APPENDIX G
WOOD IDENTIFICATION

Diamond Pond Mill, Wood Identification

Thirty pieces of uncarbonized wood collected from the submerged remains of the Diamond Pond Mill were submitted for taxonomic identification. Samples of wooden architectural elements (timbers, pegs, posts and pilings) were secured during archaeological excavation and stored under refrigeration and immersed in water. Small samples of larger wooden elements were excised and removed for analysis. Small wooden artifacts (such as pegs) were submitted in their entirety.

Taxonomic identification was accomplished under low magnification (10X to 40X) with the aide of standard texts (Edlin 1969; Hoadley 1990; Panshin and deZeeuw 1980). Identifications were secured by comparison to modern plant specimens from a reference collection representative of the flora of the project area. The samples were examined in their moist or saturated state, and small sections were removed for easier examination beneath the microscope. Clear cross-sections were obtained using a scalpel. A piece from each sample was removed and air-dried to further illuminate minute features.

Three wood types were identified from the Diamond Pond Mill assemblage. Species of the white oak group *(Quercus spp. LEUCOBALANUS* group) were the most ubiquitous wood type encountered (53 percent of the 30 specimens examined were white oak). Pine *(Pinus spp.)* of the yellow or hard pine group (*Pinus taeda [loblolly pine], P. virginiana [Virginia pine] or P. serotina [pond pine]* in the vicinity of the project area) account for 30 percent of the analyzed wood, and 17 percent of the wooden elements were identified as members of the red oak group *(Quercus spp. ERYTHROBALANUS group).* All wood types identified were locally available from the Coastal Plain forests of Delaware, and were historically useful for building construction (Panshin and deZeeuw 1980:446, 568, 571-572).

The following table provides a view of taxa identified by context and element number. Figure 01 shows the percent composition of species by architectural element. Figure 02 shows the species composition of Timber 13 and its associated pegs. Figures 03 and 04 show the species composition of architectural elements identified from the Mill and the cribbing beneath the bridge.

Some very obvious patterns emerge in the mapping of wood types throughout the Mill and its associated structures (see Figures 1, 3 and 4). The 'cross' timbers were constructed of white oak, while the 'end' timbers (nos. 7 and 8) were made from red oak. Sheet pilings were uniformly constructed of pine taxa. And posts appear to have been made of both red and white oak, and of pine. Timber 13 contained 8 intact pegs, made of pine and white oak species. The arrangement of pegs of each taxon may reveal episodes of timber reuse or repair (See Figure 02).

The red and white oak species posses many similar properties which make them highly suitable for building construction (see Table 02). A major difference is that the heartwood pores of the white oaks are clogged with a frothy growth (tyloses) which make the wood

impervious to liquid, while the red oaks usually lack tyloses and are therefore extremely porous. This distinguishing feature makes white oaks extremely durable and rot-resistant (when seasoned/dried properly), and red oaks less durable and more susceptible to decay (unless infused with a preservative treatment). White oaks are well-suited to applications in-contact with liquids, and historically the white oak species provided the most preferred wood for barrel staves and for ship building. The architectural remains from Diamond Pond Mill contain a mix of red and white oak species which were used to construct element which were in direct contact with the ground and water. The use of the less-appropriate red oak for fashioning Timbers 7 and 8, and in post construction is less than ideal. The use of red oak may be explained by the economic constraints of mill owners (they used what was available), or by the use of preservative treatments [tar?].

Table 01: Wood Identified from Diamond Pond Mill.

