GEOLOGICAL CONTEXTS OF ARCHEOLOGICAL SITES ON THE SUSQUEHANNA RIVER FLOOD PLAIN

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INTRODUCTION

Prior to the present decade, prehistoric archeological research in New York State had a long history going back over 50 years, focussing on major drainage systems (Parker 1922; Ritchie 1938b, 1944, 1951, 1965, 1969). Yet over this period relatively little attention was paid to the Upper Susquehanna Valley, including its major tributaries in the State. This neglect is surprising in view of the high archeological potential of the region, reflected in numerous recorded sites and surface collections, and a geographic position conducive to the study of many problems in cultural distribution and adaptation.

The first major attempt at professional exploration occurred in the 1920's, when a canoe flotilla carrying archeologists and laborers began at Cooperstown and surveyed for archeological sites well down into Pennsylvania (Moorehead 1938). Later, surveys were conducted by William A. Ritchie, who also excavated some sites of the late prehistoric Owasco culture (Ritchie 1934, 1938a, 1939, 1944:59-71, 1969:xxiv-xxvi). Sporadic work was carried out in the late 1960's by the New York State Museum and the State University at Binghamton, partly in connection with the State highway salvage archeology program (Wilcox n.d.a, n.d.b: Elliott and Lipe 1970; Funk and Hoagland 1972a, 1972b; Hesse 1968, 1971). A major interdisciplinary program of investigations into regional prehistory was initiated by the writer in 1971. Field work is expected to conclude with the 1977 field season and a final report will eventually be published. The project has involved personnel from several institutions, including the New York State Museum, the State University of New York at Albany, and the State University College at Oneonta. Preliminary reports have appeared (Funk, Rippeteau, and Houck 1973, 1974; Kirkland, et al 1976; Funk and Rippeteau 1977).

The fundamental objective of this project is to delineate the history of human adaptations to the postglacial Upper Susquehanna environment. This requires the acquisition of data on the sequence of prehistoric Indian cultures, their distribution in time and space, their subsistence and settlement patterns, and the various components of environmental change. To accomplish these goals, our methodological

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emphasis has been on stratified flood plain sites, where the discrete occupation surfaces are separated by the accumulation of overbank sediments. In such contexts, the mixture of debris from different periods of habitation is minimal or absent; the patterning of artifacts, hearths, pits, or refuse on each floor is undisturbed; and radiocarbon dates on organic materials from these floors can be attributed to the individual occupations with a great deal of assurance. Thus it is possible to construct a well-dated stratigraphically based regional sequence of artifact styles and cultural complexes, to study within-site patterning, and to make valid between-site comparisons.

Palynological data used to sketch a picture of floristic environments are acquired from bogs, occupation zones on archeological sites, or precultural levels in our excavations. Other paleoenvironmental data are contributed through studies of changing postglacial landforms, especially with regard to the flood plain. When all the data are analyzed, we should be able to present a synthesis of prehistoric culture change in relation to environmental change within the Upper Susquehanna drainage.

ACKNOWLEDGEMENTS

Many persons have contributed to the Upper Susquehanna Project. We are especially indebted to P. Jay Fleischer for his input on the geology of several sites; to Beth Wellman for her assistance in preparing this report and the processing of collections acquired in our excavations; and to Franklin J. Hesse by whose efforts many of the sites were located and tested.

THE ARCHEOLOGICAL SEQUENCE

An important result of our investigations has been the construction of a detailed framework for prehistoric Native American cultures in the valley. This framework consists of a sequence of cultures, identified and contrasted by means of distinctive artifact styles, which are solidly placed in relative time by recurrent stratigraphic associations and in absolute time by over 70 ^{14}C determinations.

The earliest known human groups, the Paleo-Indians, entered New York State from the south and west following the recession of Woodfordian ice. Radiocarbon dates from several sites indicate this event took place ca. 9000 B.C. and probably somewhat earlier. Generally believed to have subsisted largely on big game animals, some of which are now extinct, these people are identified chiefly by their "fluted" lanceolate projectile points chipped from high-grade flint. Although fluted points have occasionally been found on plowed fields in the Upper Susquehanna drainage, no habitation sites with <u>in situ</u> remains have so far been discovered there.

Throughout the eastern United States, the Paleo-Indian cultures apparently evolved into the Archaic cultures which represented adaptations to changing early postglacial environmental conditions. Exploiting the diverse resources of these surroundings, Archaic groups developed a

considerable variety of subsistence patterns and artifact styles. This period lasted from approximately 8000 to 1500 B.C. For reasons yet obscure, few traces of the earlier Archaic occupations from 8000-4000 B.C. are known in the Northeast. One possible explanation is that the predominantly coniferous forests of 8000-6000 B.C. were relatively poor in food resources available to populations at a hunting-gathering stage of culture. We have located and excavated two sites of that age at Wells Bridge. These are the oldest Archaic sites on record in New York or New England north of the coastal region.

Middle Archaic developments from 6000-4000 B.C. are still relatively obscure, even though the pollen data suggest an improved environmental situation. By the time essentially modern ecological conditions prevailed -- the oak-chestnut-deer-turkey biome of Ritchie (1969: 32) -- the first important Late Archaic traces are referred to as Early Laurentian and ^{14}C dated ca. 4000-3000 B.C. Later groups are known in the study area in more detail, including the successive Lamoka, Vestal, Snook Kill, and Frost Island phases (Ritchie 1969; Ritchie and Funk 1973; Funk, Rippeteau and Houck 1974). Each complex is distinguished on the basis of diagnostic traits, usually projectile point types. There appears to have been a population surge during this period of ca. 2500-1200 B.C. By Frost Island times (ca. 1500-1200 B.C.) soapstone pots, a horizon marker across the Northeast, had been introduced, followed by the first true pottery.

