

Pollen Analysis in Historic Landscape Studies At Fort Necessity National Battlefield

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Cultural Resources Management Guidelines (NPS-28) establishes two kinds of historic landscape studies: the Cultural Landscape Report and the Standards for Managing Historical Rural Landscapes. These are conducted by historians and historical landscape architects assisted by cultural geographers, cultural anthropologists and archeologists. Documentary sources and general field survey methods are emphasized.

Archeological pollen studies indicate that Euroamerican land use has changed continuously and that vegetation has constantly changed in sensitive response to cultural change (Kelso et al. 1989). No groundcover on any cultural landscape has remained perfectly stable, and (barring occasional specimens of long-lived taxa) there is no such thing as a historic vegetation. The documentary/archeological approach to historic landscape is, therefore, inadequate for sites without extensive literary and photographic records. These include most pre-20th-century NPS properties, sites occupied by humble folk and small plots within larger land-use units.

We will demonstrate with the following data from Fort Necessity National Battlefield that a cross-disciplinary approach incorporating paleobotanical studies works better. Pollen, seed and phytolith (biological silica) data may be used, but pollen is emphasized in this study because trends show up better than among sedges, and taxa are easier to recognize than among phytoliths.

The Fort Necessity earthwork and stockade (Fig. 1) were hastily constructed on the orders of Lt. Col. George Washington in an opening in the forest called "Great Meadows" during his 1754 road building expedition to the forks of the Ohio. It was surrendered to the French and destroyed in July 1754 after a brief siege that is now considered to be the opening battle of the French and Indian War. The forest surrounding Fort Necessity provided cover to the attacking French and Indian force. Its historic spacing and relationship to the meadow is critical to visitor interpretation. The meadow was drained and the surrounding forest was cleared by a family of farmers and stock growers named Fazenbaker sometime between 1856 and 1880 (Torres-Reyes 1970:12).

The current bare hillsides around the fort present visitors with an inaccurate view of the 1754 tactical situation. The Fort Necessity GMP calls for restoration of the forest to its 18th century boundaries by the 300th anniversary of the battle (A.D. 2054). Historic descriptions of the site indicate deciduous trees, with clumps of pine, on the hillsides and bushes and grass in the meadow. In 1816 some clumps of alders were observed along the stream, but a hardwood forest is assumed to have begun at the edge of the meadow in 1754 (Harrington 1957:10,22; Torres-Reyes 1970:9-10). NPS managers recognize that some of the treeline plantings already undertaken are erroneous (Harrington 1957:19), and want more precise data before proceeding with reforestation. Paleobotanical methods should provide this. The following preliminary pollen report constitutes an Eastern Parks and Monuments Association supported feasibility study for such research.

This feasibility study is really a test of two hypoth-

eses. Pollen is washed downwards in soils and is destroyed through time by oxidation and aerobic fungi (Dimbleby 1985: 5,59). Soils have been eroding and deflating rather than accumulating during the historic period, and old groundcover data would be lost unless it was carried down into the profile by percolating rainwater.

The first hypothesis is that leaching has been preserved a palynological record of the native forest and meadow under the farming and NPS period spectra in the Fort Necessity soil profiles. Our second hypothesis is that the pollen spectra should reflect different vegetation composition in contrasting edaphic situations on the site.

To test these hypotheses a series of cores was taken from west to east down a hillside and across the meadow toward the fort. Four have been analyzed to date (Fig. 2, bottom right). The hillside core 3 should register the former forest. Core 2, at the base of the hill should have fallen within the 1754 ecotone and should incorporate pollen from hawthorns and shrubby forest edge taxa, including other members of the rose family. Cores 1 and 4 are located on what was considered to have been battle era meadow and should be dominated by grass and sedges.

