probably relate to the "Southern Cult," or Southeastern Ceremonial Complex which may be more of an exchange link than an actual religious cult (Bense 1994; Faulkner 1988). Symbols associated with carvings include circles and crosses, birds, decapitation scenes, and the "weeping eye" motif. These have been found at all major Mississippian centers throughout the Southeast and may represent links between coastal and inland cultures. Two engraved conch shells from Spiro, not necessarily related to the Southern Cult, but relevant to a study of dugout canoe
Spiro, not necessarily related to the Southern Cult, but relevant to a study of dugout canoe use, have been described and illustrated by Phillips and Brown (1975:160).

The carvings were done in conch whorls and probably represent two canoes each with two paddlers. The canoes also appear to be decorated with crosshatched semi-lunate disks which are common motifs in the Spiro tradition related "to snakes, legs of snake-bird composites, and fishes" (Phillips and Brown 1975:112). Several of the canoe models or toys found at Key Marco, Florida had been decorated "with semilunar or disc-like devices" (Cushing 1896:364). Garcilaso de la Vega, one of De Soto's chroniclers, reported that the southeastern canoes they encountered were painted without and within in various colors (Varner and Varner 1951:575).

The carvings also provide data on the propulsion of Mississippian canoes. The paddlers appear to be seated rather than kneeling, as the knees of all the paddlers clearly can be seen above the gunwales. Kandare (1983:81) discusses the skeletal evidence for canoe use based on Buikstra's (1975) study of skeletal traits used to determine biological relationship, Russell's (1980) study of muscle attachments, and Ubelaker's (1979) study of squatting facets. In short, canoers would be expected to show overly developed arm muscle attachments; altered bone on the metatarsals and first proximal phalanges from prolonged kneeling; and genetic variations and mixing consistent with river travel. The possible problems with these interpretations are obvious: genetic mixing does not depend on river travel, although enhanced transportation would support it; overdevelopment of arm muscles may be related to other repetitive activities using the arms more than the legs;
and squatting does not necessarily have to take place in a canoe. Indeed, the Spiro engravings do not show the paddlers kneeling, but sitting with their legs in either a crossed or straight (knees-up) position. Kandare (1983:81) does suggest that the skeletal evidence for canoe use is strongest when all of the variables are taken together as a whole in a skeletal population.

Fluker's Bluff

In 1969, a dugout canoe was recovered from the bank of the Amite River at Fluker's Bluff in St. Helena Parish, Louisiana by Dr. Douglas Gamble of the Louisiana State University Department of Industrial Education (Louisiana Department of Culture, Recreation, and Tourism 1969:1). The vessel was noted to be made of Bald cypress and was described as flat-bottomed with a broad stern, sharp bow, slightly uplifted ends, and straight sides (Figure 7.11). A radiocarbon sample removed from the vessel and tested at the Louisiana State University Nuclear Science Laboratory placed its age at $728 \pm 50$ B.P. (LSU-75002). The vessel is now on display at the Louisiana State University Museum of Geoscience in Baton Rouge. Dimensions of the vessel are as follows:

- Length: 12.5' (3.81 m)
- Beam: 18" (45.72 cm)
- Height: 7" (17.78 cm)
- Hull thickness as gunwales amidship: 1" (2.54 cm)
Figure 7.11. Scale drawing of the Fluker’s Bluff dugout canoe.
Tombigbee 1

A dugout canoe was discovered in May, 1973 on the east bank of the Tombigbee River near Peavey's Landing, Alabama (Stowe 1974:197). The canoe had apparently ashed up on the riverbank where it was discovered by two local men and given to the University of South Alabama for preservation and study (Figure 7.12). The canoe is now on display at the university. A wood sample was obtained from the canoe which yielded a radiocarbon age of 605 ± 60 BP (UGA-695). The wood was identified as Bald cypress by Stowe (1974:197).

The canoe was described as being in "good condition" (Stowe 1974:197) although some checking and longitudinal cracking was evident. Kandare (1983:95) reports that the "port gunwale is missing and the starboard gunwale [is] split." Fuller (1992:2) notes that "Stowe [1974] does not mention tool marks or burned areas, but photos suggest both may have been present." The ends taper from the bottom of the hull to form platforms approximately 30 cm long and described as "square-ended" (Fuller 1992:2). One end (identified as the bow) was noted to be narrower than the other end (possibly the stern). According to Purdy et al. (1982:22), "double-ended" canoes such as this are more likely to be aboriginal in nature, while historic or European canoes are more likely to be "unidirectional" with a pointed bow and flat stern platform. A one centimeter-wide hole had been drilled vertically through the platform, possibly for mooring. The vessel was noted to have been preserved with polyethylene glycol (Stowe 1974:198). The measurements of the craft are:
Centerline length: 6.1m  
Beam: .48m  
Interior width: .38m  
Interior depth: .24m  
Hull thickness at gunwale: 1cm

Fuller (1992:8) reports that five canoes with similar platforms dating from the late thirteenth through the early seventeenth century have been recovered from Mississippi and Alabama. Each is manufactured from bald cypress and has a mooring hole drilled vertically through one of the platforms. At least one other of these canoes, the Alabama River Dugout, was discovered in 1977 just 50 km from Tombigbee 1 in the Lower Alabama River (Fuller 1992:2; 1991:51). The canoe was in such good condition that the children who found it bailed it out and "paddled around in it for some time, playing cowboys and indians" (Fuller 1992:8). Little information is available for the Alabama River Dugout, although it appears to be very similar to Tombigbee 1 (Figure 7.13). It measures approximately 6 meters long, 45 cm wide and 30 cm high with two rounded platforms, 16 and 18 cm long respectively. The narrower (bow?) platform has a single hole drilled through it. Evidence of tool marks and burning are evident and a radiocarbon sample yielded an age of 630 ± 55 B.P. Unfortunately, neither Fuller (1992) nor Fuller (1991) provided a laboratory number for this age.
Figure 7.13. Scale drawing of the Alabama River dugout canoe.
Grassy Lake

On September 23, 1990, a dugout canoe was discovered in Grassy Lake, Lake County, Florida (University of Florida Dugout Canoe Files). The canoe was discovered submerged in deep water and moved to shallow water inshore for study (Figure 7.14).

Figure 7.14. The Grassy Lake dugout at the time of its discovery in 1990.
A wood sample was collected for identification and for radiocarbon analysis. The wood was identified as pine (*Pinus spp.*) and the age of the canoe was assessed at 720 ± 55 B.P. (A-7772). The canoe was in relatively poor condition when discovered, having only portions of the ends and the bottom remaining with the sides mostly missing (University of Florida Dugout Canoe Files).

The ends of the canoe are angled slightly and appear to be squared off instead of rounded. Although no tool marks are visible anywhere on the vessel, charring is visible on the interior of the deck. Plans were made to conserve the canoe, but as of this writing its fate is unknown (University of Florida Dugout Canoe Files). Based on a sketch of the canoe made on the day it was discovered and on several photographs, a scale drawing was prepared (Figure 7.15).

**Hartman Lake**

Any discussion of dugout canoes by someone named Hartmann must include a discussion of the Hartman Lake canoe. The canoe was discovered in Lake Hartman, Clay County, Florida in early 1991 (University of Florida Dugout Canoe Files). The wood type was not identified, although a sample of the wood provided an age of 660 ± 70 B.P. (Beta-44218). The canoe was described as whole, although the sides were missing and it was "very waterworn" in all areas. The ends are blunt and rounded, although this may be a product of the decomposition of the wood. The wood was also noted to be "checked" indicating that some drying out and deterioration of the wood had taken place (University of Florida Dugout Canoe Files).
Figure 8.7. Scale drawing of the Grassy Lake dugout canoe.
No mention of conservation is made in any of the notes and so it is assumed that none was attempted. No tool marks were found, although one end is described as having some burns. Measurements of the canoe indicate an overall length of 3.84 meters, an interior length of 2.74 meters, and a width amidships of .38 meters. Other measurements are included in the scale drawing of the canoe in Figure 7.16 (based on a very poor sketch made sometime after its discovery). This sketch is the only visual record of the canoe made at the time of its recovery.

Late Mississippian

The Middle Mississippian period, characterized as being relatively stable and continuing many of the earlier southeastern adaptations. In contrast, the Late Mississippian period (ca. 550 - 450 B.P.) was one of change. Bense (1994:239) suggests that the formation and fragmentation cycles inherent in complex chiefdoms resulted in large-scale population movements in the Southeast during this time. Animosity between groups may also have played a role in the changing sociopolitical environment of the southeastern chiefdoms (Smith 1986:58). Some river valleys in the Southeast were either abandoned or were so sparsely populated that they fall below the level of archaeological visibility (Bense 1994:240; Smith 1986:59). West of the Mississippi River, some complex chiefdoms collapsed permanently with their populations returning to a more Woodland way of life. The complex chiefdoms of the Late Mississippian period were fragile institutions based on the process of balancing economic interdependence with ideology and coercion. This inherent weakness led to their demise.
Climate may have played a role in the rapid changes associated with the Late Mississippian period in the southeast. Changes between 550 and 500 B.P. may be related to a short-term eastward expansion of a climatic downturn that reduced the available moisture (Barreis et al. 1976:51-52). Less moisture during the maize growing season would have had a devastating effect on cultures that relied on maize agriculture. Bense (1994:248) suggests that a combination "of political turmoil and warfare coupled with drought led to massive population emigrations that left hundreds of miles of river valleys virtually vacant."

That watercraft were involved in the political strife that defined the Late Mississippian period can be seen in the descriptions of several of the earliest historic accounts of warfare with and among the native inhabitants of the Southeast. Chroniclers of the De Soto expedition record a number of confrontations with Native Americans in dugout canoes. Kandare (1983:46) notes that the Spanish avoided military confrontation on the water because of the inferiority of their boats to native watercraft. Cabeza de Vaca records that, in 1528, Pamfilio Narvaez and his men destroyed over 30 dugout canoes during a raid on a Florida village (Covey 1961:42). Data on Late Mississippian period dugouts is summarized in Table 7.3, while the locations of known Late Mississippian dugouts are depicted in Figure 7.17.

Between 1836 and 1847, the United States Government fought to push the Seminoles of Florida off their lands. The Seminole fought a guerilla campaign primarily on the water, making short raids and then slipping back into the Everglades in their
<table>
<thead>
<tr>
<th>Canoe</th>
<th>Location</th>
<th>Age</th>
<th>Wood Type</th>
<th>Thickness</th>
<th>Height</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goose Lake 5</td>
<td>Florida</td>
<td>500 ± 50 B.P.</td>
<td>Pinus spp.</td>
<td>Unknown</td>
<td>Unknown</td>
<td>8 cm</td>
</tr>
<tr>
<td>Homochitto 1</td>
<td>Alabama</td>
<td>485 ± 60 B.P.</td>
<td>T. distichum</td>
<td>Unknown</td>
<td>Unknown</td>
<td>.41 m</td>
</tr>
<tr>
<td>Suwannee River 2</td>
<td>Florida</td>
<td>4710 ± 80 B.P.</td>
<td>Pinus spp.</td>
<td>.61 m</td>
<td>.61 m</td>
<td>4-4 m</td>
</tr>
</tbody>
</table>
Figure 7.17. Map showing the location of Late Mississippian period dugout canoes.
shallow dugout canoes (Roberts and Shackleton 1983:71). The United States responded by building pirogues and canoes of their own and pursuing the Seminoles into the Everglades. Their success was only partial, however, and a few hundred Seminole eluded the government forces and continued to live in the Florida swamps; officially they no longer existed. This is the only recorded period in which the United States fought a naval campaign against Native Americans.

Most of the canoes in these historic descriptions are rather large and Kandare (1983:94) suggests that the Late Mississippian period is an "era marked by the use of large dugout canoes for the purposes of trade and warfare." Despite these descriptions, however, two of the three dugout canoes positively identified as belonging to the Late Mississippian period are relatively small, and the third is of an unknown size. The three canoes identified from this period are not well described.

**Goose Lake 5**

On December 10, 1990 a canoe was exposed on the bottom of Goose Lake, Putnam County, Florida (University of Florida Dugout Canoe Files). The canoe was discovered resting on the surface of a layer of "very deep muck" during a period of low water. A wood sample was obtained and identified as pine (*Pinus spp.*). The sample also yielded a radiocarbon age of $500 \pm 50$ B.P. (A-7780). The canoe was described as badly degraded with one end missing (University of Florida Dugout Canoe Files). No other information is available as the canoe was left *in situ* partially buried in lake bottom deposits. The only available photograph of the canoe is shown in Figure 7.18.
Figure 7.18. The only available photograph of Goose Lake 5.

Suwannee River 2

On October 31, 1985, a dugout canoe was recovered from the Suwannee River near Royal Springs, Suwannee County, Florida (University of Florida Dugout Canoe Files). The canoe was found intact, although photographs of the canoe in 1985 cannot be located. Wood taken from the craft was identified as hard pine by Lee Newsom of the University of Florida at Gainesville. The University of Florida Dugout Canoe Files indicate that a wood sample was taken for radiocarbon analysis, but where it was sent is unknown. The
files record an age of 470 ± 80 B.P. but no laboratory number is recorded. The canoe originally measured 6.4 meters long, .61 meters wide, .41 meters in height, and 8 centimeters thick but where these measurements were taken is also unknown. The canoe has suffered since its discovery and now has one end missing. What is left of the canoe is stored at the bottom of the Silver Springs Aquarena in Ocala, Florida. There are numerous tool marks, some of which are described as having been produced by metal tools (University of Florida Dugout Canoe Files). There is also evidence of charring, indicating that the fire hollowing method was also employed. If the marks resulted from metal tools, the age of the canoe may be closer to the latter age of the sample (A.D. 1560) than to the median age (A.D. 1480).

**Homochito 1**

In April, 1974, a "well-preserved" dugout was recovered from the Homochito River, Alabama (Figure 7.19) by three Natchez, Mississippi men and was subsequently examined by archaeologists from the Florida Department of Archives and History (McGahey 1974:4). Wood samples were taken for identification and radiocarbon testing. The wood was identified as bald cypress (*Taxodium distichum*) and the radiocarbon age for the vessel was placed at 485 ± 60 BP (UGA-803). The canoe measured 4.2 meters in length with a beam of .30 meters. The current location of this canoe is unknown.

McGahey (1974:4) notes that stone adzes and burning seem to have been the methods of manufacture, and that the "interior still shows some evidence of burning." The
single platform is approximately 30 centimeters long and is rounded (Fuller 1992:2). McGahey (1974:4) also notes the presence of a hole drilled in the "stern" platform - although this is difficult to tell in a double-ended vessel such as this. This hole may represent a mooring hole used to hold the canoe in place with either a line of small pole. The hole in Homochito I has broken through the platform "as the vessel was pulled away from its mooring" (McGahey 1974:4). Some dugouts may also have holes in both ends, making for even greater ease of mooring.

The other end of Homochito I had been broken off recently, possibly during a recent spring flood which McGahey (1974:4) notes, could have been responsible for dislodging the canoe from its preservation environment. The wood of the surviving portion was noted to be in good condition although it had turned "gray-brown" in color due to weathering. The shape of the vessel was described as "essentially parallel sided with a rounded, overhanging end forming a single platform . . . [the] sides are abrupt [vertical] and bottom is essentially flat (McGahey 1986:59-60).

