Sinkholes have been a common feature of Florida since before humans occupied the peninsula. Continual dissolution of the limestone bedrock has formed the irregular landscape known as karst, of which sinkholes are a common feature (Upchurch and Randazzo 1997). Many Florida sinkholes are filled with water and some, such as Little Salt Spring and Page-Ladson, have famously produced well-preserved archaeological materials dating to the Paleoindian and Early Archaic periods (e.g., Clausen et al. 1979; Halligan et al. 2016). In north-central Florida, many small and shallow sinkholes are at times disconnected from the aquifer and only intermittently filled with water from precipitation. These rather unremarkable features are seldom the focus of archaeological investigations although they might have been the settings for native settlements of the past, at least during periods of relatively high rainfall (e.g., see Milanich 1978).

This paper presents the unexpected results of test excavations within one such sinkhole that may reveal its symbolic importance to the people associated with the pre-Columbian Cades Pond archaeological culture that was uniquely adapted to north-central Florida aquatic habitats. The primary goal of the paper is to document an ash deposit and its associated pottery assemblage at the Ruffin Pond site (8AL5655), an enigmatic signature which may have no precedent in Florida. The evidence is evaluated in terms of possible relationships to natural and cultural processes, and it is argued that the pottery-filled ash deposit likely resulted from acts of ritual deposition and possibly, intentional burning of the sinkhole floor. A secondary purpose of this work is to offer a preliminary interpretation of the pond’s cultural significance, if only to provide some hypotheses for future testing. Although the evidence from the pond is admittedly limited at present, the timing and character of the pond deposit may explain the role of ponds in ritual practices near the end of the Cades Pond archaeological culture at ca. AD 700.

Background: Cades Pond Culture

The Cades Pond archaeological culture is fairly well-defined through excavations at several sites, primarily in Alachua County. Sites of the archaeological culture span the lake and wetland-rich areas of eastern Alachua and western Clay and Putnam counties (Hemmings 1978; Milanich 2002:369) (Figure 1). Milanich (1978, 2002) offers a detailed model for Cades Pond occupation of the region. He suggests that the Cades Pond culture originated with Deptford migrants that were escaping population pressure on the Gulf coast. Small Deptford campsites predominated in north-central Florida before about A.D. 100 and are presumably the seasonal habitations of people whose more permanent settlements were on the Gulf Coast. By A.D. 200, sites in north-central Florida were occupied year-round and became more abundant, likely due to a population increase in the region. These later sites are arranged in clusters that Milanich (1978) refers to as nexuses. Each of the six identified nexuses is situated in a location that provides convenient access to multiple aquatic resources such as rivers, lakes, and wetlands. For example, sites are located between Orange Lake and Lake Lochloosa and between Paynes Prairie and Newnan’s Lake, but not on the opposite edges of these water bodies that do not permit easy access to multiple aquatic landscape features (Milanich 2002:370).

Each nexus includes multiple habitation sites and burial mounds, some of which may be chronologically sequential, perhaps the result of groups of people “budding off” to form new clusters (Milanich 1978, 1994, 2002). Village sites are located adjacent to mounds, with some mounds surrounded by horseshoe-shaped earthen embankments. A relative chronology can be derived for the Cades Pond culture based on burial mounds (Milanich 1994:236-241). Deptford series wares are found at the earliest Cades Pond mound, River Styx (Wallis et al. 2014). In all other Cades Pond mounds, St. Johns Plain, Dunns Creek Red, and sand-tempered plain pottery predominate and are inferred to increase through time while Deptford types decrease. Weeden Island series sherds also increase through time, but are never abundant (Smith 1971). Although Cades Pond is described as a Weeden Island culture (e.g., Milanich 2002), St. Johns series pottery was never eclipsed as the predominant diagnostic ware in mounds. Thus, the Cades Pond burial mound tradition may demonstrate stronger connections to the St. Johns I culture toward the east than it does to Weeden Island I cultures toward the west.

