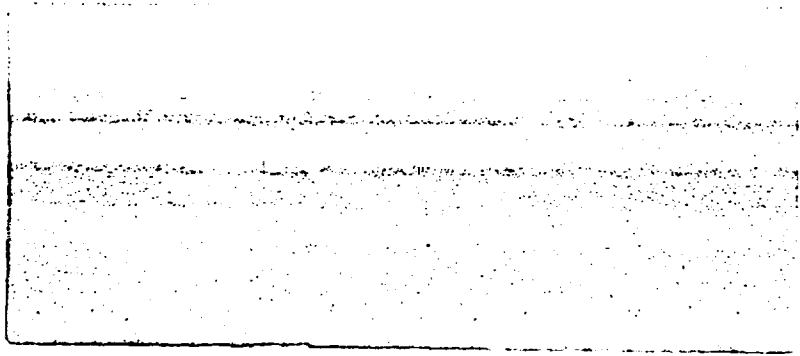


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ARCHAEOLOGY, GEOMORPHOLOGY
AND HISTORIC SURVEYS
IN POOLS 13-14, UPPER MISSISSIPPI RIVER

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An overview and intensive sample survey of the geomorphology and cultural resources of Mississippi River Pools 13 and 14 for the U.S. Army Corps of Engineers, Rock Island District, under terms of contract number DACW25-88-C-0093.

by the
Center for Archaeological Research
Southwest Missouri State University
Springfield, Missouri 65804

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STATEMENT A

September 1989

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ARCHAEOLOGY, GEOMORPHOLOGY
AND HISTORIC STUDIES
IN POOLS 13 & 14, UPPER MISSISSIPPI RIVER

ABSTRACT

This is an overview of the geomorphology and prehistoric and historic cultural resources in Navigation Pools 13 and 14, Upper Mississippi River. Background research and fieldwork were done by the principal investigator, David W. Benn (Southwest Missouri State University) and by Jeffrey D. Anderson (Donahue & Associates, Inc.) and Lawrence Conrad (Western Illinois University). The historical research was accomplished through a sub-contract with Robert C. Vogel (Cottage Grove, Minnesota). The project was done for the Rock Island District, Corps of Engineers under terms of contract number DACW25-88-C-0093.

(with P1) → An assessment of cultural resources and landscapes in Pools 13-14 was undertaken to provide the basic information for managing the cultural heritage of properties under the jurisdiction of the Federal Government. The present volume reviews existing information and describes the results of a sample survey of the valley floor. Recommendations for mitigation measures on specific impacted sites and long-term management of the pools' cultural properties and natural resources are the final products of the project.

This study begins with a general evaluation of past cultural investigations in the Upper Mississippi River valley and utilizes this as context for explaining the procedures and goals of the Pools 13-14 project. The basic premise of the project is that the interactions between humans and the natural (i.e. fluvial) system must be understood before the archaeological potential of any area can be assessed. Geomorphic processes are given priority because they function as independent variables affecting the conditions for preservation of archaeological evidence. Illinois.

Also part of the initial section of the report is the review of the previous archaeological investigations in the project areas of Iowa and Illinois. Past investigations are discussed within the context of archaeological research in Iowa and along the Mississippi River; thus, these contributions to prehistoric research are evaluated in terms of the social and academic setting in which they were produced.

The first of the three main analytical sections of the report is the geomorphological study of Pools 13-14. The late Quaternary history of the Upper Mississippi River valley is discussed with a focus on major changes in the position of the valley around Pools 13-14. Then, the results of field investigations, including analysis of aerial photographs, solid core drilling, eleven radiocarbon dates and cutbank surveys, are

described and analyzed. This discussion uses time-stratigraphic units of sedimentary fills as the basis for reconstruction of the landscape. The geomorphological analysis is completed with a discussion of the processes of landscape evolution in the valley. All of the data for the geomorphological work is appended to the report: profile descriptions, soil chemistry and particle size analysis, and radiocarbon dates.

The presentation for Historic cultural resources is in two parts. First, a thematic overview of the Historic period in the Upper Mississippi River basin is developed to elucidate the cultural processes that resulted in the formation of archaeological and architectural sites. The titles of the themes indicate the content of this analysis: Upper Mississippi River borderlands, Historic Indians, Fur Trade, Early Settlement, Development of River Towns, Agricultural Expansion and Industrial Development, Upper Mississippi Waterway, and the Corps of Engineers and the Upper Mississippi. Using the themes, a list of potential archaeological sites and historic townsites is described with a brief history of the formation and change for each site. Appended to the study of Historic sites is a bibliography of published and unpublished sources and an annotated chronology of the Upper Mississippi River basin.

The archaeological study involved an intensive surface survey of samples of government property representing all types of landforms. A total of 583.5 acres of cultivated fields, 12 miles of linear transects and 72.5 miles (143ac @ 5m wide transects) of shoreline was covered in addition to digging 120 shovel-test holes. Private collections of artifacts from the survey zone were visited and studied to enhance the survey results. Project personnel ultimately visited, recorded or studied material from 58 sites, including historic and prehistoric components. Records of previously recorded sites also were reviewed. In the report the entire floodplain is described for its native vegetation, survey conditions and previous investigations. Then, the sites and diagnostic materials from the survey areas are described and analyzed according to culture period.

The second half of the archaeological study presents an analysis of cultural materials within their landscape contexts. The potentials for site preservation and distribution patterns are discussed for each culture period. Biases due to natural site formation processes are identified. The archaeological chapter closes with an overview of prehistoric culture periods with an emphasis on settlement patterns. Throughout the analysis, frequent reference is made to findings from the Pools 17-18 survey, which formed a baseline for the Pools 13-14 work.

An evaluation of the 13 project goals is presented in the final chapter along with recommendations for future investigations. The recommendations for Pools 13-14 follow upon a more extensive list of research suggestions from the Pools

17-18 study, which apply to the former study area as well. There are 11 recommendations resulting from the work in Pools 13-14.

- 1) Archaeological surveys of Mississippi pools should come after the geological and historic archival research has been completed.
- 2) A study of Middle Woodland period sites is a priority.
- 3) Further archival research and field survey should be done to locate the Sauk village on the Wapsipinicon River (13CN36).
- 4) An overview should be developed to create a context for evaluating early recreation sites in the valley.
- 5) Intensive surveys should be done in the following locations in Illinois: along the shoreline between Lock and Dam 14 and Thomson; on the Spring Lake shoreline; on the Savanna Army Depot.
- 6) The following recommendations are made for sites on government property:
 - impacted (damaged) sites, not potentially significant; no investigations recommended: 13ST91, 13CN56, 11R1551, 11Wt236, 11Jd183, 11Jd184.
 - partially damaged sites not being impacted, may contain significant research potential, no investigations unless impact status changes: 13CN58, 13JK148, 11R1553.
 - undamaged sites, no current impacts, may contain potentially significant research potential, no investigations recommended unless impact status changes: 13ST84, 13CN59, 13JK93, 13JK138, 13JK141, 11Ca113.
 - potentially significant sites currently being impacted, phase II testing recommended: (priority 1) 11R1375, 11R1550, 11R1538, 11Ca44, 13CN55; (priority 2) 13CN57, 13JK137, 13JK139, 13JK140, 13JK150, 13CN60.
 - sites determined eligible for the NRHP: 11Ca11, 13JK79.
 - sites tested and determined ineligible for the NRHP: 13CL3, 13JK107, 11R1515, 11Ca20.
- 7) Proposed timber harvesting areas around the mouth of the Wapsipinicon River and north of the Maquoketa River in Iowa have been surveyed. Activities associated with tree cutting should have little or no impact on existing cultural resources, assuming that only widely scattered surface disturbances are the consequences of this activity.
- 8) Specific suggestions are made for archival research in national and international repositories.
- 9) A study of the Fur Trade on the Upper Mississippi River is recommended.
- 10) The COE should initiate a management plan for historic cultural resources.
- 11) A geomorphological model for all of the Upper Mississippi River pools should be developed.

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The Rock Island District, Corps of Engineers is to be commended for its foresight in funding archaeological, historical and geomorphological modeling projects on a pool by pool basis. The writers appreciate the assistance afforded by Kenneth Barr and other employees at the Rock Island office.

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David and Lori Stanley (Bear Creek Archaeology, Inc.) provided essential help with the archaeological fieldwork. E. Arthur Bettis III (Iowa Geological Survey Bureau) helped Jeffry Anderson with the geological fieldwork. Patsy Corbett (SMSU) processed the artifacts, and Jeff Ruff (SMSU) drafted the archaeological figures for the report. Margie von der Heide (SMSU) assisted with the manuscript editing and report production.

Thanks go to Larry Worgowsky of the U.S. Fish and Wildlife Service, Savanna Office, to Wayne Monmstem of the Izaak Walton League, Sabula Chapter, and to Darrow Peters, Shaffton, Iowa, for providing access to areas during the geologic investigation.

The Minnesota Historical Society provided copies of nineteenth century lithographs and granted permission to reproduce them as figures on the cover and in Chapter III.

I
INTRODUCTION
by
David W. Benn
with Lawrence Conrad

The purpose of this report is to present an overview and the findings from a sample survey of the geomorphology and cultural resources in Pools 13 and 14, Upper Mississippi River valley (Fig. 1.1). The study area lies between Lock and Dam 12 at Bellevue, Iowa and Lock and Dam 14 below LeClaire, Iowa, and is inclusive of the entire valley floor and the bluffline. (Fig. 1.2). The counties of Rock Island, Whiteside, Carroll and JoDaviess are involved in Illinois, and in Iowa the survey area includes portions of Scott, Clinton and Jackson counties. The Center for Archaeological Research, Southwest Missouri State University (SMSU) entered into agreement DACW25-88-C-0093 with the U.S. Army Corps of Engineers (COE), Rock Island District to conduct this project. David W. Benn functioned as principal investigator.

SMSU sub-contracted with four individuals to accomplish parts of the project. Jeffrey Anderson (Donohue and Associates, Inc.) conducted the geomorphic investigation in the field and composed chapter 2. He was assisted in the fieldwork by E. Arthur Bettis III (Iowa Geological Survey Bureau). Robert C. Vogel did all of the literature review and archival search for Historic sites and authored chapter 3. Benn did the archaeological fieldwork with the assistance of David and Lori Stanley (Bear Creek Archaeology, Inc.) and wrote chapters 1, 4 and 5. The Iowa archaeological literature was compiled by Benn, and Lawrence Conrad (Western Illinois University) collected similar literature and interviewed private collectors in Illinois.

The present volume was compiled by Benn, with all of the authors being responsible for text and analyses under their names and in respective appendices. Chapter 1 presents the background for the Pools 13-14 survey project, including the scope-of-work, project goals and previous investigations in the area. In chapter 2, Jeffrey Anderson describes the findings of his geomorphological survey and develops a model of landscape evolution for the valley floor, with reference to the Upper Mississippi River basin. Robert Vogel uses chapter 3 to formulate a cultural overview for the Historic period in Pools 13-14, relating a set of sites from archival research to a list of cultural themes for the Upper Mississippi Basin. The results, including shortcomings, of the archaeological survey are described in chapter 4. David Benn also relates known and potential sites to Anderson's landscape context and to a general prehistory of the Upper Mississippi Basin in chapter 4. The fifth chapter contains a project assessment and recommendations for future investigations in the pools.

Project Background & Goals

Most of the flood-prone land in the Upper Mississippi River basin has come under the ownership or jurisdiction of state and federal governments for three reasons: wildlife habitat, recreation and navigation. Changes relating to use of the river for recreation and navigation have had the most effect because the position of the river channel and its rate of flow have been controlled by wingdams, levees and a system of locks and dams. During the late 1970s many federal agencies, including the COE, began the process of indexing known and potential cultural resources on property under their jurisdiction (see Benn, Bettis and Vogel 1988:2-3 for complete background on changes in the river environment and cultural resource management). Pools 10, 11, 12, 16, 17 and 18 in the Upper Mississippi Valley have been surveyed, and background studies on geology and history have been done for Pool 21. The survey project for Pools 13-14 follows in this line of investigation.

The unifying theme of all the pool surveys and other cultural resource contracts through the Rock Island District COE is the concern for the geomorphological context of archaeological sites (cf. Eichorn 1983:5; Bettis and Benn 1984). Geomorphological context determines the preservation of sites and, therefore, affects planning in cultural resource investigations. Geomorphological study is required to reconstruct past landscape patterns, since the modern river system is in large part a product of historic change. The landscape model produced within cultural studies also has applications in the planning and management of natural resources (vegetation, terrestrial and aquatic animals) and water-control systems.

These, then, were the two goals of the Pools 13-14 survey: locate archaeological sites and determine their landscape context. It is important that the survey of Pools 13-14 follows the same type of survey project in Pools 17-18 (Benn, Bettis and Vogel 1988). In that project considerable effort was expended on detailed mapping and radiocarbon dating of landscapes on the valley floor, and a detailed cultural overview was developed for the project area, relating the area to other materials and events of cultural significance in the Midwest. The Pools 13-14 project was not intended to duplicate the previous effort but only to build on the findings of the previous work. For instance, in Pools 17-18 a significant amount of survey time was used on private (leveed) land in the floodplain, because a large sample of sites with diagnostic materials was required to construct a workable cultural overview. With that overview written and published, the survey effort in Pools 13-14 was intended to focus largely on property owned by the government. We (and the COE) are concerned about how many sites actually exist on government property, most of which is floodplain and not well drained landscapes with high site potentials.

The project area in Pools 13-14 extends from Lock and Dam 12 at Bellevue, Iowa (river mile 556.7) to Lock and Dam 14 below LeClair, Iowa (river mile 493.3), a distance of 63.4 river miles (Fig. 1.2). In this reach the Mississippi Valley forms a broad arch open to the west. The shape of the valley varies considerably, owing to the presence of one paleo-valley which crosses the present Mississippi valley, the narrow Port Byron gorge and the existence of several large tributaries. The major tributaries are the Maquoketa, Apple, Elk, Plum and Wapsipinicon rivers and Rush, Johnson, Silver, Rock and Cattail creeks. Meredosia Slough, a huge wetland, is included in this reach. The area contains relatively few man-made river levees, which is a factor influencing the outcome of archaeological survey. Another factor for the survey is the presence of the Savanna Army Depot on the Illinois side. The Depot is managed by an arm of the military separate from the COE and was not intensively surveyed for this project.

The COE contract for the Pools 13-14 survey included five elements (see Appendix A): 1) A comprehensive records search was required to collect cultural information from the literature, maps, archival resources and oral interviews. 2) A geomorphological overview was to be developed and integrated with the cultural information. 3) Models of past landscapes and their geomorphic contexts were to be developed. 4) A biased stratified field survey was to be conducted to sample variability in the landscape and cultural resources. 5) Project findings were to be evaluated so that recommendations for managing cultural resources could be formulated as the ultimate product of the project.

The SMSU project proposal (Appendix A) responded to the five COE elements (above) with the following list of goals.

Geology:

- a) The geological context and Quaternary history of the Mississippi valley will be developed from the existing literature. This will include data such as landscape mapping, valley evolution and potential types of parent material for alluvial fills. Modelling will provide a baseline of information for analyzing alluvial units on the valley floor.
- b) Alluvial fills will be described in lithostratigraphic units by means of mapping from photo imagery and by subsurface investigations. These units will be traced in the pools to develop landform regions in the study area. The Pools 13-14 landscape model will be integrated with the models from pools 17-18 and 21.
- c) Wisconsinan-aged landscapes (i.e. terraces, benches, till sheets, loess caps) will be identified and mapped. These landscapes will be analyzed as surfaces where archaeological

materials are not deeply buried, unless superimposed by Holocene sediments (e.g. alluvial fans).

- d) Investigations in alluvial fills will seek pedogenic horizons in surface and buried contexts. Representative soil profiles will be identified and their distributions mapped. Radiocarbon determinations will be gathered from these soils to provide a sequence of development that correlates with observed pedogenesis.
- e) Representative profiles and associated radiocarbon dates will be gathered from alluvial fans and colluvial slopes to develop a sequence for these landforms. The ages, buried soils and lithologic properties of fans and colluvium will be compared to the Corrington fan member that exists in Iowa and to fans in the Illinois River valley.
- f) The positioning, relative ages and cessation period of dune formations and blow-sands will be investigated.
- g) The depth and distribution of post-settlement alluvium (PSA) will be systematically investigated and related to archaeological issues, particularly the location and investigation of historic cultural resources.

Cultural Resources:

- h) The valley floor will be divided into zones that reflect conditions of site preservation and types of anticipated site impacts. This will be accomplished by applying the three-dimensional landform model to the conditions and processes that cause site impacts. Particular attention will be paid to impacts related to maintenance of the nine foot channel, to land modifications necessary for drainage and flood control, and to recreational use of the water. This means that the archaeological survey and historic site reconnaissance will focus on land under COE jurisdiction.
- i) The structure and relative ages of horizontal and vertical accretionary deposits in the floodplain will be investigated. This work will include recording pedogenic formations and probing archaeological deposits for the purpose of developing a model of Late Holocene and post-settlement alluvial units, the contexts of archaeological sites.
- j) Investigations by the historian will employ cultural themes developed in Pools 17-18 to formulate a list of specific potentially significant historical sites. Historic archives, COE records and literature will be systematically combed for the locations of historic sites. COE building records also will be evaluated. This approach will reveal what portions of the historic record are potentially preserved and what modifications have occurred in the ecological relationships

between humans and the Mississippi valley environment. Locations of historic sites will then be tested by field survey (e.g. post-holing) and test excavations.

- k) Archaeological literature and private collections will be examined to obtain information about the distributions and ages of sites throughout the valley but outside COE Jurisdiction.
- l) The landscape/site distribution model developed for Pools 17-18 will be compared with the findings from Pools 13-14. The model will be refined, and specific sets of research goals will be formulated to advance the research in subsequent pool surveys.
- m) Known sites in the floodplain (i.e. COE jurisdiction) are predominantly Woodland-aged with fewer Late Archaic components. Mississippian period peoples also may have utilized the floodplain from their well known village sites on higher terraces. Information will be collected about the relative densities and compositions of floodplain sites, and a special effort will be made to provide ages for all small components (i.e. relative dates by geomorphic context and absolute dates) so that settlement patterns of small sites and larger villages can be depicted.

Work in Pools 13-14 was an inter-disciplinary effort involving interaction and common fieldwork time between the historian, archaeologists and geologists. The project began in late September, 1988, with a brief tour of the area, including visits to available geological exposures and known archaeological sites. The literature search and preliminary geological mapping was started thereafter. Records of the Office of the State Archaeologist and Iowa State Historical Department were consulted in Iowa, and records available at the State Historic Preservation Office and Illinois Archaeological Survey were checked in Illinois. About 40% of the fieldwork, both geological and archaeological, was accomplished in mid- to late October 1988, until the leaf fall and cold weather closed down the survey on October 27. The historic archival work began during the winter and continued through the spring of 1989. Another stop was made in the project area in mid-March, 1989, to visit with local collectors (ice was still in the river). Robert Vogel provided locations of potential historic sites from the archival research, and the archaeologists and geologists returned to complete the fieldwork in mid-May and early July. A period of rising water about July 13 prevented survey of some locations in the upper ends of both pools. After the project was completed, artifacts were catalogued and curated at the Office of the State Archaeologist of Iowa and at the Illinois Archaeological Survey.

Previous Archaeological Investigations in Iowa

The record of past archaeological work on the Iowa side of Pools 13-14 is meager and not of much use for constructing a chronology of prehistoric cultures or even knowing the types of cultural resources present in the area. The lack of professional investigation is unusual, because archaeology has been accomplished all around this portion of Iowa. South in the Quad Cities area, mound excavations commenced after the Civil War (see McKusick 1975), and amateurs and professionals alike continue their interest today in Historic Indian settlements around the Rock River. Farther south in Pools 17-18 there is an equally long history of periodic archaeological work (Benn, Bettis and Vogel 1988:6). The same is true for the Illinois side of Pools 13-14 (see next section of this chapter). The areas north and west of Pools 13-14 (Paleozoic Plateau; Hallberg et al. 1984) were the subject of Wilfred Logan's dissertation (1976) on Woodland cultures. Yet, for a century local collectors have been gleaning the bluffs and terraces along the Mississippi River, removing many of the vestiges of prehistoric life before professional archaeologists arrived.

Marshall McKusick (1975; 1979) has written a useful review of archaeological research in Iowa. His focus on the unique characters and the social and political circumstances of investigations into prehistoric remains renders his account a more applicable framework for reviewing activities in Pools 13-14 than, for example, Willey and Sabloff's (1974) periodization of American Archaeology. The latter work is far too broad and theoretical.

The time between initial Euro-American settlement (ca. 1828-1835) and 1881 in Pools 13-14 was a period of exploration, especially in mounds (McKusick 1975:18). The first encounters with Indian remains are recorded in county histories as the reminiscences of settlers who were curious about past inhabitants of their land claims. Destruction of the mounds and habitations on the Bellevue terrace and the lead processing stations at Fulton, Illinois (see Chapter 3) are examples of this activity. Following the Civil War prominent business and professional men in larger cities organized private academies to exchange and publish their scientific findings. Members of the Davenport Academy of Natural and Physical Sciences profoundly impacted mound sites north and south of the Quad Cities but only published terse descriptions of their hasty diggings. At least one of their explorations ranged into Jackson County to a mound group on G.W. Boothby's farm four miles below the Maquoketa River mound (Lindley 1877; possibly 13JK12). Lindley reported copper implements, bear's teeth and a large flint spear were recovered, suggesting to this writer a Hopewellian derivation for at least some of the mounds. Shortly thereafter, archaeological work by Davenport Academy members stopped due to controversy and infighting over faked artifacts (McKusick 1976).

During the next two periods, concern for the Mound Builder myth (1880s-1890s) and New Fieldwork Methodology (1903-1910; McKusick 1975:32-44), no published archaeological work was done in Pools 13-14. The surveys and excavations by Cyrus Thomas and Theodore Lewis extended around the area, with only one foray into the area at 13JK2 by Lewis (1885:notebook 36, pg. 6). Controlled excavations were conducted at the Albany mounds in Illinois (see next section). In retrospect this period of waning interest in mound digging promoted the preservation of some mounds today.

The beginning of archaeological scholarship in Iowa dates to the 1920s when Charles R. Keyes was appointed director of the Iowa Archaeological Survey and started publishing a prehistory of cultures in the state (McKusick 1975:44). Keyes' best chronology of Iowa cultures was published in 1927 and included four episodes relevant to the Upper Mississippi Basin: 1) Algonkian culture, 2) Hopewell, 3) Effigy Mound culture, 4) Oneota culture. He hired Ellison Orr, a retired businessman from Waukon, Iowa, to conduct a state-wide survey with some excavation. Orr ranged up and down the Mississippi Valley, recording habitation sites and mound groups and excavating in many mounds during the 1930s. His field records were compiled in 10 notebooks, with an original copy being housed at Effigy Mounds National Monument (Orr 1935) and published in the Archives of Archaeology (Orr 1963). Mounds surveyed by Orr along the Pools 13-14 bluffline include 13JK9, JK10, JK14, JK16, JK17, JK18, JK19, CN5, CN6, CN7, CN8 and CN10 (Orr 1935:vols. II & III). He excavated at 13CN7 (Peterson mounds; Orr 1935:II pgs. 98-99) and at the Pleasant Creek mounds (13JK17; Orr 1935:III pgs. 17-41). [note: The 1966 University of Iowa fieldschool worked at the Eagle Point mound group, 13CN10, but no record of this work has been published (Welchman 1976:20).] As surveyors, Keyes and Orr added immeasurable information to Iowa's site records, because they heard about and visited sites that have since been destroyed. As an excavator, Orr (Keyes did not do excavation) does not measure up to the caliber of other contemporaries in the United States (McKusick 1979:17). He was not trained to recognize features and strata and missed many details of mound and habitation site stratigraphy.

Another hiatus of professional archaeological work in Pools 13-14 occurred prior to the 1970s. During this time local collectors were busy examining sites being eroded by the impounded Mississippi waters and destroyed by development along the valley sides. A substantial number of sites in the state inventory were reported as a result of these activities.

Influence of the Explanatory period (1960-) in American Archaeology (Willey and Sabloff 1974:178) reached Iowa in the early 1970s at the same time federal legislation mandating culture resources assessments affected local development projects. The result was a spurt of cultural resource surveys after 1975 (see Figs. 4.5-4.11 for survey locations). Michael Welchman (1976) conducted the first major project in Pool 14,

surveying the entire waterfront and the valley of Mill Creek around the City of Clinton. Amazingly, his crew located no new archaeological sites. In the same year, John Tandarich (1976) surveyed the river crossing route below Camanche for the Dome Pipeline but found no sites. Small surveys also were done for the wastewater treatment plant on the blufftop at LeClaire (Finn 1976) and at the Camanche boat ramp (Muse and Stocker 1976). No sites were found. About the same time, Robert Petersen was compiling a bibliography of cultural resource reports and information for the Mississippi River from Guttenberg, Iowa, to Saverton, Missouri (Petersen 1973).

Three other impact survey projects followed the first surveys. The Highway 67 corridor from Princeton to Camanche was surveyed (Hotopp 1979), and no sites were located. The rest of this road, a bypass from Camanche to northern Clinton, was surveyed later (Merry 1987). One small site, 13CN38, was cleared for the project to proceed. The route of Interstate Power Company's transmission line west of Camanche was surveyed (Johnson 1983), and 13CN11 and CN12 were determined to lie outside the impact zone. These three surveys and projects mentioned in the previous paragraph were strictly surface-oriented in their approach to archaeological survey. Little attention was paid to variations in the sub-surface configuration of sediments.

Early in the 1980s, archaeologists turned attention to the problem of how to survey landscapes with three-dimensional properties and potential buried sites. Solutions to this issue were sought in hiring geologists to assist with archaeological surveys. The Rock Island District Corps of Engineers was at the forefront in contracting for this type of investigation (Eichhorn 1983). The first archaeological survey in the Upper Mississippi River valley to integrate geological findings occurred in Pool 10 (Overstreet 1984a; Church 1984). An earlier survey in Pool 12 (Boszhardt and Overstreet 1983) paid lip service to inputs from geologists, apparently because there were contracting problems and time limitations for accomplishing the fieldwork. Survey of Pool 12 yielded nine sites on Woodfordian terraces and 15 sites in the floodplain (Ibid.). All of the floodplain sites were situated in the upper half of the pool, indicating the effect of the permanent flood pool on survey results. The Pool 12 results are comparable to ours from Pools 13-14 in terms of numbers and distribution of sites. The absence of geological input in the Pools 12 survey is a limitation which shows through clearly in the report, however. For instance, site locations are consistently described with reference to surficial landmarks (e.g., points, slough banks, etc.) but rarely are placed in stratigraphic context with descriptions of surface soils, buried soils, PSA, accumulations of illuvial clays, oxidation colors and relative elevations of terraces above the water table. Without the geological data the Pool 12 sites lack systematic landscape contexts; thus, the writers (op. cit.:161) observe that Archaic sites are absent from their data base for no apparent reason.

In 1985 the state plan for cultural resources was published by the Iowa State Historical Department (Henning 1985). This overview established a series of prehistoric and historic study units representing culture periods in major divisions of Iowa. Periods of Paleo-Indian, Archaic, Woodland, Oneota and Historic occupations are broadly identified along the Mississippi River valley. Since inception the state plan has not been updated or refined, so its application to surveys, like the Pools 13-14 project, occurs at a fairly superficial level of analysis.

Recent archaeological work in Pools 13-14 has incorporated concepts of landscape evolution into the fieldwork, although these projects have focused on small, specific portions of the valley. The effects of project findings have been correspondingly minimal. In 1984 the Office of the State Archaeologist of Iowa conducted survey and testing at 17 COE recreation areas along the Mississippi River (Johnson et al. 1985). They employed bank survey, shovel-testing and one meter unit excavations to investigate seven locations in Pools 13-14: Pleasant Creek (13JK79), Big Slough (near Spring Lake, Illinois), Bulger's Hollow (13CN3), Cattail Slough (south of Fulton, Illinois), Smith's Island (13ST79), Lock and Dam 14 (Iowa side) and Fisherman's Corner (11Ri515). Only site 13JK79 was recommended as potentially eligible for nomination to the National Register of Historic Places (3/4/85). The reader is advised to recheck all information presented in the Johnson et al. (1985) text, as it contains errors of site attributions, artifact identifications and geomorphological interpretations.

Another project focusing primarily on geomorphology of the survey area was a survey for a pipeline crossing about one mile below the Wapsipinicon River (Anderson and Overstreet 1985). No sites were recorded by this project, but the nature of floodplain sediments was exposed by coring prior to conducting the surface survey. Other recent work includes the survey of floodplain and site 13JK107 in the Green Island Wildlife area (Anderson and Green 1988). Site 13JK107 was not considered significant. Selected portions of the Pleasant Creek Wildlife refuge north of the Maquoketa River were surveyed by COE personnel, Kenneth Barr and Charles Smith, in 1986 for proposed timber harvests (26 June 1986 letter from Dudley Hanson, COE, to Lowell Solke, Iowa State Historical Department). The surveyors cite surface deposits of historic alluvium as the factor prohibiting survey for archaeological sites as well as protecting potential sites from disturbances.

Previous Investigations in Illinois by Lawrence Conrad

What might loosely be called archeological research in the study area goes back at least 136 years to the excavation of a mound at Albany. The Davenport Academy of Natural Sciences excavated there in 1873, 1875 and 1906 through 1908 (French 1876;

Herold 1971). During the latter part of this period W. B. Nickerson, who directed the last Academy season at Albany, carried out a series of almost incredibly well done excavations in Jo Daviess County, including a mound on the Savanna Army Depot on the north end of the survey area (Bennett 1952; 1945:66-68).

The next archeological field work in the area to appear in the literature is that of the University of Chicago under the general direction of Fay-Cooper Cole between 1926 and 1931. The project was initiated on a small scale when two graduate students began what was apparently to be a thorough survey of Illinois beginning at the northwest corner and sweeping southwest. Though most of the work in the region was in Jo Daviess County, they did work on the Savanna Proving Ground Village site with its puzzling combination of Middle Mississippian and Oneota traits (Bennett 1945; Cole 1945) and conducted limited surveys throughout the survey tract.

Presumably because of the flashier discoveries made in the Illinois River Valley at about the same time, the importance of the archeology of northwestern Illinois went unappreciated (Bennett 1952:108). In fact, it was neglected by the professional community for more than 40 years. It appears the next professional archeological work done in the vicinity was the University of Wisconsin-Milwaukee's Historic Sites Survey initiated in 1973 to survey the Illinois side of the Mississippi from the Mouth of the Des Moines River to the Wisconsin state line, a distance of 210 miles. In two seasons (1972 and 1974) they recorded a total of 29 sites in the lowlands adjacent to pools 13 and 14. In so doing they relied heavily on the knowledge and cooperation of three local amateurs, Ferrel Anderson of Davenport, Iowa, Budd Hansen of Moline, Illinois and James Pilgrim of Clinton, Iowa (Dudzic 1975; Gregg 1972). These surveys were done after the lock and dam system was installed on the river--too late to record floodplain sites not documented by the University of Chicago earlier in the century.

A major publication pertaining to the study area but not involving fieldwork was Elaine Herold's (1971) compilation of late nineteenth and early twentieth century investigations at the Albany mounds (11Ca1). This study was followed by survey work and test excavations in the Albany village site, which was done in conjunction with planning for the Meredosia Levee project (Benchley and Gregg 1975; Benchley, Gregg and Dudzik 1977). Since 1977 there have been a number of environmental impact assessments and evaluations of state owned property at the Mississippi Palisades State Park, which covers the bluffline north of Savanna. In 1987, excavations were conducted at Albany mounds to evaluate and partially mitigate the damage done to a mound by vandals. This (unpublished) work was funded by the Illinois Office of Historic Preservation.

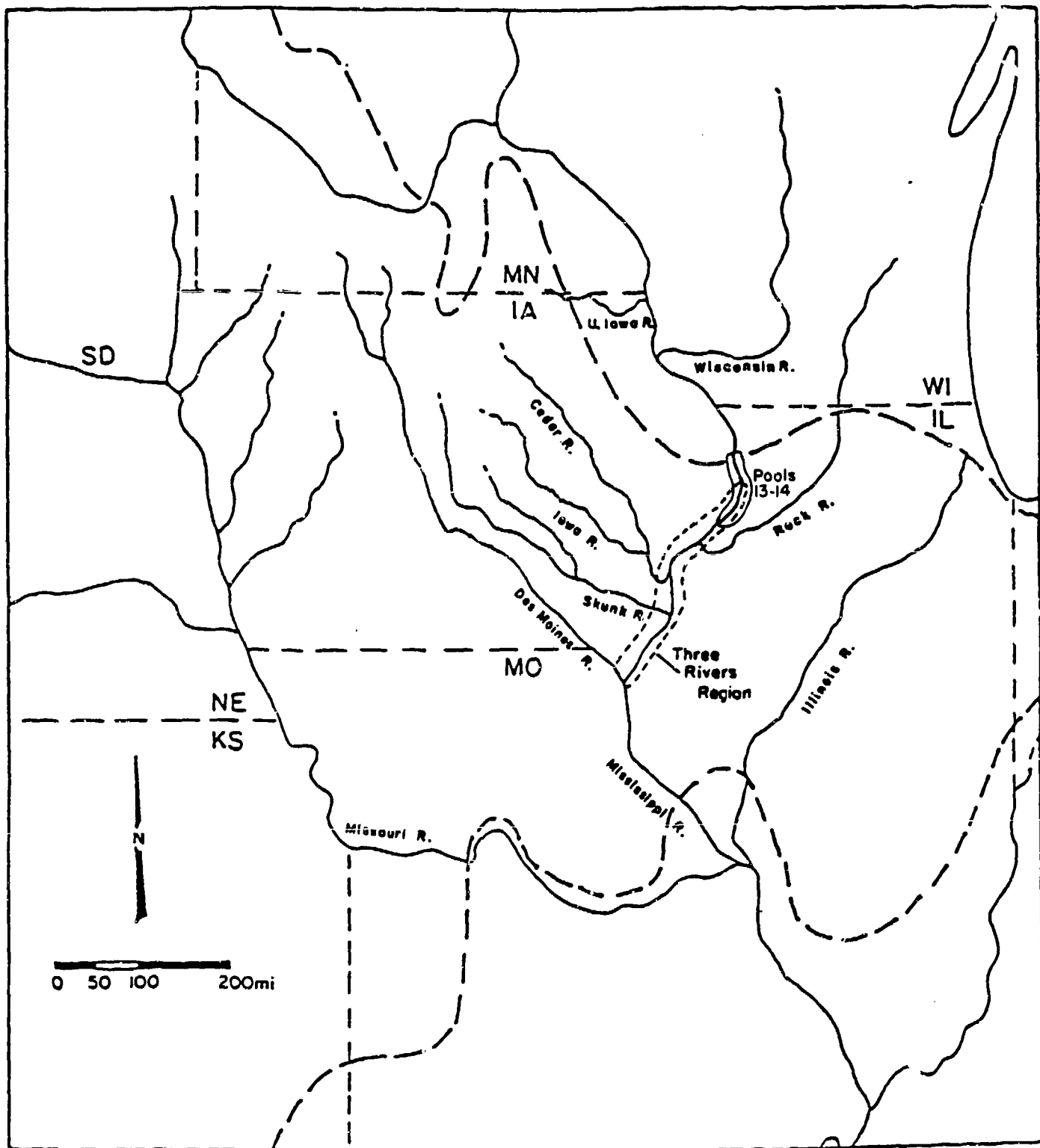




Figure 1.1: Pools 13-14 project area on the Prairie Peninsula (dashed line).

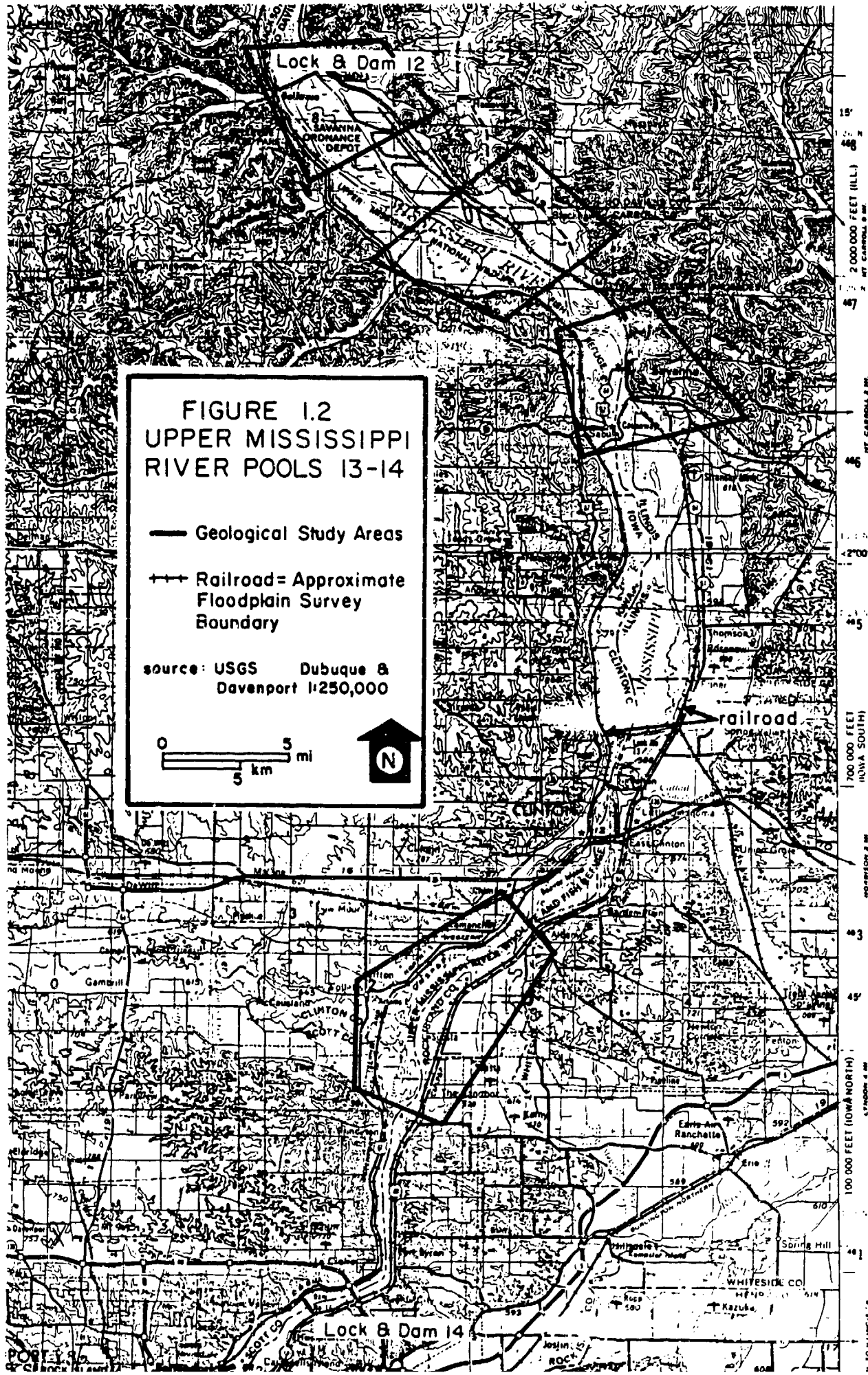
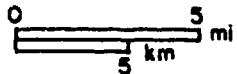
Lock & Dam 12

SAVANNA
ORONANCE
DEPOT

FIGURE 1.2 UPPER MISSISSIPPI RIVER POOLS 13-14

-  Geological Study Areas
-  Railroad= Approximate Floodplain Survey Boundary

source: USGS Dubuque & Davenport 1:250,000



Lock & Dam 14

railroad

15'
200,000 FEET (ILL.)
700,000 FEET (IOWA SOUTH)
100,000 FEET (IOWA NORTH)

NATURAL HISTORY AND RESULTS OF GEOLOGIC INVESTIGATIONS

by
Jeffrey D. Anderson

Introduction

The events surrounding the Upper Mississippi River's evolution during the Quaternary are complex and obscure. Drainage development evolved in response to multiple glacial episodes during the last 2 million years. Major main channel diversion occurred especially during the Illinoian glacial stage, but by the late Wisconsinan around 20,000 years ago, diversion ceased and the river assumed its present course. Episodes of valley aggradation with subsequent incision occurred and can be observed along the main valley margin through a series of Woodfordian terraces. Apparently major incision occurred during the late Woodfordian and was followed by periods of Holocene valley alluviation. Episodes of stability occurred during the Holocene shown through soil profile development followed by further valley alluviation.

The historical period has shown accelerated valley alluviation with buried prehistoric surfaces throughout most of both pools. Some of the recent surfaces are actually topographically higher than much older early Holocene surfaces removed from the main channel and closer to the valley margin. Therefore, correlation of surfaces based simply on elevation throughout the pools is inappropriate because of extensive late Holocene and historical valley alluviation.

The results of the geologic investigation also show that some earlier surfaces located closer to the main channel have been buried by subsequent late Holocene and historical deposits. Organic enriched buried surfaces are very common in the pools, similar to what was recorded further south in Pools 21 and 22 (Anderson, et al, 1988; Anderson, et al, 1989). Further observations show lower pool inundation of most early through late Holocene surfaces. Valley morphology and local tributary drainage also played an important role in the distribution of late Woodfordian and Holocene surfaces. Where bedrock constraints produce narrow valley widths, most older surfaces have been removed and only late Holocene deposits remain, whereas areas of relatively increased valley width show preservation of multiple-aged surfaces older than late Holocene.

Geology of the Pools 13/14 AreaIntroduction

Pool 13 generally lies within the Pre-Illinoian landscape to the north in Iowa (Hallberg, et al, 1984) and the Driftless Area in Illinois. To the south in Pool 14, an Illinoian age landscape is observed on both the Illinois and Iowa side of the valley. Both pools contain bedrock exposures; however, to the north these exposures are more common.

Bedrock Units

A typical bedrock exposure (Figure 2.1) shown along the valley margin in Pool 13 would contain the Platteville limestone at the base (Trowbridge and Shaw, 1916). The Platteville formation is a true limestone composed of calcium carbonate and interbedded with dolomite and thin beds of shale. Exposures of the formation would occur in the northern part of Pool 13 at the base of bluffs along the Mississippi River.

The Galena dolomite overlies the Platteville and occurs in most typical bluff exposures along the Mississippi River in the project area. This formation has five members which range from oil rock to massive cherty and noncherty members. The Galena has a number of minerals of economic value including galena, sphalerite, calcite, chert, pyrite, marcasite, smithsonite, and cerusite.

The Maquoketa formation overlies the Galena but is not easily subdivided since it consists almost entirely of shale (Trowbridge and Shaw, 1916). Typically at the top of the Maquoketa lies a zone of thick limestone interbedded with shale, a middle zone of shale and sandy calcareous layers, and at the base a blue black shale with lenses of sandy limestone.

In the northern end of the study area, Niagaran dolomite caps the bedrock surface. The lower units of the Niagaran are thin bedded shaley and cherty with the upper ones massive. The overall dip of the bedrock surface is to the south. Therefore, the lower portion of the study area in Pool 14 is capped by rocks of younger Devonian age (Figure 2.2). The Devonian rocks are exposed in northeastern Rock Island and northwestern Henry Counties (Horberg, 1950), and include limestone and dolomite from the Cedar Valley and Wapsipinicon Formations (Hammer, et al. 1985).

Mississippi River Drainage

Preglacial Drainage

Several ideas have been generated regarding preglacial drainage in the Upper Mississippi Valley. Trowbridge (1959) suggested that the ancestral Mississippi Valley occurred through central Iowa and followed the present Mississippi Valley below Muscatine. Horberg (1950) thought that the preglacial drainage was through the Meridosia Channel and Princeton Bedrock Valley below Clinton, Iowa. However, Willman and Frye (1970) suggested that Mississippi River drainage became established following classical Nebraskan (Pre-Illinoian) glaciation. Their argument based on upland gravelly outwash is that the Mississippi Valley must have had significant erosional development between classical Nebraskan and Kansan (Pre-Illinoian) glacial advances (Willman and Frye, 1970).

Quaternary Drainage Development

Further obscurity remains regarding the chronology of events during classical Nebraskan glaciation. Willman and Frye (1970) suggest that drainage had been established during the early Pleistocene probably during the Aftonian. Mississippi drainage was through the Meridosia Channel and through the Princeton

Bedrock Valley. Confluence with the Illinois River occurred near Hennepin and continued south through central Illinois rejoining the contemporary valley near Grafton, Illinois, just north of St. Louis (Willman and Frye, 1970, Anderson, 1968) (Figure 2.3).

In northwestern Illinois upland glacial outwash east of the present river course indicates that the Mississippi was not in its present position until about Aftonian time (Willman and Frye, 1970, Frye, et al, 1965). The interpretation is that these ice marginal outwash deposits accumulated during classical Nebraskan glaciation and were followed by episodes of valley entrenchment particularly in Pool 13. The steep valley gradient in the Driftless Area of southwestern Wisconsin and northwestern Illinois provided deep and rapid incision into the Mississippi Valley (Willman and Frye, 1970, Knox and Johnson, 1974), so by Aftonian, the course of the Mississippi north of Clinton was apparently established (Frye, et al, 1965).

Diversion of the Mississippi south of Clinton occurred several times since Aftonian interglacial. Drainage from around Clinton flowed southeastward through the Meridosia Channel and into the Princeton Bedrock Valley joining the present Illinois River near Hennepin, Illinois. Apparently, two pre-Illinoian glacial advances (classical Nebraskan, Kansan) came from the west out of Iowa and into Illinois. The Mississippi was diverted several miles eastward from its present course during this period and later during the Yarmouthian interglacial, the river reverted to the former Aftonian drainage (Figure 2,3).

Further south a complex system of buried bedrock valleys have incised through the oldest pre-Illinoian tills in the Pools 17 and 18 area. These valleys such as the Udden Channel have been filled with younger pre-Illinoian deposits of the Wolf Creek formation (Benn, et al, 1988). These recent studies further indicate that extensive Mississippi River drainage development began early during the Pleistocene.

Major Mississippi River drainage patterns changed during Illinoian glaciation. These changes occurred south of Clinton, Iowa, and diverted the Mississippi westward. The Illinoian glaciation advanced during the Liman substage covering the area south of Clinton, consequently significant drainage changes immediately south of the project area occurred during this period. The Illinoian glacier advanced from Lake Michigan basin into west central Illinois advancing over the Princeton Bedrock Valley. As the Illinoian glacier advanced westward, Mississippi River drainage was blocked developing glacial Lake Moline in the Green River lowland. As Illinoian ice proceeded westward into Iowa, the lake was covered by the glacier. Maximum Illinoian glacial advance entered eastern Iowa where diversion channels developed between the Maquoketa and Wapsipinicon Valleys through the Goose Lake Channel, and the Wapsipinicon and Iowa-Cedar Valleys through the Cleona Channel (Figure 2.4, 2.4A) (Anderson, 1968, Benn, et al, 1988).

To the south of Rock Island, the drainage system reoccupied many former drainages following Illinoian ice wastage. Many former valleys overridden by Illinoian ice were filled with drift which was at least partly removed by

fluvial erosion as the Illinoian glacier retreated. These valleys include the Andalusia Gorge, Lower Rock River Valley, Pleasant Valley, Meridosia and Cattail Channels, and the Port Byron Gorge (Anderson, 1968).

Following Illinoian glaciation, drainage during the Sangamon reverted back through the Princeton Bedrock Valley and into the Illinois River Valley. Then the Green River lobe advanced westward out of Lake Michigan during the Woodfordian and again the ancient Mississippi was ponded and glacial Lake Milan was created with an outlet through the Andalusia Gorge (Anderson, 1968). The advance of the lobe caused realignment of the Mississippi-Illinois River drainage westward. Glacial Lake Milan accumulated outwash and eventually topped the divide between the ancient Mississippi and the Iowa-Cedar valleys, and the Mississippi's flow was diverted to the south (Anderson, 1968, Benn, et al, 1988). Glacial Lake Milan then was reduced in size as the Green River lobe advanced westward. At this point, glacial lake Cordova was formed and discharged through the Port Byron Gorge at an elevation of 655 feet. Thus, around 20,000 years ago the Mississippi occupied its present course through the Port Byron and Andalusia Gorges south of Clinton.

Glaciofluvial outwash deposition in the Green River lowland was great enough to prevent the Mississippi from returning to its old course upon retreat of the Woodfordian ice. The Mississippi has discharged flood flows into the lower Rock through the valley floors of the Cattail, Meridosia, and Pleasant Valley channels since Woodfordian times. This is because the valley floors of these channels lie at or slightly above the level of the Mississippi River floodplain (Anderson, 1968). Discharge through the Meridosia Channel has occurred during historic times (see Vogel, Chapter III). Much of the area in the Green River Lowland contains sandy outwash deposits which have later been reworked into dunes.

Late Woodfordian and early Holocene main valley development was strongly influenced by events upstream in the Mississippi system in Wisconsin and Minnesota. Episodes of valley aggradation and subsequent degradation occurred throughout the Wisconsinan age. Rapid alluviation of the valley occurred during the late Woodfordian in both the Mississippi and Wisconsin River Valleys (Knox and Johnson, 1974). The Mississippi continued to aggrade until the Red River and Superior lobes retreated north approximately 12,200 yr BP (Clayton, 1982). As the lobes retreated, rapid incision occurred and by 11,500 yr BP both the Red River and Superior lobes readvanced causing renewed aggradation. This event was followed by subsequent valley incision until about 10,800 yr BP. The final episode of valley entrenchment occurred when glacial advance blocked eastward drainage of Lake Superior causing the discharge of meltwater through the Mississippi from 9,900 to 9,500 yr BP.

The Mississippi River Valley aggraded and degraded in response to the change in sediment load and discharge volumes of meltwater during episodes of late Woodfordian glacial advances, retreats, and catastrophic glacial lake discharges. Bedload was introduced into the drainage network during periods of glacial advance and caused aggradation of coarse sediment. But when drainage was blocked or when glacial lakes (such as Lake Agassiz) formed, pulses of high magnitude discharge would catastrophically release relatively sediment free water.

Meanwhile, uplands received eolian deposits of loess and sand on surfaces older than about 12,500 years. The oldest units of Wisconsinan age loess is the Roxana while the uppermost unit includes Peoria loess and Parkland sand (Willman and Frye, 1970). Wisconsinan terraces located west of Sabula in Pool 13 show a thin increment of loess capping the surface.

Concomitant with the final stages of loess deposition is the development of Savanna terraces. These terraces with Superior red clay deposits are found along the Mississippi River Valley margins at many locations and locally in the tributary mouths. Flock (1983) suggested that catastrophic discharges from pro-glacial lakes, Superior and Agassiz, probably carried little bedload but contained considerable quantities of suspended load. The clay rich deposits found on these Mississippi River terraces and in tributary terraces result from discharges associated with glacial lake drainage. The high magnitude discharges associated with catastrophic drainage from Lake Agassiz and Superior between 13,000 and 9,500 apparently created slackwater conditions necessary for the deposition of fine grain sediment.

Meltwater containing red clay from glacial Lake Superior drained through the St. Croix Valley into the Mississippi Valley. To the west, Lake Agassiz containing gray clay discharged through the ancestral River Warren and into the Mississippi (Matsch, 1983). Discharges and flood stage heights were apparently of sufficient magnitude to create slackwater conditions promoting deposition of fine grain sediment. Evidence of Lake Superior and Lake Agassiz slackwater clay deposits in the main valley occur in the Savanna Terraces throughout the project area. Thickness of these clay rich deposits vary greatly at locations where they were observed, but range up to 2 to 3 meters thick.

Tributary valleys entering the Mississippi main valley also show these terraces near their mouths. For example, smaller tributary terraces may show cross-bedded sand and gravelly sand dipping upstream in the smaller valley. Pulses of main valley aggradation with subsequent discharges from tributaries are seen in the stratigraphic section. For example, at Dakota Creek, Minnesota, in Mississippi River Pool 7, red clay is interbedded with lamina of medium sand, red silt, gray silt, and brown silt. The brown silt is calcareous and interpreted as loessal derived tributary alluvium (Anderson, 1987). These deposits in Minnesota probably correlate to Savanna deposits observed downstream in the Pool 13-14 project area.

Further south below Pool 18, a large Savanna terrace remnant is present in the lower portion of Flint Creek near Burlington, Iowa (Benn, et al, 1988). Dates from northeastern Iowa in the Savanna Terrace show ages ranging from 18,000 to about 13,500 yr BP (Bettis and Hallberg, 1985).

Investigation Methodology

Goal and Objectives

The principal goal of this portion of the investigation is to develop a landscape evolution model based on stratigraphic and radiometric evidence. Focus was directed toward the relative distribution of buried landscapes, both by

Holocene and historic deposits, and the distribution of Holocene aged landscapes within the pool's margins. Many older Woodfordian surfaces are evident in the Pool 13 and 14 study area and were also evaluated and incorporated into the evolution framework. The geological information provided in the report can be used to identify areas sensitive to archaeological site burial, preservation, or erosion.

Specified study areas were chosen for investigation because they reveal information regarding the geomorphic history of the area during the late Wisconsinan and Holocene periods. Other areas were visited, however not focused upon, because Holocene aged landscapes were, for the most part, impounded. The following methods outlined were employed in order to achieve the necessary information which could be used to predict relative ages, distribution, and potential of landscapes in Pools 13 and 14. A final investigation component focused upon the recognition and distribution of Post Settlement Alluvium (PSA) in the pools.

Preliminary Investigation

A number of sources were examined in order to choose suitable sites for the study. First, information was obtained from the Corps of Engineers Rock Island District Headquarters which included published materials already compiled for the pools. These materials include the USACE plane table maps at a scale of 1 inch equals 400 feet, the Browns survey at a scale of one inch equals 12,000 feet, and the Mississippi River Commission maps. These maps were particularly useful since they provided information about the Mississippi prior to lock and dam impoundment. The USGS 7-1/2 minute topographic quadrangle maps were used as field and general base maps and provided the basis for preliminary field mapping of the pools. GREAT II mylars were used as base maps for the distribution of Woodfordian and Holocene deposits in the project area (Volume 2). Published COE documents on Upper Brown Lake were consulted regarding the lakes' sedimentation rates (COE, 1987).

After the available published information was studied, a site visit to Pools 13 and 14 area was made. This preliminary investigation included a boat trip of the project area, with particular emphasis along the northern end of Pool 13 in the Savanna Army Depot. The preliminary investigation was used as an initial inventory of geomorphic surfaces and archaeological site potentials.

Field Investigation

The field investigation included examination of profiles from bank exposures, sampling tube cores, and Giddings probes. Detailed examinations of these profiles were taken in the field. The descriptions included color, texture, structure, consistence, sorting, special features (roots, pores, voids, coatings), effervescence, and/or pH, and horizon boundary. Colors of the deposits were examined and determined with the Munsell color chart. Soil reaction or effervescence was determined through the application of a 14 percent hydrochloric solution. Other information including vegetation type, geomorphic surface, landscape position, elevation, and parent materials were determined

in the field. The profiles were described according to taxonomic nomenclature used by Birkeland (1984) and are included in Appendix B. Parent materials and weathering zones were described using terms developed by Hallberg, et al (1978) for Iowa Quaternary deposits.

Field investigations began during the fall of 1988 and resumed during spring 1989. Sampling tube cores and bank profiles were described in areas inaccessible by power equipment. In some cases, these areas were only accessible by boat or by foot. At other more accessible locations, a trailer-mounted Giddings probe was used during the field investigations. The Giddings probe, owned and operated by the Iowa Geological Survey, was used in primarily older late Wisconsinan surfaces and on alluvial fans. Deep cores were taken from these surfaces which provided information regarding evolution in specifically Pool 13 during the Late Wisconsinan and early to mid Holocene.

Some of the profiles were sampled for particle size, organic carbon determination, and/or radiocarbon dating. The radiocarbon samples were collected, stored in zip-lock bags, and refrigerated until shipment to Beta-Analytic, Inc., Miami, Florida. The soil samples were collected and placed in whirlpack bags and taken to Donohue Analytical for particle size and total organic carbon analysis.

Laboratory Methodology

Laboratory procedures included particle size and organic carbon determination. A total of 176 samples was collected in the field and processed at Donohue Analytical in loose-leaf addendum. The hydrometer method (Bouyoucos, 1936) was used in determining the relative proportion of grain sizes. This hydrometer method was used in a manner to minimize the possibility of inaccuracy either from operator inconsistency or from laboratory temperature fluctuations. Samples were first weighed, and if they contained a relatively high organic matter, they were pretreated with the 15 ml/30 percent solution of hydrogen peroxide. Organic enriched samples from surface horizons were normally treated. The treatment continued until reaction with the organic matter ceased, then the sample was placed in a convection oven to dry overnight. The oven dried sample was then weighed to 30 grams on a digital electronic balance, and then gently crushed. A deflocculating agent of sodium hexametaphosphate was then used to treat the sample. 100 ml of the sodium hexametaphosphate was added to treat the sample. Then the sample was placed in a mechanical shaker for overnight agitation.

The sample was then screened through a No. 10 (2 mm) screen and poured into a 1-liter volumetric cylinder. The cylinder was then filled with distilled water to the 1-liter mark. The sample was agitated with the stirring rod for one minute, then the hydrometer readings were taken at 2, 4, 8, 15, 30, and 60 minutes; 2, 4, and 7 hours. The temperature of the suspended solution was recorded in conjunction with each reading in order to compensate for room temperature fluctuations. Following completion of the hydrometer reading, the samples were wet sieved to segregate the sand fraction. Wet sieving procedures included fractionation by a No. 35 (500 micron, 1.00 Phi), No. 10

(250 micron, 2.0 Phi), and No. 230 (63 micron, 4.0 Phi) sieves. These fractions, combined with the >2 mm sediment, were then dried, weighed, and recorded. Raw particle sized data was then converted by an IBM compaq with a specially design software package provided by James C. Knox, from the Geography Department, University of Wisconsin-Madison.

Organic carbon analysis was accomplished through the use of a total organic carbon (TOC) analyzer (Dohrmann). Organic carbon present in the sample is converted to carbon dioxide by high temperature combustion in an enclosed furnace. Carbon dioxide formed is then measured by using an infrared detector. The amount of carbon dioxide is directly proportional to the amount of organic carbon in the sample. Unlike titration methods, the combustion method does not have any chlorimetric or chemical interferences, such as Mn, Fe, and chlorides. The TOC is automated and reduces analyst induced error and biases.

A total of 11 samples were submitted by the project geomorphologist and principal investigator to Beta Analytic, Inc., for radiocarbon assay. These samples were taken from sampling tube cores, Giddings probe cores, and bank exposures. Prior to shipment, the samples were stored in a heavy duty zip-lock freezer bag and placed in a refrigerator.

RESULTS OF INVESTIGATIONS

Distribution of Post-Settlement Alluvium (PSA) in Pools 13 and 14

Historical Background

Recent alluvial deposits in the upper Mississippi River Valley result from land use changes produced by Euro-American settlement beginning around 1830. Original clear cutting of forests, mining exploration, and farming activities has exposed highly erodable, organic rich silty surface soil horizons. As a result, the black organic enriched A horizons have been eroded, exposing less permeable subsurface B horizons. Evidence of this can be seen throughout the midwest, and nearly every agricultural field shows a lighter brown colored subsurface horizon exposed at the surface.

Identification and Distribution

The agricultural land use has stripped the original black, organic rich silty A horizon, especially in uplands and valley side slopes, concentrating as valley fill deposits of post settlement alluvium (PSA). Morphological characteristics of the unit include laminae of variable thickness usually of silt texture. In valleys, this unit always overlies the pre-Euro American settlement soil. The PSA in the main Mississippi River Valley is often composed of two distinct units. The deposit immediately overlying the prehistoric soil tends to be leached of carbonates and slightly darker in color compared to the overlying most recent deposit. The upper unit is often calcareous and results from early 20th century limestone quarrying and washing techniques, application of agricultural lime, and erosion into unleached parent materials (Benn, et al, 1988, Bettis and Benn, 1988, Anderson, et al, 1988, Anderson, et al, 1989).

Thick historical deposits of a meter or more result from inundation by discharges containing high sediment loads or from unundation over long periods. The thick lamina may occur in relatively low lying floodplain areas such as meander cut-offs, chutes, and depressions. Thick deposits also occur below confluence with major tributaries and adjacent to the main channel. For example, thick deposits are observed in sampling tube cores overlying Holocene surfaces just below the Maquoketa River in Pool 13. In addition, Upper Brown Lake shows average sedimentation rates of about 1/2-inch per year based on Corps of Engineers research (COE, 1987). These sedimentation rates may actually be low since local informants indicate that over a period of 50 years, about 5 feet of PSA has accumulated in Upper Brown Lake (Figures 2.9 and 2.10). Deposits this thick accumulating over relatively short time periods are common and have been recorded in other areas in the Upper Midwest (Overstreet, 1985, Anderson and Overstreet, 1986, Anderson, 1986, Rogers et al, 1987, Anderson and Creal, 1989). Additional sources of PSA include side valley tributaries where historical alluvial fans have developed. The relatively steep valley wall in Pool 13 shows numerous low ordered fans entering the valley and were recorded to contain thick historical deposits (Figure 2.11).

Islands in both Pools 13 and 14 contain thick historical deposits. In many cases, these thick deposits which overlie late Holocene surfaces have aggraded to elevations at or above earlier Holocene surfaces. A general trend in the pools shows that late Holocene and historical valley alluviation has aggraded surfaces near the main channel to elevations equal to or higher than older surfaces located closer to the valley margin.

Many reasons are apparent behind thick PSA deposits in the pools. First, natural valley constrictions appear to promote upstream sediment storage. This occurs upstream north of Savanna along the Mississippi Palisades constriction. Overall reduction in streamflow velocities and higher base levels associated with pool impoundment is another cause for accelerated sedimentation. This is probably one of the most important reasons behind accelerated historical sedimentation. Next, confluence with major tributaries, such as the Maquoketa and Apple, provide local increases in sediment load promoting thick PSA. Finally, some areas of valley constriction containing a high density of late Holocene surfaces show thick PSA deposits on these surfaces. For example, the Mississippi Palisades constriction shows thick PSA deposits on the late Holocene surfaces which may be a response to higher base levels and streamflow velocity reduction. Similarly, areas downstream of Camanche show thick PSA deposits on late Holocene surfaces.

Meanwhile, areas protected by the Maquoketa levee show little historical alluvium on the surface. Areas immediately downstream from Lock and Dam 12 and 13 show significantly less recent alluvium, and most Woodfordian surfaces show relatively little PSA. The implication from the distribution and thickness of PSA shows significant recent alluviation associated with the lock and dam system in the study area.

STUDY AREAS

Bellevue/Crooked Slough Area

Introduction

The Bellevue/Crooked Slough Area is located in the northern end of Pool 13 just below Lock and Dam No. 12 (Figure 2.5). The study area is about 2 miles downstream from a valley constriction near Blanding's Landing. Modest valley widening occurs in this reach especially along the east valley margin where late Wisconsinan terraces are observed. The field investigation shows that surfaces above the 595-foot contour are of late Wisconsinan age and these surfaces abut the Driftless Area of northwestern Illinois.

Several lakes, sloughs, and Mississippi River minor channels characterize this reach of the river below the 600-foot contour. The lakes, one of which is in the northeastern corner of Section 9 is apparently an early Holocene Mississippi River abandoned channel. This area also shows a few late Woodfordian terrace outliers in the main valley located in the southeastern portion of Section 10 and northeastern portion of Section 15.

Surfaces

Main valley widening occurs immediately south of Lock and Dam 12. Valley width increases from about 2.0 to about 3.0 miles in the vicinity of the Savanna Army Depot. As this widening occurs, numerous surfaces are observed along the Illinois side of the valley, but no cores were taken from the late Woodfordian terraces along the Illinois valley margin. The deposits along the east valley wall on the Illinois side represent a series of aggradational and subsequent degradational events occurring during the late Woodfordian. These deposits are composed of late Woodfordian outwash with units of Superior red clay, which to some degree have been reworked into dunes and depressions during the early Holocene. The evidence for this interpretation comes from information downstream in the Green Island and Savanna/Sabula study areas. Based upon topographic evidence there appear to be three Woodfordian surfaces. The surfaces occur between 600 and 610 feet, 620 to 630, and 640 to 650.

It is unknown if Wisconsinan loess capped terraces occur in this reach of the valley. Topographic evidence from downstream suggests that if loess capped terraces exist, they would be observed along the Illinois valley margin above 650 feet and of limited aerial extent. In addition, the Wisconsinan loess capped terrace would probably be capped by Holocene alluvial fan and colluvial slope deposits.

There is an approximate 2 meter elevation drop between the late Woodfordian and lower Holocene surfaces. Early Holocene surfaces abut the late Woodfordian surface on the Illinois side of the valley, although a few late Woodfordian terrace outliers occur cut off by early Holocene paleochannels from those closer to the Illinois valley margin. Sampling tube cores and Giddings probes show well developed soil profiles and provided radiocarbon dated organic material.

For example, ST 13 (Figure 2.5) shows a well developed forest soil (Hapludalf). The soil is developed in main valley deposits consisting of silt loam, and shows A-E-Bt soil profile development. Silans and argillans are observed along ped faces in the Bt horizon. The upper portion of the Bt shows weak fragipan development. Another indication of a well developed, well drained soil is the changes in pH through the profile. At the surface, the A horizon shows a pH of 7.0, then pH drops to 5.5 in the Bt horizon. The evidence based on soil profile development suggests that surface stability has occurred, throughout most of the Holocene.

The profile described from GP 3 was taken along the margin of an interpreted early Holocene paleochannel. The core indicates that valley incision followed by alluviation occurred prior to 7270 yr BP (Beta 28892) in this reach of the valley. The core shows that early Holocene valley incision extended conservatively to a depth of about 575 feet. Since that time, about 15 feet of Holocene main valley deposits have filled this portion of the valley. The profile at GP 3 shows a basal component of main channel medium sand occurring at 470 cm below the surface. Overlying the basal sand are units of loam, silt loam, and silty clay loam, with some units organic enriched showing brief periods of early Holocene incipient soil formation. The radiocarbon sample dated 7270 yr BP was recovered from 380 to 395 cm in one of these organic enriched units.

Overlying the 7270 year old surface another organic enriched unit was dated. At 160 to 180 cm below the surface, a date of 3430 yr BP (Beta 28891), shows that approximately 2 meters of main valley alluviation occurred between 7300 and 3400 years ago. Furthermore, another 1.8 meters of valley alluviation has occurred since 3400 years ago.

Further investigation at GP 3 shows an eolian deposit from 60 to 160 cm. This deposit is composed of loam to sandy loam (blow sand) whose source is local immediately west and derived from a late Woodfordian terrace outlier. This eolian episode occurred after 3400 yr BP, and may have been in response to small scale climatic changes during that period. Late Holocene surficial instability has occurred in other regions in the upper Mississippi valley (Overstreet, 1984, Anderson, 1986). Capping the surface is an alluvial deposit composed of silt loam and showing an A-Bw soil horizon profile development. The GP 3 profile contains a complicated Holocene history with multiple alluvial units combined with buried incipient soils, a locally derived eolian deposit, and a surface unit composed of main valley alluvium.

The indication is that catastrophic drainage during the late Woodfordian and into the early Holocene promoted major valley incision. The evidence supporting this are erosional lags in paleochannels abutting late Woodfordian surfaces, major elevation differences between late Woodfordian and Holocene surfaces, and a 7200 year old date in Holocene alluvium about 15 feet below contemporary surfaces.

An interpreted early Holocene abandoned channel is observed in profile GP 1 which abuts the late Woodfordian surface at the Savanna Army Depot. The surface elevation is approximately the same at GP 1 compared to GP 3. Both sur-

faces are between 595 and 600 feet. The profile at GP 1 shows a basal component of poorly sorted sandy clay with gravel, interpreted as a lag. The lag includes Superior red clay and is similar to deposits found downstream in the Savanna/Sabula study area. Overlying the poorly sorted deposits is well sorted Holocene main valley silt loam. A well developed forest soil profile (Hapludalf) is developed in this deposit which shows an A-E-Bt horizon development.

The profile is interpreted to represent the final stages of late Woodfordian/early Holocene catastrophic drainage as indicated by the poorly sorted gravelly lag containing the red clay. In conjunction with the data from GP 3, this profile further supports early Holocene valley incision because GP 3 shows Holocene main valley deposits occurring conservatively at about 10 feet lower than the poorly sorted Superior red clay lag at GP 1.

Soil profiles described at GP 2 and ST 17 show development of late Holocene surfaces. These profiles show an A horizon with a subsurface Bw to Bt horizon. Though comparatively not as well developed as the older Holocene soil profiles, the increase in clay found in the subsurface horizons of these soils and clay skins provide sufficient soil profile development to be considered stable for a significant period. A radiocarbon sample collected from a depth of 290 cm was dated at 2095 yr BP (Beta 28896), and further provides evidence of late Holocene valley alluviation.

Other late Holocene surfaces occur and are observed along the Crooked Slough channel margin. A radiocarbon sample taken from a bank exposure buried by about 2 meters of late Holocene alluvium provided a date of 1030 yr BP (Beta 28895). Nearby, ST 18 was taken along the margin of Crooked Slough. Based on soil profile development, stability has occurred for a period of at least a few thousand years at this location. The profile is capped by approximately 35 cm of PSA and below an A-Bt-ABtb-Btb horizon sequences observed and probably correlative to the Odessa sequence seen further south in Pools 17 and 18 (Benn, et al, 1988). The deposits here are probably older than those seen at the nearby dated streambank exposure. The Bt horizon and decreasing pH from 7.0 to 6.3, structural development, clay skins and silans suggest stability for at least a few thousand years at ST 18.

Soil profiles taken from ST 16, and ST 15, were also located along Crooked Slough. Based on the relative degree of soil development, these surfaces are interpreted to be younger compared to the previously described surfaces. These profiles together with many of the other profiles described in the area show periods where valley alluviation interrupted landscape stability. The stability is observed through weak, buried, organic-enriched horizons.

The youngest surfaces occurring in the Bellevue/Crooked Slough area are those between the Iowa valley margin and Crooked Slough. Generally those areas closer to the Mississippi River including the islands are interpreted as late Holocene aged. These surfaces close to the main channel and including the islands contain considerable PSA deposits. For example, ST 8 shows PSA to a depth of 120 cm. Bank profiles indicate that other areas adjacent or near the main channel show similar depths of historical alluvium.

Summary

The stratigraphic and radiocarbon evidence suggests that a mosaic of different aged landscapes and surfaces exist in the Bellevue/Crooked Slough study area. Woodfordian aggradational and degradational sequences developed the three high sandy terrace surfaces along the Illinois valley margin. Around 15 or more(?) feet of incision occurred during the late Woodfordian/early Holocene based upon the radiocarbon and stratigraphic evidence. Following incision, valley alluviation proceeded throughout the Holocene with periods of stability. Based on the radiocarbon evidence and soil profile development, it appears that the Mississippi River has been in approximately the same position during the late Holocene. Topographic evidence supporting this is seen through thick natural levee deposits which occur at elevations equal to or higher than those early Holocene surfaces closer to the Illinois valley margin and similar to observations seen downstream in Pools 21 and 22 (Anderson, et al 1988, Anderson et al, 1989). Specifically those areas between Crooked Slough and the Mississippi River are primarily of late Holocene and historical age. Crooked Slough, a Mississippi minor channel has a relatively narrow meander belt and has reworked only a portion of the main valley deposits. Based upon the combined soil profile development, stratigraphic, and radiometric evidence, there is a very high potential for buried Holocene surfaces in this study area (Savanna Army Depot).

Green Island

Introduction

Downstream from Bellevue/Crooked Slough lies the Green Island study area. This area includes the Maquoketa River floodplain and fan, the late Wisconsinan surfaces of the Savanna Army Depot, and a portion of the Apple River floodplain. In this reach the valley continues to widen and extends to a maximum width of about 4-1/2 miles. Valley width is about 4 miles where the Maquoketa River enters the main valley. Inset into the sandy late Wisconsinan outwash terraces along the Illinois valley margin are Holocene surfaces associated with the Apple River. Based upon topographic evidence Apple River Holocene surfaces are below about 600 to 610 feet. Considerable late Woodfordian Savanna terrace exposures exist near the mouth of the Apple River and occur above 630 feet. This interpretation is only based upon visual observations, topographic evidence, and not from soil borings.

Surfaces

Soil borings along the Illinois side of the valley occurred at sites GP 4 and GP 5. These cores were taken in a paleochannel on the late Woodfordian surface (Figure 2.6). The channel probably dates to about 10,000 to 9500 yr BP. The Savanna terrace deposits, however, are probably older based on evidence downstream near Sabula. The coarse textured soil shows relatively weak A-AB-Bw-C horizon development. This surface 80 cm appears to be reworked eolian blow sand deposits of sandy loam, while below 80 cm well sorted alluvial sand laminae are observed. Below 215 cm and continuing to 410 cm is a unit primarily of silty red clay, showing sand laminae of coarse sand from 285 to 410 cm.

GP 5 in a similar nearby location shows a profile like GP 4. The surface 110 cm is a reworked eolian unit from loamy sand to sandy loam consisting of particle sizes ranging from coarse silt, medium and coarse sand, to granules. Below 110 cm is well sorted alluvial medium sand. At 190 cm and continuing to 410 is a unit of coarse sand with some red clayey sand laminae. The overall lower portion of this unit coarsens with depth becoming coarse sand and granules by 410 cm.

Based upon the evidence, the Savanna Army Depot area is of late glacial age. The depot area appears to have three late glacial surfaces around 600, 620, and 640 feet. Numerous paleochannels are observed parallel to the valley axis on these surfaces. The surface unit composed of blow sand represents periodic Holocene desiccation and drought and associated dune development. Evidence from the Bellevue/Crooked Slough study area shows eolian activity after 3460 yr BP. Widespread dunal development in the upper Mississippi Valley occurred during the early to mid Holocene (Knox, 1985, Overstreet, 1985, Benn, et al, 1988, Anderson, 1987), however, other areas provide evidence showing periods of a surface eolian reworking during the late Holocene (this report, Anderson, 1986).

Main channel diversion eastward to the Illinois side of the valley results from the Maquoketa River alluvial fan. Evidence supporting this interpretation is seen by the relatively large well developed Maquoketa River fan, from soil profile development, and from dated Holocene surfaces. This diversion in response to tributary discharge and sediment load commonly occurs in the upper Mississippi valley (Church, 1984, Benn, et al, 1988).

To the north of the Maquoketa fan a series of lakes (Golden, Flat, Jackson, and Western) are interpreted as early to mid Holocene Mississippi River paleochannels. For example, ST 19 taken near the southern margin of Western Pond shows a well drained, well developed forest soil (Alfisol). The degree of soil development is similar to ST 13 across the valley in the Bellevue/Crooked Slough study area. The profile at ST 19 shows an structurally well developed oxidized subsurface Bt horizon and a pronounced decrease in pH through the solum. The profile was taken to a depth of 240 cm and showed no buried former surface horizons. Based on the soil profile development and the lack of paleosols this surface has not experienced alluviation for a considerable length of time. The indication is that the main channel has been displaced eastward away from the Iowa valley margin during the early to mid Holocene.

Cores taken closer to the main channel and further east of ST 19 show younger soils and thicker PSA deposits. For example, ST 7 was described at a site between Golden and Jackson lakes. Although the profile was not taken to considerable depth, the surface soil to about 150 cm is not well developed. Similarly ST 20 shows a Bw presettlement subsurface horizon indicative of late Holocene age and capped by 95 cm of PSA. But ST 20 shows buried organic enriched A horizons below the presettlement surface soil. From the bottom of the profile at 350 cm to about 130 cm beneath the surface several weak organic enriched horizons were present.

Visual, stratigraphic, radiometric, and topographic observations show that the combined evidence; 1) of a large Maquoketa River alluvial fan, 2) Mississippi River paleochannels abutting the fan, 3) early Holocene surfaces between the Mississippi River abandons and the Maquoketa fan, 4) a pronounced late Holocene main channel levee deposit, and 5) late Holocene profiles near the present channel, one of which containing multiple buried surfaces, indicates that the Mississippi has been in its present position for at least a few and probably several thousand years. The paleochannels (Flat Lake and Western Pond) suggest a more sinuous former channel pattern, although reconstruction of prior early to mid Holocene paleochannel patterns at this stage is speculative.

Investigations were conducted south of the Maquoketa River confluence in the Green Island area. Maquoketa River paleochannels such as Fish Lake and Densmore Lake extend relatively further south into the main valley compared to those paleochannels north of its current channelized course. Surfaces both inside and outside of the diversion levees were studied, and they show a rather extensive Maquoketa River paleochannel system extending southward below the river's confluence with the main channel.

Surfaces associated with the Maquoketa River paleochannel system were investigated at GP 8 and 9. The profile described at GP 8 was taken from a slightly higher surface compared to other surrounding locations. The profile consists entirely of Maquoketa River alluvium and suggests extensive early fan development. An A-Bw horizon is observed in the surface soil, however, a buried soil occurs below 255 cm. The organic enriched buried soil consisting of silty clay loam is overlain by younger lateral and vertical accretion deposits. A radiocarbon date of 6860 ± 100 yr BP (Beta 31801) was taken from the buried A horizon from 240 to 255 cm. The younger overlying sand and gravel fines upward to silt loam at the surface. Below the 6860 yr BP surface the sequence coarsens and becomes calcareous.

The evidence suggests that the Maquoketa River discharged about 2 miles to the south of the present prechannelized course after catastrophic discharges occurred during late glacial times. Progressive fan deposition aggraded the southern outlet during the early Holocene. Later a gradient advantage to the north was produced causing abandonment of the river's southern outlet probably during the mid Holocene. Sediment loads and fan development from the Maquoketa continued diverting the Mississippi River main channel eastward which began eroding into late Woodfordian surfaces along the Illinois side of the valley. Later, as the Maquoketa continued to aggrade its northern outlet, it began migrating south or recaptured relict channels. The evidence is seen from lateral accretion point bar deposits which buried the 6860 yr BP surface. Finally after about 250 cm of additional deposition, the Maquoketa again abandoned the southern outlet and discharged further to the north during the late Holocene.

The profiles seen at both GP 8 and 9 indicate two separate aggradational sequences separated by a period of stability and soil development. Although speculative, it is likely that Western Pond, Flat Lake, and upper and lower Brown Lake, were contemporaneous Mississippi River paleochannel systems during

the early to mid Holocene. The Maquoketa River discharged through southern outlet channels and into the upper and lower Brown Lake paleochannel system during that period. Only until fan development favored southern outlet abandonment did the Maquoketa River occupy its northern outlet system. This process progressively diverted main channel flow eastward toward the Illinois side of the valley and is similar to main channel diversions from major tributary fans both up and downstream of the project area (Church, 1984, Benn, et al, 1988).

The profile seen at ST 21 shows main valley deposits of late Holocene age. The surface is capped by about 1 meter of PSA and at 170 to 200 cm a buried A horizon is observed. This buried A was radiocarbon dated at 3340 yr BP (Beta 31802) which further illustrates late Holocene valley alluviation in this portion of the valley. Moreover, the profile and radiocarbon date indicate that in this reach the main channel has remained in approximately the same location during the late Holocene.

Valley margin deposits are not extensive along the Iowa side in the upper and lower Brown Lake area. Many surfaces that extend out into the lake have thick historic PSA. Profiles described at ST 22, 23, and 24 were taken from low order fans which enter Upper and Lower Brown Lake. The profiles show deposits of PSA at least 1.9 meters thick. ST 24 was taken along the fan/lake margin and shows at least 1.5 meters of unleached PSA. These rates of historical deposition are considerably higher than the estimates provided by the COE (1987). Meanwhile, earlier Holocene fan deposits were not encountered in these three cores, however, they would expect to be deeply buried, well below the water table, and of late Holocene age (Figure 2.11).

The profile described at ST 25 shows about a meter of historical alluvium capping the surface. Below this deposit, the soil profile is developed in main valley fine grained channel fill. The channel fill has organic enrichment and continued to at least 210 cm where the core was abandoned. Although the organics were not dated, it is reasonable to expect that this surface is of mid to late Holocene age based on the relative degree of soil development. Further observations indicate a relatively young age for deposits in this locality based upon the general lack of colluvial slope and fan development along the Iowa valley margin.

The soil profile observed at ST 26 is located on a lateral accretion ridge farther away from the Iowa valley margin. The profile at ST 26 shows weak calcareous PSA down to at least 120 cm. The nature and degree of soil development in the subjacent presettlement surface is unknown, since the core only showed the PSA. However, based on all other local observations, the surface is believed to be of relatively young late Holocene age.

The Running Slough area shows bank profile exposures with considerable historical deposits. The presettlement soil occurs below pool elevation and only thick PSA profiles are exposed along channel margins. Only areas near and upstream of ST 21 showed the presettlement surface above the current pool elevation (Figure 2.9).

The Rock Island District COE (1987) conducted an EMP project in the Upper and Lower Brown Lake area. Coring data from the lakes showed considerable thickness of historical alluvium. Estimated sedimentation rates were from 0.5 to 1.0 inches of deposition annually, however, these rates may be conservative. Local informants suggest that sedimentation in these lakes has probably been 5 feet in the last 50 years, and cores taken along the lakes margin show thick recent calcareous PSA. In all cases, along the southern end of the Green Island study area very thick deposits of PSA bury Holocene surfaces.

Summary

Late glacial events are recorded along the Illinois side of the Green Island study area. Terraces of late Woodfordian age occur at around 595, 620 and 640 feet. Paleochannels and flood chutes from catastrophic discharges scoured these terrace surfaces. The distribution of older Wisconsinan loess capped terraces in the Green Island area is unknown. However, they may occur abutting the valley margin and are probably buried by local hillslope deposits.

Holocene surfaces occur below 595 feet. The degree of late glacial/early Holocene valley incision is uncertain but probably extends to at least 580 feet. This interpretation is based on the unleached Maquoketa River deposits found 4 meters below the surface at GP 8. It is believed although not substantiated by direct evidence, that main valley alluvium occurs below the unleached Maquoketa River point bar deposits.

Early to mid Holocene surfaces exist north of the Maquoketa developed in main valley alluvium in the vicinity of ST 19. Other early to mid Holocene surfaces are predicted south of where the Maquoketa enters the main valley. They are in the vicinity of GP 8 and 9, and are deeply buried by late Holocene Maquoketa and main valley alluvium.

Farther away from the valley margin, mid to late Holocene surfaces are predicted between the Flat Lake/Western Pond paleochannel and present Mississippi River channel. Other mid to late Holocene surfaces are apparent in the Densmore Lake area and are associated with the Maquoketa River paleochannel system.

Similar to the upstream Bellevue/Crooked Slough study area, main valley Holocene alluviation is apparent in this reach of the valley. Periods of main valley aggradation are interrupted with landscape stability, organic matter production, and soil development. Renewed aggradation has occurred during the late Holocene at which time the contemporary main channel had been established. Islands and natural levees adjacent the main channel margin are late Holocene aged, and are buried by thick PSA deposits. Late Holocene valley alluviation is seen throughout the Upper Mississippi System (Benn, et al, 1988, Bettis and Benn, 1988, Anderson, 1988, Anderson, 1989) from Pools 13 through 22.

Prograding fan development by the Maquoketa system has displaced the main Mississippi River channel eastward abutting late Woodfordian surfaces. The Maquoketa discharged through a southern outlet during the early to mid Holocene but as aggradation progressed, abandonment of the southern outlet favored

northerly discharge. Landscape stability and soil development was observed in cores GP8 and GP9 near the southern outlets. These early to mid Holocene surfaces were later buried by 2-1/2 meters of late Holocene alluvium as southern outlets became active for a period of time. Then the southern outlet was again abandoned, stability and soil development began on those surfaces, and the Maquoketa again discharged to the north during the late Holocene. It was probably the first diversion northward during the mid Holocene that forced diversion of the Mississippi River channel eastward.

Savanna/Sabula Study Area

Introduction

Considerable investigation took place in this study area. It shows valley widening downstream of the Palisades constriction and multiple surfaces. The oldest surfaces are seen in the Sabula area in Section 13, along the Iowa valley margin, and based upon elevation, it appears that three late Woodfordian surfaces exist. Early to mid-Wisconsinan terraces are probably found in this area along the Iowa valley margin above 650 feet (Figures 2.7 and 2.12).

Paleochannels are found on the Woodfordian surfaces and a late Woodfordian/early Holocene channel is bounded to the west by Savanna terrace deposits and to the east by Holocene alluvial units. The Joe Day and Town Lakes to the northwest of Sabula are presumed early to mid Holocene Mississippi River paleochannels.

Surfaces

The area is just downstream from the Palisades constriction where valley width narrows to about 1.5 miles. Valley width in the study area rapidly increases to about five miles below the constriction. The stratigraphic evidence shows that some high magnitude discharges apparently truncating older Savanna terrace deposits. Erosion into older slackwater red clay deposits has occurred along the Illinois valley margin and along the late Woodfordian/early Holocene margin in Iowa.

Nearby in Beaver Creek the Savanna terrace sequence was observed in a stream bank exposure. Underlying the sequence, composed of red clay laminae and coarser grained units, was a gleyed fine grained deposit containing floral remains. The remains were sampled and submitted for radiocarbon dating, and yielded an age of 18,790 \pm 320 yr BP (Beta 31883). The date represents a base age of the oldest red clay units and is consistent with other regional dates for the deposit (Beutis, personal communication, Bettis and Hallberg, 1985).

A younger Savanna terrace sequence is preserved between 640 and 650 feet at GP 12. A thin loess cap of approximately 40 centimeters caps the surface, and below an alluvial sequence composed of laminated fine sand, medium sand, red clay, and sandy silt are observed. The Ap and E horizons are developed in the surface loessal deposit. The lowest alluvial silt and sand laminae are calcareous while above 160 cm the solum is developed in leached units of red

clay, fine sand, silty fine sand, and sandy silt. The profile is complex and shows Beta-B lamellae development along textural discontinuities in the solum. Red clay is also translocated into sandy laminae in lower B and BC horizons. These pedogenically altered alluvial units also contain mottles along textural boundaries.

A gravel pit located riverward from GP 12 and occurring at approximately the same elevation showed depositional units composed of sand and gravel. The interpretation is that the deposits at GP 12 and the gravel pit are contemporaneous and reflect facies change related to streamflow velocities. The gravel pit showed no red clay deposits, instead the much coarser deposits were associated with higher flow velocities.

Below the gravel pit and GP 12 surfaces lie truncated late Woodfordian erosion surfaces. Truncation of these surfaces are interpreted from the textural and sorting characteristics found in the deposits. For example, GP 10 shows the surface 180 cm composed of poorly sorted coarse sand, granules, and pebbles with some red clayey sand. Between 140 and 180 cm is a very poorly sorted sandy, gravelly lag with minor red clay which is interpreted as an erosional remnant. Below 180 cm, the sand fraction becomes well sorted and contains red clay interpreted to be translocated from above.

A similar erosional profile is observed at GP 11, about 10 to 15 feet lower than GP 10 between 530 and 535 feet. The surface 80 cm is composed of Holocene main valley alluvium of silt loam to loam capped by 22 cm of recent PSA deposits. Below 80 centimeters, lies red clay and red clayey sandy gravel to a depth of about 190 cm. This massive poorly sorted erosion surface, is then underlain by much better sorted alluvial units of red clayey sand, brown sand, and finally sand and gravel.

Three more profiles were described from this late Woodfordian/early Holocene paleochannel from the Iowa side and one from the Illinois side. ST 28 and 29 show similar erosional profiles and up valley radiocarbon evidence is observed from GP 7 in Iowa and GP 6 in Illinois. GP 7 was taken from the same paleochannel as ST 28 and 29, and shows a sequence of historical PSA hillslope alluvium from 0 to 90 cm. The presettlement surface A horizon is developed in late Holocene alluvial fan deposits from about 90 to 130 cm. Below the fan deposits lie main valley deposits which grade into red clay down to 390 cm. Below the red clay, a buried organic enriched surface horizon was radiocarbon dated. The date yielded an age of $14,070 \pm 230$ yr BP (Beta 28893).

Across on the Illinois side, GP 6 was taken along the valley margin. The profile shows a fan extending to a depth of about 6 meters. Weak incipient soil formation is identified in the fan deposit. At the base of the fan an abrupt smooth contact with red clay occurs; the clay continues to a depth of about 740 cm. The red clay unit contains abrupt smooth contacts with grey clay laminae throughout the entire unit. Organic plant remains were collected from this deposit and dated at $14,650 \pm 690$ yr BP (Beta 28894). No soil profile development or organic matter accumulation occurred between the red clay/fan contact. Instead an abrupt smooth boundary was identified which suggests that after late Woodfordian/early Holocene incision, tributary drainage and fan development occurred immediately.

The dates of 14,000 and 14,600 along either side of the valley associated with Savanna terrace deposits seem to indicate that major valley incision associated with catastrophic discharges occurred during the late Woodfordian/early Holocene period and were followed by valley alluviation. Based on the radiocarbon dates from GP 6, GP 7, and Beaver Creek, and from profiles at GP 10, 11, and 12, it appears that Woodfordian valley aggradation was followed by about 60 feet of late Woodfordian/early Holocene incision between about 12,500 and 9,500 yr BP. Two periods of landscape stability and soil development occurred around 18,000 and 14,000 years ago followed by valley alluviation and subsequent incision. Tremendous volumes of bedload and fine grained slackwater deposits accumulated and the valley aggraded from about 580 to 640 feet after 14,000 yr BP. This aggradation event was followed by late glacial valley incision to at least 580 feet based on core evidence from ST 37.

Areas located near the main channel experiencing high streamflow velocities were apparently severely eroded during this period. Away from the high discharge velocities the late glacial depositional sequences were preserved as were many of the tributary sequences. Some deposits were partially truncated or were channel bar deposits associated with high magnitude discharges. These deposits form surfaces which occur below 640 feet. Nonetheless, valley incision was at least to a depth of 580 feet, indicated by coring data and upstream radiocarbon dates on the late Woodfordian/early Holocene surfaces.

Valley alluviation progressed during the Holocene based on topographic and coring evidence. Many of the youngest surfaces are adjacent to the main channel and topographically above some of the late Woodfordian/early Holocene erosional surfaces. For example, the ST 10 core is from an island which is a late Woodfordian/early Holocene outlier composed of silty sand with granules. Closer to the main channel is ST 11 which is at approximately the same elevation but shows soil horizon development in finer grained late Holocene alluvium. Two other late Holocene profiles are observed near the Plum River at ST 8 and ST 9. These soils are developed in fine grain alluvium, show weak soil profile development, and are considered late Holocene aged.

The late Holocene surfaces which include the Cavanaugh Bottoms and Chain-of-Lakes area, are capped by thick deposits of PSA. Cores were not taken in this area, however, visual inspection along bank profile shows at least one meter of PSA at nearly all locations. In addition, the presettlement surface lies below normal pool elevation.

Summary

The somewhat incomplete chronology of Wisconsin events in the Savanna/Sabala area has raised some questions. Observations show an apparent older Wisconsinan terrace occurring along the Iowa valley margin between 650 to 660 feet. It is unknown if this surface predates the Beaver Creek Savanna terrace or if they are correlative. If this terrace pre-dates Beaver Creek, a correlative Beaver Creek surface in the main valley has not been identified. No cores were taken from the 650 to 660-foot surface but it is expected to contain a thicker loess cap compared to the younger post-14,000 yr BP Savanna

terrace seen at GP12. Evidence from Beaver Creek shows some valley stability and organic matter production around 18,000 yr BP. Stability was followed by valley alluviation and Savanna terrace construction. Apparently, an episode of valley incision followed down to about 580 feet based upon core evidence from the main valley.

Soil development and a period of main valley stability occurred around 14,000 yr BP based upon evidence from two cores. Then renewed valley alluviation caused aggradation up to about 630 to 640 feet. This event probably occurred around 12,500 to 13,000 yr BP since core GP 12 shows a thin loess cap. Main valley incision followed during the late Woodfordian/early Holocene down to at least 580 feet. After incision, main valley alluviation has progressed during the Holocene. Coring data seems to indicate that a period of lower magnitude floods occurred during the early to mid Holocene. This assumption is based on the relatively fine grained deposits and organic enriched buried surfaces.

It appears that higher magnitude discharges and valley alluviation continued during the late Holocene. The fine grained early to mid Holocene deposits are overlain by slightly coarser grained late Holocene alluvium, which is similar to observations upstream in the Bellevue/Crooked Slough study area.

Historical deposits are widely distributed in the Savanna/Sabula study area. Bank exposures show thickness greater than one meter for the historical deposit on most Holocene surfaces. Only the remote areas adjacent to the Woodfordian surfaces and away from the main channel contain PSA deposits less than one meter.

Wapsipinicon Study Area

Introduction

The Illinois side of the study area is composed of late Woodfordian coarse grained deposits. The highest of these surfaces is around 620 feet (Figure 2.8). Some evidence of eolian reworking is observed on this surface. Dunes and blowouts are of presumed early to mid-Holocene age, however, no direct evidence of this has been collected. A lower late Woodfordian surface occurs around 590 feet and is best represented along the Iowa side of the valley. Flood chutes parallel to the valley axis are observed on this surface. Holocene surfaces are primarily confined to the Iowa side of the valley, and their age ranges from early to late Holocene based upon relative degrees of soil profile development.

Surfaces

ST 32 and 33 were taken on a nearby late Woodfordian surface in an abandon channel. Elevation of this surface is between 585 and 590 feet. Radiocarbon dates collected from ST 33 indicates that flood discharges inundated the western margin of the valley between 9,700 and 9,900 yr BP. The Mississippi apparently occupied the valley westward from its present position. Following cessation of upstream glacial lake discharges around 9,500 yr BP, development of the Wapsipinicon alluvial fan began. Wapsipinicon abandoned channels occur

both north and south of its present position, and based on the relative soil profile development lateral stream erosion has not reworked the northern margin of its meander belt for several thousand years. Evidence is seen from both ST 4 and ST 5 which show soil profile development characteristic of early Holocene surfaces. The profiles show well developed E and Bt horizons and pH changes through the profile indicate long term weathering typical of surfaces stable for several thousand years.

Schricker Slough is a Mississippi minor channel just upstream of the confluence with the Wapsipinicon and shows surfaces ranging from late Woodfordian to late Holocene. ST 1B and ST 2 were cores taken from this location and show mid and late Holocene soil profiles. The ST 1B core shows a soil profile with an oxidized Bw horizon and pH changes indicative of a pronounced weathering profile. The surface pH is 7.5 but drops to 5.5 in the Bw horizon, which suggests surface stability for several thousand years.

Along the southern margin of the Wapsipinicon meander belt are paleochannels interpreted as late Holocene. This is based on dredged canal exposures along the southern margin of the meander belt which showed thick historical units overlying young late Holocene soils. One core was taken in this area but did not penetrate the thick historical unit. The Wapsipinicon meander belt abuts the late Woodfordian/early Holocene main valley deposits along the southern margin. The late glacial age is interpreted due to the relatively coarse texture and resemblance to other similar aged deposits found throughout the pools and entire Upper Mississippi Valley (Anderson, 1989, Overstreet, 1984).

Field observations where early and late Holocene surface are juxtaposed show that these two surfaces occur at approximately the same elevation. Furthermore, the islands which are interpreted as late Holocene age occur at the same or slightly higher elevations compared to the older surfaces closer to the valley margin. The indication is similar to what occurs upstream where valley alluviation has proceeded following late glacial incision. Late Woodfordian/early Holocene incision was probably not as great as what was recorded upstream in the Savanna/Sabula area, however, cores in the area may not have penetrated the entire Holocene sequence.

Summary

The Wapsipinicon study area shows late Woodfordian outwash terraces along the Illinois side of the valley. The two late glacial terraces are observed around 620 and 590 feet. In Iowa, Holocene surfaces occur between 580 and 590 feet, although along the Iowa valley margin the late Woodfordian/early Holocene surface occurs between 585 to 590 feet. The early to mid Holocene surfaces are observed in the Schricker Slough area to the north and in the SE 1/4 of Section 35 near Cordova Slough to the south. These surfaces abut the late Woodfordian/early Holocene terrace which was dated 9,700 yr BP.

The southern meander belt of the Wapsipinicon shows surfaces of late Holocene age. Additional young surfaces are along the main channel margin and the islands. Island development is probably late Holocene age and similar to what is observed to the south in Pools 17, 18, 21, and 22 (Benn, et al, 1988, Anderson, et al, 1988, Anderson, et al, 1989).

Historical deposits are widespread in this study area but are most evident near the main channel and in the Wapsipinicon meander belt. At these locations, PSA deposits exceed one meter, however, areas protected by the levee system and some early to mid Holocene surfaces have little, if any, PSA. For example, Adams Island showed PSA to a depth of 120 cm, whereas ST 5 near Schricker Slough showed 8 cm of PSA.

Other Pool 13 and 14 Areas

The others include just upstream of Lock and Dam 14 to about Princeton, Camanche to Lock and Dam 13, and from Lock and Dam 13 to Sabula. The reach above Lock and Dam 14 up to Princeton and Cordova consist of the Port Byron Gorge. A Wisconsinan aged loess capped terrace was observed just south of Cordova. This surface lies between 650 and 600 feet and contains approximately two meters of loess capping the surface which in turn overlies main valley alluvium. Late Woodfordian terraces occur along the valley margins, however, their distribution is limited since the main channel occupies most of the area within the valley walls. The distribution of Holocene surfaces in the gorge are mostly confined to fans which enter from the valley margins. The fans overlie bedrock benches in some cases, while in others they are inset into late Woodfordian terraces.

Upstream from Camanche to Clinton, late Woodfordian/early Holocene surfaces occur along the Iowa valley margin. These surfaces are contemporaneous with the 9,700 yr BP surface in the Wapsipinicon study area. Early to mid Holocene surfaces occur along the western margin of Beaver slough based on visual bank profile exposures. Along the east side of the valley near east Clinton a profile was described from an early to mid Holocene surface. The upper end of Schricker slough shows primarily late Holocene surfaces capped by thick PSA deposits. A core showed 140 cm of PSA just downstream from Camanche and bank exposures showed up to 2 meters of PSA adjacent the main channel.

Upstream of Lock and Dam 13 to about Sabula, most Holocene surfaces are inundated by pool impoundment. This is based on evidence from the Brown's survey conducted in the 1920s. In this region, areas exposed are either very late Holocene surfaces such as islands with thick PSA deposits or late Woodfordian outliers. Alluvial fans occur along the Iowa side of the valley, many of which are expected to contain a thick historical component. The coarse textured outwash deposits occurring along the Illinois valley margin are of late Woodfordian age. This surface shows late Woodfordian paleochannels which have been located from the original GLO surveys. These former lakes have been drained and are currently in agricultural production.

