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Shipbuilding in Maryland, 1631-1850

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SHIPBUILDING IN MARYLAND, 1631-1850

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ABSTRACT

Shipbuilding has a long history in Maryland, beginning in 1631 and continuing to the present. However, there has been no comprehensive archaeological or historical study of shipbuilding or shipyards in Maryland. This study serves as an initial foray into the study of these important sites for the period of 1631 to 1850. Utilizing geographic information systems (GIS) a spatial analysis of shipyard locations derived from historical research was conducted. Based on this analysis it was possible to chart the expansion and recession of the shipbuilding market in relation to changes in the world economy. Furthermore, it was found that factors such as proximity to urban centers, the protection offered by a site, the slope of the land, and the proximity of oak promoting soils influenced the placement of shipyards. The work presented here synthesizes the disparate historical studies of shipbuilding into a single history of Maryland shipbuilding, and provides a firm foundation both for archaeological investigations of these sites and the construction of a comprehensive predictive model.

SHIPBUILDING IN MARYLAND, 1631-1850

CHAPTER I:

INTRODUCTION

For as Geographie without History seemeth a carkasse without motion, so History without Geographie wandreth as a vagrant without a certain habitation.
- Captain John Smith, ca. 1640

Jeremiah Hookes knew that today, Monday December 14th, 1714, was an important day for him. Jeremiah was to meet with the owner of a tract of land that he wished to lease to discuss the terms. He expected the transaction to go smoothly. After all everything had been going smoothly for Jeremiah as of late. At the age of 20 he had recently finished his indenture with Samuel Summers of Island Creek, where he had helped construct the massive 300 ton ship just completed there, and more importantly he had just married the very fetching Sarah Summers. It was because of this fortuitous marriage and because Jeremiah had performed so admirably throughout his indenture that Samuel had agreed to steer one of his clients towards contracting with Jeremiah to construct a 150 ton brigantine (figure 1). It was with the money paid in advance by this client that Jeremiah now intended to lease a plot of land upon which to construct the vessel. It was not a large sum of money but Jeremiah felt it would be enough. Besides he expected to get a good price on the land: it was not particularly good for growing tobacco, and now, in the cold of winter, it was not of much good for any agriculture. For a shipbuilder, though, this was the time to obtain land for a shipyard; if he wanted to have the craft ready for his client to lade on tobacco in November, the construction needed to start shortly after the first of the year. Furthermore, leasing limited Jeremiah's risk. If he should decide to leave shipbuilding for the more lucrative life of a planter, or the more stable existence of a merchant he would not lose much on his land investment.

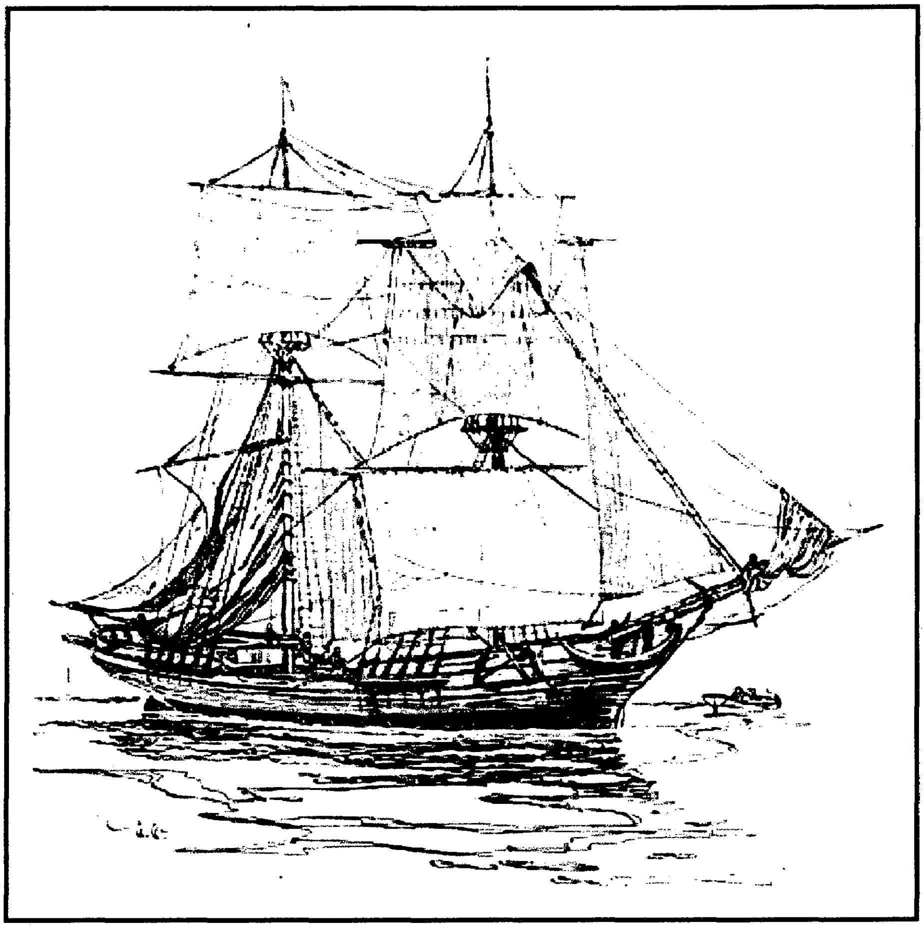


Figure 1: Brigantine (Culver 1992:179)

It was with all of these thoughts flitting through his mind that Jeremiah met the land owner near the courthouse in Oxford, and they walked, or rather Jeremiah walked and the land owner road his horse, the two miles to the site. Jeremiah happily noted that, even in the wet of the winter, the road was not too difficult to navigate. Not even the most rotund of the fat-cat merchants could balk at making the easy two mile trek to inspect their vessel during construction, and to make payments too, of course. Additionally, being easily accessible to the bustling port of Oxford had the advantage of making the accusation of English sails and cordage, and cypress knees and ship's chandlery from Virgina that much more convenient.

Our shipwright liked the lot. It was a spacious, cleared one and a half acres, providing plenty of room to construct a tool shed, place the launching ways, and manipulate the large timbers. Jeremiah did not need a lofting floor because he did not believe in that new fangled way of constructing a vessel; he had all the plans he needed in the half hull model he carried in his satchel and the years of experience he had earned as an apprentice. Besides being large enough, the parcel had a graceful slope leading down to the water that Jeremiah judged to be almost perfect for the launching of a vessel, even without any modification. There were only two problems with the land. The first was that the soil seemed to be a bit soft. That meant that before construction could begin Jeremiah would have to lay a foundation of cobbles beneath the ways to distribute the weight of the vessel, or the brigantine would sink into the muck before it was even planked. Secondly, while the channel was plenty deep, it was a bit narrow. Again this did not concern Jeremiah, as he had experience with side-launching ships, and this method required significantly less channel width than a traditional bow launch.

So Jeremiah and the land owner haggled over the price. The land owner pointing out all of the work that had gone into clearing the land, and Jeremiah devaluing the land because of its mucky soils and narrow channel. In the end Jeremiah prevailed; there were not that many shipbuilders plying their trade in Talbot county at this time and Jeremiah was the first to offer any money for this land in months. When all was said and done, Jeremiah leased not only the shipyard land but two acres of wood-lot one and a half miles up stream that was full of appropriately shaped oak trees, all for the price he had originally been prepared to dole out for the shipyard parcel alone. That night Jeremiah returned home to Sarah the proud owner of his own shipyard.

While the preceding story is a fictitious account, it does clearly demonstrate that there were a number of factors that combined in the decision to place a shipyard in one location rather than another. Shipyards were not randomly distributed across the landscape and it should be possible to identify temporal trends in their gross spatial distribution and the specific characteristics that made one location more attractive shipbuilders than another. By identifying the factors that led to their placement we can increase our knowledge about not only ship construction (Souza and Peters 1997), but about the individuals who built them, and the culture in which they lived.

As Muckelroy (1998:23) has claimed, "In any pre-industrial society, from the Upper Paleolithic to the 19th century AD, a boat or (later) a ship was the largest and most complex machine produced." More important than their complexity and size, watercraft were unsurpassed in their influence on transportation and mobility. Ships were essential to European powers, both for trade and warfare (Spectre and Larkin 1991). The economy of all countries rested on their ability to import and export goods, and for many nations, especially an island nation such as England, that meant shipping. Additionally, naval might was necessary to protect the precious goods transported over the seas. As Cicero wrote, "He who commands the sea can command everything" (quoted in Eller 1981:5). Without a strong shipbuilding infrastructure no country could expect to exert its will over its neighbors.

The same held true in the Americas. Ships transporting goods from Europe made life bearable for the colonists, and the same vessels returning to Europe with raw materials from the New World guaranteed the colonists the wealth to continue to purchase such goods. Furthermore, if all else failed ships were the only means of escape from the wilderness back to England and Europe. Seizing onto the need for an indigenous shipbuilding industry colonists quickly began to construct their own vessels. Shipbuilding provided the means for commerce to advance in North America and permitted the economy of the colonies and later the new nation to grow (Goldenberg 1976). Shipbuilding was one of the most profitable early industries (Wright and Fowler 1974).

Few regions in the South found shipbuilding to be more profitable than Maryland. The primary reason for the dominance of nautical construction in the region was that it was naturally suited to the pursuit. As Governor Seymour wrote in a letter to the Lords of Trade and Plantation, dated June 23, 1708, "The country are naturally inclined to building vessels, and the natives take it upon themselves very readily" (Clark 1950:293). Due to this natural predilection the region would eventually produce some of the finest vessels constructed in North America (Eller 1981). Even today shipbuilding plays an important role in the ideology of Maryland; the inhabitants of the State have a very close attachment to their maritime heritage. The source of this attachment is as varied as those who dwell along the shore of the Chesapeake. For some it is the romantic connotations conjured up by the Baltimore clippers of the early 19th century. For others it is proud traditional boat building heritage still evident in the construction of racing canoes, skipjacks, oystering boats, and other small vessels (figure 2). Many others see a tangible link to the wooden ships of the past in the massive steel cargo ships constructed at Baltimore's modern industrial shipyards. Regardless of the causes, the importance of shipbuilding to the region almost palpable.

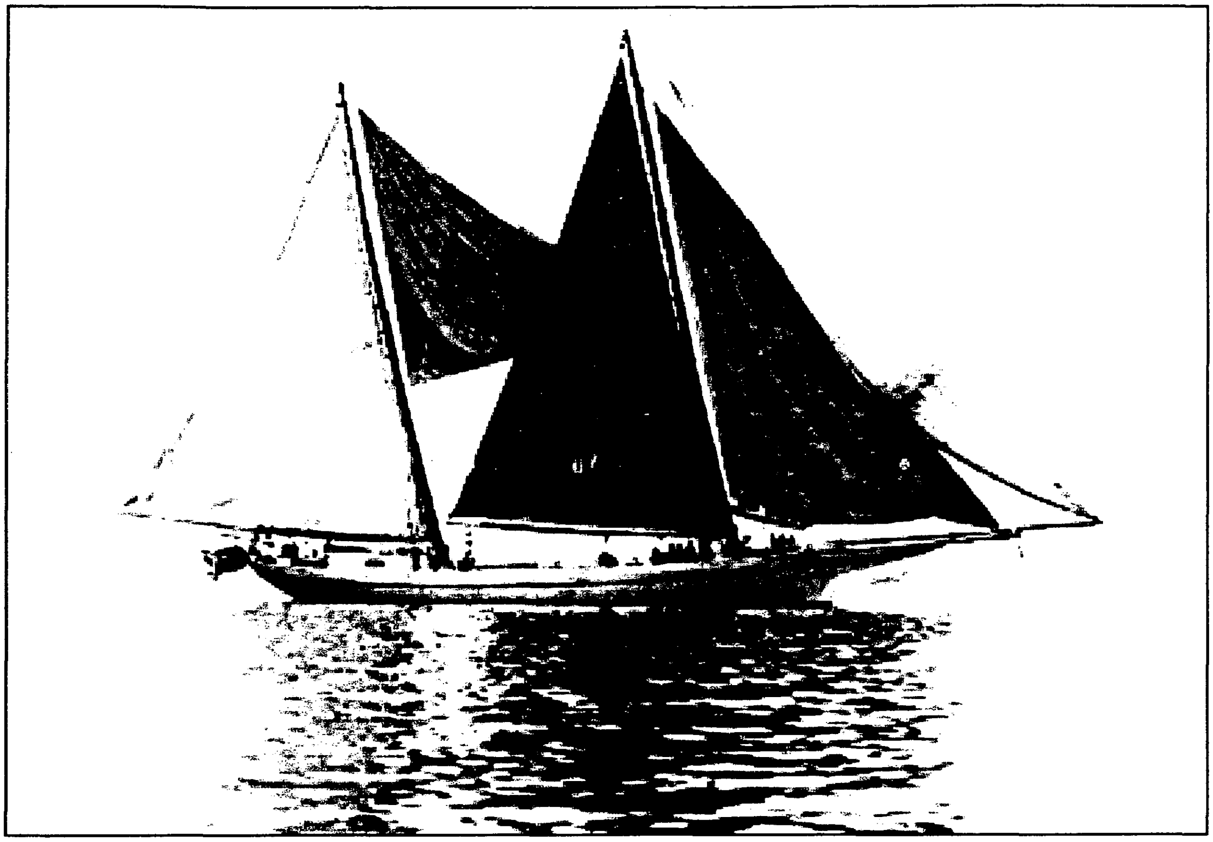


Figure 2: Traditional small craft, bugeye (Brewington 1963:49)

Despite the important role that shipbuilding played in the development of European-American culture, there has been precious little study of shipyard sites in the South, and in Maryland specifically. Only a handful of sites have been dug (e.g. Shipyard Landing # 3 (18KE334) and the Stephen Steward Shipyard (18AN817)), and a paltry number of scholarly works published on the subject (Goldenberg 1976, Middleton 1981, Middleton 1984).

This paucity of evidence has both an historical and an archaeological cause. Historically, shipbuilding, shipyards, and shipbuilders may have been an important portion of the economy but they were not overtly apparent to the upper class men that give us the majority of our historical texts. Shipwrights were tradesmen and shipbuilders were either tradesmen or common laborers. Either way they were simply workmen in the eyes of their peers and social betters, no different from a blacksmith or a weaver. As Maryland was dominated by agriculturists and merchants for much of its history, it is further unlikely that the dominant class would have paid more than passing attention to shipbuilding. Additionally, ships would have been so common as to be invisible. Ships were the tractor-trailers of their day. Assuming that tobacco was picked up and goods delivered in a timely fashion there was no need to pay them any mind (Goldenberg 1976). For colonists to have gone out of their way to note the location of a shipyard either on a map or in a document would be very much akin to a modern individual taking special note of a Kenworth or Peterbuilt plant along the highway.


Figure 3: Shipyard, ca. 1675 (Abell 1981:Plate XIV)

The reason that more of these sites have not been excavated or, if they have been dug, not identified as shipyards is likely due to their ephemeral nature (Thompson and Seidel 1993). Shipyards tended to maximize open spaces and minimize the number of buildings on site in order to facilitate the manipulation of large timbers (Goldenberg 1976; Spectre and Larkin 1991) (figure 3). Even the launching ways, used to slide the completed vessel into the water, were not always permanent affairs (Goldenberg 1976). Similarly, saw-pits and black smith shops were common on shipyards, but then saw-pits and forges were common on many other historical sites as well. Thus, the features that would make locating and identifying a shipyard possible are slight. Conversely, a shipyard site should contain a distinctive artifact assemblage containing tools unique to shipbuilders (e.g. caulking irons) (figure 4), ships' hardware, and debris associated with shipbuilding. However, the accurate identification of a shipyard site would require an archaeologist who is knowledgeable about ship construction, otherwise the site may be misidentified as the home of a carpenter or some other construction related assemblage.

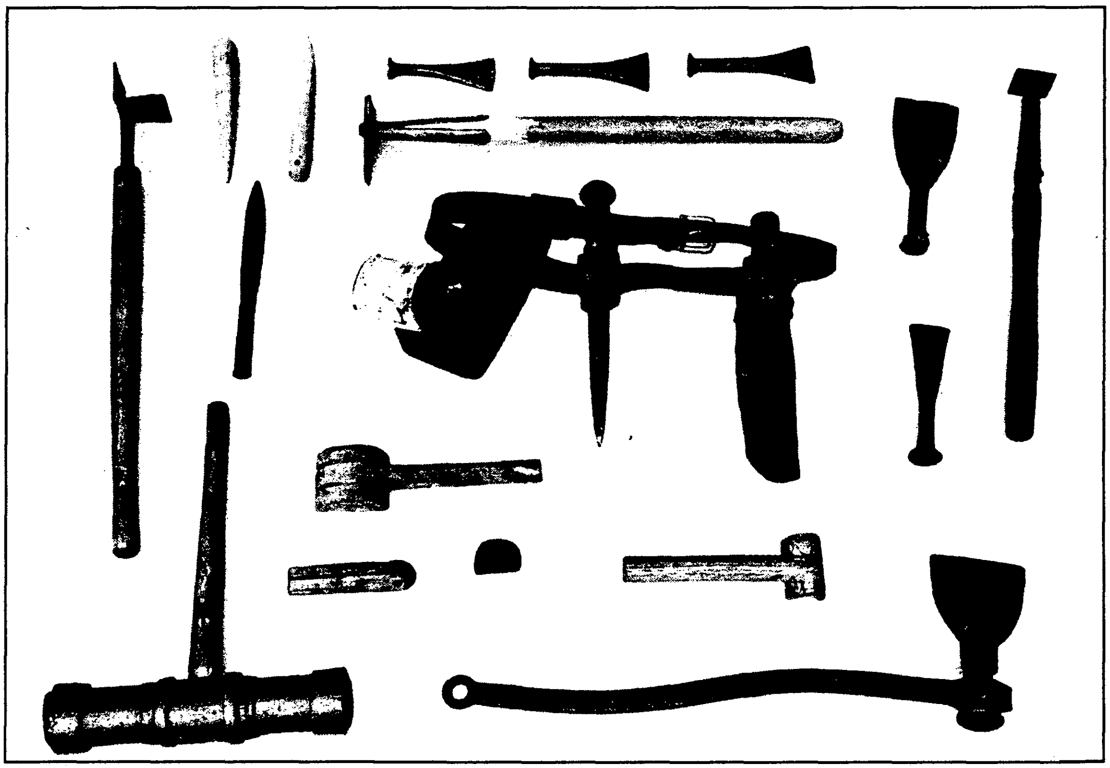


Figure 4: Shipbuilding tools (Brewington 1953:65)

In order to fill this gap in the historical record and provide guidance for future archaeologists wishing to investigate shipyards, a sample of Maryland shipyards from the period of 1631 to 1850 were investigated using the methodology of predictive modeling and spatial analysis. Both a broad and a focussed perspective were adopted to asses not only the overarching socio-cultural processes at work (Souza and Peters 1997; Gould 2000), but the factors that led to the selection of a particular site, as well.

The paucity of previous investigations into Maryland shipyards from the period of this study makes this project unique among spatial analyses. Due to how little is known about shipbuilding in early Maryland it is likely that any site with integrity identified as such could fall under both criteria C and D of the National Register of Historic Places (NRHP) (National Register of Historic Places 1991) and as such would require consideration under section 106 of the National Historic Preservation Act of 1966 (as amended) (NHPA). Consequently, it would behoove cultural resource mangers to be aware of these sites and their possible locations. Additionally, a broad-based undertaking of this nature provides a foundation for future research that is a boon to other scholars interested in the role of shipyards in the historic Chesapeake. However, the near total lack of previous archaeological investigations creates a problem in constructing a proper database for conducting a spatial analysis. The classic predictive model/spatial analysis is based on the locations of previously excavated sites. In these cases massive amounts of archaeological data are compiled in order perform the analysis. In this instance that was simply not an option. Instead the few archaeologically identified shipyards were augmented by actual and potential shipyard sites drawn from primary and secondary historical documents. While it is not supposed that this unique approach is as accurate as traditional predictive models, it is not an unprecedented endeavor (Bona and Carcombe 1996) and it is believed that this work represents an important first step in a comprehensive study of historic Maryland shipyards. Valid analysis can be conducted with these data, and these efforts represent a viable non-destructive archaeological option.

CHAPTER II:

THE HISTORY AND DEVELOPMENT OF SHIPYARDS IN MARYLAND

I tell this tale, which is strictly true,
Just by way of convincing you
How very little, since things were made,
Things have altered in the shipwrights trade.
- Rudyard Kipling, ca. 1900

Prior to this analysis there has been no comprehensive study of the history of shipbuilding in Maryland. However, the topic has been addressed in passing in many county and state histories, and in maritime and economic histories of the region (see bibliography). By synthesizing these works and interpreting their results, it was possible to construct an anthropological history of the shipwright's trade in Maryland. Because this history was compiled while attempting to identify aspects of the environment that influenced the placement of shipyards and cultural/temporal trends that affected shipbuilding and shipyards, special consideration was given those features of the history. Thus, extra attention was paid to the environmental determinants of shipbuilding and historical trends that caused the shipbuilding market to expand and contract. Additionally, the factors that led to shifts from county to county and from the Eastern Shore to the west side of the Chesapeake Bay, eventually becoming centralized in Baltimore, were explored in detail.

Natural Resources

From the earliest period it was recognized that Maryland ran contradictory to Longfellow's (1949: 33) claim that "There's not a ship that sails the ocean, but every climate, every soil, must bring tribute, great and small, and help to build the wooden wall." *An Account of the Colony of the Lord Baron of Baltimore, 1633* went on at length about the natural resources of the new colony including its natural stores of timber suitable for all forms of construction (Hall 1910). Similarly, *A Relation of Maryland* noted that "Brave ships may be built without requiring materials from other parts" (originally 1635. Hall 1910:82-83). This claim was not simply propaganda aimed at recruiting settlers for the colony. English merchants originally believed that the Chesapeake colonies would supply naval stores to England; however, plans were altered when the much more lucrative export of tobacco was discovered, and the center of shipbuilding attention was shifted to New England (Middleton 1984). In fact, only the counties of Talbot, Somerset, and Dorchester, all on the tobacco poor Eastern Shore, ever produced naval stores commercially, exporting pine, tar, and cypress (Mowbray 1980; Middleton 1984). Despite the lack of commercial exportation the area still contained prodigious quantities of wood, both for building vessels and the creation of necessary wood derivatives such as tar and turpentine. Furthermore, iron and hemp were locally available, and the coastline of the Chesapeake Bay with its numerous large rivers and sheltered coves was ideal for shipbuilding. The combination of these factors eventually led to the creation of a shipbuilding community that was second in the nation by the end of the colonial period.

Oak is the single most important material for wooden ship construction; it forms the skeleton and usually the skin of the vessel (figure 5). Historically oak was available throughout the region. To this day oak still dominates the tree species in Maryland (Vokes and Edwards 1974). Specifically, white oak (*Quercus alba*) is preferred by shipbuilders because it is so dense as to deter rot for many years. The white oak of the Chesapeake was

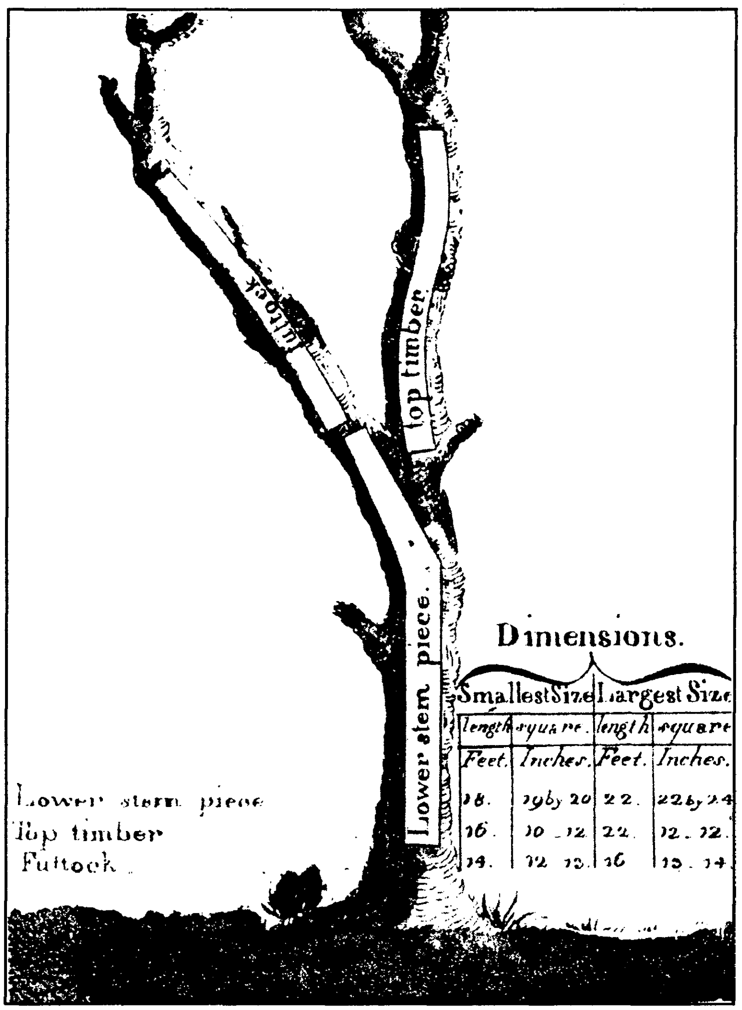


Figure 5: Oak Tree marked with ship timbers (Brewington 1953:5)

of a quality equal to that available in England, and was in fact exported to other regions, such as New York (Brewington 1953). However, throughout the colonial period American white oak, with the exception of that grown in Dorchester County, was considered inferior to English white oak. At the time it was believed that American oak grew more quickly than its British counterpart and was therefore less dense. The truth may have had more to do with the fact that American oak was not seasoned as long as

British oak prior to being used in construction. Regardless of the cause, it appears that during the early colonial period American oak tended to decay with greater celerity than that grown on the English Isle (Middleton 1984). The reputation of American oak, and American vessels, improved around the middle of the 18th century by the adoption of live oak (*Quercus virginiana*) for ship construction in the Chesapeake. Live oak proved to be more durable than either American or British white oak and was available throughout the region (*Ibid.*). Both local white and live oak continued to be used in ship construction through the 1820s when deforestation and the shift to iron hulls caused builders to look to other sources for materials.

Besides its abundance of oak, Maryland offered shipbuilders a number of other silvan resources. Pine (*Pinus* sp.) for masts and spars grew on the islands of Kent and Wye on the Eastern Shore (Thompson and Seidel 1993). In a letter to the Maryland Council of Safety, dated September 17, 1781, Stephen Steward, who owned a shipyard south of Annapolis, wrote, "As soon as it is possible for me to go I intend over the Bay myself to get Masts for the Galley" (Pleasant 1930:496). Presumably, he was intending to purchase appropriate timbers from suppliers on either Kent Island or Wye Island. Besides masts, the Eastern Shore supplied cypress (*Taxodium* sp.) for knees. Many of the ships built in Maryland contained knees of Pocomoke River cypress (Thompson and Seidel 1993). Additionally, tar and turpentine were refined from local sources. The primary locations for the production of these materials in Maryland were Charles Town, at the head of the Bay, and the Pocomoke River (Moser 1998). Tar and turpentine were also imported from the Great Dismal Swamp of Virginia and North Carolina (Goldenberg 1976; Moser 1998).

Unfortunately, as time progressed and shipbuilding became a significant activity, the natural timber resources that had made it a viable industry began to be depleted. Beginning in roughly 1760, it became necessary to import timber from other colonies to fill the vacuum created by deforestation, and this trend increased until by 1868 it was the rule rather than the exception (MSA 1859; Brewington 1953; Mowbray 1980; Mowbray and Rimpo n.d.). Areas, such as St. Michaels in Talbot County, that historically had been centers of shipbuilding were denuded earlier than other regions. St. Michaels suffered a collapse of its shipbuilding industry around 1820 partially due to the fact that the area had been entirely deforested of all timber useful for shipbuilding (Preston 1983; Arnett et al. 1999).

This massive deforestation is not surprising when one considers the amount of timber necessary to build a ship (figure 6). For every ton of shipping a vessel held, at least one and a half loads of timber were required; with a load of timber being approximately

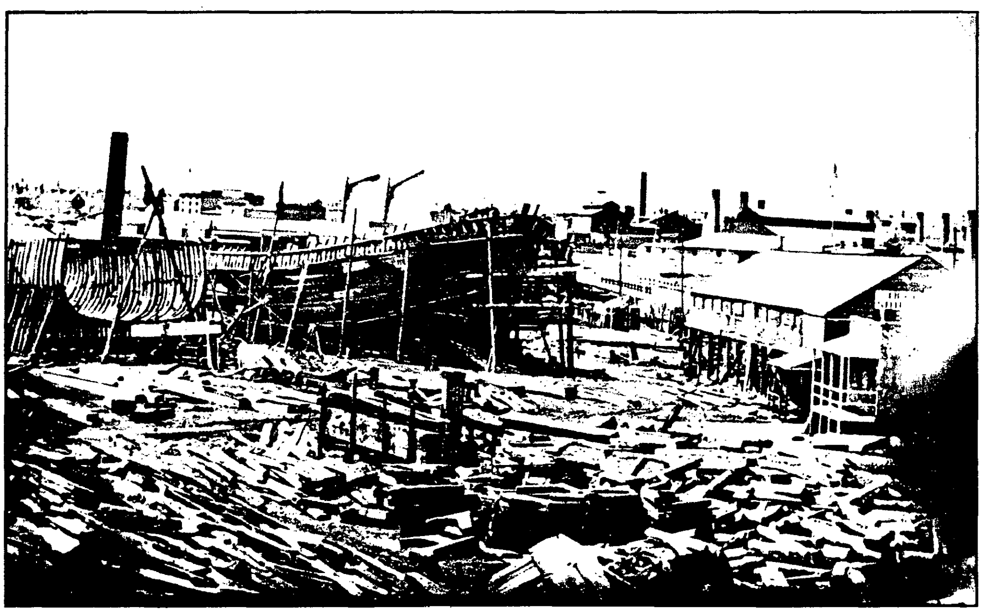


Figure 6: Shipyard, ca. 1870 (Brewington 1953:17)

equivalent to one tree's worth (Abell 1981). More specifically, a third rate British war vessel required 2,000 trees, 30,000 trunnels, five tons of pitch, and 12 tons of tar (Spectre and Larkin 1991). A barge, which was more likely than a British warship to be found on the stocks at a Maryland shipyard, required 1200 board feet of 1 ¼ inch oak planks, 1500 board feet of pine planks, 30 oak trees, and one barrel of tar (Middleton 1981). The strain on the environment must have been immense. Without replanting and other modern notions of forestry management the fact that the natural stock of timber lasted as long as it did implies that it must have been massive indeed.

In addition to timber, iron was necessary to construct a vessel. A 100 ton vessel required one ton of iron (Goldenberg 1976). Furthermore, the third rate vessel and barge mentioned above required 100 tons and more than 526 pounds of iron, respectively. Iron was used throughout the vessel. Iron pintels and gudgeons held the rudder to the ship, and iron fasteners were used to attach the rigging to the hull (Middleton 1984). Iron ore was available in Maryland, especially near the Patuxent River (Moser 1998), but prior to the 18^{th} century there were no facilities to refine and shape the ore into forms that were useful for constructing a vessel. Even in later years when refined iron was available off the docks at Baltimore (Thompson and Seidel 1993), it still had to be worked by a shipsmith into the proper forms, as all of the pieces were individual to the vessel for which they were made. It was thus impossible to mass produce them in England (Middleton 1984). Due to the custom nature of ship iron work, many shipyards had a shipsmith on site; however, this was not always the case. Generally, when a merchant contracted for a vessel he agreed to supply the ships' chandlery and the iron necessary for its construction (Goldenberg 1976).

Consequently, it is conceivable that the mixture of British and American iron found on vessels constructed in the colonies (Goldenberg 1976) may have been a function of the merchant who contracted to have the vessel built. British merchants employed British smiths with whom they were familiar, and American merchants used the local blacksmith for their iron needs. Additionally, wrecked or scrapped vessels could be cannibalized for their iron.

The final bulk material needed to build a vessel of any size was hemp and flax for the sails and cordage. *A Relation of Maryland* indicates that hemp was locally available in Maryland from the earliest period on (Hall 1910). Some interest was taken in this natural resource, especially at the end of the 17th century when a collapse in the tobacco market caused planters to look for alternative sources of income. Hemp rivaled tobacco as an export by 1767 (Moser 1998). Additionally, flax was grown extensively on the Smith Island and the Eastern Shore. By the second quarter of the 18th century, sails and cordage were available from ropewalks and sail makers in Chestertown, Bladensburg, and Baltimore (Moser 1998; Thompson and Seidel 1993; Tilp 1978). Despite this local availability, Goldenberg (1976) reports that the vast majority of sails and cordage were imported from England and were subject to crippling delays. His comments pertain specifically to New England but seem to hold true for the Chesapeake as well; the trouble of procuring the necessary supplies appears to have been ubiquitous. Governor Seymour, in a letter to the Lords of Trade and Plantation, dated June 23, 1708, complained of having trouble obtaining "sailes, rigging, and ironworks" (Clark 1950). Similarly, nearly seven decades later, Stephen Steward wrote to the Maryland Council of Safety reporting that he lacked sufficient cordage and canvas to fit out a galley he had just completed (Middleton 1981). Thus, it seems that while there was a local market in hemp products that must have been supported by the local shipwrights, a large proportion of the canvas and cordage used in Maryland ship construction came from overseas.

The final natural resource that made Maryland exceptionally attractive to early shipbuilders was its river systems. Maryland west of the Chesapeake, with its rolling uplands that eventually become the Allegheny Mountains has a number of swift rivers that cut deep channels (Vokes and Edwards 1974). Many of the rivers along the western shore were historically navigable by ocean-going vessels right up to the fall line. The Patuxent River was passable 30 to 50 miles above its mouth, the Patapsco 15 miles, the Severn 10, and the West, Rhode, South and Magothy Rivers navigable five miles inland (Middleton 1984). For its part the Eastern Shore, while it is a "flat, low, almost featureless plain" (Vokes and Edwards 1974:44), had a number of rivers with deep channels. The Chester, Choptank, and Miles Rivers were all navigable by large vessels 20 miles up stream. These deep channels offered shipwrights the protection of inland locations without compromising the size of vessels they could build at their yards. Additionally, the shipyards could be located in the vicinity of towns, located further inland to take advantage of other natural resources, without any detriment to the shipyard. However, this advantage began to fade almost as soon as the colonists began to settle. The clear cutting of trees that accompanied construction and agriculture combined with the large areas of soil left bare when cultivating tobacco and corn led to extensive erosion which accelerated siltation of the local waterways (Vokes and Edwards 1974; Middleton 1984). Other habits of early settlers, such as dumping ballast stones in harbors, did not help the matter (Middleton 1984). The end result of these processes was that the current head of navigation for many streams and rivers is miles downstream from where it was historically situated (Vokes and Edwards 1974). Consequently, towns such as Bladensburg, Elkridge and Port Tobacco that were once viable centers of maritime trade are now essentially landlocked (Vokes and Edwards 1974; Arnett et al. 1999). Thus, while it is likely that shipbuilders throughout the history of Maryland sought real-estate that offered a beneficial combination of an inland location and a deep channel, the areas that met these criteria were constantly changing and contracting.

Ship Construction Methods

As the quotation that opened this chapter states, the construction of wooden ships remained largely unchanged throughout its history. However, a brief description of the process is appropriate at this point. For the majority of history, shipbuilding was an art and mystery rather than a science (figure 7), the first treatise on shipbuilding, *The Shipbuilders Assistant*, was not published until 1711 (Abell 1981). The tendency for the worth of a ship to be based on the keenness of its builder's eye continued throughout the period under study here. Generally, the only plans for a vessel took the form of a half model, essentially half of the hull of the vessel carved in miniature. Once the client and the shipwright agreed on the shape of the vessel, the builder took the lines off of the half model and drew them full size on the lofting floor. The lofting floor was a flat open space with a smooth surface. From these drawings patterns were made out of thin wood of the principal parts (stem,

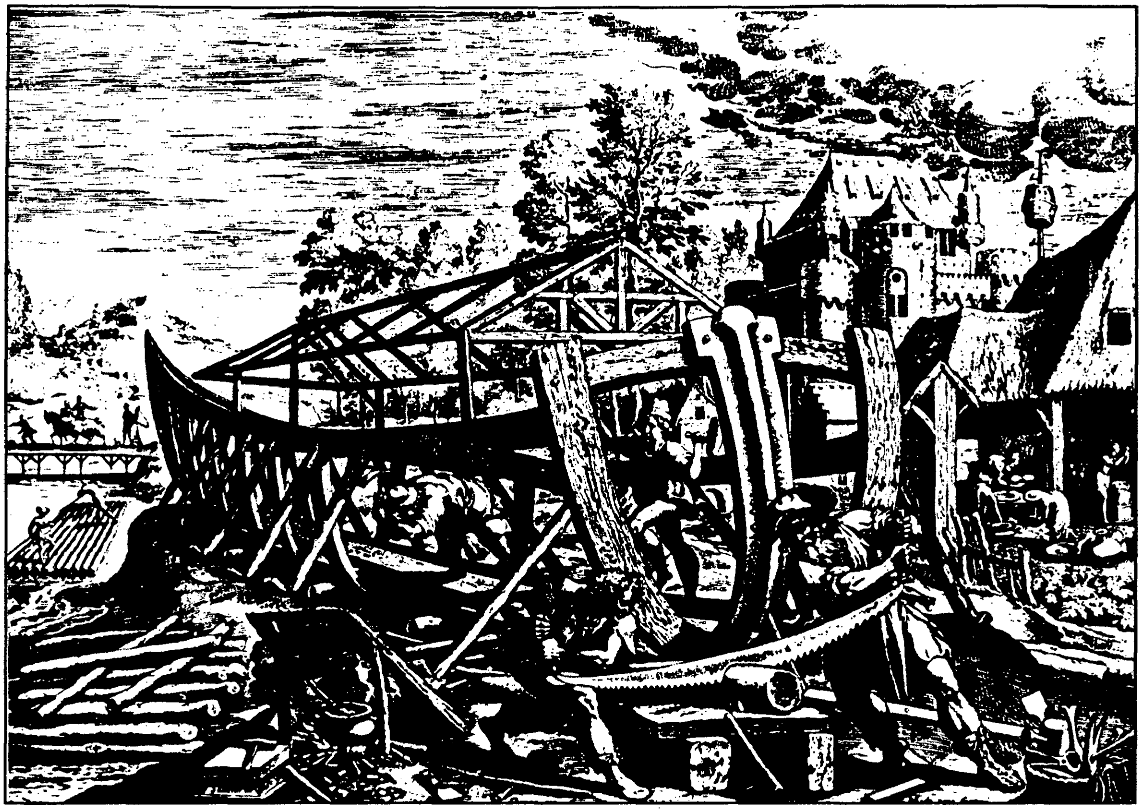


Figure 7: Fanciful depiction of shipyard, ca. 1580 (Abell 1981:Plate XIII)

stern, frames). These patterns were then transferred to the timbers themselves (Spectre and Larkin 1991). The timbers were then shaped separately before being brought together (Winklareth 2000). The keel was laid down on top of groundways, large timbers that were to support the weight of the vessel while it rested on dry land, and was rabbeted to receive the other timbers (Abell 1981). Next the stem and stern assemblies were erected followed by bolting the floor timbers to the keel. The frames had already been attached to the floors so that an entire section of framing was raised together. Once the floors were in place a ribband, or strake of thick pine planks, was placed around the vessel and braces attached to it in order to help support the weight of the vessel and keep its shape true during construction (*Ibid.*) (figure 8). On larger ships it was occasionally necessary to build ramps leading to the upper portions (Winklareth 2000) (figure 9).

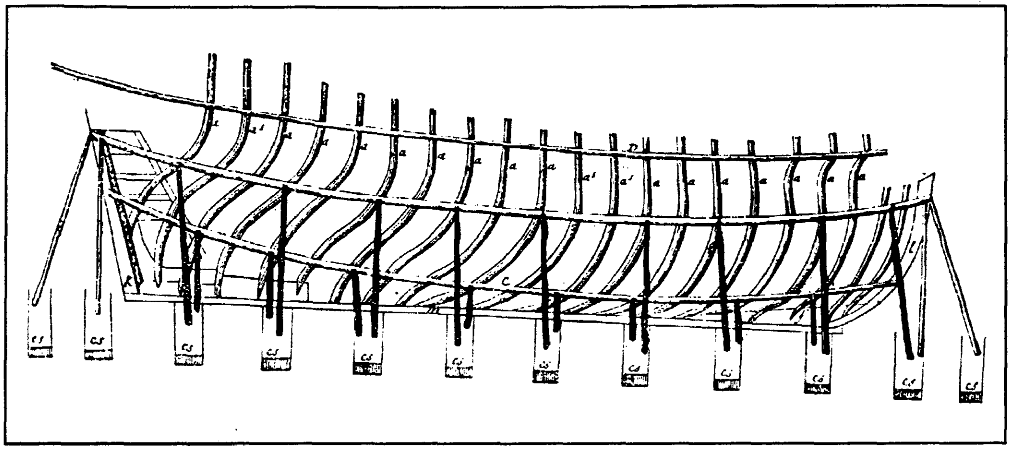


Figure 8: Ship being constructed on the launching ways (Abell 1981:71)

Figure 9: Ramp used in ship construction (Wright and Fowler 1974:115)

After the frames were erected, work began on planking the exterior of the vessel. Planking began at the keel and proceeded upward. It should be remembered that this skin of wood was what kept the vessel afloat and that it is quite difficult to force rectangular pieces of wood to smoothly cover a curved three dimensional shape. Consequently, a good deal of skill and time was required for this process (Abell 1981). With work progressing on the exterior of the vessel attention began to be paid to the interior. Ceiling, or inner, planking was applied to the interior of the vessel's sides, covering the frames on the interior. On larger vessels additional large timbers, called riders, were attached inside of the ceiling planking. These timbers, that ran parallel to the main frames, gave the vessel additional strength. Finally, the decking was put into place. The decks were supported at their ends by naturally bent timbers called knees and larger than average strakes of ceiling planking called clamps. If the deck had to span a sizable gap, stanchions were placed along the keel of the vessel to keep the deck from sagging (Abell 1981). While construction was continuing on the interior of the vessel, the exterior seams were being caulked. Caulking consisted of driving oakum (tarred hemp) into the gaps between planks in order to make the vessel watertight.

After caulking was completed, the vessel was painted, the interior accommodations installed, and any decoration and glass work was done. The ship was now ready to launch. Ideally, launching a ship consisted of splitting the wedges that held the cradle that supported the vessel during construction, thus allowing the boat to slide gently down the launching ways into the water. If the location for the ways was not chosen carefully, the vessel could slide too quickly crushing any unlucky soul in its path or not slide at all, requiring a Herculean effort to encourage it to do so. After the vessel was safely afloat the finishing work could be completed (figure 10). Masts were formed by squaring off a pine tree of sufficient length and diameter, then cutting off the corners so that it was eight sided, continuing the process until it was round. The rounded timber was then hoisted into position and placed into the mast step and secured (Spectre and Larkin 1991). Once in place the masts were supported with standing rigging, the vessel was fitted out with sails and running rigging, and finally, short of a crew, the vessel was ready to go to sea.

