Department of Defense
Legacy Resource Management Program

PROJECT 12-506

A Historical Context of the Turpentine (Naval Stores) Industry in the Atlantic and Gulf Coastal Plains of Georgia, South Carolina and Florida

Brian K. Greer, Fort Stewart/Hunter AAF
S. Dwight Kirkland, Southeastern Horizons, Inc.
Martin Healey, LG^2 Environmental Solutions, Inc.

JULY 2015

A Historical Context of the Turpentine (Naval Stores) Industry in the Atlantic and Gulf Coastal Plains of Georgia, South Carolina, and Florida

THE LEGACY RESOURCE MANAGEMENT PROGRAM
DEPARTMENT OF DEFENSE
LEGACY PROJECT #12-506

REPORT SUBMITTED TO:

DIRECTORATE OF PUBLIC WORKS, ENVIRONMENTAL DIVISION,
CULTURAL RESOURCES MANAGEMENT PROGRAM
1550 VETERANS PARKWAY BLDG 1137 FORT STEWART, GA 31314

AND

U.S. ARMY CORPS OF ENGINEERS, SAVANNAH DISTRICT
100 W. OGLETHORPE STREET SAVANNAH, GA 31402

REPORT PREPARED BY:

MARTIN HEALEY, MA, RPA – CO-PRINCIPLE INVESTIGATOR
LG² ENVIRONMENTAL SOLUTIONS, INC.
JACKSONVILLE, FLORIDA

S. DWIGHT KIRKLAND, MA, RPA
CO-PRINCIPLE INVESTIGATOR & AUTHOR
SOUTHEASTERN HORIZONS, INC.
DOUGLAS, GA

WITH CONTRIBUTIONS BY:

BRIAN K. GREER, MA, CONSULTING ARCHAEOLOGIST
CULTURAL RESOURCES PROGRAM MANAGER
FORT STEWART, GA UNDER CONTRACT WITH AEROSTAR, SES

FINAL REPORT – JULY 2015

MIPR Reference Number: MIPR2HDBPPP360
United States Army Corps of Engineers, IDIQ CONTRACT W912HN-11-D-0001 Delivery Order 0004
LG² Environmental Solutions, Inc. Project # 2013-001
Southeastern Horizons, Inc. Project Number: 1046

COVER PHOTOS

Photo of turpentine still (top), courtesy of the Georgia Museum of Agriculture.

Photo of Turpentine cup pile at Avon Park Air Force Range (bottom), by Martin Healey.

ARCHAEOLOGICAL SITE LOCATIONS

The specific locations of archaeological sites on DoD installations are considered sensitive. Legacy Program guidelines bar the release of this information. If individuals or installations require site location data, it can be requested from the Legacy Program (Project 12-506).

ACKNOWLEDGEMENTS

First and foremost, this study was fully funded by the Department of Defense Legacy Resource Management Program. Our gratitude is expressed to the people of that program for approving this concept which allowed us to take it to fruition.

Brian K. Greer, Cultural Resources Manager at Fort Stewart, Georgia, first had the idea for this project and wrote the proposal finally accepted by the DoD Legacy Program. He has been a constant supporter, advisor, and mentor throughout the work. Other members of his staff, namely Ashley Moss and Jessie Larson provided documentary support when needed.

We would like to thank and acknowledge the DoD facilities within the coastal plains of South Carolina, Georgia and Florida that assisted the project. Even though not all facilities met the criteria to be included in this study, their staff took time out of their busy schedule to speak with our researchers. Special recognition goes out to Mr. Joe Myers, cultural resource contractor at Eglin Air Force Base, and Kathy Couturier, cultural resource manager at Avon Park Air Force Range, for taking the time to meet with and assist the project researchers with access to known Naval Stores related sites on their respective facilities.

Several employees of LG^2 Environmental Solutions, Inc. (LG^2ES), the major contractor for the project, were essential to the completion of this project. President Leesa Gerald provided administrative supervision and overall support for the program while Martin "Marty" Healey, archaeologist, served as project manager and my constant companion through the work. Wendy Drennon, provided technical support and conducted a tremendous amount of research in compiling our knowledge base. Dan Boylan generated both GIS data and maps for this report.

Robert Morgan, Heritage Program Manager at the Francis Marion National Forest (FMNF), and his staff provided us with valuable information on tar kiln sites within the national forest and guided us on a foray into the forest to visit several of these remnant features.

Joe Meyer, Cultural Research Associate at Eglin Air Force Base (EAFB), guided us in the examination of about a dozen naval stores sites at that facility. He also provided electronic copies of research reports related to work at naval stores sites at EAFB for our review. These were critical in helping to develop archaeological footprints for turpentine camps.

Members of the Georgia Museum of Agriculture assisted with helping us understand more about the turpentine industry of Georgia and the Southeast. Mr. Garrett Boone was responsive to my inquiries and directed me to other people with knowledge of the turpentine industry. Mr. John Johnson and Mr. David King were instrumental in showing us the operational turpentine still at the museum. It is part of the museum's living history program and is used to "cook" a batch of gum once each year.

Mr. Doug Chassereau of the Georgia Forestry Commission was one of the operators at Carter's Turpentine Still in Portal, Georgia during its annual turpentine festival. He answered many of my questions about the still's operation and unselfishly allowed me access to photograph and learn.

Mr. David King was also present for the festival and operation of the still and he likewise provided valuable insight into the labors involved.

A number of informants submitted to my questions and interviews about their personal experiences in the turpentine industry. Mr. George McCranie kindly consented to both an interview and guided tour of the McCranie Brothers Turpentine Still and Camp at Willacoochee. This property is listed on the National Register of Historic Places. Mr. William J. Buie of Rentz, Georgia, granted me permission to visit the ruined turpentine camp on his property that was operated by his mother in the early part of the twentieth century. While I was there, he stopped by to chat and was generous with information and history about the site. Mr. Hiram Tanner, Jr. of Douglas, Georgia, managed part of his farm for turpentine up until the 1960s, and he agreed to share his experiences with the industry.

Georgia Southern University also contributed to this project by providing photographs and documents pertinent to the subject. Professor Sue Mullins Moore provided access to the Richard V. Persico Collection of photographs and documents, many of which are included in this report. Graduate student Ryan Sipe also provided another set of photographs depicting turpentine operations from an unknown source. Some of these also appear herein.

Most of the images of turpentine tools appearing in the figures in this report were from a collection owned by Mr. Ed Willis, furniture maker and antique collector, of Fitzgerald, Georgia. His generosity in allowing us to photograph these is remembered with gratitude.

My colleagues in Southeastern Horizons, Inc. (SEH), who contributed to this work, should also be recognized. Chris Trowell, professor emeritus and historian, literally buried me with information about the turpentine industry. Chris provided the bulk of the raw data on the subject from which I gleaned the information that makes up this report. John H. Cato, Jr., SEH graphics specialist and architect, provided much needed renderings and drawings for the report, and he also assisted with the photography of the Willis Collection of turpentine tools.

To all of these people I render a well-deserved, thank you. If there are errors, omissions, or shortcomings in this report, they are my responsibility alone and should not be attributed in any way to the contributors.

S. Dwight Kirkland, B.S., M.A., R.P.A.
Southeastern Horizons, Inc.
Douglas, Georgia

ABSTRACT

This document is the designed result of a study intended to produce a historic context for the naval stores industry on the Coastal Plains of South Carolina, Georgia, and Florida. More specifically, it provides the federal cultural resource manager with a guideline for identifying the archaeological signatures of naval stores sites and providing a means of assessment that can be used in making recommendations under Section 106 and 110 of the National Historic Preservation Act (NHPA) of 1966 (as amended) for nomination to the National Register of Historic Places (NRHP). It also suggests program alternatives or standard treatments for these resources in order to streamline compliance with the NHPA.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

The production of materials that we now refer to as naval stores is amongst the world's oldest industries. Tar and pitch, the two main naval stores products until the eighteenth century, were extracted from the resin of conifer trees and used to make boats water-tight as early as 5500 B.C. As time passed and water travel increased, the need for naval stores to seal ships drove the industry.

Soon after the New World was discovered and colonization began, the potential for naval stores production from the vast forests of North America was readily recognized. Europeans, long-versed in naval stores production, immigrated and became the forbears of the naval stores industry. While the naval stores industry began with the first English colonies in Virginia and Massachusetts, it would eventually move southward to exploit the vast longleaf pine ecosystem that stretched along the Atlantic and Gulf Coastal Plains from southern Virginia southward to almost Lake Okeechobee in Florida and westward from Florida to eastern Texas (Figure 1.01). Turpentine, the distillate of gum or resin, became an important commodity in the eighteenth century but was not heavily mass produced until about the first quarter of the nineteenth century. Naval Stores production in the United States peaked in the first half of the twentieth century. In 1925, as many as 2,500 fire turpentine stills operated across the longleaf pine forested areas of the southeastern United States (Figure 1.02). However, with the transition of ships made from wood to those manufactured of steel, the demand for naval stores products plummeted. Also, with the advent of the petroleum industry, many of the naval stores products could be extracted as by-products from crude oil, and they were cheaper. As a result, the naval stores industry, based on the extraction from pine resin, fell sharply and was just a shadow of its former glory by the 1970s. The last barrel of gum commercially produced was hauled out of a pine forest near Soperton, Georgia, in 2002.

In the aftermath of such a thriving industry that was distributed over a vast area of the southeastern United States, an abundance of ruined naval stores production facilities and archaeological sites are left. Those that have already been razed are now archaeological sites; those that are still standing are in the process of becoming so. They are slowly melting away and will soon become subject to solution and decay in the soil. In contrast to other historic buildings, naval stores-related properties have not received comparable preservation attention. A disproportionate number of these sites are logged in state site records as compared to other site types. For example, Georgia has only 8 records of naval stores-related sites yet it was, at times, the largest producer of naval stores. Although the residential and urban development rate of the pineland area of the Southeast lags behind other geographic provinces, far too many of the sites are being destroyed. A number of archaeologists and historians have called for an intensive effort to properly record and preserve these sites for future study. As part of that call for action, this historical context is designed as not only a history and account of the naval stores industry in South Carolina, Georgia, and Florida, but also a guide for use by federal administrators in managing naval stores-related sites on federal lands. It is intended to assist the Federal CRM manager in recognizing, assessing, and preserving naval stores-relates sites.

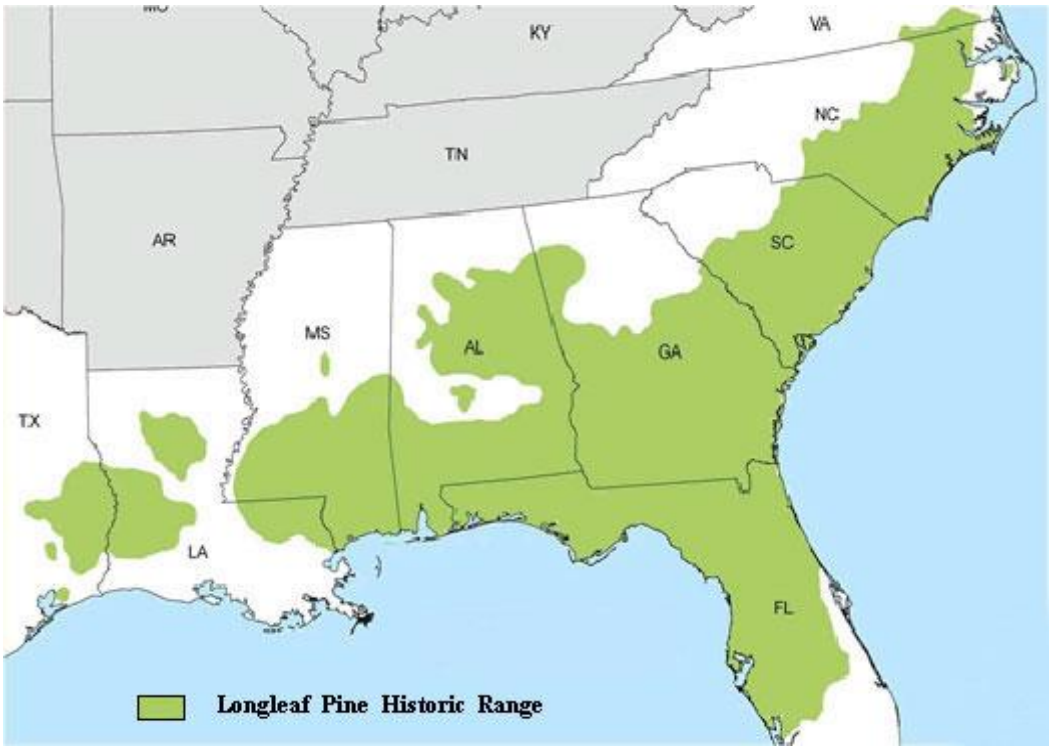


Figure 1.01: Longleaf pine range of the Southeastern United States

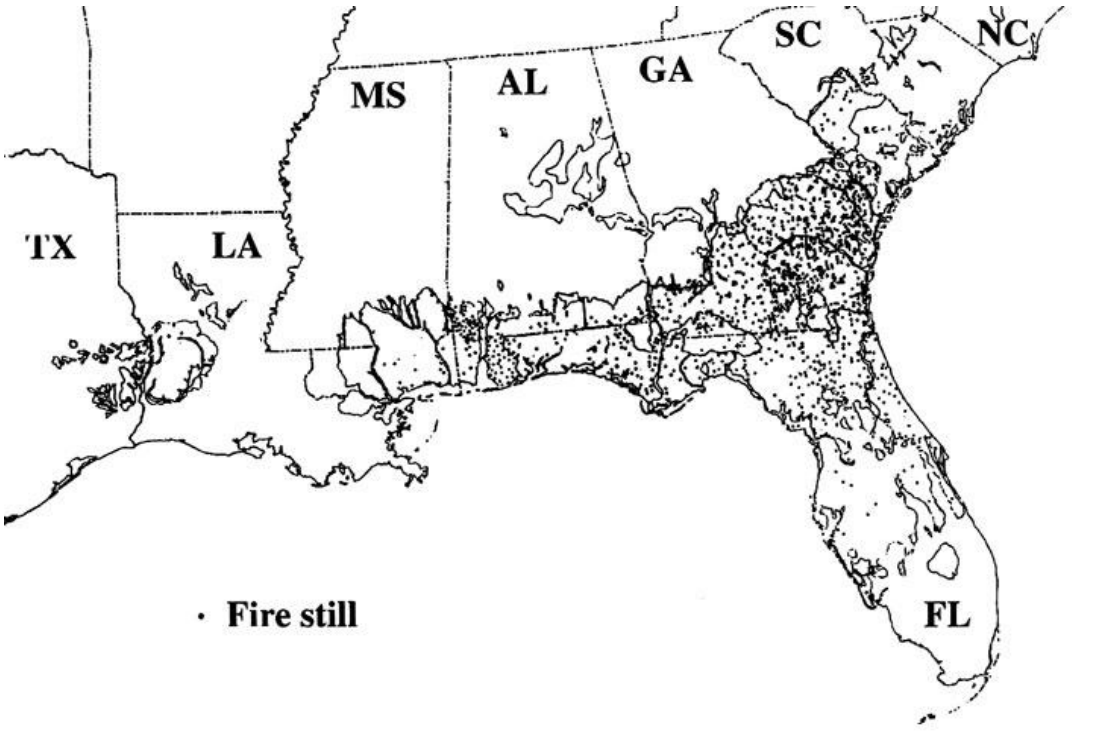


Figure 1.02: Fire turpentine stills across the Southeast in 1934 (U.S. Forest Service)

1.1 METHODOLOGY

The objective of this document is to develop a historic context for the naval stores industry on the Coastal Plains of South Carolina, Georgia, and Florida, to help in the management of historic properties on federal installations and to recommend a program of alternative or standard treatments for these resources. This includes a review and analysis of historic period archaeological investigations of naval stores-related sites across DoD installations and other federal- or state-managed forest areas. It looks at a broad array of research questions to help determine the NRHP eligibility of naval stores-related sites on a regional, as opposed to a local, context. Specific criteria for NRHP eligibility are developed for each naval stores-related site type, and these are supported by specific research questions. Also included is a method for evaluating these resource types and gauging the potential effects of undertakings on historic properties. It also contains a discussion on how managing these resources relates to the broader DoD mission. Hopefully, this context will promote procedures that will streamline the evaluation process. Examples of naval stores-related site types will be included to help clearly define the form and function of these resources. Figure 1.03 provides a glance at the areas investigated for this project and gives the location of research points.

A literature search was conducted to retrieve the needed information to develop this context. It included university library searches, internet searches, and searches of records at DoD installations. These searches involved primary and secondary sources and the "gray literature" in CRM archaeological reports. This search helped in the formulation of relevant research questions related to the naval stores industry.

Field work involved state site file searches; visits to museums with naval stores-related artifacts, dioramas, and displays; examination of private collections; and observation of the actual distillation of pine gum into turpentine and rosin at living history events.

State site file research was done at facilities in Florida and Georgia. Information retrieved from this work focused on determining the quantity and quality of naval stores-related sites across the two states. Site distribution maps were produced of naval stores-related sites. This work also revealed the degree of rarity of naval stores-related sites and helped develop the strategies for long-term preservation, standard treatments, and program alternatives for mitigation of naval stores-related sites.

Since South Carolina's state site files are not electronically searchable, the time required to produce similar information as was secured from Florida and Georgia was prohibitive. Instead, we reviewed the information available at the Francis Marion National Forest, the leader in naval stores research for the state. We were able to get valuable information on tar kiln archaeology and history from that source.

Visits to naval stores-related sites included two operational fire stills, Carter's Still at Portal, Georgia, and one relocated to the Georgia Museum of Agriculture in Tifton, Georgia. The authors observed and documented the distillation of a batch of gum during the visit to Carter's Still. An observational visit was also made to the NRHP listed, McCranie Brothers Turpentine Still and

Camp at Willacoochee, Georgia. One of the original owners, Mr. George McCranie (now 92 years old) was interviewed about its operation. The Buie Turpentine Camp (9LS162)

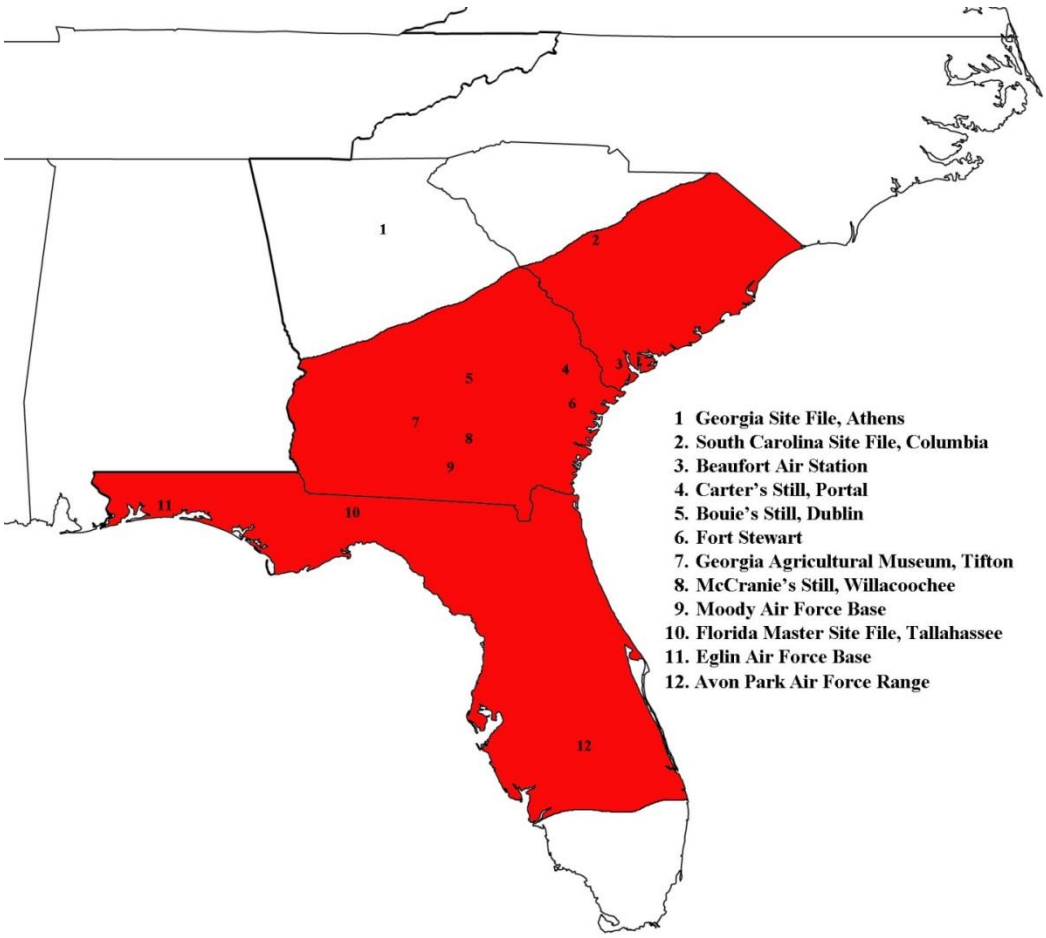


Figure 1.03: Area considered for this study

near Rentz, Georgia, now a standing ruin, was examined to get insight into the process of naval stores-related site formation and to help identify the various categories of site types and their archaeological signatures. Mr. William Buie, son of the original owner and operator, was also interviewed to obtain insight into the history and operation of that site.

This context is a summary of all the recorded archaeological sites and historic structures related to the naval stores industry in the Coastal Plain of South Carolina, Georgia, and Florida. It synthesizes the attributes and characteristics of these sites and presents a set of comprehensive research questions designed to guide future research at naval stores-related sites. It provides future researchers with a means to accurately identify and asses the significance of archaeological sites within the proper context. Based on current archaeological research and knowledge, we have developed an archaeological signature model and ranked system of assessment for the various naval stores-related sites. These are designed to aid archaeologists working in the Coastal Plains of South Carolina, Georgia, and Florida in identifying the archaeological signatures of naval stores-related sites and to allow for more efficient evaluations in terms of their NRHP eligibility.

In addition to providing researchers with a historic and archaeological context of the naval stores industry, this study may also be useful during Installation expansion activities as it would allow Department of Defense (DoD) to identify these important resources; allow the DoD to fully analyze the merits of acquiring specific tracts of land; and allow DoD to more fully plan for Section 106 of the National Historic Preservation Act compliance costs that could be associated with land use.

2.0 HISTORY OF THE NAVAL STORES INDUSTRY

2.1 Tar and Pitch Era (B.C.-1600 A.D.)

2.1.1 In the Beginning

Naval Stores production is among the oldest industries in the world. Ancient Egyptians used pitch (evaporated resin or gum) to produce an age-enduring varnish for the preservation of mummies (Dyer 1963:1). Noah was commanded by God in the book of Genesis to "Make thee an ark of gopher wood; rooms shalt thou make in the ark, and shalt pitch it within and without with pitch" (Genesis 6:14).

Among the earliest accounts of tar and pitch production is that of Theophrastus (372-287 B.C.), a Greek scholar, who recorded various ways of obtaining and processing resin (gum) in his day. He made the following observations regarding the flow of resin/gum from "wounds" made for the purpose of collection.

> The holes for the pitch fill up, so that the pitch can be again removed, in good firs in a year, in those of more moderate quality in two years, in poor trees in three. The filling-up is composed of the pitch; it is not caused by closing up of the wood; for the wood cannot close up and become one again, but the effect which takes the time mentioned is due to the formation of the pitch. However, it is clearly inevitable that there should be some new growth of the wood too, seeing that the resinous wood is removed and burnt when the discharge of pitch takes place [Hort 1916:227].

> The people of Mount Ida however say that, when they bark the stem—and they bark the side towards the sun to a height of two or three cubits from the ground,—the flow of pitch takes place in that part and in about a year the wood becomes full of pitch; and that, when they have hewn this part out, pitch forms again in the next year, and in the third year in like manner; after which that the tree, because it has been cut away underneath, is rotted by the winds and falls; and that then they take out its heart, for this is especially full of pitch, and that they also extract pitch from the roots; for that these too, as we said, are full of pitch in all firs [Hort 1916:229].

Theophrastus described the following method used by the Maccedonians for producing pitch in Macedonia and Syria.

> This is the summer in which they make pitch by fire: —Having prepared a level piece of ground, which they make like a threshing-floor with a slope for the pitch to run towards the middle, and having made it smooth, they cleave the logs and place them in an arrangement like that used by charcoal-burners, except that there is no pit; but the billets are set up right against one another, so that the pile goes on growing in height according to the number used. And they say that the erection is complete, when the pile is 180 cubits in circumference and a hundred in height, if the wood happens to be rich in pitch. Having then thus arranged the pile and having covered it with timber they throw on earth and completely cover it, so that the fire may not by any means show through; for if this happens,

> the pitch is ruined. They then kindle the pile where the passage is left, and then, having filled that part up too with the timber and piled on earth, they mount a ladder and watch wherever they see the smoke pushing its way out, and keep on piling on earth, so that the fire may not even show itself. And a conduit is prepared for the pitch right through the pile, so that it may flow into a hole about fifteen cubits off, and the pitch as it flows out is now cold to the touch. The pile burns for nearly two days and nights; for on the second day before sunset it has burnt itself out and the pile has fallen in; for this occurs if the pitch is no longer flowing. All this time they keep watch and do not go to rest, in case the fire should come through; and they offer sacrifice and keep holiday, praying that the pitch may be abundant and good. Such is the manner in which the people of Macedonia make pitch by fire [Hort 1916:229-233].

This process, with only minor modifications, was used for the next 2000 years. Theophrastus also discussed an alternate process.

> They say that in Asia in the Syrian region they do not extract the pitch by cutting out of the tree the wood containing it, but use fire to the tree itself, applying an instrument fashioned for that purpose, with which the set fire to it. And then, when they have melted out the pitch at one place, they shift the instrument to another. But they have a limit and indications when to stop, chiefly of course the fact the pitch ceases to flow. They also, as was said before, use fire to get pitch out of the terebinth; for the places where this tree grows do not produce the fir. Such are the facts about resin and pitch [Hort 1916:233].

In Theophrastus' time simple distillation was also practiced. The resin/gum from pines was placed in pots and cooked until it became thick and viscous. Sheep skins were suspended above the heating pots to collect the vapors which were later squeezed and the oily liquid (turpentine) collected for use (Drew 1981:14-15; Dyer 1963:1-2).

During the Roman Empire the Gauls, living in what is now southwestern France, had a well-established industry in naval stores, and they traded their goods with Rome until conquered by the Vandals in 407 A.D. After the fall of the Roman Empire, tar and pitch was produced in a variety of areas around Europe and Asia. In the Middle Ages, tar and pitch was produced from the forests surrounding the Baltic Sea (Dyer 1963:4). By the Age of Discovery, the industry was concentrated in Sweden. Since Sweden had almost a monopoly on the naval stores industry, their prices steadily rose, so England, in particular, began looking to the New World as a possible alternate source of naval stores products (Dyer 1963:5). As soon as its colonies were securely established, the English government began to encourage the production of naval stores.

2.1.2 Pine Tar in the New World

No one knows for sure when pine resin (gum) was first used in what is now the Southeastern United States. Archeological evidence indicates Native Americans recognized the usefulness of raw pine gum and the tar and pitch resulting from its burning (inadvertent distillation). These products were definitely used to help secure stone and/or bone tools to wooden hafts (Dickel 2002:88-90), attach fletchen to arrow shafts, and waterproof cordage, baskets, or fabrics. Evidence of such has been found in archaeological contexts as early as 11,000 years ago during the late

Paleoindian Period (Milanich 1994:49). It was also perhaps used as an ingredient in potions or medicines, and pine knots were used as torches to light the way in darkness. It is probable that gum was intentionally heated in small batches to produce tar or pitch. While these people certainly knew about and exploited pine gum, tar, and pitch in a variety of ways, there is no evidence that particular individuals or groups of Native people specialized in gathering and/or trading in this commodity. It was simply gathered as needed and used for the purpose at hand.

Shortly after Europeans arrived in the New World, they readily recognized the possibility of naval stores production. Europeans brought with them the knowledge and skills required to prepare tar and pitch, developed over centuries in northern Europe. One of the first descriptions of naval stores production in North America is that associated with the exploration of the Gulf Coastal Florida by the Spaniard, Panifilo de Narvaez in 1528. Narvaez landed near present day St. Petersburg with an army of about 300 men seeking gold and other riches. After battling the Indians and having no success at finding riches, he ordered his men to construct four rafts (sometimes referred to as boats) to use in a downriver voyage to the sea from the interior of Florida. They made tar and pitch from the pine knots and dead trees to waterproof the ropes, sails, and caulking. They soaked saw palmetto fibers with the tar and used this as caulking between the timbers. It is the first record of the actual production of naval stores by Europeans in what would become the United States (Drew 1981:15).

However, it was not until over a century later that the first true naval stores industry was established in North America. There are indications that, in 1606, French settlers in Nova Scotia were the first to produce significant quantities of naval stores. It is believed they formulated these products from red pine (*Pinus resinosa*) or jack pine (*Pinus banksiana*) growing in the area, but there is no evidence they produced enough for export. It is assumed they were used for domestic and medicinal purposes only (Dyer 1963:5).