**Concluding Remarks**

Mississippian period dugout canoes are almost indistinguishable from earlier vessel forms, supporting the argument that all dugout canoes need to be radiocarbon dated in order to determine their actual place in the cultural context of the Southeast. Stylistically, the only true variations are found in the Late Mississippian period when mooring holes appear in the platform ends of some dugout canoes. Contrary to some views (Hudson 1981; Jobson and Hildebrandt 1980; Kandare 1983; Purdy 1991) Mississippian dugouts
are not, on average, larger than earlier dugout canoes. The exception to this is the Red River dugout which may represent a specialized craft that differed from the everyday vessels used for transportation, trade, or subsistence. According to André Penicault, another early European explorer in the Southeast:

they [Native Americans] did have boats in which they went from one place to another on the river . . . These boats may be twenty-five feet long. The savages make them of various lengths, some much smaller than others. With these they go hunting and fishing with their families . . . or wherever they want to go” (in McWilliams 1953).

Hundreds of societies, both large and small, participated in Mississippian way of life. They adapted to their local environments and relied on a varied resource base. Long-distance trade networks brought cultural continuity to the entire Southeast. Many of these societies were autonomous, but they were still tied to each other by reciprocal exchange. Despite the fact that many southeastern chiefdoms represented by sites at Moundville, Spiro, Natchez, and Fort Walton were declining, others continued uninterrupted in other areas, including the Pensacola, Dallas, and Lamar areas (Bense 1994:251). The ideas and ideologies associated with "Mississippian" were diffused over an enormous area; throughout the Southeast, the eastern Plains, and the Midwest.

The southeastern United States has long been linked to the "Southern Cult" during the Mississippian period. This system of shared themes and goods may simply reflect centuries-old trade connections rather than true behavioral linkages. Many of these themes and goods were non-utilitarian, that is they served little, if any, functional purpose, although they were undoubtedly considered valuable. They may also have been status
symbols with wide areal distribution throughout the Southeast, but with distribution within each group limited to the nobility or elite class. These societies so valued particular articles or materials that they went to great lengths and travelled great distances to obtain them (Brose 1986:8).

One of the undeniable linkages between the various cultures identified as Mississippian are dugout canoes. A total of 30 such vessels have been positively identified as belonging to the Mississippian period in the southeastern United States. This is nearly half of the canoes of known age in the present study. These canoes have been found throughout the study area and must have played an important role in not only the various systems in which they functioned, but perhaps in the very development of the Mississippian cultural period itself. Arnold (1995:733) considers the development of such craft to be instrumental in the rise of complex societies. She is careful, however, not to assign "prime mover status" to watercraft, and is merely presenting the idea that those who invest the time and energy in such technology might gain substantial benefits in the form of followers and new trade partners. It seems reasonable to suggest that those who control the means of transportation also control the trade networks and the distribution of goods and possibly technology. Domination of these commodities would go a long way toward validating the power of the person controlling them. Dugout canoes could easily have played a role in all three of what Bense (1994:251) considers the "hallmarks of the Mississippian stage . . . the development of chiefdoms, the florescence of the Southeastern Ceremonial Complex, and the expansion in platform mound centers."
CHAPTER VIII

CONTACT AND BEYOND

It is not known whether historic period craft were styled after Indian designs or Old World patterns. The two most important . . . [distinctions] are tool types (fire shaped versus metal tool worked) and environmental necessity (still pond or lake versus flowing or rough water) (Purdy et al. 1982:20).

Contact Period

The contact period in the southeastern United States begins in the early 1500s with the arrival of the first European explorers to the mainland. In 1513, Juan Ponce de Leon landed near what is now Palm Beach, Florida, searching for the mythical "Fountain of Youth" (Fagan 1995:23). The ill-fated Narvaez expedition followed in 1528; but out of 260 men, only Alvar Nunez Cabeza de Vaca, two soldiers, and a black slave survived (Covey 1961). Finally, in 1539, Hernando De Soto landed at Tampa Bay, Florida with a force of 622 men. His objectives were to find gold and establish permanent colonies in the New World (Varner and Varner 1951). From De Soto's arrival until 1542, he and his army marched and fought their way from the Florida peninsula through what is now Georgia, into southeastern Tennessee, then to southern Alabama, across Mississippi, into Arkansas, and the Louisiana territory where de Soto died (Burt and Ferguson 1973:45).

It is through De Soto's chroniclers that we learn much of the early ethnographic information on southeastern dugouts. One of these chroniclers, Garcilaso de la Vega (in Varner and Varner 1951), made the following report:
There began to appear in pursuit a most magnificent fleet of more than a thousand canoes which the caracas of the league had amassed against the Spaniards... the canoes of this great river were the largest and best that our men saw in the whole of Florida... [They] were so immense that they supported twenty-five oarsmen on each side, and in addition, held twenty-five or thirty warriors placed successively from poop to bow.

Somewhere along the Savannah River, at the Native American settlement of Cofachiqui, De Soto and his men met a cacica, a female chief who travelled in her own special canoe. She rested on cushions beneath a canopy that protected her from the elements (Roberts and Shackleton 1983:63). Despite being treated with courtesy, De Soto and his men looted a "temple" that included the burials of past chiefs and their relatives, taking and dividing some 350 pounds of freshwater pearls from the bodies of the dead. In a case of ironic justice, De Soto did not survive his entrada into southeastern North America. He died of a fever somewhere along the Mississippi River and his men, attempting to conceal their leader's death from the Native Americans, may have buried him in the river in a weighted dugout canoe (Roberts and Shackleton 1983:64).

In the 1560s, two unsuccessful French expeditions entered the southeastern United States (Fagan 1995:25). Apart from these intrusions, the Southeast was left alone for more than 100 years. By the time Europeans returned to the region, native populations had declined sharply and many settlements had been abandoned. Bense (1994:256-257) presents the notion that "viruses, germs, and parasites" introduced by Europeans and Africans killed a great many Native Americans. No one knows when or how the first European infected a Native American, although Ramenovsky (1987) has found a strong correlation between the arrival of Europeans to the New World and the decimation of
Native American populations - especially in three regions: the middle Missouri Valley, central New York, and the lower Mississippi Valley.

Southeastern Native American nations are generally divided between inland populations and coastal peoples who lived along the Gulf of Mexico, Florida and the Atlantic coasts with some extension to the Alabama piedmont (Burt and Ferguson 1973:35). Fishing and collecting mollusks were important for subsistence, especially along the Atlantic coast, the Florida peninsula, and the Gulf coast. Groups such as the Chitimachas and others, sought turtles and their eggs. According to Burt and Ferguson (1973:80), "in Florida, one of the first Spanish observers, Lopez de Velasco, reported that the Calusas and Tekeetas hunted the sea cows, or manatee, for food, tusks, and raw material for leather." Hunting sea cows and manatee would have been facilitated by the use of dugout canoes not only for hunting but also for towing the carcasses back to shore.

During the three centuries following European arrival into the Southeast, England, France, and Spain occupied some portion of the region. Epidemics and the Spanish Mission system had a profound effect on southeastern Native American populations. The epidemics decimated aboriginal populations so that effective resistance was almost impossible and the Catholic missions were established to control the surviving natives.

While current research focuses on prehistoric dugout canoes, numerous historic or post-contact period dugouts have also been encountered throughout the southeastern United States. Many of these boats are tucked away in small museums, private homes, warehouses, and barns. Historic accounts indicate that these vessels played a key role in
the European presence in the Southeast. Thus, there is a need to analyze and record the materials, methods, and tools utilized in dugout manufacture and especially the context in which these craft were discovered. The recovery of archaeological specimens will add a wealth of information on native adaptations to changing technology as well as the social and political scene and to the exploration, development, and ultimate conquest of North America by European settlers.

Europeans were quick to grasp the necessity for small, maneuverable boats with which to traverse the thousands of miles of coastal and inland waterways in the southeastern United States. The region is a maze of interlocking creeks and rivers with mud and sandbar-choked channels and swift currents that are shallow and hard to spot from the sea (Fleetwood 1982:15). Because of the narrow, meandering nature of the waterways, sails could be used only sporadically, and thus oar power provided the most desirable mode of propulsion. There is no evidence to suggest that European explorers attempted to make bark canoes in the Southeast. This may be due to the geographic limitation of tree species with acceptable bark for canoe production, making the construction of boats from whole logs a necessity (Pittman 1970:52; Swanton 1946:596).

When French settlers entered the Southeast, they adopted the native dugout, which they called pirogue, primarily because of its performance and because there was little else from which they could choose. The cost and time involved in sawing out planks for conventional small boat construction was also a likely contributing factor - almost any settler with an axe or adze could chop out a small, usable boat easily and cheaply. The
ends of the log were often shaped after the design of the yawl (Fleetwood 1982:28) and longboat, with a pointed bow and square stern, enabling the dugout to slip through the water more easily. Oars might then be fitted, allowing the propulsion of heavier loads or providing easier movement against the current.

Ethnographic studies of canoes utilized in this century (Knipmeyer 1976; Pittman 1970) reveal that the form of aboriginal dugouts did not change much after contact. It is unlikely that dugout canoe forms were modified to any great extent by European influence, although European knowledge of the use of metal tools was certainly adopted by Native Americans to expedite dugout canoe construction (Figure 8.1). The dugout canoes used by the Native Americans were simply so well adapted to the environmental conditions that such changes were unnecessary. It is probable that European influence was felt more in terms of adding planks to dugouts to raise their freeboard and the using sails for propulsion than in the abandonment of traditional vessel forms.

The use of metal tools in constructing a dugout is an important archaeological consideration. The presence or absence of metal tool marks on a dugout canoe are one of the key factors in a preliminary determination of the age of the vessel. Pittman (1970:2) states that "the acquisition of metal tools was probably important to Indians of the southeast coast areas because trees having suitable bark for constructing bark canoes are few or do not exist there." The use of metal tools would have sped up the process of dugout canoe making and may have allowed more people to construct dugout canoes.
Dugout canoes produced during the Contact period closely resemble those produced during the earlier Mississippian period with the exception of their size. Canoes in the Contact period average 6.3 meters in length compared to 4.95 meters for canoes from the entire Mississippian period. This is probably due to the use of metal tools which increases significantly the speed and efficiency at which one can produce a dugout canoe. It was also no longer necessary to burn the wood as an aid in hollowing the log. Data for Contact period dugout canoes are presented in table 8.1.
Table 8.1. Contact period dugouts.

<table>
<thead>
<tr>
<th>Canoe</th>
<th>Location</th>
<th>Age</th>
<th>Wood Type</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crooked Lake 3</td>
<td>Florida</td>
<td>440 ± 50 B.P. (No Lab #)</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Hancock Lake</td>
<td>Florida</td>
<td>380 ± 50 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lake Salvador</td>
<td>Louisiana</td>
<td>346 ± 83 B.P.</td>
<td><em>T. distichum</em></td>
<td>8.33 m</td>
<td>.61 m</td>
<td>Unknown</td>
<td>5 mm gunwale</td>
</tr>
<tr>
<td>2 16SC49</td>
<td></td>
<td>LAGS-3.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Georgetown</td>
<td>Mississippi</td>
<td>340 ± 70 B.P.</td>
<td><em>T. distichum</em></td>
<td>5.44 m</td>
<td>.55 m</td>
<td>.35 m</td>
<td>12 mm gunwale</td>
</tr>
<tr>
<td>Stricklin 4</td>
<td>Florida</td>
<td>320 ± 80 B.P.</td>
<td><em>Pinus spp.</em></td>
<td>5.95 m</td>
<td>.57 m</td>
<td>.32 m</td>
<td>Unknown</td>
</tr>
<tr>
<td>Malone Lake</td>
<td>Mississippi</td>
<td>280 ± 50 B.P.</td>
<td><em>T. distichum</em></td>
<td>7.3 m</td>
<td>.40 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Shubuta</td>
<td>Mississippi</td>
<td>280 ± 45 B.P.</td>
<td><em>T. distichum</em></td>
<td>4.5 m</td>
<td>.49 m</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Dugout canoes provided "highways" for communication and trade to both the prehistoric and historic inhabitants of the southeastern United States. They also provided safety and utility in an environment filled with swamps, dense vegetation, dangerous animals, and harmful insects (Fleetwood 1982:15). Some Natchez Indian canoes were more than 12 meters long and could carry as much as 12 tons of people and cargo (Purdy 1986:9). In 1700, at Biloxi, Mississippi, the governor had "12 pirogues 30 to 35 feet long" constructed (Dunbar and Sanders 1929:11). The capacity of such large canoes was recognized by a Mr. Hudnel who, just prior to the United States Civil War, commissioned the Seminole Indians of Florida to construct a dugout canoe for his use in hauling crates of oranges from his groves on the St. Johns River (Purdy 1986:9). This same canoe was later purchased by a Mr. Bartley who used it to haul wood to Jacksonville. Knipmeyer (1976:110) reports that "in 1900 dugouts were still being used for ferrying and fishing on nearly all the large streams in Louisiana." This statement is borne out by the discovery of several late 19th century dugout canoes in Louisiana.

To date, seven dugout canoes have been identified as Contact period vessels in the southeastern United States. The locations of those that have known proveniences are depicted in Figure 8.2.
Figure 8.2. Map showing the location of Contact period dugout canoes.
Harrisonberg

Included among these are the so-called "400-year-old-canoes." Almost invariably, when a local informant reported a dugout canoe he or she had found, it had to be "at least 400 years old." This was true of the canoe on display at the Harrisonberg County Museum in Harrisonberg, Louisiana. In 1994, Mr. Emmet R. Book, Sr., Secretary-Treasurer of the museum, allowed me to study the dugout. This analysis proved the canoe to be much younger than its reported 400 years. Not only were the marks of metal tools clearly visible on the interior and exterior of the canoe, but another remarkable feature was also found on the exterior of the vessel which confirmed the recent-age hypothesis. There, a small metal plaque, long overlooked that had been attached which reads "This canoe was made in 1926 on the French Fork River by Cyrus Ketchens (deceased) using a foot add" (foot adze or sideways axe).

Marksville

Another dugout is located in Marksville, Louisiana at the site of the Marksville mound group. Ward Zischke, Staff Archaeologist at the museum, kindly granted me access to the canoe for photographs and recording and allowed the taking of a small wood sample for identification. He also noted that the canoe was "probably at least 400 years old." However, based on what appear to be metal tools marks on the exterior, as well as small wire nail holes across both ends of the vessel, a post-contact date of construction is most likely (Figure 8.3). This 4-meter-long cypress dugout did have several interesting features - along the bottom length of the canoe were several small, round holes which
Figure 8.3. The Marksville dugout on display in Marksville, Louisiana.

penetrated entirely through the wood (Figure 8.4). A wooden peg was found protruding from one of the holes in the dugout which Purdy (1991:275) notes was a "commonly . . . employed manufacturing technique" of the historic Seminole Indians of Florida. At least five canoes recovered from Florida have these "gauge holes," two of which still have their plugs in place. Knipmeyer (1976:110), in his study of folk boats in French Louisiana, noted that the thickness of the hull was gauged by drilling auger holes, usually at the curvature where the bottom and sides of the boat met. When the canoe was finished, the holes were plugged and sometimes caulked with pitch.
Swan Lake

The Swan Lake canoe, introduced in chapter III, was found in 1989 during dredging operations in Washington County, Mississippi (Fuller 1991:i). The canoe was complete and very well-preserved and the location of the canoe and the associated artifacts were designated as archaeological site 22WS776. According to Fuller (1991:i) the canoe appears to be resting where it was abandoned - it was in situ.

The artifacts recovered with the canoe were primarily shell tempered and dated to no later than "the 14th century AD" (Fuller 1991:28), although the time range for the
pottery described is A.D. 1000 to A.D. 1500. Because the pottery is badly eroded, Fuller (1991:24) believes that it may have been transported in the water and was deposited before the canoe. The position of the canoe in the bank suggested that it may have been intentionally beached and then acted as a "bankline jetty, accumulating load materials carried by the stream [including artifacts]" (Fuller 1992:8). Lithics recovered with the canoe consisted of nine unmodified flakes of local chert gravels (Fuller 1991:31). The faunal remains included fish, turtle, and reptile bones, white-tailed deer bones, and freshwater snails and mussels, none of which show any evidence of cultural modification.