The only detailed record of subsistence among Cades Pond groups comes from the Melton village site (8AL169), located on uplands less than a kilometer from the northern edge of Paynes Prairie and proximate to three associated burial mounds (see Figure 1). The site was excavated first by John Goggin in 1951 and then James Fairbanks and students in 1971. Stephen Cumbaa’s (1972) thesis focused on the faunal collection from Melton village, in which he identified more than 1000 minimum number of individuals (MNI) to define what he called an “intensive harvest economy.” His work focused on general midden from three areas of the site and three large discrete pit features. Among the vertebrate fauna at Melton village, more than 90 percent by MNI were taken from wetland resources (Cumbaa 1972:41). The proportions of taxa were remarkably consistent across all six contexts. All
Figure 1. Cades Pond culture area and sites mentioned in the text.
contexts combined, 64 percent of individuals were fish, 12 percent were reptiles, 12 percent were amphibians, and almost three percent were birds that frequented wetland environments. Terrestrial mammals made up only nine percent (n=94) of the MNI and were represented mainly by small rodents, but also the remains of at least 26 deer. Charred hickory nut shells numbered in the thousands and indicate another important terrestrial contribution to the diet. Banded mystery snail (*Viviparus georgianus*) was ubiquitous but not quantified.

Based on all of these data, Cumbaa (1972) concluded that aquatic species, especially fish, were the mainstay of the diet. In north-central Florida, this adaptive focus on aquatic species nearly to the exclusion of terrestrial fauna is unique to the Cades Pond culture (Milanich 1994:335). Previous and subsequent environments apparently did not support the abundant freshwater resources available from about A.D. 100 to A.D. 600. According to Cumbaa (1972), fish would have been acquired by mass capture techniques, presumably using nets. This technology may lend further support to the idea that coastal Deptford people colonized north-central Florida to establish the Cades Pond culture after ca. A.D. 100. Net-fishing technology might have been relatively easily adapted from saltwater habitats on the coast. In any case, north-central Florida inhabitants were in frequent contact with coastal dwellers as several species of shark and sea turtle were recovered from the middens at Melton village. Marine fish are also present in the Melton village assemblage (Kristen Hall, personal communications, December 2015).

Cumbaa’s (1972) conclusions can be faulted for significantly downplaying the importance of terrestrial mammals, particularly deer, by not considering the amount of food represented by each taxon. Calculations of biomass are beyond the scope of the present paper, but a simple estimate can illustrate the point. Assuming a conservative 43 kg for the weight of an adult female deer in Florida (Schaefer and Main 2014), the 26 deer represented in Cumbaa’s sample would have weighed more than 1100 kg. In order for the 658 fish in the sample to outweigh these deer, the average fish weight would need to exceed 1.7 kg (3.75 lbs). These very rough estimates demonstrate that deer must have made up far more, and fish far less, of the diet than considerations of MNI alone would suggest.

Even with this caveat, and considering the fact that detailed studies of paleodiet have not been conducted for any other Cades Pond sites, the locations of settlements in strategic locations that are proximate to multiple aquatic resources supports the notion that freshwater environments provided the subsistence mainstay. Moreover, this settlement pattern seems to present a stark contrast with the later Alachua Tradition that settled in the uplands, and presumably, made use of fertile and well-drained agricultural soils (Milanich 1978; Rolland 2012). Compared to the large bodies of water and wetlands that structured the Cades Pond settlement pattern, small sinkhole ponds must have been economically insignificant. However, limited evidence from the Ruffin Pond site described below may indicate that sinkholes were important symbolic resources that were conceptually linked to larger bodies of water. What follows is a description of the Ruffin Pond site and an interpretation of the unusual deposits that may have resulted from ritual deposition of pottery.

**Discovery of the Ruffin Pond Site**

The Ruffin Pond site (8AL5655) lies within a sinkhole depression in northwest Gainesville on a bluff high above the floodplain of Hogtown Creek (Figure 2). On an upland peninsula surrounded by wetlands, the sinkhole in which the site is located is one of at least four in the immediate vicinity that are similar in horizontal extent, roughly 100 meters from rim to rim. These are apparently unnamed features of the karst topography that dominate the area. Each likely formed as a solution sinkhole and subsequently filled with the remains of wetland vegetation and terrestrial debris. The age of each of these sinkholes is not known, but if the Ruffin Pond site is any indication, they are each at least several thousand years old. Two of the four sinkholes have been significantly altered by modern landscaping activities, which include scraping the peat or muck to bedrock and filling with sand. Only the steep-sided sinkhole to the east of the Ruffin Pond site is apparently completely unaltered in modern times.

