

**North Carolina  
Archaeological Society**

**N e w s l e t t e r**

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Research Laboratories of Archaeology, Campus Box 3120, University of North Carolina, Chapel Hill, NC 27599-3120

Society Website: <http://www.ncarchsociety.org>

## **CONSERVATION OF THE LAKE PHELPS CANOES**

Timothy Smith

(Lake Phelps Canoe Conservator, QAR Conservation Lab)

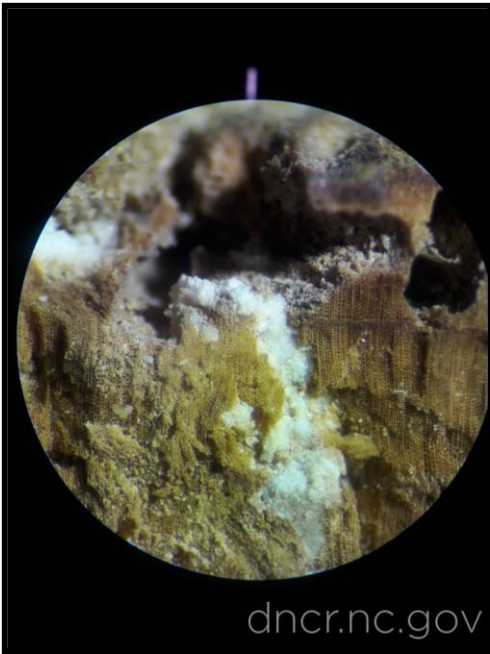
Archaeological evidence suggests that the area around Lake Phelps was occupied at least seasonally by prehistoric Native Americans from the late Paleo-Indian period, before 8000 BCE, to the Late Woodland period, about 1600 CE. Located between the Albemarle Sound and the Pamlico River, Lake Phelps is the second largest natural lake in North Carolina, covering about 16,000 acres and has an average depth of about four and a half feet. The lake is almost entirely rain fed. The north shore of the lake consists of one of the last old-growth forests in eastern North Carolina, with some bald cypress trees measuring 10 feet in diameter. It is along this north shore where all the Lake Phelps Canoes were discovered.



*Figure 1: Person pulling a modern canoe on Lake Phelps*

The Lake Phelps Canoes are all dugout canoes, which refers to how they were made. Although dugout canoes were usually constructed out of hard woods, the Lake Phelps Canoes were made from the native bald cypress, which has a heart wood that naturally protects from decay. Most dugout canoes measured about 40 feet in length, which points to large trees being felled by lighting fires at their base and using a coating of mud and straw to make sure the fire did not spread up the tree. Stone tools were then used to chip away at the charred trunk until the weight of the tree caused it to fall. The bark and sap wood were then removed, and the ends shaped. To hollow out the canoe, carefully tended fires were used to slowly burn into the log, using hand tools to occasionally scrape away the charred wood.

In the 1980s, during a period of drought that lowered the water level of the lake, some of the partially buried canoes were uncovered. Buried in the sediment under water, they were in a mostly anaerobic environment (i.e., an environment without oxygen), which in turn means fewer organisms to feed on the wood and cause it to disintegrate. While surveying the area, 30 canoes were found, and in 1985, archaeologists started the process of carefully recording the canoes for study. Each canoe was mapped and drawn, and many were radiocarbon (carbon-14) dated, a method based on the idea that plants and animals constantly exchange carbon-14 with the environment while alive, but once dead, the carbon-14 starts to decay at a predictable rate. Measuring the amount of carbon-14 left in an organic artifact can then tell us how old the artifact is. Nineteen of the 30 canoes have been dated using this method, with three canoes dating to the Late Archaic period (3000-1000 BCE), two dating to the Early Woodland period (1000-300 BCE), 11 dating to the Middle Woodland period (300 BCE-800 CE), and three dating to the Late Woodland period (800-1650 CE). The oldest canoe dates to about 2400 BCE whereas the most recent canoe dates to about 1400 CE. To protect the canoes, many were reburied in place while some were reburied in another part of Lake Phelps.