The canoe itself was made from a single Bald cypress log (Fuller 1991:41). A sample of wood sent to the Center for Radiocarbon Assessment yielded an age of 304 ± 44 B.P. (UGA-6026), calibrated to either 1514-1598 or 1620-1646 based on Stuiver and Pearson (1986). Samples of the wood were also submitted to David Stahle of the University of Arkansas for dendrochronology. Stahle could not match the sample back to either A.D. 1522 or A.D. 1563 (Fuller 1992:7), perhaps indicating that the true age of the canoe is closer to the earlier calibration age of 1514. If this is true, the canoe was made sometime before the arrival of the first Europeans to the Southeast. Principal dimensions of the canoe were taken during its recovery (Fuller 1992:11):

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum length</td>
<td>7.51 m</td>
</tr>
<tr>
<td>Maximum interior length</td>
<td>6.46 m</td>
</tr>
<tr>
<td>Maximum exterior width</td>
<td>.71 m</td>
</tr>
<tr>
<td>Maximum interior width</td>
<td>.675 m</td>
</tr>
<tr>
<td>Maximum outside height</td>
<td>.35 m</td>
</tr>
<tr>
<td>Maximum inside depth</td>
<td>.31 m</td>
</tr>
<tr>
<td>Average gunwale thickness</td>
<td>1.5 cm</td>
</tr>
<tr>
<td>Average side thickness</td>
<td>3 cm</td>
</tr>
</tbody>
</table>
Average bottom thickness 4 cm
Stern platform length .55 m
Stern platform width .71 m
Stern platform thickness 5 cm
Bow platform length .50 m
Bow platform width .55 m
Bow platform thickness 4 cm

Charred patches at either end of the canoe indicate that it was made with the use of controlled fire, and the quality of finish (symmetrical, uniform thickness of sides or bottom, and platforms) shows a high degree of workmanship. The canoe is rounded in cross-section with platforms at both ends (Figure 8.5). One end is narrower, leading Fuller (1991:41) to suggest that this may be the bow. Both platforms were split either during manufacture or while in use and appear to have been repaired by lacing. In Figure 8.5, holes that represent repairs can be seen on either side of the cracks on both platforms: the edges of these holes nearest the cracks show evidence of wear. The crack in the "bow" is deep, extending into the bottom of the hull. Fuller (1991:41) suggests that the canoe would have taken on water and this may be the reason it was abandoned.

The platform at the end identified as the bow also has a hole similar to those described on earlier vessels as mooring holes. In the case of the Swan Lake dugout, the hole is rectangular through which either a pole or rope could be inserted to hold the canoe in place. This may have allowed for a "free-floating moorage" in which the canoe could rise and fall with changing water levels (Fuller 1991:41).
Figure 8.5. Scale drawing of the Swan Lake dugout canoe.
The vessel was abandoned at some point and became buried when the silts and clays of the oxbow settled out of suspension and covered the canoe. Because of the low energy associated with the settling of suspended sediments in an oxbow lake (Waters 1992:141-142), the buried canoe was well-preserved.

Despite the obviously historic age of the canoe, it is described as "prehistoric" and therefore Native American based primarily on the method of manufacture and its resemblance to other, older canoes. The age of the canoe (ca. A.D. 1500 - A.D. 1600) places it in the Russell Phase at the end of the Mississippian period in northwestern Mississippi (Williams and Brain 1983:Fig. 11.4), although the artifacts associated with the canoe are more likely related to the Winterville Phase (Fuller 1992:6). There are several sites along the margins of Swan Lake that date to the approximate age of the Swan Lake canoe. Most of these sites are villages or hamlets clustered around small mound centers such as the Law site located nearby (Fuller 1991:57).

Finally, according to Fuller (1992:9), the Swan Lake canoe differs from other similar canoes (e.g. Alabama River, Homochito 1, Tombigbee 1) in that it is longer and wider with larger, longer platforms and it is the only canoe to show evidence of having been repaired. The Swan Lake dugout is slightly later than the other canoes mentioned above and Fuller (1992:9) submits that "it is tempting to suggest that some of the differences are temporal." However, the sample size is small and the major differences are simply in size, not in style. Stylistically speaking, all of these Contact period canoes are
remarkably similar and may represent a style that is in general use along the Gulf Coastal Plain during the latter stages of the Mississippian period.

It is interesting to note that this is one of the finest examples of dugout canoe manufacturing found anywhere. This may be due to the result of its excellent preservation; the canoe is also one of the best preserved dugouts in the region. There is no sign of metal tool marks anywhere on the vessel and it is likely that the canoe was made entirely with stone tools.

**Lake Salvador Dugout #2**

In 1985, employees of the Louisiana Department of Wildlife and Fisheries discovered a dugout canoe on the shore of Lake Salvador while posting signs (Louisiana Department of Culture, Recreation, and Tourism 1985c:1). The canoe was designated as archaeological site 16SC49. The vessel was described on the basis of an educated guess to be made of bald cypress (*Taxodium distichum*). The canoe is C-shaped in cross-section but has a slight flattening to the bottom with a slight tumblehome (Figure 8.6). Radiocarbon samples were taken and sent to the Louisiana Geological Survey which placed the age of the craft at 410 ± 90 B.P. (LAGS-3.14), 330 ± 80 B.P. (LAGS-4.141), and 300 ± 80 B.P. (LAGS-3.142). Based on these dates, the canoe has been assigned to the Plaquemine culture of the Historic period. However, such limited information provides, at best, a tenuous identification. The canoe is now on display at the Acadian Village Missionary Museum in Lafayette, Louisiana.
The overall length of the canoe is 8.33 meters, the maximum width is .61 meters, and the hull thickness of the gunwales amidships is 5 centimeters (Figure 8.7). The overall condition of the vessel is good, although one end is severely degraded and the tops of the gunwales are missing. There are also several large cracks in the bottom running longitudinally down the length of the canoe. There is no information available regarding the canoe's conservation; it appears to have been treated with polyethylene glycol (although not very well). Two charred areas are present; one on the interior approximately
amidships and the other on the degraded end seen closeup in Figure 8.8. These areas probably indicate that fire-hollowing was the method of manufacture. There are no tool marks present on the craft and the average age of A.D. 1604 indicates that it may have been made by Native Americans as yet unfamiliar with metal tools; or at least did not use them on this canoe.

Figure 8.8. Closeup of a charred area on one end of Lake Salvador 2.
Georgetown Canoe

This vessel was discovered near the Pearl River in Copiah County, Mississippi and was manufactured from a single bald cypress log using metal tools (McGahey 1986:60). The vessel had parallel and vertical sides with squared ends and a flat bottom. Purdy et al. (1982:22) note that the prow of this vessel angles upward and is similar in appearance to the Malone Lake dugout discussed below. No photographs exist, but I did produce a line drawing based on a sketch and description of the vessel (Figure 8.9). Three probable gauge holes had been bored in the bottom of the craft, one of which still had a wooden peg protruding from it (McGahey 1986:60). At some point, the bottom of the canoe had been chopped through. Had this occurred during construction, the vessel would not have been used. this may also have occurred later, but it would difficult to tell the cause of the damage. The canoe was not conserved and has not survived.

Samples of wood taken from the canoe were radiocarbon dated to 340 ± 70 B.P. (UGA-3135). The following measurements were taken from the vessel (McGahey 1986:60):

Length: 5.44 m
Width: .55m
Height: .35m
Hull thickness: 12mm
Figure 8.9. Scale drawing of the Georgetown dugout canoe.
**Malone Lake**

In July of 1980, a dugout canoe was discovered and removed from Malone Lake, Monroe County, Mississippi (Purdy et al. 1982:ii). The lake is an oxbow of the Tombigbee River still located in the active floodplain. Purdy et al. (1982:5) noted that the burial environment of the canoe consisted of "mixed wood debris (branches, trunks, bark, etc.). The canoe lay in the bank, resting on a thin (3-4 cm) layer of well-sorted and rounded pea gravel overlying a blue-grey coarse sandy stratum." In 1981, the canoe was conserved with polyethylene glycol at the University of West Florida Archaeological Laboratory. Wood samples were taken for radiocarbon dating and an age of 280 ± 50 B.P. (Dicarb.-1899) was obtained. This age is calibrated to between A.D. 1541 and A.D. 1842. Purdy et al. (1982:18) note that during this period the historic Chickasaw lived in the territory in which the canoe was found, but the style of the canoe more closely resembles later European dugouts in which one end is pointed and the other is squared or has a platform. Known prehistoric or Native American dugouts are typically double-ended and do not have squared ends.

The canoe was manufactured of cypress (*Taxodium spp.*) using metal tools, the marks of which appear to be from an axe and are found on both the bottom and sides of the vessel (Purdy et al. 1982:7). The bow is pointed and angles upward for 85 cm (Figure 8.10). The stern is squared with an overhanging platform and it is also angled, but only for 50 cm. The maximum length of the canoe is 7.3 meters while the width amidships is
Figure 8.10. Scale drawing of the Malone Lake dugout canoe.
40 cm, the bow width is 20 cm, and the stern width is 35 cm. The gunwales have degraded badly and could not be measured.

**Historic Period**

With the establishment of the first permanent European settlements in the Southeast, the Historic period (ca. 280 B.P.- present) begins and the fate of Native American culture was sealed. England and France began to encroach on Spanish territory; England along the Atlantic Coast by A.D. 1700 and France in Louisiana before A.D. 1720 when the French deerskin trade network was established (Bense 1994:300). Many groups of Native Americans participated in trade with the Europeans, but, by the 18th century, many more were being "removed" from the Southeast. Former native lands became farms, plantations, and towns for the new settlers. In the eighteenth century, members of the Creek Nation moved into what is now Florida, bringing with them the Creek canoe, described by Roberts and Shackleton (1983:68) as "a simple dugout designed for river use." These vessels are typically long and shallow, perfect for travel in relatively shallow water.

Kandare (1983:96) defines several stages in the development of dugout canoes in the Southeast ending with "The Decadence Stage" which correlates with the Historic period. Unfortunately, however, many of the traditions of Native American dugout canoe building have been lost since the arrival of Europeans to the continent. Indeed, Pittman (1970:1) argues that today, few dugout canoes are still being constructed in the southeastern United States by any Native American group. With the exception of those
made by the Seminole Indians, all canoes produced in the southeastern coastal areas were made by Euro-Americans. The Seminole continue to build and use traditional dugout canoes, although these are constructed now using metal axes and adzes.

Besides the introduction of metal tools, deforestation also played a major role in the decline of dugout canoe building in the Southeast. Kandare (1983:97) records that the forests were depleted of trees large enough to make a dugout canoe. In the late 1790s, naturalist William Bartram recorded seeing cypress trees with straight trunks that stood 90 feet high with diameters as large as 12 feet (Roberts and Shackleton 1983:68). No such trees exist anywhere in the region today.

Many European explorers and settlers either used or built their own dugout canoes in the southeastern United States. In the 1790s, Bartram travelled through the Southeast in a small cypress dugout describing both the natural and cultural environment. American writer Kirk Munroe made a similar journey in the early 1800s and he recorded some notable changes in Native American vessel design (Roberts and Shackleton 1983:68). These changes included the adoption of sails and the addition of washstrakes to the upper edges of the dugout gunwales. Not all Europeans were impressed by the native dugout, however. One man, Ebeneezer Cook, wrote in 1708 (in Roberts and Shackleton 1983:75):

The Indians call this Watry Waggon
Cannoo, a Vessel none can brag on;
Cut from a Poplar-tree or Pine
And fashion'd like a trough for Swine;

But the dugout canoe was important to many of the new settlers in the Southeast. Historic accounts abound with stories of the use of dugout canoes as cargo vessels
(Hudson 1976; Kandare 1983; Swanton 1946). Records indicate that both white settlers and later black freemen used dugout canoes for inland and coastal transport of people and goods until as late as the early 20th centuries and even up to modern times (Knipmeyer 1976; Pittman 1970; Purdy et al. 1982; Willis 1978). Other than these records and the canoes themselves, however, there is no archaeological evidence of canoe cargos. Unless we find a dugout canoe buried with a cargo, trade must be inferred from the archaeological record with help from the ethnohistorical record. Such finds may not be impossible, Wheeler et al. (1975) conducted a search for artifacts from the fur trade in various lakes and streams along the Minnesota-Ontario border. The environment of the region is not unlike that of the southeast; at least in terms of the water systems, described by Wheeler et al (1975:ix) as a "maze of interconnected lakes and streams." Through fourteen years of underwater search and survey they were able to recover hundreds of artifacts, including organic remains lost or discarded by French fur traders hundreds of years earlier.

In the Southeast, five dugouts have been identified as Historic in age and these are summarized in Table 8.2. Historic period dugouts with known proveniences are depicted in Figure 8.11.
Table 8.2. Historic period dugouts.

<table>
<thead>
<tr>
<th>Canoe</th>
<th>Location</th>
<th>Age</th>
<th>Wood Type</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Pearl River</td>
<td>Mississippi</td>
<td>185± 45 B.P. UGA-2413</td>
<td><em>T. distichum</em></td>
<td>5.9 m</td>
<td>.72 m</td>
<td>.60 m</td>
<td>Unknown</td>
</tr>
<tr>
<td>Steele Bayou</td>
<td>Mississippi</td>
<td>175 ± 55 B.P. UGA-1352</td>
<td><em>T. distichum</em></td>
<td>2.63 m</td>
<td>.44 m</td>
<td>.30 m</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lindsay</td>
<td>Mississippi</td>
<td>150 ± 55 B.P. UGA-2032</td>
<td><em>Pinus spp.</em></td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Homochito 2</td>
<td>Mississippi</td>
<td>86 ± 75 B.P. UGA-4790/A/B</td>
<td><em>T. distichum</em></td>
<td>4.9 m</td>
<td>.65 m</td>
<td>.50 m</td>
<td>Unknown</td>
</tr>
<tr>
<td>Texas Memorial Museum</td>
<td>Texas</td>
<td>100 ± 60 B.P. U.T. X-7562</td>
<td>Salicaceae spp.</td>
<td>4.4 m</td>
<td>.80 m</td>
<td>.40 m</td>
<td>10 cm deck 4 cm gunwale</td>
</tr>
</tbody>
</table>
Figure 8.11. Map showing the location of Historic period dugout canoes.
Texas Memorial Museum

In 1991, I examined a dugout canoe in the possession of the Texas Memorial Museum in Austin (Figure 8.12). The canoe had been donated to the museum sometime in the 1930s and was assumed to have been built by the Karankawa Indians of the Texas Gulf Coast approximately 400 years ago, another example of the 400-year-old dugout syndrome (Elaine Sullivan, personal communication 1991). The vessel was on display at the museum until the 1970s when it was removed and placed in storage in the museum's warehouse. Unfortunately, storage consisted of suspending the canoe from the warehouse rafters using nylon ropes. The ropes have cut into the sides of the canoe and done considerable damage. Also, the canoe has been pierced by a number of wire nails when a display sign was added in the 1950s. This period also saw the addition of a metal bracket used to hold a sign warning people to keep off or they could damage the artifact. One end of the canoe has been seriously damaged by its use as a playground for children visiting the museum and by their use of one end as a springboard from which they jumped. That end of the vessel has been broken and hangs at an awkward angle.