Finally, the area north of Savanna in the Mississippi Palisades State Park region shows considerable valley constriction (Figure 2.12). Surfaces here are late Holocene aged and covered by thick historical alluvial deposits. The ridge and swale topography in this reach of the river suggests that lateral stream migration has probably occurred recently during the late Holocene period. Distribution of older early to mid Holocene surfaces at this location are unknown, however, if they occur, they are probably of very limited distribution.

Conclusion

The distribution of late glacial surfaces is strongly affected by upstream events. These events of glacial advance, retreat, and catastrophic lake discharge are shown in Pools 13 and 14 along the valley margin expressed as a series of high sandy terraces. So far, the oldest Wisconsinan terrace identified in the study area occurred in Cordova. The sandy terrace occurs at about 660 feet and has a loess cap of variable thickness ranging from 3 to 6 feet. No other direct stratigraphic evidence of older Wisconsinan aged loess capped terraces was recovered in the study area, however observations west of Sabula indicate that an older Wisconsinan surface occurs abutting the Iowa valley wall. It is unclear if this surface is correlative to the terrace at Cordova, or to the 18,000 yr BP Savanna terrace in Beaver Creek, or not related to either terrace.

The evidence to date suggests that there are two Savanna terrace aggradational sequences; one developing after 18,000 yr BP, and another after 14,000 yr BP. Apparently an episode of valley incision occurred between 18,000 and 14,000 yr BP. Up to 60 feet of incision occurred which was followed by stability and soil development.

The pools show development of three late Woodfordian surfaces, the highest probably containing the last Savanna sequence. These surfaces occur throughout both pools and were evaluated in the Bellevue/Crooked Slough, Green Island, and Savanna/Sabula study areas. The approximate elevations of the three surfaces are 640, 620, and about 600 feet with the lower two surfaces experiencing some late Woodfordian/early Holocene erosion. Investigations of the 640-foot surface in the Savanna/Sabula study area showed high magnitude discharges associated with sand and gravel pits. An apparent correlative surface was cored about 1-1/2 miles away and showed finer grained deposits associated with lower magnitude discharges. The core from this surface showed laminae of sand, silty sand, silt, and units of red clay interbedded throughout the terrace profile. A thin loess cap was recorded on the surface which probably represents one of the final increments of local loessfall. The radiocarbon and stratigraphic evidence suggests that aggradation of this surface apparently occurred sometime after 14,000 yr BP, but before the last increment of loessfall around 12,500 yr BP. (Benn, et al, 1988, Ruhe, 1969). The two successively lower Woodfordian surfaces show no loess cap and probably experienced surface erosion since gravel lags were identified in some of these profiles.

The late Woodfordian/early Holocene erosional events removed considerable volumes of main valley alluvium. Profiles showing red clay, erosional lags and no soil development at the contact between red clay and tributary hill-slope alluvium suggest high magnitude erosional events occurring during this period.

The lowest late Woodfordian/early Holocene surface was under construction from about 10,000 to 9,500 yr BP. The evidence of this is seen in Pool 14 just upstream from the Wapsipinicon River where plant remains taken from a unit of red clay provided a date of 9,900 yr BP. This surface was overlain by 1 meter

of gray and red clay containing abundant plant remains. A unit of peat developed in the top of this deposit and provided a date of 9,700 YR BP. The evidence indicates that fine grained deposits from glacial lakes Agassiz and Superior accumulated during this period. This surface was later abandoned after 9,700 yr BP as indicated by an approximate 1 meter scarp onto the younger Holocene surfaces. Although no radiocarbon dates were collected from Holocene surfaces in Pool 14, soil profiles show well developed horizons on the early to mid Holocene surface.

The evidence in Pool 14 so far shows that near the Wapsipinicon, major valley incision did not occur compared to farther upstream in the Pool 13 study areas. Apparently major incision up to about 15 or more feet occurred in Pool 13 based upon deep burial of early to mid Holocene surfaces. The Wapsipinicon study area in Pool 14 showed no buried early to mid Holocene surfaces from the described profiles.

Evidence from Pool 13 shows that considerable valley incision occurred sometime between 9,700 and 7,200 yr BP. Following the dramatic impacts from upstream late glacial events, main valley adjustments apparently became more sensitive to local parameters such as tributary discharge and associated sediment yields, and local valley morphology. At locations where rapid valley widening exists, multiple Woodfordian and Holocene aged surfaces can be found. In contrast, areas of valley constriction have experienced lateral reworking during the Holocene and show existing surfaces of relatively young age.

As a result, the upper Mississippi should be viewed as a series of individual reaches that show general correlations between late Wisconsinan surfaces, obscure correlation between early to mid Holocene surfaces, and somewhat better correlation with the late Holocene surfaces. The difficulty in correlating early and mid Holocene surfaces throughout the upper Mississippi Valley, comes first from the relative degree of major late glacial valley incision in specific reaches. Certain reaches in the valley experienced major valley incision while others did not. And following the late glacial events, the role of tributaries and local valley parameters began playing a much more important role in main valley evolution. The tributaries and local hillslopes were sensitive to Holocene climates and associated hydrologic and vegetational changes.

Major tributary influence apparently began early during the Holocene based on the development of tributary fans and relative ages of surfaces located adjacent to fans. The effect of these tributaries on the Mississippi are two-fold. First, the development of tributary alluvial fans acted to displace the main Mississippi River channel against the opposite valley margin. Therefore, older early to mid Holocene surfaces occur buried beneath thick fan deposits. Secondly, tributary sediment loadings apparently affected local main valley channel patterns and more importantly aggradation rates. Aggradation rates are high in reaches where major tributaries enter the main valley.

Early to mid Holocene main channel patterns are unclear. Downstream in Pools 21 and 22 a more sinuous main channel pattern was dated 8400 yr BP (Anderson et al, 1989). Evidence like this in Pools 13 and 14 is not apparent, although the abandon channels and lakes suggest that at least some channel changes may have occurred during the Holocene.

Throughout Pools 13 and 14 and further downstream, evidence of widespread late Holocene main valley aggradation is recorded (this report, Benn, et al, 1988, Anderson, et al, 1988, Anderson, et al, 1989). Evidence from cores shows that some early Holocene surfaces closer to the valley margin show a buried deposit of relatively fine grained alluvium (silty clay loam), capped by a slightly coarser (silt loam) late Holocene deposit. The higher sand fraction in the upper unit relates to an increase in the frequency and magnitude of floods during the late Holocene. Lateral floodplain reworking and incision in the tributaries as late Holocene climates became more moist promoted renewed valley alluviation in the Mississippi River System (Knox 1984, Anderson et al. 1988; Anderson et al. 1989). Currently, the evidence suggests that late Holocene valley alluviation was widespread throughout much of the Upper Mississippi River System as seen through the Odessa sequence (Benn, et al, 1988), and through buried late Holocene soils and island development (Anderson, et al, 1988, Anderson, et al, 1989).

The distribution and thickness of PSA varies greatly throughout the study area. Immediately downstream of the lock and dams near the valley margins, little if any recent deposits exist. This is also true for the Woodfordian surfaces where only a few late Woodfordian/early Holocene paleochannels contain a modest amount of PSA. However most areas, particularly riverward of levee systems, contain thick PSA deposits. Nearly all late Holocene surfaces contain PSA thicknesses greater than 50 centimeters. Areas where these deposits are especially thick are just downstream of tributary confluences, at the base of steep valley sideslopes, in Holocene Mississippi River abandons, along main channel margins and islands, and upstream from the locks and dams where impounded Holocene surfaces occur.

The combination of thick PSA deposits and rising pool levels has obscured many presettlement surface bank exposures. For example during normal pool, presettlement surface exposures along banks are inundated downstream of lower Brown Lake in Pool 13. In Pool 14 the presettlement surface lies at or below pool levels below Camanche. Only slightly higher early to mid Holocene surfaces in the Wapsipinicon area, Holocene deposits overlying bedrock benches, and tributary fans on late Woodfordian surfaces show pre-settlement surface exposures above pool impoundment.

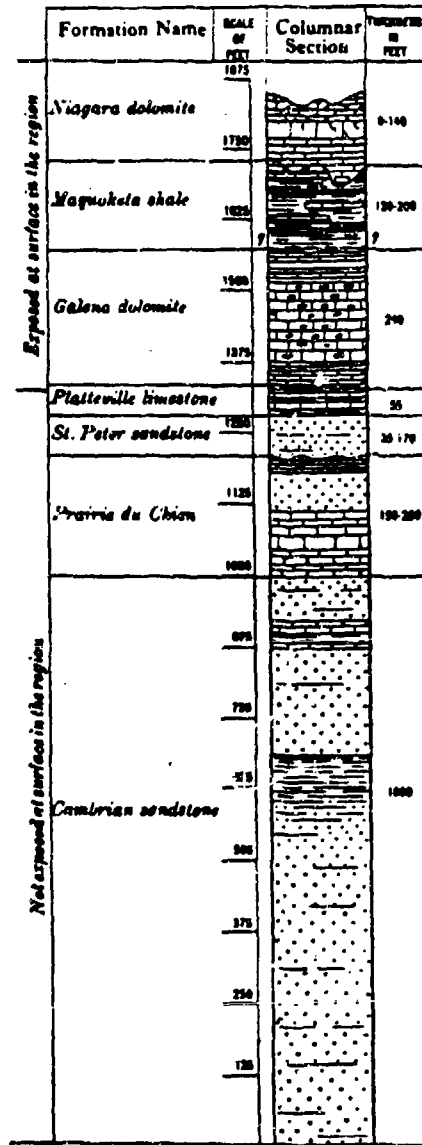


Figure 2-1. Generalized Stratigraphic sequence in the northern end of the project area. (after Trowbridge and Shaw, 1916)

TIME-ROCK UNITS			ROCK UNITS							
SYSTEM	SERIES	GROUP	FORMATION	THICKNESS ft. (m)	DESCRIPTION					
PERMIAN	Permian	KEWANEE	Sutton	0-200(61)	Shale and sandstone with thin coals and limestone					
							McCORMICK	Abbott	0-140(43)	Limestone, dolomite
DEVONIAN			Center Valley Limestone	0-140(43)	Limestone, dolomite					
			Washington L.	0-60(18)						
SILURIAN	Nagaran		Reno	200(61)	Dolomite					
			Maples	40(12)						
			Cooney	25-85(11.2-20)	Dolomite					
			Blair	25-50(11-15)						
			Brantford Shale	75-80(23-27)	Shale					
ORDOVICIAN	Cincinnatian	MAQUOKETA	Fort Amersan	15-20(4.5-6)	Dolomite, shale					
			Scott Shale	130(37)	Shale					
	Thompsonian	GALENA	Waco Lobe	110(34)	Dolomite					
			Quincy	130(40)	Dolomite, shaly					
			Curran	20(6)	Dolomite, shale					
		PLATTEVILLE		65-130 (20-40)	Limestone, dolomite					
			Greenwood	5(1.5)	Sandstone, silt.					
		Cincinnatian	PRAIRIE DU CHIEN	Shannon	207(63)	Dolomite				
	New Richmond			50(15)	Sandstone					
	Onondaga				Dolomite					
	CAMBRIAN	Cranian		Onondaga	60(18)	Dolomite, sandy				
				Potosi	100(31)	Dolomite				
				Frederick	100(30)	Sandstone, dolomite, shale				
				Horton-Galesville	130(40)	Sandstone				
Eau Claire				300(91)	Sandstone, siltstone, shale					
Mt. Simon				1250(381)	Sandstone					
PRECAMBRIAN					gneiss (granite)					

Figure 2-2. Generalized Stratigraphic sequence near the southern end of the project area. (after Hammer et al, 1985)

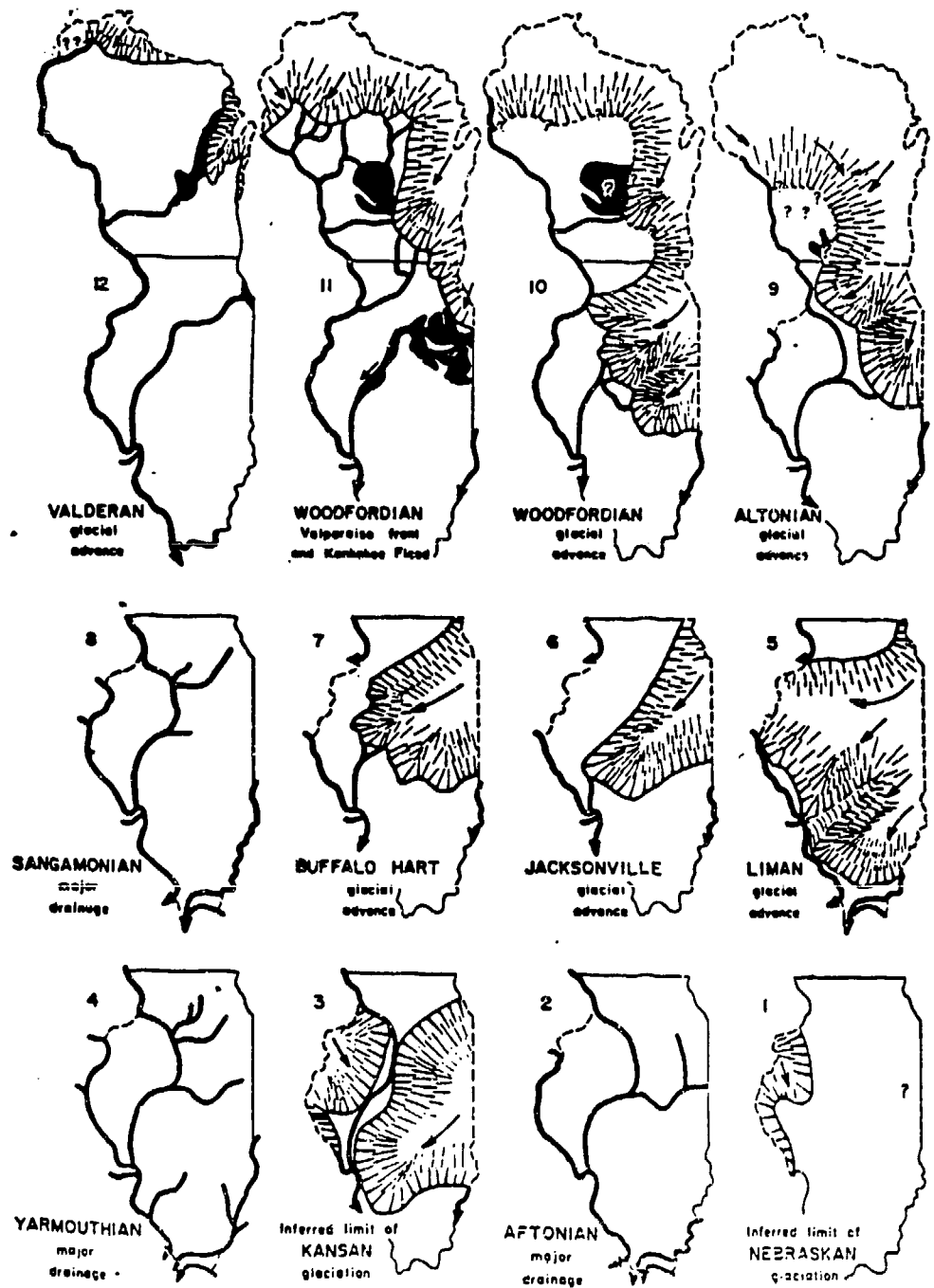


Figure 2-3. Glacial and Drainage History of Illinois and Wisconsin (Frye et al., 1965).

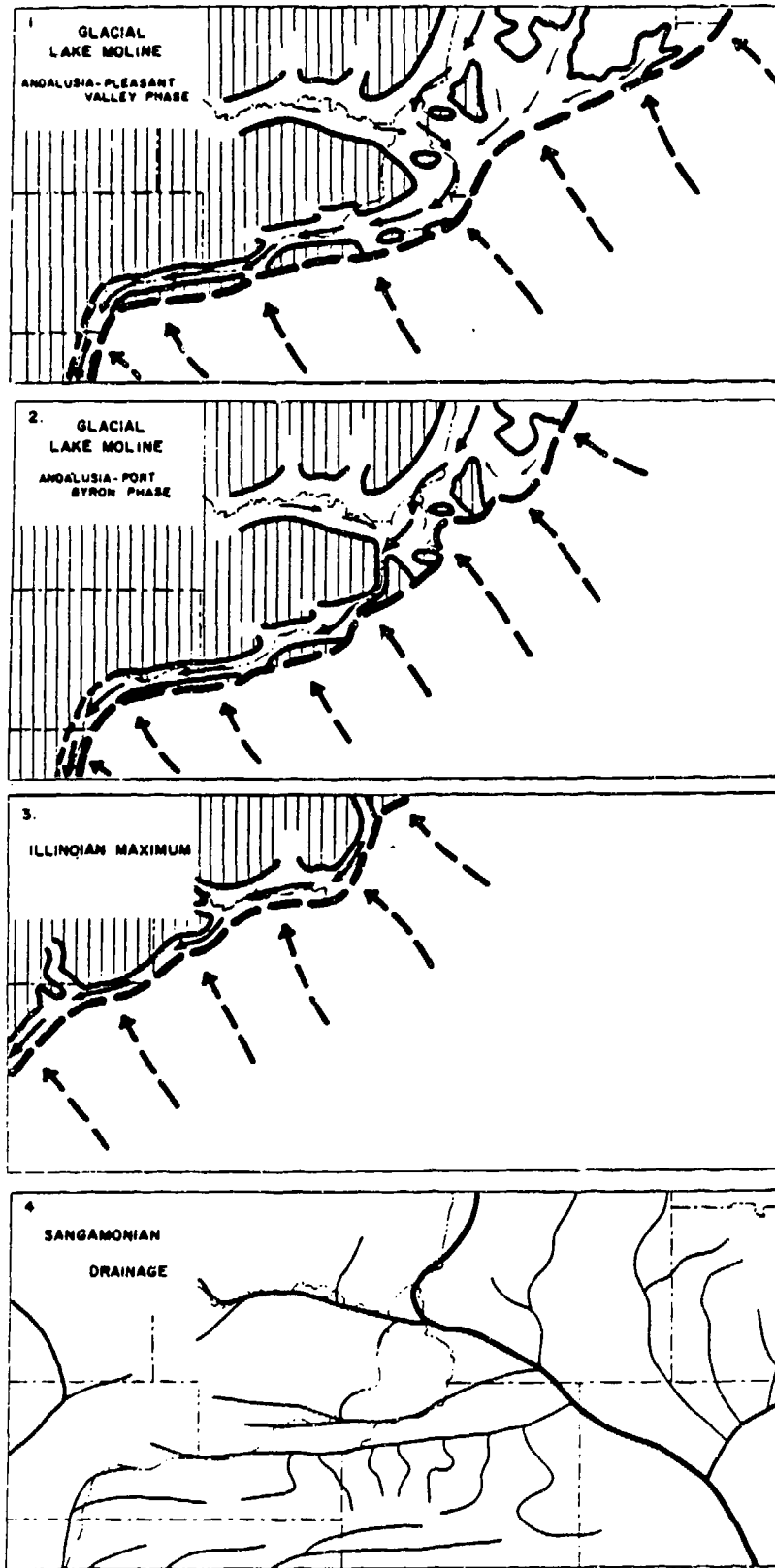


Figure 2-4. Mississippi River diversion during Illinoian Stage and following Sangamonian drainage through the Princeton Bedrock Valley. (after, Anderson, 1968)

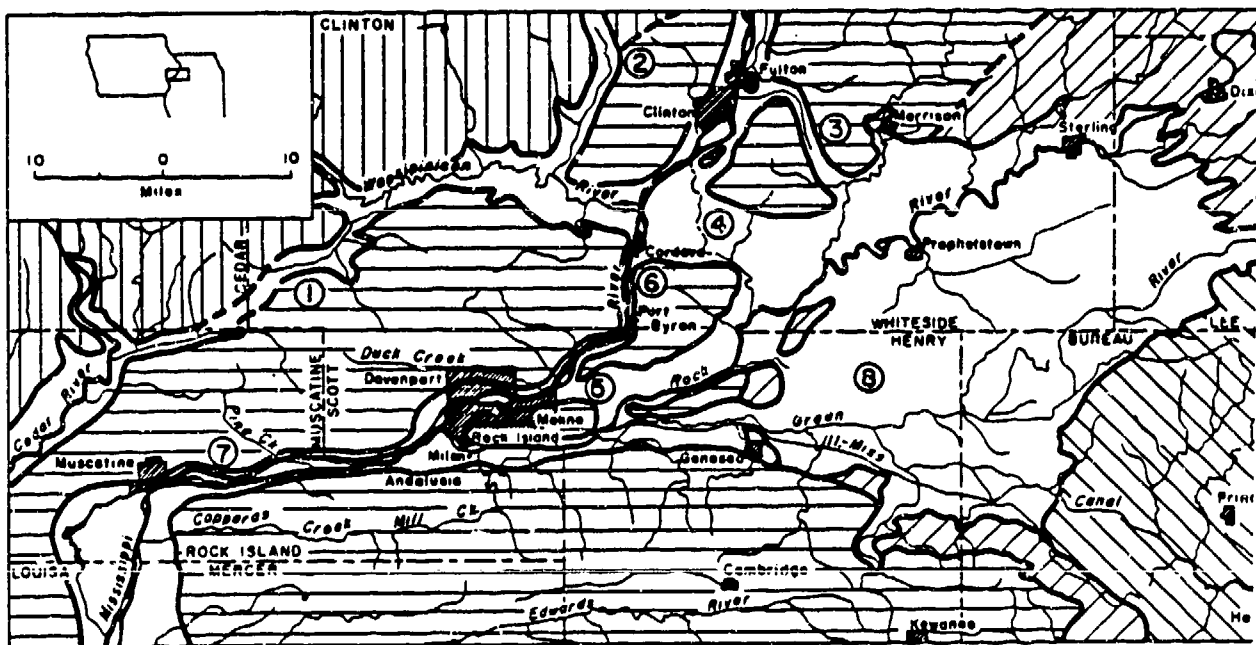


Figure 2.4A Glacial Geology and Drainage of the Rock Island Area. Vertical lines: Pre-Illinoian Drift with loess cap; Horizontal lines: Illinoian Drift with loess cap; NE/SW lines: Shelbyville Drift; NW/SE lines: Bloomington and younger Drift. 1= Cleona Channel; 2= Goose Lake Channel; 3= Cattail Channel; 4= Meridiosia Channel; 5= Pleasant Valley; 5= Port Byron Gorge; 7= Andalusia Gorge; 8= Green River Lowland. (after Anderson, 1968).

GEOMORPHIC SURFACES OF POOL 13

BELLEVUE/CROOKED SLOUGH

STUDY AREA

WISCONSINAN (>15,000 YRS)

LATE WOODFORDIAN (10,000 - 15,000 YRS)

EARLY TO MIDDLE HOLOCENE (7,000 - 10,000 YRS)

MIDDLE TO LATE HOLOCENE (4,000 - 7,000 YRS)

LATE HOLOCENE (<4000 YRS)

HOLOCENE ALLUVIAL FANS AND COLLUVIAL SLOPES

PALEOCHANNELS

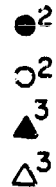
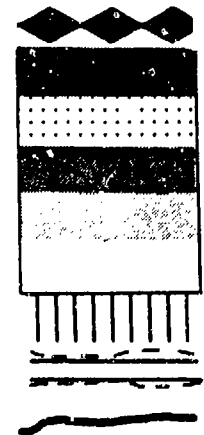
VALLEY WALL

SAMPLING TUBE LOCATION WITH RADIOCARBON DATE

SAMPLING TUBE LOCATION

GIDDINGS PROBE LOCATION WITH RADIOCARBON DATE

GIDDINGS PROBE LOCATION



SOURCE: GREAT II BASE MAP

Figure 2.5 legend

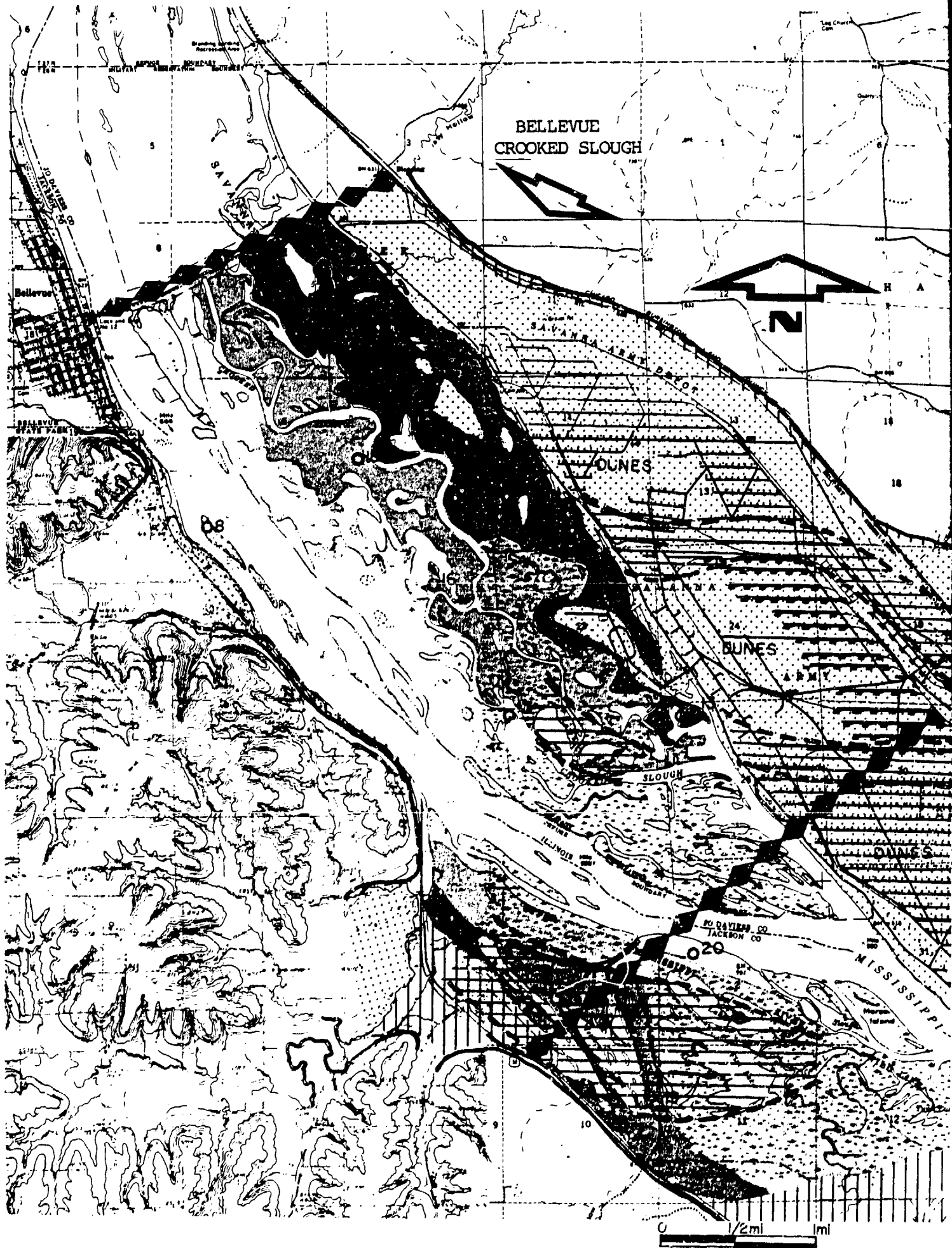


Figure 2.5 Bellevue/Crooked Slough Study Area.

GEOMORPHIC SURFACES OF POOL 13

GREEN ISLAND

STUDY AREA

WISCONSINAN (>15,000 YRS)

LATE WOODFORDIAN (10,000 - 15,000 YRS)

EARLY TO MIDDLE HOLOCENE (7,000 - 10,000 YRS)

MIDDLE TO LATE HOLOCENE (4,000 - 7,000 YRS)

LATE HOLOCENE (<4000 YRS)

HOLOCENE ALLUVIAL FANS AND COLLUVIAL SLOPES

PALEOCHANNELS

VALLEY WALL

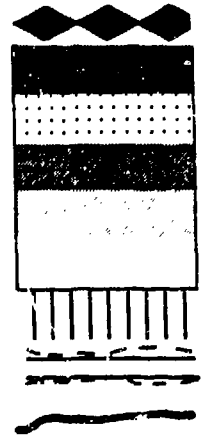
SAMPLING TUBE LOCATION WITH RADIOCARBON DATE

SAMPLING TUBE LOCATION

GIDDINGS PROBE LOCATION WITH RADIOCARBON DATE

GIDDINGS PROBE LOCATION

SOURCE: GREAT II BASE MAP



●²

○²

▲³

△³

Figure 2.6 legend

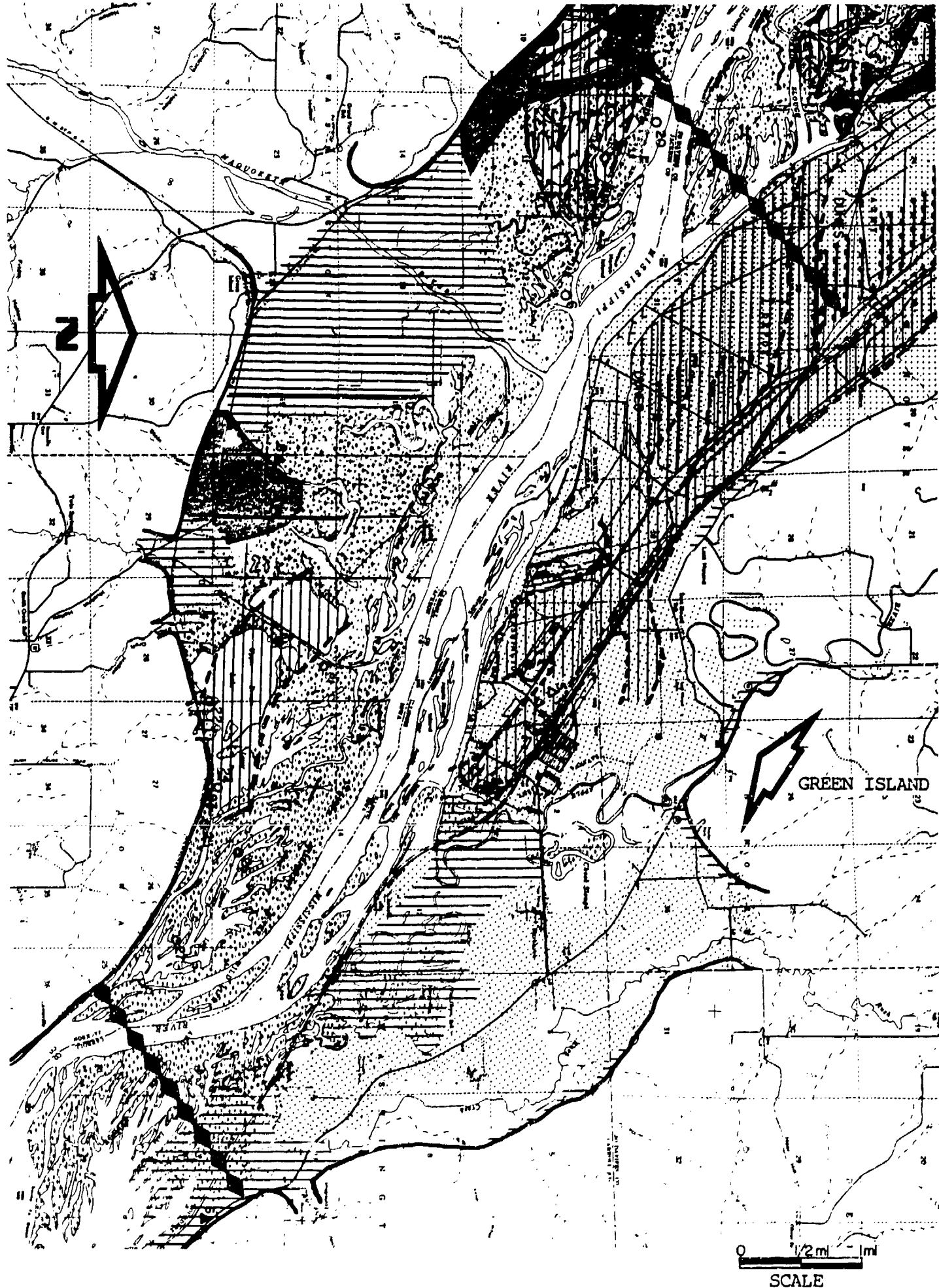


Figure 2.6 Green Island Study Area.

GEOMORPHIC SURFACES OF POOL 13

SAVANNA/SABULA

STUDY AREA

WISCONSINAN (>15,000 YRS)

LATE WOODFORDIAN (10,000 - 15,000 YRS)

EARLY TO MIDDLE HOLOCENE (7,000 - 10,000 YRS)

MIDDLE TO LATE HOLOCENE (4,000 - 7,000 YRS)

LATE HOLOCENE (<4000 YRS)

HOLOCENE ALLUVIAL FANS AND COLLUVIAL SLOPES

PALEOCHANNELS

VALLEY WALL

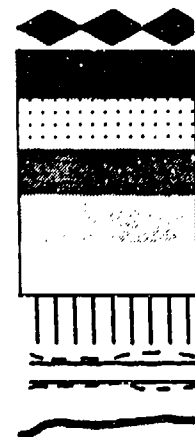
SAMPLING TUBE LOCATION WITH RADIOCARBON DATE

SAMPLING TUBE LOCATION

GIDDINGS PROBE LOCATION WITH RADIOCARBON DATE

GIDDINGS PROBE LOCATION

SOURCE: GREAT II BASE MAP



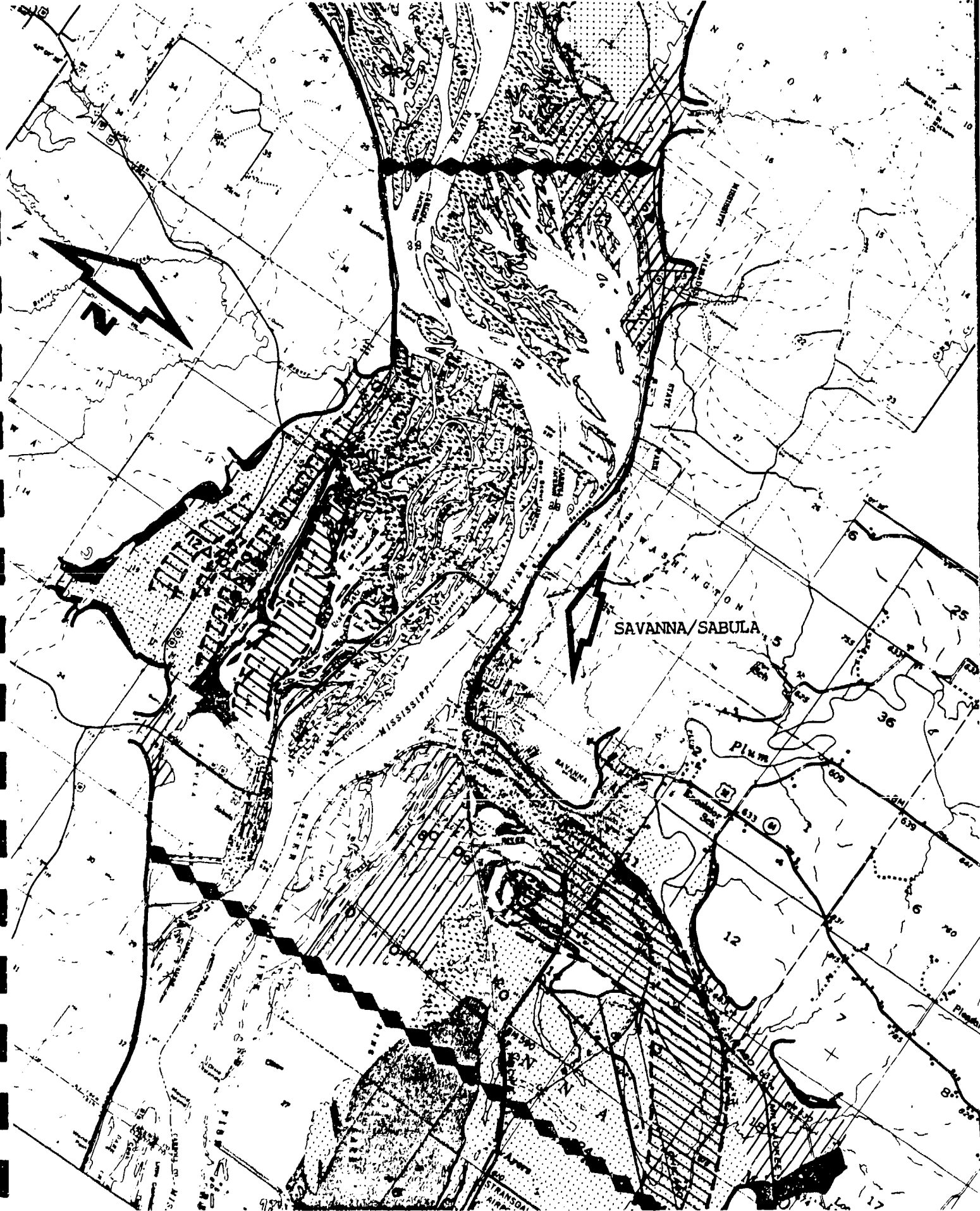
●²

○²

▲³

△³

Figure 2.7 legend



SAVANNA/SABULA

0 1/2mi 1mi
SCALE

GEOMORPHIC SURFACES OF POOL 14

WAPSIPINICON

STUDY AREA

WISCONSINAN (>15,000 YRS)

LATE WOODFORDIAN (10,000 - 15,000 YRS)

EARLY TO MIDDLE HOLOCENE (7,000 - 10,000 YRS)

MIDDLE TO LATE HOLOCENE (4,000 - 7,000 YRS)

LATE HOLOCENE (<4000 YRS)

HOLOCENE ALLUVIAL FANS AND COLLUVIAL SLOPES

PALEOCHANNELS

VALLEY WALL

SAMPLING TUBE LOCATION WITH RADIOCARBON DATE

SAMPLING TUBE LOCATION

GIDDINGS PROBE LOCATION WITH RADIOCARBON DATE

GIDDINGS PROBE LOCATION

SOURCE: GREAT II BASE MAP

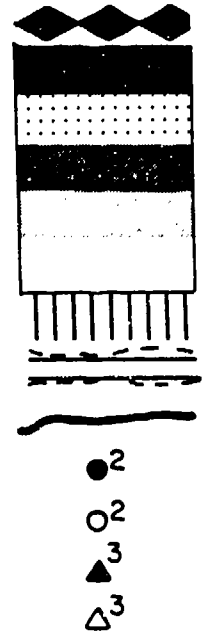


Figure 2.8 legend



Figure 2.8 Wapsipinicon Study Area.

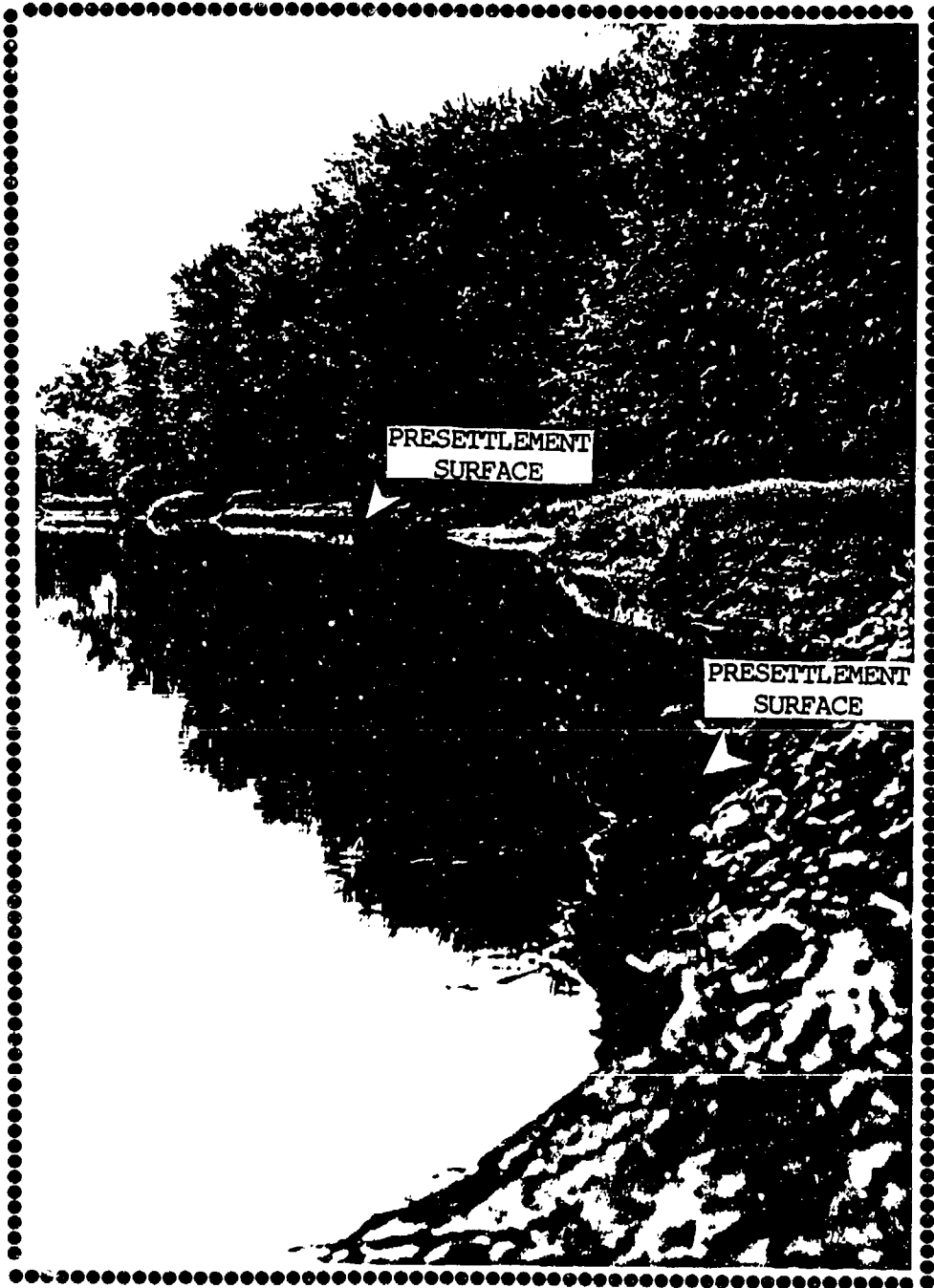


Figure 2.9. Photograph showing presettlement/PSA contact near ST 21 core



Figure 2.10. Drum partially buried by PSA near north margin of Upper Brown's Lake

ALLUVIAL
FANS

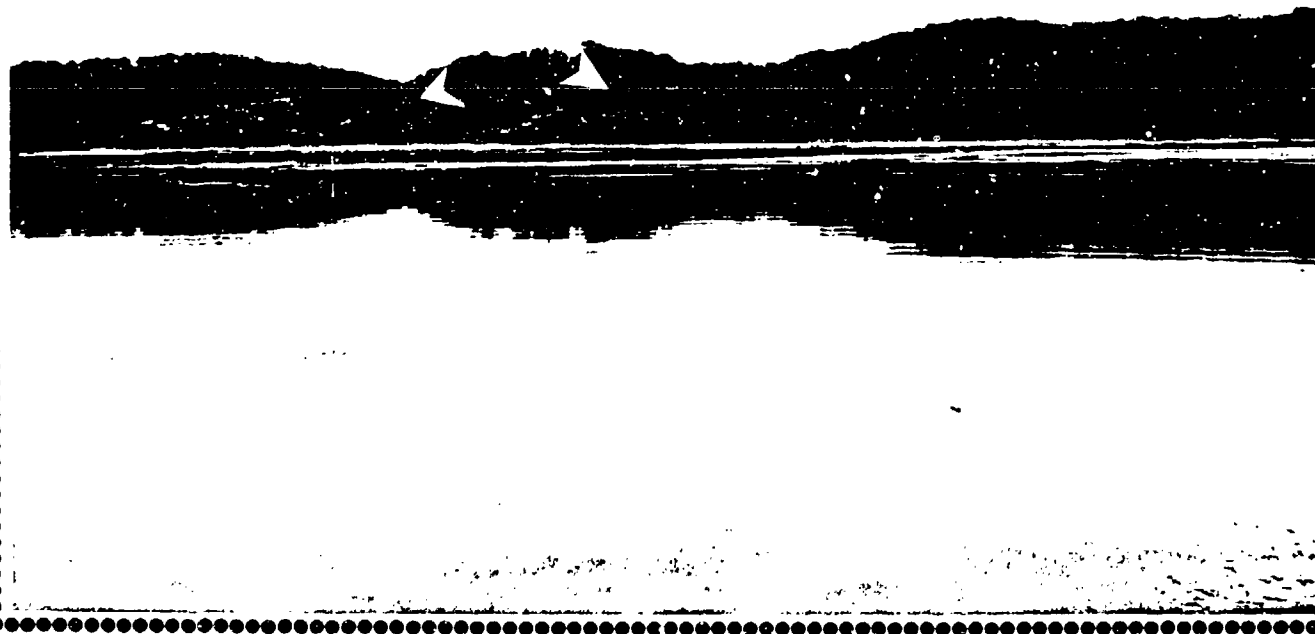


Figure 2.11. Pair of fans entering Upper Brown's Lake in the Green Island Study Area. Fans are in St 22 location and show thick PSA deposits.

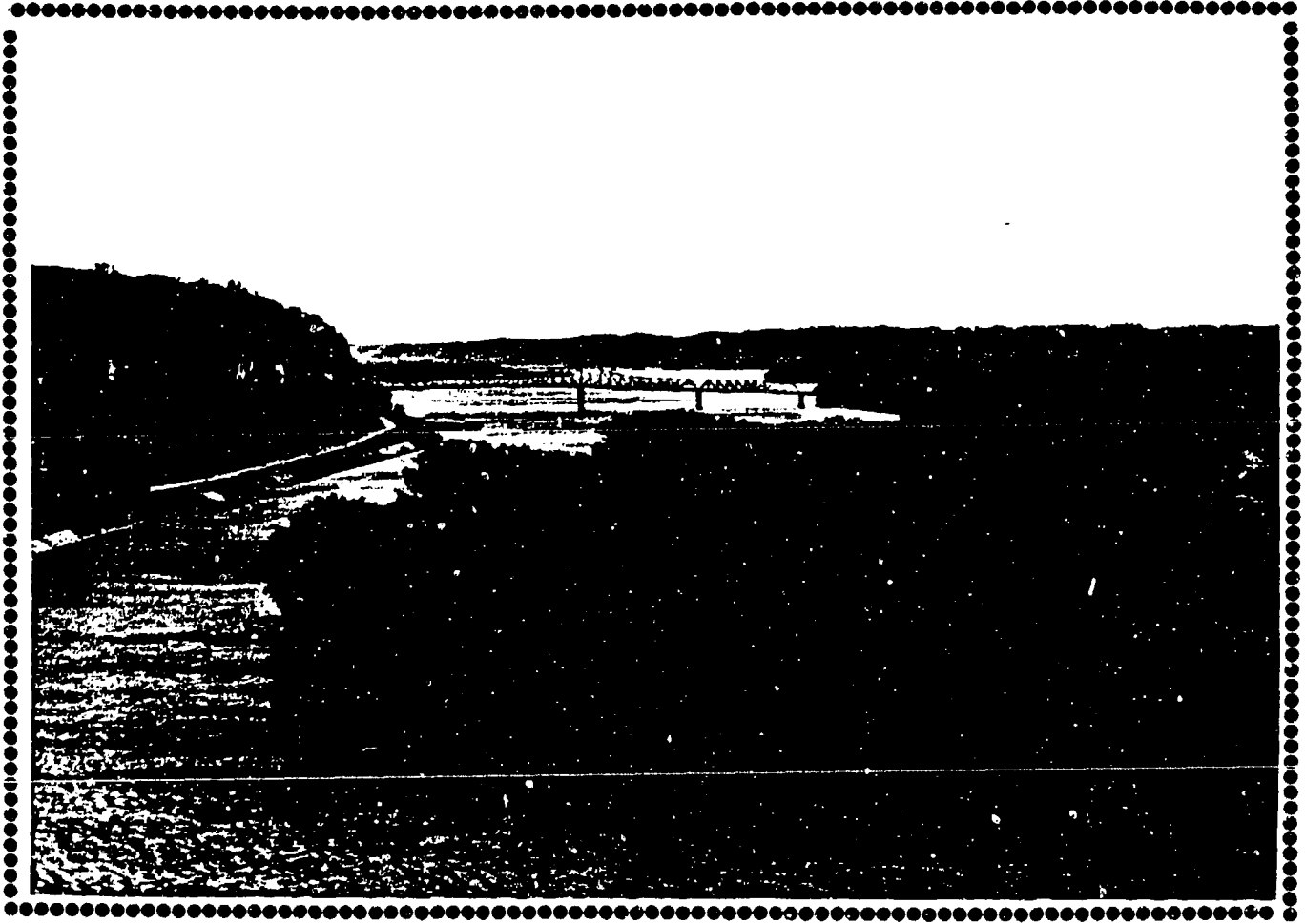


Figure 2.12. Foreground: Mississippi River Palisades valley constriction.
Background: Savanna/Sabula Study area downstream of U.S. 52 bridge.

III
ARCHIVAL RESEARCH
by
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An important result of the increased attention given historical and industrial archaeology, and their integration into historic preservation projects, is increased collaboration between archaeologists and historians. Predicting where one will find historic archaeological sites, and what they will look like, naturally requires historical research before field surveys begin . . . After some initial conflicts between archaeologists who seemed to believe that they could do without historians and historians who objected to being left out of historical research, inter-disciplinary collaboration has increased steadily in recent years, with positive results for both fields.

Thomas F. King in Stipe and Lee
The American Mosaic (1988)

Introduction

The underlying reason for including an archival research element as part of the archaeological and geomorphological study of Navigation Pools 13 and 14 is the growing recognition by public agencies and the professional archaeological community that historic archaeological resources have cultural resource value and should be identified, evaluated and protected (see South 1976; Deetz 1977; King 1988:244-246). The immediate purpose of the archival research was to gather the data and information needed to identify historic archaeological properties in the project area. The archival research was also intended to define historic contexts as the basis for evaluating site significance.

This chapter is divided into three parts, beginning with a general discussion of archival research methods and sources, followed by a thematic overview of Upper Mississippi Valley history, and concluding with a summary of local historic data. The goal of the overview section is to provide the users of this report with background information on the history of the Upper Mississippi Valley, with special reference to regional patterns of settlement and economic development applicable to sites within Navigation Pools 13 and 14. The overview has been written in the format of a series of historic contexts that characterize historic sites in the Upper Mississippi Valley and which correspond to selected broad themes in regional history. A historic context is, by definition, "an organizational framework that groups information about related historic properties based on a theme, geographical area, and period of time" (NPS 1983:

44718). Historic contexts provide the framework for seeking out site specific data, which are the basis for site identification models that can be tested through archaeological fieldwork. In April 1988, the Center for Archaeological Research published an overview of the archaeology and geomorphology of Navigation Pools 17 and 18 (Benn, Bettis and Vogel 1988), which provided an initial set of thematic historic contexts for the region. Archival data developed as part of the Pools 13-14 project was used to augment, refine and revise these historic contexts.

Perhaps the most important product of the archival research was the identification of potential historic archaeological sites in the the project area. Site specific data is presented below in the form of a summary of local history, organized geographically. Because the archival research was intended to provide initial identification of potential National Register eligible properties, site documentation was selective and geared toward meeting the needs of a reconnaissance survey, rather than for intensive survey or evaluation: in other words, it was not our intention to reconstruct the specific histories of every recorded and potential historic site in Pools 13 and 14.

Archival Methods and Sources

The mass of archival data pertaining to Pools 13 and 14 was not particularly voluminous, but it was widely dispersed (see Annotated Bibliography of Archival Sources). Decisions about what sources to consult as part of the archival investigation were based on the project's CRM goals. It goes without saying that archival research, like archaeological fieldwork, does not have to be 100% complete and comprehensive in order to be useful.

The historian's initial task was to assemble the existing information about historic archaeological resources in Navigation Pools 13 and 14. This included reviewing the reports of previous surveys of cultural resources in the Rock Island District Corps of Engineers, and searching statewide inventories maintained by the State Historic Preservation Officers for Iowa and Illinois. The records of the National Register of Historic Places, Historic American Building Survey, and Historic American Engineering Record were also consulted.

Next, archival research focused on refining the historic contexts for the Upper Mississippi Valley, previously developed as part of the survey of Navigation Pools 17 and 18 (see Benn, Bettis and Vogel 1988:228-263). Historical research already done for other cultural resource studies in the Upper Mississippi region (see, e.g., Anderson, Green & Vogel 1988:16-41; Rogers & Vogel 1989:7-39; Great Lakes Archaeological Research 1982) was incorporated into the Pools 13 and 14 project so that the present archival investigation would complement previous efforts, rather than duplicate them. This background data was synthesized in the thematic overview presented below. Bibliographic control for the

historic context research was provided by Beers (1964), Murdock (1960), and Winther (1961); by the card catalogs and guides to the general and special collections of the research libraries at the University of Minnesota in the Twin Cities, the University of Iowa at Iowa City, the University of Wisconsin at Madison; and local public libraries in the project area.

Throughout the archival investigation, the historian was on the lookout for sources of site-specific location data. Township plats and county atlases occasionally pin-pointed the locations of individual buildings, which provided the initial list of sites to be investigated. Historic maps and plans also provided documentation for changing settlement and land use patterns over time. Plats and field notes compiled by the General Land Office surveyors who laid out the original township and section lines in the early 1800's were available in the county courthouses and were particularly useful for documenting the earliest Euro-American presence in the project area. Maps and charts prepared under the auspices of the Corps of Engineers and the Mississippi River Commission identified patterns of land use along the river and documented changes in the physical characteristics of the river environment over time.

Potential sites within Pools 13 and 14 were located and identified on the basis of context-based research in local sources. Research in local sources was guided by the bibliographies of Kaminkow (1975) and Peterson (1978); by the county atlas bibliography compiled by the Library of Congress (1950-1953); and by the state guides assembled by Buck (1914) for Illinois and Petersen (1952) for Iowa. After site specific data was assembled and analyzed within the organizational framework of historic contexts, potential site locations were mapped.

The archival research involved both primary and secondary source materials. Primary sources included manuscripts, printed documents, narrative histories, and maps; the published journals of travelers, early ethnographic accounts, and government surveyors' fieldnotes; the recollections of early settlers, periodicals, commercial directories, and census rolls; and county plats, deed records, land entry books, and bond registers. Secondary sources included general surveys, historical and geographical works dealing with social, economic, and settlement systems operating in the Upper Mississippi Valley; state and local histories; monographs, pamphlets, and journal articles; historic preservation survey reports, archaeological site reports, and research papers.

Extensive use was made of the research facilities of the state historical societies of Iowa and Illinois. Both the Des Moines and Springfield research centers maintain archives and publication programs, although neither appears to have developed any special interest in the culture history of the lands bordering the Upper Mississippi River. Guides by Harris (1973) and Petersen (1952) greatly simplified the historian's work in

Des Moines. However, research in Springfield was inhibited somewhat by the lack of published guides to the collections there. Both organizations have excellent collections of published county histories, atlases, biographical albums, censuses, directories, and local genealogical compilations.

By far the most accurate and reliable record of the project area's physical development was found in the vaults of the various county clerks of court, recorders, and assessors. Deed records and plats of survey were especially useful for analyzing local patterns of settlement and economic development, and for identifying the locations of individual properties. While all of the county clerks, recorders, and assessors employ staff familiar with undertaking research in old county records, there are marked differences in clerical procedures and archival practices from one courthouse to another.

Public libraries in the communities lying within or adjacent to Pools 13 and 14 were in general good places to undertake research. The larger municipal libraries in Dubuque, Davenport, and Rock Island all house special history collections; even the smallest township free libraries have shelf space reserved for local histories, old newspapers, photographs, etc. While these local history collections are generally oriented towards genealogy, they offer many valuable sources of information on local places and events.

The basic sources for local history, of course, were the county narrative histories. Most of these are vintage collections of local lore assembled in the late 1800's and were originally published by subscription -- therefore, it comes as no surprise that the bulk of the text in these books is devoted to political history and the careers of selected leading men. Later "modern" county histories are largely distillations of the information contained in the old histories, fleshed out with the reminiscences of old folks and some antique photographs.

Thematic Overview of Upper Mississippi Valley History

The purpose of this section is to provide an historical framework for making decisions about the historical significance and potential scientific value of archaeological sites located in Navigation Pools 13 and 14. It is not our intent to analyze and interpret the history of everything that happened along the Upper Mississippi River -- to write such a history would certainly be a herculean task. It would also be presumptuous: not only is three hundred years -- ca. 1640 to 1940 -- a large chunk of history with which to deal, but there are also some significant gaps in the historical record. For this kind of investigation, the historical overview is best presented in the form of a brief outline of regional historic contexts that provide the background

for decisions involving site identification and significance. A bare outline of regional history is provided in the "Chronology of Upper Mississippi Valley History" in Appendix C.

The historical focus of the overview spans three centuries, and the geographical limits include the present states of Iowa and Illinois, with parts of Minnesota, Wisconsin, and Missouri thrown in for good measure. The range of source materials is also extensive, and to cite every one of the sources consulted using the standard author-date style would produce an unnecessarily bulky text. For this reason, reference citations have been omitted from the overview text except for direct quotes.

The Upper Mississippi Borderlands (1640s-1803)

The Upper Mississippi Valley was early recognized as having geographic and economic importance. During the seventeenth century, French missionaries and coureurs de bois based in the eastern Great Lakes made intermittent trips to the Upper Mississippi country seeking converts and pelts. Between 1654 and 1660, a couple of sharp traders from Trois Rivieres, Pierre Esprit Radisson and Medard Chouart, Sieur des Groseilliers, penetrated the country west of Lake Superior and opened the trade route between Huronia and the "upper country." Systematic exploration of the Upper Mississippi Valley began with the work of Robert Caveller, Sieur de la Salle, in 1669. Although other Frenchmen had doubtless seen the Upper Mississippi, its discovery is usually accredited to the Jesuit missionary Father Jacques Marquette and the trader Louis Jolliet, who set out from the Straits of Mackinac in May 1673 and reached the Father of Waters via the Fox-Wisconsin River route. Marquette and Jolliet, accompanied by five voyageurs, descended the Mississippi as far as the mouth of the Arkansas River, then retraced their route upriver to the Illinois River, by which they returned to Lake Michigan. They were followed by the Recollect missionary Father Louis Hennepin, who ascended the Mississippi from the Illinois River all the way to the Falls of St. Anthony in 1680. La Salle eventually explored the great river to its mouth, where on 9 April 1682 he took possession of the watershed for France and named it Louisiana in honor of the French king.

While the geographical data contained in the accounts of the earliest explorers was often obscure and sometimes absolutely fictitious (e.g., the Baron Lahontan's "Riviere Longue"), the Frenchmen of Canada were quick to realize the economic potential of the Upper Mississippi. In 1685 the governor-general of New France commissioned an experienced trader by the name of Nicolas Perrot commandant of the west and instructed him to conduct a reconnaissance of the Upper Mississippi Valley. Sometime around 1687, Perrot founded a post he called Fort St. Nicolas, located below the "Ouisconsin" (Wisconsin River) -- probably in the vicinity of Prairie du Chien, Wisconsin. A few years later,

Perrot established another post, Fort St. Antoine, on the Mississippi near Trempealeau, Wisconsin. There, on 8 May 1689, he formally proclaimed the country of the "Nadouescious" (i.e., the Dakota or Sioux) a dependency of New France.

The eighteenth century was marked by an intensification of French colonization throughout the Mississippi Valley. Missionaries followed the fur traders west and south from the Great Lakes. From their bases at St. Esprit (Madeleine Island), Sault Ste. Marie, St. Ignace (Michillimackinac) and Bal des Puans (Green Bay), Jesuits dispersed throughout the upper country. Missions were established among the Illinois (Illinwek) Indians at Cahokia, near present day East St. Louis, Illinois, in 1699, and at nearby Kaskaskia on the American Bottom in 1703. In 1700, Pierre LeSeuer, who had been active in the Upper Mississippi fur trade for several years, led an expedition up from the Gulf of Mexico to what is now southwestern Minnesota. There, under cover of a copper mining venture, he established Fort L'Huillier among the plains Dakota. The founding of New Orleans in 1718 secured French control over the Lower Mississippi. Fearing encroachment by English traders based in Hudson's Bay, the French built forts at the Straits of Mackinac and at Detroit, and after the Fox Indian Wars control of the "upper country" was consolidated with the establishment of Fort de Chartres in the Illinois country in 1720 and Fort Beauharnois on Lake Pepin in 1728. Back in France, the cartographers Delisle, father and son, undertook a synthesis of the journals and relations of their countrymen, publishing several remarkable maps of Nouvelle France (Fig. 3.1).

France's claim to the Mississippi was based on La Salle's proclamation of 1682 and the colony of Louisiana -- set off from Canada in 1717 -- included all of the Mississippi watershed from the Great Lakes to the Gulf of Mexico. The colony was never particularly successful, however, and following the disastrous Seven Years War -- which provincial historians call the "French and Indian War" -- in 1762 Louis XV ceded the whole of Louisiana, together with the city of New Orleans, to his cousin, Charles III of Spain. At the time, there were few European settlements north of the 31st parallel: the ancient village of Ste. Genevieve on the west bank of the Mississippi and the military and administrative center at Fort des Chartres on the east bank; the smaller posts of Kaskaskia and Cahokia on the Mississippi, and Vincennes on the Wabash River in Illinois; a few mining camps in the lead belts of Missouri, Illinois, and Iowa; the Indo-French community of Prairie du Chien at the mouth of the Wisconsin, the gateway to the upper country; and not much else.

In 1763, the Treaty of Paris awarded Louisiana east of the Mississippi River to Great Britain. Thus, by the stroke of a pen, the Upper Mississippi River became an international boundary between the Spanish and British colonial empires. After the transfer of government, the old French colonial bastion at Fort Chartres was abandoned and many creole families emigrated from Kaskaskia and Cahokia to Ste. Genevieve. In 1774, The Quebec Act

-- one of the so-called "Intolerable Acts" that led to the American Revolution -- formally annexed the French-Canadian settlements of the Illinois country to the British North American Province of Quebec. During the American Revolution, a Virginia army seized Vincennes and Kaskaskia and drove the British out of the Illinois country. The Illinois district was then annexed to the State of Virginia. In 1783 the peace negotiations which ended the Revolutionary War formally ceded the British territories east of the Mississippi River to the United States. However, British interests continued to hold a monopoly on the Indian trade of the Upper Mississippi Valley until the early nineteenth century.

From 1762 to 1800, Upper Louisiana (i.e., the territory north of the Arkansas River and west of the Mississippi) was part of the Spanish province of Louisiana, officially a dependency of Cuba. Spanish colonial policy during this period had two objectives: first, to erect a system of frontier posts to create a military buffer against Anglo-American encroachment; secondly, to develop a strong economic base for Upper Louisiana that would compliment Spanish interests in Lower Louisiana. St. Louis, founded in 1762 by the New Orleans trading house of Maxent, Laclède and Company, became the northern bastion of Spanish frontier defense. Minor posts at St. Charles, Carondelet, Cape Girardeau, and New Madrid eventually became the nuclei for agricultural settlements. Spanish war galleys patrolled the Upper Mississippi as far up as the Minnesota to check Anglo-American fur poachers, while traders licensed by the Spanish authorities established themselves among the Indian nations in an effort to re-orient the Upper Mississippi fur trade away from Michillmackinac. Colonists were settled on lands granted by the lieutenant-governor at St. Louis, including land grants in what is now Iowa. The Spanish even tried to promote emigration from the United States to Louisiana, with the result that by 1804 more than half of the colonists in "Spanish" Louisiana were Anglo-Americans.

But Spanish trade and immigration laws were constantly violated. After 1791, Spanish officials in St. Louis advised their superiors that the only way to secure the upper country was to construct forts at the mouth of the Des Moines and Minnesota rivers and drive the Anglo-Americans out of Upper Louisiana at gunpoint (see Kinnaird 1946:I:399). The forts were never built, although Julien Dubuque, Louis Tesson Honore and Basil Giard were awarded land grants for the express purpose of observing and counteracting British traders among the Indians in Iowa. The Spanish arrested some foreigners on the Des Moines River, but English traders continued to operate with impunity from their bases at Kaskaskia and Prairie du Chien and enjoyed the overwhelming support of the Indians.

Control of the Mississippi River was early recognized by Americans as the geographic and economic key to the continent. But while the river and its tributaries afforded an avenue to the

sea for restless English-speaking settlers west of the Appalachians, its mouth was under the control of foreign powers. The Treaty of Paris in 1783 had assured unimpeded navigation of the Mississippi for Americans, but high customs duties charged at New Orleans vexed and angered westerners. By the terms of the Treaty of San Lorenzo (i.e., Pinckney's Treaty) in 1795, Spain granted the "right of deposit" to Americans so that they could ship their produce out of New Orleans under bond. Tensions between the two nations were renewed in 1802 when the port of New Orleans was closed to American shipping, a move that prompted many westerners to call for war with Spain.

A war of conquest proved unnecessary, however. By the terms of and the Treaty of San Ildefonso in 1800, Napoleon Bonaparte succeeded in browbeating the Spanish king into secretly ceding Louisiana back to France. Having gotten wind of the secret Louisiana codicil, President Thomas Jefferson seized the initiative and quickly obtained the consent of Congress to negotiate for the purchase of New Orleans from France. In 1803, to nearly everyone's surprise, these negotiations resulted in the sale of all of Louisiana to the United States for twenty million francs.

Historic Indians (1640-1832)

Information about the indigenous peoples of the Upper Mississippi Valley, especially the geographic disposition of groups like the Illinois, Sauk and Fox, is incomplete. The post-contact period of native American Indian occupation of the region lasted from the middle of the seventeenth century up until the middle of the nineteenth century. The ethnohistoric data is especially scanty for the sixteenth century, sometimes called the "protohistoric" period, a grey area of indirect European influence on Indian cultures. At the time of initial contact, the most important native groups in the Upper Mississippi Valley were the Algonquian-speaking Illinois, their linguistic cousins the Sauk and Fox, and the Siouan-speaking Dakota and Ioway. Other Indian peoples, e.g., the Shawnee, Potawatome, Mascouten, Miami, also appeared along the river as hunters, traders, and warriors. It would be impossible to map the exact boundaries of any of the various Indian nations at any particular point in time during this period.

When the first French explorers appeared on the scene, the Mississippi Valley between the Wisconsin and the Illinois was inhabited and utilized by the Illinois (Illinwek) Indians, the overall name for the southwestern Algonquian-speaking groups who occupied most of the present state of Illinois along with parts of Iowa and Missouri. Unfortunately, comparatively little is known of the Illinois presence in the Upper Mississippi Valley during the historic period, for they were small tribes and had been driven nearly to extinction within a century of European contact.

The earliest record of the Illinois (the name signifies "men" in Algonquian) is in the Jesuit Relation for 1640: Jean Nicolet, who had gone west looking for the Chinese and found instead the Winnebago, informed the missionary Father Paul le Jeune that the Illinois lived somewhere beyond Lake Michigan. In 1666-1667, a group of Illinois wintered with the French at the Chequamegon mission on Lake Superior, where Father Claude Allouez ascertained that they lived in two large villages somewhere on the west side of the Mississippi River (Thwaites 1902:LV:185-189):

The Illinois journey always by land; they raise Indian corn [bled d'Inde], which they have in great abundance, have squashes as large as those of France, and have a great many roots and fruits. There is fine hunting there of Wild Cattle [Boeufs Sauvages, i.e., bison], Bears, Stags, Turkeys, Ducks, Bustards, Pigeons, and Cranes. The people quit their Village some time in the year, to go all together to the places where the animals are killed, and better to resist the enemy who come to attack them.

The historic Illinois lived in large riverine villages of long houses surrounded by fields of maize, squash, beans and watermelons. During the winter months, these villages emptied out onto the prairies and dispersed into numerous small mobile hunting camps. The Illinois were friendly towards the French and gradually moved into southern Illinois to be closer to the European settlements there. Toward the middle of the eighteenth century, they were displaced from their lands along the Mississippi River by the aggressive Fox and Sauk.

The earliest historic references to the Fox Indians place them on the western shore of Lake Michigan in the late seventeenth century. The Fox were of Algonquian-speakers and called themselves Musquakie -- meaning "people of the red earth" -- while other Indians called them the Outagamie, which the French translated "Les Renards" (foxes). Lamothe Cadillac found them a "wily and mischievous nation . . . very dirty, and great thieves; one has even has to watch their feet more than their hands, for they use them cleverly in stealing" (Thwaites 1902:361). In spite of their relatively small numbers, the Fox were a powerful nation, much given to war.

The Fox controlled the Fox-Wisconsin waterway and exacted a toll from French traders using the critical portage, which constituted a strategic choke-point between the Great Lakes and Mississippi Valley. Aroused by French intrigues with the Ojibwa (Chippewa) and Dakota (Sioux), the Fox began to plunder French fur traders and in 1712 launched an unsuccessful attack on Detroit. The contemporary historian Charlevoix wrote that the Fox "infested with their robberies and filled with murders not only the neighborhood of the Bay [i.e., Green Bay], their natural territory, but almost all the routes communicating with the remote colonial posts, as well as those leading from Canada to

Louisiana" (Shea 1881:305). The Fox hoped to wipe out the French presence in Wisconsin and northern Illinois; theirs was a war of extermination. The French responded with a policy of genocide: "The Renards being the common enemies of all the nations of the upper country, it is absolutely necessary to take all possible measures for destroying them" (Thwaites 1902:298).

In both Fox Wars, the grand strategy of the French was to detach the Fox from their alliances with the Eastern Dakota and the Iroquois and then arouse the enmity of their traditional native enemies, the Ojibwa, Huron, Pottowattomie, and Ottawa. In 1716 a French punitive expedition under Louis de la Porte, Sieur de Louvigny, besieged the Fox in their fortified village on the Fox River and exacted a peace treaty at gunpoint. After the First Fox War, the Fox moved their villages farther south and west. War against the French and their Indian allies continued in the 1720's, when the Fox began displacing the small tribes of the Illinois confederacy along the Upper Mississippi. In 1728 a large force of French and Indian allies swept through Fox territory, destroying two large villages. In the 1730's, the Fox were decimated in a series of aggressive French campaigns, which prompted them to merge with their traditional allies the Sauks, who were themselves embroiled in a bitter war against the French.

The Sauk or Sac -- the name means "people of the yellow earth" in Algonquian -- were first described by the Jesuit missionary Father Claude Allouez, who located them in the eastern Upper Peninsula of Michigan in 1667. They were known to the French as the Gens de Feu (i.e., "Nation of the Fire") and resembled the Fox in language, customs, and manners -- and not least in their determination to resist European encroachment and to undertake wars against the French and their Indian allies. The French campaign of 1730, commanded by Nicolas Coulon, Sieur de Villiers, forced the Sauk and Fox to merge and move west. In April 1735, a French and Indian force under Captain Nicolas Joseph de Noyelle pursued a body of Fox and Sauk all the way across the Mississippi and assaulted their village on the "Riviere sans fourche" (i.e., the Des Moines River). There were only a handful of Fox warriors left by 1736, and the Sauk had been similarly reduced. Guerilla warfare continued until peace was made in 1738.

Following their defeat at the hands of the French, the amalgamated Sauk and Fox moved into southwestern Wisconsin and western Illinois. Some bands drifted farther west, across the Mississippi into present-day Iowa and Missouri. Driving out the weaker Illinois, the Sauk and Fox extended their hunting grounds into Upper Louisiana and the Illinois country, from as far north as the mouth of the Wisconsin River to the mouth of the Illinois River in the south.

It is difficult to reconstruct historic Sauk and Fox settlement patterns in the Upper Mississippi Valley with precision, but some reasonably sound models may be offered. By the time of

their arrival in the Mississippi Valley in the middle of the eighteenth century, the Sauk and Fox were gradually emerging from the state of flux that had characterized them since the French wars and were settling into the patterns they retained into the nineteenth century. After leaving the southern Wisconsin area, they moved south and west toward the Mississippi. By the late eighteenth century, some bands had split off from the main tribes and became nomadic, with no permanent villages; but the bulk of the Sauk and Fox continued to follow their traditional village lifeways in new surroundings. Although it was claimed that they lived in two or three large towns, the populations ascribed to them by colonial authorities are more consistent with a more dispersed settlement pattern.

Contemporary maps clearly show that both the Sauk and the Fox preferred to establish large villages along the Upper Mississippi River and its major tributaries. Initial Sauk occupation of the Saukenuk site, located on the south bank of the Rock River near its confluence with the Mississippi in what is now Rock Island County, Illinois, dates from ca. 1735-1738. The site was temporarily abandoned after the war with the French, but the Sauk returned sometime ca. 1765 and made it their principal village. By all accounts, Saukenuk was a neat and orderly town of a hundred lodges, surrounded by lush gardens. Although most of the Sauk lived on Rock River until 1828, some bands established villages of their own. Early nineteenth century travelers observed significant Sauk settlements at the mouth of the Iowa River, on the Des Moines, and at scattered points along both banks of the Mississippi. The principal Fox town of Musquakinuk was situated at the lead mines on the west bank of the Mississippi, near present-day Dubuque. Prairie du Chien, at the mouth of the Wisconsin River, was the site of a large Fox village: in 1766 Jonathan Carver reported that for a month or more between May and July and again for a few weeks in October, this was the principal rendezvous for Indians and traders from throughout the Upper Mississippi. There was another large village, known as Puchechutuck or Wapello's village, occupied by both Fox and Sauk, at the head of the Des Moines rapids. All of these villages were occupied seasonally, with most of the population absent for several months out of the year, hunting buffalo. A number of former Indian villages were later occupied by white settlements, and many traces of prior Indian occupation were recorded by early settlers.

The Spanish promulgated a vigorous Indian policy in Upper Louisiana and were at least partly successful in winning the friendship of the Sauk and Fox, who were receiving annual presents from St. Louis as early as 1770. In fact, by 1770 so many Fox were coming to St. Louis for rations and gifts that the lieutenant-governor there complained he wasn't getting any sleep. The merchants of the house of Clamorgan and Loisel, the Spanish government's partner in developing Upper Louisiana, sought trading privileges with the Sauk and Fox with the goal of attracting them to permanently resettle in Spanish Louisiana.

Toward the end of the Spanish regime, the Mississippi Valley hunting grounds became so depleted that the Sauk and Fox were compelled to extend their hunts farther west, onto the prairies around the headwaters of the Des Moines and Iowa rivers, and as far downriver as the mouth of the Missouri River. Nevertheless, Anglo-American traders held sway among the Sauk and Fox on both sides of the Mississippi in defiance of Spanish authority.

During the late eighteenth century and into the early nineteenth century, the Sauk and Fox were embroiled in intermittent warfare with the Ojibwa, Eastern Dakota, Osage -- just about every other native group they came in contact with, with the exception of the Iroquois confederacy. They also participated in numerous wars between the colonial powers, usually fighting as allies of the English. "The war with the English [i.e., the American Revolution] is causing a great number of Indian tribes to go from one side to the other without knowing which side to take," wrote the lieutenant-governor at St. Louis to his superior in New Orleans (Kinnaird 1945:I:298-299). In July 1778 American agents succeeded in getting the so-called "American party" of the Sauk and Fox, led by the Fox chief La Mainé Casse, to pledge to keep out of British expeditions against United States, and in November 1780, the Fox chief Naquihuen appeared before the Spanish lieutenant-governor at St. Louis to seek an alliance against the British. During the War of 1812, several bands retained their traditional allegiance to Great Britain and campaigned against the United States, and as late as 1815 Sauk and Fox raiding parties threatened American traders and settlements in Missouri and southern Illinois.

Like the other Algonquians, the Sauk and Fox followed a semisedentary lifestyle, having fixed villages but spending part of the year hunting, away from the villages. They traditionally were dependent upon wild game, fish, maize, and various wild plants for food. Deer were probably more important than bison, both as a food source and as a trade staple. European visitors were impressed by the large acreage under cultivation in corn at their villages. Social organization closely resembled that of the other Algonquians: each nation was divided into halves, or moieties, which were further subdivided into exogamic clans. It is likely that individual Sauk and Fox clans traditionally coincided with local village populations. Each clan and village had its own civil, religious, and military functionaries. There was no head chief or council of tribal elders for either nation, and when important political or economic questions arose, the civil and war chiefs from the various clans and villages met in council.

By the time of Pike's visit in 1805, the Sauk and Fox had made a successful adjustment to their new surroundings, which they had in considerable measure chosen for themselves. Though their lives were no doubt a perpetual struggle for survival, it had always been so, and the influence of European culture was evident mainly in the form of firearms, iron axes and textiles,

which probably contributed to greater proficiency in hunting as well as to an improved standard of living. If European contact had made the Sauk and Fox dependents of the colonial economic system, the integrity of their culture was still largely intact at the start of the American regime. They had no notion that they were on the verge of enormously increased white contact, which would produce massive changes in their way of life and ultimately shatter their whole culture.

United States Indian policy during the national and antebellum periods was based mainly on the prospect of extinguishing Indian land titles in the settled territories and voluntary emigration to designated reservations west of the Mississippi. The Treaty of Fort Harmar, 9 January 1789, granted Sauk and Fox the privilege of remaining on the territory ceded to the United States by Great Britain. Sauk and Fox sovereignty was gradually extinguished by a series of treaties beginning with the farce overseen by William Henry Harrison at St. Louis on 3 November 1804. All the while, Euro-American settlers encroached upon lands reserved for the Indians, and this led to armed conflict.

In the spring of 1832, a band of Sauk and Fox, led by Black Hawk, left their reservations in Iowa and crossed the Mississippi River to the Illinois side. This triggered a series of tragic events, fueled by the Indians' naivete and a Euro-American frontier society eager to put an end to the "Indian problem" once and for all. After attempting to resettle in Illinois, Black Hawk's band withdrew up the Rock River into Wisconsin with the Illinois state militia in hot pursuit. Black Hawk was able to shake off these citizen soldiers but soon found himself being chased by army regulars. In July the soldiers finally caught up with Black Hawk's people as they tried to cross the Wisconsin River near present day Sauk City. Badly mauled in this so-called battle of the Wisconsin Heights, in August Black Hawk's hungry, pathetic little band was run to ground and massacred at the mouth of the Bad Axe River. Black Hawk escaped, but was later captured and imprisoned for a time at Prairie du Chien, before being paroled. In a few years, the Sauk and Fox were removed from their lands in southeastern Iowa to reservations farther west, and in 1842 they sold their remaining lands in Iowa and moved onto a reservation across the Missouri River in Kansas. After a falling-out with the Sauk in 1857-1859, the Fox returned to Iowa, purchasing a tract on the Iowa River near Tama City.

The Fur Trade (1680s-1830s)

The thing that brought Europeans to the Upper Mississippi Valley in the first place was the beaver, the industrious, chisel-toothed rodent called castor by the French, "hairy banknotes" by the Americans. The demand for beaverskins, incidentally, was not so much for wraps as for fur felt used in making hats -- "beaver" was slang for hat. Dressed deerskins for

making buckskin clothing were also an important commodity in the Upper Mississippi Valley Indian trade. Indeed, for the post-1830 period, it might be better to substitute "peltry trade" for "fur trade."

The Upper Mississippi trade may be divided into three periods: the French Period, from the time of initial European contact to the dismemberment of New France after the Seven Years War; the British Period, from ca. 1760 to 1796; and the American Period, from 1796 until the Civil War. The Upper Mississippi fur trade inaugurated by Radisson and Grosseillers in the mid-seventeenth century was rapidly expanded in the eighteenth. French forts and settlements were erected at strategic points throughout the Mississippi basin by 1730. French traders were active on the Missouri as well as the St. Peter (Minnesota River), St. Croix, Iowa, and Des Moines rivers, and in fact controlled the trade of nearly all of the important Indian nations north of the Ohio and west of the Mississippi. Resident traders established themselves at the principal Indian towns and brought their furs down to annual rendezvous held at the trading forts. French policy varied from time to time, but as a rule the trade of the "upper country" was farmed out to individuals with monopoly privileges granted by the crown. Unlicensed courier de bois operated throughout the Mississippi Valley on a freelance basis and were a constant source of trouble for colonial authorities.

The route geography of the Upper Mississippi fur trade followed land and water routes up and down the Mississippi, via the Fox-Wisconsin and Illinois rivers to the Great Lakes and the great frontier entrepot at Michillmackinac (Mackinac), the primary staging area for trade in the upper country. The trade from the Illinois country, the Arkansas Post, and the Natchitoches Post on the Red River was focused on New Orleans. Since the earliest French exploration, the western terminus of the Fox-Wisconsin portage route had been recognized as a strategic location, and Prairie du Chien, named for the Fox chief Alim, alias "Le Chien" (the dog), was by ca. 1750 the outstanding fur mart and settlement of the Upper Mississippi country, the principal rendezvous where the Sauk and Fox congregated to determine by council the price of their peltry.

The French withdrew their traders from the Upper Mississippi country in the 1740's and the trade was not resurrected until after 1763. French traders were replaced by British traders who hastened west in large numbers. The Straits of Mackinac remained the primary staging area for Upper Mississippi fur trade operations, with the old French post at La Bal (Green Bay) the principal depot for goods shipped via the Fox-Wisconsin route. At the same time, French-Canadian and Anglo-American traders swarmed up the Mississippi from Kaskaskia and the Illinois country.

In 1762 the Spanish granted a license to the trading house of Maxent, Laclède, and Company to establish a trading post in Upper Louisiana, and in 1764 Pierre Laclède Ligueste founded the post of San Luis des Yllinois (St. Louis), which quickly grew to rival Michillmackinac as the principal western fur mart. After the English took possession of the Illinois country in 1765, St. Louis traders had to restrict their operations to the country below the Des Moines River. Although the British had to yield the Illinois country to the Americans, they did not surrender their trading posts to the United States until 1796 and their traders remained a significant presence in the region until after the War of 1812.

After the war with Great Britain, the regional fur trade was monopolized by American fur trade interests, with St. Louis the principal fur trade entrepot. Furs were brought to St. Louis in packs by keelboat and canoe, then shipped downriver to New Orleans by steamboat. The best beaver and otter furs were exported to China, the rest to the European market. Although there were no large trading posts located among the Sauk and Fox, the region was securely within the trading orbit of Anglo-American traders based at Prairie du Chien and Rock Island who rendezvoused annually on the lower Rock, Des Moines and Iowa rivers.

Unlike the French system with its government monopoly and garrisoned trading posts, the fur trade under the British and Spanish regimes was characterized by a system of economic monopoly, with independent companies of merchant adventurers whose agents bought furs directly from the Indians. Among the Sauk and Fox, the independent trader engaging in free competition with others of his kind was the rule after 1770. Under such a system, the need for permanent trading stations was not urgent because the traders usually did not remain long in any one place.

After 1796, American fur trade interests began to make a strong bid for the Upper Mississippi trade. The Louisiana Purchase of 1803 brought the entire Upper Mississippi Valley under United States control. From 1795 until 1822, the federal government attempted to monopolize the Indian trade through a system of factories, such as the one established at Prairie du Chien in 1816. Although British influence among the Indians remained strong, after the War of 1812 there was a great influx of Americans into the Upper Mississippi Valley, and these newcomers gradually took over the system built up by their French and British predecessors. Congress paved the way for the Americanization of the Upper Mississippi Valley fur trade in 1816 with the passage of legislation forbidding foreigners to engage in the fur trade on American soil. St. Louis eventually supplanted Mackinac, and after 1820 the bulk of the furs exported from the Upper Mississippi were shipped from New Orleans. In 1822 the regional fur trade fell into the hands of John Jacob Astor's American Fur Company, which had its western base of operations in St. Louis. Astor withdrew from the fur trade in

1832 and left the field largely to Pierre Chouteau, Jr., of St. Louis, for half a century the prime mover in the Upper Mississippi fur trade.

St. Louis interests renewed their bid for control of the Upper Mississippi Valley fur trade after the Louisiana Purchase, and pried the Sauk and Fox trade out of the hands of the British. The first American license to trade with the Sauk and Fox was granted in 1804 to Auguste Chouteau of St. Louis. American Fur Company control of the Sauk and Fox trade was secured in 1822 when the partnership of George Davenport and Russell Farnham was promoted by John Jacob Astor's American Fur Company to exploit the fur trade of the Sauk, Fox, and Ioway (Van der Zee 1914:536-537).

In 1831, Farnham and Davenport described their operations in a letter to the Superintendent of Indian Affairs (U. S. Congress 1832:55-56):

The trade with the Sacs and Fox Indians is transacted and carried on by us at the following posts, viz. the Dirt Lodge, on the river Demoline; Flint Hills, and at or near Rock Island, on the Mississippi river; at a post on Ioway river, and one on Rock river . . .

. . . The trade at these posts has been transacted by ourselves for the last seven years, and we have employed a capital of from thirty-three thousand to sixty thousand dollars per annum, embracing the expense of clerks, traders, and common hands.

The trading posts were busiest in summer, when the company agents assembled their employees and secured their loads of trade goods from St. Louis. The Indians may have been primitive, but they were not simple: the Sauk and Fox recognized the advantages which European goods gave them and were shrewd traders. In 1831, William M. Gordon of St. Louis described the Upper Mississippi trade in a letter to the Superintendent of Indian Affairs (U. S. Congress 1832:54):

The Indians are good judges of the articles in which they deal, and have always given a very decided preference to those of English manufacture. Knives, guns, powder, lead, and tobacco, are also among the primary articles, some of which are of American manufacture. Whiskey, though not an authorized article, has been a principal, and I believe a very lucrative one, for the last several years. Though I consider it as deleterious in its effects, generally, as regards the welfare of the Indians, and dangerous in the hands of unprincipled men, who might, by possibility, be engaged in the trade.

Winter was the season for procuring peltry. The packs of beaver, muskrat, otter, and deerskins were collected at the

trading stations nearest to the Indians' winter hunting villages, where they were prepared for transportation to the main depot. Most of the contact between trader and Indian took place in the fall. The traders supplied the Indians with goods on credit. Most traders sought to keep the Indian hunter in debt, with the expectation that peltry would be delivered over a long period to satisfy the indebtedness. In regard to the prices they charged the Indians, Farnham and Davenport reported (U. S. Congress 1832:56) that

most of our sales have been on a credit to them in the fall of their year, for the purpose of enabling them to make a hunt, and support their families. On prominent articles, such as blankets, strouds, &c. &c., we have charged on advance of 25 to 50 per cent, and on minor articles at something more; and when goods have been sold for prompt pay, they have not averaged us more than 12-1/2 to 25 per cent. These prices relate to the Sacs and Foxes. The prices charged the Icways have been higher, because they have seldom paid more than fifty cents in the dollar of their credits, and frequently nothing at all.

The Sauk and Fox furnished about six hundred hunters, all dependant on the trader to supply them the means of sustaining three or four hundred families dependent upon the traders for the "necessaries of life."

The fur trade was big business in the best American tradition. As early as 1806, Lewis and Clark estimated the combined Sauk and Fox fur trade to be worth \$10,000 annually. In 1809, Colonel J. W. Johnson, American Fur Company agent at the Flint Hills (Burlington), reported the value of that year's trade in beaver, muskrat, raccoon and deerskins as \$10,477.95. The average annual value of furs received at St. Louis between 1808 and 1847 was between \$200,000 and \$300,000. In addition to its virtual monopoly of the peltry trade, the American Fur Company was active in minerals and fisheries, manufactured its own trade goods and maintained a vast network of trading houses, depots and forts stretching from the Great Lakes to the Pacific. Recognizing the geographical and cultural diversity of its commercial empire, the company divided its peltry operations into various departments, which were themselves sub-divided into "outfits" like the house of Farnham and Davenport. Many of these traders were themselves quite diversified, dabbling in everything from real estate and banking to steamboats.

The American Fur Company shipped its trade goods from New York to St. Louis, where each spring the traders took their goods and men upriver in keelboats. By the time the Indians had gathered their corn in roasting ears, the traders were ready with their stocks of blankets, cloth, guns, ammunition, kettles, needles, traps, wampum, axes and horses. Most of the trade was on credit. "All traders at the present day give credits to the Indians in the same manner as has been the case for the last 60

or 80 years," wrote the Sauk and Fox Indian agent in 1832 (U. S. Congress 1832:70-71):

that is to say, the articles which are passed on credit, are given at very high prices. Formerly, when the opposition and competition in the Indian trade was great, the traders would sell in the spring of the year, payment down, for less than one half of the prices at which they charged the same articles to the Indians on credit the preceding autumn. This was sometimes the occasion of broils and quarrels between the traders and Indians, particularly when the latter made bad hunts.

The problem of debtor Indians was as old as the fur trade. In 1720, one French colonial complained that the "greed of the French traders leads them to lend easily, and more than the savages can pay; that gives rise to quarrels, and leads the French to run after their debts, and to pass the winter in the woods and to fix their abode in the upper country, which renders them undisciplined and like the savages" (Thwaites 1902:389). A century later, Farnham and Davenport, acting in their capacity as the American Fur Company agents at Rock Island, advanced the Sauk and Fox between \$3,000 and \$60,000 credit annually, so that by 1831 they owed the traders \$137,000. Under the American regime, traders came to depend on government annuities paid to the Indians as part of the treaty settlements -- Farnham and Davenport obtained \$1,491 of the \$2,000 paid to the Sauk and Fox in 1827. When Catlin visited them at St. Louis, the Sauk and Fox were drawing an annuity of \$27,000, soon to be increased to \$37,000, most of which had been assigned to pay the tribes' debts to traders. The government annuities were never sufficiently large enough, and settlers' claims for property damage usually took up much of the annuities.

The Indians weren't the only ones in debt. As the American Fur Company's licensed agents, Davenport and Farnham were really semi-independent operators who worked on commission. The company provided the goods on credit and the agents sold their furs at prices set by the home office. "Our credits to these Indians, for the last seven years, have amounted to \$136,768.62, and we have collected of that sum, \$83,493.74, leaving a balance due us, on transactions with them in that time, of \$53,269.88 . . ." (U. S. Congress 1832:56). As the trade fell off in the 1830's, only the company made a profit while its agents in the field accumulated debts from the Indians.

The decline of the Sauk and Fox peltry trade was inevitable. The trade encouraged rapid depletion of hunting grounds, forcing the Indians to extend their winter hunts farther and farther from their summer villages. Interaction between Indians and Euro-American settlers intensified after the mid-1820's, generally much to the detriment of the Sauk and Fox. As early as

1817, American Indian agents and traders were recommending their removal into the interior, to maintain some kind of cordon sanitaire between the Indians and the encroaching settlers. Several years before the Sauk and Fox ceded their lands in eastern Iowa to the United States, the trade at the river posts was already drying up for lack of Indians.

Early American Settlement (1800s-1860s)

On 4 July 1778, George Rogers Clark captured the posts of the British Illinois country in the name of the state of Virginia. Illinois remained a Virginia county until 1 March 1784, when the state relinquished its claim to the western country in favor of the United States. This cleared the way for the Northwest Ordinance, passed by Congress on 13 July 1787, legislation dedicating the entire country north of the Ohio and east of the Mississippi as the "Territory Northwest of the River Ohio" (i.e., the Northwest Territory). The Ordinance of 1785 had laid the groundwork for colonizing the trans-Appalachian west by establishing the now familiar township and range survey system and authorizing the creation of territorial assemblies under a governors appointed by Congress in each district with a population of 5,000 free males, with the promise of statehood when the population reached 60,000.

The Illinois Territory was set off from the Northwest Territory counties of St. Clair and Madison in 1809, and was admitted to the Union as the twenty-first state on 3 December 1818 -- not without controversy, owing to the fact that the population was less than the 60,000 figure stipulated by the Ordinance of 1785. The original seat of government was at Kaskaskia in the American Bottom, but in 1820 the capitol was moved to Vandalia and finally to Springfield in 1839.

Territorial jurisdiction over Iowa was kaleidoscopic. At the close of the colonial period, what is now the state of Iowa was part of the jurisdiction of Upper Louisiana, encompassing the territory between the Mississippi and Missouri rivers. Following the Louisiana Purchase, Congress established Upper Louisiana as the District of Louisiana in 1804 and attached it briefly to the Territory of Indiana for administrative purposes. The next year, Congress divorced Upper Louisiana from Indiana and set up a territorial government at St. Louis. Meanwhile, Lower Louisiana, the "Territory of Orleans," became the State of Louisiana in 1812, at which time Upper Louisiana became the Territory of Missouri. During the westward rush following the War of 1812, tens of thousands of American immigrants moved into the Missouri Territory, and the Missouri Compromise, what John Quincy Adams called the "preamble to a great tragic volume," admitted Missouri as a slave state in 1821. This left that part of Upper Louisiana north of the Des Moines River as unorganized territory until 28 June 1834, when Congress attached it to the Territory of Michigan for judicial purposes.

The name "Iowa" was assigned to the territory by Lieutenant Albert Lea in 1836, when the district formed a part of the Wisconsin Territory (see Fig. 2). In spite of stubborn opposition from the Southern bloc in Congress, the Territory of Iowa -- which in its original configuration included the present states of Iowa and Minnesota as well as part of North and South Dakota -- was created on 4 July 1838. From the territorial capital at Burlington, Governor Robert Lucas had jurisdiction over some 23,000 inhabitants west of the Mississippi. The clamor for statehood culminated in two constitutions and a dispute over boundaries, but resulted in Iowa's admission to the Union with its present boundaries on 28 December 1846. In 1857 a new state constitution was adopted, and the capital was moved from Iowa City to Des Moines.

Various Indian nations occupied or claimed most of the lands embraced in the Northwest Ordinance and Louisiana Purchase. At the time of its acquisition by the United States, the country above St. Louis was largely in the possession of the Dakota, Ojibwa, Ioway, Sauk and Fox. United States Indian policy during this period was based mainly on the concept of voluntary Indian emigration from settled territories to designated reservations beyond the frontier. To this end, native American Indian sovereignty in the Upper Mississippi Valley was extinguished by means of a series of treaties with tribal authorities, beginning with the Treaty of St. Louis on 3 November 1804. The treaties customarily provided for annuities to the Indians nations and designated areas to be reserved for Indian possession and use.

The treaty of 4 August 1824 with the Sauk and Fox established the Half-Breed Tract on the west bank of the Mississippi, a triangular shaped tract of 121,000 acres between the Mississippi and Des Moines rivers and the Missouri state line (Fig. 3.2). The tract was set aside for an unspecified number of former fur company employees, and was held in trust by the federal government until 30 January 1834 when the tract was apportioned and most of the parcels sold off to speculators. The Treaty of 15 July 1830, the infamous "Corn Treaty," and the so-called "Black Hawk Purchase" of 21 September 1832 effectively opened up the Iowa country to unrestricted Euro-American settlement after 1 June 1833.

The expeditions of Zebulon Montgomery Pike, Stephen Harriman Long, Henry Rowe Schoolcraft, Stephen Watts Kearny, Caleb Atwater, Albert Miller Lea, George Catlin, Joseph Nicolas Nicollet, and others inaugurated the American regime in the Upper Mississippi Valley and established valuable contacts for future settlers. Within a decade following Pike's reconnaissance, the government established several forts on the Upper Mississippi: Fort Madison, the first American post in Iowa, in 1808; Fort Johnson at Warsaw, Illinois, in 1814, renamed Fort Edwards in 1815; Fort Armstrong at Rock Island and Fort Crawford at Prairie du Chien in 1816; and Fort Snelling at the mouth of the Minnesota

River in 1819. These military outposts functioned as nuclei for later permanent settlements.

The end of the War of 1812 brought resumption of westward expansion and large-scale settlement of the Upper Mississippi Valley. Prior to 1840, the greatest number of Euro-Americans living in the Upper Mississippi Valley were concentrated in the lead mining region. As early as 1690, the lead deposits around Dubuque and Galena were known to the French, and when Julien Dubuque came to the Spanish Mines district in 1788, he found traces of earlier mining activities. Prospectors from St. Louis made the first cautious attempts to exploit the lead deposits along the Fever River before the War of 1812, but were driven off by Indians. The United States claimed the mines under the 1804 treaty with the Sauk and Fox, but did not authorize mining in the government reserve on Fever River until 1822. A boost in lead prices brought increasing numbers of miners to the district, until there were about ten thousand "suckers" and "badgers" in the area by 1828, including many Southerners who had come up from the older lead mining district around Potosi, Missouri. Galena, situated at the head of navigation on the Fever River, was platted in 1826 and quickly evolved the most important mining, smelting, and shipping center, boasting a population in excess of 3,000 by 1839.

The first immigrants under the American regime included French Canadians, Irish, and Germans, but most were old stock Americans with roots in the Upland South or New England. The Bangor Mercury reported on the population mix in 1845 (in Thornton 1912:II:974):

A smart sprinkling of the inhabitants of Illinois are from New England, a heap from Kentucky, and the balance are John Bulls, Paddles, Pukes, Wolverines, Snags, Hosslers, Griddle-greasers, Buckeyes, Corn-crackers, Pot-soppers, Hard Heads, Hawk Eyes, Rackensacks, Linsey-Woolseys, Greenhorns, Whigs, Conservatives, Canada Patriots, Loafers, Masons, Anti-Masons, Mormons, and some few from the Jarseys.

Among them were a few merchants, mechanics and soldiers; the majority, however, were farmers or laborers. By the 1830's, the typical, if not statistically average, American had become a chronic mover. One writer has described these pioneers as "the half gypsies of America, seeking by shiftless removals from one region to another to better their wretched fortunes, or, more likely, to gratify a restless love of change and adventure" (Eggleston 1878:183). Whenever "Indian country" was opened, the first pioneers were usually rough hunter-stockmen who built log subsistence dwellings and ran their herds on the open range. With the hunter-stockmen there was soon blended the first wave of hardscrabble subsistence farmers who cleared a little forest land for a few acres of Indian corn.

Eliza R. Steele, traveling from Peoria to Alton by packet boat in 1840, described the frontier society she encountered at Monmouth, Illinois (Angle 1968:198-199):

The most of their homes consist of only one room, many of them made of logs. In this they do all their work. All lodge & all stay contentedly. 'To be content in their natural desire.' Their greatest desire seems to be to live easy. In their work they are slovenish, & care but little about improvement... Rum drinking (or rather whiskey) is quite fashionable here, & it is not uncommon to see boys 8 or 9 years old drunk. But you can judge something of the society when I tell you that we employ 7 Lawyers in this place, & have a court nearly every day.

