

## Dating the Glass Lake Dugout by Dendrochronology (NY State Museum #CN-37516)

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The Glass Lake Dugout was found at the bottom of Glass Lake in Rensselaer County, NY (42.65N 73.53W), and given to the New York State Museum in Albany, NY, in 1893 by Arthur C. Parker (NYSM records; JC Lothrop, pers. comm.). The canoe is 20.2 feet in length and had been made from about two-thirds of a large log of eastern white pine (*Pinus strobus* L.), with the center of its beam (= bottom) being the center of the tree (Figure 1). It is the most fragile of the three dugouts in the New York State Museum collection in 2008. Its fragility is at least partially due to being sunk in a lake and not immediately covered entirely by sediments. The exposed wood would have been accessible to any aquatic organism at the bottom of the lake. The organisms consumed mainly the softer earlywood cells of each tree-ring, causing the fragility, but also causing the ring boundaries to be unusually evident in the dugout's current state, particularly in its inner surfaces.



Figure 1. In this photograph, the retention of the latewood and attrition of the earlywood is clear on the inner surface of one end of the dugout. The center of the tree is at the bottom of the far side: the circular hole at bottom left is where the core was taken. Photograph by JC Lothrop.

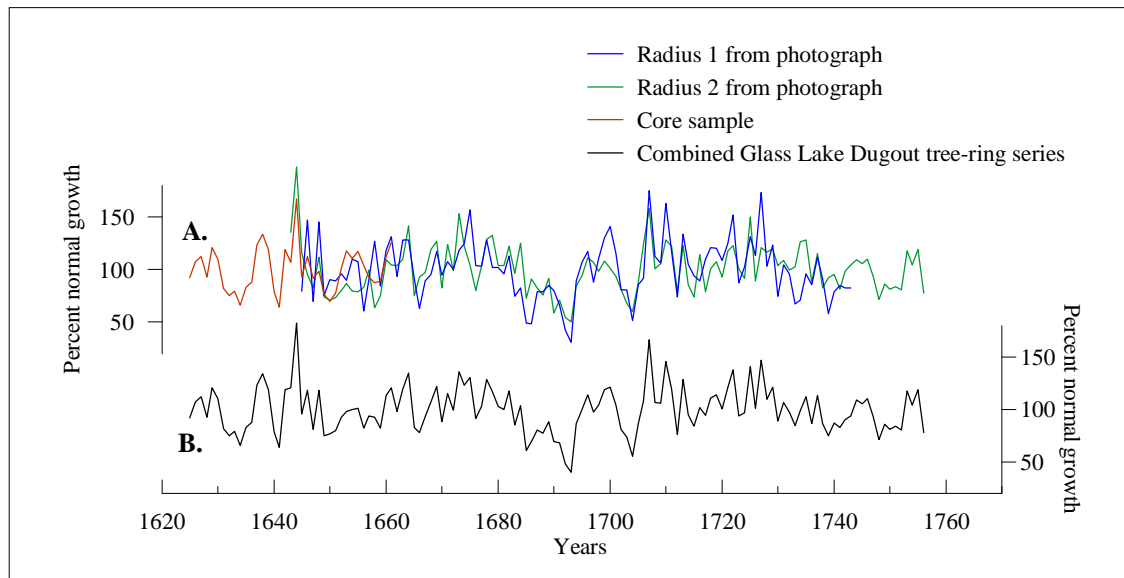


Figure 2. A. The indexed measurements of two radii in the photographs plus the core are shown in their relative placement to each other. B. The average of the three data sets. N.B. The years shown here were determined only after comparing with the regional chronologies.

Due to the dugout's fragility, we were able to drill only one core, from the beam. The core contains 37 tree rings from close to the pith (or center) of the tree. To supplement this data set, several series of photos were taken from the inner wall, starting at the gunwale and extending down to the beam (and pith). CooRecorder and CDendro software (Larsson 2003) were used to measure the relative widths of the tree rings from the photos. The data from two sets of measurements produced a tree-ring sequence covering 115 years, which overlapped the core's sequence by 19 years (Figure 2A). These three data sets were combined into a 132-year series for the Glass Lake Dugout (Figure 2B). The series was compared with other site and regional white pine chronologies, including forest chronologies from the Catskill and Adirondack Mountain regions and historic building chronologies from across New York and New England, to place this dugout in time.

A very strong visual and statistical correlation with our regional white pine chronology and a particularly good correlation with the Wilmington Notch forest pine chronology (Cook, ITRDB) from the eastern Adirondack region, date the youngest ring of the series to 1756 (Figure 3), and its incomplete (and unmeasured) outer ring of the dugout to 1757. There is no sapwood included in the dugout, which indicates that the actual felling of the tree and the production of the dugout probably occurred in 1777 or after since the sapwood of white

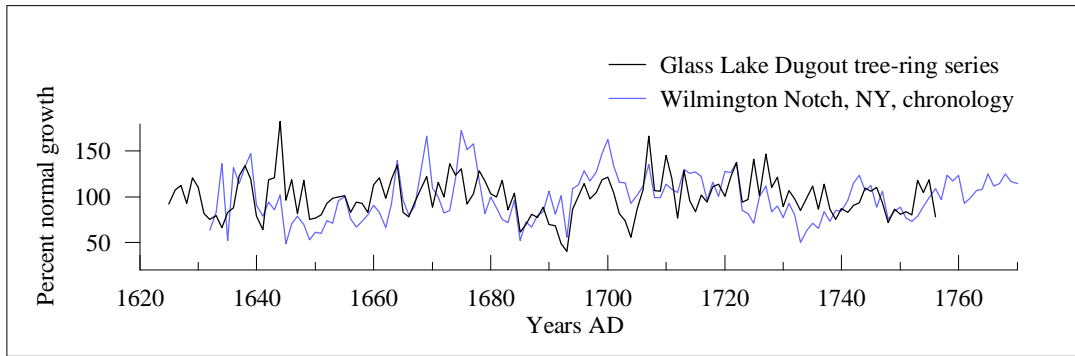


Figure 3. The Glass Lake Dugout series compared to the Wilmington Notch chronology (Cook, ITRDB). Supporting statistics are: 6.23 Student's *t*-score, 0.48 correlation coefficient, and 63.2% trend coefficient; all are significant at the 0.05 level.

pine trees generally contains around 20 rings. Removal of the sapwood is a common practice since those rings are not as strong as the heartwood rings, and they contain a higher sugar content which attracts insects. The size of the dugout, with a depth of approximately 14" (ca 0.35m) puts the diameter of the tree, at minimum, at around 30" (ca 0.75m). The tree was probably chosen with the intent of not removing much except the sapwood rings for maximum size, so this dugout was probably carved out sometime between the late 1770s and 1800, with the highest probability around 1777 or shortly thereafter.

Of additional interest is that the tree-rings near the pith of this tree are relatively small, thus the wood in the beam is denser and stronger due to more latewood content than is normally found in the juvenile rings of pines. These rings are generally wider, composed of more earlywood and less latewood cells. This feature could be another reason why this log was chosen for a dugout.

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**References:**

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Cook, ER. 1995. Wilmington Notch white pine chronology. Data stored in the International Tree-Ring Data Bank (ITRDB) and available on the web at <http://hurricane.ncdc.noaa.gov/pls/paleo/ftpsearch.treering>.