We have little data on the succeeding Early Woodland and Middle Woodland manifestations, which elsewhere in the Northeast denote a time of ceramic innovation, and burial ceremonialism attained a high degree of elaboration. There may have been a decline in population throughout the Upper Susquehanna Valley between 1200 B.C. and A.D. 400.

A continuous development is indicated from the Middle Woodland cultures into the next major stage, the Late Woodland. By A.D. 1100 there is clear evidence that northeastern Indians were growing corn, beans, and squash (domesticated long before in Mexico). This revolution in subsistence brought with it changes in the social order, an accelerated population growth, and an increase in village size. These first New York agriculturists were the Owasco people (ca. A.D. 1100-1300) who in turn gave rise to the Iroquoian cultures whose historic representatives, the Five Nations Iroquois, played an important role in colonial history. Strangely, while Owasco sites are common in the Susquehanna Valley north of Pennsylvania, Iroquois sites are rare and of small size.

GEOLOGICAL CONSIDERATIONS

Of primary relevance to this field trip, our investigations on flood plain sites have enabled us to develop a detailed ^{14}C chronology for generally structureless overbank sediments at several sites between Oneonta and Wells Bridge. Not only have the occupation levels been dated, but in some cases underlying sands and silts rich in organics have also been dated.

The sedimentological picture is reconstructed as follows. With the retreat of Woodfordian ice, the Upper Susquehanna basin was the scene of numerous small lakes formed below successive ice marginal positions. These lakes were impounded on their southern borders by morainal dams. Wells Bridge was the site of one such "valley plug" creating a lake some 10 miles (16 km) in length. This lake was subsequently filled by over 400 feet (122 m) of lacustrine silts and clays (Fig. 1, data from Randall 1972). Lenses of gravel occur in the lake sediments at the junction of major tributaries. Their positions high in the lacustrine sequence indicate a very rapid lake infilling if these gravels are related to late stage ice melting in tributary basins, or they might possibly be contemporaneous with some climatic change or fluctuation. If there was a long period of infilling it was not accompanied by any recognized shoreline features.

A series of kame deltas at 1140 feet (347 m) indicate the former lake level during ice retreat. These kame deltas occur discontinuously along the sides of the river between Wells Bridge and Oneonta.

With the disappearance of the lake as a result of breaching of the morainal "plug," the Susquehanna River occupied the surface of the lacustrine deposits (at least by 12,000 B.C.) and began a period of considerable lateral movement. Some point-bar deposits were laid down during this period (one volume dated 11,910 B.C. at the Russ site at Wells Bridge). These deposits survive on the valley margins or below overbank accumulations.

At several of the sites examined between Oneonta and Wells Bridge (Camelot No. 1 and No. 2, Kuhr No. 1, Russ, Enck) lower sands and gravels appear to represent lateral accretion deposits whereas the upper silts are overbank deposits. At the Fortin site the overbank sediments directly overlie gravels which may be reworked glacial outwash. At Camelot No. 2, Kuhr No. 1, Kuhr No. 2, and Enck there are a series of terraces or meander scars; each successive one of these features away from the river is presumed to be older than those closer to the river. Local relief between these terraces is generally only on the order of a meter. In general, archeological sites are located in the terrace closest to the river or near the surface on the second terrace. Any occupation zones in higher terraces were obscured in the plow zone (upper 30 cm). Sedimentation rates for overbank silt deposits were determined for six sites (Fig. 2). In each case sedimentation rates were very rapid initially, becoming slower with time. These curves are similar in form to a curve hypothesized for Brandywine Creek, Pennsylvania, by Wolman and Leopold (1957). They based their curve on the average number of days per year on which a given flood stage is equalled or exceeded and a constant increment of sediment deposited each time the bank is overtopped by flood waters.

As sediment accumulation due to flooding is most rapid next to the river and decreases towards and up onto the adjacent terrace, living floors also trend up away from the river. These levels (time equivalent surfaces) are compressed away from the river, eventually becoming obscured