The large proportion of Southerners among the first wave of settlers in the Upper Mississippi Valley is striking. Moving down the Ohio and up the Mississippi from St. Louis, these "Westerners" hailed mainly from Kentucky, Virginia, and the Carolinas. Lt. Albert Lea reckoned the population of the Iowa district, exclusive of Indians, to be about 16,000 at the end of 1835, and noted that "large portions of the States of Ohio, Indiana, Illinois, Kentucky and Missouri seem to be about to emigrate to this region" (Lea 1836:14). Wherever Western folk settled, they brought their distinctive Upland South culture along with them, along with their pot stills for turning rye and corn into whiskey. Typically, they were drawn more to rural areas than to towns, although many were to eventually take up urban life with enthusiasm.

The Upper Mississippi Valley shared with much of the Old Northwest a generous sprinkling of New Englanders in the leading edge of settlement. American agriculture was undergoing changes that made life hard for those at the bottom of the economic scale, and rapid population growth and industrialization in the Northeastern states generated a growing number of surplus farmworkers between 1820 and 1860. After the Black Hawk War, Yankees flocked to Illinois and Iowa in droves. They were by far the most urban-oriented of the native American immigrants in the Upper Mississippi Valley and were by and large acutely aware of their role as builders of a civilization in the wilderness. Their dominance of post-settlement society was shaken by the flood of European immigration, but the "New England of the West" persisted well into the late nineteenth century.

The Yankee pioneers regarded movers in general, and Southerners in particular, as uneducated, irreligious, lazy, and a threat to basic "American" values. It was the duty of God-fearing Yankees, many of them believed, to migrate to the West and spread their Puritan culture through schools and churches, well-ordered cities, the abolition of slavery, temperance, and republican democracy. The distaste many Southerners felt for their Yankee neighbors was rooted in the New Englanders' seeming

unabashed opportunism and singular inability not to meddle in other folks' business.

All along the Upper Mississippi, settlements occurred first at the natural breaks in the landscape: between forest and prairie, at rapids, along rivers, and at the mouths of tributary streams. In Illinois and Iowa, the first wave of settlement tended to neglect the prairies, and occupation of the uplands was regarded as an "absurdity" until local settlement was well underway. One supposition held that the prairie was unable to support commercial agriculture. The thick, matted roots of the prairie grasses formed a tough, heavy sod which the pioneer found difficult to break with the old wood or iron plow. This notion was soon disproved on the prairies of Illinois, once settlers became acquainted with the rich dark prairie soil and John Deere's heavy steel plow. In most gazetteers and immigrant guides printed before 1850, the general impression was that the timber belts and "oak openings" represented the prime farmland. For several years after the land was opened for settlement, few settlers located their homesteads more than a few rods from standing timber.

Pioneer farmsteads were located chiefly in the oak openings and along the margins of streams. Because breaking and clearing forested land was such a laborious task, comparatively little land was cultivated at first, although the natural fertility of the Mississippi alluvial valley and the abundance of wild game made it possible to survive on relatively small holdings. Pioneer farm implements were few and crude and efforts to raise cash crops were frustrated by transportation irregularities and lack of close markets. Albert Lea recorded that the "lands bordering on the Mississippi are not generally so productive as those retired from it," but noted that the river bottoms were the most valuable because of their superior market advantages (Lea 1836:24). Settlement of the floodplain was further hampered by the disease environment: Lea called the country the "ultima thule" of the sickly region (Lea 1836:31) and complaints of "intermittent fever" (malaria) characterized pioneer life in the river bottoms (Gerhard 1857:234).

Physical security and subsistence were the settlers' first concerns. Most of the first wave of settlers lived in log shanties. According to an early immigrant guide, "[T]he first tenement of the settler is generally of small dimensions, reared in haste, and ultimately to form the kitchen part of his future dwelling" (Parker 1855:67). Government surveyors laying out the township lines frequently distinguished between hewn log houses and cabins in their field notes. Peck's 1837 immigrant guide explained differences between log houses and log cabins:

A log house, in western parlance, differs from a cabin, in the logs being hewn on two sides to an equal thickness, before raising; in having a framed and shingled roof, a

brick or stone chimney, windows, tight floors, and are frequently clapboarded on the outside, and plastered within. A log house, thus finished, costs more than a framed one.

Because of its rapid ripening, high yield per acre, and ease of cultivation in stump-cleared fields, Indian corn was the principal pioneer grain. Wheat was raised as early as the 1830's and by 1850 was a close competitor to corn in the Mississippi Valley counties. Rye, well adapted to local conditions, was also raised. Potatoes were favored for human consumption and oats were grown for feed for draught animals. Imported from the Old Northwest, livestock was largely uncared for, with semi-wild herds of cattle, horses, and swine roaming the countryside in droves, subsisting on "prairie hay" and oak-hickory mast.

Cattle and hog raising was a major economic activity after 1840. Pioneer farmers also experimented with tobacco, hemp and flax, and various fruits, especially apples. Corn remained the chief cereal product of the region until the 1860's, when spring wheat cultivation boomed. The practice of sowing grasses on tilled land became widespread, with timothy widely adopted. Commercial hog raising has always been closely related to corn production. In the 1840's the meat packing industry was well established.

Immigration to North America from Europe after 1800 quickly reached the proportions of a human tidal wave: during the 60 years from the first census in 1790 to 1850, the national population rose from 4 million to 23 million. A quarter of a million immigrants, mostly Germans and Irish, were arriving in the United States each year by 1850, and in 1854 German immigration surpassed Irish immigration for the first time. In 1833 there were a few German immigrants settling in western Illinois, and a large influx of Irish came into the region in the 1830's. From ca. 1840 until the Civil War, a steady stream of German immigrants came to the Upper Mississippi Valley. Steamboats landed hundreds of immigrants at who were sometimes shipped direct from Germany: it was a common sight to find the entire landing at St. Louis or Burlington or St. Paul covered by these families with their household goods of every description.

The populating of the Upper Mississippi Valley was part of a larger trans-Appalachian settlement process. Between 1790 and 1850, the national population exploded from around four million to more than twenty-three million people, and almost doubled between 1840 and 1860. After 1820, the Middle West grew twice as rapidly as the rest of the United States. In 1820, Illinois had a population of 55,211; twenty years later, the federal census enumerated 476,183 in the Sucker State. Illinois and Iowa both enjoyed a phenomenal increase in population in the two decades 1840-1860. In the decade 1850-1860, the population of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, and Missouri increased by more than 3,350,000, or 167%.

Land and the promise of its bounty was the magnet that attracted American settlers to the Upper Mississippi Valley. Land and its use became the main focus of national concern, and public land policy shaped regional patterns of settlement and economic development. While the lines of communication ordained in large part where the early nodes of settlement occurred, the lure of cheap land was a paramount factor in the economic, political and industrial development of the Upper Mississippi Valley as well as the incentive for economic growth.

A cursory review of the succession of laws governing the alienation of public lands in the United States indicates at once the magnitude and pace of settlement and the range of policy adjustments underlying it. To the nucleus of the thirteen original states, more than 1.3 billion acres were added to the public domain between 1781 and 1853. Differences arose from the outset over the method of transferring public land to the persons who were to occupy it. One view held that the government sorely needed revenue and that the land should be sold to the settlers. Another view held that the land should be free. As in most areas of American political debate, a middle ground was reached before it was over, and most public land acquired by individuals was sold to them, but at a very low price.

The Ordinance of 1785 outlined a land tenure system that incorporated the following general concepts: rectangular rather than metes and bounds surveys based on six-mile townships of thirty-six 640-acre sections; reservation of some public domain for allocations to military veterans and sales for financing education; and the alienation of public lands to private owners in fee simple. To speed up disposition and increase revenues, between 1796 and 1800 the minimum acreage was reduced from 640 to 320 acres and the price was increased to two dollars an acre, with credit. Advocates of the family farm won a significant victory in 1820 with the passage of an act reducing the minimum size to 80 acres and the price to \$1.25 an acre, figures which would remain in effect until 1893. After 1820, a pioneer farmer in the West could go into business free of land debt on a tract of manageable size for \$100.

First among the measures used to dispose of public land was the military bounty, a practice nearly as old as war itself. Designed to encourage enlistments and reward veterans, land bounties were offered initially to volunteers serving in the Revolutionary War; the practice was recurrent through the War of 1812 and the Mexican War. The Illinois Military Tract was established by Congress on 6 May 1812. The Tract lay between the Illinois and Mississippi Rivers and comprised 207 regular and 61 fractional townships, or about 5,360,000 acres, of which 3,500,000 acres were reserved for veterans. Warrants for veterans claiming land in the Illinois Military District were issued starting October 1817, and by January 1819 more than 17,000 warrants were exchanged for land patents issued by the General Land Office. Many veterans never went west, but disposed of their patents on

the open market for as much as \$100 for 160 acres, and many of the land claims located were never occupied and were either forfeited for taxes or snatched up by speculators (see Carlson 1951; Park 1984). In 1830 the government began offering military bounty lands in Illinois to non-veterans. So much land was offered, there was initially little competition for choice parcels.

"Let a man and family go into any of the frontier settlements, get a shelter or even camp out, call upon the people to aid him, and in three days from the start he will have a comfortable cabin, and become identified as a settler" (Mitchell 1837:68). The cost of securing a farmstead and improving it was not great. In many cases the only cash expenditure was the \$1.25 per acre fee paid to the land office. The cost of fencing was often greater than the cost of the land: a quarter section in Illinois could be bought and improved for \$1000 or less (Mitchell 1837:14).

A major change in public land policy was made in 1841, with the passage of the Pre-emption Act, which in effect sanctioned the rights of squatters on unsurveyed land. The Northwest Ordinance of 1787 declared Illinois "off-limits" to all non-Indians, but Anglo-Americans quickly swarmed into the territory. Under federal law, surveys had to precede land sales, which proceeded township by township, east to west, and this drew cries of protest from impatient, penniless settlers swarming into the Mississippi Valley. Many settled upon unsurveyed land as squatters, and in the existing political atmosphere, there was an outcry for "squatter sovereignty."

The Pre-emption Act called for the filing of a declaration to purchase as much as 320 acres of the public domain within three months after settlement, or after filing a plat of survey, with payment at \$1.25 an acre within eighteenth months. Payments could be made in cash, military bounty warrants, or scrip. From its inception until its repeal in 1891, the act was widely criticized on the grounds that it encouraged fraudulent claims and speculation.

On the distant frontier, the right to land was secured by its possession, and before the land was offered for sale, claims were frequently part of transactions between squatters, bounty holders, claim jumpers, and speculators; a fair proportion of these dealings lacked any color of legality. Dummy settlement and trick resales were not uncommon. In theory, and usually in practice, the pioneer staked out his claim, started improvements, and then proved up his claim at the nearest land office once the government surveyors had finished laying out township and section lines. Settlers banded together in claims associations, when the occasion demanded, for the protection of their interests against outsiders, especially land jobbers sent by Eastern interests. The minority of Euro-American settlers paid nothing for their land. With luck, it was often years, sometimes even a

generation, before someone appeared on the scene with the legal paper to claim the squatter's land and send him packing. By the primitive law of the frontier, every settler had a right to the place on which he had located, and anyone who interfered was apt to meet with violence. An Iowa squatter is reported to have scared off a prospective claim-jumper from Illinois in the following manner (Robeson 1924:105):

My name, Sir, is Sumeon Cragin. I own fourteen claims, and if any man jumps one of them I will shoot him down at once, Sir. I am a gentleman, Sir, and a scholar. I was educated in Bangor, have been in the United States army and served my country faithfully -- am the discoverer of the Wopsey [i.e., the Wapsipinicon River] -- can ride a grizzly bear, or whip any human that ever crossed the Mississippi; and if you dare jump one of my claims, die you must.

Land speculation was endemic on the frontier, and many a pre-emptor eventually became a member of the speculator class, like old Jack Means in Edward Egglestone's novel The Hossier Schoolmaster (1892:24):

. . . This yere bottom land was all Congress land in them there days; and it sold for a dollar and a quarter, and I says to my old man, "Jack, do you git a plenty while you're a-gittin',. Git a plenty while you're a-gittin'," says I, "'fer 'twon't never be no cheaper'n 'tis now," and id ha'nt been; I know'd, 'twouldn't . . . And Jack he's wuth lots and gobs of money, all made out of Congress land. Jack didn't git rich by hard work. Bless you, no! That a'n't his way.

Tracts obtained from the government for \$1.25 an acre were sold for \$5, \$10, or \$50 an acre. Townsites were platted by the hundreds: in some embryo towns, corner lots sold for \$500 in the morning might be sold for \$1,000 later in the day. There was never much hard currency in circulation in the West and the chief medium of exchange was the private note, known in the frontier vernacular as "wildcat" or "stumptail" currency. These notes were based on highly inflated, often completely fictitious values: because there was so few consignments of merchandise or agricultural surplus to draw against, land was the chief article of trade for many years.

The frenzy of real estate speculation in the Upper Mississippi Valley was synchronized with the boom and bust cycles corresponding to the financial panics of 1819, 1836, and 1857. When panic struck, land prices plummeted, banks started falling in all directions, hard currency disappeared, credit dried up, and the frontier economy ground to a halt. Townsite proprietors trying to cover mortgages based on inflated land values knocked the bottom out of the real estate market and saw their paper assets evaporate. With many settlers, even those who had imagined themselves wealthy, panics brought on a terrible

struggle between pride and want. The movers and squatters suffered, of course, but the keenest suffering was probably felt among those who suddenly found themselves "land poor."

Free land became a reality with the Homestead Act in 1862, too late to effect development along the Upper Mississippi. Land grants for education and internal improvements was an early feature of the national land policy. Land was the basis of implementation of public schools throughout the Upper Mississippi Valley, as in other parts of the country. When Congress admitted Ohio to the Union in 1802, it laid down the rule that "Section Number 16 in every township" be reserved for the use of schools.

A few early grants from the public domain were made to individuals and corporations as an aid in building wagon roads, plank roads, and turnpikes. In 1841, the federal government started to make large land grants to the western states to encourage railroads, bridges, improvement of navigable waterways, and draining of swamplands. Enthusiasm for state and locally assisted railroad building programs peaked between the 1830's and 1860's: the Illinois Central Railroad received a substantial land grant in 1850 to subsidize a line from Chicago to the Gulf of Mexico, and from Dubuque to the Ohio River.

Development of River Towns (1830's-1900's)

Established as commercial outposts on the leading edge of the frontier, river towns were a major aspect of settlement in the Upper Mississippi Valley. They promoted and grew up with the surrounding agricultural settlements and performed the commercial, civic, and other functions characteristic of provincial towns. The growing river towns developed extensive regional hinterlands by promoting road improvements, agricultural storage and processing facilities, railroads, and steamboat ports. Financial panics in 1836-1843, 1857-1860, and 1873-1878 retarded the growth of river towns and in many instances diffused urban growth into the interior. Nevertheless, the rapid increase in the number of river towns boosted their share of the regional population.

Several factors led to rapid urban development in the Upper Mississippi Valley after 1830. The increase in population and the opening of Iowa and Minnesota to settlement triggered an explosion in townsite platting. The mounting influx of immigration from abroad swelled the population of the river towns and brought an unprecedented boom to places like Quincy, Burlington, Muscatine, Davenport, Rock Island, Dubuque, Winona, St. Paul, and St. Anthony Falls, where urban populations doubled in successive decades. Townspeople took the initiative in developing steamboat companies and railroads; and in the process, river towns absorbed an increasing proportion of the economic development which might otherwise have been dispersed throughout the interior.

In Illinois and Iowa, townsites developed rapidly along both sides of the Mississippi. The first towns were dependent upon river traffic, and their physical development occurred largely around the nuclei of trading posts, steamboat landings, and woodyards. Steamboat traffic between St. Louis and the Galena-Dubuque lead mining district accelerated in the late 1820's and by 1830 there were numerous steamboat landings and woodyards on the Illinois shore. Once the Iowa district was opened to settlement, ferry landings became incipient villages. With the addition of stores, taverns, hotels, blacksmith shops, and boarding houses they quickly developed into full-fledged cities.

An interesting sidebar to pioneer town planting, if we are to believe the reminiscences of old settlers, is that towns in the Upper Mississippi Valley originally suffered for want of sufficient stocks of timber for construction purposes. Lumber -- indeed, whole buildings -- often had to be shipped from back east. William R. Smith, pioneering in southwestern Wisconsin, wrote in 1837 that pine lumber was brought down the Ohio from the Allegheny pineries and transported up the Mississippi from St. Louis, "and instances have occurred of houses having been built altogether at Pittsburgh and at Cincinnati and shipped around in parts . . . and placed on the ground, cheaper than they could have been built by procuring the lumber from the Wisconsin River or the upper Mississippi" (Fries 1942:26).

With the exception of a few of the largest streams, the tributaries of the Mississippi were more hindrances than aids to transportation, therefore, it is not surprising that the principal ports along the Illinois-Iowa frontier were located between tributaries rather than at their mouths. This pattern of settlement was described by Burghardt (1959:308-309):

As the areas to the west of the great river became fully settled, the towns on the west bank of the river tended to outgrow those on the east bank. The west bank towns were situated between their hinterlands and the predominant market and manufacturing area of the United States, whereas, in relation to the prevailing movement of goods, the towns on the east bank lay behind their hinterlands . . . The towns on the west bank were more advantageously located to profit from the crossing traffic than were the towns on the east bank. All movement westward, whether of goods or of settlers, was constricted by the ferry or bridge. At the western end of the crossing medium the traffic could disperse into the hinterland. Consequently settlers tended to make the west bank towns their outfitting points; these towns also became the obvious wholesale centers to serve the areas west of the river. Movement eastward was in turn concentrated at the western end of the bridge or ferry, and even though grain soon came to move in bulk shipments rather than in sacks, the concentration of traffic increased somewhat the commercial importance of the west bank towns in

relation to the east bank towns. Thus, though the oldest river towns on the Upper Mississippi were on the east bank, the centers of local commerce developed more on the western than on the eastern bank.

The traditional American hunger for land manifested itself in the Upper Mississippi Valley in a frenzy of real estate speculation. "This great Northwest is now flooded with paper projects for cities which will never be built," declared a writer in Harper's New Monthly Magazine in 1858. The laying out of townsites and villages was a gratifying duty to Euro-American frontiersmen: wherever a likely looking location for a town was found, it was quickly claimed and platted into lots. In fact, a suitable location was not a prerequisite, the greed of the proprietors and the gullibility of inventors being the most common dominators.

Towns with and without inhabitants sprang up literally overnight. Townsites were laid out by individual proprietors or joint stock companies, which included some of the "neediest, greediest, and most unscrupulous landsharks that ever lived on calomel, whiskey, and the gullibility of their fellows." Many townsite proprietors platted land purchased directly from the government at \$1.25 an acre into lots which then were sold for between \$20 and \$500, even in "paper towns" consisting of nothing more than a handful of log shanties. Usually the design of the town boomers was to increase the value of the town lots at public expense, instead of improving them by their own investment in buildings and business. There were some very sharp operators at work here, and many towns existed only in the land office register and on the richly illustrated plats from which the town site proprietors sold their lots to newcomers and to speculators back East. After the town had made some progress in the way of population and improvements, the cost of lots usually skyrocketed, with corner lots commanding between five hundred and two thousand dollars. Rents for the worst specimens of residential and commercial buildings were exorbitant, sometimes upwards of 50% per year of the cost of construction. By such means, speculators often succeeded in raking in great profits, often in excess of 100% in a single year.

In spite of their natural advantages, the river towns could not escape troubles. Real estate prices collapsed in the financial depression of 1836; the late 1830's and early 1840's were a lean period; and several townsites were aborted after the Panic of 1857. Epidemics of Asiatic Cholera and other diseases took a fearsome toll. Winter ice closed the river, the main artery of regional trade and immigration, for months on end, and with the arrival of spring came disastrous flood waters, which often made the townsites into islands in the floodplain.

Town site fever suffered a violent jolt in 1836-1837, and again in 1857-1858, when financial panics shattered frontier optimism and brought down the crazy-quilt western economic

structure, causing land values to evaporate and the tide of immigration to reverse itself. Hard currency being scarce on the frontier, everyone was mortgaged to the hilt, and real estate transactions were floated on a sea of promissory notes, land warrants, and "wildcat" currency printed by private banks, all based on inflated land values. After the panics of 1836 and 1857, the mania of speculating in town lots declined and many townsites disappeared altogether, but speculators went to extraordinary lengths to keep the real estate market inflated while they scrambled to cover themselves.

Most of the river towns remained polyfunctional in character, with no single industry or service overshadowing the others. Steamboating on the Upper Mississippi became a serious business after 1850, and the river between Keokuk and Prairie du Chien was soon flaked with increasing numbers of steamboats filled with immigrants and freight, making the Mississippi the grand avenue of the bustling river towns. On both sides of the river, the rich bottomlands were soon producing a bounty of timber, corn, wheat, beef and pork, and the first industrial activities involved the storage and processing of agricultural resources. River-oriented businesses included grist and flour mills, distilleries, saw mills, ice houses, lumber mills, and woodyards. Salted pork in barrels and in carcass, smoked hams, sacks of ground corn and wheat, hominy, raw and tanned hides, and whiskey were the chief exports from the river towns before 1860, most of it moved by water.

After the Civil War, urban industrial expansion spread throughout the Midwest and transformed many of the river town landscapes. Even small river towns were rapidly covered by building bulk to accommodate rail yards, factories, warehouses, grain elevators, and tenements. Few railroads had been successfully completed during the 1850's, but by the 1860's towns all along the river were sharing in the greatest railroad building boom ever seen. The location of river towns determined the location of railroad lines, rather than the other way around. Railroads -- and later trucks -- linked the river towns with the merchant banks, farm implement factories, warehouses, and markets of the larger regional entrepôts at St. Louis, Chicago and St. Paul. With the rapid expansion of the regional rail network, commercial agriculture boomed, and industries dependent on agriculture proliferated. Lumber and flour milling, brewing, meat-packing, and farm machinery manufacturing made industrial cities out of Dubuque, Moline, Davenport and Burlington. After the regional rail network was extended to the Mississippi River in the 1850's, it continued to crisscross the countryside and led to the establishment of scores of inland railway villages and a new era in urban development along the river. Depots, stockyards and round-houses rather than steamboat landings and wharves became the focus of economic growth, and it was not long before several of the old steamboat ports became railroad towns. River towns without rail connections were either moved to new locations or gradually abandoned. By 1900, grain elevators and water

towers had replaced wharves and dockside warehouses as the characteristic features of the river town urban landscape.

The advent of the railroads and industrialization changed the aspect of the river towns not only by displacing the steamboats and immigrant hotels, but also attracting large numbers of urban workers, many of them foreign born, changing the character of the towns, whose populations up until then had been dominated by rural-oriented people of native Anglo-American stock. Rows of cheap housing and false-front commercial structures appeared in the towns along with the notion of a right side and a wrong side of the tracks.

Generally, river town development stalled after the First World War, although most river towns maintained their positions as farm trade centers and shipping points. The most significant river town landscape changes between the world wars were associated with automobiles -- i.e., paved streets, bridges, filling stations, parking lots, garages. The period was characterized by the decay of water-front commercial districts, the construction of modern public works -- i.e., the 9-foot navigation channel, flood control levees and ditches -- and, especially after 1950, the decline of railroads, resulting in abandonment of depots and yards.

Agricultural Expansion and Industrial Development (1850s- 1910s)

The trend in regional agriculture was from a subsistence garden-and-grazing economy to cash crop farming, then to a livestock-and-feed-crop farming system. The pioneer stage of agricultural development involved little more than Indian corn, Irish potatoes, and pasturage for horses, cattle, and swine. In the mid-1800's, the pace of economic growth quickened, farming methods improved, and there was a rapid shift toward cash crops. Wheat had been shown to be an excellent cash crop for western farmers and by the 1850's individual farmers were planting most of their acreage in spring wheat. Corn acreage did not push into first place until around the turn of the century, the result of depressed wheat prices, caused by railroad "wheat dumping." Oats, barley, and rye had been introduced by pioneer farmers and are still grown extensively both as cash and feed crops. Sorghum, another pioneer crop, has nearly disappeared. Livestock raising, which before the corn era had been confined largely to hogs, increased to an industry of major proportions after the Civil War. Along with corn, much of the grain formerly grown as cash crops was fed to livestock and marketed as beef, pork, mutton, and dairy products. Alfalfa, timothy, and other cultivated grasses have been grown extensively throughout the region since the mid-nineteenth century, both for forage and soil enrichment.

Important technological developments in agriculture, transportation, and marketing established the potential for rapid growth in the middle nineteenth century. Inventions of farm

machinery enabled farmers to enlarge their operations: Cyrus McCormick's reaper appeared in 1831; John Deere's plow and the Pitts brothers' thresher were patented in 1837; William Pennock's grain drill was perfected in 1841. In 1821 the Erie Canal opened, cutting freight costs between the Great Lakes states and the Eastern seaboard by as much as 90% per ton. After 1830, railroads linked the new agricultural lands with older settled areas and eastern markets. In 1843, John Dart applied steam power to flour milling in Buffalo, New York.

Industrial expansion was the keynote in the economic history of the Upper Mississippi river towns in the post-Civil War era. The rapid growth of flour milling, lumbering and manufacturing brought another influx of immigration and triggered a Victorian riot of capitalist adventure. Between 1835 and 1857, state-assisted internal improvement programs stimulated a transportation boom, particularly in railroad building, resulting in heavy speculation in both real estate and transportation facilities. Between 1840 and 1860, more than 28,000 miles of railroad track were laid, representing an investment of close to a billion dollars. Originally, most of the western railroads were extensions of existing lines of water transportation (the Illinois Central Railroad, started in 1840, linked the Galena lead mines with New Orleans), but by 1855 Chicago was joined by a continuous line of rails to New York. The rapid expansion of new railroad companies outpaced construction and encouraged fraud and speculation. Most of these elaborate programs collapsed after the Panic of 1857, burdening the people of several states with uncompleted projects and heavy indebtedness. Revived by the Civil War, railroad construction progressed with remarkable speed in the 1870's.

Of all the natural resources of the Upper Mississippi Valley, none was dissipated more rapidly or with less benefit to the general public than the forest resources. By the 1830's, the white pine forests of Wisconsin and Minnesota were falling to the lumberman's ax. Nearly all of this timber was floated down the Mississippi to mills in Illinois, Iowa, and Missouri. Cheap raw material and favorable land laws encouraged a cut-out-and-get-out attitude among lumbermen who tended to regard timber as a free good, which led to rapid depletion of the great northern pineries.

The first sawmill on the Upper Mississippi was built by the military at the Falls of St. Anthony in 1822 to provide building materials for the construction of Fort Snelling. Pioneer lumbermen James Lockwood and Col. John Shaw were floating cribs of Wisconsin pine down the Chippewa and Black Rivers as early as 1830. Commercial sawmills opened at Marine Mills on the St. Croix River in 1839 and at La Crosse at the mouth of the Black and La Crosse rivers in 1852.

The Upper Mississippi lumber industry began to decline in the 1880's, and by 1900 the vast army of woodsmen had moved

across the country to conquer the virgin forests of the Pacific Northwest. In a few years hundreds of mills closed down, although many lumber companies continued to maintain their offices and wholesale yards in the river towns.

Not long after the arrival of the first settlers in the Upper Mississippi Valley, the clatter of grist mills began to be heard along the creeks and rivers. Pioneer grain was milled in small, rickety water-powered mills that were a feature of every early settlement. Steam powered mills began to appear in the 1840's. Before 1860, millers ground soft winter wheat between millstones set close together, and this "low" milling pulverized the wheat berry. By 1870, millers were experimenting with the new "high" milling, which used hard spring or winter wheat and involved several grindings and produced a finer flour, as well as more flour per bushel of wheat. Roller milling and the middlings purifier produced a superior flour that made the Midwest the world's breadbasket. By 1880, the European market demand was so great that wheat was king everywhere, and much of the farmland in the Upper Mississippi Valley was planted in spring wheat. Merchant milling, which produced flour for export, had its first substantial beginnings in the 1860's and soon Mississippi River traffic began to swell with shipments of wheat and milled flour. The Upper Mississippi flour milling industry continued to expand and flourish until the 1920's, peaking during the First World War.

The outbreak of war in 1914 brought rapidly rising demand and prices for agricultural products: "Food Will Win the War." Farmers made more money than ever before; farms became larger, more mechanized. The war effort drew labor from the rural districts into the industrialized cities. Expanded domestic and overseas markets, improved roads, automobiles, tractors, trucks, and chemical fertilizers transformed farming from a way of life into a highly competitive business.

In the Turnerian view of American history, the frontier ceased to exist in the Upper Mississippi Valley after ca. 1890. By that date much of the available agricultural land had been cleared and brought under cultivation and there was an air of permanence about settlement in both town and countryside. Local sources indicate that by ca. 1870 nearly all of the lands in the counties bordering the Mississippi between St. Louis and Minneapolis had been entered; about one-half of the typical county was under cultivation, with improved farmland selling for around fifteen dollars an acre, more than three times the cost of unimproved lands. Agricultural development along the Mississippi in northwestern Illinois and Wisconsin, which had lagged somewhat behind Iowa and Minnesota, was probably complete by 1900.

The Upper Mississippi Waterway (1800's-1930's)

The Louisiana Purchase made the Mississippi once and for all an American river, and for more than a century the river served as the great artery of trade and commerce for the whole Mississippi Valley, truly the "Nile of North America."

The first primitive craft used on the Upper Mississippi River were bark canoes and dugout piroques based on traditional native American Indian designs. The French coureurs de bois introduced the bateau, a kind of flat-bottomed skiff made of wooden planks; and various barges and luggers, some outfitted with sails, which carried the grain and furs of the Illinois country downriver to New Orleans in the eighteenth century. There were even Mediterranean style men-o'-war: in the 1790's, a squadron of Spanish war galleys patrolled the Upper Mississippi from St. Louis to the Falls of St. Anthony.

The workhouse on the Upper Mississippi River before steam was the keelboat. Floating with the current, they made fair time downstream under oars; the return upstream was arduous, employing poles pushed against the river bottom. A correspondent of Harper's Magazine described keelboating in the upstream mode (Anonymous 1855:29):

From fifteen to twenty "hands" were required to propel it along. The crew, divided equally on each side, took their places upon the "walking-boards," extending along the whole length of the craft, and, setting one end of their pole in the bottom of the river, the other was brought to the shoulder, and with body bent forward, they walked the boat against the formidable current.

The keelboat remained an important freighter for many years after the period of steamboat dominance began in the 1840's and could still be seen on the river on the eve of the Civil War. Keelboats were also employed as lighters at the Des Moines Rapids, transferring steamboat cargoes where the main river channel was unnavigable because of low water or shoals.

Backwoods boatwrights met the needs of pioneer farmers by creating a class of river craft known as flatboats, sometimes called broadhorns or arks. The flatboat was essentially a large, oblong, watertight wooden box, steered by means of wooden sweeps. Larger and clumsier than keelboats, they were built for one-way voyages downriver. Upon reaching their destination, the crew broke the flatboat up and sold the timber for building material or firewood.

River transportation received its greatest impetus from the introduction of the steamboat. The first steam-powered craft to ply the Mississippi was Nicholas Roosevelt's Pictsburgh-built Orleans in 1811. In 1815 the steamboat Enterprise, brainchild of the brilliant engineer-painter Robert Fulton, ushered in the

steamboat age on western waters by successfully navigating the Ohio and Mississippi from Pittsburgh down to New Orleans, then ascending the Father of Waters to the Falls of the Ohio. The government-chartered Virginia demonstrated the practicality of steamboating on the Upper Mississippi, struggling all the way from St. Louis to Fort Snelling in an epic voyage in 1823.

Basically, the Upper Mississippi riverboat was a sharp-bowed, almost flat-bottomed barge with a pair of steam engines forward of amidships and a large wooden superstructure, part warehouse and part hotel. Side-wheelers, with their paddlewheels amidships, were the queens of the river. Packet and excursion boats were two- and three-story layer cakes of naval architecture.

Wood was the chief source of steamboat fuel until well after the Civil War, and the Upper Mississippi trade created the nineteenth century equivalent of filling stations, riverbank woodyards offering 4-foot billets of wood already cut and piled by the cord. In 1855, T. B. Thorpe, writing in Harper's, described "wooding up" a steamboat from a woodyard with 20,000 cords of wood in single pile. The means of supplying fuel was an important factor in the development of river settlements. Cordwood suitable for the use of steamboats was at first everywhere to be procured along the banks. Its bulk required considerable room for storage, conveniently located with reference to the main river channel, to be readily used, and also to be easily taken on board from the banks or from scows taken alongside the steamers.

The progress of steam navigation on the Upper Mississippi was extremely slow at first; most of the early steamboats running above St. Louis were chartered by the military to supply army garrisons and Indian agencies. When he was reconnoitering Iowa in 1836, Albert Lea reported that there were already ten to twelve steamboats on the Upper Mississippi, most in the lead trade (1836:16). Steamboats multiplied rapidly after 1830, until there were more than a thousand on the Upper and Lower Mississippi on the eve of the Civil War. Steamboats carried immigrants upriver from Alton and St. Louis and hauled pigs of lead downstream from the Galena-Dubuque mining district. In the 1870's it was not uncommon to see one steamboat pushing up to two dozen barges three to five abreast, lashed together. George B. Merrick wrote that the late-nineteenth century steamer Imperial, also known as the "little whale," could push eight barges laden with 100,000 bushels of wheat (1914-1915:232). The size of the tow was limited only by the size of the drawbridges encountered on the river.

From Minneapolis to St. Louis all day sounded the buzz of saws and the rattle of logs on the runways. Before the Civil War, timber rafts floated downriver unpowered: Mark Twain recalled the lumber rafts passing by Hannibal, "an acre or so of white, sweet-smelling boards in each raft, a crew of two dozen men or more, three or four wigwams scattered about the raft's

vast level space for storm quarters" (1874:42). Later, steamboats were employed pushing or towing huge rafts of Wisconsin and Minnesota timber downriver to the mills in Iowa, Illinois, and Missouri. The use of steamboats made it possible to increase the size of the rafts: by the end of the century the Upper Mississippi floated rafts as large as 270' wide and 450' long, made up in two parts in order to pass drawbridges.

Even under steam, rafting was hard, dangerous work. Every snag, bridge, island, dam, rapids, and pier was a potential disaster, as described by Charlie Russell (1928:99):

Rafts grew longer as the business found its bearings; and then to steer them around the curvings of the channel and over the numerous and always changing sandbars required a still higher order of developed skill, and at times the swift, stern, and almost titanic labor of the men at the great oars. In the lunacies of an inexplicable current and the quick changes of wind and weather, skill and hard work alike would fail, and I have seen a raft go plump into a tow head with twenty men rowing like mad to save it and the bewitched thing bent by their efforts almost into a great letter C.

Lumber rafting on the Upper Mississippi lasted roughly from 1840 to 1915; the lumber industry crested in 1892, "and then the whole thing began to dry up and blow away faster than it had come." Once the supply of Wisconsin and Minnesota white pine exhausted, timber rafts became smaller and fewer. By the 1920's, most of the rafting steamboats were sold into lower river trade or broken up.

Steamboats were the chief agency for passenger and freight carriage between the 1850s and 1880s, and enjoyed their greatest importance from the late 1860s to the early 1880's. Receipts for goods shipped downriver to the port of New Orleans rose from \$5,000,000 in 1807 to \$22,000,000 in 1830 and \$185,000,000 by 1860. Steamboat traffic on the Upper Mississippi reached its zenith in the decade prior to the Civil War, just as the railroads began sapping the river trade. Steamboating revived somewhat after the war but the railroads, with their greater speed, convenience, and certainty, frustrated all efforts to resurrect commercial river traffic. By 1875, railroads were no longer tributary to the Mississippi waterway; in that year, only 22% of the trade passing through St. Louis was moved by barge and steamboat (U. S. Congress 1878:8). The famous Diamond Jo steamboat line undercut railroad freight rates by as much as 33%, but even at such rock-bottom rates the boats could carry little freight, and the company lost its once lucrative business shipping flour from Minneapolis to St. Louis. As late as 1910, much heavy freight was still carried by "tramp steamers."

Packet boats started to make scheduled runs between the river towns above St. Louis in the 1830's. Excursion and show

boats furnished the entertainment that helped make the second half of the nineteenth century a golden age on the Upper Mississippi. A significant passenger and excursion trade remained after 1880, carried on by several small, colorful packet boat lines. Vestiges of the steamboat excursion era remained until the 1940's.

In the early days, travelers wishing to cross the Mississippi and its tributaries had to rely on poorly marked fords and swam with their horses when necessary, but with the opening of the west bank of the Mississippi to settlement there was a pressing demand for regular ferry service, and soon the Mississippi along Iowa and Illinois was lined with private and public ferries. The growing river towns had their own municipal ferry landings where licensed ferryboats took aboard and discharged passengers and cargo. Ferry licenses and rates were the jealously guarded prerogative of the county boards of commissioners.

The Corps of Engineers and the Upper Mississippi (1866-1930s)

The pre-industrial Upper Mississippi River was the broad highway of North America, an ever-changing scene of unmatched beauty that thrilled and fascinated observers from Father Marquette to Mark Twain. The voyages of the keelboats and paddlewheelers were not always supine driftings in Rhine-like style through sentimental scenery. The Upper Mississippi was no tame canal: cumbersome, under-powered river craft were at the mercy of current and breeze, flood and drought. The river in its natural condition consisted of a series of relatively deep pools separated by shoal bars and rapids. The channel was obstructed by rocks and snags, and during the low-water season the flow through the shoals divided into several chutes with narrow widths and depths as little as 30 inches. The Des Moines and Rock Island rapids were obstacles to navigation comparable to the Falls of the Ohio, and sometimes the rapids were impassable at low water. At high water, however, the river was navigable all the way up to St. Paul.

The major impediments to navigation were channel obstructions and low water. In winter, the river was closed by ice for several months, and in summer it got so low that it was frequently closed to navigation by all but the shallowest draft boats. The wash of the serpentine current undercut the banks and at high water thousands of tree trunks were uprooted. Water-logged tree trunks fixed in the river bottom, with just their tops showing above water, were called "planters" and if struck could sink a steamboat. In 1829, the government snagboat "Heliopolis" raised a planter 160' long and 3.5' in diameter out of the river bed (Dobney 1976:23). Smaller logs were called "sawyers" because they bobbed up and down with the current, like the motion of a sawmill saw. Clumps of planters and sawyers "snagged" many a steamer -- "A full-grown snag seemed ingeniously

designed to work ruin" (Russell 1928: 271). "Wooden islands," logjams of floating debris, were more dangerous than real ones. At high water, chutes and sloughs become large, deep navigable waterways, with such dimensions as usually reported on the maps of the region. During low water, these backwaters were much diminished in size and in some cases were cut off or so choked with debris that channels navigable one month were sometimes closed the next. Islands and sandbars were numerous and constantly shifting their positions or changing in size: literally hundreds that were recorded on earlier maps disappeared from later charts. Being most numerous in the bends of the river, the larger islands tended to become more difficult and dangerous to pass over time.

There were also man-made obstructions. Wrecks and derelicts abounded. Poorly sited bridges, dams, and piers took their toll of steamboats and other craft; from the 1850's on, bridge piers were a major hazard for lumber raftsmen. General G. K. Warren conducted an inspection of bridges on the Upper Mississippi and described the old Rock Island railway bridge, which had opened in 1856, as "undoubtedly the worst artificial obstruction to navigation that has been built on the Mississippi." (1878:96) Warren went on to describe the old bridge at Clinton:

Several steam saw-mills have been erected on the right bank below the bridge, which, like the mills or furnaces, make at times dense smoke and bright lights, that greatly interfere with the safe navigation of the river in their vicinity, and add to the difficulties of passage of the bridge . . . The bridge is now a greater obstruction to the passage of rafts than it was at the time it was legalized in 1867, because of the change which has taken place in the method of rafting. Formerly the rafts were all managed by men using large sweeps, and the passing under the low bridge across the Illinois channel did not interfere with the control of the raft, but now the larger number of the rafts are managed by means of small steamboats, and they cannot pass under the bridge. The raft has to be dropped near the bridge in the Illinois channel, and the steamboat goes around the head of the island and passes through the draw-opening in the bridge over the Iowa channel. The bridge over this channel does not furnish suitable openings for the passage of rafts in its present state, though near low water the rafts are sometimes separated into smaller parts and dropped through this channel by the boats. (Ibid.)

The rapid development of the Middle West after the War of 1812 created a need for improved transportation facilities to link the Ohio and Mississippi valleys with the markets of the eastern seaboard. In his last message to Congress, President James Madison recommended a federally subsidized network of roads and canals and in 1817 Western congressmen succeeded in having a bill passed to create a permanent fund for internal improvements; but Madison's own misgivings about the constitutionality of the

initiative led him to veto the bill. The first concrete step toward improvement of the Mississippi River was taken in 1820, when Congress authorized a reconnaissance survey of the Mississippi and Ohio river systems by the U.S. Topographical Engineers. The first Rivers and Harbor Act in 1824 authorized army engineers to remove specified sandbars, sawyers, planters, and snags from the Mississippi and Ohio Rivers as an aid to navigation.

Prior to 1878, more than two hundred congressional appropriations were passed to improve the Mississippi and its tributaries. But all of these acts combined earmarked only \$18,500,000 for Mississippi River improvements, less than one-third of the sum spent by the state of New York on its canals (U.S. Congress 1878:11). Systematic work on the Upper Mississippi did not begin in earnest until mid-century. Boulders were removed and snags were broken up. In one year, "Uncle Sam's Toothpullers" removed 1,837 snags from the Mississippi River, at a cost of \$13 each, and cut down 18,141 trees along the banks. Obstructions at the Des Moines and Rock Island rapids were cleared and channels deepened.

Eliza Steele described a dredge at work on the river in 1840 (Angle 1968:192):

This morning we passed one of those machines employed by the government, during low water for the purposes of clearing away the sandbars. It is a large wooden ark, worked by steam. A great shovel takes up the mud, brings it up, and throws it into the scow at the other side which is emptied upon the shores.

The Army Corps of Engineers traces its heritage back to the Continental Army of George Washington. The Corps has been active on the Upper Mississippi since 1824, when it began removing snags, boulders, and other obstructions from its main channel. The Rock Island District Corps of Engineers was established in 1866, with offices at Keokuk, St. Paul, Rock Island, and Quincy, and government snagboats and dredges have been at work on the Upper Mississippi continually since 1867.

A new era of Federal participation in improving navigation on the Upper Mississippi was ushered in by the establishment of the Mississippi River Commission in 1879 to supervise improvement of the river as a commercial/industrial waterway:

It shall be the duty of said commission to take into consideration and mature such plan or plans and estimates as will correct, permanently locate, and deepen the channel and protect the banks of the Mississippi River; improve and give safety and ease to the navigation thereof; prevent destructive floods; promote and facilitate commerce, trade, and the postal service; and when so prepared and matured, to submit to the Secretary of War a full and detailed report of their

proceedings and actions, of of such plans, with estimates of the cost thereof . . .

The Commission included civilians -- one of its first civilian members was Benjimir Harrison, another was James B. Eads, the brilliant naval architect and engineer, designer of ironclads and the first bridge across the Mississippi south of the Missouri -- but granted hegemony to the Army Corps of Engineers. The president of the commission would always be an army officer and all decisions were subject to review by the commandant of the corps, who had veto power.

On 18 June 1878 Congress authorized the army engineers to clear and maintain a 4-1/2 foot draft channel on the Upper Mississippi, so that it could accommodate larger, deep-draft boats. Wing dams, of brush mats and rock, were built; snags and boulders were removed; and shallow stretches were deepened by dredging. On 9 February 1905 Congress passed an act which permitted construction of a hydroelectric dam with a navigation lock at Keokuk. This structure, the first of its kind on the Upper Mississippi, was completed in 1913 and replaced the old locks and lateral canal built thirty-five years earlier by government engineers to circumvent the Des Moines Rapids. On 2 March 1907 Congress authorized construction of a 6-foot navigation channel from the mouth of the Missouri River to Minneapolis.

Rather imperiously, Congress had also ordered its Mississippi River Commission to "prevent destructive floods." By the middle of the nineteenth century, it had become obvious that the Mississippi River flood stages were becoming progressively higher through time, as the amount of leveed floodplain increased and the river was presented with fewer outlets. Beginning in the 1850's, some engineers began to call for the creation of a system of dams and reservoirs on the tributaries of the upper river to control river flowage, but the Corps remained committed to the old "hold by levees" concept, eschewing tributary dams and reservoirs.

People began to wonder if the levees could ever be high enough and strong enough to make the river safe. When the Commission was created, giving carte blanche to the Corps, Mark Twain was compelled to write:

One who knows the Mississippi will promptly aver -- not aloud but to himself -- that ten thousand River Commissions, with the mines of the world at their back, cannot tame that lawless stream, cannot curb it or confine it, cannot say to it, 'Go here,' or "Go there,' and make it obey; cannot save a shore which it has sentenced; cannot bar its path with an obstruction which it will not tear down, dance over, and laugh at. But a discreet man will not put these things into spoken words; for the West Point engineers have not their superiors anywhere; they know all that can be

known of their abstruse science; and, so, since they conceive that they can fetter and handcuff that river and boss him, it is but wisdom for the unscientific man to keep still, lie low, and wait till they do it.

For forty-eight years the Corps and the Commission strictly adhered to the "hold by levees" policy. Then the great flood of 1927 -- which was not even a "100 year flood" -- destroyed every bridge between Cairo and the Gulf of Mexico, killed hundreds of people, ruined millions of dollars' worth of property, and made it perfectly clear that the "hold by levees" strategy was helping to aggravate the problem it was meant to solve. The Flood Control Act of 1929 appropriated \$300 million for the Mississippi River and Tributaries Project, a scheme that would cost upwards of \$7 billion and is not yet completed a half century later. The project was designed to raise old levees and build new ones, pave cut-banks, straighten and dredge the main channel, cut meanders to speed up flow, dam upper river tributaries, and build dikes and diversion canals.

With the passage of the Flood Control Act, the Corps also accepted the challenge of transforming the Mississippi River into an industrial thoroughfare. The act of 3 July 1930 authorized construction of a 9-foot-deep navigation channel suitable for common-carrier service from St. Louis to Minneapolis. This was a massive undertaking, achieved by building a system of 29 locks and dams, converting the 669-mile upper river into a series of wide, placid pools or lakes. The Upper Mississippi lock and dam system was completed in 1940 (Fig. 3.3). The dams raised the river's water level, permanently flooding many marginal lakes and sloughs.

Because the river is constantly shifting its load of sand and sediment, and tributaries along the way contribute more, it is necessary to remove the material from the bottom of the channel to keep it open for navigation. Since the mid-nineteenth century, the Corps has operated several dredges on the upper river. Because the early dredges lacked crew quarters on board, they were accompanied by barges containing bunk and mess facilities, with crews shuttled back and forth at shift changes.

The post-industrial Mississippi's vital statistics are awesome: along with the Missouri and Ohio river tributaries, it wanders through ten states and drains a 1.2-million-square-mile basin, receiving water from thirty-one states and two Canadian provinces; its average volume of discharge at the Gulf of Mexico is 350 million gallons per day. The river is a busy commercial highway for the barge industry, plied by towboats filled with grain, coal, fertilizer, petroleum, and a hundred other commodities. Today it carries more than 250 million tons of barge cargo a year, or slightly less than that moved across the Great Lakes.

Summary of Local History
with Reference to Potential Archaeological Sites
in Pools 13 and 14

Predictions of the general location of historic sites is probably the most important application of archival research data in archaeological surveys, since these cultural resources may be eligible for nomination to the National Register of Historic Places. Historical data on potential historic sites in Pools 13 and 14 are presented in the following summary of local historical development. These site predictions are also presented in map form (Figs. 4.5-4.11). Site specific documentation is not particularly abundant -- indeed, precise locational data are altogether lacking for some sites. For example, general historical data suggest that the mouths of the major streams flowing into the Mississippi within the project area -- the Apple, Maquoketa, Plum, Elk, Meredosia, and Wapsipinicon -- would be good places to look for archaeological resources associated with the fur trade and historic Indians, but there is no way to identify the locations of many sites in greater detail than "at the mouth of the Wapsipinicon," etc. On the other hand, some very interesting sites can be fixed with some precision, but may no longer exist as intact archaeological deposits, such as the historic Sauk and Fox villages described in early travelers' accounts and the memoirs of pioneer settlers at Bellevue, Savanna, Sabula, Fulton, and Princeton.

The pages that follow are organized on a geographic basis, by pool, from north to south. There has been no attempt to reconstruct detailed local histories of each city, township, and county in the project area. Site specific documentation makes no claim to being exhaustive, or even approximately so; however, there has been an attempt to discuss potential sites in terms of their location and historic context. Finally, bibliographic references to sources of background or contextual information have been omitted from the text. Suffice it here to note that the background for the following section was drawn from county narrative histories, platbooks, atlases, and local histories, supplemented by the old American Guide series volumes for Illinois and Iowa. The cartographic records of the Corps of Engineers, General Land Office, and the U. S. Geological Survey were used to identify characteristics of the historic environment in the project area. These printed sources were augmented by the archives of the commissioners, recorders, and assessors in each of the counties bordering on Pools 13 and 14. The location of source documents is largely self-explanatory -- e.g., the reader should assume that information about the city of Fulton, Illinois, would be found under the appropriate heading in the history of Whiteside County, and that corroborative data from platbooks and land records would be available in the county courthouse. These materials are described in some detail in the annotated bibliography of historical sources.

Historical Development in Navigation Pool 13

The site of present-day Bellevue, Iowa, seems to have been the focus of considerable native American Indian activity, both prehistoric and historic. Few visitors have failed to be charmed by the setting: Zebulon Pike, sailing upriver in the late summer of 1805 on his reconnaissance to the headwaters of the Mississippi, passed an encampment of Sauks on "a beautiful eminence on the W. side of the river" and noted that the spot "had the appearance of an old town" (Coues 1895:I:27-28) (Fig. 3.4). Traces of the old Sauk village at Bellevue caught the attention of later nineteenth century Euro-American residents. According to a county history (WHC 1878:534-535): "Immediately below town, on the ground now occupied by the Presbyterian Cemetery, there was a village of the Sacs. In 1850, the war-pole was still standing. Immediately below the village was their burying ground." Dr. Lawrence Millar, a local amateur archaeologist, excavated several burials, which yielded human and animal bones, native pottery, and European trade goods, including silver, iron, and bronze objects. Arrowheads were commonplace along the river bank. There were also several large earthen mounds in the vicinity, which, upon examination, were presumed to be of prehistoric origin; the mound diggings turned up some human remains, dog or wolf bones, pottery, mussel shells, wood and stone crypts. At least one of the ancient mounds also had a recent burial; the owner of another mound, located about 2 miles south of town, reported that "when he came there in 1833, the Indians used to sit upon this mound and black their faces." Besides mounds, the county history reports that the "remains of ancient fortifications . . . regularly built breast-works, showing a great amount of skill" were visible for many years in Bellevue, and a little ways below the village site there was "a stratum of two feet of muscle-shells and clamshells, evidently being a place where the Indians had their annual clam feed." The same source relates that Black Hawk's band camped along the river at Bellevue in 1834 (WHC 542-543).

The Upper Mississippi affords few better sites for a town than Bellevue (Fig. 3.5). Situated on a high bench 15 feet above the old high water mark, it is surrounded by a natural amphitheatre of hills. "From the shore to the hills back of the city stretches a prairie about a mile wide," wrote Henry Lewis (1967:214); alluding to the landscape of prairies mingled with oak groves, the Italian tourist Beltrami mapped the site as "Cheniere" (1828:II:196), which may be roughly translated to mean an oak island. Euro-American settlement of the area dates from 1833. Land entry records in the Jackson County courthouse show that the townsite was claimed by J. B. Bell in 1835 -- it would appear that he called his townsite "Bell's View" but did not enter a plat. A formal plat of survey was recorded in 1837, not by Bell but by the commissioners of Crawford County, Wisconsin Territory, who claimed the site under authority of the act of Congress creating the Wisconsin Territory. The homespun "Bell's View" gave way to the more pretentious, Frenchified "Bellevue"

(i.e., beautiful view) and a regular town grew up around the seat of the territorial, and later county government.

Bellevue's early development was vexed, however, by problems of law and order. For several years, a group of brigands terrorized the town and its environs, until an assortment of vigilantes was raised and the outlaws were suppressed in the so-called "Bellevue War" of 1840. And in 1848 the town lost the county courthouse war to Jackson. However, early promoters realized the town's potential as a transportation terminus and agricultural processing center: a steamboat landing and ferry, saw mills, grist and flour mills, and warehouses were soon put up, and the river town also acquired stores, churches, schools, hotels, and shops. By 1877, Bellevue, with a population exceeding 2,000, was the market and trade center for a large farming region and its merchants were shipping over 100,000 bushels of wheat, 200,000 bushels of oats, and 30,000 bushels of rye each year (Owen 1878:59). Nineteenth century plats show a waterfront dominated by wharfage, mills, warehouses and commercial buildings. To facilitate transshipment of people and goods across the river to the Sand Prairie settlements on the Illinois shore, a group of Bellevue merchants formed a company to excavate a channel 100 yards long, 25 feet wide, and 3 feet deep across Cut-Off Island, to shorten the passage from the town landing through Crooked Slough (WHC 1879:533). Twentieth century development focused on trade, serving a large part of the Jackson County hinterland, and on manufacturing, including pottery works and a large player piano factory. While construction of Lock & Dam No. 12, the government fish hatchery, and U. S. Route 52-67 probably obliterated much of the historic waterfront, the little city today still boasts a picturesque riverfront, with a number of fine old homes and commercial buildings.

South of Bellevue along the Iowa side, the Mississippi is bordered by a range of low limestone bluffs. An untitled 1893 platbook in the Jackson County recorder's office shows three potential historic sites along the river in southeastern Jackson County (Fig. 4.11). The first of these is the William Dyas farmstead, nestled below the bluff about a half mile below town, in NE 1/4 SE 1/4 NE 1/4 sec. 9, T86N R5E, which would place the site, long since abandoned, on land controlled by the Rock Island District Corps of Engineers. The platbook shows a settlement and woodyard identified as Golding's on the eastern tip of Island No. 250, fronting on the slough in NE 1/4 SE 1/4 NE 1/4 sec. 3, T85N R5E (Fig. 4.10). Because of the late date, and without corroboration from another contemporary source, we are inclined to regard Golding's woodyard as a small lumber milling operation, rather than a surviving example of the earlier steamboat fueling stations. Finally, on the "mainland" shore in NW 1/4 NE 1/4 sec. 17, T85N R6E, the 1893 plat shows a complex of buildings known as the Smith & Shoecraft Sawmill. A separate building in NE 1/4 NE 1/4 sec. 17, presumably a residence, is also shown on the Smith & Shoecraft property, suggesting a dual farm-and-mill land use.

The Sand Prairie in southwestern Jo Daviess County, Illinois, was occupied by Euro-Americans at a fairly early date, but there is little evidence of development along the river, where the land was low and swampy (Fig. 3.6). Early settlers in Hanover Township must have been discouraged when the Mississippi flooded in 1828, filling its old channel along the eastern margin of the Sand Prairie, flooding all the way to the foot of the bluffs (Kett 1878:590). The first settler along the Mississippi between the mouths of the Fever and Apple rivers appears to have been Benson Hunt, who staked his claim in the southwestern corner of Hanover Township in 1836. Hunt was probably attracted to the area not so much for its agricultural potential as for its commercial prospects, it being on the projected line of the Illinois Central Railroad to Galena. Hunt is said to have been proprietor of a short-lived townsite named "Huntsville" which he abandoned when the railroad announced its plan to change its route. The site was occupied in 1849 by one Thomas Parks, who renamed it "Parksville"; there was a ferry landing and a store, but not much else, and the place was depopulated within a few years (Kett 1878:592). No record of a plat for Huntsville/Parksville could be found in the archives of the Jo Daviess County recorder's office.

That the Maquoketa River was a part of the Upper Mississippi borderlands landscape is apparent from its appearance on early maps as the "R. a Macaret" (Delisle 1718) and the "Grand Marketag Riviere" (Hutchins 1778) -- the name is Sauk-Fox and means "there are bears" (Vogel 1983:41). In pre-modern days, the river was navigable for 25-30 miles above its junction with the Mississippi (Fig. 3.6). During the American period, George Davenport is said to have had a trading post at the mouth of the river (Downer 1910:I:868).

The pretty Apple River enters the Mississippi in a maze of sloughs and islands near the boundary between Jo Daviess and Carroll counties, Illinois (Fig. 3.7). The name of the river appears in the old travelers' narratives in its standard French form: La Pomme, or Riviere aux Pommes (see, e.g., Beltrami 1828; Nicollet map in Wood 1983:plate 20). This is possibly a corruption of potomac, the Mississippi Valley French term for the cowberry or groundnut (see McDermott 1941:125), sometimes called the "prairie turnip," which is preserved in the Pomme de Terre Prairie in northeastern Clinton County, Iowa (see below). At present-day Hanover, where the Apple falls from the unglaciated uplands of Jo Daviess County into the Mississippi trench, Daniel Fowler and Charles Ames encountered a large Sauk and Fox village called "Wapello" while prospecting for claims in 1827 (Kett 1878:591; Miller 1976:11). The upper Apple River was also part of the early lead mining district: Julien Dubuque is said to have worked a mine near present-day Elizabeth, the colonial forerunner of what came to be known as Vanmatre's old furnace (Kett 1878:231, 301).

The lands around the mouth of the Apple River, undoubtedly the scene of considerable prehistoric activity, were claimed by Euro-American settlers in the 1830's. Sometime around 1836, according to local historians (Thiem 1968:83; Bourland 1978:26, 35), a townsite named Portsmouth was platted at the mouth of the Apple as a rival of Savanna. No plat has been located in the county courthouse archives, and it may be that the site of Portsmouth, which was never much more than a "paper" town, lies within the Savanna Proving Grounds (Army Depot).

About a mile downstream from the mouth of the Apple River, Stephen Arnold staked his claim in 1834 (Thiem 1968:83; Bourland 1978:25) (Figs. 3.7, 4.10). The little settlement is shown on Joseph N. Nicollet's map, drawn in November 1839 during his hydrographic survey of the Upper Mississippi (see Fig. 3.8a). An 1869 plat of survey in the Carroll County recorder's office locates a house and landing on the Mississippi in the NE 1/4 SE 1/4 SE 1/4 sec. 12, and another house fronting on the Apple in the SW 1/4 NW 1/4 of the same section. Zebulon Pike and his exploring party are supposed to have camped at or near this location on 30-31 August 1805 (Coles 1895:1:27).

According to Thiem (1968:83), there was a steamboat landing four miles south of the Jo Davless-Carroll County line. This may be the riverine equivalent of Marcus, an unincorporated railway station and post office on the Chicago, Burlington & Quincy line, which appears on late-nineteenth century maps. In 1905, Marcus witnessed one of the great train robberies in North American history, when holdup men made off with the mailbags from the CB & Q night express to Minneapolis (Thiem 1968:57-58).

The original General Land Office township survey of T25N R3E in Carroll County, Illinois, shows "Robinson's house and garden" located at the foot of the "Rocky Bluffs" in NW 1/4 NE 1/4 NE 1/4 sec. 20 and SW 1/4 SE 1/4 SE 1/4 sec. 17 (Fig. 4.10).

An untitled platbook (1913) in the Jackson County recorder's office shows a community called "Highland" on the north end of Keller's Island, about three miles above the town of Sabula (Fig. 4.10). Further documentation could not be located, but this was apparently a summer cottage or camp development. By the end of the nineteenth century, recreational uses had overtaken commercial uses of the Upper Mississippi waterway. With the advent of the automobile and improved rural roads, the Mississippi bluffs and islands became popular vacation sites for urban dwellers. The river current kept the banks along the upstream ends of the high islands like Keller's clean and sandy and prevailing winds minimized the mosquito hazard.

Named in allusion to the rolling sand prairie that sweeps back from the river below the palisades, Savanna is the oldest permanent Euro-American community on the Mississippi between Rock Island and Dubuque (Fig. 3.9). The first settlers of the Pierce-Davidson colony floated down from Galena in 1828 and set

up housekeeping in an abandoned Indian "wigwam" at the foot of present-day Randolph Street (Kett 1878:223-225; Thiem 1968:141). This is most likely the Indian encampment observed by Lt. Pike in 1805 (Coues 1895:I:27). The site must have had some special significance for the Sauk and Fox, for we learn that they called the site the "Council Bluffs" and had girdled a large number of oak and walnut trees on the terrace behind where the white settlers planted their town (Bourland 1978:5), which certainly suggests intensive agricultural use. For many years, pioneer farmers plowed up quantities of native pottery and other relics (Bowen 1928:19).

According to documents in the Carroll County recorder's office, Savanna -- also spelled Savannah -- was platted in 1836 on the claims of Aaron Pierce and George Davidson in secs. 4 and 9. The townsite is situated on a sand terrace, most of which is above overflow; below, the topography of Savanna Island and the Spring Lake basin was low and swampy; and back of town, the terrace rose to high rocky bluffs (Fig. 3.10). Growth was slow: when the English geologist George Featherstonhaugh passed by in June 1836, he noted that the place consisted of just two log houses (1847:II:134). While still in its swaddling clothes, Savanna gained importance as a river port and farm trade center for an expanding agricultural region; by 1839, the town's merchants were shipping more than 400 tons of freight each year, mostly to inland towns (Pease 1918:192). The town also prospered because of its brickyards, lumber mills, wagon factory, and breweries (Kett 1878:361). With the coming of the railroad in 1850, the river town emerged as an important rail center, the shipping point for livestock and grain destined for the Chicago market; eventually, the town housed the yards and shops for divisions of the Chicago, Milwaukee, St. Paul & Pacific and the Chicago, Burlington & Quincy railroads. Before the Mississippi was bridged, trains were shuttled across the river by ferryboat; in winter, after the river had frozen over, piles were driven down through the ice in the channel and trains continued to run until the spring ice breakup (Bourland 1978:55). The Savanna Highway Bridge was built in 1933, expanding the town's hinterland. Savanna was also an important center of commercial fishing on the river: in the 1870's, around twenty-five men were employed locally, using seines (Kett 1878:361-362).

The Plum River, which enters the Mississippi behind Savanna Island, was originally called the Riviere Plomb, using the standard French noun for lead (Adams 1969:476). The stream also appears on early maps as the Pecatolikee River (Thiem 1968:125), which defies translation. While there is little evidence of historical development around the mouth of the Plum, when Savanna and environs were settled, it was a navigable stream: the General Land Office survey plat for T24N R3W shows the "Head of Navigation" at Bowen's Mill, in NE 1/4 SE 1/4 SE 1/4 sec. 2. In 1839, a gunpowder factory was erected at this site, replacing an earlier sawmill; the factory blew up in 1845 and the site was later occupied by a flour mill (Kett 1878:226; Bowen 1928:43).

Like so many river towns, Sabula, Iowa, was founded on the site of an earlier native American Indian settlement. When the first Euro-American claims were made nearby in 1835-1836, there were several native families at the place which was then known as the Prairie LaPierre (WHC 1879:562). The location was important because it offered the only good site for urban development on the Iowa side of the river between Bellevue and Clinton. Platting occurred in 1836, under the name of Carrollport; but when mail started coming addressed to "Carroll Point" the name was changed to Charleston. The present name dates from 1846 and its origin is a bit cloudy: Sabula is derived either from the Sauk-Fox language or the Latin (sabulum) (WHC 1879:563; Mott 1973:59); or it may preserve the name of Mrs. Sabula Wood (Federal Writers Project 1945:355). The town's growth followed the standard pattern of river town development: early plats show a waterfront dominated by ferry and steamboat landings, sawmills, flour mills, packing houses, an ice house, cattle and swine pens. The first locomotive was ferried across the river in 1870; the Chicago, Milwaukee, St. Paul & Pacific Railroad bridge dates from 1881. After the turn of the century, Sabula was known for its mills, meat packing plant, shell jewelry manufactures, and for its state fish rescue station (Federal Writers Project 1945:356). Much of the old riverfront has been redeveloped and the old landing is submerged.

The mouth of the Elk River (Fig. 3.11), which enters the Mississippi on the Iowa side about mile 528, was a favorite campground for the Sauk and Fox up until at least 1839; there was also a fur trade post nearby, the chimney of which was still standing in 1879 (WHC 1879:342, 620). No corroborative data could be found to document either the Indian camp or the trading post. There were a number of early Euro-American settlements on the lower Elk. In 1841, Calderwood and Dinwiddie erected a sawmill in sec. 18 T8GN R7E, from which they shipped lumber to a wagon manufacturer in Galena until local timber resources were exhausted in the 1870s (WHC 1879:620; Clinton County Historical Society 1978:34). Nicollet mapped an unidentified settlement near the foot of the bluff a little north of the Elk (Fig. 3.8b). This was Teed's Grove, named for the first settler in the neighborhood, who came in 1836. According to local tradition, Teed shared the typical Yankee pioneer's aversion to prairies. When he learned that his 160-acre claim was located on school land, and therefore not eligible for pre-emption, Teed packed up and moved away, declaring that he would not settle where there were no trees (WHC 1879:617-618).

The name of the Pomme de Terre Prairie, located in northeastern Clinton County, Iowa, opposite Fulton Island (Fig. 3.12), preserves another vestige of the region's French heritage. In Mississippi Valley French, the name refers to the Glycine apios L. -- also known as the prairie turnip, groundnut, cowberry, or Indian potato -- rather than to the potato (McDermott 1941:125; see also Owen 1852:619). The tubers of this plant were utilized for food by Indians and early Europeans, who

ate them raw, boiled, or roasted, sometimes with maple sugar (cf. King 1984:126). An early immigrant guide refers to this landmark as the "Prairie Ponn de Tau" and in typical American fashion distorts its meaning to "beautiful prairie" (Newhall 1846:28).

Historical Development in Navigation Pool 14

The Mississippi Narrows extend for about two or three miles along the river, bordered by low, sandy terraces that are subject to overflow (Fig. 3.12). In its natural state, the main river channel was on the Iowa side, and the eastern channel was shoal, choked with sandbars and willow islands. Native American Indians occupied the Narrows for a long period prior to the arrival of the first Euro-American settlers. In the old county history we read that Cattail Slough on the Illinois side was a favorite hunting ground used by the Sauk and Fox as well as by the Winnebago and Pottawattamie well into the American period: "In the proper season the Indians would pitch their tents wherever they chose, over this ground, and hunt and trap the fur-bearing animals" (Bent 1877:156-157). When the site of Fulton was first settled by Euro-Americans, evidence of the prior inhabitants lay everywhere in plain sight: extensive old fields dotted with corn hills south of town, and the ruins of native lead smelting were clearly visible (11Wt121; Fig. 4.7). The native smelters were located in a six-foot deep depression in the northern part of town, about two hundred rods from the river. When dug up by curious pioneers, these ancient furnaces yielded "large quantities of smelted lead and lead ore in the natural state . . . besides Indian relics, such as spear heads, rude knives, battle axes, and several brass pots" (Bent 1877:156). The native process for smelting lead ore was described by Henry Schoolcraft (1953:226):

Formerly, the Indians were in the habit of smelting their ore . . . upon log-heaps, by which a great portion was converted into what are called lead-ashes, and thus lost. Now, the traders induce them to search about the sites of those ancient fires, and carefully collect the lead ashes, for which they receive a dollar per bushel . . . payable in merchandise.

The early settlers also discovered a row of red cedar posts, 12 to 14 feet high, extending from the river bank at what is now Ferry Street, all the way to the bridge crossing Cattail creek -- what these posts were used for was not known. The site was an important river crossing: we are told that the old Indian trail leading down to the Mississippi crossing "had been worn to the depth of two or three feet by the ponies" (Bent 1877:156).

Recognizing the advantages of the area for transportation and townsite development, Elijah Buell and John Baker were the first permanent settlers at the Narrows. Buell, a former river pilot, made his claim on the Iowa shore near the mouth of Turtle

Creek, brought his family up from St. Louis, and started farming the adjacent prairie in 1835. Baker, a refugee from the outbreak of Asiatic Cholera at New Orleans, had ascended the Mississippi in 1832 to prospect for townsites in more healthful surroundings; in 1835 he became a partner of Buell's and settled on the Illinois side, where the road from Rock Island to Savanna crossed Cattall Creek, and started running a ferry between Whiteside Point and Buell's. Baker's settlement could not be located with precision, but it probably lies east of Corps of Engineers land along Cattall Slough; the old Whiteside County history describes the place in some detail in the context of a story about Baker's hospitality to travelers.

John Baker was the father of Fulton, platted in 1839 and named in honor of the inventor of the steamboat (Fig. 4.7). Located 377 river miles above St. Louis and 136 airline miles due west of Chicago, the town was well placed to take advantage of the anticipated boom in Midwestern development and so attracted its share of settlers. The old history of Whiteside County describes the town's formative years (Bent 1877:162-163):

The business portion of the town is mostly on ground of a sufficient height above the river bank to preclude any danger from overflow. The bluffs, at the north and east of the business part, present elegant sites for dwellings . . . Many of these residences are notable for their beauty and elegance. The streets of the city vary in width from 60 to 100 feet, many of the resident ones being bordered by long lines of shade trees, giving them quite a forest like appearance. Much attention has been given to render the business center attractive, the buildings for the most part being large, handsome, and built of brick. The general healthfulness of the place is a matter never controverted, and is accounted for by its favorable location, the excellence of the [ground] water, and the enforced cleanliness of the city. The commercial advantages of Fulton, it has been truly said, are not surpassed by any point on the Upper Mississippi.

Early development at Fulton focused on providing prospective Iowans with temporary lodgings, provisions, and transportation. The first ferry between Buell and Baker, a small skiff, was succeeded by a flatboat ferry in 1838, a horse ferry in 1844, and a steam ferry in 1850; eventually, a wagon bridge was built, which in turn was replaced by the Lyons & Fulton Steel Highway Bridge, completed in 1891 (Davis 1908:1:181-182). Fulton grew rapidly after 1851, with the advent of the Illinois Central Railroad; several railroads were projected, but it was several years before a branch of the Galena & Chicago -- which later became the Chicago & Northwestern -- reached Fulton. Branch lines of the Chicago, Burlington & Quincy and Western Union lines also connected Fulton with the rest of the Midwest. Even "paper" railroads stimulated urban growth, as speculators and developers scrambled to anticipate the next boom. The building of the

Clinton railroad bridge across the Mississippi deprived Fulton of its passenger depot and dealt the town a severe blow.

Fulton was also widely known during the latter half of the nineteenth century as one of the great lumber towns on the Upper Mississippi. The first sawmills were small, rickety water- or horse-powered affairs, but these soon gave way to larger steam sawmills, with capacity measured in tens of thousands of board feet per day. There was also shingle, lathe, wagon, and furniture factories and commercial lumberyards by the acre. On the river next to the largest sawmill complex was a stoneware factory, built in 1866, which used clay from Boone County, Iowa, and produced more than 100,000 gallons of ware annually. The town remained an important river port until the early 1900's and was at one time the terminal for the Diamond Jo steamboat line. When the river was transformed into an industrial highway, a great deal of coal and grain was shipped out of Fulton by barge.

Located at the apex of a bend in the Mississippi, the modern city of Clinton, Iowa, is the result of the merger of the nineteenth century townsites of Lyons, New York, Clinton, Chancy, and Ringwood (Fig. 3.13). Lyons townsite, named after the city in France, was platted by a group of speculators headed by Elijah Buell and John Baker. The plat in the county courthouse is dated 17 July 1840, but the townsite was actually laid out several years earlier, for we are told that when the government land survey reached Clinton County in 1837, the entire township had been "made worthless" by town making, and that "a few dwelling houses and other improvements have been entered and made" at Lyons (Lokken 1942:22).

In 1836, Joseph Bartlett came to the Narrows and platted a townsite of his own, which he christened New York. Bartlett's townsite and sales pitch were described by a contemporary, quoted in the old Clinton County history (WHC 1879:343):

In the summer of 1836, I found J. M. Bartlett squatted on a little townsite, keeping a small store, the only building within a mile or more of this spot. He was the sole proprietor and monarch of all he surveyed -- quite a funny-talking fellow, who liked whiskey full as well as he did money. He was ready for a trade of any kind, and was always anxious to sell town lots, which he often accomplished, for some commodity, such as old harness, horses, wagons, plows, etc. -- generally, in those days, minus the money; more commonly, a great deal of time, called credit, was given . . . I had a chance to watch the little town of New York and its sole proprietor . . . Besides its natural and commercial advantages, he would argue, when trying to sell me the site for a town, that there was gold enough in the earth in and about this site, if properly worked, to run the United States Mint. He always insisted that he was digging for gold, and that he found it in large quantities.

In 1838, Bartlett sold out to a new group of speculators headed by Capt. C. G. Peace and Col. Beal Randall. New York failed to prosper under new ownership but remained a place on the map because of Col. Randall's store, which stocked mostly whiskey, patent medicine, and tobacco. Development at both the New York and Lyons townsites was stagnant until 1855, when a railroad bridge spanning the Mississippi was projected at the Narrows by the Iowa Land Company, which purchased 400 acres, including the inactive New York plat. The company platted a new town, christened Clinton in honor of former New York governor DeWitt Clinton, one of the prime movers behind the Erie Canal. By 1895, Clinton had absorbed the relict river town of Lyons and the adjacent residential additions of Chancy and Ringwood.

The development of Clinton had all of the usual aspects of a modern industrial city. Early growth was linked to its port facilities and to the railroad bridge across the Mississippi River; the river city was the gateway to the West. The Clinton Railway Draw-Bridge, built by the Albany Bridge Company under the authority of the states of Illinois and Iowa, opened for railway travel January 1865. The original wooden bridge, a notorious hazard to navigation (see Warren 1878:94-97), was replaced by an iron truss structure in 1870, which was succeeded by the present steel railway bridge in 1910 (Fig. 3.14). Steamboats, railroads, and lumber called the tune for economic development between 1860 and 1900. As many as fifty steamboats daily passed through the Narrows, and there was for many years an important steamboat works on Beaver Slough. By the 1880's, Clinton was recognized as the largest lumber producing city in the world, with five large mills; indeed, several city blocks were built over "sawdust bottoms," underlaid with more than 20 feet of sawdust. The importance of the river during the city's formative years is clearly demonstrated by the narrow, elongated pattern of additions to the original town plat; by the turn of the century, the city stretched for seven miles along the river, and there was little development west of the bluffs until the 1950's. After the boom years between ca. 1890 and 1920, manufacturing, milling, meat packing, and retailing set the pace for twentieth century growth.

The sleepy old river town of Albany emerged in the 1840's as the trade center for a rapidly developing agricultural area that included parts of Carroll, Whiteside, and Clinton counties (Fig. 3.15). Like most of the towns along the river, it traces its origins to a couple of backwoods land sharks, in this case Abraham Mitchell and Edward Corbin, who established claims here in 1835, anticipating townsite speculators. Mitchell, who is said to have lived in a tree, called his settlement "Upper Albany," while his neighbor Corbin was lord and master of "Lower Albany," which was, of course, nothing more than his own claim shack and a few cords of steamboat wood. The speculators took notice and within a year bought out the Mitchell and Corbin claims and set about laying out the twin townsites of Van Buren, nee "Upper Albany," and simply "Albany," which were eventually

merged as one town under the name of New Albany in 1839 (Bent 1877:111-112). There was little there to impress passersby like the English geologist George Featherstonhaugh, who noted in 1836 (1848:II:134):

At another place, on a slope with a few trees, was a solitary log hut, called, in honor of the president of the United States, Van Buren, and, a short distance from it, was a settlement, consisting of two huts, called Albany. Plans of these flourishing places were in circulation, but I was told that the lots of places with New York names did not sell well.

New Albany, which appears on Nicollet's 1839 manuscript map along with the notation "24 houses" (Fig. 3.8b), grew from a rude collection of log huts to something resembling a village, with mills, a few stores, and a hotel. The first steam sawmill was constructed in 1837, on the river bank in Lower Albany, to produce lumber for a Rock Island boatworks; it was followed by others. Beginning in the late 1800's, cottage and recreational camp development extended south from Albany along the river, the basis for the town's twentieth century reputation as a sportsmen's retreat. The former river port and farm trade center is now a bedroom community of the Quad Cities.

Beaver Island (Fig. 3.15) was claimed early but seems to have been used mostly for timber cutting and pasturage. There is no evidence of any permanent island community or settlement. However, the island was the scene of a frontier burlesque memorialized by the pioneer historian of Whiteside County (Bent 1877:116-117):

A big fight came very near taking place on Beaver Island directly opposite the town [of Albany] in the winter of 1842 and '43. Albany had what was called a town claim on the Island, from which the inhabitants got a great deal of wood, to the cutting and carrying away of which the people of Clinton County, Iowa, finally strenuously objected, alleging that all the Island with the timber growing thereupon belonged to their county. Finally to prevent further depredations by the people of Albany, [the sheriff] came to the Island one day . . . with a posse of men, fully armed, determined to drive away the Albany wood choppers, and to take such full and complete possession of the premises as would prevent their trespassing again in the future. Word was immediately sent to Albany of this action on the part of the Clinton County authorities, and it had no sooner got to the ears of the people, than they began to gather for the purpose of devising means to force the Clinton army back to their headquarters in Iowa, and 'hold the fort,' or in other words their claim, at all hazards." After a considerable interval of threats and name-calling, the two sides agreed to a truce. After long and vehement argument, both sides agreed to a compromise, whereby the Albany folks were

granted permission to take wood off 400 acres in return for recognition of Clinton County's sovereignty over Beaver Island.

Camarache, the old Clinton County seat (Fig. 3.15), was a classic "paper town" project. When Nicollet passed by in November 1839, he noted the name of the place and counted ten houses there (Fig. 3.8b). The original gridiron plat of some 3,200 lots was laid out in 1840 by Dr. George Peek, another of Elijah Buell's cronies, who is said to have deliberately misspelled the name in order to produce a more euphonous sounding appellation. As soon as the ground had been staked, Peek reportedly hiked to Chicago, where he tried personally hawking the lots, apparently to little effect. The townsite was replatted in 1845 by another group of investors, who employed the Frenchman August Brion to survey the town; Brion, we are told, used grapevines instead of a gunter's chain to lay out the new blocks (WHC 1879:568). The town was "knocked flat" by a tornado in 1860, but recovered to reach some level of prosperity as a river port. Late nineteenth century development focused on mills and railroads.

By all accounts the Meredosia (Fig. 3.16), a swampy lowland extending from the Mississippi opposite the mouth of the Wapsipinicon River all the way to the Rock River, was named by French-speaking fur traders, who utilized it as a detour around the Rock Island rapids during episodes of high water. According to Judge John Reynolds, an early American resident of the Illinois country (1855:234):

Above the upper rapids of the Mississippi, in very high floods, part of the water of the river passes through a channel, and enters Rock River. This channel was called by the French Marrals d'Ogee [sic], and they often navigated it with their light crafts, and entered the Mississippi again through Rock River -- thus avoiding the rapids.

The placename is a corruption of Marais d'Osier, variously rendered by nineteenth century American cartographers as "Mer a Doge" (Long 1890:67) or "Mare de Ogee" (Mitchell 1837:map). In Mississippi Valley French, marais = swamp or lake, while d'Osier refers to the sandbar willow, sometimes called "basket reed" because its bark was used by native peoples for basketry. We might infer from an entry in the journal of the Italian tourist Beltrami (1828:II:196) that Marais d'Osier is the French translation of a "savage," i.e., native American Indian, placename.

Bent (1877:109) reports that the Meredosia attracted the attention of promoters who tried to exploit the detour around the upper rapids:

Many years ago, Capt. H. H. Gear and others, of Galena, laid out a town at the Mississippi mouth of the Meredocia,

intending to cut a canal from river to river, the idea being to avoid the rapids at Rock Island, and have steamers take the Rock river up to this canal and then follow it back to the Mississippi; but after making a careful survey of Rock river from its mouth up, greater obstructions were found there than at the rapids, and the project was abandoned.

Although the navigation project failed, the Meredosia drained more than 150,000 acres of first class farmland. The Meredosia Levee and Drainage District was organized in 1864 to reclaim the watershed for agriculture, and in 1897 a two-mile long earthen dike and a pumping station were constructed to protect farmers' fields from floods (Bennett, et al. 1976:28-29).

Like the Maquoketa, the Plum, and the Meredosia, the Wapsipinicon River (Fig. 3.16) seems to have been well known to the earliest European explorers and fur traders. It is located, but not named, on Jean Baptiste Franquelin's map (1684), and appears on some eighteenth century maps as the Riviere Pomme de Cigne, i.e., Swan Apple River (Barrows 1863:11; Vogel 1983:98), apparently a reference to the wild artichokes or "swan potatoes" that grow along the river (see Owen 1852:619). There is a local tradition supporting an early French presence at the mouth of the river: one amateur historian (Lage 1976:7), without citing her source, states that one of the Marin brothers established a trading post hereabouts in the early 1700's; and at least one modern historian (Nothstein 1940:309) has suggested that the Peoria village visited by Marquette and Jolliet in 1673 was located on the Wapsi, rather than on the Lower Iowa River. No primary source documentation is available to support these claims. Finally, a geographical curiosity is the tributary slough of the Wapsi labeled a "bayou" on the General Land Office survey of T80N R5E, dated 1837.

Identification of historic native American Indian occupancy of the mouth of the Wapsi is extremely problematical. Wapsipinicon is, of course, an Indian name, from the Algonquian word for "white potato" (Vogel 1983:98) -- we can safely dismiss as white man's fantasy the charming story of the doomed drowned Indian lovers Wapsi and Pinicon (see Federal Writers Project 1938:452). According to Barrows (in Downer 1910:I:133), usually a reliable informant, there was a Sauk village under a chief named "No-No" at the mouth of the Wapsi during the French period -- but, as usual, there is no primary reference citation. Records maintained by the Office of the State Archaeologist in Des Moines include a site form for an historic Sauk village on the north bank of the Wapsi at its junction with the Mississippi; the legal description is given as SE 1/4 NE 1/4 SE 1/4 sec. 18 (Fig. 4.6). This site, originally assigned number 13CN32 but now identified as 13CN36, was recorded by the pioneer archaeologist Charles R. Keyes, but its existence has never been confirmed.

Perhaps this elusive Sauk village was the camp of a trading post band associated with the firm of Davenport and Farnham, who

controlled the fur trade along the Mississippi between the Rock and Turkey rivers (see Van der Zee 1905) and who may have maintained a trading station at the Wapsi. An entry in Davenport's ledger book, dated 15 November 1826, refers to the arrival of the Winnebago chief Carlmonne from the "Warpsipinican" (Downer 1910:I:868, 870). There was a later American Fur Company trading post a short distance from the mouth of the river: the county histories report that when James D. Bourne settled at the Wapsi crossing in 1836, he moved into an old log cabin next to the abandoned trading post located in sec. 1, T80N R4E (Andreas 1875:402; Huebinger 1904:305; Clinton County Historical Society 1978:21-22). There must have been native settlements nearby, because we read in another archaeology site report (USA Site Record 13CN19) that for many years after the removal of the Sauk and Fox from eastern Iowa, the folks living around High Rock Bridge were visited by Indians searching for the graves of their ancestors.

The site now occupied by the city of Princeton (Fig. 3.17), in Scott County, Iowa, has been identified as the "first village of the Reynards [i.e., Fox Indians]" where Lt. Pike stopped for breakfast on 29 August 1805 (Fig. 3.4). Pike's memoir does not describe the location in detail, but the site was fixed by his editor nearly a century later (Coues 1895:I:25-26):

This Fox Indian village is located on Pike's map, but without name. It was on the Iowan side, above the rapids -- not at Le Claire but somewhat further up, at or near present town of Princeton, Scott Co., Ia. Forsyth in 1819 speaks of 'the little Fox village, 9 miles above the rapids'.

Long after the Fox had abandoned their little village, Giles and Haswell Pinneo arrived in the fall of 1835 to stake their claims. They were joined by a handful of other settlers: what appears to be the Pinneo settlement appears on Nicollet's 1839 map (Fig. 3.8c). A store was opened in 1840 and a post office was established the following year, but for more than a decade the settlement was little more than a ramshackle collection of log shanties strung out along the riverbank. Formerly known as Pinnacle Point (Mott 1973:117), Princeton was platted in 1852 and incorporated a few years later, when the population reached about 250; by 1859 the population had swelled to more than 1,000 and the town acquired its first rail link to the outside world the following year (Downer 1910:I:266-267).

According to the old county history (Kett 1877:221-222), the site of Cordova (Fig. 3.17) in Rock Island County, Illinois, was settled in 1836 and platted in 1837 by John Marshall and Dr. Thomas Baker. The place grew slowly at first -- there were only five houses on the site when Joseph Nicollet passed by in November 1839 (1983:plate 20) -- then emerged in the 1850's as an important river port, grain shipping terminal, and trading town. The town had several limestone quarries and kilns and exported large quantities of quicklime (Bennett, et al. 1976:26-27).

Cordova also had important mussel shell fisheries in the late nineteenth and early twentieth centuries; the clams were boiled out in large kettles placed along the riverbank at the north end of 10th Street (Bennett, et al. 1976:29).

The 640-acre Antoine LeClaire reserve at the upper Rock Island Rapids (Fig. 3.18) was ceded to him as part of the Black Hawk Purchase treaty of 21 September 1832. In 1833, LeClaire, a mixed-blood interpreter employed by fur trade and government interests, built his house on the site of the treaty signing. The site was strategically placed adjacent to the largest Sauk and Fox towns, as well as to the burgeoning Fort Armstrong-Rock Island settlement. It was here that steamboats transferred their cargoes to keelboats for the dangerous passage through the rapids (Parker 1855:165). In 1836, Thomas C. Eads entered a townsite on the north end of the reserve, which he named Parkhurst or Parkhurstown, in honor of one of LeClaire's associates, Eleazer Parkhurst. The following year, a group of real estate speculators headed by George Davenport acquired a part of the old treaty tract and platted a rival townsite, which they named LeClaire in honor of the pioneer benefactor. It was several years before either township amounted to much: there were only about a dozen establishments at this location by 1848. A hamlet called Middletown soon grew up between Parkhurst and LeClaire, and in 1855 all three were incorporated under the name of LeClaire.

LeClaire's development was linked with that of the Mississippi River, and indeed it has always been dependent upon the river for its trade and industry. The town boomed in the 1850's with the construction of mills, warehouses, stores, hotels, saloons, and a boatyard. This boom lasted until ca. 1870: as Davenport grew in size and importance, diverting commerce away from LeClaire, the old river town declined steadily as a port and trade center. Late-nineteenth century plats show hardly any development along the river (Schmidt & Huebinger 1882; Hurbglinger 1894 and 1919). By the early twentieth century, LeClaire was no longer a true river town, but an outlier of Davenport, and eventually a bedroom community of the emerging Quad-Cities metropolitan area.

Originally named Sym's Woodyard (Adams 1969:478), the site of Port Byron (Fig. 3.18) was settled in 1828. Town platting was delayed until the fall of 1836 and the townsite nearly went under during the Panic of 1837; the site consisted of little more than a few cabins on the riverbank when Henry Lewis sketched it in 1840 (Fig. 3.19). An 1852 effort to secure a railroad failed; nevertheless, the town hung on and enjoyed some measure of prosperity a generation later as a grain and livestock shipping center. In the late 1800's, Port Byron emerged as an important center for lime quarrying and burning, exporting more than 100,000 barrels of quicklime annually (Kett 1877:212-215).

Rapids City (Fig. 3.18) was founded in 1857 as a steamboat landing, lightering, and fueling station at the upper rapids. Nearby coal banks supplied late-nineteenth century river boats with fuel (Kett 1877:213-214; Adams 1969:483-484).

According to one county historian (Downer 1910:I:257), Smith's Island (Fig. 3.20) was the site of an American Fur Company post frequented by Indians from the Rock River, Marais d'Osier, and Wapsipinicon River. The island was settled and named in 1824 by members of the Smith family, natives of Pennsylvania, who, according to courthouse records and local tradition, farmed and operated a steamboat woodyard for successive generations. A Corps of Engineers survey located sixteen structures along the eastern shore of the island, suggestive of summer cottage and camp development (COE 1929-1930:sheet 72).

The upper rapids of the Mississippi extended from Rock Island to LeClaire and for many years the rocky shoals were a great menace to navigation (Fig. 3.21). A corps of specially trained pilots was recruited to navigate steamboats crossing the rapids. Because the channel was so tricky during low water, most steamboats off-loaded their cargoes into small lighters for the passage across the rapids. In 1837, Lt. Robert E. Lee was assigned to superintend the earliest efforts of the federal government to overcome the hazard, which focused on clearing boulders and blasting a channel through the rock strata. The resulting channel around the upper rapids was narrow, crooked, and swift and not much of an improvement over natural conditions. Eventually, engineers constructed a lock and dam at Moline, with a canal to bypass the worst of the rapids, completed in 1907. When the 9-foot navigation channel was created in the 1930's, the old upper rapids control structures were demolished and replaced by the present Lock and Dam Nos. 14 and 15, which totally inundated the rapids.

Many historic locations in Pools 13-14 mentioned in the preceding text are not on government property, so they were not evaluated during the 1988-89 SMSU survey. A list of potential historic properties on government land was compiled prior to the survey fieldwork. This list is reproduced in Appendix D.

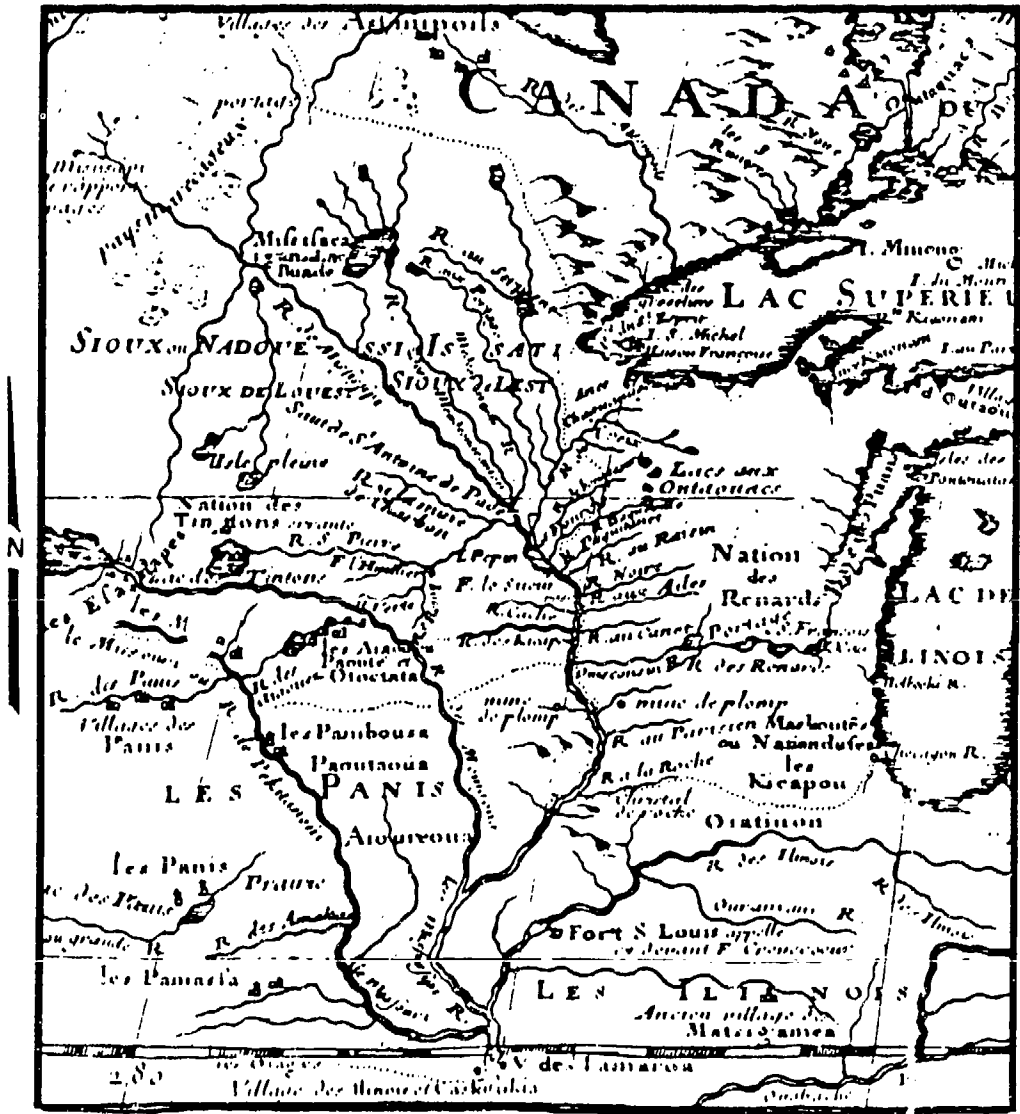


Figure 3:1. The Upper Mississippi Valley Borderlands. Excerpt from Delisle's Map of New France (1703).

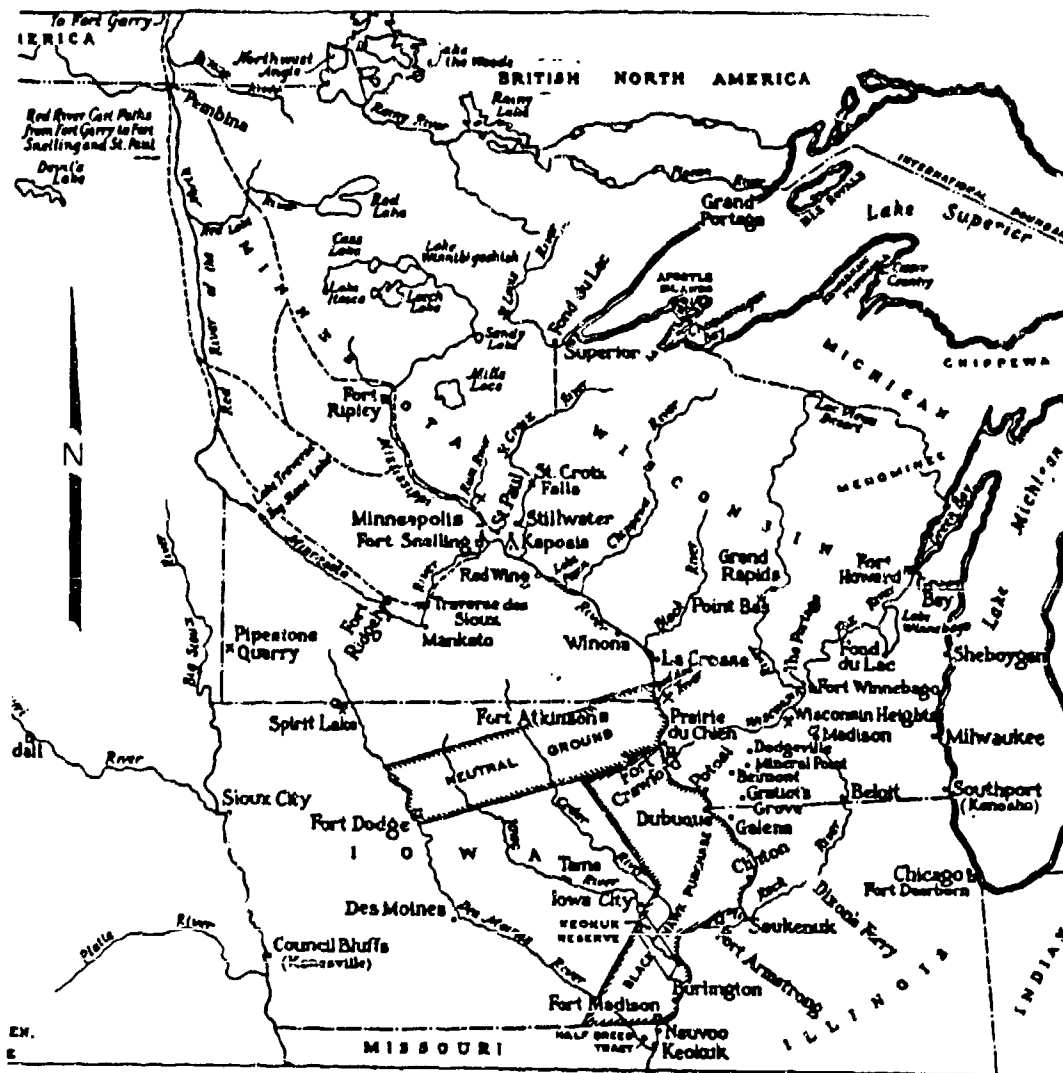


Figure 3:2. Upper Mississippi Valley in the Mid-19th Century.