Figure 10: Finishing a vessel afloat (Abell 1981:Plate XII)

Shipbuilders

Despite the prodigious amount of labor that was required to produce a vessel and delays brought on by the lack of proper materials and inclement weather, many colonial shipbuilders managed to launch more than one ship per year (Goldenberg 1976). The productivity of a shipyard depended largely on the workforce that the shipwright could muster. Colonial shipyards ranged in size from large commercial yards employing 20 individuals to "shade tree" yards where one or two people built small coastal sloops and schooners (South Carolina Institute of Archaeology and Anthropology (SCIAA) 2000). Small shipyards likely had little division of labor, with one individual undertaking all of the tasks necessary to build the vessel, possibly with one assistant to lighten his load. Conversely, larger yards employed an assortment of laborers and artisans all with different skills. First and foremost among the builders was the shipwright. In many cases this man was the owner of the yard as well as its lead employee; however, even in yards owned by merchants the shipwright maintained overall responsibility for the success of a building project. In all cases the shipwright drew up the plans for the vessel (or carved the half model, as the case might be), and then oversaw all of the tasks that intervened between the conception of the vessel and its completion. He made certain that all of the timbers were hewn and positioned correctly, that the planks were attached properly, and that all the details of the interior met with his approval (Middleton 1981). In many images the shipwright is shown as an old man simply overseeing the construction process (figures 10 and 11), but while a shipyard could benefit from the years of experience such a figure represents, it is likely that younger shipwrights were more physically involved with the construction, especially at those yards with smaller profit margins. Working under a shipwright's supervision, a crew was likely to include at least a few of the following: joiners, caulkers, painters, carvers, glaziers, plumbers, coopers, sawyers, sailmakers, riggers, mastmakers, blockmakers, masons, tinmen, shipsmiths, and common laborers (Goldenberg 1976; Middleton 1981; Spectre and Larkin 1991). It is unknown, but it seems likely, that a number of these positions were filled by a single craftsman at different times during the construction of a vessel.

The workforce consisted of free-men, convicts, and slaves. Free-men workers were hired on by the task (Goldenberg 1976). For example, if a quantity of ironwork was needed for the construction of a vessel, a shipsmith was contracted to produce it, just as a team of sawyers was contracted to cut the required amount of planking, and so on.

Convict and slave laborers found themselves indentured to a shipyard for a somewhat longer period of time, though in some cases, if an owner possessed a slave or convict that

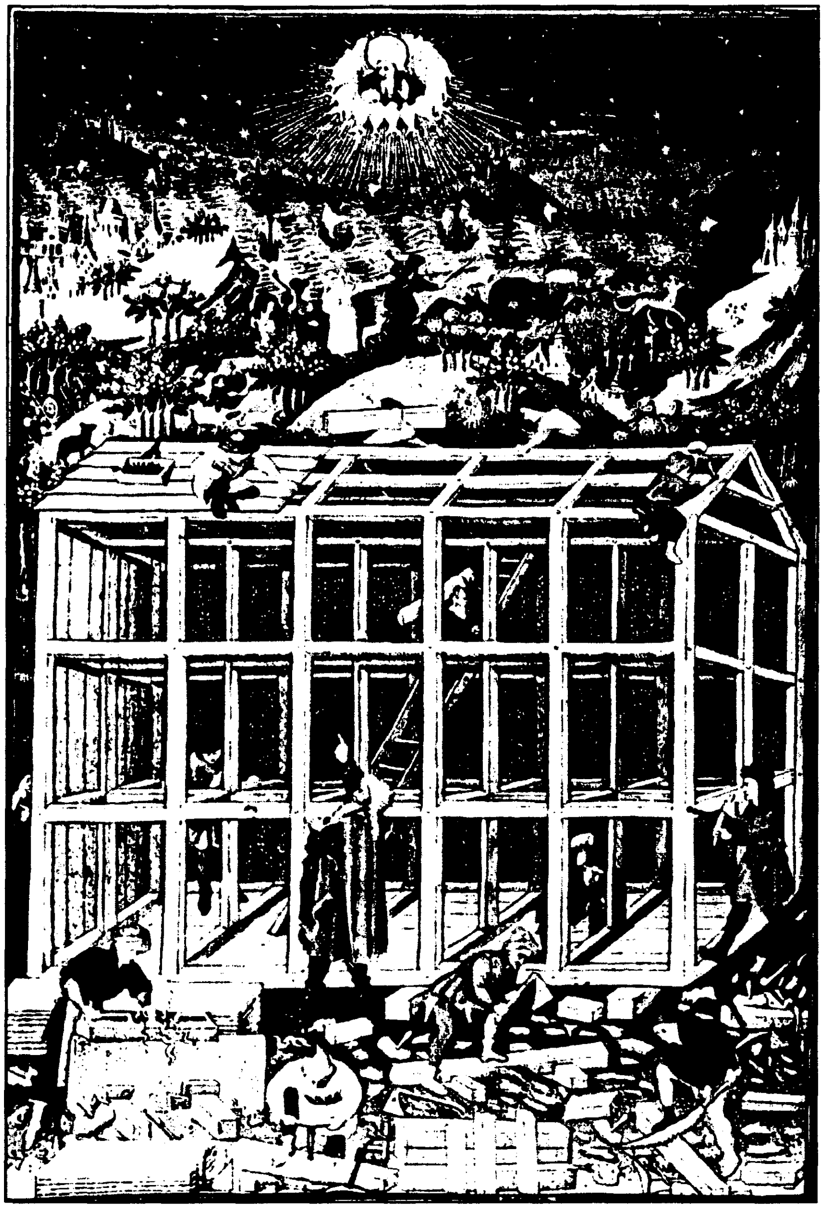


Figure 11: Fictitious shipyard scene, 1423 (Abell 1981:Plate XI). Note elderly shipwright (center) and the various tasks taking place throughout.

had a particular skill, he might rent their services to a shipyard for a given period or task. Slave and indentured labor was used in shipbuilding throughout the colonies, but the shipwrights of Pennsylvania, Virginia, and Maryland seemed to have preferred indentured servants and convicts (*Ibid.*), possibly due to the fact that these individuals often had shipbuilding skills prior to their indenture. In Maryland Charles Carroll depended on both slave and indentured servant labor at his shipyard, while Samuel Galloway and Patrick Creagh utilized servant labor alone (*Ibid.*). Conversely, Daniel Whitney, William Skinner, Solomon Kirwan, and Thomas Jones were all slave owners (MSA 1822, 1810, 1803, 1802, 1798, 1797), as was William Price (Ahrens 1998). Whether or not some of these slaves were employed at the shipyards run by their owners is unknown, but it is not too difficult to imagine that they were. Regardless of their status, all shipyard workers were expected to toil ten hours a day, six days a week in order to complete the vessel on schedule (Spectre and Larkin 1991).

Shipyard Structures

The space in which the shipbuilders worked tended to be as flexible and fluid as the workforce itself (Goldenberg 1976). Many shipyards, especially those of the early period, kept their layout simple and the number of enclosures to a minimum in order to maximize the amount of space available to manipulate the large timbers (Spectre and Larkin 1991) (figure 12). If a shipwright was informal enough to build vessels by sight without the benefit of the patterns created during the lofting process, and his shipyards small enough that he subcontracted for its ironwork, sails and rigging, then the only enclosed space necessary was a tool shed. Even launching ways in colonial America were generally

temporary affairs (Goldenberg 1976). However by the 1700s, shipyards began to take on an industrial appearance (Wolf 1993) and this trend continued until shipbuilding was fully embraced by the Industrial Revolution in the second quarter of the 19th century. With

Figure 12: Spencer Hall, Kent County, Maryland, ca. 1760 (Brewington 1953:14)

increased industrialization, certain features began to become more common at shipyards until all respectable shipyards had a sawmill (or at least a saw pit), a blacksmith, a tool shed, an oakum shed, a timber storage yard, and stocks (Souza and Peters 1997). Additionally, some shipyards may have included a ropewalk and a sail loft. Ropewalks were long sheds, sometimes as long as 1,300 feet, with an opening down the center. Strands of hemp were attached to a twisting machine and pulled down the length of the walk, creating a length of finished line as long as the building (Spectre and Larkin 1991; Moser 1998). Since, the labor force of a shipyard was constantly in flux, it is unlikely that a large amount of housing was found on shipyard sites. However, yards that were more distant from urban centers and those that employed slave and servant labor may have had some bunkhouses on site. The shipwright himself initially tended to live at the shipyard, but as time progressed, more and more wrights took up residence off site so that by 1850 all shipbuilders maintained a residence separate from their yard (Brewington 1953). This trend was particularly pronounced in small towns (Goldenberg 1976). Ralph Storey is a good example of a shipwright dwelling away from his yard. Storey lived in Chestertown until sometime between 1771 and 1783, where his residence was located several blocks from the waterfront (MHT 1977).

The Influence of Tobacco Agriculture

Shipbuilding was a source of employment for only a small portion of Maryland's population and consequently it was not a prime driver of the economy or ideology of the region; tobacco was. The development of Maryland from the mid 17th century through the mid 19th century, and beyond, was driven by and fluctuated with the fortunes of tobacco, and shipbuilding was no exception. As early as 1618 the Virginia Company attempted to dissuade settlers from focussing solely on tobacco by encouraging fishing, the production of iron, glass, and lumber, and shipbuilding, to no avail (Middleton 1984). Maryland followed a similar pattern. For 200 years almost all of the tobacco in Europe was produced in Virginia and Maryland, with every county in Maryland's coastal plain producing at least some until the Civil War (Vokes and Edwards 1974).

Through at least the early 18th century, tobacco agriculture was practiced in Maryland to the near exclusion of all other trades. Marylanders "sheared their sheep to cool them and failed to put the fleece to any use. They wore hats manufactured in England and sold in the colonies at a high price rather than make them of their abundant supply of furs" (Middleton 1984:174). What drove this monomania was the demand for the weed in Europe. In the early years of the colony, the market was so strong that English merchants picked up tobacco (figure 13) and dropped off goods at each planter's private landing (Goldenberg 1976). Consequently, there was no economic reason for other crafts to develop. With all trading going on at the wharves of individual landowners, no urban centers began to develop which prevented the critical mass necessary to support artisans. Specifically, shipbuilding really did not get underway during this period because, with the dependable arrivals of English vessels, there was no need for merchants to ship their own wares and thus no need to buy sizable vessels at all (Goldenberg 1976).

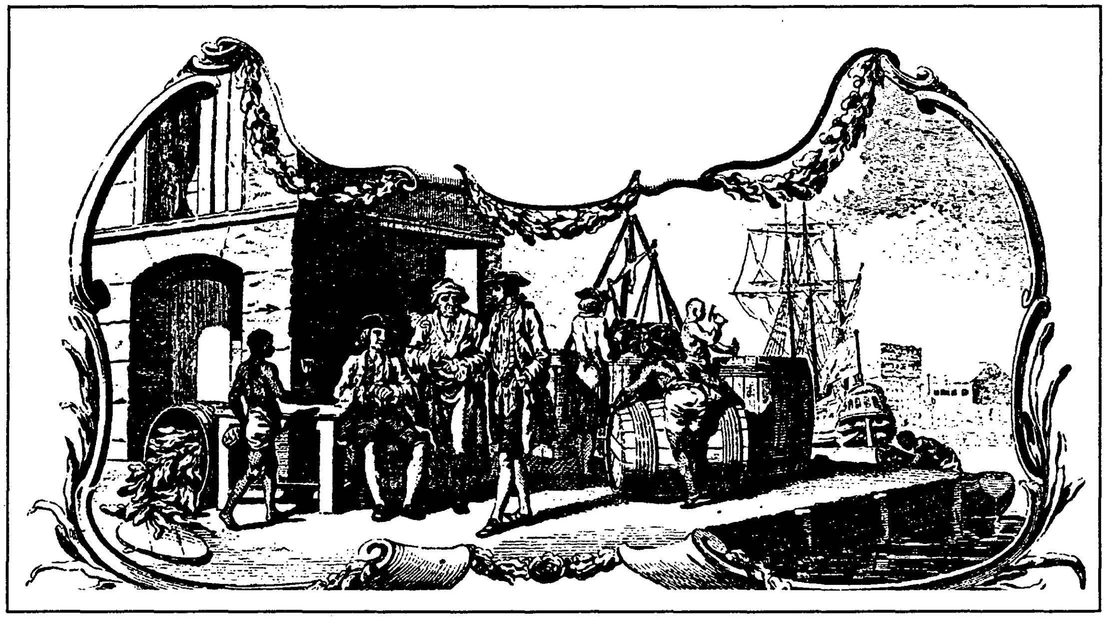


Figure 13: Loading tobacco (Brewington 1953:143)

However, all good things come to an end, and Massachusetts Governor Francis Bernard's statement, "Shipbuilding is generally a losing trade, but it is a necessary resort to make good the balance due Great Britain when other branches fail or prove insufficient" (Goldenberg 1976:126), came true in Maryland during the first quarter of the 18th century. At that time Maryland faced its first economic crisis. The strange climate, hard work, and distance from medical treatment in early Maryland had depressed the area's population growth for the colony's first 70 years. However, by the early 1700s the inhabitants had become "seasoned", resulting in a native born population increase. This natural increase coupled with the beginning of slave importation in 1698 caused ever increasing tobacco production until the market was glutted (Middleton 1984; Moser 1998). Prior to 1660 any abundance of tobacco in England was exported directly to the European continent. After 1660 England began to enforce the Navigation Acts, which stringently curtailed this trade (Middleton 1984). Suddenly the supply outstripped the demand. By 1681, the depression that had begun in 1660 became so pronounced that some observers wondered whether the Chesapeake tobacco market would survive (*Ibid.*). King William's War (1689-1697) and Queen Anne's War (1702-1714) only exacerbated the problem (Walsh and Fox 1974). Yet, it was not until the turn of the century that a shift occurred in Maryland. At this point tobacco planters and merchants in Maryland became more actively involved in the distribution of their product. Previously, the planters had sold their crops to factors, employees of English merchants, in the colonies, and these factors had then seen to its exportation. However, by the early 1700s, a class of merchant-planters had arisen in Maryland and Virginia who dealt directly with merchants in England or outports, such as Scotland (Middleton 1984). As time progressed, this practice became the rule rather than the exception. This newfound independence, combined with the cessation of Queen Anne's War and the resumption of normal trade, brought Maryland's tobacco market out of its depression. After this period the tobacco market only really suffered during wars, which was about half of the time (*Ibid.*)

While the tobacco depression of the late 1600s was relatively short-lived, it had a number of long term effects on the region's economy. The removal of the factors and the addition of slaves meant that there was less chance for the landless poor to advance themselves in agriculture (Mernard and Carr 1982). Thus, a new population was opened up to practicing other trades, including shipbuilding. At the same time shipping began to become the purview of local merchants and ship owners (Middleton 1984). Initially, this was the case because the English merchants lost interest in importing the nearly valueless weed at their own expense, and later because the merchant-planters had taken to exporting their own tobacco directly to their English clients. These developments established an interesting dichotomy between tobacco and ships in terms of how the society assigned value to various objects (Preucel and Hodder 1999). Tobacco was expensive because of the value people placed on it as a symbol of their wealth and their level of enculturation. Conversely, vessels were expensive because of the massive amounts of raw material and labor that their construction required, and valuable because of their ability to transport tobacco to the location where its value was the greatest.

Beside the overarching trends that tobacco produced in ship construction, and crafts in general, it influenced the yearly round of shipbuilding as well. As a vast majority of ship construction was undertaken to provide a means of transporting tobacco to market and whereas the first tobacco to reach England each year commanded the best price because the demand was greatest at that point, it was necessary that vessel construction be synchronized with tobacco production. The bulk of the tobacco was ready for loading in November and it behooved the shipbuilder to have his work completed by that time (Jackson 1982). Therefore, the shipwright had to plan far enough in advance to ensure the timely delivery of his product despite whatever delays may occur in the process. Thus, having introduced the players and set the scene, the drama of ship construction in Maryland can begin.

History of Maryland Shipbuilding

The first shipbuilders in the English colonies did not build vessels for intercontinental trade but simply repaired and replaced the vessels sent from Europe. In fact, many colonial leaders actively recruited shipwrights for their new colonies by giving them land grants free of charge (Goldenberg 1976). Colonial administrators that shipwrights were vital to a colony's success simply because ships provided the only link with the mother country (*Ibid.*). In a worse case scenario the shipwright's wares also provided the sole means of escaping a failed colony.

The first vessel built in the Chesapeake region was not built using the abundant native timber, instead it was a barge assembled by the original settlers at Jamestown from parts prefabricated in England and transported in pieces across the ocean in the hold of one of the other vessels (Brewington 1953). Virginia did not get its first true shipbuilders until 15 years after the area was settled. In 1622 Captain Thomas Barwick and 25 ship carpenters relocated to the area and began constructing small craft for local use (Goldenberg 1976). Maryland had to wait more than a decade after Barwick's arrival to see its first ship construction. During William Clairborne's time on Kent Island (1631-1637) the first vessel constructed by Europeans on Maryland soil was built. The pinnace, *Long Tayle*, was constructed by William Paine with much of the ship's chandlery being imported from Virginia (Semmes 1937). A few years later in 1634, the first settlers in the newly established colony of Maryland took a page from the book of their southern neighbors and shortly after they reached St. Clements Island, they assembled a vessel they had carried from England broken down in the hold of the *Ark.*

During the early years of the Maryland colony, shipbuilding was more boatbuilding than anything. A number of factors conspired to keep the industry small. There was a shortage of skilled laborers, capital, and supplies (Middleton 1984). Shipwrights were not the first individuals to move to the new colony; consequently, the colonists had to be content with whatever vessels untrained individuals or craftsmen trained as traditional carpenters could manage. Shipwrights were no doubt slow to immigrate since the supplies necessary to conduct their trade were not yet developed in the colony. Oak, pine, and cypress were abundant, but the iron industry and the production of sailcloth and cordage would not begin for a number of decades, and a trade network to supply these necessities was slow in being initiated. Furthermore, there was no demand for the services of shipwrights during the early colonial years. Until the end of the 17th century, most colonists lacked the capital to invest the substantial amount of money necessary to build an ocean going vessel (*Ibid.*). Even had there been the requisite capital in the colony, there would have been little demand for ships because tobacco was so valuable that English and Dutch merchants sent vessels laden with goods to purchase and transport the tobacco back to Europe (Brewington 1953). Due to the lack of shipwrights, colonists were instructed to bring ships' chandlery and servants experienced at boatbuilding with them in order to construct even the simple vessels needed for transportation and local trade in a colony with no roads (Semmes 1937).

Despite these handicaps, shipbuilding did begin to grow in Maryland, likely because the area provided so many natural advantages for it. In a letter dated April 25, 1638 Leonard Calvert, Lieutenant-Governor of Maryland, told his brother, the Lord Proprietor, of accusations of piracy leveled against a Mr. Smith for taking goods off of a pinnace owned by St. Mary's Town (Hall 1910). Thus, even by this early date, maritime trades seem to have been developing in the region. Three years later Maryland boatbuilders may have seen an increase in their trade as the English Civil War cut off overseas trade. At this point trade shifted to intercolonial and West Indian trade (Chapelle 1951). The smaller coasting vessels used in this sort of trade were within the abilities of the early shipbuilders in Maryland as they primarily built pinnaces, shallops, barges, and wherries (Semmes 1937). Nonetheless the increase of the craft was still incremental at best. In 1642 Maryland reported only eight individuals even peripherally associated with shipbuilding: two boatbuilders, two mariners, one joiner, one sawyer, one blacksmith, and one brickmason (Menard and Carr 1982). In fact the growth was so incremental that in 1678 Governor Charles Calvert reported that, despite attempts to encourage it, no ships were being built in Maryland (Goldenberg 1976). It would seem that while the governor had the right spirit, he overstated things a bit; at least six shipyards appear to have been operational at the time of his statement. These yards were the Smoote, Kings Creek, Dover, Avery, and Lowe shipyards, as well as the shipyard operated by Thomas Skillington, that produced the largest vessel (450 tons) then produced in Maryland in 1697 (see appendices A and B). Additionally, a good deal of small vessel construction was taking place on individual plantations. Small coastal trading vessels were constructed on the shores, and at the wharves, of many large tracts of land. However, since both the yards and the vessels they produced were small, even by 17th century standards, and because shipbuilding was only a small portion of the owner's undertakings these do not constitute true shipyards.

As the 17th century drew to a close, substantial changes began to take place in Maryland, affecting all aspects of life, shipbuilding included. For nearly the first three quarters of a century that the colony was in existence, the colonists strove to increase efficiency in tobacco production and to develop the wilderness into a home that Europeans could recognize. At the turn of the century the latter of these two goals had been successful, and the infrastructure of the colony was in place: stumps had been pulled, fences built, houses erected, etc. leading to more free time to pursue crafts (Carr 1988). Furthermore, the sex ratios in the colony had begun to balance out due to the growth in the native born population. As families grew, there was a need to diversify production and begin home industries such as spinning and brewing (*Ibid.*). However, the major incentive for diversification came as a result of the tobacco depression at the end of the 17th and the beginning of the 18th centuries. With tobacco prices at an all time low, settlers sought other means of earning a living. Many continued to pursue agriculture in the form of grain and maize production, while others took up crafts such as leatherwork, weaving, and metalwork (Carr et al. 1988). This diversification led to a steadier, expanded economy that began to generate urban centers which could support more craftsmen. Additionally, the collapse of the tobacco market brought on a cessation of the steady tide of white servant labor that had supplied the workforce on the tobacco plantations. In response planters began to import African slaves. With this newfound labor force many poorer whites were no longer needed on the lands of large planters so they also had to seek other sources of income (*Ibid.*).

Shipbuilding benefited from this newfound interest in the crafts as well as from the formation of a new class of merchant-planters. These entrepreneurs began to exclude the English factors from their trade network and started trading directly with English and Scottish merchants. In order for Maryland merchants to conduct this trade, it became necessary for the first time to own vessels. Beginning during this period, these merchants began funding the construction of large vessels on both the eastern and western shores (Thompson and Seidel 1993). The 1697 census reported that since 1689, 93 vessels had been built on the Eastern Shore and 67 in the remainder of the state (Brewington 1953). Much of this shipbuilding was occurring in Talbot County; the center of the industry during this period (Goldenberg 1976). Furthermore, the 1698 Report of the Sheriffs references 13 ships, nine "vessels", six pinks, 12 brigantines, 70 sloops, and 51 shallops owned in Maryland. The average tonnage of these vessels was 150 tons (Middleton 1984). While not all of these ships were necessarily built in Maryland, some certainly were, as were larger ones including Skillington's 450 ton ship and the 358 ton *Elizabeth* that cleared Oxford in 1699 (*Ibid.*). This sudden boom in the shipbuilding market precipitated the shipyards and shipwrights taking on a more structured, professional appearance. As ships became larger it became necessary to have permanent facilities manned by highly skilled workers to build and maintain them (Winklareth 2000).

The colony's newfound interest in the shipbuilding industry was supported by the British government because American shipyards were more efficient, producing cheaper vessels quicker than their British counterparts (Middleton 1984). This fact had less to do with rugged individualism and colonial can-do entrepreneurship than with the timber shortages and bureaucracy that hindered British builders. The King's consent to American ship construction took the form of a number of laws passed between 1661 and 1723 designed to encourage Maryland shipbuilding. The 1661 legislation imposed a tax of one pound of gunpowder and three pounds of shot per ton of shipping on vessels "not properly belonging" to the colony (Middleton 1984: 280). This law was followed by the 1694 law that stated:

> "And for the Encouragement of all such psons as have built Shipps or Vessells since the Assembly held at St. Mary's the 21st of September 1694 within this Province, as also for all such persons as shall from hence forward build any Shipps or Vessells within the province afd shall be free and clear from paying any Duty impost or Custome for any Liquors imported into this Province. Liquors from Pensilvania East & West Jersey only excepted" (Browne 1899: 248).

Next in 1704 double the tax was placed on furs exported from the colony by non-Marylanders. The year 1715 saw the imposition of a three pence per gallon tax on imported liquors and a 20 shilling tax on each slave and Irish servant brought into the state. However, inhabitants of the state were exempt from these charges. Finally, in 1723 a one shilling per barrel duty was charged on all pork for non-residents (Middleton 1984). One other law was discussed years later that provides a preview of how important ship building was to become in the colony. In 1754 the General Assembly brought a motion to the Lower House that shipyard employees be exempted from being summoned to repair the Public Road (Pleasant 1932). Obviously, their employment, and by extension their product, was given precedence over other concerns. For shipbuilders to be relieved of public duty implies that vessels were considered vital to the public welfare.

As the 1700s progressed, some of the crafts that saw their inception during the tobacco recession of the late 17th century began to suffer. As large plantations strove for self-sufficiency, they incorporated many of the trades that required less skill and capital to undertake, generally employing slave or servant artisans to complete them. This trend left many of the free craftspeople of the newly established urban centers out of work (Russo 1988). However, shipbuilders were not grossly affected by these developments as their trade involved large amounts of both capital and skill. Doubtlessly, small boats were still constructed on the shores of most plantations but the larger vessels required for the European and West Indian trade were constructed by professionals.

Throughout this period shipbuilding continued to grow and the boom-bust cycle that would define much of its history was established. The trade was recessed around 1708 during Queen Anne's War, only to be revived in 1713 at the end of the hostilities (Middleton 1984). There was a burst of activity until the early 1720s when another recession struck (Thompson and Seidel 1993). The market rebounded again in the 1730s (Middleton 1984). Despite these frequent recessions, the general trend in Maryland shipbuilding was toward increase. However, none of this is to say that shipbuilding was truly a going concern during the first century of the colony. Up through the 1730s, shipbuilding was underdeveloped throughout the South. There was simply too much interest in tobacco and English shipping was too readily available. The sustaining employment of shipwrights during this period was likely ship repair, rather than new construction (Goldenberg 1976). In 1731 the General Assembly noted, "There are but very few Trading Vessells belonging to the Inhabitants of this Province, severall Counties…have not one Trading Vessell belonging to them" (Steiner 1917:291). Similarly, in 1732 the same body reported, "The number of Vessells belonging to this Province are about Sixteen Sloops, Two Snows & one Ship" (Steiner 1917:589) (figure 14). Clearly, though shipbuilding was on the rise, it had yet to reach a respectable level.

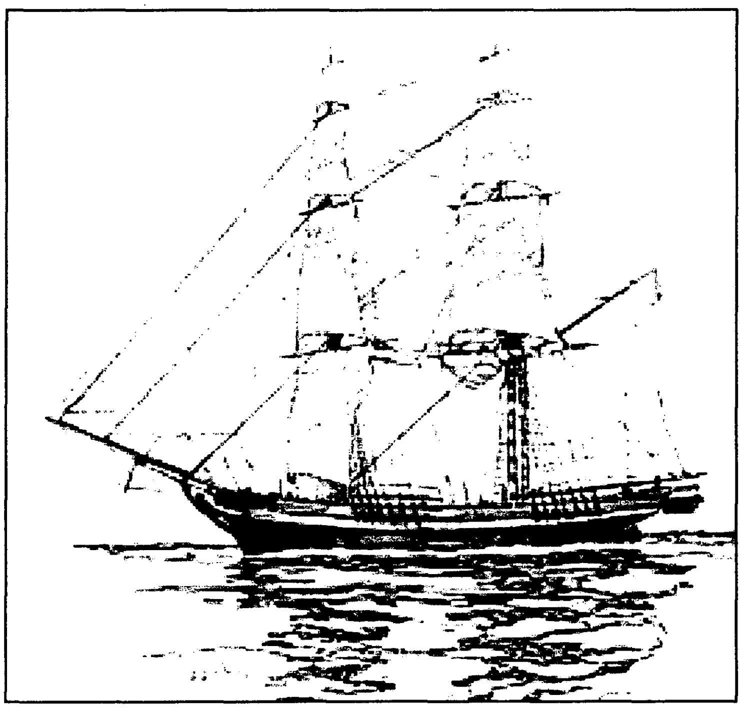


Figure 14: Snow (Culver 1992:177)

As the second and third quarters of the 18th century proceeded, this state of affairs began to change. During the years leading up to the American Revolution, Maryland shipbuilding continued to suffer cyclical recessions, but the overall increase was much more pronounced. Throughout the 1740s and 1750s, Maryland merchants purchased more and more of their own shipping in an effort to seize greater control over the wealth generated by their exports (Goldenberg 1976). The local merchants had finally begun to see the benefits that a locally owned merchant marine could foster in terms of independence from the credit system of the English merchants, and in terms of their own overall economic growth. Accordingly, there was a steady increase in the average tonnage of vessels registered in Maryland (figure 15). In 1735 the average was 36 tons, 1740 saw an increase to 42 tons, with 44 tons being the mean five years later, and by 1750 the

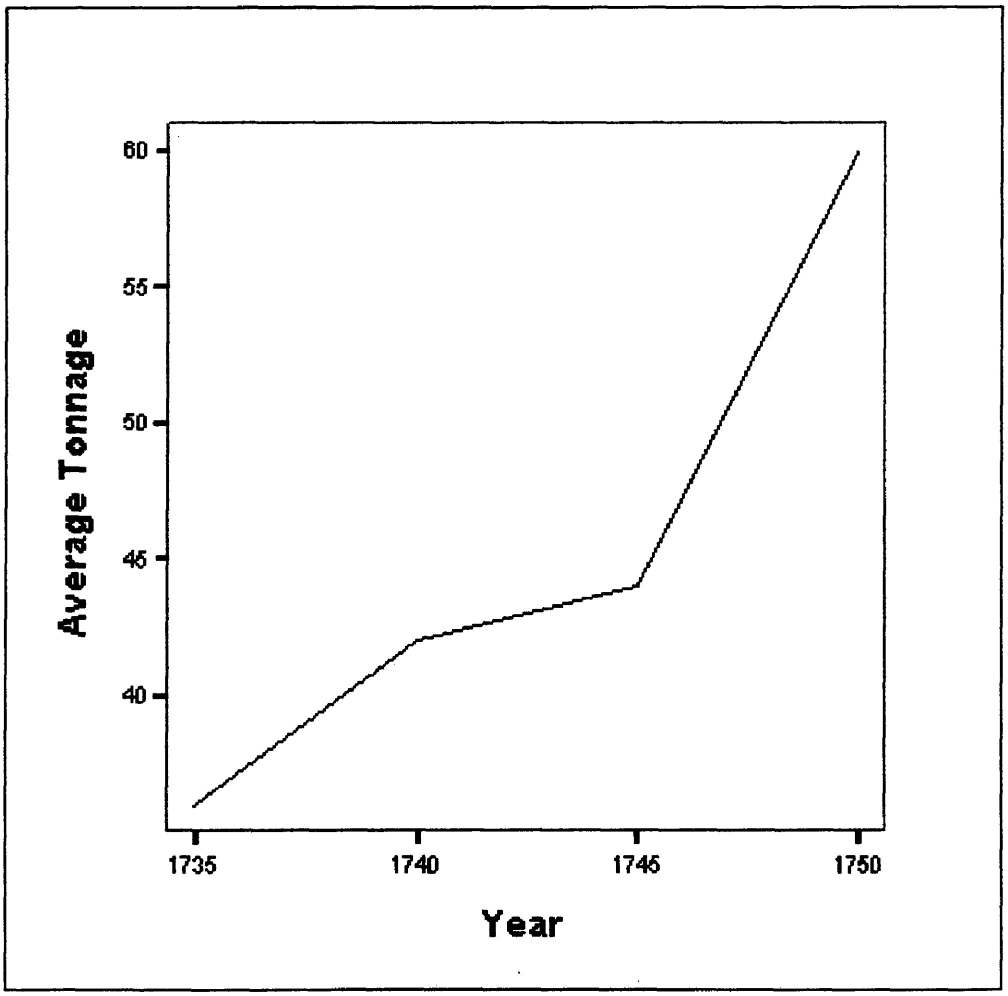


Figure 15: Trends in average tonnage of vessels registered in Maryland, 1735-1750

average tonnage had reached 60 (figure 16). While this increase is impressive, it should be normalized by realizing that in 1754 the average British vessel was 80 tons (Middleton

1984). Large vessels, similar to the *Elizabeth* and Skillington's 450 ton ship, continued to be built in the colony as well. In 1747, a 425 ton vessel was launched on the Nanticoke River (*Ibid.*).

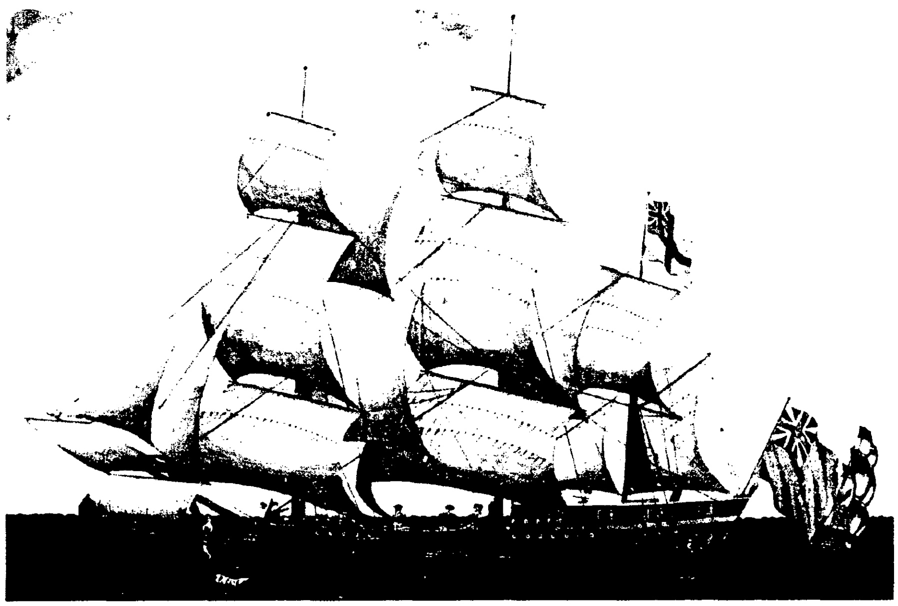


Figure 16: Ship, ca 1750 (Brewington 1953:30)

While all of these changes were incremental, it seems that 1748 represented the benchmark year of this period. In that year the New England shipping to Annapolis dropped from 80% to 30% (Goldenberg 1976). While this statistic is only for one port, it seems likely that Annapolis can be treated as a proxy for the state as a whole. Maryland shipbuilding had finally begun to achieve primacy in its own waters. To follow the Annapolis example further, the percentages of native built shipping can be followed from 1747 through 1775 (figure17). In 1747, only 9.8 percent of the vessels registered at Annapolis were Maryland built. However, from 1748 to 1751, the percentage was 40.2 percent; this represents the drastic shift in local shipbuilding discussed above. For the next four years, the market held steady at 40.4%. It then increased to 48.8% between 1756 and 1759, only to decrease to 40.6% between 1760 and 1763. The percentage fell even further during the period of 1764 to 1767, reaching bottom at 34.9%. However, the industry rebounded between 1768 and 1771 with percentages at Annapolis reaching 53.7%. Finally, from 1772 through 1775, the percentage was 56% (drawn from the appendix of Goldenberg 1976). In summary, between 1745 and 1775 only 6% of the vessels that came

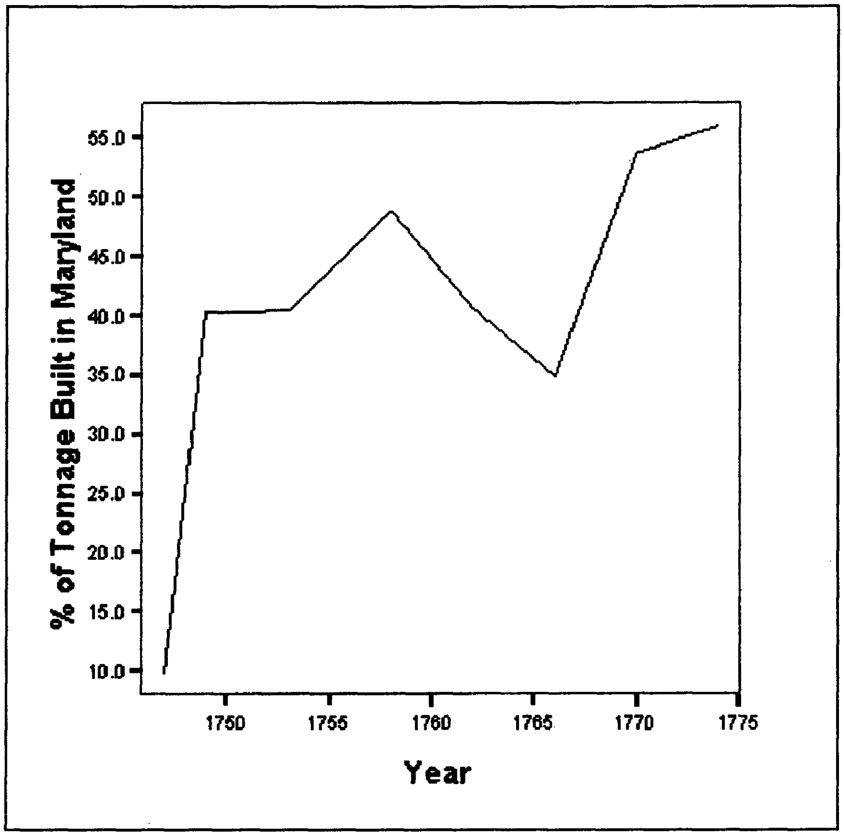


Figure 17: Trends in the percentage of tonnage registered at Annapolis that was built in Maryland, 1748-1775

into Annapolis were registered from New England. Maryland had established a strong shipbuilding industry at home and was consequently disinterested in outside shipping (Goldenberg 1976). To look slightly beyond the Maryland-New England dichotomy: in 1769 the Chesapeake colonies (Maryland and Virginia combined) produced 12.5% of the tonnage in British America from Florida to Newfoundland (Middleton 1981, 1984). Similarly, while in 1771 the Chesapeake region built fewer ships, these ships were larger so the area again represented 12.5% of colonial shipping. For that year Maryland represented 6.3% of the total; an even split with Virginia (Middleton 1984).

While the percentages of Maryland-built ships registered at Annapolis is a good indicator of the strength of Maryland shipbuilding in comparison to other regions, a more accurate index of the growth of the industry is the amount of built tonnage produced each year. Between 1748 and 1751 the built tonnage of Maryland vessels increased each year. This trend was reversed between 1752 and 1760. Then during the period of 1761 to 1775 the market saw a constant increase (Goldenberg 1976). Between 1756 and 1775 Maryland produced 98 ships, 37 snows, 66 brigs, 111 schooners, and 74 sloops (Middleton 1981). Overlapping that period and thus representing a similar sample, during the period of 1753 to 1776, Maryland built 126 vessels over 100 tons, 36 over 200 tons, and one vessel with a capacity of 320 tons (Middleton 1984). Much of this growth was stimulated by the high grain prices fostered by King George's War and the French and Indian War (Middleton 1984). Vessels were required to export these grains from the colonies in order to take advantage of the growth market. In 1766 a dip in the fortunes of shipbuilders was observed as the grain market in the Mediterranean, Spain, Portugal and the Wine Islands collapsed causing an according drop in the demand for new vessels. Shipbuilders recovered quickly by 1768, but the market was not as strong as it had been before and shipbuilding was once again a risky business (*Ibid.*). Clearly, the trends established early in the century persisted throughout: the market waxed and waned but generally tended towards an increase. In fact, the increased demand for Maryland-built vessels was so great that there were not enough native shipbuilders to meet it. Consequently, during the 1740s and 1750s, skilled convicts began to be imported from England to fill the labor gap (*Ibid.*).

That this shift in shipbuilding fortunes was driven by the interests of local merchants is supported by the fact that between 1748 and 1759, 75% of Maryland-built vessels were owned by Marylanders. This percentage grew to 80% between 1760 and 1771 and reached 95% by the eve of the American Revolution (Goldenberg 1976). The primary market for Maryland shipbuilders was their neighbors, and it seems that their neighbors may have been their only market as well. To the north, the percentage of Maryland-built tonnage reported at Boston, Philadelphia, and the whole state of New Hampshire never exceeded 3%. South of Maryland there were many years when no Maryland-built vessels were reported in either South or North Carolina, though Maryland built tonnage did reach 9.5% in South Carolina for the period of 1770 to 1774 (drawn from the appendix of Goldenberg 1976). Maryland shipbuilding had yet to leave an indelible mark on the shipbuilding of North America.

Much of the growth just discussed took place on the Eastern Shore. The soils of that region are not as well suited for growing tobacco as those of the western portion of the state's coastal plain. Thus, whenever the tobacco market was depressed, the inhabitants of the Eastern Shore were the first to turn to other trades (Middleton 1984). Two factors drove the inhabitants of this region to produce goods other than tobacco. Primarily, these individuals began to produce their own goods to fill the void left by the products they could no longer afford to import from England. Additionally, the goods they produced allowed them a means of exchange in the local market. One of the trades that grew out of this imposed self-sufficiency was shipbuilding. Shipbuilding fit well into the Eastern Shore economic scheme because it allowed a means to transport their other crafts to distant markets. As the region had less tobacco to export, they had fewer goods imported from England and consequently they began to focus on coastal trade (Clark 1950) for which locally produced vessels were well suited. Consequently, the Eastern Shore dominated the early shipbuilding market, especially the counties of Talbot and Kent (Middleton 1984), with a ratio of five vessels built to every three of the rest of the state (Clark 1950).

As the 18th century progressed, shipbuilding ancillary industries began to develop throughout Maryland so that, by 50 years prior to the American Revolution, the Chesapeake began to have all of the industries necessary for independent shipbuilding on this side of the Atlantic (Middleton 1981) (figure 18). In 1718, the Principio Company

Figure 18: Advertisement for shipbuilding ancillary industry (Brewington 1953:168)

established the first iron forge in Maryland at the head of the Chesapeake Bay (Middleton 1981, 1984). By the time of the Revolution there were 15 to 20 such foundries in the state

(Moser 1998) with the capability of supplying all of the iron needs of local shipbuilders. While the iron industry depended only slightly on shipbuilders for its growth, the production of cordage and sails were inextricably linked to the development of shipbuilding. With the growth of ship construction, these crafts were given an opportunity to flourish for the first time in Maryland. In 1736, John Conner established himself as a sailmaker in Annapolis; he was joined in 1753 by William Bicknell (Middleton 1984). Additionally, Stephen West was spinning hemp for sailcloth and cordage at London Town on the South River in 1747, (*Ibid.*) and Adam Bence was making sails in Bladensburg along the Potomac River in 1786 (Tilp 1978). The first ropewalk in Maryland was established in 1747 (Moser 1998) with Annapolis, London Town, and Chestertown each supporting one a year later (Middleton 1981, 1984). The Ashbury Sutton ropewalk in Annapolis was 360 feet long and capable of making sizable pieces of cordage (Middleton 1984). In 1774, Christopher Lowndes established what may have been the first ropewalk in the Potomac region (Tilp 1978). The only known 18th century ropewalk on the Eastern Shore was the Bedingfield Hands and Company ropewalk in Chestertown (Moser 1998). This paucity of ropewalks seems odd in conjunction with the Eastern Shore's dominance of shipbuilding during this period. A partial explanation for this incongruity may be that all ships' chandlery had heretofore been imported from England, thus making it acceptable for shipbuilders to import the required goods from across the Bay. Consequently, ropemakers and sailmakers were able to dwell in the more developed portions of the colony. In fact, despite this boom in ancillary industries, most shipbuilders continued to import their ships' chandlery not only from across the Bay but from across the ocean. This was partially due to attempts by Parliament to rein in the growing economy of the colonies. In 1736/1737 Parliament passed an act reading:

> "Every vessel built...in any of his majesty's plantations in America shall, upon her first setting out to sea have...one full and complete set of sails made of sailcloth manufactured in Great Britain."
>
> (quoted in Moser 1998:125)

Another act of Parliament taxed the sails of a vessel entering an English port if the sails were not English (Middleton 1984). Thus, while England was trying to encourage the development of local shipbuilding through tax relief, it was at the same time trying to keep the market from becoming fully independent by the same means. This state of affairs was likely brought on by the fact that Great Britain had been largely denuded of timber by this time making shipbuilding inefficient there, but hemp for sails could still be imported cheaply from Russia, processed and exported at a large profit. Thus, what may have appeared as a paradoxical approach to American shipbuilding in fact was economically wise for English merchants. This behavior is not uncommon in core nations. In addition to the economic argument, it seems that the quality and quantity of the indigenously produced wares were simply not sufficient to meet the demands of shipwrights, thus English goods continued to dominate the market right up to the American Revolutionary War (Middleton 1984; Moser 1998).