*Figure 2: Microscopic view of sugar causing damage to the canoes*



*Figure 3: Misting treatment of a canoe fragment*

Of the 30 canoes, four were recovered in 1986 to be preserved and put on display around the state. A critical required step before the canoes could be displayed was to conserve them. When wooden artifacts such as these canoes are removed from an inundated environment, they cannot just be dried, or they will become fragile, warp, and further degrade. To prevent this, the water in the cells of the wood must be replaced with a bulking or impregnation agent. Bulking uses a chemical that can enter the cell walls, and impregnation uses chemicals that fill the cell lumen, or center of the cell, both providing support to the cell to prevent shrinkage. A common agent today is Polyethylene Glycol (PEG). In the 1980s though, one common bulking agent was sugar due to its low cost, and it is still used occasionally today. Sugar was used to treat the Lake Phelps canoes when they were first conserved. A large wooden tank was constructed and lined with plastic, into which a canoe was then placed along with water and sugar added to create a 20% by weight solution, with phenol (carbolic acid) added to the solution to prevent it from fermenting. Sugar was then added weekly until a 100 percent solution was reached, which took about 12 weeks for the canoes to become fully saturated. Afterwards the canoes could air dry at ambient temperature and humidity.

Unfortunately, this sugar treatment has developed problems over the years. Two of the canoes were stored at Pettigrew State Park in an environment that was not temperature or humidity controlled. This is a major problem for wood treated with sugar, which should be stored at about room temperature with a stable humidity of 45-55%. The canoes suffered drastic swings in both temperature and humidity, causing sugar to leech to the surface, resulting in damage to many areas of the canoes. Some of this damage can be seen in **Figure 2**. Even the two



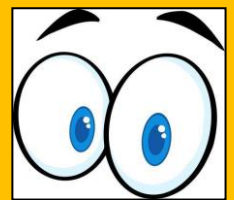
*Figure 4: Canoe fragment before treatment (Left), Canoe fragment after initial misting treatment (Middle), Canoe fragment after subsequent poultice treatment (Right)*

canoes stored in controlled environments at museums have suffered from this problem, but to a lesser extent. This demonstrates why archaeological waterlogged wood should no longer be treated with sugar. In 2015, the canoes from Pettigrew were treated to remove this surface sugar using a misting technique with a solution of 75% reagent alcohol and 25% reverse osmosis (RO) water (the process of reverse osmosis purifies the water and separates out any unwanted molecules or larger particles from the water). However, this treatment did not hold up over time. In 2020, the Queen Anne's Revenge Conservation Lab was awarded a grant from the Institute of Museum and Library Services to re- conserve the canoes. After testing various percentages of the previous solution, it was decided that a new treatment method was needed. With more testing, a poultice application using tissue paper and RO water was found to be effective at dissolving most of the sugar back into the wood. This worked well for some of the canoe fragments, but others had too much sugar for the poultice to work successfully. In these cases, an initial misting treatment of just RO water was used to remove most of the sugar. The fragments were then allowed to dry before a poultice treatment was applied to remove what remained. **Figure 4** shows the progression of treatments. Finally, mechanical cleaning removed small amounts of sugar from cracks and pores in the wood that the other treatments did not impact. Despite testing different applications, and the use of these methods, some sugar is still reappearing on the surface of some of the canoe fragments. Further testing and research are required to finish successful retreatment. With the work we are doing, we are on the right track to preserve these important artifacts as part of North Carolina's history.



**MYSTERY ARTIFACT** – The image of the portcullis and tower was from a British ball clay (or kaolin) pipe. The crown on the pipe above the tower is identified with Queen Victoria. Sources place the manufacture of this pipe to London, ca. 1890.

**NCAS Fall Membership Meeting  
Durham, NC (as part of SEAC)  
Date: Oct. 24<sup>th</sup> ... Time: TBA  
Stay Tuned for Details**



## VOLUNTEER OPPORTUNITY FOR NCAS MEMBERS

If you are a current or soon-to-be NCAS member and want to participate in the upcoming **Southeastern Archaeological Conference (SEAC) to be held in Durham, NC from Sunday, October 24<sup>th</sup> to Wednesday, October 27<sup>th</sup>**, then here is your opportunity. The SEAC organizers are looking for several dedicated volunteers to work at least 8 hours (split into two 4-hour shifts or one single day) to assist with registration, event setup, and/or serve as a monitor in the presentation rooms. An 8-hour volunteer slot will get you into the conference **FOR FREE**. You do not have to be a SEAC member to volunteer. This is an exciting event featuring current archaeological research from the Southeastern United States. We hope you will consider joining us by volunteering and attending this exceptional archaeological gathering ([Meeting Details – Southeastern Archaeological Conference](#) ([southeasternarchaeology.org](http://southeasternarchaeology.org))). Please contact volunteer organizer, Dr. Heather Lapham at [hlapham@unc.edu](mailto:hlapham@unc.edu), if you are interested.



