PREHISTORIC CULTURAL SITES IN RELATION TO SOILS AND OTHER PHYSICAL FEATURES OF THE LANDSCAPE IN PART OF THE KICKAPOO VALLEY, WISCONSIN

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Several years ago, as part of a flood control program, the United States Army Corps of Engineers proposed that a dam be built on the West Fork of the Kickapoo River in Vernon County, Wisconsin. This plan has since been approved. The resultant pool, or reservoir, when filled, will innundate many archeological sites along the river and its tributaries between the villages of La Farge and Ontario.

Because of the impending destruction of these sites, the pool area was included in the U.S. Department of Interior's River Basin Survey's program of survey and salvage of archaeological remains from areas threatened with destruction by impounded waters. As a result, field investigations have been made, resulting in the location and classification of a large number of sites within or adjacent to the proposed pool.

In 1969, a detailed soil map, and soil survey report of Vernon County was published by the USDA (Slota, 1969). This soil map and report made it possible to determine the nature of the soils on which various kinds of archeological sites occurred, and by inference, the native vegetation. The location of sites in regard to landforms and streams was made possible by study of soil maps, topographic maps, and air photos.

The primary purpose of the present study was to determine the location of archaeological sites in relation to physical features of the landscape, including kinds of soil. Hopefully, such a study would provide new insights as regards the choice of lands for living by prehistoric inhabitants of the area. By correlation this knowledge could then be used to predict where additional archaeological sites might be found in similar unexplored areas.

SETTING

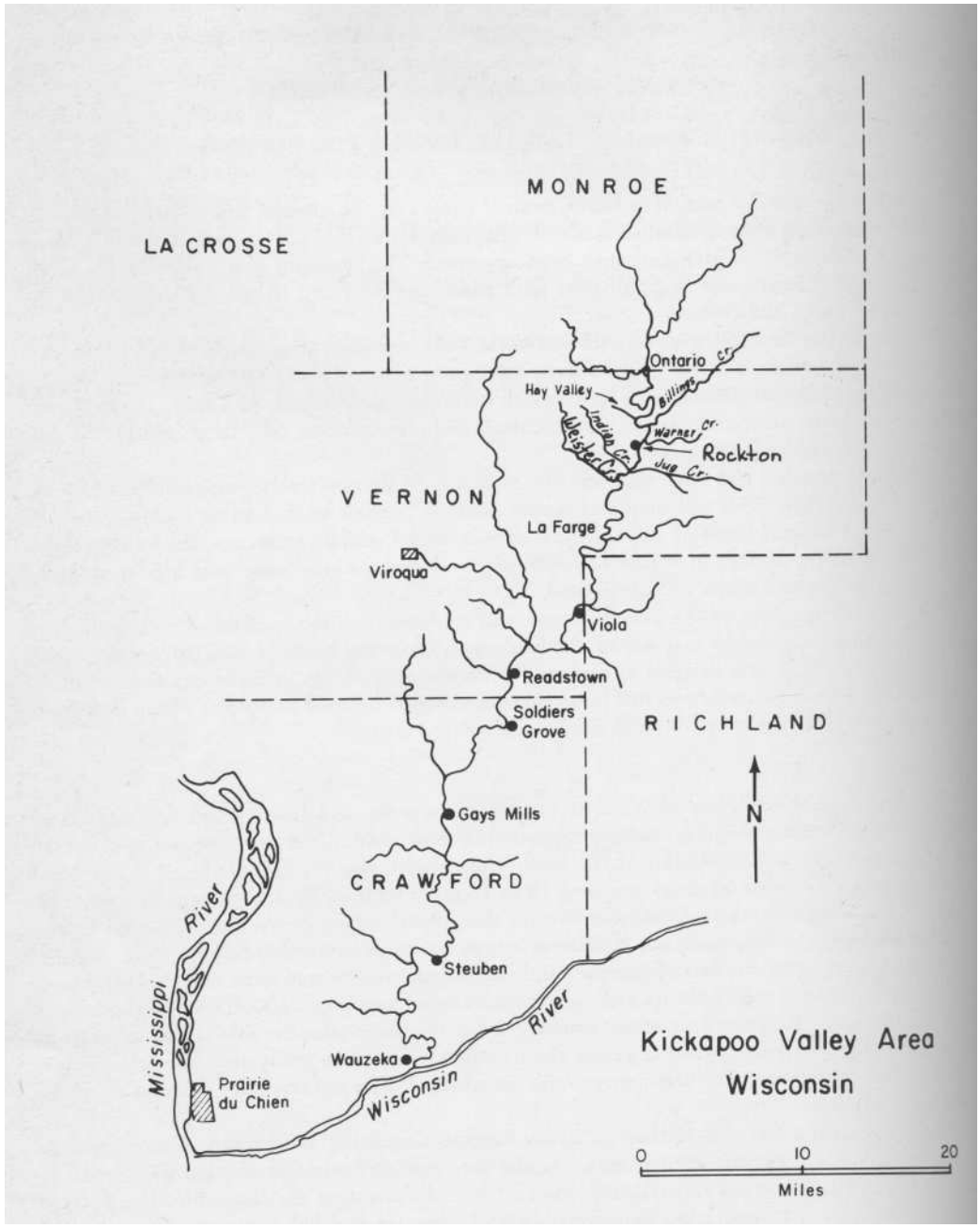
The Kickapoo River rises in Monroe County, Wisconsin and flows south and southwest through the "Driftless Region," emptying into the Wisconsin River near Wauzeka, about 16 miles upstream from the junction of the latter stream with the Mississippi (Fig. 1). The basin of the Kickapoo is about 60 miles long and 10 to 15 miles wide (U.S. Army Corps of Engineers, 1963). It has a well developed meander system along much of its course, as evidenced by the fact that the length of the stream is 1.8 times as long as the valley in which it flows.