The canoe itself is made from a single log belonging to the family Salicaceae, which includes willows and cottonwoods (Phil Dering, personal communication 1991). A more specific identification (i.e. genus and species) could not be determined due to the extreme similarities of the structures of these woods. Dering (1991:personal communication) did note that the color of the wood is more representative of willows, but the extremely dry and degraded condition of the wood makes this a fairly speculative
identification. Trees in the Salicaceae family have a wide distribution covering much of the temperate latitudes. Swanton (1928:689) noted that, regarding dugout canoe manufacturing, "the trees used for this purpose were usually cypress, though some larger ones were made of cottonwood [Salicaceae]."

The vessel is in fair condition although the wood was significantly degraded - possibly due to rubbing or ordinary wear. Sullivan (personal communication 1991) indicated that, as far as she knew, no attempt was ever made to conserve the canoe and it has suffered greatly through neglect and mishandling. Total length of the vessel at the
time of examination was 4.4 meters with a maximum beam of 1 meter and a maximum depth of .45 meters (Figure 8.13).

None of the original tree surface remained on the vessel, nor did any of the bark survive. There is also extensive erosion of the wood grain, indicating long-term exposure. The bottom of the canoe is relatively flat and no evidence was found to indicate that the wood was charred during construction. Along the bottom of the canoe a series of parallel cuts can be clearly seen. The 5-6 cm long cut marks have fine edges and are narrow and deep, indicating the use of a straight-bladed, square metal tool. These are very similar to the marks found on the Malone Lake dugout from Mississippi which Purdy et al. (1982:10) describe as the result of a "steel axe." Willis (1981:9) notes that "stone axes (and adzes) are incapable of such cutting and even shell adzes leave wider cuts, usually with a noticeable curvature in their length." Purdy (1991:273) agrees, comparing the "broad-bladed tool marks of a metal axe" to "the tooling marks found on prehistoric canoes, (which) when present, generally indicate a tool with a rounded bit." Each series or set indicates the use of a technique similar to that described by Willis (1981:11) for squaring timber.

a series of cross-grained, parallel cuts were made in a line or arc that is defined by the comfortable reach of the arm in working. This is to break the grain and prevent splits from travelling too deep into the bottom. The second step consists of splitting off the pieces isolated by the cuts, by turning the edge of the axe from a vertical to a horizontal position. This is a very efficient way to quarry wood from a log.

Radiocarbon dating for the canoe was performed by Salvatore Velastro of the University of Texas at Austin Radiocarbon Laboratory. The resulting age, 90 ± 40 B.P.
Figure 8.13. Scale drawing of the Texas Memorial Museum dugout canoe.
(UTX-7562) indicates that the canoe was built recently. The last of the Karankawa moved to Mexico around 1840, and by 1855 not more than six or eight survivors remained, living near San Fernando in Tamaulipas (Shuffler 1970). Thus, the Texas Memorial Museum Dugout cannot be of Karankawa origin, although certainly these Native Americans had a long tradition of watercraft use. Tradition holds that, after the Karankawa's final defeat at the hands of the Texas settlers around 1840, "a single surviving 'war canoe' put out to sea to be swallowed by the foam-crested waves of the Gulf" (Atkinson 1953:149).

This canoe more likely represents what Purdy et al. (1982:20) call a "unidirectional" vessel. With its pointed and angled bow and squared off stern, this canoe fits into a style that seems representative of European-built vessels that are made to resemble more traditional European boats constructed out of planks. According to Willis (1978:27-28), style is "the function of tool types, cultural affinity, and environmental necessity." Metal tools, European culture, and the changing nature of the environments and the waterways in the latter part of the Historic period all contribute to vessels that are distinctly separate from those made by the prehistoric inhabitants of the southeastern United States.
CHAPTER IX

CONCLUSIONS

To date, over 400 dugout canoes have been reported from the southeastern United States, and yet the dugout's role in southeastern prehistory and history is poorly understood. This will change once archaeologists, historians, and the public recognize the importance of these significant artifacts. Often when dugout canoes are discovered in archaeological contexts, they are either ignored or given only minimal protection. McGrail (1982:7) notes the general lack of good evidence for early water transport around the world, but criticizes archaeologists for generally failing to evaluate and make deductions from the evidence that is available. Unfortunately, most of the southeastern canoes that have been studied properly have turned out to be historic in age (Fuller 1991; Purdy et al. 1982; Willis 1981). The only prehistoric dugout to be studied with any detail is the Ringler dugout, and it is from Ohio, not the Southeast (Brose and Greber 1982). Thus, there are huge gaps in our knowledge base related to the development and use of dugout canoes in the southeastern United States.

In this dissertation I have shown that the archaeological and ethnohistorical records can tell us much about the development and function of dugout canoes in the prehistoric southeastern United States. Written records regarding dugout canoe use can be traced back to the early 1500s. Many of these, however, may be inaccurate. Garcilaso de la Vega, who is one of De Soto's oft cited chroniclers, is not considered the most factual recorder
and this may be true of other historic accounts (Roberts and Shackleton 1983:64). The Native Americans, of course, left no written records.

The archaeological sample, while large, is not well documented, and is scattered over space and time, making far-reaching conclusions difficult. As Purdy et al. (1982:24) so aptly put it; "there are relatively few basic and readily preserved design options which are wholly culturally determined when one is hollowing out a log to make such a basic, functional water craft." Attempting to develop a system of stylistic taxonomy is made difficult by the fact that few of the canoes in the archaeological record have been properly recorded and fewer still have been radiocarbon dated. Consider these factors along with problems of provenience. Dugout canoe are seldom found associated with other cultural materials and most are found in a secondary context. An abandoned dugout seldom takes its "rightful place" in the proper context of its own culture. Instead, it usually floats, partially waterlogged, for years along a shoreline or downstream in a river before finally coming to rest in a place free enough of bacteria and other wood destroying organisms that it is preserved in the archaeological record (Purdy et al. 1982:24).

Most researchers have not taken the presence of watercraft into account in formulating Native American adaptive models, especially those of the Paleoindians (Englebrecht and Seyfert 1994:221). That is true, primarily because, as yet, there is no archaeological evidence for dugout canoes from the Paleoindian Period (Purdy 1991:267). And yet, this may change. Circumstantial evidence such as the settling of islands during the Paleoindian period means that some rudimentary form of watercraft must have existed.
Perhaps a Paleoindian dugout has already been found, but not studied properly and therefore no age determination was made. More than 80 percent of the total number of dugout canoes from the Southeast have not been dated. Unfortunately, neither have most of them been properly conserved. Of the more than 400 dugout canoes examined in this study, only 100 or so remain available for direct study. Of these, many have been treated with various conservation chemicals so that if funding were available the wood would no longer be suitable for radiocarbon dating. It leaves one wondering why you would spend several thousand dollars conserving a dugout canoe without spending an additional $250.00 to find out its age; but this has been a fairly common occurrence. In her studies of Florida dugouts, Purdy (1991:267) reports that "most of the canoes have not been dated by radiocarbon analysis." As part of the research for this dissertation 30 dugout canoes from Florida were radiocarbon dated. Considering, however, that there are over 250 canoes reported from Florida alone, that is a very small drop in a very large ocean.

Kandare (1983:99) also reports that "the socio-economic implications of these finds [dugouts] have largely been ignored." This is true for almost all systems operating in the prehistoric Southeast; subsistence, warfare, transportation, the rise of complex societies, and the flow of goods and ideas. According to Brose (1986:8):

from at least the Late Archaic to the Late Mississippian periods in the Eastern Woodlands, there existed aboriginal societies that so valued particular materials or objects that they were willing to obtain these at considerable cost in time and energy, frequently from distant sources and from differing societies, and often for little functional and technological advantage or discernable practical benefit.
Huge amounts of energy must have been expended in the creation of even a single
dugout canoe. Experiments involved in this study indicate that a small dugout canoe
carved using fire and stone adzes must have taken two people a minimum of 20 8-hour
days to complete a dugout of about 2 meters in length. According to Purdy (1991:183)
such large expenditures of energy are significant in and of themselves. The benefits for
the owner of such a vessel, however, may have outweighed the costs involved in
producing it. Arnold (1995) has made a compelling argument tying advances in watercraft
to the development of complex societies, arguing that "as tools representing wealth and
high standing within a community, sophisticated forms of watercraft could become part
of the strategy of aspiring elites to dominate others." The current study has shown that
dugout canoes were present during the period in which complex societies
developed in the southeastern United States. In fact, the Red River dugout, the largest
dugout in the New World, was made during the early stages of the Mississippian period
when social inequality was becoming an important aspect of prehistoric society. The
emergence of elites during this period was most likely based on the advantages of
controlling trade throughout the region. The development of most modern states depended
heavily on water routes and in many places today, major activities occur along waterways
(Purdy 1991:284). In 1984, Mueller and Purdy (5) wrote that "until the advent of cars and
trains, steamboats were the lifeline that linked Florida's people and resources to the rest
of the world." In the prehistoric southeast, dugout canoes played the same role.
In 1961, Arthur Petzold identified a dugout canoe workshop at the Eaton Site in Massachusetts based on the presence of lithics and a log-shaped burned area. Kandare (1983:6) states that "no dugout canoe construction site has ever been identified in the Southeast," and that Petzold's find is the only one "identified in the entire eastern United States." In 1971, however, an unfinished dugout was found in Fort Lauderdale, Broward County, Florida (University of Florida Dugout Canoe Files) (see Chapter 3). One end of the log is shaped into a point and the general appearance of the exterior indicates that the outside was worked first and that it is fairly complete. The interior, however, was only just begun when the task was abandoned for some reason. The opposite end of the log was never worked. This end still has the base of the tree where the roots begin to expand and, while charred, shows no evidence of tool marks. The log was not dated although the wood has been identified as pine (Pinus spp.) (University of Florida Dugout Canoe Files). The log was soaked in 240 gallons of white glue for six months and is now on display at the Broward County Archaeological Society in Fort Lauderdale. While no other artifacts were associated with the find, it is noteworthy because it shows a canoe in the process of being constructed.

Styles also vary greatly with a few generalizations possible. For example, the earliest dugout canoe from the Archaic period tend to be blunt-ended and thick. They are also very heavy. It is difficult to imagine that such craft could ever have been portaged. Woodland period canoes tend to be larger, but they are still rather heavy, thick-sided vessels with blunt ends. An exception would be the Dog Island canoe which has a
platform at one end; a common feature in later Mississippian vessels. During the Mississippian period, canoes tend to get smaller, although the Red River dugout is an early Mississippian example that is almost 10 meters long. The sides of these dugouts tend to be more finely constructed and the bottoms are not quite as thick. The appearance of true platforms at both ends is a distinctly Late Mississippian feature that appears only in Alabama and Mississippi; there are none of this type farther east. It is important to remember, however, that all of these characteristics are broad generalizations and there seems to be a great deal of overlap depending on the wood type used and on how the wood was worked. At this point in the investigation, it would be nearly impossible to look at a dugout canoe and make more than an informed guess as to time period based on wood type and style.

One sure diagnostic feature for the chronological placement of dugout canoes is the presence of metal tool marks. Such marks are an indicator that the canoe is post contact in age. And yet, the term "post contact" still implies a span of more than 400 years. Some authors have argued that the presence of gauge holes may also be a sign that distinguishes pre-contact and post-contact watercraft, such holes being used in the post-contact period. This may be true, but it is not true that only Europeans used such construction methods. Purdy (1991:275) reports that the historic Seminole commonly used this manufacturing technique. Whether the Seminole adopted this technique from European boatbuilders or whether Europeans adopted it from Native Americans is unknown. The fact that no pre-contact craft have them may indicate that this was
originally a European practice. The Seminoles also adopted thwarts and sails (Purdy 1991:275-276), both of which are decidedly European traits.

Numerous authors (Cushing 1896; Fuller 1991; Kandare 1983; McGahey 1974; Purdy 1991; Swanton 1946) have also suggested that dugout canoes get larger as time progresses. When the average lengths and widths of prehistoric southeastern dugouts are compared, however, the largest vessels are found during the Late Woodland period (Figure 9.1). Contact period dugouts are the largest overall, but this may represent the introduction of metal tools which made the construction of larger dugouts much easier. Canoe size drops off in the Historic period, probably due to the massive deforestation that occurred in the Southeast and the fact that larger trees for larger dugouts simply were no longer available.

This study is by no means complete. Prehistoric and historic dugouts are continuing to be discovered, many of which have been neither recorded nor analyzed. This trend must be reversed if we are to truly understand the role these fascinating craft played in the human occupation of the Southeastern United States. There are special problems associated with gathering this information. First, the data is scattered throughout the region in the form incised shell (Phillips and Brown 1975), written records (Covey 1961; Varner and Varner 1951), and the dugouts themselves (Bullen and Brooks 1968; Dreves 1979; Kandare 1983; McGahey 1974; Purdy 1991) and that this material has never been collected together in a single place. Put simply, little has been published on this ever-expanding database.
Second, the canoes that are discovered are often not conserved properly, and while the database expands and new canoes are being found regularly, older ones are not being treated properly and they decompose before they can be recorded. It is of little value to obtain an age on a dugout canoe that is deteriorating into fragments. More data is required for each cultural period to aid in producing typologies of vessel lengths and widths.

![Bar chart showing comparison of lengths and widths of complete dugout canoes.](image)

In meters

Figure 9.1. Comparison of lengths and widths of complete dugout canoes.
forms and to examine adaptations and changes in technology through time. To do this correctly, photographs, drawings, and wood samples are required at a minimum.

Third, most dugout canoes are found by chance. Canoes are small when compared to the average size of a terrestrial archaeological site and most canoes are isolated finds divorced from any cultural associations. Add to this that most are buried under sediments and/or water and the problem of visibility becomes even more acute. No systematic survey has yet been undertaken to identify in situ canoe remains, although I have developed a proposal to attempt such an undertaking.

Because the study of dugout canoes relies so much on pure accident, public awareness needs to be increased. Such awareness is highest in Florida where Barbara Purdy initiated a dugout canoe location campaign. The public was made aware through posters, newspaper articles, and lectures, and as a result reports of dugout canoe finds increased dramatically throughout the state. Unfortunately, the program worked too well and more canoes were reported than the state could handle. Hence many canoes were simply recorded in place and then left to the ravages of time.

What specifically can be done to alleviate this problem? This is a difficult question at best. The least that should be attempted is a minimal recording of any dugout canoe encountered. This would include photographing, measuring, and taking a wood sample large enough for both radiocarbon dating and wood identification. Methods for recording a dugout are presented in Appendix 1 of this dissertation. Of course, radiocarbon dating is not inexpensive. Samples should be stored along with the written data and photographs
until funds become available. More money was actually available during this study, however, there were no more wood samples left to date. The canoes had either been conserved or no wood sample had been taken. If such funds become available in the future, it would be important to have the samples packed and ready to be analyzed.

The role of the dugout canoe in southeastern prehistory was an important one. These vessels were important tools used by many cultures in the daily activities of their lives and as such they need to be investigated as fully as any other aspect of Native American or early European culture. Through a combination of archaeology and ethnohistory, information has been gained about prehistoric and historic period dugout canoes and their contexts within the cultures that produced them. Data on their use in transportation, subsistence, exchange, ritual, and warfare, as well as size and shape and on construction materials and methods has also been presented. Dugout canoes are artifacts that were every bit as important as lithics and ceramics to the cultures that produced them (perhaps even more so). As such they can no longer be ignored if we are ever to truly understand the prehistory of the southeastern United States.
REFERENCES CITED

Adair, James

Adney, Edwin Tappan and Howard I. Chapelle
1983 *The Bark Canoes and Skin Boats of North America*. Smithsonian Institution Press, Washington, D.C.

Agenbroad, L.D.

Agogino, George A.

Agogino, G.A.

Alterman, M. L.

Andrews, C.M. and E.W. Andrews (editors)

Arnold, Jeanne E.