The sinkhole at Ruffin Pond is approximately seven meters deep and has gently sloping sides. A modern drainage ditch was dug into the northeast side of the sinkhole and allows high water to flow into the wetland below. Over the past several decades the water level in the sinkhole has fluctuated but it was only completely dry between 2010 and 2012 (Wilder Ruffin, personal communications, March 2016). When dry, a small cave was exposed on the southern end of the sinkhole but was filled in by a landowner due to safety concerns. The archaeological site was first identified in January of 2012 by Wilder Ruffin, who owns the property at the north end of the sinkhole. As he dug for worms to use for fishing he exposed a dense deposit of pottery within the sinkhole depression. After digging an exploratory hole, he brought much of his collection to the Florida Museum of Natural History (FLMNH) to inquire about its significance. The large portions of pottery vessels and many decorated Weeden Island series wares demanded a follow-up field visit. The profile in the exploratory excavation consisted of four strata: black muck and peat to half a meter below surface, a pale brown ashy lens about 10 cm thick that contained the vast majority of artifacts, and a clean white sand stratum above organically enriched dark brown sand (Figure 3). Impressionistically, potsherds in the exploratory excavation seemed to become more frequent toward the center of the pond. However, a shovel test 5.5 m toward the sinkhole center (south) from the exploratory hole revealed a narrower band of ash about 5 cm thick and a commensurate decrease in the density of pottery. A low density scatter of artifacts is distributed around the sloping sides of the sinkhole and along its rim. Additional controlled testing by Mr. Ruffin in these areas revealed that artifacts are distributed only in the top 20 cm below surface and typically include only a handful of sherds and chert flakes. However, the artifact bearing strata along the sides of the sinkhole are
Figure 2. Topography of the Ruffin Pond site and surrounding features.

Figure 3. Stratigraphic profile of Wilder Ruffin’s exploratory excavation.
likely disturbed by earthmoving activities associated with the construction of the house and gardens upslope.

**Results of FLMNH Excavation**

The FLMNH excavated a single two-by-two meter test unit one meter east of the landowner’s excavation pit with the goal of encountering the edge of the ashy deposit observed in the existing profile. Figures 4, 5 and 6 give stratigraphic profiles and photographs for Test Unit 1. Table 1 gives descriptions and depths of each of the stratigraphic units in the profiles. The profile revealed three discrete strata of decaying organic matter and peat. The top two strata contained terrestrial macrobotanicals such as leaves and twigs within the matrix, while the third and lowest organic stratum was homogenous and plant material was decayed beyond the point of recognition (i.e. peat). The top two strata also contained occasional modern debris, while the third stratum contained no artifacts. The ashy lens below these strata, Stratum IV, was much thicker in our excavation than in the profile from the adjacent excavation, averaging more than 20 cm. Small pieces of charred wood were occasionally encountered throughout the ash lens. The white sandy lens beneath the ashy deposit observed in the landowner’s excavation was absent in our test excavation. In its place was a thin band of black charred material, Stratum V, that divided the ash lens above from the dark organically stained sand below. Neither the sand (Stratum VII) nor the ash lens continued across the entire excavation unit. Each discontinued toward the south and east and intersected very dark brown or black peat, comprising Stratum VI and Stratum VIII, respectively.

In the field, the composition of Stratum IV was something of a puzzle and based on its texture we speculated that it might contain some clay. Through X-ray Diffraction (XRD) conducted by Dr. Willie Harris in the UF Department of Soil and Water Science, we were able to determine that the ashy lens was composed nearly entirely of peat ash with minor traces of quartz, and no clay (Figure 7). This composition was

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**Figure 4. Test Unit 1 scaled drawings of profiles.**
Figure 5. Test Unit 1 south (top) and west (bottom) profiles.
Figure 6. Test Unit 1 north (top) and east (bottom) profiles.
Table 1. Stratigraphic units from TU1.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Max. Depth (cm BS)</th>
<th>Munsell Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gs</td>
<td></td>
<td></td>
<td>ground surface</td>
</tr>
<tr>
<td>I</td>
<td>45</td>
<td>10YR3/1</td>
<td>very dark grey peat with decaying leaves and modern debris</td>
</tr>
<tr>
<td>II</td>
<td>79</td>
<td>10YR2/1</td>
<td>black peat</td>
</tr>
<tr>
<td>III</td>
<td>94</td>
<td>10YR2/2</td>
<td>very dark brown loamy peat</td>
</tr>
<tr>
<td>IV</td>
<td>103</td>
<td>10YR7/4</td>
<td>very pale brown ash</td>
</tr>
<tr>
<td>V</td>
<td>106</td>
<td>10YR2/1</td>
<td>black, charred peat</td>
</tr>
<tr>
<td>VI</td>
<td>120</td>
<td>10YR2/2</td>
<td>very dark brown loamy peat</td>
</tr>
<tr>
<td>VII</td>
<td>120</td>
<td>10YR2/1</td>
<td>black loamy sand</td>
</tr>
<tr>
<td>VIII</td>
<td>109</td>
<td>10YR2/1</td>
<td>black peat</td>
</tr>
</tbody>
</table>

Figure 7. Results of XRD analysis of soil samples from Ruffin Pond: Stratum VIII peat burned in the lab (top) and Stratum IV archaeological ash (bottom).
virtually identical to peat from the site that we burned in the lab and compared by XRD. Burning a sample also allowed for an understanding of other properties of the peat. Burning samples of peat at 800 degrees C for six hours reduced its mass by 65 percent. Under the microscope, both the ash deposit and the peat contained abundant sponge spicules.