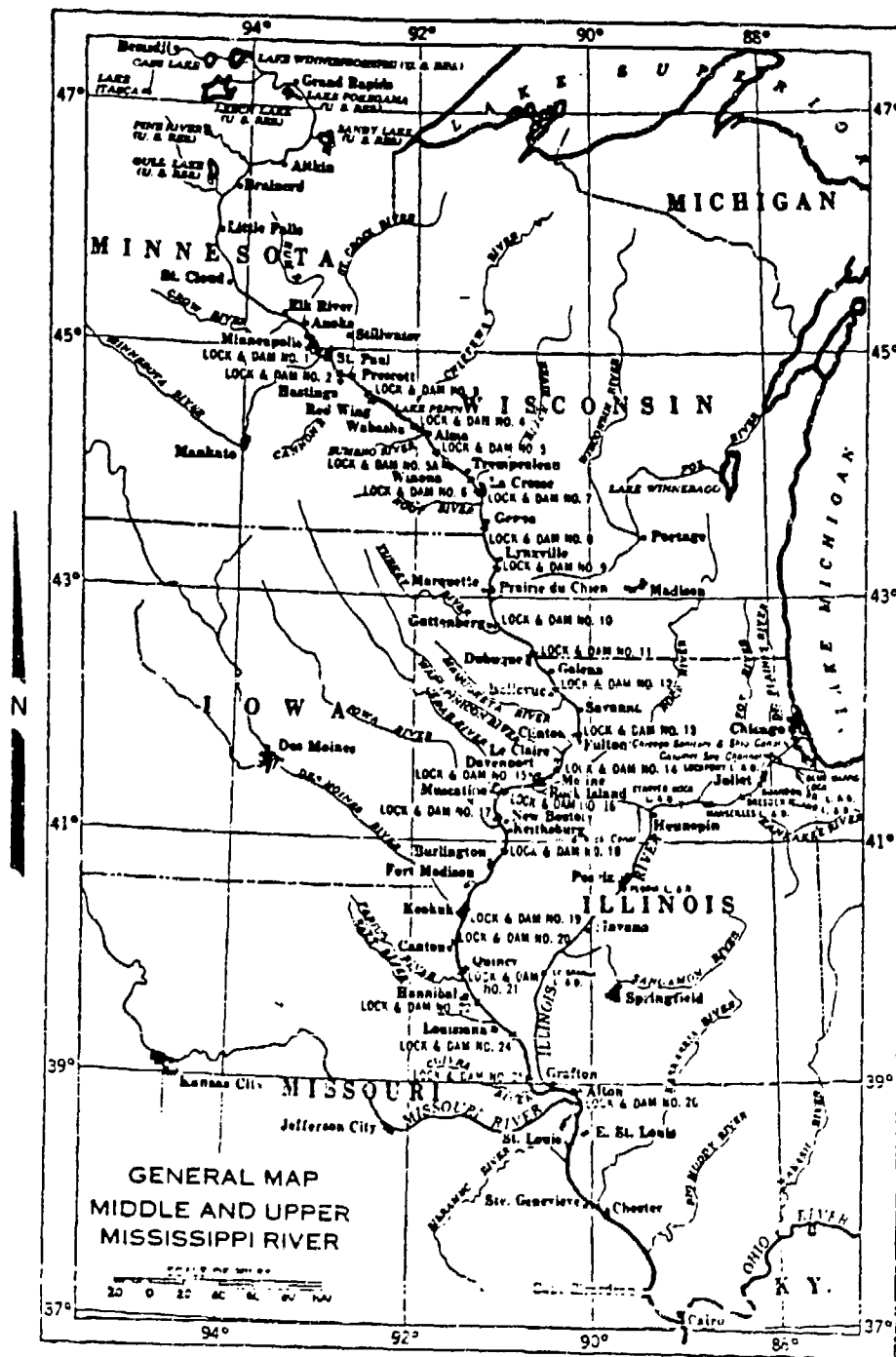
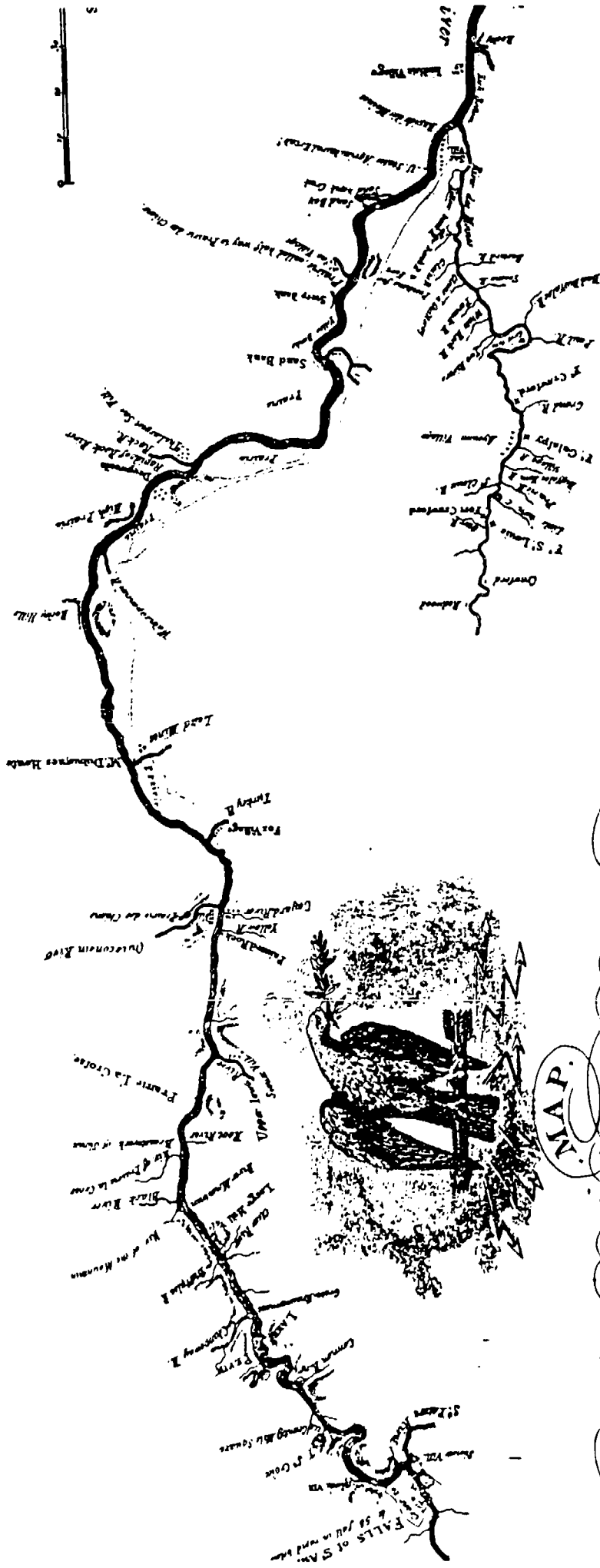


Figure 3:3. Upper Mississippi Valley Lock & Dam System (Corps of Engineers 1940:57).



MAP OF THE MISSISSIPPI RIVER FROM ITS SOURCE TO THE MOUTH OF THE MISSOURI.

Laid down from the notes of *Lieut. G. M. Pike* by *Anthony Nau*.
 Reduced and corrected by the *Astronomical Observations of M. Thompson* at its source,
 and of *Capt. M. Lewis* where it receives the waters of the *MISSOURI*.

BY NICH KING

Printed by Francis & Taylor, Philadelphia

Figure 3:4. Excerpt from Nicholas King's map of the Upper Mississippi River, based on the notes of Zebulon

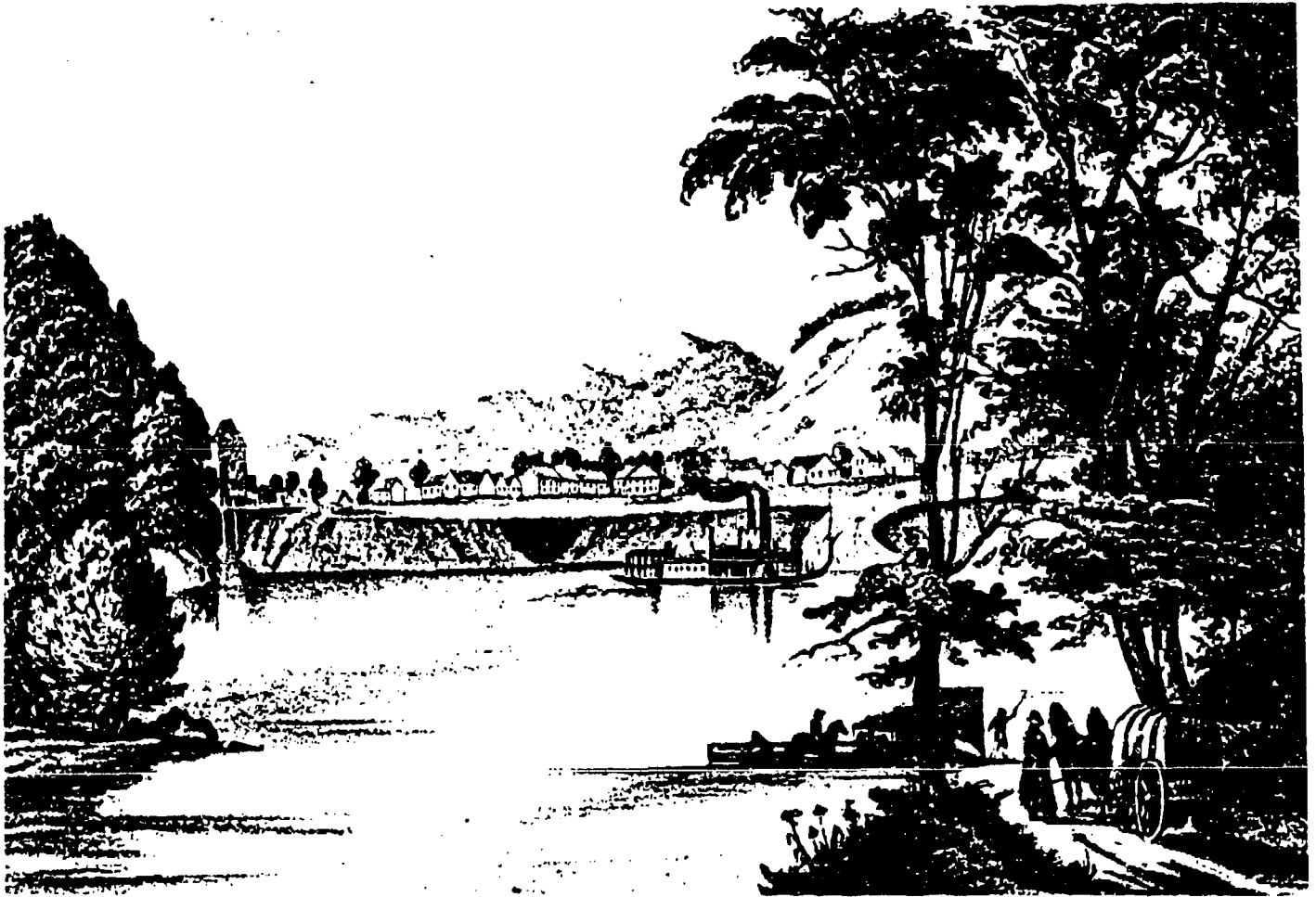


Figure 3:5. Bellevue, Iowa, 1847. From Henry Lewis' Valley of the Mississippi Illustrated.

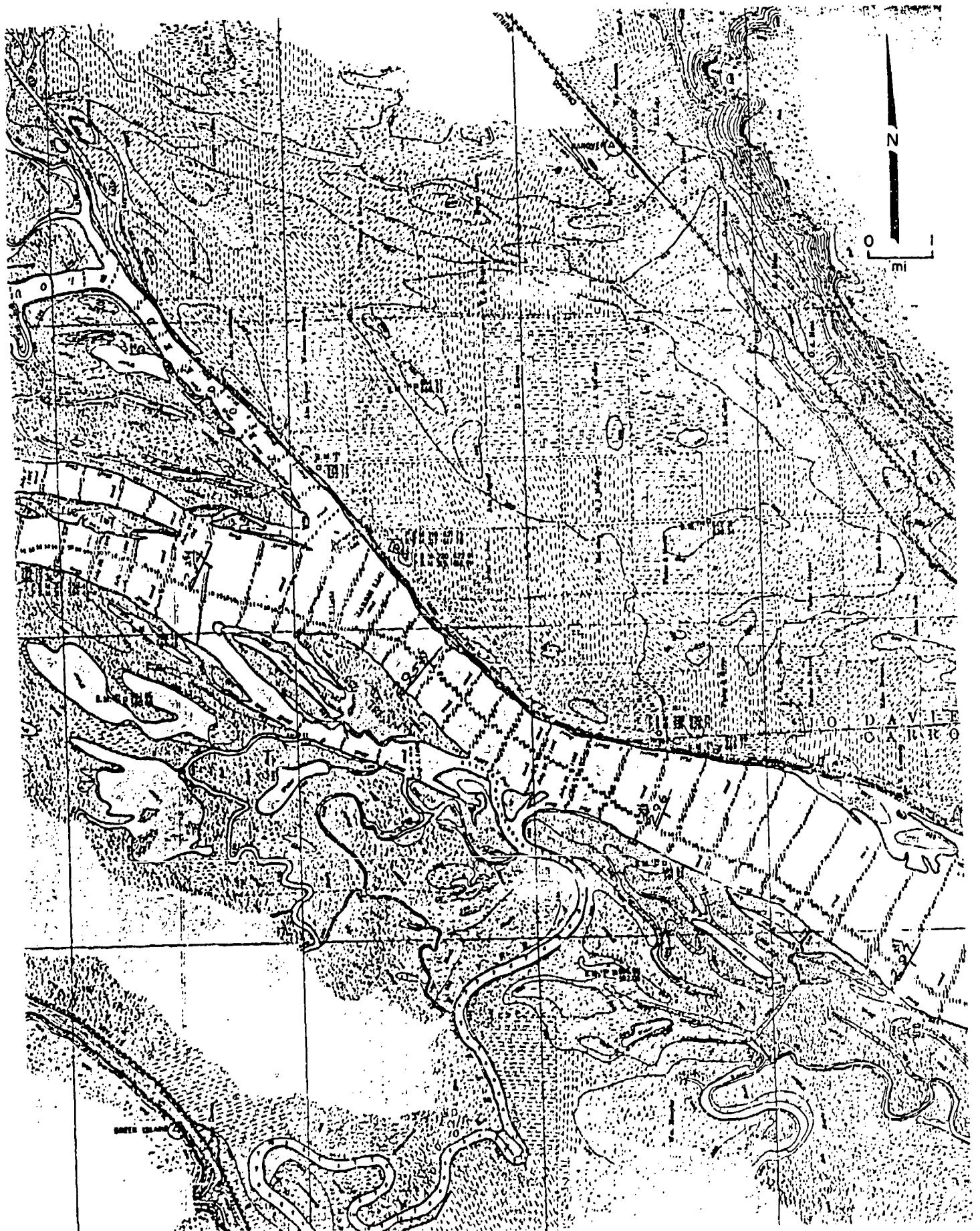


Figure 3:6. Maquoketa River and Sand Prairie. From Mississippi River Commission Chart (1891-1892).

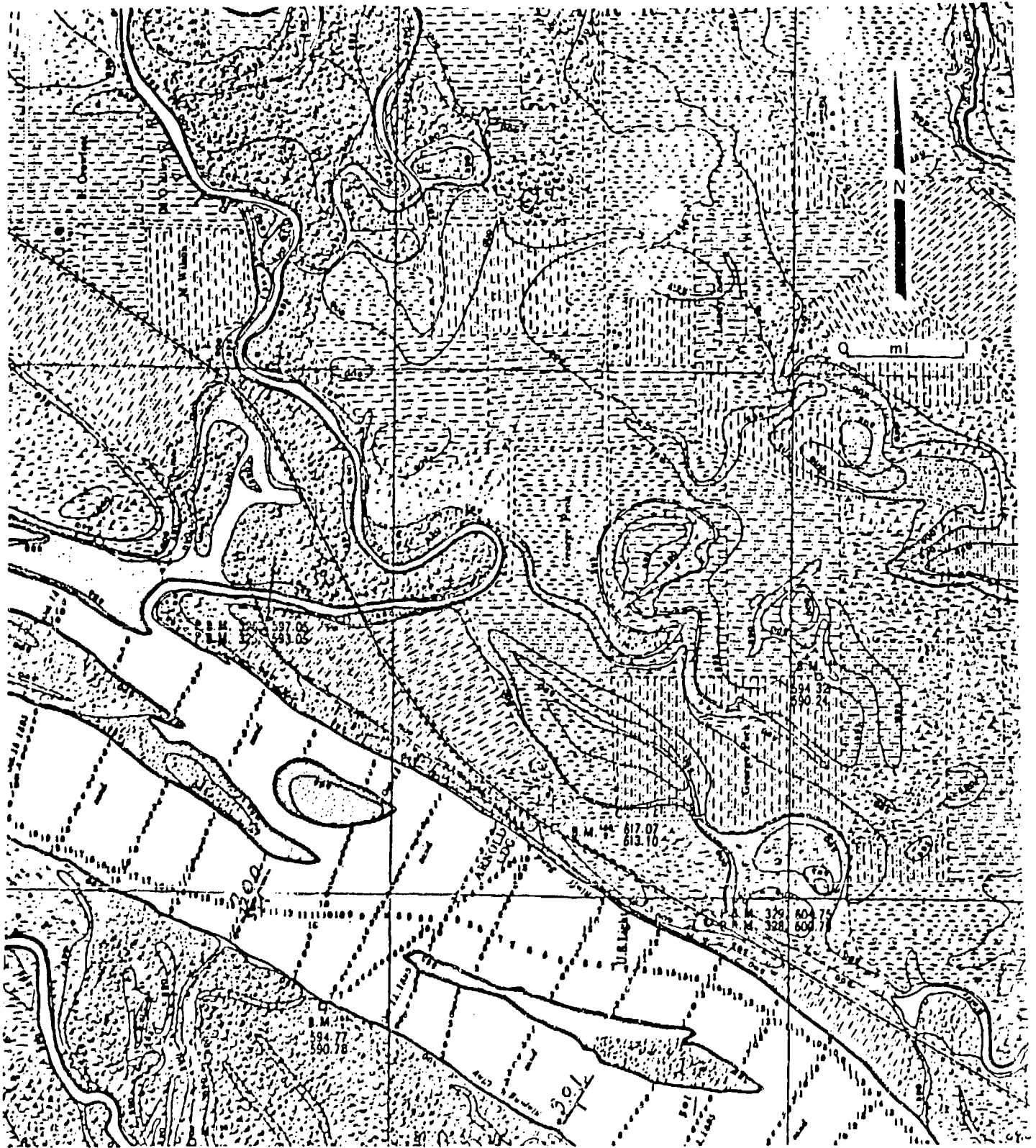


Figure 3:7. Mouth of the Apple River. From Mississippi River Commission Chert (1891-1892).

Mississippi River, November 6, 1839.

Mississippi River, November 6, 1839.

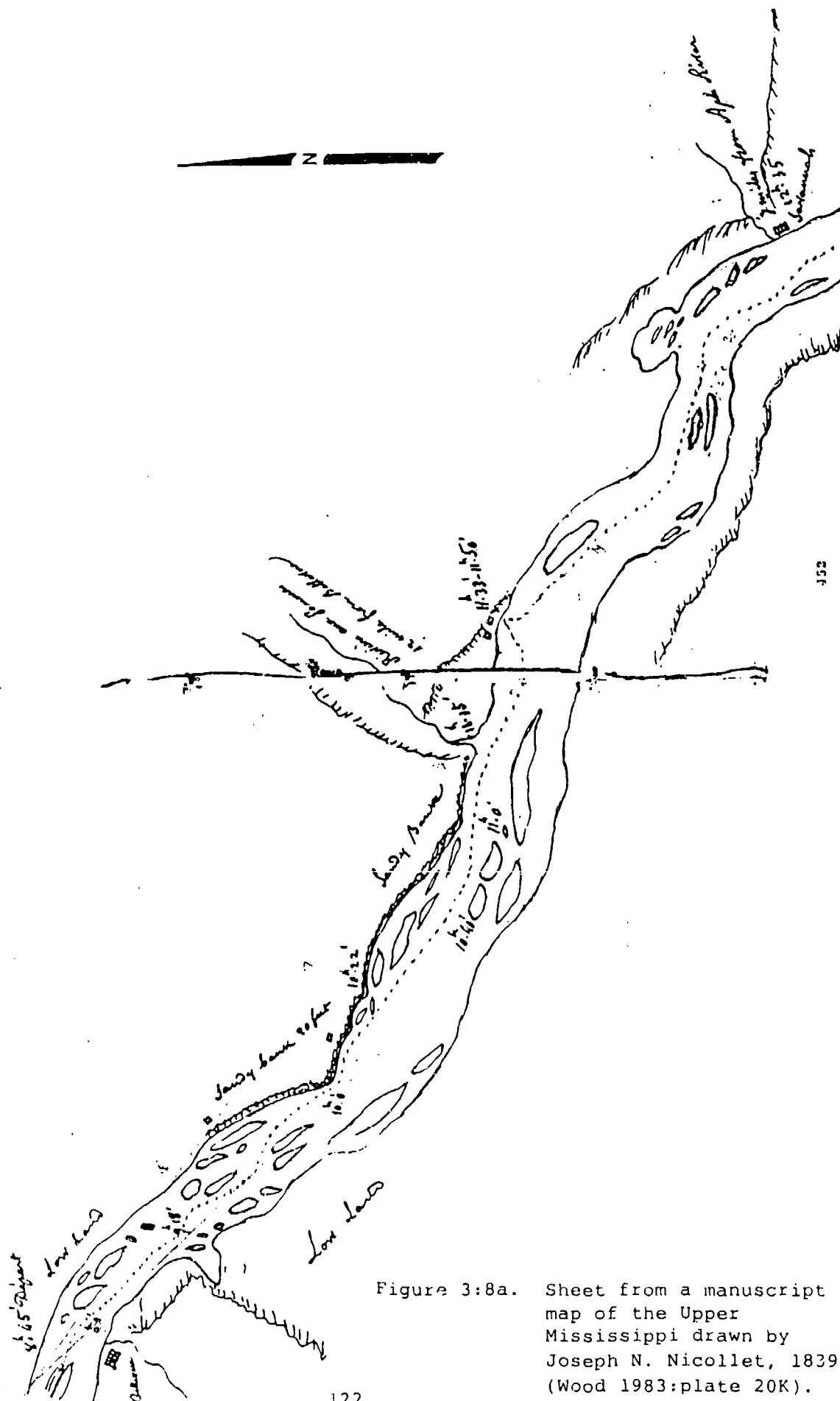


Figure 3:8a. Sheet from a manuscript map of the Upper Mississippi drawn by Joseph N. Nicollet, 1839 (Wood 1983:plate 20K).

Mississippi River, Nov 6 & Nov 7 1839.

7 1/2 29, 280-44,0-33,0 - No. 110. Same cut.

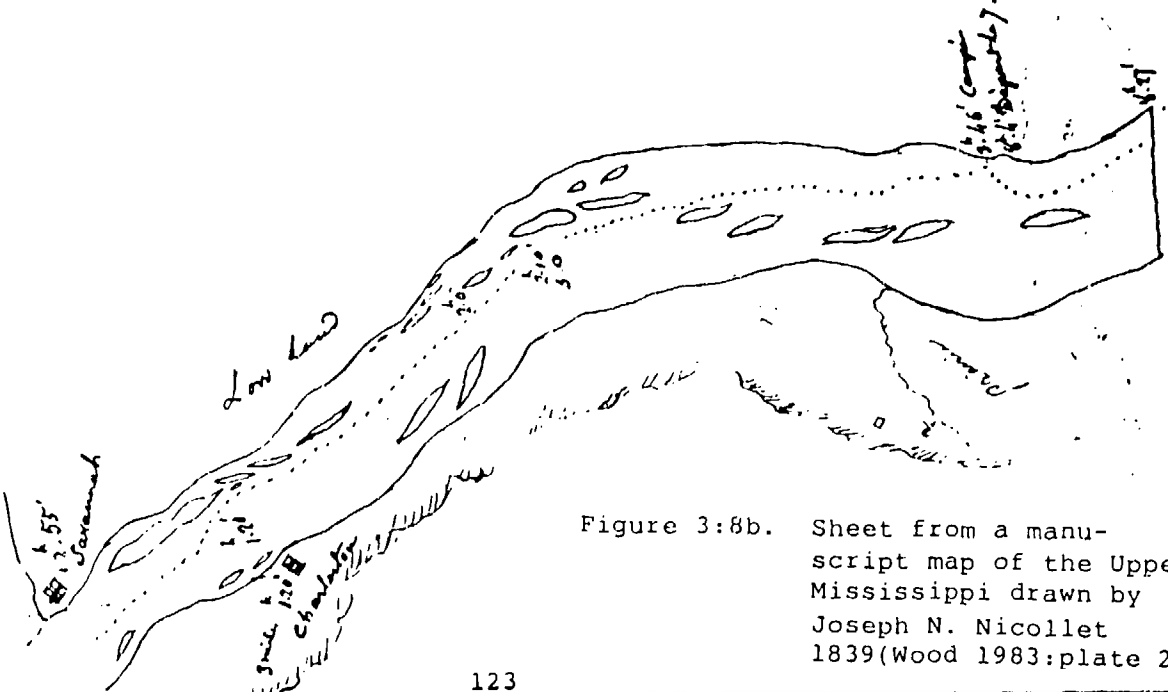
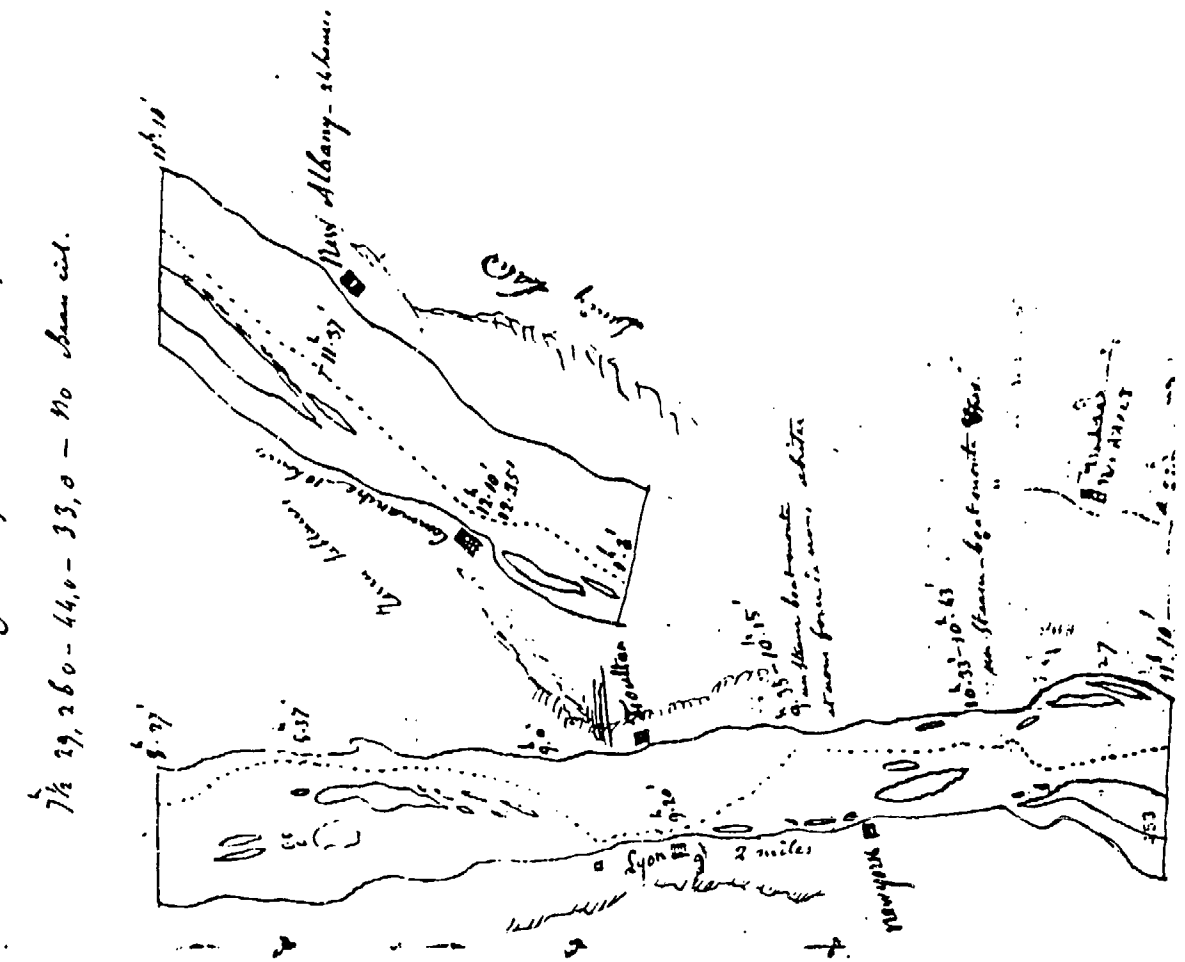
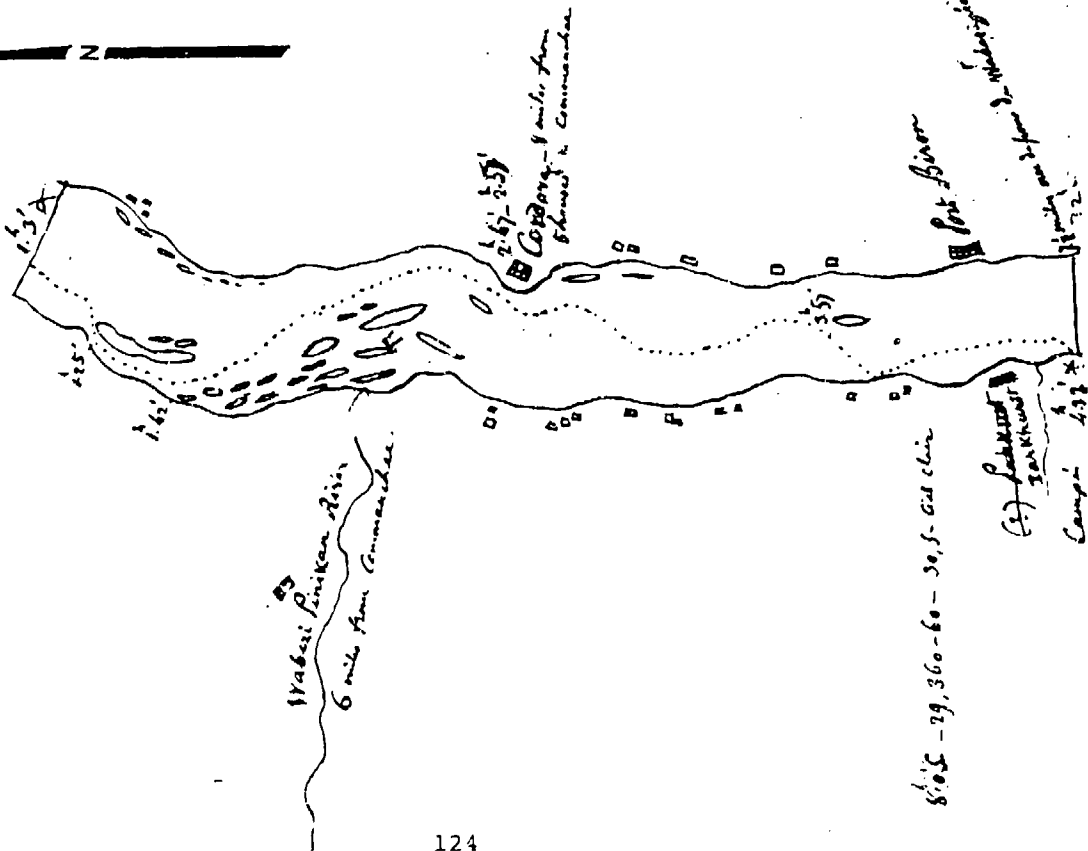


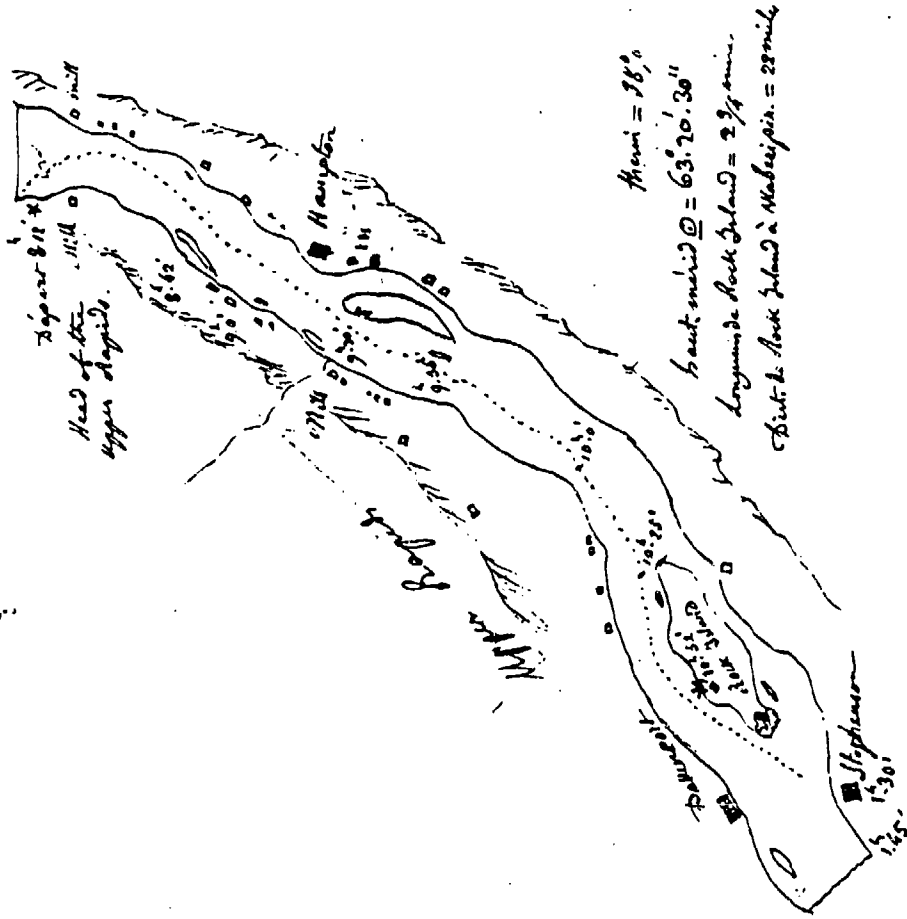
Figure 3:8b. Sheet from a manuscript map of the Upper Mississippi drawn by Joseph N. Nicollet 1839 (Wood 1983:plate 20L).

Mississippi River - Jardi 7 Novemb 1839.



Yards: 8. Novemb 1839

8' 1/2 - 29, 410 - 660 - 26, 0 - Calm, cut clin.



Therm = 28°
 Haut-mur = 63. 20. 30"
 Longue de Rock Island = 2 3/4 m.
 Haut de Rock Island à Madesipin = 28 mile

Figure 186. Sheet from a manuscript map of the Upper Mississippi drawn by Joseph N. Nicollet, 1839 (Wood 1983:plate 30M).

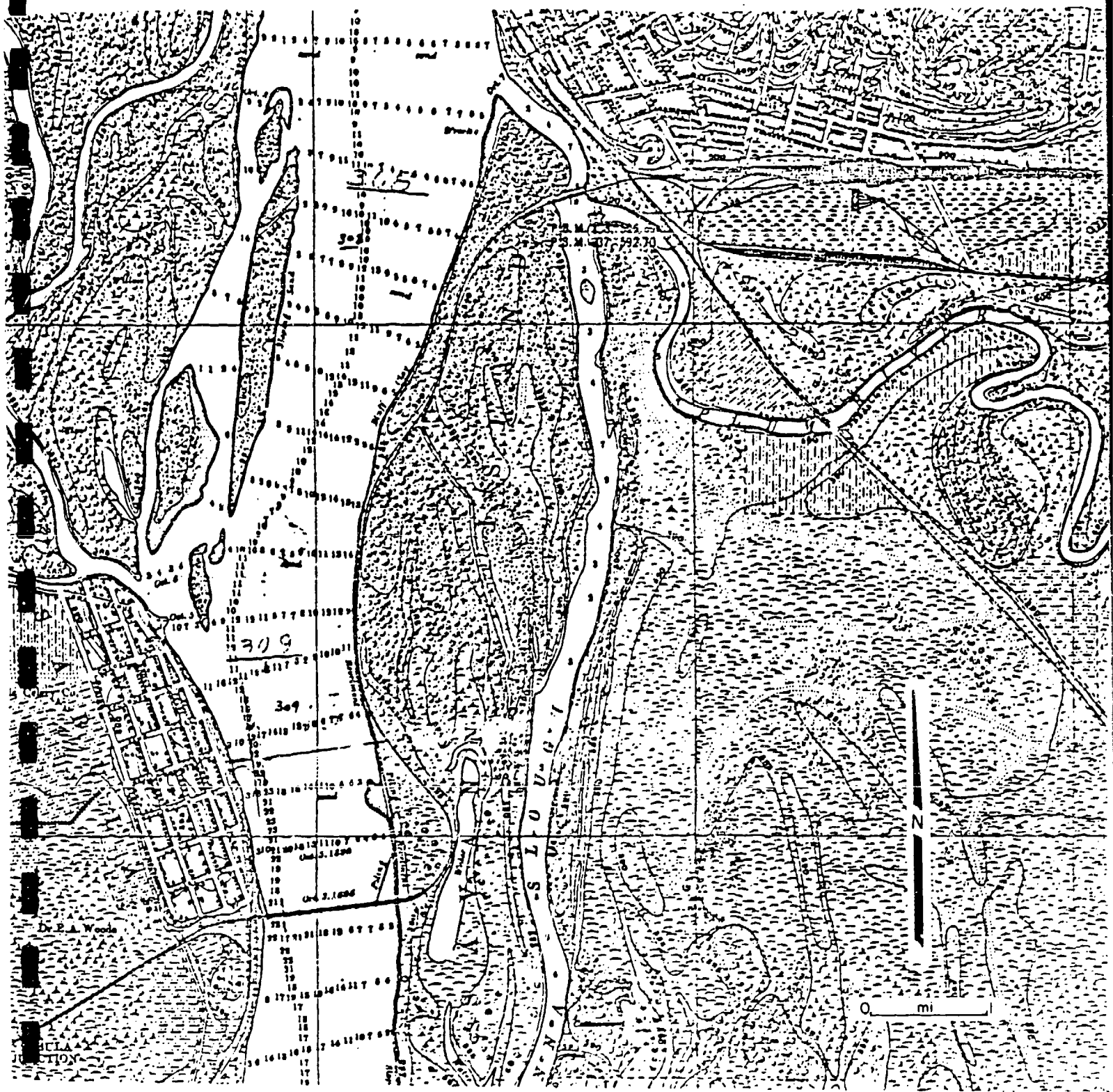


Figure 3:9. Savanna, Illinois, and Sabula, Iowa. From Mississippi River Commission Chart (1891-1892).



H. Lewis

Figure 3:10. Savanna, Illinois, 1847. From Henry Lewis, Valley of the Mississippi Illustrated.

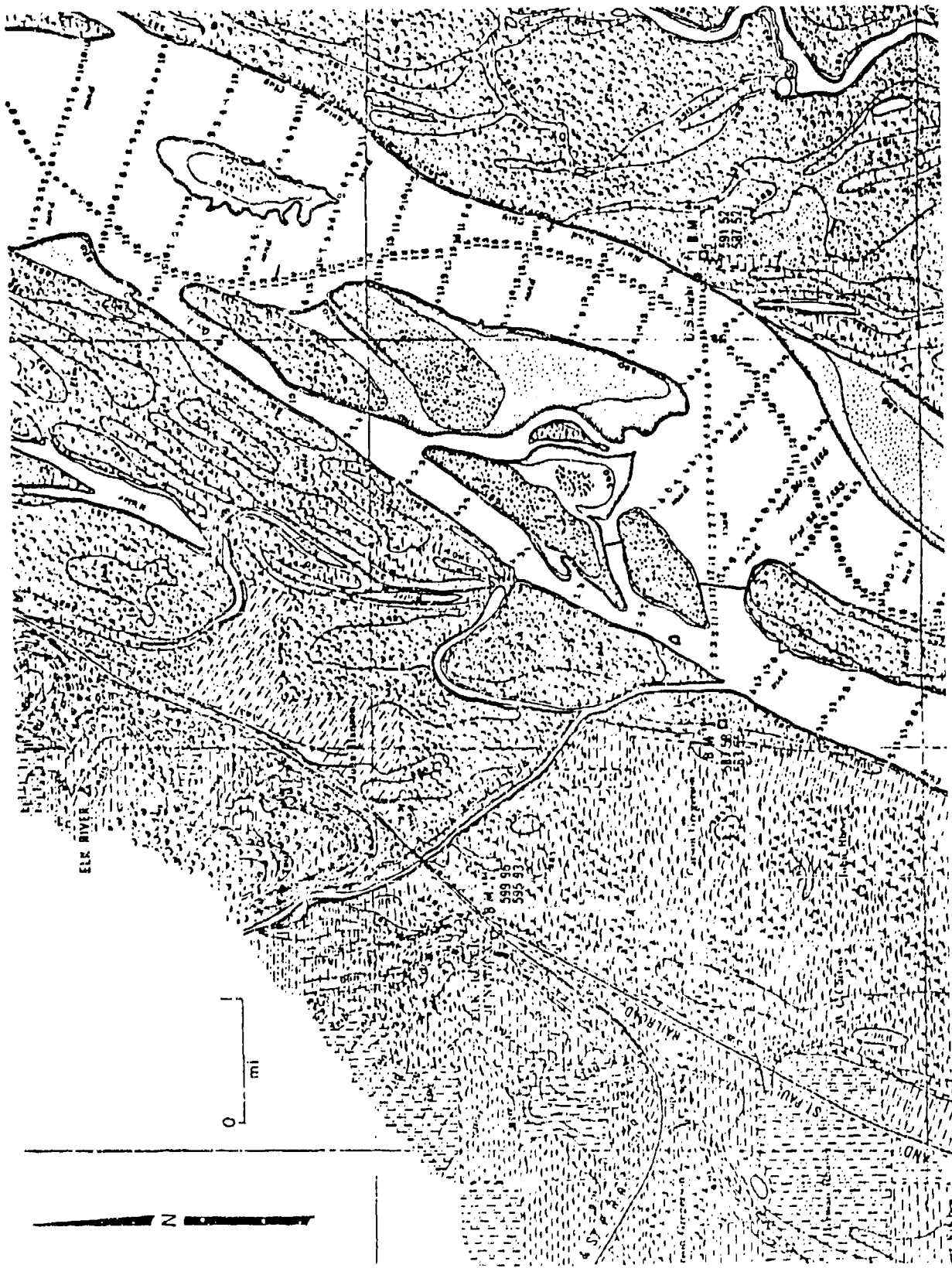


Figure 3:11. Elk River. From Mississippi River Commission Chart (1891-1892).

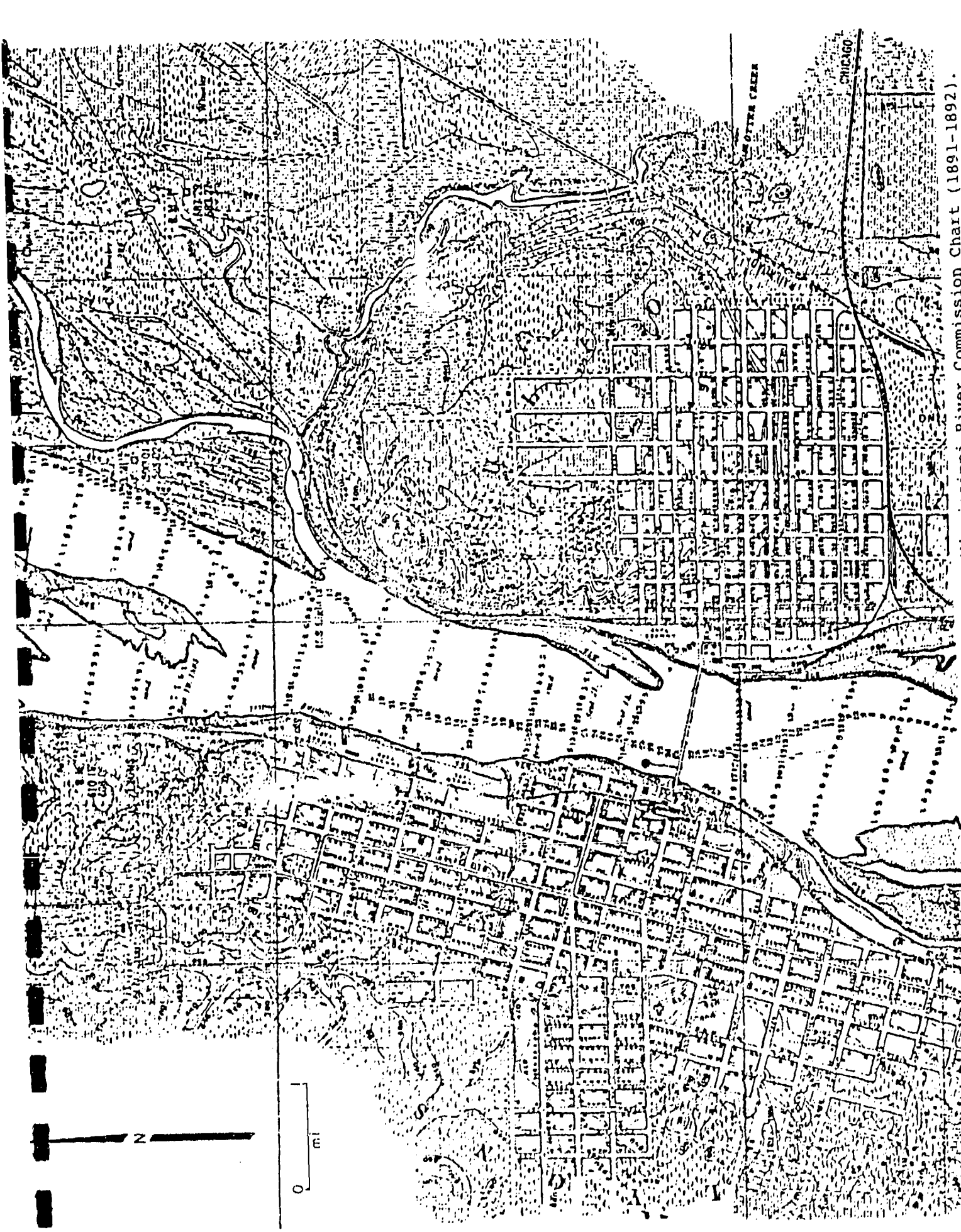


Figure 3:12. The Mississippi Narrows and Fulton Island. From Mississippi River Commission Chart (1891-1892).

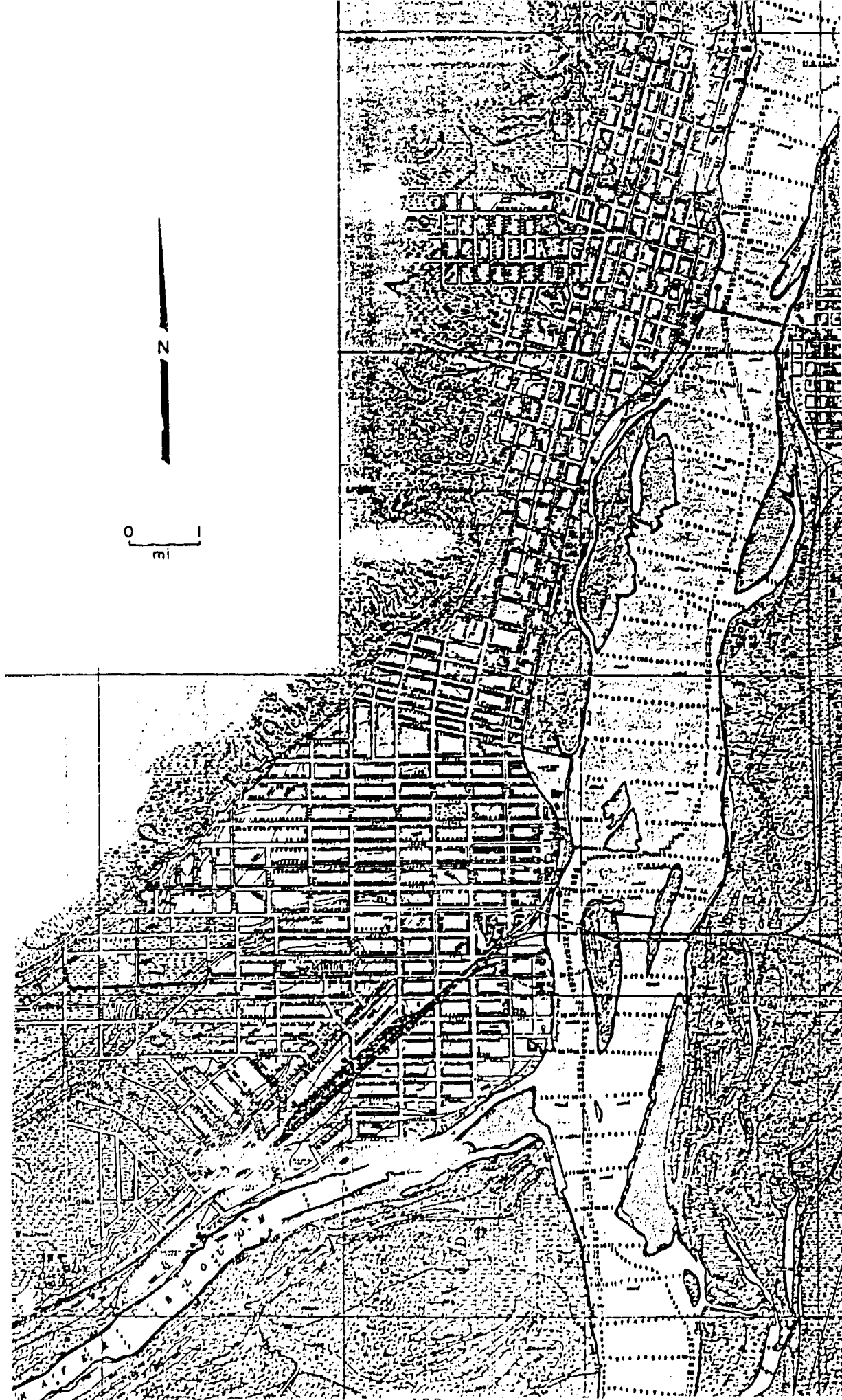


Figure 3:13. Clinton, Iowa, and vicinity. From Mississippi River Commission Chart (1891-1892).

Engineer Department, U. S. A.
 Bvt. Maj. Gen. A. A. Humphreys,
 Brig. Gen. & Chief of Engineers.

Map of Survey made in accordance with part of Section 4 of the
 Appropriation Act approved June 28 1855 which is as follows:
 "For the examining and reporting upon the subject of constructing
 a Railroad Bridge across the Mississippi River between St. Paul in
 Minnesota & St. Louis in the State of Missouri upon such plans as
 will offer the least impediment to the navigation of the river."

CLINTON RAILWAY DRAW BRIDGE

Built in 1864-'65

Without authority from the General Government
 but legalized by Act of Congress approved Feb. 27 1867.

Survey & Observations

made by

Bvt. Maj. Gen. G. K. Warren, Maj. of Engineers, U. S. A.

in 1865-'6

and under his direction in 1868 by

J. P. Costock, C. E.

Assisted by

W. Weston, C. E., & A. M. Soott, C. E.

Horizontal Scale

Vertical Scale

Note.

Plans used in determining the direction of the current were of pine, 8' long and 12" x 12" in section, loaded to flow
 vertically with the water and with various weights. The position of these floats was determined at intervals of 30 seconds
 by angles taken from each end of a measured base. These terminal positions are indicated by crosses, lines drawn through
 these show the course of the floats.

Current observations in timber lines were made Oct 16 1868 when the water was 2.5 ft. ... in 1868 when the water was
 3.1 ft. above the low water of 1861. Tides in full line were made May 16 1867 when the water was 20 ft. above low water.
 The rise from low to high water is 12 feet.

176

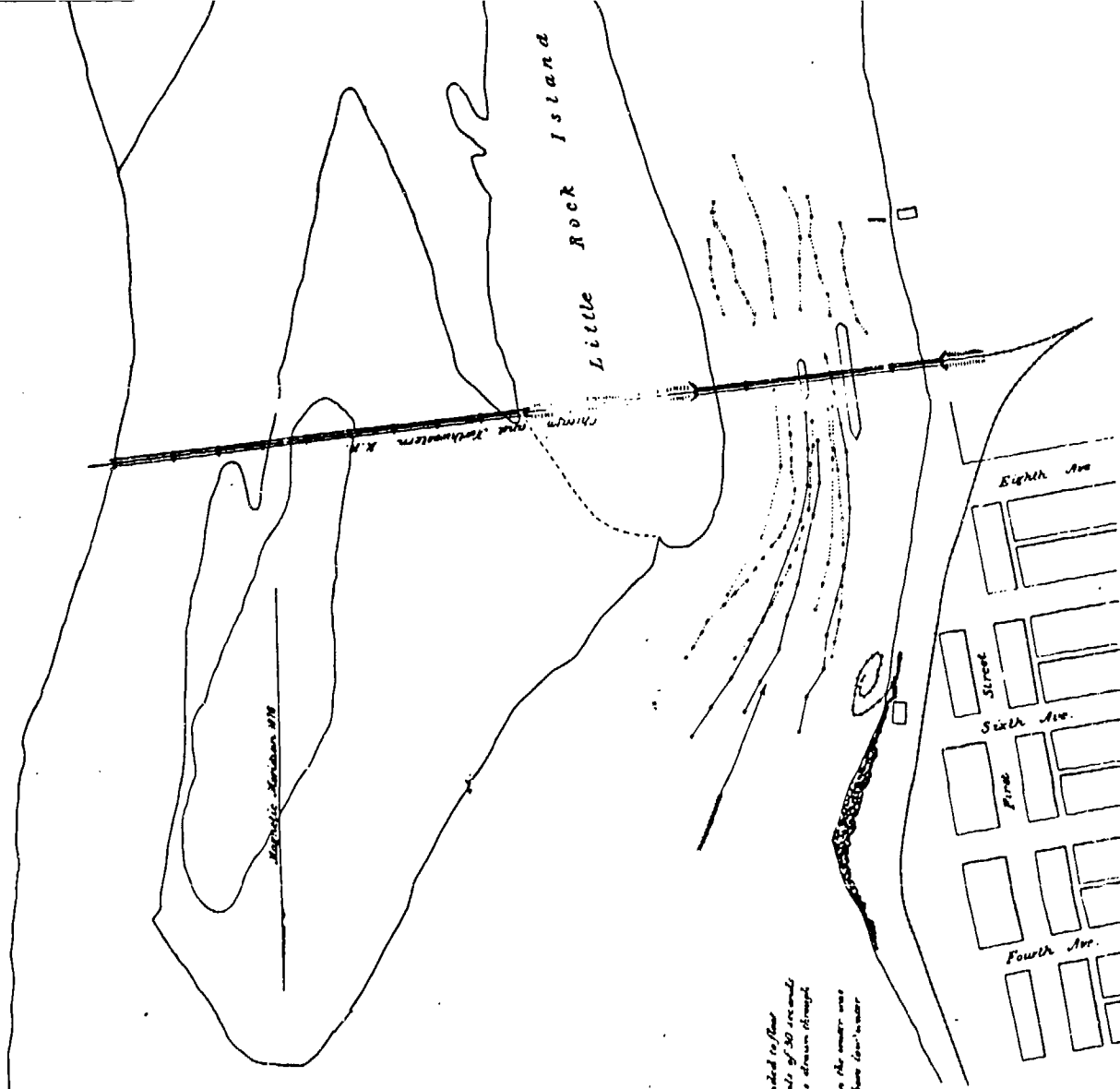


Figure 3:14. Clinton Railway Bridge. From Gouverneur K. Warren's Report on Bridging the Mississippi River (1878).

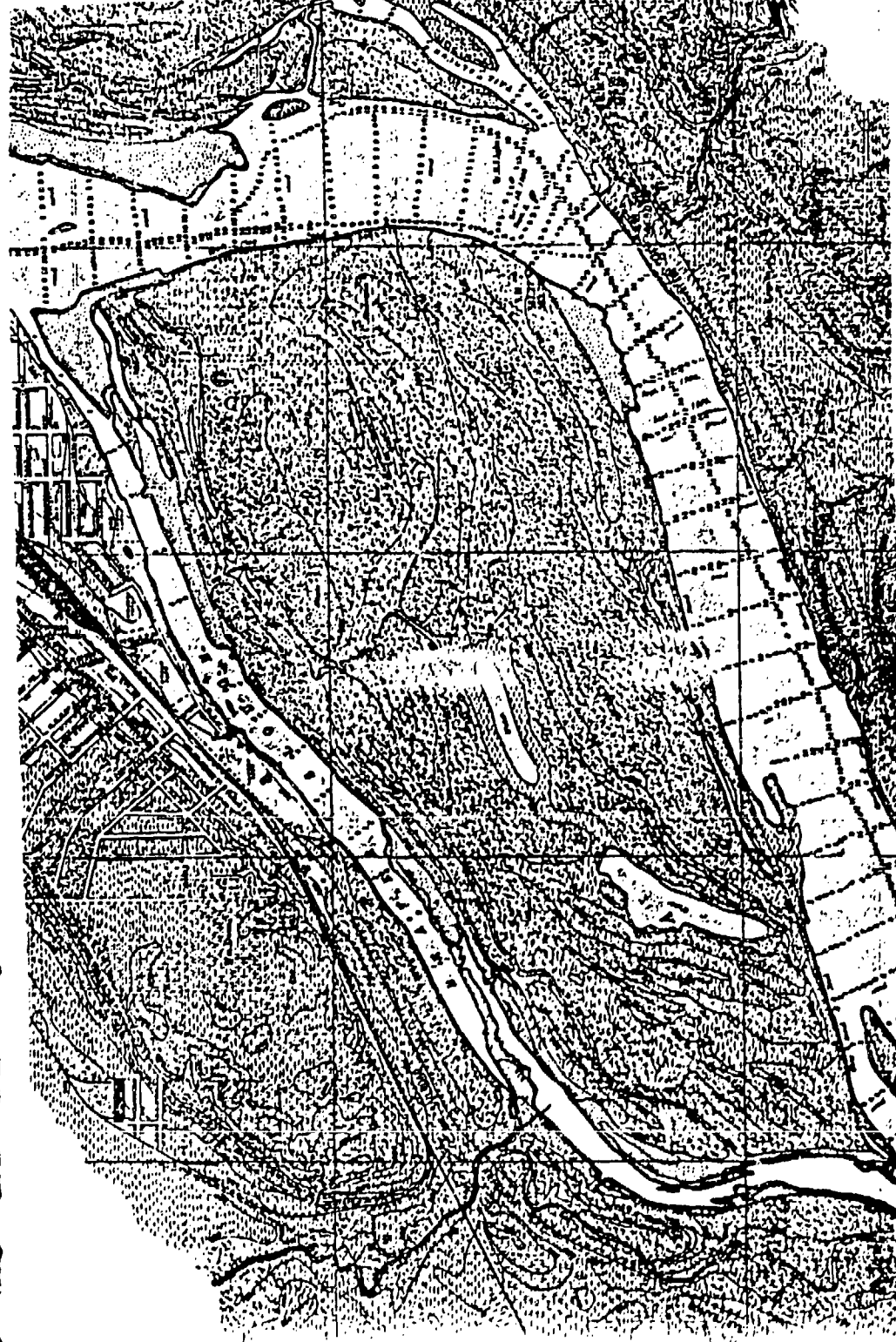
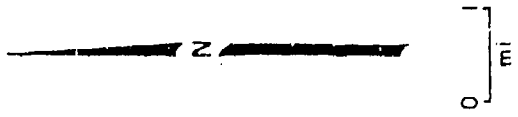
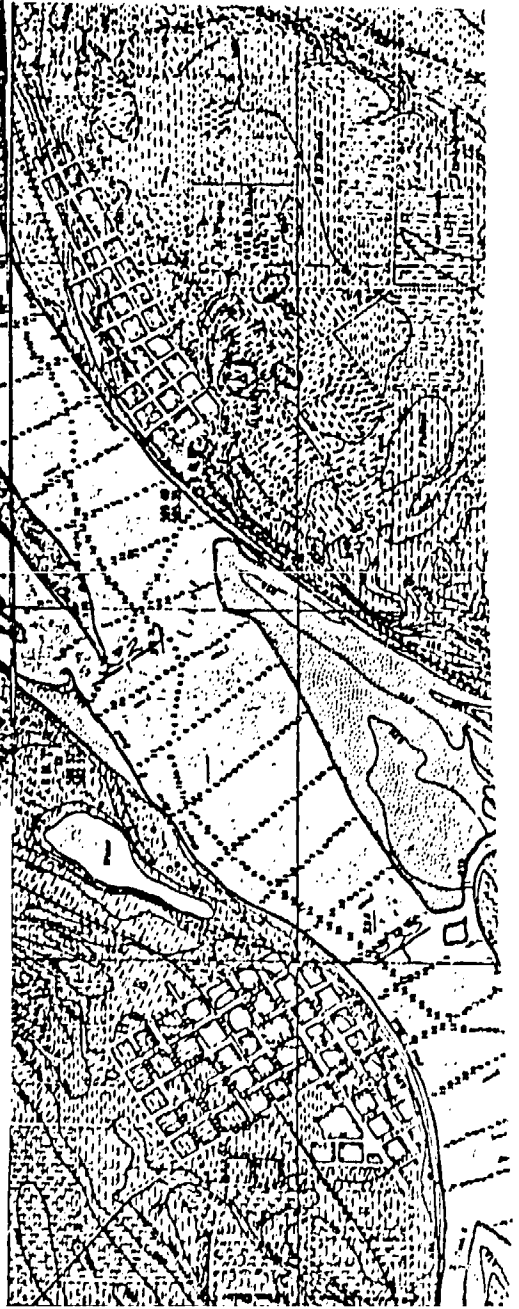


Figure 3:15. Albany, Illinois, Camanche, Iowa, and Beaver Island. From Mississippi River Commission Chart (1891-1892).



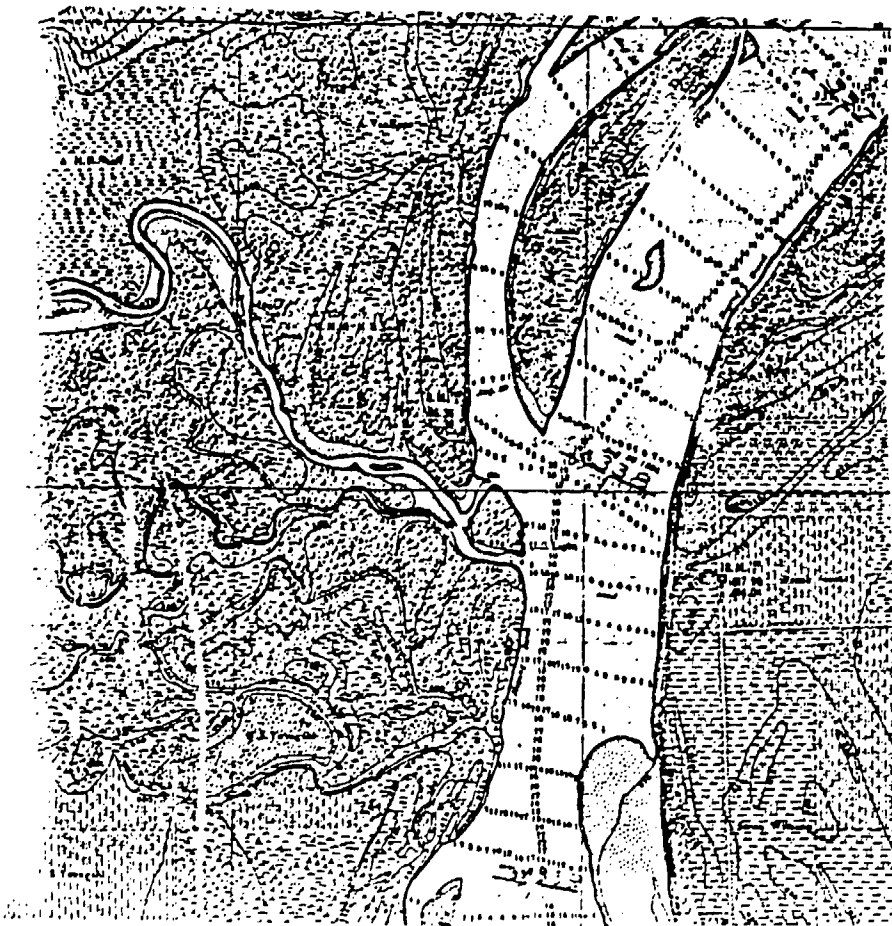
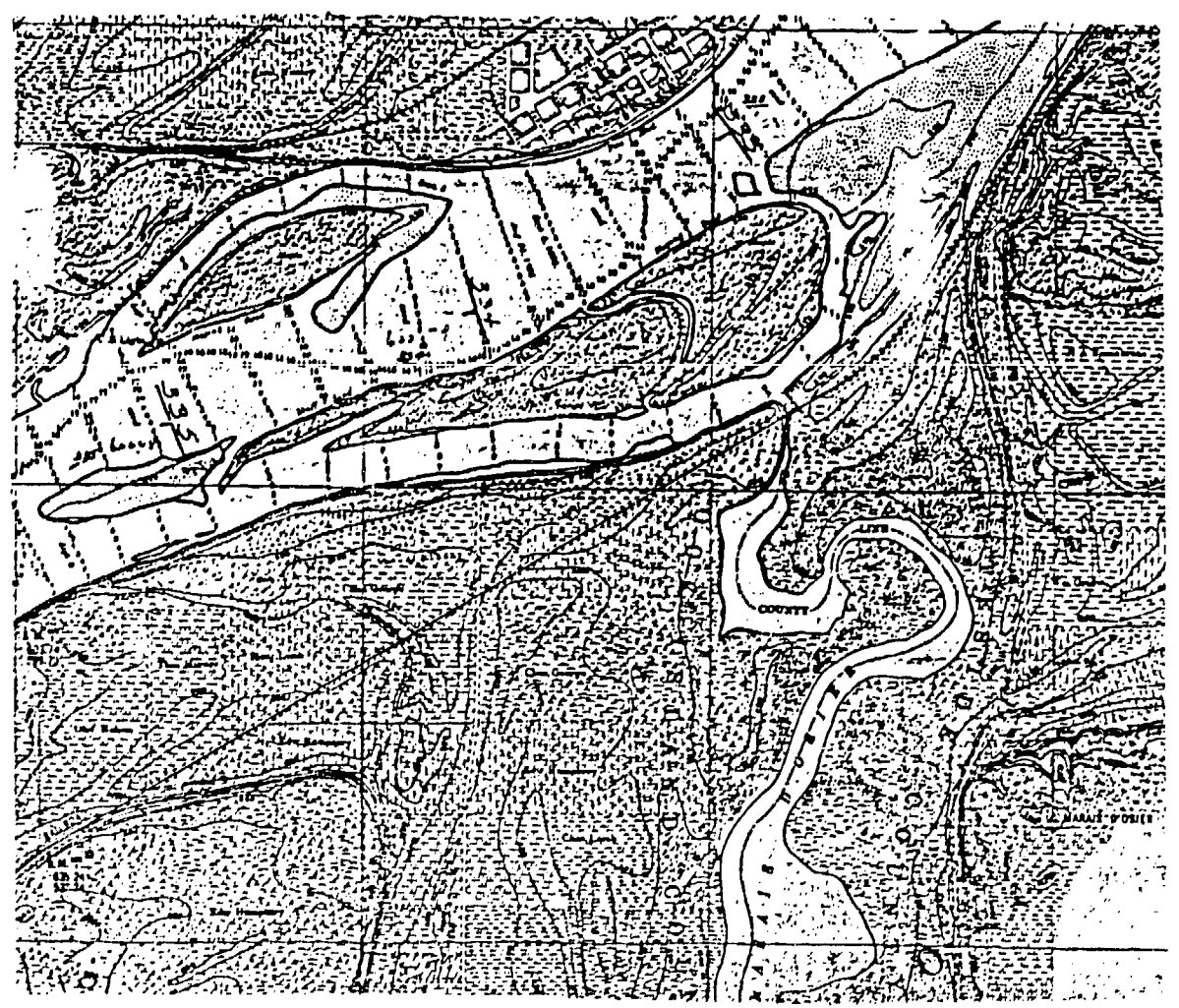
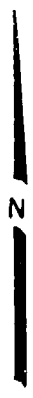
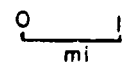


Figure 3:16.

Meredosia (below) and
Wapsipinicon River (left).
From Mississippi River
Commission Chart (1891-
1892).



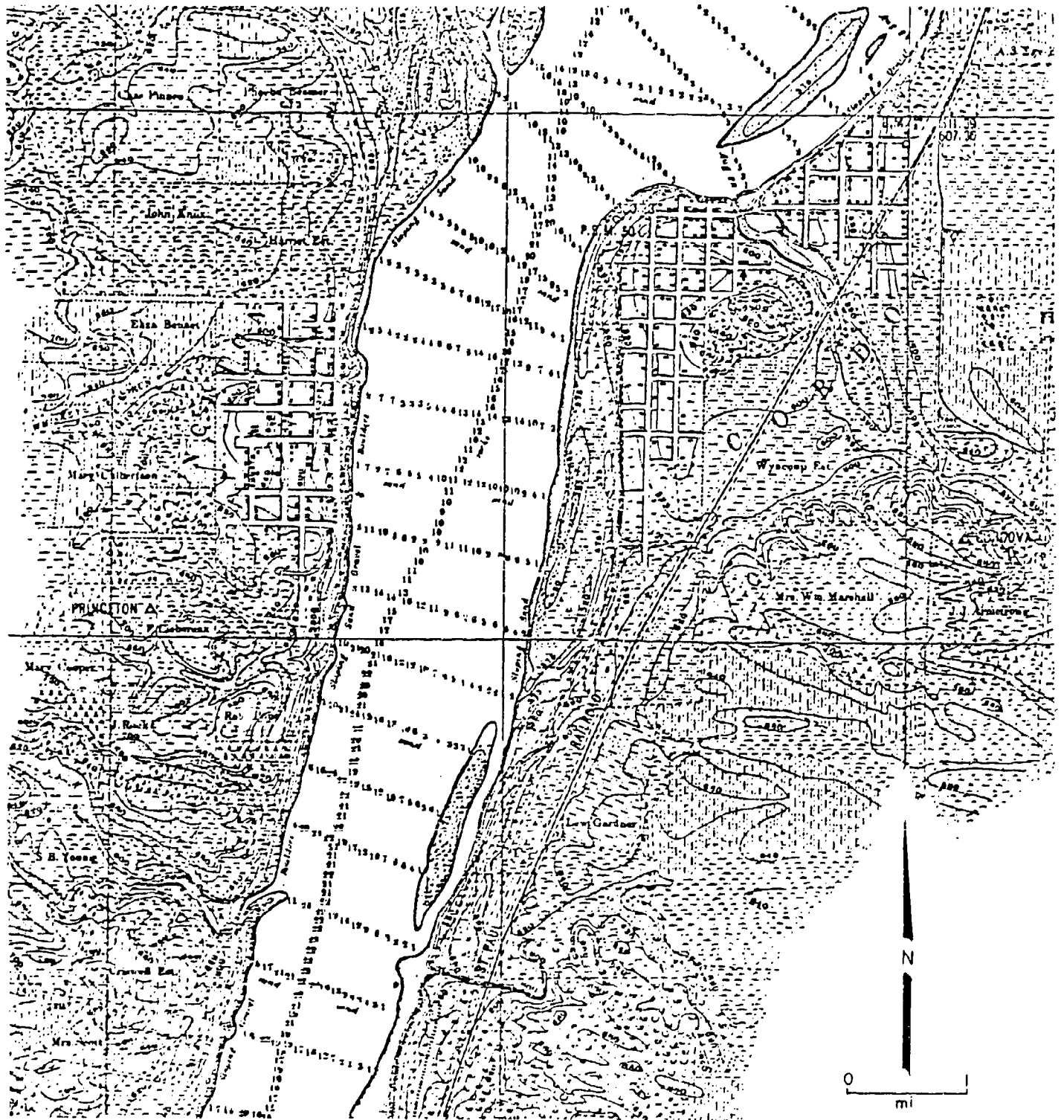
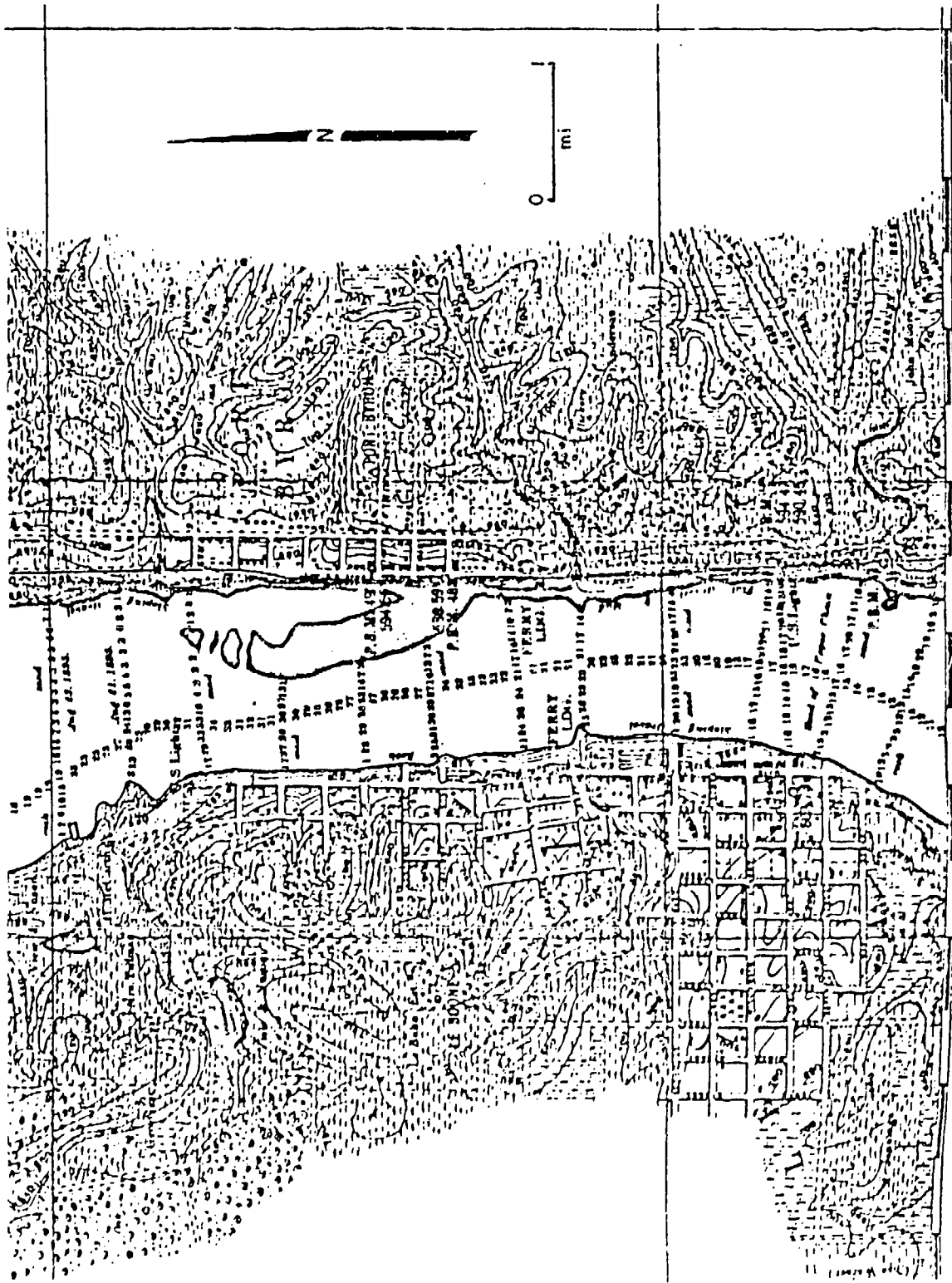


Figure 3:17. Princeton, Iowa, and Cordova, Illinois. From Mississippi River Commission Chart (1891-1892).



90718

80707

81117

Figure 3:18. LeClaire, Iowa, and Port Byron and Rapids City, Illinois.
From Mississippi River Commission Chart (1891-1892).



H. Lewis

Figure 3:19. Port Byron, 1847. From Henry Lewis, Valley of the Mississippi Illustrated.



H. Lewis

Figure 3:21. Rock Island Rapids, 1847. From Henry Lewis, Valley of the Mississippi Illustrated.

IV
ARCHAEOLOGICAL SURVEY
by
David W. Benn
with Lawrence Conrad

This chapter presents the findings of the field survey and the information provided by private collectors who roam the area of Pools 13-14. The survey results and collector information are very different sets of data which will be treated in separate discussions in the following pages. Collector descriptions of sites tend to be vague about site boundaries and dates when the material was found, and artifacts possessed by collectors are selective but informative indicators of site contents and culture period. On the other hand, the locational/depositional information for professionally surveyed sites is highly specific. Unfortunately, professional archaeologists rarely find enough diagnostic artifacts during field surveys. At some juncture in this report a synthesis of these two sources of site data must be achieved.

The initial portion of this chapter covers the research methodology of the project. Included here are descriptions of survey techniques and the problems encountered in surveying the Mississippi River valley. Archaeological sites and survey areas are described in the next section, which is subdivided into sites within and outside the COE project corridor. The third section of the chapter is a discussion of site distributions (i.e., natural site formation processes) and culture processes. The chapter is completed with recommendations for the evaluation and future investigation of the sites under COE jurisdiction.

Research Design

The principal goal of the 1988-89 survey of Pools 13-14 was to investigate as much land as possible under COE jurisdiction (Figs. 4.1, 4.2). This meant the field survey was conducted almost exclusively in the "floodplain" (i.e., property within the 100 year flood zone), the most technically difficult area to survey for archaeological remains. The floodplain is overgrown by weeds and forest, except in a few refuge areas where fields are leased for row crops. Little of the river channel in Pools 13-14 is leveed, so the juncture between the undeveloped floodplain and developed land under private ownership on higher terraces is irregular. Where the government property boundary follows the course of the escarpment between the "floodplain" and higher terraces (usually demarcated by the railroad track), one can stand on (apparently) culturally sterile floodplain and observe high potential areas for archaeological sites on higher terraces outside the government boundary.

Also included within the survey area were two timber sale parcels. These are government properties where the commercial cutting of trees will be permitted. One parcel covers the forested floodplain on both sides of the Wapsipinicon River (Fig. 4.4a), and the other lies on the north side of the Maquoketa River (Fig. 4.4b). Both parcels were surveyed as part of the overall research design for the Pools 13-14 project.

Methods

The survey methodology was designed around the assumption that archaeological remains are difficult to locate in floodplain environments. Three strategies were employed to overcome this impediment. First, the survey team moved quickly and ranged over all of the floodplain, both on land and water. Resurvey and exhaustive search of specific locales were avoided. In the author's experience more sites are located by inspection of as many bank and terrace exposures as possible. The second survey strategy entailed the use of a variety of survey techniques apropos for specific local conditions. The survey strategy was not designed to treat the floodplain as a monolithic environment where a specific set of techniques could be applied all of the time. The third strategy applied to Historic period sites. Robert Vogel provided a list of recorded historic buildings and locations of activity (Appendix D), which were field checked.

A portion of the field survey was conducted on land using pedestrian transects. Most of the land survey was situated among the sloughs north of the Wapsipinicon River (Figs. 4.5-4.11), in the Pleasant Creek preserve north of the Maquoketa River and in the Green Island district south of the Maquoketa River (Fig. 4.10, 4.11). A total of 583.5 acres and 12 linear miles was surveyed by the pedestrian method (Table 4.1).

Pedestrian survey of cultivated fields involved walking transects spaced at 20-50m across corn and soybean fields, following crop rows and landform contours. All fields were weathered and had 100% surface visibility. When an artifact was encountered, survey transects were tightened to every-other crop row (5m) around the find to demarcate the site.

Linear pedestrian survey entailed walking bare field roads, levee roads and terrace escarpments through weedy or forested tracts of land. This technique was employed to explore fresh bank exposures and escarpments, to evaluate the geological structure and age of the landscape and to locate historic sites. Shovel-testing was utilized to search for cultural remains in high potential locations within the Pleasant Creek and north-Wapsipinicon areas. A total of 120 shovel-test holes was dug.

The other type of survey in the project area employed boat transportation to investigate the banks of sloughs and the main

channel. This work was done by pairs of archaeologists (3 people with the geomorphologist) boating close to the banks to observe whether prehistoric surfaces were exposed. When available, these surfaces were walked by "leapfrogging" with the boat along the shoreline. A total of 25.75 miles (51ac @ 5m wide transects) of shoreline was surveyed by walking. A hand soil core was used to explore the depth and composition of subsurface sediments behind sand levees along the shoreline. Where the banks were too steep or overgrown for walking transects, the survey was accomplished by floating close to the bank. A total of 46.75 miles (93ac) of banks were inspected at close range from the boat (Table 4.1).

A site was designated by any material evidence of human activity which appeared to be in original context. Historic sites had to be at least early twentieth century or older. To keep site impacts at a minimum, only the initial finds of flakes and diagnostic items were retained for analysis. Cobbles, fire-cracked rocks and historic building materials were left in place.

Survey Limitations

Expectations for floodplain surveys normally are low because dense vegetation, high water table and recent sediments reduce the visibility of cultural remains. From observations made in Pools 13-14, this list of survey limitations can be expanded and analyzed for specific effects.

Dense vegetation always inhibits site visibility in the floodplain. There are periods in the spring and in late autumn before the leaves fall when stream banks are relatively clear of vegetation and surveying is productive. Even when vegetation is reduced, stream banks remain clogged by fallen trees and tangles of roots. For a brief period (1-2 weeks) in the autumn the brilliant colors of oak leaves actually enhance the effectiveness of the survey. In the floodplain, oak trees mark the locations of the most well drained surfaces (Fig. 4.3), which seem to have higher potentials for archaeological remains. During the summer the floodplain transforms into a jungle of poison ivy, stinging nettles and green algae on the banks--all rendering archaeological survey unproductive and unpleasant.

Water levels affect surveys in the Upper Mississippi River basin because pool elevations are artificially maintained for navigation. Damming of the Mississippi River creates lakes (pools) where the normal water level inundates the pre-settlement land surface in the lower half of the pool. Virtually all floodplain terraces and low Woodfordian-age terraces are completely submerged in the first 9mi above each lock and dam. From observations of soils, particularly the B horizon, modern water levels are maintained above the pre-lock and dam water level in at least 70% of each pool (e.g., up to Camanche in Pool 14 and up to the Maquoketa River in Pool 13). Thus, when the

water level is at the normal pool stage, archaeological survey is prohibited on a majority of pre-lock and dam landscapes.

There is a general state of sediment aggradation in Pools 13-14. Aggradation causes survey techniques to be less effective, although it is also argued that sites may be protected by this type of burial. Sediment is filling the valley from three sources: small sidevalleys and bluff slopes, from upstram main valley sources, and fine-grained sediments from major tributary streams. The effects of sedimentation from the valley sides are seen best on alluvial fans. Nearly all fans adjacent to the river channel or its sloughs are veneered by .5-2m or more of PSA, with fan edges having the thickest accumulations. Sediment carried by the river consists mostly of tan colored sand deposited adjacent to the main channel and sloughs with high streamflow velocities (Fig. 4.4). One to two meters of sand mantles island margins and on the downstream portion of islands (see Benn, Bettis and Vogel 1988:55). Sand also forms .5-1m thick natural levees along the banks of the main channel and large sloughs. Alluvial sand layers rarely extend more than a few decameters away from the channel into the floodplain (except on island heads) and usually do not occur on surfaces of Early Holocene or Woodfordian age. The third sediment source, fine-grained material from large tributaries (e.g., Maquoketa, Apple, Plum and Wapsipinicon rivers), accumulates at the confluence and immediately downstream. These deposits accumulate along the main channel and sloughs for a distance of 3-6mi south of the river mouth (Fig. 4.4). Fine sediment is darker colored than river sand and is difficult to distinguish from late prehistoric, pre-settlement deposits where pedogenic horizons have not developed unless bank profiles are cut for close examination.

Modern development of the river environment is another factor which affects the outcome of archaeological surveys. One aspect of development has a positive affect; development of the floodplain makes this environment more accessible for pedestrian survey. Developments such as access roads, levees, agriculture fields for wildlife plots and dredging by state and federal agencies expose the ground surface and soil profiles in areas otherwise heavily vegetated. However, most modern development has a negative affect on archaeology. For instance, vast sections of shoreline in Pool 14 (e.g., Clinton, Camanche, Albany and Princeton to Lock and Dam 14) have been filled, landscaped and/or riprapped for private housing, leisure boat marinas, industry and barge traffic. Known sites have been destroyed, and future survey is abrogated by these changes. Private collectors express similar regrets concerning the disappearance of significant sites along the valley sides outside the government property boundaries. At least in Pool 14 private and industrial development is the largest source of impacts on cultural resources. This is not true (yet) in Pools 13, where much of the property adjoining government land is owned by farmers.

This brief review of factors affecting archaeological survey in the Mississippi River floodplain points to a conclusion that planning for such surveys encompasses a degree of uncertainty. The outcome of floodplain surveys is uncertain because the factors that limit survey effectiveness do not converge, rather impediments to survey can occur at any place and during any season of the year. Regarding seasonality, the writer has surveyed in the Mississippi floodplain during most months of the year, except late August-September (too much vegetation) and December-February (frozen ground). Rarely have conditions been "perfect" (i.e., low water, stream banks clear of vegetation, good weather) and then for only brief periods of time (e.g., a week). Actually, survey conditions are never "perfect," since certain conditions favor the locating of specific types of cultural resources. For example, very low water is a favorable condition for finding ship wrecks, but at the same time the cutbanks are overgrown by vegetation and the backwaters are inaccessible by boat. The lesson from this analysis is that the best way to plan a Mississippi floodplain survey is to reconnoiter the project area first, then formulate the survey goals and coverage to reflect realistic field conditions.

Archaeological Survey Findings

Discussion of the survey findings is divided into two parts. Surveyed areas and sites on government controlled lands are described first. This information was collected during the field survey. Then, sites encountered through the literature review and informant interviews are described. Most informant sites were not visited in the course of the field survey. The reader should refer to seven project area maps (Figs. 4.5-4.11), artifact tables (Appendix E) and site forms (Appendix F) for both parts of the discussion.

Surveys & Sites on Government Property

Pools 13-14 are divided into seven reaches for discussion of the survey findings. Each reach has unique landforms and valley parameters which affect site preservation and the effectiveness of survey techniques. The segments are organized from south to north.

Lock & Dam 14-Princeton (river miles 493.3-503; Fig. 4.5):

The river flows through the Port Byron gorge in this reach. The gorge is .4-.7mi wide, and there is no space for the river channel to meander. Limestone bedrock outcrops beneath terraces on the Illinois side between Port Byron and Princeton. Islands and backwater sloughs were absent for the most part from the pre-lock and dam floodplain, except for a small number of Woodfordian age terrace remnants which have been sculpted into

islands by erosion (e.g., Smith Island below LeClaire). A ribbon of Holocene terraces and alluvial fans rimmed the river channel prior to raising the pool level. Most of these landforms have been eroded or drowned by the pool rise. Today, waters at normal pool level lap against the base of two (low and high) Woodfordian terraces. Virtually all of the river shoreline has been developed for private homes, businesses and industry, and an estimated 70-80% of the shoreline has been filled and riprapped.

Our survey in this reach of the river consisted of boating along the shoreline and putting ashore at the few remaining terrace exposures. Attempts at visiting previously recorded sites were mostly futile, since a recent construction boom has filled the valley walls with new houses and changed the landscape as well as damaged or destroyed many sites. The following sites were noted.

13ST79: Archival research indicates that Smith's Island was the site of an American Fur Trade Company post, was settled by the Smith family as early as 1824 and once had at least 16 cottages along its southern shore. Pedestrian survey along the northwest bank (80% visibility) of Smith's Island yielded no diagnostic material. A few whiteware and glass sherds were noted but not collected. The site is mapped on a Woodfordian terrace and small inset surface of (probable) early Holocene age. Dredge spoil covers the upper surface of Smith's Island. The Office of the State Archaeologist tested this site in 1984 by the post-hole method (Johnson et al. 1985:89). They found relatively little historic and prehistoric material in a soil deflated by erosion, and they recommended that the site was not eligible for consideration on the National Register of Historic Places. No additional investigation is recommended.

13ST84: Charles Keyes recorded this mound site on the east end of Smith's Island. The Johnson et al. (1985) report and an earlier COE report (Dunn 1984) do not mention the mound. Today, large piles of dredge spoil cover the east end of the island, and the foundation of a twentieth century farmstead (see Johnson et al. 1985:90) is buried by spoil at the location of the recorded mound. No additional archaeological work is recommended.

13ST91: This site is located where two small valleys join and open into the Mississippi valley. Alluvial fan deposits have filled the small valleys and are being eroded by the present Mississippi channel. The site exposure consists of a 3m high cutbank immediately south of a private residence and a few meters below the railroad grade. The cutbank has a veneer of modern spoil or sandy fill over fan deposits consisting of coarsely graded loam, sand and fine gravel. A hammerstone and broken cobble were removed from the fan deposits approximately one meter above normal pool level. Other details of the fan stratigraphy and context of the rocks are not available owing to heavy vegetation and slumping on the cutbank. A fragment of turtle shell was found on the shoreline. This site has been impacted by

Highway 67 and the railroad and has been severely eroded by the river. The site is not potentially eligible for the National Register, and no additional investigation is recommended.

11R1553: Ferrel Anderson (Davenport) reported to Larry Conrad that human remains eroded from this location during the flood of 1965. The site now is a spit of land on the same landform as 11R1515. When the SMSU crew visited this location, the spit was at the waterline, muddy and overgrown. Today, the location is aggrading but probably has been severely eroded by wave action in the past. The site is not being impacted, and no additional survey is recommended.

11R1515: This site is situated on alluvial fan and Woodfordian terrace deposits well away from the river channel. The fan is aggrading, and the site is not endangered by impacts associated with COE actions on the river. The site was discovered and shovel-tested by Johnson et al. (1985:98), who determined that the site was not potentially eligible for nomination to the National Register.

11R144, 11R145: These sites are on high Woodfordian terraces with riprapped river frontage. Recent house construction and landscaping probably has damaged or destroyed both sites. Both sites were reported as campsites by the University of Chicago survey in 1933.

11R1551: This site was recorded during the survey. One, large heavy percussion flake was found in the gravel lag along the shoreline of a low Woodfordian terrace. Heavy vegetation and high water prohibited careful survey of this shore. The site location is immediately north of the mouth of a small stream and within the construction zone for Interstate 80, which may have impacted the site. The surface soil on the terrace appears to be deflated; thus the site probably has little integrity. It is not potentially eligible for the NRHP, and no additional investigation is warranted.

11R1375: This previously recorded site was visited during the survey, but heavy vegetation and a slumped bank prevented extensive examination. The site is on a high Woodfordian terrace with an intact mollusk in a loamy sediment. The site record, dated 1978, indicates the site consists of a Woodland age refuse midden in the upper 40cm of topsoil. Many bones, shells, rocks, flakes and sherds were recovered from the cutbank. Today the river bank is actively being eroded because westerly winds blow waves directly into the terrace. This site is potentially significant and should be tested to evaluate the impact of shore erosion.

11R1552: This site was reported to Larry Conrad by collector Allan Verbacke. He has recovered Archaic side notched points and one Dickson/Waubesa Contracting Stem point as well as other chipped stone material from the eroded beachline. The site

appears to extend along 400ft of shore in Boy Scout Camp Hauberg. This location is a Woodfordian terrace, thus cultural material is relegated to the topsoil. The area is been extensively modified for roads, buildings and trailer parking, and the shoreline has been riprapped in many places. This site appears to have been extensively disturbed and is on private property.

11RI550: This site was discovered while probing a mid-late Holocene surface located at the mouth of a small, unnamed tributary. Portions of the cutbank and shoreline were clear of vegetation and log obstructions so that a bank profile could be examined. A hearth with burned-red limestone rocks was observed in the cutbank about 30m north of the stream mouth, and another fire-cracked rock feature had eroded onto the beachline about 30m north of the hearth. A broken, lanceolate biface with a contracting stem (Fig. 4.12) was found next to the eroded rock feature. The biface, made of local gray chert, may belong in the Late Archaic period. The soil profile at the hearth location contained an A-Bw topsoil developed in sandy-loam, which also contained a piece of fire-cracked chert shatter, and a buried soil (Ab2-Bwb, 35-82cm) with silans and considerable evidence of clay movement. The hearth was in the Bwb2 horizon below 51cm, and charcoal from the hearth was radiocarbon dated at 800 ± 50 B.P. (Beta-31800), an age which seems too late for the typology of the projectile point and the well developed nature of the soil profile. Below 82cm in the profile is a Btb2 horizon (a possible modified Ab3 horizon) containing rounded pebbles, and this horizon rests on limestone bedrock. A low Woodfordian terrace is about 30m behind the Holocene landform. The site is on an actively eroding river bank facing the main shipping channel. It contains potentially significant information and should be subjected to test excavations to determine its significance.

11RI538: This site is on the south side of the unnamed tributary described above. Cultural material found 40m south of the tributary mouth came from the Bwb2 horizon of the same soil profile as 11RI550. The material consisted of a piece of chert biface shatter and two igneous fire-cracked rocks. The cutbank at this site is vertical above the waterline and could not be investigated as closely as the previous site. The site is eroding rapidly and should be investigated by test excavations to determine its significance.

Princeton-south Camanche (river miles 503-510; Figs. 4.5, 4.6):

This reach of the river lies within the intersection of Pleistocene paleo-valleys. The paleo-valleys are broad (+6mi) and are composed of a series of Pleistocene terraces rather than a distinct bluffline. The Mississippi and Wapsipinicon rivers meet at the center of the area. Both rivers are confined within a 1-2mi wide meanderbelt bordered by Woodfordian terraces. The Wapsipinicon River discharges a load of fine-grained material, resulting in the formation of a series of sandy and loamy

floodplain sediments at its mouth and for a distance of 3mi above and below the mouth. Early, middle and late Holocene sediment packages are represented in Wapsipinicon and Mississippi river fluvial features, with the earliest Holocene sediments positioned against the Woodfordian terraces and north of the present Wapsipinicon channel. Progressively younger sediments tend to be located nearer the present Mississippi channel. Today, the normal pool level occurs at or slightly below the pre-settlement land surface. At low water the early to mid-Holocene aged surface north of the Wapsipinicon River is completely exposed. Relatively little of the shoreline on the Iowa side is developed (except a line of summer houses on Schricker Slough), while the entire Illinois bank (a high Woodfordian terrace) is covered by houses and industrial facilities.

Our survey focused on the Iowa side of the river where land in the Upper Mississippi River Wildlife Refuge dominates the floodplain. This survey area is called the Wapsi transect.

13ST88: This site consists of a piece of chert shatter and a thick biface tip from the crest of a cultivated field on a high, sandy Woodfordian terrace. The terrace overlooks abandoned Wapsipinicon River channels that flowed through middle to late Holocene sedimentary deposits. No other materials were observed despite perfect ground visibility. It is possible that private collectors visit the site and have removed material; otherwise, there is surprisingly little material at this location, which should logically have a high potential for prehistoric occupation. This site is on private property, and no action is recommended.

13ST89: This site is a ca. 50m diameter scatter of structural (i.e., limestone, bricks, nails) and kitchen refuse dating to the latter half of the nineteenth century. This site is on a low rise of the high, sandy Woodfordian terrace about 75m south of the Wapsipinicon floodplain. This location is on private property. A selected surface collection of ceramics from the cultivated surface yielded one ironstone rimsherd for each of two decades in the 1860s and 1870-80s and a late nineteenth century canning jar neck. The material scatter on this site is heavy, with many sherds of whiteware, ironstone, porcelain, glass and stoneware. Most of the material, however, must be in the plowzone, as the site is on a Pleistocene age terrace.

13CN36: Charles Keyes recorded this site as a potential Historic Sac/Fox village at the mouth of the Wapsipinicon River. The current site form at the Office of the State Archaeologist locates the site immediately north of the river mouth. We surveyed this location and found the landform to be composed entirely of PSA, making it an impossible location for a site of early Historic age. The OSA site record printout gives a quarter-section location (NE NW SE) 300-400m north of the mapped location, which is an area of Mississippi River ridge-and-swale topography. The levee adjacent to Schricker Slough is late

Holocene age and is buried by more than .5m of PSA, but inland levees are progressively older, higher and have little or no PSA cover. The surfaces at the center of section 13 (e.g. 13CN59) are well drained early to mid-Holocene age sediments. If an Historic Indian village exists at the Wapsipinicon mouth, it is probably on one of the older surfaces, not on the bank of Schricker Slough. The entire Wapsi transect is forested and, except for occasional bare cutbanks, requires the shovel-test survey method to locate sites.

13CN59: This is an historic site on the south end of an early to mid-Holocene surface remnant between two oxbow ponds. A wagon road bisects the site. Two limestone rocks and one chunk of coal slag were found on the terrace escarpment. One of three shovel-tests yielded a clam shell fragment. The site is forested and undisturbed, so no further work is recommended. The significance of this site was not determined during the survey.

13CN60: Historic material, possibly representing a trash dump of a former vacation cabin, was found on 10m of beachline on Schricker Slough across from an island tip. The site is on a forested, middle Holocene age surface with a .5m veneer of PSA. Material at the site includes many bricks with the logo "Evans & Howard, St. Louis", stoneware, ironstone, whiteware and many bottles (soda, wine and beer; Fig. 4.12). Diagnostic material dates after ca. 1880s and through the turn of the century. The bank at this site is being eroded by waves from recreational boat traffic. A comprehensive study of the early period of recreational development along the Mississippi River should include this site and others like it to determine criteria of site eligibility.

13CN55: This is a prehistoric site on both sides of a natural levee which forms a point in the sloughs at the Shaffton boat access and county park. The landform is an early to mid-Holocene surface with a dark, overthickened A horizon and oxidized, sandy B horizon. Material was found on the beachline during a low water stage of the river. A half dozen rocks of quartz, limestone and igneous types were scattered along 50m of the shore, and a chert primary flake was found on the point. The site is forested, and its bank is severely eroded due to waves from boat traffic and tunnelling by animals. The site should be tested to determine its significance.

13CN56: This site consists of a light scatter of 4 chert primary and thinning flakes and the stem of a point on the crest of a natural levee on the high, sandy Woodfordian terrace. Today, this location is at the north end of the driveway and picnic area in the Shaffton county park and boat access. The site covers at least a 30m diameter area covered by thin grass and widely spaced trees. The terrace surface is heavily eroded and modified for the park, and cultural material probably exists only on the surface. The site is not potentially eligible for the NRHP, and no additional investigation is recommended.

13CN57: A 10m beachline on an east-facing slough bank north of the Shaffton boat access yielded a collection of basalt cobbles and flakes. The forested bank was clogged by vegetation and logs, making conditions difficult for surface collecting. The river level was very low at the time of survey, and the cultural material appeared to be eroding from the B or Ab2 horizon. The surface at this location is a middle to late Holocene deposit with the Odessa sequence of buried soil surfaces. Among the cobbles was a cleaver with several spalls removed to form a sharp, crescent-shaped edge, which is battered and rounded by use-wear. A chert, core rejuvenation flake with a flaked and use-rounded edge also was recovered. This site is being eroded by waves due to recreational boat traffic and should be subjected to subsurface testing to determine its significance.

13CN58: One tested chert cobble was found on the beach of a northeast-facing point on Schricker Slough. Heavy vegetation at this location prohibited a thorough inspection for other artifacts, but one shovel-test was excavated with negative results behind the bank. The surface at this location is early to mid-Holocene age and has an oxidized B horizon. The property at this site may still be in private ownership; if so, no additional work funded by government agencies is possible. When the property passes to government ownership, this location should be revisited to see if additional material is exposed.

13CN61: This site is in a privately owned cultivated field immediately across the railroad track from Schricker Slough at the northern end of the Wapsi survey transect. A brief visit was made to the field because it is a rare patch of cultivated Woodfordian terrace adjacent to the floodplain. Visibility on the ground surface was 100%. In two passes across the sandy rise in the center of the field, widely scattered limestone rocks were noted (these could be from the railroad grade), and one chert flake was seen but not collected. The single artifact retained in a collection is the midsection of a projectile point (Fig. 4.12). This artifact has parallel blade edges and is finished with collateral pressure flaking typical of late Paleo-Indian technology. The artifact's chert is a heat treated Mississippian type probably from a local source.