Two years later, in 1608, a group of six Polish settlers, skilled in the Old World techniques of producing pitch, tar, soap, and other products, came to the English colony of Jamestown. They were brought to Jamestown after it had nearly failed (Drew 1981:14). Following the leadership of the Poles, the Jamestown settlers cleared the land, built a small factory, and began producing naval stores. The colony not only survived but was able to fill a ship with naval stores for the return to England. This marked the first export of naval stores from the New World (Drew 1981:14).

In the most rudimentary procedure, the Jamestown settlers cut a blaze on a pine tree from which the gum flowed. After a time this was scraped from the tree. Another process involved collecting pine gum by boring holes in trees and catching the gum in a container. Kettles were then used to heat pine gum until most of the volatiles evaporated away. The resulting mass, referred to as tar or pitch depending on the viscosity, was cleaned by filtering or straining and used to caulk the joints, cracks, and crevasses in wooden ships (Gerrell 1997:1). In some instances, trees were set ablaze which resulted in the exudation of resin and carbonization on the tree trunk. The carbonized resin or tar was then scraped from the tree and used.

Serious tar production began shortly after 1620, in New England. The New England pine wood used to extract the resin was largely from pitch pine (*Pinus rigida*). These were inferior gum producers when compared to the longleaf (*Pinus palustrus*) and slash (*Pinus elliottii*) pines that

would later be tapped further south in the Carolinas, Georgia, and Florida. Still, the wood extraction method was popular and lucrative.

As early as 1650, restrictions were placed on some New England settlements in the gathering and burning of fat wood to produce tar. As dead wood became increasingly scarce, people slowly turned to the living tree for raw materials (Dyer 1963: 6). This was done by making a large blaze on the tree (wounding) and returning later to scrape off the exuded gum. By 1715, a law was passed in Massachusetts to oppose the forest depletion. This law came largely too late in New England since the bulk of the tar industry had already begun to move south to the new colony of Carolina.

As Virginia's settlement progressed and the Province of Carolina was established in 1629, the concentration of naval stores production began moving southward. While this was largely due to the loss of most of the pine forests, the better gum production of the longleaf and slash pines of the mid-Atlantic, southern Atlantic, and Gulf Coastal Plains was also a factor (Drew 1981:15). Once naval stores production was established in Carolina, a bustling industry developed. When Carolina was separated into northern and southern colonies in 1729, most of the naval stores production was centered in South Carolina. However, as settlers moved up the Cape Fear River the industry spread rapidly into North Carolina. North Carolina became the major producer and exporter of naval stores by the 1770s (Walbert 2008). While kiln production of tar and pitch from fatwood was prominent from the early 1700s until about 1850, it lasted to a lesser extent into the twentieth century.

The settlement of the North Carolina began around 1665 and naval stores soon became a primary industry. Due to the fact that the longleaf pine produced more resin, the center of the industry soon shifted southward to take advantage of this attribute. South Carolina did not lag far behind her sister state. During the early years, tar and pitch production was rather small in scale. However, war between England and France at the close of the seventeenth century and between Sweden and Russia around the same time put a strain on Sweden's naval stores industry, the main supplier of these products to England (Hart 1986:7). Worse, the government of Sweden granted a monopoly to the Stockholm Tar Company, and it subsequently raised the price for tar and pitch purchased by England by 100 percent. As a result, England began to look to her New World colonies as an alternate source of naval stores products. In 1705, the English government offered a bounty in the amount of four pounds per ton for tar and pitch, three pounds per ton for rosin or turpentine, and six pounds per ton for hemp (Butler 1998:8). The bounty stimulated the growth of the naval stores industry and fed an industry that would continue almost unchanged for two centuries (Hart 1986:7).

The bounty on tar and pitch production expired in1725 and a sudden drop in tar and pitch production resulted. After four years, the bounty was reinstated and the industry revived. With the outbreak of war between the American colonies and England, the industry again suffered but continued on a small scale. It returned to normal following the end of the Revolution and became even more lucrative as competition from New England prior to the war did not resume after the conflict. The Carolinas were the undisputed center of naval stores production in North America (Hart 1986:9).

Further south in Spanish Florida, a fledgling naval stores industry began in the mid-1700s. The production of resin, tar, and pitch was first encouraged as early as 1735 by governor Moral, but he soon departed and the incentive was forgotten. Then in 1744, governor Montiano proposed re-establishing the industry on a grander scale. He recommended building a large factory for producing tar and pitch for the shipbuilders of the Havana Company. It was not until 1756, when Governor Alonso Fernández encouraged some colonists at St. Augustine to produce naval stores that they finally shipped 70 barrels of tar and pitch to the Havana Company. Late the following year, the governor expanded the trade in tar and pitch to include Vera Cruz when a launch landed there carrying tar and pitch. However, the formative Florida industry was short-lived. In 1763, following the French and Indian War, Spanish Florida was ceded to England which ended the first chapter in Florida naval stores production (TePaske 1964:106-107).

In tar kiln production, dead and fallen timber was collected and the resin extracted usually by burning in earthen kilns. In this reducing (oxygen deficient) environment, the resin underwent a pyrolitic chemical change that resulted in a dark brown to black viscous mass. The technology was remarkably similar to that described for the Macedonians by Theophrastus during the fourth millennium B.C.

Tar kilns were constructed to extract the tar from pine wood (Figure 2.01). Their precise configuration varied (Hart 1986:12-18) but generally followed a plan described as follows. To begin with, a 10 to 30 feet, in diameter, circle was first marked on the ground, followed by the removal of a sufficient quantity of soil inside the circle to provide a slight slope from the circumference to the center. The earth was then packed and smoothed and, if composed of coarse sand, sometimes coated with clay and then smoothed. The clay provided a less permeable barrier than sand and reduced the loss of tar. This action resulted in a basin-shaped depression where the tar would flow toward and collect at the center. A shallow ditch was cut from the center of the basin to a distance of about eight to ten feet outside the circle. A roughly six inch square wooden conduit was placed in the ditch and the surrounding voids backfilled with soil. The conduit's outflow end was suspended over a pit with a volume of about 10 to 15 barrels (550-825 gallons). To protect the tar collection point and in-flow end of the conduit, round unsplit lightwood was carefully placed in a teepee-like shape so as to leave open space above the drain. Billets of split lightwood were then laid and stacked in a radial pattern around and above the "teepee" until it reached a height of 8 to 12 feet, tapering from a slightly narrower bottom to a wider top. It was normally around 20 feet in diameter at ground level and 25 feet in diameter at the top and resembled an inverted, truncated cone. Green pine boughs were used to cover the entire structure until no wood could be seen beneath. Pine boughs prevented the subsequently added sod and soil over the structure from getting into the tar. Finally, a wall was built of logs and poles around the sides of the kiln in such a way as to leave an open space between the pine

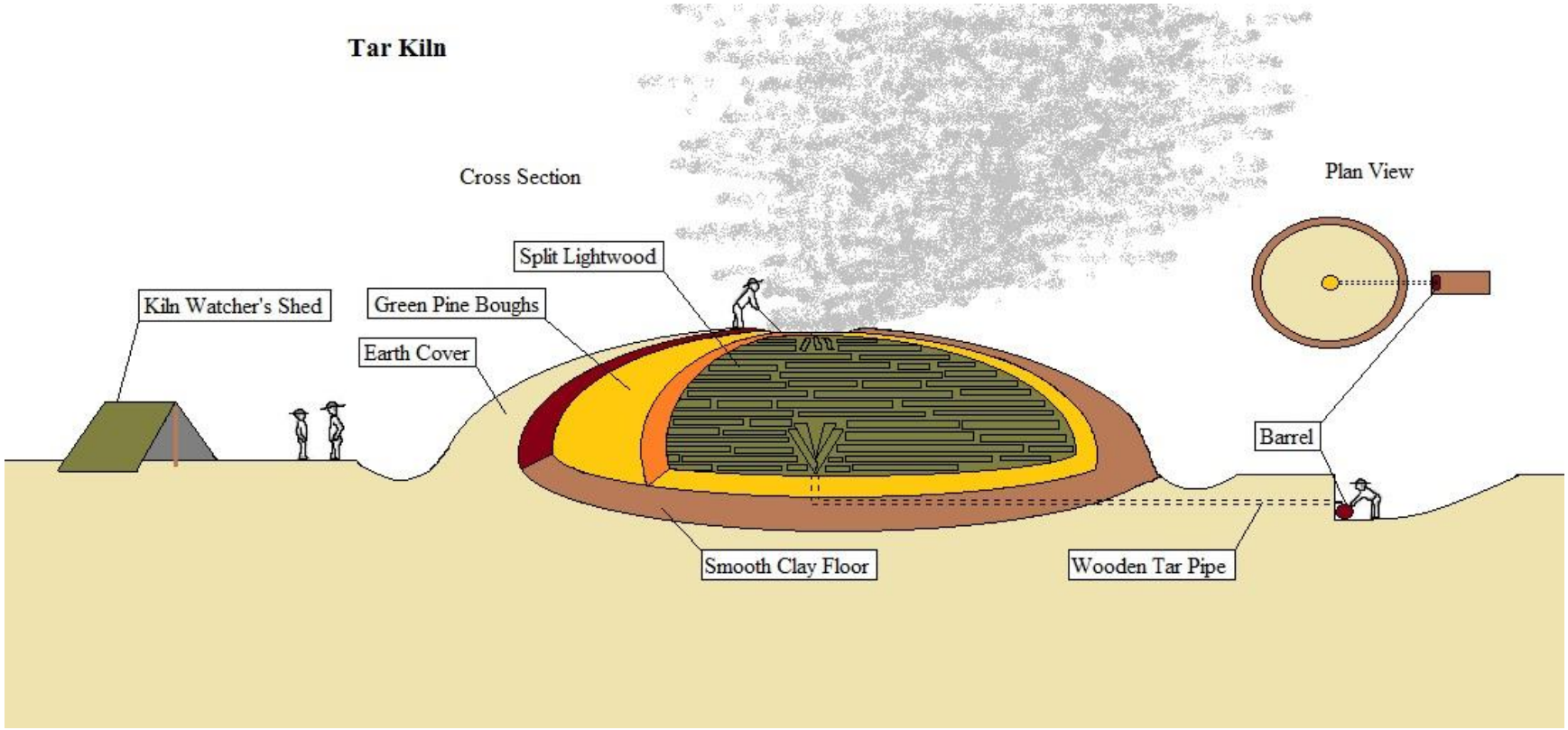


Figure 2.01: Composition of a typical tar kiln (Graphic by W.G. Drennon)

boughs and wall. This space was filled with soil and packed to form an embankment. The boughs on top of the kiln were covered in sod or root mat having sufficient fibers to hold the sod together. Any gaps were covered with loose soil and packed. Fire was applied through openings along the rim which then spread toward a center opening about two feet in diameter left at the top center of the kiln. This configuration drew the fire toward the kiln's center. Once the fire caught and began progressing, the center hole was gradually closed. As the burning advanced, other openings were made along the sides of the kiln from top to bottom to encourage a similar burn pattern in the kiln. It took about two days for the tar to begin flowing into the pit and about five to ten days to completely extract the tar from a batch of billets. When sufficient tar accumulated in the pit, it was dipped and placed into barrels. These barrels were loaded on wagons for final shipment. During the cooking time the kiln was monitored around the clock to make sure no flare-ups occurred. Soil was intermittently added as needed to squelch any escaping gas and flames. Attendants sometimes built makeshift shelters to get out of harsh weather while monitoring the burn (Butler 1998:10-11). Tar kilns of this type were used to extract tar from wood as late as the first half of the twentieth century. Figure 2.02 shows the remains of a tar kiln site in Francis Marion National Forest, South Carolina in 2013.

Figure 2.02: Remnant tar kiln at Francis Marion National Forest

Early attempts to improve on the earthen tar kiln system led to the development of rough cast-iron retorts. Distillation in these resulted in a generally lower quality product (Dyar 1963:10). However, an oven or retort was developed in 1852 for "sweating" the tar from lightwood. It was more successful and produced an increase in yield and better product than the earthen kiln system. It consisted of a large horizontal cylinder with flues inside (Figure 2.03). Lightwood was placed inside through doors at the end and heated with charcoal to extract the tar. Large

Figure 2.03: Iron retort used to extract tar from pine wood

permanent retorts could hold up to 20 cords of wood. Smaller, portable retorts were developed with 2.5 to 5 cord capacity and provided the major advantage of portability in the pine forests (Butler 1998:94-95). While retorts continued in use sporadically into the twentieth century, the advent of the turpentine still supplanted them in popularity and quantity.

2.2 Turpentine Era (1800-1900)

2.2.1 Introduction

As dead wood became depleted in the pine forest areas, gum became more favorable as the source of naval stores. Consequently, new more efficient methods and procedures were developed to extract the gum from the trees. The boxing method of gathering gum was developed during the early part of the nineteenth century and was at its height during the latter half of the nineteenth.

2.2.2 Antebellum Period

At first, gum was largely collected close to navigable streams then shipped down river to coastal ports such as Wilmington, North Carolina, or transported by ship to Philadelphia and New York for distillation (Dyer 1963:10). Then in the 1830s, Scotts Highlanders introduced the copper still, a technology borrowed from Scotland's whiskey industry, to distill turpentine from pine gum and produce rosin as a by-product. Rosin could then be further distilled into tar or pitch (Drew 1981:16; Dyar 1963:11) through thermal degradation. Naval stores products produced in copper stills were far superior to those from the iron retorts. The number of these small stills steadily increased because of their profitability and due to the rapidly developing transportation

infrastructure (roads and railroads) that enabled them to be near the source of the gum. The gum was brought to these small stills, the turpentine distilled and packaged, and shipped to the large coastal centers (Wilmington, NC, Charleston, SC, Savannah, GA, Brunswick, GA, and Jacksonville, FL) for sale. Rosin was also placed in barrels and shipped to these same centers.

2.2.3 Post-Civil War Period

Prior to the Civil War, rosin and turpentine were important only for domestic uses and, consequently, the prices were low. The rosin market dropped so low that many distillers dumped the rosin into streams or lakes and sold only the turpentine. However, after the war the market increased and prices rose. In addition, new uses for rosin developed, making it a lucrative product. Many of the rosin dumps were later mined to recover this product for profit (Drew 1981:16; Dyar 1981:11).

The industry developed significantly in South Carolina but never became as extensive as in North Carolina. South Carolina's production was at its greatest around 1880 (Dyar 1963:10), when it briefly out produced North Carolina. As the longleaf/slash pine forests were depleted in the Carolinas due to the harmful boxing method, the industry shifted further south to the untapped forests of Georgia, Florida, Alabama, Mississippi, Louisiana, and eastern Texas. There were over 1,500 distillation plants in North Carolina in 1840 but only about 174 in 1890 and 87 in 1905 (Dyer 1981:11).

Figure 2.04: Box and catface cut into pine tree trunk

The earliest widespread procedure for pine gum extraction was referred to as the box method. Workers chipped a cavity in the trunk at the base the tree called a box (Figure 2.04) (Bland 1975). A special tool called a boxing ax was used to shape the cavity (Figure 2.05a). A worker began cutting a box by making a series of horizontal cuts with an ax, in a triangular shape with the apex up and the base down, about eight to ten inches above the ground at the base of the tree. The wood and bark in this area was next removed by cutting at an acute angle to the tree trunk to form a triangular cavity ("box"). Sufficient wood was then removed to provide a downward slanted base. The range of dimensions of the box was 12 to 14 inches wide, 7 to 8 inches deep, and with the distance front to back about 3 to 4 inches. Boxes of such size would hold about three pints of gum. Once the box was cut, the tree face had to be prepared for the flow of gum. This was accomplished by "cornering the box" or removing the bark above the box using a felling axe (Figure 2.05b) then carving grooves into the wood in a chevron pattern (apex down) above its top using a wood hack (Figure 2.05f). This shaped the area

above the box in such a way that the gum then flowed down the exposed "face" and into the box. Since the chevron channels resembled the whiskers of a cat the naked surface was called a "catface" (Figure 2.04). The accumulated gum was periodically collected and two new strips of bark removed (chipped) at the top of the face at each visit (Figure 2.06). A common woods ax (Figure 2.05b) was used for cutting the box in the early period but later a special boxing ax (Figure 2.05a), having a 12 inches long and 4 inches wide blade, came into use. Initially, a variety of hatchets were used for cutting the streaks above the box. Later, specialized cutting devices such as wood hacks (Figure 2.05f) were developed and used to cut the streaks. Sometimes the streaks were cut in a "V" shape to channel the gum toward the streak apex and into the box. As many as four boxes could be cut into most trees, and this was usually done in late fall and winter (Dyer 1963:14-15). A skilled woodsman could cut 75 to 100 boxes per day (Butler 1998:20).

Figure 2.05: Tools used with the boxing method. (A) boxing axe, (B) woods axe, (C) push-pull scraper blade, (D) cutter, (E) weeding hoe, (F) wood hack, (G-I) dip paddles. (photo S.D. Kirkland)

Figure 2.06: Chipping using a wood hack. (photo, Georgia Southern University)

Preparing the face to begin the flow of gum was called chipping (or sometimes streaking). Chipping began in the spring, usually in March and ended after the first cold weather in the late fall or early winter, depending on the geographic location (e.g. North Carolina versus Florida). It involved the removal of the bark and about ½ to one inch of the sapwood in a diagonal pattern above the box as described in the section above. It was normally done weekly and as many as 30-35 streaks were applied during the first year after boxing. A full crop of 12,500 boxes in virgin timber could be completed in one week by a good chipper. In large operations, the jobs of chipping and gum collection (referred to as dipping) were separated and conducted by two workers. Based on their approximate volume, about 250 boxes were required to fill a 55-gallon barrel with gum (Butler 1998:20). Tools common to this procedure included a wood hack, a wood puller, and a cutter (Butler 1998:24).

The process of removing the gum from the box was referred to as dipping since it involved using a spoon-shaped iron (Figure 2.05 g,h) to dip into the box and retrieve the gum. It was normally done on a monthly schedule, and two to three barrels of gum could be collected in a day by a good woodsman. It took about 300 cups to fill a 50-gallon barrel (Figure 2.07). Later with the evolution of the cup and gutter system the process involved removing the cup from the tree, pouring off any accumulated water, and then "pushing" the gum from the cup into a dip bucket, using a short specialized spatula called a dipping iron. In the case of McKoy cups, dip irons had their edges angled to match the cup thereby allowing a more thorough cleaning of the cup in a single swipe and increasing dipping efficiency (Butler 1998:29).

One of the disadvantages of the box system was that since the box was cut into the living tree it could not be moved upward as the chipping progressed in that direction. As long as non-specialized tools such as axes and hatchets were used to cut the streaks, the total height a tree that could be worked was restricted to five or six feet. The development of the specialized tools with longer handles enabled the face to be worked upwards by 12 to 15 feet (Figure 2.08). However, since the box could not be moved, this led to a higher percentage of the gum drying on the tree face and creating hardened gum. This hardened gum, referred to as scrape was removed and collected for distillation (Figure 2.09). This process required specialized tools, including a scrape box, scrape buckets, a scrape cart, a shove-down scraper, a push-pull scraper, a yoyo, and a rosin barrel with loose staves (Figure 2.10) (Butler 1988:33).

Unfortunately, the box method also damaged the tree and made it susceptible to fire, insects, and rotting. Most trees were worked for four or five years before being felled for lumber. If not cut for lumber, the tree would eventually die or be naturally toppled because of the weak point at the box. This was the primary method used for collecting pine gum until the advent of the cup and gutter system in the first decade of the twentieth century.

Figure 2.07: Wooden turpentine barrel, dipping irons, and dipping buckets. (A) Wooden turpentine barrel, (B) Dipping irons, (C) Dipping bucket (early versions were made of wood staves). (photo S.C. Kirkland)

Figure 2.08: Woodsworker using a long-handled tool. (photo, Persico Collection)

Figure 2.09: Woodsworker collecting scrape. (photo, Persico Collection)

Figure 2.10: Scrape collecting tools. (A) scrape bucket, (B) shove-down scraper, (C) push-pull scraper. (photo, S.D. Kirkland)

Normally, there were 200 to 250 boxes per acre and a good "chipper" could work a "crop" of 12,500 faces in one week. "Crops" were later considered as 10,000 to 10,500 faces (Dyer 1963:11).

2.2.4 Turpentine Camps

Prior to the Civil War, turpentine distillation was normally done on plantations. However, after 1865 the Turpentine Camp emerged as the primary operational organization (Butler 1998:127). The size of the camp was dependent on the number of crops being worked. Once a still was built and began distillation, other structures were constructed to support the operations (Figure 2.11). A barn and lot were needed to house and care for the horses and mules used in the operations. It might also house cows, pigs, goats, and/or chickens for subsistence. Every camp had at least one well to provide clean water for drinking, household, and personal use. The owner's residence usually had its own well and the still operator and woodsworkers and their families shared another. Although not directly associated with distillation, cooperage was a necessary task to furnish barrels for the collection of gum and for shipping the distillation products. Cooperage sheds were usually close and sometimes connected to the turpentine still complex. Blacksmithing was another supporting operation. These shops produced the tools needed for the woods work and providing parts and repairs for the still and transportation vehicles such as wagons and trucks. A cup cleaning vat or station was another element of the camp. These might be manifest as cane syrup kettles that were used to boil and clean the cups or a brick vat specifically designed for that purpose. Normally the still owner's and still operator's residences were close to the still, but the woodsworkers' quarters were at the periphery of the camp. Their residences often formed a compound of several shanties set close together. Housing was usually simple and considered temporary since the timber in a given area was expected to be worked-out within a ten-year period (Butler 1998:185). Sometimes a company store or commissary was also established to sell goods to the workers and operators. Frequently a vacant shanty was designated as a church on Sundays and a school during the week (Wright 1979:77-78). Whites usually went to church and school in the nearest town. There was usually a cemetery associated with the camp where deceased black members of the camp were buried. Roads frequently converged at turpentine camps to provide transportation for needed goods and final products. Sometimes, if the camp was of sufficient size, a railroad might serve the community. In other cases, the turpentine camp was purposely built near a railroad to facilitate transportation.

2.2.5 Production South and West of the Carolinas.

As the forests in the Carolinas became depleted, the industry moved south into Georgia and Florida and eventually westward into Alabama, Mississippi, Louisiana, and eastern Texas. By the middle of the nineteenth century, many Carolinians moved their homes to Georgia and northern Florida to tap the vast longleaf pine forests of the Atlantic and Gulf Coastal Plains. Between 1880 and 1905, Georgia led the nation in naval stores production. Florida was the leader from 1905 to 1923, then Georgia regained the lead and held it until the industry waned. The industry spread westward to Alabama, Mississippi, Louisiana, and eastern Texas beginning at the turn of the twentieth century. During the first quarter of the twentieth century, Alabama

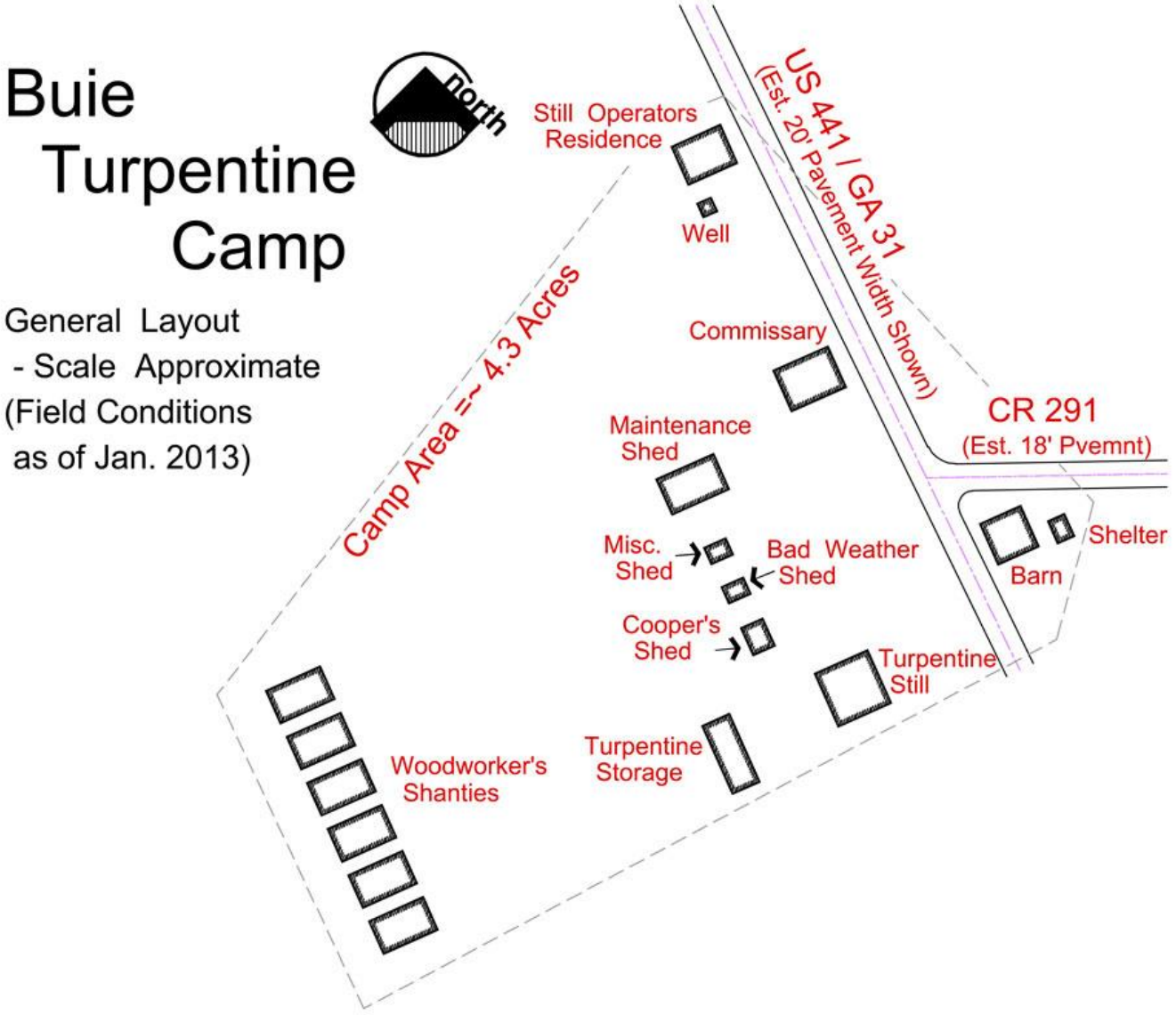


Figure 2.11: Layout of the Buie turpentine camp. (John H. Cato, Jr.)

produced about one-quarter to one-half the volume of Georgia and Florida. Mississippi produced a little less than Alabama, and Louisiana and eastern Texas were never large producers (Dyer 1963:13).

2.3 Rosin Era (1900-1975)

2.3.1 Introduction

About 1875, serious naval stores production began in Georgia. Industrialization was expanding worldwide and this lead to an increased market for naval stores products. Many North Carolinians moved to the Georgia pine belt and began distilling pine gum into turpentine and rosin. Production began in northern Florida shortly thereafter, and Georgia and Florida became the leading producers of naval stores by the turn of the twentieth century. While naval stores products would also be made in Alabama, Mississippi, Louisiana, and eastern Texas, none of the production in these states would reach the levels in Georgia and Florida. Gum naval stores reached its highest level in 1908-09 when approximately 750,000 barrels of turpentine and 2,000,000 barrels of rosin were produced (Dyar 1963:16).

In the early part of the twentieth century (1910-1920) several researchers made discoveries that increased the production of gum. Eloise Gerry, of the U.S. Forest Service, discovered that the resin ducts responsible for exuding the gum were more numerous at shallower depths in the wood than were being cut into the trees. Prior to that time, the deep chipping removed this valuable high gum producing tissue (Butler 1998:66; Dyer 1963:17). Others also learned that shallow chipping and narrower streaks could almost double the life of the tree and greatly reduce the mortality caused by deep chipping (Dyer 1963:17). In 1936, the Southern Forest Experiment Station, of the U.S. Forest Service, began to test the effectiveness of various chemicals in stimulating gum flow. Over the course of several years these investigations led to the conclusion that a 50 percent solution by weight of sulfuric acid was the best agent. The practice of spraying fresh scrapes with this solution began just after World War II. Eventually, only the bark was removed during chipping, leaving the wood of the tree undamaged and in good growing condition. By 1963, more than 90 percent of the growers were spraying acid on freshly-cut bark streaks (Dyer 1963:18).

2.3.2 Improvements in Forest Work

After making a trip to France at the turn of the twentieth century to study the practices of the turpentine industry there, Dr. Charles Herty, of the Forest Service, developed a cup and gutter system like that used by the French (Drew 1981:16; Dyer 1963:16). This system, once adopted, led to a dramatic improvement in the overall health of the pine forests by eliminating the boxing method of gum collection. The simple cup and gutter system was cost effective and allowed gum to be collected for much longer periods as well as lessening the injury to trees. Since the cups and gutters could be raised as the streaking climbed the trunk, fluid gum was maximized and scrape minimized, again increasing the gum production of the tree. However, the cup and gutter system did not catch on quickly. Herty travelled around the pine belt lecturing and extoling the advantages of his system for over a decade before real change occurred. Gradually the acreage using this system increased until it had almost completely replaced the former box system by around 1920.