Atkinson, Mary Jourdan
Bailey, David
1985 UF Archaeologists Make Rare Find of Dugout Canoes, University of Florida Information Services, Gainesville.

Barnett, James F. Jr.

Barreis, D. A., R. A. Bryson, and J. E. Kutzbach

Beaton, J.M.

Bednarik, Robert G.

Bense, Judith A.

Berlandier, J.L.

Blackburn, Graham

Blehr, O.

Bliss, L.C. and J.H. Richards
Blond, G.

Bloom, A. L.

Bonichsen, R.
1978 Clovis, Migration or In Situ Development? AMQUA Abstracts 5:133-135, Edmonton.

Borofsky, Robert

Bourne, E. G.

Braund, Stephen R.

Brewington, M. V.

Brose, David S.


Brose, David S. and Isaac Greber
Brothwell, Don

Bruemmer, F.

Bryan, A.L.

Bullen, Ripley P. and Harold K. Brooks

Burrage, Henry S. (editor)

Burt, Jesse and Robert B. Ferguson

Butzer, Karl W.

Cable, J.

Campbell, Shirley

Chagnon, N.A.
Chapman, Carl H.

Chapman, Carl H. and Eleanor F. Chapman

Chapman, L.

Chatwin, Bruce

Chisolm, M.

Clark, Graham

Coles, Bryony and John M. Coles
1989  *People of the Wetlands: Bogs, Bodies and Lake-Dwellers.* Thames and Hudson, New York.

Coles, John M.

Columbus, Christopher

Conner, Jeannette Thurber (trans)

Covey, Cyclone (trans)
1961  *Cabeza de Vaca’s Adventures in the Unknown Interior of America.* University of New Mexico Press, Albuquerque.
Crapo, Richley H.

Cunningham, Richard W.

Cushing, Frank H.

Delcourt, Paul A. and Hazel R. Delcourt


Delcourt, Paul A., Hazel R. Delcourt, R. C. Brister, and L. A. Lackey

Dixon, J.E.

Doran, Glen H. and David N. Dickel

Doran, Glen H., David Dickel, and Lee Newsom

Dreves, Arthur F.
Driver, H. E. and W. C. Massey

Dunbar, Roland and Albert G. Sanders

Dunnell, Robert C.

Du Pratz, LePage

Ember, Lois R.

Englebrecht, W.E. and C.K. Seyfert

Erlandson, J.

Fagan, Brian M.


Faulkner, C.H.

Firth, R.
1936 *We, the Tikopians*. George Allen and Unwin, London.
Fladmark, K.R.  


Flannery, Kent V.  

Fleetwood, Rusty  

Florian, Mary-Lou  

Fowler, Melvin L.  

Fuller, Richard S.  


Gagliano, S. M., C. E. Pearson, R. Weinstein, D. E. Wiseman, and C. M. McClendon

Gartner, Linda M.

Gilliland, Marion S.

Goad, Sharon


Goodyear, A. C.


Goodyear, A. C., J. H. House, and N. W. Ackerly
Gordon, B.C.

Gould, Richard

Grayson, D.K.

Greenhill, Basil

Gregory, Hiram F.

Grieder, Terrance

Griffin, James B.

Gruhn, Ruth
Guidon, N. and B. Arnaud

Guidon, N. and G. Delibrias


Guilday, J. E.

Hamilton, Donny L.

Hanson, G. T.
1982 The Analysis of Late Archaic-Early Woodland Adaptive Change Along the Middle Savannah River: A Proposed Study. Institute of Anthropology and Archaeology, University of South Carolina *Notebook* 14:3-38.

Harrington, John P.

Harrington, M. R.

Harriot, Thomas

Harris, Marvin
Haynes, C.V.


Heizer, Robert F.

Hester, Thomas R.

Hines, Mary Ann

Hoffecker, J.F., W.R. Powers, and T. Goebel

Holmes, William Henry

Hopkins, D.M.

Hotham, Lar

House, John H. and R. W. Wogaman
Hudson, Travis

Hudson, Travis, J. Timbrook, and M. Rempe

Hudson, Charles M.
1976 *The Southeastern Indians.* University of Tennessee Press, Knoxville.

Ikawa-Smith, F.

Jenkins, Ned J. and Richard A. Krause
1986 *The Tombigbee Watershed in Southeastern Prehistory.* The University of Alabama Press, University of Alabama.

Jennings, Jesse D.

Jeter, Marvin D. and Ishmael Williams, Jr.

Jett, Stephen C.

Jobson, Robert and William Hildebrandt
Johnstone, Paul

Jones, Charles C.
1873 *Antiquities of the Southern Indians, Particularly of the Georgia Tribes.* New York.

Jones, Terry L.

Kandare, Richard P.

Keeley, Lawrence H.

Kidd, K.E.

Knipmeyer, William B.

Kottak, Conrad Phillip

Krämer, A.

Kubiak, H.
Kunz, M.L. and R. Reanier

Lafferty, Robert H., III

LeBlanc, Raymond

Leshikar, Margaret E.


Lewis, D.
1972 We, the Navigators: The Ancient Art of Landfinding in the Pacific. The University Press of Hawaii, Honolulu.

Lewis, Sheila

Little, Elizabeth A.

Lorant, Stefan (editor)
Lynch, T.F.

Louisiana Department of Culture, Recreation, and Tourism
1985 Dugout Canoe Inventory Form on File, State of Louisiana Department of Culture, Recreation, and Tourism, Baton Rouge.

1983 Dugout Canoe Inventory Form on File, State of Louisiana Department of Culture, Recreation, and Tourism, Baton Rouge.

1969 Dugout Canoe Inventory Form on File, State of Louisiana Department of Culture, Recreation, and Tourism, Baton Rouge.

MacDonald, George F. and Barbara A. Purdy

Manning, Kathy

Martin, P.S.

Masters, Patricia M.

McCrocklin, Claude

McEwan, G.F. and D.B. Dickson
McGahey, Sam O.


McGrail, Sean
1981  *The Ship*: Rafts, Boats and Ships From Prehistoric Times to the 
      Medieval Era. Basil Greenhill, editor. Her Majesty’s Stationery Office, 
      London.

McKusick, M. B.
1960  *Aboriginal Canoes in the West Indies*. Yale University, Department of 
      Anthropology, Paper No. 63.

McWilliams, R. G. (trans)
1953  *Fleur de Lys and Calumet*. The University of Alabama Press, 
      Tuscaloosa.

Meighan, C.W.
1989  *Early Shell-Mound Dwellers on the Pacific Coast of North America*. 
      Paper presented at the Circum-Pacific Prehistory Conference, Seattle, 
      Washington.

Meltzer, David J.
1989  Why don’t we know when the first people came to North America. 

Meltzer, David J. and Bruce D. Smith
1986  Paleoindian and Early Archaic Subsistence Strategies in Eastern North 
      America. In Neusius, S.W. (editor), *Foraging, Collecting, and 
      Harvesting: Archaic Period Subsistence and Settlement in the Eastern 
      Woodlands*. Center for Archaeological Investigations, Southern Illinois 
      University, Carbondale, Occasional Paper No. 6, pp. 3-32.

Milanich, Jerald T. and Charles H. Fairbanks

Mohlenbrock, Robert H.
Morse, Daniel F.


Morse, Daniel F. and A.C. Goodyear

Morse, Daniel F. and Phyllis A. Morse

Morse, Phyllis A.

Mueller, Edward A. and Barbara A. Purdy

Muller, Jon
Newcomb, W.W.

Newsom, Lee Ann
1985 Letter to James Levy on file at the University of Florida at Gainesville Department of Anthropology.

Newsom, Lee Ann and Barbara A. Purdy

North Carolina Division of Archives and History
1986 Log Canoe Inventory Form, Underwater Archaeology Unit, Kure Beach, North Carolina.

Panshin, A. J. and Carl de Zeeuw

Pearson, Charles E.

Pelly, D.F.

Peterson, J.

Petzold, Arthur

Phelps, David Sutton
1989 *Ancient Pots and Dugout Canoes: Indian Life as Revealed by Archaeology at Lake Phelps.* Pettigrew State Park, Creswell, North Carolina.

Pittman, R. H.
1970  *Dugout Canoe Transportation in the Southeastern Woodlands*. Published M.S. Thesis on file, Department of Anthropology, State University of New York at Binghamton, Binghamton, N. Y.

Porter, D.
1822  *Journal of a Cruise Made to the Pacific Ocean*. Wiley and Halstead, New York.

Porter, S.C.

Powers, W.R. and J.F. Hoffecker

Purdy, Barbara A.


Purdy, Barbara A., Raymond F. Willis, and George MacDonald
1982  The Malone Lake Canoe: An Historic Craft from the Tombigbee River, Mississippi. *Reports of Investigations, Number 1*, Office of Cultural and Archaeological Research, the University of West, Florida, Pensacola.

Renfrew, Colin and Paul Bahn

Ramenovsky, Ann
Rau, Charles
1884 Prehistoric Fishing in Europe and North America. *Smithsonian Contributions to Knowledge 509*. Smithsonian Institution, Washington, D. C.

Roberts, Kenneth G. and Phillip Shackleton

Sahagún, Bernardino


Saucier, Roger T.

Schiffer, Michael B.


Schwweger, C.E.

Seacrist, Noreen

Shuffler, R. Henderson
1970 *The Indian Texans*. The University of Texas Institute of Texan Cultures, San Antonio, Texas.
Smith, Bruce D.


Steele, D.G. and J.F. Powell

Steponitis, Vincas P.

Stoltman, J.B. and D. A. Barreis

Story, Dee Ann
1985 *Gilliam Dugout Canoe*. Unpublished Manuscript on file, University of Texas at Austin, Texas Archaeological Research Laboratory, Austin.

Stowe, Noel R.

Stright, Melanie J.

Stuiver, Mintz and Gordon W. Pearson
Swanton, John R.

Thomas, Stephen D.

Trout, William E.

Tylor, Edward B.

University of Florida
1982 Loan Form on File, University of Florida, Florida State Museum, Gainesville.

n.d. University of Florida Dugout Canoe Files. Forms and notes on file, Department of Anthropology, University of Florida at Gainesville (contact Dr. Barbara A. Purdy).

Van Osdell, Mary Ann
1983 Ancient Canoe Yields Clues to Early Caddo Life. The Times, Shreveport-Bossier City, Louisiana.

Varner, John and Jeannette Varner (trans)

Walthall, John A.
1980 Prehistoric Indians of the Southeast: Archaeology of Alabama and the Middle South. The University of Alabama Press, University, Alabama.

Waters, M.R.

Watson, Patty Jo, Steven A. LeBlanc, and Charles L. Redman
Webb, Clarence
1985 Letter to Dr. Barbara Purdy in the Possession of the Author.


Webb, W. S. and D. L. Jamette

Welch, Paul

Wheeler, Robert C., Walter A. Kenyon, Alan R. Woolworth, and Douglas A. Birk

Wicke, Charles R.

Wilbanks, Ralph L. and Katherine Singley Dannenburg

Wilbert, Johannes

Willey, Gordon R.

Williams, J.
1846 *A Narrative of Missionary Enterprises in the South Seas*. Snow, London.
Williams, Stephen and Jeffrey P. Brain

Willis, Raymond F.

Young, Steven B.
APPENDIX 1

METHODOLOGY

Recording a Dugout Canoe

Dugout canoes have been discovered in many different environments and in many different conditions. Both of these factors may dictate the amount of information recoverable from a given canoe. Two canoes discovered in a dry peat deposit in Micanopy, Florida, for example, were so badly decomposed that only a few general measurements and *in situ* photographs were possible. Any attempt to move either canoe would have resulted in their immediate destruction. Other canoes, such as the Little Orange Lake #2, currently on display at the Silver River Museum in Ocala, Florida, have been well-preserved and could be recorded completely.

The minimal information required for a proper study of a dugout canoe includes the taking of some basic measurements. Ideally, canoes should be treated as any other small watercraft and basic recording would include the taking off of lines so that the shape of the vessel can be accurately reconstructed, either as a drawing or as a model or replica (Dillon 1992:70). Often, however, time and provenience are the enemies of such lengthy recording procedures. A few basic measurements, maximum length, maximum breadth, and maximum height, however, can and should always be attempted for each vessel. It is best to take these measurements with the bottom of the canoe reasonably level. Again, however, this may or may not be possible.
Figure A-1.1. Illustration showing the major planes and lines used in taking off lines.
If possible, begin by laying out both a baseline running along the bottom centerline of the canoe (Figure A1.1). Reference lines may also be established parallel to the baseline. Ideally, these lines should encompass the maximum width of the vessel. Measure the maximum length (length between perpendiculars) from the farthest extremities (fore and aft) of the hull down to the base line. Maximum width is measured at the widest point along the gunwales and maximum height is measured from the baseline to the highest point on the gunwales. Other measurements such as gunwale thickness (measured at the edge of the gunwale); floor thickness (subtract depth from maximum height, measured at the same location); side thickness (may be measured with a spreading or hinge caliper); platform length (measured from the end concavity to the farthest extent of the platform), maximum depth (measured from the floor to the top of the gunwale); and angle of the ends should be taken if feasible. The shape of the hull is also an important consideration, and should be measured along both ends and amidships.

The taking off of lines is only one portion of the total recording off any given vessel. For a more comprehensive description of the taking off of lines, the reader is referred to D.W. Dillon’s (1992) "Taking Lines Off Small Craft." Construction methods, wood type, evidence of repair or modification, and style should also be considered. Construction methods will appear in the form of tool marks and possible evidence of burning or charring (darkened or charred areas) on the interior and exterior surfaces of the canoe. Some such areas have also been interpreted as evidence for fire-
carrying in canoes during the latter prehistoric periods (Purdy 1990). While this explanation is possible it should be evaluated for each individual dugout examined. Some Contact and Historic period canoes show extensive evidence of modification in the form of added strakes or thwarts and repairs in the form of patches and plugs. It is best to recover a sample of wood from the vessel for Genus and species identification and for radiocarbon assay to determine the age of the canoe. It is best to take the sample from an area that is already degraded or from an area that will not affect the overall appearance of the vessel. It is also advisable to take the sample from the outer portion of the wood in order to obtain a more accurate radiocarbon age.

Photographs are an important source of information that have often been neglected in dugout canoe investigations. The type of camera used is not as important as taking the correct photograph. Black-and-white film, at least ASA 400 is preferred. Black-and-white photographs show contrast very well and are easier to reproduce than color film. Color slides are also recommended for future visual presentations. At a minimum, a photograph depicting the entire length of the canoe should be taken; as well as photographs of both ends and view looking toward the bow and toward the stern. In addition, any unusual features (charred areas, tool marks, etc) should be photographed. All photographs should include a metric scale for reference.

Included in this methodology is a sample Dugout Canoe Recording Form. As much of the information called for on this form should be filled out for each dugout canoe encountered.
Canoe Terminology

The following list of terms have been adopted in this study to refer to certain features of dugout canoes. Figure (A-1.2) depicts a generic dugout illustrating each of the terms used in the study.

Gunwale (gunnal). The topmost portion of the vessel's sides.

Side. The exterior and interior hull that extends from the bottom to the gunwale.

Bottom. The base of the canoe, generally taken to mean that part of the vessel that is underwater when the canoe is afloat.

Concavity. The hollowed out interior of the dugout canoe, measured from the interior of both ends.

End. The end of the vessel measured from the farthest extent of the concavity to the farthest exterior extent of the vessel (use bow and stern only where this can be determined).

Platform. A area along either end that projects outward from the edge of the concavity and generally "hangs" over the water.

Floor. The interior bottom of the canoe (not to be confused with the bottom of the frames that comprise the ribs of a true ship).