Charred wood from within the ash stratum was submitted for AMS dating and yielded a conventional age of 1280 +/- 30, which gives a 2-sigma date range of cal AD 662 to 774.1 This date range is potentially commensurate with the pottery found within the stratum, which seems to date to the end of the Cades Pond phase around A.D. 600 (see below). This age estimate also corresponds with a longstanding and significant drought in north-central Florida and much of the lower Southeast, reconstructed from tree-ring chronologies to have lasted from A.D. 659 to A.D. 724 (Cook and Krusic 2004, 2008; Smith 2009). Perhaps not coincidentally, this is around the time that farmers of the Alachua tradition first settled in north-central Florida and fisher-hunter-gatherers of the Cades Pond culture are no longer archaeologically visible. By the eighth century, Cades Pond people seem to have either transformed their subsistence practices to become Alachua farmers or were forced to abandon the region. Thus, the drought may have been an existential threat to the Cades Pond “aquatic life” that had flourished for more than four centuries.

Combined, the landowner excavations and our test excavation yielded 1252 sherds weighing more than 22 kg. We also recovered 23 chert flakes, the base of a middle archaic stemmed biface, and one bone pin made from a deer long bone. This assemblage clearly does not represent a typical midden, which in Alachua County normally includes abundant chert debitage. Nor did preservation bias limit our recovery of faunal remains because bone would have preserved quite well in the peat that was not burned. Pottery overwhelms the assemblage because pottery was deposited here almost to the exclusion of anything else.

Table 2 gives an inventory of the pottery assemblage from Ruffin Pond. The total pottery assemblage is overwhelmingly sand-tempered plain sherds, which comprise 94 percent by count and 89 percent by weight. Decorated sherds of the Weeden Island complex make up most of the remainder of the assemblage, including Weeden Island Incised, Weeden Island Punctated, Weeden Island Zoned Red, Keith Incised, Carrabelle Incised, Carrabelle Punctated, Swift Creek Complicated Stamped, Ruskin Dentate Stamped, and Ruskin Linear Punctated (Figures 8-13). We also recovered several Weeden Island “embellished” rims, one of which is on a Ruskin Linear Punctated sherd (Figure 14). The proportion