The Kickapoo basin consists of narrow dendritic ridges, interspersed with valleys. Differences in elevation, between valley floors and ridge tops, ranges from about 100-400 feet. The highest parts of the main ridges are at some distance from the river whereas side ridges decrease in elevation as they extend toward the river and its tributaries. In the study area, the valley of the Kickapoo is mainly less than one quarter mile in width. Valleys of tributary streams are corresponding narrower.

Rock formations in the Kickapoo basin include Cambrian sandstones (Franconia and Trempealeau), Ordoviciaon (St. Peter's) sandstone, and Ordoviciaon limestone (Prairie du Chien, Platteville, Decorah, and Galena). Most of the higher ridges are capped by the younger formations, while the underlying sandstones extend down to and below the present river bed.

In its headwater portion, the Kickapoo has a steep gradient, becoming less steep downstream; there is a drop of 64 feet in about 16 miles of channel length in the study area. Tributary streams have a steeper gradient than the main channel.

Soils on uplands in the study area are formed in deep loess (Fayette), loess and an underlying clayey paleosol over limestone (Dubuque), or in sandstone formations (Norden, Hixton).


MONROE
LA CROSSE
Ontario
Hay Valley
Billings Cr.
Indian Cr.
Warner Cr.
Weister Cr.
Rockton
Jug Cr.
VERNON
La Farge
Viroqua
Viola
Readstown
Soldiers Grove
RICHLAND
N
Gays Mills
CRAWFORD
Steuben
Mississippi River
Wauzeka
Prairie du Chien
Wisconsin River
Kickapoo Valley Area
Wisconsin
0
10
20
Miles

There are also silty soils formed on high terraces (Rockbridge) and colluvial bottomlands (Arenzville, Huntsville). A few areas of loamy soils are on low terraces (Dakota, Tell) and on alluvial bottomlands (Kickapoo). The soil landscape of the study area is described in the Soil Survey Report for Vernon County. (Slota, 1969) as a "Norden-Fayette association: loamy (includes silt loam), nearly level to steep, moderately deep to deep well-drained soils on valley slopes and bedrock benches."

ARCHAEOLOGY

Prior to 1960, little archaeological work had been done in the upper Kickapoo Valley. Twenty-five sites had previously been recorded in Vernon County but these had been described only briefly. One report, dealing with the testing of the White site in the western part of the county, had been published by McKern (1931).

In 1960, A. D. Buck and W. H. Wilson made a preliminary survey of the reservoir area and recorded 25 sites (Buck and Wilson, 1960a). They also reported the Hanson Petroglyphs, which are above the maximum pool area (Buck and Wilson 1960b). In 1961, Donald L. Brockington directed testing operations at four of the sites reported earlier and located an additional site (Brockington, 1961). Following a year in which no field work was done, additional surveys were carried out in the reservoir area in 1964 and 1965 by Hurley (1965a and 1965b) and in 1964 by Storck who worked above the reservoir (1967). This work resulted in the location of a large number of additional sites, as well as extensive testing operations. In all, 181 sites were located within the pool area and 114 of these tested during the period 1960-64. A total of 57 sites were located outside the limits of the proposed reservoir of which seven rockshelters and eight sites were tested.