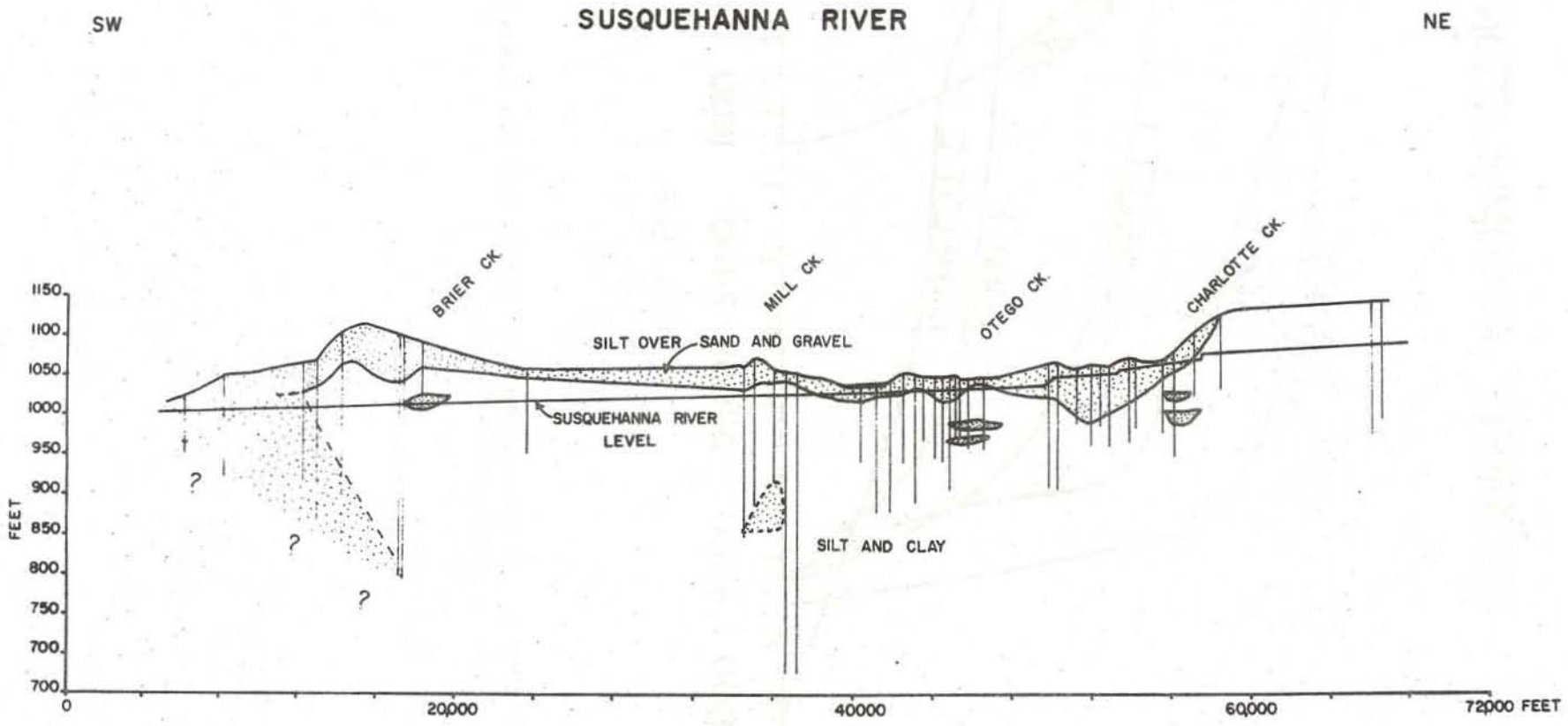

Figure 1. Longitudinal section of the Upper Susquehanna River from Wells Bridge to Oneonta.