South Camanche-north Clinton (river miles 510-521.3; Figs. 4.6, 4.7):

The Pleistocene valley in this reach of the river is 3mi wide and contains three streamlined terrace remnants at the towns of Fulton and Albany, Illinois, and Clinton, Iowa. The terrace remnants rise 80-100ft above the river surface. Holocene age landforms are confined to the center of the valley between Woodfordian terraces. At Clinton the Holocene meanderbelt is .3-.5mi wide, including the main channel and a few low, sandy islands. The reach from Clinton to south Camanche is .8-1.5mi wide and encompasses some small islands, several sloughs and the

giant Beaver Island. Sediments of early to late Holocene age are preserved in small patches along the flanks of the present floodplain, notably below the mouth of Mill Creek (southern Clinton) and in Sunfish Slough. Beaver Island sediments span the late Holocene and recent periods. Otherwise, most of the floodplain is covered by a layer of PSA. There are many deposits of dredge spoil in this river reach. At normal pool level the pre-settlement soil surface is 2-3ft above the waterline on older Holocene surfaces, while the late Holocene surface is 1-2ft above water at the northern end of the pool.

Weichman (1976) conducted an intensive survey of the Clinton levee area along Beaver Slough. He did not locate a site, although much of his survey area covered the "sawdust bottom" along Clinton's waterfront.

At the time of survey (June 1989) the water level was slightly above normal, and late Holocene surfaces were inundated. This is why the SMSU survey located almost no new archaeological sites in this reach of the river. The largest impediment to survey, however, is the huge amount of public and private development that has occurred along the river banks. All of the water frontage from Camanche to Clinton on the Iowa side and from Fulton to Albany on the Illinois side is either filled, riprapped or developed for commercial barge or recreational traffic. Both banks of Beaver Slough have been modified by industrial development. Many archaeological sites must have been destroyed by the development. Finding partially damaged or buried sites in this river reach would require a painstaking search of the banks involving walking over miles of developed shoreline to find isolated traces of past activity.

11Wt236: This site is situated at the boat ramp on the west road from East Clinton, Illinois. The terrace at this location has been disturbed by many years of development (building, filling, surface roads, etc.) and now receives heavy recreational traffic (boats and cars). A terrace exposure revealed a mollic epipedon and a Bw soil profile overlying sandy substratum. One chert primary flake was found on the soil profile. Fire-cracked rocks might be present as well, but rocks from land-filling confuse the artifact inventory. Due to extensive disturbances and the light amount of cultural material, this site is not significant and should receive no additional investigation.

North Clinton to south Spring Lake (river miles 521.3-532; Fig. 4.8):

The Mississippi River valley is 7mi wide in this reach. During the Holocene period the meanderbelt has been in the western half of the valley, leaving a series of Woodfordian terraces in the eastern half (e.g. where Thomson, Illinois is located). Prior to inundation the western half of the valley contained a complex series of low, late Woodfordian terraces and

a full array of Holocene age sediments in the form of alluvial fans, terraces and the floodplain. The complexity of this landscape was created by river meandering and by tributary streams, which enter from the Illinois side (e.g., Johnson and Otter creeks) and the Iowa side (e.g., Elk River, Silver and Deer creeks). Today, all of the landforms below the high Woodfordian terrace (ca. 580ft ASL) are submerged at normal pool level behind Lock and Dam 13, except for highpoints of the lower Woodfordian terrace. Islands of Woodfordian terraces and alluvial fans are aggrading. Below the lock and dam a mile long section of the pre-inundation floodplain is preserved. Here, an array of landforms--high and low Woodfordian terraces, early through late Holocene surfaces, modern floodplain--is preserved on the Illinois side of the channel.

A small amount of professional archaeological work has been accomplished on Potters Island west of Thomson, where the COE has developed a camping and river access park. The Bulger's Hollow access on the Iowa side also has been surveyed (Johnson et al. 1985:71). Other than these brief investigations, most site information for this reach comes from private collectors.

The SMSU survey toured alluvial fans on the Iowa side by boat and visited on foot less vegetated portions of the Potters Island shoreline. Buildings on Potters Island also were viewed. The Iowa shoreline was found to be generally aggrading, particularly around the fans. The Illinois shoreline on Potters Island is being eroded by waves from westerly and northerly winds. The bank of the high Woodfordian terrace along the eastern side of the pool is mostly developed for houses and businesses. The SMSU survey also boated through the sloughs and up Johnson and Otter (Cattail Slough) creeks in the area below the lock and dam. Cutbanks were checked in this area, although rising water obscured the view of late Holocene sediments. No new sites were recorded during the survey.

13CN3: This site was tested in 1985 (Johnson et al. 1985:71) after the area had been developed by the COE for boating and camping. Woodland material was recovered from the upper meter of the alluvial fan by the postholing method, and five short backhoe trenches were excavated to penetrate the subsurface soil. The periphery and southern half of the fan were composed of PSA. Johnson et al. (1985) did not offer a definite recommendation of significance for this site. The SMSU survey found no cultural remains presently eroding along the shore, which is formed from riprapped PSA. We do not feel the site contains significant research potential, and no additional archaeological work is recommended.

11Ca11, 11Ca13, 11Ca20, 11Ca64: These four sites are situated on the northern half of Potters Island. The Thomson Causeway site (11Ca11) was reconnoitered and tested by Illinois State University (Esarey and Carlson 1983) and found to contain Early and Middle Woodland components, including a mound on the terrace

edge. The COE has stabilized the mound and riprapped the bank to prevent erosion. A picnic area and public information panel have been constructed around the mound, following a finding of "no adverse impact" by the COE (1984). Site 11CA13 was identified in 1932 as consisting of two low mounds near houses. Today, a two-track road crosses the site, and the SMSU surveyors noted a Late Woodland (cord roughened) body sherd here. The Shear's Point site (11CA20) was reported to have eroded 70ft in 30 years (in 1972) and to have yielded axes and other materials from the beach and flooded terrace. Charles Smith (COE-Rock Island) visited the site in 1983 to obtain collections and evaluate the site (Corps of Engineers 1984). A finding of "no adverse impact" was made by the COE (1983), and the campground was developed on 11CA20. Site 11CA64 was recorded in 1974 as a single mound on the undeveloped interior of Potters Island. The SMSU survey was unable to locate this mound in the forested interior of the island. Today, Potters Island is continuing to erode along its west and north sides. Recreational facilities have been developed on the northern half of the island, and public use of the area is heavy. One nineteenth century house in the middle of the island has had its upper story removed after the 1965 flood. Half of the island and sloughs at the northern end of Potters Slough are part of the Upper Mississippi River Wild Life and Fish Refuge. From the distribution of mounds and village debris, it is apparent that government property contains more archaeological properties than are presently recorded. Even existing sites have not been thoroughly evaluated for a determination of eligibility to the National Register. An intensive survey of government property from the lock and dam levee at Johnson Creek north to Thomson, including Potters Island (approx. 4mi), is recommended. All of this landscape is the Woodfordian terrace system. Threatened or damaged sites in this area should be evaluated by subsurface testing.

11Ca117, 11Ca118: The elevation of site 11Ca117 is at normal pool level, and the site is overgrown and surrounded by a cattail marsh. This site has not been evaluated for its research potential. Site 11Ca118 is on the Woodfordian terrace and does not appear to be eroding into Potters Slough.

11Ca10: This is a large Havana Hopewell site at the north end of the Thomson locality. Parts of the site, including a mound, are on the high Woodfordian terrace. However, local collectors have been removing ceramics, lithics and copper items from the beach and inundated areas in front of the site. Collector activities on COE property have been curtailed recently by arrests and fines. Artifact collections cited by Conrad and Benn elsewhere in this report came from 11Ca10. The nature of impacts due to beach erosion should be assessed at this site as part of a comprehensive shoreline survey of the Thomson locality.

South Spring Lake to Riprap Island (river miles 532-541; Figs. 4.8-4.9):

The 7mi wide valley described in the previous reach (north of Clinton) continues up to Savanna, Illinois in this reach. At Savanna the Plum River empties into the Mississippi River from the Illinois side. Together, the Plum and Mississippi rivers have built a complicated floodplain of abandoned channels and linear islands in the middle of the valley. These landforms have ages spanning the Holocene period. Above Savanna the valley narrows to 2mi within which the Mississippi makes a huge, right-angle turn below Riprap Island. An enormous network of scrolled levees and yazoo channels forms the floodplain inside this turn opposite Beaver Creek, a small Iowa tributary. Late Woodfordian and Holocene age sediments comprise the floodplain. Today, the normal level of Pool 13 floods the pre-settlement surface in most of this reach, except the extreme upper end. This means the late Holocene age sediments are normally below water, while the early-middle Holocene terraces extend about one foot above the normal pool level. The lowest Woodfordian terrace is at the normal pool level, and the next higher terrace is 1-3ft above water. These terrace levels are well illustrated on the contour map (Fig. 4.9). Sand ridges on the Woodfordian terrace form large islands in Spring Lake south of Savanna, and at low water the remainder of the Woodfordian terrace emerges in Spring Lake. The town of Sabula, Iowa is built on a higher Woodfordian terrace. The western side of the Spring Lake levee is constructed on the latest Woodfordian terrace and on early to mid-Holocene Plum River deposits.

The SMSU survey conducted pedestrian survey along the levee and islands within the northern end of Spring Lake. A shoreline survey by boat covered islands and alluvial fans below Sabula as well as all of the islands outside the levee at the south end of Spring Lake. The survey also reconnoitered shorelines in Savanna Slough (i.e., Plum River mouth) and in the floodplain opposite Riprap Island (e.g., Sabula Slough, Little Kellier Lake). In general, Woodfordian sediments (islands) were found to be eroded along the shoreline and deflated on the surface (all were once cultivated). Islands in and around Spring Lake receive heavy wave impacts on their western shores. Holocene age landforms have a veneer of PSA .5-1m or more thick. At normal pool level archaeological sites were found only on Woodfordian landforms.

11Ca112: Soil adhering to the roots of overturned trees along the western shoreline of this island offer the best survey exposure when the water level covers the beach. We located a single fire-cracked rock in a root mass. Other materials could be found at low water. This island is the southern-most of a string of Woodfordian terrace remnants in Spring Lake. Most, if not all of these islands contain archaeological sites known to local collectors. Topsoil at this site consists of a mollic epipedon (with a plowzone) and a reddish B horizon formed in sandy sediments. Cultural materials are expected to be surficial

deposits, and features are not likely to be preserved in the sandy sediments. This site should be revisited in conjunction with a broad survey of the Spring Lake area.

11Ca113: This site was discovered in two shovel-test holes situated in a grassy patch in forest approximately 50m north of the southern tip of the island. The island is a narrow ridge of sand which is probably a natural levee on the Woodfordian terrace. Historic period material came from the upper 10cm of an A horizon buried beneath 50cm of PSA. Artifacts consisted of several sherds of milkbowl crockery with light blue exterior finish, lamp chimney glass, ferrous metal (nail fragments) and cinders. The age of this material might be late nineteenth or early twentieth century. No structure remains were visible in the area of the shovel-tests, although vegetation was too dense for effective survey. Concrete structures (e.g., water control, footings?) are located on the western shore more than 50m north of the site. Since this site is not eroding, no additional archaeological investigation is recommended at this time.

11CA18: This previously recorded site covers an entire island in the middle of the northern half of Spring Lake. Today, an east-west dike/roadway passes through the island, damaging part of the site. The site is well known to local collectors and has been recorded for two decades. The site sheet (dated 1970) records Black Sand sherds and stemmed, side-notched and corner-notched points in private collections. This location was investigated by Lane (1977:51-55) for the Fish and Wildlife Service. He failed to find material on the shoreline or in test units and attributed the negative findings to the presence of historic sand deposits on top of the cultural zone. Lawrence Conrad viewed private collections from this site and noted the presence of Middle Archaic side notched points and winged drills, stemmed and broadly notched points of the Late Archaic period and stemmed points of the Early Woodland period. The SMSU surveyors visited when the water level was below normal and the beachline was exposed. Several fire-cracked rocks were noted on the southern tip of the island, and broken rock and a tested chert cobble were found on the beach on the northwestern side of the island. The western side of the island is heavily eroded by wave actions. The island is a Woodfordian terrace without a PSA cap. Cultural material is in the topsoil, which has been plowed. Further survey investigation of this site is recommended in conjunction with a broad survey of the Spring Lake area.

11Ca114: A private collector, Joe Daniels, reported to Larry Conrad that cultural material erodes from low islands in the northeastern side and northern end of Spring Lake. The collection includes side-notched Archaic points. Other local residents informally confirmed that artifacts are common in this portion of Spring Lake. Except for an island bisected by the east-west levee (east of 11CA18), most of the landforms yielding the material are at normal pool level and are heavily vegetated. They are accessible for survey only at low water and preferably

in the spring when vegetation is minimal. The islands east of 11CA18 are Woodfordian landforms. The landform immediately south of the Plum River is a stratified deposit of mid- to late Holocene age silts, probably containing buried soils and veneered by historic sediment. Because different landforms are represented within this site, additional survey investigations should separate these areas into more than one site.

Riprap Island to South Crooked Slough (river miles 541-551; Fig. 4.10):

The Mississippi Valley is 2-4mi wide in this reach. Its bluffs are steep and prominent. The Illinois side is rimmed by broad Woodfordian terraces, the largest of which is the location of the Savanna Army Depot. The Apple River cuts through these terraces, meandering across a 2mi wide floodplain at its mouth. The Iowa side of the valley floor is completely covered by Holocene age surfaces formed around the mouth of the Maquoketa River. This area is known as the Green Island bottom. Landforms in sloughs at the lower end of this reach have pre-settlement surfaces at or just above the normal pool level, and PSA is very thick (+1m) on landscapes adjacent to the modern river channel. As one moves upriver into the Green Island bottom, the late Holocene surface has a .3-5m cutbank above normal pool level. The early to mid-Holocene surface has a 1m cutbank. Large portions of the Green Island bottom inside the levee are cultivated, including hundreds of acres of government lease land. Non-cultivated sections of the bottom are accessible by two-track roads during the dry season.

The SMSU team did shoreline survey by boat at the lower end of the reach (e.g., the mouth of Running Slough). This area has extensive deposits of PSA, and surface survey is not productive. Rising water prohibited more extensive shoreline survey below the mouth of the Apple River, although a portion of the shoreline at Arnolds Landing was checked, including the mounds at 11CA44. The Iowa shoreline on the main channel above and below the Maquoketa River mouth also has extensive PSA deposits as well as levee fill. The majority of project time was given to pedestrian survey and shovel-testing within the Green Island bottom. North of the Maquoketa river the circumference of Jackson, Golden and Flat lakes was completely surveyed. This area is mostly forested with about 65ac of cultivated ground. Here, fields were walked, cutbanks were examined, a newly cut road was surveyed and groups of shovel-tests were excavated on points and levees where site potential was high. South of the Maquoketa more than 400ac of cultivated fields (early to mid-Holocene landscape) were intensively surveyed, and spotchecks were done at cutbanks and locations noted by local informants. A previous survey in 1988 covered 120ac of the Green Island Wildlife area (Anderson and Green 1988).

11CA44: Three effigy mounds were recorded at this location in 1974. They are situated on government land on a high Woodfordian terrace between the river bank and the railroad right-of-way. Local resident Robert Knuth told SMSU surveyors that University of Wisconsin (Milwaukee?) staff and students visit sites 11Ca44, 11Ca55 and 11Ca56 on summer field exercises. The SMSU survey checked the mounds and the adjacent cutbank of the high Woodfordian terrace. The area is a mature oak forest and probably has not been plowed. A line of four mounds and a potential linear mound were identified (Fig. 4.13). The four alligned mounds consist from southeast to northwest of a .5m high oval mound (#1), a .5m high conical mound with a "tail" (#2), a 1m high conical mound (#3) and a small .5m high oval mound (#4) on the highest (northwest) end of the terrace. An Inceptisol with a moderately developed E/B horizon occurs in the fill of the mounds. All four mounds have slight traces of central potholes. Mound #4 is rounded by erosion and in a few years will be threatened by destruction from bank erosion. Landowner Knuth noted that +20ft of the bank has eroded in the last 10 years due to high water and strong westerly winds. Extending south from mound #4 is a linear rise about 4-5m wide. It parallels the cutbank, and its south end has been destroyed by bank slumping. This rise appears to be a linear mound, as there is some evidence of loading over cultural features in the cutbank. The cutbank is formed in loose sand which is undercut during periods of high water. At the crest of the cutbank deposits of mussel shells, ceramics, fire-cracked rocks and flakes are eroding from the A/EB soil horizon. Trash pits appear to be present. Six rim and body sherds found on the bank are Madison Fabric Impressed pottery of the Late Woodland period. This appears to be the only component present and probably represents the age of the mounds as well. This site is eroding rapidly and should be examined by test excavations to determine its significance.

13JK107: This site was located in 1988 during a survey of the Green Island Wildlife Area (DNR) by Anderson and Green (1988). Lithic debitage was found on the surface of a sandy rise and in shovel-tests and a backhoe trench. The landform is an early to mid-Holocene, Maquoketa River terrace lacking a buried soil. The SMSU survey found an igneous cobble in a cultivated field across the road (i.e., west) of the original 13JK107. Nothing else was noted despite perfect surface conditions. There is no reason to assume a significant portion of the site extends west of the road. The site was determined to be non-significant in 1988, and no further investigation is recommended on the newly found section of the site.

13JK138: This site is located on the eastern point of a natural levee between Jackson and Golden Lakes. The site was identified by a chert thinning flake recovered from a soil core St7. The flake came from an AB2 horizon at a depth of approximately 140cm. The landform is a mid- to late Holocene Odessa sequence. Three negative shovel-tests were excavated to 1m depth to probe the topsoil on the levee. The site location is forested, and the

lake shoreline is not eroding. This site is undisturbed and requires no additional investigation.

13JK139: This newly recorded prehistoric site covers approximately 30x100m on two ridges at the south end of a cultivated field between Flat Lake and Western Pond. The site is situated on the eastern shore of Western Pond. A field road runs along the pond escarpment across the western side of the site. Material occurs as a light-moderately dense scatter of cobbles and broken rocks (less than 6), chert flakes and shatter. All 27 pieces of chert (shatter, primary interior flakes, thinning flakes) are locally derived Galena chert. One flake (Fig. 4.12) functioned as a hafted tool and has completely retouched edges, haft wear and use-wear rounding and polish on the edges and flake faces. Another has distal retouch (Fig. 4.12). One plain surface body sherd with crushed igneous rock temper probably belongs to the Late Woodland period. The site is on an early to mid-Holocene landform. Most of this late prehistoric site probably is in the plowzone, but subsurface features could exist. Testing to determine site significance is recommended.

13JK140: Another new site is situated at the north end of Western Pond in a cultivated field which borders the pond on its east side. The site consists of a light-moderately dense scatter covering 30x30m on a small ridge. This location is about 150m south of the turn in the field road. A collection made in standing corn produced 14 pieces of chert shatter, primary interior and thinning flakes as well as a polymorphic core and the mid-section of a medium sized corner-notched or expanding stem point. All of this material is the local Galena chert. One cobble also was noted in the field. This site is in the same condition as 13JK139 and should be tested to determine its potential significance.

13JK141: This is a new site located on a point on an L-shaped slough west of Flat Lake. The location is forested and frequented by hunter/campers. The landform is an early to mid-Holocene surface with a 1.5m escarpment along the slough. Two of nine shovel-tests produced a large interior flake (utilized) and a chunk of shatter, both being Galena chert. The material came from areas 10m from the point and the surface margin at 30-35cm depth (A/EB horizon contact). The slough bank is eroding gradually due to water level changes, and beavers are damaging the surface by tunnelling. However, these impacts are minor as are the effects of hunter/campers. As long as this potentially significant site remains in its natural setting, no additional archaeological work is recommended.

13JK149: This is a newly recorded Historic site is located just outside government property on the south side of the railroad track. The site is on the apex of a small alluvial fan on the south side of Upper Brown Lake. There are three structural features distinguished by limestone footings (burned red) and occasional bricks (Fig. 4.14). One 5x8m structure next to the

railroad track has a 3x4m extension and presumably was a residence. The second structure 26m south of the first has two rooms (about 4x6m, 6x6m), one of which is damaged by cutting a channel for a railroad culvert. A third feature between the other two is a depression with a few limestone rocks, presumably the privy.

13JK148: This site represents the former location of a late nineteenth and twentieth century farmstead. A house and outbuilding were still standing in 1953 when the U.S.G.S. Green Island Quadrangle was drawn. Today, the site consists of a half acre plot in grass and trees on the northeastern side of the intersection of the county gravel road and the D.N.R. "mud" road (the house place and yard) and a heavy scatter of material on a low rise in the cultivated field behind (northeast) the yard. The surface scatter is composed of limestone rocks and very few domestic items (crookery, glass, metal, farm animal bones) and probably represents the location of the outbuilding. No structural remains or unusual artifacts distinguish this site and make it potentially significant. It is not being impacted, and no additional investigation is recommended.

13JK150: This site was reported to the SMSU survey by DNR rangers at the Green Island office. They found prehistoric artifacts on a spoil pile after excavating several goose ponds on a point bar south of Fish Lake. The artifacts came from light brown sand (i.e., the B horizon). SMSU surveyors visited the goose ponds and located two pieces of chert shatter at the edge of the southwestern pond. The spoil piles were partially overgrown and devoid of material. The DNR collection includes 5 secondary bifaces (Fig. 4.15a-e), two small (2.5-4cm) side-notched points (Fig. 4.15f,h) and a flake, all made from galena chert. This material dates to the early Late Woodland period (A.D. 350-650). The landform at this location is an early to mid-Holocene Maquoketa River deposit lacking buried soil horizons. Material is in the topsoil and should be accessible from the surface (no PSA) and in shovel-tests. Because this site has been impacted, additional testing is recommended to evaluate the site.

13JK151: One chert flake fragment was located on an alluvial fan one-half mile west of Smith Creek. This location is a cultivated field on private property. Local collector, Roger Keil, has found "a few" points on this site, although he cannot distinguish these artifacts in his collection.

Green Island Find Spot 2: DNR rangers at the Green Island office found a Koster point base (Late Woodland period; Fig. 4.15g) south of the steel bridge on the "mud" road in section 18. SMSU surveyors did not see other cultural materials in the field or on the road in this vicinity.

South Crooked Slough to Lock and Dam 12 (river miles 551-556.7; Fig. 4.11)

This stretch of Mississippi River is relatively straight and flows through a 2-4mi wide valley. A high Woodfordian terrace fills the eastern half of the valley floor--now the Savanna Army Depot. Most of the remainder of the valley floor is floodplain (the Crooked Slough area) on the Illinois side--also the Savanna Army Depot. On the Iowa side the upper portion of the Green Island bottom extends into this reach, fronting on the Pleasant Creek valley. Farther north at Bellevue the Duck Creek and Mill Creek valleys open directly into the main channel of the Mississippi. The floors of Mill, Duck and Pleasant creek valleys are dominated by high Woodfordian terraces with inset Holocene sediments. Floodplain landforms in front of Pleasant Creek are Holocene sediments. The bottom containing Crooked Slough includes a complete array of low Woodfordian and Holocene age landforms, which are generally arrayed in strips with the youngest sediments closer to the main channel. PSA covers the late Holocene deposits (.5m thick) and all of the landscape adjacent to the main channel. At normal pool level the pre-settlement surface on late Holocene deposits is at least .5m above water.

Two survey methods were used in this reach. On the Iowa side the SMSU crew walked the shoreline from the Pleasant Creek boat ramp to Duck Creek (13JK93). The rest of this shoreline up to Bellevue, including the mid-channel island, was inspected by boat. The presumed locations of the William Dyas farmstead, Goldings woodyard and the Smith and Shoecraft sawmill are buried by PSA and levee fill. A majority of this shoreline has been modified for private homes or the railroad grade. On the Illinois side the crew boated up the lower three-quarters of Crooked Slough, checking cutbanks and walking open shoreline where possible. Extensive exposures of early to late Holocene sediments were examined along this slough. A small section of the low Woodfordian surface south of Beaty Creek also was surveyed on foot (i.e., shovel-testing and searching bare spots and a two-track road). Access to the Army Depot was denied following the initial reconnaissance.

13JK79: This site was extensively tested in 1985 (Johnson et al. 1985:27) and determined to contain significant information, making it potentially eligible for the National Register. Early through Late Woodland artifacts and faunal remains, some probably in pit features, were recovered from the northern end of the COE recreation area. Among the artifacts are 4 bear canines modified for suspension and 3 rim sherds. The latter belong to the Linn ware (Benn 1978) and the Pike or Baehr groups (e.g., Griffin 1952), not Madison ware and Foreman ware as attributed by the authors (Johnson et al. 1985:39, 46). The writer made a brief stop at the site. The northern shoreline continues to erode, although little intact culture deposit remains. Several flakes and a cord roughened body sherd (early Late Woodland) were found

on this cutbank. The rest of the site is protected beneath PSA and landfill. The site has been determined eligible for the National Register and should receive intensive excavation if more deposits are disturbed during development of the recreational facilities.

13JK93: Up to one meter of PSA covers the bank and Holocene surface at the location of this previously recorded site. Neither cultural material nor the pre-settlement surface was observed.

13JK137: This site was identified while searching for 13JK93. Most of site 13JK137 is on a low Woodfordian terrace on the south bank of the mouth of Duck Creek. The terrace has been landscaped and sowed in grass as part of Duck Creek park. Cultural material is in the topsoil, which has a reddish Bt horizon indicating a long period of development. A fragment of fish bone was found at the A/B horizon contact in the cutbank. Cultural remains also occur within a Holocene terrace inset (covered by .5m PSA) along Duck Creek, but this terrace is only a few meters wide. The 38 chert flakes and shatter fragments recovered from the site came from the shore lag along 50m of the terrace scarp. All of these items are made from Galena chert, and one is a blade flake. This river bank location is a favorite fishing spot, and the cutbank is breaking down fast due to foot traffic and wave erosion. The site appears to contain a dense artifact scatter and may have stratified deposits in the Holocene terrace inset. The site should be tested to determine its significance.

11Jd75: The site record (dated 1926) places this site on an island along the main channel in section 27. Ten conical mounds are supposed to be present. This is an unlikely location for mounds (in the low floodplain), and the genesis of the landform makes it even more unlikely. The mainland floodplain here is late Holocene in age and consists of seasonally inundated ridge-and-swale topography. The island where the site is recorded is even younger. Its lower end is a sand bar of historic age. This site may be mis-located in the site records.

11Jd182: This new site consists of a single platform core made from Galena chert. The item was recovered from the A/B2 horizon contact beneath .7-1m of PSA on the right bank of Crooked Slough. Slightly upstream a carbon sample from the Ab2 horizon in the same landform was radiocarbon dated at 1030 B.P. (Beta-28895). The location is floodplain forest, and the cutbank was heavily vegetated at the time of the survey. The cutbanks of Crooked Slough are steep and eroding gradually due to changing water levels and boat traffic. This location should be revisited to find more materials during a comprehensive survey of the properties within the Savanna Army Depot.

11Jd183: Six Galena chert flakes were located along 10m of a two-track road on the crest of the low Woodfordian terrace. One specimen is a blade flake. The site is directly above an

abandoned channel of Beaty Creek. This location is forested but once was cultivated. The soil profile consists of a 10cm A horizon over a sandy B horizon. Cultural material appears to be at the surface, and it is unlikely that cultural features are preserved in the sandy soil. Two shovel-tests placed on opposite sides of the road gave negative results. This site has little research potential and does not meet the criteria for NRHP eligibility.

11Jd184: This site is like the previous one, in this case 4 Galena flakes and fragments found along 30m of a two-track road. The location is on the crest (levee) of the low Woodfordian terrace between a backwater lake and an abandoned channel of Beaty Creek. The area is forested, and the soil is shallow and eroded at the surface. This site is not potentially eligible for the NRHP.

Crooked Slough Find Spot 1: A single piece of chert shatter (gravel?) was found with a deposit of clam shells on the right bank of Crooked Slough. This material was eroding from the PSA and therefore belongs to the Historic period.

Sites Outside Government Land

Most local collectors know the best spots for finding Indian artifacts in the Upper Mississippi River valley. They will direct you away from the floodplain (i.e., government property), because the prolific sites are on high terraces and the blufftops. Unfortunately, these locations are outside the project survey boundaries, so we must rely on the information in private collections to comprehend the prehistory of the area. A brief survey of material in private ownership and unpublished site records is presented in the following pages. This is by no means a comprehensive evaluation of any collection or all of the records. A thorough study of all that is available would require months of interviews, dozens of telephone calls and many miles of travel.

Sections describing the Iowa and Illinois sides of the river are compiled by different authors. The Iowa material is separated into three reaches: below Clinton, Sabula area, Pleasant Creek area. The Illinois information consists of an overview of sources with a focus on the Albany mounds and village sites. Projectile point types follow Morrow (1984).

The Iowa Side Below Clinton:

James Pilgrim (Clinton) and Bruce Filbrandt (RR Blue Grass) are the primary informants for this area. Their knowledge of the area left three impressions with this writer. First, the valley and bluffline below Princeton is loaded with archaeological sites, but the heyday of surface collecting happened before the

1980s. The "rich" sites were discovered during the post-World War II expansion of farming on the blufftops and when sites along the floodpool began to erode in the 1950s and 1960s. Recent extraordinary expansion of towns and private housing along the river has destroyed many collecting sites. Second, the mouth of the Wapsipinicon River is not known as a "good" collecting area. Rather, one must travel a few miles up that valley to locate many sites. Third, the Clinton area was overbuilt decades ago, and many collections obtained from this area have been disbursed after their owners died.

Filbrandt's knowledge of the project area extends from Princeton to well below Lock and Dam 14 (Fig. 4.5). He noted familiar collecting sites on the Woodfordian terraces and in small side valleys throughout this reach. Some of the riverside sites yield ceramics. Cultivated sites on the blufftops are more numerous and accessible, however. From the uplands above Lock and Dam 14, he has collected several Thebes points (Early Archaic period) and a number of finely-made adzes similar to the Dalton adze type (cf. Goodyear 1974). Farther up-river on the south side of LeClaire, he found the blade of a Folsom point made from dark gray chert (Fig. 4.16). This is site 13ST92 situated at the headwall of a small valley. Many items in Filbrandt's collection come from the Parson Estate (13ST90) between Princeton and LeClaire. The conjunction of small valleys at this spot creates a broad opening of alluvial fans and Woodfordian terraces. There is a mound on the back of one terrace, and Filbrandt has found full and three-quarter grooved axes and late Paleo-Indian points in addition to many other projectile point types on this site. Much of the Parson site has been over-built by housing and a golf course. Filbrandt also collected material from the uplands and the high strath terrace north of Princeton (see Orr 1935:II pg. 77).

In 1944 a large mound (no site number) on the high terrace at Princeton (see reference in Orr 1935:II pg. 77) was salvaged by the Davenport Museum (6 Oct. 1944 letter from John H. Bailey, Director, to Charles Keyes in the Keyes' Collection, Iowa State Historical Department-Iowa City). Bailey's letter describes a potted mound with a layer of limestone slabs and piles of human bones. Associated with the slab layer was a brown jasper (probably Knife River Flint) leaf-shaped spear and two charred corn cobs. Apparently, his excavation penetrated a midden below the mound fill, because points, hammerstones, scrapers and two more cobs were found.

James Pilgrim found a cache of 26 primary bifaces in the bottom west of Camanche (13CN11; Fig. 4.6). Part of the cache was plowed to the surface, and he excavated the rest. The bifaces are ovate and made from local white chert from a Mississippian formation. The location of the cache appears to be an early to mid-Holocene age surface.

The Paul Sagers collection at Maquoketa, Iowa, contains a shell tempered vessel (approx. 13in diameter) dredged from the Mississippi River bottom at Clinton. Sagers' letter to Keyes (26 Aug. 1940; Keyes Collection, Iowa State Historical Department-Iowa City) indicates the vessel came from the area where a wing dam was built. This locational reference is too vague to pinpoint, but Pilgrim and others state that a "Mississippian" site once was situated on the north end of Fulton, Illinois. Sites 11WT12 (a village) and 11WT50 (a mound) have been recorded in this vicinity.

The Iowa Side Below Sabula:

From the Eagle Point mound group (13CN10) in north Clinton to Sabula, Iowa (Figs. 4.7-4.9), there are seven recorded mound groups. This is a denser array of mound sites than the reach below Clinton, where there are only three (in a longer stretch of river). The higher density of mounds is partly due to the activities of Ellison Orr, who surveyed intensively north of Clinton. However, the bluffline above Clinton is steeper and more prominent from the valley below Clinton, and after all mounds tend to be placed on the most prominent locations. I suspect that the density of mounds along the river above Clinton, and perhaps all the way to the Iowa state line, is significantly high.

The Sabula area is well known to two local collectors, David Horst (Camanche) and Orville Martinson (Clinton). The earlier Martinson collection comes from a wide area and is not accessioned, while Horst is currently collecting and can locate most of his finds.

Martinson has significant materials from three locations. The Cook farm on the bluff at Waneta Point (13CN8; Fig. 4.9) was visited by Orr (1935:III pg. 186), who recorded the presence of 4 linear and one conical mounds. Martinson has collected a St. Charles and a Dalton point (Early Archaic period) from this area, and he has a flanged drill (Osceola, late Middle Archaic period) and a socketed copper point (Late Archaic period) from the same place. The most interesting aspect of the Cook farm is its scrapers and bifaces. Martinson has gathered dozens (i.e., several frames and small boxes) of end scrapers, mostly heavy bodied tools with flanged or spurred bits (Fig. 4.17). Also, there is a frame of relatively small, finely chipped end scrapers. In addition, the 13CN8 collection includes more than a dozen primary and secondary, medium-sized bifaces, many of which appear to have been utilized as adzes. Another Martinson site was situated on the Sabula island (Fig. 4.9). This was the Creamery village (13JK146), an Oneota site also identified by William B. Nickerson (Epworth, Iowa) as an "lower Mississippian type" in a letter to Keyes (5 June 1923; Keyes Collection, Iowa State Historical Department-Iowa City). Martinson's grandfather discovered the pieces of an Oneota vessel and a Mill Creek chert

hoe (Fig. 4.18) while excavating a ditch ca. 1920s. Vessel fragments appear to be Burlington-Moingona phase Oneota of southeastern Iowa rather than the Orr phase of northeastern Iowa.

The third site where Martinson has collected a great deal of material is the Horst farm (13JK147), which is actually a grouping of habitation sites around spring branches within the valley embayment opposite Sabula (Fig. 4.9). His framed collection includes many long, narrow lanceolate and stemmed point forms of both Late Paleo-Indian/Early Archaic types (e.g., Maynes Creek, Dalton/Meserve, Lehigh) and Late Archaic types (e.g., Nebo Hill, Sedalia). There are also Little Sioux points (Early Archaic period) and one Osceola point. The Late Archaic period is represented by many varieties of stemmed points (e.g., Poag, Tipton, Table Rock, Durst, Atalissa, Etley). Early Woodland types are present in large numbers (e.g., Robbins, Kramer, Dickson/Waubesa, Adena), but there are relatively few Middle Woodland Snyder and Steuben points. One of the largest components in Martinson's collection are Koster, triangular and small notched points of the Late Woodland and Mississippian periods. He also has full and three-quarter grooved axes, but these are round and not carefully sculpted, fluted or double-grooved (e.g., Keokuk type). Conspicuously lacking from the Martinson collection are bannerstones and many Middle Archaic period side-notched point types (e.g., Matanzas, Godar, Raddatz).

David Horst has a growing collection from 13JK147 (Figs. 4.19-4.24) with most of the same types described above for the Martinson collection. Of particular interest are the Hardaway-like (Fig. 4.19b), "fish-tail" point (Fig. 4.19c) and Cache River-like point (Fig. 4.20) of the late Paleo-Indian and Early Archaic periods. Horst has many stemmed points (Figs. 4.19, 4.21) which almost defy classification because of the variety of forms. His collection of Snyder and Adena (Figs. 4.20, 4.22) points is larger than Martinson's. The writer perused lithic types in Horst's collection and noted a Gibson point made from Warsaw tabular, Hixton quartzite made into two Late Paleo-Indian lanceolate points and two stemmed (Early Woodland period) points made from Moline chert. Site 13JK147 also has yielded a small collection of ceramics from the stream bank, including: one Fettle-like, 2 Spring Hollow Plain (one Weaver-like bold, notched decoration), one Lane Farm rocker stamped vessel body, 2 castellated Canton/Minotts rims, 3 Madison Fabric Impressed sherds and one shell tempered (Oneota) body sherd.

Horst also found a Clovis point (Fig. 4.25) made on a blade flake of white chert at hilltop site 13JK144. He also collects many Madison points and chert primary and secondary bifaces (preforms) from 13JK143, a site on the Savanna terrace at the mouth of Beaver creek (Fig. 4.9). A broken pendant of green pipestone from near Sterling, Illinois also came from this site. The Horst collection does not contain many side-notched point forms typical of the Middle Archaic period, nor does he have

bannerstones. The axes he has found are simple, not elaborate forms.

The Iowa Side Below Bellevue:

Between Sabula and Bellevue there are seven recorded mound groups, a high density. There are also many habitation sites tucked into the valley openings in the high bluffs. For more than a century this area has been known for its prolific sites, and many collectors roam the region. Many artifacts obtained in the early twentieth century have been disbursed, although at least one well known collection (Ardo Keil) is still owned by the family. The Keyes collection in the Iowa State Historical Department-Iowa City contains much correspondence with collectors in the Bellevue area concerning specific artifact finds and major sites.

This writer viewed a private collection from a farmyard at site 13JK142 (Fig. 4.10) in the Wapsipinicon valley. The site is on a Savanna terrace and inset Holocene valley fill on the Pataska farm. The collection is useful because it is attributable to one location, which is not the case with hobbyist relic collectors. Lithic material in the collection is locally derived, except one item of Hixton quartzite. The point types include: one late Paleo-Indian lanceolate, 2 Late Archaic stemmed points, 2 Kramer points, several Pelican Lake and Steuben types (Middle Woodland period) and 2 Late Woodland Koster points. The owner also has a marine shell disk bead from his property.

The next valley north of the Wapsipinicon is Pleasant Creek (Fig. 4.11). There can be no doubt that this was an important location in the prehistoric era, judging from the time range and variety of artifacts that have come from this valley. Only four of many sites in this valley have been recorded. Ardo Keil (deceased) obtained much of his huge collection from this valley during the first half of the twentieth century. He kept poor provenience records, which probably cannot be deciphered today, and he obtained many artifacts and smaller collections through local and regional acquaintances. For instance, there are many obsidian and Cobden chert pieces as well as a number of very large, finely made bifaces that are of dubious local origin. Notable portions of the collection include a Folsom point made from local white chert and a Scottsbluff point made from Hixton quartzite. The Middle Archaic period is represented by several Osceola points, grooved axes and hematite axes. There are enough large, whole Osceola points and finely made axes to suggest grave artifacts could have been plowed out of the valley. Several Middle Woodland point forms are made on Moline chert. The collection has many triangular and flake points of the Late Woodland and Mississippian periods, and pottery sherds (of uncertain origin) include Black Sand Incised, Sister Creeks Punctate, Naples Stamped, cord and fabric impressed wares and Oneota ceramics.

Roger Keil, son of Ardo Keil, has a personal collection from the terraces fronting the floodplain in Pleasant Creek valley. Most of this material is from 13JK91. While not catalogued, the items have a more certain derivation than Ardo Keil's collection. Roger Keil has collected enough Osceola points and a drill (Fig. 4.26) to indicate the presence of a substantial component. He has found a small number of round, full and three-quarter grooved axes. There are few Early to Middle Archaic point types (Fig. 4.27 bottom row) but many Late Archaic stemmed types (Fig. 4.27 middle row). Early Woodland through Late Woodland and Mississippian periods are represented by corner notched and triangular forms (Figs. 4.27 top row, 4.28). Pottery sherds from 13JK91 include Black Sand Incised, Spring Hollow Plain and Cordmarked, Levsen Stamped, Lane Farm Cord Impressed, Madison Fabric Impressed and one shell tempered (Oneota) rim (Fig. 4.29).

Burial mound site 13JK17 on the Savanna terrace edge in Pleasant Creek valley was partially excavated by Ellison Orr (1935:III pgs. 17-41). Two excavated mounds (#2,3) produced interesting Hopewellian materials, which were mentioned again in a somewhat garbled account by Johnson et al. (1985:32). A total of 14 mounds once existed: 2 large ones (9-12ft high), 3 smaller mounds (3.5ft high) and two more rows of 4 and 5 obscure mounds. Oral traditions related by Orr said that an early French settler was buried in mound #2 and that glass trade beads had been found on the surface of the field. Both mounds contained several bundle burials and basal layers of clam shells. Mound #2 had been potted before Orr arrived, yielding more than 70 copper beads. In this mound Orr discovered a layer of purple clay (swamp muck), 7 very fine ovate secondary bifaces (Fig. 4.30) and a cache of 5 flat, stream-rounded rocks (Fig. 4.31). The artifacts are stored in the Iowa State Historical Department-Iowa City. Only 6 bifaces are in the collection. They are thin, biplano Snyders point preforms made from Cobden chert. Pottery in the collection from the mound fill includes one Sister Creeks Punctate rim and a plain surfaced sherd of a coarse ware that resembles Fettle Incised but is decorated with blocks of incised lines. Three other sherds of a finer ware have crushed rock temper (2 appear to be limestone), plain surfaces and fine, incised lines in geometric patterns. One of these rims has a bold interior channel and a round lip with a trailed line decoration. The 3 rims have characteristics of Hopewell and Baehr wares, although none exhibit combinations of classic design and a fine ware indicative of trade vessels from the southern direction.

In conjunction with Orr's reference to the French settler buried in mound #2 and the trade beads at the Pleasant Creek mound group, Roger Keil's collection includes a "point" cut from heavy ferrous metal and a silver single arm cross (Fig. 4.32). The "point" came from the northern end of 13JK79 and is designed like other early Historic artifacts fashioned from recycled European trade materials. The point tang is bent as if damaged. The cross has a single arm with scalloped ends. Three florets

are engraved on each arm. It has a round base and scalloped top, which has two perforations. The vertical element is decorated on both faces by a wavy vine, and a script "RC" appears at the intersection of the arms on one side. Kell's father found the crucifix while plowing the lower terrace across Highway 52 (west side) from Roger Kell's present house. Budd Hansen (Moline) identifies the cross as the type made between 1767-1809 by Robert Cruickshank of Montreal, Quebec. These crosses were manufactured for the Indian trade and appear most often on Sauk and Fox sites and throughout the territory of those tribes in the Upper Mississippi basin.

Archaeological Prehistory on the Illinois Side
by Lawrence Conrad

With the exception of two very rich and archeologically important areas -- Albany and Thompson -- and to a lesser extent the lower reaches of the Plum River at Savanna, amateur and collector activity in the area does not seem to be very intense. The factors accounting for this situation include: the richness of these three loci; the drowning of so much of the bottomlands which brought the river almost to the bluff in some areas; and the richness of the archeology of the tributary river valleys such as those of the Rock and Apple rivers.

As part of the current project Ferrell Anderson, Budd Hansen and James Pilgrim were interviewed again. While they had few additional sites to report, they provided names of amateurs and collectors who did provide additional sites and names. Some of the leads have yet to be followed up, but thus far the project has benefitted from the help and cooperation of the following people: Joe Daniels, Savanna, Illinois; Bruce Filbrandt, Bluegrass, Iowa; Charles Leavens, Clinton, Iowa; Melvin Olson, Hanover, Illinois; Allan Verbecke, Hillsdale, Illinois; and Mark Ware, Hanover, Illinois.

Drawing upon data gathered by the aforementioned projects and from work in adjacent regions a sketch of the prehistory of the Illinois side of Pools 13 and 14 is possible. Much work remains to be done before we will approach its potential for contributing to our understanding of upper Midwest prehistory.

Late Paleo-Indian (11,500 to 10,000 B.P.): Though this project gathered no data on the late Pleistocene human utilization of the lowlands, there is no reason to doubt the bottoms utilized during that period. Fluted points (11,500 to 10,500 B.P.) are fairly common in the uplands in the vicinity (see Bennett 1945:Plate 20) and there is every reason to believe their makers hunted in the swamps and along the river. Very little if any surface contemporary with these hunters is available in the bottoms (see Benn et al. 1988:137-138 for a discussion of the situation in pools 17 and 18), and there is no reason to expect unburied

fluted points to be discovered there. Exactly the same can be said for the terminal Pleistocene Agate Basin points (10,500 - 10,000 B.P.). They are reported from the uplands in the Portage, Illinois area (Bennett 1945; Plate 12d,e) are yet to be reported in the lowlands.

Dalton (10,000 - 9300 B.P.): The situation is slightly different for the Dalton material. It is possible the point reported by Bennett (1945:13-15) as having been excavated by Nickerson from a buried loess deposit in or below the Galena River fan was a Dalton point (see Bennett 1945:Figure 2). Dalton points are relatively common on the terraces of the lower Rock River (Anderson 1989). Again, Dalton points have not been reported on the lowlands of Pools 13 and 14 because the surfaces on which they would have been deposited are buried (or at least inundated), but it is very likely they will be found on the terraces as well as the bluff tops.

Early Archaic (9300 - 8500 B.P.): Again we have no definite Early Archaic material from the lowlands, but it is common in the uplands (see Bennett 1945: Plate 12a-c, f-h). The Western Illinois University (WIU) collections include a Scottsbluff point of Hixton quartzite from a high Woodfordian terrace on the river front at Hampton just below Lock and Dam 14. It is probable points of this age would be found in quantity if the lower terraces were searched for them.

Middle-Late Archaic (8500 - 2500 B.P.): The Atlantic climatic episode in western Illinois is characterized by a gradual decrease in precipitation and elevation in temperature until approximately 7,000 B.P. when conditions began ameliorating. The intensification and amelioration of these conditions were time transgressive, moving from west to east. By ca. 5500 B.P. conditions were probably very similar to those of today. Judging from the material from the Koster site in the lower Illinois Valley (photos on file at the WIU Archeological Research Lab) and the stratified sites in the Tennessee Valley (Chapman 1975) one would expect bifurcated based points, followed by short, broadly corner notched points, then broadly and still later boldly side notched points. The assemblage containing a small proportion of these points probably became dominated by Matanzas points around 5500 B.P.

No bifurcated base points are known from the region, but they would be expected. The side and corner notched points would be difficult to recognize on a multicomponent site, but they are present. There is no such point as a Black Sand point and no reason to believe there was a Black Sand component on the site. Large side notched points were observed in the Joe Daniels collection from the lower Plum River and now drowned sites near its mouth, and from 11Ri552 at Camp Hauberg Boy Scout Camp on the present river bank at Port Byron. Some of the boldly side notched points might date from the time of the Osceola site in Grant County, Wisconsin. Elsewhere (Conrad 1981:125-130) it has

been suggested Osceola points probably date between 4950 and 4250 B.P. Benn (ed. 1987:20-21) reported dates of 4140+/-110 and 4270+/-90 B.P. for a level dominated by Osceola and Godar/Raddatz points at Sand Run Slough in Louisa County, Iowa. Mr. Melvin Olson reported a single Table Rock point from site 11Jd185 on a river terrace approximately 630 feet above sea level. The points labeled h-aa in Figure 11 from 11Jd31, approximately 4 miles up the Plum River from Savanna (Gregg 1975) are probably all from this period.

Early Woodland (2500-2200 B.P.): The Marion Culture characterized by the presence of Marion ceramics and Kramer points is not in evidence from the survey area proper, though the area is within the range of the culture (Munson 1966). Marion pottery is found in northeast Iowa (Logan 1958:142), and Kramer points are reported from Milan, Illinois (Markman 1986). There is one Kramer point in the WIU collections from Hampton. Marion culture material is to be expected on the lowest terrace above the current river level.

Black Sand pottery is reported from the Albany site (Herald 1971:Plate 43a,b) and was observed from collections from other sites in the immediate vicinity. Esarey and Carlson (1983:33-35) report Spring Hollow Incised, now termed Prairie ware (Stoltman 1986:123) from their tests at the Thompson Causeway site (11Ca11). This pottery is equivalent to Black Sand pottery. Black Sand pottery is also reported from 11Ca18 on what is now an island in the drowned landscape south of the Plum River (Benchley and Gregg 1975b). Designation of sites as Black Sand on the basis of boldly side notched points or grooved axes is occasionally encountered in the literature for the region, but neither of these artifacts is characteristic of Black Sand. It is probable there are many more Black Sand/Prairie Phase sites on the low terraces of the study region.

Middle Woodland (2200 - 1600 B.P.): Despite over a century of research in the area the extant literature still does not reflect the fact that the Albany mounds and Thomson area sites are among the richest and most important sites in the state. Budd Hansen owns a portion of the Albany site and has been engaged in controlled intermittent excavations there for a number of years. These excavations have yielded vast quantities of artifactual and ecological materials. Perhaps the most striking observation made during the brief perusal of the collection is that he has excavated several obsidian cobbles with intact cortex. These cobbles would not be satisfactory for the production of large Ross blades, but they would be quite suitable for the production of the flake blades and small points which characterize the Illinois assemblages. Other interaction Sphere material from the site includes galena, copper, pipestone, Knife River flint, Cobden chert, meteoritic iron, mica, marine shell, quartz crystals (?), panpipes and figurines (Herald 1971 and observations of the Hansen and Pilgrim collections). Another interesting aspect of the collection is the presence of large

numbers of what Hansen convincingly argues are pipe drills. If this hypothesis is supported by the presence of unfinished pipes and scraps it would suggest Albany was an important pipe manufacturing center. The impression one gets from looking at the ceramics in Hansen's collection is that they are generally late Middle Woodland with a mixture of Weaver, Havana, poorly made Hopewell and Baehr material.

The Middle Woodland materials gathered from the shallows and beaches at Thomson are fewer in number but also reflect intensive participation in the Hopewellian Interaction Sphere. The site (11Ca117) consists of a habitation area of undetermined size, part of which has been inundated, and at least one mound. There have been several assessments of the site which have determined it to have been occupied from Early Woodland through late Middle Woodland times (Esarey and Carlson 1983), but they do not seem to have revealed the intensity of the inhabitants' participation in Middle Woodland exchange.

Before the COE made it clear that such activities were illegal and would not be tolerated, the collecting of artifacts from the beaches and shallows at the Thomson sites was a common activity. Materials reportedly collected before the crackdown include a variety of Middle and Late Woodland sherds, Snyders points of Cobden Chert, a reported Gibson point of Knife River flint, single copper awls, celts, knives, copper scrap, a red platform pipe, black obsidian bladelettes, a small obsidian point and microdrills on blades. Again, it should be emphasized that the literature does not reflect the significance of these sites. They must be given considerably more consideration than they have been given in any consideration of Middle Woodland in the Upper Mississippi Valley. Representative samples should be gathered from the beaches and shallows at Thomson and materials in the Hansen collection should be studied and published.

Late Woodland (1600 - ca. 950 B.P.): There is considerable diversity in the Late Woodland ceramics reported from the study region. The earliest Late Woodland material is the late Weaver ware from Albany (though Weaver ware was also probably dominant before the end of the Middle Woodland period; Benchley et al. 1977). Surprisingly little data is available on other Late Woodland manifestations in the region, but there is little doubt several other phases will ultimately be recognized. Effigy mounds are found immediately north of the survey area. The exact time span of these enigmatic mounds is still debated, but they certainly were being built as late as 950 B.P. Madison Cord Impressed ceramics, which are often associated with mounds, are represented in the Pilgrim collection from Albany and have been reported from at least one habitation site on the lower Plum River (Gregg 1975:Figure 9). Further survey and work with private collections will doubtless greatly expand the number of sites with Late Woodland manifestations.

Middle Mississippian/Oneota: The most important Mississippian site in the survey tract is the old Savannah Proving Ground (Army Depot) site located on sandy terraces along the banks of the Apple River. Bennett (1945:150) describes the site thus: "...like the Chapman site, the occupation seems to have been little more than a campsite with a limited area and with debris confined to a few concentrated spots." Since the Chapman site is actually a large, dense village, it is impossible to evaluate the Savannah site from this description. During recent discussions (July 1989), Thomas Emerson indicated the sherds from the site illustrated by Bennett (1945:Plates 27-29) could be interpreted as a mixed Oneota/Middle Mississippian assemblage, Oneota influenced Middle Mississippian, Middle Mississippian transitional to Oneota, or simply as late Middle Mississippian. Only further work at the site will provide an answer. There are other sites, including Albany (Benchley et al. 1977:39), which produce shell tempered sherds, but nothing more can be said about them at this time.

Landscape Evolution & Site Distributions

The changes in the landscapes within a fluvial system occur independent of the activities of prehistoric human beings. This means there are two different sets of criteria which affect the distribution and preservation of archaeological materials in a river valley. One of the sets is natural formation processes (e.g., climate, fluvial processes, soil profile development) affecting archaeological deposits to modify their original character or to destroy the site. Since most natural systems are independent of humans, natural formation processes take priority in any analysis of site distributions. The other set of criteria consists of the choices people make about utilizing the landscape, i.e., where people live and how they choose to exploit the environment to produce what they need. The choices people make are cultural patterns.

We are interested ultimately in culture patterning (see next section of this chapter), but biases in site distributions due to natural formation processes must be cleared first. In the study of Pools 17-18 (Benn, Bettis and Vogel 1988:128) we went into considerable detail about differential site distributions, going as far as estimating the areal extent of ancient landscapes and potential numbers of sites destroyed by movements of the Mississippi River. That kind of detailed analysis cannot be developed for Pools 13-14, at least in terms of potential numbers of destroyed sites, because the sample of recorded sites in the floodplain is much smaller than the sample for Pools 17-18. The general sequencing of episodes of fluvial activity and surface development are essentially alike in Pools 17-18 and 13-14.

Late Pleistocene-Middle Holocene (18,000-5000 B.P.)

These were times of enormous landscape changes in the Upper Mississippi basin. By ca. 18,000 B.P. the river assumed its present position by cutting through the Port Byron gorge (Fig. 4.33). Between 18,000 and 12,000 B.P. episodes of alluviation followed by downcutting and floods formed thick sand and gravel deposits across the entire valley floor. Today, these Woodfordian age terraces dominate the valley, perching above Holocene surfaces and seasonal inundations (Fig. 4.34). These terraces have been removed from constricted valley reaches by lateral stream erosion during the Holocene period but are preserved where the main valley widens. There is no evidence in Pools 13-14 of human occupation on the Woodfordian terraces during the early Paleo-Indian period (i.e., before ca. 11,500 B.P.)--the period when downcutting still would have been removing large sections of the sandy terraces. Human evidence of this age does exist on the sandy terraces in Pools 17-18, and a thorough search of private collections in the Pools 13-14 area probably would turn up appropriate evidence.

Landscapes contemporary with late Paleo-Indian occupations (ca. 11,500-9500 B.P.) consisted of high, sandy terraces surrounded by wide paleochannels with low, sandy islands. Today, some uneroded portions of the late Pleistocene floodplain are buried beneath Holocene sediments, although little evidence of this was seen during the 1988-89 survey. The best areas to search for buried, late Paleo-Indian sites are in the paleochannels east and west of Thomson and in the Meredosia Slough vicinity beneath large alluvial fans. Higher late Pleistocene terrace surfaces have experienced dessication, drought and surficial eolian reworking probably during the early to mid-Holocene.

The early and middle Holocene period (ca. 9500-5000 B.P.) was a time when large volumes of fine grained sediment filled the valley floor. The river entrenched in a 1-4mi wide floodplain between the bluffs and Woodfordian terraces and deposited a thick, uniform deposit of sandy substratum and sandy loam topsoil. Large alluvial fans also formed at this time. The early-middle Holocene surface covers areas abutting many late Woodfordian/early Holocene terraces, particularly at the mouths of major tributaries and in the wide valleys of the Bellevue/Crooked Slough, Green Island and Savanna/Sabuia study areas. Farther south in Beaver Slough this surface has a thick topsoil with a clay-enriched B horizon (Fig. 4.35) and is rarely overlain by PSA. Sections of the early to mid-Holocene have been destroyed by subsequent river meandering (e.g., at the mouth of the Wapsipinicon River).

According to the Pools 13-14 survey results, major sites occur on alluvial fans. Archaeological sites are not especially common on the early-middle Holocene surfaces, nor are there large habitation sites. Of course, we do not know the site density on

the large expanse of terraces north of Lock and Dam 13, since this area is drowned and unavailable for survey. Most of the habitation sites and mound groups familiar to collectors and archaeologists are situated on the Woodfordian terrace and in sidevalleys, both of which tend to be adjacent to backwater sloughs. From this preliminary information about site densities, we would predict that significant numbers of sites have not been destroyed as the early-middle Holocene terrace was removed by river erosion. A different conclusion was reached for Pool 17 (the Odessa transect; Benn, Bettis and Vogel 1988:131), where 5-20% of Archaic sites may have been destroyed.

The last major vegetation change occurred during the middle Holocene period. In Pools 17-18, prairie began to invade portions of the valley floor after ca. 7500 B.P. (Benn, Bettis and Vogel 1988:131). We assume a similar process happened in Pools 13-14 because the pre-settlement vegetation pattern included large expanses of prairie. The vegetation pattern in the early Historic period (Fig. 4.36) shows the major Woodfordian terraces and locations of concentrations of Archaic and Woodland habitation (e.g., Savanna Depot and Thomson areas) as being covered by prairies. Actually, a mosaic pattern of prairie and forest is a more accurate statement for the area's vegetation. The relationship between prairie and site distributions seen in Pools 17-18 holds for Pools 13-14 as well: sites situated within the prairie were chosen because they were close to backwater lakes.

Late Holocene (ca. 5000-100 B.P.)

The sedimentary record in the Mississippi meanderbelt for the last 5000 years is one of gradual lateral movement of the river channel and renewed floodplain aggradation. Some reaches of wide valley were apparently more stable than others, while constricted valley reaches showed a higher degree of lateral channel movement as well as reworking by yazoo channels. Multiple soil weathering zones (Odessa sequence) and cut/fill episodes are observed in Late Holocene landscapes. The SMSU survey located few sites in Late Holocene sediments--too few to formulate patterns of site distributions and preservation. Our impression is that very few prehistoric sites have been destroyed by movements of the Mississippi channel, since few sites are located adjacent to the main channel. Likewise, no evidence was found for sites being destroyed by lateral migration of major tributaries like the Wapsipinicon, Maquoketa, Appie and Plum rivers. Sites found in Late Holocene sediments are small, temporary occupations. Enough of these sites remain intact to provide an adequate sample for archaeological investigation and permanent preservation.

Historic Period (100 B.P.-Present)

The last 100 years on the Upper Mississippi River has been a period of instituting controls on the fluvial system to promote navigation. Wing dams, levees, dredging and locks have changed the flow of water so that the floodplain has been aggrading while river banks have been eroding. This has led to a complete modification of floodplain surfaces entailing bare cutbanks and land surfaces covered with PSA or water. One of the best visual records of changes in PSA and water levels is tree roots (Fig. 4.37) which record the level of the ground surface during the growth cycle of the tree and remain for several decades as stumps after the death of the plant. The oldest tree stumps record the pre-settlement land surface throughout Pools 13-14. When these stumps lie at or below the water level, as they do in nearly 70% of both pools, and when stumps are buried by 1-2m of PSA, the archaeologist knows an effective survey is precluded. The conditions of artificially ponded water and aggradation are why Historic period sites are so difficult to locate in Pools 13-14. Virtually every instance of an Historic site found through the archives search could not be confirmed by field investigation because the land surface had changed.

Prehistoric Cultural Overview

A reconstruction of some characteristics of the prehistoric culture periods in the project area is presented in the following pages. There are not many diagnostic artifacts or recorded sites on which to base this reconstruction, so the analysis will be brief--certainly not the kind of detailed analysis we would need to go beyond previous overviews (e.g., Billeck and Benchley 1982). Frequent reference is made to cultural patterns discovered downriver in Pools 17-18 (Benn, Bettis and Vogel 1988:136), since the overview for that area was more comprehensive having been based on larger numbers of sites and more diagnostic artifacts. By building on the previous overview, we may test hypotheses defined in the earlier work as well as extend certain cultural patterns farther up the Mississippi River valley.

Paleo-Indian/Dalton Period

There is no settlement pattern known for this period, only find spots where local collectors have discovered projectile points. The same situation occurred in Pools 17-18. The point types, however, cover the entire time span of the period. This means we should anticipate a Paleo-Indian tradition (ca. 12,500-9500 B.P.) was entrenched along the Upper Mississippi River valley rather than assuming isolated point finds represent only temporary visits to the area. Sites belonging to this period include a Clovis point from 13JK144, a Folsom point at 13ST92, late Paleo-Indian lanceolate points from 13ST90 and

possibly from 13CN61, and a Dalton point from 13CN8 (Fig. 4.38). All but one of these sites are on the uplands or in small sidevalleys. Site 13CN61 is on a Woodfordian terrace on the valley floor, but the identification of this point fragment is tentative.

In Pools 17-18 several Paleo-Indian sites were recorded on Woodfordian terraces on the valley floor. More such sites might be present in Pools 13-14, particularly on the terrace complex south of Savanna, Illinois (e.g., at Thomson), and one would have to search out private collections to verify this presumption. The other potential location for late Paleo-Indian evidence is on the late Pleistocene "surface" beneath the mantle of Holocene fan and colluvial sediments on the valley floor. Radiocarbon dates from this project (see Chapter II) demonstrated sediments of this age exist, especially beneath alluvial fans and paleochannels. This "surface" is the product of several episodes of downcutting and alluviation, thus it is complex and difficult to tract. In addition, Pleistocene surfaces are under the water table in most places. The largest expanse of paleochannel area dating to the end of the Pleistocene is under the permanent pool north of Lock and Dam 13.

Archaic Periods

The same depositional context existed in the Pools 17-18 and 13-14 study areas. Aggradation commenced on the valley floor at the beginning of the Archaic periods (ca. 9500 B.P.) and continued to the end of the Hypsithermal episode (after ca. 5500 B.P.). Massive alluvial fans formed along the valley margins, and sediment accumulated throughout the floodplain forming the early to mid-Holocene age surface of today. Since only one Late Archaic site was found in the floodplain of Pools 13-14, we know nothing about Archaic settlement patterns. In Pools 17-18 late Middle Archaic sites were located on the floodplain. This indicates the environment containing floodplain forest and sloughs were exploited by Archaic peoples.

One Early Archaic period (9500-8000 B.P.) site (13CN8) in the project area has yielded a St. Charles point. This site is on a blufftop. A more extensive review of private collection from the Illinois side (i.e., the Thomson area) probably would reveal additional sites. Private collections from the Pools 17-18 area seemed to contain large numbers of Hardin Barbed, Thebes and St. Charles points not seen frequently in the Pools 13-14 area north of Clinton.

Most of the Archaic sites shown in Figure 4.38 belong to the Middle (ca. 8000-4500) and Late (4500-2500 B.P.) Archaic periods. Except for the Late Archaic lanceolate point from 11RI550 and stemmed points from 13JK91 and 13JK142, the sites are not even relatively dated. As was in the case in Pools 17-18, the number of Middle and Late Archaic sites increases over previous periods,

suggesting either a more dense population or heavier exploitation of the valley floor. Also paralleling a finding from the earlier study, the big Archaic sites in Pools 13-14 are concentrated on high terraces (Woodfordian) adjacent to backwater lakes and sloughs. High potential areas for sites include high terraces at the mouth of the Apple River, on the valley floor south of Savanna to Fulton and around the Meredosia Slough. Most of the high terraces became prairie habitats during the Middle Archaic period (Fig. 4.38).

In the course of reviewing private collections from the Iowa side, I noticed that the complex of side notched points (Godar, Matanzas, Raddatz) typical of Middle Archaic assemblages farther south seemed to be infrequent or missing in the areas north of Clinton. Finely shaped axes, plummets, hematite and bannerstones also are rare or absent. This may reflect a cultural phenomenon, not a collectors' bias, since these objects are highly prized in the private markets. I suggest the northern end of the project area could have been in a different cultural zone than the southern end up to ca. 4500 B.P. Elsewhere (Benn, Bettis and Vogel 1988:145-6), I have argued that finely-made artifacts and items fashioned from exotic materials represent extra labor (surplus-value) expended to satisfy social obligations (debts; cf. Bender 1985). By ca. 4500 B.P. the entire project area was involved with the cultural tradition distinguished by the Osceola point style. The same tradition occurs in Pools 17-18 (Ibid.; Benn ed. 1987) and in southwestern Wisconsin (Overstreet 1984).

The Late Archaic period (ca. 4500-2500 B.P.) is well represented by point types in private collections. Many varieties of stemmed points typical of the period after ca. 3500 B.P. are especially prevalent, and the preceding horizon of Titterington-like materials (lanceolate points; Cook 1976) also occurs in Pools 13-14. These preliminary indications suggest there were strong cultural relationships among Late Archaic peoples of the Mississippi valley along the entire border of eastern Iowa.

Early Woodland Period

Private collections include many stemmed points of the Kramer, Dickson/Waubesa and Robbins types but little incised-over-cord roughened pottery except from 11Ca11 at Thomson. Therefore, we cannot determine the content and classificatory affiliation of the Early Woodland components in the project area, i.e., whether Black Sand or Prairie phase (cf. Munson 1982; Stoltman 1986) is the appropriate designation. Many Early Woodland components were found in the Pools 17-18 area, even some components buried in the Odessa sedimentary/soil sequence. The buried sites were on river levees and slough banks. Strangely, no Early Woodland sites are identified in the floodplain in Pools 13-14, although some lithic scatters are in a stratigraphic position on levees that could qualify them as

potential sites of this age. The absence of Early Woodland sites probably is a survey bias, i.e., the "luck" of finding pottery sherds.

Middle Woodland Period

There was a substantial occupation in the project area (but outside government property) during the Middle Woodland period (ca. 2200-1600 B.P.). Many of these remains have been excavated and reported, but the cultural manifestation as a whole has not been analyzed. In particular, there has not been a compilation of all mound sites and habitations with Middle Woodland artifacts. Therefore, the overall settlement pattern cannot be related to the largest Havana-Hopewell site in the area, the Albany mounds (11WT1; Herold 1971; Benchley and Gregg 1975; Benchley, Gregg and Dudzik 1977).

The Albany site is one of the most important Havana tradition sites in the Upper Mississippi basin by virtue of its size (81 mounds and one or more villages) and its assemblage of interaction sphere artifacts. Seaman (1979:396) places Albany as a third order mortuary site in his measure of complexity. Judging from Budd Hansen's large collection of exotic materials and artifacts from the village site, Albany may have been a more significant stop within the exchange sphere than Seaman calculates from the mound data alone. Hansen's collection includes obsidian cobbles, copper, marine shell, exotic chert, green pipestone, trade ceramics and large quantities of specialized artifacts in various stages of manufacture (e.g., ovate bifaces, bone pins, pipes).

Smaller mound groups, single mounds and villages sites are spread north and south of Albany (Fig. 4.39). South of Albany there are only a few mounds that could be attributed to the Middle Woodland period, e.g., the now destroyed mound at Princeton. North of Albany there are several loci of activity. Around Thomson there are mounds at 11CA11 and 11CA21 in addition to village sites (11Ca10) that have yielded interaction sphere materials, according to local collectors. Their collections include Cobden and Crescent Quarry chert, Knife River Flint, black obsidian and rolled copper (Fig. 4.40). Among the lithic tools are blade flake drills like those found at the Albany mounds village owned by Budd Hansen. Pottery from 11Ca10 seen by this writer includes Havana ware and Linn ware (Levsen Stamped) belonging to the latter half of the Middle Woodland period. The Apple River mouth has a concentration of village sites (e.g., 11CA51) and mounds (e.g., 11JD9, 11JD89) which have been recognized as Middle Woodland sites since the time of Bennett (1945:66). On the Iowa side there are Middle Woodland age mounds at Pleasant Creek (13JK17) and probably at Sabula (e.g., 13JK18) and Bellevue (e.g., 13JK9). If we accept the regularity of site spacing implicit in the Struever and Houart (1972) model of hierarchical settlement patterning, as derived from the pattern

of interaction sphere items (see Seaman 1979), then the Pools 13-14 Middle Woodland site distribution seems impressionistically to have this kind of spacing.

Pottery types are an aspect of the Pools 13-14 sites that might be informative about the character of Middle Woodland culture in the Upper Mississippi Valley. Linn ware types (see Logan 1976; Benn 1978; Stoltman 1979) are common in the assemblages from Albany and the Thomson area sites. This ware is far less common south of Muscatine (see Benn ed. 1987; Markman 1988), where Havana ware predominates and Pike-like and Baehr ceramics occur. We suspect, as Will Logan (1976) also did, that a major division in Middle Woodland culture types falls somewhere within or south of Jackson County on the Mississippi River. This would be the northern limit of the Three Rivers region (Fig. 1.1; Benn ed. 1987).

Late Woodland Period

We have no good evidence for the distribution of sites belonging to this period (ca. 1600-750 B.P.). Relatively low mounds, many of which are presumed to date to this period, occur along the bluffline on both sides of the river, but site records, when available, do not specify their cultural identity. The distribution of recorded Effigy mounds does not extend south of Dubuque (Mallam 1976), so this cultural type does not clarify the issue in Pools 13-14. Rumors of Effigy mounds in the project on the bluff above 13CN3 and at 11CA44 (Fig. 4.39) are not confirmed, although the latter site is a Late Woodland mound complex with clearly defined conicals. The Pool 13 area appears to represent the southern boundary of the Effigy Mounds tradition.

Early Late Woodland ceramics (e.g., Weaver ware) are documented at the Albany mound village (Benchley, Gregg and Dudzik 1977) but otherwise lack a distributional pattern in other sites. Late Woodland ceramics (e.g., Lane Farm Cord Impressed, Madison Fabric Impressed, plain ware) have been identified in the Pleasant Creek and Sabula localities and at 13ST91 on the Iowa side, and at 11CA44 on the Illinois side. Studies of more ceramic collections are needed to understand the significance of the distributions of various wares. When this is accomplished, four critical issues will be confronted. 1) Did the Weaver tradition extend north through the Pools 13-14 area? 2) What was the relationship between Madison ware, which is common to the north, and Minotts ware, which has a southerly distribution? 3) How late in time were cord impressed ceramics manufactured? 4) Does the distribution of sites with corded ceramics indicate a fissioning and expansion of the Late Woodland settlement pattern as seen in Pools 17-18 and elsewhere in the midwest (cf. Benn, Bettis and Vogel 1988:154).

Mississippian Period

The central issue in this period involves the site distributions and cultural relationships between Oneota and Mississippian societies. Mississippian sites are concentrated at the mouth of the Apple River (Bennett 1945), where occupation apparently began with an intrusion of Cahokia-oriented people by the middle of the eleventh century A.D. (Emerson 1985). The Mississippian habitations show little influence from Oneota culture but appear to have amalgamated some influences from surrounding Late Woodland populations and from the Spoon River culture in the Illinois River valley (Ibid.). The settlement pattern in the Apple River locality consists of a central temple town (Mills village) and surrounding hamlets and house sites.

Oneota sites occur only on the Iowa side of the river. Ceramics come from a Pleasant Creek site (13JK91) and from the Sabula locality, which probably contained at least one large Oneota site (13JK146). The few ceramics seen by this writer appear to be more similar to those from the Molgona/Burlington manifestation in southeastern Iowa than the Orr phase in northeastern Iowa (see Tiffany 1979; Henning 1985:52). This distribution of Oneota materials sits directly opposite the major Middle Mississippian occupation at the Apple River (Fig. 4.39). I suspect this is not a coincidental pattern, a point discussed in relation to sites in Pools 17-18 (Benn, Bettis and Vogel 1988:158). The Mississippi River appears to have been the boundary between Oneota and Mississippian cultures in Pools 17-18, and the same observation applies to Pools 13-14. Emerson (1985:31) suggests that the dispersed settlement pattern of the Apple River Mississippian sites indicates a relatively peaceful situation. The Oneota settlement pattern in Pools 17-18 was similarly dispersed, yet I doubt the Oneota had a reputation for being peaceful among their contemporaries (Benn 1989). The fact that settlements of these contemporaries lie on opposite sides of the river in Pool 13 presents an interesting cultural situation for future research.

Early Contact Period

The Early Contact study unit (Henning 1985:54) covers the period 350-130 B.P. when resident and migrating Indian tribes utilized the Upper Mississippi basin for hunting and habitation. The SMSU survey searched for at least one Indian village at the mouth of the Wapsipinicon, but nothing was found. A silver trade cross in the Kell collection is the only material evidence for this period in the project area. Many tribes, including the Sauk and Fox (Temple 1958), passed through the area, and Sauk village sites are located at the mouth of the Rock River (McKusick and Slack 1962; Budd Hansen, personal communication). This writer feels that future archaeological work in Pools 13-14 will turn up a major historic site buried by PSA most likely at the mouth of the major rivers: Wapsipinicon, Maquoketa and Apple.

Table 4.1
Upper Mississippi River Pools 13-14
1989 Survey Coverage

Quadrangle (Figure)	Shorelines		and		Shovel-tests
	walking	boating	acres	linear miles	
Bellevue (4.11)	.5ml	-	-	.75ml	4
Springbrook (4.11)	4.0	2.25ml	-	-	1
Green Island (4.10)	2.25	2.75	461.5	10.75	68
Blackhawk (4.10)	-	4	10	.5	-
Savanna (4.8-4.9)	3.75	4.25	25	-	4
Clinton NW & Thomson (4.8)	-	6.5	5	-	-
Clinton (4.7)	.75	8.5	-	-	-
Camanche (4.6)	6.5	1.5	12	-	10
Cordova (4.5-4.6)	7	7.25	70	-	33
Port Byron (4.5)	-	8.75	-	-	-
Silvis (4.5)	1	1	-	-	-
totals	25.75 (51ac)	46.75 (93ac)	583.5	12	120

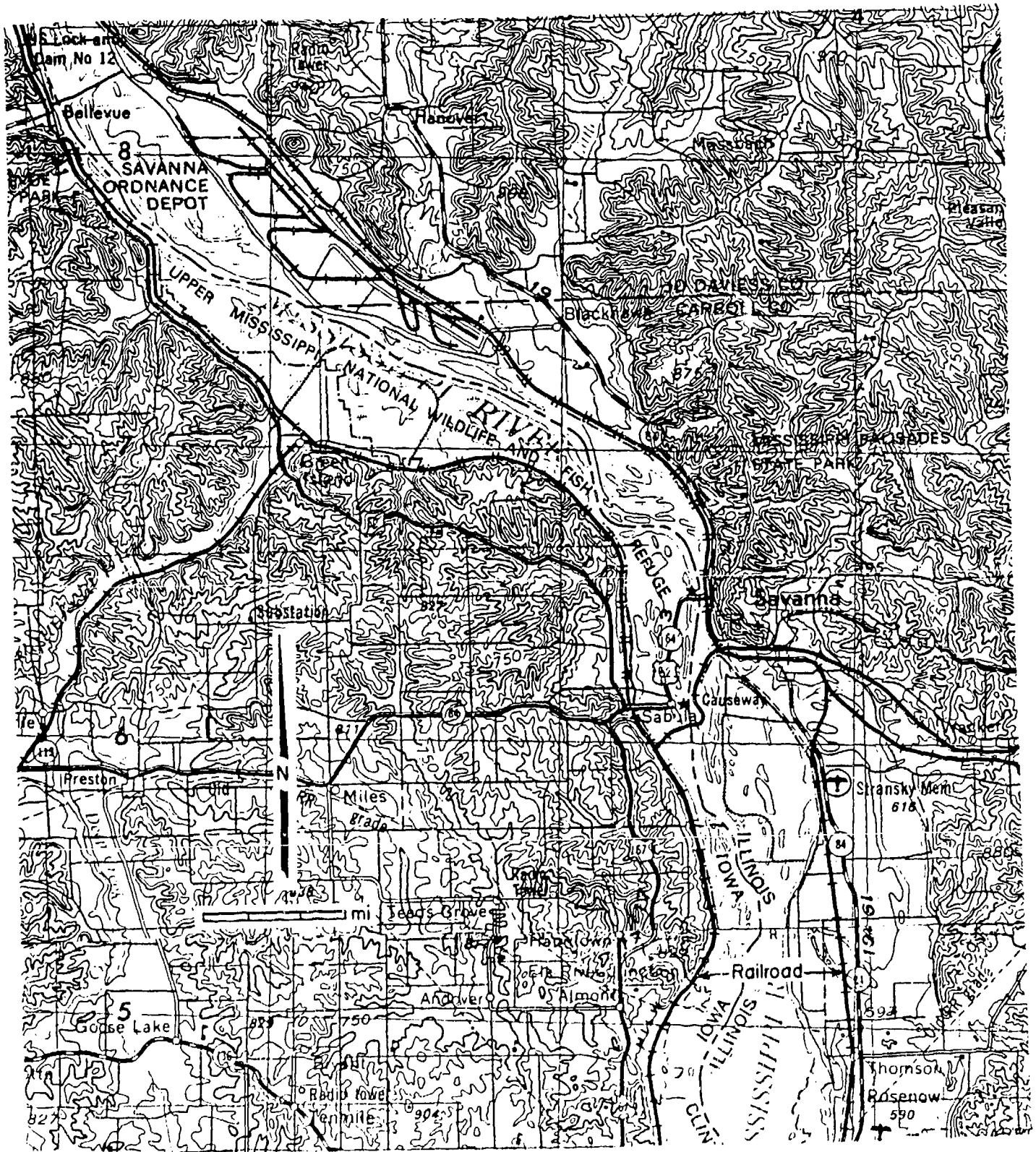


Figure 4.1: Pool 13 project area on the USGS Dubuque 1:250,000 map; the railroads border the approximate floodplain boundary.

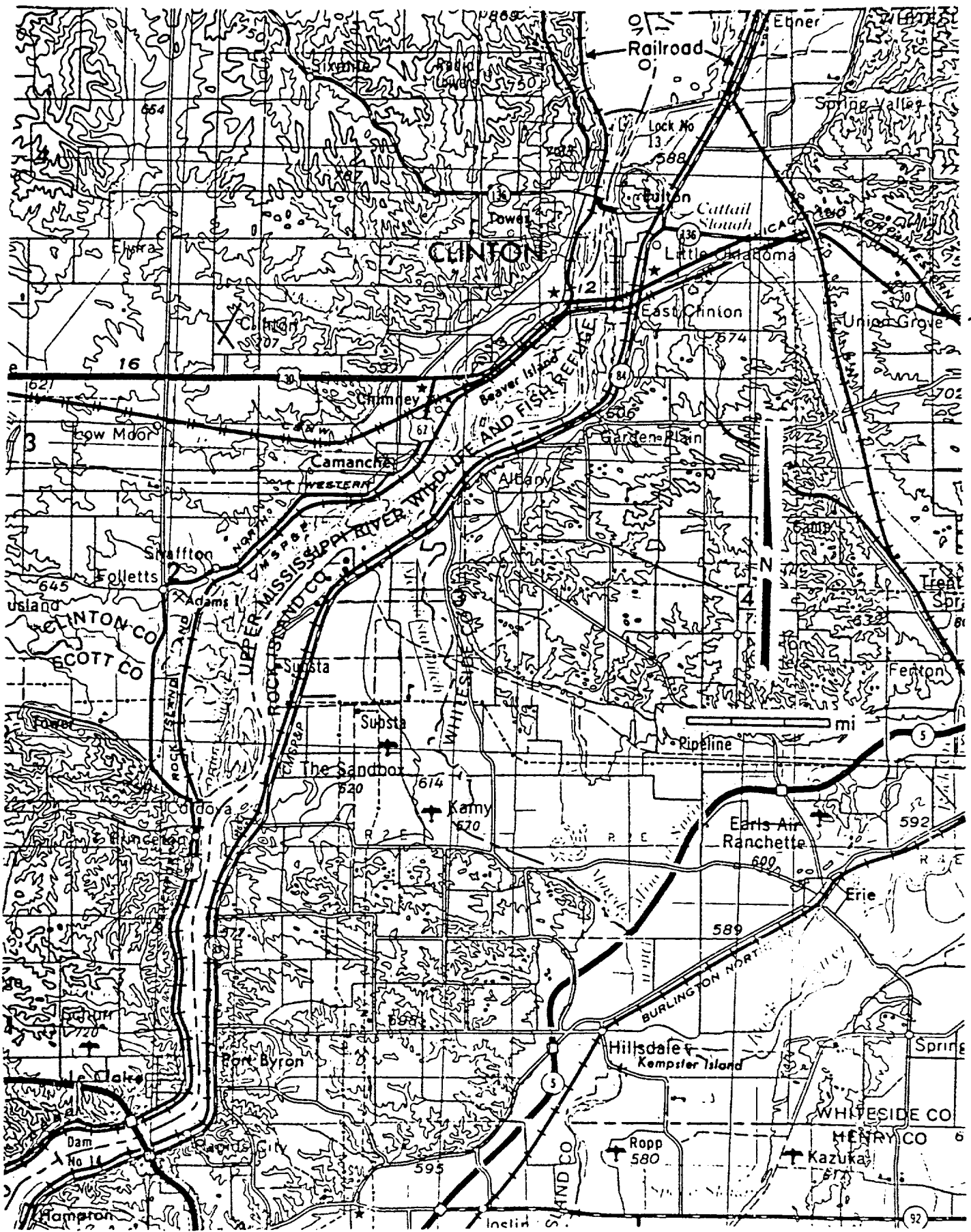


Figure 4.2: Pool 14 project area on the USGS Davenport 1:250,000 map; the railroads border the approximate floodplain boundary.

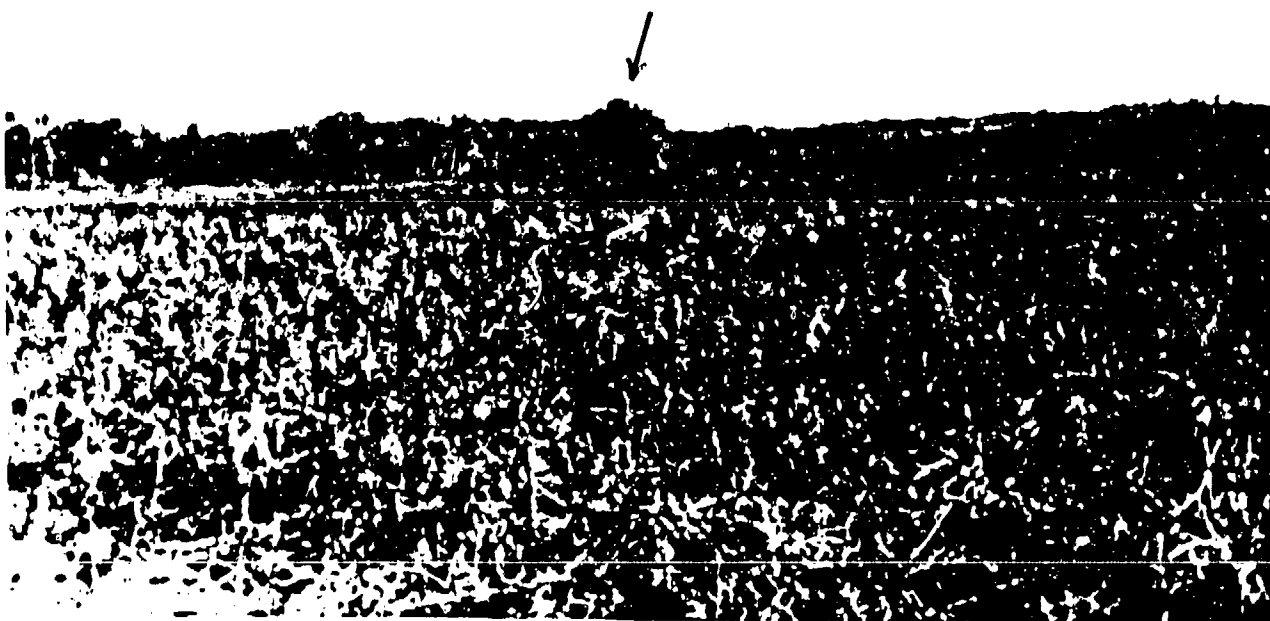


Figure 4.3: Vegetation patterns in Western Pond, Pool 13; single oak tree (arrow) on the shore of the pond indicates the location of a well drained terrace (early-mid-Holocene) in the low floodplain.

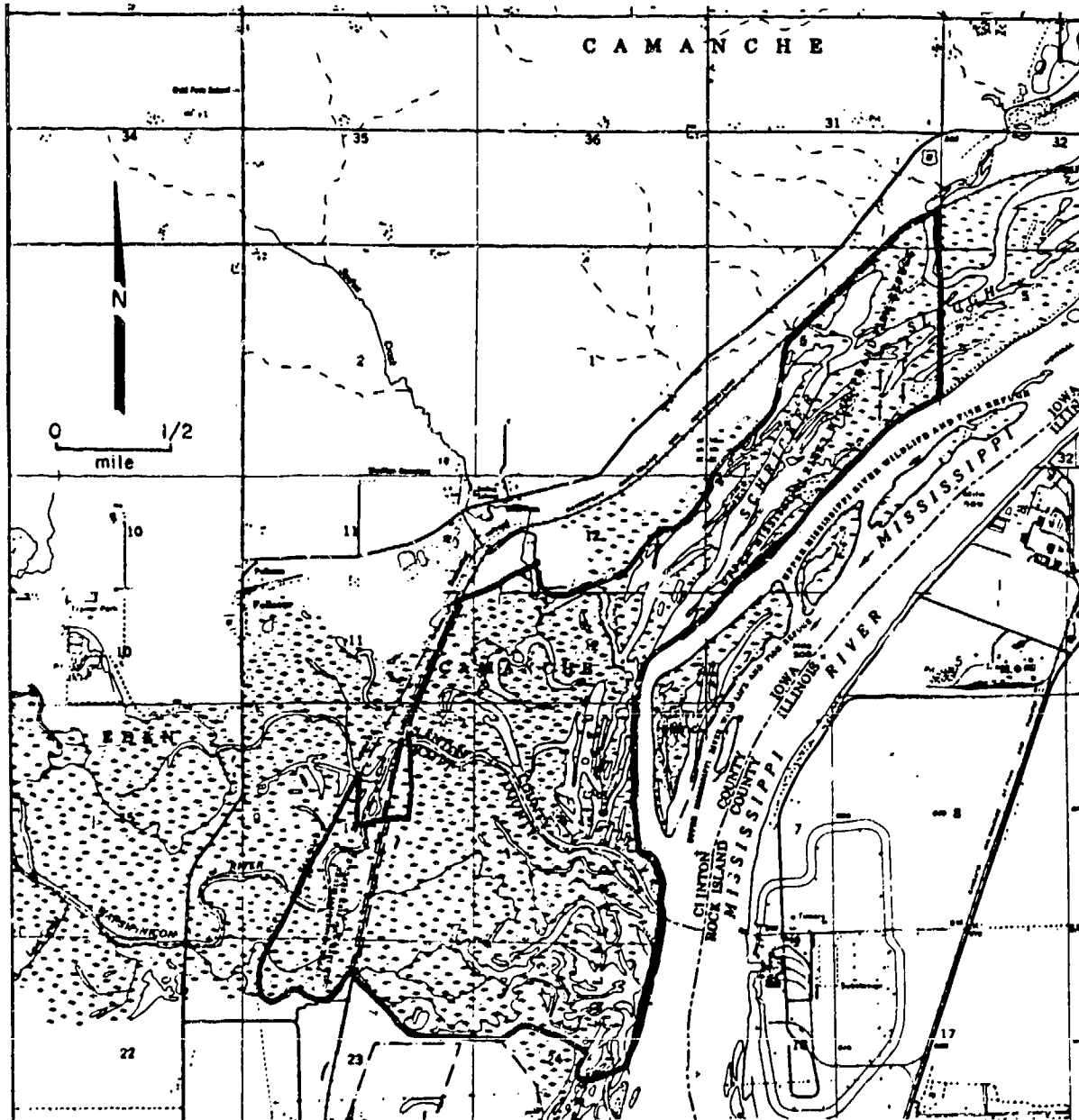


Figure 4.4a: Proposed timber sale parcel at the mouth of the Wapsipinicon River (see Fig. 4.6 for surveyed areas).

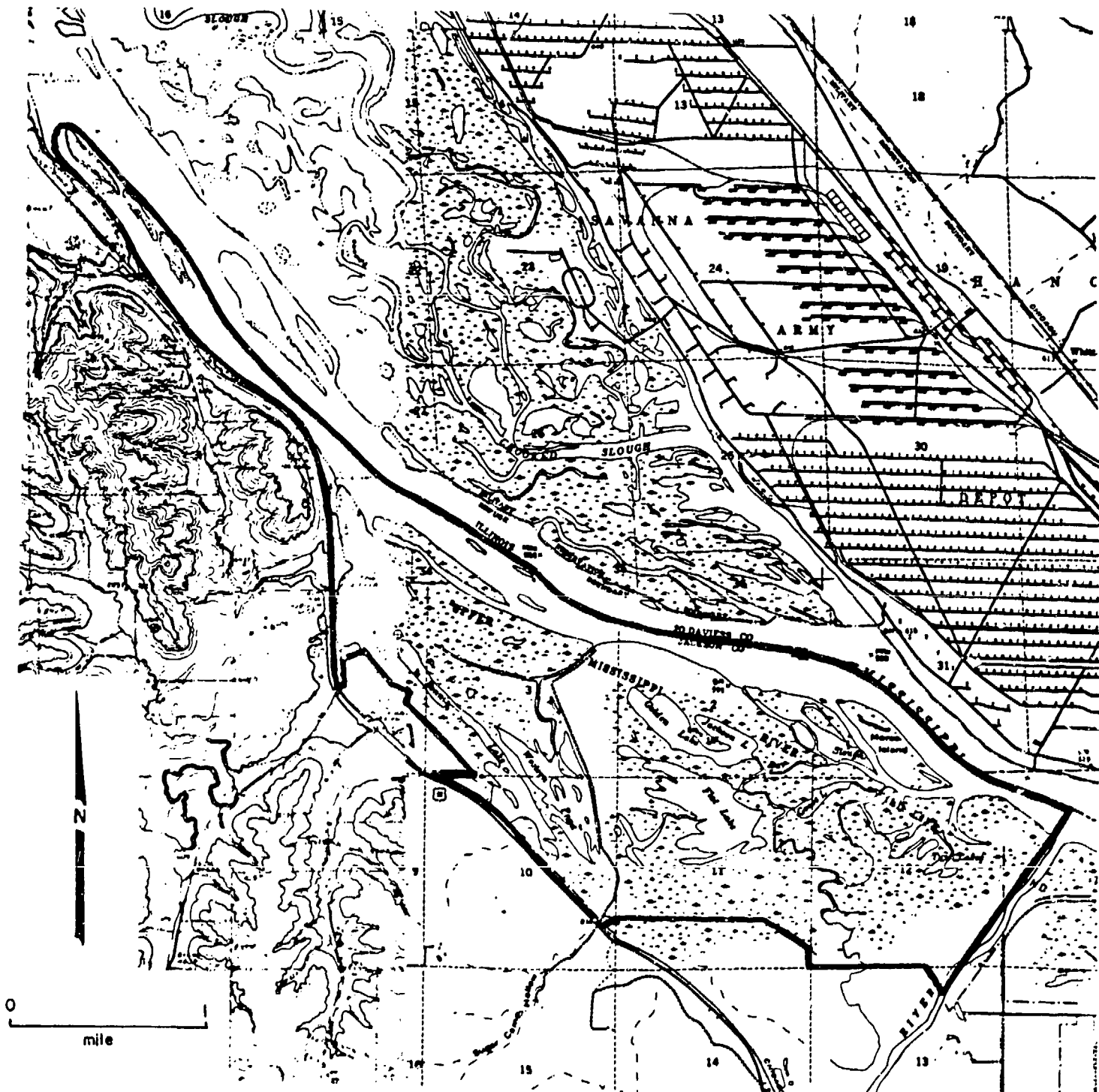
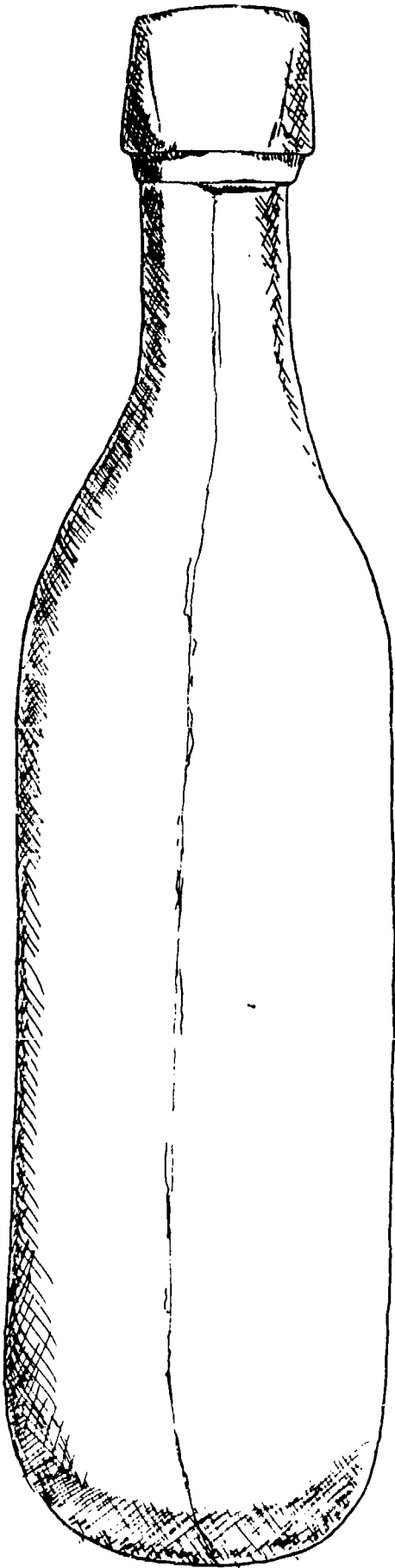


Figure 4.4b: Proposed timber sale parcel at the mouth of the Maquoketa River (see Figs. 4.10, 4.11 for surveyed areas).

Figures 4.5-4.11
Volume II

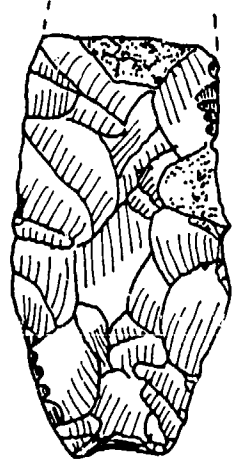
Figure 4.12: Artifacts from the 1988-89 survey of Pools 13-14.