**Southeastern Archaeological Conference**



## NCAS Word Find: “Headed into the Field”

Whether packing for vacation or making sure you have all your gear for your next field school, you’re bound to leave something behind. As we head into the field during these dog days of summer, can you spot not only all the words from our equipment list but also what we may have overlooked? Reply to [pjmohler@ncdot.gov](mailto:pjmohler@ncdot.gov) by Sept. 22<sup>nd</sup> (1<sup>st</sup> day of Fall!) with your guesses for what we forgot (as is usually the case); best response may even earn some nice NCAS swag. Words can go forward, backward, or diagonally. Answers will appear in the next issue of the Newsletter.

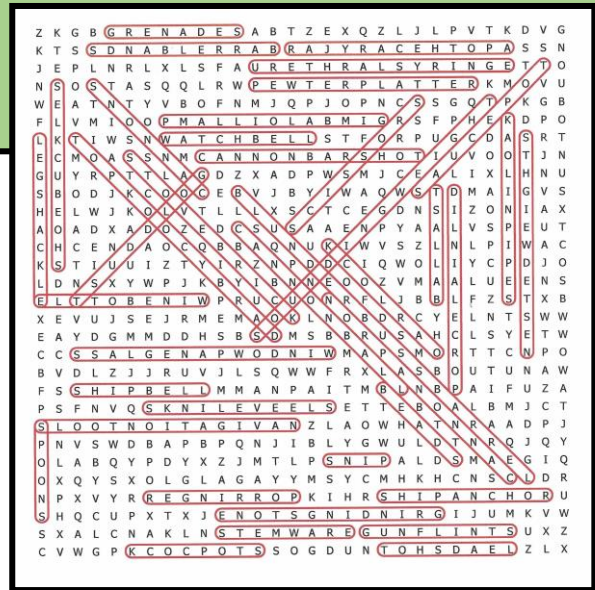
- |                |                         |                      |                  |
|----------------|-------------------------|----------------------|------------------|
| BOOTS          | HAT                     | PIN FLAGS            | SUNSCREEN        |
| BUCKETS        | KNEE PAD                | PLASTIC BAGS         | TARP             |
| CAMERA         | LARGE ROLLING TAPES     | PROBE                | TRANSIT          |
| CHAINING PINS  | LINE LEVEL              | RESEARCH QUESTIONS   | TRIANGULAR RULER |
| FIELD NOTEBOOK | MACHETE                 | ROOT CLIPPERS        | TWINE            |
| FOLDING RULER  | MARSHALLTOWN TROWEL     | ROUND BLADED SHOVEL  | WATER COOLER     |
| GPS LOCATOR    | MUNSELL SOIL COLOR BOOK | SNAKE GUARDS         | WHEELBARROW      |
| GRAPH PAPER    | PAPER BAGS              | SOIL CORER           | WIRE SCREEN      |
| GRID STAKES    | PENCILS                 | SQUARE BLADED SHOVEL |                  |
| HAND TAPE      | PHOTOGRAPH SCALE        | STADIA ROD           |                  |

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A	B	D	G	R	A	P	H	P	A	P	E	R	R	A	X	P	V	X	R	Y	V	L	T	S	C	B	G	V	T



**HAVE YOU SEEN AN ARTIFACT LIKE THIS? – If so, please contact Joe Herbert at [ijherbert245@gmail.com](mailto:ijherbert245@gmail.com). This bent tube clay pipe, found on Fort Bragg in 1963, was previously written about in [Volume 13 No 2 hi.pdf \(unc.edu\)](#) of our newsletter. Time is of the essence; Joe plans to talk about pipes like this at SEAC, and if he doesn't hear from you, he won't have anything to say...and he'll owe me lunch!**

*Answer Key for Spring Issue Word Search*



**Grant-in-Aid Program  
Whitey Graham Award (WGA)**

The North Carolina Archaeological Society (NCAS) invites applications for The Whitey Graham Award (WGA) in support of research pertaining to North Carolina archaeology. The WGA is underwritten by the NCAS Endowment Fund, which was established in 2001 from the proceeds of the sale of the “Blue Banks” property near Greenville. The sale took place largely through the efforts of then-president Robert Graham. We owe him our thanks for making these grants possible! Applicants must be members of the North Carolina Archaeological Society (exemptions for public educators, as defined below, will be considered) and must also meet one or more of the following criteria:

1. An applicant must be: (a) a graduate or undergraduate student actively pursuing a degree in archaeology or a related field; (b) an individual enrolled in an internship program with a museum, a state historic site, an archaeological park, or a Native American group (with state or federal recognition); (c) an avocational archaeologist who is a member of the North Carolina Archaeological Society and has over time demonstrated a concern for the protection or study of archaeological resources within the state (including working under the direction of professional archaeologists); or (d) a public educator (e.g., school teacher or museum personnel). Collaborations between educators are encouraged.
2. An individual must apply for the award with a proposal that states how the grant will aid in the individual's research relevant to North Carolina archaeology. Each proposal must include (a) a statement of research design (up to 2 pages long), (b) a budget showing how grant funds will be spent in pursuing this research, (c) a curriculum vitae, and (d) a letter of support from a professional archaeological mentor or advisor. The advisor is expected to take an active role in overseeing and/or guiding the research to completion and should explicitly indicate a willingness to do so in the letter. Public educator applications include all of the above but can substitute the

following for the research design statement above: (a) an explanation of the educational goals and methods or activities used to promote public awareness of archaeology in North Carolina (up to 2 pages long).

3. Each grant award will not exceed \$500. The budget may include any direct expense in support of the proposed research, except for wages paid to the grant's recipient. Examples of allowable expenses include travel (fares, mileage, and per diem), supplies, and fees for specialized services (photography, radiocarbon dating, drafting, etc.). Grant funds may not be used for indirect costs or institutional overhead.

4. Selection criteria shall include, but need not be limited to, (a) the quality of the proposed research, (b) the likelihood that the research can be successfully carried out in a timely manner, (c) the individual's promise as a professional or avocational archaeologist, and (c) the degree to which the individual has contributed to the programs of the North Carolina Archaeological Society. Note that the committee reserves the right to make no award in any given year.

5. Normally, the term of the grant shall be for one year, subject to extension for an additional year. The recipient shall submit interim reports of progress and expenditures to the Committee's chair at six-month intervals from the initial date of the grant. A final report is due within six months after the grant's term ends. This final report must include a description of the project's research results, as well as a detailed summary of expenditures made under the grant. If asked, the recipient of the grant will present the results of his or her research at a meeting of the North Carolina Archaeological Society. Each recipient is also required to submit an article on the grant-supported research to the NCAS Newsletter or to the Society's journal, *North Carolina Archaeology*. Grant recipients should acknowledge the North Carolina Archaeological Society in any printed, electronic, or graphic material produced through the grant and in announcements at any public meetings, classes, or events to which the grant gives rise, as follows: *This (publication, project, etc.) was produced in part by a grant from the North Carolina Archaeological Society.*

The next deadline for receipt of proposals is November 1, 2021. Awards will be announced by December 31, 2021. Email all materials to NCAS Grant-in-Aid Program co-chairs, Dr. Randy Daniel ([danieli@ecu.edu](mailto:danieli@ecu.edu)) and Dr. David Moore ([dmoore@warren-wilson.edu](mailto:dmoore@warren-wilson.edu)).

## The Role of the Office of State Archaeology in Compliance Review

Mary Elizabeth Fitts, Lindsay Ferrante, and Rosemarie Blewitt-Golsch (OSA)

The Office of State Archaeology (OSA) serves North Carolina's citizens through programs that identify archaeological resources on land and beneath state waters. With the State Historic Preservation Office, the OSA reviews applications for activities receiving government assistance or permits. Pertinent laws or regulations include the National Historic Preservation Act (NHPA) (Sections 106 and 110), the National Environmental Protection Act, the North Carolina Coastal Area Management Act, the North Carolina Environmental Policy Act, and the North Carolina Mining Act. Cemeteries are protected under North Carolina General Statutes (NCGS) Chapter 14-148 and 14-149 and are afforded consideration under NCGS Chapters 65 and 70.

Most often, the OSA reviews projects that are federal agency activities or are considered federal undertakings, meaning they have federal dollars or permits associated with them. When reviewing these types of projects under Section 106 of the NHPA, the OSA consults on whether the project may adversely affect archaeological sites that are either listed in the National Register of Historic Places (NRHP) or are eligible for listing in the National Register.

This is an important point. Not all archaeological sites are given the same consideration under the law; only those that qualify for listing in the National Register are considered. The exception to this is cemeteries, which are protected by state law regardless of their National Register eligibility.

There are four criteria that make a historic place eligible for listing in the NRHP: association with significant events or trends in history, association with important historical figures, exceptionally good architecture or good examples of craft production or engineering, and the potential to yield significant information about the past. While archaeological sites are most frequently evaluated for their information potential, they can be eligible for the National Register under any of these criteria.

In addition to meeting one or more of the NRHP criteria, an archaeological site must possess integrity to be eligible for the National Register. Six types of integrity are considered: location, design, setting, materials, workmanship, and association. If an archaeological site has well-preserved features, artifacts, and intra-site patterning, it is usually interpreted as having good integrity. However, even a damaged site could address research questions if it is a rare type of site and might therefore be eligible for the National Register.