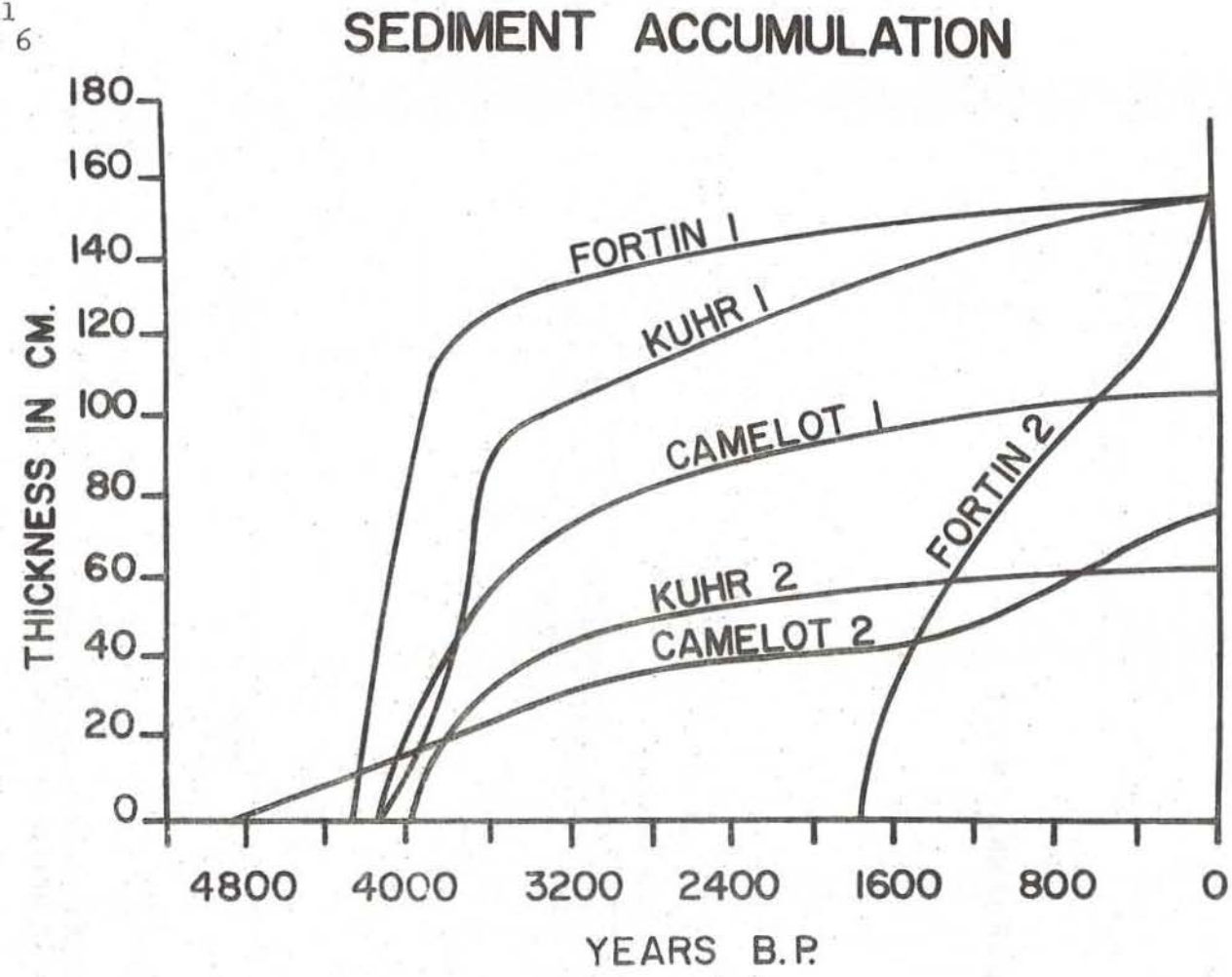

Figure 2. Sedimentation rate curves for six sites in the Upper Susquehanna Valley.

in the plow zone. No occupation levels occur below about 5000 y.a. on the first terrace at most of the sites. Older occupation zones are unlikely to occur on this terrace since they would have been close to the water table and therefore uncomfortably wet and subjected to more frequent flooding. Time rate accumulation curves for some of the sites are shown in Fig. 2. The form of these curves support Wolman and Leopold's concept of overbank sediment accumulation. The close proximity of the sites to the river suggests the lack of lateral migration by the Susquehanna River for several thousands of years in the immediate past. Further confirmation of this river stability can be seen when the configuration of the river from 1915 topographic mapping is compared with that from 1968 aerial photography (Fig. 3). In addition the proximity of the dated organics from lateral accretion deposits suggests an even older stability of the river approaching 7000 to 9000 years. Although much evidence for past meandering of the Susquehanna River is evident from scroll patterns (Fig. 4), we believe that the majority of these are the result of migrations that took place some 7000 to 9000 years ago and that few if any major changes have occurred in the river geometry in the past 5000 years.

The latter statement is supported by the data from the Russ and Gardepe sites, even though they contained very early Archaic occupation levels older than 5000 y.a. Probably they displayed a different pattern because they lie astride the Wells Bridge moraine. Here the river channel was largely confined by the drift, into which it incised itself soon after the local ice lobe receded from the vicinity. Following initial deposition of point-bar silts and sands ca. 12,000 B.C. at the Russ site, the river seems to have shifted slightly to the south, commencing deposition of overbank silts which attained a thickness of ca. 1 m beginning ca. 6300 B.C. and continuing to the present. In this southward swing it eroded away part of the Gardepe site where Indian occupancy began ca. 9300 y.a.

Incidentally, our study of scroll patterns may aid in the discovery of additional early occupational remains on the older terraces of sites similar to Kuhr No. 2 and Camelot No. 2.

CONCLUSIONS

A sequence of prehistoric Indian occupations extending to at least 9300 B.P. has been delineated by our investigations. Possibly due in part to unfavorable environmental conditions, little evidence exists of Archaic groups who lived between 10,000 and 6000 B.P.; much more information is available for Laurentian, Lamoka, Frost Island and other hunting-gathering cultures of 2500-1200 B.C., who collectively seem to represent a moderate population increase. After another poorly known period from 1200 B.C. to A.D. 400, the archeological record again seems more complete, and is understood in some detail through most of the Late Woodland (village agricultural) epoch. Most of our data on the pre-agricultural groups was obtained from stratified flood plain sites, which have also provided material for over 70 radiocarbon dates.