The results of the analysis of core 3 are presented at the top of Figure 2. Pre-clearance forest is registered in the prominent oak counts near the bottom of the profile, confirming our hypothesis that leaching would preserve pre-clearance groundcover data. Dimbleby (1985:3,59) estimated a pollen leaching rate of 10 cm per 300 years under English forest planted on former plowland and pasture. If the deforestation recorded at 12 cm below the surface in Fort Necessity Core 3 took place around 1880 the leaching rate at Fort Necessity is ca. 10 cm per 90 years. If deforestation took place closer to 1856 the leaching rate approximates 10 cm per 110 years. These average out 3 times as fast as Dimbleby's (1985:3,59) projected rate. Leaching is faster under cleared soil than under forest. Actual leaching rates may be somewhat faster, because friction between the coring tube wall and the sediment compressed the profile about 20 percent. Our initial Fort Necessity cores apparently did not reach the 1754 pollen spectra. Countable pollen remains at the bottom of profile, and our next core can go deeper.

A post-clearance groundcover and land-use succession is also recorded in Fort Necessity core 3. Local tradition holds that the hillside was cleared for pasture.

The pollen spectra tend to support this interpretation. The trees are followed by the ragweeds predictable on disturbed soils and then by the grass which should dominate a pasture. Pollen from grass planted on former farmland under the Boot Mill Boardinghouse backlot at Lowell, Mass. leached down into the underlying glacial sands as an abrupt block of high frequencies (Kelso, et al. 1989: Fig. 9-9). The Fort Necessity grass spectrum, in contrast, developed slowly. The hillside appears to have been cleared and let go naturally to grass.

Cereal pollen other than rye does not blow. It is spread by cultural rather than natural mechanisms (Vuroela 1973:12). Cereal pollen in Fort Necessity core 3 appears as the ragweed frequencies peak, and the type is most prominent in the upper 4 cm where grass counts are highest. It is probably derived from cattle feed, deposited via manure, and most probably reflects active grazing. The Fazenbakers apparently were willing to put cattle on the hillside before the grass population was fully developed. This would be unlikely if they had actively cultivated the grass. The chestnut data also suggest little effort was expended on soil preparation. Chestnut pollen increases as oak pollen declines. This must indicate stump sprouting. Chestnut pollen, in turn, declines as the manure borne cereal pollen increases. The stumps on the hillside were neither grubbed out nor burned at clearance, and the chestnut stump sprouts were left, eventually to be exterminated by browsing.

The critical pollen spectra of the core series down the hill and out onto the meadow are presented in topographic order below core 3 in Figure 2. The forest clearance and pasture development reflected in the oak/ragweed/grass and European cereal/chestnut sequences of core 3 are repeated in cores 2 and 1. The patterns become less clear with progress out into the meadow, and sedges indicating wet ground appear in core 1. The distribution of historic groundcovers does not, however, appear to have been as we hypothesized. Hawthorn and other shrubby members of the rose family are not recorded in core 2 at the postulated ecotone. Neither these types nor really large quantities of sedge pollen appear until core 4, closer to the more solid ground around the fort on the other side of the meadow.

The most obvious change in the pollen spectra with topography is a steady increase in alder pollen from core 3 through core 1. Percentages decrease again in core 4 and it is unlikely that this alder pollen either



Fig. 1. NPS reconstruction of Fort Necessity based on archeology and documentary sources.