INTERPRETATION

On the basis of field evidence gathered during survey and testing operations, most sites in the study area appeared to be culturally related to Palaeo-Indian or Archaic (Circa 9000 B.C. to 1000 B.C.).[2] The majority of sites were classified as Archaic. In addition, some evidence in the form of surface finds was discovered for Early Palaeo-Indian (9000 B.C. to 7500 B.C.), and for Late Palaeo-Indian (7500 B.C. - 5000 B.C.), as reported earlier by Hurley (1965a: Figs. 13 and 15). Some excavated specimens (Hurley, 1965c: Figs. 7 and 16) also gave evidence of the latter group.

METHOD OF STUDY

Base maps used during survey and testing operations were made by tracing the maximum pool contour line, roads, streams and other physical and cultural information from topographic maps and photographically adjusting the scale to 6 inches to the mile. These maps were later supplemented by aerial photographs having a scale of 8 inches to the mile. Location of sites within a 100 yard square was made possible by use of a systematic codification system designed by W. M. Hurley (1965b). Exact location was particularly important in this operation because survey and testing stopped short of excavation which was to be done later by other investigators.

Detailed soil maps of the area were made by conventional methods in which a soil surveyor traversed the area on foot making borings to depths of 2 to five feet in the various soil landscape elements in order to identify and classify the soils present. Boundaries of soil map units were sketched in the field on air photos having a scale of 4 inches equal to 1 mile. Percent slope, and degree of erosion were also indicated for the map units (soils) present. Published soil maps were at the same scale as the field maps. Soil descriptions were included in the accompanying report (Slota, 1969).

In the present study, site locations were transferred from the archaeological maps to the soil maps, using various reference points on the air photos, and the air photo mosaic background of the soil maps, to determine their correct location. Following transfer, the site number, site type,

elevation, and soil symbol for each site were tabulated.[3] In addition, distances from streams and alluvial soil bodies, vegetation (by inference), and land forms and position were recorded.

RESULTS - Classification and Distribution of Sites.

Sites were classified into seven categories on the basis of presumed character and use (Table 1). According to this classification, most sites were used for habitation although not necessarily on a year-around basis.

In terms of aerial distribution, sites tend to cluster at (i) stream junctions (Table 2), and (ii) along modern oxbow meanders (Table 3). Clustering of sites near stream junctions suggests that easy access to more than one stream and its resources, as well as those of associated bottomlands, was a desirable feature of a living site. Clusters near oxbows are not as easily interpreted, as ox-bows are not stable features of a fluvial landscape; the relation of these sites to the associated streams may have been altered drastically since time of habitation.

TABLE 1
CLASSIFICATION OF SITES ACCORDING TO USE

Type of Site	In Pool	Tested	Out of Pool
Campsites	94	62	56
Worksites	5	0	1
Villages	10	7	8
Rockshelters	70	44	23
Caves	1	0	1
Mounds	1	1	7
Totals	181	114	96

TABLE 2
DENSITY OF SITES AT STREAM JUNCTIONS

Junction	Number of Sites
Weister Creek and the Kickapoo	33
Indian Creek and the Kickapoo	21
Billings Creek and the Kickapoo	12

TABLE 3

DENSITY OF SITES ALONG OX-BOW MEANDERS

Location	Number of Sites
Above Rockton	19
Above Hay Valley	13
Near LaFarge	10
Below Confluence of Weister and Kickapoo	8

By plotting site locations on topographic maps of the area, additional evidence was obtained showing that proximity to the river was a prime factor in site selection. Results, as shown in Table 4, indicate that sites below 900 feet elevation (elevation of river 800 to 864 feet in study area) were preferred for villages, camps and worksites. The majority of rock shelters showing evidence of habitation were also below 900 feet. Most of the remaining rock shelters, as well as campsites and worksites were at elevations between 900 and 1000 feet. A few sites, including one village, were above 1000 feet. These data indicate that most sites in this part of the Kickapoo Valley were relatively close to the main stream, or one of its tributaries, and not too far upslope.

An additional aspect of the site location concerns the kind of soil and land forms on which people of the Palaeo-Indian and Archaic cultures chose to live. Table 4 shows that archaeological sites were found on 19 different kinds of soil. Ninety-six sites were on upland slopes and ridges, nine were on terraces, four on colluvial slopes and fifty-six on bottomlands. One of the soils listed ("Marsh")[5], must be considered a questionable correlation and may result from a cartographic error. Most of the remaining soils are well drained although Boaz (10 sites), Orion (16 sites) and alluvial soils (7 sites) are somewhat poorly drained. All alluvial soils are subject to seasonal flooding; the colluvial soils may be subject to occasional flash flooding.