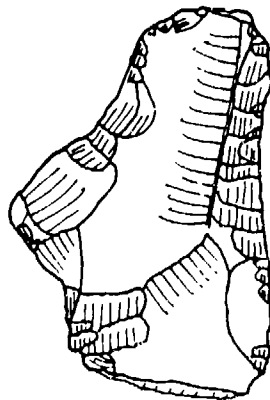
a) 13CN60



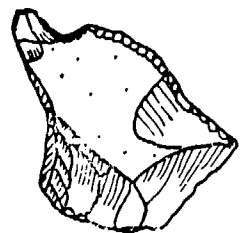
b) 13CN61



c) 11Ri550



d) 13JK139



e) 13JK139

FIGURE 4.13
IICA 44
Field Sketch Map

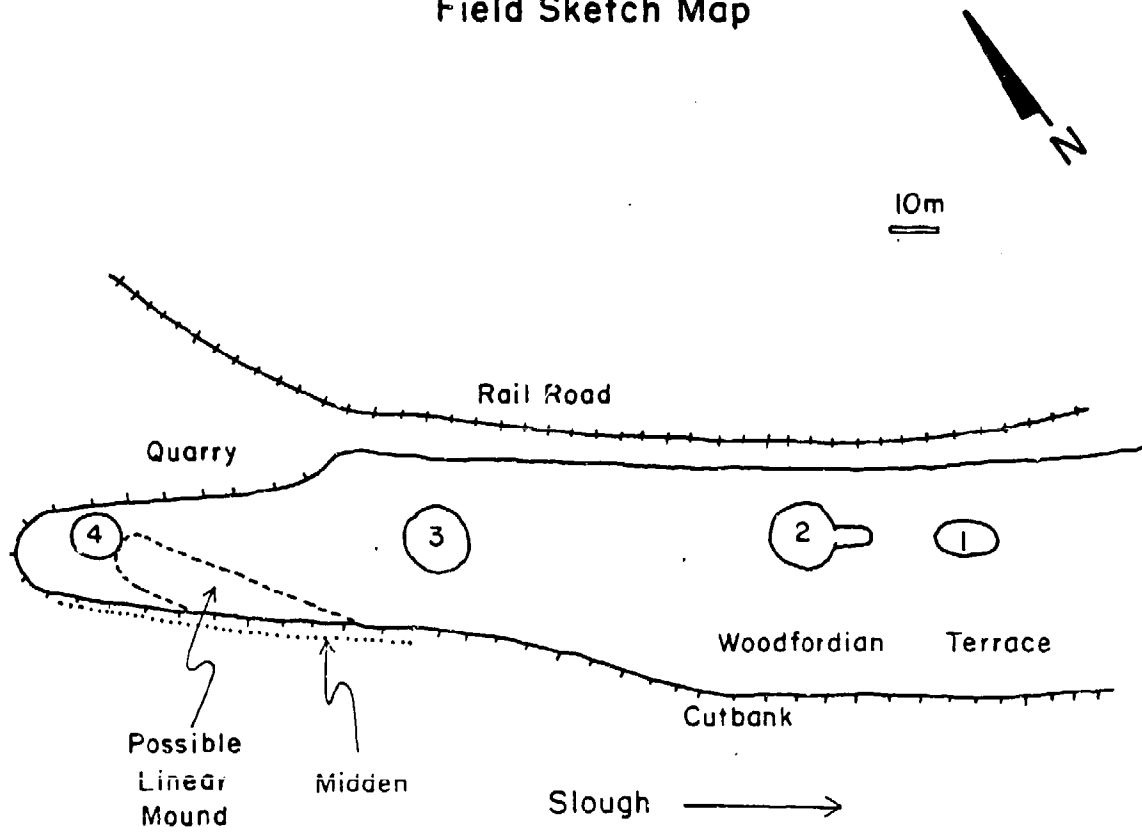


FIGURE 4.14
13JKI49
Field Sketch Map

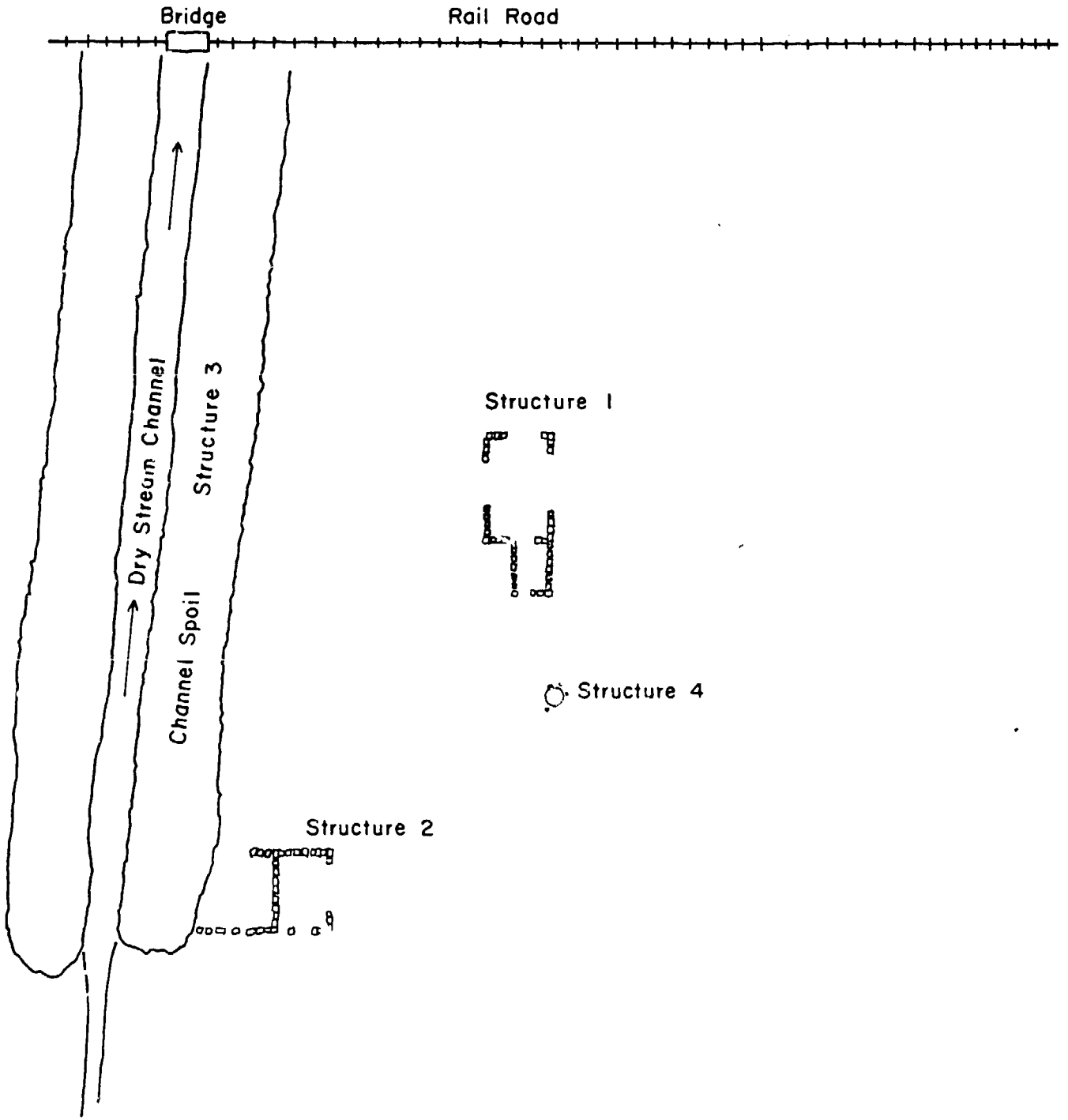
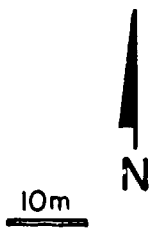




Figure 4.15: Artifacts in the DNR collection from 13JK150 (a-h); g) notched point from Find 2 in the Green Island bottom.

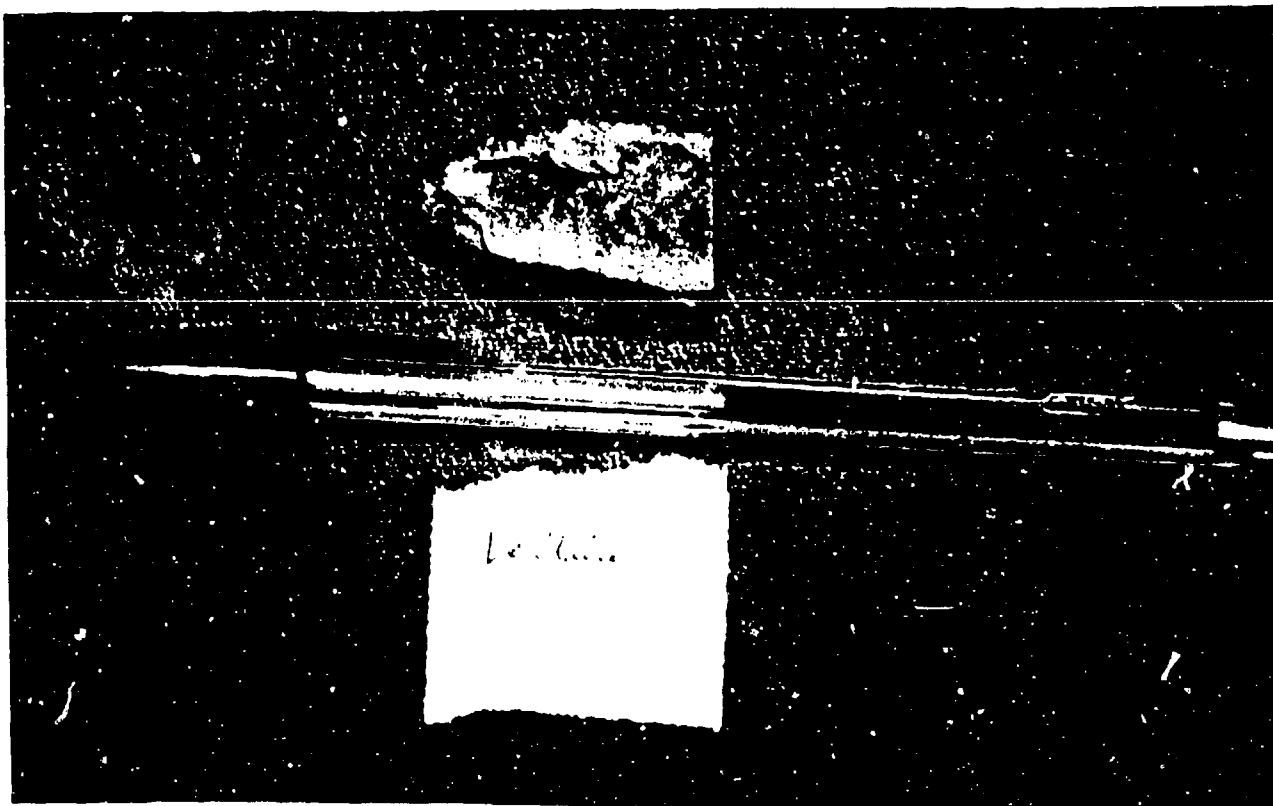


Figure 4.16: Folsom point in a private collection from 13ST92.

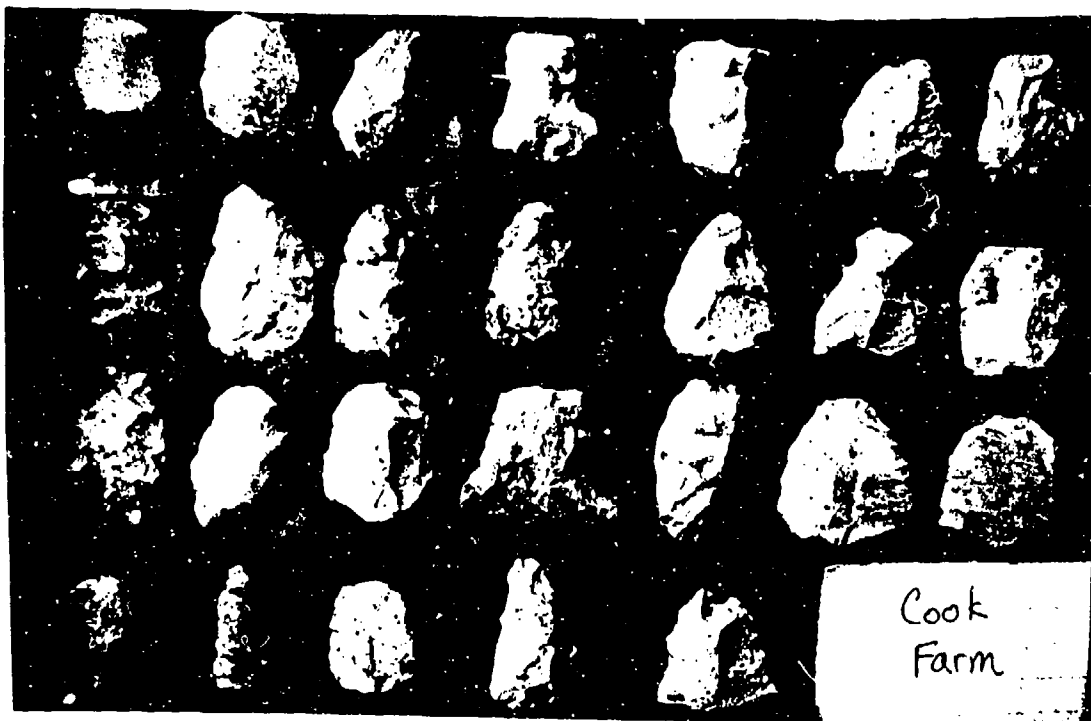


Figure 4.17: One of several frames of end scrapers in a private collection from the Cook farm, 13CN8.

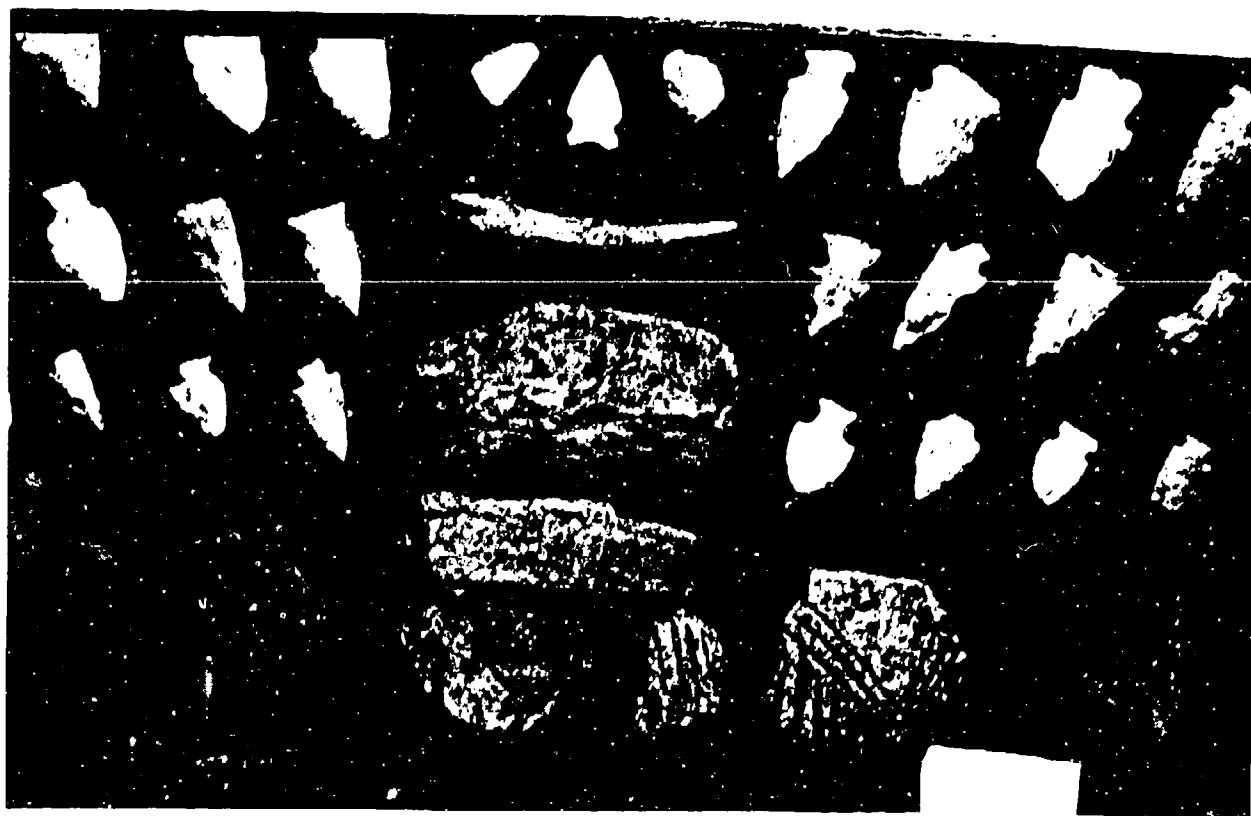


Figure 4.18: Oneota ceramics (lower row) and a Mill Creek chert hoe in a private collection from 13JK146.

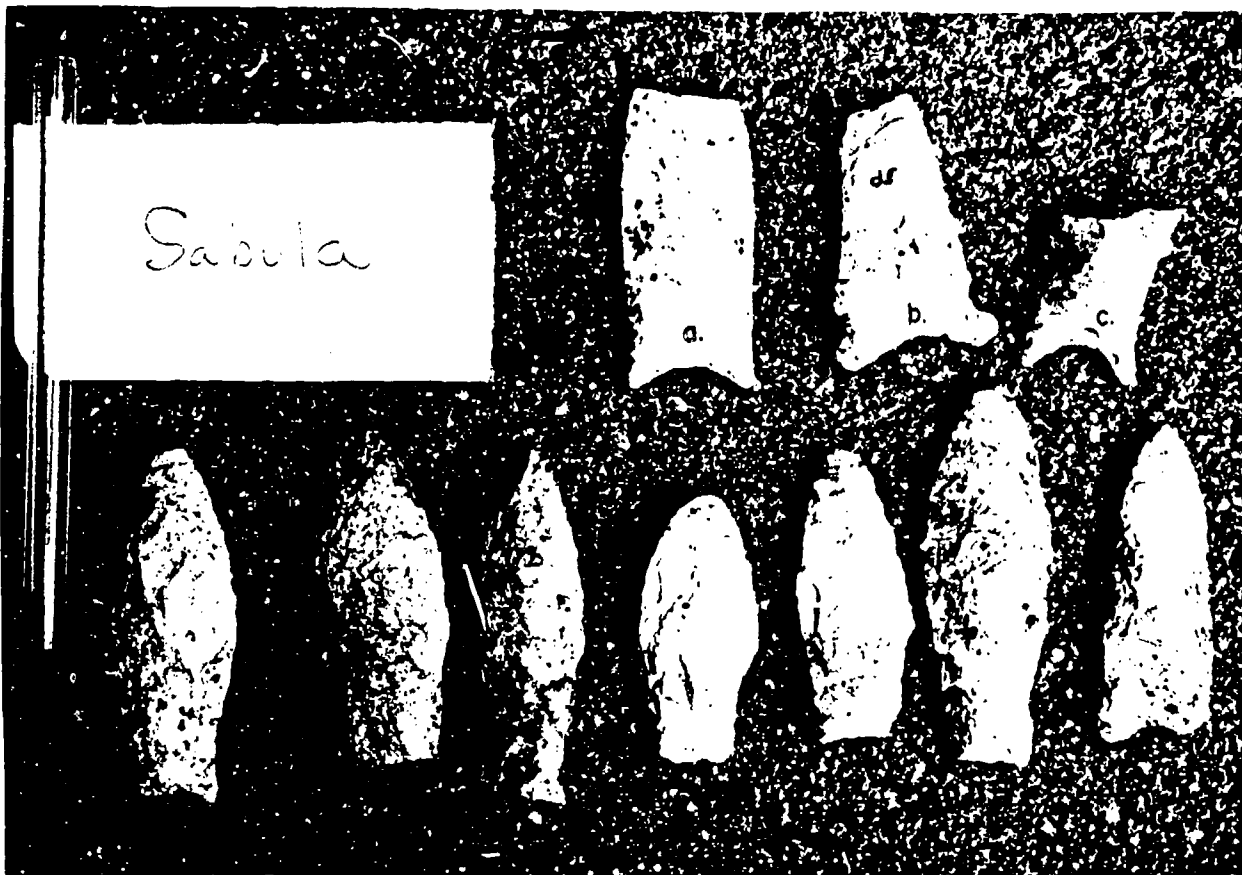


Figure 4.19: Projectile points in a private collection from 13JK147.

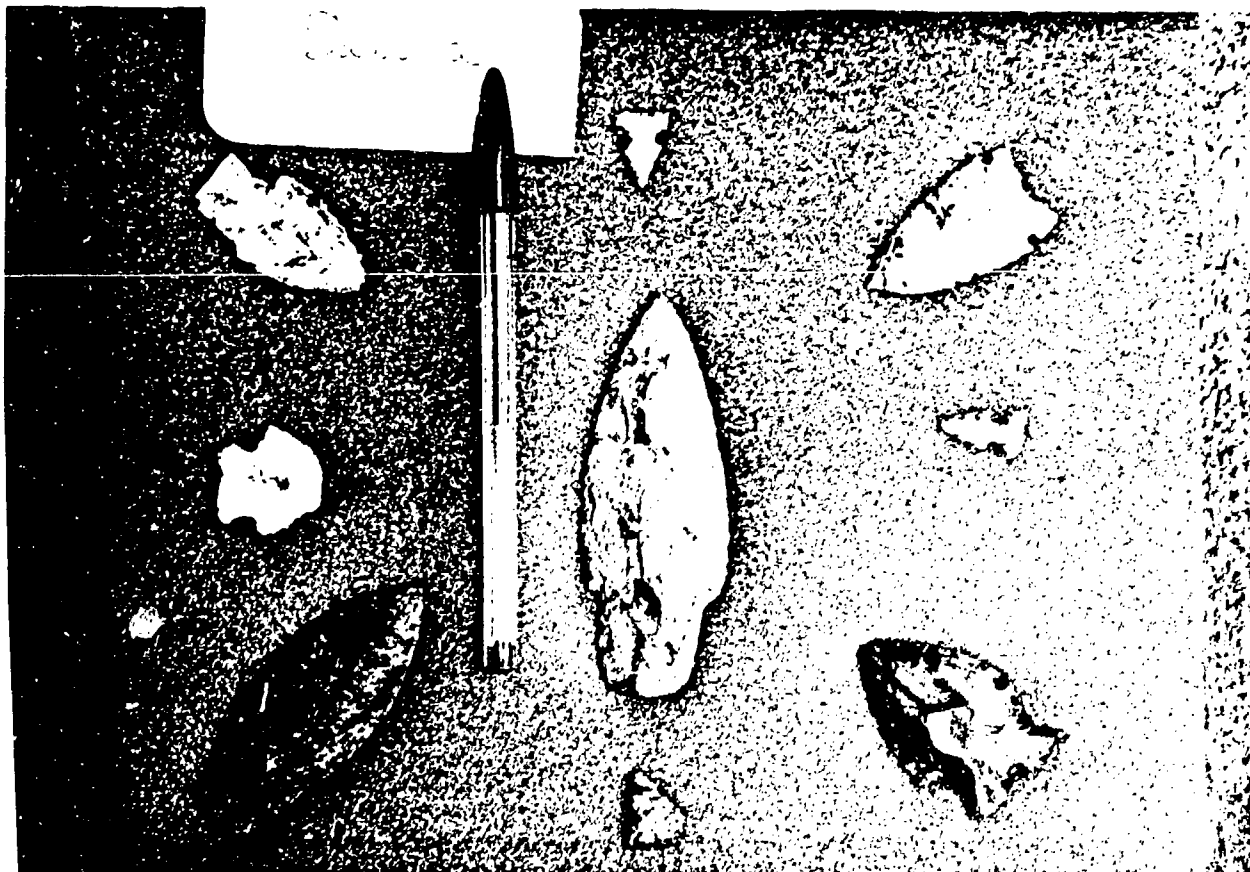


Figure 4.20: Projectile points in a private collection from 13JK147.

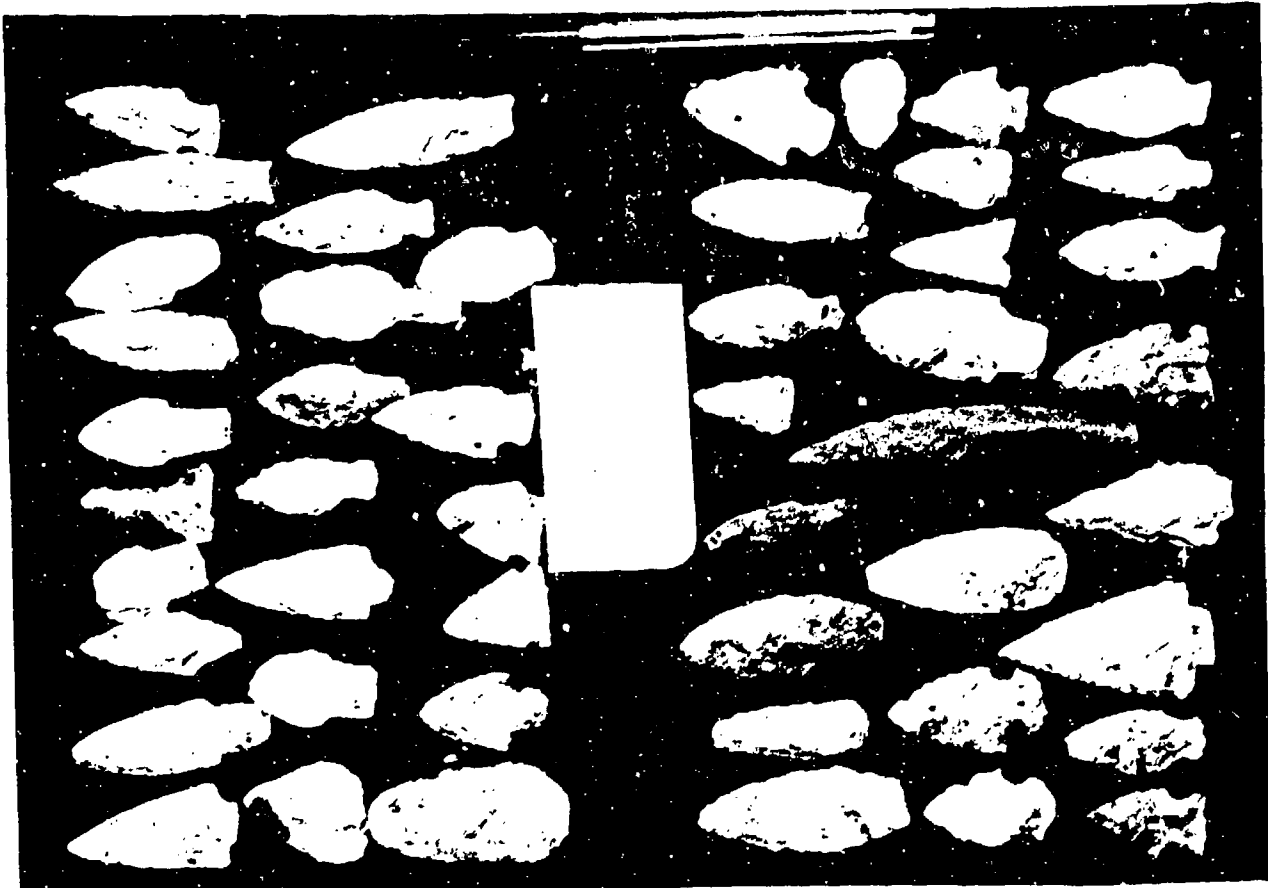


Figure 4.21: Projectile points in a private collection from 13JK147.

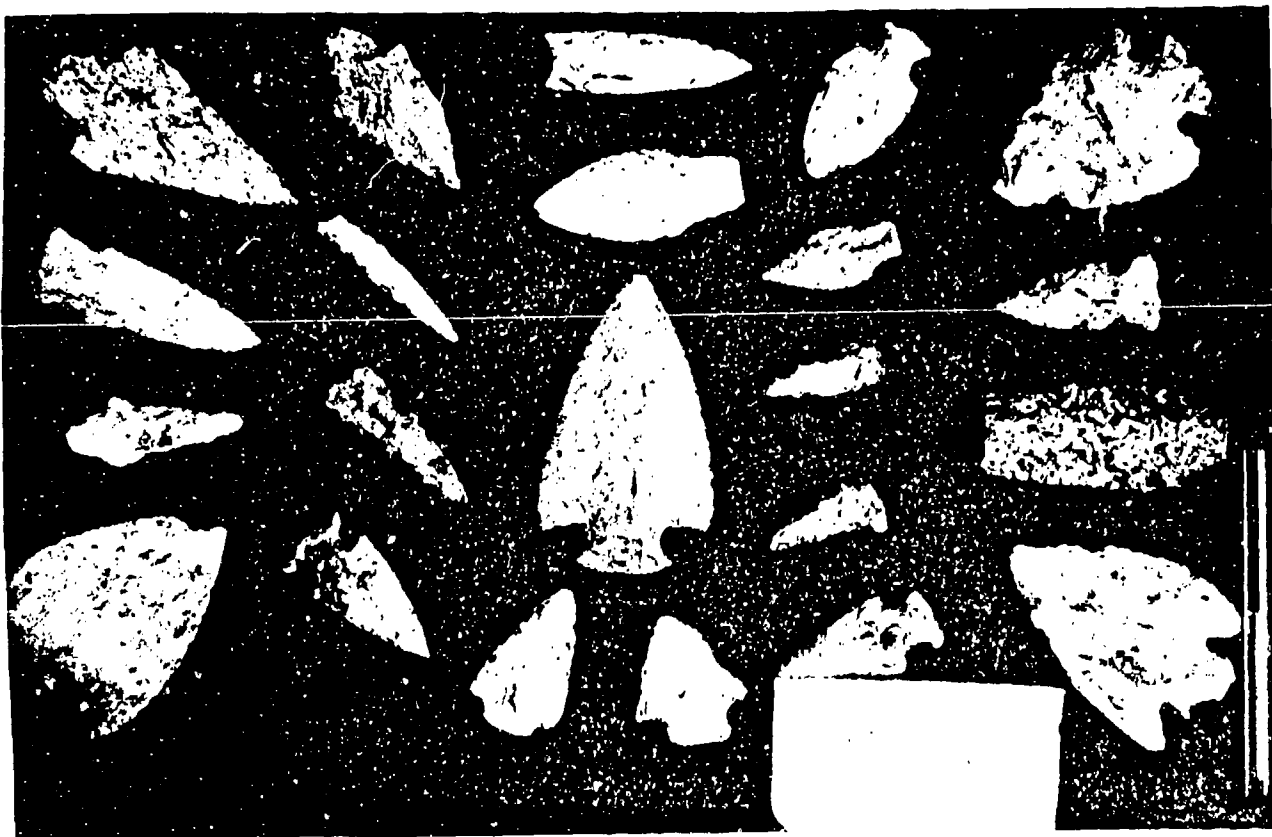


Figure 4.22: Projectile points in a private collection from 13JK147.

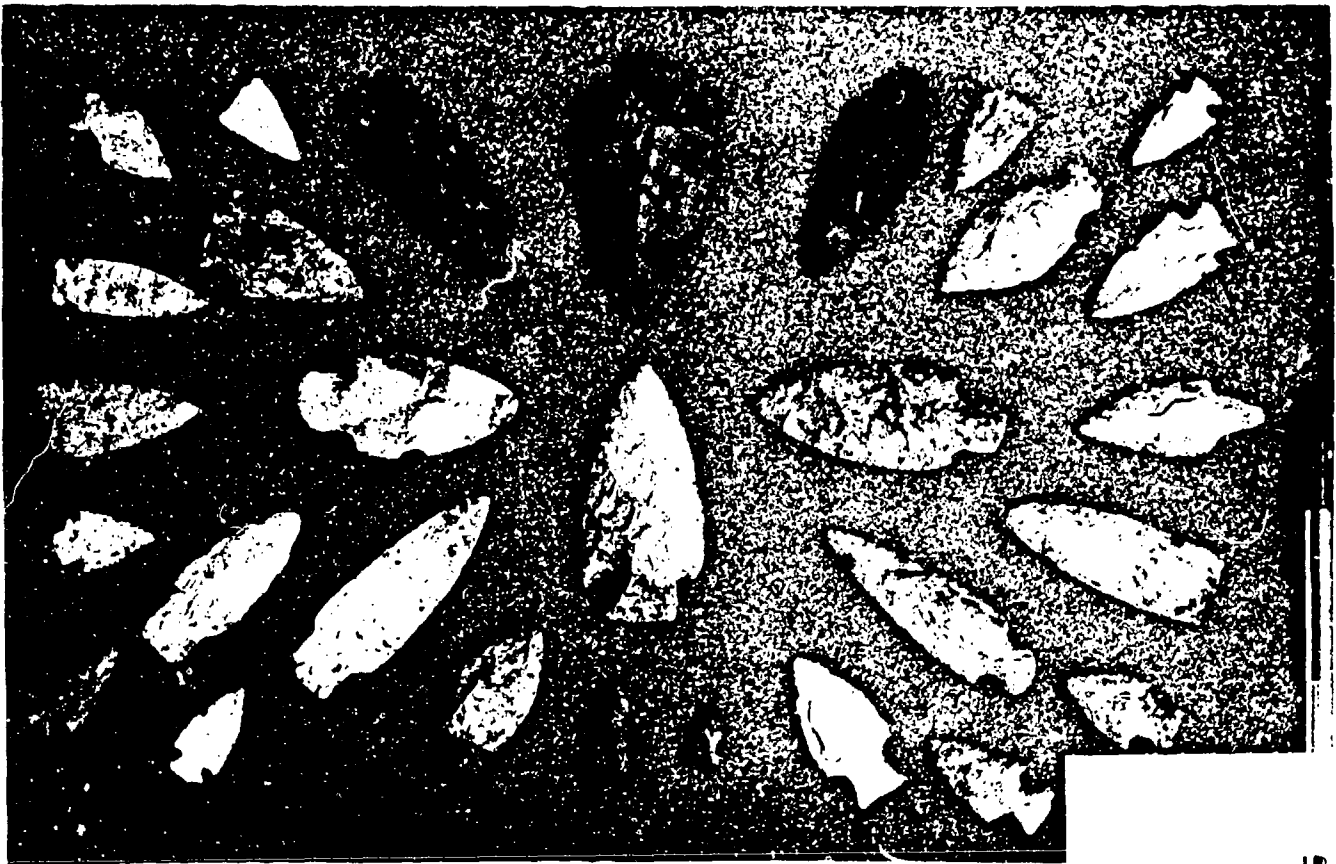


Figure 4.23: Projectile points in a private collection from 13JK147.



Figure 4.24: Projectile points and bifaces in a private collection from 13JK147.



Figure 4.25: Clovis point in a private collection from 13JK144.

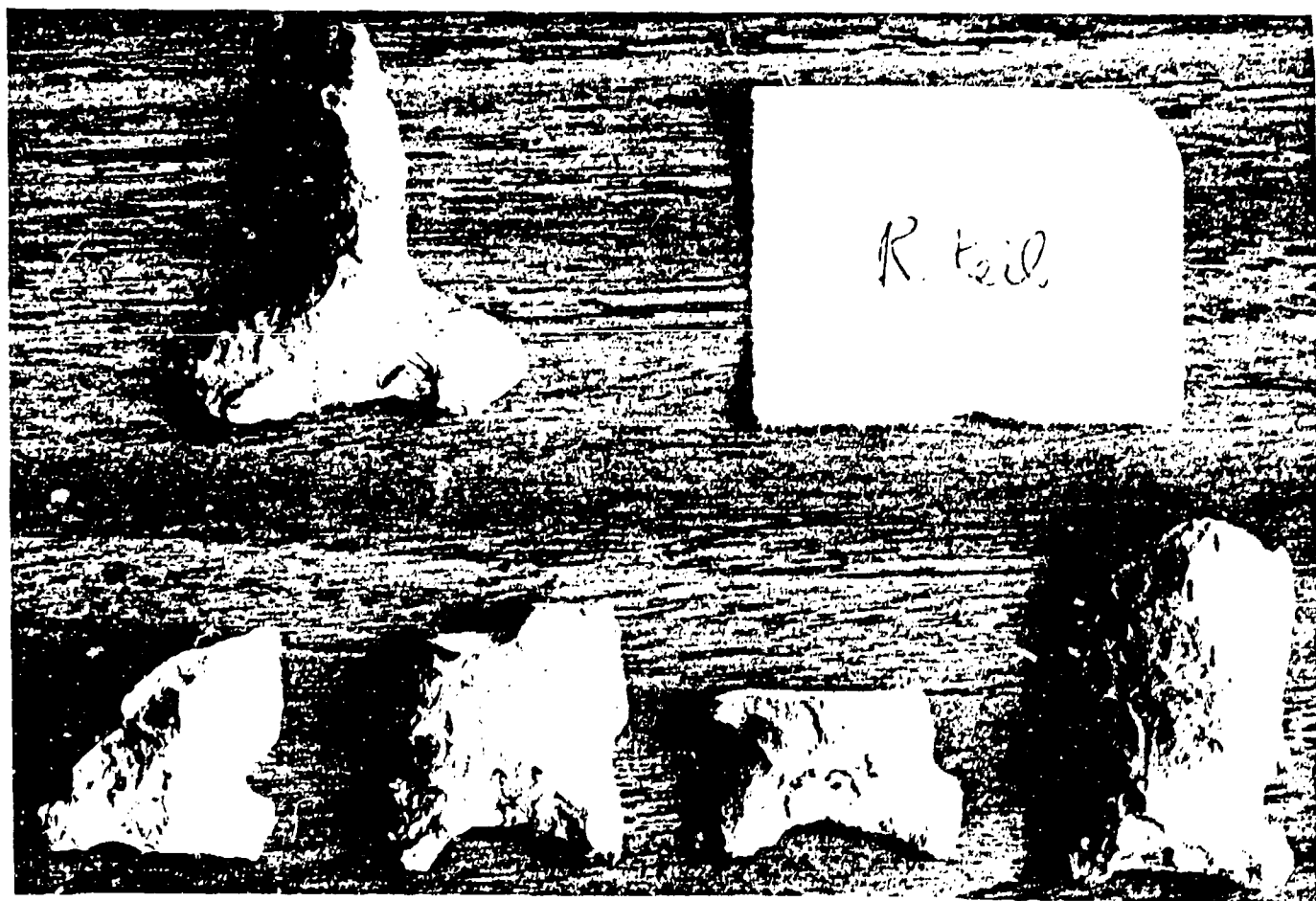


Figure 4.26: Osceola points and a drill in a private collection from 13JK91.



Figure 4.27: Projectile points in a private collection from 13JK91.

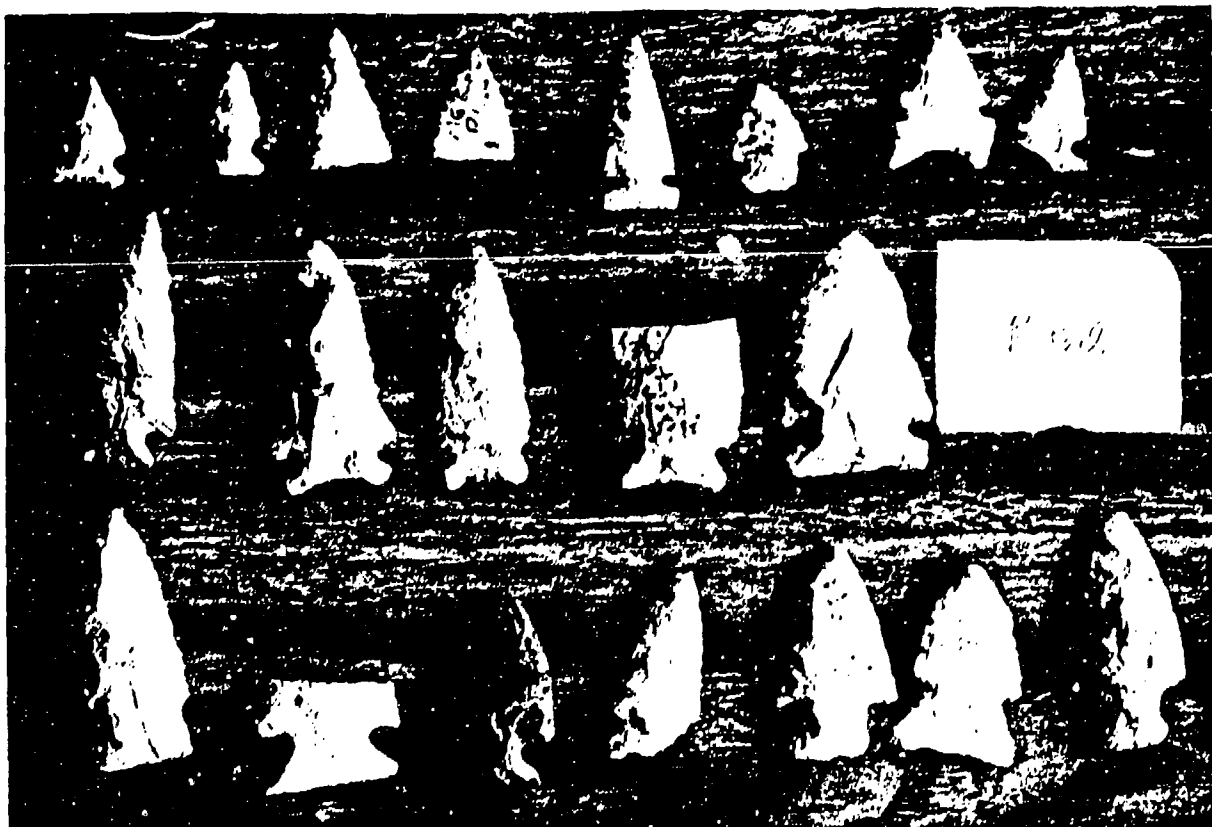


Figure 4.28: Projectile points in a private collection from 13JK91.

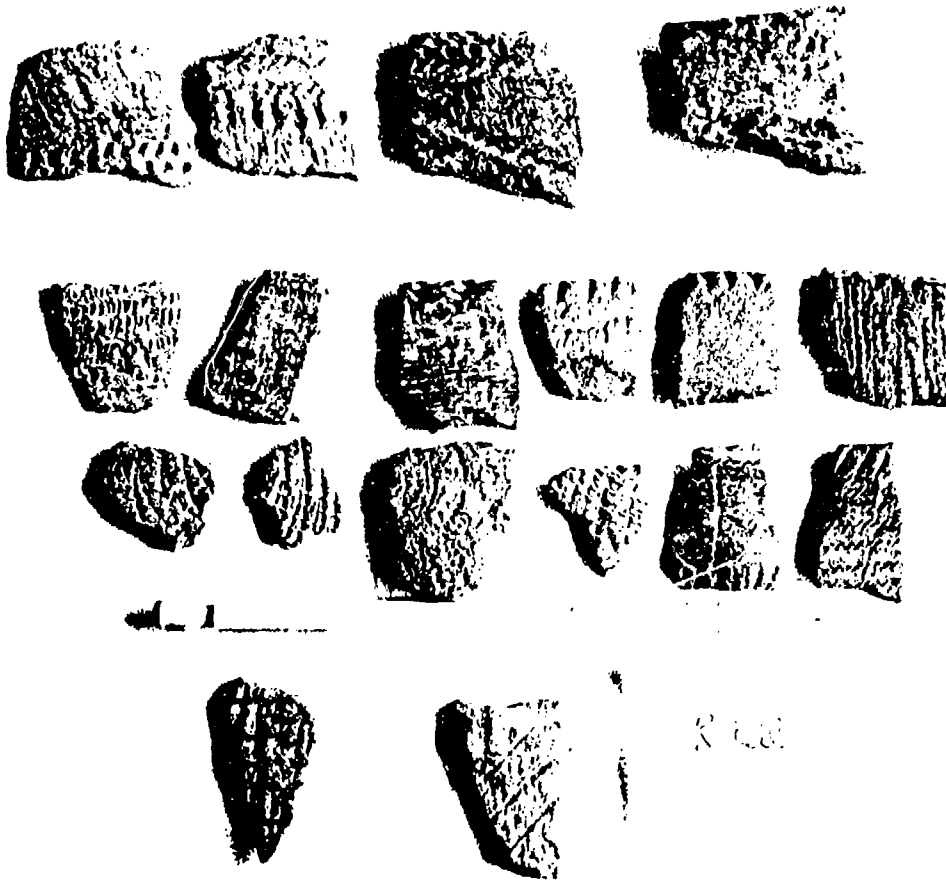


Figure 4.29: Woodland ceramics in a private collection from 13JK91 and the vicinity.



Figure 4.30: Five Cobden chert bifaces from Orr's excavation in mound 2 of the Pleasant Creek mound group (13JK17)(collections of the Iowa State Historical Department--Iowa City).

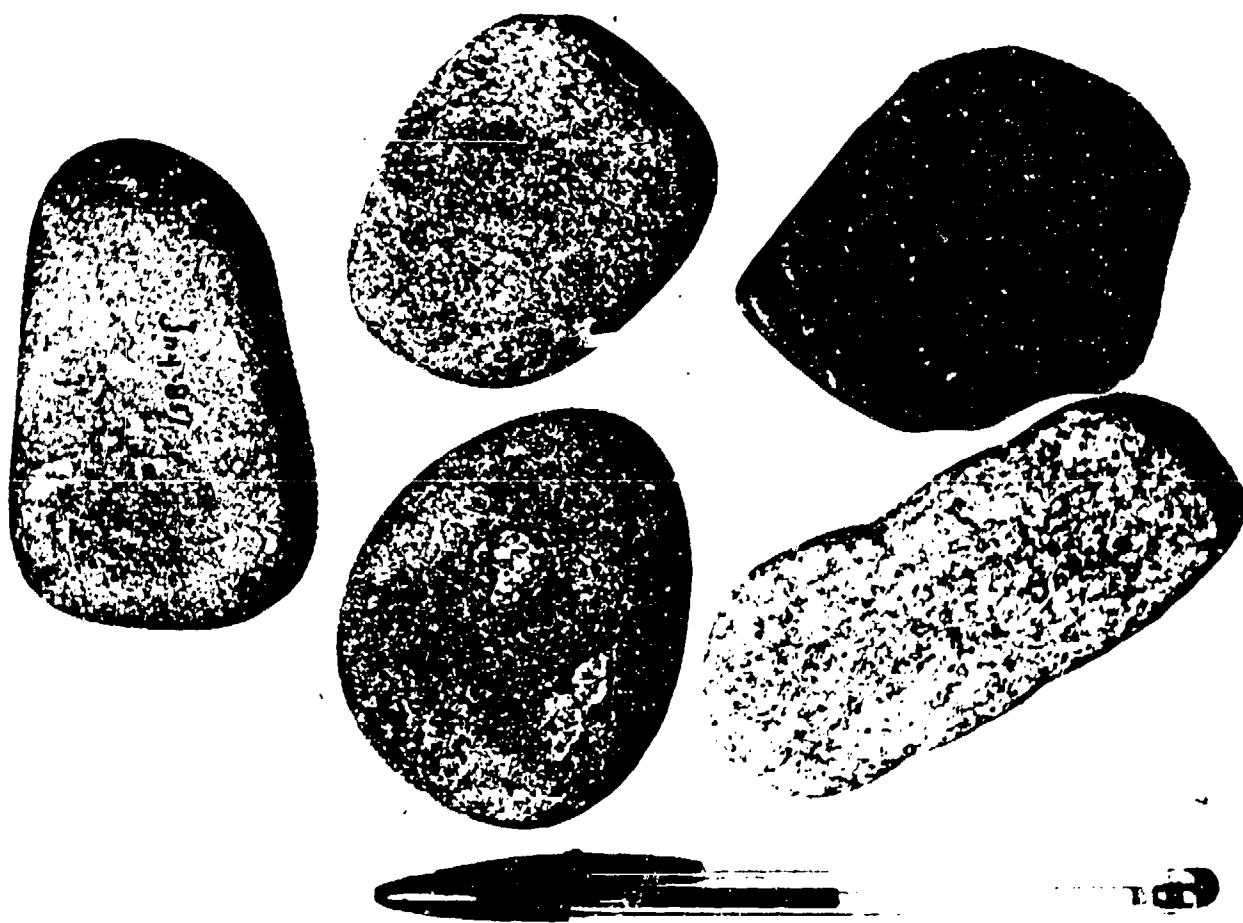


Figure 4.31: Cache of rounded cobbles from Orr's excavation in mound 2, Pleasant Creek mound group (13JK17) (collections of the Iowa State Historical Department-Iowa City).



Figure 4.32: Obverse (left) and reverse sides of the silver cross from the Pleasant Creek locality; (right) cut point made of ferrous metal from 13JK79.

R2E

R3E

R4E

ILLINOIS

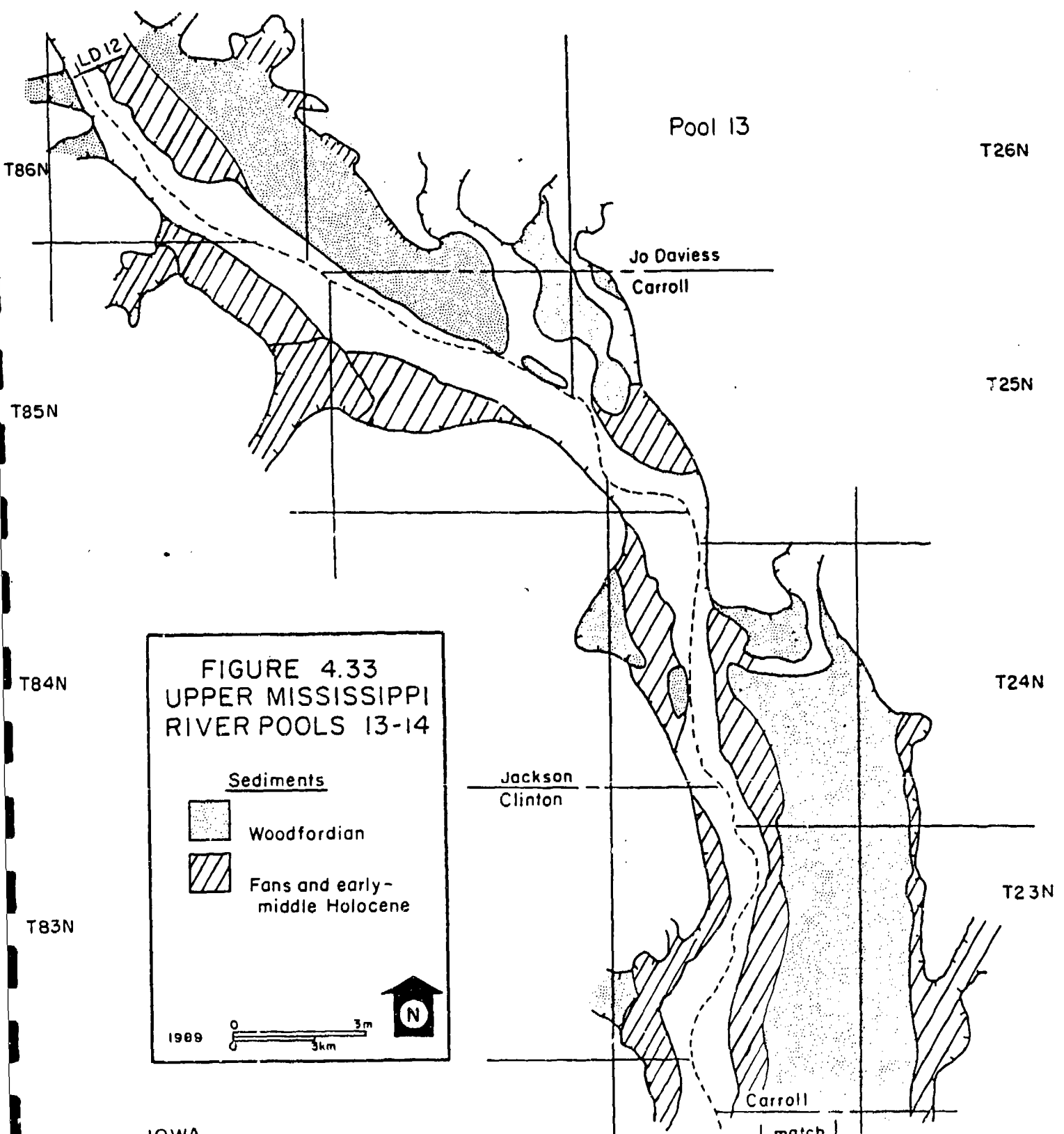


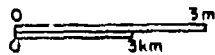


FIGURE 4.33
UPPER MISSISSIPPI
RIVER POOLS 13-14

Sediments

-  Woodfordian
-  Fans and early-middle Holocene

1989



IOWA

R5E

R6E

R7E

Carroll

↓ match ↓

Pool 13

Jo Daviess
Carroll

Jackson
Clinton

LD12

T86N

T26N

T85N

T25N

T84N

T24N

T83N

T23N

R5E

R6E

IOWA

T82N

Pool 14

match

Whiteside

LD 13

T22N

T81N

T21N

T80N

Clinton
Scott

T20N

T79N

Whiteside
Rock Island

T19N

T78N

LD
14

ILLINOIS

T18N

R2E

R3E

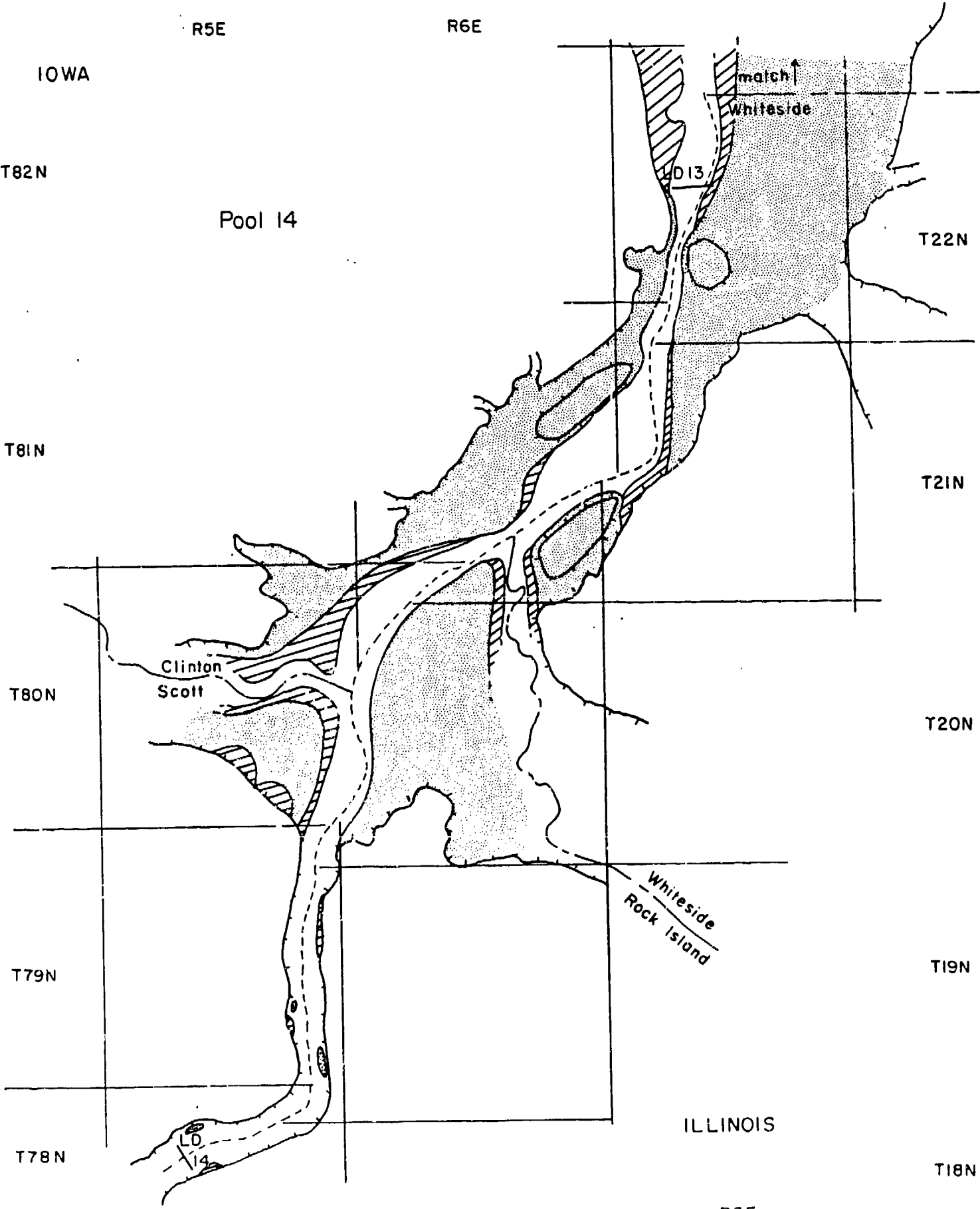




Figure 4.34: The mouth of the Elk River looking up the straightened channel; Savanna terraces are outlined against the trees in the left-center.

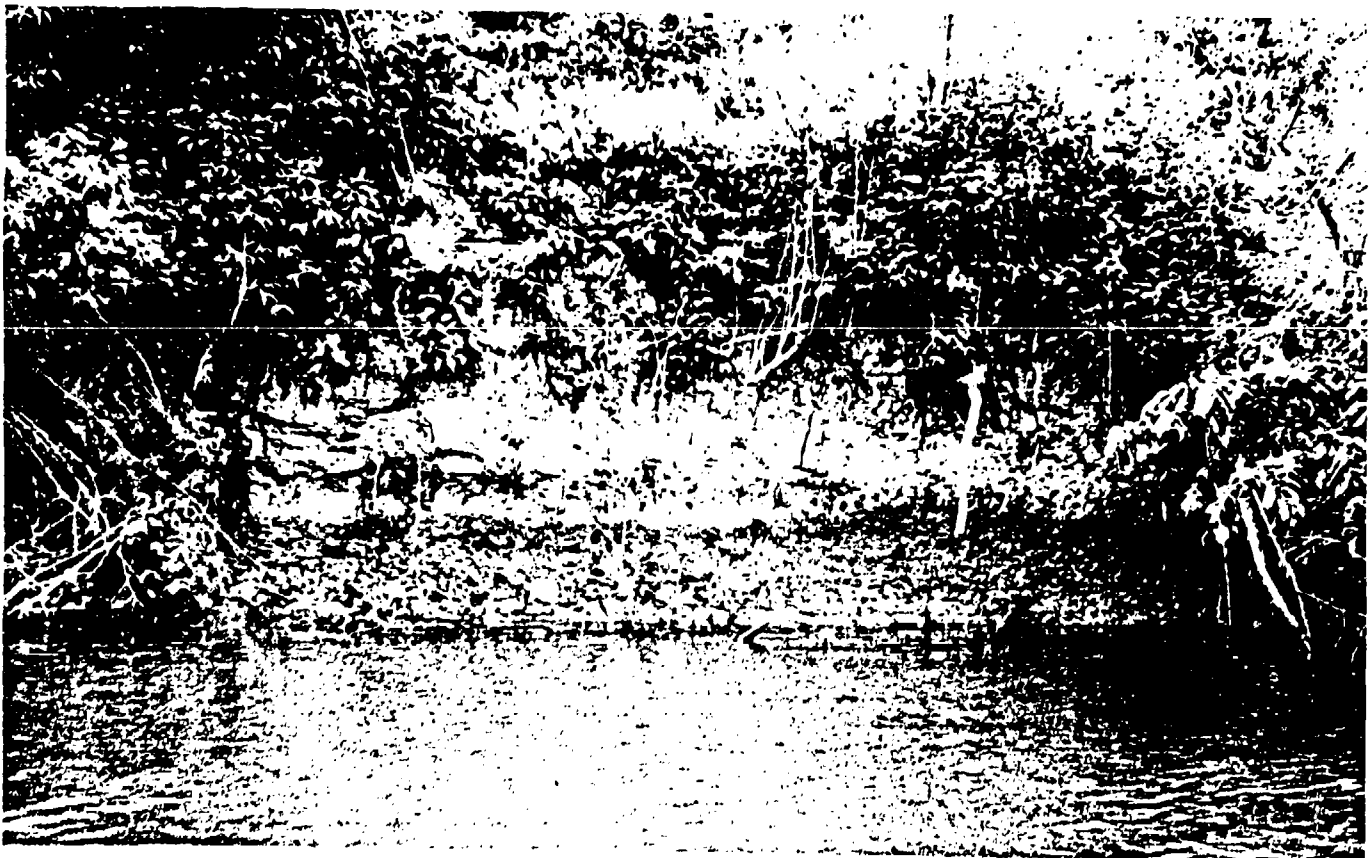
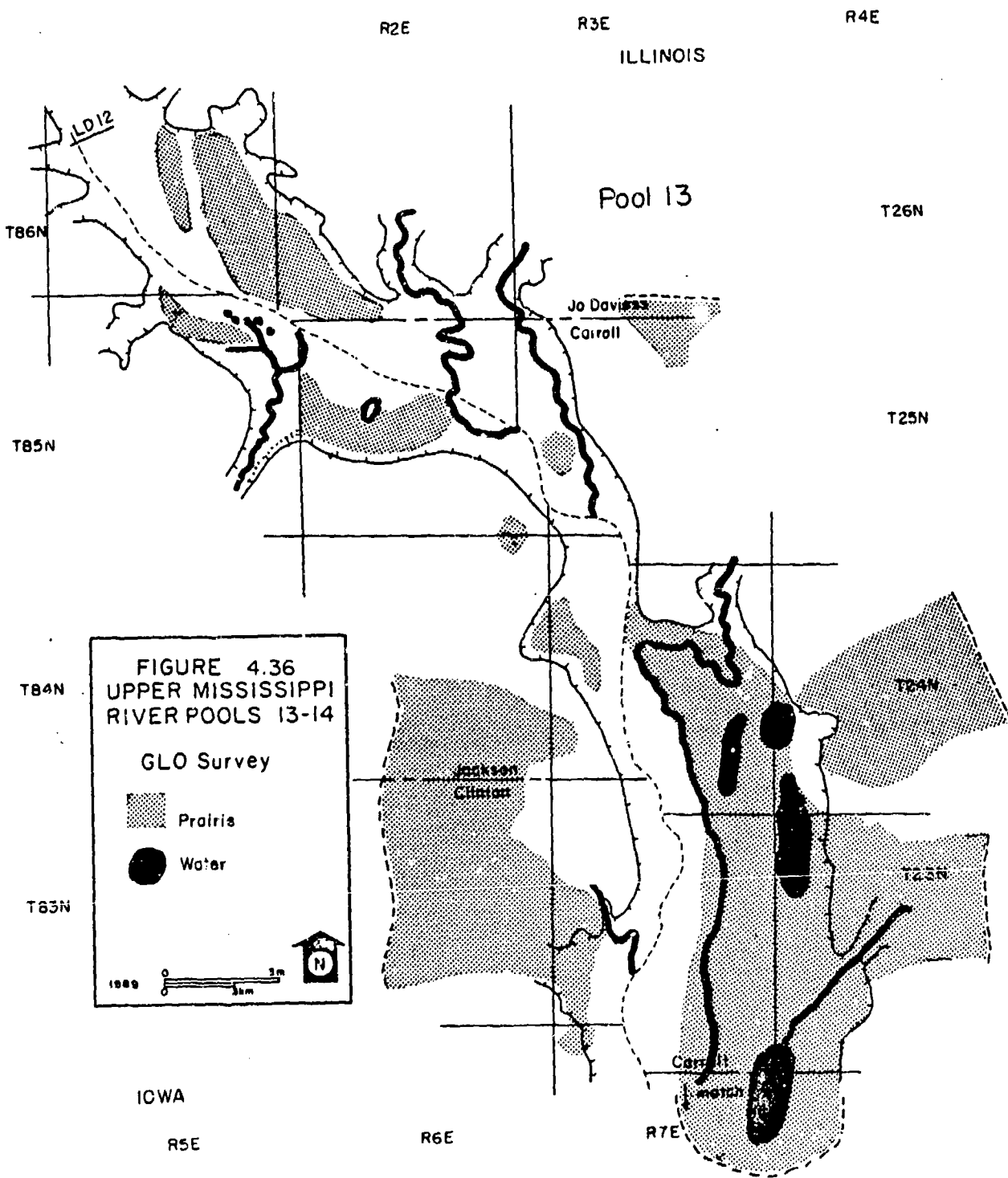
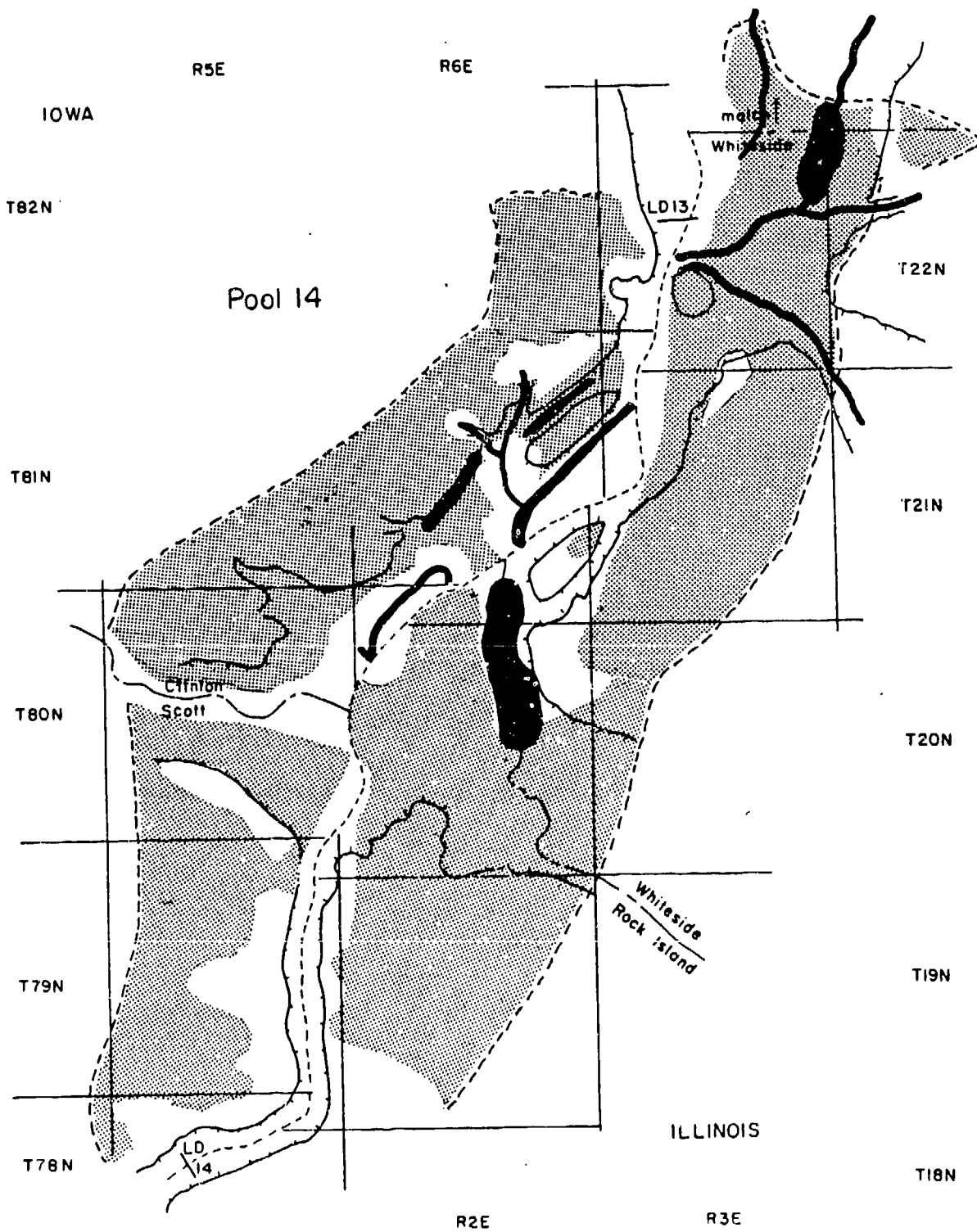


Figure 4.35: Cutbank in lower Beaver Slough showing an early-mid-Holocene soil beneath spoil sand.





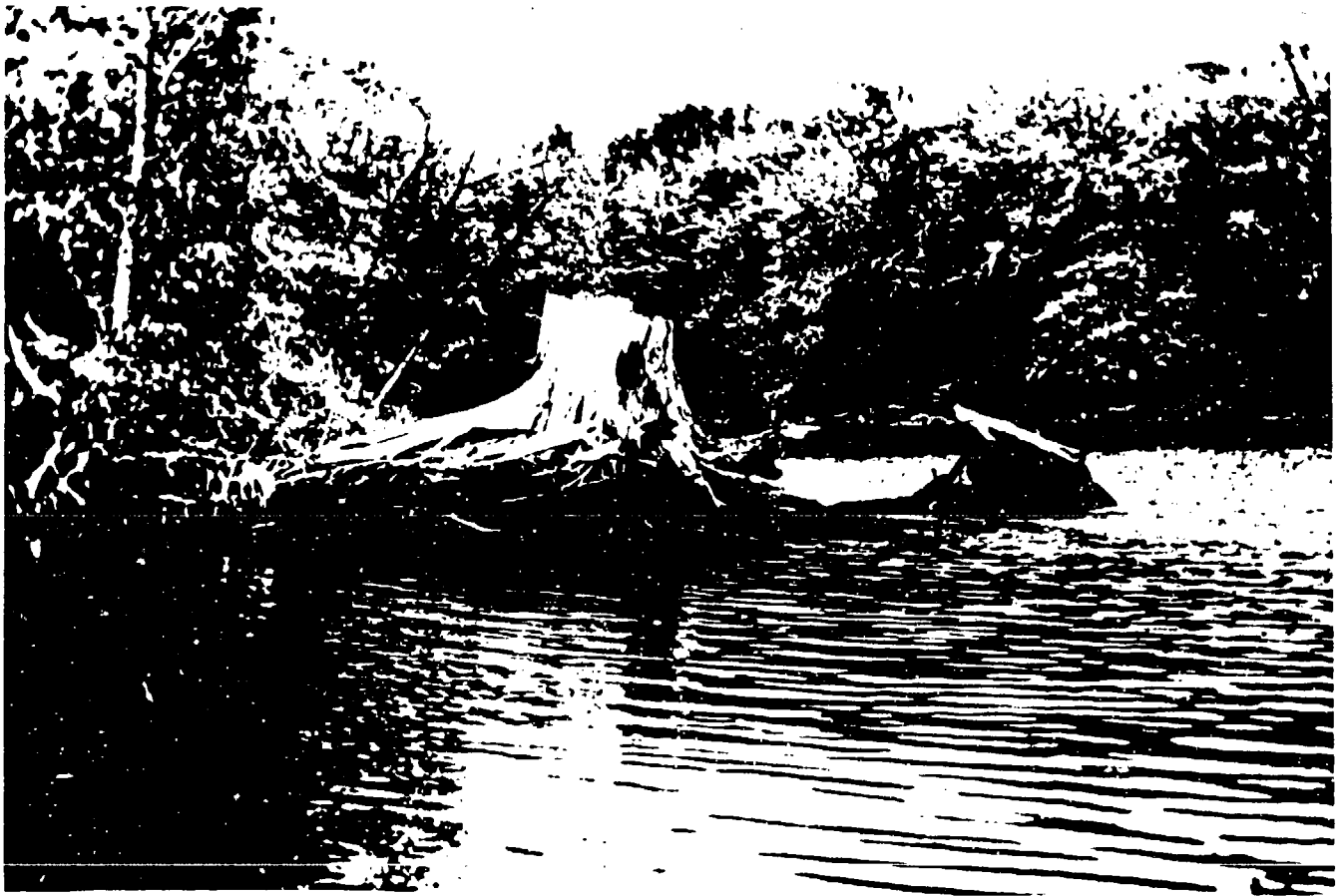


Figure 4.37: Tree stumps marking the pre-settlement surface (right) and the top of PSA overburden (left) at the mouth of the Shaffton access on Schricker Slough, Pool 14.

R2E

R3E

R4E

ILLINOIS

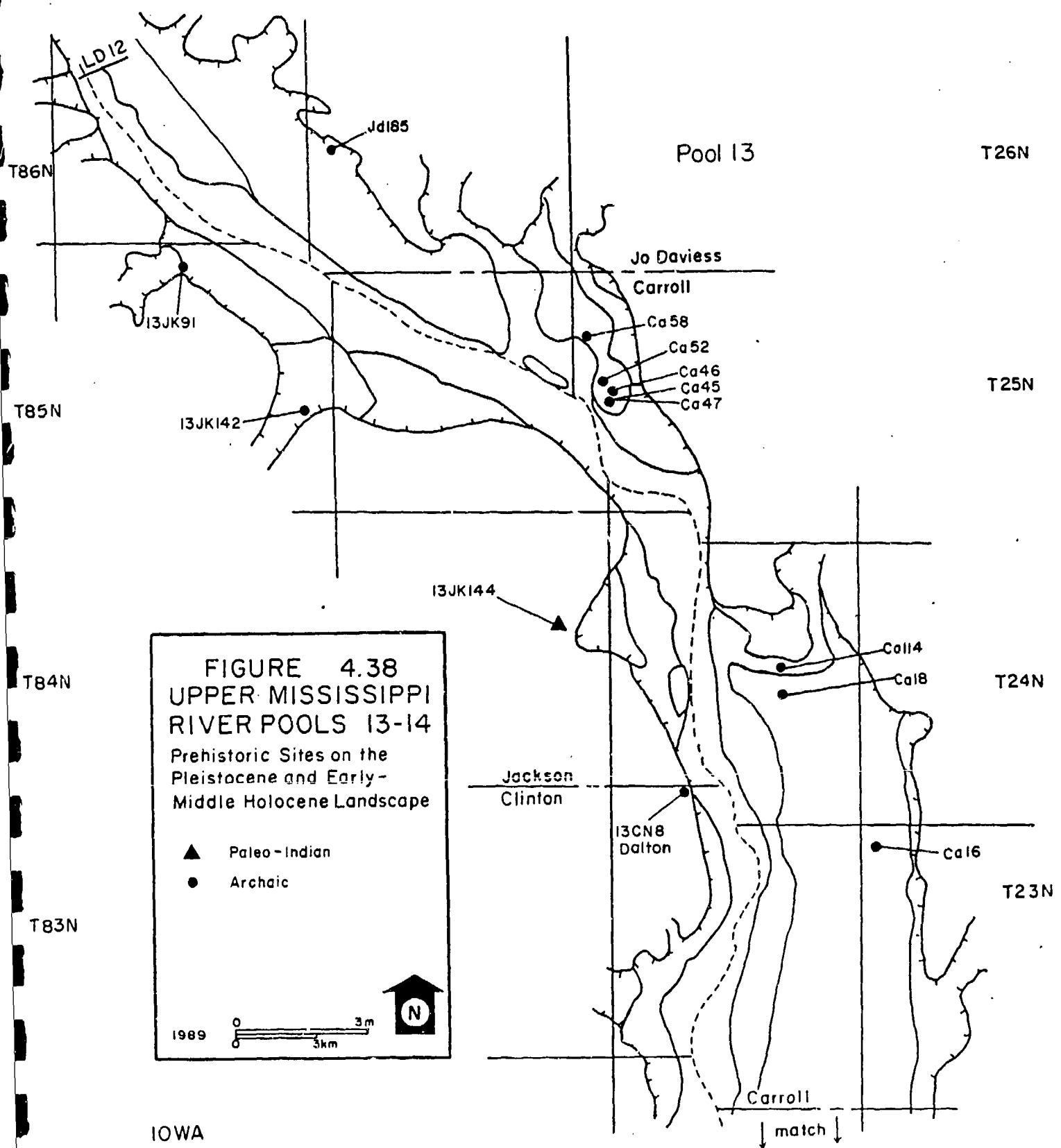


FIGURE 4.38
UPPER MISSISSIPPI
RIVER POOLS 13-14
 Prehistoric Sites on the
 Pleistocene and Early-
 Middle Holocene Landscape

- ▲ Paleo-Indian
- Archaic

1989

0 3m
 0 3km

N

IOWA

R5E

R6E

R5E

R6E

IOWA

match ↑
Whiteside

T82N

LD13

T22N

Pool 14

T81N

I3CN61

Wt III

T21N

Wt 53

Wt 57

T80N

Clinton
Scott

T20N

T79N

I3ST90

Whiteside
Rock Island

T19N

I3ST92
Folson

ILLINOIS

T78N

LD
14

T18N

R2E

R3E

R2E

R3E

R4E

ILLINOIS

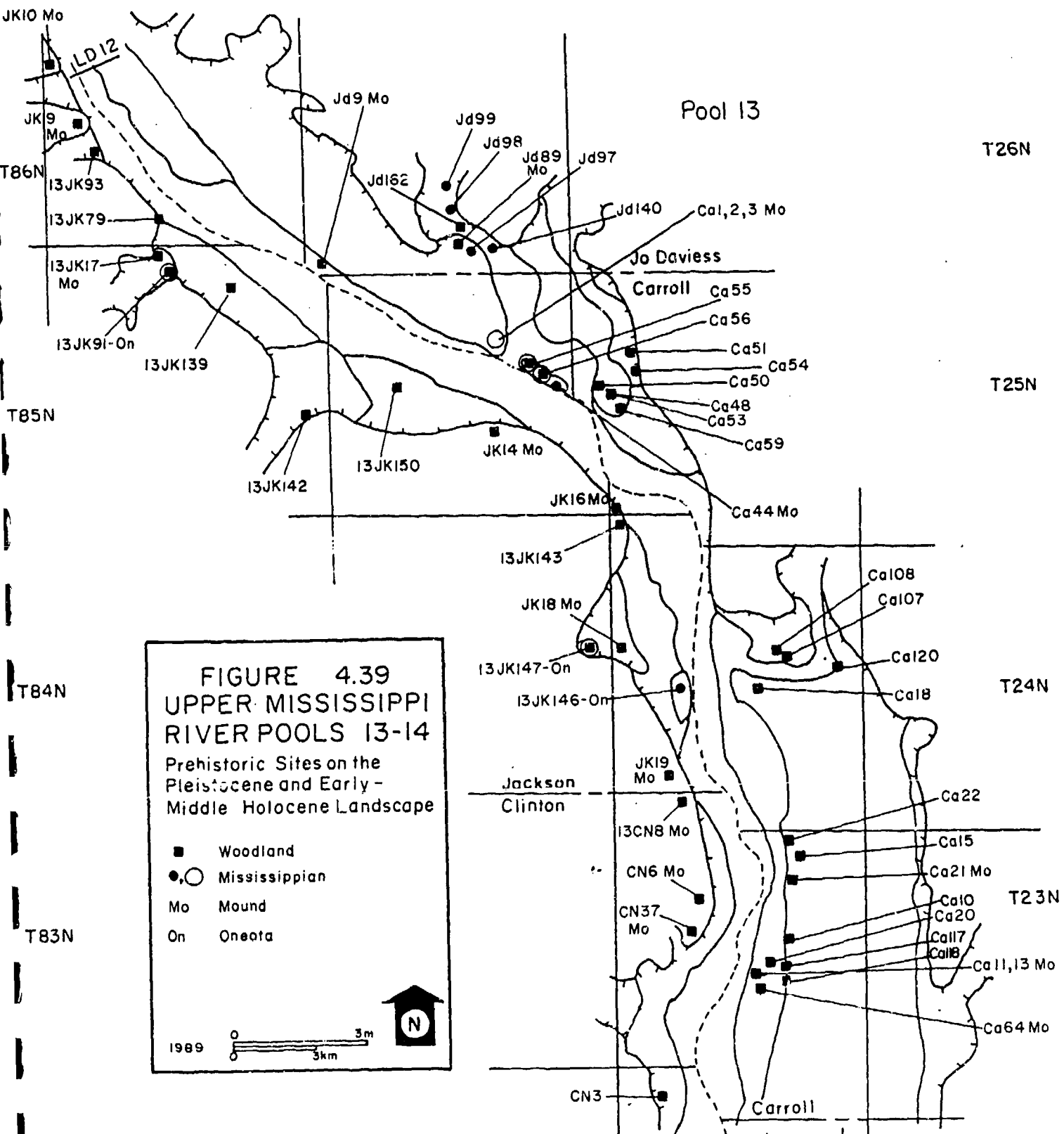


FIGURE 4.39
UPPER MISSISSIPPI
RIVER POOLS 13-14
 Prehistoric Sites on the
 Pleistocene and Early -
 Middle Holocene Landscape

- Woodland
- , ○ Mississippian
- Mo Mound
- On Oneota

1989

0 3m
0 3km

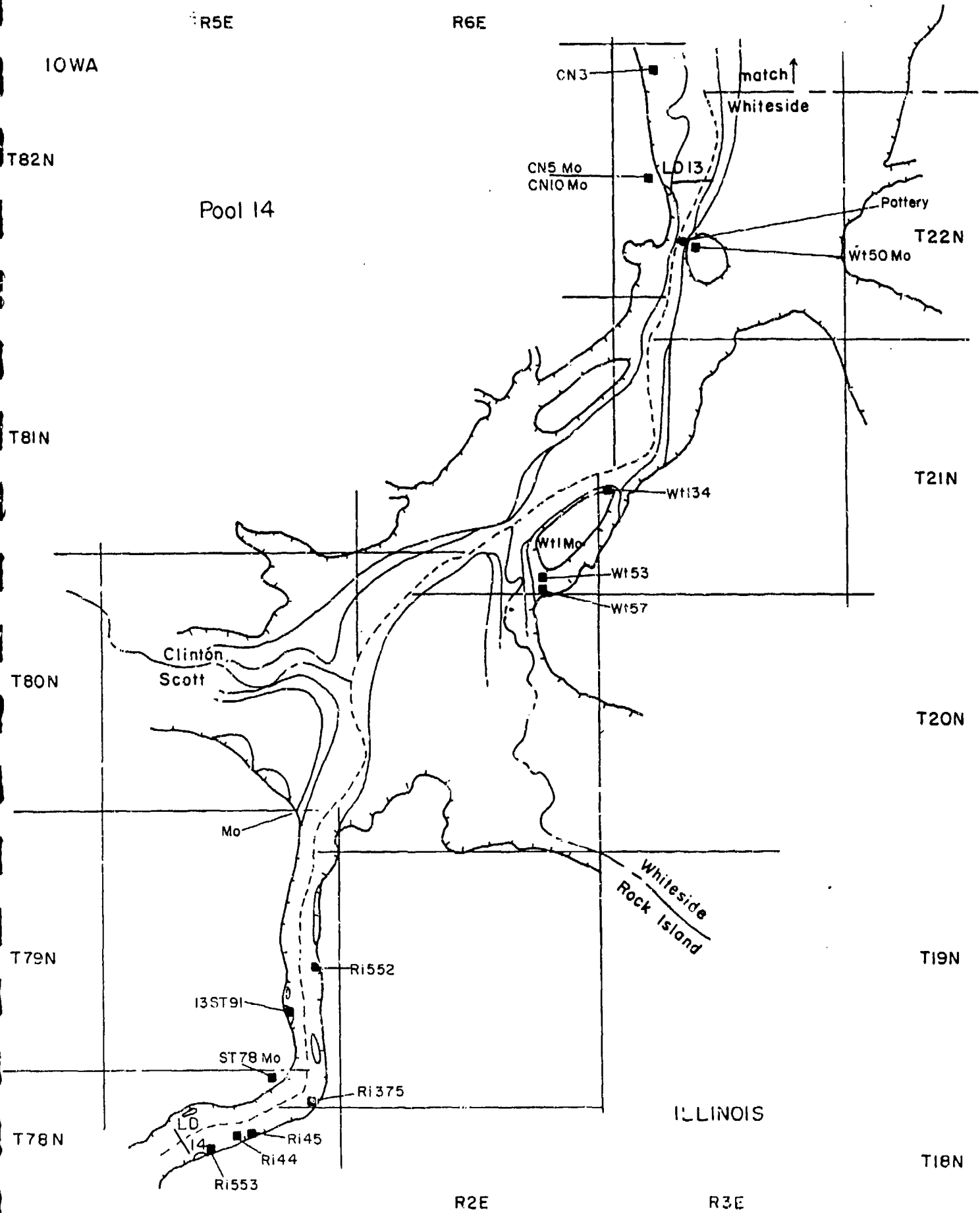
N

IOWA

R5E

R6E

R7E



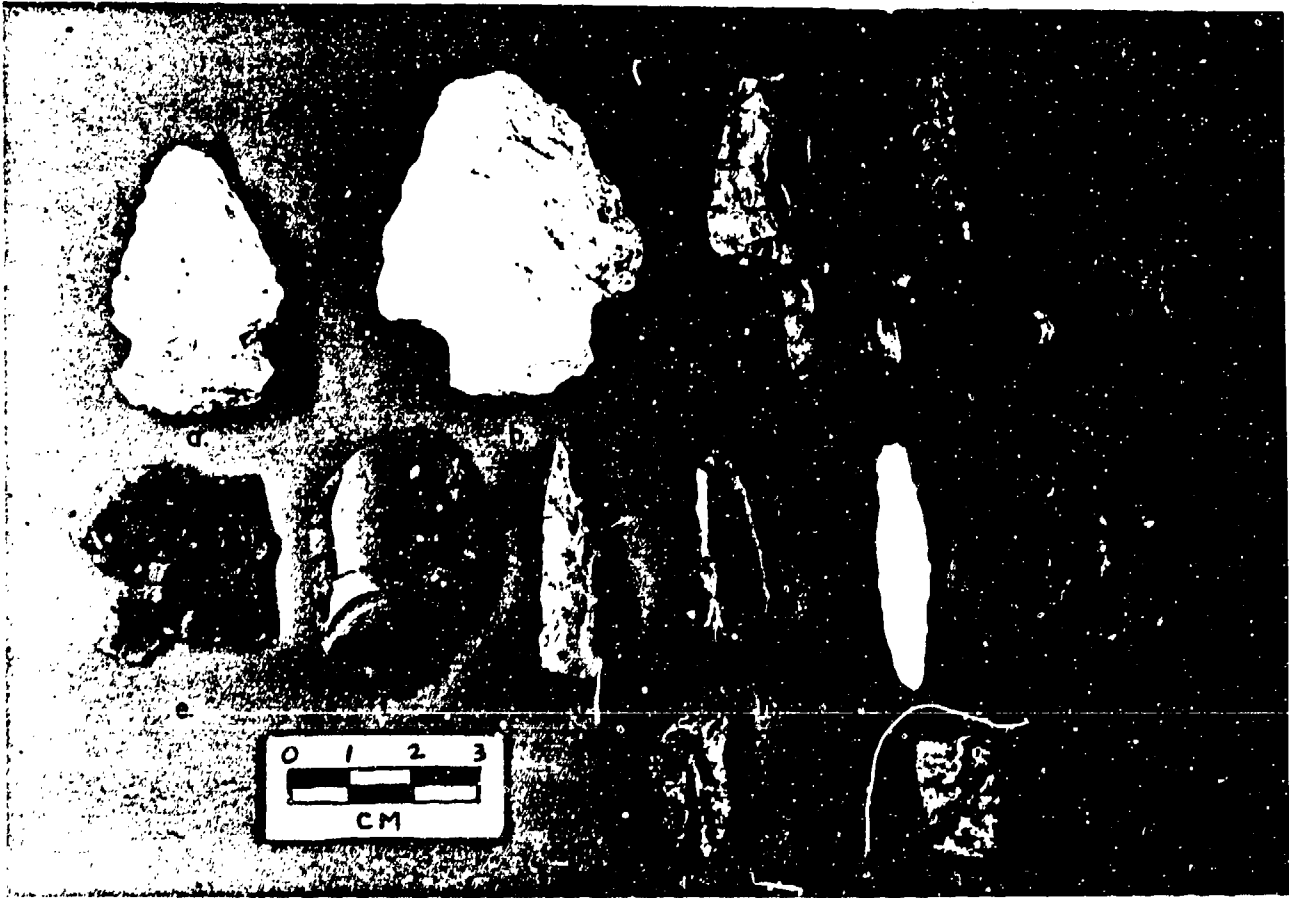


Figure 4.40: Middle Woodland period artifacts from 11Ca10 (private collection): a,b) retouched Manker points made from Burlington chert; c) Dickson point made from Cobden chert; d) side notched obsidian point fragment; e) Knife River Flint flake; f) Cobden chert side scraper; g) Cobden chipped stone drill; h,i,j) drills on blades made from Cobden chert, Burlington chert and obsidian; k,l) fragments of sheet copper (cones?).

V
PROJECT SUMMARY & RECOMMENDATIONS

by
David W. Benn, Robert C. Vogel
& Jeffrey D. Anderson

This is the place where results of the Pools 13-14 survey project are evaluated and recommendations for future investigations are formulated. We undertake evaluations of this project with suggestions from our previous project in mind. The Pools 17-18 survey project yielded a detailed set of observations about site preservation and recommendations for future research topics (Benn, Bettis and Vogel 1988:320-328) which we would apply to the Pools 13-14 area without alteration. The following evaluations and recommendations relate to specific findings and conditions in Pools 13-14.

Evaluation of Project Goals

The list of project goals for Pools 13-14 (Chapter 1 and Appendix A) was nearly the same as the goals for the Pools 17-18 project. In fact, the Pools 13-14 proposal called for direct comparison of the results from the preceding project. This is done in the following paragraphs.

- a) Geological literature search: The landscapes in Pools 13-14 presented no surprises to the writers. A generalized model of Pleistocene and Holocene landforms had formed in our* minds from previous experiences along the Upper Mississippi River valley and from information available in the literature. The Pools 13-14 area conformed to this intuitive model, with deviations occurring only because of local valley morphology and proximity to tributary streams.
- b) Landform Model: The Pools 13-14 landform model defines a generalized set of landforms with broad lithostratigraphic definitions and temporal parameters. The dichotomy between Wisconsinan and Holocene sediment packages is recognized. One factor inhibiting complete development of the Pools 13-14 model is the extent of inundated surfaces in the lower half of Pools 13, where the best exposures of surfaces of all ages occur.

* J. Anderson, E.A. Bettis III, D.W. Benn

- c) Wisconsin Landscapes: Comparable Wisconsin landforms were found in Pools 13-14 and 17-18. Radiocarbon dates and surficial features associated with these landforms also are similar, as is the presence of a buried erosional surface of late Wisconsin age. All of the features of the Wisconsin landscape are easily recognized by visual inspection of locations in Pools 13-14, although solid core drilling is still the most effective method for obtaining stratigraphic data and material for radiocarbon dating.
- d) Pedogenic Horizons and Radiocarbon Dating: Characteristic soil types, degrees of pedogenesis and relative dates based on soil profile development were found to be very similar in Pools 13-14 and 17-18. Again, there were no surprises in the Pools 13-14 data. The Odessa soil sequence noted in Pools 17-18 is traced throughout the Upper Mississippi River from Pools 13-14 to Pool 22 and is often observed around the mouths of major tributaries. Identification of soil characteristics in the Pools 13-14 project was hampered by permanently inundated landscapes and periods of high water. Certainly the presence of more leveed areas in Pools 17-18 contributed to a more wide ranging analysis of soil horizons than in Pools 13-14.
- e) Alluvial Fans and Colluvial Slopes: Fans and colluvial slopes in Pools 13-14 tended to consist of historic alluvium and PSA when they were adjacent to the impounded waters (i.e., in Upper and Lower Brown's lakes on or near government property). This is a different condition than we observed in Pools 17-18, where both early-middle and late Holocene fans were cored and dated. Similar fans and colluvial slopes exist in Pools 13-14; they merely are beyond the limits of government property and were not extensively investigated during the project.
- f) Dunes and Blow-sands: These features were observed and mapped in Pools 13-14 but were not investigated. They lie outside the limits of government property in areas which are heavily developed (e.g., Thomson area) or are off-limits to COE survey teams (e.g., Savanna Depot). Sand formations of Wisconsin terraces appear to be comparable in every respect to the ones encountered in Pools 17-18.
- g) Post-settlement Alluvium: The pre-settlement surface with tree stumps and a layer of PSA were observed in the same patterns in Pools 13-14, 17-18 and 21-22. There is a more generalized distribution and tendency for thicker PSA in Pools 13-14 owing to the relative narrowness of the valley and to the larger number of tributary streams which empty into this reach of the Mississippi River. However, relative depth of PSA was not a factor that significantly affected the outcome of the Pools 13-14 survey. The pre-settlement surface was characterized everywhere by the presence of stumps, which were too often found at or near the water level to indicate a

submerged pre-settlement landscape. Inundation of pre-settlement landscapes is a factor which affected the Pools 13-14 survey results.

- h) Survey of COE Properties: An important methodology in the Pools 13-14 project involved dividing the valley floor into zones reflecting conditions of site preservation and types of anticipated site impacts and surveying these zones with appropriate methods. For instance, boat and shoreline surveys were employed along high terrace exposures where development had encroached upon archaeological sites, and pedestrian survey with shovel-testing was utilized only on the surfaces of older landforms where FSA was negligible. This method of stratifying the survey area according to geomorphic factors and modern surface conditions allowed the survey to cover sample areas in all portions of the government property.
- i) Horizontal and Vertical Accretionary Deposits: These deposits are typical of the late Holocene period in Pools 13-14. Sediments of this age are very complex and impossible to analyze without extensive surveys. The vast majority of these deposits are inundated in Pools 13-14, although a large sample is available in the Savanna Depot tract. Therefore, our survey was not able to obtain an adequate sample of late prehistoric landscapes and inclusive sites.
- j) Historic Sites: Archival searches produced a list of potential historic locations, a few of which were located on government property. [Most of the significant historic sites are not on government land.] The survey attempted to locate some of the archival sites without success. In particular, two days were expended searching and digging for the historic Sauk village on the Wapsipinicon.
- k) Literature Search and Private Collections: These resources yielded almost all of the diagnostic information about prehistoric remains in the project area. Contrasting with the small amount of cultural information obtained from surveys on government land, the information contained in site records and provided by local informants proved to have great potential for assisting in the reconstruction of the prehistoric culture history of the Pools 13-14 area.
- l) Landscape/Site Distribution Model: Pools 13-14 yielded so few diagnostic sites on government property that the resultant landscape/site distribution model could not be developed with the same degree of sophistication achieved in Pools 17-18. By this turn of events we are relegated to borrowing the Pools 17-18 conclusions to analyze the meager Pools 13-14 data.
- m) Sites in the Floodplain: The survey yielded only a few sites in the floodplain. Too few sites were located to form patterns. The negative survey evidence, however, is significant. The site distributions among the sloughs north

of the Wapsipinicon and Maquoketa rivers and along Crooked Slough are not dense when compared, for instance, with the high density of sites in the Odessa tract in Pool 17 (Benn, Bettis and Vogel 1988). We conclude from the results of both surveys that the presence of backwater lakes and sloughs does not guarantee the existence of large numbers of archaeological sites.

Recommendations

Future investigations include recommendations for the prompt mitigation of site impacts as well as long-term research investigations. The following recommendations apply to Pools 13-14 but are logical extensions of the recommendations for Pools 17-18 (Benn, Bettis and Vogel 1988:328-338). Recommendations are subdivided by the three disciplines in this report.

prehistoric archaeology:

1) Pool Surveys: In contracting for future pool surveys the COE should attempt to have the geological model and historic archival research accomplished before any of the archaeological work (i.e., literature search, fieldwork) is initiated. This procedure would set the parameters for the archaeological investigation, which can have different problem orientations in the various Mississippi River pools. Another advantage to having the geologic and historic studies done is that the field archaeologist survey specific locations for particular types of sites. When the archaeological contract is sealed, the investigator should reconnoiter the project area before formulating the goals of the research design. The project research design would then be tailored to the specific conditions and problems within the pool.

2) Middle Woodland Period Study: From the site records review in Iowa and Illinois and from interviews with local collectors it is plain that the Pools 13-14 area contains an important Middle Woodland period manifestation. People of the Havana tradition in the area participated in the pan-continental interaction sphere, and local villages were possibly linked in social and economic ways. There may be significant differences between culture types on the Illinois and Iowa sides of the river; furthermore, a cultural division could exist between the northern and southern areas on the Iowa side. Private collections contain enough information for a detailed investigation of these research issues. Priority must be given to studying Budd Hansen's materials from Albany and to establishing the state of preservation of Middle Woodland sites west and north of Thomson, Illinois.

3) Sauk Village 13CN36: Identification of the Historic Sauk village at the mouth of the Wapsipinicon River should be a

priority for intensive archival and archaeological investigation. Historic Sauk and Fox village sites are extremely rare, and if identified and excavated, the Wapsipinicon site would have to be regarded as one of the most valuable scientific resources in the region. The archival research effort should be focused, at least initially, on documenting the presence of native American Indians in the vicinity during the post-1828 period, then working backward in time. The key to locating the site may well be found in the papers of the fur trading firm of Farnham and Davenport; archival research will have to focus on the Davenport Papers, the Chouteau Papers, and the archives of the American Fur Company. An understanding of the physical geography and human adjustments to landscape and environmental changes over time will provide researchers with a more fine-tuned context for the site.

4) Early Recreation Period Sites: Many potential site locations representing early recreation on the Mississippi River (e.g., summer houses, boat docks, businesses) were noted in the archival records in Pools 13-14. One archaeological site, 13CN60, was identified. Before such sites are processed piecemeal by the cultural resource management system, a theme accounting for the significance of the period of early recreational development should be developed. No such theme exists in the Iowa state plan (Henning 1985).

5) Intensive Surveys: Three areas in Pool 13 contain many potentially significant cultural resources which could not be thoroughly evaluated during the 1988-89 survey. Sites are being impacted by shoreline erosion and fluctuating water levels in the three areas, and by military activities on the Savanna Army Depot. The areas recommended for intensive survey are:

Thomson Survey: This survey should cover the shoreline from Lock and Dam 13 to the sloughs west and north of Thomson, including Potters Island. Woodfordian sand terraces are the primary landforms in this reach. Recorded sites in the survey zone are 11Ca10, 11Ca11, 11Ca13, 11Ca20, 11Ca21, 11Ca64, 11Ca117 and 11Ca118. The shoreline in this reach has receded 20-30m or more due to erosion from waves driven by westerly winds.

Spring Lake Survey: Woodfordian terraces and sand ridges in Spring Lake contain unrecorded sites, which are being collected by local people as they erode. The recorded sites are 11Ca18, 11Ca112 and 11Ca114. Government property (Fish and Wildlife Service, COE) within and around the Spring Lake levee has not been thoroughly surveyed. The entire area should be intensively surveyed to assess the condition of sites and their potential for future research.

Savanna Army Depot Survey: This property is not under COE jurisdiction. Appropriate federal agencies should initiate a comprehensive survey of all Depot properties, including not only the Woodfordian terrace, where all previously recorded

sites are placed, but also the floodplain, where the 1988-89 SMSU survey located three sites (11Jd182, -183, -184).

6) Site Impacts: The text of chapter IV included recommendations for the treatment of individual sites in Pools 13-14. Those recommendations are summarized below for sites located on government property.

Impacted (damaged) Sites; Not Potentially Significant; No Investigations Recommended

13ST91
13CN56
11R1551
11Wt236
11Jd183
11Jd184

Partially Damaged Sites Not Being Impacted at the Present Time; May Contain Significant Research Potential; No Investigations Recommended Unless Impact Status Changes

13CN58
13JK148
11R1553

Undamaged Sites; No Current Impacts; May Contain Potentially Significant Information; No Investigations Recommended Unless Impact Status Changes

13ST84
13CN59
13JK93
13JK138
13JK141
11CA113

Potentially Significant Sites; Currently Being Impacted; Phase II Testing Recommended

11R1375 priority status 1
11R1550 priority status 1
11R1538 priority status 1
11Ca44 priority status 1 (with mounds)
13CN55 priority status 1
13CN57 priority status 2
13JK137 priority status 2
13JK139 priority status 2
13JK140 priority status 2
13JK150 priority status 2
13CN60 may be tested when Early Recreation Theme is developed

priority 1: severe erosion, buried material in situ.
priority 2: slow-moderate erosion or plowing, cultural stratigraphy uncertain.

Sites Determined Eligible for the NRHP

- 11Ca11 Thomson Causeway site (Esarey and Carlson 1983)
- 13JK79 Pleasant Creek site (Johnson et al. 1985)

Sites Tested and Determined Ineligible for the NRHP

- 13CN3 Bulger Hollow (Johnson et al. 1985 & this report)
- 13JK107 (Anderson and Green, 1988 & this report)
- 11R1515 (Johnson et al. 1985)
- 11Ca20 (Corps of Engineers 1984)

7) Timber Parcel Survey: Survey of large portions of both parcels yielded 10 archaeological sites (13CN36, CN55, CN56, CN57, CN59, CN60, JK136, JK139, JK140, JK141; Figs. 4.4a,b, 4.6, 4.10, 4.11). More sites could be located in these parcels using very intensive survey techniques (e.g., close interval shovel-testing), since thick vegetation inhibits the effectiveness of broad-based surveys, like the Pools 13-14 project. The majority of known sites probably would not be significantly affected by timber removal activities, which disturb only small, shallow sections of the ground surface. Prehistoric sites tend to be buried beneath the surface soil layer (e.g., at the A/B horizon boundary or in buried soils). However, site impacts due to timbering have not been observed and evaluated. This should be accomplished by monitoring timber removal from selected tracts where sites are known to exist.

historic research:

8) Archival Materials: As in the survey of Pools 17 and 18 (see Benn, Bettis & Vogel 1988), the present archival investigation pointed out major gaps in the historic archaeological data base for the Upper Mississippi Valley. The time span for the historic period in the region runs through three centuries and its geography is extremely diverse. The range of potential sources of contextual and site specific archival data is extensive, but they are widely dispersed, and many of these source materials have been largely neglected by the historians working in the region. The historiography of the alluvial valley is underdeveloped, especially when compared to other regions of the United States -- indeed, CRM studies would appear to afford excellent opportunities for original research, a fact which is at the same time both heartening and yet maddening.