FORT NECESSITY NATIONAL BATTLEFIELD
CORE SERIES: CRITICAL ELEMENTS

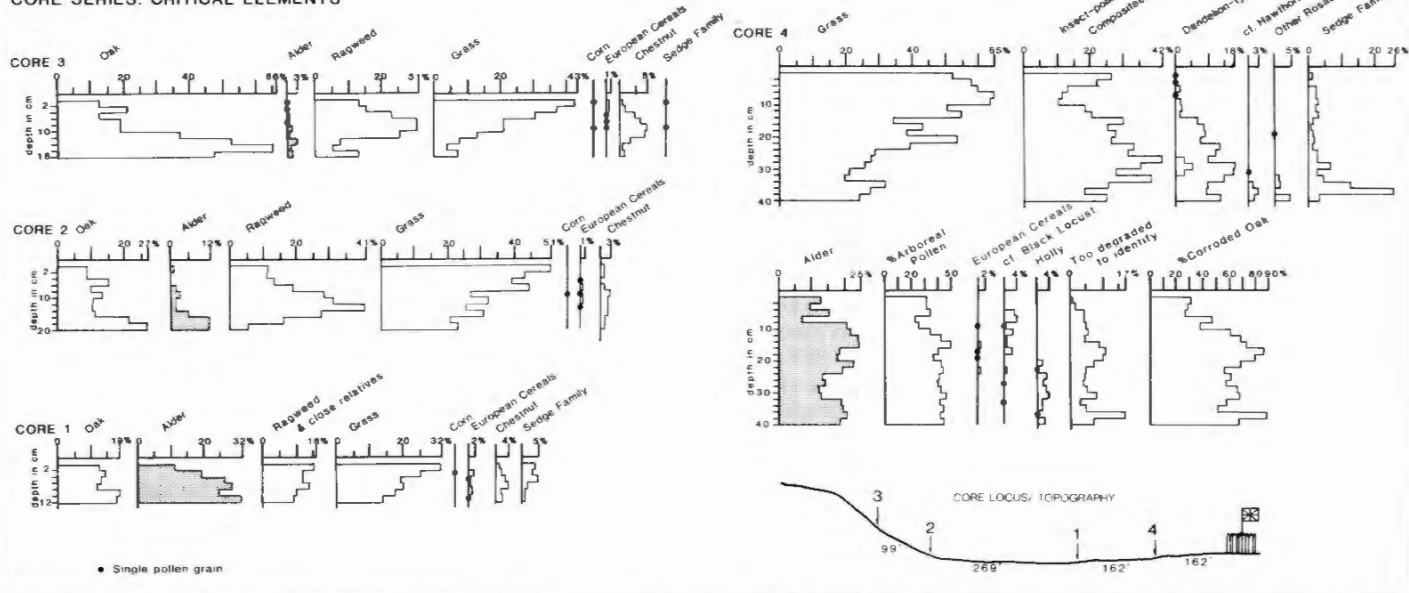


Fig. 2. Pollen percentages critical types in Fort Necessity cores in topographic order down hill and onto meadow.

reflects wet-land drainage or the clumps of alders observed along the creek in 1816 (Torres-Reyes 1970:9). It appears probably that an extensive, previously unrecorded population of alders existed between the oak dominated forest and the open meadow at the core transect.

A post-battle land-use record is also registered in core 4 from the meadow (Fig. 2, right). Fazenbaker drainage improvements are evident in the decline of sedge pollen at about 32 cm, and brush removal is recorded in the disappearance of hawthorn and other members of the rose family in the 30 cm 28 cm zone. The numbers of plants related to the dandelions and asters initially increased on this dryer, less shady soil but were suppressed by an expanding grass population above ca. 26 cm.

The introduction of cattle is indicated by the appearance of European cereal pollen at 24 cm, and both the "too degraded to identify" and "corroded oak" measures of pollen corrosion increases in those samples in which cereal pollen is best represented. This indicates that the soil is being churned and aerated by

the hooves of the cattle. Cattle also appear to have browsed the local holly population out of existence above 20 cm. Black locust frequently invades exhausted pastures and overgrazing may be responsible for the expansion of that pollen type above 18 cm.

Vegetation change through time and across space at Fort Necessity is clearly recorded among the pollen cores. Our next step is to establish the pollen and phytolith signatures of all plant populations and the leaching rates for all types of matrices. We will then be able to map the battle era vegetation by analyzing only the pre-clearance spectra. Not all historic era changes in the Fort Necessity flora are applicable to our research problem but all are attributable to particular human activities. Pollen analysis should serve landscape historians investigating other questions equally well at other sites.

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