The clay cup developed for the cup and gutter system took the name of its inventor and is universally referred to as the Herty Cup. It was shaped much like a modern flower pot with a wide smooth rim band at the top and vertical flutes on its lower part (Figure 2.12a). A single hole was present in the rim for hanging the cup on a nail driven in the tree. Since it was made of fired clay and was brittle, it was susceptible to breakage in the field either during installation, routine servicing, or because of freeze thaw cycles during the winter. Today, literally millions of fragments of Herty Cups are found across the landscape where the pine forests were tapped for gum and resin. As the twentieth century progressed, alternative containers such as the Pringle (Figure 2.12b) were tried, and eventually these were replaced by a variety of metal cups that wouldn't break (Figure 2.12e). First came the metal copy of the Herty Cup (Figure 2.12d) and then the (galvanized steel and aluminum) gravy boat-shaped (McKoy) cup (Figure 2.12c). The latter was the most popular and eventually was made of plastic in the same shape (Figure 2.12f).

The evolution of the round Herty-style cup to the oblong "trough" style McKoy cup was an important industrial development that occurred not long after the introduction of the Herty cup. Just as the Herty cup was slow to be adopted by the box system of gum collection, the McKoy cup eventually replaced the Herty cup as the most popular turpentine cup. The galvanized metal McKoy cups were lightweight, less susceptible to damage from handling (and therefore more economical), but also required a redesign of the dip iron/paddle. With the enlongated flat bottom of the McKoy cup, the dip paddles evolved from a more-or-less pointed/tapered blade to a flat bladed paddle. Perhaps the most important result, the capacity of the Herty cups were manufactured in either 1.0 or 1.5 quarts, whereas the newer design of the McKoy cups were 1.5 to 2.0 quarts thereby increasing the efficiency of gum colletion.

The "gutters" of the Herty Cup and gutter system were narrow metal strips or flanges that were commonly set into diagonal cuts in the sapwood of the tree at the same angle as the chipping strips. Two of these were used at about a 90 degree angle to each other and slightly overlapped to divert the gum into cup as it flowed down the trunk (Figure 2.13). Other gutters were developed that had flanges that were tacked to the tree using two-headed nails (Figure 2.14). This eliminated the need to cut into the sapwood to seat a flat gutter and it could easily be moved up with just a claw hammer. As the chipped face moved up the tree trunk due to successive chipping streaks, the gutters and cup could be move up as well. This reduced the amount of dried out gum (scrape) that accumulated on the exposed tree face. Figure 2.15 shows the tools needed to install and move cups and gutters included a hanging box, cupping axes, a hatchet, gutter tongs, a small and a large maul, a jump streak hack, and a wood hack (Butler 1998:37).

2.3.3 Fire Stills

The technology and operation of the small fire turpentine still improved over time. It was commonly composed of five main parts, a furnace for burning wood as a heat source; a copper kettle set in a brick cradle above the furnace for boiling the gum; a copper cooling worm submerged in a forced-flow water tank where vaporous turpentine and water condensed; a water/turpentine separation system (spirit room) where the volatile fractions were separated, and the turpentine was drawn off into barrels; and a rosin filtering vat where the residual rosin was conveyed from the kettle, screened, and filtered before being transferred into barrels (Figure 2.16).

Some stills also had a cooperage shed nearby for making the needed barrels and a shipping ramp to facilitate loading the final products for shipment and sale.

Most turpentine stills had a lower (receiving) platform at the height of wagon and truck beds that allowed the barrels of gum to be easily off-loaded (Figure 2.17). This platform was large enough to hold several tens if not hundreds of barrels of gum. Connecting the lower platform to the still charge deck was usually a long pole ramp consisting of two parallel wooden poles and a walkway beneath them that were sloped from the lower platform to the upper (Figure 2.17). This allowed full barrels of gum to be rolled up the ramp to the charging deck. This deck was at the upper level of the kettle and slightly below the charging port. Early stills were opened for charging by removing the kettle cap and the worm connector (Figure 2.18). Later stills had a separate charging port for easy access to the still (Figure 2.19). In the latter case the kettle cap, screw connector, and screw remained intact during the charging process. This increased efficiency and reduced maintenance problems. Eight to ten barrels of gum were usually dumped (charged) into the kettle for distilling. Once the kettle was charged, the kettle dome and screw connector were re-attached and sealed (usually with clay), or the charge port was closed and screw clamped to seal. As the gum was heated by the fire furnace, turpentine and water vaporized and rose to the top of the kettle where it exited through the connector and entered the worm (Figure 2.20). A constant stream of water had to be added during distillation to replace that evaporated (Figure 2.21); otherwise, the gum/rosin would overheat and catch fire. The worm was housed in a large forced-flow water tank that allowed the entire worm to be submerged. Cool water was usually circulated from a nearby pond through the bottom of the tank via a pump and hose system. The water overflowed through an exit pipe at the top of the tank and was returned to the pond. As the hot vapors entered the cooled worm, the heat was drawn away through the copper worm and transferred to the flowing water outside. The loss of heat from the vapors caused them to condense back into liquids. The worm exited the cooling tank near its bottom and entered the spirit room (Figure 2.22). In the spirit room, the turpentine and water out-flowed into the first separator barrel, a 50-gallon container with a horizontal short over-flow tube near the top. Since water and turpentine are almost insoluble and they have different densities, they separated in the barrel, water at the bottom and turpentine at the top. Once the barrel filled, turpentine would flow through the upper over-flow tube and be deposited into the second separator barrel of about 30 gallons, called the dehydrator. The dehydrator contained rock salt which removed the remaining water. Excess water could be drained from the first two separator barrels by removing a plug from a hole at their bases (Thomas 1975:31). The dehydrator was also equipped with a similar over-flow tube near its top and, as it filled, high grade turpentine exited through its over-flow tube. It is at the second separator barrel over-flow tube where final turpentine cut was collected in barrels and prepared for shipment (Gerrell 1997:108).

Figure 2.12: Containers used for gum collection: (A) Herty cup, (B) Pringle cup, (C) McKoy metal cup, (D) metal Herty-style cup, (E) Baker cup, (F) plastic McKoy style cup. (S.D. Kirkland)

Figure 2.13: Herty cup and gutter gum collection system. (photo, S.D. Kirkland)

Figure 2.14: Metal cup (McKoy type) gum collection system (photo, Georgia Southern University)

Figure 2.15: Tools used to install cup and gutter collection system. (A) tree gauge (calipers), (B) cupping axe, (C) metal apron (flanged) (D)large maul, (E) small mall, (F) wood hack, (G) push-pull scraper, (H) jump streak hack, (I) Herty cup, (J) McKoy cup, (K) cup hanging box, (L) gutter tongs, (M) hatchet. (photo, S.D. Kirkland)

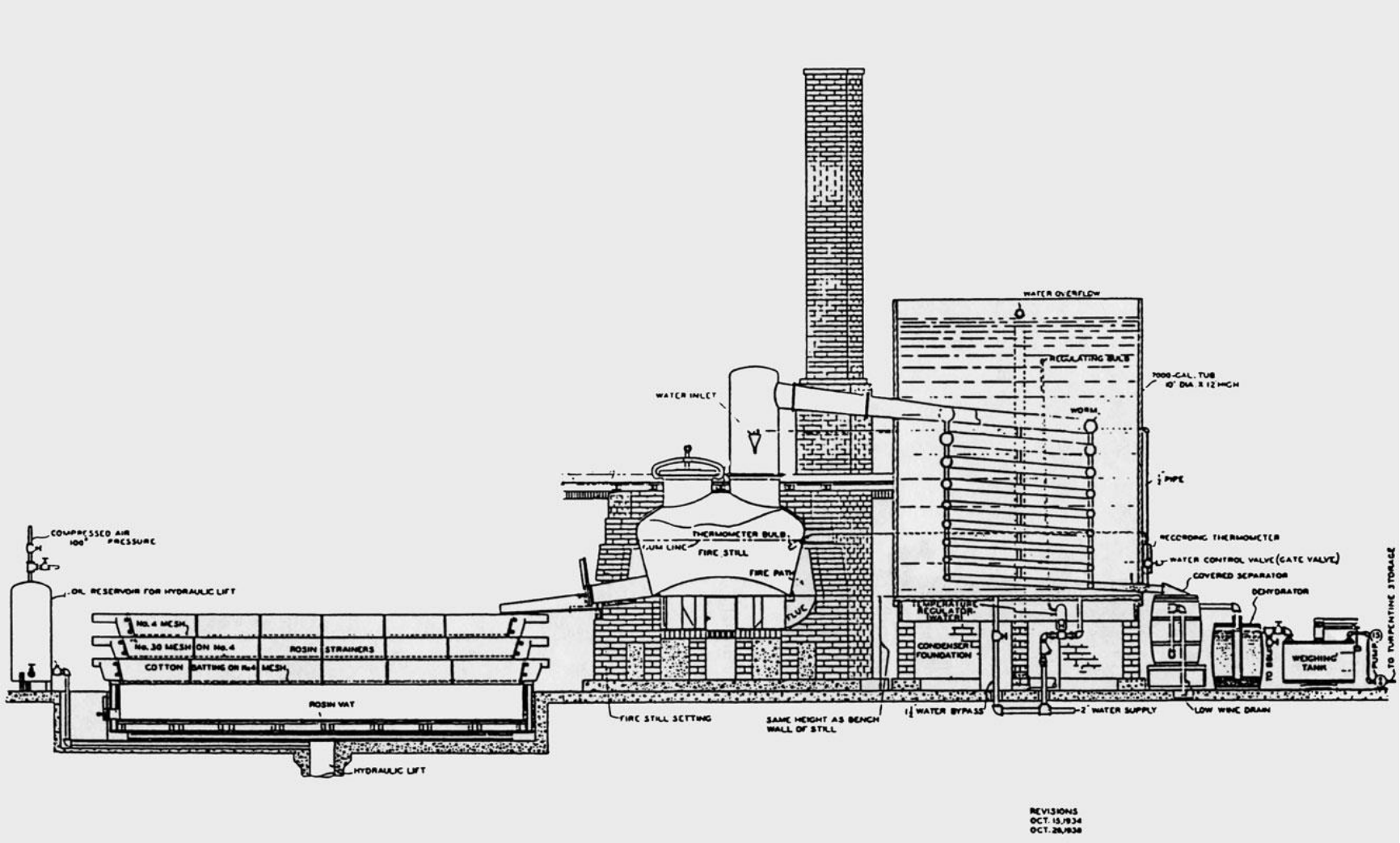


Figure 2.16: Engineering drawing of a fire turpentine still. (USDA, 1940)

In the earlier history of the copper stills, the amount of heat applied to the kettle was regulated by the operators through the nuances of specific sounds emanating from the end of the worm. The operator would listen, at that point, for the characteristic resonance and vibrations of over-heating or too much cooling. If the sound was flat, water was added to the kettle. If a boiling up sound was detected, additional heat was added. At later times, thermometers were used to control the distillation within optimum parameters. Thermometers came into use after the first decade of the twentieth century and recording thermometers (which gave a profile record of the entire distillation run) in 1916 (Butler 1998:81; Dyer 1963:20). A ten ounce baby nursing bottle was adopted for use as a distillate separation measuring device (Figure 2.23). By filling it to the ten ounce mark with distillate coming from the end of the worm, the percentage of turpentine and water could be determined (Butler 1998:83). As the two are practically insoluble and differ in density, they would separate in a steady state. Water would settle to the bottom, and turpentine would float above. Since the volume in the bottle was marked on base 10, the

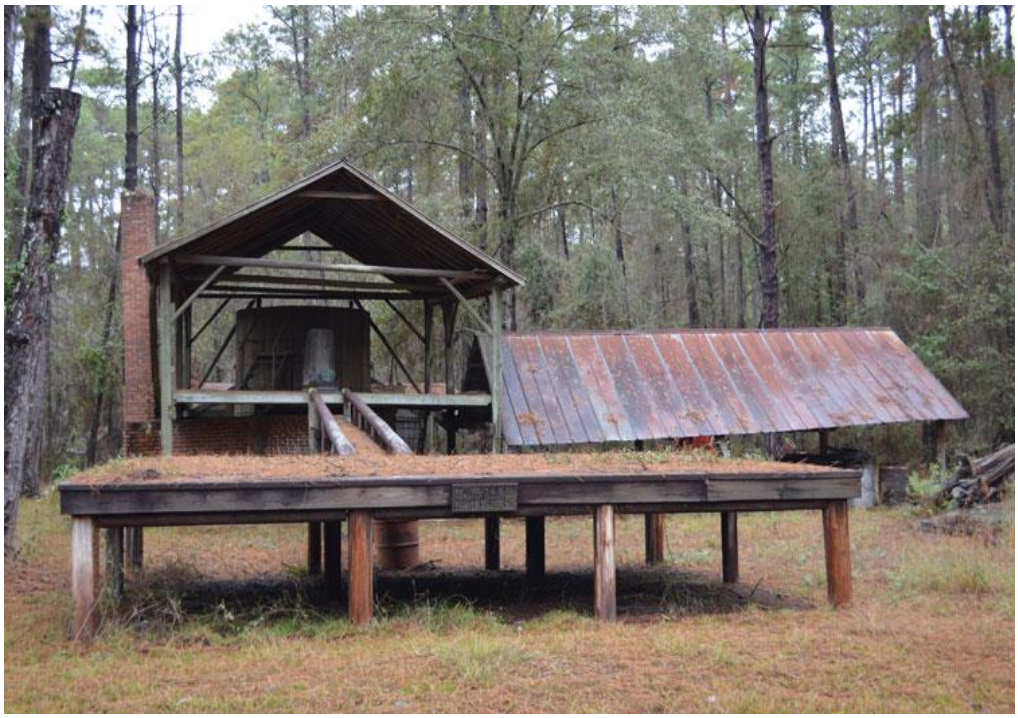


Figure 2.17: Turpentine still loading platform and pole ramp (McRanie Brothers). (photo, S.D. Kirkland)

Figure 2.18: Charging the turpentine still after removing the kettle cap and worm connector (Carter's) (photo, S.D. Kirkland)

Figure 2.19: Kettle cap (center), charge port (lower right), and cooling tank (left) (McCranie Brothers). (photo, S.D. Kirkland)

Figure 2.20: Cooling worm (McCranie Brothers). (photo, S.D. Kirkland)

Figure 2.21: Port for adding water to the turpentine still (Carter's). (photo, S.D. Kirkland)

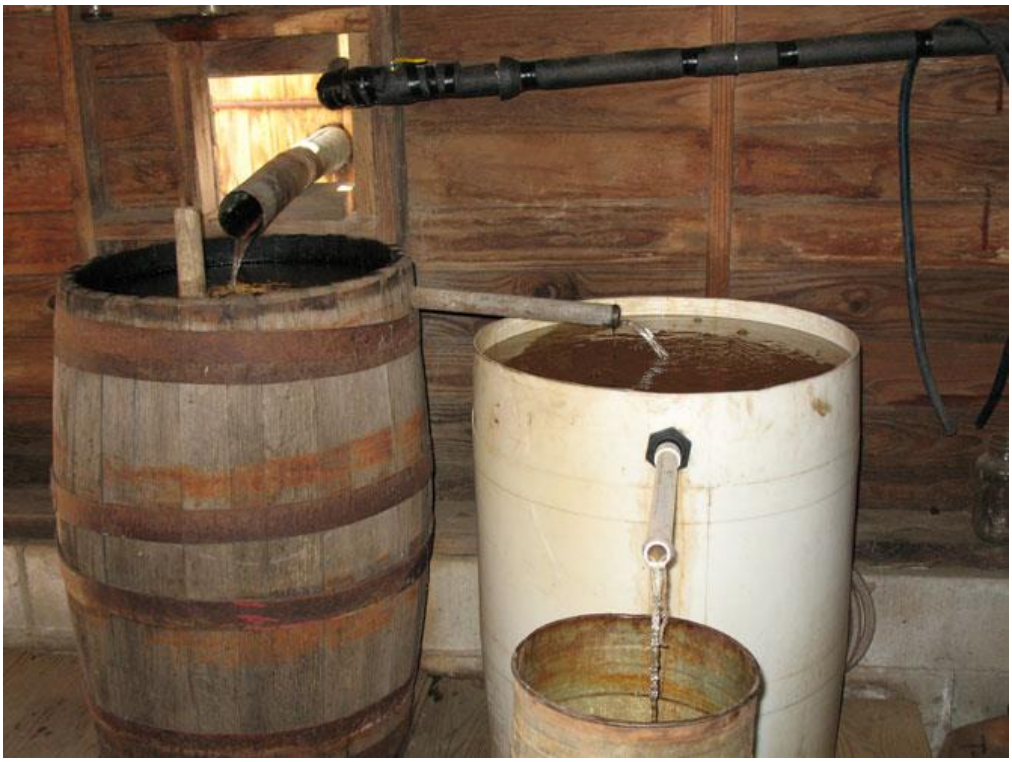


Figure 2.22: Spirit room turpentine/water separation system (Carter's). (photo, S.D. Kirkland)

percentage could simply be read directly and the value multiplied by ten to get the percentage. For example, if the boundary between the two liquids was at 4.6 ounces the percentage of water was 46 and the percentage of turpentine was 54.

When only about 10 percent of the final out-flow from the worm was turpentine, the fire below the kettle was quenched by pulling all of the burning wood and glowing embers out of the furnace (Figure 2.24). This was accomplished with a long metal handled rake or hoe and the burning wood and embers squelched with water outside the furnace. This was a point of high risk in the process and technology, and fires destroyed many stills during this step. In the earliest stills either no walls flanked the furnace opening or only small safety walls existed. These safety walls took the form of acute angular partitions extending outward from the brick kettle cradle, and they enabled the isolation of the pulled fire and burning embers from other areas of the still. As time progressed, these safety walls became longer to further reduce the risk of fire during the fire "pulling" process.

Either before or early in the distillation process, a wooden sluice was attached below the kettle gate valve, and its opposite end was suspended over the screens above the rosin vat. As soon as the fire was pulled and the kettle vented, the gate valve was opened allowing the boiling rosin to gravity transfer from the kettle to the screens above the rosin vat (Figure 2.25). The upper screen was usually a "4" wire mesh size, the middle, a "30-40" wire mesh size on top of a "4" wire mesh, and the lowest filter consisted of cotton batting on top of the "4" mesh screen. Each of these successively removed smaller trash objects from the rosin. Collectively, all of this separated trash was referred to as dross (Figure 2.26). The cotton batting in the bottom screen usually had to be

scraped with a hoe or similar tool to facilitate the rosin's passage through to the open vat (Figure 2.27). Once the filtration process was complete, the rosin was hand-dipped into barrels and allowed to cool before shipping (Figure 2.28).

2.3.4 Steam Stills

During the 1920s, research began on developing a steam distillation process. At that time about 15 percent of the stills in France used steam as the heat source. Ultimately, this process was perfected and used in large, centrally-located stills (Figure 2.29). One of the problems associated with early steam stills was that trash in the gum would collect in and on the steam coils and char. The charring led to an undesirable discoloration of the rosin. By cleaning the gum before charging, this problem was eliminated and resulted in higher grades of rosin. Steam stills also produced more consistent products, were more economical to operate, and operated at a lower risk of fires. The development of the central steam stills also opened the market for gum sellers in small farm operations (Butler 1998:89). Since the small farmer didn't have to operate and maintain a fire still but only had to ship his gum to a central steam still, it became lucrative to harvest smaller plots. This led to an increase in the number of central steam stills at the expense of fire stills. The quantity and distribution of fire stills peaked in 1925 when approximately 2,500 were in operation. By 1963 practically all of the fire stills had ceased operations (Dyer 1963:21).

2.4 Naval Stores Research Station

The U.S. Forest Service established the Naval Stores Research Station (NSRS) on the edge of the Osceola National Forest, near Olustee, Florida. It became the center for research and development of the naval stores industry. A number of advances and improvements emanated from this center, including much needed conservation practices. Experiments were initiated to study the effect that depth and height of chipping had on gum yields. These showed that shallow chipping of narrow streaks could almost double the life of the tree and also greatly reduce the mortality caused by deep chipping in second growth stands. Other studies showed that the resin ducts that produced the gum were much more numerous in the area just above where chipping was done. A new procedure for chipping was developed whereby streaks of approximately one-half inch in height and near the same depth were made. Faces were cut on only one-third of the circumference of the tree and bark-bars left between. Producers who adopted this revised chipping method realized the advantage and increased gum yield (Dyer 1963:16). Effort toward standardizing the optimum size of trees for working also was conducted. Improvements were advanced for the distillation process as well. Better fire distillation buildings, kettle settings, and process controls were developed. Finally the invention and perfection of the steam distillation process came. Steam distillation centralized the process and opened the market to small farmers who had smaller acreages of trees. Changes resulting from the work at the NSRS, together with better marketing, revolutionized the industry. The overall product quality was improved and much of the waste from the distillation process was eliminated (Gerrell 1997:12-13).

Figure 2.23: Turpentine/water separation graduate (Carter's) (note the separation meniscus). (photo, S.D. Kirkland)

Figure 2.24: Pulling the fire (Carter's). (photo, S.D. Kirkland)

Figure 2.25: Dumping rosin into the filters (screens) (Carter's). (photo, Georgia Museum of Agriculture)

Figure 2.26: Dross on the filters/screens (Carter's). (photo, S.D. Kirkland)

Figure 2.27: Lowest screen showing the hot rosin atop the cotton batting (Carter's). (photo, S.D. Kirkland)

Figure 2.28: Filling the barrels with hot rosin (Carter's). (photo, S.D. Kirkland)

2.5 Human Costs

The rudiments of the naval stores industry in the New World had its roots in slavery. As such, exploitation and privilege depended on one's race. Despite the Civil War and the emancipation of black slaves, this dichotomy largely continued until just before the demise of the industry in the twentieth century. Most of the naval stores work was extremely hard labor which was conducted in utter poverty. Most African Americans who continued in the naval stores industry after the Civil War traded slavery for an oppressive institution that kept them in debt to the still owners and inextricably bound to turpentine camp life. Most workers were housed in squalor conditions in dilapidated shanties that just barely provided protection from the elements. Almost all were always indebted to the still owners which kept them in an endless cycle of debt and work. Many of the camp commissaries charged higher prices for goods which sapped the low wages they were paid. Some camps even had their own token coinage that could only be exchanged at their commissaries (Prizer 2009:25-26).

In the antebellum period, African American men made up the bulk of the people who performed the daily tasks in the naval stores industry. It was they who carried out the menial tasks of hard labor in the woods and at the turpentine stills. Black women also contributed but not nearly to the extent as black men. As Prizer (2009:52) states, ". . . not only did the growing demand for turpentine bring with it an increasing demand for forced labor, but it also necessitated a grueling work routine in a rigidly controlled environment." They often worked in an oppressive setting, subject to the whims of the overseer or woodsrider (Figure 2.30). The woodsrider was

Figure 2.29: Steam turpentine still operations. (photo, Georgia Southern University)

Figure 2.30: Woodsrider and woodsworkers. (photo, Georgia Southern University)

responsible for seeing that the work in the woods was done efficiently (Prizer 2009:26-30). The inadequate performance by a worker was often met by abuse at the hands of the woodsrider. Whippings were common punishment for slow work, failure to complete tasks, and/or complaining (Butler 1998:185; Prizer 2009:54). They were also subject to passive abuse such as not being provided with enough food or proper clothing and shelter. In fact, the slave turpentine quarters were often worse than that of the agricultural slave because of the mobile nature of the industry. Since workers were only in one place for a few years before the woods were "worked-out" and they moved on, housing was little more than lean-tos or shanties that barely kept their inhabitants out of the weather and safe from mosquitos. The turpentine slave plantations were established close to the worksites which isolated them from diversions and led to a life of work from sunup to sundown with little hope for the future. As a result, many fled these conditions, and possibly even in higher numbers, percentage-wise, than runaway agricultural slaves (Prizer 2009:55).

While emancipation was mandated by the results of the Civil War, it did little to free African-Americans from the economic bondage in which most of them lived. It also did little to free them from the lifestyle of the turpentiner. The plantations of North Carolina became the turpentine camps in southern Georgia and northern Florida (Prizer 2009:59). The layout and function of the camps resembled the plantations of the Carolinas and, although the physical abuse may have lessened somewhat, the economic shackles remained. Most workers were paid pittance for their labors and, as a result, they often became insufferably indebted to the owners. They became bound in servitude because of debt through a system referred to as Debt Peonage. When a new worker arrived in camp he was given a cash advance to buy basic supplies for his family and their new home. As a result, an account was immediately set-up and charged for his cash advance. As he

purchased new items through the company commissary, the debt was added. Charges for doctor's bills, trips to the hospital, or any other debts outside the camp were also added to this debt. His daily work was paid by piecework—the amount of labor he was able to complete each day—not by the hour. On payday, his wages were applied to the account to lessen the debt. He could see a reduction in the debt he owed, but rarely any pay. Even if workers managed to pay off the debt, they were rarely paid in currency. Instead they were issued tokens, scripts, coupon booklets, or punch cards, and sometimes these were redeemable only at the camp store (Outland 2004:169-173). Ultimately, the process forced workers into an inescapable system of debt. If a worker wanted to change employers the new employer had to pay off the debt before the worker could be transferred. Owners used this indebtedness or peonage to hold workers in an inescapable condition of poverty. Although no longer considered the property of the turpentine camp owners, they were still bound to the system through economics (Prizer 2009:59-60).

Convict leasing was also a popular way to provide a labor force for the Turpentine Industry during the latter part of the nineteenth and the first half of the twentieth centuries. Although reasonably widespread, it never comprised a significant portion of the industry's labor force. Between 1880 and 1910, only 7 to 8 percent of the turpentine workforce was composed of convicts (Butler 1998:128; Outland 2004:188). However, those businesses that used convict-labor found it very lucrative. Outland (2004:187-188) relates that, on average, businesses using convict labor posted a $25,000 profit in 1912. The majority of convict-laborers were African Americans and a vast majority of these were men. About 15 percent were European American males, about four percent African American females, and about one percent European American females. Most were sentenced for less than three years. A typical convict labor camp was comprised of about 30 to 50 convicts and was located in an isolated area away from the free worker camps. A high stockade or fence normally surrounded the convict camp. Most of its buildings were constructed in the same way as at free worker camps, except that a large bunk house replaced the typical family housing of the free camps. The bunkhouse was often separated into a sleeping space and a dining area. The dining area had a heating stove and tables and chairs. Their diet appears to have differed little from their free worker counterparts. Black and white convicts were usually housed separately and in some states they were not allowed to be chained together. Convicts performed the same tasks as free workers but usually at a faster pace. In some cases convicts were expected to outperform free workers by as much as 50 percent (Outland 2004:190-194). Some convict camps were notorious for their abusive treatment of prisoners. Investigations into some of these in Florida ultimately led to the legislature eliminating the practice of leasing state and county prisoners to private labor contractors (Butler 1998:128).

While the above description paints a picture of callousness and exploitation, not every camp owner was abusive, and there were instances of more compassionate operations. However, practically all naval stores production environments were at best oppressive, at least until the Civil Rights Movement of the 1960s and the demise of the industry. In the latter part of the nineteenth century, white men were usually the producers, operators, stillers, and woodsriders, and they did not commingle with the black workers except in a supervisory capacity. Whites and blacks almost never socialized in situations not related to work. Even their children were not permitted to play together (Prizer 2009:61). During this time, African-Americans were enculturated with a sense of submissiveness, a belief that they were lower-class citizens. Still, not every white "boss" and supervisor treated their workers badly. Some were benevolent and supervised with respect and

integrity. However, it should be remembered that the naval stores industry began in the institution of slavery and flourished on the work of exploited African-Americans well into the twentieth century. It wasn't until the very end of the industry's life that African-Americans gained the freedom and autonomy that was commensurate with their labor.

Civil Rights laws passed in the 1960s and 1970s regulated southern employers. This resulted in a radical shift from a turpentine camp organization to an industry based on contract labor. Turpentine woodsmen suddenly had an unprecedented level of freedom and autonomy. Finally, their earnings became consistent with the amount of labor they contributed, and they suddenly realized an excess in pay where they could afford their own homes and experience the dignity of supporting their families. They could report to work in stands of timber that they leased from the state or from a private owner and go and come as they pleased, work as much or as little as they pleased. It was a situation that most African-Americans could never have imagined. Reminisces of woodworkers, in the final twenty years or so of the turpentine industry, stand in stark contrast to the horror stories of the earlier years (Prizer 2009:70-71).

Up to about the 1930s, building and maintaining a fire still to process the gum into turpentine and rosin were cost prohibitive for the small landowner. The introduction and spread of large centralized steam turpentine stills, after that time, opened the market to small farmers. They enabled the farmer with a few acres of pine trees to work these and sell the gum to the central still to supplement his income from other crops and livestock. Since few African-Americans owned land during these times, the bulk of this contribution to the industry was done by low-income and, in some cases, middle class whites. Granted, many white property owners hired African-Americans to work the woods, however, but whites were usually involved in all aspects of gum gathering (Prizer 2009:62).