In 1776, the percentage of Maryland-built ships in Lloyd's Registry reached its highest mark to that time, 8.8% of the total American shipping (Goldenberg 1976). At the same time Maryland shipbuilders were beginning to take part in what would become the

American Revolution. On December 3, 1775, Congress authorized the construction of 13 frigates (figure 19) to form the basis of the federal navy. One of these vessels, the 28 gun

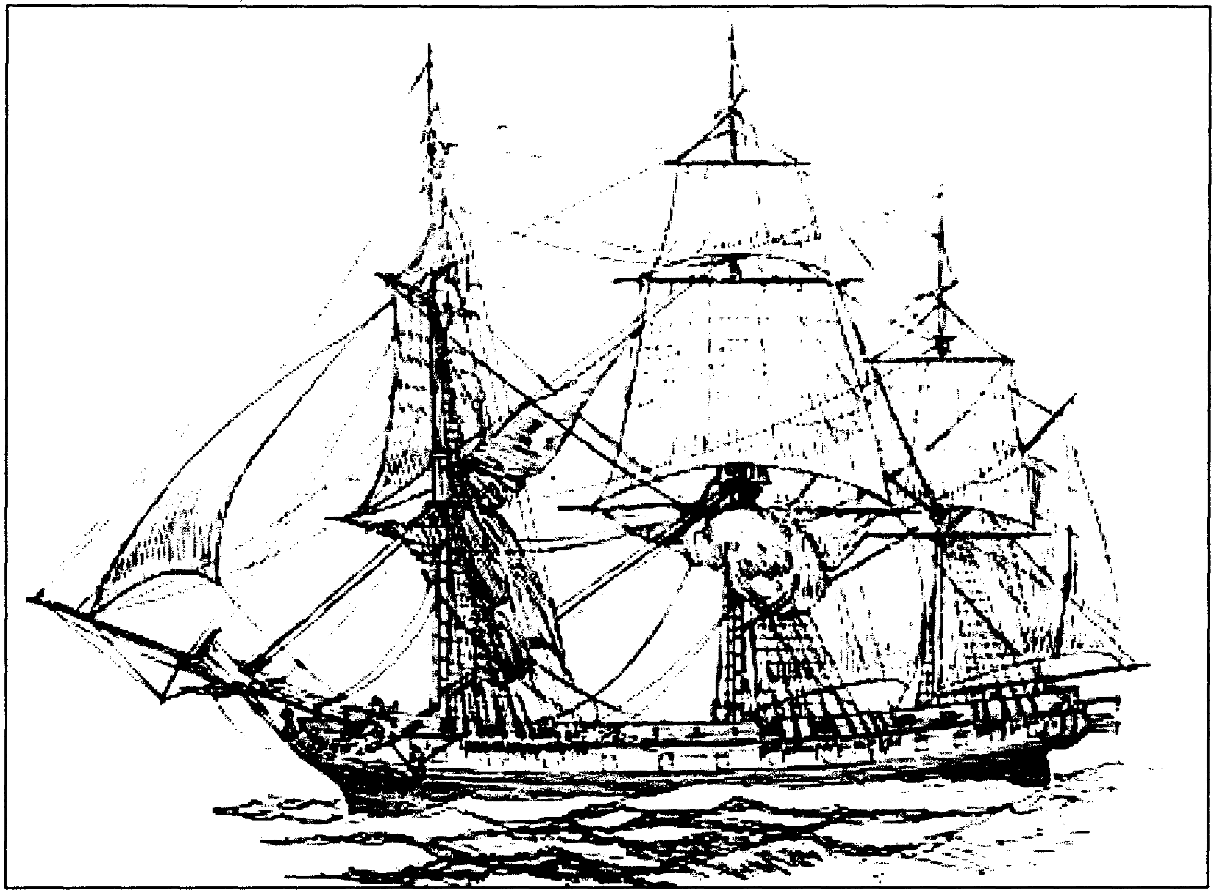


Figure 19: Frigate (Culver 1992:169)

Virginia, was contracted to be built by George Wells of Fells Point, Baltimore (Eller 1981, Winklareth 2000). Six months later, in June of 1776, the Maryland General Assembly authorized the construction of seven galleys for the State Navy. The first of these galleys was launched on December 27, 1776 (Eller 1981). Again, a few years later, in May of 1781, under the second Defense of the Bay Act, the Maryland Assembly ordered that eight barges and two galleys be built. However, because they felt that the government was moving too slowly to defend their maritime interests, Eastern Shore citizens began building multiple barges and Baltimore began to build a galley in 1781 as well (*Ibid.*).

Because the builders of Maryland's official navies were concentrating their efforts on barges and galleys their vessels were generally not menacing English shipping channels or engaging ships of the line in pitched naval battles. However, they were invaluable in deterring privateers from haunting Maryland waters, protecting merchant vessels, transporting troops, and acting as couriers (*Ibid.*).

Some of the vessels constructed in Maryland during this period did give English vessels cause for concern. At the beginning of the Revolution the Chesapeake was producing essentially two types of vessels: large ships and brigs that were slow, cumbersome and conservative, but which maximized cargo capacity; and smaller vessels, chiefly sloops and schooners, that were radically designed and fast, but which sacrificed cargo space (Middleton 1981). Throughout the war, Maryland builders continued to construct these types of vessels with the larger ones serving as merchantmen and men-of-war, and the smaller, quicker vessels being used as privateers (Eller 1981). However, the Revolution had effects on both the large and small vessels. Brigantines began to outpace the other larger vessels in terms of production (Middleton 1981) because its hermaphrodite rig provided a good mixture of the straight sailing speed of a square rig and the maneuverability and adaptability of the fore and aft rig. Adopting a similar rig, but growing more out of the radically designed fast vessels of the earlier period, the Baltimore schooner came into its own at this time as well. The rudiments of this design had been in existence since roughly the middle of the century but it was not until the Revolution that there was an opportunity to show its true value. With their slim hulls and raking ends, these vessels were fast enough to avoid ships of the line, but they were also large enough and sufficiently well armed to stand their ground against privateers and smaller war vessels (Ahrens 1998; Chapelle 1988). Throughout the war, these schooners made a name for themselves and proved the legitimacy of Maryland shipbuilding. The Baltimore schooner, was easily the most significant maritime development for Maryland to come out of the American Revolution. After the war, these vessels saw service wherever a sizable but speedy ship was required, most notably as privateers and in the slave trade. Eventually, this vessel type developed into the now famous Baltimore clipper (Ahrens 1998).

By the end of the colonial period, the Chesapeake region had replaced Pennsylvania as the second leading ship producing region; New England still maintained dominance (Goldenberg 1976). After a recession immediately following the war, Maryland's shipbuilding industry continued to grow as well, especially during the 1790s (Ahrens 1998). Maryland merchants and planters were now left completely to their own devices when it came to getting tobacco to the European market. Ships that were large enough to transport the bulky leaf across the ocean were now in high demand (Middleton 1981). The trend that had begun mid-century with merchants beginning to own their own vessels now reached fruition and the tonnage produced in Maryland continued to grow. Military contracts continued to be awarded to local shipwrights as well. In 1797, when Congress authorized the construction of six new frigates one of them, the 36 gun *Constellation*, was built in Baltimore by David Stodder (Winklareth 2000). This vessel was a sister ship to the *USS Constitution* of Old Ironsides fame. Additionally, William Price of Baltimore was authorized to build a gunboat in 1805, the firm of Flannigan and Parsons of Baltimore built the 44 gun frigate *Java* in 1813, and in the same year Thomas

Kemp, also of Baltimore, built an 18 gun sloop-of-war (Winklareth 2000). Some of Joshua Barney's gunboats were Baltimore-built, as well. The fact that, while there was some naval shipbuilding in St. Michael's, Talbot County the majority of the contracts were awarded to Baltimore based shipyards is indicative of trends that, during the first two quarters of the 19th century, changed the face of Maryland shipbuilding.

The shipbuilding industry in Maryland suffered another of its periodic recessions in 1808 in response to the Non-Intercourse Act, which cut off all trade with France and Great Britian, but quickly recovered in 1811, only to decline again in 1813 due to the War of 1812 (Ahrens 1998). After a brief resurgence following the war, shipbuilding, like many other industries, was again struck by a depression in 1819 as an economic panic swept the nation. Shipbuilding was depressed in Baltimore throughout the 1820s. The St. Michaels area of Talbot county, that had up to this point had been a major shipbuilding center, all but ceased production and did not resume until the 1840s (Lesher 1995, in press). During this period, the shipbuilding industry of Maryland faced a major ecological catastrophe. Almost 200 years of unbridled development had finally succeeded in depleting the region's natural stores of timber (Vokes and Edwards 1974). The Eastern Shore seems to have been particularly hard hit. While it was possible for shipbuilders to import lumber from other regions, and they most certainly did (i.e. MSA 1859), it was harder for Eastern Shore builders to take advantage of this trade. The Eastern Shore had continued to have few urban centers of any size, while the western portion of Maryland had developed major ports at Baltimore and Annapolis. The presence of these ports and the centralization of shipbuilders at them put the Eastern Shore at a distinct disadvantage when it came to importing materials. At the same time, other even more significant changes were being wrought in the worlds of science and engineering that would ultimately lead to the total centralization of all large scale shipbuilding into a few companies located in Baltimore, namely the creation of iron vessels driven by steam engines.

Figure 20: The *Codorus* under construction, 1825 (Brewington 1953:24)

The first commercially employed steam engine was used by John Fitch in 1790 on the Delaware River (Gould 2000). This development was followed 35 years later, in 1825, by the *Cordus*, the first iron hulled vessel built in the United States (figure 20). The *Cordus* also had the distinction of being the first iron hulled steamship (Brewington 1953). By the middle of the century all naval vessels had gone to steam propulsion using screw propellers (Winklareth 2000). However, the transition was not instantaneous. Steam vessels did not surpass those driven by the wind in tonnage until the 1880s, and it was not until after the turn of the 20th century that the production of steamships finally outstripped sailing vessels (Gould 2000). It was not until World War II that the transition was complete (Spectre and Larkin 1991). Thus, it took more than a century for iron and steam to push wood and sail out of the market, but the end result was inevitable. With the advent of the Industrial Revolution and trains, people had begun to develop rigid schedules and very exacting ideas about how much deviation from these timetables was acceptable. The wind was simply not dependable enough for sailing vessels to fulfill these expectations (*Ibid.*). Furthermore, by this period, significant road networks and bridges had been constructed reducing the need for shipping. Even the beautiful clipperships began to see a decline. With the threat of violence reduced after the War of 1812 the need for speed was replaced by a desire for more cargo space (Ahrens 1998), but it was impractical to build one of these vessels over 600 tons, so they could not compete with the larger iron hulled cargo vessels. By the 1860s, even these ships had disappeared (Chapelle 1988).

The period when "the Industrial Revolution went to sea" (Gould 2000:264) had monumental effects on all facets of the shipbuilding trade. The first half of the 19th century was a traumatic period for shipwrights as they struggled to incorporate the new materials and propulsion systems into their repertoire of skills (Gould 2000; SCIAA 2000). Entirely new crafts had to be learned and incorporated into the shipbuilding process. New craftsmen such as boilermakers and punch and shear operators had to be hired (Souza and Peters 1997). The shipyards themselves had to be expanded to include engineering works for the construction of boilers and additional equipment to facilitate working large pieces of iron (Winklareth 2000). Beginning in the 1820s, there was a consolidation of shipbuilding into a few yards in centralized locations (Brewington 1953). This transition was simply a matter of economics. The smaller shipbuilders did not have the capital to purchase all of the machinery and raw material necessary to build a vessel, let alone hire all of the specialized laborers required to see it to successful completion. Gone were the days when the bulk of the materials needed were available from the environment and a handful of individuals could master all of the skills needed to build a vessel. The larger yards were centralized in the big cities for much the same reason that shipyards had traditionally been in the vicinity of cities; it was necessary for them to be near their customers. Furthermore, as this new mode of ship construction depended on materials that were not locally available, they positioned themselves near importation centers; located not only in major ports, but near railheads. In Maryland that meant Baltimore. Gone were the smaller dispersed shipyards of the colonial period, they had been replaced by corporate "iron works" such as Baltimore's Columbia Iron Works (Winklareth 2000).

The only exception to this statement is the smaller wooden vessel construction that persists throughout the state to the present day. Areas such as Solomons Island continue to produce skiffs, bugeyes, racing canoes, and oystering vessels. However, all of these vessels are small and analogous to the plantation-based small boat construction that has been ubiquitous in Maryland since the earliest days. While these vessels represent an important economic boon to their regions and a source of cultural pride for the state as a whole, they do not constitute true shipbuilding. By the mid to late 19th century, Maryland shipbuilding had largely adopted the character that it maintains today: large industrial shipyards servicing not just Maryland merchants but international interests complemented by regional small-scale boatbuilding.

CHAPTER III:

THEORETICAL CONSIDERATIONS

If the methodology and theory are almost wholly beneath the level of consciousness it is axiomatic that they are inadequate. For all aspects of intellectual procedure must be made explicit in order that they may be subject to criticism and empirical testing.

- Kluckhohn, 1978

Clearly, historical shipbuilding in Maryland was driven by the economic development of the colony and fluctuations in the availability of the natural resources. Changes in modes and means of production over time influenced how and where vessels were constructed. Consequently, the theoretical perspective adopted in this work is a materialist framework couched in terms of economics and ecology. Thus, the primary archaeological theories that bear on this research are cultural ecology and materialist or Marxist archaeology. Additionally, the theories surrounding settlement pattern analysis, spatial analysis, and predictive modeling are discussed because this text deals with the locational analysis of specific sites. Finally, as the spatial analysis conducted here was performed using GIS software, and the GIS movement has fostered its own robust theory, it is necessary to delve briefly into the theoretical considerations raised by GIS.

The term cultural ecology was coined by Julian Steward in 1955. In this earliest manifestation Steward set forth three tenets. He believed that similar adaptations could occur in different cultures living in similar environments. Secondly, because environments change and the needs and technologies of a culture undergo metamorphoses, adaptations to the environment alter over time. Finally, these changes are not unidirectional. Cultures, as defined by their interactions with the environment, can become more or less complex as time passes. Based on these observations, Steward felt that he could identify traits that occurred in multiple cultures and thus distinguish the features that made up the cultural core. Initially, culture was seen as being driven by the environment, with the role of other factors largely ignored. However, as cultural ecology matured, cultural manifestations came to be viewed as the results of interactions between three subsystems: culture, the biotic community, and the physical environment (Fagan 1997). These factors influence one another in a constant attempt to reach equilibrium. Because the system is seldom closed, with all three factors being influenced by external forces, the internal forces have little chances of achieving equilibrium, and the system is always in flux.

Because "cultural ecology is a way of obtaining a total picture of how human populations adapt to and transform their environments" (Fagan 1997:417), it applies directly to how shipyards were integrated into their environment. One of the assumptions of modern cultural ecology is that human settlement is a behavioral adaptation to the cultural and natural environments (Hasenstab 1996). Thus, the locations of shipyards reflect the shipbuilder's awareness of, and concessions to, both the cultural and environmental requirements of his trade. The shipbuilder had to have access, either through natural setting or importation, to the materials necessary to build a vessel. Similarly, the physiographic setting of the shipyard had to meet certain requirements to allow for the building and launching of vessels. These requirements either occurred naturally at the location or the shipbuilder had to alter the landscape to meet them. Finally, the shipbuilder had to be attuned to his culture if he wished to sell vessels. For example, a culture's assumptions about how far was too far to visit a ship under construction would have dictated how far a shipbuilder could build his yard from a population center. Shipbuilding clearly fits into the paradigm of cultural ecology.

At a broader level shipbuilding falls into what Fagan refers to as "open system ecology" (1997:51). As the name implies, there are occasions when the closed cultural ecological system of the environment, culture, and the biotic community is affected by factors outside of the system. In the case of shipyards, these influences took many forms. The New World was not a closed system, as fluctuations in the socio-political and economic climate of the Old World caused gross fluctuations in the colonial shipbuilding market. At the local level, the interaction between shipbuilders and the environment was only a small portion of the overall colonial cultural ecology. Shipyards were affected by changes in the cultural and natural environment caused by other colonial occupations. For example, while shipbuilding did not directly cause rivers to silt up, deforestation and tobacco agriculture did. As river channels became shallower shipwrights were forced to adapt.

The environment plays a role in Marxist archaeology as well. "The landscape is viewed as an ideological expression, and as such, economic change or change in the social relations may reflect changes in the understanding of the meaning of the traits in the physical landscape" (Boaz and Uleberg 1995:252). Thus, it is desirable to adopt a Marxist or materialist approach to the study of shipyards in order to investigate the economic factors that influence the open system ecology and the ideological facets of the landscape. This approach is particularly important because this study is not interested in shipwrights, or even shipyards, but with the cultural system that drove both (Gould 2000). Consequently, while cultural ecology provides the framework for analyzing the locations of shipyards, the materialist paradigm provides the structure for investigating how the decisions of location and the expansions and recessions of shipbuilding are integrated into the larger world system. However, many materialist studies, especially those that tend toward critical theory, can be overly relativistic, even nihilistic (Willey and Sabloff 1993). This work will utilize Marxist notions of economics and the role of material culture in molding society while attempting to maintain enough of a positivist stance that the quantitative results generated by the spatial analysis can be viewed as having a degree of validity.

Three aspects of Marxist archaeology in particular apply to this study: conflicts and bipolar relationships, internal contradictions, and the linkage between material culture and larger cultural trends. Marxist archaeology is the archaeology of conflict and bipoles (Hodder 1997). In traditional Marxist thought the conflict is between the classes. However, in archaeological Marxism, that has to account for conflict in classless societies, the aegis conflict has been expanded to include the interaction between any groups with different world-views or agendas. Two such dichotomies are prevalent in Maryland shipbuilding: tobacco versus shipbuilding, and the colonies versus England. Throughout its early history the fortunes of shipbuilding ran directly counter to those of tobacco agriculture. Shipbuilding boomed whenever tobacco was in a recession, particularly in those regions where tobacco was the weakest. The division existed on a social level as well. Shipwrights were craftsmen while the planters and merchants who dealt in tobacco were the gentry. For example, the distinctly independent Eastern Shore was particularly influential in Maryland's early shipbuilding industry and this region's schism from the urban mercantile, tobacco driven, economy of the remainder of the state typifies the conflict between the subculture that produced shipbuilders and that of the merchant-planters. This divide was no doubt tempered by the fact that the shipbuilders depended on the merchant-planters for their patronage and the merchant-planters required the shipwright's craft to get their tobacco to the European market.

A source of conflict external to Maryland that involved shipbuilding was the relationship between the colony and the mother country. It was economically beneficial for England to establish itself as a core country and utilize its colonies as a periphery. In this arrangement raw materials were imported from the colonies, converted into finished goods in England, and then reexported to Europe and the colonies. In this way, the majority of the profits were gained by England while the colonies were simply exploited. Shipbuilding was directly involved in these schemes, as laws were passed in England designed to keep American shipping dependent on Britain for goods such as sails and cordage. More importantly, Maryland shipbuilding provided the means for local merchants to combat the dominance of English merchants. As Maryland shipbuilders developed their trade it became possible for local merchants to export their tobacco to, and import goods directly from, England and Europe. Thus, shipbuilding permitted the colony to achieve a degree of economic independence.

The division between the New and Old Worlds also fits the notion of internal contradictions as discussed by Gilman (1984). In explaining the Upper Paleolithic Revolution, Gilman expressed the belief that, while groups desired to be independent, they needed external allies in order to survive. However, as a group's technology improved they were able to become more independent and self-sufficient. Thus, technology allowed a group to become self-sufficient without compromising their health or comfort. While Gilman was dealing with hunter-gatherer populations, the development of shipbuilding in Maryland mirrors the process he describes. Initially, the colonies were dependent on England for their survival, just as early hunter-gatherer groups were dependent on exterior interaction for survival. However, as crafts prospered in the colonies and as shipbuilding technology developed to transport these goods to market the colonies became more self-sufficient. Thus, the development of shipbuilding technology helped establish an independent economic system in early Maryland, just as the development of new technology did during the Upper Paleolithic Revolution.

Finally, critical, Marxist, and materialist theories all look for links between material culture and larger cultural trends (Fagan 1997). In historical archaeology the classic example of this genre of study is the work of Dethlefsen and Deetz (1966) with New England gravestones. In this case Deetz and Dethlefsen investigated changes in economics and the ideologies of colonists through the imagery used on their gravestones. It was found that shifts in motifs could be correlated with changes in the dominant ideology. In the case of shipyards the correlation is between the economy, primarily driven by the tobacco market, and the number of shipyards. It seems that the numbers of shipyards in existence at any one time varied inversely to the larger economic trends. Thus, the material culture of shipbuilding, most noticeably the ships and shipyards, is directly linked to the larger tobacco culture of early Maryland.

In summary, based on the tenets of cultural ecology shipyards should be distributed across the landscape in respect to the environment, both natural and cultural.

Thus, we would expect factors such as the proximity of oak, urban centers, and other shipyards, as well as the slope of the region to affect the number of shipyards found there. Similarly, according to the Marxist perspective there should be fluctuations in the shipbuilding industry caused by changes in the economy. In general it is expected that these changes were driven by the tobacco economy, which was in turn controlled by factors in Europe. As time progresses and the Maryland economy becomes more diversified, the driving force of tobacco will be replaced by other influences such as industrialization.

However, this information about the larger culture has to be gleaned from the locational data of the shipyards. Consequently, it is appropriate to discuss how spatial analysis applies to this thesis. Spatial analysis has historically been so concentrated on settlement patterns that it is discussed only under the rubric of settlement pattern analysis in two major texts (Trigger 1997; Willey and Sabloff 1993). Settlement pattern archaeology has its roots in the Scandinavian archaeology of the early 1800s where archaeologists began to concentrate on inter-site analysis rather than just intra-site excavations (Trigger 1997). In North America the first interest in settlement patterns was developed during the Great Depression. At that time, the massive horizontal excavations sponsored by the federal government as part of make-work programs provided the data necessary to investigate these issues (*Ibid.*). Prior to the 1940s little attention had been paid to settlement patterns and it was not until 1953, with Willey's *Prehistoric Settlement Patterns in the Viru Valley, Peru*, that the first monograph length work on the subject was published (Willey and Sabloff 1993). Early on it was recognized that settlement pattern archaeology offered some distinct advantages over the traditional artifact driven archaeology. Artifacts are almost invariably excavated in the context in which they were disposed, while settlement patterns are directly linked to the settings in which human activities were carried out (Trigger 1997). Consequently, settlement pattern archaeology offered a different and, in some cases, more holistic view of culture. For the next few decades settlement pattern archaeology remained largely unchanged until the New Archaeology introduced scientific sampling. The processualists introduced inter-site sampling as a means to elucidate recurring themes. The interest shifted from solely temporal trends to those that included a spatial component (Trigger 1997; Dunnell 1986). Settlement pattern archaeology did not develop in historical archaeology until the 1970s (Langhorne 1976). The historical record gave archaeologists hypotheses to test against the archaeological record (*Ibid.*). Besides providing hypotheses the historical record can also provide explanations of the rationale behind placing settlements in certain locations.

By definition settlement pattern archaeology focuses on settlements, areas where people dwelt, but spatial analysis does not have to be so limited in scope. As Willey wrote early on, settlement patterns are, "The way in which man disposed himself over the landscape on which he lived. It refers to dwellings, to their arrangement and *to the nature and disposition of other buildings pertaining to community life*" (Willey 1953:1, emphasis added). Even in one of its earliest American manifestations it was recognized that settlement pattern analysis should include aspects of settlements besides those associated solely with habitation. In the case of this thesis the focus is not on historic habitation sites but on historic shipyards which were not always located within the boundaries of urban centers and many times were not locations where anyone actually lived. However, their locations were dictated by many of the same criteria that influenced where settlements were placed.

Settlement pattern analysis integrates well with the cultural ecology perspective. The landscape can be viewed as a system with the sites placed on it in a pattern that is directly influenced by the natural environment (Preucel and Hodder 1999). As cultural ecology dictates the environment has a profound effect on all aspects of culture, settlement patterns included. However, some scholars have chosen to ignore the environmental influences in favor of other explanations. For example, in his study of New York mills, Langhorne (1976) ruled out all ecological factors in light of the historical data. He believed that while the environment may have had an effect, it was negligible because Europeans were less influenced by the environment than Native Americans.

Similarly, the tenets of spatial analysis can be adapted to fit a Marxist perspective. Willey noted that spatial analysis "reflects the natural environment, the level of technology on which the builders operated, and various institutions of social interaction and control which the culture maintained" (1953:1). Even at that early date it was realized that factors besides technology and the environments, such as economics, shaped settlement patterns (Trigger 1997). Additionally, following the dictates of Marxist Archaeology, space is not a neutral concept but a culturally defined creation (Verhagan et al. 1995). The ideologies of a society can in part be seen in how it distributes itself across the landscape. An early example of this sort of study was Chang's 1958 "Study of Neolithic Social Groupings". In this work Chang investigated the role of history, ideology, and economics in land ownership. All three of these factors figure prominently in the doctrine of Marxist Archaeology. Finally, Delle's (1998) work with Jamaican coffee plantations is a similar example from modern scholarship. Delle's work is also analogous to the study here. It shows how actions taken in Europe and fluctuations in the world market (coffee in Delle's case, tobacco in this study) and economy effect industries and their distribution on the landscape in the colonies. Economics and material considerations are inextricably linked to settlement patterns and a complete understanding of one requires investigations of the other.

While settlement pattern analysis can generally be taken as synonymous with spatial analysis, the second term is more appropriate to this study and some of its implications should be explored. The term is much more general and less archaeologically oriented than settlement pattern analysis. One of the earliest examples of spatial analysis was not archaeological at all. In 1854 John Snow performed a spatial analysis of the water pumps of London, England. He prepared a map with dots representing cholera deaths and crosses symbolizing water pumps. The result was very clear evidence that all of the cholera deaths were centered around the Broad St. pump (Wilford 1998). What had appeared as a random pattern was easily elucidated by a simple visual spatial analysis. More than most other fields, archaeology is especially suited to spatial analysis because it dwells in four dimensions: the three dimensions of space and the fourth dimension of time (Fagan 1997). By its very nature archaeology is spatial. Within archaeological spatial analysis there are two possible approaches: visual and statistical. Both methods are valid, but each has particular strengths. Visual analysis is more powerful and gives the true essence of the spatial pattern, while statistical methods bring out the subtle and complex patterns that are otherwise invisible (Kvamme 1995). Because, "Spatial analysis deals with the locations of features in relation to other features" (Environmental Systems Research

Institute, Inc. (ESRI) 1998:6-3), both these types of analyses can be performed on features of any size. Thus, the relationships between artifacts within a single archaeological feature can be compared using roughly the same methods as would be used to study all of the sites of a particular period nationwide.

Spatial analysis is analysis for the sake of analysis; the knowledge is sought to sate curiosity. Predictive modeling is the practical application of spatial analysis, where the knowledge gained through analysis is applied to creating hypotheses about site locations. Predictive modeling arose in the American West where the US government owned large tracts of land. The government wanted a means to predict archaeological locations based on known patterns without having to excavate the entire area (Kvamme 1995). "Predictive models are tools for projecting known patterns or relationships into unknown times and places" (Warren and Asch 2000:6). The general method of this projection is to examine known sites in a region for statistical associations with various conditions, and then based on the conditions present at a location with unknown archaeological resources predict the likelihood of it containing sites (Kvamme 1995). The underlying assumption of predictive modeling is that site locations occupy only a portion of the total available variation in the environment (Duncan and Beckman 2000). If either sites or the conditions that predict them are ubiquitous in a region then the model is useless, because a model that cannot differentiate between site and nonsite areas is not particularly informative.

There are essentially two approaches to predictive modeling: inductive and deductive (Ebert 2000). This dichotomy has also been defined as academic versus CRM (Van Leusen 1996), and explanatory versus correlative (Church et al. 2000). Regardless of the name applied to it, the distinction is the same. Some predictive models explain only locational factors, those factors with a significant statistical correlation with site location, while others attempt to expound on locational choice factors (Leusen 1996). Correlative or locational factor predictive modeling is useful in managing archaeological resources but it does not provide any insight into the culture behind the sites; sites are treated as objects devoid of human agency. Conversely, explanatory or locational choice factor predictive modeling attempts to link what is known about a group (e.g. diet preferences, trade networks, and kinship patterns) with what is found with the model in order to present a more holistic pattern (Church et al. 2000). Correlative models provide an explanation for the pattern rather than allowing the model to float unattached to history. Some authors have associated explanatory modeling with cultural resource management and correlative modeling with academic archaeology (Van Leusen 1996). This distinction is unfair as correlative modeling is commonplace in both fields and the distinction between correlative and explanatory archaeology is often blurred (Van Leusen 1996; Ebert 2000). Irrespective of the rubric under which the predictive model is created, a more powerful model will result if an attempt at explanation is made.

Regardless of the mode of predictive modeling there are two primary benefits. Predictive models show archaeologists patterns of land use and help them identify which factors were most important to the group being studied, whether the archaeologist can explain these preferences or not. Additionally, based on the recognized patterns, cultural resource managers can better protect sites and developers can plan around areas with high potentials. As pot-hunters are quick to point out, archaeologists have documented only a fraction of the millions of sites in the New World and thousands of sites are unwittingly destroyed each year. However, instead of sanctioning the pillaging of sites, formal predictive models allow for their protection (Warren and Asch 2000). Initially, it was hoped that low likelihood areas would be exempt from archaeological investigations and development could proceed unabated (Church et al. 2000), but it was found that predictive models are not sufficiently accurate to permit total exclusion, as most models are only 60% to 70% correct (Ebert 2000). Consequently, the approach was changed to simply flagging high potential areas (Church et al. 2000). Based on where high potential areas fall, planners are able to save money and effort by simply avoiding regions that are very likely to contain sites. Thus, benefiting both the developers and the archaeological resources. Furthermore, predictive models allow cultural resource managers to focus their efforts on regions that are likely both to contain sites and be subject to development so that high risk areas can be given the specific attention they require (Wescott and Kupier 2000).

The major shortcoming of most predictive models, and possibly the reason that their accuracy is not as high as was originally hoped, is that they tend to focus on environmental factors to the exclusion of cultural factors. This approach borders on environmental determinism. Even the earliest cultural ecologists recognized that culture and the environment exerted forces over one another and to ignore one was to have a skewed perspective (Leusen 1996). It is very likely that the error ranges for predictive models are in part caused by cultural considerations that will continue to be invisible sources of error until archaeologists begin to include culture in their models.

In order to undertake spatial analyses and to create predictive models more effectively and efficiently, many archaeologists have turned to the tools of geographic information systems (GIS). While GIS software is constantly becoming more common in archaeology, archaeology is still not a major contributor to the theory of GIS or its parent discipline geography, so there is a disjunction between the two fields. However, GIS has a very robust body of theory outside of archaeology that must be acknowledged if it is going to be used for archaeological research. GIS theory is similar to the middle range, or linking theory, of archaeology. It consists largely of rules and considerations that govern the proper and sophisticated application of the software. Thus, GIS theory serves to link the data and queries described in chapters four and five (low level theory) with the high level archaeological theory described above. Simply put, GIS theory forms a bridge between the shipyard data collected in this study, temporal and spatial artifacts, and the archaeological theories used to put them into cultural context.

In importing theories from other fields there are the two problems identified by Keene (1983) that must dealt with. First, Keene admonishes scholars to be careful of importing theories unmodified from alien disciplines. In the case of archaeology this concern is not particularly pressing, as archaeologists use GIS software in much the same way that geographers do. While the units of analysis are different, both fields use similar modes of analysis. Geographers tend to be interested in predicting environmental changes, archaeologists are more interested in retrodicting the environments of the past. Similar equations can be used for both. Secondly, Keene warns that the hidden agendas of the lending field must be acknowledged. In this case that is a moot point. Because GIS software was designed as a quantitative means to explore spatial characteristics a, high degree of positivism can be assumed in its developers.

However, the empirical nature of predictive modeling in GIS should not be overstated. While the mathematics involved in creating a computer generated predictive model are unbiased, some of the ingredients in the model, such as the weight given to various factors, are based on personal opinion (Leusen 1996). Furthermore, as mentioned above, predictive models are far from 100% accurate. "There is no absolute correlation between predictions and site locations, merely a level of confidence at which a model becomes a useful tool" (Duncan and Beackman 2000:56). Models identify areas of high potential but in no way do they replace the need for intensive archaeological surveys (Wescott and Kuiper 2000). With the current sophistication of modeling, simply predicting that a site is located in an area in no way guarantees its presence.

Despite the shortcomings of both GIS and predictive modeling, GIS is the new context for spatial analysis because it is more accessible than any other method (Longley and Batty 1996). Through the use of global positioning systems (GPS) it is possible to take coordinates from the GIS and find the location in the field, and to record coordinates for sites in the field and place them exactly in the GIS (Lowe and Burns 1998). In other words, the link between maps and reality has been substantially strengthened through this new technology.

Due to the fact that GIS technology is quickly becoming a powerful archaeological tool but is still largely foreign to most archaeologists, an introduction to it is appropriate. The "geographic" in GIS refers to the space and place of a feature. The second word, "information", refers to the data, the spatial data that identify the location of the feature and the attribute data that identify the characteristics of the feature. Finally, the "system" identifies a GIS as a related group of elements. All combined a geographic information system is an integrated software package capable of the input, storage, retrieval, analysis, and output of digital data. To put it crudely, a GIS is a database management program for spatial data (Longley and Batty 1996); a GIS is similar to the old method of creating transparent overlays to analyze spatial relationships. However, because of the difficulty involved in creating accurate overlays, the old method could not keep up with changes in the data (Wilford 1998). GIS is much more efficient and consequently superior.

In 1975 SYMAP became available. It represented the first successful, widely available spatial analysis and mapping software on the market. SYMAP was an ancestral form of GIS functionality including the ability to produce maps (Kvamme 1995). The first real GIS application in archaeology occurred between 1979 and 1982 with the Granite Reef project in the American Southwest. While the types of analyses used at this time were essentially the same as they are today, the term GIS was never used, instead it was referred to as "a computer based cartographic analysis system" (Kvamme 1995:2). The term geographic information system did not begin to appear in archaeological literature until between 1983 and 1985. The use of computer based cartographic analysis systems in archaeology got a boost in the late 1970s and early 1980s with the introduction of digital elevation models (DEM). DEMs are analogous to a three dimensional Cartesian plain: each point has three values, two to locate it in space and a third for its elevation. With these three values it is possible for a GIS to create a three dimensional image. Using DEMs it became possible for archaeologists to model the environment more accurately and do analyses such as the study of viewsheds. In the mid 1980s federal agencies began to adopt GIS as a resource management tool. In 1985 the first official discussion on GIS in archaeology was held at the annual meeting of the Society for American Archaeology (SAA) during a symposium entitled "Computer-Based Geographic Information Systems: A Tool of the Future for Solving Problems of the Past." Shortly thereafter, in 1988, another symposium on the subject of GIS in archaeology was held at the annual meeting of the SAA. From this symposium came the book *Interpreting Space: GIS in Archaeology* (*Ibid.*). GIS now had a firm foothold in American archaeology and it continued to grow. The GIS industry reached $2 billion in 1992 and has continued to expand since then (Longley and Batty 1996). As the GIS industry developed, archaeology kept pace (e.g. Craig 2000), and despite some opinions to the contrary (Van Leusen 1996; Hageman and Bennett 2000) it is now firmly entrenched in archaeological methodology.

Thus far, the use of GIS in archaeology has been primarily limited to the visualization of data and management/predictive modeling (Church et al. 2000). "The importance of predictive models of archaeological location to the growth of GIS in North American archaeology cannot be overemphasized" (Kvamme 1995:3). GIS software made predictive modeling that much easier and that much more of an efficient means for the government to manage the large tracts of land in the West. Like any database, GIS facilitated the storage, organization, and analysis of the prodigious amount of data created around these tracts of land. The boon that GIS proved to be for predictive modeling thrust it into the archaeological limelight. However, GIS did not solve the theoretical problem of predictive modeling; the question of why sites were located where they were. GIS was used simply as a database, there was no attempt to use it as a tool to test hypotheses (Hasenstab 1996). Furthermore, early GIS predictive models concentrated on "normal" or "typical" sites (*Ibid.*). Little regard was given to the fact that the environment varies with space and that cultures vary with time. There is still substantial room for the development of sophistication in the use of GIS in archaeology. The other primary use of GIS in archaeology has been as a graphics tool; nothing more than making maps. While using the speed and efficiency of a GIS to perform visual analyses of spatial relationships is valid, to ignore the powerful analytical tools built into the software is to sell short the capabilities of GIS (Neustupny 1995; Verhagen et al. 1995).

GIS is an important and pervasive technology but the skill level in its archaeological users is still generally low (Longley and Batty 1996). Simply using GIS does not automatically equal spatial analysis and the spatial analyses performed with GIS are not inherently better than those performed with paper maps and databases. GIS software makes spatial analysis more efficient and powerful but it can not solve problems for itself (Ebert 2000; ESRI 1996). A GIS can tell you the distance between two points or how steep a slope is, but the question "is this the best spot" is beyond its abilities, unless you quantify what a good spot is. As Evzen Neustupny wrote, "I do not believe that even a highly sophisticated software package can replace the theoretical judgment of an archaeologist" (1995:133). All of the procedures that generate archaeological structures and interpretations are beyond the scope of GIS. GIS can be used for the analysis of the archaeological record, but it is the human factor in the interpretation that gives meaning to the archaeological study (Neustupny 1995). The same statement can be made about paper maps (Bona 2000), thus the problem of interpretation is wider than simply GIS spatial analysis. Consequently, the archaeologist must be a scientist and not just a technician punching keys in the appropriate order. Conversely, archaeologists can not depend on GIS specialists trained in other fields to conduct their analyses for them. The individual performing the research must be trained in archaeology and have a firm grasp of the functionality, capabilities and limitations of GIS.

In addition to increased sophistication in the archaeologist performing the analysis, the audience needs to be more GIS and map savvy as well. Even a good map "tells a multitude of little white lies" (Wilford 1998:17). The real world is a multi-media environment full of visible data. Additionally, there are the data we can measure with mechanics such as infrared and magnetic. All of this information must be distilled into a two dimensional representation in order to be analyzed (Claxton 1995).

> Nature itself is merely a complex of gradual transitions between different soils, geomorphological units, etc. which are translated into areas, points, and lines which make up the paper map in order to give a more or less general idea (depending on the scale of the map) of the real situation.
> (Wiemer 1995:301)

As such, maps are simply models of the environment where the real world has been simplified and generalized by reducing the number of variables, reducing the scale and resolution, and averaging data over space. Not only are maps models but they are distorted models. In order to transform the spherical earth into a two dimensional representation it has to be warped. Depending on the projection shape, area, distance, and/or direction will be compromised (ESRI 1998). While maps are useful tools they do have limitations and these limitations should be recognized.

GIS tends to obscure some of the limitations of maps because many scholars believe that "the statistic is an objective measure for evaluation of certain aspects of patterning" (Stark and Young 1981:298). However, the results of even the most exacting analysis must be inspected with a critical eye and interpreted in order for them to have any meaning. Unfortunately, this is not always the case:

> Mathematical methods have a certain aura of exactitude, express relationships with apparent precision, and are

> implemented on devices which have a popular reputation for infallibility...The presentation of masses of numbers, all expressed to eight decimal places overwhelms the minds of many people and numbs their natural skepticism...The greatest danger is to the researcher himself [who] may cease to critically examine his data and interpretive methods.
> (Davis 1986:8-9)

At this time, neither GIS nor any other sophisticated computer based analysis package can replace the skills of an individual trained in analyzing the data in question. "Blind acceptance of modeling results from the bowels of the computer can be as irrational as reliance on the honored and ancient skills used by the oracles in deciphering messages in the entrails of a sacrificial chicken" (Church et al. 2000:150-151). GIS is particularly dangerous in this regard because of the power of the graphical medium (Longley and Batty 1996). The graphic output function of GIS permits it to create high quality professional looking maps, full of straight lines and apparently precise locations. However, this aura of precision can be a false one, especially when dealing with archaeological and historical data. When comparing an historic hand-drawn map to a computer generated map depicting the same information most people inherently tend to favor the modern map as more accurate, despite the fact that the modern map was created directly from the historic map. Consequently, while GIS offers many powerful tools for statistical analysis and the creation of informative maps, careful attention should be paid to the sources and validity of both the data and the interpretations.

Despite these admonitions the value of GIS to future archaeological studies cannot be overstated. The development of GIS in archaeology "is part of the wider move to a digital world in which computers are realizing their fundamental role as universal machines applicable to any and every medium" (Longley and Batty 1996:1). Archaeological data, being spatial in nature, are well suited for use with GIS (Wescott 2000). While archaeologists, as anthropologists, are ultimately interested in social interactions which have no spatial components, their units of analysis are the artifacts, features, and sites that represent the cultures they study. All of which have definite locations on the landscape. A number of claims have been made regarding the significance of GIS in the development of archaeology, including that GIS will have as profound an effect on archaeology as radiocarbon dating did in the 1950s (*Ibid.*). While the next few years will prove the truth of that prediction, it seems clear that GIS is a viable new method of theoretical discourse (i.e. Craig 2000). In this role GIS will help close the gap between data and theory by making data sets more accessible and interpretations as numerous as a scholar could care to explore (Claxton 1995). The ease of analysis with GIS permits researchers to pursue paths of inquiry that may seem somewhat capricious, where before they would have hesitated to undertake a project that would more than likely show no significant results. Thus, the breadth of archaeological inquiry is drastically expanded by GIS. Because GIS provides a relatively quick means of investigating data the time spent on a given project can be reduced and the chances of a scholar becoming wedded to a particular outcome decreased. Consequently, the quality of archaeological interpretations will be improved and scholars will be less dependent on the received knowledge of an earlier generation when they can verify the research for themselves.

CHAPTER IV:

PRESENTATION OF DATA, LIMITATIONS, GOALS, AND ASSUMPTIONS

I have a great subject to write upon, but feel keenly my literary incapacity to make it easily intelligible without sacrificing accuracy and thoroughness.
- Sir Francis Galton, ca. 1900

In order to construct an accurate spatial analysis of Maryland's pre-1850 shipyards, based almost entirely on historical documents, it was necessary to collect data from multiple sources, few of which were originally intended to facilitate such a study. Due to these limitations, the author was forced to regularly glean from the available sources small amounts of information that only take on meaning when viewed as parts of a larger whole. Similarly, not a few leaps of faith were required to construct a meaningful analysis using the available data. However, by making clear the sources of the data, the methods used to collect them, and the nature of the analyses conducted with them, the readers can decide for themselves the validity of the results.