provenience	taxon
Timber 1	*Quercus spp. LEUCOBALANUS* group (white)
Timber 2	*Quercus spp. LEUCOBALANUS* group (white)
Timber 3	*Quercus spp. LEUCOBALANUS* group (white)
Timber 4	*Quercus spp. LEUCOBALANUS* group (white)
Timber 5	*Quercus spp. LEUCOBALANUS* group (white)
Timber 6	*Quercus spp. LEUCOBALANUS* group (white)
Timber 7	*Quercus spp. ERYTHROBALANUS* group (red)
Timber 7, South End	*Quercus spp. ERYTHROBALANUS* group (red)
Timber 8	*Quercus spp. ERYTHROBALANUS* group (red)
Timber 9	*Quercus spp. LEUCOBALANUS* group (white)
Timber 10	*Quercus spp. LEUCOBALANUS* group (white)
Timber 13	*Quercus spp. LEUCOBALANUS* group (white)
Timber 13 Peg 1	*Quercus spp. LEUCOBALANUS* group (white)
Timber 13 Peg 2	*Pinus spp.* (southern pine group)
Timber 13 Peg 3	*Pinus spp.* (southern pine group)
Timber 13 Peg 4	*Quercus spp. LEUCOBALANUS* group (white)
Timber 13 Peg 5	*Quercus spp. LEUCOBALANUS* group (?) (white)
Timber 13 Peg 6	*Pinus spp.* (southern pine group)
Timber 13 Peg 7	*Pinus spp.* (southern pine group)
Timber 13 Peg 8	*Pinus spp.* (southern pine group)
Post AA	*Pinus spp.* (southern pine group)
Post D	*Quercus spp. LEUCOBALANUS* group (white)
Pile Post A	*Quercus spp. LEUCOBALANUS* group (white)
Upright Post "LL" West End	*Quercus spp. ERYTHROBALANUS* group (red)
Post "upright", East End of Timber 5, Unit HH	*Quercus spp. ERYTHROBALANUS* group (red)
Loose Post in Fill, South of Timber 5	*Quercus spp. LEUCOBALANUS* group (white)
Sheet Piling B	*Pinus spp.* (southern pine group)
Sheet Piling C	*Pinus spp.* (southern pine group)
Sheet Piling Unit 1	*Pinus spp.* (southern pine group)
Loose Peg	*Quercus spp. LEUCOBALANUS* group (white)

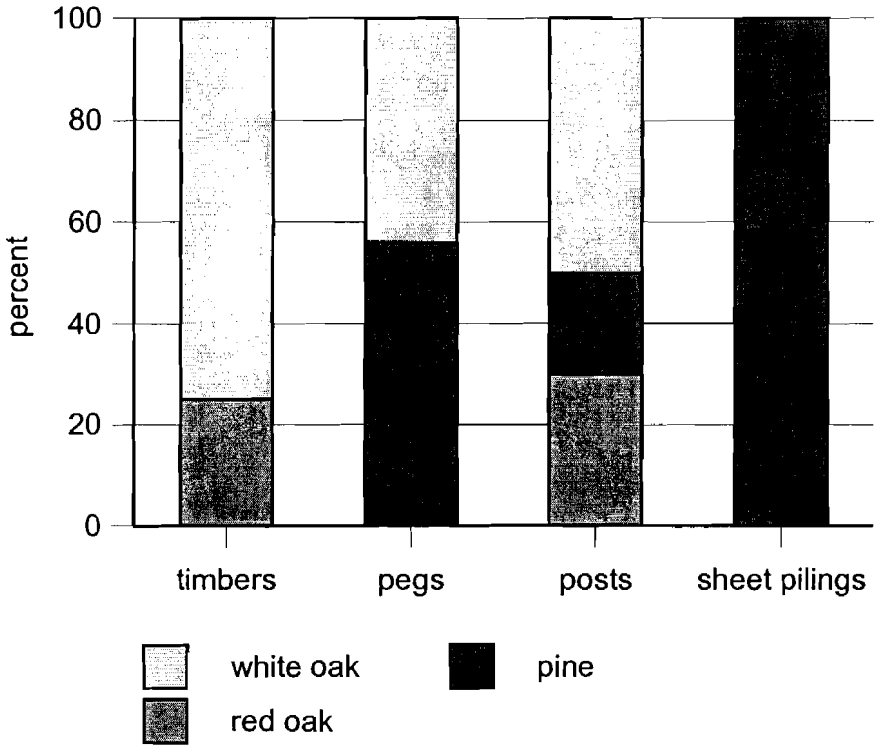

Figure 01: Species Composition by Element Type.

Table 02: Comparison of Oak Properties.

Properties	White Oak	Red Oak
specific gravity (important species)	0.57-0.81	0.52-0.60
average weight (approximate)	47 lbs per cubic foot	44 lbs per cubic foot
decay resistance	more	less
heartwood	non-porous	extremely porous
tyloses	abundant	absent or scattered
shrinkage during drying	significant	significant
decay resistance	high	low to moderate
drying	difficult - tendency to checking, splitting and casehardening	difficult - tendency to checking, splitting and casehardening
permeability to liquids	impermeable	permeable
holds nails		well, but splits along rays

(USDA1981:8, Brown and Panshin 1940:456-461, Bishop 1999:122-125)

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