In a sense, the still owners were also dependent on debt since they secured start-up and maintenance loans through cooperatives. The American Turpentine Farmers Association (ATFA) was organized in Valdosta, Georgia, in 1936, as a cooperative to promote education, research, advertising, legislation, insurance, and marketing for the industry. It was responsible for helping secure loans for gum producers from the Commodity Credit Corporation. In a short time, practically all of the leading gum producers were members of this group (Dyer 1963:18). ATFA achieved a number of developments for its members, although these were largely to the detriment of the workers. It secured the exemption of gum producers from the provisions of the Federal Social Security Act, the Federal Wages and Hours Law, and the Workmen's Compensation Laws of Alabama, Georgia, Mississippi, and Texas. AFTA also promoted improvements in the industry, such as improved packaging of rosins and the transition from wooden barrels to those of metal (Butler 1998:174).

2.6 Decline of the Naval Stores Industry

The demise of the naval stores industry came about due to a number of factors, some interrelated and some that seemed to randomly converge at a stretch of history between the 1950s and the 1970s. The technological innovations of the early part of the twentieth century made the industry more profitable. However, the improvements in labor conditions resulting from Civil Rights legislation decreased the profitability of the industry. According to some operators, the difficulty

of hiring a quality labor force was a major factor in their getting out of the business (Hiram Tanner, Jr., personal communication 2013). Workers were taking easier jobs in local towns rather than the back-breaking work in the woods. Mechanization and its' consequent decrease in labor costs for other crops in the pine belt region, led to a decrease in gum production by small farmers. Worse, mechanization of the turpentine industry just was not practical in the piney woods. A rise in timber prices for lumber took away a significant part of the very raw material source of the industry. Although, probably of the greatest impact was the fact that almost all of the turpentine products were replaced by the by-products from the pulp and paper and the petroleum industries.

All of these factors crippled the industry and sent it into a tailspin. In 1950, there were almost 9,000 turpentine producers in the United States, but by 1960, there were just a little more than 1,000. Over that time, the number of barrels of turpentine produced dropped by 85 percent and the labor force by 84 percent. The last quarter of the twentieth century saw the further erosion of the industry until the last barrel of gum was gathered from a pine forest near Soperton, Georgia, in 2001. Pine gum is still gathered and distilled today in Brazil, China, Indonesia, Mexico, and several Mediterranean nations as supplementary income for rural employment. However, this represents only a trace of the massive industry that was so vital to the economy of the southern pine belt.

2.7 Uses of Naval Stores Products

2.7.1 Pitch

From ancient times until the advent of iron/steel-hulled ships, the bulk of naval stores products were used for waterproofing the hulls and accouterments of sailing ships. Oakum (old twisted rope) was driven into seams, cracks, and/or crevasses in the decks and hulls of ships using specialized tools. The oakum was then covered with melted pitch poured from pitch ladles. A ship's rigging and ropes were also pitch treated to waterproof them and retard rotting. This treatment was usually done in the filament stage before the strands were formed into a rope (Carroll 1998:13-14).

2.7.2 Tar

The primary use of tar during the sailing period was for rigging and waterproofing. Terrestrially tar was used as a medicine to relieve the sore hooves of mules, to cover plow lines, to coat the bottoms of fence post to retard rotting, as axle grease for wagons, and as an ingredient in composition roofing. Tar was also used as medicine for eczema and psoriasis. Mixed with honey it was claimed to be a cure for the common cold and prevent pneumonia (Carroll 1998:215-216).

2.7.3 Turpentine

The primary use for turpentine was as a solvent for paint and varnish. It was heavily used as such by the automotive, railroad, and building trades and by the rubber industry. It was also used by the general consumer for paint thinner and household uses. The use of turpentine in the pharmaceutical industry was relatively small. It was used in disinfectants, liniments, medicated soaps, and salves. Turpentine was also used in shoe polish, furniture polish, cement, cleaning

agents, stain removers, drawing crayons, printing inks, indelible marking ink and to waterproof cloth, tents, and covers for wagons; it also acted as an insecticide. One of the earliest uses was as an illuminant. It was mixed with castor oil to produce a fluid used in lamps (Butler 1998:218-221; Drew 1981:16).

2.7.4 Rosin

Almost 85 to 90 percent of the rosin produced was used in paper products, primarily as paper sizing. It was also a component in soap or varnish, from 1930 to 1932. By the 1940s, the major consumers of rosin were pharmaceutical and chemical industries. Rosin was used as a paper coating in a treatment referred to as "sizing" which prevented paper from acting as a blotter and allowing the bleeding of inks. Another major use was to produce varnish. From 1922 to 1932, rosin oils, greases, and printing inks accounted for about 5 to 25 percent of the rosin consumption (Butler 1998:222).

3.0 ARCHAEOLOGY OF THE NAVAL STORES INDUSTRY

3.1 Types of Naval Stores Industry Sites and their Descriptions

3.1.1 Introduction

In order for Department of Defense Cultural Resource Management (CRM) teams to manage naval stores industry sites on their properties, they must first be able to recognize not only that an archaeological site is related to that industry, but also which element of the industry it represents. This chapter is devoted to describing the series of sites that are related to the industry and providing the characteristics that differentiate them one from another. In addition, specific research questions are posed to help determine NRHP eligibility. Armed with these descriptions and appropriate research questions, the DoD-CRM managers should be able to effectively oversee these cultural resources on Installation properties. All of the typical sites related to the turpentine industry will first be summarized, and then each will be meticulously described in order to provide the details necessary for recognizing their signatures in the field.

There are two overall categories of sites related to the naval stores industry based on the dichotomy of process. They include woods-related sites and extraction-related sites. Within these are several subcategories that define the universe of naval stores industry archaeological sites. Sites typical of woods work are much more difficult to recognize since they were much more ephemeral in nature and are distributed over the entire landscape of the southern pine woods. In many cases, activities that were intense over a short period of time at a particular woods location left virtually no evidence, and consequently no site exists as commonly thought of. These activity areas can only be generally described from first-hand oral accounts or from written summaries in reports and books. Distillation sites are much more recognizable because of their size and configuration and because more detailed historical records exist of their operation and locations.

3.1.2 Tar Kiln Sites

Tar Kiln Sites are locations where the extraction of tar from pine wood occurred through a slow-burning, oxygen deficient, process. Concentration of this site type is heaviest in Virginia and the Carolinas, because these states were the locations of the earliest naval stores extraction done by this process. Considerably fewer sites are found in the remaining naval stores producing states, because by the time the industry had spread to their borders, the focus was on turpentine and rosin and away from tar and pitch. Tar and pitch could be produced further allowing distillation of rosin.

A number of reports were reviewed to ascertain the feature configuration and artifacts (footprint) of tar kilns. These include 9BN1370 (Espenshade 2012); 9BN0452 (Ross 2004); 9LI0450 (Mathews et al. 2004); 9LI0560 and 9BN0830 (Morehead et al. 2008); 9BN0257, 9BN1174, 9BN1175, 9BN1179, 9BN1183, 9BN1199, 9BN1225, 9BN1230, 9BN1231, 9BN1240, 9BN1241, and 9BN1256 (Campbell et al. 2012); 9BN0267 (Markham and Holland 2002) from Fort Stewart and 38BK0475 (Hart 1986) and 38BK0541 (Poplin et al. 2010) for the Francis Marion National Forest and Campbell et al (2012), Mathews et al. (2004), Morehead et al (2008), and Ross (2004a, 2004b) for Fort Stewart Military Reservation.

Today, a tar kiln site is recognized by the presence of a low mound of earth with a surrounding ditch and sometimes a pit or depression outside the ditch. When excavated, one should find an abundance of charcoal and perhaps the remnants of wood billets inside. Artifacts found might include the remnants of wooden barrels (largely their metal binding hoops); various digging implements such as hoes, shovels, and picks; wood-cutting tools such as axes, adzes, saws, etc.; and tar-dipping devices such as buckets that were fastened to long poles. In rare cases, an iron pitch-pot might be found at the end of the linear trench.

In the Francis Marion National Forest (FMNF), South Carolina, tar kiln sites are manifest as circular sand mounds of about 50-75 centimeters above the surrounding ground surface and 20-30 meters in diameter. They have a central depression that ranges between about 6-8 meters in diameter and a perimeter ditch that is from 25-50 centimeters below the surrounding terrain and 2-3 meters wide. Many also have a depression on the downslope side of the mound that is positioned just outside the ditch. The latter feature is presumably the catch basin where the tar flowed from the mound and was collected in barrels. Archaeological work at these sites has yielded curiously few artifacts. The lack of diagnostic time markers has impeded the development of site temporal segregation.

At Fort Stewart, Georgia, kiln sites are significantly smaller. They occur as low hemispherical mounds of about 8 to 9 meters in diameter and 30-50 centimeters above the surrounding ground surface (Figure 3.01). Their peripheries are surrounded by a narrow (1 m wide) shallow (25 cm deep) ditch that is the defining feature demarking the tar kiln from its surroundings. It is thought that this ditch was the result of soil being thrown up on the kiln before firing. Strangely, no remnant catch basins have been observed at the Fort Stewart tar kilns and few, if any, have central truncations. Again, as at FMNF, these sites have produced few associated and useful time markers.

Three sites at Fort Benning, Georgia, have a total of four tar kilns. The first of these (9ME52) is described as four meters in diameter and located on a ridge overlooking Randall Creek (Cooper 2000a). A shovel test dug into its center found an abundance of charcoal. The second Fort Benning site (9ME779), also along Randall Creek, is almost identical in size and configuration (Cooper 2000b). It too produced a profusion of charcoal from a centrally dug shovel test. The third site along Randall Creek has two tar kilns (no size specified), both of which failed to produce artifacts from shovel testing.

A site on St. Catherines Island, dug in the 1970s, is described as a historic "turpentine rendering station" (Peter 1987). It was earlier thought to be an Indian burial mound, but excavation revealed a persevered wood "structure" collapsed inside a pit. This site might be a remnant tar kiln, but the internal "structure" is problematic.

Some research questions posed by tar kiln sites are the following: Are there differences between tar kiln sites in the Carolinas where the naval stores industry is older than in the remainder of the Southern pine belt? Does the frequency of tar kiln sites vary between the Carolinas and the remainder of the pine belt? Can temporal markers be found for differentiating tar kilns through time? Can tar kilns be clearly differentiated from charcoal kilns? What is the range of sizes and configurations of tar kiln sites?

Figure 3.01: Tar Kiln site at Fort Stewart, Georgia. (photo, S.D. Kirkland)

3.1.3 Woodsworking Sites

It is more accurate to define the evidence of woodsworking as non-site activities. That is, instead of the residue of human activities being manifest as artifacts and features located in distinct concentrations that archaeologists commonly refer to as "sites," they were spread over the entire landscape where gum-producing pine trees grew. Consequently, artifacts denoting that activity are spread over the landscape in a low but consistent distribution. A prime example of this is the occurrence of Herty Cup fragments. On account of the fragility of these gum-catching containers, they often broke during installation, routine gum-collection, and even from freeze-thaw cycles over the winter months. Once broken, the fragments were almost never collected and reused since they were so inexpensive and could serve no further practical use. In the years following the naval stores industry's demise, most of the former virgin pine lands were converted into stands of row planted pines or agricultural fields. These operations involved plowing and led to the dislocation of the Herty Cup fragments from where they were originally dropped. This action further distributed them less densely across the landscape. Today, these artifacts are widespread across the former pine forest landscape. Archaeological survey reports on projects done in the pine regions often list the occurrence of Herty Cup fragments as isolated finds or "non-site

occurrences." Most authors of such reports simply state that these are evidence of turpentine industry activities and provide little further interpretation.

Practically all of the site information reviewed to ascertain the archaeological footprint of this type naval stores site was from Fort Stewart since that facility has the best documented sites of this type. These included 9BN1269 (Sweeney et al. 2011), 9LI422 (Campo et al. 1999), 9LG133 and 9LG30 (Trinkley et al. 1998), 9BN1371 (Espenshade 2012), 9LI576 and 9LI663 (Jackson 2000), 9BN250 and 9LI1012 (Jackson 2001), 9BN510 (Morehead et al. 2009), 9BN1198, 9BN1211, and 9BN1215 (Campbell et al. 2012), 9LI322 (Gantt and Styer 2004), and 9LG168 (Espenshade 1998).

Herty and McKoy Cups are the most numerous and visible artifacts associated with woodsworking. These are the remnants of the use of the cup and gutter system for the periodic collection of the gum. The fact that whole Herty Cups have survived in the woods at some locations speaks to the fact that when the later metal cups supplanted them, most were simply discarded in woods. The one useful fact about the occurrence of Herty Cups is that they were in widespread use during a definite timeframe, between about 1910 and 1925. After 1925, the McKoy cup supplanted Herty Cups. The presence of both in the piney woods denotes former human activities that were landscape related.

Rarely, but occasionally, old preserved pine stumps can be found with either catfaces or gum boxes cut into them. These are evidence of woodsworking activities generally before about 1910 and are reminders of the massive destruction wrought by that method of gum collection. Most pine stumps on private lands were harvested in the latter half of the twentieth century and subjected to a steam and solvent process for extracting the tar. Since the DoD lands have received less disturbance than private sector lands, those established before about 1960 are more likely to have boxed stumps than private lands. Discarded tools and materials (see Figures 2.05 and 2.10) that might be found from the boxing, chipping, dipping, and scraping activities include remnants of dip buckets, cutters, dip irons, weeding hoes, felling axes, boxing axes, wood pullers, whetstones, wood hacks, scrape boxes, scrape buckets, shove-down scrapers, push-pull scrapers, yoyo scrapers, and plastic bottle fragments (from sulfuric acid containers). In addition, other items related to the chipping and scraping process include cup covers.

Gum consolidation is an activity that could have resulted in discrete woodsworking sites. Each woodsworker had one or more collection barrels (50-gallon) located near his work area where he dumped the collected gum from his gum collection bucket (5-gallon) when it became filled. This was often the place where he left personal items such as his coat, drinking water, lunch, and excess work-related supplies. He would return to the dump point when his gum collection bucket was filled and empty it into the barrel. He and perhaps other woodsworkers might rendezvous at one of these dump points for lunch or to retrieve needed supplies. Once the dump barrel(s) was filled with gum, it was loaded into a wagon or truck that held other full barrels for transport back to the still. These consolidation stations are occasionally visible on the landscape as a small scattering of artifacts that might include: items of discard from the worker's lunch such as glass bottles, tins, one-gallon syrup buckets (woodsworkers lunch pail), or perhaps tableware; tools related to woodswork such as broken turpentine tools (see list in preceding paragraph); or excess supplies such as metal gutters and/or aprons, and nails. In addition, whetstones from sharpening tools, discarded barrels or barrel components, and/or wagon or automobile parts could also be found.

Several research questions can be asked to help guide any future research. Can temporal and spatial relationships be discerned between artifacts recovered from woodsworking sites that will allow better interpretation of these kinds of past activities? Can patterns be detected in woodsworking activities that are temporal in nature? Can the change from large-scale Turpentine Camp operations to the more limited activities of small farmers be detected from the archaeological record manifest on the landscape?

3.1.4 Turpentine Camp Sites

The turpentine camp evolved following the Civil War as an organization of structures for housing the people and activities associated with the gathering of pine gum and its distillation into turpentine and rosin. The configurations of these camps varied but they had many common structures that served the same functions. Central among these were the distillery (still) complex with its function of distilling raw gum into turpentine and rosin. It was usually the largest structure and could have several associated sheds, ramps, and/or earthworks. Most often a Cooper's shed was close to the still but frequently not attached to the still complex. Here is where wooden barrels were produced for use in the gum gathering and the packaging of the final products of the still. There was also a storage area for the turpentine and rosin. The turpentine was often stored in what was called the Spirits Room or Spirits Shed which was sometimes attached to the still complex and provided shelter for the outflow end of the worm where the distillates were collected. In other instances, turpentine was stored in a separate structure not connected to the still complex. Tools and other metal objects were constructed and repairs made to metal machinery in a blacksmith's shed. A Commissary was a structure that served as a general store for the turpentine camp and might also house the company office. This is where the workers met before sunrise to prepare for the day's work. A residence for the still operator and his family was usually among the buildings of the turpentine camp. However, it was usually located some distance from the still and commissary. A group of structures referred to as shanties were positioned in rows and of like construction and normally located at the periphery of the camp. These were the residences of the woodsriders, woodsworkers, and their families. One of these shanties might be designated for dual use as a school during the week and a church on Sunday. The company owner's house, if on-site, was usually located in the forward area of the camp nearest the access road and was always of much better construction.

Much of the information for compiling the archaeological footprint of the turpentine camp and its elements came from the field notes compiled during an examination of the Buie Turpentine Camp (Kirkland 2013a) and two reports of archaeological investigations at 8OK0149 (Meyer et al. 2006) and 8OK2664 (Mathews et al. 2008) inside Eglin Air Force Base.

3.1.4.1 Still Complex

By far, the largest and most recognizable part of all naval stores related sites are turpentine still complexes. These were the focal point of activities related to turpentine and rosin production, and wherever a still was constructed a host of other support structures sprang up. A typical configuration of the turpentine still was described earlier in this report. If a still site is in ruin and perhaps only had its kettles and other reusable components removed, it is easily recognizable as

such. Copper kettles are almost never found in archaeological context today since the vast majority was sold for the value of their copper. Frequently, the remnants of the brick and masonry setting and furnace are left, and these are telltale features (Little et al. 2000:407). Other components that are readily recognizable are the rosin vat and perhaps parts of the cooling tank. The rosin vat is usually manifest as a six to eight feet long linear trench or depression in the ground that is aligned with the still setting's center but separated from the brick and masonry structure. Metal ring clamps used to hold and tighten the staves of the cooling tower were found at all of the turpentine still sites examined at Fort Stewart, Georgia (S.D. Kirkland, unpublished field notes, 2013b:2). Sometimes the presence of collection cups can indicate the period of operation. For example, if metal McKoy cups are found, then the still operated after about 1920. If fragments of Herty Cups are found and no metal cups are present, then it operated between about 1910-1920. If no gum collection cups are found then it may be an indication that the still operated between about 1834 and 1910. The presence of both types of cups suggests that the still was long-lived and operated from the early 1900s into the 1920s or later.

If the site has been razed, recognition might be more difficult. In such cases, one often finds the remnants of the still setting and a depression left by the rosin vat or perhaps a concrete pad where the still once stood (Figure 3.02L). Sometimes a deep depression or an abandoned well (Figure 3.02R) might be close as the source of cooling water for the still. In addition, razed still sites sometimes exhibit linear trenches that were used to lower trucks or wagons to facilitate the loading and unloading of materials and products. In some cases, low mounds or sheets of dross are visible if the area has not burned since the still was razed. There are a host of tools and metal objects that may litter the surface at a razed still site. Keystone artifacts that were often discarded include the hoop clamps used on the cooling tank, screen from the rosin vat, barrel hoops, and cups used to collect the pine gum (Figure 3.03). Tools include almost any kind of implement used to operate and maintain the still. Specific tools related to the distillery might be dipping buckets that were originally attached to long poles, blackened rakes or hoes that were used to "pull" the fire, barrel staves or metal rings, wheelbarrows or wheels from wheelbarrows, skimmers or the wire mesh from skimmers, pitchforks, paddles, remnant screen from rosin vats, and the adjustable metal rings for compressing the staves of the water tank together. Besides tools for operating the still, one almost always finds artifacts associated with woodsworking, such as clay cups and fragments (Herty and/or Pringle primarily), metal cups (Byrd, McKoy, and others), and galvanized metal aprons or gutters.

Research questions of this site type include the following: Can technical differences seen in the turpentine still construction be correlated with improvements in process and safety? Is there evidence for the frequency of accidents or catastrophic failures at turpentine still sites?

Figure 3.02: Fire turpentine still site at Fort Stewart, Georgia. (L) still setting, (R) abandoned well. (photo, S.D. Kirkland)

Figure 3.03: Artifacts at a fire turpentine still site at Fort Stewart, Georgia. (photo, S.D. Kirkland)

3.1.4.2 Spirits Room/Shed

Many turpentine stills, particular those in the latter years of the industry, had a room attached or very close to the still where the turpentine was separated and stored. It was in these rooms where the outlet end of the worm emerged from the cooling tank and delivered its load into a succession of decanting barrels. The decanting station was normally at one end of the Spirit Room, and the remainder was reserved for storing turpentine. A station also existed, in most spirits rooms/sheds, for gluing the inside of the barrels (Thomas 1975:31). At a ruined site these structures are usually manifest as a simple shed with a hole in the wall at one end where the outflow end of the distillation worm entered. In many cases these rooms were repurposed after the turpentine still ceased operations. At razed sites these rooms or structures may be completely gone since most had either dirt or wooden floors. Artifacts that might be found in the area include remnant barrels (primarily metal hoops), funnels, bung closures for barrels, various hammers and metal chisels, and maybe even a metal glue pot. A 10 ounce baby nursing bottle is considered a keystone artifact for the spirits room/shed. These were used as a device for measuring the relative concentration of water/turpentine during the distillation process. In researching these type sites one question that arises is, why were some of the distillation separation areas located in the relative open space of the still shed while others were contained in separate rooms?

3.1.4.3 Cooper's Shed

Besides the turpentine still structure, the cooper's shed is probably the next most easily recognized structure and activity area of the camp. If in ruin, look for remnants of the cooper's wheel or a winch as a telltale artifact of this activity (Figure 3.04). Another possible prominent artifact associated with cooper's sheds is a glue pot or basin. The glue pot/basin may sometimes be made of iron/steel and incorporated in a brick setting with a fire box and chimney. On account of the large number of specialized tools related to this activity, a long list of artifacts could be associated with the cooper's shed. Artifacts included are cooper's axes, backing knives, hollow knives, shaving blocks, block hooks, jointers, booge hoops, pitch hoops, quarter hoops, raising-up hoops, truss hoops, cooper's hammer, cressets (basket-like metal container), chiming hoops, chiming adzes, curved topping planes, finishing adzes, jiggers, crozes, inside shaves, beek irons (resembled a small anvil), brace and scoop-shaped bit, compass marker, bow saw, swift shave, heading knife, heading vise, rivet punches, and rivet sets (Butler 1998:104-105). Figure 3.05 shows just a few of these. Cooper's sheds were sometimes attached to the still shelter complex, but most frequently they were detached and located close by.

Some research questions related to the cooper's shed include the following: What is the average distance separating the turpentine still complex from the cooper's shed? Are temporal differences detectable from the artifacts found in cooper's sheds? Are technological differences discernible amongst cooper's sheds? Can a razed cooper's shed be distinguished from other turpentine-complex sites?

Figure 3.04 Cooper's shed ruins at the Buie Turpentine Camp near Rentz, Georgia. Note the remnants of the Cooper's wheel. (photo, S.D. Kirkland)

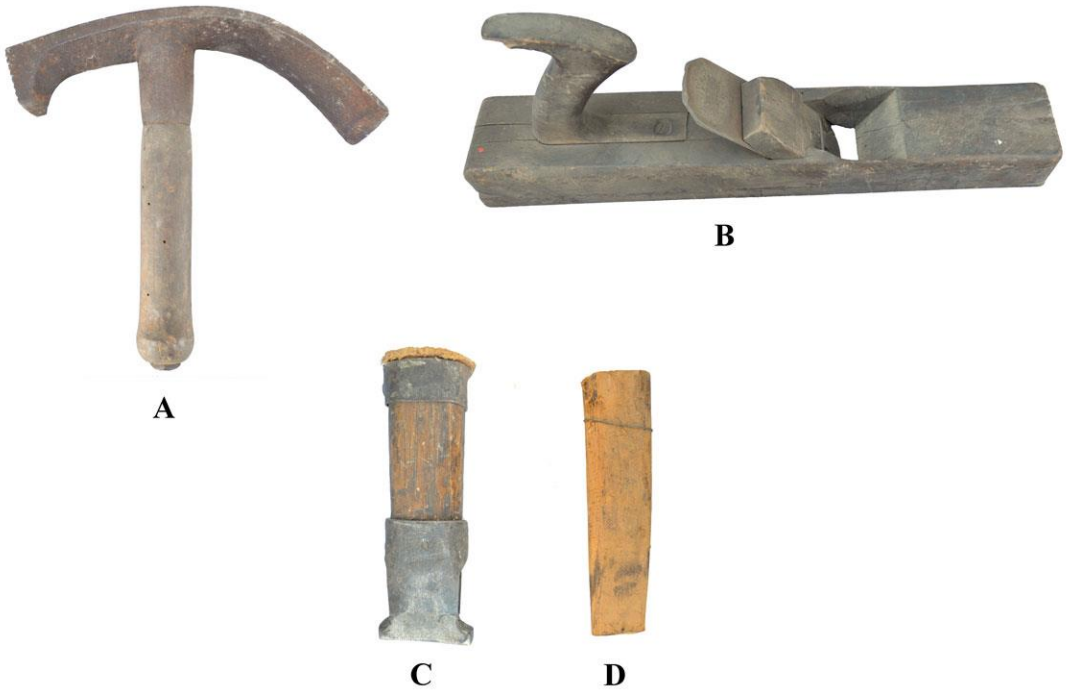


Figure 3.05: Selected tools used in cooperage. (A) Chiming Adze, (B) Plane, (C) metal hoop driver, (D) wooden hoop driver. (photo, S.D. Kirkland)

3.1.4.4 Blacksmith Shed

Some turpentine camps had a wagon shed or blacksmith shop to manufacture the tools needed for woodsworking and stilling or for making repairs to the still, wagons (and later trucks), tools, and any other needs. Such structures were usually small and had dirt floors and a brick furnace to heat the metal. Remnants of the brick furnace, an abundance of metal fragments, slag, and both finished and unfinished tools are the telling signs of these activities. Questions for research include the following: Can technological differences be detected in Blacksmith's sheds? Is the size of a Blacksmith shed related to the quantity of animals it services or the size of the turpentine operation? Can differences in the use of draft animals be detected through residual artifacts found at either ruined or razed Blacksmith's sheds?

3.1.4.5 Cup Cleaning Station

Another necessary activity in the camp, especially after the advent of the metal turpentine cup, was cleaning the caked-on film of gum and dirt that developed after several years of use. At smaller operations this was accomplished using a vat similar to a syrup boiler to submerge the cups in boiling water. In the larger camps, a rectangular-shaped brick and masonry station containing water was built for this purpose. After boiling, the cups were rinsed and wiped to remove any residue and set aside to dry. Later, after drying, they were painted to cover any rust areas. As an archaeological site or element of the camp these locations would likely appear as areas where the remnant vat or perhaps the boiler were present, and these are accompanied by an abundance of metal turpentine cups (Butler 1998:44). Research questions for this site type include the following: Do cup-cleaning stations have the same elements at all turpentine sites? Can chronological differences be seen in cup-cleaning stations across regions? Is a particular cup-cleaning station one that was constructed as a permanent turpentine complex feature or was it simply an add-on?

3.1.4.6 Livestock Barn

Almost every camp had a barn and fenced lot for housing work animals. Other animals such as cows and pigs might be kept in an adjoining pen. These structures were usually rather large and had dirt floors. There were sometimes wooden-floored rooms for the storage of tack materials, harnesses, and perhaps bagged food for the animals. Commonly, they had lofts for storing hay and other items. Archaeologically, these would likely yield artifacts associated with animal husbandry. Metal parts of harnesses or draft rigs would be present as well as horseshoes and horseshoe nails, bridle parts, stirrups, and even spurs. If half shoes are present, these were for oxen (Hume 1969:237-243). Tools associated with animal care could be found such as brushes, hoof-trimmers, hammers, tongs, and anvils. Research questions include the following: What is the pattern or layout of a typical Stock Barn? Can differences be seen in separated uses for turpentine draft animals and animals for domestic use? Is there a pattern across sites as to the preferred location of the Stock Barn in relation to other buildings in the turpentine complex?

3.1.4.7 Commissary

Unlike the previously described structures, the commissary was the location of business and exchange in the turpentine camp and had no function related to the distillation process (Figure 3.06). It was the place where woodsworkers usually met before sunrise to prepare for the day's work. Most commissaries opened early to allow woodsworkers to buy the products they needed for the day such as lunch items, tobacco products, and tools such as hackers, pullers, whetstones, dip paddles, dip buckets, and cutters. A variety of food items and clothing were available for all of the camp's residents. Fresh garden vegetables grown in small camp gardens such as sweet potatoes, okra, collard greens, mustard greens, sweet corn, beans, peas, and turnip greens also graced the shelves of the commissary. Some operators had their company office in the commissary. This office held all of the records of the operation and is where the operator tracked all purchases and expenses. Pay was often calculated and dispensed from this office.

Unless their account at the commissary was paid in full, turpentiners were rarely paid in cash. Due to the remoteness of most turpentine camps money was of little use. As a result, most operators issued company-minted tokens, script, commissary checks, or credit chits which were used in exchange for goods. The tokens were struck with the company name and were composed of several metals, including brass, copper, and aluminum. They were usually minted in $.01, $.05, $.25, $.50, $1.00, and sometimes $2.00 denominations. Commissary checks were also used and were made of heavy cardboard and color-coded by amount printed around the edges. Congress outlawed these "alternative currencies" in the 1930s (Butler 1998:134-135).

A ruined commissary should be recognized as a reasonably large structure located away from the still/spirit room/Cooper's complex. As noted in the description above, some woodsworking tools might be found in and around the structure. However, the bulk of the artifacts should be from activities associated with goods exchange and reflect the needs of households. A key defining artifact would be the tokens used in lieu of legal tender. There could also be artifacts related to the company office. A razed commissary would be little different and resemble the footprint of a general store.