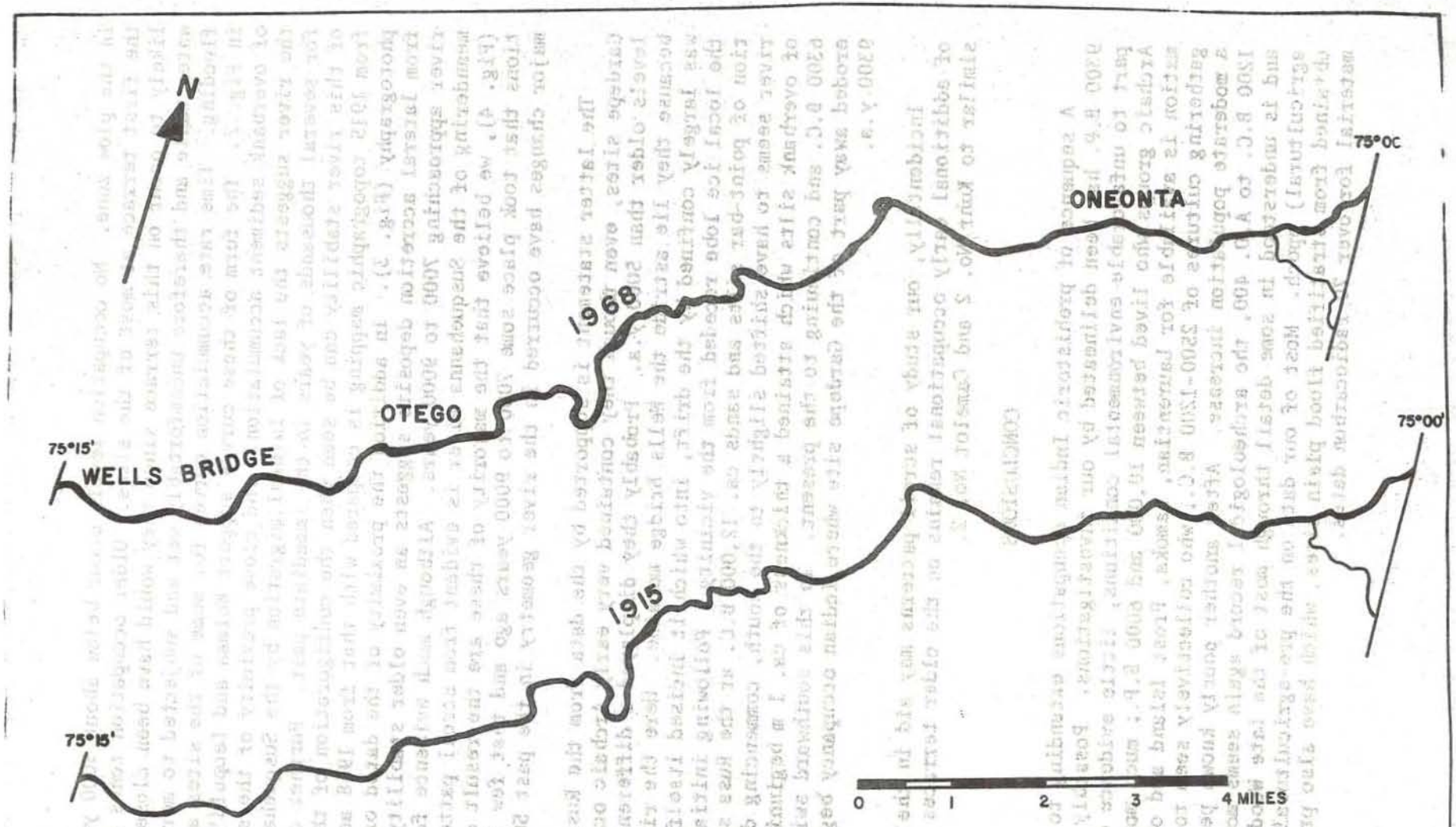

Figure 3. Comparison of Upper Susquehanna River geometry for 1915 and 1968.