Gauge hole. A hole cut through the floor and bottom of a canoe during construction to measure hull thickness.

Mooring hole. A hole generally cut through a platform used to attach a line for mooring or securing a canoe.
Figure A-1.2. Generic dugout canoe illustrating the terms used in this study.
DUGOUT CANOE RECORDING FORM

LOCATION (Attach additional sheets as necessary)
State________________________ County______________________ USGS
Quad Name (Attach copy)________________________________ Section____
Township____ Range____ UTM Zone____ Northing_____ Easting____
State Site Number____ Accession Number________
Catalog Number____________ Reported By___________________________
Address________________________ Phone___________________________

Current Location of the Canoe_________________________________________
Date discovered______ Date recorded__________________________
Recorded by____________ Affiliation__________________________
Address________________________ Phone___________________________

Preservation________________________ CONTEXT____________________
Local Environment___________________________________________
Nearest Water Source_________________________________________
Matrix_____________________________________________________
Associations (artifacts, features, sites)________________________________

CANOE DATA
Wood Type____________ Identified by____________ Affiliation_____________________

Indicate on sketch where sample was taken
Approximate Age (Check one)
Prehistoric____ Historic______ Indeterminate____
Radiocarbon Age____________ Laboratory Number________
Condition (give percentage):
Largely intact(75%-100%) ____ Eroded (50%-75%) ___ Fragmentary <50%) ____ Written

Description (include method of manufacture if determined)
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Length between perpendiculurs___________________________
Maximum beam_____ Length to beam ratio__________Midship height (base of bottom to sheer)____
Hull thickness at gunwales amidship______Bottom thickness amidship _________________
Bottom contour: Flat ______ Arched______ Other_______
Keel line: Straight____ Slight uplift ___ Moderate rocker___ Extreme rocker___ Other____
Girth: End A (bow)_______ End B (stern)_________ (Measured at maximum circumference)
Sides: Tumblehome (concave)____ Straight____ Flared____

Instructions: Fill out as much of this form as possible. Sketch dugout on the back of this form
(include a plan view, profile, and at least two cross-sections and be sure to include a scale). Provide
any available photographs. Photographs should include a profile of the vessel and details of the ends
and any unique features.
APPENDIX 2

DUGOUT CANOE DATA

The following appendix contains data on many canoes not discussed in the text. The majority of these canoes have not been dated and many have only limited information available for them. It is important, however, to include this data for future reference and to make this information available to others interested in continuing research on dugout canoes in the southeastern United States and elsewhere.

Alachua County, Florida

NAME: HIGH SPRINGS CANOE
OWNER OR REF: FL State Museum, Cat. No. 31845, Assn. No. 1684, Gainsville, FL.
WHEN RECOVERED: June 1927.
WHERE RECOVERED: According to the records of the FSM the canoe was found buried in a dried up lake near High Springs by W.S. Westermoreland and Harry Simpson.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Length: 8.7 m.
   Width: .48 m.
   Height: .43 m.
   Hull Thickness: .14 m.
   This is a whole canoe.

PRESERVATION: The authors found the canoe to be in fair condition in 1983. Canoe largely intact, parts of sides missing.
COMMENTS: This is a fire-hollowed canoe with squared-off, overhanging-platform at the bow. The stem is incomplete. The interior is charred. The canoe is currently (July 1987) in the Austin Carey Forest. Gainesville, Florida.

BAY COUNTY, FLORIDA

NAME: ECONONFINA CREEK CANOE
OWNER OR REF: Junior Museum of Bay County, Inc., P.O. Box 977, Panama City, Florida 32401.
WHERE RECOVERED: Mr. Drew McKeithen, of Panama City, Florida. Found the canoe while diving in Econonifica Creek.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Unknown to Investigators.
PRESERVATION: Unknown.
COMMENTS: The Junior Museum of Bay County contacted the Bureau of Historic Sites and Properties in 1978 wishing to have the canoe undergo preservation treatment, after which Mr. McKeithen was to donate the canoe to the Museum. No further measures were taken and the canoe is still located in the creek. Efforts to contact Mr. McKeithen were unsuccessful.

BRADFORD COUNTY, FLORIDA

NAME: HAMPTON LAKE NO. 1 CANOE
OWNER OR REF: Tommy and Pat Clark, HWY 18, Hampton Lake, Florida. 904/468-1851.
WHEN RECOVERED: June 1981.
WHERE RECOVERED: The canoe was found by the Clark’s in a pond at the North end of Hampton Lake. Wald Florida Quadrangle. Section 23-T7S-R21E.
WOOD TYPE: Unknown.
DIMENSIONS: This is a whole canoe.
   Length: 6.30 m.

PRESERVATION: Dr. Purdy saw the canoe in June 1981 and found it in very good condition. The Clarks are keeping it wet.
COMMENTS: A portion of one end of the canoe is missing, it is otherwise whole. Charring is evident on one end and along the inside.
BREVARD COUNTY, FLORIDA

NAME: LAKE WASHINGTON CANOE
OWNER OR REF: Mr. John P. Montrose, RT. 1, Box 1007-M, Melbourne, Florida 32935.
WOOD TYPE: Bob Gross of the Brevard Co. Museum reported the wood type as Cypress but an exact (microscopic) determination of species was not made.
AGE OF CANOE: Probably historic, having possibly been shaped with metal tools.
DIMENSIONS: This is a whole canoe.
  Length: 6.29 m.
  PRESERVATION: Mr. Gross reported on 8-27-82 that the canoe was in relatively poor condition.
  COMMENTS: According to Mr. Gross the canoe was removed from the lake and taken to a pond on the property of Mr. Montrose. There are distinct gouge marks on the canoe's undersurface which Mr. Gross believes may have been made with metal tools. The discovery of the canoe was recorded on film by Weona Cleveland, reporter for the Melbourne Times, who has slides of the canoe.

BROWARD COUNTY, FLORIDA

NAME: FORT LAUDERDALE CANOE
OWNER OR REF: Broward Co. Archaeological Society Inc. (See below)
WHEN RECOVERED: Date of recovery was not reported to the authors.
WHERE RECOVERED: The canoe was found in a Cypress swamp located East of Andrews Ave., South of Cypress Creek Canal, and West of I-95. Fort Lauderdale North Quadrangle. Section 10-T49S-R42E.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: This is a whole canoe.
  Length: 4.05 m.
  Width: 60 cm.
  Height: 60 cm.
  PRESERVATION: Fair. Canoe was partially dry when discovered. It was subsequently soaked in white glue and water.
  COMMENTS: This may be an unfinished canoe, having rough and crude surfaces. One end is angled into a distinctive point. Tool marks are apparent along one side and end of the canoe. For further information contact Wilma B. Williams, Broward County Archaeological Society, Hollywood, FL, or the Fort Lauderdale Historical Museum, 219 SW 2nd Ave., Fort Lauderdale, FL, where the canoe is on display.

CITRUS COUNTY, FLORIDA

NAME: LAKE INVERNESS CANOE
OWNER OR REF: Temple Mound Museum, Museum No. 1337; Acc. No. 72-15-1, (See Comments).
WHEN RECOVERED: Approximately 1951 or 1952.
WHERE RECOVERED: Mr. G.A.H. Cowart described this canoe for the museum in 1973. He cites the discovery location as "Bud's Boat Basin", Lake Inverness, FL.
WOOD TYPE: Mr. Cowart believed the wood was Cypress (Taxodium Sp.), but gave no account as to how this determination was reached.
AGE OF CANOE: Cowart believes the canoe is Seminole, judging by its design.
DIMENSIONS: This is a whole canoe.
  Length: 3.86 m.
  Width: 40.6-43.2 cm.
  Height: 22.9-30.2 cm.
  PRESERVATION: Yulee Lazarus, Curator, reported very good condition. White glue has been used as a preservative.
  COMMENTS: The canoe has an overhanging-platform bow and stern; flat bottom. Mr. Cowart reported that no evidence of charring or tool marks could be seen, but that the canoe was obviously well made. (This is not necessarily a Seminole canoe.) For more information contact: Yulee W. Lazarus, Curator, Temple Mound Museum, Fort Walton Beach, FL., 32548. (904) 243-6521. (904) 243-3219.

CLAY COUNTY, FLORIDA

NAME: BROOKLYN LAKE CANOE
WHEN RECOVERED: Museum records show the canoe was discovered in 1958 or 1959.
WOOD TYPE: FSM records list the wood as Bald Cypress (Taxodium Distichum), but the method of species identification is not included.
AGE OF CANOE: Uncertain, although believed to be Prehistoric.
DIMENSIONS: Both ends are missing.
  Length: 3.78 m.
  Width: 46 cm.
  Height: 30 cm.
PRESERVATION: Very poor condition (February 1982).
COMMENTS: What remains of the canoe is the center portion of the hull. It is charred and hollowed in the interior. Mr. King told the museum that the canoe was found during drought conditions when the level of the lake was down about 22 feet. The canoe was placed in a holding pond on Paynes Prairie in 1978 by the museum and was removed to Silver Springs Florida Attraction on February 17, 1982.

COLUMBIA COUNTY, FLORIDA

NAME: SEMINOLE LAKE CANOES (2)
OWNER OR REF: Lake City Historical Society **
WHEN RECOVERED: February 1983.
WHERE RECOVERED: Small Lake in the city limits of Lake City, Florida. Lake was being emptied of water. Lake City Quadrangle. **
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Unknown.
PRESERVATION: Canoes are being preserved in Tallahassee at the Division of Archives, History and Records Management.
COMMENTS: Awaiting more complete information from the conservators in Tallahassee, Florida.

DADE COUNTY, FLORIDA

NAME: DADE COUNTY CANOE
OWNER OR REF: Tom Gaskins, owner, Cypress Knee Museum, Palmdale, Florida, 33944F.
WHEN RECOVERED: Unknown.
WHERE RECOVERED: Mr. Gaskins wrote on 8-18-82 that he has no information of the discovery location. The canoe was donated to the museum by Mr. Russ Smiley of Miami, Florida.
WOOD TYPE: Unknown.
DIMENSIONS: Mr. Gaskins furnished no measurements.
PRESERVATION: Mr. Gaskins did not mention the present condition of the canoe.
COMMENTS: Mr. Gaskins stated that the canoe appeared to have been hewn directly from the log without the use of fire-hollowing techniques. Only one end fragment of the canoe remains.

DUVAL COUNTY, FLORIDA

NAME: ETHERIDGE CANOE
OWNER OR REF: Jean Etheridge, 9172 Heckscher Dr., Jacksonville, Florida, 32218. Phone (904) 251-3228.
WHEN RECOVERED: Exact date unknown to authors, probably sometime in 1977.
WHERE RECOVERED: R. Willis, University of Florida, reported in 1978 that the canoe was found along the estuarine shore of the St. John’s River, downstream from Jacksonville and 3 miles from the Atlantic Ocean.
WOOD TYPE: Pine (Pinus Sp.) Positively identified by Mr. Willis through microscopic species identification.
DIMENSIONS: Mr. Willis examined the canoe in 1976. Only one half was recovered.
  Length: 3.25 m.
  Width: 59 cm.
  Height: 32 cm.
PRESERVATION: Willis suggested treatment using turpentine and linseed oil. Present condition is not known.
COMMENTS: Canoe has a long, pointed, overhanging platform end which, according to Willis, may have aided travel on rougher waters (estuarine environment). The craft was apparently fire-hollowed and had 4 definite "fire pits"along the inside deck. The Etheridges decided to keep the canoe at their home; they should be contacted to learn of the present condition of the wood.
ESCAMBIA COUNTY, FLORIDA

NAME: PENSACOLA CANOE
OWNER OR REF: Florida State Museum, Cat. No. 48857; Acc. No. 25-92.
WHEN RECOVERED: September 1930.
WHERE RECOVERED: FSM records show that the canoe was found on the grounds of the U.S. Naval Air Station, Pensacola, Florida.
WOOD TYPE: Unknown.
AGE OF CANOE: No C14 dates have been taken, but the canoe is probably Historic.
DIMENSIONS: The canoe is fragmentary.
   Length: 2.10 m.
   Width: 75 cm.
COMMENTS: This is the forward half of a dugout canoe. It is very symmetrical and well-shaped, flat-bottomed inside and out, with a pointed bow. Tool marks are visible in the wood. There is a 3/4" wooden plug along the centerline, which passes through the hull, and was probably used to gauge hull thickness during manufacture (Seminole practice). It is currently (August 1982) stored at the Austin Carey Forest, Gainesville, Florida (July 1987).

FRANKLIN COUNTY, FLORIDA

NAME: CARRABELLE/DOG ISLAND CANOE
OWNER OR REF: Jimmy Vaughan, Southeastern Maintenance Corp., 115 Fletcher St., P.O. Box 26, Thomasville, GA., 31792.
WHEN RECOVERED: Approximately 1967. It was brought to the DAHRM lab in 1983.
WHERE RECOVERED: Mr. Vaughan stated in 1978 that it was thought to have been found on Dog Island, Franklin County, Florida.
WOOD TYPE: Unknown.
AGE OF CANOE: Radiocarbon date of 1240 +/- 80 years B.P.
DIMENSIONS: Length: 5.3 m.
   Width: 53 cm.
FRESERVATION: Allowed to dry after recovery at the lab. It was painted with Flex-Seal for preservation.
COMMENTS: The canoe is missing both gunwales and one end. The full length of the canoe was apparent upon initial recovery, but it has degraded and is no longer that length. The canoe is currently housed at the San Luis Basement Storage Facility of the Bureau of Archaeological Research, DAHRM, Tallahassee, Florida.

GADSDEN COUNTY, FLORIDA

NAME: HAITIAN CANOE
OWNER OR REF: C.M. (Martin) Hattan, Cemetery Ave., Sneads, Florida. Phone (904) 593-6587. Florida Master Site File #GD59, FDAHRM.
WHERE RECOVERED: According to the Florida Master Site File: Found by Mr. Hattan "several hundred feet South of the Port Authority below the Jim Woodruff Dam; on the East bank of the Apalachicola River, Gadsden County."
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: This is a whole canoe.
   Length: 6.83 m.
   Width: 65-70 cm.
   Height: 40 cm.
FRESERVATION: FMSF records state that in 1973, it was in good condition although the gunwales and bow, were deteriorating.
COMMENTS: The Site Files report evidence of iron tool marks on the interior surfaces of the canoe, probably indicating Historic Period manufacture.

GULF COUNTY, FLORIDA

NAME: LAKE WIMICO CANOE
OWNER OR REF: Florida State Museum, Cat. No. 45556; Acc. No. 2373, Gainesville, Florida.
WHERE RECOVERED: FSM records show that this canoe was discovered by James Silva while raising sunken logs from the bottom of Lake Wimico, 15 miles from Apalachicola, Florida. Lake Wimico Quadrangle.
WOOD TYPE: Museum records list the wood as Cypress, although the method used to determine species is not given.
DIMENSIONS: This is a whole canoe.
Length: 15 m.
Width: 60 cm.
Height: 67.5 cm.
PRESERVATION: The wood has remained in relatively good condition (December 1982).
COMMENTS: This canoe may or may not be of Indian manufacture. It has blunt, tapered ends and a flat bottom. Metal tool marks are visible. It is unusually long (15 m). It is currently in storage for the Anthropology Department, FSM, at the Austin Carey Forest, Gainesville, Florida (July 1987).

HERNANDO COUNTY, FLORIDA

NAME: SILVER LAKE CANOE
OWNER OR REF: Mr. Bob Marsh. Mr. Marsh notified the Florida State Museum in 1977 about this canoe. No address given.
WHERE RECOVERED: Silver Lake on the Withlacoochee River near Lacoocchee in Hernando County. Saint Catherine, Florida Quadrangle Map. Boundary of Sumpter and Hernando Counties, in Withlacoochee State Forest. Section 16-T22S-R21E.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Unknown.
PRESERVATION: No present information.
COMMENTS: We have no further information on this canoe. Need to know of its present location and condition.