Research questions for this type site might include the following: Are razed commissary sites distinguishable from other buildings in the turpentine camp complex? What were the types of goods marketed through the commissary? Is there evidence of a company office in the commissary? Is there evidence at a particular commissary of whether or not its business was conducted using non-standard legal tender?

3.1.4.8 Still Operator's Residence

In most turpentine camps, the residence of the still operator was located somewhere reasonably close to the still (Figure 3.07). These structures were better built than the shanties of the woodsriders or woodsworkers but less so than the owner's/operator's residence. They were also usually closer to the camp compound. Other than perhaps an occasional turpentine industry related artifact, archaeologically, these sites resemble many of the other lower income status residences found throughout the south. They were wood frame constructed and set on piers,

Figure 3.06: Commissary at the Buie Turpentine Camp near Rentz, Georgia. (photo, S.D. Kirkland)

Figure 3.07: Turpentine still operator's residence at the Buie Turpentine Camp near Rentz, Georgia. (photo, S.D. Kirkland)

usually wooden. If still standing, they are normally found to have 3-4 rooms composed of a living space, kitchen and dining area, one or more bedrooms, a well, and a privy. In addition, there is usually an open front porch, for leisure, and a back porch, often with a water shelf for washing clothes or other household duties. The well was usually within a few tens of meters from the house and the privy generally located at a greater distance away. Trash dumps are often associated with such structures and are usually found behind the house and beyond the well. Artifacts in the trash reflect the economic status of the residents. If razed, the site of the still operator's residence would be almost indistinguishable from other similar structures that are not turpentine industry related. Only its position in the camp and its perceived economic status can lead to its interpretation as the still operator's residence.

Some research questions that might guide future research at sites of this type are the following: Can the still operator's house be distinguished from the woodsworker's and woodsrider's shanties? Is there a pattern, across the region, of a typical location for the still operator's house in the turpentine camp complex? Does that pattern differ from region to region? Is the higher economic and employment status of the still operator reflected in the archaeological record?

3.1.4.9 Woodsworkers' Shanties

Woodsworkers' residences were referred to as "shanties" because of the poor nature of their construction. They normally numbered at least eight or more, were usually built exactly alike, and were arranged in rows on either side of an open corridor (street). Some large camps had as many as 40, arranged in a grid-like pattern with roads fronting the rows of houses. The structures themselves were cheaply constructed and rarely had running water. In most camps the woodsworkers shared a pitcher pump and well (Butler 1998:127-128). Some former occupants relate that they could see the stars through the gaps in the roof and the ground through cracks in the floorboards (Prizer 2009:59). They were built on wooden piers and had a front porch but not always a back porch. They commonly had a living space, a kitchen with a small dining area, and one or two bedrooms. A single fireplace provided heat and, in the early days, the place for cooking. They frequently had no ceilings, and the roof was constructed of corrugated metal. Floors were of rough wood, and windows had no screens and used hinged boards for closure. Old newspapers were used to cover the walls and seal cracks to hold in the heat. Most woodsworkers' shanties were well away and often not visible from the camp compound. Several shanties often shared a privy positioned well behind the buildings. In larger camps, where multiple rows of shanties existed, the backs of the houses faced each other on adjacent rows with common privies in the space between (Butler 1998:139-1). The shanty areas were positioned along the periphery of the camp. The woodsriders and general foremen might have a slightly larger shanty, perhaps with one or two more rooms and two chimneys. Archaeologically, these structures resemble the still operator's residence only smaller and more poorly constructed. Any artifacts found amongst ruined or razed shanties are likely to reflect the abject poverty associated with these people. There may be occasional turpentine related tools, but most artifacts should reflect the barest of household activities and little or no luxury items should be found. The best indicator of their function is the grid-like pattern of their distribution.

Research questions to guide future work at sites of this type might include the following: Can the woodsworkers' shanties be distinguished from other structures in the turpentine camp complex?

What were the construction materials of the woodsworkers' shanties? Does the archaeological record reflect the lower economic and employment status of these workers? What is the pattern of location of the woodsworkers' shanties in relation to other buildings of the turpentine camp complex?

3.1.4.10 Company Owner's Residence

Where they existed, the company owner's or residence was by far the best structure in the camp (Figure 3.08). It reflected the economic status of its residents. It was crafted of better materials, usually pine lumber, with the exterior walls painted or well-finished, and the structure was set on concrete piers. It had its own well and privy and was larger than the other residences, usually encompassing a living space, a dining area, a kitchen, and two or three bedrooms, depending on the size of the family. These structures normally had glass windows and screened porches on the front and back of the house. Inside, its floors were well-finished and smooth and a ceiling separated the living space from the roof, often made of cedar shingles but sometimes corrugated metal. Archaeologically, these structures should stand-out from all of the remaining structures of the camp. The presence of window glass, upscale ceramics, and luxury items should denote these as the company owner's residences.

Research questions for this type site include the following: Is the company owner's residence distinguishable from the other residences of the turpentine camp complex? How does the company owner's residence compare with other residences in the surrounding countryside or in the nearest town? What does such a comparison indicate about the economic status of the company owner? How is the archaeological record for these type of sites different from others in the turpentine camp complex?

3.1.4.11 Other Support Structures

A variety of other structures might also be associated with the turpentine camp. Certainly there can be specialized buildings such as a small, lean-to type, closed shed built at the Buie Turpentine Camp near Rentz, Georgia, that provided a refuge for workers during bad weather events (William J Buie, personal communication 2013). Small storage shacks or open-air shelters used to protect equipment or support apparatus were present at most of these camps. These site types are more difficult to recognize archaeologically and, in the absence of any definitive characteristics or artifacts, one is better served to consult any records, documents, and histories of the camp or living descendants of the workers to determine their function. Research questions involving these structures would be more basic such as: What was the function of this structure? What was its relationship in the turpentine camp complex?

3.1.5 Continuous Turpentine Operations

Following the improvements in woodsworking procedures such as the cup and gutter system, the change to shallower and narrower chipping, and acid stimulation, the longevity of the trees increased allowing operations to continue longer in the same area. Many Georgia fire still sites

Figure 3.08: Company owner's residence at the McCranie Brothers Turpentine Camp at Willacoochee, Georgia. (photo, S.D. Kirkland)

became permanent and continued operating until the advent of the centralized steam stills. A good example of this is the Olmstead Distillery, located in what is now Fort Stewart, Georgia. It was established in the 1890s and continued operations until the land on which it stood was purchased by the federal government in 1940 (Mathews et al. 2005). The last fire still to operate commercially was the Brooks Distillery in McRae, Georgia. It was shut down in 1958 (Blount 1993:43, Little et al. 2000; Thomas 1975:35-36).

3.2 Incidence and Distribution of Naval Stores Sites in South Carolina, Georgia, and Florida

3.2.1 Introduction

According to Dyer (1963:21), there were approximately 2,500 fire stills in operation across all the turpentine producing states at the industry's peak in 1925. By 1960, all of the fire stills had ceased operation. Thereafter, steam stills processed the gum until the demise of the industry around 1970. A 1934 U.S. Forest Service map (Butler 1998:74) shows the distribution of fire stills concentrated in southern Georgia and northern Florida with only a few in South Carolina, Alabama, and Mississippi (Figure 1.02). They appear to be evenly dispersed over the landscape and not concentrated along waterways or railroads as they were in the late 1800s. By this time the road systems were sufficiently developed so that stills could be located close to the worked forests. Despite these numbers and recorded data, surprisingly few sites are recorded in their respective state's archaeological site files.

3.2.2 South Carolina

One objective of this project called for an examination of each state's master site files to locate information on naval stores related archaeological and historical sites on DoD properties within the study area. Research staff from LG^2 Environmental Solutions, Inc. (LG^2ES) began the search for South Carolina sites by contacting the site files of the South Carolina Institute of Archaeology and Anthropology (SCIAA), housed at the University of South Carolina, in Columbia. The SCIAA site files manager, Mr. Keith Derting, related that the SCIAA site files were not searchable online, nor was the database computerized. LG^2ES described the project requirements to Mr. Derting and he related that such a task would require a prohibitive amount of time to extract the data in this format. On account of the analog state of the SCIAA data, LG^2ES consulted with other CRM managers in South Carolina and with the Fort Stewart CRM staff for advice on the best course of action.

Mr. Derting had told LG^2ES that the best archaeological research into naval stores in South Carolina had taken place at FMNF, and he provided a contact for that facility. While the FMNF would ultimately be the best resource on the naval stores industries on federal lands in South Carolina, LG^2ES decided to contact the environmental programs of all DoD facilities in the Coastal Plain of South Carolina. LG^2ES began calling and emailing environmental staff until a CRM manager was reached at each facility. The following South Carolina DoD facilities were contacted:

- Fort Jackson U.S. Army Training Center
- Shaw Air Force Base

- Joint Base Charleston
- Marine Corps Recruit Depot Parris Island
- Naval Weapons Station Charleston
- Marine Corps Air Station Beaufort

LG^2ES queried the staff at each DoD installation about known naval stores sites on their properties. While some were knowledgeable about the naval stores industry and even admitted the existence of naval stores sites on their installations, others were completely unfamiliar with the subject. Many facilities have no official documentation of these sites, not only in South Carolina but other states as well. Although site forms exist for some sites and others are mentioned in Phase I Archaeological Survey Reports, still others have no significant information recorded at all and were consequently unavailable for inclusion in this study.

In order to maximize the South Carolina site data collection, the next logical step was to expand the research to non-DoD federal lands. Most sources contacted continued to say that FMNF was the leader with regards to naval stores archaeological research in South Carolina (Figure 3.09 and Figure 3.10). LG^2ES then contacted Mr. Robert Morgan, Heritage Program Manager at FMNF to arrange a meeting. On April 18, 2013, representatives of LG^2ES and Southeastern Horizons, Inc. (project archaeological consultants), met with Mr. Morgan at FMNF to develop a better understanding of the naval stores industry in South Carolina and to visit some sites at FMNF.

It was quickly obvious from the FMNF records that tar and pitch production was much more widespread in South Carolina than in Georgia, Florida, and other states to the west. In the FMNF alone, there are over 200 tar kiln sites that are properly recorded and have state site numbers. However, at least another 50 are mentioned in project reports and are recognized only by temporarily assigned field numbers. These have not been reported to the SCIAA site files. Only the wetland areas of the FMNF are devoid of tar kilns. In one study, Archaeological Consultants of the Carolinas, Inc. surveyed approximately 5,400 acres of FMNF and encountered 35 tar kiln sites. This corresponds to approximately one tar kiln every 154 acres.

Only one site in FMNF, the Limerick Tar Kiln (38BK472), has received significant testing. In the summer of 1980, Linda Hart, of the U.S. Forest Service, conducted an intensive investigation of that site. The results provided detailed information about kiln construction, tar extraction procedures, and re-use, but little evidence emerged to enable their temporal segregation.

Southerlin (2013) has called for a new perspective and approach in field methods when investigating tar kiln sites to hopefully extract more useful information. He notes that under the current process, artifacts are virtually never recovered from tar kiln sites and a method has yet to be developed for dating these features. He suggests the use of Light Detection and Ranging (LiDAR) imagery to detect the low, visually elusive, tar kilns that often get overlooked in the field. Since the method has the ability to negate the interference of vegetation and to detect the most subtle differences in ground relief, it has produced some incredible images of tar kilns in FMNF. Although LiDAR-based maps clearly show the telltale circular footprints of tar kilns, ground-truthing must still be done to confirm their existence (Figure 3.11) Southerlin also encourages the liberal use of metal-detection to help increase the frequency of metal artifacts

from tar kilns. This would also aid in the detection of any "watcher's shelters" commonly reported as being a short distance away from kilns. Perhaps the process will result in the recovery of more diagnostic metal objects that can be used to correlate human activities at these sites through time.

Regarding the lack of available data on the naval stores industry in South Carolina, several factors should be considered. Early naval stores production most certainly did occur in South Carolina; however, the primary function of this industry during the Colonial and Antebellum time periods was focused on the production of tar and pitch. As the industry progressed towards an emphasis on the production of turpentine and later rosin, South Carolina was shadowed by the production on the Coastal Plains of Georgia and northern Florida. For example, at Fort Jackson, only one site has been recorded that is directly associated with turpentine production. This site (38RD632) is described as a "turpentine collection and/or storage site" and consists of a small number of artifacts which include two pieces of tin (presumed to be McKoy Cups) and an embossed turpentine bottle. Otherwise, only the occurrence of catfaced trees comprise the remainder of turpentine related sites at the Installation (Roberts et al. 1992: 250; Joseph & Botwick 2009: 72-74). Similar circumstances were reported for the remainder of the DoD Installations, little to no archaeological recognition of these ephemeral sites primarily related the occurrence of catfaced trees with little to no archaeological materials beyond the standard cups, gutter, and/or aprons.

As a result, the archaeological signatures of the industry within South Carolina are largely related to the earlier production of pitch and tar. Since the archaeological signatures of the tar and pitch industries produce very little in the sense of artifact assemblages, recognition most often must occur by recognizing the actual tar kiln features themselves. Understandably, these features are quite often mistaken as simple push piles or other simple modifications to the landscape. As such, tar kiln sites are likely to be unrecognized at the Phase I survey level and therefore are likely to be impacted by land management activities resulting in even less preservation and/or recognition over time. With the problems associated with the recognition of early tar kiln sites, a lack of archaeological materials associated with tar kilns, a dearth of turpentine related sites recorded in South Carolina related to industry trends within the state, and unfortunately no efficient method to search the state site files by site type results in an incomplete picture of the quantities and distribution of the naval stores industries in South Carolina.

3.2.3 Georgia

Data collection began in Georgia with a file search by personnel from Southeastern Horizons, Inc. (SEH), at the Georgia Archaeological Site File (GASF), University of Georgia, in Athens. This investigation turned up significant information regarding naval stores related sites in Georgia. The majority of the recorded sites are the result of archaeological investigations conducted at military installations under compliance regulations, specifically Section 106 and Section 110 of the NHPA as amended. GASF provided an electronic copy of their database to LG^{2}ES who then manipulated it to extract the needed information for this study.

After the initial search at GASF, personnel from LG^{2}ES contacted Georgia Coastal Plain DoD facilities, directly, to acquire research reports on naval stores sites for review. These included:

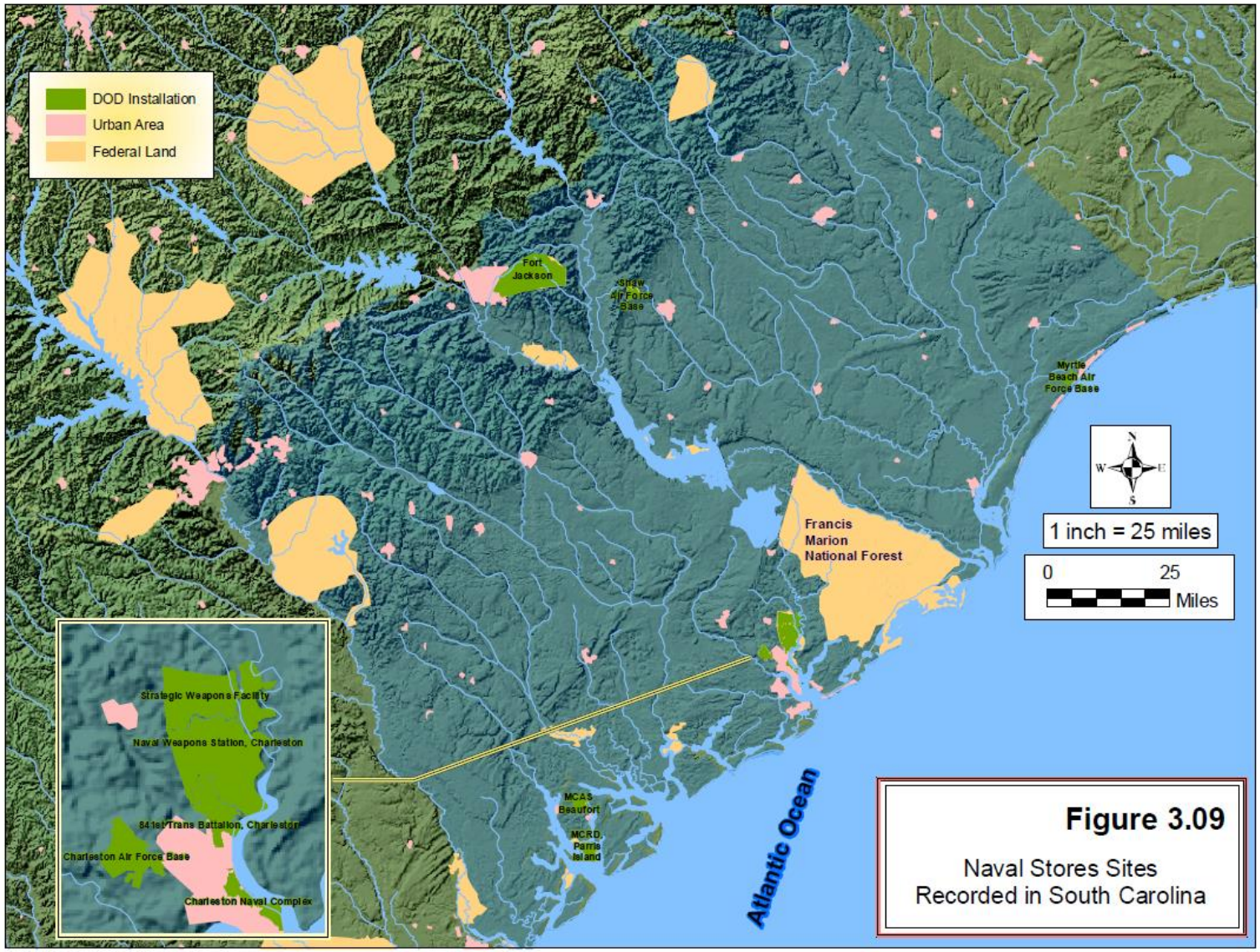
- Moody Air Force Base
- Kings Bay Naval Submarine Base

- Robins Air Force Base
- Fort Benning U.S. Army Maneuver Center
- Fort Stewart/Hunter Army Airfield Military Reservations

The team also conducted an extensive literature search of the Fort Stewart/Hunter Army Airfield research reports, since it is the most extensive of all the Georgia Coastal Plain DoD facilities. In addition, the LG^{2}ES/SEH team visited several tar kiln and turpentine camp/still sites at Fort Stewart to help formulate archaeological footprints of these activities.

GASF forms recorded at sites in Moody Air Force Base, Kings Bay Naval Submarine Base, and Robins Air Force Base recognize the presence of naval stores related sites but little is known about them. They were investigated only at the Phase I (survey) level, and none have had further testing. However, data from the GASF forms from Fort Benning was sufficient to be included in the study. Another GASF form describes a turpentine still site in the Okefenokee National Wildlife Refuge, but it too has had only cursory attention. Although consideration was given to the investigation of other federal lands in Georgia, the focus of this study is primarily on DoD facilities.

Georgia has records for only 82 naval stores-related sites of all types that have been investigated and recorded by professional archaeologists (Figure 3.12 and Table 3.1). Surprisingly, the highest category recorded is tar kilns followed by turpentine stills, gum dipping stations, and then gum collections stations. All of the other categories appear to be incidental. When compared by counties (Table 3.2), the largest number (87%) are on Department of Defense facilities namely, Fort Benning (Chattahoochee and Muscogee Counties), Fort Stewart (Bryan, Liberty, and Long Counties), and Moody Air Force Base (Lowndes and Lanier Counties). The only other non-DoD federal property containing a naval stores related site on the Georgia Coastal Plain is the Okefenokee National Wildlife Refuge.


DOD Installation
Urban Area
Federal Land
Fort Jackson
Shaw Air Force Base
Myrtle Beach Air Force Base
Francis Marion National Forest
1 inch = 25 miles
0
25
Miles
Strategic Weapons Facility
Naval Weapons Station, Charleston
841st Trans Battalion, Charleston
Charleston Air Force Base
Charleston Naval Complex
MCAS Beaufort
MCRD, Parris Island
Atlantic Ocean
Figure 3.09
Naval Stores Sites
Recorded in South Carolina

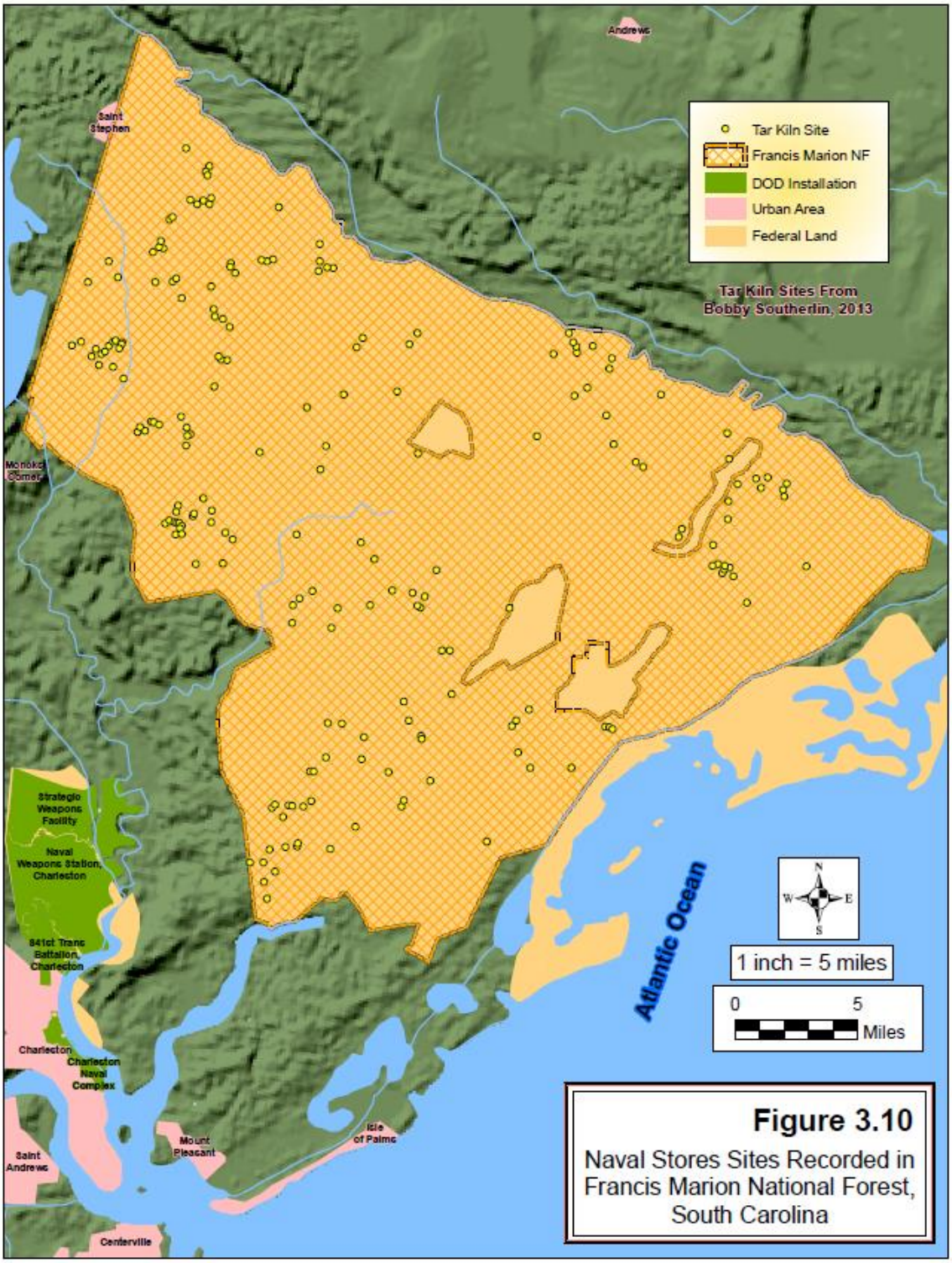


Figure 3.10
Naval Stores Sites Recorded in Francis Marion National Forest, South Carolina

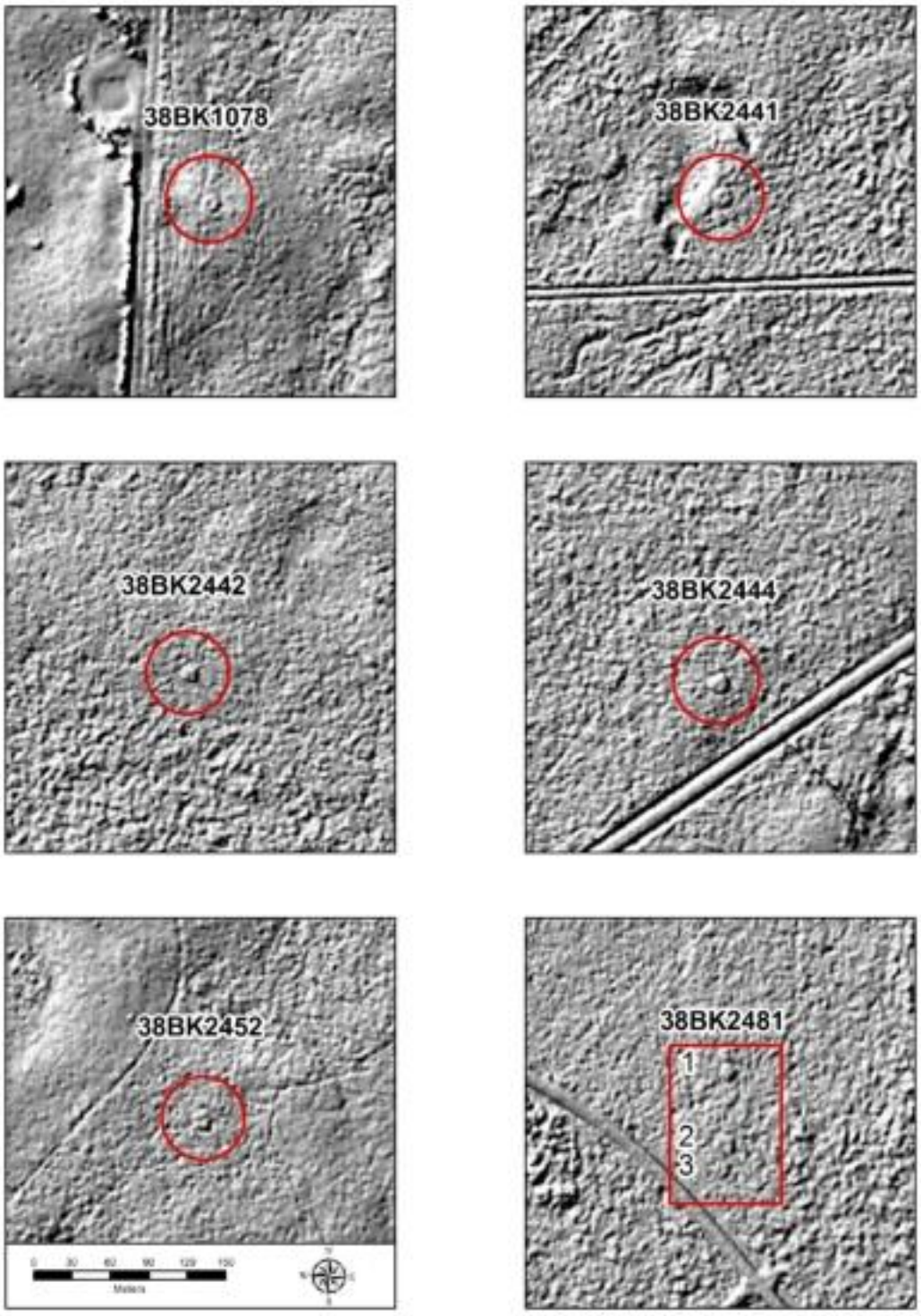


Figure 3.11: LiDAR from Francis Marion National Forest, South Carolina showing images of tar kiln sites.