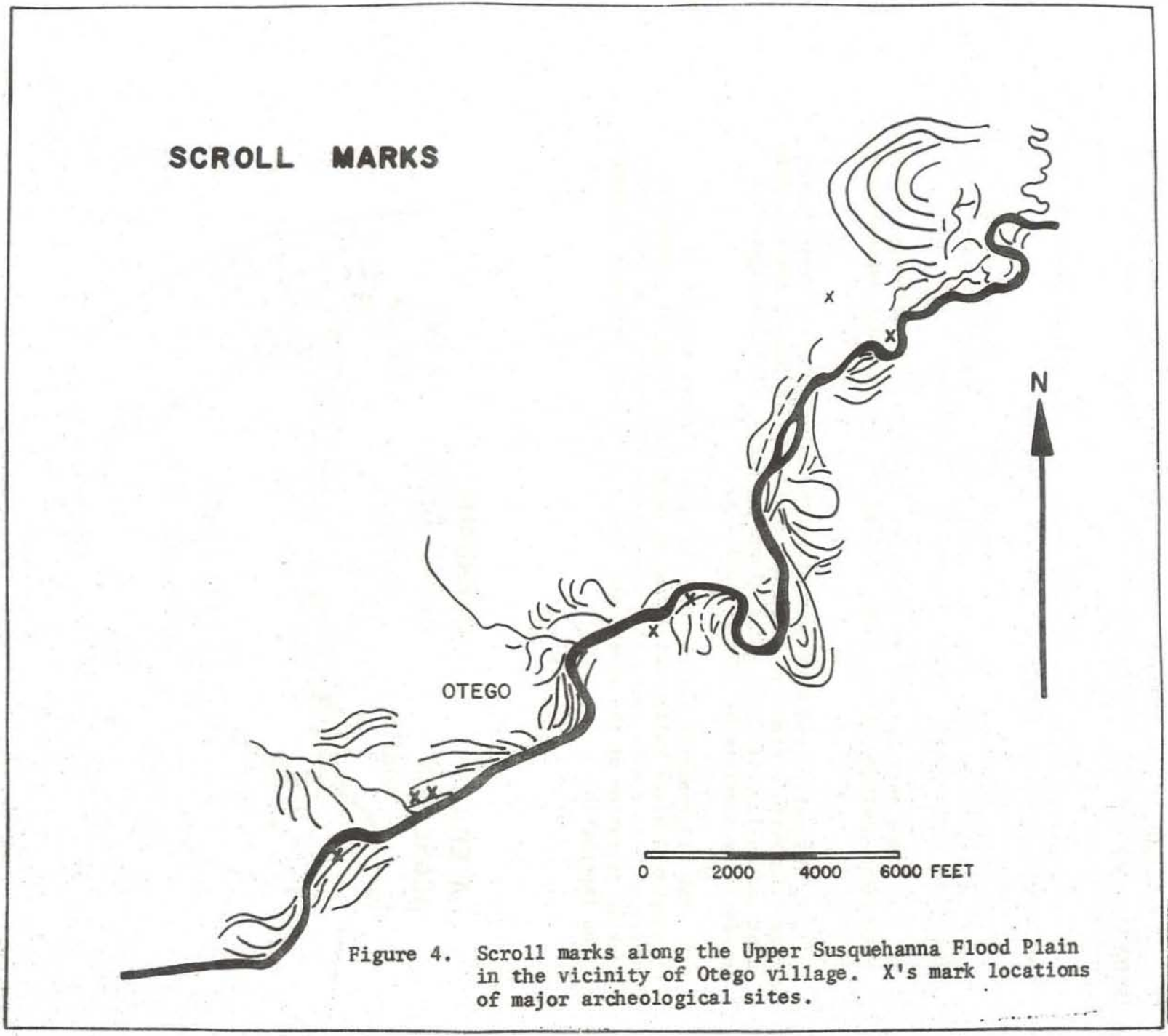

Figure 4. Scroll marks along the Upper Susquehanna Flood Plain in the vicinity of Otego village. X's mark locations of major archeological sites.

In light of the evidence presented herein we propose the following postglacial history for the Susquehanna River between Oneonta and Wells Bridge.

1. Initial deposition of lake sediments into a lake dammed by the Wells Bridge "valley plug" moraine.

2. Entrenchment of the dam allowing the river to flow on top of the lake sediments. At this time the river probably migrated readily across the whole flood plain. Period begins ca. 14,000 y.a.

3. Slow entrenchment of the river into the lake sediments. Each successive position of the river created its own overbank depositional terrace.

4. Migration and entrenchment of the river into its present configuration with a stabilized meander configuration due to the entrenchment and buildup of flood silts along the banks. This configuration essentially complete by 7000 to 9000 y.a.

The diagrammatic sketch (Fig. 5) shows a cross section of the Susquehanna River Valley detailing an idealized series of successive terraces. As can be seen, each successive terrace is at a lower level making migration of the river back into a previously occupied configuration improbable.

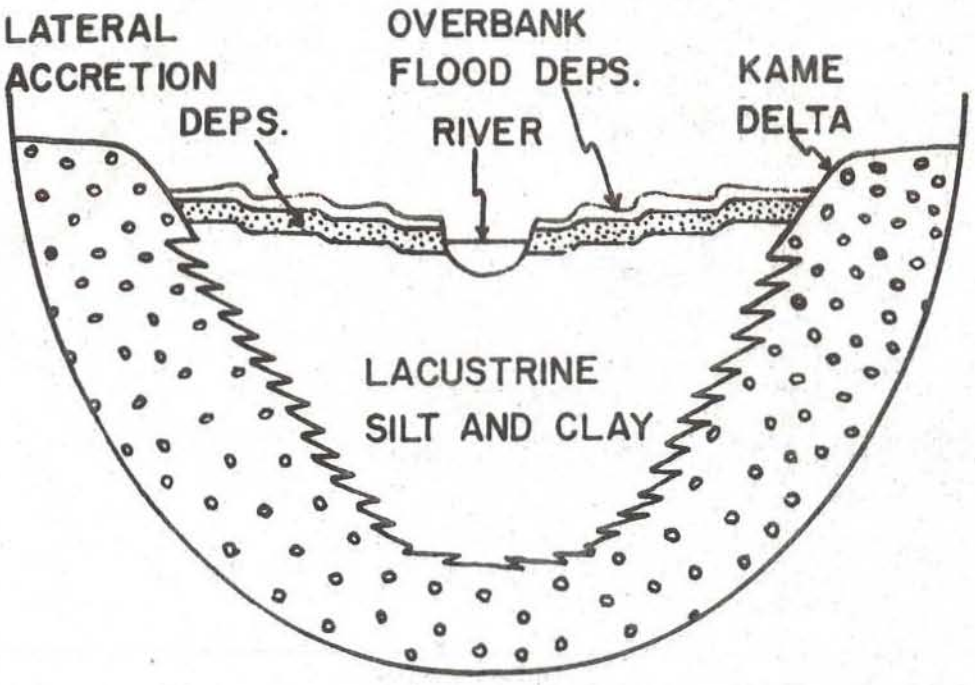

Figure 5. Idealized cross-section of Susquehanna River showing flood deposit terraces.