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
<th>Weight (g)</th>
<th>% count</th>
<th>% weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>check stamped</td>
<td>12</td>
<td>193.5</td>
<td>0.96</td>
<td>0.87</td>
</tr>
<tr>
<td>Carrabelle Incised</td>
<td>1</td>
<td>75</td>
<td>0.08</td>
<td>0.34</td>
</tr>
<tr>
<td>cord marked</td>
<td>1</td>
<td>14.3</td>
<td>0.08</td>
<td>0.06</td>
</tr>
<tr>
<td>Carrabelle Punctated</td>
<td>2</td>
<td>33</td>
<td>0.16</td>
<td>0.15</td>
</tr>
<tr>
<td>Crooked River Complicated Stamped</td>
<td>1</td>
<td>20.4</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td>cross simple stamped</td>
<td>1</td>
<td>46.5</td>
<td>0.08</td>
<td>0.21</td>
</tr>
<tr>
<td>Keith Incised</td>
<td>5</td>
<td>99.1</td>
<td>0.40</td>
<td>0.45</td>
</tr>
<tr>
<td>Papy's Bayou Punctated</td>
<td>1</td>
<td>6.6</td>
<td>0.08</td>
<td>0.03</td>
</tr>
<tr>
<td>Ruskin Dentate Stamped</td>
<td>4</td>
<td>62</td>
<td>0.32</td>
<td>0.28</td>
</tr>
<tr>
<td>Ruskin Linear Punctated</td>
<td>7</td>
<td>154.5</td>
<td>0.56</td>
<td>0.70</td>
</tr>
<tr>
<td>Swift Creek Complicated Stamped</td>
<td>4</td>
<td>163.6</td>
<td>0.32</td>
<td>0.74</td>
</tr>
<tr>
<td>simple stamped</td>
<td>2</td>
<td>59.8</td>
<td>0.16</td>
<td>0.27</td>
</tr>
<tr>
<td>St. Johns Plain</td>
<td>9</td>
<td>70.7</td>
<td>0.72</td>
<td>0.32</td>
</tr>
<tr>
<td>sand tempered plain</td>
<td>1136</td>
<td>19701.9</td>
<td>90.73</td>
<td>89.00</td>
</tr>
<tr>
<td>UID brushed, incised, punctated, roughened, and scraped</td>
<td>16</td>
<td>424.5</td>
<td>1.28</td>
<td>1.92</td>
</tr>
<tr>
<td>Weeden Island Incised</td>
<td>3</td>
<td>47.3</td>
<td>0.24</td>
<td>0.21</td>
</tr>
<tr>
<td>Weeden Island Plain (incised rim)</td>
<td>11</td>
<td>160.4</td>
<td>0.88</td>
<td>0.72</td>
</tr>
<tr>
<td>Weeden Island Plain Embellished</td>
<td>11</td>
<td>423.2</td>
<td>0.88</td>
<td>1.91</td>
</tr>
<tr>
<td>Weeden Island Punctated</td>
<td>23</td>
<td>346.2</td>
<td>1.84</td>
<td>1.56</td>
</tr>
<tr>
<td>Weeden Island Zoned Red</td>
<td>2</td>
<td>34.1</td>
<td>0.16</td>
<td>0.15</td>
</tr>
<tr>
<td>Total Pottery</td>
<td>1252</td>
<td>22136.6</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Figure 8. Weeden Island Punctated sherds.

Figure 9. Clockwise from top left: Weeden Island Zoned Red, Keith Incised, Weeden Island Zoned Red, Swift Creek Complicated Stamped, and Weeden Island Punctated lip.
Figure 10. Carrabelle Incised vessel fragment and rim profile.

Figure 11. Swift Creek Complicated Stamped vessel fragment and rim profile.
Figure 12. Ruskin Dentate Stamped sherds.

Figure 13. Ruskin Linear Punctated sherds.
of decorated and plain wares would be fairly typical for Cades Pond village assemblages, which range between 91 and 97 percent sand-tempered plain (Smith 1971). In contrast, mounds tend to contain a much higher proportion of St. Johns Plain and Dunns Creek Red, sometimes comprising the majority of the assemblage (Smith 1971).

Based on typology, the pottery assemblage dates exclusively to the Cades Pond period, likely sometime between AD 300 and 600. The preceding Deptford phase could be represented by 12 check-stamped sherds, but these are more likely to be Wakulla Check Stamped and contemporaneous with the Weeden Island series (Figure 15). The only potential Alachua culture artifact is a single small cordmarked sherd, which could be classified as West Florida Cordmarked and thus contemporaneous with the Cades Pond assemblage.

Our excavations showed very clearly that pottery was confined mainly to the arbitrary levels that were the same depth as the Stratum IV ash lens between 85 and 105 cm below the ground surface (Table 3). However, pottery was not strictly confined to the ash lens that was mostly distributed across the northern half of the excavation unit. Figure 16 shows plan views of each 10 cm excavation level and the counts and weights of pottery sherds in each 1x1 meter quadrant. The southern half of the excavation unit was mostly black peat but contained more pottery than the northern half. While not confined to the ash, based on the more extensive investigations of the landowner, pottery does seem to be associated with it. Only larger scale controlled excavations can confirm this impression of correlation.
Sherds from the northern quadrants of the test excavation associated with the ash lens were much more likely to be highly oxidized than those from the southern quadrants (Table 4). In fact, more than half of the assemblage from the NW quadrant was highly oxidized while less than two percent of the pottery from both southern quadrants was oxidized. Carbonized residue on the interior and exterior of vessels was much less prevalent than oxidation but shows essentially the opposite distribution, with most occurring in the peat on the southern half of the test unit. Notably, oxidation and carbonized residue are mutually exclusive on individual samples. That is, no oxidized vessels exhibit carbonized residue.

**Vessel Analysis**

Among the total pottery assemblage are 231 rim fragments. Each of these was analyzed to determine vessel morphology and evidence of use. Of the 145 vessels assigned to a vessel form, 51 are open bowls, six are restricted bowls, two are flattened globular bowls, three are open pots, and one is a collared jar. The remaining vessels include 50 restricted and 32 unrestricted vessels that may be pots, bowls, or jars. By any measure, open bowls are the most common vessel form in the assemblage (Figure 17).