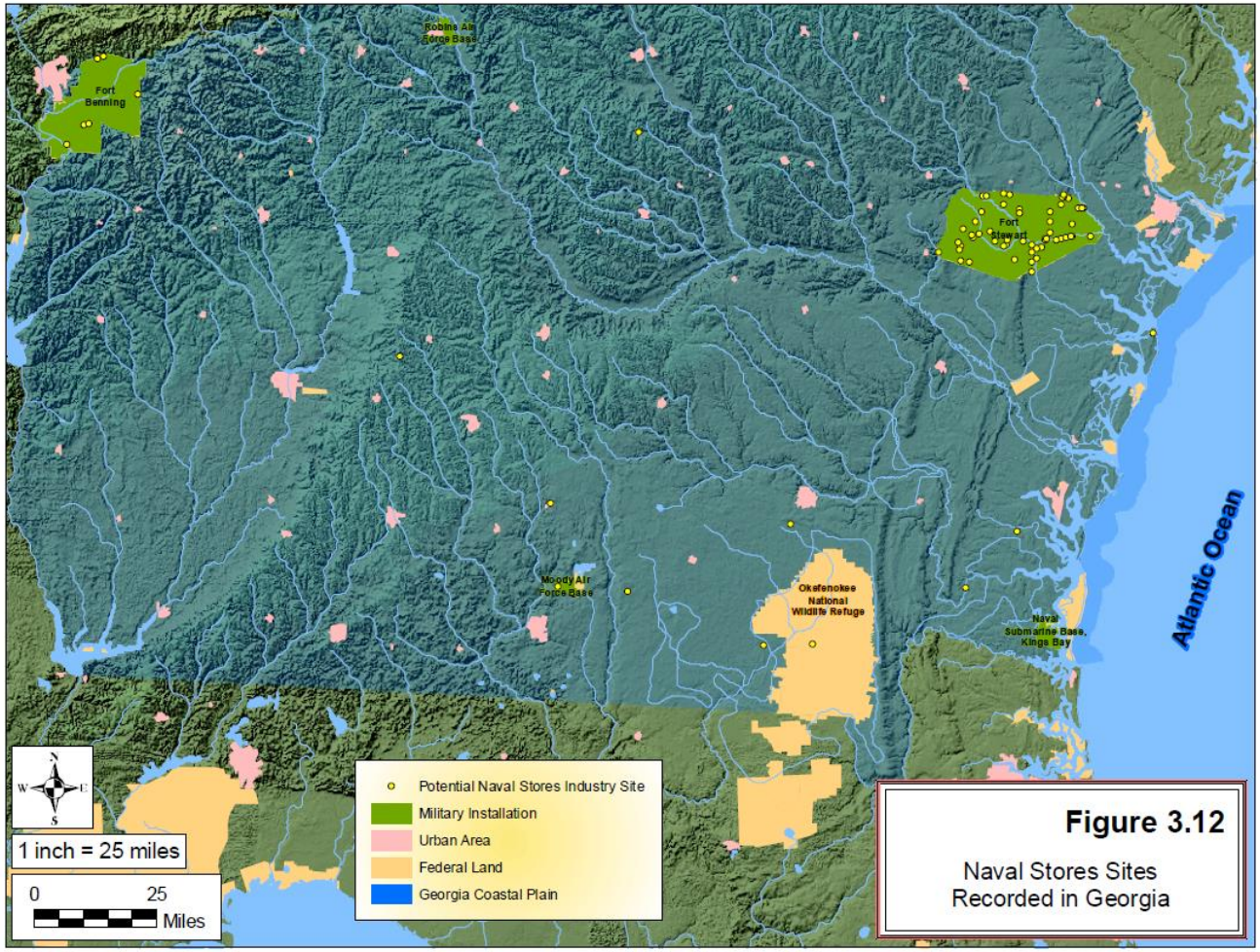

Robins Air Force Base
Fort Benning
Fort Stewart
Moody Air Force Base
Okefenokee National Wildlife Refuge
Naval Submarine Base, Kings Bay
Atlantic Ocean
N
W
E
S
1 inch = 25 miles
0
25
Miles
Potential Naval Stores Industry Site
Military Installation
Urban Area
Federal Land
Georgia Coastal Plain
Figure 3.12
Naval Stores Sites
Recorded in Georgia

Table 3.1. Naval stores sites recorded in Georgia

Description	Frequency (n)
Tar kilns	25
Turpentine stills	21
Gum dipping stations	20
Gum collection stations	13
Turpentine camps	3
Cup-cleaning stations	1
Indeterminate	5
Total	**88***

Table 3.2. Naval stores sites recorded in Georgia by county

Description	Frequency (n)
Bryan	35
Liberty	22
Long	7
Chattahoochee	4
Berrien	1
Camden	2
Houston	2
Lanier	2
Lowndes	2
Muscogee	2
Charlton	1
Clinch	1
Laurens	1
Turner	1
Ware	1
Total	**84***

* Total number of site types vs. total number of sites per county reflects multi-site type conditions present within a total of 88 sites recorded for the study area of Georgia.

The low numbers recorded outside DoD installations (13%) is a reflection of the very low incidence of professional archaeological surveying on the Coastal Plain of Georgia. Except for the Coastal Strand, most of the Georgia Atlantic and Gulf Coastal Plains have low population densities. It is rural, mostly farming and/or timber country, and there has been woefully little archaeological attention devoted to this part of Georgia. There is less development and therefore less opportunity for archaeological surveys. It is not that the sites are not there, but rather that they have just not yet been discovered and recorded.

Table 3.3. Naval stores sites recorded in Georgia on Federal Lands

Description	Frequency Type	Frequency Total
Fort Benning		6
Gum dipping stations	4	
Tar kilns	2	
Fort Stewart		62
Tar kilns	22	
Turpentine stills	12	
Gum dipping stations	15	
Gum collection stations	8	
Turpentine camps	2	
Cup-cleaning stations	1	
Indeterminate	2	
Moody Air Force Base		4
Gum collection stations	2	
Gum dipping stations	1	
Indeterminate	1	
Okefenokee National Wildlife Refuge		1
Turpentine Stills	1	
Total	**73**	**73**

3.2.4 Florida

Research into Florida naval stores sites began when LG^{2}ES personnel conducted an online search of the Florida Master Site File (Tallahassee). Since the entirety of Florida is coastal plain and the state has been under heavy development pressure for many decades, it has more recorded sites than surrounding states. The lower one-fourth of the peninsula has no naval stores sites because it has no pine habitat. The northern limit of the naval stores industry in Florida extended to about the latitude of the north shore of Lake Okeechobee.

After the site file search, the LG^{2}ES team contacted Florida's DoD facilities to request information about naval stores sites on their properties and any associated archaeological research reports. These reports were secured and reviewed. Not all DoD facilities in the Florida Coastal Plain were contacted. Those that were include:

- Jacksonville Naval Complex
- Camp Blanding Joint Training Center
- Eglin Air Force Base
- Tyndall Air Force Base
- Patrick Air Force Base
- MacDill Air Force Base
- Cape Canaveral Air Force Station
- John F. Kennedy Space Center

- Hurlbert Air Force Base
- Avon Park Air Force Base

The initial results from the Florida Master Site File search allowed the research team to narrow its focus on Eglin Air Force Base and Avon Park Air Force Range. Although Camp Blanding does have naval stores related sites, this facility is located on state owned lands and is managed by the Florida Department of Military Affairs; all of the other contacted facilities did not meet the study criteria.

Personnel from LG^{2}ES and SEH conducted a site visit to Eglin Air Force Base between May 6 and 8, 2013. Mr. Joe Myer, CRM Research Assistant, guided the team and provided excellent background data on the naval stores industry in the region. Mr. Myer escorted the team to six naval stores related sites. This allowed first-hand examination of the sites to further develop standard archaeological foot prints of naval stores sites. Mr. Myer also provided four archaeological survey reports for review.

The final visit was to the Avon Park Air Force Range (APAFR), on July 11, 2013. APAFR is located near the southern limit of the long leaf pine habitat and, therefore, the southernmost range of the naval stores industry. LG^{2}ES personnel assessed a naval stores site and related community in the abandoned town of Nalaca.

Despite the fact that the region of south-central Florida was the most southern frontier in the 1880s, it experienced a growth boom just after the Civil War. Men and their families from southeastern Georgia moved to the area to escape Georgia's harsh post-civil war economy. These people took to farming, cattle ranching, and the production of naval stores, in particular the distillation of turpentine. With cattle fetching an export price of $20 per head in Cuba, central Florida turned into a free-range cattle district and the wild west of the South (Smith and Healey 2012). The commerce ships coming and going from the port towns of Punta Gorda, Fort Myers, and Tampa drove the need for naval stores goods for these sailing vessels. Although the industry is documented in the region as early as the 1880s, it was definitely flourishing in the 1920s just after the Town of Nalaca was in established (1918). Nalaca was a true "company town", set up for the sole purpose of naval stores production (Figure 3.13). It is thought to have had some 250 residents at its peak. The town existed for only six to ten years and was owned and operated by the now-defunct Consolidated Naval Stores Company who most likely dismantled and moved it after depleting the nearby timber resources. The company's operations shifted further south, but eventually the turpentine industry declined because of petroleum substitutes (Carman 2007). The ruins of Nalaca provided the research team with a unique look into the way these turpentine towns were set up and how they evolved into lumber towns during the 1920s. Nalaca is an extraordinary site and poses many research questions. Its records and archaeological foot print can provide valuable insight into the naval stores industry.

Today, the piney woods of Florida are more densely populated than comparable areas of Georgia. As a result, there have been more professional investigations across the region.

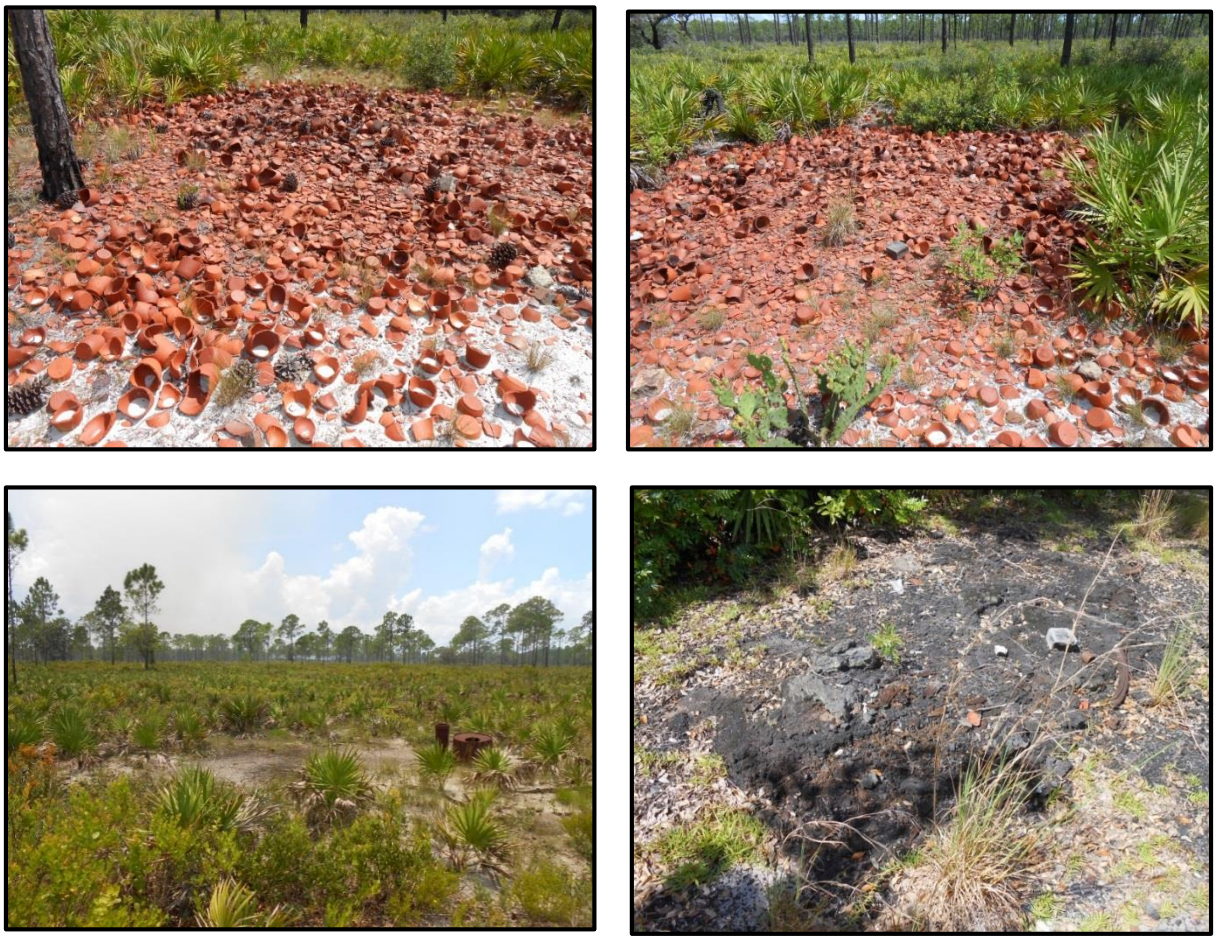


Figure 3.13 Artifacts from the Town of Nalaca, Avon Park Air Force Range, Florida. (U) Two separate large piles of discarded gum collection cups, (BL) well head and cover associated with the town site, (BR) dross pile mixed with several turpentine related artifacts. (photo, M. J. Healey)

Consequently, Florida has a significantly larger number of recorded naval stores related sites. A search of the Florida Master Site Files produced a return of 932 naval stores related sites for the whole state (Figure 3.14). Based on the site forms and artifact tables, 81 of these are diagnostic sites that are found on federal lands, and 57 of these are found on DoD installations (Table 3.4). There are others, as depicted on the Florida map, which were listed as naval stores sites in our initial search but were not confirmed by any related artifacts recorded in the site forms or artifact tables (possibly just homesteads). The most frequent type site is the turpentine camp followed by gum dipping stations.

Table 3.4. Naval stores sites recorded in Florida on Federal lands

Description	Frequency (n)
Turpentine camps	34
Gum dipping stations	28
Gum collection stations	9
Turpentine stills	6
Indeterminate	13
Total	**81**

Table 3.5. Naval stores sites recorded in Florida by County on Federal lands

Description	Frequency (n)
Okaloosa	24
Walton	23
Leon	6
Liberty	6
Columbia	5
Santa Rosa	5
Highlands	3
Marion	2
Wakulla	2
Baker	1
Clay	1
Lake	1
Polk	1
Putnam	1
Total	**81**

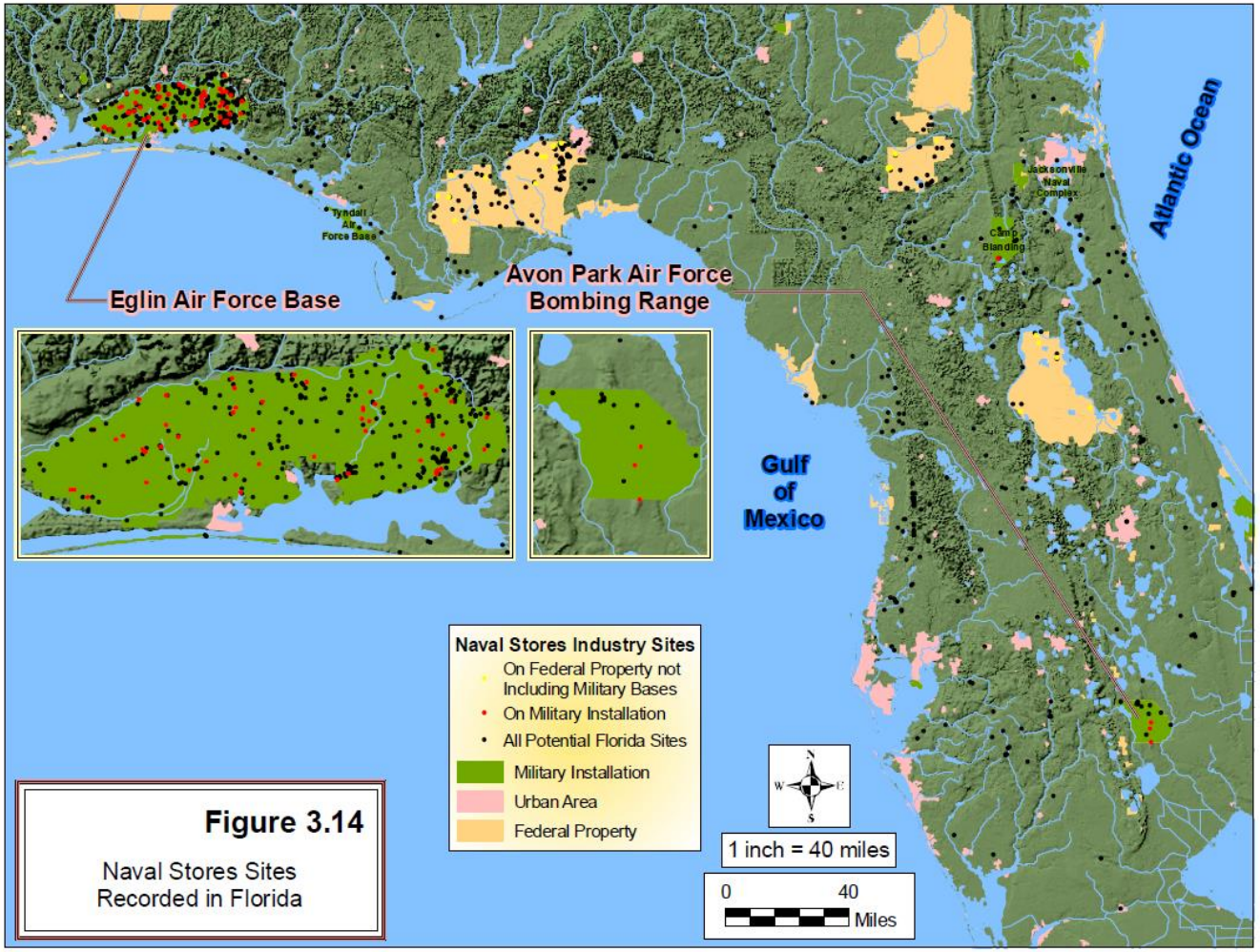


Figure 3.14

Naval Stores Sites Recorded in Florida

Table 3.6. Naval stores sites recorded in Florida on DoD properties

Description	Frequency Type	Frequency Total
Eglin Air Force Base		52
Turpentine camps	19	
Gum dipping stations	17	
Turpentine stills	3	
Indeterminate	13	
Camp Blanding		1
Turpentine Stills	1	
Avon Park Air Force Range		4
Turpentine camp	3	
Gum collecting stations	1	
Total	**57**	**57**

Table 3.7. Naval stores sites recorded on DoD properties in South Carolina, Georgia, and Florida

Description	South Carolina	Georgia	Florida
Tar kilns		24	0
Turpentine camps		2	22
Turpentine stills		12	4
Gum dipping stations		20	17
Gum collecting stations	1	10	1
Cup cleaning stations		1	0
Indeterminate		3	13
Total	**1***	**72**	**57**

* Does not include ephemeral notations of catfaced trees. Lack of digitized site file database precludes accurate quantities.

4.0 SIGNIFICANCE EVALUATION OF NAVAL STORES INDUSTRY SITES

4.1 Introduction

Based on the information from the currently recorded archaeological sites in South Carolina, Georgia, and Florida, it is apparent that these resources are statistically underrepresented in comparison to other types of sites. Therefore, the level of emphasis placed on these sites should be high, in terms of identifying, recording data, evaluating integrity, and preserving them for future research wherever possible. This chapter is devoted to looking at site significance and providing methods for subjective and objective evaluation of naval stores sites.

4.2 Criteria for National Register Eligibility

4.2.1 All Sites

It is the National Historic Preservation Act of 1966 as amended that requires and regulates that all federal agencies assess the impacts to cultural resources of undertakings on U.S. government properties. This act established the National Register of Historic Places (NRHP) and provided methods, procedures, and criteria for recommending, nominating, and listing properties in the register. It also established the Advisory Council on Historic Preservation as the only entity with the legal responsibility to encourage Federal agencies to factor historic preservation into Federal project requirements.

The first step in assessing a site's eligibility is to define it by class and by type.

The criteria used to evaluate archaeological sites and historic properties for the NRHP are surprisingly simple. They are worded in a manner to provide for a wide diversity of resources. The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60 § 60.4).

While the vast majority of archaeological sites are evaluated for significance under Criterion D, occasionally Naval Stores related sites could fall under two of the other Criteria, A and B.

Criterion C relates mostly to non-industrial structures and properties so the chances of Naval Stores Sites being evaluated under it is extremely rare. Regardless of which of these four criteria a site is nominated under, it must first meet the requirements of (1) integrity of location, (2) integrity of design, (3) integrity of setting, (4) integrity of materials, (5) integrity of workmanship, (6) integrity of feeling, and (7) integrity of association. The following descriptions follow largely Joseph et al. (2004:220-221).

Integrity of Location requires that the site must be at the location with which it was associated; it must be where the original human activities occurred. For example, turpentine still that has been moved to a museum or a living history village would not have integrity of location because it was moved from its original site.

Integrity of Design refers to all of the elements that make up the form, plan, structure, space, and type of site. That is a measure of how well all of the original site elements are represented. For example, if a turpentine camp had a total of 15 structures, integrity of design refers to the extant completeness of the original configuration.

Integrity of Setting refers to the completeness of the environment originally surrounding the site. For example, if the entire area surrounding the ruins of a turpentine still complex is covered in planted pines, it does not have good integrity of setting.

Integrity of Materials refers to the degree to which all of the materials that make up a site are intact. For example, if a turpentine still complex site has all of its brick and masonry components relatively intact and its original configuration can be determined it is said to have good integrity of materials. On the contrary, if the brick and masonry structure is now just a pile of rubble, it has poor materials integrity.

Integrity of Workmanship refers to a site's ability to convey a sense of workmanship in its construction. Can the remains at a site indicate construction techniques? If the foundations and post hole patterns of a turpentine camp structure allow its construction techniques to be deduced it has good integrity of workmanship.

Integrity of Feeling refers to how well the evidence at a site can convey the original character of the lifeways. A turpentine camp site that allows the locations of its various structures to be mapped and their uses recognized archaeologically would have good integrity of feeling. If these camp elements cannot be distinguished it is said to have low integrity of feeling

Integrity of Association refers to a site's connection to a historic event or person. For example, the site where Herty Cups were developed may be similar to cup-cleaning stations in turpentine camps but it is associated with a historical event or person (e.g. Charles Herty). This category is limited in its application.

4.2.2 Naval Stores Industry Sites

In order to assess the significance of any given Naval Stores archaeological site and make a recommendation for nomination to the NRHP, a system of both objective and subjective evaluation

is needed. The seven prerequisite requirements of integrity provide a useful base from which to begin the development such a system that will be referred to as the Quality and Integrity Evaluation (QIE). Given that these are measurable, either as a "yes" or "no" response or at subjective levels, a scaling system can be used to provide a means of objective evaluation. In addition to the qualitative analysis of integrity, a quantitative analysis of site type representation is also necessary. Each of the requirements will now be explored and a numerical value or scale generated for each which will be used in an overall assessment for significance.

4.3 Development of a Quality/Integrity Evaluation Scheme for Naval Stores Sites

The development of the QIE assessment scheme for naval stores sites begins by considering the seven categories of integrity listed as prerequisites before evaluation under the NRHP Criteria of Evaluation. In addition to these, we have chosen to add the category of Integrity of Diagnostics and Resource Quantity. Thus, a total of nine research questions were generated from these categories that can be asked of naval stores sites. Once answered as either a no or yes (1 or 5) or by valuating on a scale from 1 to 5, the numbers can be summed to arrive at a total for comparison to an ideal case and used to help in making a recommendation on NRHP register eligibility. Sites with values at or near the high end of the scale (generally 37-45) would be recommended eligible for nomination while those of low value (generally 9-29) would be recommended ineligible. Those falling in the mid-range of the scale (30-36) are more problematic and require further subjective evaluation to arrive at an eligibility statement.

Question 1 (Integrity of Location)**:** Is the naval stores site at its original location or not? If it is, it can be assigned a value of 5. If not, it is assigned a value of 1. If portions of the site have lost integrity of location then a rank score proportionate to the amount should be considered. For example, if additional non-contributing elements have been introduced at the site, the score would be proportionately lower.

Question 2 (Integrity of Design)**:** How much of the original naval stores site design elements are now present? Individual elements of the site do not necessarily have to have integrity, but they must be able to be recognized as discrete elements. The answer to this question is valued on a scale of 1-5. If all of the original site elements are represented, its value is 5. If as much as 75% is represented, its value is 4. If only about 50% is represented, its value is 3. If only about 25% is represented, its value is 2. If less than 25% is represented, its value is 1.

Question 3 (Integrity of Setting)**:** To what degree is this naval stores site in its original setting? This has to do with the current environment. It is evaluated on a scale of 1-5. If the entire original environment still exists, then the value is 5. If 75% of the original environment exists, its value is 4. If 50 % of the original environment exists, its value is a 3. If 25% of the original environment exists, its value is a 2. If less than 25% of the original environment exists, its value is a 1.

Question 4 (Integrity of Materials**)**: Does the naval stores site have integrity of materials? Integrity of Materials is also evaluated on a scale of 1-5. If the materials of the individual elements that make up a site are in good condition, then its value is 5. If approximately 50% of the materials that make up the elements of a site are intact, then its value is 3. If less than 25% of the materials are *in situ*, then its value is 1.

Question 5 (Integrity of Workmanship**)**: Is there integrity of workmanship at this naval stores site? On account of the wide range of possibilities of workmanship, this requirement is evaluated of a five-step scale. If all of the elements of a Naval Stores site are standing and reveal construction techniques, then its value is 5. If an estimated 75% of the elements are standing and show good workmanship, then its value is 4. If only about 50% of the site's elements show good workmanship, then its value is 3. If a site has only about 25% intact structures that reveal how they were built, then its value is 2. If a less that 25% of the elements of a Naval Stores site show construction techniques, its value is 1.

Question 6 (Integrity of Feeling**)**: Does this naval stores site have integrity of feeling? Integrity of Feeling is measured by a three-step gauge. If a Naval Stores site conveys its historical character as evidenced by differentiable elements, then its value is 5. If only partially so, its value is 3. If there can be little to no differentiation between the historical elements of the site, then the value is 1.

Question 7 (Integrity of Association**)**: Is this naval stores site associated with a person or persons of historical importance and/or associated with an important event in history? Integrity of Association is measured as a "yes" or "no." If the site can be strongly correlated to a person or event of national, state, or historical significance, then its value is 5. If it cannot be clearly associated with a person of historical significance or event at all, its value is 1. Of special note, sites related to the naval stores industry are frequently cited as significant due to their association with local economies and/or the regional history under NRHP Criteria A. As a result, the typical value of any given naval stores related site will likely default to a score of 3.

Question 8 (Integrity of Diagnostics**)**: Are there diagnostic artifacts that reflect a temporal link to the operation of the site? This measured on a scale of 1 to 5. If a naval stores site's artifact inventory has a very high relative frequency of diagnostic items and/or a substantial frequency of minimally researched assemblages, then it is said to have very good integrity of diagnostics and is given a value of 5. If it has a relatively average amount of diagnostics and no minimally researched assemblages, then a value of 3 is assigned. If it has no little to no diagnostics it is valued at 1.

Question 9 (Resource Quantity): How rare is the site/resource type and is it well represented in 0131the archaeological record? This is measured on a scale of 1 to 5. If the resource type (e.g. turpentine still, tar kiln, collection center, etc…) is relatively common as it relates to the context (i.e. local, state or national), then it would score a 1 or 2. If the resource type is less common and/or is poorly represented, a score of 3 or 4 would be appropriate. For resource types that are rare and/or very poorly represented in the archaeological record, a score of 5 would be appropriate. In many instances, the relative frequencies of the resource type must be compared separately for the regional and local levels. For example, a gum-dipping station being the most common naval stores related site would likely be given a score of 1 or 2 at the Regional/National level; whereas, if it is the only recorded site type in the surrounding locality *and there appears to be a potential for localized variation*, then the resource quantity would score higher relative to the overall site frequencies.

It must be noted that, the "score" of a site should not be considered absolute regarding a recommendation of NRHP eligibility. Depending on the NRHP Criteria or Criteria Considerations, each question may have a relatively higher or lower "weight". This must be taken into account as part of the evaluation process. For example, if a turpentine still site retains high scores for integrity of design, workmanship, materials, feeling, association and is an under-represented site type but the site scores a 1 for Integrity of Location, the Criteria for evaluation (e.g. Criteria D) may almost exclusively negate the site's potential for eligibility for the NRHP. However, the site may be eligible under other NRHP criteria. The main purpose of this ranking system is to provide a more subjective approach to the standard qualitative analysis that frequently is conducted without considering the appropriate quantitative factors.

It should also be noted that most naval stores activities related to woodsworking are not sites at all, that is, in the usual or common sense of practice. Archaeologists recognize sites as clusters or dense scatters of artifacts that have a restricted limit or boundary. Artifacts and debris left from woodsworking is most commonly widely scattered and at very low density across huge tracts of land; there are some exceptions to this, for example, an area of clustered stumps having the boxes cut in them for collecting turpentine or a cluster of stumps with carved catfaces. Studying this activity is what some researchers would refer to as non-site archaeology. Non-site archaeology is not easily applied to Section 106 since the 106 process relies on the evaluation of sites. Therefore, when assessing site significance of the woodsworking activity based on the scores of the above developed scales they will be either "1" or very low. From a Section 106 standpoint, these activity areas would almost always be recommended ineligible for nomination to the NRHP. From a practical perspective, the fact that a tract of land bears evidence of turpentine activities may be sufficient.

4.4 Evaluation of Naval Stores Sites

The best way to illustrate how QIE evaluation scheme works is to actually use it to evaluate sites. Below is the evaluation of six sites. One, because it is in ruin, required no archaeological testing to be evaluated; four were subjected to at least some level of archaeological testing or excavation; and one is preserved as an example of tar kiln sites and has had only survey level of investigation.

4.4.1 Buie Turpentine Camp (9LS162), Rentz, Georgia

Located near Rentz, Georgia, are the ruins of the Buie Turpentine Camp. The site is comprised of a cluster of 10 ruined buildings that make up the camp compound and a group of woodsworkers' shanties positioned some distance to the west. There are at least two other associated houses located 110 and 500 meters to the north, respectively. The overall size of the compound (excluding the two northern houses) is about 3.24 hectares (8 acres) and includes a barn, a turpentine still complex with two stills, a turpentine/rosin storage building, a Cooper's shed, a bad weather shed, a truck maintenance shed, a commissary, and the still operator's residence. There is one small ruined structure of unknown function. A series of shanties are out of sight along the western periphery of the camp.