HILLSBOROUGH COUNTY, FLORIDA

NAME: HAYEY FLATS CANOE
OWNER OR REF: Mr. William Fertic, 7911 Williams Road, Seffner, Florida, 33584.
WHEN RECOVERED: October 1, 1985.
WHERE RECOVERED: Section 20-T18S-R20E at the MeAtor Lake Site. UTM Coordinates Zone: 17, Easting 369420, Northing 3101000.
WOOD TYPE: Southern Hard Pine (Pinus Sp.).
AGE OF CANOE: 3950 +/- 70 B.P., 2770-2255 B.C. Corrected date by Beta Analytic Inc.
DIMENSIONS: Unknown at this time.
PRESERVATION: Undergoing preservation at the University of South Florida.
COMMENTS: The canoe was discovered during peat mining when it was hit by a Backhoe destroying one end of the canoe. The canoe was under 4.5 feet of peat and the upper portions of the gunwales, bow and stern were eroded away. The Radiocarbon date for the canoe makes it one of the oldest canoes yet recovered in Florida.

JEFFERSON COUNTY, FLORIDA

NAME: NAUTTA RISE CANOE
OWNER OR REF: Florida State Museum, Cat. No. 63020; Acc. No. 3081, Gainesville, Florida.
WHEN RECOVERED: Mr. U. Padgett found the canoe in 1931.
WHERE RECOVERED: FSM records show that the canoe was found at Nautta Rise, 25 miles South of Lamont, Florida on the Aucilla River, Jefferson County Side.
WOOD TYPE: Unknown. May be Cypress.
AGE OF CANOE: Unknown.
DIMENSIONS: This is the forward part of a canoe.
Length: 3.20 m.
Width: 70 cm.
Height: 37.5 m.
PRESERVATION: Presently (8/83) stable, but remains untreated for preservation.
COMMENTS: The canoe has a very symmetrical, thin, well-shaped bow. It is flat-bottomed in and outside, with flaring sides. It is probably from the Historic Period. It is presently in storage for the Anthropology Dept., FSM, at the Austin Carey Forest (July 1987). After having found the canoe, Mr. Padgett subsequently traded it to Mr. R.M. Ream who later donated it to the museum.

LAKE COUNTY, FLORIDA

NAME: CROWS BLUFF CANOE
OWNER OR REF: John R. Ward, P.O. Box 1261, Kissimmee, Florida.
WHEN RECOVERED: Mr. Ward stated that the canoe was uncovered in 1953.
WHERE RECOVERED: Mr. Ward phoned the Florida State Museum in December 1975, reporting that the canoe was found at Cows Bluff, near “Get-Out Creek”, off of the St. John’s River, in Lake County.
AGE OF CANOE: Unknown.
DIMENSIONS: Ward stated that the canoe was in “80% of its original condition, the shape being complete.”
Length: 4.83 m.
PRESERVATION: Present condition not known to authors.
COMMENTS: When Mr. Ward contacted the museum in 12-1975, he stated that he would send photos and drawings with measurements. This information was apparently never sent to the museum. An attempt should be made to contact Mr. Ward to learn of the present location and condition of the canoe.

LEE COUNTY, FLORIDA

LEE COUNTY CANOE
OWNER OR REF: Mr. Tom Gaskins, owner, Cypress Knee Museum, Palmdale, Florida, 33944. Phone (913) 675-2951.
WHEN RECOVERED: Unknown.
WHERE RECOVERED: Mr. Gaskins wrote the authors in August 1982 and stated that he was unsure of the exact location of discovery. The canoe was given to him by Mr. Norwood Strayhorn of Fort Myers, Florida.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: This is a whole canoe. Mr. Gaskins did not furnish dimensions in his correspondence of 8-18-82.
PRESERVATION: According to Mr. Gaskins, the canoe was in poor condition in August 1982.
COMMENTS: Mr. Gaskins related that the canoe “appears to have been hewn from the log without use of fire.” But he made no mention of tool marks. The authors plan to visit the museum to obtain more data on this canoe and four others in Mr. Gaskins’s possession. Note that Gaskins did not confirm that the canoe came from the Lee County area, only that it was donated from someone in that area.

LEVY COUNTY, FLORIDA

WACCASASSA RIVER CANOE
OWNER OR REF: Robert Armstrong, address not known to authors. Lived in Gainesville, Florida in 1977. Present Address?
WHERE RECOVERED: Mr. Armstrong located the canoe at the bottom of a log jam in the Waccasassa River. In July 1979 the canoe was still in place in the river. Bronson S.W. Quadrangle.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: In 1977, Armstrong described the canoe to Florida State Museum personnel as being approximately 1.28 m wide and 75 cm deep; he did not estimate length.
PRESERVATION: Unknown.
COMMENTS: In Mr. Armstrong’s 1979 report to Florida State Museum personnel, he stated that the canoe appeared to be complete in length with both ends present. He viewed it from one side only, in situ, at the bottom of a small log jam. He described the hull as “V-shaped” in cross-section. A map showing the location of the canoe is on file with the authors. It is unknown whether or not it is still in place in the river (August 1983).

MARION COUNTY, FLORIDA

DELANCY CANOE
WHEN RECOVERED: February 1, 1983.
WHERE RECOVERED: Found by Mr. R.L. Westbrook and Mr. Don Cumbe in Lake Delancy, located in the Northern end of the Ocala National Forest. Sections 22,23,26, and 27-T12S-R25E.
WOOD TYPE: Southern Hard Pine (Pinus Sp.) Positively identified by microscopic examination by Lee Newsom, Graduate Student, Department of Anthropology, University of Florida.
AGE OF CANOE: Modern.
DIMENSIONS: This is a whole canoe.
Length: 3.76 m.
Width: .48 m.
Side Thickness: 5-7 cm.
PRESERVATION: The wood is eroded and soft. The bottom and ends are intact, sides partially eroded.
COMMENTS: Evidence of charring can be seen on both interior and exterior surfaces of the canoe. The ends are rounded and have a slight taper upwards, one end forming a small platform. Axe or Adze marks are visible. The canoe was found partially
exposed in mud in about 2 m of water after a large floating peat island had shifted due to strong winds. Mr. Westbrook is keeping the canoe as moist as possible, hoseing it daily.

**MARTIN COUNTY, FLORIDA**

**JUPITER ISLAND CANOE**

**OWNER OR REF:** Frederick S. Ford, Jr., 60 Renaud Road, Grosse Point, Michigan, 48236.

**WHEN RECOVERED:** May 1981.

**WHERE RECOVERED:** Ford wrote to Purdy in August 1981, reporting his find of the canoe. It had "washed ashore" on the beach at his Jupiter Island home. Jupiter, Florida & Hobe Sound Quadrangles (Gomez Land Grant). T39 and 40S-R42 and 43E.

**WOOD TYPE:** Unknown.

**AGE OF CANOE:** Unknown.

**DIMENSIONS:** Mr. Ford did not provide measurements in his 8-1981 letter.

**PRESERVATION:** According to Ford, it is in excellent condition (8-81), completely intact.

**COMMENTS:** This is probably a Historic Period Canoe, may be Seminole. Fine finishing marks are visible on all surfaces. Sides are thin and well finished, as are the bow and stern. A square hole was cut in the bow and stern. A square hole was cut in the bow to enable a rope to pass through. There are nails in the canoe. In 1981, Mr. Ford wanted to donate the canoe. He should be contacted for further information.

**MONROE COUNTY, FLORIDA**

**GRASSY KEY CANOE**

**OWNER OR REF:** Mr. George H. Gross, 101 Vallea Lane, Crystal River, Florida, 32629.

**WHEN RECOVERED:** 1960.

**WHERE RECOVERED:** Mr. Gross found the canoe on Grassy Key after Hurricane Donna in 1960; he believes it blew over from the everglades during the storm. Grassy Key Quadrangle Map.


**AGE OF CANOE:** Historic Period (brass nails in wood).

**DIMENSIONS:** Only the bow was recovered.

- **Length:** 92-130 cm.
- **Width:** 50 cm.
- **Side Thickness:** CA. 3 cm.

**PRESERVATION:** Very poor condition. It has been out of water since discovery (22 years), dry rotted and very fragile.

**COMMENTS:** This is a well made canoe with a pointed bow and very straight, angular, regular sides. There is no evidence of tool marks, but some slight charring on the exterior and interior surfaces. Mr. Gross stated that the bottom (hull) was very flat (before lost). The sides are very flat and squared at the top. Two brass nails were in the bow.

**ORANGE COUNTY, FLORIDA**

**LAKE APOPKA NO. 1**

**OWNER OR REF:** Florida State Museum, Cat. No. 96580; Acc. No. 4237, Gainesville, Florida.

**WHEN RECOVERED:** No date recorded in museum files.

**WHERE RECOVERED:** At the edge of Muckland just North of the entrance road which leads from the Hooper Farm road, on the East side of Lake Apopka (Lake was drained for agricultural purposes in the early 20th century). Section 12-T21S-R27E.

**WOOD TYPE:** Unknown.

**AGE OF CANOE:** Unknown.

**DIMENSIONS:** None recorded.

**PRESERVATION:** Very poor. Only one small fragment was given to the museum.

**COMMENTS:** The canoe was presented by William D. Long to the Florida State Museum. FSM records show that only a small fragment of the dugout was recovered by a drag line from a mucky soil matrix. Currently stored at Silver Springs.

**ZELLWOOD CANOE FRAGMENTS (2 OR 3)**

**OWNER OR REF:** Florida State Museum, Cat. No. 96581; Acc. No. 4328, Gainesville, Florida.

**WHEN RECOVERED:** February 7, February 9, and February 21, 1961.

**WHERE RECOVERED:** FSM records show the fragments were excavated at a depth of 4 to 5 feet at three locations in plastic peat/muck on C.R. Clonts' farm adjacent to the Eastern dike of Lake Apopka. Discovered by Mr. Arch Hodges.

**WOOD TYPE:** Southern Hard Pine (Pinus Sp.) Positively identified by microscopic thin section by Lee Newsom. Graduate Student, Department of Anthropology, University of Florida.

**AGE OF CANOE:** Fragment No. 1: 1185 +/− 75 B.P. (CA. A.D. 765); Institute of Marine Science.
DIMENSIONS: Fragment No. 1 (End Section):
  Length: 15.5 inches.
  Width: 1.5 inches.
Fragment No. 2:
  2' x 4'
Fragment No. 3 (no measurements) **metric

PRESERVATION: Fragment No. 1 is very poor. Fragment Nos. 2 and 3 are unknown since they were never excavated (located below water table).

COMMENTS: Fragment No. 1 is the blunt-overhanging bow or stern section of a canoe, made of coarse-grained wood. It is located in the Anthropology Dept., FSM (8-82). Fragments 2 and 3 were left unexcavated due to their poor condition and their location below the water table. No. 3 was reported to be badly damaged and may be a part of the same canoe as No. 2. **

OSCEOLA COUNTY, FLORIDA

LAKE PRESTON CANOE

OWNER OR REF: Orange County Historic Committee/Society, Orange County Museum, 812 E. Rollins St., Orlando, Florida, 32803.

WHEN RECOVERED: May 24, 1981.

WHERE RECOVERED: Mrs. Youthers of the Museum reported that the canoe was discovered by Steve and John Schaeffer of Orlando, in Lake Preston "in Mormon Ranch property." It was in 2 feet of black muck. Narcoosee Florida Quadrangle.

WOOD TYPE: The wood was determined to be Southern Hard Pine (Pinus Sp.) by microscopic thin section by Lee Newsom.

AGE OF CANOE: Unknown.

DIMENSIONS: This is a whole canoe though broken in two halves.
  Length: 420 m.
  Width: 47.5 cm.
  Height: 23 cm.

PRESERVATION: In June 1981 it was drying out and breaking up. White glue and water were added. Present condition unknown.

COMMENTS: The canoe was broken in half during recovery. The interior is heavily charred and the wood may have been burned too badly for use by its makers. The bow and stern are slightly upsweeping and rounded. St. Johns Period Pottery was found in possible association with the canoe. The discoverors later found several pieces of "other canoes" in the vicinity of the original find but we have no further information.

PINELLAS COUNTY, FLORIDA

ST. PETERSBURG CANOE


WHEN RECOVERED: Unknown.

WHERE RECOVERED: Unknown.

WOOD TYPE: Cypress (Taxodium Distichum) Identified by Lee Newsom using microscopic thin sections.

AGE OF CANOE: Believed to be less than 200 years old. Historic.

DIMENSIONS: Length: 4.88 m.
  Maximum Width: 72 cm.
  Height: 40 cm.
  Inside Depth: 35 cm.

PRESERVATION: None noted.

COMMENTS: The Historical Society has no provenience information on the canoe; no donor was recorded. The canoe is 4.88 m long and .72 m wide at the widest point. The bow is pointed and angled. The stem is squared off and angled forward with a small keel. The deck is flat both inside and outside. The gunwales are thin, straight, and uniform. In the bow area of the deck there is a gauging hole in the bottom. In the center of the canoe there is an indication of a seat that was 36 cm wide, 6 cm thick and 66 cm wide. The wood is eroded both inside and outside with no distinct tool marks. The seat appeared to have been nailed in with iron nails and there is an iron loop on the left side of the bow to attach a rope.

POLK COUNTY, FLORIDA

CROOKED LAKE CANOE NO. 1

OWNER OR REF: Mr. Roger Rose, P.O. Box 66, Babson, Florida, 33827.


WHERE RECOVERED: From the property of Mr. Rose on Crooked Lake, Polk County, Babson Park Quadrangle. Section 297-T30S-R28E.

WOOD TYPE: Southern Hard Pine (Pinus Sp.) Determined by microscopic thin section by Lee Newsom.
AGE OF CANOE: 800 (70) Radiocarbon years or about A.D. 1150 from Beta Analytic Inc.
DIMENSIONS: Length: 4.03 m.
   Width: 39 cm.
   Height: 18 cm.
PRESERVATION: Awaiting preservation in a holding pond.
COMMENTS: The canoe appeared to be in one piece prior to removal. It was broken in half and further broken into four pieces during removal. The wood was very degraded and further fragmentation occurred during transit. The gunwales and upper portions of the bow and stern had degraded and eroded away prior to discovery. An attempt will be made to preserve the canoe and put it back together for display in the local Crooked Lake Museum. The canoe had char marks in the bottom as evidence of the chip and burn method of canoe manufacture.

PUTNAM COUNTY, FLORIDA

FLORIDA ROCK CANOE
OWNER OR REF: Lloyd Watson (caretaker), Florida Rock Properties, P.O. Box 14, Grandin, Florida, 32138. Phone (904) 659-2566.
WHERE RECOVERED: On Florida Rock Properties 2 miles Southwest of Grandin, FL.
WOOD TYPE: Hard Pine (Pinus Sp.) Identified by Lee Newsom.
DIMENSIONS: Length: 10 feet 6.5 inches.
   Width: 16.5 inches.
PRESERVATION: The canoe will preserve in a Peg solution.
COMMENTS: The canoe appeared to be nearly intact. The gunwales were slightly eroded and the stern section may have been missing. It is hard to tell since there is a raised area in the aft part of the deck. This may be a foot hold similar to the one in Davis Florahome Canoe No. 4 and the Deleon Springs Canoe. If it is, then the stern is missing. The canoe exhibits charring inside and has a pointed bow. There were the remains of two other canoes on the other side of the same lake. They were not in very good condition since they were out of the water and had been so for some time. One was little more than the deck, the other was the end of a canoe. Both were Pine.