Orifice diameters were recorded for 112 vessels and are wide ranging, from 4 cm to 50 cm (Figure 18). Orifice diameter is variable among all vessel forms except flattened globular jars and restricted bowls, which average 14 cm (s.d.=2.8) and 11 cm (s.d.=1.7), respectively, and indicate the possibility of standardization in size but suffer from small sample sizes. The open bowls are widely diverse in orifice diameter. In morphological terms, the assemblage is fairly homogenous in form (mostly open bowls) but diverse in vessel size. No data from Cades Pond contexts can be compared, but the wide range of vessel sizes is generally more typical of Woodland burial mound assemblages than village midden collections in northern Florida (Wallis 2011).

In the total assemblage, heavy sooting was present on interior and exterior surfaces of many sherds of various vessel forms. The random distribution of these accumulations indicated that much of it was caused by post-depositional burning. There are also highly oxidized sherds that seem nearly vitrified—the hardness and light color of them indicate that they were heated at temperatures above the typical open pit firing. These extremely high fired sherds occurred only in the ash stratum. Occasionally pieces of the same vessel were recovered from within and outside of the ash and only those within the ash were highly oxidized (Figure 19).
Summary and Implications of Investigations

Based on the evidence, four secure inferences can be made concerning the deposit. First, the ash lens and charred lens beneath it are the result of an in situ fire that completely burned the peat stratum sometime in the late seventh or early eighth centuries. Second, the fact that pottery from within the ash is more highly fired than pottery alongside the deposit indicates that the fire post-dates the deposition of pottery and some of it was burned in situ. Pottery seems to have been deposited in the water-filled pond over some period of time as peat gradually accumulated and, after some period of drying, was subsequently burned at a very high temperature. Third, the assemblage of diagnostic pottery types indicates that the period of time over which pottery was deposited could not have been more than a few centuries and might have been far less. If the ash deposit represents 25 percent of the volume (not just the mass) of the peat prior to burning, then portions of the peat column were originally up to 80 cm thick before burning. If the rate of deposition evident in the uppermost two strata containing modern debris is any indication, this thickness could be achieved in less than a century. Fourth and finally, pottery typology mostly conforms to a village assemblage, and vessel forms include a majority of open bowls of various sizes, along with an assortment of other shapes and sizes.

There is little doubt that the pottery in the sinkhole was intentionally deposited. The assemblage does not exhibit any weathering or erosion that might indicate its transport down the slope of the sink by natural processes. Many of the sherds may be too large to have been carried by erosion down the very gentle slopes of the sinkhole. The association with an ash lens dated to cal AD 660 to 770 negates the possibility that the pottery assemblage was deposited recently. The fact that all of the pottery was embedded in peat—some of it burned and some not—also indicates that it was deposited while the sinkhole contained water.

Assessing the intentionality of the fire that resulted in the ash lens and oxidized pottery is much more difficult. The circumscribed extent of the ash might indicate a fire contained by people, but natural processes cannot be ruled out. During times of drought, bogs can be ignited by lightning strikes. According to Dr. Adam Watts in the School of Forest Resources and Conservation at the University of Florida (personal communication, March 2013), it is not unusual to see a heterogeneous distribution of smoldering in the organic soils of such fires. Some areas are left only lightly charred while others show deep smoldering in “pockets.” If this were the cause of the ash deposit at Ruffin Pond, we should expect to see other similar formations at the site. Unfortunately, we do not have survey data from other areas of the pond to evaluate this possibility. Also limiting our interpretation is the fact that little research has been conducted concerning the microtopographic variation produced by widespread smoldering in organic soils.
Figure 16. Plan view of the top of excavation levels (from top) B, C, D, and E.
Table 4. Distribution of oxidation and carbonized residue on sherds.