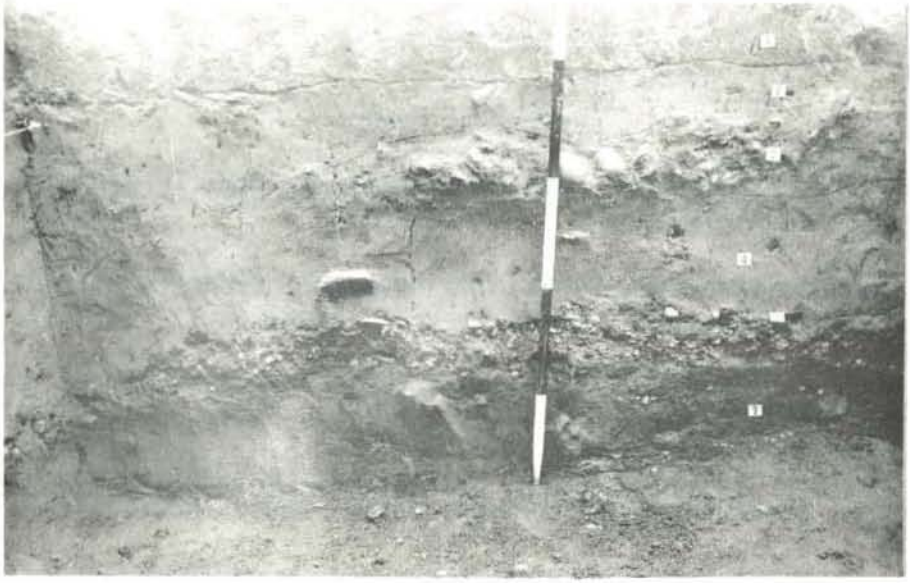

Figure 6a. East profile of section W50S10 at the Fortin site, Locus 1. Stratigraphic zones numbered with tages. Zone 1, plow zone (mixed occupation debris including modern trash). Zone 2, yellow-brown silt (Frost Island phase, 1330 B.C. ± 90 years, I-7097). Zone 3, living floor demarcated by fire-cracked rock, charcoal, thermally reddened silt (Late Archaic occupations dated between 1870 B.C. ± 95 years, Dic-207, and 1660 B.C. ± 95 years, I-6368). Zone 4, yellow-brown sandy silt (Late Archaic Lamoka phase, 1890 B.C. ± 100 years, I-6567, and 1800 B.C. ± 95 years, I-6369). Zone 5 is absent from this part of grid. Zone 6, gravel containing rare artifacts. Zone 7, interbedded sands and silts (Lamoka phase, 2235 B.C. ± 120 years, I-7098, and 2020 B.C. ± 100 years, I-6568). Tip of range pole rests on heavy gravel (outwash?).

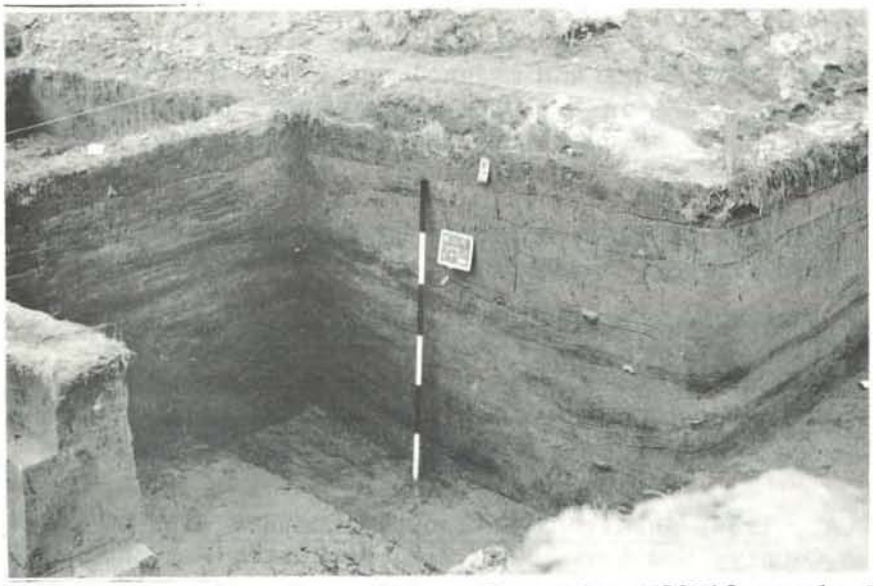

Figure 6b. North and east profiles of section W20N10 at the Kuhr No. 1 site. Below the plow zone (top 30 cm) are easily visible dark bands representing prehistoric occupation zones within a matrix of yellow-brown silt. The oldest zones within a matrix of yellow-brown silt. The oldest occupation is dated 2570 B.C. ± 165 years (Dic-116) and the youngest just below plow zone is dated 380 B.C. ± 85 years (I-7093). Oldest (deepest) occupation level is dark band just one foot above tip of range pole.

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ROAD LOG

Cumulative Miles	Point to Point Mileage	Description
0	0	Depart from Hunt Union. Turn left from Union parking lot; go to East St., turn right, follow East to Center, right on Center, go to Maple. Turn left on Maple, continue to I-88, enter northbound lane. Take I-88 to terminus at Emmons-West Davenport Road. Turn right, cross iron bridge to F & F Airpark entrance on other side. Drive in to parking area on Fortin site next to hangars.
5.0	5.0	STOP #1: Fortin site, Locus 1 and Locus 2: Located at the junction of the Susquehanna River and Charlotte Creek near Oneonta, the Fortin site loci yielded one of the most complete cultural sequences of any of the sites examined. At Locus 1 eight occupation zones and a plow zone were contained within 1.83 meters of stratified sands, silts, and small gravels. These deposits rested on compact gravels which appear to be of ice-contact derivation, perhaps reworked by the river. The deepest occupation level (Late Archaic, Lamoka phase) dates to 4185 ± 120 years B.P. (I-7098) and the youngest level just below plow zone (Early Woodland, Meadowood phase) is dated 3180 B.P. ± 95 (I-6740). At Locus 2, there were five occupation floors in 1.83 meters of unstructured silt, again resting on heavy gravels. In this case however the deepest zone only dates to about A.D. 200. The cultural components range from early Middle Woodland to Late Woodland in affiliation. At both loci, occupations tended to concentrate on low rises which existed from the beginning (initially point bars?) and maintained themselves as perceptible topographic forms to the present. Return to I-88, proceed south to Otego exit. Turn right, go to Route 7, turn right again, drive into Otego. Turn

right at Church St., proceed to railroad tracks. Turn right and drive on raised path along tracks. Turn left at first crossing, follow tractor path through field, turn right along river to Kuhr No. 1 site near creek.

