Geoarchaeological Study of late Quaternary terraces at the apex of the Great Bend of the Susquehanna River

Article appearing in the Fieldtrip Guide for the 67th Annual Field Conference of Pennsylvania Geologists, October, 2002

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This article describes two late Quaternary terraces at the apex of the Great Bend of the Susquehanna River. State Route (S.R.) 11 crosses the river at the bend apex, just downstream of the mouth of Salt Lick Creek (see Figure 1). The Salt Lick Creek valley was the location of a large proglacial lake, which is discussed elsewhere in this fieldtrip guide. The S.R. 11 bridge was replaced this past year (2001), and studies mandated by federal law provided an opportunity to examine deposits on both sides of the river as well as to recover prehistoric artifacts from Holocene stratigraphic contexts.

Figure 1: Great Bend of the Susquehanna River showing the location of the Great Bend (36SQ17) and Hallstead Park (36SQ31) archaeological sites
T-1 and the Great Bend Archaeological Site (36SQ17)

On the right bank of the Susquehanna River at Great Bend, there is a Holocene T-1 surface from three to five meters above river grade (see Figure 2). A T-1 terrace at this same height above river grade occurs thirty kilometers upriver at the proposed crossing of the Millennium Pipeline near Windsor, New York (Thieme et al., 1998). Discontinuous segments of the T-1 are also mapped further upstream in New York state by both Scully and Arnold (1979, 1981) and Dineen (1993). In Pennsylvania, the T-1 has recently been mapped for the reaches from Athens downstream to Northumberland (Thieme, 2002).

![Figure 2: Schematic cross-section of the Susquehanna River valley at Great Bend showing the T-0, T-1, and T-2 surfaces.](image-url)
The T-1 at Great Bend houses a stratified archaeological site. The site is recorded in the Pennsylvania Archaeological Site Survey files as "36" (for the state of Pennsylvania), "SQ" (for Susquehanna County), "17" (the site number). The Great Bend site is only the seventeenth archaeological site to be recorded in Susquehanna County. The PennDOT archaeologist, Ms. Jamie McIntyre, suspected from the outset that prehistoric artifacts might be found deeply buried in this alluvial terrace. At the request of Ms. McIntyre and the state historic preservation office, geomorphological studies were performed in conjunction with the archaeological excavations.

Three geomorphological test trenches were used to describe the terrace stratigraphy. A 9 x 5 m excavation block was then excavated by hand to the base of the Holocene deposits. Wooden shoring was used to make the excavation safe. The stratigraphy within the excavation block generally conformed to a framework of "allostratigraphic" units (Autin, 1992; NACSN, 1983) based on the profile described in one of the test trenches, Trench 99-2 (see Figure 3). The four allostratigraphic units were numbered sequentially beginning at an unconformable contact with upper Pleistocene outwash approximately 4.5 m below the land surface. Radiocarbon dates for the basal Holocene sediments range from 8,320±50 B.P. to 11,160±40 B.P., with the younger dates representing charred material directly associated with an assemblage of Early Archaic lithic artifacts.
A soil or buried soil occurs at the upper bounding surface of each allostratigraphic unit (ASU). The lowest buried soil, the 4Bt horizon capping ASU-1, has moderately developed, medium sized soil "peds" which are shaped like prisms (see Figure 4). In thin section, reddish brown clay can be seen as a discontinuous coating (ferriargillan) on the surface of a large ped as well as dispersed throughout the soil matrix (see Figure 5). Clasts of quartz and fragments of the local siltstone bedrock are rimmed with the same reddish brown clay. The same is true of a large oval soil pore which represents a passage trace, probably a worm or insect burrow.

Figure 4: 4Btx horizon showing moderate medium prismatic ped structure and continuous clay films
Figure 5: Thin-section photomicrographs in PPL (left) and XPL (right) of the 4Bt horizon in the Great Bend site (36SQ17) master stratigraphy

ASU-II consists of a single soil horizon, the 3Bw. The upper part of this buried soil was truncated by a scour episode, and it is unconformably overlain by the much coarser flood sands at the base of ASU-III. The abrupt coarsening in the profile at the 2C(b)/3Bw contact marks a new cycle of vertical accretion. Laboratory particle size analyses show the 2Cb horizon to be 84% sand compared to only 41% for the 3Bw horizon (see Figure 6). The mean grain size for the 2Cb, 2.9 φ (0.15 mm), is actually fine sand. Nonetheless, this is considerably coarser than the mean of 6.8 φ (0.008 mm) for the 3Bw horizon.
Increases in silt from the 4C2b (43%) to the 4Bt3 (64%), and from the 2Cb (13%) to the 2Ab (51%) typify fining-upward trends of vertical accretion on point bars of meandering streams (Allen, 1970, p. 140-143; Nichols, 1999, p. 116-118; Reineck and Singh, 1986, p. 267-274). Overbank deposition appears to have been much less common after the deposition of ASU-III, with both slope wash and refuse disposal contributing significantly to the uppermost 50-70 cm of the T-1 (ASU-IV). Several large Woodland (Owasco culture) pit features were found at the top of the C1 horizon, and subtle changes in the percent organic matter and sediment chemistry in the upper part of the profile are clearly related to late prehistoric as well as early historic human activities in the immediate vicinity of archaeological site 36SQ17.

**T-2 and the Hallstead Park Site (36SQ31)**

On the left bank, diagonally across the river from the Great Bend archaeological site, a T-2 terrace stands approximately eight meters above river grade. Geomorphological investigations for the S.R. 11 bridge replacement determined the T-2 to be composed of upper Pleistocene outwash with a thin cap of loess and/or colluvium (Thieme et al., 1999). The T-2 is flanked by a narrow (<3 m wide) floodplain (T-0) which consists of historic alluvium overlying glacial till.
A trench was excavated with a trackhoe on the sloping bank of the T-2 (see Figure 7). This trench, Trench 1, was three meters wide and measured eight meters along its longer, north-south axis. Upper Pleistocene outwash gravel was encountered at depths raging from 0.3 to 0.9 m below surface (see Figure 8). There appears to have been little or no alluvial deposition on this T-2 surface during the Holocene epoch.

Four auger borings were performed in the area west of Trench 1 in order to define the limits of the previously reported Hallstead Park archaeological site (36SQ31). Intact deposits containing prehistoric cultural material were identified in two of the borings. There is at least 60 cm of intact sandy loam sediment overlying the outwash gravel in this portion of the T-2. Excavations for the Pennsylvania American Water Line corridor by the Binghamton University Public Archaeology Facility (Wurst and Lain, 1996) recovered artifacts affiliated with the Middle Archaic through historic Iroquois cultures. Five radiocarbon dates were obtained, the earliest being 4290±50 B.P. for Feature 21, which contained a Stanly Stemmed projectile point affiliated with the Middle Archaic culture.
References Cited