First and foremost, it should be understood that this work does not purport to be an exhaustive catalog of every shipyard and boatyard operated in Maryland prior to the age of steam and iron. Maryland was, and still is, a maritime state, and at some point in history a shipyard or boatyard of some sort has been operated on almost every creek in the state large enough to launch a vessel (Browne 1905). One of the major concerns of this study is the distinction between shipyards and boatyards. Essentially, a ship can carry a boat, but a boat can not carry a ship. More to the point, ships required individuals with particular skills to construct them and were a monumental undertaking, while a boat could be built by almost anyone in their backyard in a short period of time. The primary assumption of this research is that, for the majority of the historical period, in order for mention of a yard to reach the modern day it must have been a significant enterprise and was therefore in all likelihood a shipyard. Even in the case of shipyards, it is certain that some were missed, in fact some yards were excluded from the sample intentionally, for reasons addressed below. However, every effort was made to collect a representative sample of Maryland's shipyards in order that the results of this analysis can be used to predict the locations of yet undiscovered yards.

As only two shipyard locations have been archaeologically reported in the State of Maryland, it was necessary to draw the majority of the locations used in the model from the historical record. Initially, the records of the Maryland Historical Trust (MHT) were searched for any references to historical shipyards. This task was greatly simplified by the fact that the MHT maintains a computerized database of their records, pertaining to historic sites, that can be searched by key word. Similar to the archaeological records, this search was fruitful but not as productive as hoped. Next, an exhaustive search was made of all available secondary sources including state histories, county histories, and maritime histories, both Maryland-centric and national (see bibliography). From these sources were gleaned the names, dates of operation or birth and death, and general locations of shipyards and shipyard owners. At the same time a search was made of the indices of *The Archives of Maryland*, an ongoing series that publishes important state historical documents, and other indexed works such as Green's (1989) compilation of the *Maryland Gazette*.

Obviously, this technique of data collection has the potential of leading to a biased sample. By relying on secondary sources the sample is likely to be skewed towards those regions of the state with more interest in their maritime history, and consequently more published on the subject, and those periods that tend to draw more attention from historians. Thus, areas such as Baltimore, which have been researched heavily (Ahrens 1998; Ruckert 1976), and the period surrounding the American Revolution were liable to be disproportionately represented in the sample. In order to partially rectify this situation two approaches were taken. First, the collection of data from the highly represented periods and areas was conducted slightly differently from the rest of the sample. In general, an effort was made to pursue every lead, but with the dominate areas a more relaxed approach was adopted. For example, both Ahrens's and Ruckert's books include names of shipbuilders not identified elsewhere, due to the fact that these authors performed exhaustive research on a small geographical area. While these works were consulted and provided useful information for placing the historical shipyards of Baltimore on a map, in the case of Ahrens's work, if the yard was not mentioned in another source it was not included in the sample. Secondly, in order to verify that the counties that appeared to have a paucity of shipyards were in fact not shipbuilding areas, excursions were made to the historical societies and archives of these areas to search for shipyard references. In some cases it was shown that these areas were not shipbuilding regions, in others this impression was given solely through the vagaries of the original sampling technique. In both cases confidence in the representative nature of the sample was increased.

Conversely, the reliance on secondary sources served two important positive functions. By relying on published sources for the bulk of the sample, greater celerity in the data collection was achieved. The documentary history of Maryland, unlike most of the South, survived the wars of the 18th and 19th centuries relatively unscathed. Consequently, there are a prodigious number of relevant primary historical documents for the State, to peruse all of them would have taken many years. The use of the secondary sources provided a more focused subset that allowed for an efficient search of the primary documents. More important, the use of secondary documents facilitated the inclusion of individuals who were not necessarily identified as shipbuilders. Many individuals who were identified as owners of shipyards in the secondary sources were described as "gentlemen", "merchants" and "planters" in the land records. While these men may not have been shipwrights themselves, they certainly owned the land on which the ships were built. Furthermore, tax lists do not distinguish between the shipbuilders who owned their own yards and those who worked on someone else's, both are referred to simply as "shipwrights" (Goldenberg 1976). Because this study is interested in the locations of the yards, the owner of the land is much more important than the actual builder of the vessels, and these individuals may have been excluded if the study utilized solely primary documents.

Once likely candidates had been gathered, the second phase of data collection began. The land records housed at the Maryland State Archives were scoured for references to the individuals mentioned in the secondary sources. The land records predating the first recorded mention of the yard by 15 years through 15 years after the latest reference to the yard being in operation were searched for land transactions involving the shipyard owner. This approach permitted more certainty regarding the identification of possible shipyard sites and provided firmer dates for the yard's years of operation. Information identifying the tract of land involved in the transaction, as well as the date of the transaction and other anecdotal information, was recorded. For the City of Baltimore, the city directories were consulted as they gave addresses for many of the known Baltimore shipbuilders. The largest problems with identifying possible shipyard locations from land records is that land records do not generally include lands that were inherited or leased. As shipbuilding seems to have been an occupation that many builders undertook only when the tobacco market was in a lull, many shipwrights may have opted to lease appropriate lands rather than purchase them, allowing the lease to lapse when they returned to agriculture. With a few exceptions, these individuals are lost through this method.

Based on the information gleaned from the land records the shipyards were entered into the GIS. Only a portion of the shipyards were identified geographically in the secondary sources or were owned by individuals represented in the land records. Of those mentioned, an even smaller proportion were identified with enough specificity to permit their inclusion in the model. Various confounding factors caused a shipyard not to be included. Many yards were too vaguely identified for them to be comfortably included. Additionally, many shipyard owners owned multiple parcels of land. In this instance an attempt was made to identify the actual shipyard parcel based on information included in the secondary sources, such as vague geographic information and dates. If a single tract of land could not be identified as the most likely to contain the shipyard, that owner's properties were excluded from the model. A number of other shipyards were identified with a good deal of specificity but using archaic place names that could no longer be linked to geographic features. Furthermore, a tract of land that contained a shipyard tended to include other sites and lands within its boundaries as well. Unfortunately, exactly which portion of the property was used for shipbuilding is unclear. Additionally, most of the usable tracts of lands were identified in such a way that their general location was clear but the specifics of their boundaries had been lost to history. Consequently, the largest possible area for a given tract of land was entered into the GIS so as not to accidentally exclude the parcel of land underlying the shipyard. Thus, while historic shipyards commonly occupied only one half acre (Goldenberg 1976), the possible shipyards sites entered into the GIS range in size from 0.4 acre to 466.4 acres.

The quality of the information that led to the placement of the shipyards was not all equal. In order to reflect the varying levels of confidence in the possible sites, each site was given an accuracy index ranging from one to four; one being the lowest. A site with an index of one was identified only by the city, large creek, or river where it was located. Number two sites had vague descriptions placing them on smaller creeks or bays. Sites given a three were more accurately described but still presented an uncertainty. Finally, level four sites were drawn from very accurate descriptions and historic or modern maps, such as those that accompany archaeological inventory forms.

The sites that were deemed sufficiently accurate were digitized as a GIS layer using georeferenced USGS 7.5' topographic quadrangle maps as basemaps in Micro Images' TNT MIPS software. An historic shorelines overlay was used to guide the placement of the shipyards relative to the current shorelines. The historic shorelines layer, created by the GIS staff at the MHT from coastal geodetic surveys dating back to the mid-19th century, was used because, as Church et al. have expounded, "The present-day environment is a good place to start, but a poor place to end" (2000:139). This is especially true in Maryland where the coast is dynamic with parts of the shore eroding away and rivers constantly silting up. Based on the historic shorelines and still extant landmarks from the descriptions, the shipyards were placed on the map. It is appropriate at this point to again admonish the reader that, while GIS creates very accurate appearing maps, the data that permitted their creation were generally anything but (Miller 1995). Even a good historic map, which in this study would have gained the shipyard it represented an accuracy index of four, has a real world accuracy of only +/- 40 meters (Lowe and Burns 1998). Consequently, the sites identified in this study should be considered possible shipyard locations and search areas for future archaeological surveys and excavations.

In the end, a sample of 181 shipyards was collected, of which 172 had enough geographic information to place them on either the Eastern or Western shore. Furthermore, a subsample of 95 yards had enough positional information to include them in the GIS. Of these 95, 41 are fours, 20 are threes, 23 twos, and 11 are ones (figure 21). Information regarding each shipyard in the analysis, including its references, is contained in Appendix A.

Using only the information gleaned from the secondary and primary historical sources, the shipyard layer, a similarly created historic cities layer, the USGS 7.5' maps, and a generalized Maryland State map, a number of interesting analyses were undertaken

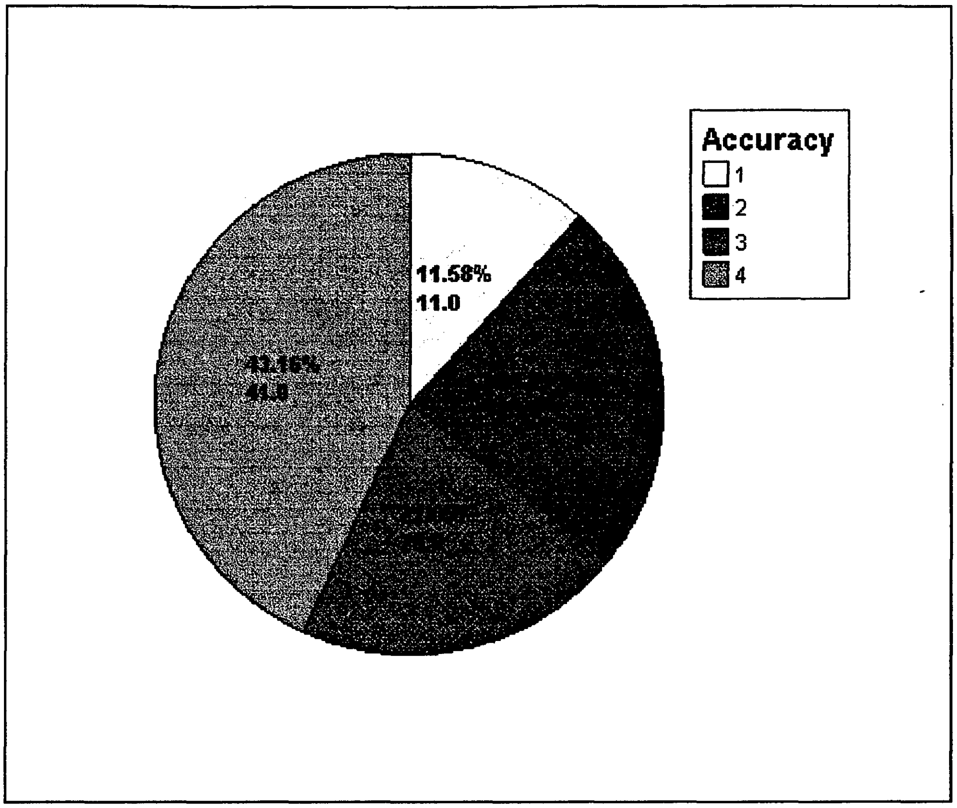


Figure 21: The accuracy of the locations of the 95 shipyards entered into the GIS

utilizing ESRI ArcView software. Initially, by plotting the dates for all of the known yards it was possible to judge how well the sample shipyards fit the boom-bust trends for shipyards described in the literature. Furthermore, it was possible to diachronically track the changes in shipyard centers from county to county and from shore to shore, and their distribution over the state as a whole. Linguistic analysis was possible by looking at the descriptor terms accompanying the names of shipyard owners mentioned in the land records; shedding light on how many of these individuals had sources of income considered more important than the construction of vessels.

Additionally, some of the site by site analyses of the shipyards, that is important in constructing a predictive model, was possible using these data. Proximity to historic cities was investigated to establish a maximum distance that a shipbuilder was willing to stray from the city. A vessel of any size was a major investment and a client was unlikely to purchase one sight-unseen. Thus, it behooved a shipbuilder to remain close to urban centers, as that was where their primary clients, merchants, made their homes. Additionally, the other limiting factor in ship construction, labor, was more readily available in towns. Shipbuilding was a seasonal affair, and many workers were hired on only for specific task; consequently, the labor force was not permanent. This fact reduced the need to house laborers, but increased the need to limit their daily commute from the urban center to the shipyard. Conversely, the need for a large lot on which to construct the vessel and readily available stores of timber likely forced shipyards away from the heart of town. What distance proved a healthy balance of these factors for most shipbuilders?

Another geographic analysis was conducted using the amount of protection a site offered a shipyard and the width of the channel at that site. The Chesapeake Bay provides some protection from the open sea, but, being a large body of water itself, it can be subject to severe storms. Consequently, it seems likely that shipbuilders would have chosen sites that offered them further protection from wind and waves. By assigning each site a protection index ranging from one to four it should be possible to identify if certain generic types of locations were preferred by shipbuilders. A site with an index of one is exposed directly to the Bay, while a four site is located well inland on a river. Two and three ranked sites are located on bays and headwaters of rivers, providing varying degrees of protection from the open Bay. While shipbuilders may have had knowledge not accounted for here, such as that storms always came from a particular direction, it is felt that this index provides a good basis for analysis of site location. It is likely that a shipwright was required to weigh the need for protection from the elements against the depth of the channel needed to launch the vessels he intended to build. While a fully exposed site was subject to the full brunt of nature it offered an unlimited possibility in terms of launching large vessels. Conversely, a shipyard located far upstream was well shielded but almost certainly limited to building smaller coastal trading vessels. It was possible to discover what sorts of locations were preferred by historic shipbuilders. To further elucidate these trends, graphical and statistical analyses of the channel width at each shipyard site, based on the historic shorelines, was made as well.

All other analyses required the use of additional GIS layers. The first such layer was that of slope. All available digital elevation models (DEM) for the project area were imported from the internet. The models are available through the United States Geologic Survey (USGS) (GIS Data Depot 2000) and give elevation data on a 30 meter by 30 meter grid. TNT MIPS was used to convert the elevation data into slope data by calculating the change in elevation for contiguous grid squares and the use of interpolation models. DEMs were available for areas containing 53 of the shipyards. For each of these 53 yards a slope measurement was taken approximately every 60 meters along its shoreline. The minimum, maximum, and mean slopes for each shipyard were recorded. Based on these data it was possible to calculate the mean slope for the shipyards in an attempt to point towards an important predictor for other shipyard locations.

The reason that slope represents an important shipyard location prediction tool is that gravity was the primary means of moving the completed vessel from the stocks into the water. Too steep a slope would have resulted in a premature and often deadly launching of the vessel, sending it sliding, unexpectedly, down the launching ways crushing any hapless workman caught in its path. Conversely, not enough slope would have required a substantial effort on the part of the builders to transport the vessel from terra firma to its proper home on the waves. Both secondary (Goldenberg 1976) and primary (Abell 1981) sources indicate the importance of the angle of the landscape, but neither states explicitly what that angle should have been. This analysis offers one possible answer.

The slope analysis is based on uniformitarian principles. It is assumed that a shipwright would have sought out a location or altered an existing location to achieve an ideal slope for the construction of vessels. Over time, similar environmental actions would have had similar effects on the slopes of these areas. Consequently, while the slopes of these areas may not be the same as they were historically, they should all still be similar. There are two principal concerns with this assumption. The first is that the study period covers from 330 to 151 years before the present. While the same factors may have been affecting all of the sites, they have been affecting them for very different lengths of time. Secondly, the same factors have not affected all of the regions. Some shipyard locations have doubtlessly been subject to later development. Consequently, it is more reasonable to speak of slope in terms of a range of possibilities, rather than as a single mean number.

The final set of analyses were conducted utilizing soils data downloaded from the Natural Resources Conservation Services webpage (USDA 2000a, 2000b, 2000c, 2000d), and information gleaned from soil survey books (USDA 1967, 1968, 1970, 1973a, 1973b, 1973c, 1974, 1975, 1976, 1978, 1982). For the project area, GIS-based soil survey data are available for the Counties of Baltimore City, Dorchester, Queen Anne's, and Worcester. Unfortunately, all of the shipyards located in Baltimore City are in, what is today, a highly industrialized section of town. Consequently, all of these yards are on lands that are now designated only as "urban land," which does not elucidate its historic characteristics in the slightest. For this reason the Baltimore City shipyards, 21 in all, were excluded from all but one of the soils analyses. The remainder of the counties represented in the digital data contained only 21 possible shipyard sites. This number was judged to be insufficient for use as the basis of statistical analyses, so the time consuming task of identifying the soils that lay under the other shipyard sites from paper based soil maps was undertaken. By combining these methods a sample of the soils of 69 shipyards was compiled. Besides the 21 Baltimore City shipyards, five other yards were located in areas for which no soils data were available. Based on estimated percentages and the known areas of the possible shipyard sites, it was possible to calculate the acreage of given soils under the possible shipyard sites. The databases that accompanied the GIS data and the tables in the soil survey books were searched for soils that had certain characteristics. Based on this information it was possible to calculate the percentages of shipyard soils that demonstrated certain characteristics and compare those percentages to the percentages of soils in the shipyard counties as a whole that had the same characteristics. This comparison was made with a one-sample *t* test (for a discussion of one-sample *t* tests see Drennan 1996:159-160) .

The three characteristics that the soils were judged on were: their suitability for construction, their ability to support white oak, and their suitability for the cultivation of tobacco. "Since the classification system developed by the Soil Conservation Service [SCS, now NRCS] is based on major physical characteristics of soil, its application can be extended to determine the soils suitability for certain land uses" (United States Department of Agriculture (USDA) 1973a:9). The gross assumption of all of the soil analyses is that the soils have not changed drastically since the historic period. This seems to be a safe assumption based on the fact that, in geologic time, there have been very few ticks on the clock between the period under study and the present day. However, merely stating that shipyards were located on given soils is not a very strong statement without considering the environmental background. A correlation with a variable is not significant if that variable is ubiquitous (Church et al 2000; Hasenstab 1996). For example, the fact that 80% of the shipyard soils were conducive to growing oak is not a significant conclusion if 80% of the counties as a whole were also conducive to oak growth. For this reason the one-sample *t* test was employed to give an indication of whether the soils were in fact good predictors of shipyard locations.

As has been indicated, those regions that were not particularly well endowed for the cultivation of tobacco were the first to turn to ship construction (Middleton 1984). The question is whether or not that generalization holds true on the micro scale. It is hypothesized that shipwrights avoided building vessels on lands that were well adapted for the far more lucrative occupation of tobacco agriculture. If this was true then there should be significantly less tobacco land monopolized by shipyards than in the state as a whole. In order to test this hypothesis the GIS database was searched for those soils that had values for tobacco, indicating that they were conducive to its growth. The different structure of the paper based soils data required a different approach. For those counties with tobacco indices the soils that were rated as “high” or “very high” for tobacco quality were recorded. However, six of the 14 counties included in the study area had no data on tobacco whatsoever. It is likely that these counties represent such poor tobacco environments that the USDA opted to disregard tobacco entirely. However, in order to avoid making that assumption the one-sample *t* test was conducted twice, once including the blank counties and once excluding them.

The second soil characteristic investigated was the suitability of the soil for construction. The erection of a large vessel on the land would have required a surface capable of supporting the weight. Unfortunately, the NRCS was not kind enough to include an index for wooden ship construction in their tables, so the decision was made to use the value for constructing a house without a basement. The assumption here is that, like building a ship, erecting a home without a basement represents the placement of a heavy object on the surface of the land without the complications that arise with excavation. It was possible for shipwrights to lay foundations beneath their launching ways and some did (Thompson 1993), but they likely would have preferred a site that did not necessitate the extra effort. Thus, the databases were searched for soils that had only "slight" limitations for the construction of houses without basements. Unfortunately, the NRCS (or in earlier data sources the SCS) was not consistent in its use of this distinction. In cases where there was no index for houses without basements the next nearest value was employed, generally houses with basements. In the instances where the same soil existed in another county that did provide information on houses without basements the values were corrected.

"From the stand point of human adaptations, use patterns of local vegetation are of crucial concern … In addition to fuel, a variety of trees provide the raw materials for tools, utensils, shelter, and weapons," not to mention ships (Schermer and Tiffany quoted in Bona 2000:75). Based on least cost transportation theory drawn from economic geography (Langhorne 1976; Verhagen et al. 1995), for as long as it was feasible, shipyards should have been built in close proximity to natural sources of white and live oak; the primary building materials for ships. The closer the shipyard was to a natural store of suitable timber, the less it cost to transport the necessary materials to the building site. Unfortunately, the entire state was clear-cut prior to an effort being made to record the original stands of oak. Consequently, the soils have to be used as a proxy for the trees themselves. It is assumed that if the soils today are conducive to the growth of oak then it is likely that oak was present on them in the past. Unfortunately, due to inconsistencies over the years in how the NRCS recorded suitability for oak growth it was necessary to employ a number of different methods to ascertain which soils likely contained white or live oak in the past. For the GIS databases only the generic distinction of "oak" was made, so any soil that had an "oak" listing was recorded. For five of the remaining counties "oak" or "white oak" was included in the woodland table under the columns of "in existing stands" or "for planting", indicating that the soils were suitable for oaks. Soils that only mentioned a specific type of oak, besides white oak, such as red oak, were ignored. For the other five counties no such table existed and it was necessary to glean from the texts which soils were beneficial to oaks in general or white oaks in particular. No reference mentioned live oak.

Site centered analysis ignores the fact that people used the whole landscape (Ebert 2000), and as Maryland was deforested it became necessary for shipwrights to go ever farther afield in their search for raw material. Consequently, the Counties of Baltimore City, Dorchester, Queen Anne's, and Worcester, those for which there were GIS data, were used to create a proximity map between the shipyards and the soils in those counties that supported oak. Baltimore City was included in this analysis because even though the shipyards themselves are on urban land they still may be in the vicinity of oak-promoting soils. Only the GIS based soils data were used in this analysis because the daunting number of soil types and the amorphous nature of the soil polygons made creating an accurate proximity map of the soils, without the aid of a computer, an impossibility. This analysis also permits for statements to be made regarding whether or not those shipyards that contained oak promoting soils within their borders were also centered in areas that were generally beneficial to the growth of oak trees. Unfortunately, at this point proximity maps can not be created for the entire region. As time passed shipbuilders began to import lumber not only from other parts of the state but from other states, such as Pennsylvania. The current model has no means of addressing this concern.

In closing, the issue of Ascher's (1968) subtractive model of information transmission from the past, or "Time's Arrow," needs to be addressed. As time passes the quality and quantity of information progressively degrades. Consequently, the shipyards of the earlier periods are less well represented in the model, and those that are represented are more vaguely located with less well defined dates of operation, than those shipyards of the later periods. While every effort was made to rectify this shortcoming, it is believed that these sites will continually suffer from inferior information as compared to later sites. Despite this, and the other biases identified above, the results of these analyses remain valid and robust.

CHAPTER V:

RESULTS

The full and complete picture of a human behavior that produced a particular site assemblage in the past will never be fully known, either through archaeology or with the aid of written and other documents. The ideas that archaeologists produce about the past to account for the material assemblages that they record at sites should be viewed as approximations of what happened to produce those associations.

- Richard Gould, 2000

The structure of this chapter is from general to specific. Thus, the reporting of results will proceed from an holistic investigation of Maryland shipyards, through comparative analyses of various regions of the state, to studies of individual shipyards. In order to embrace both the clarity of a synchronic approach, and the increased ability to make statements of significance garnered by diachronic methodology (Leusen 1996), all of these analyses will slip between results drawn from the entire era under study (1631-1850) and studies of more focussed periods. For all analyses an attempt will be made to link the results to cultural, historical, or environmental explanations.

Initially, the dates for all of the shipyards were tabulated in order to create a timeline for the shipyard sample and compare it to the chronology for Maryland shipbuilding developed by historians. Three dates for each shipyard were drawn from this table, flourish decade (figure 22), late decade (figure 23), and early decade (figure 24). Flourish decade represents the median decade that the shipyard was in operation, adjusted with any known information. In all three cases, decades were used instead of individual dates because they offered less cluttered and more easily interpreted results.

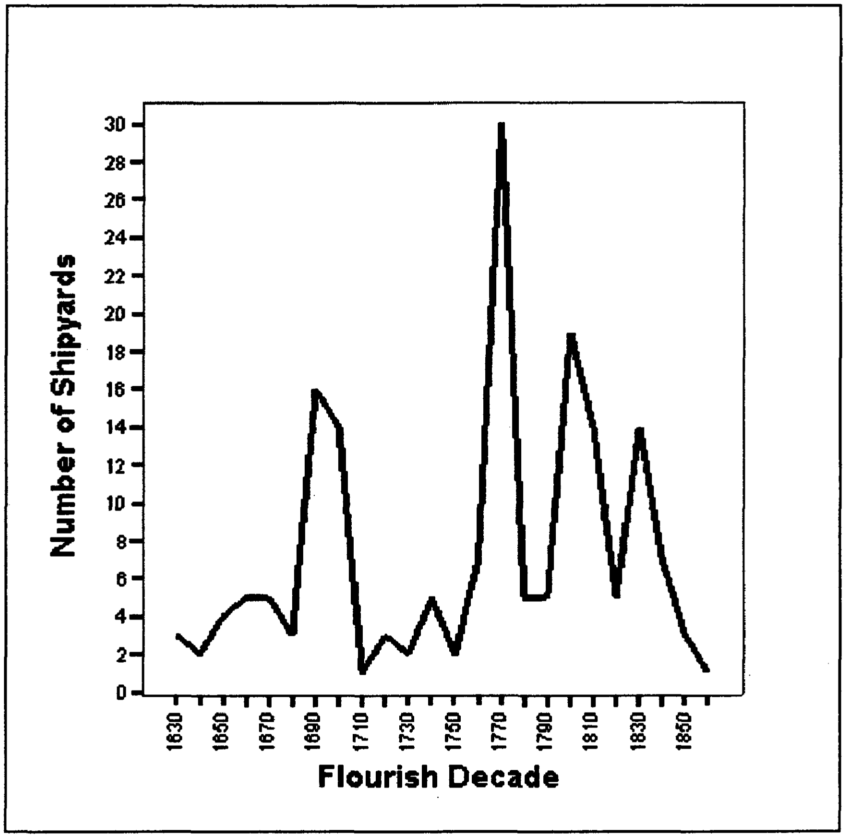


Figure 22: Graph of the number of shipyards flourishing in a given decade

To reiterate briefly information contained in a chapter two, the accepted history of shipbuilding in Maryland is as follows: Beginning in the late 17th and early 18th century Maryland shipbuilding saw its first expansion (Carr 1988; Middleton 1984), followed by a collapse in 1708 (Middleton 1984). Shipbuilding regained a foothold in 1713 (Goldenberg 1976) only to suffer another recession in the 1720s and 1730s (Thompson and Seidel 1993). The year 1748 represented a threshold, for the first time domestic shipbuilding began to surpass ships brought in from other regions. In that year, the percentage of New England ships registered at Annapolis fell from 80% to 30% (Goldenberg 1976). However, due to a collapse in the grain market, Maryland shipwrights suffered another

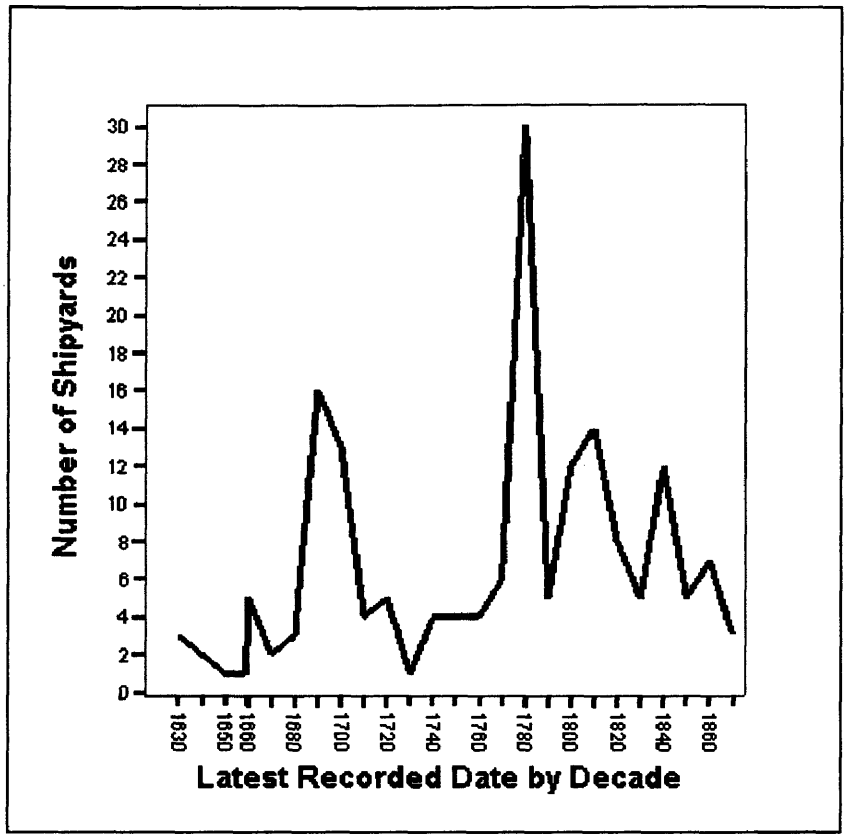


Figure 23: Latest recorded date, grouped by decade

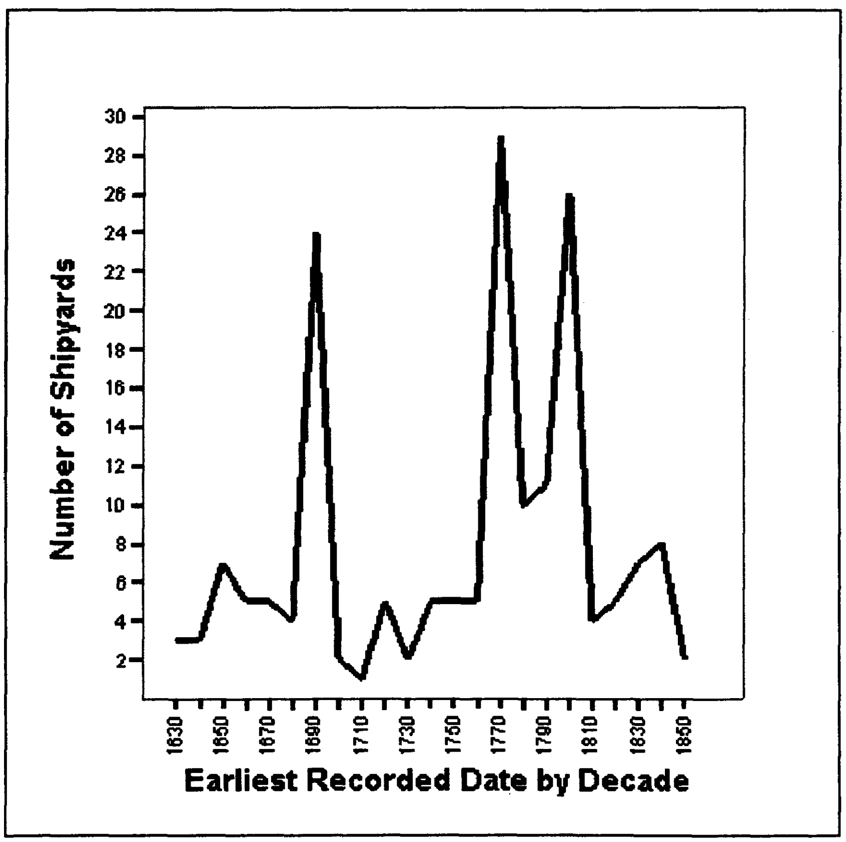


Figure 24: Earliest recorded date, grouped by decade

recession between 1766 and 1768 (Middleton 1984). The American Revolution saw a dramatic increase in domestic shipbuilding, not only to support the war effort but because merchants could no longer depend on English ships to transport their wares. The period following the Revolution is a source of disagreement among scholars. Eller (1981) and Middleton (1981) believe that the boom-time begun during the Revolution continued after it as well, but Ahrens (1998) puts forth that the 1780s saw a recession. Regardless, during this period the Chesapeake region became the second leading shipbuilding center in what had until recently been England's American colonies (Middleton 1984), with the 1790s hosting another expansion of the market (*Ibid.*). The advent of 1808 saw another severe recession with the passing of the Non-Intercourse Act, which suspended all trade with France and Great Britian (Ahrens 1998). Quickly thereafter, the market rebounded in 1811, only to collapse again in 1813 as the War of 1812 began to take its toll (*Ibid.*). After a slight resurgence, the financial scare of 1819 again put shipbuilding into a tailspin from which most regions did not recover until the 1830s. The 1830s were the final peak for wooden shipbuilding (Brewington 1953). Between the late1830s and 1850 shipbuilding continued to be a going concern but the locations in which it was practiced began to become centralized, primarily in Baltimore, as the inception of iron and steam began to drive the smaller shipyards out of existence.

All three graphs corroborate the historical record surprisingly well. Of the three the graph drawn from the earliest recorded date grouped by decade seems to offer the tightest fit. The latest recorded date graph seems to have an excess of noise towards the end of the study period and the flourish decade graph failed to accurately represent the pivotal years surrounding 1748 or the collapse of 1766. The only apparent shortcoming of the earliest recorded date graph is that it shows the recession of 1813 as a check in the upward trend rather than as a decline. All three graphs answer the controversy surrounding the economic fortunes of shipbuilding in the decade following the Revolutionary War by representing that period as a significant trough. Similarly, all of the graphs show the precipitous decline in the number of shipyards towards the middle of the 19th century as the craft became more centralized. Ideally it would be possible to calculate the number of shipyards in operation at any one time using the ratios between dates represented on the graph and a year for which the actual total is known. Unfortunately, while the graphs represent trends well, it is likely that some of the peaks are exaggerated. While the years of the Revolution and the transition from the 17th to 18th century were undoubtedly times of increased shipbuilding, their numbers relative to other periods may have been unfairly bolstered by the popularity of the first period and a sheriff's report identifying all shipbuilders during the second. However, it seems that not even these periods represent a total accounting of all the shipbuilders in operation at that point. For instance, none of the graphs show more than 30 shipbuilders working in the state in 1775, but there were at least 68 shipyards in operation at the beginning of the Revolution (Middleton 1981). Despite this fault it appears that these graphs are a source of new information. Little has been written regarding the history of shipbuilding prior to the 18th century, and no known source reports an expansion of the market during that period. However, all three graphs show a marked increase in shipbuilding between 1645 and 1660. This would have been a period of growth through immigration and relatively uninterrupted trade for the colonists. It is possible that indigenous shipbuilding sprang up to facilitate the exportation of tobacco. This peak corresponds roughly with the initial surge in tobacco mania and its decline in 1660 matches the onset of the recession that peaked at the beginning of the 17th century. Additionally, the peak begins around the start of the English Civil War, which cut off trade to the colonies and would have necessitated some sort of colonial shipbuilding for the West Indian trade.

Moving then from temporal to geographic analyses, there is the matter of the proximity of shipyards to urban centers (figure 25). It was noted in chapter two that it behooved shipbuilders to locate their yards in the neighborhood of towns in order that their primary clients, merchants, could easily visit the yard (Goldenberg 1976). Walsh (1988) has demonstrated that, until at least the end of the 18th century, the maximum effective radius of a community network was five miles; the distance within which face-to-face contact was convenient. Based on that hypothesis, it seems reasonable to expect shipbuilders to locate their shipyards within five miles of an urban center. In fact, of the 95 shipbuilders in the sample a full 75 (79%) were within five miles of a town. All but two (2%) of the shipyards were within ten miles of an historic town. Somewhat surprisingly there were 50 (53%) shipyards located within the boundaries of historic urban centers. Slightly better than half of the shipbuilders opted for lands that likely cost more to purchase or lease and were certainly removed from immediate stores of timber in order to be readily accessible to their clients. Those shipyards located in urban centers tend to cluster along specific parts of the shoreline forming what were essentially shipbuilding districts. Examples of these districts can be seen at Fells Point in Baltimore, and along the St. Michael's waterfront. The clustering of these shipyards may have been a concession to the natural environment or it may have been the result of a decision on the part of shipbuilders to make their yard more convenient to the prospective client. Irregardless, these results point to shipbuilding being more of an urban occupation than has been previously believed (Goldenberg 1976).

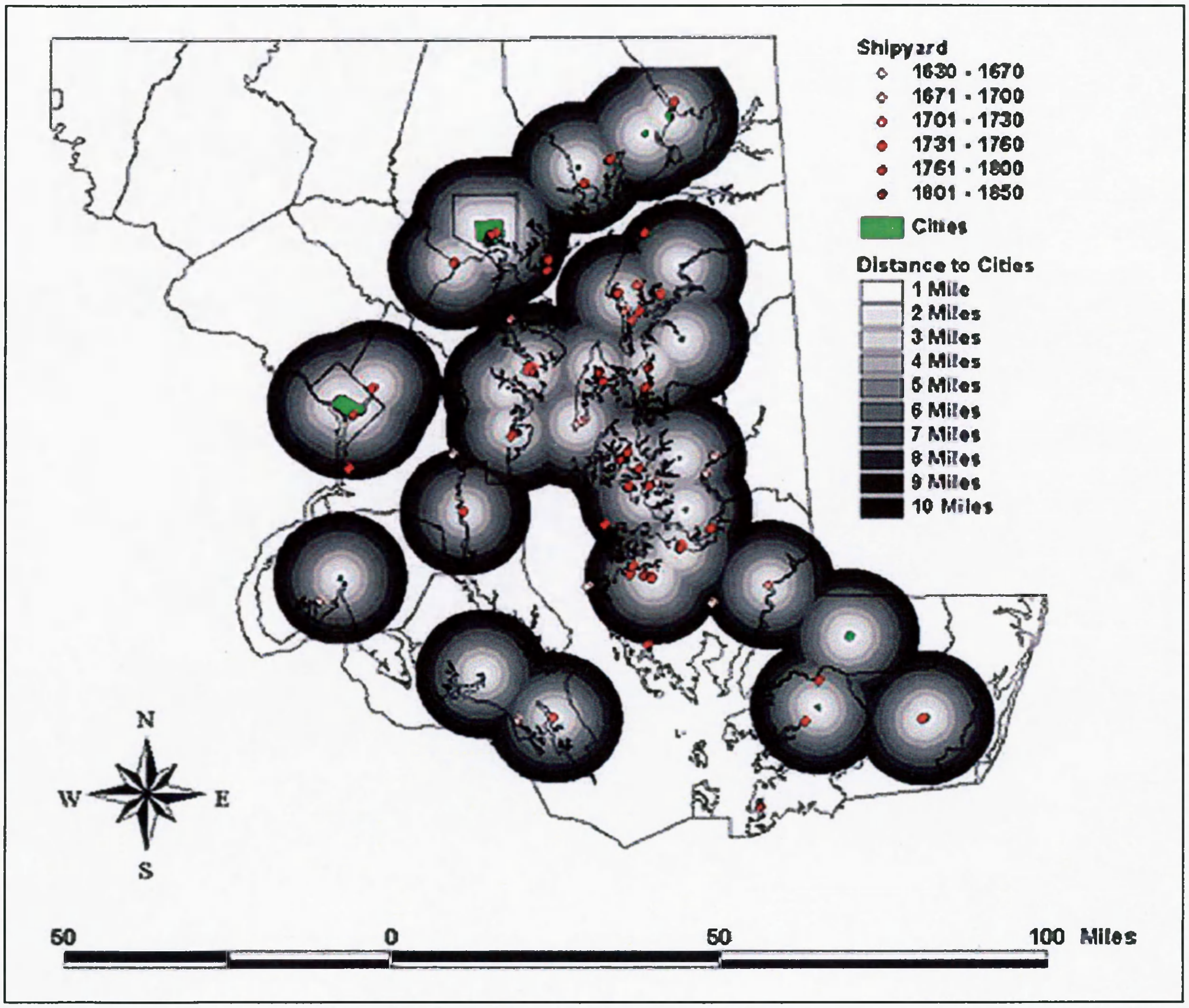


Figure 25: Proximity of shipyards to urban centers

The final gross spatial analysis conducted on the shipyards involved their proximity to one another. This analysis also segues into the comparison of the Eastern Shore to the remainder of the state. The shipyards were broken into five periods based on their earliest recorded date and concentric rings were plotted around them to a distance of 10 miles from the center. Based on these results a clearer description of the development of Maryland shipbuilding is attained.

The first period included all of the shipyards in existence prior to the first major expansion of the market in 1700 (figure 26). These yards reflect the pattern expounded by Middleton (1981, 1984) in which shipyards tend to be widely dispersed. The majority of the shipyards are at least 18 miles from one another. The exception to this statement is the small cluster of yards in Queen Anne's County on the Eastern Shore. The Eastern Shore in general is more developed in terms of shipbuilding at this time; there are seven shipbuilding centers there, as compared to four in the rest of the state. Furthermore, all the shipbuilding is located in the southern part of the state. The upper reaches of the Chesapeake Bay are still empty. This is likely due to the fact that the upper Bay had not yet been settled.

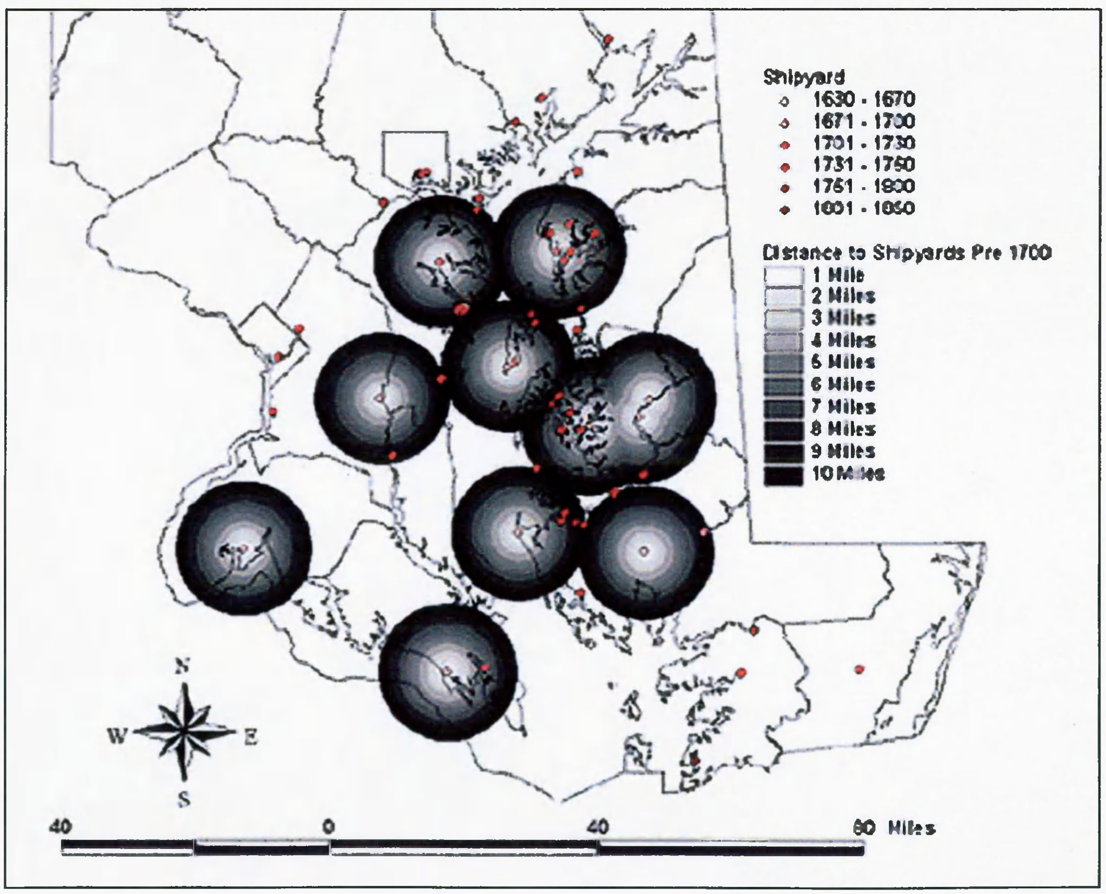


Figure 26: Proximity of shipyards, 1631-1699

However, over the next three quarters of a century this pattern changes (figure 27). For the period of 1700 through 1774 there are a number of shipyards expanding northward as Europeans colonize the entire periphery of the Bay. Additionally, at this time there is an expansion to the west, with the first shipyards appearing on the Potomac River. Despite shipyards extending into these regions the major centers of shipbuilding remained in the center of the Bay, especially on the Eastern Shore. The Eastern Shore boasted eight shipbuilding clusters, many of which were in Kent County during this period, compared to six such centers in the rest of the state.