The first professional archaeological investigation at the site was done in 1994, when it was encountered as part of an archaeological survey for the Georgia Department of Transportation

prior to the widening of U.S. Highway 441 (Espenshade 1996). Although the widening area is to the east side of the road opposite the main part of the camp compound, a Georgia Archaeological Site Form was completed to record and describe the entire site. The official site number of 9LS162 was assigned at that time. In 2013, the author revisited the site as part of the research for this report. A thorough walk-over inspection was done and over 130 digital photographs made. In addition, the owner of the property Mr. William J. Buie (son of the original camp owner) was interviewed to get details about the site's history of operation (Kirkland 2000a). Using all of this information, a significance evaluation was done according to the system described above.

Question 1 (Integrity of Location): The site has Integrity of Location since, although not restored or maintained, it is in-place as it was left following cessation of operations. At least two of the buildings were later repurposed. It was given the value of 4.

Question 2 (Integrity of Design): This site ranks at the maximum for Integrity of Design since all of the major elements of a turpentine camp are present. It was given a 5 for this value.

Question 3 (Integrity of Setting): Although most of the environmental setting surrounding the site is intact, the road passing along the east side of the compound was of dirt construction when the still operated. Today, it is a modern, well-maintained asphalt capped highway that will soon be widened and impact the site. As a consequence of this difference, the site was awarded a mid-range value of 3 for Integrity of Setting.

Question 4 (Integrity of Materials): The close inspection of the site revealed that it has Integrity of Materials. That is, all of the various construction techniques and the architectural elements are clearly revealed in the ruins. Therefore, the site gets a value of 5 for Integrity of Materials.

Question 5 (Integrity of Workmanship): Even though many of the elements of the particular components of the buildings, such as the settings for the stills are damaged and partially disarticulated, portions of these remain intact and clearly show the construction techniques and craftsmanship. Therefore, the site gets a value of 4 for Integrity of Workmanship.

Question 6 (Integrity of Feeling): This site gets a high value for Feeling, since it conveys a sense of its history and activities. Since the positioning and function of the structures is known they lend to the historical character of the site. It is assigned a value of 5 for Integrity of Feeling.

Question 7 (Integrity of Association): It has been noted that the Buie family was an important naval stores operator at the local level of significance. However, their turpentine camp was one of many hundreds across the longleaf pine belt and it was not associated with any specific historic event. However; as with most naval stores sites, the Buie Turpentine Camp is associated with the broad pattern of naval stores history and its role in the southeast. Therefore, at the local level of significance it could be assigned a value of 4.

Question 8 (Integrity of Diagnostics): A value of 4 is given to the site because of good diagnostic materials. Numerous McKoy style metal cups are present on the site, and all of the shipping containers are remnant wooden barrels. Since no Herty Cup fragments were found, which date

earlier that the McKoy cups, and no metal barrels are present, which came into widespread use about 1940, this site appears to have operated in the time window from about 1920 to 1940.

Question 9 (Resource Quantity): At the state or national level of significance, a value of 2 is given to the site because of its relative frequency of this site type having been recorded archaeologically. However at the local level of significance, this is the only recorded naval stores related site in the county. Therefore, a final value of 5 would be assigned to this assessment factor.

Table 4.1 provides a summary of the evaluation of the Buie Turpentine Camp and, when all of the scores are summed, yields an overall score of 39 out of a possible highest score of 45 (86.7%). Since very few, if any, turpentine camp sites will yield a perfect value of 45 due to the Integrity of Association requirement, the practical score is 37 of 40 (92.5%). This very high score verifies the subjective perception that this site is important and could be recommended as eligible for nomination to the National Register based on this method of evaluation.

Table 4.1. Significance Evaluation of the Buie Turpentine Camp site

Location (1)	Design (2)	Setting (3)	Materials (4)	Workmanship (5)	Feeling (6)	Association (7)	Diagnostics (8)	Quantity (9)	Total
4	5	3	5	4	5	4	4	5	39

4.4.2 Halfway Creek Road Tar Kiln (38BK0541), Francis Marion National Forest, South Carolina

Preserved as an interpretive example of the multiple tar kiln sites for visitors to the Francis Marion National Forest (FMNF), South Carolina, the tar kiln designated by site number 38BK541 is manifest as a large mound of earth (21 m) surrounded by a wide shallow ditch (2.8 m wide by 0.5 m deep) with a central depression (5.4 m in diameter and 0.3 m deep). There is no depression outside the demarking ditch to suggest the location of a tar catch basin. An interpretive plaque stands just outside the ditch on the kiln's southwest side. First recorded in 1981 as part of a FMNF internal reconnaissance survey and utilizing only surface inspection, the site was originally assessed as ineligible for the NRHP. However, in 2010, the site received a Phase I level archaeological investigation by Brockington and Associates, Inc. (Brockington), where 12 shovel tests were systematically dug in a cruciform pattern around the mound (Poplin et al. 2010). No artifacts were recovered during either investigation. Brockington recommended the site as eligible for the NRHP under Criterion A, regarding its association with a dominant industrial activity of the eighteenth and nineteenth centuries (Poplin et al. 2010:272).

Conversation with the FMNF cultural resources management revealed that their policy regarding eligibility of tar kilns is as follows. If a tar kiln is intact, that is, it has no visible signs of disturbance it is automatically assessed as potentially eligible for the NRHP. This policy arose from the fact that so few tar kilns have been investigated, and so little is known about this class of sites anywhere across the naval stores production region (Robert Morgan, personal communication 2013). So, how will this site fare in our assessment scheme?

Question 1 (Integrity of Location): The site has integrity of location and is given a value of 5.

Question 2 (Integrity of Design): The site is given a value of 3 for integrity of design since three of the five common elements (mound, surrounding ditch, and central pit) are present. The fourth and fifth (tar collection pit and watcher's shanty) may also be present but buried.

Question 3 (Integrity of Setting): The site is surrounded by a new growth pine forest that is maintained through frequent prescribed burns, exactly the environment present when the kiln was operated. The only difference is that the forest is not old growth since it was cut-over before FMNF was established. As such, the value assigned to this question is 4.

Question 4 (Integrity of Materials): The materials that make up the individual elements of the site are in good condition. Therefore the value for this question is a 3.

Question 5 (Integrity of Workmanship): The site also has integrity of workmanship since it appears largely as it was left except for normal weathering and bioturbation. The value for this question is 4.

Question 6 (Integrity of Feeling): The site conveys integrity of feeling and is given a value of 5.

Question 7 (Integrity of Association): The site is not known to be attributed to a known prominent person in history. As with most naval stores related sites, there is an association with the broad patterns of agri-industrial economies of the region and therefore receives a score of 3.

Question 8 (Integrity of Diagnostics): No diagnostic artifacts have been recovered from this site and therefore it is given a value of 1 for this question.

Question 9 (Resource Quantity): Tar kilns can be problematic in regard to their relative frequency as many of these features are often overlooked or misidentified at the Phase I survey level. Also, one must consider if the tar kiln is an isolated feature or part of a larger tar kiln complex/district. At the national level, tar kilns are range from relatively common to uncommon and would merit a score of 3 or 4. Since the data on the frequency of tar kilns at the state or local level of significance within South Carolina is limited, it is difficult to assign a relative score. Without such comparative data, a score of 4 is assigned.

Table 4.2 gives a tabular summary of the evaluation. Although seemingly low on association and diagnostics, it is above average in other categories. As a class, tar kiln sites are almost always going to score low on diagnostics since the number of artifacts recovered from these sites are very low to none. Therefore the emphasis on the issue of integrity is to the features itself rather than an assemblage of artifacts. Therefore, this site is not unusual in that regard. The resulting cumulative score of 32 places this site at 71 percent of the possible perfect score and 80 percent if Integrity of Association is disregarded. In either case, the scores place this site in the middle of the scoring criteria. Based on the level of investigation (in this case a Phase I evaluation), the evaluator may conclude that this site may be potentially eligible for the NRHP and recommend further analysis to come to an unequivocal determination. For example, if there was a substantiate potential for the site to yield diagnostic materials resulting in a significantly higher score and/or further

evidence of buried features, the evaluator would likely conclude that the site was eligible for the NRHP. Should the evaluation of this site at the Phase II come to this score, additional justification would be warranted (e.g. clear association with events or persons of significance, substantiated frequencies of resource type, etc.). Based on this approach to evaluation, it can be concluded that Brockington's conclusion that this site is eligible (or at a minimum potentially eligible) for the NRHP.

Table 4.2. Significance Evaluation of the Halfway Creek Road Tar Kiln (38BK0541), Francis Marion National Forest

Location (1)	Design (2)	Setting (3)	Materials (4)	Workmanship (5)	Feeling (6)	Association (7)	Diagnostics (8)	Quantity (9)	Total
5	3	4	3	4	5	3	1	4	32

4.4.3 Limerick Tar Kiln (38BK0472), Francis Marion National Forest, South Carolina

In the summer of 1980, Linda Hart directed the archaeological investigation of three tar kilns on Threemile Head Road in the Francis Marion National Forest, South Carolina (Hart 1986). No artifacts were visible on the surface prior to or during the investigation. One kiln (A) was completely bisected on its north-south axis and dug well into subsoil. Inside the kiln a mass of fire-hardened clay was exposed as well as the wood remains of the drain trough. Two machine-cut nails with hand-wrought heads were found in direct association with the wooden trough; these were produced from 1790 to the 1820s. Several pieces of charred wood, lying just as they were placed in the kiln, were also encountered. They were positioned in a radiating pattern, surrounding the mouth of the trough at the center of the kiln. Pieces in the bottom layer are charred on the top and sides while the undersides remain unburned (Hart 1986:26-33).

At Tar Kiln B the drain trough was not found, but evidence for two burnings was discovered as excavations progressed and was clearly visible in the wall profiles. Associated with this kiln were six depressions, originally thought to be tar collection pits. However, after excavating and a thorough review of the literature, it was determined that they were clay-lined pits in which tar was burned to render it into pitch (Hart 1986:35).

Tar Kiln C was higher and smaller in diameter than the other two. At the base of the kiln, charred wood was arranged in a radiating circle, as at Kiln A. No evidence of a wooden drain trough was found although it may lie in the unexcavated part. The clay lining in this kiln is much thicker than that found in the other kilns (Hart 1986:39).

Hart states that the primary goal of the work at the Limerick Tar Kiln site was to establish the age of the kilns and the techniques employed in their construction (Hart 1986:43), and no recommendation of eligibility for nomination to the NRHP was made. However, she strongly implied the need for preservation of the site for future research.

The following is our evaluation based on the QIE system.

Question 1 (Integrity of Location): It is given a value of 5 since it has clear Integrity of Location.

Question 2 (Integrity of Design): Since most of the known design elements are present (less an example of the tar recovery pit) it is valued at 4 for Integrity of Design.

Question 3 (Integrity of Setting): This question is unclear from the report's description, but since practically all of the FMNF was logged in the early twentieth century the area of this site likely was too. Although not in the original old growth forest, the site is in a young pine forest and therefore retains some resemblance of its former environment. It is therefore given a value of 3 for Integrity of Setting.

Question 4 (Integrity of Materials): Since all of the known elements of a typical tar kiln site are present, a value of 5 is awarded for Integrity of Materials.

Question 5 (Integrity of Workmanship): The excavations at this site revealed complex construction techniques. It is therefore given a value of 5 for Integrity of Workmanship.

Question 6 (Integrity of Feeling): Due to the lack of the old growth forest that would convey a sense of timelessness, the site is given a value of 3 for Integrity of Feeling.

Question 7 (Integrity of Association): While the site is shown to be associated with an eighteenth century plantation, the owner was not of historical significance. In accordance with naval stores sites being associated with general patterns of agri-industrial land use in the southeastern coastal plain economies, a score of 3 is assigned to the question of Integrity of Association.

Question 8 (Integrity of Diagnostics): Very few artifacts were found during the excavation of the site. However, two recovered nails helped to show that one tar kiln was in operation between about 1790 and the 1820s. Although the artifact density is very low, the fact that diagnostics were recovered from a site type that generally does not produce diagnostics, the score should be considered a 4.

Question 9 (Resource Quantity): Similar to the Halfway Creek Road Tar Kiln previously discussed, resource quantity is problematic. Since this site represents multiple tar kilns, the site could be potentially considered a tar kiln complex. As a result, the score would likely be a 5 until more accurate resource quantities are established for the state of South Carolina. Based on the available information, recorded tar kilns in the South Carolina area typically are isolated occurrences.

Table 4.3 gives a tabular account of the appraisal. The cumulative evaluation value of 37 out of a possible maximum of 45 (82%) indicates that this site still holds research value. Further, it is the one of the most extensively studied tar kiln sites known, and preserving it would allow future researchers to possibly complete the excavation, contributing data to combine with the Hart data. Our evaluation suggests that the site has the potential to answer additional research questions and could be recommended for nomination to the NRHP.

Table 4.3. Significance Evaluation of the Limerick Tar Kiln (38BK0472), a Francis Marion National Forest

Location (1)	Design (2)	Setting (3)	Materials (4)	Workmanship (5)	Feeling (6)	Association (7)	Diagnostics (8)	Quantity (9)	Total
5	4	3	5	5	3	3	4	5	37

4.4.4 Baggs Tar Kiln (9LI450), Fort Stewart, Georgia

A tar kiln located on an 800 acre tract originally owned by William A. Baggs, in what is now Fort Stewart, Georgia, was archaeologically investigated by a team from Prentice Thomas and Associates, Inc. (PTA) (Mathews et al. 2004). The kiln is positioned in an immature open canopy of mixed pines and scattered live oaks that have volunteered from an earlier cut-over forest. Disturbance since site formation seems to be minimal. However, a modern firebreak runs north northeast to south southwest across the landscape and adjacent to the east perimeter of the kiln.

Originally discovered and surveyed by TRC Garrow Associates, Inc. (TRCG), in the late 1990s when it was found to contain dense layers of charcoal but no artifacts. PTA later recorded the kiln remnants to be 14 m in diameter and about 1.5 m in height with a central depression (no depth given) and surrounded by a 0.5 m deep ditch. The ditch is broken on its northeast side by level ground and a depression is present in its center. This depression appears to be a continuation of the perimeter trench. PTA dug a series of five contiguous 2m by 2m test units from the center to beyond the perimeter of the kiln in a north-south direction. Near the center a dense layer of charcoal, charred wood, lenses of burned earth, charred timber billets, and ash were found. Lenses of tar-soaked earth were also encountered and a heavily-soaked shallow trench running to the southeast. No other historic artifacts were found in the kiln. Two wire nails were found in the southernmost block which was outside the configuration of the kiln. Seven small chert flakes were recovered from the subsoil deposits beneath the kiln.

The work by PTA revealed the feature to definitely be the remains of a tar kiln. The kiln's remote location, away from any recorded roads, suggests that the site was selected because it was near a ready source of lightwood. It appears to have been of expedient construction and there was no evidence of multiple burning. While the kiln is configured closely to the "textbook" descriptions, no evidence (except possibly the two wire nails) was found for an associated watcher's structure. The overall preservation of the elements of the kiln is remarkably good.

Although 9LI450 is an excellent example of a tar kiln, PTA did not recommend it as eligible for NRHP nomination because it represents only a single kiln out of many others present at Fort Stewart. Through this testing they uncovered the detailed process of its construction and use and further work would likely add little new knowledge.

What is the evaluation score of this site?

Question 1 (Integrity of Location): Since the site is in its original location, it is given a value of 5 for Integrity of Location.

Question 2 (Integrity of Design): Since there is no evidence of a tar collection pit, it is given a value of 4 for Integrity of Design.

Question 3 (Integrity of Setting): At the time of operation the kiln was likely in an old growth pine forest which was cut-over sometime after the kiln was abandoned. However, the immature forest does impart some resemblance of the original forest. No intrusive modern elements are within the immediate viewshed. Thus the site is given a value of 4 for Integrity of Setting.

Question 4 (Integrity of Materials): The excellent preservation of the materials and construction inside the kiln is the reason for giving the site a value of 5 for Integrity of Materials.

Question 5 (Integrity of Workmanship): Similar to integrity of materials, it gets a value of 5 for Integrity of Workmanship.

Question 6 (Integrity of Feeling): Integrity of Feeling is awarded a value of 3 because of the apparent lack of a tar collection pit and the surrounding immature pine forest.

Question 7 (Integrity of Association): The site is not associated with any known historical figures. As a tar kiln site, it is associated with the broad patterns of economic history associated with the rural south and therefore a score of 3 is assigned.

Question 8 (Integrity of Diagnostics): Despite the almost complete absence of temporal diagnostics at this site, the charred billets, tar-soaked soil, ash are functional diagnostics. Therefore, this site gets a value of 4 for Integrity of Diagnostics.

Question 9 (Resource Quantity): As previously mentioned, single tar kiln sites can be problematic in regard to their relative frequency as many of these features are often overlooked or misidentified at the Phase I survey level. At the national level, tar kilns are range from relatively common to uncommon and would typically merit a score of 3 or 4. For the state level of significance, there are at least 25 tar kiln sites recorded for the state of Georgia making this a relatively common naval stores site type (29% of naval stores site types in Georgia). At the local level of significance (i.e. the Fort Stewart area), there is a large number of tar kiln sites recorded (22 out of 26 in the state). At the local level of significance, this tar kiln should merit a score of 2 due to its relatively common and substantially represented site type for local area.

Table 4.4 provides a tabular summary of the evaluation. The cumulative score of 35 is within the higher range of uncertainty. Based on the fact that this site type is a relatively common type within the study area and no exceptional qualities distinguishing it above and beyond the typical local tar kilns, the level of investigation efforts are important. In this instance, this tar kiln was analyzed at the Phase II level of effort and the data collected was likely maximized with little potential for additional data to be gathered beyond what had been conducted. Therefore, the original recommendation of ineligible for the NRHP would be supported by this analysis.

Table 4.4. Significance Evaluation of the Baggs Tar Kiln (9LI450), Fort Stewart, Georgia

Location (1)	Design (2)	Setting (3)	Materials (4)	Workmanship (5)	Feeling (6)	Association (7)	Diagnostics (8)	Quantity (9)	Total
5	4	4	5	5	3	3	4	2	35

4.4.5 Patrick Tar Kiln Site (9BN267), Fort Stewart, Georgia

As described earlier, reported tar kilns at FSHAAF are markedly different from those described and seen in the Carolinas. Most are considerably smaller (although slightly larger kilns do occur) and appear as low, hemispherical mounds measuring 8 to 9 meters in diameter and reaching about 50 cm above the surrounding terrain. The mounds are accented by a surrounding ditch that is about one meter wide and 25 cm deep. There is usually a small break in the ditch of no more than about 10 percent of its circumference. No mound central depressions or outside ditch pits (for collecting tar) have been found and associated artifacts are extremely rare.

This test site (Feature 43) is the largest of three clusters of these small mounds positioned in the southeast portion of the larger, complex, historic site. The cluster has 29 kilns, one of which was subjected to test excavation by TRC Garrow Associates, Inc. (TRCG) (Markham and Holland 2002). A 1 by 3 meter test block, oriented north-south, was dug to a depth of 75 cm on the eastern edge of the kiln. Three almost level strata were encountered in the excavation. The upper stratum (0-20 cmbs) is black sand with chunks of charcoal only in the west wall. The next stratum (20-44 cmbs) is grayish brown sand with charcoal flecks. The lowest stratum excavated (44-75+ cmbs) is brownish yellow sand with little to no charcoal. The only artifact found was a 10 cm piece of cut wood that was recovered from the upper 10 cm of the block. It was interpreted as the remnant of a pole framework used to stabilize the kiln structure or possibly the fragment of a pole used to vent the kiln during the firing process. They also hypothesize that the charcoal had been collected from this kiln as evidenced by the lack of large chunks in Stratum II.

TRCG recommended the site complex as eligible for the NRHP based on the integrity of a homestead area and the "intactness" of most of the kiln features. Below is the result of using the QIE model to asses this site.

Question 1 (Integrity of Location): This site is given a value of 5 since it is at its original location for Integrity of Location.

Question 2 (Integrity of Design): Not all of the elements of a typical tar kiln were discovered at this site. While a mound surrounded by a ditch is evident and remnants of charcoal were found, there is no mention of a clay-lined base, a central to perimeter drain trough, down-slope tar collection pit, or a watcher's shed. It is possible that this tar kiln complex represents a different site layout as compared to other tar kiln sites previously recorded. For example, the associated homestead may have served as the watcher's shed. Furthermore, there was a relatively limited amount of excavation of the tar kilns and therefore may be underrepresented archaeologically. The Integrity of Design is valued at a 3.

Question 3 (Integrity of Setting): A value of 3 is awarded for Integrity of Setting. While the feature is still positioned in a pine forest, it is not the original forest but instead a stand of young slash, loblolly, and longleaf pine.

Question 4 (Integrity of Materials): The materials that make up the elements of the feature are not in good condition, perhaps because the charcoal was later collected or the function of this feature was for charcoal production only. Therefore it is given a value of 3.

Question 5 (Integrity of Workmanship): Although there is some disturbance of the "kilns" through the cutting of firebreaks, most remain intact. Therefore this question is scaled at 4.

Question 6 (Integrity of Feeling): Although the pine forest is likely younger that the one standing at the time the "kilns" were constructed the integrity of feeling is probably similar. Therefore the question gets a value of 3.

Question 7 (Integrity of Association): The age of the tar kilns are unknown but suspected to be associated with a nearby homestead from the late 1800s. Research into the ownership of the property did not reveal any association with significant individuals in history. Association with the general tar kiln industry in the regional economy places a value of 3 for Integrity of Association

Question 8 (Integrity of Diagnostics): Evaluating this question also suffers from the uncertainty of function but since no diagnostic artifacts were recovered it gets a value of 1.

Question 9 (Resource Quantity): Although single tar kilns are relatively uncommon to rare at the National and State level, they are quite common at the local level for this resource (i.e. the Fort Stewart area). However, this site represents a rare variation not only that of a tar kiln complex but it also exhibits variations from other reported tar kilns and complexes. As such, this site would merit a score of 5.

Table 4.5 summarizes the scores of the evaluation questions. A relatively low cumulative score of 30 out of 45 (67%) is obtained for this feature and places it at the bottom range of uncertainty. It suffers from a lack of internal integrity and lack of expected elements. The latter might be explained if the function of this feature was not for tar extraction but for charcoal production instead. Many more similar features would need to be studied before this question can be answered. Since the initial level of effort was limited as far as the amount of excavation conducted, the site still retains a potential for yielding additional information beyond what has been recovered thus far. Coupled with the fact that this site (a 40 acre tar kiln complex) represents a rare site type at both the local and state level, this site would qualify for eligibility for the NRHP despite some of its shortcomings.

Table 4.5. Significance Evaluation of the Patrick Multiple Tar Kiln site

Location (1)	Design (2)	Setting (3)	Materials (4)	Workmanship (5)	Feeling (6)	Association (7)	Diagnostics (8)	Quantity (9)	Total
5	3	3	3	4	3	3	1	5	30

4.4.6 Ginsburg Turpentine Camp (8OK2591), Eglin Air Force Base, Florida

This is a documented turpentine camp site within Eglin Air Force Base, Florida, tentatively identified as being operated by Simon Ginsburg between about 1903 and 1930 (Campbell et al. 2008). It is suggested that the still operated only over a 10-year period during this timeframe. The site is manifest as surface scatters of artifacts, mostly bricks, ceramics, turpentine cups, dross, and barrel hoops. At the Phase I level of investigation it was recommended as potentially eligible for nomination to the NRHP and at the Phase II level was recommended as eligible.

The original site environment was likely an upland pine forest. Today the site covers an area of 17.3 hectares and is situated in a closed canopy of live oak, laurel oak, turkey oak, sand pine, and longleaf pine with an understory composed of youpon, blueberry, hawthorn, holly, gallberry, palmetto, overstory saplings, wiregrass, smilax, goldenrod, deer moss, bracken fern, and a variety of other grasses and herbs.

The surveyors reported minor substantial surface scarring by firebreaks and erosion, suggesting this was the result of past timbering activities. Push piles are associated with the access roads and are likely related to their construction and maintenance. Although the Phase II work has revealed the subsurface disturbance to be less than originally perceived, it remains moderate as reported.

The fieldwork involved the excavation of 35 shovel tests (50 cm by 50 cm) and larger test units (seven 1m by 1 m and one 1 m by 2 m). In addition to household items, objects related to the turpentine industry were also observed and recovered. These included barrel hoops, saw-toothed Daly aprons, and turpentine cups (Herty, Pringle, and McKoy). This site appears to have workers' quarters, possible outbuildings for specialized activities, a possible overseer's residence or store, and an industrial core with a turpentine distillery, a cooper's shed, and perhaps a barn for animal housing and care. In view of these findings, 8OK2591 is deemed as eligible for nomination to the NRHP.

Based on the information contained in the research report, the site does appear as eligible for nomination to the NRHP. Below is our evaluation according to our integrity scheme.

Question 1 (Integrity of Location): This site has Integrity of Location since it is at the location of it its formation. It therefore receives a value of 5.

Question 2 (Integrity of Design): Most, if not all, of the elements of a turpentine camp are recognized at this site so it gets a value of 4 for Integrity of Design.

Question 3 (Integrity of Setting): The fieldwork documented that current landscape is likely quite different from that expected at the time of this site's occupation. However, it is still located in a pine forest that bears at least a similar resemblance. Therefore, it receives a value of 3 for Integrity of Setting.

Question 4 (Integrity of Materials): The materials that make up the elements of the site appear to be in reasonably good condition based on the excavated tests. However, the work also documents considerable surface disturbance and some subsurface disturbance. Therefore the site receives a value of 2 for Integrity of Materials.

Question 5 (Integrity of Workmanship): Although most of the elements of a turpentine camp are present at this site, none were effectively tested to reveal workmanship. However, given the fact that intact features are present it stands to reason that at least some of the workmanship of these elements can be determined. Therefore, this site is given a value of 3 for Integrity of Workmanship.

Question 6 (Integrity of Feeling): Integrity of Feeling is awarded a value of 3 for this site,

since it has moderate disturbance.

Question 7 (Integrity of Association): A value of 3 is given for Integrity of Association since the operator was not a person of historical significance or the site cannot be related to a significant historical event beyond the broad patterns of economic history of the local and regional economy.

Question 8 (Integrity of Diagnostics): This site has a wealth of diagnostic artifacts and supporting historic documentation. Therefore, it is given a 5 for Integrity of Diagnostics.

Question 9 (Resource Quantity): Relative to naval stores related sites overall, turpentine camps are ranked as fairly common (second most frequent naval stores site type). At the state level of significance for Florida, turpentine camps have been recorded at a commensurate level of frequency. At the local level of significance (i.e. the Eglin AFB study area), a total of 19 turpentine camps have been recorded and would suggest a relatively common naval stores site type for the region. Due to the relatively common nature of turpentine camps for the area, a score of 2 is merited.

Table 4.6 gives a summary of the evaluation. The cumulative evaluation totaled 30 out of a possible 45 (67%), and places it at the low end of uncertainty. Although there is moderate disturbance to the surface, it does not penetrate too deeply. Looking further into the evaluation criteria, focusing on the site's strong points indicate that there is a high score for design and diagnostics. Since the site is spans a formative time in the naval stores industry for Florida coupled with its association with a still that only ran 10 of the 30 years the camp was in operation, this site provides the opportunity to archaeologically document the transition from a typical turpentine camp to a camp supported still site. Although the site ranks low on the spectrum of its potential to meet NRHP criteria, the model still suggests that the site should be considered eligible for the NRHP.

Table 4.6. Significance Evaluation of the Ginsberg Turpentine Camp (8OK2591), Eglin AFB, FL

Location (1)	Design (2)	Setting (3)	Materials (4)	Workmanship (5)	Feeling (6)	Association (7)	Diagnostics (8)	Quantity (9)	Total
5	4	3	2	3	3	3	5	2	30

4.5 Preservation of Naval Stores Sites as Part of the Broader DoD Mission

In accordance with Department of Defense Instruction (DoDI) 4715.15: Cultural Resource Management (2008), each Installation is required to prepare an Integrated Cultural Resources Management Plan (ICRMP) as a management tool for the purposes of outlining its role and responsibilities for the management of the Installation's resources. Furthermore, the ICRMP is intended to integrate the applicable legal requirements for historic preservation with planning, construction, and military training missions. As such, objectives of ICRMPs typically include:

- Ensure that the Installation remains in compliance with applicable cultural resource laws and regulations.
- Complete the identification and evaluation of historic properties.

- Ensure protection and/or prepare mitigation alternatives for eligible NRHP properties.
- Develop a public awareness program to provide instruction and education regarding the importance of historic properties protection.

DoD Installations accomplish the first objective by keeping or having access to enough qualified CRM personnel on staff to address the preservation issues that arise. They also work to ensure that adequate yearly funding is sufficient to accomplish CRM related tasks. Included in this is the planning for long-term funding for CRM. They also complete the first point by maintaining proper and adequate contact with State Historic Preservation Officers (SHPO), the Advisory Council on Historic Preservation (ACHP), Native American Tribes, and other interested stakeholders to ensure timely and efficient coordination of their respective CRM programs.