At the head of the list of untapped collections of archival materials pertaining to the Upper Mississippi must come the working papers and official reports generated by the United States government agencies active along the river: e.g., the correspondence and reports of officers stationed at the various military facilities on the river, deposited in the Old Military Records Division of the National Archives; the textual records of the Rock Island and St. Paul districts of the U. S. Army Corps of Engineers, the agency letterbooks of the Bureau of Indian Affairs and its War Department predecessor, and the cartographic records

of the U. S. Topographical Engineers, also located in the National Archives; the unpublished files of the Works Projects Administration in the various states; and the extensive map collections of the Library of Congress. There are also several significant microfilm collections of French, Spanish, and British colonial documents relating to the Mississippi Valley held by depositories located in the United States; the foreign repositories should be thoroughly searched. Finally, a major effort should be made to locate and examine collections of documents relevant to the Upper Mississippi Valley fur trade; the principal depositories for this material would seem to be the Public Archives of Canada in Ottawa, the New York State Historical Society in Albany, the Missouri Historical Society in St. Louis, and the Newberry Library in Chicago. Other libraries, such as the Bancroft Library at the University of California and the John Carter Brown Library at Brown University, also may possess significant Upper Mississippi Valley materials among their special collections.

9) Fur Trade: There is no adequate history of the fur trade on the Upper Mississippi between the Illinois River and Prairie du Chien, nor a useful history of the Farnham-Davenport outfit of the American Fur Company. Almost all of the pool surveys completed in the Rock Island District have identified potential fur trade sites, but documentation has been based on secondary sources in almost every case. These sites have the potential to yield significant information about the frontier economy of the Upper Mississippi Valley and about Indian-European relations. Research should refine an historic context or contexts for fur trade sites and compile site specific data.

10) Historic Resource Management Plan: The Rock Island District Corps of Engineers needs to develop a comprehensive cultural resource management plan for historic archaeological sites located on lands under its jurisdiction. This plan should take the format of a series of historic contexts which correspond to major themes in regional (i.e., Rock Island District) as well as local (i.e., pool) history. The plan should establish district-wide research and preservation priorities. The Corps may also wish to consider playing a more active role in the formulation of statewide preservation plans.

geomorphology:

11) Modelling: We recommend modifying the approach to geomorphological modelling for archaeological surveys in pools of the Upper Mississippi River valley. The geomorphological studies in Pools 13-14, 17-18 and 21-22 were generously funded and produced a great deal of the basic information (e.g., radiocarbon dates, landform maps, soil patterns) necessary for general modelling of the valley landforms. We know, for example, the essential parameters of landforms above and below the Port Byron and Andalusia gorges and the nature of the broad floodplain south

of the Des Moines River. To date, we know that late glacial episodes of valley alluviation with subsequent incision from catastrophic drainage occurred throughout the Upper Mississippi basin. The impact of upstream glacial events on downstream valley evolution in specific reaches varies. Some reaches of the river have few late Woodfordian terraces preserved along valley margins, whereas other reaches show multiple late Woodfordian terrace development. Some reaches were deeply incised, while others were not. Following waning glacial events around 9500 B.P., local valley parameters, including a strong influence by local tributaries, were superimposed upon the late glacial landscape. The shift from upstream glacial influences to local processes is now well documented through radiocarbon dating and relative soil profile development on Holocene surfaces. The nature of PSA and the pre-settlement surface also are understood.

Adding the data from previous studies in Pools 10, 21 and 22, it is possible now to construct general landform maps for every Upper Mississippi pool. The tools needed to do overview mapping of all pools would include good photo coverage (e.g., color infrared, black and white Soil Conservation Service) of each pool, soil survey maps, GLO and Mississippi River Commission maps and a reconnaissance of selected landforms in each pool to provide "ground truthing" for the study. It should be possible to identify Holocene fans, early, middle and late Holocene main valley surfaces, and PSA thicknesses. With overview mapping accomplished in every pool, archaeological surveys could enter individual pools with a research design geared to specific landforms and surface conditions. Any additional geologic investigation should emphasize fine tuning previous studies by focusing on specific early Holocene problems. For instance, periods of lateral reworking or abandonment and changes in channel morphology (i.e., suspended/meandering to mixed load/braided channel types) could be addressed and better documented. This would involve additional deep coring and recovery of radiocarbon samples for dating.

GLOSSARY

- ALLUVIUM: sediment deposited by running water, rainsplash and gully-wall slumping.
- ALLUVIAL FAN: a cone-shaped landform developing where a small stream abruptly descends to a lower surface of flatter gradient; fans form where streams lack the competence (energy) to transport sediment load.
- ALLUVIAL FILL: alluvium representing a lithologically distinct stratigraphic unit or period of time.
- BASE CAMP: (archaeological) habitation area occupied for an extended period of time and containing evidence of many domestic activities.
- BENCH: an elevated, fluvially cut surface mantled with a thin veneer of alluvium.
- BETA-B LAMELLAE: mineral stains left in sediments by fluctuations of the water table.
- B.P.: radiocarbon years before present (1950); also A.D. (after Christ), B.C. (before Christ).
- CHANNEL SCAR: swale or groove in sediments representing a former stream or river channel.
- CLAST: a rock larger than pebble size.
- COLLUVIUM: material transported primarily by gravity.
- COMPONENT: (archaeological) the smallest discrete array of artifactual materials representing human activity at a site.
- DECORTICATION: removal of weathered rind from the surface of lithic material (as in decortication of a chert cobble).
- ESCARPMENT/SCARP: a short, steep slope usually separating inset surfaces of different age.
- FIRE-CRACKED ROCK (FCR): rocks showing evidence of thermal alteration in the form of splitting, spalling, color changes and crumbling.
- FLAKE: the product of controlled chipping of stone, usually chert; decortication flakes = removal of cortex; primary flakes=first (largest) flakes without cortex removed from the stone core; secondary flakes=smaller biproducts from thinning an artifact; tertiary flakes=fine pressure retouch biproducts from trimming edges of artifacts.
- FLUVIAL SYSTEM: the physical system through which water and sediment are transported from source areas to areas of deposition.
- GULLY: a near-vertical walled channel belt entrenched in a valley floor and containing an ephemeral stream.
- HEADWALL: the upvalley end of a gully, including a plunge pool and overfall.
- HOLOCENE: the period of time since 10,500 B.P., encompassing adjustments of landscapes to post-glacial environments.
- INSET TERRACE: remnants of the former valley floor left along valley margins; formed by successive episodes of vertical and lateral erosion.
- KNICK/KNICKPOINT: a relatively sharp change in valley gradient where water collects and flows.

LEVEE: a ridge of overbank sediment on a terrace surface adjacent to the stream or former river channel.
LOESS: a wind-deposited sediment of dominately silt-sized particles; may contain significant amounts of sand-sized particles locally.
PALEOSOL: a soil that formed on a landscape and was buried by younger materials.
PEDOGENESIS: physical, chemical and biological alteration of the upper portion of a deposit resulting in development of soil horizons.
PERIOD: (archaeological) a stage of cultural development given chronological limits.
PHASE: (archaeological) a group of sites with similar contents and dating to a limited period of time (sites are assumed to have represented an interacting population).
POINT BAR: lateral accretion deposits of sand- and pebble-sized particles on the inside of a curve in a river or stream channel; point bar deposits can underlie terraces.
SCARP: see escarpment.
SIDEVALLEY: a much smaller valley relative to the main valley stem it empties into.
SITE: a bounded area of space containing remains of human presence; sites are accessioned by the Smithsonian Trinomial System (e.g. in 13PK156, 13=Iowa; PK=Polk County; 156=site number in that county).
SOIL HORIZONS: a recognizable zone in soil where certain weathering phenomena dominate and result in a distinctive morphology.
SOLUM: the A and B soil horizons.
STRATIGRAPHY: a sequence of superimposed sediments.
TERRACE: alluvial sediments representing a former floodplain level of the fluvial system; in the project area terraces are composed of DeForest Formation alluvium.
THALWEG: primary (deepest) flow line in a stream channel.
TILL: nonstratified and poorly sorted loam to clay loam sediment deposited by a glacier.
TRADITION: large groups of sites (more than one phase) representing long-term continuity of artifact styles and subsistence patterns.
UNCONFORMITY: a time of non-deposition or erosion; used here to imply something is missing.
WARE: (archaeological) a group of potteries that are similar because of the same manufacturing techniques, shapes and surface finishes.
WISCONSINAN: a geological period covering the most recent episode of glaciation in North America (ca. 70,000-10,500 B.P.).

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- ROGERS, LEAH D., D.G. STANLEY, J.D. ANDERSON, 1987, Archaeological Testing NRHP Eligibility Determination and Impact Assessment, Lake Red Rock, Iowa Pool Raise Project, American Resources Group Cultural Resource Management Report, No. 127, U.S. Corps of Engineers Contract No. DACW25-87-C-0016, September, 1987.
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ANNOTATED BIBLIOGRAPHIC REFERENCES TO ARCHIVAL SOURCES

Background Information

The sources listed below provided the starting point for the archival research. A large number of reports of previous investigations were consulted for contextual and site specific data, as well as background on survey and planning methodology. The materials listed below are those which proved most helpful in laying the groundwork for the present study.

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1986 Geomorphological Investigations: Mississippi River Pool 21, Illinois and Missouri, with Archaeological and Historical Overviews. Donohue & Associates, Sheboygan, WI. [Presents a general regional framework for identifying and evaluating historic archaeological sites (pp. 16-30); cf. Benn, Bettis & Vogel (1988) and Rogers and Vogel (1989).]
- Barnhardt, Michael L., et al.
1983 Preliminary Cultural Resource Survey and Geomorphological Assessment of Selected Areas in Navigation Pool 16, Mississippi River. The Wisconsin Archaeologist 64:9-110.
- Benn, David W., E. Arthur Bettis III, and Robert C. Vogel
1988 Archaeology and Geomorphology in Pools 17 & 18, Upper Mississippi River. 2 vols. Center for Archaeological Research, Springfield, Missouri. [Report prepared for the Rock Island District Corps of Engineers, includes regional and local historic contexts (pp. 228-315); cf. Anderson, Green & Vogel (1988) and Rogers and Vogel (1989).]
- Great Lakes Archaeological Research Center
1982 Introduction and Narrative, in Cultural Resources Literature Search and Records Review, Upper Mississippi River Basin, Vol. 1. Waukesha, Wisconsin. [Part of a report prepared for the St. Paul District Corps of Engineers, it contains a fairly detailed summary of regional history drawn from published sources.]
- National Park Service (NPS)
1983 Secretary of the Interior's Standards and Guidelines for Preservation Planning, Identification, Evaluation, and Registration. Federal Register 48:44716-44728. [Basic standards for federal CRM studies.]

Rogers, Leah D., and Robert C. Vogel
1989 Allamakee County, Iowa, Historic Archeology Overview. Bear Creek Archeology, Decorah, Iowa. [Report for the Allamakee County HPC develops a contextual approach to historic archaeological resources; cf. Benn, Bettis & Vogel (1988), Anderson, Green & Vogel (1988).]

Stipe, Robert E., and Antoinette J. Lee (eds.)
1987 The American Mosaic: Preserving a Nation's Heritage. National Trust for Historic Preservation, Washington. [Basic primer on CRM and historic preservation in U.S.]

Overview of Upper Mississippi Valley History

The following list of sources is not meant to comprise an exhaustive list of primary and secondary sources: such an encyclopedic treatment of the historical, geographical, and ethnological literature would be a gigantic task. Suffice it here simply to note the sources cited in the text, with a sampling of the principal general histories, guides, synthetic, and topical works pertaining to the Upper Mississippi Valley.

Alvord, Clarence Walworth
1920 The Illinois Country, 1673-1818. Illinois State Historical Library, Springfield. [Good general survey of the Upper Mississippi borderlands.]

Belthuis, Lyda
1948 The Lumber Industry in Eastern Iowa. Iowa Journal of History and Politics 46:115-155.

Blaine, Martha Royce
1979 The Ioway Indians. University of Oklahoma Press, Norman. [One of the better tribal histories with a good review of regional history.]

Bogges, Arthur C.
1908 The Settlement of Illinois, 1778-1830. University of Wisconsin Press, Madison. [One of the better traditional studies of the settlement process; cf. Pooley 1908.]

Bogue, Allan G.
1963 From Prairie to Corn Belt: Farming on the Illinois and Iowa Prairies in the Nineteenth Century. University of Chicago Press. [19th century agricultural development in broad historic context.]

- Bond, Beverly W.
1934 The Civilization of the Old Northwest: A Study of Political, Social, and Economic Development, 1788-1812. Macmillan, New York.
- Brown, Ralph H.
1948 Historical Geography of the United States. Harcourt, Brace & World, New York. [The classic work on the subject, with regional studies of the Great Lakes, Mississippi Valley, and bordering areas.]
- Buck, Solon J.
1914 Travel and Description 1765-1865: Together with a List of County Histories, Atlases, and Biographical Collections and a List of Territorial and State Laws. Collections of the Illinois State Historical Society Library, Bibliographical Series Vol. 15. Springfield. [The starting point for both the regional context and local history investigations.]
- Buley, R. Carlyle
1950 The Old Northwest: Pioneer Period, 1815-1840. 2 vols. Clarke, Indianapolis. [A monumental compilation, essential to an understanding of the region.]
- Burghardt, Andrew F.
1959 The Location of River Towns in the Central Lowland of the United States. Association of American Geographers, Annals 49:305-323.
- Carlson, Theodore L.
1951 The Illinois Military Tract: A Study of Land Occupation, Utilization, and Tenure. Illinois Studies in the Social Sciences 32. University of Illinois Press, Urbana.
- Carter, Clarence E. (ed.)
1948-50 The Territory of Illinois. Territorial Papers of the United States, vols. 16 and 17. Government Printing Office, Washington.
- Caruso, John Anthony
1966 The Mississippi Valley Frontier: The Age of French Exploration and Settlement. Bobbs-Merrill, Indianapolis. [The standard synthetic work for the French period, Caruso establishes the historic context for Indian-European relationships.]

- Catlin, George
1841 Letters and Notes on the North American Indians. London. [This magnificent work, widely recognized for its authoritative discussion of native American Indian cultures, is also valuable as a travel narrative; Catlin visited Rock Island in 1836.]
- Ellsworth, H. L.
1837 Illinois in 1837. S. A. Mitchell, Philadelphia. [An early immigrant guidebook.]
- Gerhard, Fred
1857 Illinois As It Is. Keen & Lee, Chicago. [This immigrant guidebook has fairly extensive local history sections.]
- Giraud, Marcel
1958-74 Histoire de la Louisiane française. 4 vols. Presses Universitaires de France, Paris. [The best comprehensive summary of early Mississippi Valley history.]
- Gue, Benjamin F.
1903 History of Iowa. 4 vols. The Century History Co., New York. [Something of an historiographical antique, but still useful.]
- Hagan, William T.
1958 The Sac and Fox Indians. University of Oklahoma Press, Norman. [Superficial treatment of historic Indians in the context of political history.]
- Haites, Erik F., et al.
1975 Western River Transportation: The Era of Early Internal Development, 1810-1860. Johns Hopkins University Press, Baltimore. [A good synthetic work based on a wide range of source materials.]
- Hartman, George B.
1942 The Iowa Sawmill Industry. Iowa Journal of History and Politics 40:52-93.
- Hartsough, Mildred
1934 From Canoe to Steel Barge on the Upper Mississippi. University of Minnesota Press, Minneapolis. [Good historical overview, but barely mentions COE role in changing the river.]

- Hodge, Frederick Webb (ed.)
 1907-11 Handbook of American Indians North of Mexico. 2 vols. U. S. Bureau of American Ethnology Bull. 30. Washington. [Still the fundamental work on native American Indians.]
- Houck, Louis
 1909 The Spanish Regime in Missouri. 2 vols. R. R. Donnelley & Sons, Chicago. [With Kinnaird (1946) and Nasatir (1928-29, 1930, 1931, 1952), the best documentary survey of the Upper Louisiana borderlands, based on the working papers of the Spanish colonial administration.]
- Hubbart, Henry Clyde
 1936 The Older Middle West, 1840-1880: Its Social, Economic, and Political Life and Sectional Tendencies Before, During, and After the Civil War. Appleton-Century, New York. [A pioneering work in regional culture history.]
- Hunter, Louis C.
 1969 Steamboats on the Western Rivers: An Economic and Technological History. Octagon Books, New York. [Probably the best work on the subject.]
- Kaminkow, Marlon J. (ed.)
 1975 United States Local Histories in the Library of Congress. 4 vols. Magna Carta Book Co., Baltimore. [Vols 3 and 4 cover the Upper Mississippi Valley, Iowa, and Illinois. This unique source provided bibliographic control for the archival research in Pools 13 and 14.]
- Kellogg, Louis Phelps
 1925 The French Regime in Wisconsin and the Northwest. State Historical Society of Wisconsin, Madison.
 1935 The British Regime in Wisconsin and the Northwest. State Historical Society of Wisconsin, Madison. [Kellogg's works are classic studies based on exhaustive use of primary documents against a Turnerian backdrop of frontier history.]
- Kinnaird, Larence (ed.)
 1946 Spain in the Mississippi Valley, 1765-1794. 3 vols. American Historical Association, Washington. [Translated documents re: Spanish Louisiana include much Upper Valley material.]

- Lea, Albert M.
1836 Notes onn the Wisconsin Territory: Particularly with Reference to the Iowa District, or Black Hawk Purchase. H. S. Tanner, Philadelphia. [The earliest historical geography of Iowa.]
- Lee, Judson F.
1917-18 Transportation: A Factor in the Development of Northern Illinois Previous to 1860. Illinois State Historical Society Journal 10:17-86. [Waterways, roads, and railroads in the context of regional history.]
- Library of Congress
1950-53 United States Atlases: A List of National, State, County, City, and Regional Atlases in the Library of Congress. Compiled by Clara E. LeGear. 2 vols. Washington.
- Madsen, John
1985 Up on the River. Schocken Books, New York. [Written for a popular audience, this may be the best book about the "personality" of the Upper Mississippi landscape since Mark Twain; very good descriptions of clamming and commercial fishing.]
- Mahoney, Timothy R.
1985 Urban History in a Regional Context: River Towns on the Upper Mississippi, 1840-1860. Journal of American History 72:318-339. [Good discussion of the evolution of river towns.]
- Margry, Pierre (ed.)
1876-86 Memoires et Documents pour servir a l'histoirew des origines Francais des pays d'outre mer... 6 vols. Jouast et Signaux, Paris. [Margry took some liberties with some texts, but this remains the best collection of primary documents about the French regime in the Mississippi Valley.]
- Merrick, George B.
1909 Old Times on the Upper Mississippi. Arthur H. Clarke Co., Cleveland. [Recollections of a mid-19th century steamboat pilot.]
- Murdock, George P. (ed.)
1960 Ethnographic Bibliography of North America. 3rd ed. 3 vols. Human Area Relations File, New Haven. [Bibliographic control for review of literature pertaining to native American Indian groups in the project area.]

- Murray, John J. (ed.)
 1958 The Heritage of the Middle West. University of Oklahoma Press, Norman. [Interpretive series of essays dealing with regional culture history.]
- Nasatir, Abraham Phineas
 1928-29 The Anglo-Spanish Frontier in the Illinois Country During the American Revolution, 1779-1781. Journal of the Illinois Historical Society 21: 291-358.
- 1930 Anglo-Spanish Rivalry in the Iowa Country. Iowa Journal of History and Politics 28:337-389.
- 1931 The Anglo-Spanish Frontier on the Upper Mississippi. Iowa Journal of History and Politics 29-155-232.
- 1952 Before Lewis and Clark: Documents Illustrating the History of Missouri, 1785-1804. 2 vols. St. Louis Historical Documents Foundation.
- Nothstein, Ira O.
 1940 Rock Island and the Rock Island Arsenal. Journal of the Illinois State Historical Society 33:304-340.
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 1855 Iowa As It Is in 1855: A Gazetteer for Citizens, and a Handbook for Immigrants. Keen & Lee, Chicago. [Includes descriptions of counties and towns.]
- 1857 The Iowa Handbook for 1857. J. P. Jewett & Co., Boston.
- Pease, Theodore C.
 1918 The Frontier State, 1818-1848. Centennial History of Illinois, Vol. 2. Illinois Centennial Commission, Springfield. [The only one of the centennial histories to cover northwest Illinois in any detail.]
- Peck, John Mason
 1831 A Guide for Immigrants, Containing Sketches of Illinois, Missouri, and the Adjacent Parts. Lincoln & Edmonds, Boston.
- Pelzer, Louis
 1913 The Spanish Land Grants of Upper Louisiana. Iowa Journal of History and Politics 11:3-37. [Reviews archival data from American sources on the Giard, Tesson, and Dubuque grants.]

- Petersen, William J.
 1930 Some Beginnings in Iowa. Iowa Journal of History and Politics 28:3-54. [A good summary of early American settlement.]
- 1934 Population Advance to the Upper Mississippi Valley 1830-1860. Iowa Journal of History and Politics 32:312-353.
- 1938 Geography of Iowa Territory. Palimpsest 19.
- 1952 Iowa History Reference Guide. State Historical Society of Iowa, Iowa City. [Definitely not one of the better state historical guides.]
- 1968 Steamboating on the Upper Mississippi. State Historical Society of Iowa, Iowa City. [A collection of documentary and folk history material.]

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 1978 Cultural Resources of the Upper Mississippi Valley: Guttenberg, Iowa to Saverton, Missouri. Two vols. Rock Island District Corps of Engineers. [A fairly comprehensive listing of major books and periodicals relating to the Rock Island District.]

- Pooley, William V.
 1908 The Settlement of Illinois from 1830 to 1850. University of Wisconsin Press, Madison. [Excellent study of the settlement process; cf. Buley 1950.]

- Power, Richard L.
 1953 Planting Corn Belt Culture: The Impress of the Upland Southerner and Yankee in the Old Northwest. Indiana Historical Society, Indianapolis. [Dated, but still useful underpinning for studies of "Midwestern" culture of Illinois and Iowa.]

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 1953 Broadax and Bayonet: The Role of the United States Army in the Development of the Northwest, 1815-1860. State Historical Society of Wisconsin, Madison.

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 1968 The Land Office Business: The Settlement and Administration of American Public Lands, 1789-1837. Oxford University Press, New York.

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1899 Indian Land Cessions in the United States. U. S. Bureau of American Ethnology Annual Report 1896-1897. Smithsonian Institution, Washington.
- Russell, Charles Edward
1928 A-Rafting on the Mississippi. Century, New York. [Collection of reminiscences of an Upper Mississippi raftsman.]
- Scarpino, Philip V.
1985 Great River: An Environmental History of the Upper Mississippi, 1890-1950. University of Missouri Press, Columbia. [The title is misleading: this is a superficial view of the rise of the conservation movement, with some discussion of navigation improvements, fisheries, etc.]
- Schockel, B. H.
1917 Settlement and Development of the Lead and Zinc Mining Region with Special Emphasis upon Jo Davless County, Illinois. Mississippi Valley Historical Review 4.
- Smith, H. M.
1898 The Mussel Fishing and Pearl Button Industry of the Mississippi River. U. S. Fisheries Commission Bulletin 12:289-314.
- Swierenga, Robert P.
1968 Pioneers and Profits: Land Speculation on the Iowa Frontier. Iowa State University Press, Ames. [Analysis of land sales in 34 pioneer counties.]
- Tanner, Helen Hornbeck (ed.)
1987 Atlas of Great Lakes Indian History. University of Oklahoma Press, Norman. [While the focus is on the Great Lakes region, the excellent text and maps shed considerable light on the culture history of native peoples in the Upper Mississippi Valley.]
- Temple, Wayne C.
1966 Indian Villages of the Illinois Country: Historic Tribes. Illinois State Museum Scientific Papers, Vol. 2, Pt. 2. Springfield. [Well documented review of Sauk and Fox culture history, but short on site location data.]
- Thwaites, Rueben Gold (ed.)
1892 Notes on Early Lead Mining in the Fever (or Galena) River Region. Collections of the State Historical Society of Wisconsin 12:216-265.

Thwaites, Rueben Gold (ed.) (cont.)

1896-1901 The Jesuit Relations and Allied Documents, Travels and Explorations of the Jesuit Missionaries in New France, 1610-1791. 73 vols. Burrows Brothers, Cleveland.

1902 The French Regime in Wisconsin--I, 1634-1727. Collections of the State Historical Society of Wisconsin 16.

1906 The French Regime in Wisconsin--II, 1727-1748. Collections of the State Historical Society of Wisconsin 17.

1908a The French Regime in Wisconsin--[III], 1734-1760. Collections of the State Historical Society of Wisconsin 18:1-222.

1908b The British Regime in Wisconsin--1760-1800. Collections of the State Historical Society of Wisconsin 18:223-468. [In all of his works, Thwaites made extensive use of primary documents, especially materials from colonial archives; his Turnerian view of American history is somewhat outdated.]

Trewartha, Glenn T.

1932 The Prairie du Chien Terrace: Geography of a Confluence Site. Annals of the Association of American Geographers 22:119-158.

1938 French Settlement in the Driftless Hill Land. Annals of the Association of American Geography 28:179-200. [With the 1932 article on Prairie du Chien, this is probably the best local cultural-historical study for the Upper Mississippi Valley, and a model for modern multi-disciplinary studies.]

Tweet, Roald

1975 A History of the Rock Island District Corps of Engineers. Government Printing Office, Washington. [One of the more useful COE district histories, based on extensive primary sources.]

U. S. Congress

1832 Message from the President of the United States in Compliance with a Resolution of the Senate concerning the Fur Trade, and Inland Trade to Mexico. Senate Doc. No. 90, 22 Cong., 1 ses.

- Van der Zee, Jacob
 1905 The Roads and Highways of Territorial Iowa. Iowa Journal of History and Politics 3:175-225.
- 1914 Fur Trade Operations in the Eastern Iowa Country Under the Spanish Regime. Iowa Journal of History and Politics 12:335-372.
- 1914 Fur Trade Operations in the Eastern Iowa Country From 1810 to 1833. Iowa Journal of History and Politics 12:479-567. [While his works dominate the historiography of early Iowa, Van der Zee's articles are characterized by their shallow research, poor documentation, and generous borrowing from other published works.]
- Winther, Oscar O.
 1961 A Classified Bibliography of the Periodical Literature of the Trans-Mississippi West (1811-1957). Indiana University Press, Bloomington. [Still the best work of its kind.]
- Winsor, Justin
 1898 The Mississippi Basin: The Struggle in America Between England and France, 1697-1763. Houghton, Mifflin & Co., Boston. [An old-fashioned masterpiece.]
- Wyman, Mark
 1984 Immigrants in the Valley: Irish, Germans, and Americans in the Upper Mississippi Country, 1830-1860. Nelson-Hall, Chicago. [Good summary of the history of immigration.]

Pools 13 and 14

There has been no attempt to list all of the individual documents and collections pertaining to local history in Pools 13 and 14. Much of the history of the communities along this stretch of the Mississippi is preserved in newspaper articles and private papers; in the archives of the General Land Office, the War Department, Bureau of Indian Affairs, and other federal agencies; and in the form of oral history -- sources which were not extensively searched as part of the Pools 13 and 14 project. The following bibliography can make no claim to being exhaustive, or nearly so; it will, hopefully, offer a reasonable overview of the published history of the project area.

- Adams, James N. (comp.)
 1969 Illinois Place Names. Illinois State Historical Society, Occasional Publications No. 54. Springfield.

- Anderson, G. W.
1925 Atlas of Clinton County, Iowa, Containing Maps of Townships of the County. Anderson Publishing Co., Des Moines. [Township plats show locations of selected buildings.]
- Andreas, Alfred T.
1875 Illustrated Historical Atlas of the State of Iowa. Andreas Atlas Company, Chicago. [Some of the best short county histories, with county maps, city plats, and statistical data.]
- Beltrami, Geacomo C.
1828 A Pilgrimage in Europe and America, Leading to the Discovery of the Sources of the Mississippi and Bloody River . . . 2 vols. Hunt & Clarke, London. [Beltrami was an Italian tourist who accompanied the Long-Keating expedition up the Mississippi in 1823.]
- Bent, Charles (ed.)
1877 History of Whiteside County, Illinois, from Its First Settlement to the Present Time . . . I. P. Allen, Clinton. [Well crafted local history based on courthouse documents and oral history; fragments of site data interspersed among the standard political resumes and biographical information; sometimes referred to as "Bent and Wilson's History of Whiteside County."]
- Bourland, Richard D.
1978 Savanna Pioneers. Shawver Press, Morrison IL. [Largely based on county histories.]
- Bowen, Alice M.
1928 The Story of Savanna: Early Settlement, 1828-1850. Times-Journal, Savanna. [Account of town founding and early history by daughter of one of the original settlers.]
- Burrows, J. M. D.
1888 Fifty Years in Iowa: Being the Personal Reminiscences of J. M. D. Burrows. Glass & Co., Davenport. [Burrows was a pioneer settler at Davenport and carried on extensive trade between there and Prairie du Chien; good account of local conditions.]
- Carroll County (Illinois)
n.d. Deed index to townships. Books in County Clerk/Recorder's Office, Mt. Carroll.

Cordova American Revolution Bicentennial Commission

1976(?) Cordova Illinois: Then and Now, 1836-1976. [A collection of local lore assembled by amateurs; good sections on local industries, Meredosia swamp.]

Coues, Elliott (ed.)

1895 The Expeditions of Zebulon Montgomery Pike, to Headwaters of the Mississippi, Through Louisiana Territory, and in New Spain. 3 vols. Francis P. Harper, New York. 1965 reprint in 2 vols. by Ross & Haines, Minneapolis. [Somewhat dated, but still the best edition of Pike's 1805 expedition up the Mississippi; Coues assembled a wealth of local historical and geographical data in his voluminous footnotes.]

Davis, William H.

1908 History of Whiteside County, Illinois. 2 vols. Pioneer Publishing, Chicago. [A standard Victorian era county history, heavily indebted to Bent (1877) for its local history content.]

Downer, Harry E.

1910 History of Davenport and Scott County, Iowa. 2 vols. S. J. Clarke Publishing Company, Chicago. [Largely a summary of previously published works, but with several obvious errors; benefits from the author's use of primary sources.]

Featherstonhaugh, George W.

1847 A Canoe Voyage up the Minnay Sotor 2 vols. London. 1970 reprint by the Minnesota Historical Society. [Featherstonhaugh was an Englishman who undertook a geological excursion through the Upper Mississippi Valley in 1835.]

Federal Writers Project

1939 Illinois: A Descriptive and Historical Guide. A. C. McClurg, Chicago. [The American Guide Series volumes for Iowa and Illinois afford the researcher a basic source on community history and selected points of historic interest; uneven but useful.]

Huebinger, M.

1894 Atlas of Scott County, Iowa. M. Huebinger & Company, Davenport. [Township and city plats show some buildings.]

1904 Atlas of the State of Iowa. Iowa Publishing Co., Davenport. [Contains brief county histories.]

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Huebinger, M. (cont.)

1905 Atlas of Scott County, Iowa. Iowa Publishing Co., Davenport. [Township and city plats show some buildings.]

1719 Atlas of Scott County, Iowa. Huebinger Publishing Co., Davenport. [Township plats show some buildings.]

Inter-State Publishing Company

1882 History of Scott County, Iowa. Chicago. [Typical subscription history, mixing local lore with excerpts from published histories.]

Iowa State Historical Department

n.d. Iowa Site Record. On file in Des Moines office. [Archaeological site records arranged by county.]

1981 National Register of Historic Places in Iowa. Iowa City. [Arranged by county.]

Jackson County (Iowa)

n.d. Abstract of Original Entries in Jackson County, Iowa. Bound volumes in County Recorder's Office, Maquoketa. [Arranged by township and range, with dates and costs of individual parcels.]

n.d. Deed Records. Bound volumes in County Recorder's Office, Maquoketa. [Indexed, cover period 1838 to present; include plats and town lots.]

n.d. Original Surveys Jackson County. Bound volume in County Recorder's Office, Maquoketa. [GLO maps show some improvements, roads, etc., but no buildings.]

1893-1913 Plat Books. Untitled atlases (bound together) in County Recorder's Office, Maquoketa. [Township plats show location of selected buildings.]

James, Urah Pierson

1856 James' River Guide: Containning Descriptions of all the Cities, Towns, and Principal Objects of Interest on the Navigable Waters of the Mississippi Valley. U. P. James, Cincinnati.

Jo Daviess County (Illinois)

1860 Original Surveys. Office of the Surveyor General, St. Louis. In County Recorder's Office, Galena [Bound atlas of GLO survey plats; some cultural data shown on maps.]

- Kett, H. F. & Co.
1877 The Past and Present of Rock Island County, Illinois. Chicago. [A typical subscription history, with heavy emphasis on political developments and war records.]
- 1878 The History of Carroll County, Illinois . . . Chicago. [One of the company's better efforts, a good mix of history and politics; pays more attention to physical development than most of the genre.]
- 1878 The History of Jo Daviess County, Illinois . . . Chicago. [Comparable to above; history of old Galena is particularly well done, but that of Hanover Township is superficial.]
- Lage, Dorothy
1976 LeClaire, Iowa, a Mississippi River Town. Privately printed. [Based on secondary sources.]
- Lewis, Henry
1967 Valley of the Mississippi Illustrated. Minnesota Historical Society, St. Paul. [Lewis toured the Upper Mississippi in 1848 to paint landscapes; his collection of sketches and paintings of scenes along the river, with his accompanying journal, was originally published in German; plates show Bellevue, Savanna, Albany, and Port Byron.]
- Lokken, Roscoe L.
1942 Iowa Public Land Disposal. F. J. Palmer, state printer, Des Moines. [Contains some specific data on surveys of Wapsipinicon River and Lyons-Clinton areas.]
- Long, Katherine
1983 Clinton, a Pictorial History. Quest Publishing, Rock Island.
- Long, Stephen H.
1890 Voyage in a Six-Oared Skiff to the Falls of St. Anthony in 1817. Minnesota Historical Society Collections 2:9-83. [Observations of a member of the Corps of Topographical Engineers.]
- McDermott, John Francis
1941 A Glossary of Mississippi Valley French, 1673-1850. Washington University Studies, Language and Literature, No. 12. St. Louis. [Source of placename information applicable to project area.]

- Meese, William A.
1905 Early Rock Island. Rock Island County Historical Society, Moline. [Very little site data; early history superficial.]
- Miller, Terry J.
1976 Hanover: A Portrayal of a Northwestern Illinois Village's Changes from 1827 through 1976. Privately printed. [Good local history, but scant information on surrounding area.]
- Mitchell, Samuel A.
1837 Illinois in 1837: A Sketch Descriptive . . . Philadelphia. [Contains one of the earliest maps showing the Meredosia.]
- Mississippi River Commission
1891-92 Survey of the Mississippi River. On file Rock Island District Corps of Engineers. [Charts show navigation channel, islands, backwaters in detail; also indicate land uses along river; no structures shown.]
- 1893 Map of the Upper Mississippi River from the Mouth of the Ohio River to Lake Itasca, Minn. Washington. [Bound atlas in 50 sheets, similar to 1891-92 charts.]
- Mott, David C.
1973 Abandoned Towns, Villages, and Post Offices of Iowa. Hoffman & Purlington, Council Bluffs IA. [Reprint of articles originally published in Annals of Iowa.]
- Newhall, John B.
1846 A Glimpse of Iowa in 1846; or, the Emigrant's Guide . . . 2nd ed. W. D. Skillman, Burlington IA. [In addition to useful descriptions of the counties, this guidebook includes a reference to the "Prairie Pon de Tau" in Clinton Co.]
- Nicollet, Joseph N.
1842 Report Intended to Illustrate a Map of the Hydrographical Basin of the Upper Mississippi River. Senate Document No. 237, 26 Cong., 2d ses. Washington. [Report of the author's 1839 reconnaissance; Nicollet's manuscript map, showing settlements along the river, is reproduced in facsimile in Wood (1983:plate 20).]
- Northwest Publishing Company
1893 Plat Book of Jo Daviess County Illinois. Philadelphia. [Township plats show locations of selected buildings.]

Northwest Publishing Company (cont.)

- 1894 Plat Book of Rock Island County, Illinois.
Philadelphia. [Township plats show locations of
selected buildings.]
- Ogle, George A., & Co.
1908 Standard Atlas of Carroll County, Illinois.
Chicago. [Township maps show locations of selected
buildings.]
- 1913 Standard Atlas of Jo Davless County, Illinois.
Chicago. [Township maps show locations of
selected buildings.]
- Owen Publishing Company
1878 Owen's Gazetteer and Directory of Jackson County,
Iowa, . . . Davenport. [Good descriptions of
county natural resources, development, and town
growth.]
- Reynolds, John
1855 My Own Times, Embracing also, The History of My
Life. Privately printed. [Lively personal
history of a frontier judge; descriptions of early
Illinois, morals and customs, transportation, lead
mining, etc.]
- Rock Island County (Illinois)
n.d. Government Survey. Bound volume in County
Recorder's Office, Rock Island. [GLO plats do not
show individual buildings.]
- n.d. Deed Records. Bound volumes in County Recorder's
Office, Rock Island. [Indexed deeds, plats,
conveyances, etc.]
- n.d. Plat Books. Oversized volume of plats and
additions in County Recorder's Office, Rock
Island. [Assessor's plats from mid-1800's.]
- 1836 Land Book. Volume in County Recorder's Office,
Rock Island. [Lists original land entries.]
- Schmidt, Ronald E.
1980 The Architecture of Clinton, Iowa. Department of
Community Development, City of Clinton. [Overview
of local history with reference to standing
structures.]

- Schoolcraft, Henry Rowe
1821 Narrative of Travels through the Northwestern Regions of the United States . . . Hartford, Albany, NY. [The popular writer, mineralogist, and pioneer ethnologist includes lively, detailed descriptions of the fur trade, lead mining, etc., in his memoir of the 1820 Cass expedition.]
- Scott County (Iowa)
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APPENDIX A
COE Scope-of-Work
SMSU Proposal
Correspondence

PART I - SECTION C, Description/ Specifications/Work StatementI. OBJECTIVE

1.1 The following described professional services contract requires a scientific cultural resources investigation for Corps of Engineers-owned land in Navigation Pools 13 and 14. The major work elements under this solicitation are: (1) a comprehensive literature search with oral interviews, (2) an articulated cultural/geomorphological resources synthesis/overview, (3) a preliminary landscape and geomorphological context model, (4) a biased/stratified sample field survey, and (5) an evaluation of the cultural and geomorphological resources base in Pools 13 and 14 with management recommendations on site significance, cultural manifestations, and any further studies required to mitigate impacts (i.e., erosion, vandalism, development). A summary section also will be required discussing research potentials and management objectives based upon the results of Items 1 through 5 above. Cultural resources, as used in this solicitation, include archeological, architectural, and historical properties. Site location, cultural affiliation, and geomorphological models developed under this contract will be based upon the articulation of the updated synthesis/overview with new data collected during fieldwork.

1.2 This action is in accordance with the National Historical Preservation Act of 1966 (as amended); the Archaeological and Historic Preservation Act of 1974, Executive Order 11593; Title 36 of the Code of Federal Regulations (CFR), Parts 60-66 and 800; and ER 1130-2-438, as appropriate. These guidances require that Rock Island District identify cultural resources under our jurisdiction so that they can be evaluated in terms of National Register significance. This solicitation is part of this process; however, Offerors are reminded that this work falls under the identification phase. Except for obviously significant sites, previously listed sites, or sites for which sufficient information is already available, the Contractor shall not be responsible for fully establishing National Register significance. It is anticipated that the Contractor will be able to make general statements about the sites, recommending archeological testing for potentially significant sites, or arguments for no further work at clearly nonsignificant sites.

II. PROJECT BACKGROUND

2.1 Pools 13 and 14 (enclosures 1 and 2) are part of the Mississippi River Nine-Foot Navigation Project which was constructed during the 1930's. These pools extend from 4 miles below LeClaire, Iowa, (river mile 493.2) to Bellevue, Iowa (river mile 556.7).

a. General. Pool 13 extends upstream of Lock and Dam 13, river mile 522.5, to Lock and Dam 12, river mile 556.7 - from approximately 2 miles north of Fulton, Illinois, to Bellevue, Iowa, - a distance of 34.2 river miles measured along a determined sailing line. Bordering Illinois counties on the east shore include a part of Jo Daviess, Carroll, and a short stretch of Whiteside. Iowa counties, on the west shore, include parts of Jackson and Clinton.

b. Topography and Geology. The course of the pool is through a valley of less precipitous hills and bluffs than those which characterize the preceding pools. The generally flat floodplain broadens appreciably and supports numerous small farms and wooded tracts. In addition to 8 minor creeks, 4 small tributary streams -- the Apple and Plum Rivers in Illinois and the Maquoketa and Elk rivers in Iowa -- discharge into the pool. Runoff from these latter streams can be significant following heavy rainfall and can have an appreciable effect on short-range pool levels. Resulting siltation from excess flows of any stream can result in long-range problems from a resource management standpoint.

c. Numerous and sizeable islands exist throughout the pool, particularly in the middle and upper reaches, and are generally densely vegetated.

d. The original river valley was excavated by a much larger glacial stream. Subsequent glacial action partially filled the valley floor and covered the foundation rock. As a result, the bottom of the present river lies as much as 200 feet above the original river bed. Loess, eroded from the uplands and combined with decayed vegetative matter, has been deposited on the floodplain by recurring high water over the centuries with resulting fertile soil conditions. The underlying rock strata beneath the pool is classified as Maquoketa shale at and above the dam, and Galera dolomite throughout the remainder of the stretch, overlaying Platteville limestone in the extreme upper reaches.

e. Extending in a generally northerly direction for half its length, the pool turns to the northwest to Lock and Dam 12, a total length of 34.2 river miles. The drainage area covers 85,500 square miles at the dam, and the pool width varies from 1,000 to 17,000 feet at the authorized elevation (flat pool) of 583.0 feet above mean sea level (1912 adj.). Low water of record, since the dam became operable, was at elevation 581.28, or 1.7 feet below the authorized flat pool level. Record high water was established on 28 April 1965 at elevation 593.73, or 10.73 feet above the established pool elevation at the dam.

f. Land. The necessary land acquired for the pool project by the Federal Government, both shore and island real property, amounted to 25,285 acres in fee. Federal land, as presently remains above the flat pool elevation, totals 8,843 acres administered by the Corps of Engineers. The Savanna Ordnance Depot controls and administers an additional 11,566 acres of Federal lands, which is not a part of this

solicitation. Flat pool shoreline (mainland and islands) totals approximately 503 miles with 274 miles under Corps of Engineers control. Some 331 islands, totaling 5,667 acres, lie within the pool limits, and with the exception of 140 acres, are all under Federal ownership.

g. Vegetation. Vegetative cover on Federal lands varies throughout the pool reach with the denser growth found largely on islands of the upper area. As of 1969, of Government lands administered by the three agencies, 21% is classified as open, 19% as sparsely covered, and 60% as supporting medium to dense growth.

2.3 Pool 14

a. General. Considering the numerical sequence of navigation pools progressing downstream, Pool 14 is the fourth of such units contained within the limits of the Rock Island District. Extending between river miles 493.2 and 522.5, 4 miles below LeClaire, Iowa, to 3 miles above Clinton, Iowa, the pool covers a distance of 29.2 river miles measured along a determined sailing line. Parts of Whiteside and Rock Island Counties border the pool on the eastern, or Illinois shore, and portions of Clinton and Scott Counties on the western, or Iowa side.

b. Topography and Geology. In Pool 14 the river returns to the generally narrower confines which characterize Pools 11 and 12 and does not repeat the broad expanse of its upstream counterpart, Pool 13. The highlands, bordering the shores, remain impressive in a rolling, wooded type of terrain. The narrow floodplain supports small farm plots, pasture areas, and woodlands and is relatively extensive only immediately below Clinton, Iowa.

c. Nine minor creeks and one major tributary, the Wapsipinicon River, in Iowa, join the waters of the Mississippi within the limits of the pool. The creeks, while having rapid response to heavy rainfall and runoff, have little effect on pool levels. The Wapsipinicon River in flood stages, however, does affect pool levels below the confluence point. Recurrent high water stages on any pool tributaries may pose localized siltation problems to resource management. Islands, far less numerous than in previous pools, are generally heavily timbered.

d. A geological change in the river begins some 12 miles below Lock and Dam 13, opposite Camanche, Iowa. At this point, the original river continued another 10 miles in a southerly direction to the present Rock River Valley, some 30 miles above the existing confluence of the Rock and Mississippi Rivers. During the last ice age, a barrier was formed across the channel in the Camanche area, diverting the water flow along the edge of the glacier in a new path to the southwest. The original course left a vast marsh, to become known as the Marais d'Osier (Sea of Willows), and which was gradually drained and given to farmlands as settlers were attracted to the area. Prior to agricultural development, the area abounded in wildlife, and European royalty journeyed to America for the hunting that the marsh afforded.

e. The slow cutting of the new channel created a narrow and shallow stream extending from the site of Camanche, Iowa, to the present mouth of the Rock River, a distance of some 32 river miles. The uneven wearing of the new river bed left areas of rock at shallow depths and created rapids which curtailed navigation during low flows, a situation which persisted into modern times. A particularly hazardous stretch of rapids was bypassed in 1922, as part of the 6-Foot Channel Project, by the construction of the LeClaire Canal and appurtenant lock (river mile 493.0). The lateral canal extended some 3 miles along the Iowa shore.

f. Most of Pool 14, therefore, is a "young" river in terms of geologic time. Underlying rock strata, from Lock and Dam 13 to the "new" stretch of river, is Maquoketa Shale with Niagaran Dolomite thereon to navigation Locks and Dam 14, the construction of which eliminated the problem of rapids.

g. Extending in a north to northeasterly direction above the dam, the pool is 29.2 river miles long, has a drainage area of 88,400 square miles, and varies from 1,000 to 2,800 feet in width under normal flow conditions. The authorized water elevation (flat pool) is established at 572.0 feet above mean sea level (1912 adj.). Low water of record, since the dam became operable, was recorded at elevation 569.16, or 2.84 feet below the authorized flat pool level. High water of record (April 1965) reached elevation 577.08, or 5.03 feet above the normal pool elevation at the dam.

h. Land. The Federal Government acquired 6,615 acres in fee land for the 9-Foot Channel Project within the pool, representing both mainland and island real property. Of this original acquisition, 4,559 acres remain above the flat pool elevation established by Dam 14 and is administered by the Corps of Engineers.

i. Flat pool shoreline (mainland and islands) totals 277 miles with 151 miles controlled by the Corps of Engineers.

j. Some 117 islands are contained within the pool limits and have a combined area of 3,167 acres above flat pool. All such land, with the exception of 662 acres, is owned in fee by the Federal Government.

k. Existing laws permit the granting of leases on project lands for agricultural purposes, generally for a 5-year period, and are renewable at the option of Government administrators and the lessee. No such leases are presently in force within the pool limits.

l. Vegetation. Most Federal property is concentrated in the upper two-thirds of the pool with vegetative cover generally distributed toward a dense classification. As of 1969, of the Federal lands administered by the Corps of Engineers, 92% is classified as dense, 6% as sparse, and 2% as open.

2.4 Prospective Offerors are advised to consider the results of similar investigations conducted in Pools 10, 11, 12, 16, 17, 18, and 21. The Pool 10 work was done by the Great Lakes Archaeological

Research Center (GLARC), Milwaukee, Wisconsin, for the St. Paul District under the direction of Dr. David F. Overstreet (Overstreet 1984). The results of the Pools 11 and 12 surveys presented in the reports entitled Preliminary Investigations, Archeology and Sediment Geomorphology, Navigation Pool 12, Upper Mississippi River (Boszhardt and Overstreet 1981), Intensive Survey and Testing at 11-Jd-126, Jo Daviess County, Illinois (Boszhardt and Overstreet 1982), and Archeological Investigations, Navigation Pool 11, Upper Mississippi River Basin (Overstreet 1985) apply to this project. A fourth example of a pool survey is described in the report entitled Assessment of Selected Areas in Navigation Pool 16, Mississippi River (Barnhardt et al. 1981) prepared for the Rock Island District by Illinois State University. The results of the Pool 12 and 16 surveys are discussed in the Wisconsin Archeologist (64:1 & 2:March-June 1983). Prospective Contractors are advised to use this publication as the District does not have enough copies of the reports to send out for proposal development. The Wisconsin Archeologist volume contains a forward by Mr. Roy Eichhorn, formerly with the Rock Island District, describing the project histories and theoretical underpinnings of the survey program. Results of Pools 17 and 18 are presented in the report Landscapes and Man in Pools 17 and 18, Upper Mississippi River (Benn, Bettis, and Vogel 1988). The archeological/historical overviews and geomorphological models of Pool 21 are reported in Geomorphological Investigations: Mississippi River Pool 21, Illinois and Missouri, with Archaeological and Historical Overviews (Anderson, Green, and Vogel 1988).

III. PROPOSALS

3.1 The Contractor shall conduct this investigation in a manner that insures the greatest contribution to an understanding of Midwestern prehistory and history. In an effort to insure this, prospective principal investigators shall submit a technical research proposal and a separate cost proposal to the Contracting Officer for evaluation. The technical proposal shall include sufficient discussion to fulfill the Scope of Work and how these needs will be met. Key personnel will be identified and manpower efforts (by hours) shall be included, but without costs. The cost proposal will be a detailed, itemized quotation for personnel, goods, and services required to accomplish the technical proposal. Overhead and wage rate figures shall be clearly presented, as well as any costs for equipment, transportation, per diem, lodging, and consultant services. The cost proposal shall be sealed in a separate envelope to insure that the technical evaluation can be accomplished without prejudice prior to evaluating cost proposals.

3.2 Prospective Offerors must adhere to the minimum professional qualifications published in the Federal Register 48:190:44716-4472. For the most part, these guidelines are compatible with standards set forth by the Society of Professional Archeologists (SOPA) and standards recommended by the respective State Historic Preservation Officers. It is the responsibility of the Contractor to insure that the designated principal investigator(s) and key personnel are in compliance with this requirement and that their qualifications are

clearly set forth by vita and/or other documents. The Contractor shall identify, by name, the principal investigator and key personnel in the proposal and document experience in work of this type in the Midwest. The principal investigator must be able to document involvement in the project, and will be held responsible for the technical quality of the work.

3.3 Proposals will be evaluated as specified in PART IV - Section M. The technical evaluation team will evaluate the technical proposals first without prior knowledge or review of concurrently submitted price proposals. Therefore, it is in the best interest of the Offeror to include the data necessary to evaluate the merits of technical proposals, independent of cost consideration. Proposals must demonstrate that the Offeror is knowledgeable of previous work in the region, current research objectives, and state-of-the-art methodologies and techniques. Proposals that simply restate the Scope of Work or offer "canned" approaches may be judged technically inadequate. A clear, well written, well thought-out research design is far more effective than fancy packaging and pages of stock text on the Offeror's abilities.

3.4 Particular emphasis in proposal evaluation will be given to proposals offering a high quality product which will best identify and evaluate cultural resources in Pools 13 and 14 in accordance with local and regional research objectives and management concerns. Geomorphological considerations and respective State RP3's (Resource Protection Planning Process study units) also must be addressed.

3.5 Offerors should submit a comprehensive scheduling plan to document anticipated levels of effort.

3.6 Contract award will not necessarily be based upon low estimated price, but on the most advantageous combination of method, price, and schedule that best meets the Government's needs. This will be a firm-fixed-price negotiated contract.

3.7 Offerors are invited, in their proposals, to suggest improvements on the Scope of Work so long as the minimum requirements are met. Any substantive changes will be dealt with during the negotiation (best and final) process for those within the competitive range. The objective is to obtain the maximum amount of useful data in the most cost-efficient manner. Note that award may be made without negotiation if a competitive pool of proposals is received and a winner can be selected without requiring proposal changes.

3.8 Laboratory procedures shall be described for special studies such as soils and C-14 analyses. Prospective Contractors shall include in proposals a discussion of the capabilities and facilities to adequately perform required laboratory analyses, mapping work, and for curation of study materials upon the completion of the project.

3.9 Offerors must clearly set forth their sampling design. Approximate acreage figures should be provided and sample biases and stratification criteria identified. Contractors should also be aware that substantial work can be done at the District Office using the

hand-drawn plane table sheets (ca. 1940), Brown Survey Maps, Mississippi River Commission Maps, aerial photographs, and land acquisition files. Historic sites are shown, and the 1-foot contour intervals are conducive for identifying landforms.

IV. SPECIFICATIONS

4.1 The Contractor shall conduct a comprehensive literature search (with oral interview) of sufficient quality to provide a complete inventory and assessment of prehistoric and historic properties on federally owned lands for Pools 13 and 14. Sufficient data shall be synthesized from which to generate preliminary predictive models for site locations, site functions, and cultural affiliations applicable to current research and management objectives. Management objectives are related to Section 106 compliance, erosion monitoring, permitting, leasing, and recreational development. It is anticipated that the resulting synthesis, survey data, and geomorphological models will serve as a sound basis for guiding subsequent field efforts for Pools 13 and 14. Any predictive models generated should be explained in terms of sampling procedures, assumptions, and the data upon which the predictions are based. A draft of the results of the comprehensive literature search should be revised, as required, based upon the results of the fieldwork solicited under this RFP.

4.2 Data refinement is recommended for any previous work done for Pools 13 and 14 based upon the cultural resources synthesis/overview and new data generated under this contract.

4.3 The comprehensive literature search and records review should include, but not be limited to, the sources listed below:

a. Oral interviews shall be conducted with local collectors, property owners, former property owners, and State/local Historical Society members.

b. Written archival sources shall be utilized such as the National Register of Historic Places, State Landmark records, State site files, HABS/HAER materials, USGS maps, 19th/20th century plat maps, land holding records, and Rock Island District files. The District has Mississippi River Charts from 1881, Browns Survey Maps from 1930, and hand-drawn plane table maps from 1938 to 1943. The successful Offeror shall be provided copies of these maps as well as tract maps (these indicate Federal land holdings) for use. Overlay maps will be made by the contractor to document landscape changes and to highlight site locations, high potential landforms, and areas where made or disturbed contexts occur. Post-settlement alluvium also will be mapped, along with previously utilized and proposed disposal sites. Survey coverages and sites will be marked on a separate overlay keyed for easy identification by site type, National Register status, and impacts.

c. The Rock Island District also has large format pictures of real estate purchases from the 1930's construction of the 9-Foot Channel Project. These photographs include many structures demolished

at that time. A work item of this contract will be to review these photographs and summarize them in the historical resources section of the report. Less than 50 photographs of Pools 13 and 14 contain structural remains, and the majority of those include late 19th/early 20th century resort/riverside cabins.

d. Professional literature will be examined (national, regional, and local) for background information and site-specific information.

e. Resources of the State Historic Preservation Officers (i.e., Mr. Thomas Emerson for Illinois and Dr. Kay Simpson for Iowa) and State Archeologists shall be investigated. State survey programs such as the Illinois Archaeological Survey (IAS) at Urbana, Illinois, and the Office of State Archeologist, Iowa City, Iowa, shall be visited. The Contractor will be responsible for obtaining and completing any State site forms that may be required.

f. The results of the comprehensive literature search shall be documented in the draft and final reports by extensive narrative, reference, and an annotated bibliography.

4.4 The Contractor shall include provisions for necessary professional level geomorphological studies to identify and define the sequence, depth, and extent of soils development. Geomorphic processes will be defined and fluvial histories will be generated. Of particular concern is the relationship between cultural resources and landforms. The question of what resources have been lost due to erosion and inundation must be addressed, as well as what kinds of resources remain for future management efforts. It is anticipated that geomorphological studies may identify surface and/or subsurface landforms which can be defined as contexts likely to contain cultural resources. On a set of USGS topographic maps, the Contractor shall color code landforms and depositional contexts prior to designing the final fieldwork plan, and then correct the maps based upon fieldwork results. A set of these maps, copies, or maps with the relevant information transposed shall be provided with the draft and final reports. A series of mylar overlays representing geomorphic mapping units is to accompany the USGS topographic maps in the final report.

4.5 The nature of the Pools 13 and 14 landscape is very complex. Cut bank and other fortuitous exposures must be examined throughout the study area, regardless of sample design. Problems with dredged disposal and up to 15 feet of post-settlement alluvium combine with pre-lock and dam erosional cycles to create a constantly changing, difficult environment for conducting archeological research. Lofty survey coverage designs typically do not work well in the Mississippi River floodplain. Offerors should provide a general survey design, specifically outlining sample sizes and locations; however, Offerors also should realize that field conditions almost certainly will result in changes. Previous researchers in Pools 11, 12, 16, 17, and 18 found that in many instances the only practical exploratory tools (i.e., on islands) are silt probes and bucket augers. Granted, little can be seen in such a soil column, but major soil units can be identified and depth of post-settlement alluvium is fairly obvious. The silt probe, in some settings, can be used to depths of 15 feet.

Obviously, a buried landscape is not conducive to surface survey, and even deep testing may be out of the question. These determinations are valuable, regardless, from a management perspective.

4.6 In order to attain maximum cost effectiveness for any geomorphological fieldwork that will be performed, the Contractor shall make appropriate use of power machinery for test trenching, test pitting, and coring.

4.7 The Contractor shall generate and implement a sample field survey to confirm cultural resource locations cited in documents and to identify previously unrecorded sites or geomorphological contexts that will require management decisions. The field sampling strategy will include a definition of the study area through the use of available mapping (including aeriels), the description and display of project lands in terms of field coverage, and the description of geomorphological and environmental data pertinent to past cultural use. An evaluation of field sampling strategies will be presented, particularly in relation to geomorphological considerations, cultural patterns to be examined such as settlement patterns, subsistence strategies, resource utilization, site burial, and problems with erosion. The explicit discussion of the rationale for sampling strategy selection shall include the consideration of ground cover, accessibility, overburden, time/money constraints, problems with inundation/water tables, expected resources, and existing mapping. Hence, constraints and research objectives will be articulated to develop a strong, realistic statement of research design. This will lead to amplification of field methods for surface collecting and any subsurface investigations proposed. If research units are delineated, the Contractor shall describe the plan for each unit and the reasons for unit development.

4.8 To be included within the sample survey will be two parcels of land scheduled for future timber sales by the Corps. These areas consist of the Wapsipincon River (O4 p14) and the Pleasant Creek (O7 p13) parcels (Enclosures 3 & 4). Areas within these parcels, which the geomorphological model indicates may have a high probability of containing archeological sites, will be surveyed.

4.9 Based upon Sections 4.1 through 4.7 above, the Contractor will refine the cultural resources synthesis/overview with predictive models for Pools 13 and 14, and the region identifying the following:

a. What data exists, as well as what data gaps exist geographically, temporally, and as guidance for research topics which can be approached through the performance of this and future contracts?

b. What RP3 study needs can be addressed through the performance of this contract?

c. How will data discovered during this contract contribute to our understanding of cultural resources for Pools 13 and 14 and the region (descriptive and interpretive)?

d. What is the distribution of cultures in Pools 13 and 14?

e. How do geomorphological and ecological data apply to cultural resource investigations for Pools 13 and 14?

f. How do lithic and ceramic typologies compare or vary north-south or east-west? Can type names used in different states be refined?

4.10 The following information is to be obtained for each site identified under this contract: Site locations defined in four quarter section descriptions and UTM coordinates; these will be plotted on topographic maps (overlay) separate from the main report. State site forms will be completed and submitted to the appropriate state office by the Contractor.

4.11 If possible, the following information is to be obtained for each site identified under this contract:

a. The horizontal and vertical extent of each site with sketch maps.

b. The number of cultural components at each site and the stratigraphic position of each component in relationship to the geomorphological setting.

c. The type or types of activities represented by data from the site if known from existing documents or discernable from survey data.

d. Contracting archeologists, institutions, or investigators that have studied Pools 13 and 14 generally and specific sites within it.

e. Date of work for each site.

f. Site number.

g. Location of collections.

h. The relationships between the site, environment, physical setting, surrounding sites, and preliminary models.

i. The current status of sites in terms of burial, ground cover, disturbances, and previous work.

j. An assessment of research potential for sites with rationales, if possible, based upon survey data or previous investigation.

It is not expected that Items "a" through "j" will be fully addressed in every case.

4.12 An explicit research design will be required that provides the rationale, goals, and methods for this investigation including, but not limited to:

a. The scientific and anthropological reasons for pursuing the

proposed investigation.

b. What the investigator realistically hopes to determine about past human activity, including such topics as occupational sequences, settlement patterns, subsistence strategies, chronologies, trade and social networks, and geomorphological considerations.

c. What the investigator has learned concerning "b" above using the data actually generated under this contract.

d. The explicit manner in which data will be collected and analyzed, and how these relate to the research goals and results.

e. Geomorphic field strategies that were applied and their utility.

f. Descriptive analytic and interpretive techniques should be presented, including summaries of classification systems used.

g. Quantitative techniques used to interpret data shall be explained.

4.13 The successful Offeror will be provided the most recent information on previously utilized dredged disposal sites. These areas should not be surveyed, but there is no problem with including the tracts in geomorphic models based upon pre-disposal topographic maps.

V. REPORTS

5.1 The principal investigator shall be responsible for preparing a comprehensive technical report based upon the results of the work under Sections I through IV. A report format is attached as Exhibit 1 for guidance. A separate set of USGS topographic maps showing individual site locations and boundaries will be provided by the Contractor, along with a set of the overlay maps required under paragraph 4.4. Any sketch maps of individual sites will be included as an appendix if inclusion in the main report would facilitate vandalism. Basic data description, including provenience in metrics, will be provided for use both in support of the author's arguments and conclusions and as a source of basic information that may find wider use by other cultural resource professionals. Drawings and photographs are also recommended. Individual site sheets shall be included in a separately bound appendix; these will be obtained from the State agency responsible for administering State-wide site files. The Contractor will conduct an evaluation of geomorphological changes as a result of the construction and operation of the Nine-Foot Channel Project. The Rock Island District will supply sets of maps indicating the pre- and post-lock and dam configurations. These changes will be documented as appropriate overlay maps.

5.2 Six copies of the draft report shall be submitted to the Contracting Officer for review 237 days after work begins on the contract (20 days after award). Draft reports shall be complete when

submitted, unless other arrangements are made with the Contracting Officer, no less than 30 days prior to the due date. Changes directed by the Contracting Officer based upon draft review shall be made prior to submission of a final report. In the event that major revisions are required, the Contracting Officer may request, and the Contractor will supply, a revised draft report for review at no additional cost to the Government. In the event that a revised draft is required, it will be due 30 days after notice of the Contracting Officer. The final version will be due 30 days after the Contracting Officer approves the draft.

5.3 Thirty (30) days prior to draft due date, a meeting will be arranged with the District Archeologists and the Contractor. The purpose of this meeting will be to assess the progress of laboratory analysis and report preparation to ensure the timely completion of the Contractor's draft report. Any modifications of the original contract for time extensions will be carefully scrutinized; justification for extensions must be realistic and warranted. Time extensions are not standard operating procedure and will not be granted without sufficient justification.

5.4 After the pre-draft report meeting discussed in 5.3 above, time extensions, if requested, and approved by the Government, may include monetary reimbursements to the Government for damages resulting from project delays.

5.5 The draft review period may be as long as 60 days. The intervening time is necessary to obtain reviews from the State Historic Preservation Officers, the District, and the National Park Service (Interagency Archeological Services).

5.6 Any materials (documents, artifacts, or notes) collected under this contract shall be evaluated, analyzed, and referenced according to current professional standards for presentation in the report. These procedures must be specified in proposals. An inventory of these materials shall be supplied to the Contracting Officer with the final bill, as they remain Government property and are subject to review or recall at any time.

5.7 The Contractor shall furnish the Contracting Officer with sixty (60) copies of the final document, including all photographs and appendixes. A master copy of the final report in reproduction format will be furnished to the Contracting Officer with the final bill. Only five sets of the overlay maps will be required using USGS topographic maps as the topographic base for current conditions.

5.8 The Contractor will prepare an informational report on this work suitable for presentation to the lay public. This report should focus on the general prehistory and history of the area, the work done under the contract, and what has been contributed to our understanding of the area. Appropriate photographs, maps or drawings shall be included to illustrate the project. A set of 35mm color slides shall be provided to complement the text.

PROPOSAL

ARCHAEOLOGICAL & GEOMORPHOLOGICAL SURVEY OF POOLS 13 & 14, UPPER MISSISSIPPI RIVER

by
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CAR-752

with Jeffrey Anderson, Lawrence Conrad,
David G. Stanley & Robert C. Vogel

9 May 1988

This is a proposal for archaeological and geomorphological survey of Iowa and Illinois in Pools 13 and 14, Upper Mississippi River valley. By making this presentation the writers agree to comply with the stipulations in solicitation DACW25-88-R-0050, including amendments. In the following pages an interdisciplinary program of research is proposed for Pools 13-14. The research effort will be coordinated among five professional researchers--three archaeologists, one geologist and one historian--for the purposes of composing an initial account of the cultural, natural and geological history of this portion of the river and of developing management strategies for preserving cultural resources.

This document is divided into four parts. First, the preconceptions and current knowledge about the project area are reviewed. Research goals are presented next, followed by methods. Then, personnel, scheduling and reporting are described. Appended to the proposal are Jeffrey Anderson's proposal for geomorphological investigations, Robert Vogel's proposal for historical and archival research and vitae for project personnel.

PRECONCEPTIONS

Fluvial systems are integrated networks of water courses. From headvalley streams to the primary river to the sea, the fluvial system is related by complex responses to climate, parent material and environment. The writers have studied the fluvial system in large and small streams, including the Mississippi Valley, across the mid-continental prairies, and models have been developed for direct application to the proposed project area (cf. Church 1984; Hajic 1985; Anderson, Green and Vogel 1988; Benn, Bettis and Vogel 1988). The models incorporate

archaeological data which make it possible to predict the relative age of sites and the potential for preservation of cultural remains.

The Pools 13-14 project will follow a string of cultural resource investigations on the Mississippi River, including whole pools (e.g. #10, 11, 12, 16, 17-18, 21), levee surveys, site excavations and recreation area surveys. The combined information from Pool 21 (Anderson, Green and Vogel 1988) and Pools 17-18 (Benn, Battis and Vogel 1988) revealed a sequence of landscape changes for the last ca. 18,000 years. In both surveys the landforms were mapped and dated, and post-settlement alluvium (PSA) was systematically investigated. The latter survey also recognized types of soil formations that will provide diagnostic horizons within vertical and horizontal accretion deposits. Altogether, this information amounts to a template for the Pools 13-14 survey. The landscapes in Pools 13-14 must be related to other Mississippi River pools where studies have been done, because all are situated on the main stem of the same fluvial system.

Another presumption for the Pools 13-14 survey is that the cultural record will be broadly similar to that found in Pools 17-18. There are two reasons for this assumption. First, the pools are close and located in the same culture area. Second, the valley environment in all four pools is similar. The assumption of cultural continuity between these pools is important because the scope of the proposed survey cannot presume to cover all cultural problems and potential variability in Pools 13-14. Therefore, the cultural themes and patterns found during the Pools 17-18 survey will be applied in the Pools 13-14 project area, where a broad sample of cultural resources will be examined during the proposed project.

RESEARCH GOALS & METHODS

A significant advantage in pool-wide surveys is that they range over the whole landscape and, therefore, are unrestricted by the limitations of narrow rights-of-way. Additionally, Pools 13-14 contain a broad array of Mississippi Valley landscapes, including some of the narrowest and widest reaches of the valley. Thus, this section of the valley has preserved a complete array of paleo-landforms as well as a record of landscapes that have been voided by fluvial processes.

Our proposal is geared for two levels of research. The geological investigation must account for the distribution of sedimentary fills across the entire valley; therefore, subsurface investigations will cover not only COE property but also will extend into levee districts and bluff-base zones (see appended geomorphological prospectus). The archaeological investigation is geared toward determining site potentials and site impacts related to hydraulic processes. Therefore, archaeological survey

will be confined properties under Federal auspices, while the archaeological literature search will encompass the entire valley. A non-prioritized list of basic research goals for the geological and archaeological work in both pools is presented below.

Geology:

- a) The geological context and Quaternary history of the Mississippi valley will be developed from the existing literature. This will include data such as landscape mapping, valley evolution and potential types of parent material for alluvial fills. Modelling will provide a baseline of information for analyzing alluvial units on the valley floor.
- b) Alluvial fills will be described in lithostratigraphic units by means of mapping from photo imagery and by subsurface investigations. These units will be traced in the pools to develop landform regions in the study area. The Pools 13-14 landscape model will be integrated with the models from pools 17-18 and 21.
- c) Wisconsinan-aged landscapes (i.e. terraces, benches, till sheets, loess caps) will be identified and mapped. These landscapes will be analyzed as surfaces where archaeological materials are not deeply buried, unless superimposed by Holocene sediments (e.g. alluvial fans).
- d) Investigations in alluvial fills will seek pedogenic horizons in surface and buried contexts. Representative soil profiles will be identified and their distributions mapped. Radiocarbon determinations will be gathered from these soils to provide a sequence of development that correlates with observed pedogenesis.
- e) Representative profiles and associated radiocarbon dates will be gathered from alluvial fans and colluvial slopes to develop a sequence for these landforms. The ages, buried soils and lithologic properties of fans and colluvium will be compared to the Corrington fan member that exists in Iowa and to fans in the Illinois River valley.
- f) The positioning, relative ages and cessation period of cone formations and blow-sands will be investigated.
- g) The depth and distribution of PSA will be systematically investigated and related to archaeological issues, particularly the location and investigation of historic cultural resources.

Cultural Resources:

- n) The valley floor will be divided into zones that reflect conditions of site preservation and types of anticipated site impacts. This will be accomplished by applying the three-dimensional landform model to the conditions and processes that cause site impacts. Particular attention will be paid to impacts related to maintenance of the nine foot channel, to land modifications necessary for drainage and flood control, and to recreational use of the water. This means that the archaeological survey and historic site reconnaissance will focus on land under COE jurisdiction.
- i) The structure and relative ages of horizontal and vertical accretionary deposits in the floodplain will be investigated. This work will include recording pedogenic formations and probing archaeological deposits for the purpose of developing a model of Late Holocene and post-settlement alluvial units, the contexts of archaeological sites.
- j) Investigations by the historian will employ cultural themes developed in the Pools 17-18 to formulate a list of specific potentially significant historical sites. Historic archives, COE records and literature will be systematically combed for the locations of historic sites. COE building records also will be evaluated. This approach will reveal what portions of the historic record are potentially preserved and what modifications have occurred in the ecological relationships between humans and the Mississippi valley environment. Locations of historic sites will then be tested by field survey (e.g. post-holing) and test excavations.
- k) Archaeological literature and private collections will be examined to obtain information about the distributions and ages of sites throughout the valley but outside COE jurisdiction.
- l) The landscape/site distribution model developed for Pools 17-18 will be compared with the findings from Pools 13-14. The model will be refined, and specific sets of research goals will be formulated to advance the research in subsequent pool surveys.
- m) Known sites in the floodplain (i.e. COE jurisdiction) are predominantly Woodland-aged with fewer Late Archaic components. Mississippian period peoples also may have utilized the floodplain from their well known village sites on higher terraces. Information will be collected about the relative densities and compositions of floodplain sites, and a special effort will be made to provide ages for all small components (i.e. relative dates by geomorphic context and absolute dates) so that settlement patterns of small sites and larger villages can be depicted.

METHODS

This section presents a list of methods that the investigations will follow. Since most of the techniques are familiar modes of research, they have been itemized with a minimum of explanation. Geological and archaeological methods are separated, but close coordination between investigators is guaranteed by their seeking and sharing each other's data sets.

geology:

- * The geomorphological investigation will be conducted by Jeffrey Anderson of Donohue & Associates, Inc., Sheboygan, Wisconsin (see appended prospectus). Anderson will make the investigation of Pools 13-14 part of his on-going research on the fluvial history of the Upper Mississippi River.
- * Logs from borings in the project area will be utilized. Sources of this data include the Iowa Geological Survey Bureau, bridge and lock and dam projects, and the departments of transportation in Illinois and Iowa.
- * Historic and contour maps, air photos and soil surveys will be employed to develop landform maps for the project area presently above water. The preliminary maps will be "ground-truthed" by investigating all types of landforms between the river bluffs. The fieldwork will consist of a complete reconnaissance (on foot, by car and boat) of the pools and inspection of relevant cutbanks, escarpments and drainage cuts. Following preliminary analysis of the reconnaissance data (e.g. submission of the first C14 dates, inspection of contour maps and soil surveys, consultations with the archaeologists regarding diagnostic materials in context), 3-4 valley transects and other local study areas will be selected for intensive research. (Study areas will coincide with zones surveyed by the archaeologist and with large tracts of government property.) The transects and study locations will be probed by coring with hand augers, a solid core power drill (i.e. Giddings) and perhaps limited backhoing. A drill crew led by E. A. Bettis (Iowa Geological Survey Bureau) will be retained for a week of subsurface investigations. Three-dimensional models of the fills will be developed from the transect and study location data, and overall landscape models will be extrapolated to unsurveyed areas and to the flooded portions of pools. All models will be field checked by the geologist and archaeologist.
- * Geological data will consist of full soil descriptions of borings, cutbank profiles and trenches. Sediments will be processed in the laboratory for particle size, organic carbon, pH and other relevant chemistry. Special emphasis will be given to sand-sized particles, as these are useful for differentiating episodes of sand deposits on the valley floor.

- * All of the geological data and samples will be prepared for permanent storage at a location approved by the COE.

cultural resources:

- * Archives and literature pertaining to the study area will be researched prior to undertaking fieldwork. Archaeological information for the Iowa side will be collected by Bann. The records for the Illinois side will be examined by Lawrence Conrad, Western Illinois University. Historical archival research will be conducted by Robert Vogel (see prospectus for historic research attached to this document). The literature review has three principal objectives: 1) to obtain and verify all site and survey records for both states; 2) to reveal potential locations of sites mentioned in the archives and literature; 3) to continue to develop a more extensive and complete historical overview of the Upper Mississippi River valley which is related to the needs of cultural resource management programs and COE planning.
- * Previous survey records will be collected and systematically recorded on quadrangle maps with the locations of archaeological sites. COE building records also will be evaluated. The site and survey data will be employed to design the locations, methods and anticipated results of the Pools 13-14 survey.
- * Local members of archaeological organizations and independent collectors will be interviewed to obtain site information. Conrad and the writer are familiar already with informants that will travel the river and point out sites. Sources of site information, aside from state repositories, include the Putnam Museum, Northern Illinois University, Illinois State Museum, the Archaeology Laboratory at the University of Wisconsin-Milwaukee and organizations such as the Quad-Cities Chapter of the Iowa Archeological Society.
- * Original Land Survey records will be correlated with the landscape models, and soil profiles to develop environmental models for previous periods.
- * Archaeological survey in the pools will be conducted to complement the geological survey, yet the archaeologists will not do intensive surveys outside government controlled land. A preliminary reconnaissance of all existing sites and of exposed banks will be made (after preliminary landscape models are developed) to gauge the size of the data base. During the reconnaissance nearly all cutbanks and other exposures will be inspected. The majority of field time will be concentrated on the survey transects spanning the valley (see geological methods above). Much of the archaeological survey will be concentrated in the upper halves of the pools due to water problems. In the transects we will determine relative size

and density of sites by employing careful bank inspections and transects of posthole probes across dry land (islands). The thickness of post-settlement alluvium will be systematically recorded. All surveys will record the height and extent of eroded (vertical) river banks to provide quantification of navigation impacts. Areas likely to be included in the survey transects are the floodplain adjacent to the Savanna Proving Grounds terrace both north and south of the Maquoketa and Apple rivers, the backwater sloughs north of Savanna, Illinois, the aprons of alluvial fans inundated behind Lock and Dam 13, and the sloughs between Clinton and the Wapsipinicon River.

- * Information collected at sites will be selective. No 100% pick-ups from dense site scatters are anticipated; rather, diagnostic artifacts will be retained with the first 20 flakes and other material noted in written and photographic records. Special efforts will be made to profile existing banks at each site and to obtain artifacts and datable material from soil contexts. Always, we will favor spending time on site context rather than on producing a "catalogue list" of sites and artifacts.
- * Provisions have been made for 18 radiocarbon dates, including 3 accelerator dates for small samples. The additional cost for small sample dates will allow for dating deeply buried fills, which is the primary issue in the Mississippi River valley. Beta Analytic, Inc. will be the laboratory.
- * It is anticipated that archaeologists, geologists and COE personnel will want to visit the project during the fieldwork stage. If so, a tour will be provided.

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PROPOSAL

GEOMORPHOLOGICAL SURVEY, MISSISSIPPI RIVER POOL POOL 13-14, ILLINOIS AND IOWA

by Jeffrey Anderson.

INTRODUCTION

The following proposal is submitted in response to solicitation (No. DACW25-88-R-0050) Archaeological and Geomorphological Surveys, Mississippi River Pools 13 and 14, Illinois and Iowa. The proposal is formulated in a way which provides for the accomplishment of the following major objectives. The first objective is to articulate a cultural geomorphological resource synthesis overview and a preliminary landscape and geomorphological context model. A second major objective is a comprehensive literature search with oral interviews. Another objective is a biased stratified archaeological sample field survey. And finally, an evaluation of the cultural and geomorphological resource base in both of the pools with management suggestions regarding site significance, cultural manifestations, and recommendations requiring further studies to mitigate impacts.

These objectives will be accomplished by the following procedures. First, a review of the existing literature for both pools will be initiated. In addition, the review process will include personal interviews with local residents who are familiar with the archaeological resources in the study area.

Geomorphological mapping of the study area will be done in order to identify areas which may indicate a high potential for containing archaeological deposits. The mapping procedure will include areas such as terraces, colluvial slopes, lateral and vertical accretion deposits, abandoned channels, chutes and back-water areas.

An important consideration in the geomorphic mapping study will be the distribution of post-settlement alluvium and recent post lock and dam deposits. It has been found that historical deposits occur as a discontinuous mantle overlying Holocene valley deposits in the upper Mississippi River Valley (Overstreet, 1985, Anderson and Overstreet, 1986, Anderson, 1988). Island margin expansion occurs in the lower reaches of Pool 21 (Anderson, 1988).

Due to the contracting period, the mapping stage of the study will be concurrent with field investigations. The investigations will include an archaeological reconnaissance survey in conjunction with stratigraphic studies. The field data will be submitted for laboratory analysis and will be incorporated into the report draft.

Correlation of archaeological and geomorphological data must be integrated in a common framework to develop a comprehensive model of site location for cultural resource management. In addition, these data and the site predicate model should be evaluated through comparison with those models developed in other regions, e.g., western Iowa (Benn & Bettis, 1985), southwestern Wisconsin (Knox, et. al., 1981), eastern Iowa (Anderson and Overstreet, 1986), the Illinois River Valley (Wiant, et. al., 1983), Pools 17 and 18 (Benn & Bettis, 1988) and Pool 16 (Barnhardt et. al, 1982).

The model will be applied for integration of geomorphic and archaeological data, and effectively place the results with the context of the preliminary cultural resources management plan. This interdisciplinary approach will aid in providing the greatest contribution to midwestern archaeology and geomorphology as well as a more efficient management of archaeological and historical sites within the pool margins.

WISCONSINAN AND HOLOCENE TERRACE DEVELOPMENT

Episodes of valley aggradation and degradation occurred throughout the late Wisconsinan age in the upper Mississippi River Valley. During the early Woodfordian, about 22,000 years before present, Wisconsinan ice formed glacial Lake Milan and eventually diverted the Mississippi to its contemporary course through the Port Byron gorge and through Rock Island (Anderson, 1968). Thick sand and gravel units are observed in the Mississippi Valley and are a remnant of the Woodfordian substage, when large amounts of sand and gravel were deposited in the Mississippi River Valley in response to Wisconsinan glaciation (Clayton, 1982, Church, 1984). Upstream in southwestern Wisconsin, during the late Woodfordian, rapid alluviation occurred in the Mississippi and Wisconsin River Valleys (Knox and Johnson, 1974).

Near the southern border of the project area at Cordova, younger Holocene fluvial landscapes are observed. These landscapes include a complex mosaic of mixed lateral and vertical accretion deposits, ridge and swale topography, and islands. These landforms, which were stabilized during different periods throughout the last 10,000 years, are juxtaposed illustrating a complex mechanism of lateral channel migration and reworking of valley

floor sediments, with subsequent channel abandonment (Anderson and Overstreet, 1985). This complex set of different aged alluvial landforms are characteristic of the upper Mississippi Valley and have been identified in other reaches of the Mississippi Valley, particularly in Pools 10, 11, 12, 17, 18, and 21 (Church, 1984, Overstreet, 1985, Boszhardt and Overstreet, 1983, Benn and Bettis, 1988, Anderson, 1988).

Several researchers in the upper midwest have addressed the problem of Holocene landscape evolution. For example, in southwestern Wisconsin, geomorphic responses found in alluvial chronologies are strongly affected by the magnitude and direction of Holocene climatic changes. During the early Holocene, valley alluviation, including alluvial fan development, appear to be proceeding (Knox, 1983) in many parts of the midwest. In western Iowa, small valleys were being stripped while alluvial fans were being developed along a larger valley beginning around 8,500 B.P. (Bettis and Thompson, 1981). Bettis and Thompson suggested that a cultural hiatus exists from 8,000 B.P. to 3,000 B.P. in the lower order drainages. However, in the larger streams valleys, Archaic deposits would more often be identified with terraces and alluvial fans.

Anderson and Overstreet (1986) identified a very complex series of geomorphic events in the Iowa River Valley during the late Wisconsinan and Holocene. A series of four terraces were identified. In some cases, the terraces were buried by alluvial fan deposits, while in other cases, terrace stability was followed by burial of late Holocene or historical vertical accretion (PSA) deposits.

Along the valley margins, in Pools 13 and 14, it is suspected that burial by hill slope alluvium represents a high archaeological potential. In addition, terraces which abut the valley margins have probably been mantled by Holocene and historical sediments.

Our proposed study will reconstruct the chronology of Holocene geomorphic events by conducting a detailed Mississippi River valley transect in the upper portion of Pool 13. We will specifically look at Holocene terraces, colluvial slopes, alluvial fans, tributary terraces and islands. Depths of Holocene aged and older deposits will be recorded during the investigation. In addition, the depths of historical deposits will be recorded throughout the investigation. The cross section will be generated to develop the comprehensive landscape model, which will be used to predict archaeological potential and improve cultural resource management.

PROPOSED RESEARCH METHODOLOGY

The first phase of geomorphological investigation will involve indirect information about the pools. This will be a literature review of previous archaeological and geomorphological investigations. This will include an analysis of original land survey documents in order to determine the extent of historical archaeological sites. Geomorphic mapping will involve the use of black and white aerial photographs from 1927 through the 1960's. These photographs will be obtained at the Corps of Engineers Office of River Commission maps and the Brown Survey maps, will be employed during the mapping exercise. Furthermore, the USACE plane table maps will be used to help delineate geomorphic surfaces.

The prelock and dam Mississippi River maps and aerial photographs will be used to produce the base maps. Overlays will include the geomorphic mapping units, historical (PSA) deposits, spoil and urban land, and archaeological sites will be similar to what was produced for Mississippi River Pool 21 (Anderson, 1988).

Direct geomorphologic investigations will include subsurface investigations along the valley wall and on Mississippi River terraces. The valley wall investigation will be combined with an island study. Silt probe, sampling tube, Giddings probes and backhoe trenches will be used to sample the deposits and reconstruct a valley cross-section.

Where buried surface horizons are encountered, samples will be taken for radiometric reconstruction. The dates will be used to help establish a chronology of geomorphic events and will help correlate related surfaces within the Mississippi Valley Pools 13 and 14. The dates will provide a time frame where stable surfaces could have potentially been culturally occupied. Moreover, the dates will also be used to help relate Holocene geomorphological events, both upstream and downstream of the study area.

Soil and sediment descriptions shall include color, texture, structure, consistency, special features, boundary conditions, effervescence, and/or pH. Soil stratigraphic units will be described under the latest revised taxonomic nomenclature described in Birkland (1984), and parent materials exclusive of the solum and paleosolum will use the standard weathering zone terminology for Quaternary sediments in Iowa (Hallberg, et. al., 1978).

LABORATORY METHODOLOGY

Upon completion of detailed stratigraphic studies, the sediment samples will be processed for particle size determination and

organic carbon content. These methodologies will provide documentation and correlation of alluvial and pedologic units along the developed transects. Hydrometer and wet sieve analysis will be used to determine the relative proportions of sand, silt, and clay. Organic carbon will be determined through the use of the Dohrman TOC analyzer. Buried surfaces which contain high organic carbon content and are suspected to represent buried soil horizons of considerable age, will be sent for radiometric dating analysis.

The field, laboratory, and radiocarbon data will provide the necessary information for reconstruction of geomorphic surfaces and archaeological site distributions will be produced through the detailed mapping of Pools 13 and 14. Terraces, alluvial fans, colluvial slopes, vertical and lateral accretion deposits, islands, historical alluvium, and all known archaeological sites will be mapped for Pools 13 and 14.

PROPOSAL SUMMARY

This proposal is guided by research design based upon familiarity of the co-principal investigators with the study area. Furthermore, the proposal seeks to integrate the disciplines of archaeology and geomorphology within the frame work of a preliminary management plan for both Pools 13 and 14. Through this approach, we believe the greatest contribution can be made toward cultural resource management.

TR/MISC/JD0

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PROJECT OUTLINE

RE: ARCHIVAL RESEARCH FOR ARCHAEOLOGICAL & GEOMORPHOLOGICAL
SURVEY OF POOLS 13-14 by Robert C. Vogel

Introduction

The archival research plan outlined below responds to a request for proposals for an archaeological and geomorphological investigation of Navigation Pools 13 and 14, Upper Mississippi River. It is my understanding that this project will be undertaken by the Center for Archaeological Research at Southwest Missouri State University under contract to the U. S. Army Corps of Engineers Rock Island District.

The proposed archival research will review and evaluate information about cultural resources in Pools 13 and 14 as an aid to the archaeological field survey. To the extent possible, the archival research will develop site specific documentary data for historic archaeological sites as well as a series of historic contexts for evaluating historic site significance in terms of National Register of Historic Places eligibility.

Particular attention will be paid to documenting all post-contact American Indian and Euro-American occupations within the project area, and to defining successive human adjustments to environmental change within the Pools 13-14 region. The study area's historic focus on agriculture, its economic relationship to the Mississippi River as a mid-continental transportation artery, and its inhabitants' adaptations to changing alluvial valley morphology are closely related, both geographically and historically, to previous studies conducted by this writer in Minnesota, Iowa, Illinois and Missouri. Historic contexts previously developed for historic archaeological sites in Navigation Pools 17, 18 and 21 (see Benn, Bettis and Vogel 1988; Anderson et al. 1988) will be refined and expanded to suit the needs of the Pools 13-14 project; new historic contexts will be developed as necessary.

Research Goals and Methods

Archival research is the study and organization of information on the post-contact history and historic sites of the project area. Historic contexts for setting survey goals and evaluating properties identified in the field are established on the basis of archival research, making it possible to predict where specified site types may occur and what their archaeological characteristics may be. Finally, archival research will provide the information needed to evaluate archaeological sites in terms of their eligibility for nomination to the National Register of Historic Places.

The research strategy I have developed for the archival research in Pools 13-14 is designed to achieve four primary goals:

1. Compilation of site location data for use by the archaeologists in the field;
2. Documenting historic archaeological sites on land controlled by the Corps of Engineers;
3. Develop regional contexts for historic site significance; and
4. Identify, review and critically evaluate archival and published historical sources relating to cultural resources in the project area.

Because the mass of archival data relating to Pool 13-14 is voluminous, it will be absolutely vital to keep the archival research clearly focused on data relevant to the project goals. Historic contexts, providing an organizational framework based on theme, geographic area and chronology, will be the basis for organizing the archival research. The archival research methodology is summarized below.

1. Identification of sources and their relevant data is the first step in the archival research process. Existing information about Pools 13 and 14 will be assembled from primary and secondary source materials, agency records and oral history sources.
2. Sources will be critically reviewed and the reliability of the data they contain will be assessed to identify historiographical biases and information gaps.
3. Historical data will be synthesized within the framework of historic contexts. Archival research in Pools 17, 18 and 21 provided a range of broad historical, archaeological and cultural contexts which would seem to be applicable to the Pools 13-14 study. Sites associated with significant historic events and personages will be identified, as well as properties linked to social, economic and ethnic groups which have had an impact on regional history.
4. Property (i.e., site) types will be identified within the historic contexts.
5. Predicting the general location of archaeological sites is probably the most important aspect of this kind of archival research. For some property types (e.g., townsites) this will be quite simple, but for most post-contact property types predicting site distribution will be complicated by gaps in the data base and by landscape changes.
6. Identify information needs to be satisfied by archaeological fieldwork. These needs should be used to guide

the field survey and future cultural resource management studies in Pools 13-14.

Research Design

My research design is organized around the concept of historic contexts. This approach parallels statewide preservation planning processes carried out by the SHPO's in both Iowa and Illinois, and builds on archival research conducted as part of archaeological and geomorphological investigations in Pools 17 and 18. Because of the historical, geographical and cultural communality between Pools 17-18 and 13-14 (hence their mutual comparative value), I propose structuring my research along the lines of the following historic contexts: the Upper Mississippi River Borderlands (1640s-1820s), Historic Indians (1640s-1830s), the Fur Trade (1680s-1840s), the American Regime in the Upper Mississippi Valley (1780s-1820s), early settlement (1830s-1850s), development of river towns (1840s-1890s), agricultural expansion and industrial development (1850s-1910s), the Upper Mississippi Waterway (1820s-1920s) and the Corps of Engineers and the Upper Mississippi Valley (1860s-present).

Together with the Corps of Engineers' cultural resource management priorities and its funding resources, historic contexts should be viewed as the most influential factors in defining the scope of the archival research effort. In preservation planning terms, an historic context is a broad pattern of historical development that is represented by historic properties (see NPS 1983).

Historic contexts are developed on the basis of background data produced by historical overviews. To mobilize this background data, I will conduct initial research into regional history, consulting a wide range of primary and secondary sources. Local historical organizations, academic history and geography departments, and professional and avocational archaeological organizations will be contacted, as well as the respective State Historic Preservation Offices and the staff of the Rock Island District Corps itself. The primary goal of this initial literature review and consultation is to review the history of the Pool 13-14 region, define important patterns of settlement and development, and identify historic property types.

Historic contexts will be refined, modified, expanded and elaborated on as the archival research proceeds.

Sources to be Consulted

Archival research will make use of both primary and secondary sources, as well as informant interviews, in compiling historical data.

Primary sources include original contemporary narrative material and documents, including but not limited to the following:

accounts of travelers, narrative histories, family papers and records, early ethnographic accounts, census records, land records, historic maps and plats, directories, old photographs, reports of previous cultural resource management studies and contemporary newspapers. Secondary sources include but are not limited to the following: general state and regional history surveys, monographs, county and local histories, journal articles, SHPO and state archaeologist county files, magazine articles and the records of the NABS, HAER and NRHP.

The library holdings of the University of Minnesota and the state historical societies of Iowa and Illinois will be the starting point for the archival research. Several college and public circulating libraries located in or near the project area also are known to house special collections devoted to state and local history, as well as local newspapers and journals.

The archival holdings of county courthouses within the project area will provide abstracts and title deeds, surveyors' notes and plats, probate and tax records. These constitute some of the most important sources of site-specific documentation.

The professional staffs of state historical and archaeological agencies will be an important source of information. There are several learned societies within the region which have publication programs, and most maintain archives and specialized libraries. State archaeological and historic preservation organizations maintain files, notes and libraries of information on sites in Pools 13-14. Members of local archaeological societies and preservation organizations are also known to possess relevant information in the form of private collections, files and notes.

The U. S. Army Corps of Engineers technical library and vault in Rock Island is a treasure trove of information on the river environment and civil works projects. Research will make use of the Corps' extensive cartographic and photographic holdings.

The National Archives in Washington, D.C., and its regional repository in Chicago contain a vast body of relevant data for the Pool 13-14 study, including agency files, land records and maps. The Library of Congress houses the records of the Historic American Buildings Survey and Historic American Engineering Record, as well as one of the world's great map collections. These sources will be utilized through interlibrary loan of microfilm wherever possible.

Scheduling

I am prepared to begin the literature search immediately upon notification of award of the contract, and will carry out the proposed archival research and report preparation within the time allotted in the scope of work.



DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

September 6, 1989

REPLY TO
ATTENTION OF:

Planning Division

Dr. David Benn
Center for Archeological Research
Southwest Missouri State University
901 South National Avenue
Springfield, Missouri 65804-0029

Dear Dr. Benn:

The Rock Island District of the U.S. Army Corps of Engineers, Illinois State Historic Preservation Office, and Iowa State Historic Preservation Office have completed their review of the draft report entitled Archaeology, Geomorphology, and Historic Surveys in Pools 13 and 14 Upper Mississippi River. Comments from the reviewers to be addressed in the final report have been provided under separate cover.

The report provides a wealth of information on this reach of the Mississippi River and will be a valuable management tool for the Rock Island District. If you have questions concerning the comments, please call District Archeologist Kenneth Barr at 309/788-6361, Ext. 349, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P. O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

J. Paul VanHoorebeke
Authorized Representative
of the Contracting Officer

Project: Pools 13-14, 89
 Location: Upper Mississippi River

Reviewer: Ron W. Deiss
 Organization: CENCR-PD-E

Comment No.	Page No.	Comments or Correction	Action
1	57	2nd para. The comment on time and funding limits should be removed from the report. All scopes of work have time and cost limitations; also if the report suffered the authors bid should have originally been increased to meet the scope.	remove
2	60	3rd line. This is one example of a couple present in the report where the appendix no. should be included.	proof for final
3	61	3rd para. An unnecessary space and/or hyphen in "international". This is one example of a couple present (see p65, 1st para.; p73, 3rd para. and p75, 4th para. for example) where unnecessary spaces or hyphens are present.	proof for final
4	66	2nd para., line 2. The word "there" is unnecessary in this sentence.	remove
5	69	2nd and 3rd para. River should be capitalized as a part of a proper name. This is a common editorial error throughout the report. County should be capitalized as a part of a proper name (see 101, 3rd para.). This is a common editorial error as well.	edit throughout
6	75	2nd para. Should be Treaty Of St. Louis	edit
7	75	3rd para. Treaty should not be capitalized unless the title includes the date, 4 August 1824.	edit
8	76	2nd para., in quote. Is "Hossiers" a correct spelling, also seenovel title The Hossier Schoolmaster (p82, 1st para.).	hoosier or hossier?

Comment No.	Page No.	Comments or Correction	Action
9	80	4th para. In the 5th sentence 17,000 is written out. In a few places within the report inconsistencies concerning numeric or written amounts occur.	edit where necessary
10	93	2nd para., 2nd sentence. But could be taken out.	comment
11	93	2nd para., last sentence. "low higher" or low water?	edit accordingly
12	102	6th para., 1st sentence (words are missing).	edit accordingly
13	107	3rd para., quotes (last sentence). "In" is duplicated in text.	edit
14		<p>The Archival Research section of the report is well written and an interesting text. Personally, I felt the local history section to be of more use in performing Corps cultural resource assessments and recons. Although written by an authoritative historian, Mr. Vogel's thematic overview section should contain the "author - date style." precluding the (p60, 1st para., last sentence.) remark on reference citations. No action is recommended by this reviewer on this comment, although future Corps scopes of work may specifically require adherence to the American Antiquity style guide.</p> <p>This reviewer does appreciate the author's desire to "weed out" unnecessary text and produce a less bulky text. The authors writing style is to the point and he has successfully distilled an extensive data base concerning many facets of history. Mr. Vogel is to be commended on this demonstration. I feel that a summary for this chapter would enhance the subject matter, as pertaining to Pools 13-14.</p>	
15		In Chapter V, Project Summary and Recommendations I found the results both "heartening and yet maddening" as stated by the authors on p225, 1st sentence. I took to heart the comments of future modifications, approaches and specific changes to improve Corps scopes of work, but maddened (as was	

Comment Page
No. No.

Comments or Correction

Action

the authors) by absence of original research and high cultural resource potential unsubstantiated by ground truthing. Many of the recommendations imply that archival and geomorphological potential is always viewed as being high irregardless of the ground truthing results. Whether this implication is correct or incorrect, I suspect that the Site Impacts and Intensive Surveys Recommendations will be most helpful in future Corps management.

Project Review Comments

September 6, 1989

Project: Arch/Geomorph/Hist
Location: Pools 13-14

Reviewer: Ken Barr
Organization: CENCR-PD-E

Comment No.	Page No.	Comments or Correction	Action
1	x	Should read resulting from pool 13 & 14 study.	
2	x	Recommendation 6: under no impacts and no recommendations; are these sites, in your opinion, not eligible for NRHP or not being impacted or not on Corp land or what?	
3	9-11	Expand considerably on the Illinois Archeology. Discuss types of site found; give site #'s; implication of research to present study.	
4	10	Indicate who did recent work at Albany and results.	
5	25	Summary: Is high potential area on Corps Fee land?	
6	53-54	Nice photos.	
7	--	See Pulcher & marked up report for detailed editorial on geomorph.	
8	68	Briefly describe William Henry Harrison farce.	
9	93	3rd para: "low higher" should read "low water"	
10	96	2nd para: typo "the the"	
11	104	What is a fish rescue station?	
12	115-137	Maps need scales, north arrows, and keys.	
13	139	5th para: Convert 25.75 miles to acres making some assumptions for NPS purposes.	

Comment No.	Page No.	Comments or Correction	Action
14	146	ST 89: Is this site present in historic documentation (i.e. maps)?	
15	143	CN 59: Why no further work? Not eligible? Not being impacted or what?	
16	147	CN 56: Not eligible?	
17	147	CN 57: Discuss probable location of site in profile to surface and to average water level in order to assist in planning future excavations.	
18	150	CN 3: No work recommended because no impacts or not eligible?	
19	152	11 CA 113: State that it may be eligible or not.	
20	154	11 CA 44: Who owns mounds contradiction in sentence.	
21	158	Is 13 JK 93 previously recorded?	
22	167	Is it true that Dalton components may be found on terraces which terraces?	
23	167	"torrent bar" not in geomorph section. Are "lower terraces" 9,000 years old?	
24	172	Savanna proving ground need site #.	
25	165- 173	Illinois section is in need of extensive editing. Need to use terminology consistent with rest of report. Boreal and Atlantic are not consistent. Torrent bar is not described in geomorph section. Also when discussing terraces, say which terrace. Make formatting same throughout report.	
26	189- 195	Archeological site location maps should be board in separate volume. Also distinguish between walkover, boat survey, & shovel test areas.	
27	199- 208	Strive to make photos as clear as possible in final report.	
28	224	Must distinguish between sites that are not significant and those which are potentially significant but not currently being impacted.	

Comment No.	Page No.	Comments or Correction	Action
29	Gen	Integrate Archeology bibs and Geomorph leave annotated bib independent: Need statement on where artifacts are curated. A significant amount of information has ben collected by this project. Presentation suffers somewhat from lack of integration between authors. This should be corrected in the final report. See editorial comments in enclosed draft report returned to you. REF. Pulcher & Deiss comments and my editorial comments on pages 93, 96, 140, 145, 147, & 221. Incorporate Timber scale area discussion previously provided to District on 9 Nov 89.	