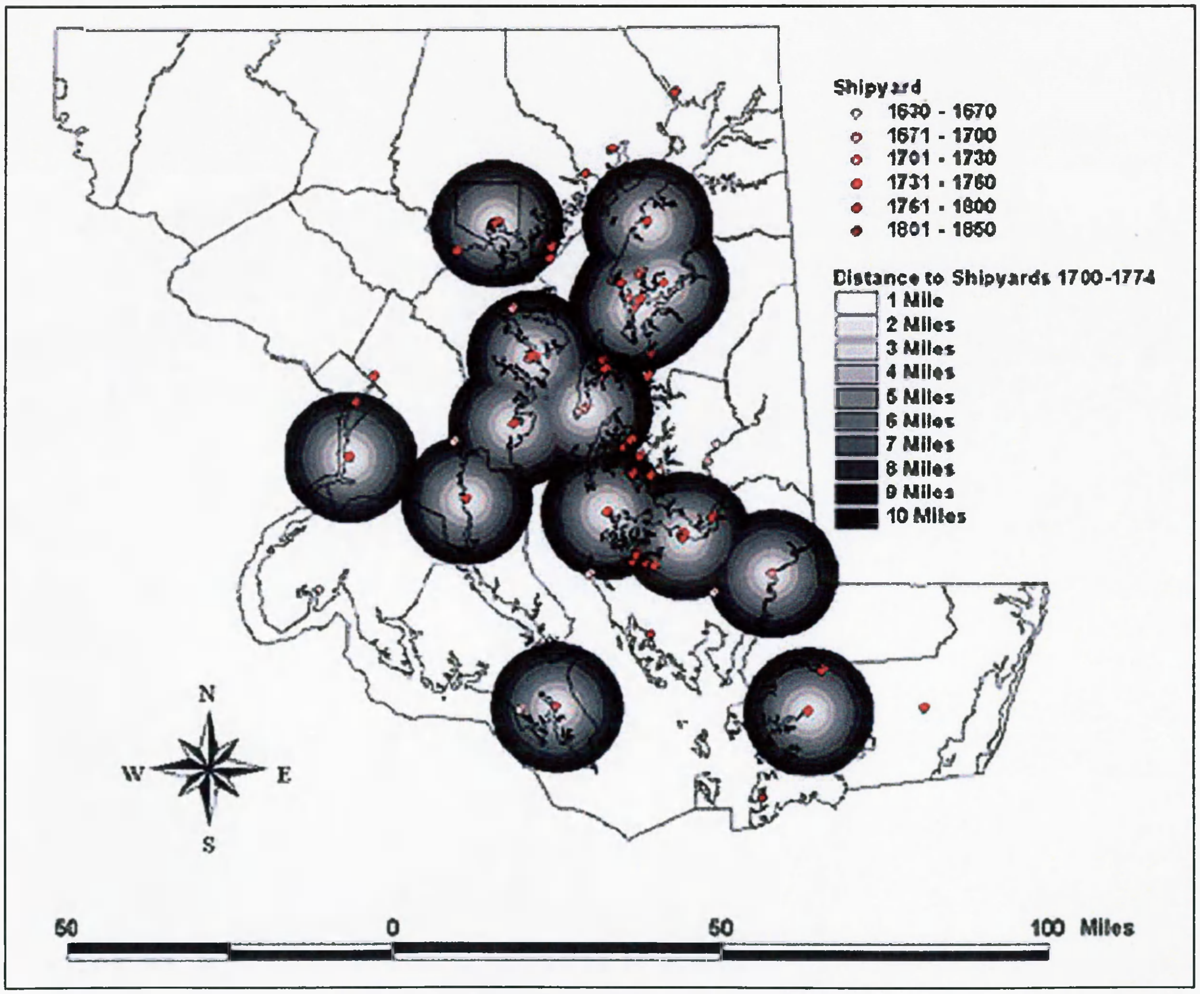


Figure 27: Proximity of shipyards, 1700-1774

The next period, the years of the American Revolution, represented a drastic shift in the distribution of shipyards (figure 28). The shipyards are tightly clustered in the northern portion of the Bay, primarily on its western shore. This may have been in part a defensive measure; an attempt by shipbuilders to put as much distance as possible between themselves and the attacking British entering the mouth of the Bay. Some credibility was given to these fears in 1781 when the British sought out and burned the Stephen Steward shipyard located south of Annapolis (Thompson 1993). Interestingly, there were no shipyards founded in Baltimore during this period. There is no clear explanation for this

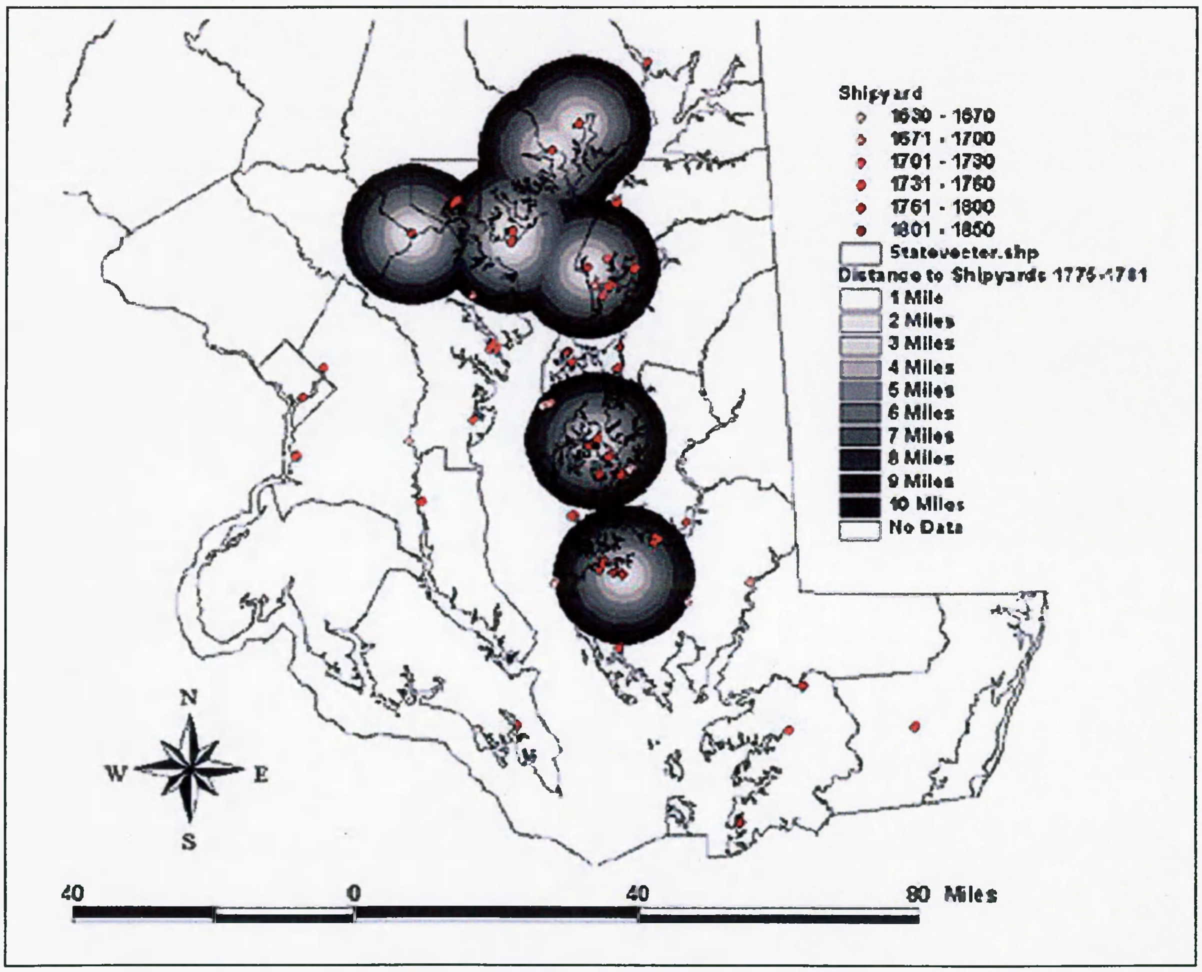


Figure 28: Proximity of shipyards 1775-1781

phenomenon, as Baltimore was a growing urban center at this time and shipyards were established there both in previous and subsequent periods. At this time the Eastern Shore appears to have temporarily lost its dominance over the shipbuilding market as it only boasted three shipbuilding clusters as compared to four for the rest of Maryland.

The period from 1782 to 1813 represents the golden age of wooden ship construction (figure 29). This is the period of the Baltimore Clipper when Maryland shipbuilding came into its own. The final surge before the collapse of wooden shipbuilding is indicated by the massive clustering of shipyards all along the Eastern Shore. The

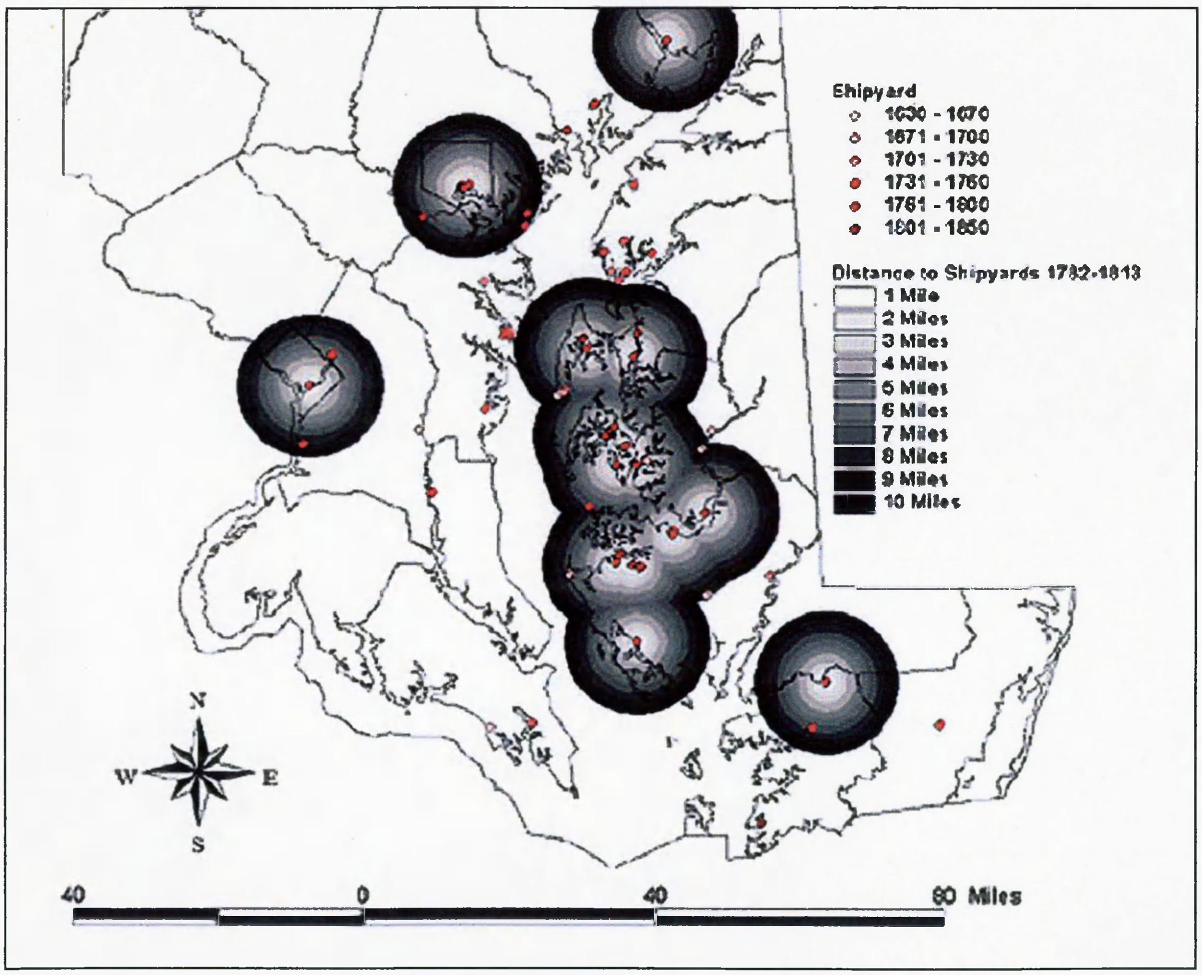


Figure 29: Proximity of shipyards, 1783-1813

Eastern Shore clearly won back the market after the Revolution, as it contains three times as many shipbuilding centers as the remainder of the state. However, a harbinger of the next period is in the large number of shipyards operating in Baltimore at this time.

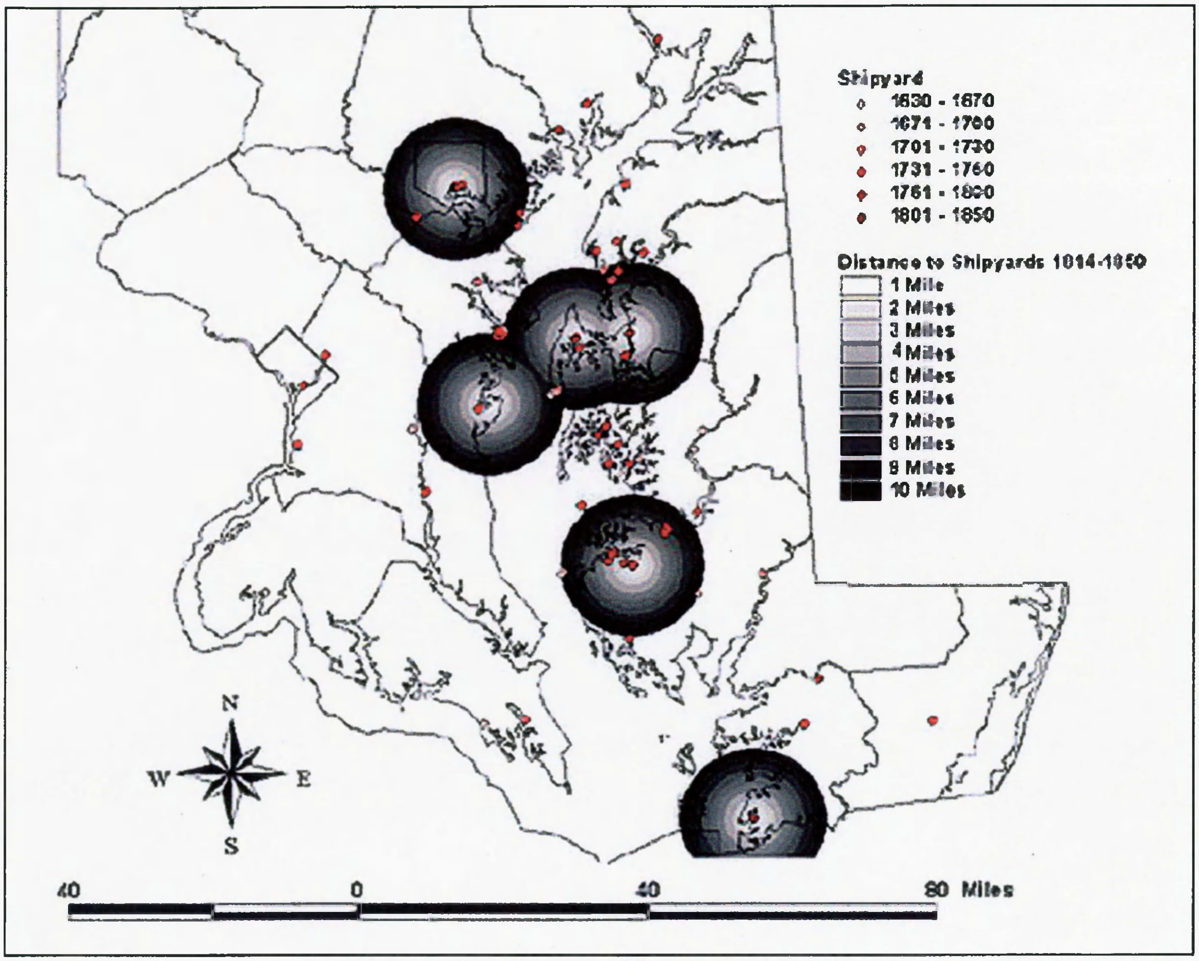


Figure 30: Proximity of shipyards, 1814-1850

The final period from 1813 until 1850 represents the period during which shipbuilding became centralized (figure 30). While the image gives the impression that shipbuilding has come full circle and has returned to the same pattern of a few dispersed shipyards, the opposite is in fact true. Clustered in the shipbuilding center at Baltimore (more specifically, along the Key Highway at the foot of Federal Hill) are as many shipyards as there are in the remainder of the state combined. What is more, the shipyards in Baltimore were all founded late in the period indicating that they had a number of years of production ahead of them, while the shipyards in the remainder of the state were all established early in the period and were beginning to fade by 1850. From this time forward Baltimore was the undisputed center of Maryland shipbuilding.

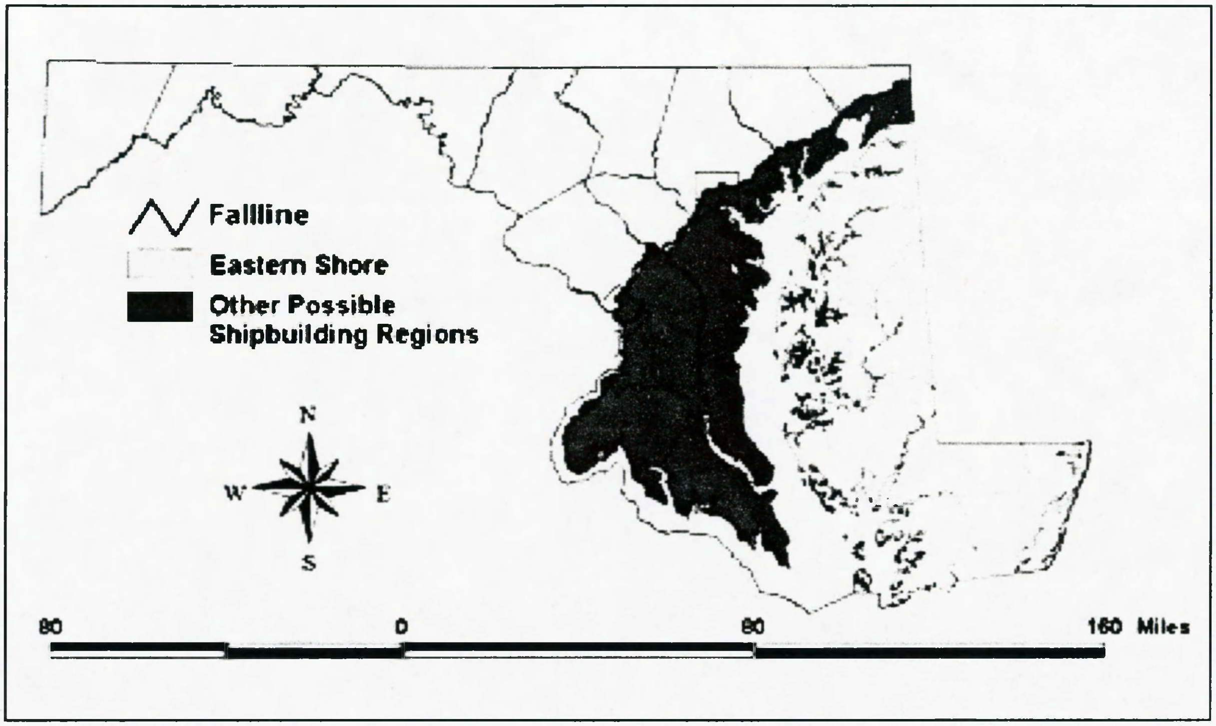


Figure 31: Maryland shipbuilding regions

Maryland shipbuilding can be effectively divided into two regions: the Eastern Shore and the rest of the state south and east of the fall line (figure 31). With a few exceptions this distinction parses the shipyards into those to the east of the Chesapeake Bay and those to the west. Based on the previous analysis, where the Eastern Shore was shown to dominate the shipbuilding market for three of the five periods, it would seem that the vast majority of shipbuilding took place on the Eastern Shore. This is not the case. The Eastern Shore did lead the western part of the state, but not by an overwhelming amount (figures 32 and 33). In this sample, 78 shipyards (46%) were located to the west of the Bay, while 93 (54%) operated to the east. The reason for this surprising result is the

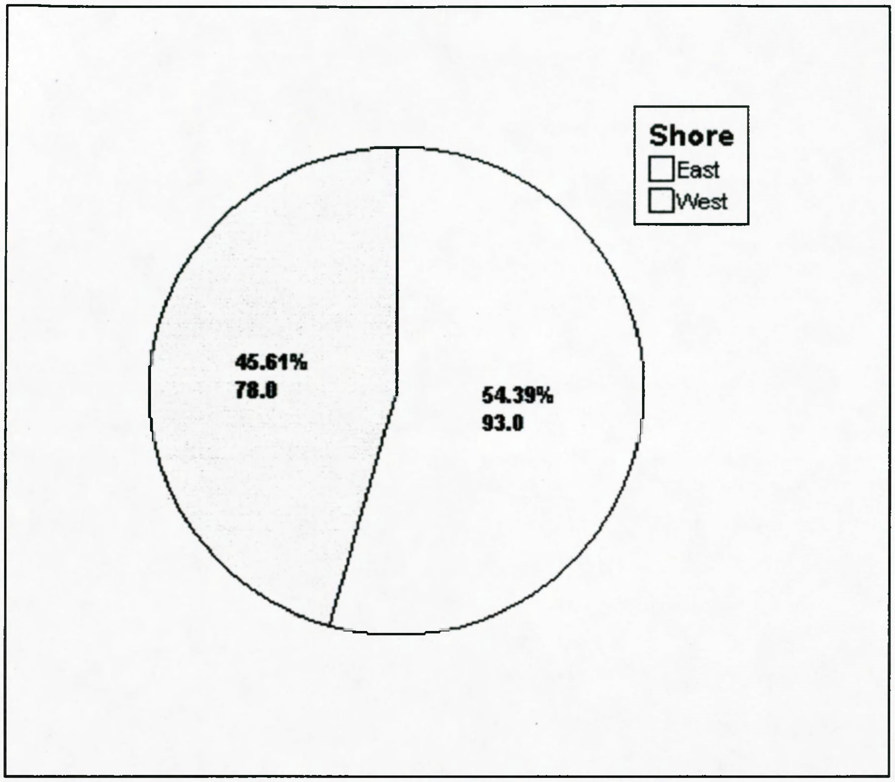


Figure 32: Proportion of shipyards by region

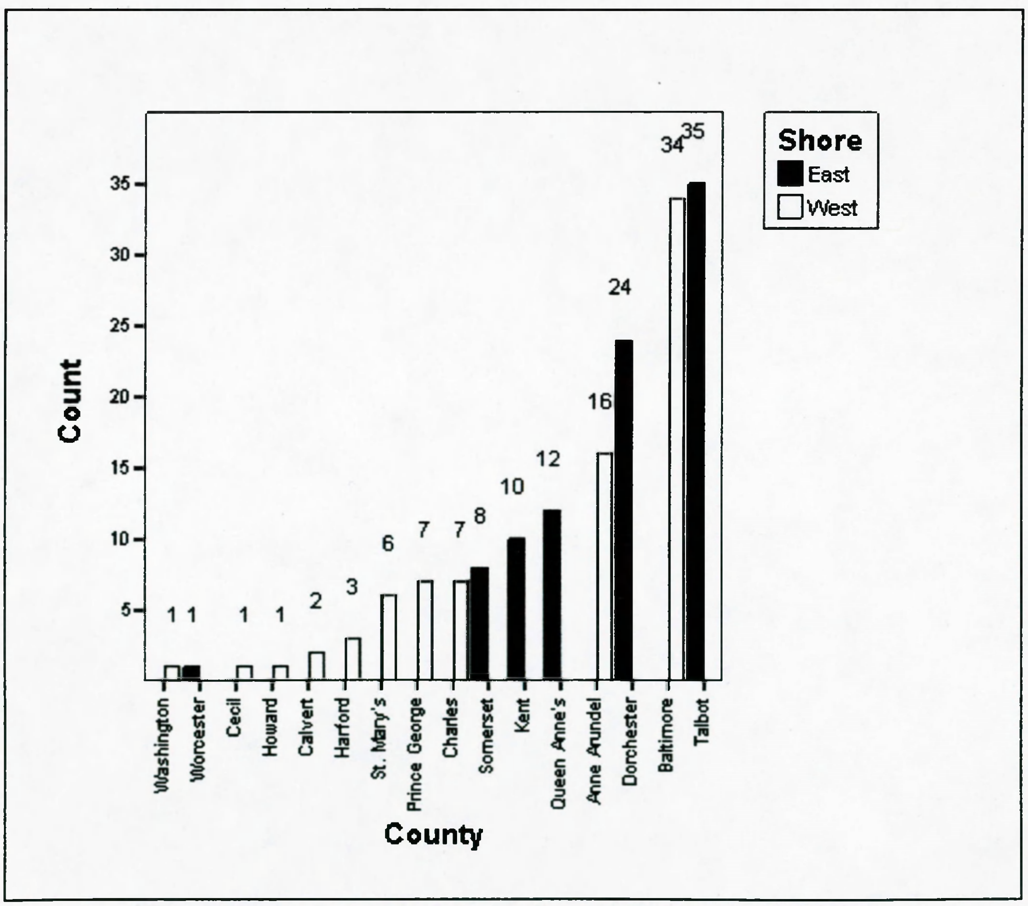


Figure 33: Number of total shipyards, grouped by county and shore

prodigious number of shipyards (25) located in Baltimore City. The fact that this city was such a major shipping hub significantly increased the number of shipyards in the region.

To clarify the relationship between the Eastern Shore and the remainder of the state, the fluctuations from shore to shore were traced (figure 34). The mean dates for the shipyards in each county show that early in Maryland's history the vast majority of the shipyards were clustered in the southwestern portion of the state. This pattern is reasonable, as this was the first area settled by Marylanders. Shipbuilding then shifted to the Eastern Shore for the majority of the 18th century. During this period there is a slump

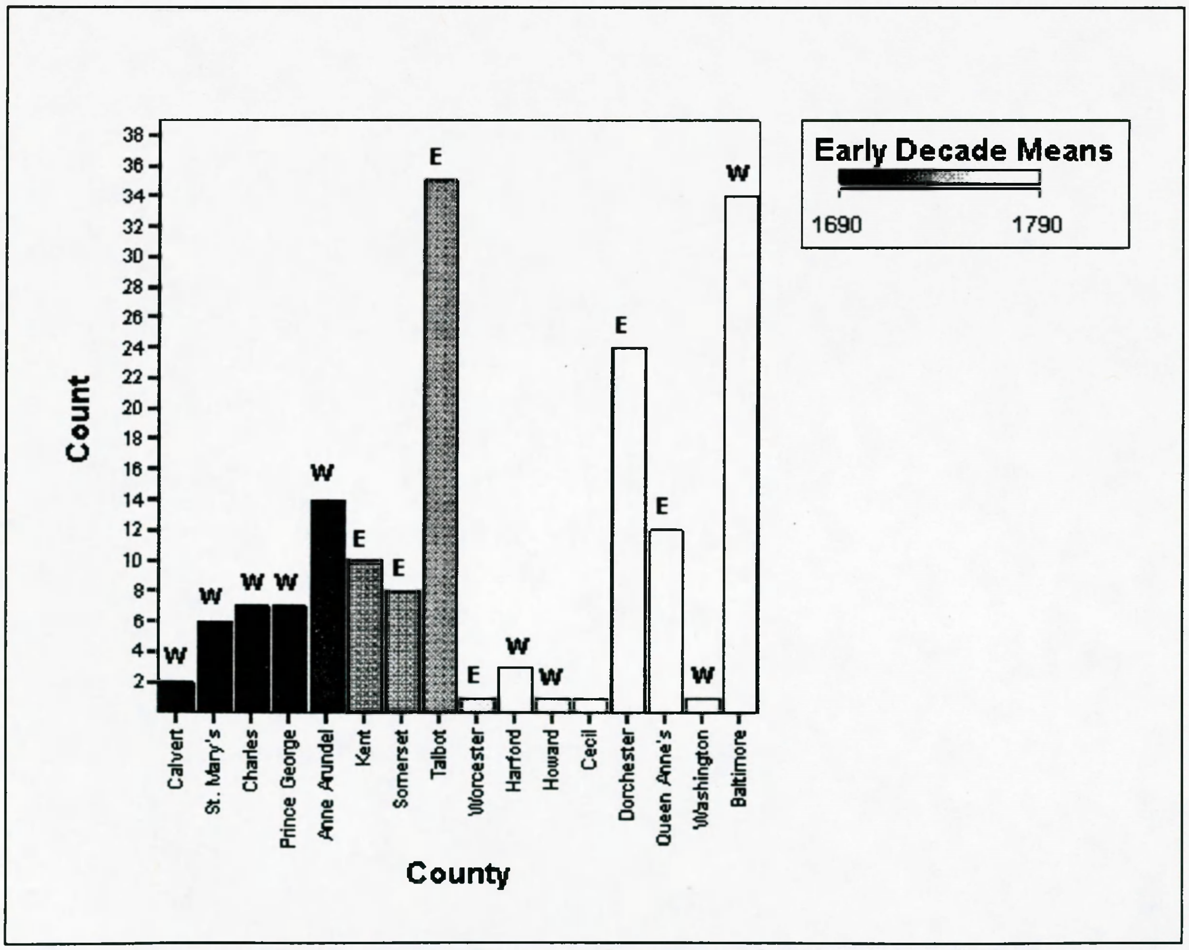


Figure 34: Number of shipyards, grouped by county and arranged chronologically

in shipbuilding and the trend seems to shift back to the west and north; however, the small sample size for those dates may be skewing the results. Regardless, by the second half of the century the Eastern Shore had regained dominance. Finally, the West, Baltimore County in particular, surpasses the East at the end of the period of study. Again, this represents the shift to large, centralized, iron shipbuilding in major cities.

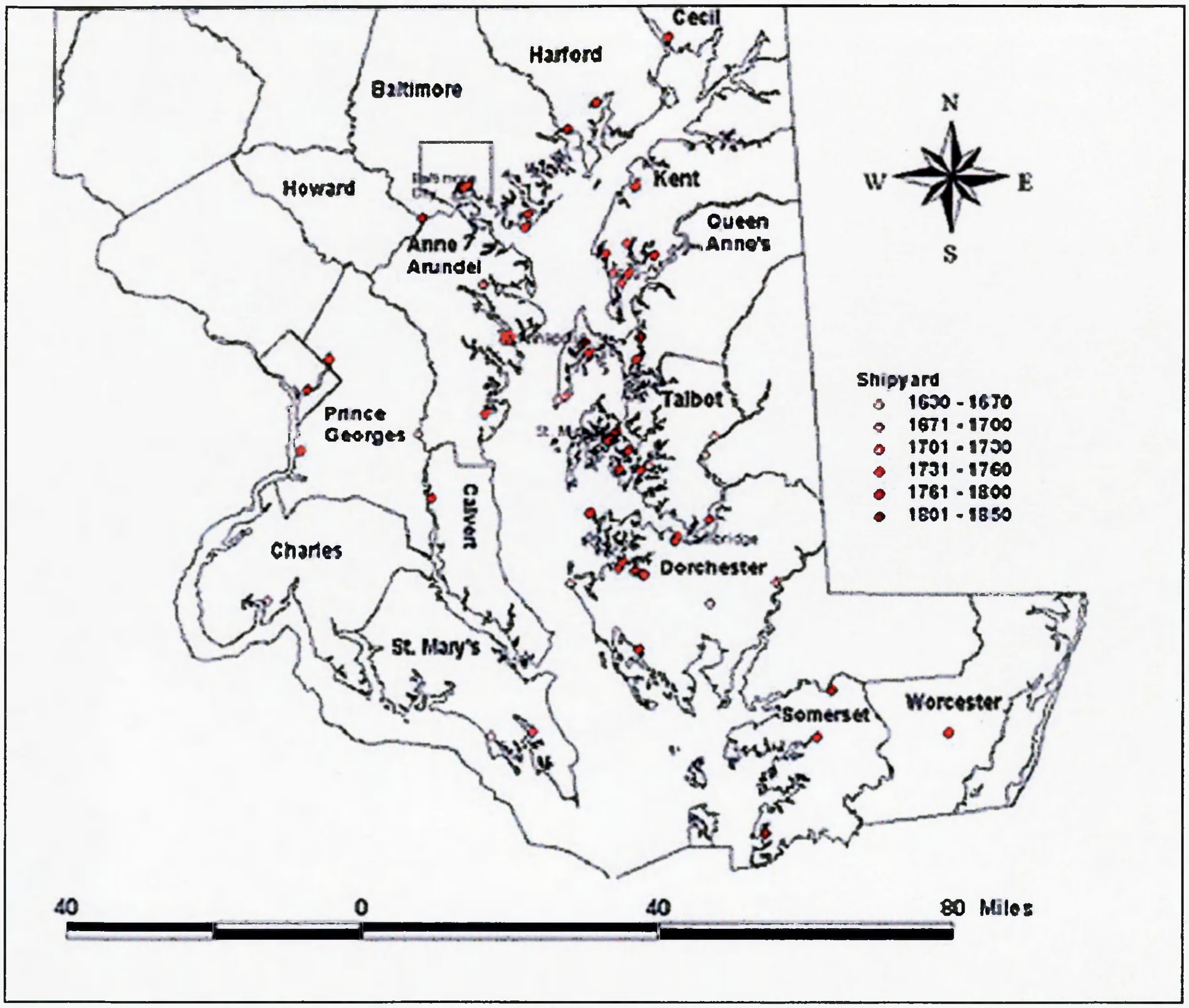


Figure 35: Geographical distribution of shipyards, grouped by date

From this discussion of the temporal variance in the shores it is appropriate to proceed to a more focussed discussion of the various shipbuilding counties of Maryland (figures 34 and 35). Initially, much of Maryland's shipbuilding took place along the Potomac and the state's southern Bay waters (Tilp 1978). At roughly the same time the state saw one of its first shipbuilding center established at Annapolis in Anne Arundel County (figure 36). It would seem that Annapolis became a shipbuilding center only because of it was the seat of government (Chapelle et al. 1986), as it was not near a good supply of timber or naval stores, and its harbor was too shallow to accommodate large vessels (Middleton 1984, Winklareth 2000). In fact it appears that a an act of the State Legislature was required to initiate shipbuilding in the town. A 1695 act declared that one or more places in Annapolis "be laid out and reserved as ship-yards" (Riley 1887:63). Nevertheless, Annapolis grew into a respectable shipbuilding center with multiple yards, rope walks, and ship chandlers, and until its decline after the middle of the 18th century it vied with Norfolk, VA as the dominant port on the Chesapeake (Middleton 1984).

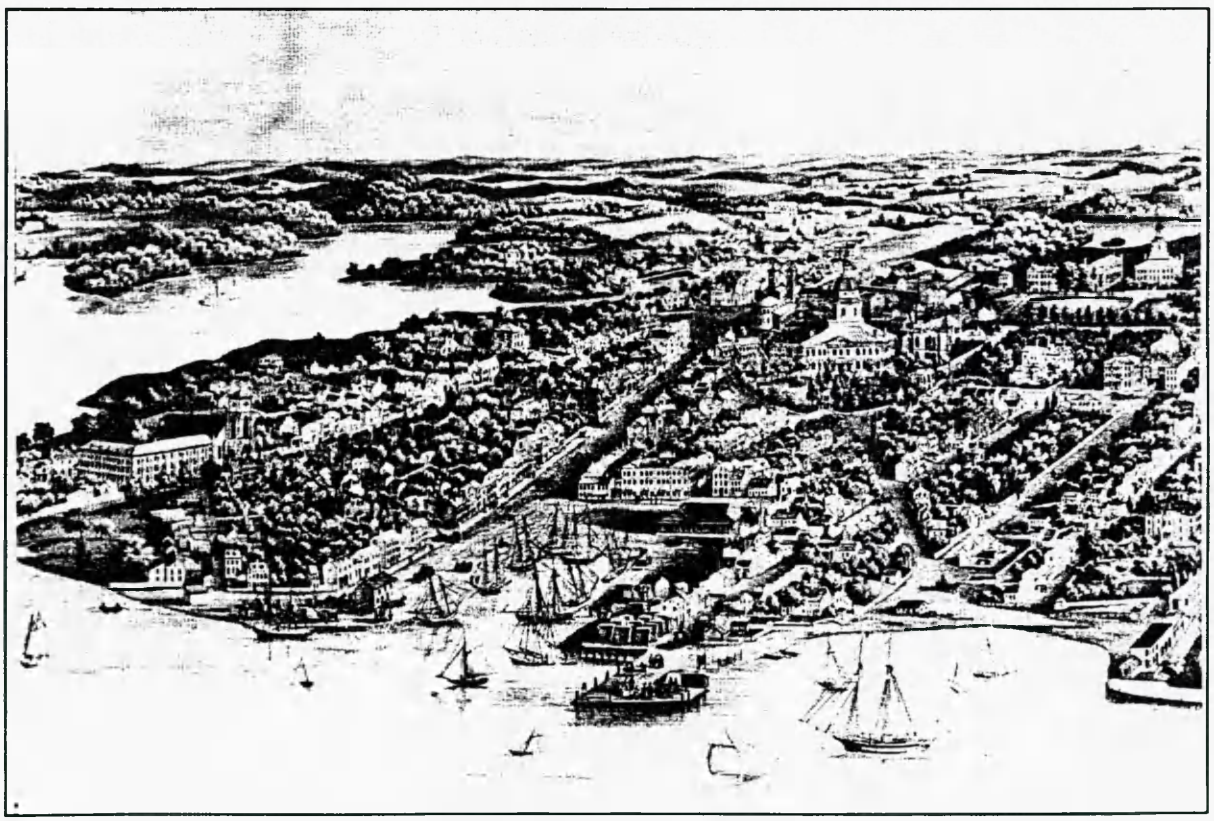


Figure 36: Annapolis, 1858

According to the graph (figure 34) the next region to ascend to primacy was Talbot County, but this is only partially true. In reality, Talbot County experienced two peaks of shipbuilding, which the graph has conflated into one. Talbot County's first rise corresponded, and possibly preceded that of Annapolis. In 1697-8, with eleven shipyards in operation, Talbot County led the colony in shipbuilding (Preston 1983; Lesher 1997). However, while the county dominated the market there was no one single shipbuilding Mecca as there was in Anne Arundel County. Talbot County followed a pattern of diffuse settlement that typified the Eastern Shore during this period. Consequently, shipyards like settlements were spread along the coast. After this initial surge Talbot County maintained a strong shipbuilding presence through the middle of the 18th century. Between 1690 and 1759 there were 50 shipbuilders (42 ship carpenters, four caulkers, two sailmakers, and two blockmakers) in the county making up 6% of the artisan population (Russo 1988). Rising from this strong base, Talbot County saw its second fluorescence just prior to the turn of the 19th century. At this time, the vast majority of shipbuilding became centralized in St. Michael's, which had been surveyed in 1778. Unfortunately, this upward surge was short-lived. Shipbuilding declined across the state in 1813 after the advent of the War of 1812 and Talbot County never recovered, primarily because it was denuded of its timber by 1820 (Preston 1983).

The next mode on the graph is that of Dorchester County. Dorchester did not have an established shipbuilding industry until the mid-1700s and at that time it was not a substantial part of the local economy. (Mowbray 1980; Mowbray and Rimpo n.d.). However, the shipbuilding community continued to grow for the remainder of the century and by the 19th century it was a mainstay of the county (Mowbray 1980). Unfortunately, Dorchester, like Talbot County and much of the rest of the state, was deforested by early in the 1800s. This environmental debacle effectively put and end to all shipbuilding in the county. However, the region still supports a strong small craft building population, specializing in oystering and pleasure craft (Mowbray and Rimpo n.d.). Similar, to the early period in Talbot County, shipbuilding in Dorchester was dispersed throughout the county. Yet, in the decades immediately preceding and subsequent to the turn of the 19th century there was a shipbuilding center in the town of Cambridge.

The patterns of Dorchester and Talbot Counties bring to light an interesting trend in Maryland shipbuilding. The transition from multiple small dispersed shipyards to relatively few larger yards in a single location was not as abrupt as the term "Industrial Revolution" would imply. In both cases, while still building wooden, sail-driven vessels centralization had begun. This is indicative of the fact that shipbuilding was becoming more of an industry in the modern sense. The shipyards of St. Michael's and Cambridge were never as large as the ones in Baltimore a few decades later, but as they required large amounts of supplies and skilled laborers the shipyards had already begun to be centralized in areas where those necessities could easily be obtained. Consequently, the advent of iron and steam in shipbuilding only accentuated a trend that had begun decades earlier.

The ultimate beneficiary of this accentuation was Baltimore. Yet, Baltimore did not spring fully formed from the womb of the Chesapeake shipbuilding at the beginning of the 19th century. The area had a long standing tradition of shipbuilding dating back to the middle of the 1700s. Unlike Annapolis, Baltimore was naturally suited for shipbuilding with a good harbor and a fertile backcountry full of white oak and ship stores (Chapelle et al. 1986). Throughout the pre-Revolution years Baltimore grew as a shipbuilding center, eventually achieving the highest concentration of shipyards on the Chesapeake Bay (Middleton 1981). Yet, throughout this period Baltimore was constantly overshadowed by

Norfolk, VA. During the Revolutionary War this relationship changed; Norfolk was destroyed by the British while Baltimore survived with minimal damage to its shipbuilding industry, and consequently became the dominant shipbuilding center in the region (Middleton 1984). What is not immediately obvious from the graphics is that Baltimore actually included two separate shipbuilding centers (figure 37). From its founding as a shipbuilding area in 1730 through roughly 1820 Fells Point was almost the exclusive home of major ship construction in Baltimore. However, after that period, as shipbuilding became increasingly industrialized and the need to import raw materials increased,

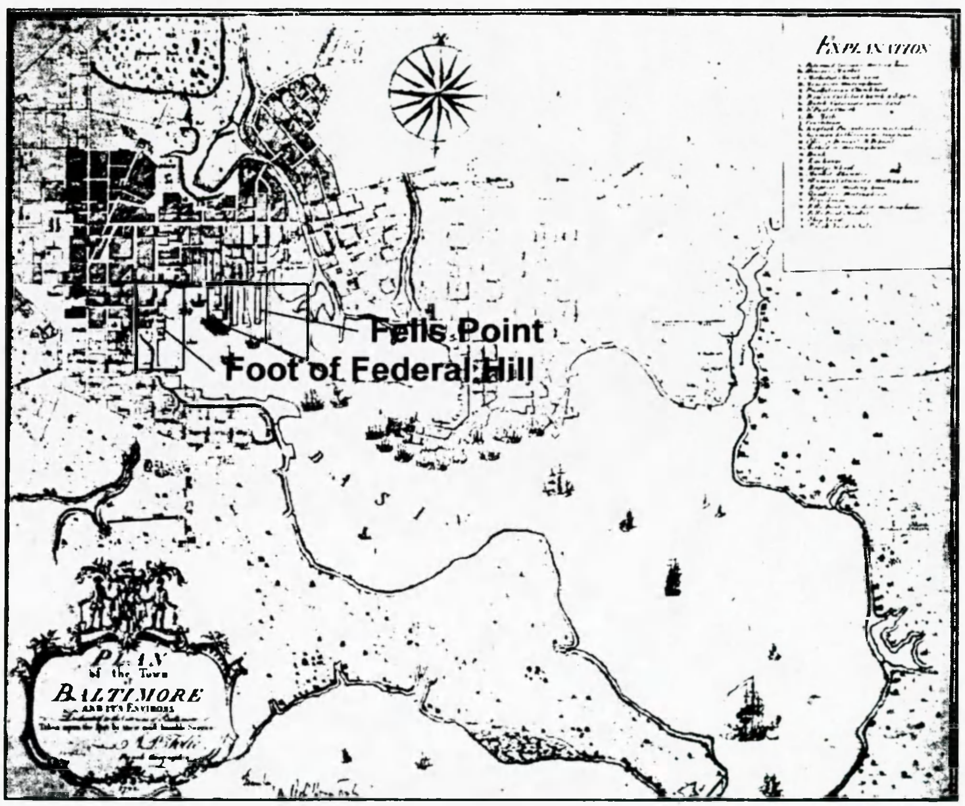


Figure 37: Historic Baltimore

shipbuilding shifted across the Inner Harbor to along the Key Highway at the foot of Federal Hill. In all likelihood this transition occurred because the railroads were routed very close to Federal Hill. At the same time the number of shipyards in the city decreased, again as shipbuilding became ever more centralized. Today, the handful of shipyards that operated along the Key Highway in the mid 19th century are underneath the Bethlehem Steel Shipbuilding facilities. Obviously, the trend of increased size and centralization did not end with the study period (figure 38).