20.2 15.2 STOP #2: Kuhr No. 1 site:

Located in Otego village at the junction of Flax Island Creek and the river, this site displayed a highly sensitive archeological stratigraphy. At least 11 living floors were present, separated by culturally sterile silt where the overbank deposits were thickest (3-4 m) close to the river. The oldest identified occupation, of the Lamoka culture, was dated at 4520 ± 165 years (Dic-116). The field in which the site is located consists of four terrace-like long, low rises sub-parallel to the river. They occur in a south to north succession, with the highest being farthest from the river. The terrace presently adjoining the river is the youngest and presumably they increase in age away from the river, indicating successive positions of the river. The occupation levels occur mostly in the second terrace, and reach an average depth of 1.8 m. They trend upward onto the third terrace where they are compressed into the top .60 m of deposit, eventually feathering into the plow zone (upper 25 cm.).

A backhoe trench excavated to a depth of 4 m in the third terrace exposed 2.5 m of sterile silt below the deepest occupation level. At its base was the water table. In turn this deposit rested on a coarse blue-gray sand at least 30 cm thick containing wood fragments, leaves, acorns, and pine cones. A wood sample yielded dates of 8970 ± 110 and 9020 ± 85 years B.P. (Dic-113, 120). Test pits into sands and gravels 4 m below surface on the fourth terrace failed to yield organic remains.

Return to Route 7, turn left, proceed south and west on Route 7 to Wells Bridge. At first hill on west edge of Wells Bridge village, turn left on gravel road, go

across railroad tracks. Park alongside road on left side next to trees. Russ site is in field behind trees.

25.6 5.4 STOP #3: Russ site:

The archeological levels at this site overlie the Wells Bridge moraine on the north side of the river where it swings southward in the first leg of a crescentic bend. Here in some places .7 m of late-glacial lacustrine deposit overlie the moraine; in other parts of the field what appear to be river deposited sands rest atop the moraine. On the northeastern edge of the field 1.3 m of silts overlie the lake sediment and underlie a horizon dated 13,860 $\pm \frac{750}{830}$ B.P. (Dic-750). These old silts may represent a very early stage of point-bar deposition, as they slope away to the south and west where younger silts have filled in following a slight southward shift of the river. This shift occurred at least 10,500 y.a. as indicated by a dated humic zone which caps the older sediment.

The more recent silts may be of overbank origin. By at least 8300 B.P. the first Archaic Indians occupied the site; the deepest living floors occurred at ca. 1 m. A terminus ante quem for the sub-plow zone silts is provided by dates on several hearths which extend below plow line from occupation surfaces destroyed by cultivation. These dates average about 4000 B.P. The plow zone itself contains artifact types ranging in age from 6000 y.a. to the present, so the silts immediately underlying the plow zone probably date to at least 6000 y.a.

Return to Route 7, turn right and proceed ca. 400 feet to bridge approach. Turn right, go across river, keep to right, proceed on road to gravel turn-off on right side next to drainage ditch. Drive in, park in field adjoining Firemen's Association pavilion. Gardepe site is across drainage ditch.

26.7 1.1 STOP #4: Gardepe site:

This site is located on the south side of the river near the middle of the bend. Since the river has moved slightly southward in postglacial time, it has added to the deposits on the north side, but has cut into the banks on the south side. An undetermined portion of an archeological site has been destroyed in this way.

The major locus of occupation closely parallels the river near its bank. Behind this locus and also paralleling the bank is a low rise. Farther from the river are other features associated with the moraine, including a fair-sized kettle hole bog only 100 m from the river. This bog, 7 m deep, was sampled by Michael Melia and the data incorporated in his Master's thesis.

Occupational remains occurred within six definable strata near the river bank. The upper two zones relate to modern cultivation and contain much mixed Indian material. Zone 3 was partly disturbed by plowing; below it the various levels were undisturbed. The artifacts and radiocarbon dates from Zone 1 through 5 suggest Indian occupations ranging in age from ca. 4000 y.a. to A.D. 1100. The mode of formation of Zones 4 and 5 is a mystery; flood deposition may have played a part but downslope wash from the adjoining rise also seems to be a factor. Zone 6, a firm olive-brown silt, was ca. 3 m thick, resting on bluish clays of possible lacustrine origin, which in turn covered the morainal deposit. Zone 6 seems continuous with old silts which overlie the moraine everywhere on the site, including the edges of the bog. Presumably therefore it is of fluvial origin but the precise mechanism is not fully understood. A bifurcated-base projectile point was recovered, apparently in place, about 40 cm below the top of the zone. Three m from the point a hearth within the zone produced charcoal dated 9380 B.P. + 100 years (Dic-261). The point is of a type dated ca. 8000 years old in the Southeast. Together with the dated hearth it suggests occupation by

		Early Archaic Indians concurrently with the late stages of formation of Zone 6.
41.0	14.3 (approx.)	Return to Hunt Union.