Ground disturbances, whether of natural or human origin, affect the integrity of archaeological sites. Examples include shoreline erosion, the plowing of a field, and the use of heavy machinery for grading. These activities all differ in the extent and depth of disturbance they cause. For example, plowing may disturb the upper foot or so of soil in a field, but intact archaeological deposits may exist below this plow zone.

To determine if archaeological sites eligible for listing in the National Register will be affected by a project under review, the OSA may recommend that an archaeological survey be done prior to the proposed activity. The OSA provides this recommendation to the government agency providing the grant, funds, or permit. In some cases, conditions of a project area may make it very unlikely for a significant archaeological site to be present. Examples include very poorly drained soils, previously mined areas, or areas with very steep slopes.

If an NRHP-eligible archaeological site is identified in a project area under review, the OSA advises the government agency regarding ways to avoid, minimize, or mitigate adverse effects the project will have on the site. In terms of stewardship, avoidance is the best option because it means the site will be there for future generations. However, the feasibility of avoidance depends on the project. In some cases, the mitigation option is chosen. This most often means that a portion of the site is excavated by professional archaeologists and a detailed report is written describing the information that was obtained from the excavation. The development project then proceeds.

The final piece of this process is to make the information learned from important archaeological sites accessible to everyone. An essential activity for the OSA involves public education programs. Although Section 304 of the NHPA prohibits sharing the actual locations of archaeological sites, the OSA organizes public lectures and prepares several types of publications to share current research on North Carolina archaeology. Increasingly, the OSA has been using social media to communicate with the state's citizens. Targeted audiences include school groups, archaeological and historical societies, and government agencies that deal with archaeology. Staff archaeologists also share important information on North Carolina through workshops, symposia, and professional papers at state, regional, and national archaeological meetings. You can follow the OSA on Facebook [@ncarchaeology](#) or Instagram [@ncarchaeology](#) to hear about upcoming events and to learn more about North Carolina archaeology.

Please feel free to reach out to the OSA if you have any questions about the compliance review process, or if you want to become involved in OSA's citizen scientist program by recording sites. You can find the Review Archaeologist for your region at <https://archaeology.ncdcr.gov/about/contact>. For more information on how to identify and comment on projects subject to the federal compliance process, check out the Advisory Council on Historic Preservation's guide: *Protecting Historic Properties: A Citizen's Guide to Section 106 Review* (<https://www.achp.gov/sites/default/files/documents/2017-01/CitizenGuide.pdf>).



**PLEASE REMEMBER TO PAY YOUR DUES**<https://www.ncarchsociety.org/membershipanding>**AND WHILE YOU'RE AT IT,  
BUY SOME MERCH**<https://www.ncarchsociety.org/ncasmerchandise>**AMERICAN INDIAN HERITAGE MONTH  
-NOVEMBER 2021-**

Archaeological evidence indicates that Indians were living in the area now called North Carolina at least 12,000 years ago. Indians of what is now the Virginia and North Carolina coast were hosts to the first English-speaking explorers and settlers. Overall, Indians of North Carolina numbered in the tens of thousands, including more than 30 tribes geographically separated by three linguistic families.

**NCAS Officers****President:** Shane C. Petersen ([scpetersen@ncdot.gov](mailto:scpetersen@ncdot.gov))**Vice-president:** Emily Nisch Terrell ([emilyaterrell@gmail.com](mailto:emilyaterrell@gmail.com))**Treasurer:** Mary Beth Fitts ([mbfitts@gmail.com](mailto:mbfitts@gmail.com))**Secretary:** Linda Carnes-McNaughton ([lfcmdoc@gmail.com](mailto:lfcmdoc@gmail.com))**Editor:** David Cranford ([david.cranford@ncdcr.gov](mailto:david.cranford@ncdcr.gov))**Newsletter Editor:** Paul J. Mohler ([pjmohler@ncdot.gov](mailto:pjmohler@ncdot.gov))**At-Large Board Members:** Danny Bell, Nicholas Henderson, Douglas Hill, John Krizmanich, Celeste Purvis, and Sarah Watkins-Kenney**NCAS Newsletter  
Publication Schedule**

All NCAS members should submit articles and news items to Paul J. Mohler ([pjmohler@ncdot.gov](mailto:pjmohler@ncdot.gov)) for inclusion in the Newsletter. Please use the following cut-off dates as guides for your submissions:

**Winter Issue – January 31****Summer Issue – July 31****Spring Issue – April 30****Fall Issue – October 31**

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