

## **Narrative: Dating Historic Barns in Holland Township with Dendrochronology**

This project is to be managed by the Holland Township Historic Preservation Commission with Carla Cielo and Lawrence LaFevre principal volunteers in charge. Michael Worthington of Oxford Tree Ring Lab will be engaged as a paid professional to conduct dendrochronological dating of four historic barns.

According to Wikipedia, dendrochronology or tree-ring dating is the scientific method of dating timbers used in the construction of buildings based on the analysis of its growth rings. Most trees in a temperate climate put on one ring per year, and the width of that ring is dependent on regional climate conditions. The resulting pattern of wide and narrow rings allows oak and chestnut timbers to be dated using dendrochronology. Timber must retain a waning edge or bark and have 75 or more growth rings.

Determining a precise date of four historic barns will add to an existing body of work, which began with a township-wide barn survey. Dating barns will help to better understand the early settlement patterns and migration into the area which is now Holland Township. Several grant rounds may be needed to date enough barns for this research.

Holland Township occupies a 24 square mile area in the northwestern corner of Hunterdon County. The Delaware River forms its boundary with Pennsylvania to the west and the Musconetcong River with Warren County to the north. Early commercial opportunities were associated with the Durham Iron Furnace (1727-1791) in neighboring Durham Township, northeastern Bucks County. Ferry service was in operation by 1740 and facilitated easterly migration and westerly trade. English, Scottish, Welsh, Dutch and German settlers were present by 1750. These early settlers were tenant farmers paying absentee British landowners; there were roughly 64 farms during the tenant period. Farm "lots" were sold for private ownership between 1792 and 1814 and were subsequently divided into smaller farms for later generations. The 1880 agricultural census lists 170 farms and 1886 inhabitants.

An architectural barn survey began in 1999; 92 barns and barn ruins remained at the time of the survey, which is roughly 54% of the farms that were present in 1880. Of the 92 remaining barns and barn ruins, 88 were documented, which included a detailed survey form, floor plans, site plans, framing drawings and photographs. An approximate date was assigned to each barn.

Of the 92 remaining barns, 8 are ruins with no remaining evidence of a construction date, 11 may date to the 18<sup>th</sup> century, 40 are believed to have been built between 1800 and 1860, and 33 appear to have been built between 1861 and 1961.<sup>1</sup> The approximate date is based on a visual analysis of the materials of construction, nails, scribe or square rule, how the timbers were cut, the type of auger used to make a mortise and the framing pattern.

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<sup>1</sup> Barns built between 1861 and 1961 are not included in the dendrochronology study.

One mission of the dendrochronological study is to gain a precise date for all of the barns that may date to the 18<sup>th</sup> century. A date before the Revolutionary War would indicate construction by the British landowners for their tenant. Dates after the Revolutionary War but before the associated land was purchased, would suggest construction by a tenant in anticipation of ownership. One barn, which was dated 1787 with dendrochronology in 2011, is from this period. Construction dates after ownership would suggest that the private landowner replaced the tenant barn with his own structure.

The documented barns have been categorized by framing type and by barn type.

There were two major framing types used to build barns in Holland Township: a heavy timber frame with a swing beam and a much lighter “Pennsylvania German” frame.

*The heavy timber style of framing is characterized by two braced, oversized, cambered tie beams with no intermediate posts in each bent (a bent is an assemblage of framing members traversing the barn). Tie beams are cambered, posts are hefty (11” wide x 8” deep is typical) and are oriented with the width parallel to the ridge, two-foot scribe marks are present in the older examples, knee braces are always present, and the tie beam tenons typically extend through the posts. The lower tie beam of one or more interior bents is typically an oversized “swing beam.” A swing beam is defined as an oversized beam spanning the depth of the barn without studs beneath it. It acts to join the center bay with a side bay, thus extending the threshing floor beneath the loft of the side bay.*

*The framing style classified as a light Pennsylvania German frame has a light timber frame often with long diagonal braces and always with intermediate posts in all of the bents. The upper tie beams are typically framed into the plate (with lapped half dovetail) or, in later barns, just below the tops of the posts. The wall posts (up to 6” wide x 9” deep) are often oriented with the width perpendicular to the ridge (this is opposite the orientation of the posts in a heavy timber frame). There is never a swing beam, never a dropped tie (dropped below the tops of the posts more than a few inches), never gunstock posts and the tie beams are never cambered.*

Two major barn types were built in Holland Township: Ground barns and Pennsylvania Forebay bank barns. Both types have three associated subtypes (listed below).

Ground barns have a single story with haylofts and a central thrashing floor and are believed to be the oldest remaining style of barn built in Holland Township. The ground barn subtypes are as follows:

Three-bay frame ground barns with a heavy swing beam.

Three-bay stone ground barn with a light “Pennsylvania German” frame.

Extended or two-bay frame ground barns.

Pennsylvania Forebay bank barns became the most popular barn type in Holland Township by the early 19<sup>th</sup> century. These are two-story barns built into a slope or with a ramp to access the upper level. The forebay is created by recessing the front stable wall to shelter the stable doors from weather. According to Robert Ensminger, the forebay bank barn form began in southeastern Pennsylvania and migrated in all directions including northeast into Bucks County and into northwest central New Jersey. The forebay bank barn form appears to have arrived in the area that would become Holland Township by circa 1800 or possibly the 1790s. The Pennsylvania Forebay bank barn subtypes are as follows:

The Sweitzer, which is a forebay bank barn with an asymmetrical roof profile.

The Standard Pennsylvania forebay barn with a light Pennsylvania German frame.

The Standard Pennsylvania forebay barn with a heavy timber swing beam frame.

In addition to the mission listed above, the use of dendrochronology can reveal information about settlement patterns and framing methodologies. The oldest barns of each barn subtype will be dated. The aim is to establish conclusions about when the Pennsylvania forebay barn form and the lighter Pennsylvania German framing technique migrated into northwest central NJ from Pennsylvania, confirm the period of use for the heavy swing beam frame and further our knowledge of dating barns with a visual examination.

With the available funding of \$5,000 from the New Jersey Historic Commission, and \$1,400 from the township, four barns can be dated in this grant round. Forms indicating the owners' permission to date 6 barns are included as an attachment (two barns will be held in reserve as back up or for future dating; two barns are structurally compromised and were damaged by hurricane Sandy). Michael Worthington will examine all 6 barns to determine which ones are the most suitable to sample. This includes looking for timbers with bark or a waning edge and doing a species identification. Once the four barns are chosen, Michael will core drill 10 samples from each barn. The samples will be analyzed in a lab and a report prepared with drawings to show the locations of the samples.

The dendrochronology reports will be publicly accessible through the following web sites:

The Holland Township web site: [http://www.hollandtownship.org/historic\\_preservation\\_2.html](http://www.hollandtownship.org/historic_preservation_2.html)

The Oxford Tree Ring Lab web site: <http://dendrochronology.net/>

The Hudson River Valley Vernacular web site: <http://www.hvva.org/dendro.html>

The conclusions of the barn survey will be published in book form.