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>oxidized (n)</th>
<th>% oxidized</th>
<th>carbonized residue (n)</th>
<th>% carbonized residue</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW</td>
<td>32</td>
<td>51.6</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>NE</td>
<td>11</td>
<td>13.9</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>SE</td>
<td>1</td>
<td>1.3</td>
<td>5</td>
<td>6.5</td>
</tr>
<tr>
<td>SW</td>
<td>1</td>
<td>1.2</td>
<td>5</td>
<td>6.0</td>
</tr>
</tbody>
</table>

An Interpretation: Sinkholes as Vessels, Vessels as Sinkholes

The Ruffin Pond site is enigmatic, and interpretations based on such limited evidence are somewhat perilous. Nonetheless, the following interpretation is offered as a hypothesis for testing. Why deposit portions of vessels in a sinkhole pond? I take some inspiration from the work of Chris Gosden (2006) and Scott Ortman (2000), among others, who show how associations can flow across varying classes of objects and between people and things. Ortman’s (2000) work is of particular relevance here, as he uses metaphor as a way to trace links among pottery, textiles, and kivas in the Mesa Verde area of southwestern North America. Each of these types of container is linked by analogous features that support the notion that they are all equivalent and each implicated in the manifestation of the same meaning, in this case Puebloan views of the cosmos.

At Ruffin Pond, associations can be viewed as potentially linking categories of geological features, places, and artifacts. Diverging from Ortman’s linguistically informed concept of metaphor, we can consider a systematic set of linkages in terms of Charles Sanders Peirce’s concept of the sign. Wallis (2013) offers an overview and case study that explains the usefulness of Peirce’s semiotic in archaeology (see also Preucel 2006). To summarize very briefly for the purpose at hand, Peirce’s model of the sign allows us to consider how things become meaningful through their specific material qualities and relationships. Instead of interpreting material things as inert expressions of people’s thoughts and beliefs, which makes their past meaning difficult to access, the Peircian perspective emphasizes that material is involved in the active creation of meaning through signs. Signs are references: Nothing exists in isolation; everything exists with reference to something else. Things carry this information in physical form that is accessible to archaeologists. Two very important signs to consider are icons and indexes.

Icons make reference through resemblance to something else. A painting or photograph of a person and computer desktop icons in the shapes of printers or mail envelopes are all familiar examples. In contrast, indexes make reference through evidence of causation or proximity to something else. Smoke indexes fire; a weather vane indexes wind; a footprint indexes the person who made it. Icons and indexes can sometimes provide archaeologists with surer footing than symbols, which are defined by convention and are therefore arbitrary in a cross-cultural sense. A wedding ring can symbolize marriage or a red octagon can symbolize the command to stop, but neither material thing has intrinsic connections through resemblance or contact. This is not to say that icons and indexes are always easy to interpret in the archaeological record either. All things have the potential to embody multiple signs simultaneously but a more limited number of qualities or relationships are usually emphasized in specific contexts. For instance, a printed book indexes the author, publisher, printer, and the tree used to make its pages, but when it is given to someone as a gift, a connection between two people may be highlighted as most important. In order to understand which of the available qualities of things became significant in the past, archaeologists must examine how those things were employed in practice. In the case of Ruffin Pond, icons (identified by resemblance) and indexes (identified by signs of contact) can each be identified and shown to constitute the connections that might explain the depositional practices at the site. In this case, the icons and indexes identified are real and legitimate, but understanding whether they were truly marked as important by ancient inhabitants will require more evidence.

As suggested in previous work (Cumbaa 1972), it is significant that Cades Pond culture was oriented toward a watery world and heavily reliant on aquatic species. Small sinkholes such as the one at Ruffin Pond are unlikely to have been major economic resources compared to the much larger nearby marshes, lakes, and streams, but they were potential symbolic resources. Knowledge of native cosmologies would have us anticipate water in sinkholes and caves as portals to the underworld (Hudson 1976:130-132), but at a more fundamental level they are simply microcosms, connected by indexes and icons to the watery world on which people depended. If we consider earthenware vessels that held water and food as iconically connected to sinkhole ponds by their shape and indexically linked by their contents, we can see how vessels could be metonyms of the aquatic landscape, basically “standing for” aquatic features through resemblance and association. Indeed, the most common vessel form in the Ruffin Pond assemblage is an open bowl that approximates the gentle contours of the sinkholes in the area. These were serving vessels that may have contained the same essential sustenance that derived from the abundant bodies of water in Middle Woodland north-central Florida.