Figure 38: Modern shipyard, Baltimore

An interesting aside to the discussion of Baltimore City as a shipbuilding center are the shipbuilders that were excluded from the sample in order that it not become completely skewed towards Baltimore. As it stands now the vast majority of the real estate along both Fells Point and the foot of Federal Hill is represented in the GIS sample. Consequently, the excluded yards limited only the total counts, rather than the geographic areas. Nonetheless, some mention should be made of these shipbuilders. Between 1812 and 1815 there were at least two additional "ship carpenters" on Fells Point: William Parsons (MSA 1812) and Andrew Flannagan (MSA 1814-1815). Similarly, Charles Pearce, S. Salenave, Andrew Descondes, Charles Clarke, Watchman and Bart, Charles

Reeder, Andrew Gray, Langley B. Culley, E. Willey, and Fooks and Dale, among others were all shipbuilders at the Foot of Federal Hill between 1773 and 1850 (Ruckert 1980). Finally, there were six individuals listed as either "shipwright" or "shipbuilder" in the 1804 Baltimore City Directory that were mentioned in no other text. These individuals included: Joseph Degles, Levi Regin, Charles Nash, William Parson, and Ezekiel Stokes (MSA 1804). Interestingly, the address given for all of these individuals placed them under what is now Oriel Park at Camden Yards. With all of these individuals, especially those listed only in the City Directory, it is hard to discern if they owned their own shipyard or were simply employed at one of the yards already listed in the sample.

While the above discussion identified the areas of greatest intensity of Maryland shipbuilding, some consideration should be given to those regions where shipyards are conspicuously absent. The most noticeable of these areas is Calvert county, with its Chesapeake Bay margin oddly vacant of shipyards. The absence of shipyards from this county is real, and not a sampling error (Berry 2000: personal communication). A primary cause for this paucity of shipyards is probably the natural setting of the county. Its shoreline is less bisected by rivers than most of the region, in fact large portions of its coast are composed of cliffs. Thus there are no natural harbors to provide shelter from storms. Additionally, there may have been cultural factors, and these comments hold true for the Counties of St. Mary's and Charles, as well (Humphries personal communication). Calvert County had no large cities to attract merchants and subsequently shipbuilders. Furthermore, tobacco grows very well in all of these counties. Thus, unlike the Eastern Shore where shipbuilding and other crafts arose out of necessity, the counties of southwestern Maryland may have been able to sustain their economies with tobacco agriculture alone.

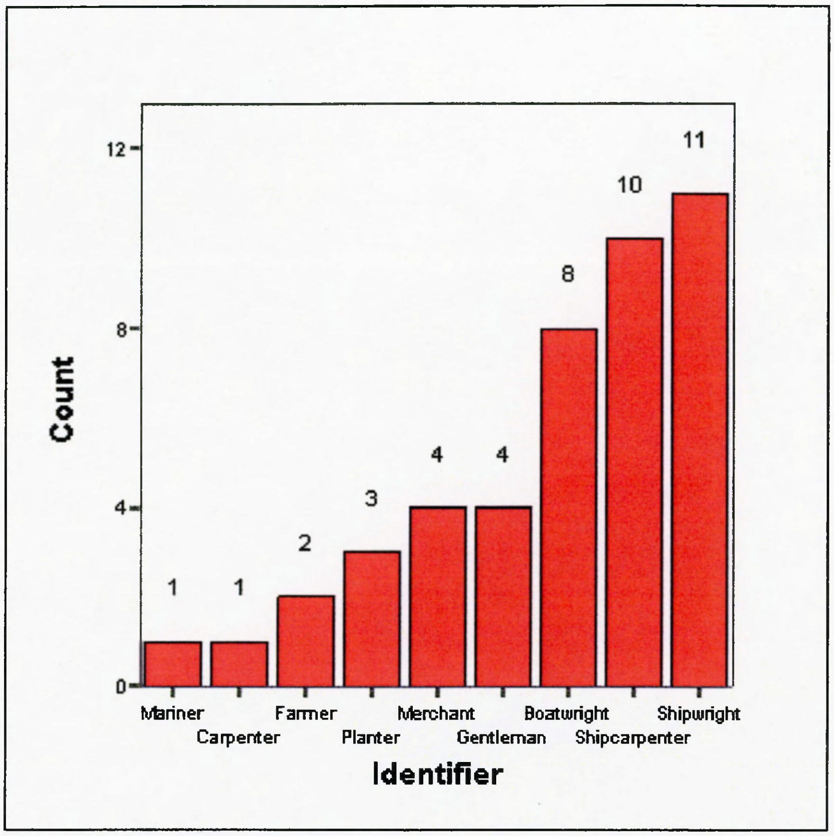


Figure 39: Graph of terms used to identify shipyard owners in land records

The remainder of the analyses are at the site specific level, in an attempt to elucidate the specific considerations involved in the decision to locate a shipyard in one location rather than another. However, prior to continuing on with the discussion of geography and the environment some attention should be paid to the shipyard owners themselves. Goldenberg (1976) argues that merchants such as Charles Carroll, Samuel Galloway, and Patrick Creagh were unusual in their close association with shipbuilding, either as builders themselves or as owners of shipyards. Goldenberg states that most merchants avoided being actively involved in shipbuilding because it was unstable and often unprofitable. However, of the 44 shipyard owners who had an identifying title attached to their name, eight (18%) were listed as either merchants or gentlemen (figure 39). Consequently, there seems to have been a sizable population of Maryland shipyard owners who operated primarily in the mercantile realm. Furthermore, this analysis indicates how much of the sample would have been lost if only the primary historical record had been consulted. Only two thirds (29) of the shipbuilders with identifiers were listed as either "boatwright," "shipcarpenter," or "shipwright." Thus a full one third of the shipbuilders would have likely been excluded without the benefit of secondary sources.

Regardless of their title, all of these shipbuilders would have been engaged in constructing similar vessels and as such would have desired certain characteristics in the location where they chose to build. The literature on shipbuilding is peppered with references to the importance of a site's characteristics to the success of a shipyard (Brewington 1953; Goldenberg 1976; Spectre and Larkin 1991; Souza and Peters 1997). However, few of these sources are specific in regard to what makes one site better than another, and none of them attempt to quantify the characteristics of a superior shipyard location. What follows is a preliminary effort to rectify this situation.

The first characteristic investigated was that of slope (figure 40). As discussed in the previous chapter the slope of the land was invaluable in transporting the vessel to the water in a safe and efficient manner. The average slope for the shipyards (N=53) measured ranged from one to 43 degrees. However, there were a number of outlier averages that skewed the sample to the higher end. By excluding the three highest values, all those greater than 25, a mean slope of eight was obtained with a standard deviation of five. Further limiting the sample so that a larger group of outliers, the six values of 20 or greater, were excluded yielded a mean of seven with a standard deviation of four.

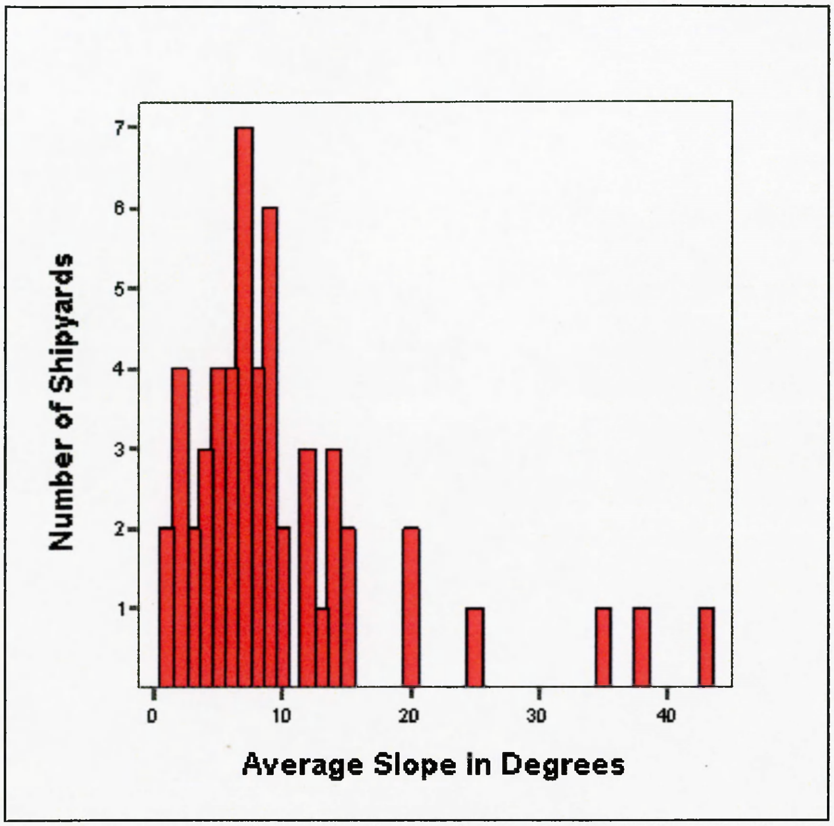


Figure 40: Graph of mean slopes

Consequently, the majority of the shipyards have slopes today of between three and eleven. This range includes the only archaeologically recorded slope of a launching way in the State of Maryland. The Stephen Steward Shipyard was reported to have a slope of three to four for its launching ways (Thompson 1993). The Steward yard had side launching ways, rather than a bow-first launch, and this may be the reason for it being on the low end of the range. However, future archaeological investigations of both bow and side launch shipyards will be necessary to test that theory.

The next site specific analysis involved the degree of protection that a site offered the shipyard (figure 41). Goldenberg (1976) mentions that shipbuilders favored bays and the mouths of rivers, but no examples are provided to elucidate the nature of these sites. The study conducted here found that 67% (64) of the shipyards under consideration were

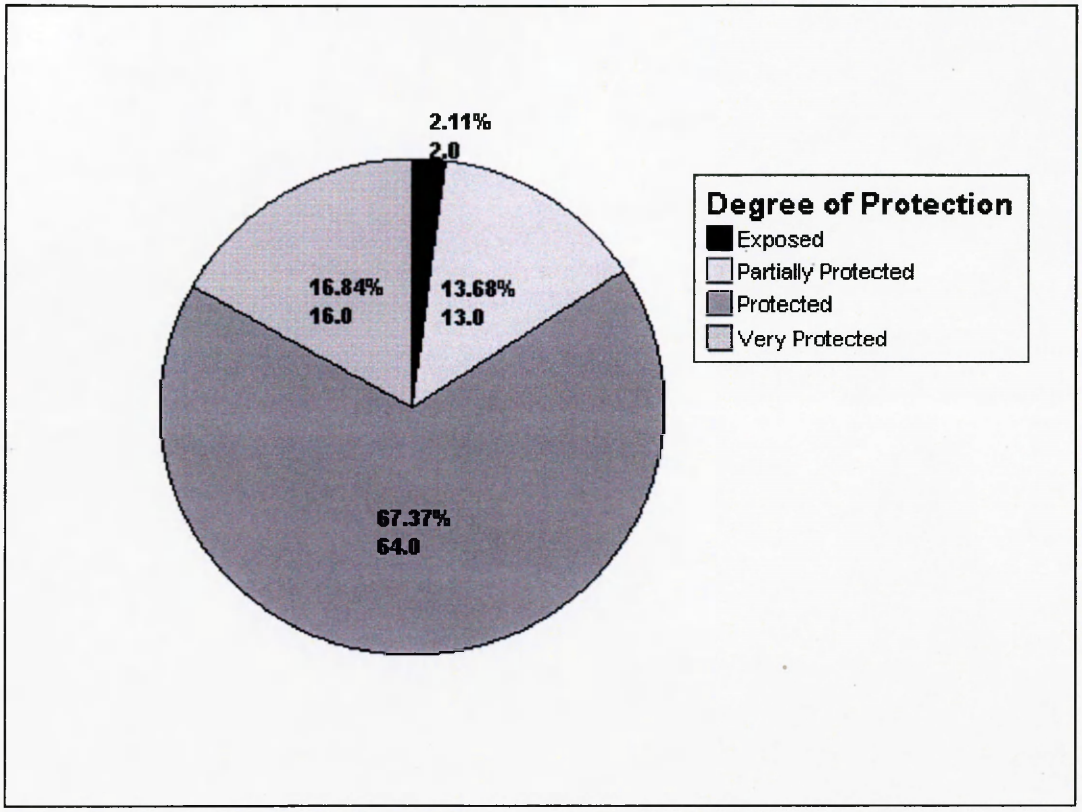


Figure 41: Graph of degree of protection offered by sites

located in areas that were well protected but not exceptionally limited in their ability to host large vessels; these are the class three sites as quantified in the previous chapter. Only 16% (15) of the sites were less protected, and 17% (16) more protected. In order to further elucidate the relationship between protection and the ability of the shipbuilder to construct large vessels, the width of the channel was analyzed, as well (figure 42). Channel width was used instead of channel depth as bathymetry data was not readily available in GIS format, and it is assumed that, to some degree, depth and width are correlated. A Kruskal-Wallis test (performed using Statistical Package for the Social Sciences (SPSS)), used to compare the width of the channels by their degree of protection, showed that there is a very significant difference between at least two of the variables (chi-square = 23.144, df = 3, $p<.01$). To further substantiate these findings a one-tailed Spearman's rho test was performed to measure the correlation between channel width and degree of protection.

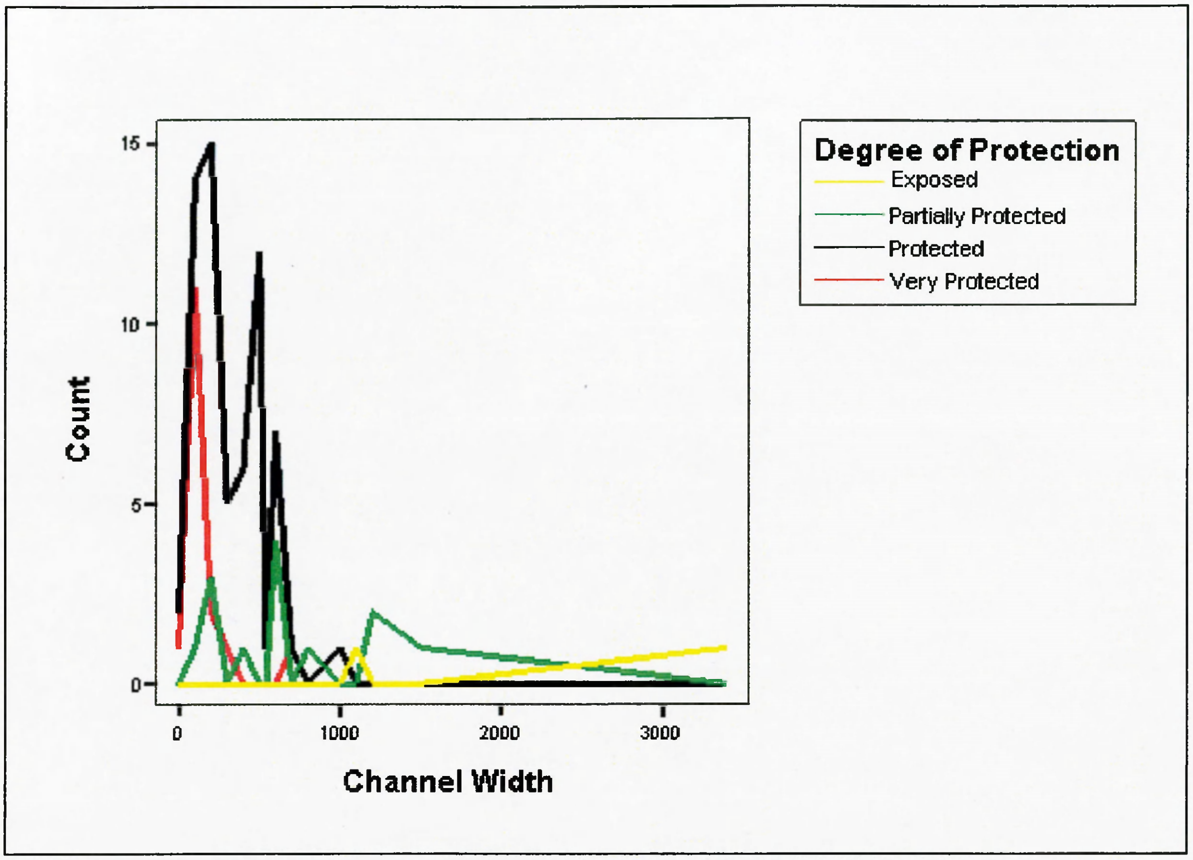


Figure 42: Graph of channel width, grouped by degree of protection

The result was a nonparametric correlation of -0.485 (N = 95, p<.01). These results demonstrate that channel width and degree of protection are inextricably linked with greater protection equating with a narrower channel, which supports the idea that the more protected a site was the more limited it was in its ability to produce large ocean going vessels. Thus, it would seem that shipwrights were very carefully weighing the pros and cons of a site in terms of its protection from storms and its flexibility in terms of vessel construction. Based on these mental calculations the majority of shipbuilders arrived at a similar conclusion that is still evident today.

The final set of analyses center around the soil characteristics of the shipyard sites. Specifically, the ability of those soils to support oak trees, tobacco, and construction. For the soils of the 69 shipyards included in this analysis, 32% had high construction values, 5.2% high tobacco values, and 39.5% were judged to be beneficial to the growth of oak, by acreage. These numbers are in comparison to the values for all of the soils in the 13 counties (Baltimore City County was excluded) that contained shipyards, which were: 37.3% for beneficial construction soils and 33.9% for good oak soils. There are two values for good tobacco soils because not all of the counties contained data on tobacco. The percentage of tobacco soils in all 13 counties is 10.9%, while it is 17.7% if only the counties with data on tobacco growth are tabulated. All of these results should be viewed with a degree of skepticism due to the fact that soil maps are only 30% correct (Leusen 1996). It would be interesting to see if the soil profiles developed as more shipyards are dug support or refute these findings.

No statistical test was required to investigate the relationship between the construction potentials of the shipyard soils and the county soils, as the shipyards had less soils with positive construction values than the counties as a whole (figure 43). Thus, it would seem that the ability of the soil to naturally support construction was not a concern to historic shipbuilders. This fact may have been due to their ability to lay a foundation of paving stones beneath the ways, in order to help distribute the vessel's weight and provide a steady base on which to build.

The difference between the ability of the shipyard soils and the county soils to support tobacco agriculture was investigated using a one-sample *t* test (figure 44). When compared only to the counties for which there were tobacco data the results were significant at the 0.5 significance level ($t = 4.68$, df = 68). Meaning that there is a one in twenty chance that shipbuilders were not actively avoiding good tobacco lands. When compared to the all 13 counties the results are even more significant ($t = 2.13$, df = 68,

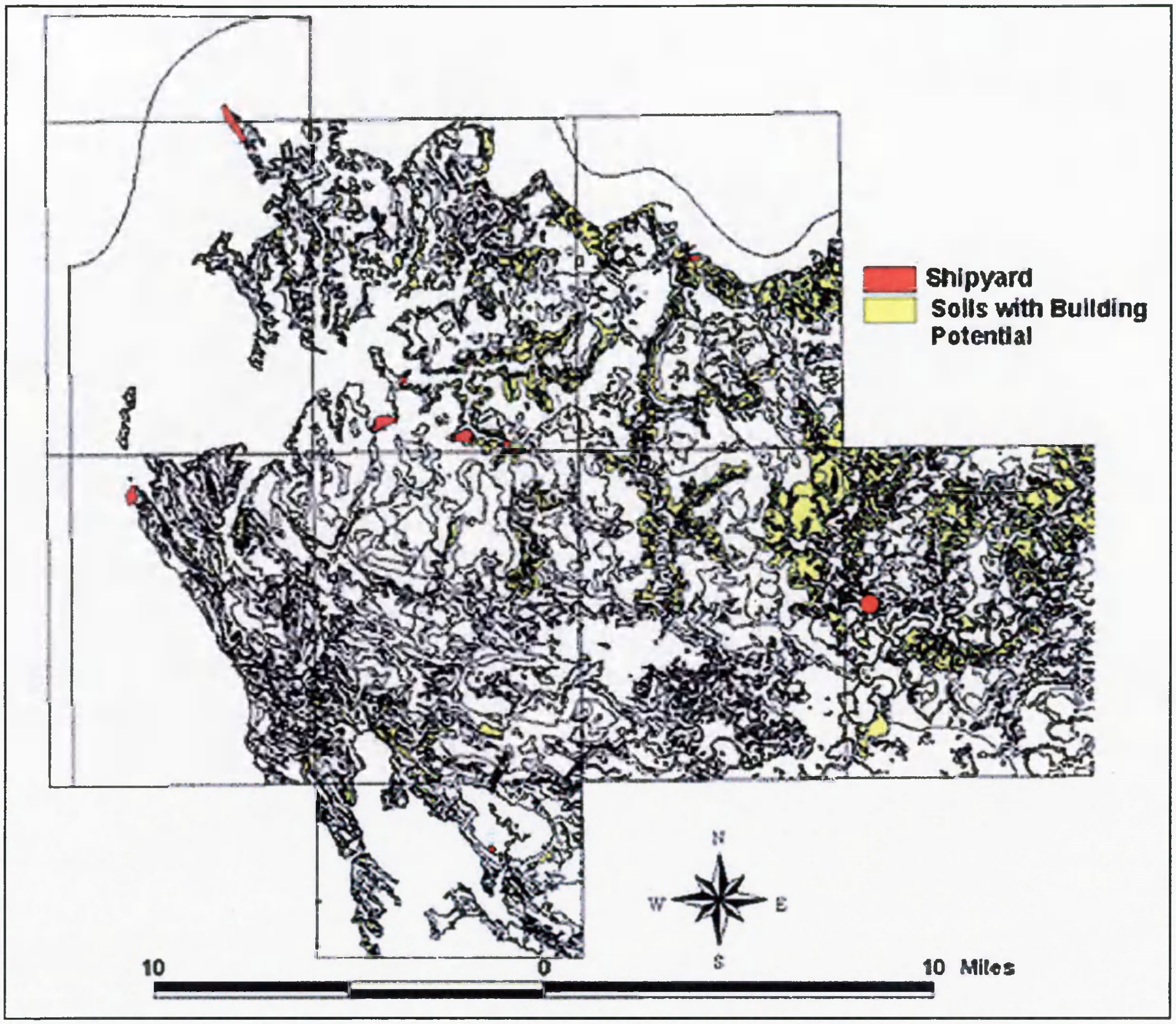


Figure 43: Soils with positive building potential in a portion of Dorchester County

$p<0.01$). Thus, the interpretation of the tobacco results depends on the interpretation of the soils books. If the absence of soils data is taken to be just missing data, to which no reasoning can be attached, then it is almost certain that historic shipbuilders were giving prime tobacco lands wide berth. However, if the absence of soils data is interpreted to indicate that little or no suitable tobacco lands are present in that particular county, then it is likely, but by no means certain, that shipbuilders were intentionally avoiding tobacco lands. Conservatism, and a close reading of the soils books points toward the latter interpretation. Regardless, these results are a good indication that tobacco not only influenced the trend of shipbuilding recession and expansion and the yearly schedule of shipbuilders, but the very location of shipyards.

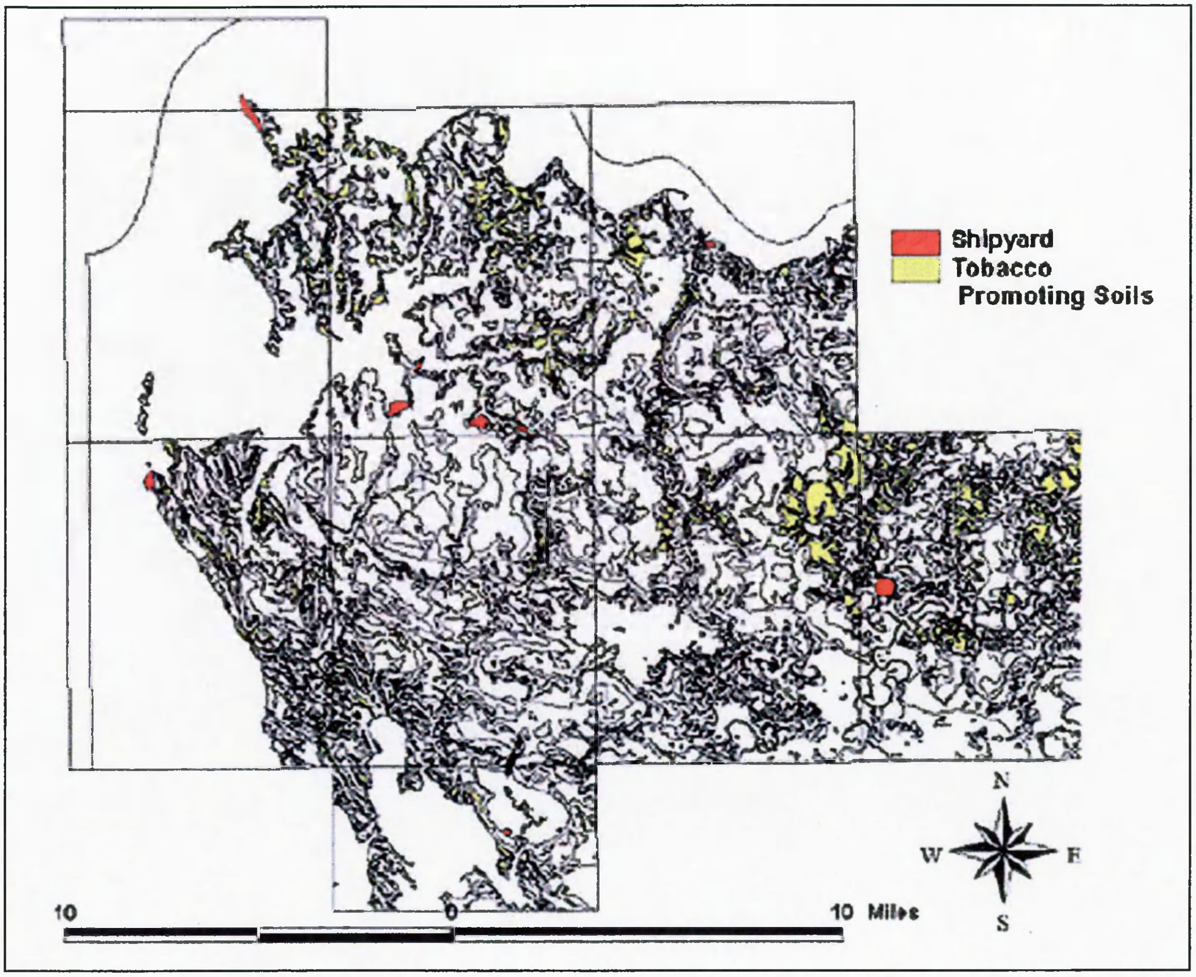


Figure 44: Soils with positive tobacco growing potential in a portion of Dorchester County

The most surprising results were those of the one-sample *t* test performed on the oak samples (figure 45). Various scholars have made the point that the primary factor for shipyard locations was the availability of timber (Brewington 1953; Goldenberg 1976; Middleton 1984; Spectre and Larkin 1991; Souza and Peters 1997). However, the difference between the soils under the proposed shipyard sites and in the counties as a whole was only significant at roughly the 65% confidence level ($t = -.95$, $df = 68$). In other words, it is not particularly likely that shipwrights chose locations because they included stands of oak within their boundaries.

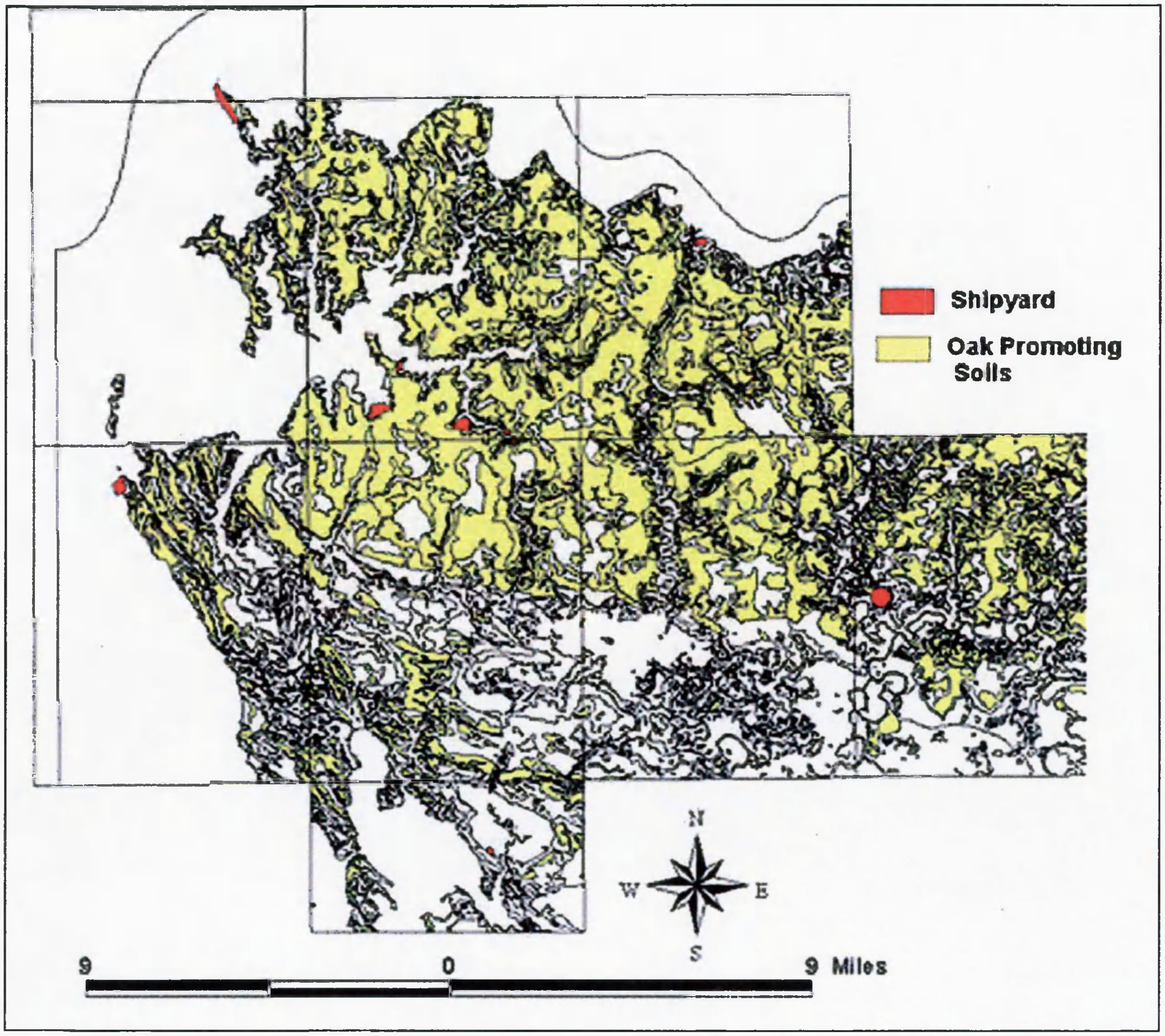


Figure 45: Soils with the potential to support oak trees in a portion of Dorchester County

This result warranted further analysis, due to the fact that it diverged so greatly from what would have been expected based on the historical record. None of the previous studies stated that shipyards contained stands of white oak within their boundaries, or even in contiguous lots, but only that suitable timber was available nearby. Thus, the soils of the four counties in the study area for which there was GIS soils data were analyzed to measure the distance between each shipyard and soils that possibly contained oak in the

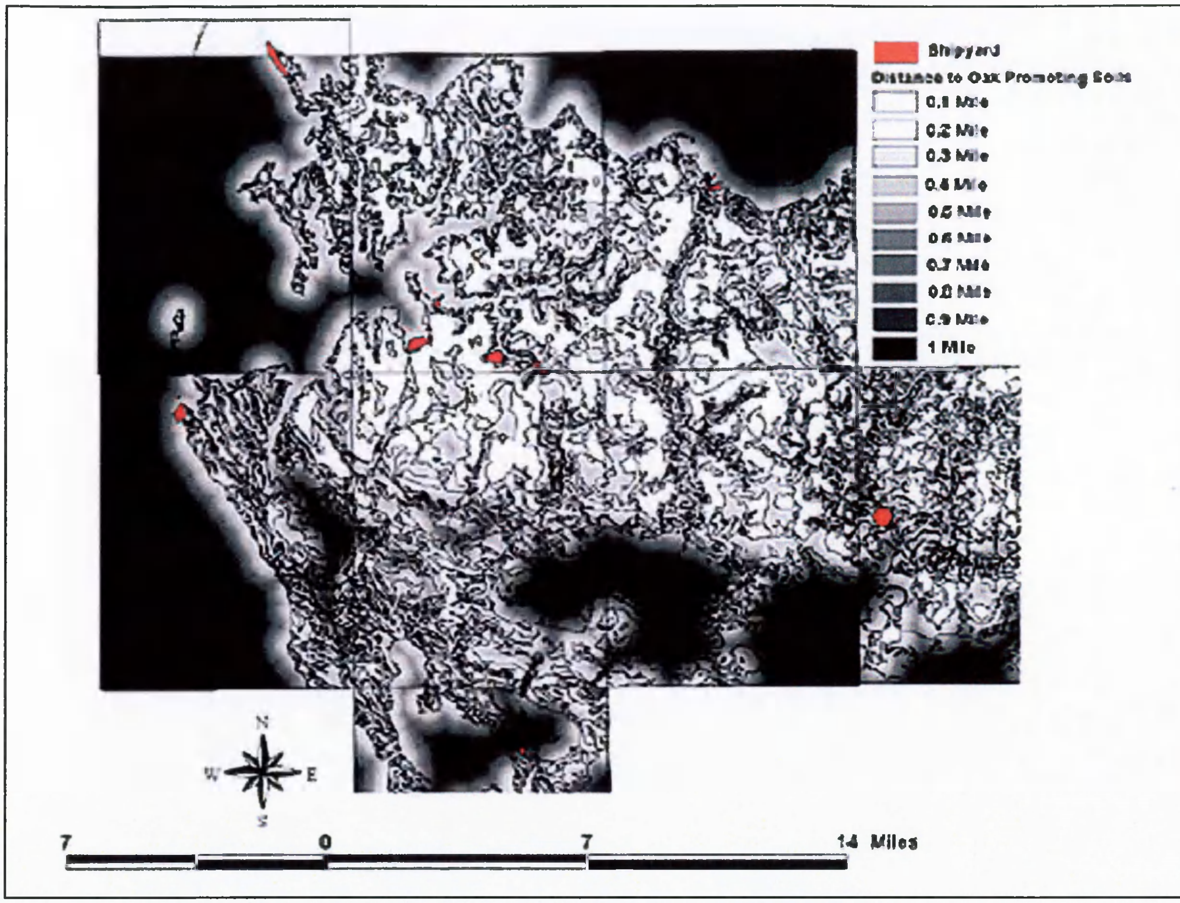


Figure 46: Proximity to oak promoting soils in a portion of Dorchester County

past (figure 46). All of the 46 shipyards included in this sample were located within 0.7 mile of land suitable for growing oak. Furthermore, 15.5 (34%) of the sites were located within 0.1 mile of oak soils. Therefore, while shipbuilders did not necessarily choose sites that contained stands of oak they always chose sites where oak was locally available. However, the proximity of sites to oak is at best a mediocre factor for predicting the locations of yet unidentified shipyards because a large amount of the study area is within 0.7 mile of oak soils. Consequently, it is as likely that the results of the proximity study are as much a result of Maryland being a superior region for oak growth as it is representative of a conscious decision on the part of the shipwright.

In summary, shipyards of the pre-iron period tended to be located either in towns or in close proximity (i.e. within five miles) to them and on tracts of land with slopes generally ranging from three to eleven. Furthermore, the majority of shipwrights carefully selected the location of their yard so that it provided good protection from the wind and waves that commonly swept the Bay, without limiting the size of the vessel they could produce there due to a narrow channel. Additionally, it appears that shipbuilders consciously avoided taking up valuable tobacco land with their trade but did not fret over having oak or a spot naturally suited for construction on their property, assuming that they could alter the land to suite their needs and import timber from nearby at a minimal expense.

CHAPTER VI:

CONCLUSIONS AND OPPORTUNITIES FOR FUTURE ADVANCEMENTS IN THE STUDY OF SHIPYARDS

Shipbuilding is America's greatest pride and in which she will, in time, excel the whole world.
- Thomas Paine, Common Sense, 1776

This study purports to be a predictive model of Maryland's historic shipyards, but in truth it is only the foundation of such a model. A truly effective GIS predictive model should be able to create a very clear layer that covers the entire project area and indicates which areas have high site probability and which have low probability. Such a model will have to await more complete GIS data coverages for the state. Data such as the DEMs and the soil surveys only cover a fraction of the proposed sites, making the creation of a unified predictive model impossible. In order for the model to be accurate the same data must be present for all regions.

Conversely, this study does provide a rubric for the creation of a true predictive model in the future. The tests and analyses conducted here can easily be expanded once all of the data are available. The general framework for creating such a model would start by conducting the same analyses presented here on the remainder of the sites. In order to streamline that work the results presented here should be considered exploratory data analyses and the tests that were ineffective should be excluded from future analyses. Thus, for soils, sites would only need to be identified for their tobacco growing soils and proximity to oak promoting soils. Once all of the tests have been performed, the researcher would have to assign weights to the results. Weights are assigned to reflect how important the researcher feels the results are to the overall placement of the shipyard. This is an arbitrary decision, and the researcher's theoretical perspective can easily influence the decision, but in general a good faith effort is made to accurately reflect the data (Bona 2000). However, this research does provide a number of mechanisms to make the weighting process less subjective. Indications of appropriate weights can be drawn from the historical record. For example, because many of the authors are adamant about the necessity of nearby oak, that variable might be given a high weight. Additionally, the results from this study may give clues to appropriate weighting. The significance of a result, or the number of shipyards adhering to a specific pattern, is a good indicator of how much weight that variable should be given. Once weights have been agreed upon and the variables have been normalized (e.g. proximity measurements are renumbered 1 through X, and presence and absence are renumbered 1 and 0), the variables are multiplied by the weights. The resulting weighted variables are then added together. Essentially, each piece of land (in this case no less than a 30m by 30m cell) has a stack of numbers on it representing the various weighted shipyard presence predictors, and these numbers are summed to reduce all of those numbers to a single shipyard predictor value. The higher the predictor value the more likely that parcel of land is to contain the remains of a shipyard. This number is then used to create one of two map layers. The first layer is a color gradient, representing the likelihood of shipyards in the various regions. The spectrum can be made as wide as the researcher likes. The second option is also a color gradient, but one that has been completely reduced. In the second approach the researcher chooses a number at which he feels that the presence of shipyards is no longer highly likely. All values above that number are given one color, all below another. When this layer is laid over a map it clearly indicates the areas with a high likelihood of once containing a shipyard.

There is no reason why the modeling process need stop at this point. There is still much more room for research on the factors influencing the locations of shipyards. For example, as corn was another major crop in Maryland, a study similar to that conducted on tobacco lands could be undertaken for corn promoting soils. Additionally, as accurate projections of the bathymetry of the Bay for various historic periods become available in a GIS format, this data could be used to measure the channel depth in the vicinity of the shipyards. This research would be most informative, as channel depth was certainly a limiting factor on how large a vessel the shipyard could construct. In meshing topographic and bathymetric data the researcher should verify that both have the same elevation datum or a disjunction will occur at the coast, theregions where these very characteristics are of interest (Li 1999). Another fascinating analysis would be to study shipyards in terms of other structures standing at the same time. By finding the proximity of other industrial and domestic structures it could be judged whether or not shipyards were a factor in the agglomeration of people (Langhorne 1976). Were shipyards part of larger industrial districts? Did residential communities form around shipyards?

Furthermore, increased control over geographic and temporal factors would be interesting. By parsing the study period into ever smaller units additional temporal patterns may become evident. Similarly, a more detailed understanding of the environment will likely lead to a more accurate model. For example, it is much easier to move timber down stream than up; consequently, the proximity to oak soils analysis should be altered to take into account the flow of the nearby watercourses. Similarly, all of the studies of proximity treated the entire region as a barren plain. To more accurately represent the effective distance between two points some consideration should be given to the topography and the road networks in existence at that time. Tighter control over time and geography can also be combined to give a better sense of how changes in the environment diachronically affected the locations of shipyards. For instance, in-depth studies of the chronology of deforestation and erosion in Maryland would certainly help refine the predictive model.

Unfortunately, these analyses are beyond the scope of the current work. In truth, to effectively perform most of them a researcher would have to restrict the study area to a smaller geographical unit (e.g. a single county) and conduct an intensive study of that region. Any future studies should almost certainly include archaeological investigations. The historical record is only accurate to a point, especially as it is concerned to largely ignored industries such as shipbuilding. The only way to test the accuracy of this model and refine it into a truly useful management tool is through the archaeological verification of its results.

Once an accurate model has been constructed for Maryland and the methodology for constructing the model refined, similar studies could be carried out all along the eastern seaboard. Simply because a region has a different topography or climate does not inherently indicate that the underlying structures are not similar (Church et al. 2000). It would be interesting to see if the pattern identified for Maryland holds true only for the Chesapeake, or if it can only be applied to the South, or are there common features that link all historic shipyards. As the regions become more disparate environmentally, it becomes more likely that any similarities between shipyards are a result of common cultural tenets of the shipbuilders. If, in a trade as tied to the environment as shipbuilding is, the practitioners make decisions irrespective of the environment then there must be another factor influencing their choices. In all likelihood that factor is their common culture. A means to test this hypothesis would be to compare the general patterns of English, French, Spanish, and Dutch shipbuilders in the Americas, and investigate if they either homogenize as time progressed, or become entrenched in regional traditions. Regardless, of the outcome of such a study, a more complete understanding of this largely underrepresented aspect of American history could not help but arise.

GLOSSARY

Brig: Two-mast vessel carrying square sails on both the foremast and the mainmast.

Brigantine: Two-mast vessel with square sails on the foremast and fore-and-aft sails on the mainmast. Also known as an hermaphrodite brig.

Frigate: Fast, three-masted ship with a raised quarterdeck and forecastle. Generally carried between 20 and 50 guns.