If all three types of sites shown in Table 5 are considered the data show that the majority are located on relatively few soils series and are to be found mainly on uplands or bottomlands. Table 6 shows a regrouping of soils according to frequency of use and physiographic position. Seven kinds of soils, formed on upland slopes or ridges, and three on alluvial bottomlands, have ten or more sites each for a total of 130, and 78 percent of the total number. Ninety of the 130 are on uplands, safe from floods; over one half of these are on well drained soils typically found on valley slopes, the remaining (Fayette) soils are also stable, well drained soils and while **typically** on ridges may also be on valley slopes.

TABLE 4

KICKAPOO RESERVOIR AREA;
SITES LOCATED ACCORDING TO ELEVATION *

Type of Site	Below 900'	900' to 1000'	Above 1000'	Total
Rockshelters	65 (69.8%)	24 (25.8%)	4 (4.3%)	93
Camp & Worksites	110 (71.8%)	25 (16.3%)	18 (11.7%)	153

Table 4 (conted)

Villages	14 (93.35)	0	1 (6.6%)	15
Total	189 (72.4%)	49 (18.7%)	23 (8.8%)	261

* The elevation of the river in this area ranges from 800 to 864 feet above mean sea level.

TABLE 5

CLASSIFICATION OF SITES, BY TYPE, ACCORDING TO SOIL AND LAND FORMS

Soil Series	Land Form*	Campsites		Worksites		Village		Total**
		Number	%	Number	%	Number	%	Number
Alluvial	B	6	4.0			1	7.6	7
Arenzville	B	3	2.0					3
Boaz	B	7	4.7	1	25.0	2	15.3	10
Chaseburg	CS	3	2.0					3
Dakota	T	2	1.3					2
Fayette	R-VS	34	22.9			4	30.7	38
Gale	VS-R	10	6.7			1	7.6	11
Hixton	VS-R	6	4.0					6
Huntsville	B	2	1.3	2	50.0			4
Kickapoo	B	11	7.4			1	7.6	12
Lawson	B	1	.6			1	7.6	2
Marsh	B	2	1.3					2
Norden	VS-R	25	16.8					25
Orion	B	15	10.1			1	7.6	16
Rockbridge	HT	1	.6	1	25.0			2
Stoney Rock land	VS	14	9.4			2	15.3	16
Stronghurst	T	4	2.7					4
Tell	T	1	.6					1
Worthen	CS	1	.6					1
Total		148		4		13		165

* B is Bottom land; CS, Colluvial slope; HT, High terrace, R, Ridge; T, Terrace, and VS, Valley slope.

** Rockshelters are omitted.

TABLE 6

CLASSIFICATION OF SITES ACCORDING TO FREQUENCY OF OCCURRENCE AND PHYSIOGRAPHIC POSITION

Physiographic Position	Soils with 10 Sites or More		5 to 10 Sites		Less than 5 Sites	
UPLANDS	Fayette	38	Hixton	6		
	Gale	11				
	Norden	25				
	Stoney Rockland	16				
	Subtotal	90				
TERRACES					Dakota	2
					Rockbridge	2
					Stronghurst	4
					Tell	1
					Subtotal	9
COLLUVIAL					Chaseburg	3
FAN OR FOOTSLOPE					Worthen	1
					Subtotal	4
ALLUVIAL BOTTOMLANDS	Boaz	10	Alluvial Soils	7	Arenzville	3
	Kickapoo	14			Huntsville	4
	Orion	16			Lawson	2
	Subtotal	40			Subtotal	9
Total		130		13		22

The three preferred alluvial soils (Boaz, Kickapoo, Orion) are all subject to modern floods in varying degrees, and two of them, Boaz and Orion, are somewhat poorly drained, meaning that they may be saturated for several months during each growing season. Both of the latter have village sites.

Of the soils having fewer sites, sixteen are of alluvial origin, 6 are on uplands, nine are on terraces, and four are on colluvial fans or footslope deposits. Most but not all are well drained. All of the alluvial soils are subject to flooding at the present time and the soils on colluvial fans may be innundated briefly from time to time by runoff from the slopes above.