The repeated deposition of broken vessels were acts that would have constituted and reinforced the metonymical and scalar relationships among earthenware vessels (especially serving bowls), sinkhole ponds, and the surrounding watery landscape. Viewed this way, as inextricably connected, fragments of vessels may at times have been necessarily emplaced within the sinkholes of which they were integral parts. Moreover, as vessels were formed from wet clay, they also may have been viewed as originating out of the water and necessarily returned upon breaking. In any case, the connections between vessels, sinkholes, and water were physically (i.e. indexically) reinforced by the periodic
Figure 17. Sample of open bowl rim profiles.
deposition of vessels in the pond. At some point in the late seventh century the pond went completely dry. Other water bodies must have also dried up, an economy based on aquatic resources was no longer viable, and the Cades Pond archaeological culture was replaced by the Alachua tradition. We are currently unable to confirm whether the fire at the pond was anthropogenic, but the impression that pottery is mostly absent outside of the areas where ash occurs suggests that it might have been. Why burn the area in the pond where pottery had been deposited for generations? Pottery may or may not have been visible on the exposed pond floor, but, as suggested by the ash lens, the center and deepest part of the sinkhole may have continued to be the focus of ritualized practices. To explain these practices we can again draw on the relationships between sinkhole ponds and vessels that might have been based on icons and indexes.

An unfired vessel holds no water, and if we continue the metonymic connection, neither should a sinkhole. Therefore, the surface of the sinkhole depression might have been fired in order to make it suitable to hold water once again. This parallel in fact has practical implications: by lowering the elevation of the ground surface toward the water table, bog burns can sometimes bring back water to a sinkhole depression (Micah Mones, personal communication, June 2012). This knowledge might have further solidified the linkages between earthenware vessels and sinkhole ponds, whereby people attempted to affect change by creating vessels suitable to hold water. As a microcosm of the once watery landscape, these actions within the sinkhole could have been intended as an attempt to transform the entire desiccating world during a period of punctuated environmental change.

It may be that this sinkhole became the target of transformative practices because it was known to be sensitive to climatological events and human intervention. We experienced these qualities ourselves in the field. After being dry for nearly two years, in June of 2012 the sinkhole was filled with ten feet of water following Tropical Storm Debbie, and it remains a pond today in the midst of a significant recovery from a longstanding drought. Although the drainage regime of the pond and the neighborhood surrounding it has been altered from its previous configuration, the sinkhole may have always been a sensitive index of climate—the first to fill with water during rainy seasons and the first to recede during droughts. Notably, vessels were always deposited in the deepest part of the sinkhole where water likely remained most of the time, not along any of the shorelines that were present during high water stands. Correspondingly, the fire was also ignited in this deepest part of the sinkhole, where...
the peat was thickest and the water was most likely to return. Because of the relationships among vessels, sinkholes, and other bodies of water, the manipulation of this place may have presented the best chance to affect change. After years of ritualized interaction with its central water body, the sinkhole could have been an index of available water and the aquatic habitats that were made possible by it. This symbolic resource thereby might have become a critical point for bringing water back. If this were the case, the intervention may have been deemed a failure, as over the next decades people abandoned the Cades Pond “aquatic life,” presumably because it was no longer viable in the context of a drier climate pattern.

Conclusions and More Speculations

There is much work left to be done at Ruffin Pond. The most important objective is to better understand the distribution and content of the ash deposit and to identify any evidence of intentional burning. But there are other avenues that could be explored as well. Perhaps further excavation would reveal pits dug into the ash from Cades pond people mining the material. The ash contains abundant sponge spicules and could have been used as temper for making St. Johns series pottery, which comprises the majority ware of Cades Pond burial mound assemblages. Laboratory experiments using sediments from Ruffin Pond indicate that some St. Johns pottery may have been tempered this way and that the hallmark “chalky” feel comes from the ash of burned organic matter laden with sponge spicules that was mined from wetlands and swamps (Lollis et al. 2015). This idea requires further experimentation as well as more fieldwork, but, assuming St. Johns vessels are locally made, it may be that we have stumbled upon evidence for the manufacturing of temper. If so, then St. Johns vessels were indexes of drought events and perhaps successful attempts to end them, making them potent materials for inclusion as mortuary wares in Cades Pond burial mounds.

If the water recedes and fieldwork becomes possible again, we will focus our efforts on delimiting the extent of the ash deposit and examining other areas of the sinkhole. In addition, we will test nearby sinkholes that appear unaltered by modern development. Data from comparable sinkholes will prove invaluable, whether revealing comparable archaeology or culturally sterile stratigraphy that can serve as a proxy for local paleoenvironment.

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Note

1. Sample number Beta-330111; Measured Radiocarbon Age 1290±30; 13C/12C Ratio -25.4 o/oo. Calibration uses the IntCal13 atmospheric curve (Reimer et al. 2013).

Figure 19. Weeden Island Punctated vessel fragment and rim profile. The top left rim sherd was recovered from peat and is buff colored while the body sherd below it came from the ash lens and exhibits a pale color due to extensive oxidation.
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