ST. LUCIE COUNTY, FLORIDA

ADAMS RANCH CANOE
OWNER OR REF: Alto Adams Jr., Adams Ranch Inc., P.O. Box 1030, Fort Pierce, Florida. Phone (305) 461-6321.
WHEN RECOVERED: The canoe was found in a small pond near Gammom Hammock on Adams Ranch. Section 14-T30S-R37E.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Not reported.
PRESERVATION: Adams reported in July 1981 that the canoe was then moderately eroded; it has never received treatment.
COMMENTS: The canoe has both ends intact, both are beveled or shaped into blunt points, no platform. The gunwales are intact though eroded to a narrow strip on one side. Then the canoe was discovered, tall vegetation had grown up all around it. It has been kept outdoors on a raised platform since its discovery in 1940. The owner is willing to make the canoe available for study.

SANTA ROSA COUNTY, FLORIDA

ESCAMBIA BAY CANOE
OWNER OR REF: T.T. Wentworth Museum, P.O. Box 806. Pensacola, Florida.
WHEN RECOVERED: Date not reported.
WHERE RECOVERED: The Pensacola News-Journal (date unknown) reported that Mr. and Mrs. Robert R. Curd discovered a dugout canoe buried under sand and water on the western shore of Escambia Bay.
WOOD TYPE: Unknown.
AGE OF CANOE: Estimated to be 500 to 1500 years old—Pensacola News-Journal*.
DIMENSIONS: Not reported. See Comments.
PRESERVATION: Allegedly treated with a wood preservative, the exact substance used was not reported.
COMMENTS: The above information was provided by Yulee Lazarus of the Temple Mound Museum in Fort Walton Beach, Florida. A copy of the newspaper account was provided for the authors, but did not include the date of publication. This canoe appears to have a blunt bow or stern, no other details were noted. In July 1982, Ms. Lazarus related that there may also be part of a second canoe in the Wentworth Collection. She did furnish the address for the Wentworth Museum and the authors will contact them for further details.** *The estimated date, above, was reported in the newspaper account and it is not known how, and by whom, this determination was made—a an exact date should be taken.
SEMINOLE COUNTY, FLORIDA

LOCH LOW LAKE CANOE
OWNER OR REF: A.B. "Tommy" Peterson, Sanford, Florida.
WHEN RECOVERED: September 29, 1981.
WHERE RECOVERED: Mr. Peterson discovered the canoe in Loch Low when low ground water levels exposed portions of the Loch's bottom. Sanford Florida Quadrangle. T20S-R30E—would be Section 10, but Section numbers are afoot due to Spanish Land Grant.
WOOD TYPE: Probably Pine (Pinus Sp.) but definite determination of species needs to be made.
DIMENSIONS: This is a whole canoe.
Length: 6.67 m.
Width: 33 cm.
PRESCRIPTION: Treatment at State Preservation Lab in Tallahassee (since April 1983).
COMMENTS: Both ends and the whole bottom of the canoe were intact but the gunwales are partially eroded. The ends are upsweeping and bow appears to have had an overhanging-platform. Mr. Peterson reported having also found a wooden paddle in the same lake approximately 15-20 years ago which has subsequently deteriorated. See the Seminole Little Sentinel. Sunday, October 4, 1981, Vol. 6, No. 197.

SUMPTER COUNTY, FLORIDA

HILLARY PEAT CANOE
OWNER OR REF: Hillary Peat Company (Valentine Property), Center Hill, Florida, 33514.
WHEN RECOVERED: Unknown.
WHERE RECOVERED: Lt. J.P. Mielock, Crystal River State Archaeological Site, wrote in July 1981, informing the authors of this dugout which had been "uncovered by a dragline of the Hillary Peat Co." Bushnell Quadrangle Map. Section 22-T21S-R23E.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Unknown.
PRESCRIPTION: Unknown.
COMMENTS: The authors sent a letter to Hillary Peat requesting information on the canoe. It was returned "not delivered". More information might be obtained by contacting Lt. Mielock, who is the Superintendent of the State Archaeological Site—Route 3, Box 610, Crystal River, Florida, 32629.

SUWANNEE COUNTY, FLORIDA

SUWANNEE RIVER CANOE
OWNER OR REF: Robert E. Jones, RT. 8, Box 135, Lake City, Florida, 32055. John W. Herrell, RT. 6, Box 574, Lake City, Florida.
WHEN RECOVERED: Found in August 1981, reburied at place of discovery.
WHERE RECOVERED: Found in wet sand on a Mid-Suwannee River Island located approximately 1 mile up-river from the Royal Spring Boat Ramp. Boundary for Suwannee and Lafayette Counties.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Only the bottom and one end remained of the canoe.
Length: 9 m.
PRESCRIPTION: The wood was badly deteriorated when discovered, probably due to wet/dry conditions.
COMMENTS: Mr. Jones and Mr. Herrell reburied the canoe in the sand approximately 5 feet from the waters' edge (low water line) on the Northeast side of the island and 45 yards from the low water Northwest tip of the island. It is lying diagonal to the island. It is lying diagonal to the waters' edge. SE by NW with the Southeastern end buried in sand under a broken tree limb. The environment is wet, sandy river bottom. The interior hull was charred.

VOLUSIA COUNTY, FLORIDA

DAYTONA BEACH/ORANGE CITY CANOE
OWNER OR REF: Halifax Historical Society. P.O. Box 5051, Daytona Beach, Florida, 32018. Phone (904) 255-6976.
WHERE RECOVERED: This canoe was found submerged in a lake near Orange City, FL. Sections 2 and 3-T18S-R30E.
WOOD TYPE: Pine (Pinus Sp.) Identified by microscopic cellular analysis by R. Willis, Graduate Student, Department of Anthropology, University of Florida.
AGE OF CANOE: Probably Historic. Exact date not taken.
DIMENSIONS: This is a whole canoe.
   Length: 5.9 m.
   Width: 37 cm.
   Height: 40 cm.

PRESERVATION: The Halifax Historical Society planned to preserve the canoe in 1978; it is not known whether this was done.
COMMENTS: Mr. Willis examined the canoe in 1978 and reported it in his Dugout Retrieval Project Report. It has visible iron tool marks and showed fine workmanship with thin, well-smoothed walls. According to Willis, the one complete end indicated either a platform bow or stern. Willis felt that the canoe may have been a seminole canoe, judging by its design.

ALBANY, GEORGIA

NAME: ALBANY CANOE
OWNER OR REF: James Bloom, Thronateeska Heritage Foundation. 100 Roosevelt, Albany, Georgia 31701 (912) 432-6955.
WHEN RECOVERED: June 8, 1981
WHERE RECOVERED: Unknown
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Length: 3.04 m.
This is a whole canoe.
PRESERVATION: Unknown

NAME: Cumberland CANOE
OWNER OR REF: Georgia Department of Natural Resources, Ft. King George, Georgia.
WHEN RECOVERED: July 1976
WHERE RECOVERED: Cumberland Island, Georgia - buried in the banks of Shell Creek.
WOOD TYPE: Unknown.
AGE OF CANOE: Unknown.
DIMENSIONS: Length: 3.04 m.
   Width: .71 m.
   Height: .43 m.
   Hull thickness: 4 cm.
This is a whole canoe.
PRESERVATION: Listed as submerged at Fort King George, Georgia awaiting conservation by the Department of Natural Resources.
COMMENTS: This is a fire-hollowed canoe with rounded ends and a c-shaped cross-section.

Bladen County, North Carolina

NAME: Pridgen Canoe
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: April 30, 1989
WHERE RECOVERED: West Shore of White Lake
WOOD TYPE: Yellow Pine
AGE OF CANOE: 1980 ± 60 BP (no lab #)
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: End fragment only, measures 1.27 meters long.

NAME: #1-1905
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: August 3, 1987
WHERE RECOVERED: Singletary Lake
WOOD TYPE: Yellow Pine
AGE OF CANOE: 960 ± 50 B.P. (no lab #)
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: End fragment measuring 1.82 meters.
Brunswick County, North Carolina

NAME: Battery Island
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: 1985
WHERE RECOVERED: Battery Island in the Cape Fear River.
WOOD TYPE: Yellow Pine
AGE OF CANOE: Unknown
DIMENSIONS: Width: .40 m
            Height: .35 m
            Side Hull Thickness: 4 cm
            Bottom Hull Thickness: 5 cm
PRESERVATION: Unknown
COMMENTS: Fragment measuring 1.5 meters long. Described as one end "spoon-shaped" only about 15% intact.

Columbus County, North Carolina

NAME: Waccamaw Canoe #1
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: July 16, 1975
WHERE RECOVERED: North shore of White Lake (N. Lat. 34° 18' 37" - W. Lon. 78° 30' 48")
WOOD TYPE: Yellow Pine
AGE OF CANOE: 140 ± 55 B.P. (no lab #)
DIMENSIONS: Length: 4.12 m
            Width: .30 m
            Height: .27 m
            Bottom Hull thickness: 11 cm
PRESERVATION: Unknown
COMMENTS: Noted to have "tapering" sides.

Cumberland County, North Carolina

NAME: Tyson Canoe #1
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: May 24, 1989
WHERE RECOVERED: Gray Creek
WOOD TYPE: Unknown
AGE OF CANOE: 1470 ± 60 B.P. (no lab #)
DIMENSIONS: Length: 3.65 m
            Width: .51 m
            Height: .30 m
            Hull thickness: 5 cm
PRESERVATION: Unknown - currently housed at the Museum of Cape Fear, Fayetteville.
COMMENTS: The canoe was noted to be only 40% complete.

Dare County, North Carolina

NAME: Manteo Marine Resources Center Canoe
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: May 7, 1985
WHERE RECOVERED: Unknown
WOOD TYPE: Yellow pine
AGE OF CANOE: Unknown
DIMENSIONS: Fragment
PRESERVATION: Unknown
COMMENTS: Described as "trough-like" with evidence of charring but only 25% complete. One end apparently has a 35° rake from horizontal to vertical.

New Hanover County, North Carolina

NAME: Goodwind Canoe
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: 1985 or 1986
WHERE RECOVERED: Carolina Beach inlet.
WOOD TYPE: Unknown
AGE OF CANOE: Unknown
DIMENSIONS: Unknown
PRESERVATION: Unknown, noted as being at "Tryon Palace in New Bern."
COMMENTS: End only, no evidence of tool marks interior charring.

Onslow County, North Carolina

NAME: Cottle Half Moon
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042.
WHEN RECOVERED: September 7, 1968
WHERE RECOVERED: "New River"
WOOD TYPE: Bald Cypress
AGE OF CANOE: 750 ± 50 B.P. (no lab #)
DIMENSIONS: Length: 11 meters (?)
  Width: Unknown
  Height:.86 m
  Hull thickness: Unknown
PRESERVATION: Unknown, stored at the Onslow County Museum.
COMMENTS: V-shaped bottom, noted as 75% complete which would make this canoe nearly 15 meters long - this seems rather long for a prehistoric dugout.

Robeson County, Canoe

NAME: Valenti Canoe
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: May 15, 1985
WHERE RECOVERED: 50° west of McNeil Bridge ca. 1000° Hwy 11-95.
WOOD TYPE: Yellow Pine
AGE OF CANOE: 1020 ± 60 B.P. (no lab #)
DIMENSIONS: Length: 5 m
  Width:.46 m
  Height:.30
PRESERVATION: Treated with sucrose.
COMMENTS: Charred interior, approximately 80% intact.

Washington County, North Carolina

NAME: Lake Phelps #1
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: November 1985
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 2720 ± 70 B.P. (no lab #).
DIMENSIONS: Fragment
PRESERVATION: Unknown
COMMENTS: Broken in two pieces

NAME: Lake Phelps #2
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 2850 ± 60 B.P. (no lab #).
DIMENSIONS: Length: 9 m
Width: 0.68 m
Height: .40
PRESERVATION: Unknown, located at the Raleigh Department of Archives and History.
COMMENTS: Broken - approximately 60% intact.

NAME: Butler Canoe (Lake Phelps 3)
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 550 ± 60 B.P. (no lab #).
DIMENSIONS: Unknown
PRESERVATION: Sucrose
COMMENTS: Now located at Pettigrew Park.

NAME: Pond Canoe (Lake Phelps 4)
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1610 ± 60 B.P. (no lab #).
DIMENSIONS: Unknown
PRESERVATION: Sucrose
COMMENTS: Noted to have a "step rake" of approximately 13.5° on one end. Now located at Pettigrew Park.

NAME: Lake Phelps #5
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1760 ± 60 B.P.
DIMENSIONS: Length: 8.5 m
PRESERVATION: Unknown
COMMENTS: Left in situ.
NAME: Lake Phelps #6
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: July 18, 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1720 ± 60 B.P.
DIMENSIONS: Length: 6.5 m
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #7
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: July 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 4380 ± 70 B.P. (no lab #)
DIMENSIONS: Length: 9.1 m
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #8
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: July 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1840 ± 60 B.P.
DIMENSIONS: Length: 7.9 m
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #9
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: July 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 3230 ± 110 B.P. (no lab #)
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #10
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1530 ± 60 B.P. (no lab #)
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ. Noted to have a "Beak like appendage" on one end.

NAME: Lake Phelps #11
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1790 ± 70 B.P. (no lab #).
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ. Noted to be curved near the center. One end is intact and is angled ca. 45° to one side.

NAME: Lake Phelps #12
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: Unknown
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #13
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 560 ± 60 B.P. (no lab #).
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #14
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: Unknown
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #15
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1630 ± 60 B.P. (no lab #).
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ.
NAME: Lake Phelps #16
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1980 ± 70 B.P. (no lab #).
DIMENSIONS: Unknown
PERSEVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #17
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 2090 ± 60 B.P.
DIMENSIONS: Not measured
PERSEVATION: Unknown
COMMENTS: Unknown

NAME: Lake Phelps #18
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 750 ± 80 B.P. (no lab #).
DIMENSIONS: Unknown
PERSEVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #19
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1740 ± 60 B.P. (no lab #).
DIMENSIONS: Unknown
PERSEVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #20
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 1580 ± 50 B.P. (no lab #).
DIMENSIONS: Unknown
PERSEVATION: Unknown
COMMENTS: Left in situ.
NAME: Lake Phelps #21
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Bald cypress
AGE OF CANOE: 3060 ± 70 B.P.
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ.

NAME: Lake Phelps #22
OWNER OR REF: Underwater Archaeology Unit, Division of Archives and History, P.O. Box 58, Kure Beach, North Carolina 28449, (919) 458-9042. May 15, 1985
WHEN RECOVERED: August 1986
WHERE RECOVERED: Lake Phelps
WOOD TYPE: Unknown
AGE OF CANOE: Unknown
DIMENSIONS: Unknown
PRESERVATION: Unknown
COMMENTS: Left in situ.
VITA

Mark Joseph Hartmann was born in St. Louis Missouri, to Wilbert R. Hartmann and Julia Cummiskey. He grew up in St. Louis, Missouri and, in 1990, received a B.A. in Anthropology with a minor in writing from The University of Missouri-St. Louis. During this time, he conducted archaeological research in conjunction with the University of Missouri at St. Louis Archaeological Survey. He also excavated in Jordan and Syria with Florissant Valley Community College. In August of 1990, he began work on a Ph. D. in Anthropology at Texas A&M University. During this time, he conducted archaeological research in Jamaica with Dr. Donny Hamilton; in Texas with the Texas A&M University Archaeological Research Laboratory; and in Guatemala where he directed an underwater archaeological survey of Lake Atitlan.

Permanent Address: Department of Sociology and Anthropology
University of Arkansas at Little Rock
Little Rock, AR 72204