Native vegetation, based on soil character, included prairie and deciduous forest. All of the ridge and hillslope soils, and the Rockbridge and Tell soils on terraces, are classified as Typic Hapludalfs (Slota, 1969). An interpretation of this classification suggests that these soils were forested at the time of settlement (Circa 1840) but likely supported oak openings or prairie during part of the last several thousand years. The Dakota soils on low terraces, and Worthen soils on colluvial slopes, are dark colored and likely formed mainly under prairie or oak savanah.

Colors of young alluvial soils, are largely inherited from the soils from which they were derived. Thus Kickapoo, Orion and Arenzville soils are derived from light colored forested soils (Typic Hapludalfs) of the uplands; Huntsville and Lawson are derived from dark colored prairie soils (Typic Argiudolls). It must be remembered, however, that the alluvial soils described are mainly Entisols, formed since European settlement of the area, i.e. since about 1840. These recent sediments overlie an older dark-colored soil in most places. (Slota, 1969; Official Soil Descriptions of Arenzville). On the basis of its morphological development, the buried soil appears to have formed under prairie vegetation, on a surface that was stable for a considerable period of time.

The picture that emerges, therefore, is that of a valley floor covered with prairie flora, not altogether well drained or safe from floods but likely habitable except for several months during the spring season. Locally, low terraces protrude like small jagged shelves above the valley bottom along the valley slopes. These too support prairie grasses and forest in most places. The surrounding slopes and ridges and occasional high terrace, are forested in part, at least on steep slopes, but have many oak or praire openings.

Within this setting are campsites, work sites and villages. Worksites are mainly on bottom-lands and terraces; campsites and villages are on bottomlands, terraces, valley slopes and low ridges. This variety of living sites suggests that there may have been a seasonal pattern of occupancy. The fact that about half of the village sites (6 of 13) and one third of the campsites (47 of 148), were located on alluvial bottomlands suggests that these were desirable sites by virtue of their proximity to water, game and fish, and possibly because of plants growing in the moist bottomlands. Protection from winter storms may have also been a factor. Morphological evidence in the form of a thick, dark colored Al soil horizon, frequently found buried by post-settlement alluvium within the valley suggests that the bottomland surface was more stable, and therefore, a safer place to live, prior to European settlement of the area.

Despite the fact that many campsites and villages were located on bottomlands, it must be remembered that even more were on uplands or terraces within the river valley namely about 2/3 or the campsites (101 of 165) and over one half of the villages (7 of 13). Most of these, as shown earlier by topographic data and by inference from soil-landscape data, were relatively close to the bottomlands and in that way provided relatively easy access to the river and bottom-lands, along with protection from winter storms, and safety from floods. They were likely cooler sites than those on bottomlands due to convection currents moving upslope and likely less insect-ridden.

It would appear therefore that some upland sites were permanent, being occupied on a year-around basis. Others may have been used alternately with bottomland sites. Of the latter, a few may have been occupied on an annual basis most years. Others, because of flood waters and/or poor drainage must have been uninhabitable part of the year.

In this day of pipe line construction of several hundreds of miles in a few short years or of rapid dam and highway construction, should we not look for a better means of preliminary site *survey* without the slow time consuming acre by acre walking survey? In this instance we were dealing with Palaeo-Indian and Archaic open sites but possibly other likely site locations can be circumscribed in the laboratory during our slack winter periods. Many of the counties throughout the Great Lakes have detailed soil surveys and the use of map sheets can tell us more than the fact that well drained soils were preferred by prehistoric man because he wished to keep his bottom dry.

FOOTNOTES

[1] William M. Hurley, Department of Anthropology, University of Toronto, Gerhard B. Lee, Department of Soil Science, University of Wisconsin, Peter L. Storck, Department of Archaeology, Royal Ontario Museum.

2 Evidence as to cultural identity was limited at most sites. For example less than two hand-fulls of ceramic fragments were found during the four field seasons.

[3] The authors wish to acknowledge the help of Patrick McGuire, University of Wisconsin, for his able assistance in transferring site locations to the soil maps and compiling the soils data.

The data shown in Table 5 does not include rockshelter or cave sites, which must be considered accidents of geology, nor does it include mound and petroglyph sites.

[5] "Marsh," is a very wet landscape unit, not easily traversed, and not likely lived on. A map check showed the two sites to be very close to an alluvial soil area. In Table 6 therefore they are included under Kickapoo.

[6] Storck's field work was supported by a N.S.F. Summer Fellowship for Graduate Teaching Assistants.

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