The second objective is achieved through a program to identify and evaluate historic properties on their lands. Evaluation results in a determination of whether sites are recommended eligible, potentially eligible, or ineligible for nomination to the NRHP. Those initially deemed as potentially eligible are further, more intensely, investigated to determine whether they are eligible or ineligible. The program may also identify free zones where there is no threat to eligible properties by military training. These are released for installation use without further impingement on military activities.

The third objective is completed by developing plans for preserving historic properties or adapting them for contemporary use. In cases where they cannot be preserved, mitigation and/or preservation through documentation are typically required.

Objective four is accomplished by making sure professionally-trained CRM staff are available and that their training is constantly updated. These people are essential in implementing public awareness programs of instruction and education about the importance of historic preservation on DoD installations. Also, as part of the public awareness programs, they must inform the public of the laws and penalties for unauthorized disturbance of historic properties or removal of artifacts from them. They also provide CRM training programs for non-CRM divisions and departments at DoD installations and work with on-site museums for CRM displays. They also create posters and brochures that promote CRM assets and participate in installation special events where they promote CRM programs.

5.0 DEVELOPMENT OF PROGRAM ALTERNATIVES DESIGNED TO STREAMLINE COMPLIANCE WITH THE NHPA

5.1 Introduction

Since naval stores related sites make up a class of historic archaeological sites that are interrelated and considerable historic documentation exists about them, it may be possible to make assessments under special circumstances. Doing so would not only ensure that naval stores sites and properties are adequately addressed under Section 106 of the NHPA but that they are treated in a standard manner which also streamlines that process.

5.2 Focused Research Program

A fact that is painfully obvious from this study is the huge discrepancy between the actual number of naval stores locations that were at one time active and the number of these that are recorded as archaeological sites. It was evident during our field visits as to how quickly the ruined sites that remain are disappearing. This is particularly true of tar kiln sites. Only a very few tar kiln sites have been thoroughly investigated archaeologically, and those that have, have yielded few time sensitive diagnostic artifacts. As a consequence, this class of naval stores sites is poorly understood.

Long range research programs focused on the thorough delineation of tar kiln configurations and temporal variation could lead to a better definition of these sites. Such a research plan needs to be regional beyond the boundaries of a single property. For this to happen, significant tar kiln sites need to be fully documented and evaluated wherever possible. At FMNF, archaeologists consider tar kiln sites as a major cultural resource and consider their "intactness" as a major factor in eligibility assessment. If it is completely intact and undamaged, it is automatically recommended as potentially eligible for the NRHP. Should all of these tar kiln sites be preserved? Perhaps not as many of them have the potential of being duplicated in the archaeological record. However, until a larger body of archaeological evidence is gathered on this type of naval stores resource, the tar kilns are likely to continue to remain 'potentially eligible'. Therefore, it is recommended that efforts should be concentrated on the archaeological investigation of the various tar kilns across the region to distinguish any regional variations. Based on the current state of knowledge, there appears to be significant regional variation.

The following are suggestions presented as the development of a strategy of alternative treatments for naval stores sites on federal properties.

5.3 Alternative to Naval Stores Site Mitigation

In many of the larger DoD installations on the coastal plain, timber harvesting is a major component of their land management practices. Tree harvesting and the sale of pine trees is a significant component of operational economics and is most often managed by civilian professional forestry departments. In order to comply with Section 106 of the NHPA, the land targeted for tree harvest must be assessed to identify any cultural resources (archaeological sites) present before cutting the trees. If any sites are found, they are typically marked for avoidance by

heavy equipment, and military training is restricted from inside their boundaries. If no sites are found, then these forest areas are released for harvest, and the trees can then be cut and sold.

However, not all areas in DoD installations can be harvested. Since firing ranges often have unexploded ordnance (dud or non-dud producing), digging or traversing with heavy vehicles and equipment and any other soil disturbances are often limited in these areas, including forestry activities. For ranges that are associated with non-dud producing ordnance, forestry assets are typically compromised due to metal contamination and therefore are usually non-merchantable. In most instances, foot traffic can be permitted following a surface inspection by Emergency Ordnance Disposal teams when necessary. For these areas, gum (resin) from the pine trees could be harvested using the modern "bore and bag" method. The accumulated gum could be donated to local living history programs that consist of the distillation of turpentine.

Through this, DoD installations would in essence be helping to preserve existing active turpentine stills by supporting their operation as public education. Doing so not only helps preserve the history and understanding of the naval stores sites both on and off the Installation, it potentially leverages the Installation's opportunity for alternative mitigation of impacts to naval stores related sites. For example, if a military action is determined to have an adverse effect upon a historic property related to the naval stores industry, the Installation could off-set the impacts to the site by preserving the historical collection methods and techniques of gum for the purposes of providing a supply to local living histories which preserve the distillation process. The costs associated with granting access to the non-merchantable timber may be considerably less expensive than standard archaeological data recovery efforts. This approach would best be suited in areas of previously metal contaminated timber such as Small Arms Ranges.

Another way of alternative site mitigation would be for the DoD to fund a project to identify and thoroughly document the few remaining naval stores sites that are left in ruins. Private sector sites could be included in this project since the goal is to preserve information about naval stores sites, wherever they occur. This could be done through document research and interviews with living people associated with the sites and by preparing a map of the existing ruins and a description of their character. Again, the DoD would be supporting the history of its extant naval stores related sites by helping to record and preserve information about sites in the private sector. By preserving off-post assets, impacts to missions are significantly reduced and are often the most cost effective approach to implementing military mission requirements. Timeline restrictions associated with range construction or modifications would be potentially minimized as off-site mitigation could be planned at a future date while the mission requirement could be executed independently.

5.4 Establishment of Naval Stores Site Class Redundancy

Another suggestion is to consider naval stores sites across all federal properties in the Southeast to see if there are enough site types to declare specific ones as adequately represented. That is, if there are enough sites of one particular class or another that provide an adequate accounting of the history and archaeology of that class, then any newly discovered sites of this class could automatically be recommended ineligible for the NRHP. A scheme of standard treatment could be developed for such sites that would minimize field work and streamline their assessment. Based on the current state of knowledge, sites associated with woodworking activities may be a suitable

candidate as “non-sites”. As more naval stores sites are identified properly and appropriately assessed, additional patterns of sites suitable for class redundancy may be revealed. As this knowledge base is expanded, suitable Program Comments could also be developed to mitigate for adverse impacts to historic properties.

6.0 SUMMARY AND CONCLUSIONS

This report has attempted to first familiarize the reader with the concept of the naval stores industry in the southeastern United States (Southeast); why and how it began, how it developed, how it flourished, and then how it waned and died. This was done by providing a world history of the industry from its earliest beginnings in Biblical times until its final demise in the Southeast at around the turn of the twenty-first century. It looked at naval stores archaeological sites across the longleaf pine belt with an eye toward similarities and differences and created a set of archaeological "footprints" for each type of site. With a bit of caution, a system was devised and proposed whereby archaeological sites on the DoD installations can be recognized and evaluated for recommendation to the NRHP. It has further provided suggestions toward alternative treatments of naval stores sites on the DoD properties, including non-mitigation measures supporting preservation efforts in the private sector as a means of preserving the history of the practices that transpired at sites on the DoD properties. This document is the beginning point, not the end, of a strategy for dealing with a rapidly disappearing class of archaeological sites. It is hoped that the DoD CRM managers will try these measures, rejecting those that are found untenable and formulating new ones to improve the strategy, and work to preserve these cultural resources on federal properties.

One of the most important aspects revealed to this author by undertaking this project is the fact that people involved in this industry are still living. Rarely do archaeologists have the opportunity to interview people that made the sites. That is the territory of historians and ethnologists, and they ask different questions. However, valuable information for archaeology can be collected through interviews about not only these people's personal experiences, but also the "nuts and bolts" of what the sites themselves are made of. So many times archaeologists encounter an object about which they have no concept of function. Interviews with living people about naval stores sites provide an opportunity to learn about puzzling objects or patterns observed in the archaeological record.

Another point is that there are very few naval stores industry sites left today. However, a few of the ones left in ruins are in excellent condition, and their formation into archaeological sites can readily be observed. These need to be properly researched, documented, photographed, mapped, and recorded in their associated state's archaeological site files offices. If the DoD were to adopt a program of supporting the effort to properly record these sites, they would be helping to preserve the knowledge and history of the naval stores sites on federal properties.

7.0 REFERENCES CITED

Bland, Dan E.
1975 *Memoirs of Dan E. Bland*.

Blount, Robert S., III
1993 Spirits of Turpentine: A History of Florida Naval Stores. *Florida Heritage Journal* Monograph , No.3. Florida Agricultural Museum, Tallahassee

Butler, Carroll B.
1998 *Treasures of the Longleaf Pine Naval Stores*. Tarkel Publishing, P.O. Box 45, Shalimar, Florida 32579.

Campbell, L. Janice, Prentice M. Thomas, James H. Matthews, James R. Morehead, and Stephen L. Kilgore.
2008 *Test and Evaluation of 8OK591 (Task Order CR-08-0041, Contract FA4890-04-D-0009-DK07) Cultural Resources Management Support, Eglin Air Force Base, Okaloosa, Santa Rosa, and Walton Counties, Florida*. Submitted to Cultural Resource Management, Eglin Air Force Base, Florida.

Campbell, L. Janice, James R. Morehead, James H. Mathews, Karina Cooksey, Christina M. Callisto, Lee C. Thomas, Bret Kent, Ashley Kent, Carrie Williams Bourgeois, Philip Bourgeois and Erica Meyer
2012 *Cultural Resources Survey at Fort Stewart Military Reservation, Volume 1, Final Report.* Prentice Thomas and Associates, Inc., Contract No. C5000030247, Delivery Order 11. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Campo, Rachel, Michael Trinkley, and Debi Hacker
1999 Fort Stewart 9: An Archaeological Survey of Natural Resource Management Units A6.4, A8.1, and B2402, Fort Stewart, Evans and Liberty Counties, Georgia. Chicora Foundation, Inc., Contract No. 1443CX500095044, Delivery Order 9. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Carman, Doug
2007 Mounds Reveal A Lost Trade Town: Turpentine Boom Created Town of Nalaca. *Highlands Today*. Electronic Document, http://www.floridacountiesmap.com/hicostories/seb_070613turpentine.shtml, accessed April 12, 2002

Cooper, Leslie
2000a Georgia Archaeological Site Form: 9ME52. Georgia Archaeological Site File, Athens.
2000b Georgia Archaeological Site form: 9ME779. Georgia Archaeological Site File, Athens.

Dickel, David N.
2002 Analysis of Morturay Patterns. In *Windover: Multidisciplinary Investigations of an Early Archaic Florida Cemetery*, edited by Glen H. Doran, pp. 73-96. Universtiy Presses of Florida, Gainesville.

Drew, John
1981 The Early Days of the Naval Stores Industry. *Naval Stores Review*, November-December.

Dyer, C. Dorsey
1963 History of the Naval Stores Industry. American Turpentine Farmers Association Journal, January, 1963.

Espenshade, Christopher T.
1996 *Phase I/II Cultural Resource Investigation of the Proposed Widening of U.S. Highway 441 in Dodge, Laurens, and Wheeler Counties, Georgia*. Garrow and Associates, Inc., Project EDS-441 (18), (19), and (20), Final Report. Submitted to Greenhorne & O'Mara, Inc., Marietta.

Espenshade, Christopher
1998 *An Intensive Look at Fort Stewart: Archaeological Survey of 18,352 acres at Fort Stewart, Georgia*. TRC Garrow Associates, Inc., Contract No. 1443CX509096013, Delivery Orders 1 and 2. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.
2012 *Final Report Phase I Archaeological Survey of 9,785 Acres and Phase II Evaluation of Nine Sites Fort Stewart Georgia*. New South Associates, Contract No. W912HN-10-D-0001, Delivery Order 14.

Federal Register
1981 National Register of Historic Places Program: National Register Federal Program Regulations. 46 FR 56187, Nov. 16, 1981, unless otherwise noted.

Gantt, Mary E., and Kenneth F. Styer
2004 *Phase I Cultural Resources Survey of the Wright Army Airfield Joint Use Area II (770-Acre Tract) Fort Stewart, Liberty County, Georgia*. R.S. Webb & Associates. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Gerrell, Pete
1997 *The Illustrated History of the Naval Stores (Turpentine) Industry*. Morris Publishing, 3212 East Highway 30, Kearney, Nebraska 68847.

Grover, Jennifer E., and David A. McKivergan, Jr.
2001 *Integrated Cultural Resources Management Plan for Fort Stewart and Hunter Army Airfield, Georgia*. Copies available from The Director of Public Works, Fort Stewart, Georgia.

Hart, Linda P.
1986 *Excavations at the Limerick Tar Kiln Site (38BK472)*. Francis Marion and Sumpter National Forests Cultural Resource Management Report 86-52.

Holy Bible
1611 *Genesis*, Chapter 6, Verse 14. King James Version.

Hort, Sir Arthur, translator
1916 *Theophrastus. Enquiry Into Plants and Minor Works on Odours and Weather Signs*, Volume II. Translated by Sir Arthur Hort, S. P. Putnam's Sons, New York.

Hume, Ivor Noël
1969 *A Guide to Artifacts of Colonial America*. Alfred A. Knopf, Inc., New York.

Jackson, Paul D.
2000 *Archaeological Investigations at Fort Stewart: An Intensive Archaeological Survey of 9,732.6 Acres (NRMUS A9.4, A11.1, A13.2, A18.1, B3.1, B3.2, B8.1, B8.2, B9.4, D11.1, E4.1, E4.2, E4.3, E6.5, F4.2, and Training Areas B2 and Taylors Creek Maintenance Area in Liberty and Long Counties) at Fort Stewart, Georgia.* Panamerican Consultants, Inc., Contract No. 1443CX509098044, Delivery Order 1. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch
2001 *Archaeological Investigations at Fort Stewart: An Intensive Archaeological Survey of 9,892 Acres (NRMUs B20.3, C7.1, C9.1, C9.3, E3.1, E3.2, E3.3, E10.1, E10.2, E10.3, E22.4, E22.5, F2.2, F2.3, F3.2, and F3.3 in Bryan, Liberty, Long, and Tattnall Counties) at Fort Stewart, Georgia*. Panamerican Consultants, Inc., Contract No. 1443CX509098044, Delivery Order 3. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Joseph, J. W. and Bradford Y. Botwick
2009 *Rural Industries of the Sand Hills, Georgia, South Carolina, and North Carolina: A Historic Context*. Report submitted to the US Army, Fort Gordon, Environmental, Natural, and Cultural Resource Management Program and the US Army Corps of Engineers, Savannah District, Savannah, Georgia. Prepared by New South Associates, Inc., Stone Mountain, Georgia. Technical Report 1799. Department of Defense Legacy Program Project 09-436.

Joseph, J.W., Theresa M. Hamby, and Catherine S. Long
2004 *Historical Archaeology in Georgia*. University of Georgia Laboratory of Archaeology Series, Report No. 39, Georgia Archaeological Research Design Paper No. 14.

Kirkland, S. Dwight
2013a Transcription of a Digitally Recorded Conversation with Mr. William J. Buie of Rentz, Georgia. Primary source material, submitted to Fort Stewart Cultural Resource Management.

2013b Transcription of the Digitally Recorded Notes of a Field Trip to Fort Stewart Military Reservation, 06 February 2013. Primary source material, submitted to Fort Stewart Cultural Resource Management.

Little, Keith J., James N. Ambrosino, and Paul D. Jackson
2000 *Archaeological Investigations at Fort Stewart An Intensive Archaeological Survey of 9,732.6 Acres (NRMUs A9.4, A11.1, A13.2, A18.1, B3.1, B3.2, B8.1, B8.2, B9.4, D11.1, E4.1, E4.2, E4.3, E6.5, F4.2, and Training Areas B-2 and Taylors Creek Maintenance Area in Liberty and Long Counties) at Fort Stewart, Georgia.* Panamerican Consultants, Inc., Contract No. 1443CX509098044. Submitted to the National Park Service, Southeast Regional Office, Atlanta Federal Center, 1924 Building, 100 Alabama Street, S.W., Atlanta, GA. Copies available from the Fort Stewart Cultural Management Office.

Maggioni, Joseph P.; Brian K. Greer, Jessie. A. Larson; Ashley Moss; Jennifer E. Grover, and David A. McKivergan
2014 *Integrated Cultural Resources Management Plan for Fort Stewart and Hunter Army Airfield, Georgia: Through Fiscal Year F18*. Directorate of Public Works, Environmental Division, Fort Stewart, GA.

Markham, Virginia M., and Jeffrey L. Holland
2002 *Fort Stewart Site Testing D.O. #5, 6, 7, and 8 Archaeological Testing at Fort Stewart in Bryan, Evans, Liberty, and Long Counties, Georgia*. TRC Garrow, Inc., Contract No. 1443CXS09096004, Delivery Orders 5-8. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Mathews, James H., L. Janice Campbell, and James R. Moorhead
2005 *Test and Evaluation of 11 Sites on Fort Stewart Military Reservation, Bryan and Liberty Counties, Georgia 9EV249, 9EV291, 9EV294, 9EV295, 9EV312, 9EV321, 9LI617, 9LI619, 9LI643, 9LI1190, and 9LI1249.* Prentice Thomas and Associates, Inc., Contract No. C5890020159 - Delivery Order 3.

Mathews, James H., L. Janice Campbell, Carrie A. Williams, James R. Morehead, William R. Mallory, Prentice M. Thomas
2004 *Test and Evaluation of 28 Sites on Fort Stewart Military Reservation Bryan, Liberty, and Long Counties, Georgia*. Contract No. C5890020159 - Delivery Order 1. Submitted to the National Park Service, Southeast Archaeological Center.

Mathews, James H., William R. Mallory, L. Janice Campbell, and Ben Aubuchon
2008 *Cultural Resources Survey of X-966 Cultural Resources Management Support, Eglin Air Force Base, Okaloosa, Santa Rosa, and Walton Counties, Florida.* Prentice Thomas and Associates Inc., Contract #FA4890-04-D-0009-DK07, Task Order CR-08-0022, Final, Report of Investigations No. 1126.

Meyer, Joseph, James H. Matthews, James R. Morehead and L. Janice Campbell
2006 *Survey of X-367 Cultural Resource Investigations, Eglin Air Force Base, Okaloosa, Santa Rosa, and Walton Counties, Florida.* Prentice Thomas and Associates Inc., Contract No: F08635-96D-0002, Task Order No: EM-96-05, Final Report, Report of Investigations No. 352

Milanich, Jerald T.
1994 *Archaeology of Precolumbian Florida*. University Press of Florida, Gainesville.

Morehead, James R., William R. Mallory, Carie Williams-Bourgeois, L. Janice Campbell, James H. Mathews, and Eric Ian Hamilton
2008 *Cultural Resources Survey at Fort Stewart Military Reservation, Volume 1, Final*. Prentice Thomas and Associates, Inc. Contract No: C5000030247, Delivery Order: 9. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Morehead, James R., Carrie Williams-Bourgeois, William R. Mallory, L. Janice Campbell, and James H. Mathews
2009 *Cultural Resources Survey at Fort Stewart Military Reservation Volume One-Final Report*. Prentice Thomas and Associates, Inc., Contract No. C5000030247, Delivery Order 10. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Outland III, Robert B.
2004 *Tapping the Pines: The Naval Stores Industry in the American South*. Louisiana State University Press, Baton Rouge.

Peter, D.
1987 Georgia Archaeological Site Form: 9LI48 (North Mound). Georgia Archaeological Site File, Athens.

Poplin, Eric, Jon Marcoux, David Baluha, Brent Lansdell, and Brian Falls
2010 *Archaeological Survey of Selected Timber Stands in the Hell Hole Analysis Area, Francis Marion National Forest, Berkeley and Charleston Counties, South Carolina*. Brockington and Associates, Inc., CRM Report 2010-05. Submitted to the USDA Forest Service, Contract No. AG-4670-D-09-0019.

Prizer, Timothy C.
2009 Pining for Turpentine: Critical Nostalgia, Memory, and Commemorative Expression in the Wake of Industrial Decline. Electronic document, https://cdr.lib.unc.edu/indexablecontent?id=uuid:cbd65b74-4323-46bd-bba3-8c3e6d763454&ds=DATA_FILE, accessed and downloaded, January 9, 2013.

Roberts, Marian D., Eric C. Poplin, and Rick R. Richardson
1992 *Cultural Resources Survey of Selected (FY-91-1) Timber Harvesting Areas, Fort Jackson, South Carolina.* Prepared for US Army Corps of Engineers, Savannah, Georgia, by Gulf Engineers & Consultants, Inc. Baton Rouge, Louisiana, and Brockington & Associates, Inc., Atlanta, Georgia.

Ross, James
2004 *Archaeological Investigations at Fort Stewart: An Intensive Archaeological Survey of 10,000 Acres (NRMUs A3.1, A3.2, A4.1, A4.2,A9.1, A9.2, A9.3, A19.1, A20.2, A20.3, B4.11, B19.1, C11.1, C15.1, C17.1, C17.2, C17.3,D2.2, E8.2, E18.1, F5.1, and F12.1 in Bryan, Evans, Liberty, and Long Counties) at Fort Stewart, Georgia*, Draft Report. Panamerican Consultants, Inc., Contract No: Delivery Order: 7. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

Smith, Greg and Martin Healey
2012 Researching Negrotown Knoll and Marsh: A Former Freedman Community in Highlands County, Florida.
Southerlin, Bobby

2013 A Survey of Tar and Pitch Production Sites in the Francis Marion National Forest: Part I. Paper presented at the 2013 Archaeological Society of South Carolina Conference, Columbia.

Sweeney, Alex, Will Brockenbrough, and Shannon Dunn
2011 *Phase I Archaeological Survey of the 2235 Acre Convoy Live Fire Tracts at Fort Stewart Military Reservation (NRMUs C1.3, C5.1, and C6.1) Bryan, Evans, and Liberty Counties, Georgia*. Brockington and Associates, Inc., Contract No. W81XWH-05-2-0091-005-002. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

TePaske, John Jay
1964 *The Governorship of Spanish Florida, 1700-1763*. Duke University Press, Durham

Thomas, Kenneth H., Jr.
1975 *McCranie's Turpentine Still: A Historical Analysis of the Site with Some Information on the Naval Stores Industry in Georgia and Elsewhere*. The University of Georgia Institute of Community and Area Development and the Georgia Department of Natural Resources, Atlanta.

Trinkley, Michael, Debi Hacker, and William B. Barr
1998 *Fort Stewart 4,5, 6 and 7: An Archaeological Survey of 3,078.27 Ha Survey Tracts "A" Through "N" (Portions of Training Areas A-11, B-9, D-8, D-9, D-11, D-14, E-7, E-8, E-11, E-14, E-15, E-19, E-20, and E-21), Fort Stewart, Liberty, Long, and Tattnall Counties, Georgia*. Chicora Foundation, Inc., Contract No. 1443CS500095043, Delivery Orders 4-7. Submitted to Fort Stewart, Directorate of Public Works, Environmental Branch.

United States Department of Agriculture Bureau of Chemistry and Soils
1940 Turpentine Still Buildings and Equipment. *Miscellaneous Publication*, No. 367, 1940, United States Government Printing Office, Washington, D.C.

Walbert, David
2008 Naval Stores and the Longleaf Pine. Electronic document, http://www.learnnc.org/lp/editions/nchistory-colonial/4069, accessed January 2, 2013.

Wright, Gay Goodman
1979 *Turpentining: An Ethnhistorical Study of a Southern Industry and Way of Life*. M.A. Thesis, Department of Anthropology, University of Georgia, Athens.

8.0 LIST OF ACRONYMS

ACHP	Advisory Council of on Historic Places
APAFR	Avon Park Air Force Range
CFR	Code of Federal Regulations
CRM	Cultural Resource Management
DoD	Department of Defense
DoDI	Department of Defense Instruction
EAFB	Eglin Air Force Base
FMNF	Francis Marion National Forest
GASF	Georgia Archaeological Site File
GIS	Geographic Information Systems
ICRMP	Integrated Cultural Resource Management Plan
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NSRS	Naval Stores Research Station
PTA	Prentice Thomas and Associates, Inc.
QIE	Quality and Integrity Evaluation
SCIAA	South Carolina Institute of Archaeology and Anthropology
SEH	Southeast Horizons, Inc.
SHPO	State Historic Preservation Office
TRCG	TRC Garrow and Associates, Inc.
USDA	United States Department of Agriculture

9.0 NAVAL STORES TERMINOLOGY

Term	Definition
Apron	Galvanized metal strip placed above turpentine collection cups to guide pine gum into them.

Box	Cavity cut into a tree to collect pine gum.
Box axe	Long-bladed axe used to cut boxes into trees.
Cap (or kettle cap)	The top portion of a turpentine still that directs the steam vapors to a condenser, coil, or "worm".
Catface	V-shaped/chevron markings into a tree to facilitate pine gum flow into a box or cup (origin derived from the "whisker-like" appearance of the markings).
Chip	To cut streaks into a tree to promote pine gum flow (see "catface").
Chipper	One who chips trees.
Cleaning boxes	Remove bark and debris from turpentine boxes.
Commissary	General store owned and operated by a Still Owner which typically extended credit to their workers and families often resulting in a debt-peonage relationship between the owner and the workers.
Condenser coil	See "worm".
Cooper	Worker who manufactured or repaired barrels used for transporting gum, turpentine, or rosin.
Cooperage	Barrel manufacturer.
Cooper shed	Structure used by the cooper to provide barrels; often located adjacent or near turpentine stills.
Cotton batting	Cotton filter used to strain rosin.
Crop	10,500 faces (catfaces).
Cup	Receptacle used to collect pin gum. A variety of cups were used in the turpentine business of which Byrd, Herty, McKoy, and Pringle were the most popular.
Deck hand	Assistant to a stiller.
Dip	To collect pine gum from boxes or cups.
Dip barrel	Wooden or metal barrel (31 ½ - 55 gallon) where pine gum is stored and later transported to a turpentine distillery.
Dip bucket	Small bucket (typically 5-8 gallons) used by individual workers to collect pine gum.
Dip iron/paddle	Metal or wooden tool used to remove pine gum or scrape boxes or cups.

Dipper	Worker who collects pine gum from boxes or cups.
Distillate	Spirits (condensed vapor) of turpentine.
Distillation	Process used to convert pine gum into turpentine and rosin.
Dross	Bark, limbs, and needle/leaf litter that is strained from rosin after it is processed.
Factor	Agent or company that financed or extended credit to turpentine still owners. Also acted as marketing agents for naval stores products.
Fire Still	See Still.
Glue pot	Used by the cooper to melt glue for turpentine barrels.
Gum	Resinous substance derived from pine trees which when distilled produces turpentine and a byproduct of rosin.
Gum producer	One who specialized in only the extraction of pine gum but not involved with distillation process.
Gutter	Flat metal strip arranged into a V-formation which is nailed to a tree below a catface to direct the flow of pine gum into a cup.
Hack	An edged tool that chips streaks into a pine tree to create a catface. The opposite end of the cutting edge is a counter-weight to allow for deeper cutting strokes.
Hanging box	Typically a handmade box used to carry aprons and nails.
Herty Cup	Turpentine collection cup invented by Charles H. Herty.
Kettle	Large copper vessel filled with pine gum comprising the largest component of a turpentine still.
Naval stores	Initially the term referred to the processing of tar and pitch. In more recent history, it refers to the extraction and processing of pine gum for the purposes of producing turpentine and rosin.
Peonage	A system of labor exploitation by the means of extending credit to workers for room & board at inflated prices which typically surpassed worker's incomes resulting in the inability to leave their work without fear of criminal charges or other forms of coerced servitude. Also known as Debt Peonage.
Pitch	Viscous residue obtained by distilling tar from wood or rosin.

Puller	A tool with an oval blade on a long unweighted handle used for chipping trees to extend faces farther up the tree. Also a term used to describe someone who utilizes a puller tool.
Retort	Large portable cylindrical container used during a destructive distillation process which involved the distillation of wood debris and stumps (vs. a gum distillation still).
Rosin	The byproduct of distillation of turpentine. Primarily used for adhesives, varnishes, and paper finishing.
Rosin vat	A vat used to strain rosin of foreign debris.
Scrape	Dried gum that collects on catfaces. Harvested at end of collection season and distilled for turpentine and rosin.
Scrape box	Box used to collect scrape.
Spirits (of turpentine)	Volatile oil which consists of terpene hydrocarbons by distilling oleoresin (pine gum).
Still	Turpentine distillery based on same technology developed for the Scotch Whiskey industry.
Stiller	Primary worker in charge of the distillation process, often assisted with Deck Hands.
Tar	A viscous brown to black substance derived from the distillation of organic substances such as wood, coal, petroleum, or peat. Typical uses included sealants for sailing ships, rigging, and other wood shingles for homes.
Tar Kiln	Earth covered mound of wood that is processed by destructive distillation to produce tar and charcoal.
Tins	See apron.
Turpentine	Also known as Spirits of Turpentine. Terpene oils obtained through the distillation of pine gum or wood stumps through a variety of distillation methods. Primary uses were for solvents, paint thinners, and lighting fuel (alternative to whale oil). Historically believed to have medicinal value.
Worm	Condenser coil used in the turpentine distillation process that is housed in a cooling vat (typically a cypress vat). Cooled vapors of distilled gum condense into turpentine and collected in barrels.