Gudgeon: A metal socket fitted to the stern which allows the pintel and rudder to swing freely.

Pink: Square rigged vessel with a narrow stern. Used primarily for coastal travel.

Pinnace: A boat, usually with eight oars, used as a tender for a larger vessel.

Pintel: The pin portion of the hinge used to attach the rudder to the vessel. Generally used in conjunction with a gudgeon.

Schooner: Two or more mast vessel carrying fore-and-aft sails on all masts.

Ship: Generically, any large vessel. Specifically, a vessel of three or more masts, all square rigged.

Shipsmith: Blacksmith specializing in ship hardware.

Skipjack: Small, sloop-rigged workboat with low sides.

Sloop: One-mast vessel, rigged fore-and-aft.

Snow: Large two-mast vessel. Square rigged with a fore-and-aft rigged trysail attached to the foremast.

Tonnage: A measure of the holding capacity of a vessel. Calculation changes with time. Used generally to indicate the relative size of a vessel.

APPENDIX A

SHIPYARD DATA

Explanation of shipyard database:

Name: Name used to identify shipyard in database. Generally the most common applied to the shipyard in the literature or the name of the property owner.
ID: Identification number assigned to shipyard by author, used in organizing the database.
Early Date: The earliest recorded date for the shipyard. If the early date was unknown and could not be estimated within 10 years "2000" was entered.
Late Date: The last recorded date for the shipyard. If no late date was known the last year of the decade of its Early Date was entered (e.g. 1679, 1779, 1819, etc.).
Flourish Decade: The mean decade that the shipyard was in operation, adjusted using any known extenuating information.
Proprietor 1-3: Full known names of the proprietors of the shipyard, listed in order of ownership.
Descriptor: Term, if any, used to describe the shipyard owner in the land records.
Accuracy: Accuracy index, as described in the text. Accuracy of the information that led to the placement of the shipyard geographically. 1=low. 4=high.
GIS: X = shipyard entered into the GIS. See Appendix B.
Max Slope: Maximum slope recorded along the site's shoreline, in degrees.
Min Slope: Minimum slope recorded along the site's shoreline, in degrees.
Avg Slope: Average slope recorded along the site's shoreline, in degrees.
Area: Area within the boundaries of the proposed shipyard site, in acres.
Protected: Degree of protection, as described in the text. Degree of protection offered by the shipyard location. 1=low. 4=high.
Location: Summary of the known information regarding the location of the shipyard.
Notes: Any additional information regarding the shipyard, its location, or its owner.
References: The references that furnished the information above.

County: Anne Arundel

Name: Beard

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
210	1690	1699	1690	Beard, Richard			Gentleman

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				39.1	3	Near the head of Cattail Creek

Notes	Reference
Built brigantine ca. 1697	MSA 1694; Browne 1905:595-601

Name: Buck

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
231	1690	1699	1690	Buck, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Anne Arundel County

Notes	Reference
Building ships and brigantines ca. 1697	Browne 1905:595-601

Name: Carroll

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
64	1754	1759	1750	Carroll, Dr. Charles			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	47	14	25	1.0	3	Spa Creek

Notes	Reference
built Mermaid	Goldberg 1976:62; Middleton 1984: 292; Norris 1925:111; Worden et al. 1989: 10-12

Name: Childs

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
229	1690	1699	1690	Childs, Abraham			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Anne Arundel County

Notes	Reference
Built sloop ca. 1697	Browne 1905:595-601

Name: Creagh

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
71	1735	1747	1740	Creagh, Patrick			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	10	3	6	6.6	3	Annapolis160 Prince George St. Corner of Prince George and East St.,

Notes	Reference
Address for home only.	Arnett et al. 1999:61; Goldenberg 1976:62

Name: Hamond

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
218	1690	1712	1700	Hamond, Major John			Planter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Annapolis area

Notes	Reference
Built sloop.	Browne 1905:595-601; MSA 1670, 1691, 1702, 1708, 1712

Name: Heller's

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
23	2000	2009	2000	Heller			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Annapolis

Notes
probably too late

Reference
Burgess 1963

Name: Herring Bay

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
42	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Southern part of Anne Arundel

Notes

Reference
Middleton 1981:127

Name: Johnson/Gordon

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
103	1719	1729	1720	Johnson, Robert	Gordon, Robert (1723)		

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	57	3	20	19.9	3	Nicholson Cove, Annapolis

Notes
120' long lot. Used to belong to Francis Nicholson

Reference
Steiner 1918: 247,335

Name: Magothy River

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
45	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Magothy River, north of Annapolis

Notes	Reference
.	Middleton 1981:127

Name: Merrykin

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
230	1670	1678	1670	Merrykin, Hugh			Boatwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Anne Arundel County

Notes	Reference
	Stone 1980; Merritt 1959:110.

Name: Roberts

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
102	1746	1775	1760	Roberts, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	63	3	35	5.1	3	Johns College dorsey Creek, Annapolis. Adjacent to Bloomsbury Square, near St.

Notes	Reference
1746 built 400 ton Rumney and Long	Green 1990:75,279; Moser 1998:63

Name: Shadyside

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
22	2000	2009	2000				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X	22	3	8	23.8	2	West River, near Gailsville. NE peninsula into West R.

Notes	Reference
	Burgess 1963

Name: Stephen Steward

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
70	1753	1791	1760	Steward, Stephen	Galloway, Samuel		

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	10	3	4	24.8	3	West River Between Norman's Creek and Ford's Creek at the Headwaters

Notes	Reference
site 18AN817	Goldenberg 1976:62; MDNR 1999; Middleton 1981:128; Thompson and Seidel 1992:2; Thompson 1993

Name: Todd

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
129	1651	1660	1650	Todd, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	11	4	7	3.6	2	Confluence of Spa Creek and the Severn River, Annapolis

Notes	Reference
	Schaun 1977:81

Name: **Weems**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
162	1780	1789	1780	Weems, David			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Annapolis, Weems Creek (?)

Notes	Reference
Has a brig at Baltimore and a "large schooner" on the stocks (in Annapolis ?) in 1781	Pleasant 1930:30

County: Baltimore

Name: **Alexander**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
132	1750	1759	1750	Alexander, Mark			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	10	9	9	0.9	3	Fells Point

Notes	Reference
	Ruckert 1976

Name: **Beachman and Brothers/Redman-Vane**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
4	1826	1942	1880	Beachman, J.S. and Brother	Redman-Vane (1917)	Bethlehem Steel (1942)	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	17	1	10	6.6	3	Key Highway, foot of Federal Hill, Baltimore. Under Bethlehem Steel

Notes	Reference
1826 Beachman built 64 gun ship for the Brazilian government. Redman-Vane built over Beachman	Bodine 1954; Burgess 1963:52; Scharf 1874:420

Name: **Bear Creek**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
30	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Baltimore

Notes	Reference
	Middleton 1981:127

Name: **Berilliant**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
139	1804	1809	1800	Berilliant, S.			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	11	4	7	1.1	3	Fells Point

Notes	Reference
	Ruckert 1976

Name: **Booz and Brothers**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
3	1849	1859	1850	Booz, Thomas		Bethlehem Steel (1942)	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	29	1	12	3.9	3	Key Highway, foot of Federal Hill, Baltimore. Under Bethlehem Steel

Notes	Reference
	Bodine 1954; Burgess 1963:52

Name: Buchanan

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
74	1773	1783	1770	Buchanan, Archibald			Merchant

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	8	5	6	1.6	3	Lot 57, Thames St. Fells Point, Baltimore

Notes	Reference
Owns several other properties in town and country.	Middleton 1981: 115; MSA 1775

Name: Caverly, Jas.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
135	1799	1809	1800	Caverly, James			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	6	2	4	1.7	3	Fells Point

Notes	Reference
	Ruckert 1976

Name: Caverly, Jos.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
169	1778	1779	1770	Caverly, Joseph			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Baltimore City

Notes	Reference
No land record. No directory for these years.	Lesher pers. comm.

Name: Cordery

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
136	1800	1809	1800	Cordery, James			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	6	4	5	1.5	3	Fells Point

Notes	Reference
	Ruckert 1976

Name: DeRochbrune

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
134	1796	1799	1790	DeRochbrune, L.			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	11	6	8	0.7	3	Fells Point

Notes	Reference
	Ruckert 1976

Name: Fardy and Auld

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
9	1845	1860	1850	Fardy, John T. and Brothers	Auld, Hugh		Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	12	4	7	6.6	3	East end of Hugh St. Baltimore

Notes	Reference
Auld listed as both "ship carpenter" and "shipwright" in different years.	Brewington 1953; MSA 1849-1850; MSA 1851; MSA 1853-1854; MSA 1855-1856; MSA 1860

Name: Fell

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
131	1730	1739	1730	Fell, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	9	4	7	1.5	3	Fells Point

Notes	Reference
	Ruckert 1976

Name: Flannigan and Parsons

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
68	1812	1819	1810	Flannigan, William	Parsons, John		Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	9	8	9	1.3	3	Busy Alley, Fells Point, Baltimore

Notes	Reference
	MSA 1812; MSA 1814-1815; Winklareth 2000: 193

Name: Goodwin

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
168	1833	1848	1830	Goodwin, Caleb			Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							29 Stiles (Styles) St., between High St. and Exeter St.

Notes	Reference
Address not located on water.	MSA1833, 1835, 1845, 1847; Lesher pers. comm.

Name: Kemp 2

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
69	1803	1819	1810	Kemp, Thomas			Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	15	12	14	2.0	3	Fountain St. Fells Point, Baltimore

Notes

Reference

MSA 1812; MSA 1814-1815; Winklareth 2000; 193

Name: Kennard and Williamson/Despeaux

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
7	1794	1844	1810	Kennard, Samuel	Williamson, James	Despeaux, Joseph	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	5	3	4	1.7	3	6 Philpot St., Fells Point, Baltimore

Notes

Kennard listed as "ship carpenter" and Williamson as "shipbuilder" in directory.

Reference

Brewington 1953; MSA 1831; MSA 1833; Ruckert 1976

Name: McIntyre and Henderson/Baltimore Ship Repair Co.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
14	1849	1942	1890	McIntyre	Henderson	Baltimore Ship Repair Co.	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	1	1	1	1.8	3	Key Highway, foot of Federal Hill, Baltimore. Under Bethlehem Steel

Notes

McIntyre and Henderson became Baltimore Ship Repair Co.

Reference

Bodine 1954; Burgess 1963:52

Name: Miles

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
167	1831	1836	1830	Miles, Isaac H.			Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	9	3	5	1.0	3	Philpot St.

Notes	Reference
	MSA 1831; Lesher pers. comm.

Name: Morgan, J.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
83	1771	1783	1770	Morgan, James			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	15	8	12	0.8	3	1771 Lot 43 (Philpot St.) and lot 97-98 (Wolf St). 1776 lot 166

Notes	Reference
	Middleton 1981:127; MSA 1771; MSA 1776a; Ruckert 1976

Name: Morgan, T.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
81	1776	1783	1770	Morgan, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Baltimore

Notes	Reference
	Middleton 1981:127

Name: Nelson

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
101	1765	1769	1760	Nelson, Benjamin			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	10	3	6	1.2	3	Fells Point

Notes

Reference
Ruckert 1976

Name: North Point

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
49	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	36	1	12	163.6	1	North Point.

Notes

Reference
Middleton 1981:127

Name: North Point Creek

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
50	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	20	1	14	344.4	3	North Point Creek

Notes

Reference
Middleton 1981:127

Name: Parsons, W.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
138	1803	1815	1810	Parsons, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	10	9	10	1.6	3	Fells Point

Notes	Reference
	MSA 1814-1815; Ruckert 1976

Name: Pearce

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
82	1776	1783	1770	Pearce, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Baltimore

Notes	Reference
	Middleton 1981:127

Name: Price

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
67	1790	1835	1810	Price, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	10	8	9	1.6	3	Fells Point Baltimore

Notes	Reference
site 18BC2. 1799 launched 26 gun Maryland	Ahrens 1998:XV; MDNR 1990; Ruckert 1976; Scharf 1971:293; Winklareth 2000:193

Name: Public Shipyard

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
146	1760	1769	1760				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Baltimore? Contiguous with Mr. Middleton's property and the prison.

Notes	Reference
	Browne 1895:395

Name: Sewell 2

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
84	1776	1783	1770	Sewell, Captain John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Baltimore

Notes	Reference
	Middleton 1981:127

Name: Skinner's

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
15	1859	1879	1860	Skinner			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	8	1	5	6.1	3	Federal Hill, Baltimore. Under Bethlehem Steel, Centered on West St.

Notes	Reference
App 400' of frontage	Burgess 1963; Hopkins 1876

Name: Steele and Lambdin

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
133	1795	1799	1790	Steele	Lambdin		

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	6	4	5	0.5	3	Fells Point

Notes	Reference
	Ruckert 1976

Name: Stodder

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
66	1787	1796	1790	Stodder (Stoddard), David			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	16	9	14	2.0	3	9 Philpot St., Fells Point, Baltimore

Notes	Reference
1787launched 600 ton 38 gun Goliath	MSA 1796; Scharf 1874:246; Scharf 1971;293; Ruckert 1976; Winklareth 2000:192

Name: Storey

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
160	1781	1789	1770	Storey, Ralph			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	9	5	7	1.5	3	Lot 165, foot of Market St. to Apple Alley, Fells Point, Baltimore

Notes	Reference
Lived off-site	MHT 1977; MSA 1781; Ruckert 1976

Name: Wells

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
65	1773	1779	1770	Wells, George			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	11	6	8	0.9	3	Lot 154 and Lot 160 (Market St. and Argyle Alley), Fells Point,

Notes	Reference
1776 built Continental Navy 28 gun frigate Virginia	Middleton 1981:115; MSA 1776b; MSA 1777; Ruckert 1976; Winklareth 2000:192

Name: Willis

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
137	1803	1809	1800	Willis, Joshua			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	9	6	8	0.6	3	Fells Point

Notes	Reference
	Ruckert 1976

County: Calvert

Name: Kedger

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
239	1644	1649	1640	Kedger, Robert			Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Calvert County

Notes	Reference
	Stone 1980; Browne 1887:273

Name: Waters

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
161	1740	1750	1740	Waters, Littleton			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	54	17	38	3.8	4	Lower Marlboro

Notes	Reference
Questionable identification	Shomette 2000:117, 327; Maryland Gazette 1 Aug. 1754:3; Waters 1750

County: Cecil

Name: Hart

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
130	1785	1789	1780	Hart, Robert			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	72	27	43	8.6	3	French Town

Notes	Reference
Hart was originally from Elk Neck	Johnston 1989:519

County: Charles

Name: Barber

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
172	1722	1726	1720	Barber, Rich			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Charles County

Notes	Reference
All property appears to be landlocked	MSA 1722; Lesher pers. comm.

Name: King

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
232	1727	1729	1720	King, John			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Charles County

Notes	Reference

Name: Martin

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
219	1693	1724	1710	Martin, John			Boatwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Lyons Denn, Head of the Wicomico River, west side of Lathum swamp

Notes	Reference
Described as boatwright and gentleman	Stone 1980; MSA 1722b; 1724

Name: Quantico Creek

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
55	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Quantico Creek

Notes	Reference
	Middleton 1981:127; Tilp 1978

Name: Robins

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
233	1688	1712	1700	Robins, Thomas			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Port of Wicomico

Notes	Reference
	Stone 1980

Name: Smoote

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
173	1648	1692	1670	Smoote, William			Planter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							West of Wicomico River, at the head of Forked Creek, near Sodgo Marsh.

Notes	Reference
	MSA 1683, 1692; Lesher pers. comm.; Browne:1887:432

Name: True

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
174	1652	1665	1650	True (Trewe), Richard			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	19	0	3	101.5	3	Near Burgess Creek, on the northeast branch of Nanjemoy Creek

Notes	Reference
	MSA 1653, 1665; Scisco 1928:361; Lesher pers. comm.; Browne 1891:172 and 187

County: Dorchester

Name: Avery

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
205	1670	1679	1670	Avery, John			Boatwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				61.5	2	Neck of land between James' Point and Eastern Shore

Notes	Reference
Area badly eroded	Flowers 1961; MSA 1670

Name: Brooks

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
199	1800	1850	1830	Brooks			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				14.1	3	Brooks Rd. Fishing Creek east of Little Choptank River. Peninsula.

Notes	Reference
Dates estimated. Can not be directly tied to any land records. Possible first names include John, William, and Daniel James.	Brannock pers. comm.

Name: Cambridge Shipyard

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
202	1770	2000	1800	unknown			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	34	0	13	24.2	3	East side of Cambridge harbor

Notes	Reference
Ship repair facilities still located on the site. Early date is not precise. Described as "pre-Revolution" and "colonial"	Brannock pers. comm

Name: Cook

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
197	1742	1788	1760	Cook, Edward			Mariner

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	1	0	1	99.4	1	Cook owns west side of area. Cooks Point, south of a cove.

Notes

Reference
MSA 1742, 1788; Lesher pers. comm.

Name: Esgate

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
185	1834	1839	1830	Esgate, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Fishing Creek

Notes
No land record

Reference
Lesher pers. comm.

Name: Ewing

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
204	1776	1779	1770	Ewing, Captain			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				7.6	4	Tract of land called Whitehaven, later became Church Creek

Notes
Can not be directly linked to any land records. Possible first names Robert and Patrick; Peter unlikely as Peter Ewing purchased shares in a Schooner named Moscow.

Reference
Mowbray and Rimpo n.d.:26; MSA 1780

Name: Fooks

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
192	1844	1845	1840	Fooks, Levin			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Fishing Creek

Notes	Reference
	Lesher pers. comm.

Name: Hicks

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
203	1706	1709	1700	Hicks, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				3.4	4	Thames St. (now Waterfront St.)Lots 16, 17, and 18 in Vienna.

Notes	Reference
	Mowbray 1979:50

Name: Johnson 1

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
201	1800	1850	1830	Johnson			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	22	16	20	2.9	3	Market St. On west side of creek running through downtown Cambridge

Notes	Reference
Dates estimated	Brannock pers. comm.

Name: Johnson 2

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
200	1800	1850	1930	Johnson			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	27	0	15	2.4	3	Cemetery Ave. On west side of creek running through downtown Cambridge

Notes	Reference
Dates estimated	Brannock pers. comm.

Name: Jones

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
196	1798	1841	1830	Jones, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				89.3	2	Woolford Pasture on Tobacco Stick Bay

Notes	Reference
	MSA 1798, 1805; Lesher pers. comm.

Name: Kirwan

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
188	1802	1869	1830	Kirwan, Solomon F.			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				13.8	4	North east side of County Road. Kirwan's Neck

Notes	Reference
	MSA 1802, 1803b, 1810, 1811; Lesher pers. comm.; DHS 1869

Name: Lithcum/Richardson Family 2

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
100	1830	1849	1830	Lithcum (prior to 1840)	Richardson, Aaron (post 1840)	Richardson, Jessie (post 1840)	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				13.1	3	Church Creek, Dorchester County

Notes	Reference
building Brigantine	Mowbray 1980:149; Mowbray and Rimpo n.d.:27; Brannock pers. comm.

Name: Mitchell/Ross

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
92	1775	1878	1820	Mitchell, Captain Sadrach	Ross, Lewis		

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	25	1	7	4.8	3	Cambridge, Cambridge Creek. Strip of land called "the Shipyard".

Notes	Reference
	MHT 1986; Middleton 1981:126

Name: Nield

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
193	1810	1860	1830	Nield, Hugh			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				68.7	3	Milton (now Woolford)

Notes	Reference
	Lesher pers. comm.

Name: Rawlings

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
214	1676	1690	1680	Rawlings, John			Boatwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X				123.7	4	Transquakinn River, east of Beaverdam Swamp

Notes

Reference
Stone 1980; Merritt 1954:239; MSA 1690, 1690b, 1690c

Name: Richardson Family 1

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
186	1807	1844	1820	Richardson, Levin	Richardson, Noah	Richardson, Nathan, etc.	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Dorchester County

Notes
Family of shipbuilders, too many individuals, too much land to be specific.

Reference
Lesher pers. comm.

Name: Skinner, J.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
191	1807	1816	1810	Skinner, James			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Town Point Neck, Fook's Regulation

Notes

Reference
MSA 1807f; Lesher pers. comm.

Name: Skinner, W.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
189	1797	1842	1830	Skinner, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Dorchester County

Notes	Reference
	MSA 1797, 1803c; Lesher pers. comm.

Name: Skinner, Z.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
190	1807	1864	1830	Skinner, Zachariah			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Town Point Neck, Fook's Regulation

Notes	Reference
	MSA 1807e; Lesher pers. comm.

Name: Spedden

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
187	1825	1829	1820	Spedden, Impey			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Dorchester County

Notes	Reference
No land record	Lesher pers. comm.

Name: Steward

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
195	1823	1829	1820	Steward, Joseph			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Tobacco Stick

Notes	Reference
No land record	Lesher pers. comm.

Name: Travers

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
206	1830	1841	1830	Travers, William D.	Travers, John C.	Travers, Captain	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Taylor's Island

Notes	Reference
	DHS 1841

Name: Tyler

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
194	1782	1826	1800	Tyler, John			Carpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Vicinity of World's End Creek

Notes	Reference
Identified as: 1782 and 1805 carpenter, 1805 shipscarpenter, 1809 planter, 1826 captain.	MSA 1782, 1785, 1802b, 1805, 1805b, 1809; Lesher pers. comm.

County: Harford

Name: Bush River

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
32	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Bush River, between the peninsulas of the Aberdeen proving grounds

Notes	Reference
	Middleton 1981:127

Name: Joppa

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
44	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X				166.9	2	Joppa

Notes	Reference
	Middleton 1981:127

Name: Otter Point

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
51	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X				20.1	2	Otter Point

Notes	Reference
	Middleton 1981:127

County: Howard

Name: Elkridge

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
38	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X				98.2	4	Near Patapsco R.

Notes	Reference
	Middleton 1981:126

County: Kent

Name: Clark's Conveniency

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
93	1750	1769	1760	Wilkins, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				5.7	4	Clark's Conveniency

Notes	Reference
In the family until 1878, no record of when shipbuilding ceased	MHT 1980a

Name: Denny, Jo

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
165	1825	1829	1820	Denny, Joseph			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Kent County

Notes	Reference
Not able to locate land record	MSA 1825b; Lesher pers. comm.

Name: Eastern Neck

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
2	1720	1820	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				5.7	3	Eastern Neck. Hailpoint. Shipyard Creek

Notes	Reference
site 18KE334	MDNR 1992; Wilstach 1931

Name: Graves

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
85	1762	1779	1770	Graves, Colonel Richard			Farmer

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				17.2	3	Southern arm of Worton Creek, Budds Discovery 60 perches from road before road crosses Worton Creek

Notes	Reference
1776 built brigantine Sturdy Beggar	Middleton 1981:117, 127; MSA 1756; MSA 1762; MSA 1780

Name: Oliver

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
215	1690	1699	1690	Oliver, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X				129.7	3	New Yarmouth, Eastern Neck

Notes	Reference
Built Torrington Loyalty	Browne 1905:595-601

Name: Power

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
237	1690	1699	1690	Power, Geofry			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Chester River area

Notes	Reference
Ship named Factor of Cediford and another ship on the Chester River in 1697	Browne 1905:595-601

Name: Smith

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
238	1690	1702	1690	Smith, Robert			Gentleman

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Choptank River. Salisbury Plains on the branches of the Tuckano, near Walnut Ridge

Notes	Reference
Built ship and brigantine ca. 1697	Browne 1905:595-601; MSA 1690d, 1702

Name: Smyth

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
75	1765	1783	1770	Smyth, Thomas			Merchant

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				391.3	2	West Side of Langford Bay, Kent County

Notes	Reference
	Middleton 1981:115; MSA 1765; MSA 1768; MSA 1771; MSA 1781; Pleasant 1930:85-86

Name: Spencer Hall

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
8	1725	1760	1740	Spencer, Richard			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				29.1	2	At the head of Grays Inn Creek, tributary to the Chester River

Notes	Reference
	Brewington 1953; Chapelle 1951:14; Middleton 1984:274

Name: Swan Harbor

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
58	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X				82.9	3	Swan Harbor

Notes	Reference
	Middleton 1981:127

County: Prince George

Name: Bart

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
211	1746	1749	1740	Bart, Humphry			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	13	0	2	111.4	3	Aire (now Broad Creek)

Notes	Reference
No land record. 1746 built 36 ton schooner his largest.	Tilp 1978:200

Name: Brown

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
234	1690	1699	1690	Brown, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Prince George County

Notes	Reference
Built two sloops ca. 1697	Browne 1905:595-601

Name: Hollyday

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
235	1690	1699	1690	Hollyday, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Prince George County

Notes	Reference
Built a brigantine ca. 1697	Browne 1905:595-601

Name: Lowe

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
166	1670	1748	1700	Lowe, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Above Piscattaway River, north of Oxon Run. Near Washington D.C.

Notes	Reference
	MSA 1748; Lowe pers. comm.; Browne 1905:595-601

Name: Lowndes

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
212	1756	1776	1760	Lowndes, Christopher			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	4	0	2	16.2	4	Bladensburg

Notes	Reference
1756 first vessel built, carried 330 hogsheads	Tilp 1978; Maryland Gazette 1756

Name: Paine

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
236	1682	1689	1680	Paine, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							"at a place on the Maryland side of the Potomac River"

Notes	Reference
Operating shipyard	Tilp 1978

Name: Small, D.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
213	1690	1699	1690	Small, David			Merchant

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X	16	0	6	19.4	4	West side of Patuxent. Calvert Manor

Notes	Reference
Built sloop	Browne 1905:595-601; MSA 1697, 1700b,1700c,1700d

County: Queen Anne's

Name: Blades

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
176	1834	1849	1840	Blades (Blake?), Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Queen Anne's County

Notes
No land record

Reference
Lesher pers. comm.

Name: Bruff

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
177	1846	1849	1840	Bruff, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Queen Anne's County

Notes
No land record

Reference
Lesher pers. comm.

Name: Bunts

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
175	1813	1819	1810	Bunts (Blunts ?), Jacob			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Queen Anne's County

Notes
No land record

Reference
Lesher pers. comm.

Name: Denny, J.E.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
183	1794	1826	1810	Denny, John Earle			Farmer

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				11.9	3	Kent Island, West side of Coxes Creek, south and west of Pigquarter

Notes	Reference
	MSA 1794, 1796b, 1807c, 1807d, 1826; Lesher pers. comm.

Name: Gray

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
179	1834	1839	1830	Gray, Andrew			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Piney Neck

Notes	Reference
No land record	Lesher pers. comm.

Name: Greene

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
178	1807	1836	1810	Greene, James C.			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Queen Anne's

Notes	Reference
Moved to Ohio by 1836	MSA 1836b; Lesher pers. comm.

Name: Kent Island

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
76	1631	1639	1630	Paine, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X				25.4	2	Kent Island in heading north from Kent Point Kent Island, Kent Fort. On the first navigable creek on the east side of

Notes
Established by the William Clairborne expedition from Virginia

Reference
Arnett et al. 1999:150; Brewington 1953: 9-10; Emory 1950:92

Name: Kirby, J.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
184	1816	1819	1810	Kirby, James			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				34.8	3	Chester, Kent Island

Notes
No land record

Reference
Lesher pers. comm.

Name: Kirby, S.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
180	1822	1843	1830	Kirby, Samuel			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				38.0	4	of road from Broad Creek to Kent Point on the Chesapeake Bay. Piney Neck, in the vicinity of the Wye River and Queenstown. East

Notes

Reference
MSA 1822b, 1843b; Lesher pers. comm.

Name: Larrimore

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
181	1805	1816	1800	Larrimore, Robert			Gentleman

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				36.6	3	the northernmost branch of the Wye.Sayers Forest. Broad Neck in Piney Neck, between the Chester River

Notes	Reference
	MSA 1816; Lesher pers. comm.

Name: Sewell 1

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
182	1804	1809	1800	Sewell, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Queen Anne's County

Notes	Reference
1804 selling 83 ton Schooner at Greenwood Creek for 292.10.9	MSA 1804c; Lesher pers. comm.

Name: Small, R.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
143	1706	1707	1700	Small, Robert			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				78.8	2	Pickard Creek Kent Island, Ship Point. Southeast side of Island

Notes	Reference
	MSA 1706

County: Somerset

Name: Denwood

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
217	1690	1699	1690	Denwood, Liven			Planter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Oystershell Point, Cedar Landing

Notes	Reference
Oystershell Point and Cedar Landing are not near one another on modern maps	Browne 1905:595-601; MSA 1688, 1688b

Name: Dorsey

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
227	1690	1699	1690	Dorsey, Stephen			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Somerset County

Notes	Reference
Built two vessels prior to 1697	Browne 1905:595-601

Name: Ennalls

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
228	1690	1717	1700	Ennalls, Major Thomas (?)			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Somerset County

Notes	Reference
Built brigantine ca. 1697	Browne 1905:595-601; MSA 1717

Name: Gale

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
25	1690	1712	1700	Gale, George			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Monie, Mothers Love, south of Great Monie River, east of Princess Anne.

Notes	Reference
	Carr 1988:374-375; MSA 1707

Name: Glainville Lot

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
91	1740	1749	1740	Tunstall, Captain John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				22.4	4	Princess Anne. On a point of land lying in the fork of the Manokin River

Notes	Reference
	MHT 1987; Torrence 1973:422-423

Name: Riggin

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
170	1831	1860	1840	Riggin, Emory			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				10.1	4	Little Annamassex; Somers Cove (?)

Notes	Reference
	MSA 1831b, 1833b, 1849, 1849b, 1859, 1859b; Lesher pers. comm.

Name: Walley

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
104	1781	1789	1780	Walley, Captain Zeekiah			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Somerset County

Notes	Reference
1781 offered to build barge for the defense of the bay	Pleasant 1930:140-141

Name: Whitney

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
171	1805	1825	1810	Whitney, Daniel			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				10.5	4	West of Wicomico Creek, east of road leading from lower ferry.

Notes	Reference
1825 selling schooner "Valentine", 36 tons, for $250.	MSA 1807, 1808, 1822, 1825; Lesher pers. comm.

County: St. Mary's

Name: Bateman

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
242	1634	1639	1630	Bateman, Edward			Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							St. Mary's County

Notes	Reference
	Stone 1980; Browne 1883:6

Name: Deacon

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
127	1723	1750	1730	Deacon, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				13.7	3	St. Mary's City

Notes	Reference
Royal collector of Customs for North Potomac and county justice of the peace.	Carr 1973; Hurry and Miller pers. comm.

Name: Hopkins

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
163	1805	1809	1800	Hopkins, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							St. Mary's County

Notes	Reference
No land record	Beitzell 1973:156-157; Lesher pers. comm.

Name: Parsons, E.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
240	1690	1699	1690	Parsons, Edward			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							St. Mary's County

Notes	Reference
Built sloop ca. 1697	Browne 1905:595-601

Name: **Reape**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
241	1665	1669	1660	Reape, Samuell			Boatwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							St. Mary's County

Notes

Reference
Stone 1980

Name: **Strowd**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
216	1665	1669	1660	Strowd, James			Boatwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X	10	0	3	466.4	3	Herring Creek

Notes

Reference
Stone 1980; Pleasant 1932

County: Talbot

Name: **Braddock**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
87	1782	1806	1790	Braddock, James			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				0.6	3	St. Michaels Historic District, lot 4

Notes

Reference
MHT 1988

Name: Church Neck

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
97	1800	1809	1800				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				22.7	3	Domingo Creek and Broad CreekChurch Neck, near St. Michaels. SW of St. Michaels

Notes	Reference
	Preston 1983:156

Name: Crooked Intention

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
89	1809	1819	1810	Spencer, Colonel Perry			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				4.5	3	

Notes	Reference
	MSA 1980b

Name: Davis

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
126	1803	1804	1800	Davis, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3	X				0.5	3	Lot 17 St. Michaels. Mulberry St. and Northgate (not on water front)

Notes	Reference
	MSA 1803; MSA 1804b; Preston 1983:155-156

Name: Dickinson

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
112	1695	1705	1700	Dickinson, William			Merchant

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Talbot County

Notes
Can't track down a likely location in deeds; too much property.

Reference
MSA 1699; Preston 1983:73

Name: Dover

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
79	1650	1680	1660				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	4	0	2	51.2	4	2 miles below the 331 bridge over the Choptank on the west bank

Notes

Reference
Thompson and Seidel 1993:5

Name: Ferguson

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
115	1695	1705	1700	Ferguson, George			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Dividing (Trappe) Creek, Talbot County

Notes
Not listed in Land Records

Reference
Preston 1983:73

Name: Ferry Neck

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
96	1800	1809	1800				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X	15	3	9	8.2	3	Bellvue Ferry Neck, near St. Michaels. Peninsula across from Oxford,

Notes	Reference
	Preston 1983:156

Name: Fishbourne

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
114	1680	1705	1690	Fishbourne, Ralph			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Fishborne Landing. North side of Choptank, north of Harris Creek, west of -?- Branch

Notes	Reference
Land record does not correlate with modern features.	MSA 1700; Preston 1983: 73; Tilghman 1967: 126

Name: Graison

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
128	1695	1705	1700	Graison, Robert			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Miles River, Talbot County

Notes	Reference
Built 120 ton vessel. Not listed in land records	Preston 1983:73

Name: Haddaway/Willey

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
105	1798	1845	1810	Haddaway, Thomas L. (1798-1815)	Willey, Edward (1845)		Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				0.5	3	St. Michaels

Notes
Haddaway identified as ship carpenter

Reference
MHT 1981b; MSA 1796b, 1800b, 1845; Lesher 1995, Preston 1983:15; Tilghman 1967:244

Name: Harris

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
125	1800	1810	1800	Harris, Skinner			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							St. Michaels Area, Talbot County

Notes
Not listed in land records.

Reference
Preston 1983: 155-156

Name: Harrison and Kemp

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
118	1806	1825	1810	Harrison	Kemp, Joseph		Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
3							St. Michael, Lot 18, Talbot St. and Chestnut St. (must be living off site)

Notes
Kemp listed as ship carpenter. Kemp delegate to the Lower House of Assembly 1812. 1825 sell half of schooner "Thomas Washington" for $130. No record of Harrison.

Reference
MSA 1806; MSA 1825; Preston 1983;155

Name: Hookes

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
117	1695	1705	1700	Hookes, Jeremiah			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Talbot County

Notes	Reference
Not listed in land records	Preston 1983: 73

Name: Jamaica Point

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
122	1796	1810	1800	Haddaway, Thomas L. (?)			Shipcarpenter

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	27	0	15	35.7	2	Jamaica Point

Notes	Reference
	MSA 1796b; MSA 1800b; Preston 1983:155; Tilghman 1967:244

Name: Kemp 1

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
144	1780	1790	1780	Kemp, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				3.2	3	St. Michaels lots 55, 56, 57

Notes	Reference
1790 sells these lots to P. Spencer	MSA 1790b

Name: King's Creek

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
77	1650	1705	1670	Southby, William	Graison, Robert		Boatwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X				38.6	4	King's Creek, Eastern Shore

Notes	Reference
Southby in the area 1676. Graison present around turn of century, built 300 hogshead pink	MSA 1676; Thompson and Seidel 1993:5

Name: Lowes

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
221	1688	1720	1700	Lowes, Nicholas			Gentleman

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Tred Avon Creek

Notes	Reference
ca, 1697 built 40 ton sloop	Browne 1905:595-601; MSA 1688, 1718, 1720

Name: Miles River

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
46	1775	1783	1770				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Miles River, Talbot County

Notes	Reference
	Middleton 1981:127

Name: Peck's Point

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
95	1800	1809	1800				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	15	3	9	66.0	2	Peck's Point, near St. Michaels

Notes

Reference
Preston 1983: 156

Name: Richardson, J.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
164	1844	1849	1840	Richardson, Jerome			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Oxford

Notes
No land record

Reference
Lesher pers. comm.

Name: Sharpe

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
113	1690	1709	1690	Sharpe, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Tuckahoe Creek, Chestnut Bay

Notes
Land record does not correlate with modern features.

Reference
Leonard 1987; Preston 1983: 73

Name: **Shipyard Poynt**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
142	1660	1669	1660				

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Branch of Tred Avon Creek

Notes	Reference
	MSA 1669

Name: **Skillington**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
94	1675	1705	1680	Skillington, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1	X	13	3	9	196.3	2	Tred Avon Creek near the mouth of Trippe Creek. Hambleton's Neck.

Notes	Reference
1697 built 450 ton ship, largest in colony to date.	Preston 1983: 72

Name: **Spencer, P.**

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
119	1777	1784	1780	Spencer, Perry			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				0.5	3	St. Michaels lot 13. East on Mulberry St to Church Cove

Notes	Reference
Listed as shipwright and as ship carpenter	MSA 1777; Preston 1983:155

Name: Spencer, P. 2

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
145	1784	1819	1800	Spencer, Perry			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				1.6	3	St. Michaels, Lot 2. Half of Mill Point

Notes	Reference
Other half of Mill Point owned by R. Spencer. Listed as shipwright and ship carpenter	MSA 1784; Lesher pers. comm.; Preston 1983:155

Name: Spencer, R.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
120	1790	1819	1800	Spencer, Richard			Shipwright

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				1.3	3	Mill Point, St. Michaels

Notes	Reference
Other half of Mill Point owned by P. Spencer.	MSA 1790a; Lesher pers. comm.; Preston 1983:155

Name: Stephens

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
222	1668	1697	1670	Stephens, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Dividing Creek

Notes	Reference
Built 35 ton vessel	Browne 1905:595-601

Name: Summers, Sa.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
220	1690	1699	1690	Summers, Samuel			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Island Creek

Notes	Reference
ca. 1697 built 300 ton ship	Browne 1905:595-601

Name: Summers, So.

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
111	1695	1705	1700	Summers, Solomon			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Island Creek, Talbot County

Notes	Reference
Not listed in land records. Built 300 and 400 ton vessels	MHT 1981a; Preston 1983:73

Name: The Shipyard

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
123	1774	1814	1790	Wetheral, Phillip (pre-1774)	Thompson, John (ca. 1784)	Dawson, Impey (1802-1814)	

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				1.0	3	Lot 11, St. Michaels. Foot of Mulberry St.

Notes	Reference
Robert Lambdin shipyard in the same vicinity founded 1840	MSA 1800a; Preston 1983:155; Lesher 1995, n.d.

Name: Tonnard

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
106	1690	1699	1690	Tonnard, Andrew			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Island Creek and Porridge Creek, Talbot County, Eastern Shore

Notes	Reference
Present in land records, but inconclusive	MHT 1981a; Middleton 1984:245; Preston 1983:73

Name: Wayman

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
121	1807	1810	1800	Wayman, Thomas			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
2	X	10	4	7	16.0	3	St. Michaels area, Solitude, on Broad Creek. Solitude still listed on maps

Notes	Reference
At least three generations of Thomas Waymans	MSA 1807b; Preston 1983:155

Name: Whitaker

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
116	1695	1705	1700	Whitaker, William			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							Tred Avon Creek, Talbot County

Notes	Reference
Not present in land records.	Preston 1983: 73

Name: Wrightson

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
124	1800	1810	1800	Wrightson, John			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
1							St. Michaels Area, Talbot County

Notes	Reference
Not listed in land records.	Preston 1983: 155

County: Washington D.C.

Name: Washington Navy Yard

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
207	1799	1879	1840	United States Government			

Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X	3	0	2	78.0	3	Anacostia River, Washington D.C.

Notes	Reference
Built last major vessel, the Nipsic, in 1879. Now focuses on naval armaments	Tilp 1979; Winklareth 2000:144-6

County: Worcester

Name: Snow Hill

ID	Early Date	Late Date	Flourish Decade	Proprietor 1	Proprietor 2	Proprietor 3	Descriptor
56	1760	1783	1770				

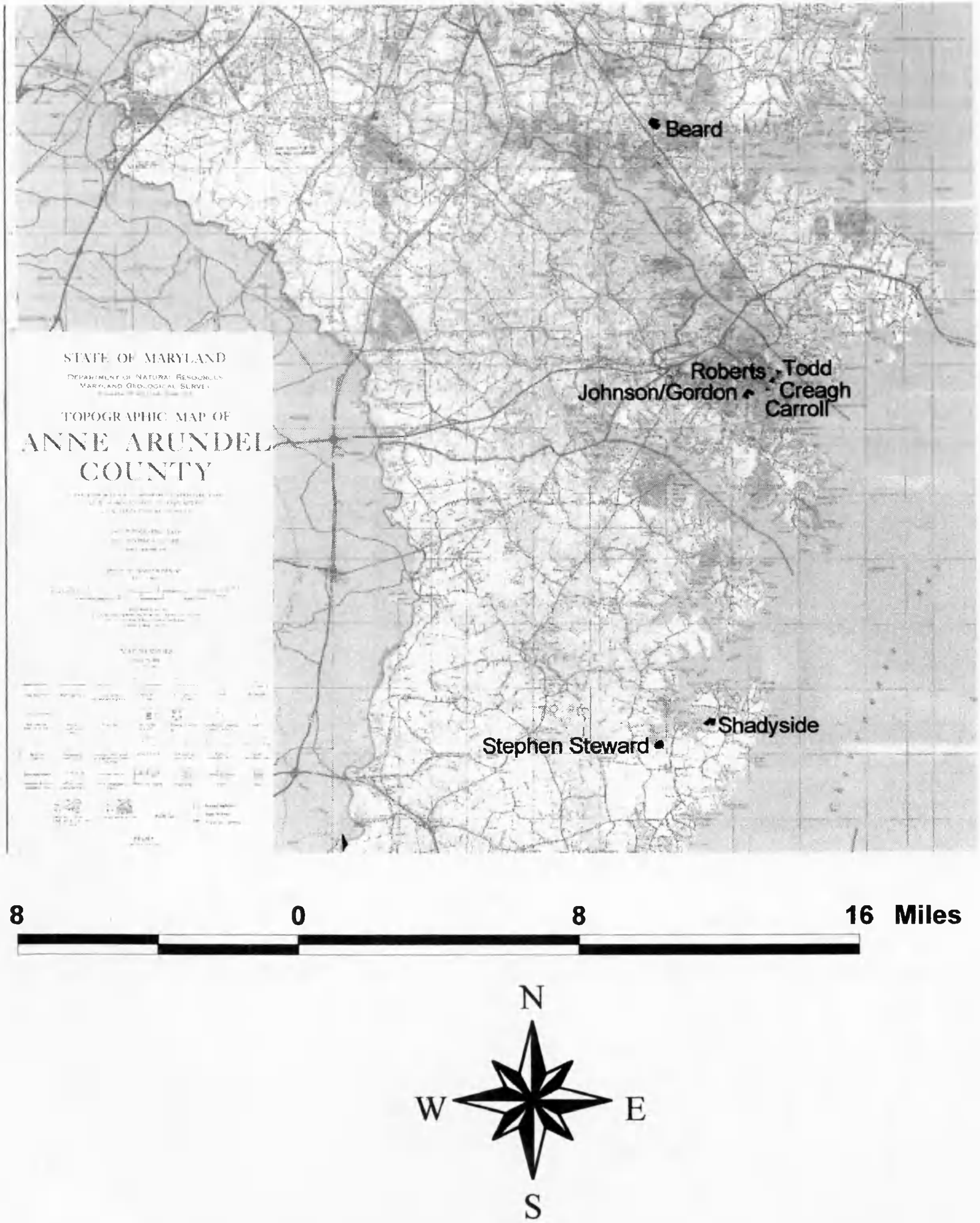
Accuracy	GIS	Max Slope	Min Slope	Avg Slope	Area (acres)	Protected	Location
4	X				4.6	4	Snow Hill, Shipyard Rd.

Notes	Reference
	Middleton 1981:127

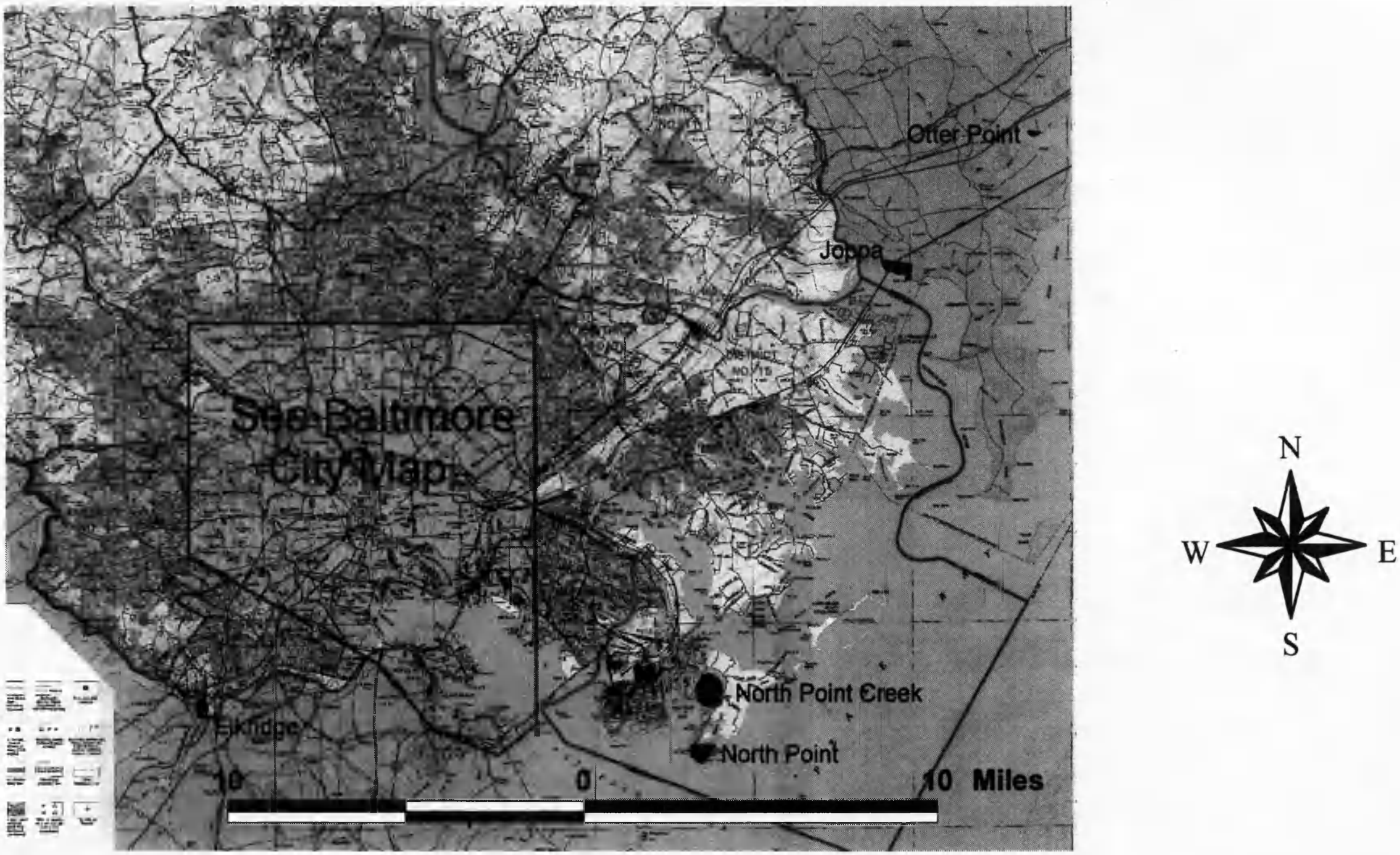
APPENDIX B

SHIPYARD LOCATIONS

Anne Arundel



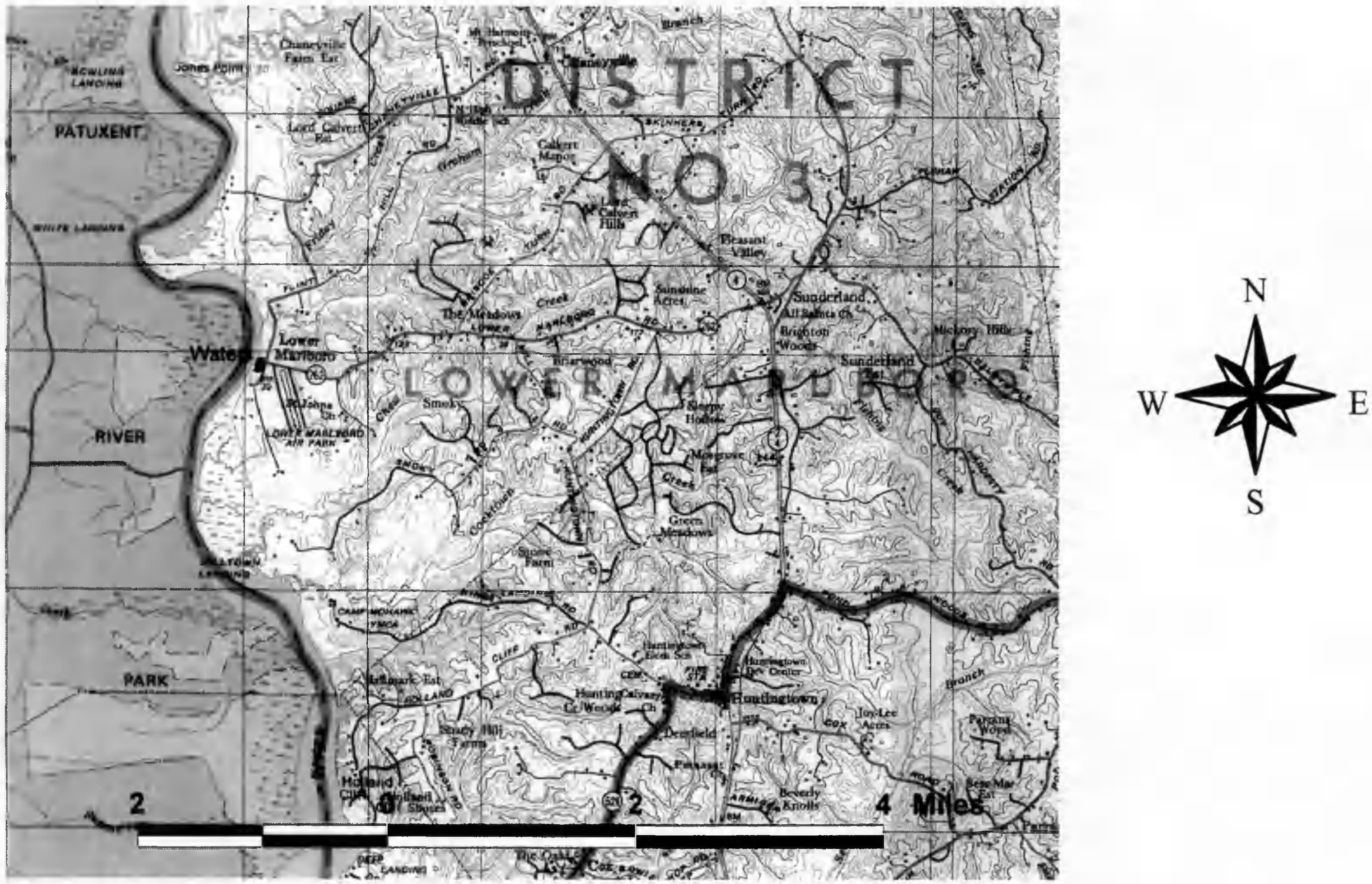
Baltimore/Howard/Harford



Baltimore City

1. Beachman & Brothers
2. Skinner's
3. McIntyre & Henderson
4. Booz Brothers
5. Fardy & Auld
6. Caverly, James
7. Miles
8. Kennard & Williamson
9. Cordery
10. Nelson
11. Alexander
12. DeRochbrune
13. Willis
14. Wells
15. Berillant
16. Fell
17. Buchanan
18. Storey
19. Flannigan & Parsons
20. Morgan
21. Steele & Lambdin
22. Price
23. Parsons, W.
24. Kemp 2
25. Stodder

Calvert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NO. 3
LOWER MARLBORO
PATUXENT
RIVER
PARK
Jones Point
Lower Marlboro
Sunderland
Huntingtown
Pleasant Valley
Sunshine Acres
Green Meadows
Joy-Lee Acres
Beverly Knolls
Deerfield
Calvert Manor
Lord Calvert Est.
The Meadows
Briarwood
Sleepy Hollow
Mickory Hills
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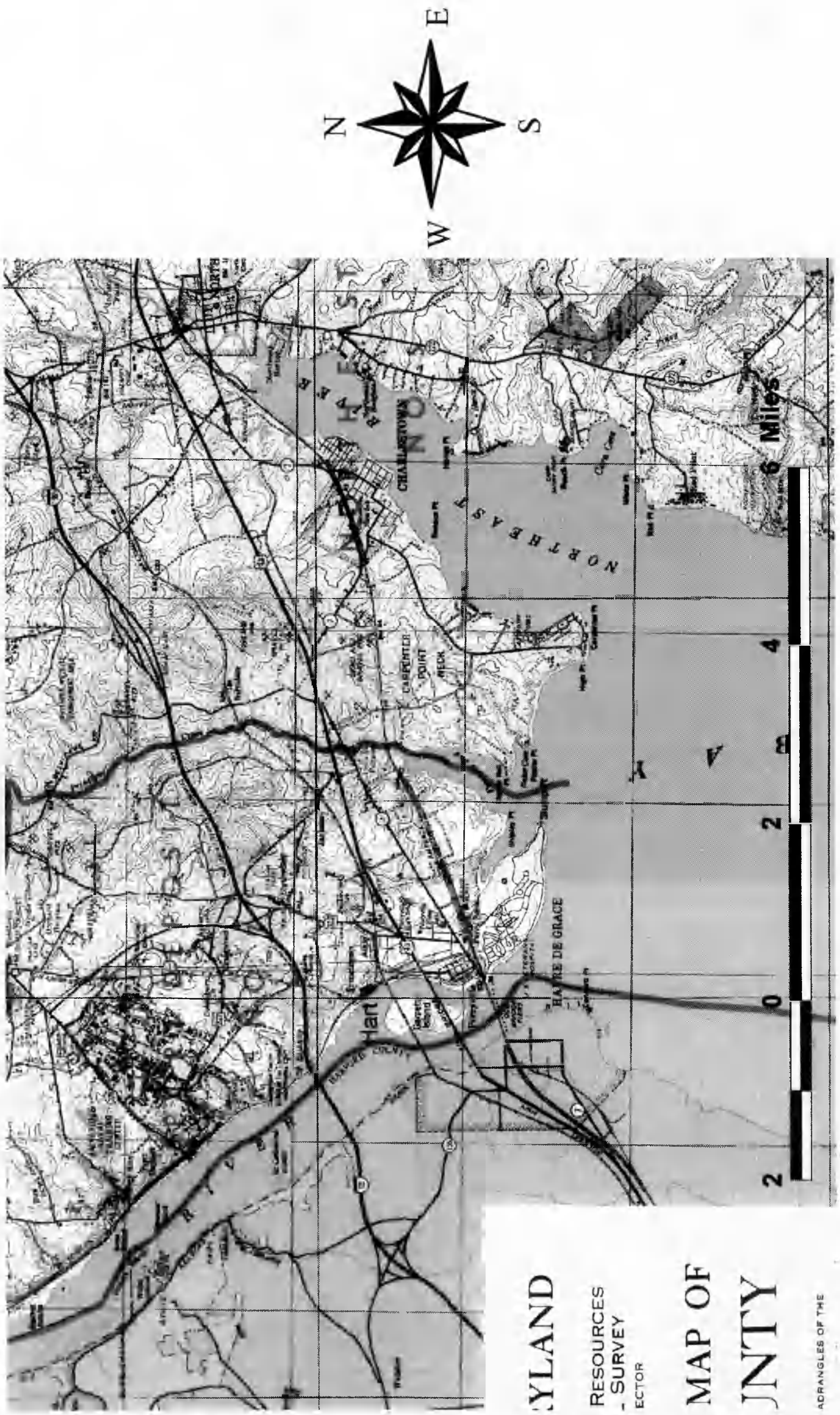
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CARPENTER POINT NECK
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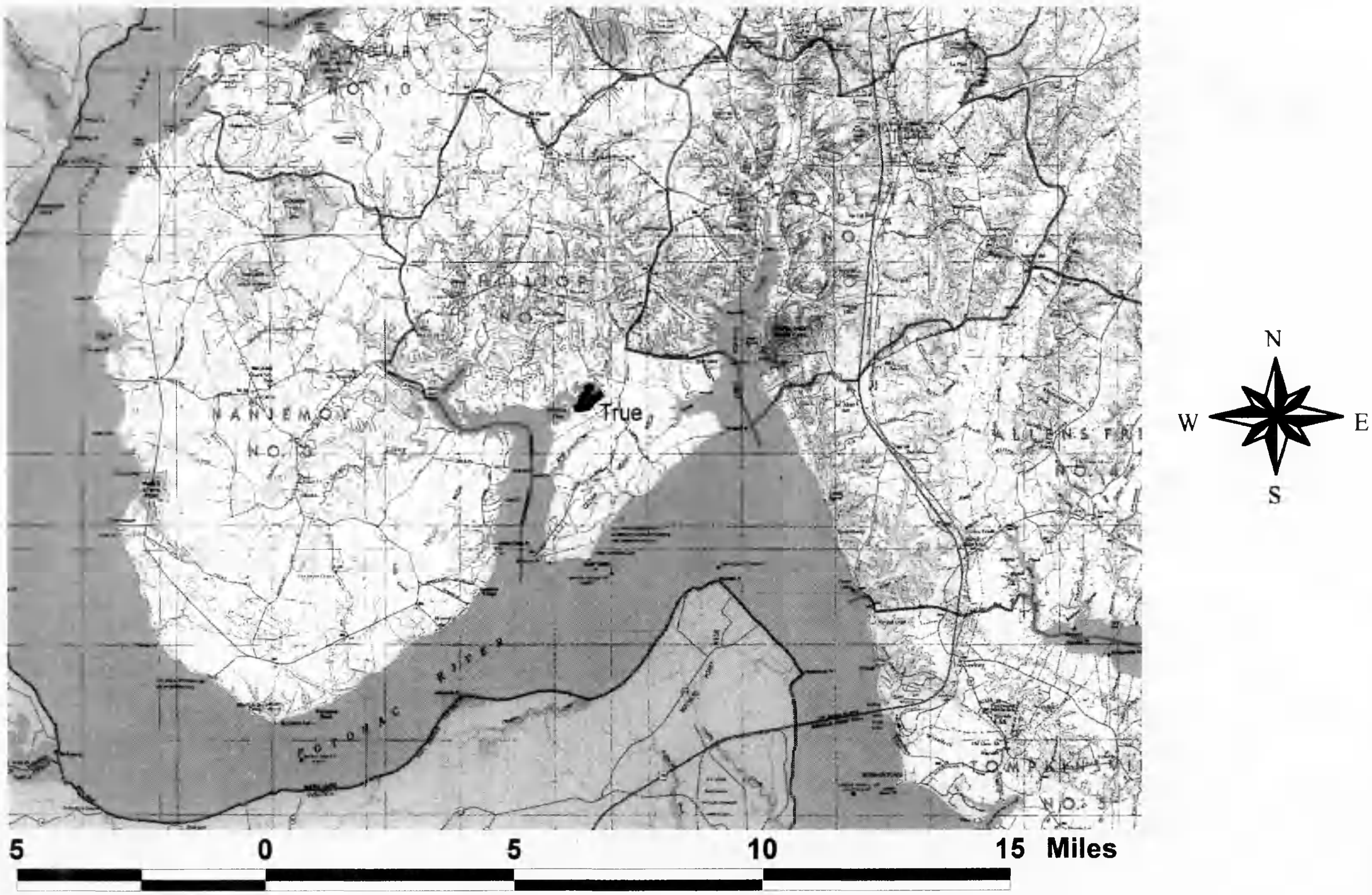
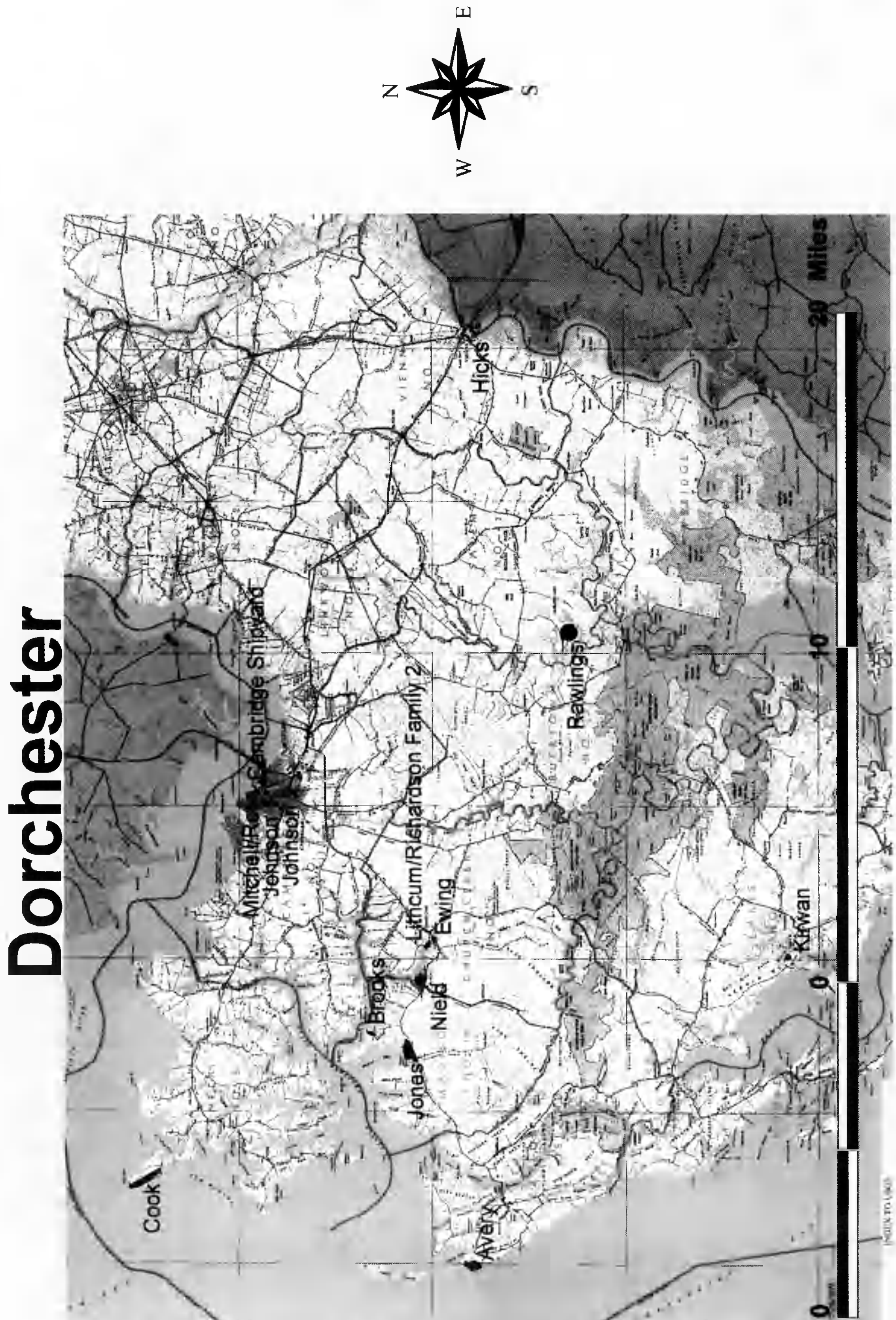
Charles

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Nield
Ewing
Lithcum/Richardson Family 2
Johnson
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Cambridge Shipyard
Hicks
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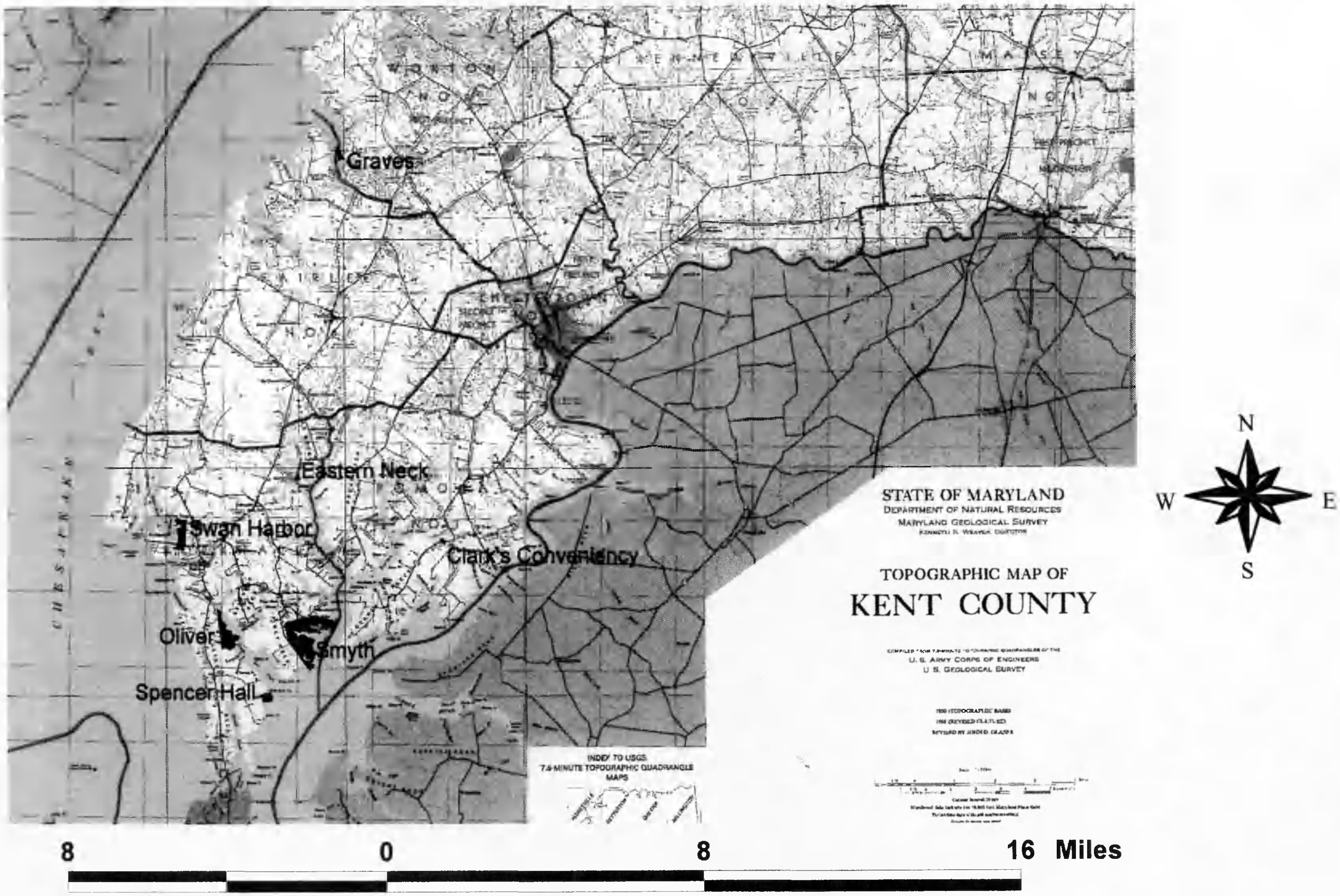
Kent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Eastern Neck
Swan Harbor
Clark's Conveniency
Oliver
Smyth
Spencer Hall
STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
MARYLAND GEOLOGICAL SURVEY
TOPOGRAPHIC MAP OF
KENT COUNTY
U. S. ARMY CORPS OF ENGINEERS
U. S. GEOLOGICAL SURVEY
INDEX TO USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLE MAPS
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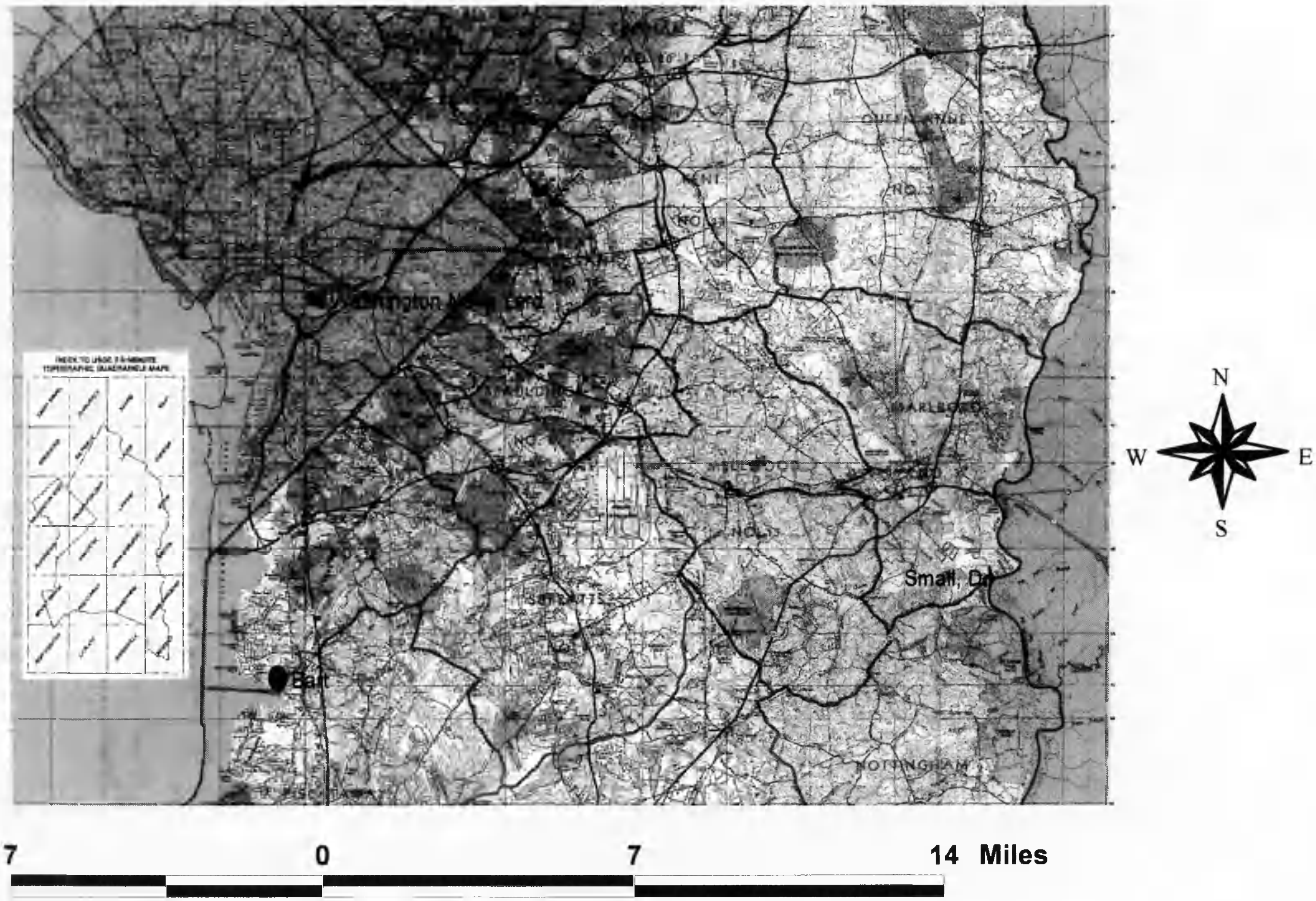
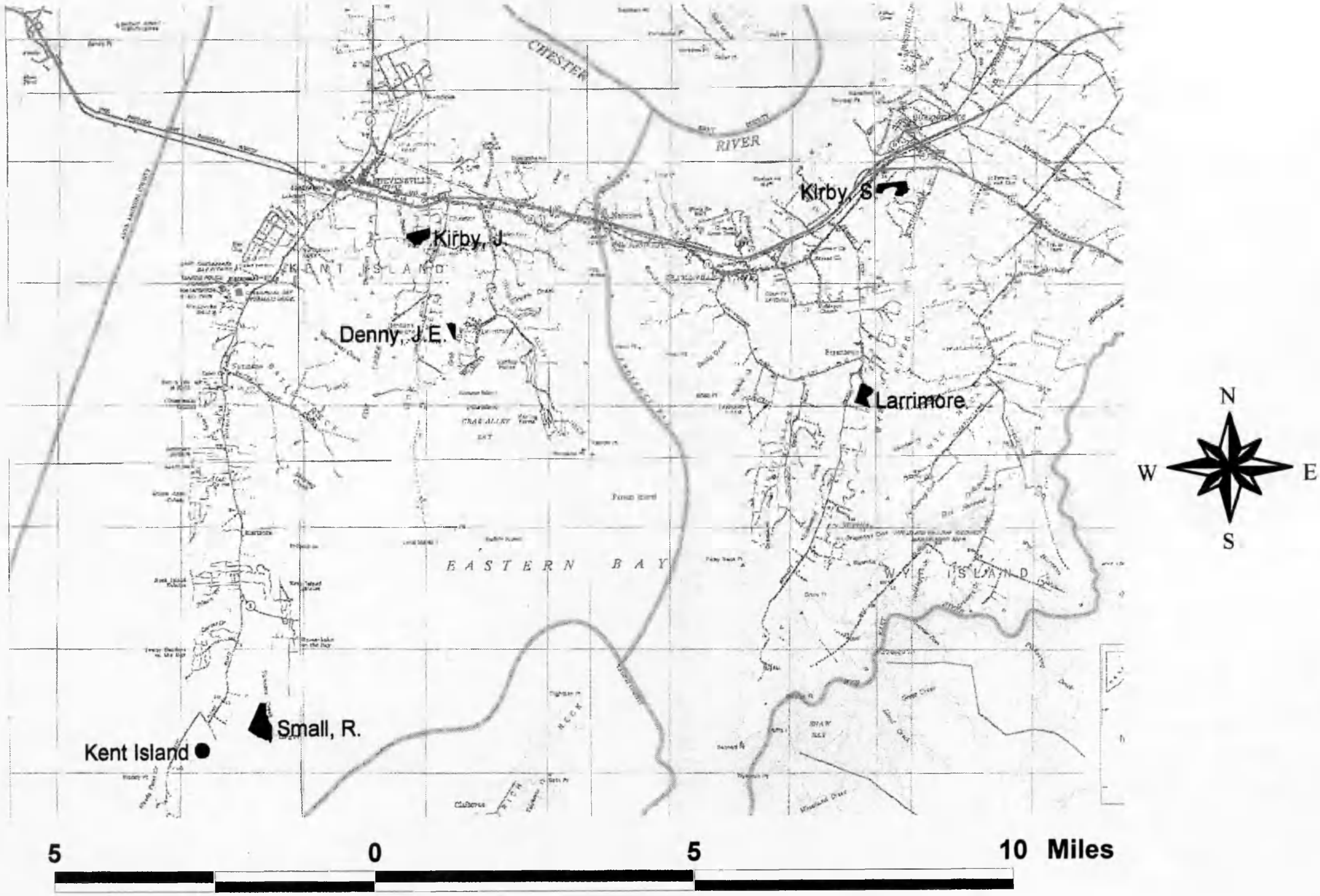
Prince George's/Washington DC



Queen Anne's


CHESTER
RIVER
Kirby, S.
Kirby, J.
KENT ISLAND
Denny, J.E.
Larrimore
EASTERN BAY
WYE ISLAND
Small, R.
Kent Island
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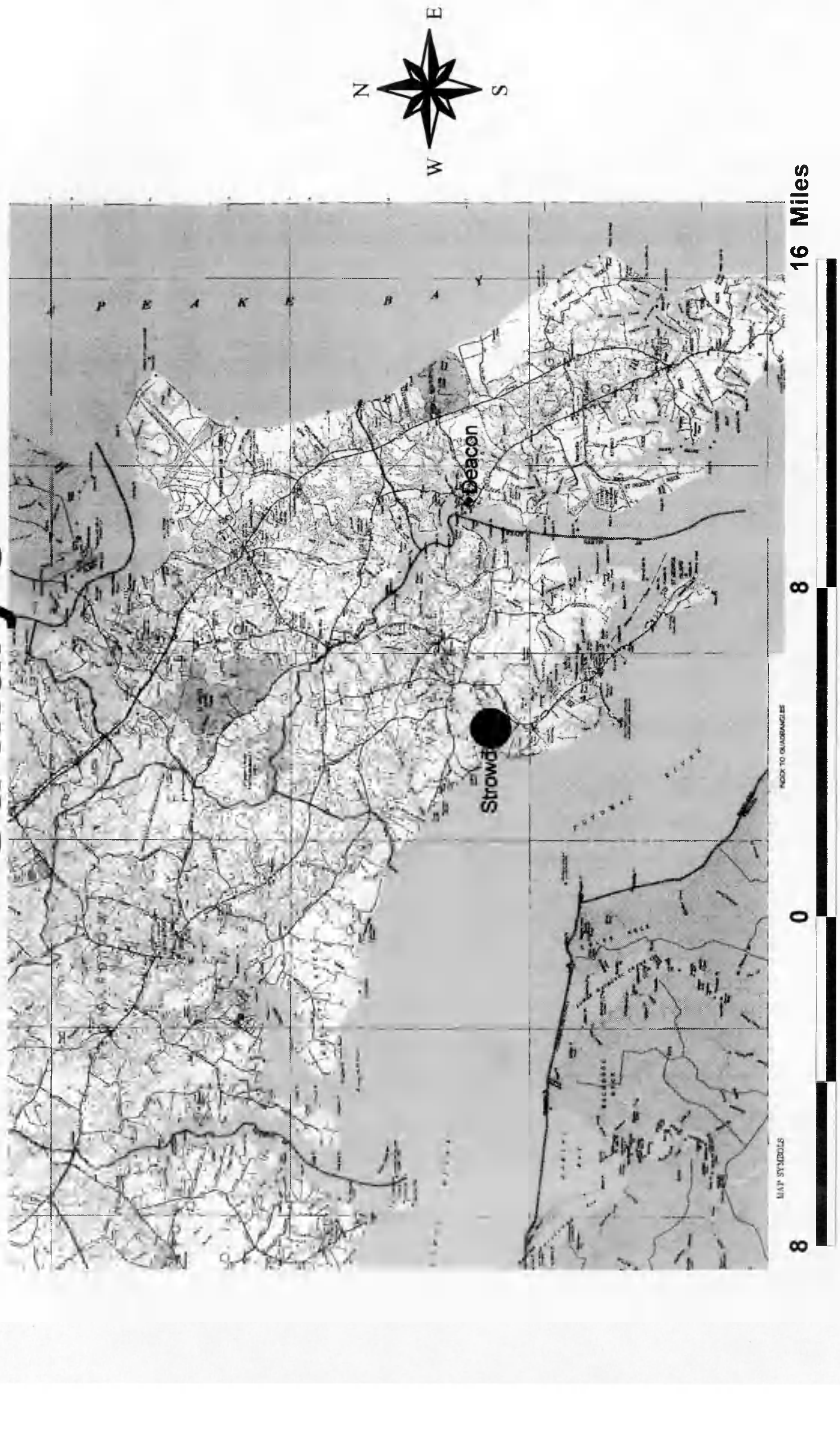
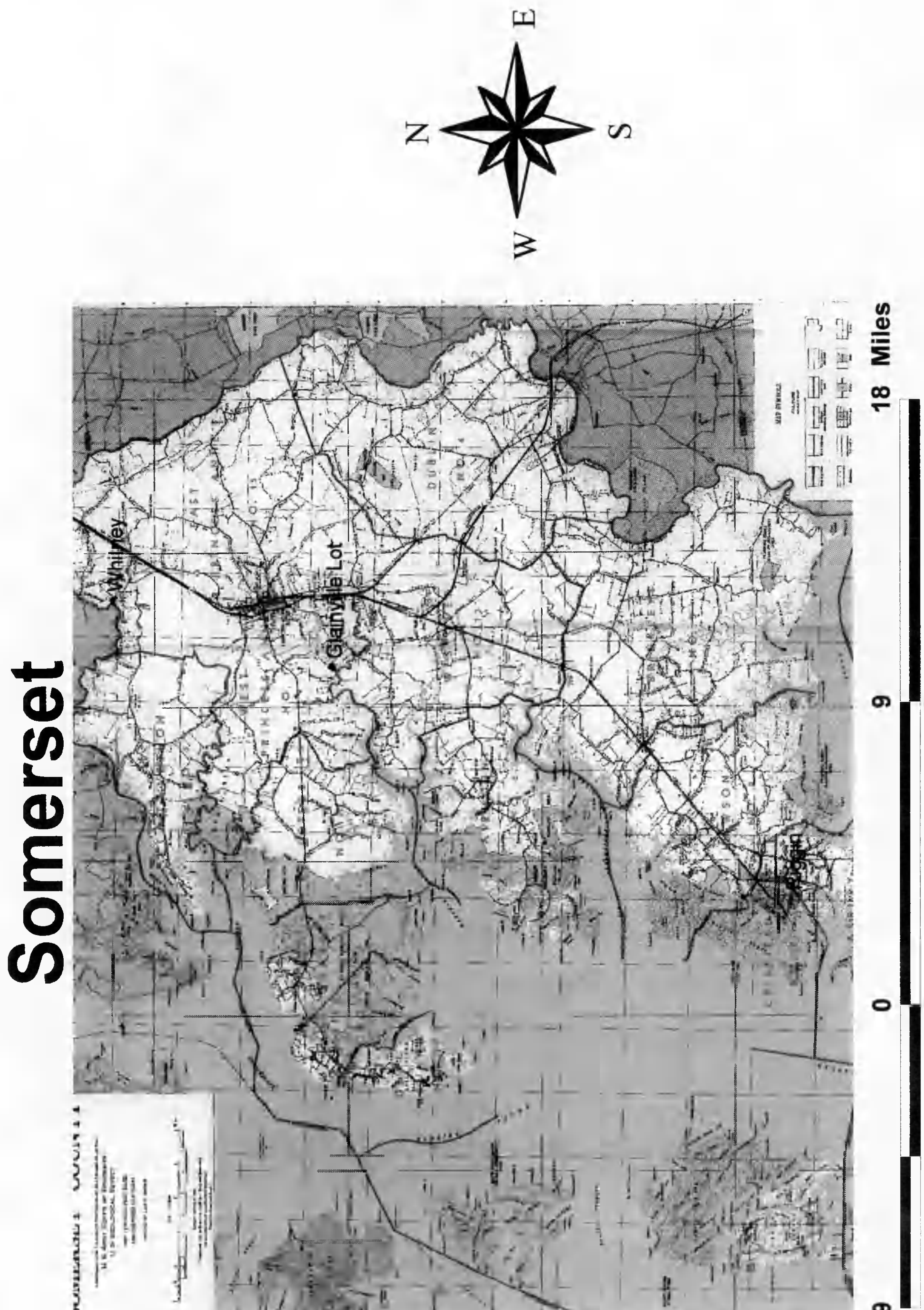
10 Miles

St. Mary's




Somerset
Whitney
Glanville Lot
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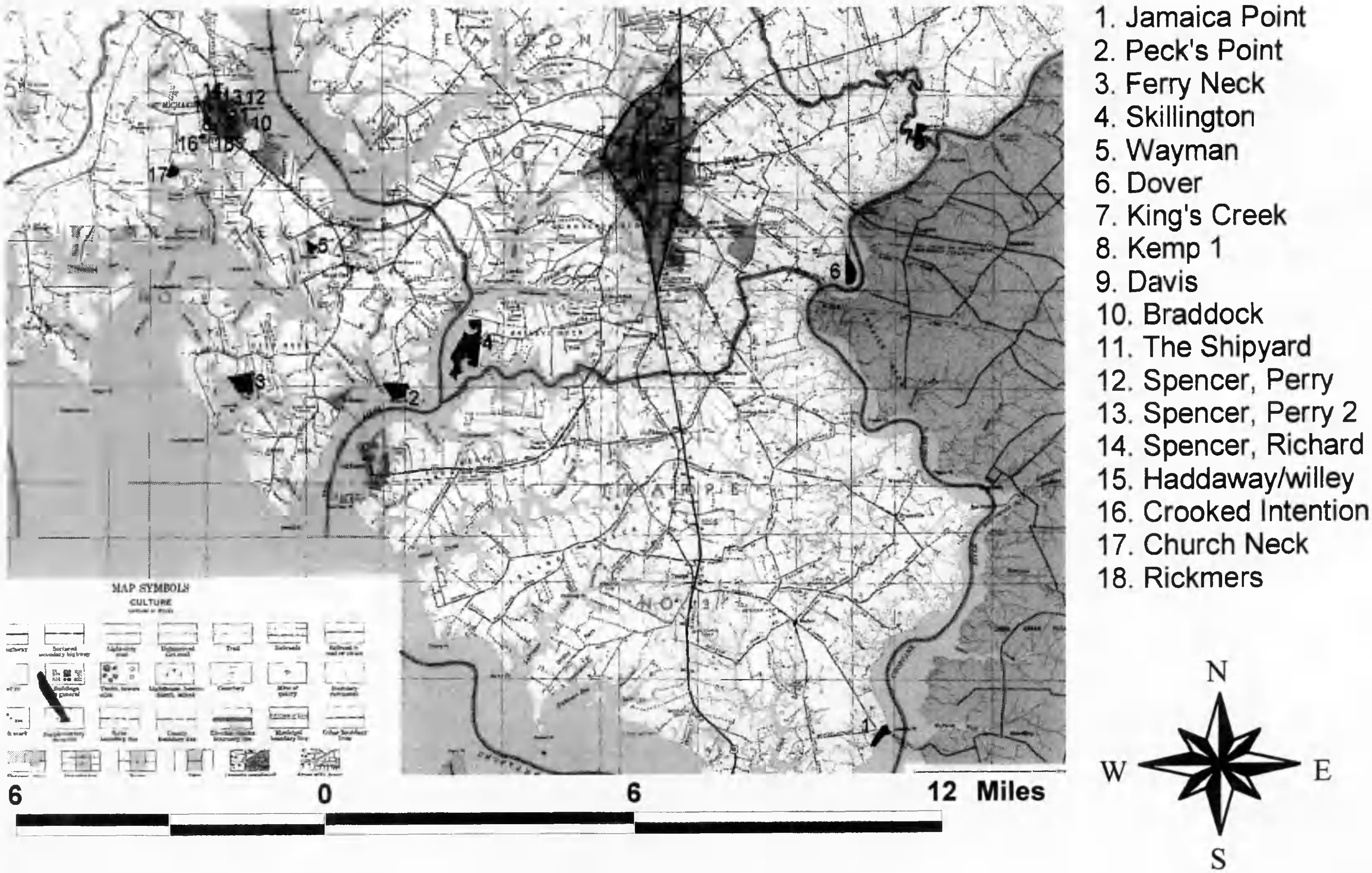
18 Miles

Talbot


1. Jamaica Point
2. Peck's Point
3. Ferry Neck
4. Skillington
5. Wayman
6. Dover
7. King's Creek
8. Kemp 1
9. Davis
10. Braddock
11. The Shipyard
12. Spencer, Perry
13. Spencer, Perry 2
14. Spencer, Richard
15. Haddaway/willey
16. Crooked Intention
17. Church Neck
18. Rickmers
MAP SYMBOLS
CULTURE
6
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Radio Tower
High Sch
Mt Zion Cem
Sandpit
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Red Landing
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