Project: Arch/Geomorph/Hist
 Location: Pools 13-14

Reviewer: Ron Pulcher
 Organization: CENCR-PD-E

Comment No.	Page No.	Comments or Correction	Action
Gen.	1	The report is informative. It reflects the extensive familiarity of the authors with their subject matter and the project area in particular. The recommendations in Chapter V are well-reasoned and appropriate, though somewhat idealistic, from the perspective of what is possible under COE cultural resource management capabilities (e.g., extensive archival research).	
Gen.	2	The quality of the graphics is poor, doing an injustice to the generally organized, well-presented, textual information. Some of the graphics problems are noted directly on the draft copy returned to the authors. Some general comments include: 1.) poor readability due to shading tones selected, 2) use of no shading or hatching whatever for a category of data when project boundary is not clearly marked on map (pool 13, post settlement Alluvium map sent separately from bound report, 3) incomplete keys (i.e., figure 2.5, 4) lack of scale bar (figure 2.5-2.8, 5) a generally unprofessional look due to variable a/o no margins, eclectic format, etc., and 6) no hand written entries shall appear on graphics in the final report.	
Gen.	3	Chapter II lacked editorial review, leaving minor and major problems (punctuation, grammar, sentence structure, spelling, etc.) to distract the reviewer and remove his focus from the chapter's content.	
Gen.	4	The report format (headings, figure numbers, reference citation, etc.) is a conglomeration of styles which needs to be editorially addressed before production of the final report.	

Comment No.	Page No.	Comment or Correction	Action
Gen.	5	Much of the map information is on too small a scale to be useful to the cultural resource manager. Will maps accompanying the final report be at a larger scale?	
Gen.	6	No map really defines the limits of government (COE, specifically) controlled land and its relation to the geomorphic mapping or archaeological survey areas. This should be corrected using maps of sufficient scale to be useful for cultural resource management needs.	
1	v.	Give photographs on pp. 52-55 figure number. Do not cite these in text as "(see photos)" - cite by figure number.	
2	11	What is the significance of "Three River Region"? Discuss this in the text or remove it from Figure 1.1.	
3	14	"Hammer et al. 1985" is not in References Cited list.	
4	19	Lines 22-23: "So far" and "are being processed" are not results suitable for a final report draft. Tell how many samples were actually collected and processed.	
5	20	Lines 23-24: Omit this sentence from final report. Indications of missing data in draft report which will appear in final report should be noted in cover letter to the draft, not in the text, except perhaps as a bracketed note.	
6	21	Line 9: Does the author really mean "centimeter"? line 26: Cite figure & number, do not use "(see photos)". This comment marked elsewhere in draft report returned to authors and not repeated here.	
7	26	4th sentence of last para. needs rewriting a/o punctuation to clarify meaning.	
8	31	6th line from bottom of page: What is the significance of "Beta-B lamellae" and what are they composed of? Or just put in glossary.	
9	32	1st line, para. 2: please put "thalweg" in glossary.	

Comment No.	Page No.	Comment or Correction	Action
10	36	Lines 5-7: This sentence needs rewriting to clarify meaning.	
11	38	Para. 2: Major valley incision did not occur at all near the Wapsipinicon or did not occur to the extent seen in pool 13? Please clarify.	
12	39	4th sentence of para. 2: Please clarify phrase - "lateral floodplain reworking an incision in the tributaries".	
13	51	Hatching south of Cordova not in key to figure.	
14	--	Chapter III, pp. 60 - 97 received only a cursory review as nearly 95% of this material was previously accepted in the Pools 17 - 18 report.	
15	98	Line 8 of para. 1: "(see Site Map)" should be replaced by specific reference to a figure in the report.	
16	102	3rd para.: "one of the great train robberies in North American history" sounds facetious without additional documentation. Please provide additional discussion.	
17	104	End of 1st para.: a "fish rescue station"! Please give a little more detail explaining its function. Sounds interesting.	
18	116	Source of Figure 3.2 needs to be referenced.	
19	121	Figures 4.1 and 4.2 showing "project area" do not give the boundaries of the area. This should be corrected by using a larger scale map, using an approximate boundary marking on this map and providing detailed boundary data elsewhere, or reaching some other workable solution.	
20	139-140, 183	Change headings in Table 4.1 as follows: "Water" to Shorelines "Shore" to Walking This will be much clearer and agree with the text.	
21	151	Last para.: Explain why survey was conducted "on the levee". Was it a natural levee? Was it likely to contain material removed from	

Comment No.	Page No.	Comment or Correction	Action
		below the surface in the immediate vicinity? Please clarify.	
22	154	Who really owns sites 11CA44, 55 and 56? The Government? Mr. Knuth? Or both?	
23	--	Pages 165 - 173: This material needs editing for content and format to integrate it into the report. If headings are retained, it would probably be appropriate for them to refer to the culture history rather than a mix of environment and culture history.	
24	--	Pages 177 - 182: The prehistoric cultural overview raises interesting and original questions for future researches to consider.	
25	219	1st para.: the "detailed set of observations" incorporated into Chapter 5 by reference (Benn, Bettis on Vogel 1988: 320 - 328) were consulted. It is requested that these be spelled out in full in this chapter as they contain pool specific references. Why do so many photos of artifacts lack a scale? A small plastic ruler would be preferable to a "Bic" pen to show scale.	
26	--	Pages 251 - 258: integrate these two bibliographies.	
27	--	A set of maps for Pools 13 and 14 with PSA depths accompanied the draft report. Will these replace Figure 4.4? Supplement it? How will they be referenced in the final report?	
28	--	Reference para 4.8 of the Contract, Timber Management: Two parcels were specifically detailed for inclusion in the survey. The draft report, at a minimum, should address these parcels with: <ol style="list-style-type: none"> 1) Maps showing their boundaries and the areas surveyed therein. 2) Discussion showing that "areas within these parcels which the geomorphological model indicates may have a high probability of containing archaeological sites" have been surveyed. 3) Indications in the text and map titles that these were specially numbered and named areas 	
29	--	See typos, comments, etc. as marked in the draft copy returned to the authors on pages:	

Comment No.	Page No.	Comment or Correction	Action
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i, ii, v, 2, 4, 7, 8, 9, 10, 13, 15, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 35, 37, 38, 39, 94, 98, 99, 100, 102, 103, 104, 105, 107, 111, 113, 116, 138, 143, 144, 145, 146, 147, 148, 151, 156, 157, 159, 165, 166, 167, 169, 170, 171, 172, 173, 175, 176, 177, 179, 180, 189, 219, 220, 222, 223, 226, 230, 257, 258, 294, 301, and 357.



**Illinois Historic
Preservation Agency**

Old State Capitol • Springfield, Illinois 62701 • (7) 782-4836

217/785-4997

HENRY, WHITESIDE, CARROLL, AND JODAVIESS COUNTIES
River Pools 13 and 14
Archaeology, Geomorphology, Historic Surveys

August 29, 1989

Mr. Paul Van Hoorebeke
Planning Division
District Engineer
U.S. Army Engineer District, Rock Island
Attention: Planning Division
Clock Tower Building Post Office Box 2004
Rock Island, Illinois 61204-2004

Gentlemen:

Our staff has reviewed the draft manuscript entitled "Archaeology, Geomorphology and Historic Surveys in Pools 13 and 14, Upper Mississippi River CAR 752" prepared by Benn et al. A sheet containing our comments is attached. This document meets the scope-of-work and professional standards met in the previous Pools 17 and 18 manuscript.

The manuscript is an excellent synthesis of archaeology, historic and especially geomorphology of the Pools 13 and 14 areas. The authors have comprehensively integrated information from their specific fields into recommendations for research and cultural resources management. We concur fully with these proposed recommendations.

The Rock Island District and the Center for Archaeological Research, SMSU can be proud of this excellent document.

Sincerely,

Theodore W. Hild
Deputy State Historic
Preservation Officer

TWH:JAW:bv

Enclosure

cc: Ken Barr, CoE-Planning Division W/A

ARCHAEOLOGY SECTION REPORT REVIEW
ILLINOIS HISTORIC PRESERVATION AGENCY

Report Archaeology, Geomorphology and Historic Surveys in Pools 13 and 14, Upper
Reviewer Williams Date August 23, 1989 Mississippi River CAR 752

Cmt. Page/Para/
No. Line.

REVIEWER'S COMMENTS

1	2/3/4	delete "a"
2	2/3/17	remove "d" from "focused"
3	5/4/12	is "step" a good word perhaps "trip"
4	9/2/7	"incredibly" not incredibly
5	10/1/1	add "o" to "through"
6	65/4/6	remove "the"
7	74/3	Illinois' capitals were: Kaskaskia 1818-1820 Vandalia 1820-1839 Springfield 1839-present
8	75/3/7	no space in "government"
9	80/1/7	insert "of" between lure cheap
10	82/6/3	eliminate "to"
11	85/3/6	reverse "from" and "directly"
12	96/3/10	eliminate "the"
13	97/1	indent remainder of quote started on page 96
14	102/3/6	"tain" should be "train"
15	102/6/2	"pallisade" should be "palisade"
16	107 4/1	"Inn" should "In"
17	139/1/2	eliminate "d" from "located"
18	158/4/3	eliminate "are"
19	179/1/7	eliminate "of"
20	219/4/6	"extend" should be "extent"
21	222/3/9	"archaeologist" not "archaeological"
General		Previous Investigations in Illinois The documentation in this section seems to be missing more recent works. Also this section could be filled out a little more with information about Illinois archaeology.
General		Illinois archaeology in that area is very interesting and this fact has not been addressed adequately in the various sections dealing with the subject.



State Historical Society of Iowa

The Historical Division of the Department of Cultural Affairs

August 31, 1989

Mr. Dudley M. Hanson, P.E.
Chief, Planning Division
U.S. Army Engineer District
Clock Tower Building - P.O. Box 2004
Rock Island, IL 61204-2004

DRAFT

RE: COE - ARCHAEOLOGY, GEOMORPHOLOGY AND HISTORIC SURVEYS IN
POOLS 13-14, UPPER MISSISSIPPI RIVER, CAR-752 - DACW-88-C-
0093 - REVIEW OF DRAFT REPORT.

Dear Mr. Hanson:

We have reviewed the draft archeological report on the above referenced survey. This report provides a wealth of data on the prehistoric and historic occupations of this reach of the Upper Mississippi River. We urge the COE-RI to prepare a Multiple Property Nomination for the historic contexts identified in this and other pool survey reports. A "beachhead" nomination for several districts could easily be prepared from these reports.

In general we concur with all recommendations for further COE investigations outlined in Chapter 5.

Comments on the report are attached.

Sincerely,

Kay Simpson
Archeologist
Bureau of Historic Preservation

PD	<i>Dir</i>
PD-C	_____
PD-E	_____✓
PD-F	_____
PD-P	_____
PD-R	_____

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COMMENTS

CHAPTER 1:

General: Single spacing on a dot matrix printer is very cruel to reviewers - and so rough a draft delivered in August for a October 1 due date. The P.I. should integrate all chapters even though some are individually authored. Chapters need bridging paragraphs to make the report more cohesive, and summary statements to end each chapter and tie together issues discussed. One of the great strengths of this report is the integration of Pool 17/18 results with Pool 13/14 results.

The prehistorical and historic chapters do not follow parallel formats. The prehistoric chapter on sites precedes an overview of prehistory, while in the historic chapter, historic contexts are

page ix:
& p. 139 We need total number of acres surveyed. Please convert linear miles to acres.

page ix-x: It would be easier to read if the recommendations were listed as single lines. As an aside, throughout the text there are a number of overly long paragraphs.

Recommendation #1: Do you mean historic/geomorph overviews should be issued as separate contracts? Or are you just re-emphasizing that you did the overviews before fieldwork and this was a successful strategy? BHP would concur, but recognizes the difficulties of scheduling multi-phase projects.

Recommendation #2-4: BHP concurs and suggests that the COE consider preparing Multiple Property Nominations for these three themes as a final product for any additional work effort.

Recommendation #5: Insert state by each survey area.

Recommendation #6: Only 27 of the 58 sites investigated are mentioned. Language should read "recommend as ineligible for NRHP"? - throughout the text it is very confusing as to when eligibility, impacts, and management issues are discussed. These are separate issues which need to be separated. Language should read "previously considered by COE/SHPO as eligible for NRHP".

page 1: List counties covered in survey.

page 1: Page viii, first parag. implies the three individuals bid as co-PI's with one sub-contract; page 1 says there is one PI and 4 sub-contracts. Stanley and Bettis are variously referred to as helpers and sub-contractors.

page 3: Figure 1.2, not 4.2. Figure 1.1 is so simplistic and

Fig. 1.2 is so busy. Neither one is a stellar graphic. The COE's L&D map could be altered to be a better Fig. 1.1 or could become Fig. 1.3. Either way the entire L&D/pool system referred to repeatedly in Chapter 1 should be graphed. Fig. 1.2 should show the River from Bellevue to LeClair with all tributaries and creeks. Smaller towns referred to in the text and the Army Depot should be plotted. And some map in Chapter 1 should reference Prior's landforms (mentioned on page 6 without citation). In short, the chapter provides few reader's aids for those not intimately familiar with the area, a hinderance in any overview document.

- page 5: No mention is made of NABD search or survey map records check at SHSI or site records check at OSA. There should be a map showing previously surveyed areas, and if not all previously recorded sites, then at least sites mentioned in text. See also page 7 reference to Fig. 4.5-4.11. These figures show 1988 survey areas not prior areas. And the figure for past survey efforts should be in Chapter 1, not 4.
- page 7: The text in []'s on 13CN10 is lost in space.
- page 7: Some sense of acreage in these previous surveys would be appreciated (NADB could provide this).
- page 8: In first paragraph the following non-sequitor occurs "...no sites (including 13CN13)..." The comment on 'oversight' should be taken in context of the recent AIA discussion of the appropriateness of geomorph/searching for buried sites on small projects.
- page 9: Site 13JK79 was considered eligible for the NRHP for Section 106 purposes by the SHPO in a letter dated 3/4/85. 'Acceptance date' sounds like it is actually listed. Perhaps it should be stated the report was rejected by COE and SHPO? This is another run-on paragraph. Separate the section on 17 rec areas and the pipeline projects.
- page 10: Chapter needs summary section. A chart of previous surveys on both sides of the river would be useful, as would a list of evaluated and non-evaluated sites from these previous work efforts.
- CHAPTER 2:
General: The clean, well-edited text is much appreciated by the reviewer. Overall, this is a very clear summary of landscape history, methods employed in survey, and results.
- page 21: "thick" deposits of "a centimeter"?
- page 22: There is more than one Section 9 on Fig. 2-5.

page 25: Is there equally high potential for buried deposits on both sides of the river?

Chapter 3:

page 66: Saukinuk or Saukenuk?

page 98: Site map not included in draft?

page 98: I found the omission of bibliographic references requires a great deal of hunt & peck work in the bib. appendix.

page 99: Do Miller's 1878 excavations have an archeological site number? Is it known where the materials reside - Putnum?

page 100: Site numbers for the three historic sites - or do you think this should wait for confirmation? Paragraph leads reader to think Smith & Shoecraft sawmill on Fig 4.11, not 4.10.

page 101: Fig. number for Davenport trading post location?

page 102" " " Highland?

page 102: Going back and forth between figures in Chapter 3 and 4 is very confusing.

page 106: Map reference for Baker's Settlement?

page 107: Gold in Iowa - the mind reels.

page 114: Smith's Island - the survey was in 1930?

page 114: The end? - no summary?

Figures 3.6 ff. (MI River Commission) are unreadable.

Appendix D: This is really part of Chapter 3's summary and should not be an appendix.

Chapter 4:

Fig. 4.1-2: Our office needs the survey location plotted on USGS scale maps. The survey parcels identified on page 139 cannot be identified on the two maps.

page 143: Am I to infer that "no additional investigation" = recommend as not eligible for NRHP? And that discussions, e.g. 13ST84, of site destruction mean the same thing?

page 146: Site 13ST88 remains unevaluated?

Site 13CN36 - I hope this isn't a stupid question, but why is this an impossible site location? I thought

most PSA has been deposited since 1830. Why can't the site be simply buried under PSA?

13CN59 - the site is forested and undisturbed but no further work is recommended. On the basis of 3 SH, the site is ineligible?

Throughout the site descriptions in Chapter 4 I was confused as to what was found to be ineligible and what remains unevaluated, but you are not recommending the COE to pursue investigations. A chart would clear up eligibility decisions.

page 158: 13JK93 - What was assigned a site number?

page 160: Princeton mound - site number?

page 162: Creamery village - site number?

Were you able to visit any collector's sites or did you just view collections with topo map in hand?

page 165: The Conrad text is a poor fit into the present Chapter 4 format and needs to be integrated with pages 175ff.

page 180: Did you calculate point spacing through locational analysis to conclude pool 13-14 MW sites have the same spacing as in the Struever analysis?

Fig 4.5ff: It is difficult to tell what is a potential historic site location and what is a confirmed site.

page 224: To me, no significance is not synonymous with no impact and the chart combines significance and COE responsibility.

APPENDIX B
SOIL PROFILE DESCRIPTION

SITE NAME: Whiteside Area 1
LOCATION: Pool 14 SE1/4, NE1/4, SE1/4, T.21N, R3E Illinois
ELEVATION: 575-580'
GEOMORPHIC SURFACE: Early Holocene Surface
POSITION IN LANDSCAPE: Mid terrace
PARENT MATERIAL(S): Mississippi alluvium

WATER TABLE: Below depth of core
SLOPE: 0%
VEGETATION: Oak forest
METHODOLOGY: Silt probe
DATE DESCRIBED: 9/26/88
DESCRIBED BY: Jeff Anderson

REMARKS: Probably early Holocene surface. Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-40	C (PSA)	10YR 3/3 silt loam moderate medium granular, friable, many roots, leached, clear wavy.
40-140	A&B	10YR 3/4 silt loam grading to loam, moderate medium granular and subangular blocky, friable, leached.

SITE NAME: ST No. 1A
 LOCATION: Pool 14 T80N, R5E. SW1/4, SE1/4, NE1/4, Sec. 35, T.80N, R5E,
 Iowa (Wapsipinicon Area)
 ELEVATION: 575-578'
 GEOMORPHIC SURFACE: Mid to late Holocene Surface
 POSITION IN LANDSCAPE: Small swale in terrace
 PARENT MATERIAL(S): Mississippi alluvium

WATER TABLE: Below depth of core
 SLOPE: 0%
 VEGETATION: Maple Elm forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 9/26/88
 DESCRIBED BY: Jeff Anderson

REMARKS: South of Wapsipinicon River near DNR area. Apparently slow alluviating surface. Paleosol occurring at and below 1 meter. Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-20	C (PSA)	10YR 2/1; silt loam; fine sub-angular blocky, friable, clear wavy.
20-100	A&B	10YR 2/2-3/3; silt loam to silty clay loam, moderate medium sub-angular blocky, friable, clear wavy.
100-140	A _b	10YR 2/2; silty clay loam, moderate medium subangular blocky, friable, clear wavy.
140-173	Bt _b	10YR 3/3; silty clay loam, moderate medium subangular blocky, friable, mottled and gleyed.

SITE NAME: SP No. 1B
 LOCATION: Pool 14 NE1/4, LW1/4, SE1/4, Sec. 12, T80N, R5E. (Wapsipinicon Area)
 ELEVATION: 530-585'
 GEOMORPHIC SURFACE: Mid-Holocene levee
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Mississippi alluvium

WATER TABLE: Below depth of core
 SLOPE: 0%
 VEGETATION: Hardwood Forest
 METHODOLOGY: Silt probe
 DATE DESCRIBED: 10/21/88
 DESCRIBED BY: Jeff Anderson

REMARKS: No apparent PSA deposits on this surface. Probably mid-Holocene levee system. Shafton access area, this is a surface above 580 feet. Adams Island appears to be relatively late Holocene age. The Shafton access boat ramp is on this early/mid Holocene surface. About 1 meter higher and closer to the 590 contour is the lowest late Woodfordian terrace. Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-20	A	10YR 2/1; silt loam, moderate medium granular, friable, pH = 7.5, clear wavy.
20-40	Bw1	10YR 3/3; fine sandy silt (loam), moderate medium subangular blocky, friable, pH = 6.5, clear wavy.
40-109	Bw2	10YR 4/4; fine sandy silt, fine sand (loam), weak medium subangular blocky, friable, pH = 5.5.

SITE NAME: ST No. 2
 LOCATION: Pool 14 SW1/4, NW1/4, Sec. 7 T70N, R6E Iowa (Wapsipinicon Area)
 ELEVATION: 575-580'
 GEOMORPHIC SURFACE: Late Holocene surface
 POSITION IN LANDSCAPE: Main valley
 PARENT MATERIAL(S): Mississippi alluvium

WATER TABLE: Below depth of core
 SLOPE: 0%
 VEGETATION: Silver Maple forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/21/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Along late Holocene surface. Buried A horizon occurs at 110 cm below surface. The buried A is a pre-settlement surface. Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-110	C (PSA)	10YR 3/3 -2/2 -4/4; silt loam, laminae varying in thickness of historic alluvium, pH = 7.5, abrupt wavy.
110-127	ACg	5Y 3/1, silty clay loam, massive becoming gleyed near base of horizon, pH = 7.5.

SITE NAME: ST 3
 LOCATION: Adams Island, Pool 14 N1/2 S1/2 Sec. 7 T.80N R6E Iowa
 (Wapsipinicon Area)
 ELEVATION: 575-580'
 GEOMORPHIC SURFACE: Late Holocene Island
 POSITION IN LANDSCAPE: Away from island margin on flat surface
 PARENT MATERIAL(S): Mississippi floodplain deposits

WATER TABLE: Below depth of core
 SLOPE: 0%
 VEGETATION: Hickory/Silver Maple forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/21/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Profile was not sampled. PSA to 120 cm.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-85	C (PSA)	10YR 3/2 -4/4; silt loam, laminae of historical alluvium, friable pH = 7.5, clear wavy.
85-120	C2 (PSA)	10YR 3/2 -4/4; silt loam, friable, PSA laminae not evident. pH = 7.5, clear wavy.
120-140	A _b	10YR 3/1; silt loam-silty clay loam, moderate medium subangular blocky, friable, many fine roots and wormholes, leached.

SITE NAME: ST No. 4
 LOCATION: Pool 14 NW1/4, SE1/4, NW1/4, Sec. 13, T.80N R5E Iowa
 (Wapsipinicon Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Early Holocene surface
 POSITION IN LANDSCAPE: Mid-terrace flat lying
 PARENT MATERIAL(S): Main Valley Mississippi River alluvium

WATER TABLE: 140 cm
 SLOPE: 0%
 VEGETATION: Hickory/Silver Maple
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/21/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Early Holocene surface. Stricker slough area. To the west is the late Woodfordian surface, to the east where active slough channel occurs is the Holocene surface at ST No.4. Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-10	C (PSA)	10YR 2/1-2/2; silt loam, moderate medium granular, friable, pH = 8.0, clear wavy.
10-45	A	10YR 2/1; silty clay loam, moderate medium subangular blocky, friable, few root holes, pH = 7.2, clear wavy.
45-55	AB	10YR 2/2; silty clay loam, moderate medium subangular blocky, friable, pH = 7.0, clear wavy.
55-76	BE	10YR 4/4; silty clay loam, moderate medium subangular blocky, friable, few siltans along ped-faces, pH = 5.5, clear wavy.
76-130	Bt	10YR 4/6; silty clay loam, moderate medium subangular blocky, friable, few siltans and argillans, clear wavy.
130-160	BC	10YR 4/4; silt (silt loam), moderate medium subangular blocky, friable, mottled and gleyed.

SITE NAME: ST No. 5
 LOCATION: SE1/4, SE1/4, NE1/4, Sec. 12 T.80N, R5E, Iowa, Pool 14
 (Wapsipinicon Area)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Early Holocene terrace
 POSITION IN LANDSCAPE: Flat lying terrace surface
 PARENT MATERIAL(S): Mississippi River alluvium

WATER TABLE: Below depth of profile
 SLOPE: 0%
 VEGETATION: Oak Hickory forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/21/88
 DESCRIBED BY: Jeff Anderson

REMARKS: An early Holocene surface. Charcoal fleck observed at 50 cm.
 Profile was not sampled

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-8	PSA	10YR 2/2; silt loam, moderate medium granular, friable, pH = 7.5, clear wavy.
8-30	A	10YR 2/1; silt loam - silty clay loam, moderate medium granular and fine medium subangular blocky, friable, many root and wormholes, pH = 7.0, clear wavy.
30-50	EB	7.5YR 4/4; silt loam, moderate medium subangular blocky, friable, many root and worm holes, common siltans, pH = 6.0, clear wavy.
50-75	Bt	10YR 4/4, silty clay loam, strong medium subangular blocky and columnar, friable, many root and wormholes, pH = 5.5, clear wavy.
75-100	BC	7.5YR 4/6, sandy silt (loam), moderate medium subangular blocky, friable, sand fraction coarser than above, leached.

SITE NAME: ST No. 6
 LOCATION: Pool 13, (Green Island Area) SE1/4, NW1/4, NE1/4, Sec. 12, T85N, R5E, Iowa
 ELEVATION: 585'
 GEOMORPHIC SURFACE: Late Holocene surface
 POSITION IN LANDSCAPE: Flat lying terrace surface
 PARENT MATERIAL(S): Main Valley Mississippi River alluvium.

WATER TABLE: 120 cm.
 SLOPE: 0%
 VEGETATION: Silver Maples
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/22/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Near Maquoketa River, Green Island area. Late Holocene surface.
 Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-80	C (PSA)	10YR 3/2 -3/3 -4/4; silt loam, laminae of silt observed, pH = 8.0, clear wavy.
80-110	A	10YR 2/1; silt loam, moderate medium subangular blocky, friable, pH = 7.5, clear wavy.
110-140	AB	10YR 3/1 -2/1; silty clay loam, moderate medium subangular blocky, sticky wet, leached.

SITE NAME: ST No. 7
 LOCATION: Pool 13, Jackson Lake area, NW1/4, SW1/4, SE1/4, Sec. 2. T85N, R5E, Iowa (Green Island Area)
 ELEVATION: ~587'
 GEOMORPHIC SURFACE: Mid to late Holocene surface
 POSITION IN LANDSCAPE: Near terrace margin adjacent Jackson Lake
 PARENT MATERIAL(S): Main Valley Mississippi River alluvium

WATER TABLE:

SLOPE: 0%
 VEGETATION: Silver Maple and hardwood forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/21/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Near Jackson Lake/Golden Lake. Jackson and Golden Lakes appear to be mid-Holocene Mississippi River abandons which are PSA filled. Site was photographed. Recovered a retouched flake from the core at 140 cm. The surface could be dated below 85 cm. Jackson Lake is dry.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-45	C (PSA)	10YR 3/3; laminae of silt, clear wavy, pH = 7.5
45-85	A	10YR 2/1; silty clay loam, moderate medium subangular blocky, friable, pH = 7.5, clear wavy.
85-148	AB	10YR 3/1; silty clay loam, moderate medium subangular blocky, friable, becoming mottled and gleyed, leached.

SITE NAME: SP No. 8
 LOCATION: Pool 13 Sec. 20, T.86N, R1E, Iowa (Bellevue - Crooked Slough
 .Area)
 ELEVATION: ~590'
 GEOMORPHIC SURFACE: Late Holocene island
 POSITION IN LANDSCAPE: Flat lying island surface
 PARENT MATERIAL(S): Historical alluvium

WATER TABLE:
 SLOPE: 0%
 VEGETATION: Silver Maple forest
 METHODOLOGY: Silt probe
 DATE DESCRIBED: 10/21/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Entire profile composed of historical alluvium. Along island margin,
 2 meters of PSA overlies a poorly developed pre-settlement surface.
 The pre-settlement surface appears very young.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-120	C (PSA)	10YR 2/3 -4/4; silt loam, plates of PSA laminae vary in thickness.

SITE NAME ST No. 8A
 LOCATION: Savanna Island area, Pool 13, SE1/4, NW1/4, NW1/4, Sec. 15,
 T24N, R3E, Illinois (Savanna - Sabula Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Late Holocene terrace
 POSITION IN LANDSCAPE: Near levee
 PARENT MATERIAL(S): Main Valley Mississippi alluvium

WATER TABLE:

SLOPE: 0%
 VEGETATION: Silver Maples
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/25/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Profile was not sampled. Late Holocene surface.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-15	Ap	10YR 3/1; silt loam, moderate medium granular, friable, pH = 7.0, clear wavy.
15-100	Bg	5Y 3/1; silt loam, massive mottled and gleyed, pH = 7.0, clear wavy.
100-140	BCg	5Y 3/1; silty clay loam, massive, Fe concretions, clay increasing with depth, pH = 7.0, clear wavy.
140-155	Cg	5Y 3/1; silty clay loam, massive, gleyed fine grained vertical accretion clay silt deposit, leached.

SITE NAME: ST No. 9
 LOCATION: Pool 13, SE1/4, NE1/4, NW1/4, Sec. 15, T24N, R3E, Illinois
 (Savanna - Sabula Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Late Holocene terrace
 POSITION IN LANDSCAPE: Near levee
 PARENT MATERIAL(S): Main valley Mississippi River alluvium

WATER TABLE:

SLOPE: 0%
 VEGETATION: Silver Maples
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/25/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Profile composed of fine grained vertical accretion deposits.
 Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-35	A	10YR 2/1; silt loam, moderate medium granular, friable, pH = 7.0, clear wavy.
35-82	Bw	10YR 3/1; silty clay loam, moderate medium subangular blocky, friable, becoming mottled and gleyed, clay increasing with depth, pH = 6.5 clear wavy.
82-120	C	10YR 3/1; silty clay loam, moderate medium subangular blocky, friable, becoming mottled and gleyed, clay increasing with depth, Fe concretions, pH = 6.5, clear wavy.
120-140	Cg	5YR 4/1; silty clay loam, (clayey silt), silt increasing with depth, massive, laminae of oxidized and deoxidized flood deposits vary in thickness from a few millimeters to a centimeter, leached.

SITE NAME: ST 10
 LOCATION: Pool 13, NW1/4, NW1/4, NE1/4, Sec. 22, T24N, R3E, Illinois
 (Savanna - Sabula)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Late Woodfordian Terrace (lowest)
 POSITION IN LANDSCAPE: Near center of island
 PARENT MATERIAL(S): Late Woodfordian Mississippi River outwash

WATER TABLE: 90 cm
 SLOPE: 0%
 VEGETATION: Silver Maples
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/25/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Core is taken from an island near the city of Savanna (1.5 mi south).
 Four samples were taken for particle size and TOC analysis.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-18	Ap	10YR 2/1; loam (sandy silt), weak medium granular, friable, pH = 7.0, clear wavy.
18-40	Bw	10YR 3/3; sandy loam (silty sand), weak medium subangular blocky, friable, pH = 5.5, clear wavy.
40-75	Bw2	7.5YR 3/3; loamy sand with few granules, single grain, pH = 6.0, gradual smooth.
75-90	C	10YR 6/4; loamy sand with granules, single grain, leached.

SITE NAME: ST 11
 LOCATION: Pool 13, NW1/4, NW1/4, NW1/4, Sec. 22, T24N, R3E, Illinois
 (Savanna - Sabula Area)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Mississippi River levee
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Mississippi River Main Valley Levee Deposit

WATER TABLE: 30 cm
 SLOPE: 0%
 VEGETATION: Oak and Silver Maple Forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/25/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Profile was not the end of sequence. Buried soils probably exist below 120 cm. Five samples were taken for particle size and TOC analysis.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-10	A	10YR 2/1; silt loam, moderate to weak medium granular, friable, pH = 6.0, clear wavy.
10-25	AB	10YR 3/1; silty clay loam, moderate medium subangular blocky, friable, mottled and gleyed, many roots, pH = 7.5, clear wavy.
25-70	BCg	5YR 3/1; loam (fine sandy silt), massive, gleyed, pH = 7.5, gradual smooth.
75-120	Cg	10YR 4/2; silty clay loam, massive, mottled and gleyed with Fe concretions, unit becoming finer with depth pH 7.5.

SITE NAME: ST 12
 LOCATION: Pool 13, NW1/4, SE1/4, SW1/4, Sec. 14, T.24N, R3E, Illinois
 (Savanna - Sabula Area)
 ELEVATION:
 GEOMORPHIC SURFACE: Late Woodfordian Surface and distal end of Holocene
 dune.
 POSITION IN LANDSCAPE: Distal end of dune
 PARENT MATERIAL(S): Late Woodfordian Mississippi River Outwash and
 Holocene reworked eolian deposits.

WATER TABLE:
 SLOPE: 2-5%
 VEGETATION: Cultivated field
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/25/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Along east margin of Wildlife area just south of Plum River on Late
 Woodfordian surface. Fragipan and Beta B horizon observe below
 50 cm. Surface erosion has occurred. Profile was not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-20	Ap	10YR 3/3; sandy loam, moderate medium granular, friable, pH = 6.0, clear wavy.
20-50	Bw	7.5YR 3/3; sandy loam, single grain, pH = 7.0, gradual smooth.
50-60	BC	7.5YR 4/4; loamy sand, single grain Beta B lamellae observed at 50 cm, fragipan observed at 60 cm, pH = 6.5.

SITE NAME: ST 13
 LOCATION: Pool 13, NE1/4, NW1/4, NW1/4, Sec. 25, T26N, R1E, Illinois
 (Bellevue/Crooked Slough Area)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Early Holocene Surface
 POSITION IN LANDSCAPE: Along flat lying terrace surface
 PARENT MATERIAL(S): Main Valley Mississippi River deposits

WATER TABLE: 90 cm
 SLOPE: 0%
 VEGETATION: Red Oak Forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/26/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Nine samples were taken for particle size analysis and TOC. Well developed, oxidized Alfisol on early Holocene Terrace. A photograph was taken of the sampling tube with the field book from 100-120 cm.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-15	A	10YR 2/2 silt loam (fine sandy silt), moderate medium granular, friable, many fine roots, pH = 7.0, clear wavy.
15-30	EB	10YR 4/3; silt loam, fine sandy silt, weak medium platy, many fine roots, pH = 5.5, clear wavy.
30-50	Bt1	7.5YR 4/4; loam, moderate medium subangular blocky, friable, few silans and clay skins, weak fragipan, many fine roots and root holes, pH = 5.5, clear wavy.
50-120	Bt2	10YR 5/4; silt loam (fine sandy silt), moderate medium subangular blocky, friable, weak fragipan, argillans and silans along ped faces, clay increasing with depth, fragipan ends at 100 cm, pH = 5.5, clear wavy.

120-155

Bt3

10YR 6/4; loam (sandy silt) with minor clay, moderate medium subangular blocky, friable, common roots and worm holes, few clay skins along voids, leached, clear wavy.

155-210

BC

7.5YR 4/6; sandy loam, weak medium subangular blocky, friable to loose, many large prominent mottles, Beta B begins at 190 just above water table, Beta B horizon color 5YR 4/6, leached.

SITE NAME: ST 14
 LOCATION: Pool 13, NW1/4, NW1/4, NW1/4, Sec. 25, T26N, R1E. Illinois
 (Bellevue/Crooked Slough Area)
 ELEVATION: ~585'
 GEOMORPHIC SURFACE: Early Holocene Paleochannel Margin
 POSITION IN LANDSCAPE: Along E. Bank of Paleochannel Margin
 PARENT MATERIAL(S): Holocene Mississippi River mixed deposits

WATER TABLE: 34 cm
 SLOPE: 0-2%
 VEGETATION: Wetland Grasses
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/26/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Four photographs were taken at this location. This core is taken on a slightly higher paleochannel abutting the early Holocene surface where ST 13 was taken. End in point bar deposit at 200 cm. Three samples were taken for particle size and TOC determination.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-45	AC	5Y 3/1; silty clay loam, moderate medium subangular blocky, changing to massive with depth friable to firm, very moist, many roots and root holes, many fine prominent mottles along block faces, mottles colored 7.5YR 5/8, pH at 5 cm = 6.0 at 20 cm = 5.5, charcoal observed at 40 cm, gradual smooth.
45-250	Cg	2.5Y 4/0; laminae of gleyed sand and silt, massive sand is fine to medium sand, sand fraction increases and coarsens with depth; by 200 cm color changes to 10YR 4/6 which is an oxidized medium sand unit, end in point bar lateral accretion deposit, pH = 7.5.

SITE NAME: ST 15
 LOCATION: Pool 13, NW1/4, NW1/4, NW1/4, Sec. 26, T26N, R1E, Illinois
 (Bellevue/Crooked Slough Area)
 ELEVATION: 590-595
 GEOMORPHIC SURFACE: Late Holocene Surface
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main Valley Mississippi River Alluvium

WATER TABLE:

SLOPE: 0%
 VEGETATION: Silver Maples, few Red Oaks
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/27/88
 DESCRIBED BY: Jeff Anderson

REMARKS: In Crooked slough, Pool 13 near army depot. Six samples were taken for particle size and organic carbon analysis. Probably a surface about 2,000 years old.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-12	C (PSA)	10YR 2/2; silt loam, moderate medium granular, friable, many roots and worm holes, pH = 7.5, clear wavy.
12-42	A	10YR 2/1; silt loam to silty clay loam, moderate medium subangular blocky, friable, many fine roots and worm holes, pH= 7.0, clear wavy.
42-85	AB	10YR 2/1; silty clay loam, moderate medium subangular blocky, friable, silans along ped faces, pH = 7.2, clear wavy.
85-120	B	10YR 2/1; silty clay loam, moderate medium subangular blocky, many silans, few organs along ped faces, pH = 7.2, clear wavy.
120-145	BCg	2.5Y 3/1-4/1; silty clay loam, weak medium subangular blocky, friable, becoming massive with depth, mottled and gleyed, few fine distinct mottles, leached.

SITE NAME: ST 16
 LOCATION: Pool 13 SW1/4, NE1/4, Sec. 22 T.26N R1E, Illinois (Bellevue/
 Crooked Slough Area)
 ELEVATION: 590-595'
 GEOMORPHIC SURFACE: Late Holocene Terrace
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main Valley Mississippi River deposits

WATER TABLE:
 SLOPE: 0%
 VEGETATION: Silver Maples
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/27/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Surface could be dated between 90 and 130 cm. No samples were taken.
 Crooked Slough area.

DEPTH CM.	SOIL HORIZON OR SEC. UNIT	DESCRIPTION
0-25	C (PSA)	10YR 3/2-4/4, silt loam, laminae of silt, fine sandy silt and clayey silty, laminae vary in thickness, texture and color, abrupt smooth.
25-60	A	10YR 2/1; silt loam, moderate medium granular and subangular blocky, friable, many fine roots and root holes, organic matter down voids and channels, leached, clear wavy.
60-90	Bw	10YR 3/2; silt loam, weak medium subangular blocky, friable, few silans along ped faces, leached, clear wavy.
90-130	Ab	10YR 3/1; silty clay loam, massive, fine grained, leached, Holocene flood deposits.
130-140	Cgb	5Y 4/1; silty clay loam, massive, gleyed, leached.

SITE NAME: ST 17
 LOCATION: Pool 13, SW1/4, NW1/4, NE1/4, Sec. 15, T26N, R1E, Illinois
 (Bellevue/Crooked Slough Area)
 ELEVATION: 595-600'
 GEOMORPHIC SURFACE: Mid Holocene surface
 POSITION IN LANDSCAPE: Flat lying terrace position
 PARENT MATERIAL(S): Main Valley Mississippi River Alluvium

WATER TABLE:
 SLOPE: 0%
 VEGETATION: Silver Maples and Red Oaks
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/27/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Seven samples were taken for particle size and organic carbon analysis. Site was flagged with green tape and about 70 meters south of GP No. 2.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-18	A	10YR 2/2; silt loam, moderate medium granular, friable, many roots and root holes, pH = 7.2, clear wavy.
18-25	EB	10YR 3/2; silt loam, moderate medium subangular blocky and platy, friable, many roots and worm holes, few silans, pH = 6.8, clear wavy.
25-55	Bt1	10YR 4/4-7.5YR 4/4; silt loam, moderate medium subangular blocky, friable, many fine roots and root holes, slight increase in clay, pH = 6.5, clear wavy.
55-95	Bt2	10YR 4/4; silty clay loam, moderate to strong medium, subangular blocky, friable to firm, many fine roots and root holes, common 10YR 3/2 argillans along ped faces, trace organic matter at 70 cm, pH = 6.5, clear wavy.

95-110	AB _b	10YR 3/2; silt loam, moderate medium subangular blocky, friable, many fine roots and root holes, few fine faint mottles, pH = 6.5. clear wavy.
110-120	AE _b	10YR 3/3; silt loam, moderate medium subangular blocky, friable, many roots and worm holes, few silans along ped faces, pH = 6.5, clear wavy.
120-130	ABt _b	10YR 3/2-10YR 3/1; silty clay loam, moderate medium, subangular blocky, friable, common argillans along ped faces, many fine roots and root holes, leached, clear wavy.
130-145	ABt2 _b	10YR 3/2; silty clay loam, moderate medium subangular blocky, friable, many fine roots and root holes, common argillans, pH = 6.5.

SITE NAME: ST 18
 LOCATION: Pool 13 NE1/4, NW1/4, SW1/4, Sec. 15, T.26N, R1E, Illinois
 (Bellevue/Crooked Slough)
 ELEVATION: 590-595'
 GEOMORPHIC SURFACE: Mid to late Holocene Surface
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main Valley Mississippi River Alluvium

WATER TABLE:

SLOPE: 0%
 VEGETATION: Silver maples with few red oaks
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 10/27/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Eight samples were taken for particle size and organic carbon analysis.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-35	C (PSA)	10YR 3/2; silt loam, moderate medium granular, few roots and root holes, friable, pH = 7.0, clear wavy.
35-50	A	10YR 2/1; silty clay loam, moderate medium to fine subangular blocky, friable, many roots and root holes, pH = 6.8, clear wavy.
50-64	Bt1	10YR 3/3; silty clay loam, moderate medium subangular blocky, friable, few silans along ped faces, pH = 6.3, clear wavy.
64-110	Bt2	10YR 3/3; silty clay loam, moderate to strong medium subangular blocky, friable, many root and worm holes, common argillans along ped faces, pH = 6.3, clear wavy.
110-125	ABt _b	10YR 3/2; silty clay loam, moderate medium subangular blocky, friable, many fine roots and worm holes, organic matter enrichment, common argillans along ped faces, pH = 7.0, clear wavy.

125-155

Bt_b

10YR 3/1; silty clay loam, moderate medium, subangular blocky, friable, many fine roots and worm holes, few fine faint mottles, few silans and common argillans along ped faces, leached.

SITE NAME: GP 1
 LOCATION: Pool 13 SW 1/4, NE 1/4, NW 1/4, Sec. 10, T26N, R1E, Illinois
 (Bellevue/Crooked Slough Area)
 ELEVATION: ~595-600'
 GEOMORPHIC SURFACE: Abandoned Early Holocene Channel
 POSITION IN LANDSCAPE: Abutting Late Woodfordian Surface
 PARENT MATERIAL(S): Mississippi River Main Valley Alluvium

WATER TABLE:
 SLOPE: 0%
 VEGETATION: Wetland grass
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 11/14/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Early Holocene Paleochannel. Nine samples were taken for particle size and organic carbon analysis. Two meters of Holocene alluvium overlies Superior red clay.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-45	A	10YR 2/1; silt loam, moderate medium granular, friable, many fine roots and root holes, leached, clear wavy.
45-70	E	10YR 5/4; silt loam, moderate medium platy, friable, many roots and root holes, leached, clear wavy.
70-135	Bt	10YR 4/4; silty clay loam, moderate medium to coarse prismatic and columnar, friable, few fine roots, leached, clear wavy.
135-195	BC	7.5YR 3/3; loam, moderate medium to coarse subangular blocky, friable, few root and worm holes, leached, clear smooth.
195-250	2C	5YR 3/4; sandy clay with gravel, massive, poorly sorted sand and gravel, Superior red clay, gravel and gravel lag, leached, clear smooth.
250-370	2C2	10YR 4/4; coarse sand with granules, structureless, few gravels, end at 370 in coarse sand with gravel, leached.

SITE NAME: GP 2
 LOCATION: Pool 13 NW 1/4, NW 1/4, NE 1/4, Sec. 15, T26N, R1E, Illinois
 (Bellevue/Crooked Slough Area)
 ELEVATION: 7595'
 GEOMORPHIC SURFACE: Mid to Late Holocene Surface
 PARENT MATERIAL(S): Main Valley Mississippi River Alluvium

WATER TABLE: 250 cm
 SLOPE: 0%
 VEGETATION: Oak and Silver Maple
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 11/14/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Six samples were taken for particle size and organic carbon determination. One radiocarbon sample in charcoal at about 260 cm was taken, dated 2,095 ± 60 yr BP Beta - 28896. Date seems a little young.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-30	A	10YR 2/1; silt loam, moderate medium granular, friable, many fine roots and root holes, leached, clear wavy.
30-45	AB	10YR 3/1; silty clay loam, moderate medium to coarse subangular blocky, friable, many fine roots and root holes, leached, clear wavy.
45-105	Bt	10YR 4/4; silty clay loam, moderate medium subangular blocky, friable, few to common roots and root holes, few to common argillans and silans common medium distinct mottles, leached, clear wavy.
105-185	BCg	2.5Y 3/1; silt loam, weak to moderate medium subangular blocky, friable, common medium distinct mottles, leached, clear wavy.
185-240	Cg	5Y 4/1; silt loam, massive common coarse prominent mottles, leached, gradual smooth.

240-295

Cg2

5Y 4/1-3/1; silt loam to loam, massive, coarsening with depth, gleyed, charcoal recovered a 260 cm submitted for radiocarbon date, leached, gradual smooth.

295-375

Cg3

5Y 4/1; loamy sand, structureless, fine to medium sand, leached.

SITE NAME: GP 3
 LOCATION: Pool 13 SE 1/4, NE 1/4, SW 1/4, T26N, R1E, Illinois
 ELEVATION: 595-600'
 GEOMORPHIC SURFACE: Early Holocene paleochannel
 PARENT MATERIAL(S): Main Valley Mississippi River Alluvium and Reworked eolian

WATER TABLE:
 SLOPE: 0-2%
 VEGETATION: Oak and Silver Maple
 METHODOLOGY: Giddings Probe
 DATE DESCRIBED: 11/14/88 - 11/22/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Amended profile description 11/22/88. In laboratory, 15 samples were taken for particle size and organic carbon analysis. Two radio carbon samples were recovered from the core. From 0-60 cm late Holocene flood alluvium. From 60-160 cm is reworked eolian deposits from adjacent late Woodfordian terrace and below 160 is Holocene main valley Mississippi River alluvium. Radiocarbon dates are 7,370±120 yr B.P. (380-395 cm) and 3,430±70 yr B.P (160-180 cm).

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-48	A	10YR 2/1; silt loam, moderate medium granular, friable, many fine roots and root holes, leached, clear wavy.
48-60	Bw	10YR 3/4; silt loam, moderate medium subangular blocky, friable, many fine and medium roots, few fine faint mottles, few clay skins down root holes, leached, clear wavy.
60-130	2Bw	10YR 6/3; sandy loam to loam, moderate medium and coarse columnar and subangular blocky, blow sand, very friable to loose, common medium distinct mottles, few root holes, leached, clear wavy.
130-160	2Bw2	10YR 5/2; loam, (clayey silt sand), moderate to weak medium subangular blocky, friable, many fine root holes.

160-190	3A _b	10YR 3/1; silt loam, moderate medium subangular blocky, friable, many fine roots and root holes, common fine distinct mottles, organic enriched, leached, clear wavy.
190-225	3ACg _b	5Y 3/1; silty clay loam, weak coarse columnar and subangular blocky to massive, firm, many medium distinct mottles, charcoal observed, leached, clear wavy.
225-350	3Cg _b	5Y 4/1; silt loam to loam, massive, units varying from dominant silt to dominant sand flood laminae gleyed, charcoal observed from 220-240 cm, chert pebble observed 350 cm, some laminae are fine grained showing weak incipient A horizon development, multiple weak A horizons observed from 270-350, leached, abrupt smooth.
350-400	3ACg _b 2	N 3/0; silty clay loam to silty clay, fine grain channel fill, gleyed, radiocarbon date collected at 380 cm, organic enriched channel fill, leached, clear wavy.
400-490	3Cg _b 2	5Y 4/2; silt loam, massive grading to sand by 470 cm, leached.

SITE NAME: GP 4
 LOCATION: Pool 13 NW 1/4, SE 1/4, NE 1/4, Sec. 3 T26N 42E, Illinois (Green Island Area)
 ELEVATION: 595-600'
 GEOMORPHIC SURFACE: Woodfordian Terrace
 POSITION IN LANDSCAPE: In a depression along terrace margin
 PARENT MATERIAL(S): Late glacial outwash

WATER TABLE: 260 cm
 SLOPE: 0-2%
 VEGETATION: Prairie grass
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 11/15/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Looks like an abandoned former late Woodfordian channel with a reworked eolian deposit as a surface unit. Eight samples were taken for particle size and organic carbon analysis. One picture of GP 4 profile.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-35	A	10YR 2/1; sandy loam, moderate medium granular and moderate medium subangular blocky, friable, many roots and root holes, leached, clear wavy.
35-55	AB	10YR 3/3; loamy sand weak coarse granular, friable, few fine roots, leached, clear wavy.
55-80	Bw	7.5YR 3/4; loamy sand, very weak coarse granular prismatic, few fine roots, leached, clear wavy.
80-215	C	10YR 7/3-6/4; medium sand structureless, fine sand laminae from 178-180 cm, leached, gradual smooth.
215-410	C2	7.5YR 4/6; silty clay, laminae of primary red clay, and sand observed at 285 and 410 cm, these sandy units are 7.5YR 4/6, leached.

SITE NAME: GP 5
 LOCATION: Pool 13 NE 1/4, SW 1/4, NE 1/4, Sec. 3, T26N, R2E, Illinois
 (Green Island Area)
 ELEVATION: 595-600'
 GEOMORPHIC SURFACE: In a chute near the Woodfordian Terrace margin.
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Late Woodfordian outwash

WATER TABLE:

SLOPE: 0
 VEGETATION: Prairie grass
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 11/15/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Six samples were taken for particle size and organic carbon determination. Two pictures of the core were taken. One picture is a close-up of red clay interbedded with sand. Reworked eolian overlying well sorted glacial outwash.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-40	A	10YR 2/1; loamy sand, moderate coarse granular, friable, many fine roots and worm holes, leached, clear wavy.
40-55	AB	10YR 3/3; loamy sand to sandy loam with a few granules, v. weak medium subangular blocky, v. friable, leached, clear wavy.
55-110	C	10YR 7/3; loamy sand with few granules, single grained, leached, gradual smooth.
110-410	C2	10YR 4/6; well sorted alluvial sand, sand varies from medium to coarse, some sand units contain granules, becoming coarser after 4 m with granules, structureless. Two clayey sand laminae observed. One at 190 cm another at 300 cm. Clayey sand units are colored 7.5YR 4/6.

SITE NAME: GP 6
 LOCATION: Campmeir Fan Pool 13 NW 1/4, NW 1/4, SW 1/4, Sec. 21 T25N, R3E, Illinois (Savanna - Sabula Area)
 ELEVATION: 590-600'
 GEOMORPHIC SURFACE: Alluvial fan overlying late Woodfordian main valley deposits.
 POSITION IN LANDSCAPE: Mid-fan
 PARENT MATERIAL(S): Alluvial fan and Mississippi River outwash and red clay
 WATER TABLE: Below depth of profile
 SLOPE: 2-5%
 VEGETATION: Grass
 METHODOLOGY: Giddings Probe
 DATE DESCRIBED: 11/15/88
 AMENDED: 11/23/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Alluvial fan deposits have two buried soils. Below the fan are late Woodfordian red clays and gray clays. No paleosol soil seen at the red clay alluvial fan contact. One sample was sent for radiocarbon date from 600 to 710 cm in the red clay unit. Dated 14,650±690 yr E.P. Beta-28894. Two weak soils developed in upper alluvial fan unit.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-25	C (PSA)	10YR 2/1; silt loam to very fine sandy silt with some road gravel, weak medium platy, many roots and root holes, calcareous, historical alluvial fan deposit, gradually smooth.
25-45	A	10YR 2/1; silt loam, moderate medium granular and moderate medium platy, friable, many fine roots and root holes, PH7.5, clear wavy.
45-60	AE	10YR 4/3; silt loam, weak medium platy and weak medium subangular blocky, hard dry, many roots and worm holes, PH7.0, clear wavy.
60-110	Bw	10YR 4/5; silt loam, very fine sandy silt, moderate to weak medium prismatic and subangular blocky, many root holes and worm holes, friable, leached, clear wavy.

110-120	AB _b	10YR 3/4; silt loam, weak medium subangular blocky, friable, very weak organic enriched paleosol, leached, clear wavy.
120-220	BC _b	10YR 4/5; silt loam, very weak medium subangular blocky, friable, many fine roots and worm holes, few clay skins, leached, clear wavy.
220-245	AB _b 2	10YR 3/3; silt loam, weak medium subangular blocky, friable, many fine roots and worm holes, leached, clear wavy.
245-380	C _b 2	10YR 4/4; silt loam, massive, few fine root holes, few medium distinct mottles, few MN concretions, leached, gradual smooth.
380-590	C _b 2	10YR 4/4; silt loam, very fine sand-coarse silt, massive, MN and FE concretions medium common distinct mottles, below 540 cm many coarse prominent mottles, mottling increases with depth, alluvial fan deposit ends at 590 cm. Leached, abrupt smooth.
590-610	2Cg _b 2	N 4/0; silt, well sorted alluvial gray silt, abrupt smooth.
610-730	2Cg2 _b 2	Laminae of red clay (5YR 4/4), gray silty clay (N4/0) and whitish silty clay (10YR 7/1), laminae very in thickness from a few mm to several mm, contacts of the laminae are abrupt, few organic floral root remains occur in the unit from 610-730. RC Date 14, 650 yr B.P. Leached, abrupt smooth.
730-740	2Cg3 _b 2	Sand and gravel, massive to structureless, leached.

SITE NAME: GP 7 Malone Site NE 1/4, SW 1/4, SW 1/4, Sec. 6, T84N, R7E Iowa
(Savanna/Sabula Area)
 LOCATION: Pool 13
 ELEVATION: 685-690'
 GEOMORPHIC SURFACE: Mississippi River abandoned channel
 PARENT MATERIAL(S): Historical alluvial fan, Holocene alluvial fan, main
valley Mississippi River alluvium, and late
Woodfordian Superior red clay slackwater deposits.

WATER TABLE:

SLOPE: 0-2%
 VEGETATION: Land recently cleared former forest
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 12/15/88
 DESCRIBED BY: Jeff Anderson

REMARKS: Took two pictures of profile. Profile was sampled for particle size
and organic carbon analysis. Radiocarbon date in the soil alluvial
underlying the red clay. Date of 14,070±230 yr B.P. (390-420 cm
surface).

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-90	C (PSA)	10YR 3/3; silt loam, moderate medium granular and platy, fri- able, many fine roots and worm holes, historical alluvial fan deposit from side valley tribu- tary, unleached, abrupt smooth.
90-130	A	10YR 2/1; silty clay loam, moder- ate medium subangular blocky, friable, many fine roots and worm holes, late Holocene tributary fan deposit, leached, clear wavy.
130-170	2Btg	5YR 3/1; silty clay, strong medium subangular blocky, friable to firm, many fine roots and worm holes, gleyed Bt horizon, main valley fine grained vertical accretion flood deposits, leached, clear wavy.
170-240	3BCg	5YR 2/4-4/4; silty clay to clay, strong medium subangular blocky, firm, Krotovina observed in lower solum with organs coating voids, leached, abrupt smooth.

240-390	3C	2.5YR 3/4; red clay laminae, laminae vary in thickness from much less than 1 m to greater than 2 mm, some laminae are colored 10YR 4/3 and are brown silty clay, laminae extremely well preserved and part along bedding planes, leached, abrupt smooth.
390-420	4AC _b	10YR 3/3; clayey silt with sand (loam), organic enriched clayey silt with minor sand, unit coarsens with depth. Buried weak A horizon, leached, abrupt smooth.
420-490	4C _b	10YR 4/4; sandy loam to loamy sand with gravel, leached.

SITE NAME: ST 19
 LOCATION: SE 1/4, SE 1/4, NE 1/4, Sec. 10 T85N, R5E, Pool 13, Iowa (Green Island Area)
 ELEVATION: 590-590'
 GEOMORPHIC SURFACE: Early to mid Holocene surface,
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main valley Mississippi River alluvium.

WATER TABLE: 100 cm
 SLOPE: 0%
 VEGETATION: Silver maple, oak, and elm.
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/17/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Eight samples were collected for particle size and organic carbon analysis. No PSA located on the surface. Due to the relatively high moisture content of the soil, it appears that soil development is not as pronounced as would be expected during drier periods. For example, argillic development was masked due to high moisture content and expected to be pronounced once the soil has been drained later on in the season.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-35	A	10YR 2/1; silty clay loam, moderate medium granular and fine subangular blocky, friable, many root and worm holes, many fine pores and voids, pH = 6.5, clear wavy.
35-50	AB	10YR 3/2; silty clay loam, moderate fine subangular blocky friable, many fine root and worm holes, few fine faint mottles, pH = 6.5, clear wavy.
50-75	Bt	7.5YR 4/4; silty clay loam, weak to moderate medium subangular blocky, friable, many root and worm holes, few argillans along ped faces, common fine faint mottles, pH = 6.0, clear wavy.
75-105	BC	7.5YR 4/4; loam, weak to moderate medium subangular blocky, many root and worm holes, common medium distinct mottles, argillans would be evident if horizon was drained, pH = 7.0, clear wavy.

105-140

BC2

10YR 4/3; loam, weak medium sub-angular blocky, many root and worm holes, voids, common medium distinct mottles, saturated wet, leached, clear smooth.

140-240

C

5Y 4/1-10YR 4/4; laminae of medium sand, silty sand, sandy silt, massive, silt laminae is gleyed, sand laminae is oxidized, some organic enrichment and charcoal flecks observed, leached.

SITE NAME: ST20
 LOCATION: NW 1/4, SE 1/4, NW 1/4, Sec. 2, T85N, R5E, Iowa, Pool 13 (Green Island Area)
 ELEVATION: 590-595
 GEOMORPHIC SURFACE: Late Holocene surface
 POSITION OF LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Mississippi River main valley alluvium

WATER TABLE: 150cm
 SLOPE: 0%
 VEGETATION: Ash, cottonwood, and mature silver maples, sugar maples
 METHODOLOGY: Sampling tubes
 DATE DESCRIBED: 5/17/89
 DESCRIBED BY: Jeff Anderson

REMARKS: 95cm of PSA capped the surface, 7 samples were collected for particle size and organic carbon determination. Photographs were taken of this site, particularly the PSA laminae. Note the worm activity breaking down the historical laminae in the photograph.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-95	C (PSA)	10YR 3/2; silt loam, moderate medium granular, friable, common root and worm holes and worm casts, unleached near surface becoming leached in lower portion of horizon, faint flood laminae observed several mm thick, abrupt smooth.
95-110	A _b	10YR 2/2; silt loam, moderate medium granular, friable, many root and worm holes, pH =7.5, clear wavy.
110-130	Bw _b	10YR 3/3; silt loam, weak to moderate medium subangular blocky, friable, common fine faint mottles, many fine root and worm holes, pH =7.5, clear wavy.
130-145	A _b 2	10YR 2/2; silt loam, moderate medium granular, friable, many fine root and worm holes, buried late Holocene, organic enriched surface, pH =7.5, clear wavy.

145-175	Bw _b 2	10YR 4/2; silt loam, weak medium subangular blocky, friable, few fine root and worm holes, pH =7.5, gradual smooth.
175-340	Cg _b 2	10YR 4/2-5Y 3/1; silt loam, massive, common fine faint mottles, some organic enriched horizons present in this unit, few root holes, becoming many fine to medium distinct mottles 250cm, few Fe concretions, becoming silty clay loam at base of horizon, leached.
340-350	ACg _b 3	5YR 3/1; silty clay loam, massive, many medium distinct mottles, few Fe concretions, organic enriched, buried surface, leached, end in organic enriched silty clay loam at 350cm.

SITE NAME: ST21
 LOCATION: NE 1/4, NW 1/4, NE 1/4, Sec. 21, T85N, R6E, Pool 13, Upper Brown Lake Area, Iowa (Green Island Area)
 ELEVATION: Approximately 580-585'
 GEOMORPHIC SURFACE: Late Holocene surface
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main Valley Mississippi River Alluvium

WATER TABLE: 130 cm
 SLOPE: 0%
 VEGETATION: Silver maple and elm
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/22/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Late Holocene surface, one sample for radiocarbon dating was taken. Surface capped by 1.1 meters of PSA. Radiocarbon date 185-210 cm is 3,340 ± 80 year BP (Beta-31802).

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-110	C (PSA)	10YR 3/3; silt loam, moderate medium granular, friable, common root holes, unleached upper unit, leached lower, clear wavy.
110-150	A _b	10YR 2/2; silt loam, moderate medium granular and subangular blocky, friable, many fine roots and worm holes, leached, clear wavy.
150-170	B _g	5YR 4/1; silty clay loam, moderate medium subangular blocky, friable, few fine roots and root holes, mottled and gleyed, leached, clear wavy.
170-210	ACg _b	5YR 3/1; silty clay loam, massive, organic enriched buried surface horizon, leached.

SITE NAME: ST 22
 LOCATION: NE 1/4, NE 1/4, NE 1/4, Sec. 28, T585N, R6E, near Upper Brown Lake, Iowa (Green Island Area)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Alluvial fan
 POSITION IN LANDSCAPE: Near distal end the fan
 PARENT MATERIAL(S): Historical hillslope alluvium

WATER TABLE:

SLOPE: 0-2%
 VEGETATION: Silver maple
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/22/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Photographs were taken of this fan. No samples were collected.
 Historic site is located across railroad tracks.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-5	C (PSA)	10YR 3/2; fine sandy silt (loam), moderate medium granular, friable, many roots and wormholes, unleached, weak A horizon developed in recent historical alluvial fan deposit, clear wavy.
5-190	C2 (PSA)	10YR 3/3, fine sandy silt (loam), massive to weak medium platy, friable, PSA laminae are observed, some laminae greater than 1 cm thick, unleached.

SITE NAME: ST23
 LOCATION: NW 1/4, NW 1/4, NE 1/4, Sec. 27, T85N, R6E, Lower Brown Lake
 area, Iowa (Green Island Area)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Alluvial fan.
 POSITION IN LANDSCAPE: Approximately mid-fan
 PARENT MATERIAL(S): Historical hillslope alluvium

WATER TABLE: 90
 SLOPE: 0-2
 VEGETATION: Silver maple, cottonwood
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/23/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Historical fan deposits onto 130 cm. No samples were taken.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-5	C (PSA)	10YR 3/3, fine sandy silt (loam), moderate medium granular, friable, many roots and wormholes, historical A horizon development, unleached, clear wavy.
5-110	C2 (PSA)	10YR 4/4, fine sandy silt (loam), massive to weak medium platy, friable, PSA laminae vary in thickness, unleached, abrupt smooth.
110-130	Cg (PSA)	5YR 3/1, fine sandy silt (loam), massive gleyed organic enriched PSA, unleached.

SITE NAME: ST24
 LOCATION: NW 1/4, NW 1/4, NE 1/4, Sec. 27, T85N, R6E, Lower Brown Lake
 area, Iowa (Green Island Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Alluvial fan
 POSITION IN LANDSCAPE: Near distal end of fan
 PARENT MATERIAL(S): Historical hillslope alluvium

WATER TABLE: 55 cm
 SLOPE: 0
 VEGETATION: Cattails and grass
 METHODOLOGY: Sampling Tube
 DATE DESCRIBED: 5/23/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Further out near the fan/water margin deep PSA unleached exists in
 this profile. No samples were taken. What was seen in this area is
 large quantities of PSA from low order Iowa tributaries. The fans
 are very young. I think in many cases the presettlement surface is
 well below the water table at these locations.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-105	C (PSA)	10YR 4/4, fine sandy silt, massive, friable, few to common roots, unleached, abrupt smooth.
105-145	Cg (PSA)	5YR 4/1, fine sandy silt (loam), massive, firm, gleyed, unleached with wood fragments.

SITE NAME: ST25
 LOCATION: NW 1/4, NW 1/4, NW 1/4, Sec. 26, T85N, R6E, Pool 13, Running Slough, Iowa (Green Island Area)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Holocene abandon channel, buried by main valley late Holocene alluvium and historical PSA deposits
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main valley alluvium, channel fill, and PSA

WATER TABLE:

SLOPE: 0
 VEGETATION: Silver maple, cottonwood,
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/23/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Channel fill begins at about 120 cm with some organic datable material. Overlying this is late Holocene main valley alluvium and recent PSA deposits.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-15	AC (PSA)	10YR 2/2, fine sandy silt (loam), moderate medium granular, friable, common roots and wormholes, A horizon developed in PSA deposit, unleached, clear wavy.
15-90	C (PSA)	10YR 4/4, fine sandy silt (loam), massive to weak medium platy and weak medium granular, apparent mixture of hillslope alluvium and main valley deposits, some laminae unleached and others leached, abrupt smooth.
90-120	ACg _b	5Y 3/1, silty clay loam, massive, few fine roots, leached, clear wavy.
120-210	Cg _b	5Y 4/1-3/1, silty clay loam to silty clay, massive, firm, some organic material in channel fill unit, end 210cm.

SITE NAME: ST26
LOCATION: NE 1/4, SW 1/4, SW 1/4, Sec. 23, T85N, R6E, Pool 13, Pin Oak
Lake area, Iowa (Green Island Area)
ELEVATION: 580-590'
GEOMORPHIC SURFACE: Apparent late Holocene surface capped by thick PSA
POSITION IN LANDSCAPE: Flat lying
PARENT MATERIAL(S): Main Valley Mississippi River alluvium and PSA

WATER TABLE:

SLOPE: 0
VEGETATION: Silver maples, one pin oak
METHODOLOGY: Sampling tube
DATE DESCRIBED: 5/23/89
DESCRIBED BY: Jeff Anderson

REMARKS: Thick PSA deposit. No samples were taken.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-30	AC (PSA)	10YR 2/2, silty clay loam, moderate medium granular, friable, common roots and wormholes, faint laminae observed, weakly calcareous, clear wavy.
30-120	C (PSA)	10YR 3/3, silty clay loam, weak fine subangular blocky to moderate medium granular, common roots and wormholes, weakly calcareous, end in 120.

SITE NAME: ST27
 LOCATION: NE 1/4, SE 1/4, NE 1/4, S26, T1N R6E, Pool 13, Pinoak Lake
 area, Iowa (Green Island Area)
 ELEVATION: 580-590'
 GEOMORPHIC SURFACE: Late Holocene alluvium and PSA
 POSITION IN LANDSCAPE: Flat lying lateral accretion ridge
 PARENT MATERIAL(S): PSA, Mississippi River alluvium

WATER TABLE:

SLOPE: 0
 VEGETATION: Silver maple and oak
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/23/89
 DESCRIBED BY: Jeff Anderson

REMARKS: No samples were taken. Unit composed of PSA.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-40	C (PSA)	10YR 3/2, silty clay loam, moderate medium granular, friable, common root and wormholes, PSA laminae observed, unleached, abrupt smooth.
40-60	C2 (PSA)	10YR 6/4. medium sand, single grained, main valley flood deposit, leached.

SITE NAME: ST28
 LOCATION: SE 1/4, SW 1/4, SW 1/4, Sec. 7, T84N, R7E, Pool 13, NW of Sabula, Iowa (Savanna/Sabula Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Late Woodfordian Paleochannel
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Superior red clay

WATER TABLE: 95 cm
 SLOPE: 0
 VEGETATION: Forbs and a few small willows surrounded by forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/24/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Late Woodfordian erosion surface. Five samples were collected for particle size and organic carbon determination.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-20	A	5YR 2/2, silt loam with few pebbles and granules, moderate medium granular, friable, many roots and wormholes, Superior red clay parent material, pedogenically changed by an increase in organic matter, pH 5.0, clear wavy
20-30	AB	5YR 2/2, silty clay loam, moderate medium subangular blocky, friable, many roots and wormholes, pH 6.0, clear wavy.
30-55	Bw	5YR 3/2, silty clay, strong medium subangular blocky, firm, many roots and wormholes, red clay continues, pH 5.5, abrupt smooth.
55-90	BC	10R 4/4, clay, massive to weak subangular blocky, crawfish stack translocating organic material seen along pedface, pebbles observed, pH 7.0, abrupt smooth.
90-100	C	10R 4/4, clayey sand with granules and pebbles, massive, pH 7.5, refusal from sand and gravel at 100 cm.

SITE NAME: ST29
 LOCATION: SE 1/4, NW 1/4, NW 1/4, Sec. 18, T84N, R7E, Pool 13, NW of Sabula, Iowa
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Late Woodfordian paleochannel
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Superior red clay

WATER TABLE: 5 cm
 SLOPE: 0
 VEGETATION: Wetland grass and cattails
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/24/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Late Woodfordian erosion surface. No samples were taken at this location.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-25	A	N 2/0, silty clay loam, moderate medium granular and moderate fine subangular blocky, many roots and wormholes, leached, clear wavy.
25-100	C	10R 4/4, clay, massive, common fine faint mottles, leached, end at 100 cm in massive red clay with few pebbles and granules.

SITE NAME: ST30
 LOCATION: SE 1/4, NW 1/4, NW 1/4, Sec. 6, T84N, R7E, Pool 13, Iowa
 (Savanna/Sabula Area)
 ELEVATION: 595-600'
 GEOMORPHIC SURFACE: Mid-Holocene surface
 POSITION ON LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main Valley and tributary Holocene alluvium capped by PSA

WATER TABLE: 95 cm
 SLOPE: 0
 VEGETATION: Silver maple, ash, and elm
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/24/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Numerous weak soils are developed in the sequence. Five samples were taken for particle size and organic carbon determination. One sample was taken for radiocarbon dating, carbon not sufficient for date.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-10	AC (PSA)	10YR 3/2, silty clay loam, moderate medium granular, friable, common fine root and wormholes, A horizon developed in PSA, pH 7.5, clear wavy.
10-35	C (PSA)	10YR 4/3, silty clay loam, weak medium subangular blocky, friable, common root and wormholes, pH 7.4, abrupt smooth.
35-95	A	10YR 2/1, loam, moderate medium granular, friable, many fine root and wormholes, becoming sandy loam by 60 cm (10YR 2/2), then massive by 60 cm., coarsening with depth, apparent late Holocene tributary deposit, pH 7.0, abrupt smooth.
95-140	ACg	10YR 3/1, silt loam, weak medium subangular blocky, firm, many fine root and wormholes, clay increasing with depth, weak gleying, leached, gradual smooth.

140-365

Cg

10YR 3/2-3/3, loam to silty clay loam, massive, many root and worm-holes and void spaces, alluvial units consist of sandy silt (loam) to silty clay loam, colors vary from 10YR 3/2 to 10YR 3/3, some organic enriched horizons exist, leached, end 365 in loam.

SITE NAME: ST31
 LOCATION: SE 1/4, NW 1/4, SE 1/4, Sec 14, T80N, R5E, Pool 14, Wapsipinicon River area, Iowa
 ELEVATION: 575-580'
 GEOMORPHIC SURFACE: Apparent late Holocene surface capped by thick PSA
 POSITION IN LANDSCAPE: About 1 km south of Wapsipinicon in Wapsipinicon floodplain
 PARENT MATERIAL(S): PSA

WATER TABLE:
 SLOPE: 0
 VEGETATION: Silver maple, cottonwood
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 5/25/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Thick PSA deposit. No samples were taken.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-60	C (PSA)	10YR 3/1, silt loam, moderate medium granular and fine subangular blocky, common roots and wormholes, laminae observed up to 1 cm thick, unleached, abrupt smooth.
60-90	C2 (PSA)	10YR 6/3, medium sand, single grained, large historical flood deposit, leached, abrupt smooth.
90-110	C3 (PSA)	10YR 3/1-5Y 3/1, silt loam and silty clay loam, massive, thick laminae observed, mottled and gleyed, leached.

SITE NAME: ST32
 LOCATION: NW 1/4, SE 1/4, SE 1/4, Sec 1, T80N, R5E, Iowa (Wapsipinicon Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Paleochannel
 POSITION IN LANDSCAPE: Paleochannel abutting West Valley margin
 PARENT MATERIAL(S): Peat and red clay

WATER TABLE: 20 cm
 SLOPE: 0
 VEGETATION: Swamp grass
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 6/06/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Abundant gastropod shells throughout entire profile. Profile was described but not sampled.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-65	0e	N2/0 peaty silt, hemic, weak medium granular, friable, becoming wet by 30 cm, common gastropods, unleached, gradual smooth.
65-80	0a	N2/0 silty peat, sapric, plastic, common gastropods, unleached, abrupt smooth.
80-190	C	5Y 5/1 - N2/0 laminae of gray clay, and sapric peaty silt massive, grades into red clay at base of horizon, unleached, few gastropods gradual smooth.
190-240	C2	2.5YR 4/4, red clay, massive, few gastropods, unleached.

SITE NAME: ST33
 LOCATION: NW 1/4, SE 1/4, SE 1/4, Sec 1, T80N, R5E, Iowa (Wapsipinicon Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Paleochannel
 POSITION IN LANDSCAPE: Paleochannel abutting West Valley margin
 PARENT MATERIAL(S): Peat and red and grey clay

WATER TABLE: 20 cm
 SLOPE: 0
 VEGETATION: Swamp grass
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 6/06/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Two radiocarbon samples were taken in profile, 95-125 cm dated 9,750 ± 110 yr BP Beta - 31804 and 190-230 cm 9,910 ± 190 yr BP Beta 31805.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-60	Oe	N2/0 peaty silt, hemic, with layers of fibric material, weak medium granular, friable, becoming saturated below 30 cm, common gastropods, unleached, gradual smooth.
60-90	Oa	N2/0, peaty silty clay, sapric, massive plastic to greasy, common gastropods, grey clay laminae observed at base of horizon (5Y 5/1), unleached, abrupt smooth.
90-125	Oi	2.5Y 4/2, peat, fibric with silty fine sand, massive, common gastropods, unleached, abrupt smooth.
125-185	C	5Y 5/1 - 2.5YR 4/4 - N2/0, laminae of grey clay, black (sapric) peaty silt, and red clay, massive, common gastropods and plant remains; unleached gradual smooth.
185-345	C2	2.5YR 4/4, red clay, massive, few black (sapric) peaty silt inclusions (krotovina), chunks of well preserved plant remains and red clay, few gastropods, unleached.

SITE NAME: GP8
 LOCATION: SW 1/4, SW 1/4, NW 1/4, Sec 20, T85N, R6E, Iowa (Green Island Area)
 ELEVATION: 590-595'
 GEOMORPHIC SURFACE: Early to mid-Holocene surface
 POSITION IN LANDSCAPE: Out in Main Valley near Maquoketa River Paleochannel (Maquoketa River)
 PARENT MATERIAL(S): Maquoketa River alluvium

WATER TABLE:
 SLOPE: 0
 VEGETATION: Prairie grass
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 6/07/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Apparent early Holocene surface where unleached basal deposits are capped by progressively younger Holocene aged sediment. One sample was taken in a paleosol for radiocarbon dating, from 240-255 cm dated 6,860 ± 100 yr BP Beta-31802. Samples were taken for particle size and organic carbon determination.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-25	A	10YR 2/2, silt loam, moderate medium granular, friable, many fine and medium roots and root holes, leached, clear wavy.
25-55	AB	10YR 2/1, silt loam, moderate to strong medium subangular blocky, friable, few fine roots and worm holes, leached, clear wavy.
55-95	Bw	10YR 3/3, loam, moderate medium subangular blocky, friable, common fine roots and worm holes, few fine faint mottles, leached, clear wavy.
95-210	C	2.5Y 4/2, loam to silt loam, massive, few fine root holes, leached, abrupt smooth.
210-220	C2	10YR 6/4, medium sand, single grain, leached, abrupt smooth.

220-255	C3	10YR 4/4 - 5Y 3/1, laminae of loam, sandy loam, and silt loam. Sand and gravel occurs at base of horizon from 253-255 cm, gleying in silt loam, abrupt smooth.
255-285	AC _b	5Y 3/1, silty clay loam, organic enriched, massive, buried A horizon, abrupt smooth.
285-400	Cg _b	5Y 4/1, loam to silt loam, massive unit becoming unleached by 350 cm.

SITE NAME: GP9
 LOCATION: SE 1/4, SW 1/4, NW 1/4, Sec 20, T85N, R6E, Iowa (Green Island Area)
 ELEVATION: 585-590'
 GEOMORPHIC SURFACE: Early to mid-Holocene Maquoketa River Paleochannel.
 POSITION IN LANDSCAPE: In paleochannel.
 PARENT MATERIAL(S): Maquoketa River alluvium

WATER TABLE:
 SLOPE: 0
 VEGETATION: grass
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 6/07/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Profile very similar to that observed to GP8. Difference being this horizon basically shows more fine grained deposits characteristic of abandoned channel fill. Samples were taken for particle size and organic carbon determination.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-27	A	10YR 2/1, silt loam, moderate medium granular, friable, many fine root and root holes, leached, clear wavy.
60-210	C	5Y 4/1, loam, massive, friable, many medium distinct mottles, texture coarsening with depth, leached, abrupt smooth.
210-215	C2	10YR 6/4, medium sand, single grained, leached, abrupt smooth.
215-240	AC _b	5Y 3/1, silty clay loam, massive, leached, clear wavy.
240-310	Cg _b	5Y 4/1, silt loam, massive, horizon coarsening with depth, gravel refusal at 310, leached.

SITE NAME: GP10
 LOCATION: SE 1/4, NW 1/4, NW 1/4, Sec 18, T84N, R7E, Iowa (Savanna/Sabula Area)
 ELEVATION: 600-610'
 GEOMORPHIC SURFACE: Late Woodfordian low terrace.
 POSITION IN LANDSCAPE: Flat lying.
 PARENT MATERIAL(S): Mississippi River alluvium

WATER TABLE:
 SLOPE: 0
 VEGETATION: grass
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 6/07/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Erosion surface, poorly sorted gravelly clayey lag from 140-180 cm. Samples were taken for particle size and organic carbon determination, sample taken for clay mineralogy.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-45	A	10YR 2/1, loam, with few pebbles and coarse sand, moderate medium granular, friable, many fine roots and worm holes, poorly sorted, leached, clear wavy.
45-90	Bw	7.5YR 3/2 - 2/2, sandy loam with pebbles and coarse sand, moderate medium subangular blocky, friable, many fine roots and worm holes, very poorly sorted, coarsening with depth in red clayey sand matrix, leached, clear wavy.
90-140	C	5YR 3/2, clayey sandy gravel, massive to single grained, very poorly sorted, red clayey sand matrix, leached, abrupt smooth.
140-180	C2	5YR 3/2, sandy gravel with minor clay, massive to single grained, very poorly sorted, leached, gradual smooth.
180-630	C3	5YR 4/4, red clayey sand with few pebbles, massive to single grained, leached.

SITE NAME: GP11
 LOCATION: NE 1/4, NW 1/4, NW 1/4, Sec 18, T84N, R7E, Iowa, Pool 13
 (Savanna/Sabula Area)
 ELEVATION: 580-585'
 GEOMORPHIC SURFACE: Late Woodfordian paleochannel.
 POSITION IN LANDSCAPE: Flat lying.
 PARENT MATERIAL(S): Mississippi River alluvium. Upper 80 cm Holocene
 alluvium.

WATER TABLE:

SLOPE: 0
 VEGETATION: oak, silver, maple, and cottonwood forest
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 6/08/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Six samples were taken for particle size and organic carbon determination.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-22	AC (PSA)	10YR 2/2 - 3/2 silt loam, moderate medium granular, friable, many roots and worm holes, A horizon developed in PSA unit, leached, clear wavy.
22-48	A	10YR 2/1, silt loam to loam, moderate medium granular, friable, many fine roots and worm holes, leached, clear wavy.
48-60	Bw	7.5YR 3/3, silt loam, moderate medium subangular blocky, friable, many fine roots and worm holes, leached, clear wavy.
60-80	Bw2	5YR 4/2, silty clay loam, moderate medium subangular blocky, friable, many fine root and worm holes, leached, clear wavy.
80-145	2C	2.5YR 3/4, clay, massive, leached, abrupt smooth.
145-190	2C2	2.5YR 4/4, red clayey sand and gravel, massive, very poorly sorted erosion surface, leached, gradual smooth.

190-240

2C3

2.5YR 4/4, red clayey sand, with few pebbles, massive, red clay probably sieved from above, single grained, leached, clear wavy.

240-850

2C4

7.5YR 4/4, coarse sand with gravel, single grained, leached.

SITE NAME: GP12
 LOCATION: SW 1/4, NE 1/4, NE 1/4, Sec 13, T84N, R6E, Iowa, Pool 13
 (Savanna/Sabula Area)
 ELEVATION: 640-645'
 GEOMORPHIC SURFACE: Late Woodfordian savanna terrace.
 POSITION IN LANDSCAPE: Near terrace margin.
 PARENT MATERIAL(S): Mississippi River alluvium with thin loess cap.

WATER TABLE:

SLOPE: 2-5%
 VEGETATION: corn
 METHODOLOGY: Giddings probe
 DATE DESCRIBED: 6/08/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Samples were collected for particle size and organic carbon determination.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-30	Ap	10YR 3/3, silt loam, moderate medium, granular and platy, friable, few fine roots, leached, abrupt smooth.
30-37	E	7.5YR 4/4, silt loam, moderate medium platy, friable, many fine roots and worm holes, leached, abrupt smooth.
37-44	2EB	7.5YR 6/4, loam to sandy loam, single grained to weak coarse subangular blocky and prismatic, friable, few medium root holes and voids, leached, clear wavy.
44-48	2Bt	7.5YR 4/4, loam (clayey sand), moderate medium subangular blocky, friable, many roots and worm holes, beta B Horizon, leached, abrupt smooth.
44-63	2Pt?	5YR 3/4, silty clay loam, weak medium platy and moderate medium subangular blocky, friable, many fine root and worm holes, red clay translocated through pores and voids, leached, abrupt smooth.

69-80	2BC	10YR 5/4, loam, (fine sandy silt) weak medium subangular blocky, friable, common root and worm holes, leached, abrupt smooth.
80-160	2C	5YR 4/4 - 2.5YR 4/4 - 10YR 4/2, loam, laminae of sandy silt, and red clayey silt, beta B lamellae observed in horizon, common fine faint mottles, leached, abrupt smooth.
160-222	2C2	10YR 4/4, sandy loam (fine sand) single grain, unleached, abrupt smooth.
222-240	2C3	2.5Y 4/2, coarse silt, massive, unleached, abrupt smooth.
240-260	2C4	10YR 6/4, fine sand, unleached, single grained, abrupt smooth.
260-600	2C5	5YR 6/4, laminae of fine sand to medium sand. Some laminae brown 10YR 6/4, unleached end 600 cm.

SITE NAME: ST No. 34
 LOCATION: NW 1/4, SE 1/4, NE 1/4, Sec 35, T80N, R5E, Iowa, Pool 14,
 Wapsipinicon Area
 ELEVATION: ~575-580'
 GEOMORPHIC SURFACE: Early Holocene Surface
 POSITION IN LANDSCAPE: Abandon tributary drainage inset into early Holocene
 surface
 PARENT MATERIAL(S): Main valley alluvium and tributary deposits

WATER TABLE:
 SLOPE: 0-2%
 VEGETATION: Mixed Hardwood and Silver Maple Forest
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 7/26/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Profile was not sampled. Early Holocene deposit.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-20	A	10YR 2/2, silt loam, moderate medium granular, friable, many root and wormholes, pH = 6.3, clear wavy.
20-36	BE	10YR 3/4, silt loam, moderate medium subangular blocky, friable, many fine root and wormholes, pH = 5.5, clear wavy.
36-65	Bt	7.5YR 4/4, silty clay loam, moderate medium subangular blocky, friable, many fine root and wormholes, few fine faint mottles, leached, clear wavy.
65-105	2BCg	2.5Y 4/1, loam (sandy clayey silt with few granules), weak medium subangular blocky, friable, relatively poorly sorted tributary deposit, leached, gradual smooth.
105-125	2Cg	2.5Y 4/2, coarse sand with granules and pebbles, single grain, erratics well rounded, grading into coarser point bar deposits, leached.

SITE NAME: ST No. 35
 LOCATION: NE 1/4, SE 1/4, SW 1/4, Sec 32, T81N, R6E, Iowa, Pool 14
 ELEVATION: ~575'
 GEOMORPHIC SURFACE: Late Holocene Surface
 POSITION IN LANDSCAPE: Flat lying near abandon channel
 PARENT MATERIAL(S): Main Valley Mississippi River alluvium

WATER TABLE:

SLOPE: 0%
 VEGETATION: Silver Maple
 METHODOLOGY: Sampling Tube
 DATE DESCRIBED: 7/26/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Did not penetrate PSA, ended with 140 centimeters of PSA over presumed late Holocene surface. Nearby bank exposures show a thick PSA with apparent presettlement surface below water level.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-65	C (PSA)	10YR 3/2, silt loam, weak medium granular and platy, friable, laminae of PSA mostly silt loam, some silty fine sand, common roots and wormholes, few fine faint mottles, weak calcareous, gradual smooth.
65-140	Cg (PSA)	5Y 4/2, silt loam, massive, common medium distinct mottles, leached.

SITE NAME: ST No. 36
 LOCATION: W 1/2, SW 1/4, Sec 26 T81N, R6E, Pool 14
 ELEVATION: 575-580'
 GEOMORPHIC SURFACE: Early to mid-Holocene Surface
 POSITION IN LANDSCAPE: Near Beaver Slough margin
 PARENT MATERIAL(S): Main Valley Mississippi River alluvium

WATER TABLE:
 SLOPE: 0%
 VEGETATION: Mixed Forest Grass
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 7/27/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Hard, dry nature of parent material, was difficult to penetrate.
 Consequently, subsurface horizons were not extracted in the core.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-85	C (PSA)	10YR 3/2, loam, weak medium granular and platy, hard dry, fe. fine roots and root holes, laminae observed in loam, leached, gradual smooth.
85-105	A	10YR 2/2, loam, moderate medium subangular blocky and prismatic, hard dry, many fine root holes pores and voids, leached.

SITE NAME: ST No. 37
 LOCATION: SE 1/4, NE 1/4, NW 1/4, Sec 18, T84N, R7E, Iowa, Pool 13
 (Savanna/Sabula area)
 ELEVATION: ~585-590'
 GEOMORPHIC SURFACE: Early-Mid Holocene Surface
 POSITION IN LANDSCAPE: Flat lying
 PARENT MATERIAL(S): Main valley alluvium

WATER TABLE: 210
 SLOPE: 0-2%
 VEGETATION: Silver Maple
 METHODOLOGY: Sampling tube
 DATE DESCRIBED: 7/27/89
 DESCRIBED BY: Jeff Anderson

REMARKS: Profile shows fine grained early Holocene material with a buried AC horizon at about 200 centimeters, overlying this is late Holocene main valley alluvium slightly coarser grained.

DEPTH CM.	SOIL HORIZON OR SED. UNIT	DESCRIPTION
0-30	C (PSA)	10YR 3/2, silt loam, weak medium granular, friable, some flood laminae of silt loam, leached, gradual wavy.
30-50	A	10YR 3/1-2/2, silt loam, moderate medium subangular blocky, friable, many roots and wormholes, few fine faint mottles, leached, clear wavy.
50-95	Bg	5Y 4/2, silt loam, moderate medium subangular blocky, friable, many roots and wormholes, many fine faint mottles, gleyed, leached, gradual wavy.
95-210	Cg	5Y 4/1, weak medium subangular blocky, massive, leached, becoming silty clay loam at base of horizon, clear wavy.
210-230	ACgb	5Y 3/1, silty clay loam, massive, organic enriched buried soil horizon, leached, gradual smooth.

230-305

Cgb

5Y 3/1-4/1, silty clay loam, massive, organic enriched units mostly silty clay loam, one lamina of silt loam from 250-270 centimeters, many fine distinct mottles, leached.

RP/POOL1314/AA1

APPENDIX C
A CHRONOLOGY OF UPPER MISSISSIPPI VALLEY HISTORY

- 1541 **Mississippi Discovered.** Spanish explorer Hernan de Soto, first European of record to reach the Lower Mississippi River.
- 1640 **Initial Contact.** Jean Nicolet, emissary from the governor-general of New France, travels west from the Great Lakes in search of Cathay, finds Winnebago Indians instead, who tell him about the Illinois nation living on a "great river" to the west.
- 1655 **Illinois.** Algonquian-speaking Illiniwek (Illinois) Indians visit French the post on Lake Superior, opening the way for French traders to penetrate the Illinois country.
- 1659 **Radisson and Groseilliers.** Trader Pierre-Esprit Radisson, and his brother-in-law Medard Chouart, Sieur des Groseilliers, journey to the Upper Mississippi country in search of furs. Although Jean Nicolet may have reached the Mississippi Valley while exploring in the interior west of Lake Michigan in 1635-1635, this is the first documented European presence in the Upper Mississippi Valley.
- 1668 **Perrot's Mission.** Jean Baptiste Talon, the "great intendant" of New Frances, dispatches trader Nicolas Perrot on a diplomatic mission to establish permanent relations with the Indian nations of the Upper Mississippi.
- 1673 **Marquette and Jolliet.** The Jesuit missionary Jacques Marquette and trader Louis Jolliet set out from the Straits of Mackinac on 17 May, voyage down Lake Michigan to Green Bay, up the Fox River and down the Wisconsin River, reaching the Mississippi on 17 June. reach the mouth of the Iowa River while ascending the Mississippi. On 25 June the Frenchmen visit the village of the Peoria near the mouth of the Iowa River.
- 1680 **Hennepin's Voyage.** The Franciscan missionary Louis Hennepin, accompanied by David Accault, ascends the Mississippi River from the mouth of the Illinois to Lake Pepin, where he is captured by Sioux (Dakota) Indians. The Hennepin party is subsequently rescued by Daniel Greysolon, Sieur du Luth, an emissary sent to the Dakota by the governor-general of New France.
- 1682 **La Salle Claims Louisiana.** Robert Cavalier, Sieur de la Salle, reaches the junction of the Illinois and Mississippi Rivers and claims the Mississippi watershed.

for France, naming it "Louisiana" in honor of Louis XIV.

- 1689 **Fort St. Antoine.** Nicolas Ferrot, holding a commission as commandant of the western district of New France, establishes Fort St. Antoine on Lake Pepin and asserts direct French control over the "upper country." Ferrot was active on the Upper Mississippi for many years and in 1690 he visited the lead mines around Dubuque and Galena, where he found the ore rich but hard to work.
- 1695-1702 **Le Sueur on the Upper Mississippi.** Pierre Charles le Sueur, commandant of the Chemquamegon Post on Lake Superior, travels inland and establishes a trading house on the Mississippi River at Isle Pelee (Prairie Island), near present day Red Wing, Minnesota. In 1700, Le Sueur leads an expedition from the Gulf of Mexico to the Falls of St. Anthony and erects Fort L'Huillier at the site of a suspected copper mine on the Upper Minnesota River. Fort L'Huillier is attacked by the Fox Indians and has to be abandoned in 1702.
- 1699-1725 **Early French Posts.** A Sulpician mission is established at Cahokia, near present day East St. Louis, in 1699. The same year, French colonists led by Pierre le Moyne, Sieur de Iberville, found the posts of Fort Maurepas on Biloxi Bay; in 1702 the colony is moved to Fort Louis on the Mobile River. The forts at the Straits of Mackinac and Detroit were built in 1700 and 1701, respectively. In November 1718, Jean Baptiste le Moyne, Sieur de Bienville, occupies the site of New Orleans. The Jesuit post at Kaskaskia in the American Bottom dates from 1703; a fort is erected at the mouth of the Kaskaskia River in 1720. French control of the Upper Mississippi is secured with the establishment of Fort Chartres by Pierre, Duc de Boisbriant, in 1719; rebuilt in 1751, Fort Chartres is the military and administrative capitol of the Illinois country until 1765.
- 1701-1716 **First Fox War.** French grand strategy is to detach the Fox from their alliances with the Inoquois and the Eastern Dakota (Sioux) and crush them in a war of extermination. This policy of genocide is militarily successful, but economically disastrous.
- 1717 **Province of Illinois.** The French establish civil government in the Upper Mississippi Valley; the Illinois country, previously part of Canada, is annexed to Louisiana.
- 1719 **Lead Mines.** Lead mines at Mine la Motte and on the Big River in southeastern Missouri are opened by Philip Renault of the Company of the Indies.

- 1726 Flood. A major flood in the Upper Mississippi Valley.
- 1727-1738 Second Fox War. French atrocities cause the Sauks to join the Fox in war against the French. Sauk and Fox are forced out of their old habitat in southern Wisconsin and have to relocate along the Mississippi.
- 1727 Fort Beauharnois. Rene Boucher, Sieur de la Ferriere, builds Fort Beauharnois on Lake Pepin, reasserting French control over the upper country. The fort is garrisoned intermittently until 1737.
- 1728 Flood. Great flood of the Mississippi River recorded by La Ferriere at Fort Beauharnois.
- 1735 Battle on Upper Des Moines River. French soldiers and Indian allies under the command of Captain Nicolas Joseph de Noyelle attack the Sauk and Fox village on the Upper Des Moines River.
- Ste. Genevieve Founded. There is some evidence that the French-Canadian settlement on the west bank of the Mississippi opposite Kaskaskia may have been established as early as 1732 or as late as 1752.
- 1754-1763 French and Indian War. Hostilities break out between French and English colonials and their respective Indian allies. The conflict, known in British North America as the French and Indian War, leads to a general war involving all of the major European powers known as the Seven Years War (1756-1763). Quebec falls to the British in 1759. The war is a disaster for the French.
- ca. 1755 Prairie du Chien Founded. First permanent European settlement at site of Prairie du Chien. Prairie du Chien may be the site of the "Fort St. Nicholas" mapped by Franquelin in 1688. Jonathan Carver visited the place in 1767 and found it a bustling regional trade center.
- 1762 France Cedes Louisiana to Spain. The Treaty of Fontainebleau is signed by the Duque de Choisseul for France and the Marques de Grimaldi for Spain. By the terms of the treaty, France cedes all of Louisiana west of the Mississippi and the Isle d'Orleans (New Orleans) to Spain.
- 1763 France Cedes the Illinois Country to Great Britain. The Treaty of Paris ends the Seven Years War and defines the boundaries of Louisiana and the Illinois country: France cedes all of its colonial possessions in North America east of the Mississippi River (except New Orleans) to Great Britain.

Pontiac War. Pontiac, chief of the Ottawas, besieges the British garrison at Detroit, touching off the bitter conflict known as Pontiac's Rebellion. Every British post west of Niagra is destroyed, but the "rebellion" is eventually put down and the tribes brought to terms. The Pontiac War occasions the Proclamation of 1763, whereby the British Parliament forbids settlement west of the Appalachian Mountains.

- 1764 St. Louis Founded. Laclède Liguest and Auguste Chouteau, agents of the New Orleans trading firm of Maxent, Laclède & Company, establish the Post of St. Louis on the west bank of the Mississippi across the river from Cahokia.
- 1764 Sauk and Fox Established in Mississippi Valley. The Sauk and Fox Indians abandon their villages on the upper Wisconsin River and relocate in Illinois and Iowa.
- 1766 Carver's Expedition. Jonathan Carver, a captain of militia, leads an expedition from Prairie du Chien to the Falls of St. Anthony, wintering on the Minnesota River before returning to Mackinac via Lake Superior.
- Quebec Act. The Act extends the boundaries of British Canada west and south to the banks of the Mississippi and the Ohio, including the Illinois country. Anglo-Americans regard the act, which also grants full citizenship to French-speaking Canadians, as a papist plot, one of the so-called "Intolerable Acts," one of the causes of the American Revolution of 1775-1782.
- 1769 Fever River Lead Mine. Martin Miloney Duralde receives a patent from the Spanish government to mine lead on the Fever River.
- 1770 Spanish Louisiana. In St. Louis, Captain Pedro Fiermas takes definitive possession of Upper Louisiana for Spain.
- 1772 Attack on Upper Louisiana. Jean Marie Ducharme leads an English-backed expedition against Spanish Upper Louisiana but is repulsed by St. Louis militia under the command of Pierre Laclède.
- 1773 Peter Pond. British trader Peter Pond, one of the founders of the North West Company, establishes his base of operations at Prairie du Chien.
- 1778-1779 War in the Upper Mississippi Valley. A Virginia army under General George Rogers Clark captures the posts of Kaskaskia with the assistance of French Canadian inhabitants on 4 July and within six weeks secures the

British Illinois country. On 9 December, the Virginia legislature creates the County of Illinois. The post of Vincennes on the Wapash is recaptured by the British but Clark tricks the English commander, Colonel Henry "the Hair Buyer" Hamilton, into surrendering on 25 February.

1780 **St. Louis Attacked.** British-Indian attack on St. Louis is repulsed by Spanish forces under Lieutenant-Governor Francisco de Leybe. Spain entered the Revolutionary War on the side of the Americans on 21 June 1779.

1783 **Illinois Country Acquired.** Treaty of peace signed in Paris between Great Britain and the United States, ending the Revolutionary War. By the generous terms of the treaty, the United States acquires the whole trans-Appalachian West, including the Illinois country. In a separate simultaneous treaty, Britain cedes Florida to Spain.

1784 **Territorial Ordinance.** The State of Virginia cedes the County of Illinois (the future Northwest Territory) to the United States.

1785 **Flood.** Great flood of the Mississippi River -- the year is remembered in Upper Louisiana as L'Anee des Grandes Eaux. Tradition has it that the floodwaters were so high, Auguste Chouteau moored his boat and had breakfast on the highest rooftop in Ste. Genevieve. The site of old Ste. Genevieve is abandoned and the town is moved to higher ground.

1787 **Northwest Ordinance.** Congress passes Northwest Ordinance, creating the Territory Northwest of the Ohio River.

Immigration to Spanish Louisiana. Spain announces royal decree adopting a liberal immigration policy designed to attract Anglo-American settlers to Spanish Louisiana.

1788 **Flood.** Floodwaters inundate Ste. Genevieve and other Upper Mississippi river posts.

Spanish Mines. Julien Dubuque obtains permission from the Sauk and Fox Indians to work the lead mines on the west bank of the Mississippi, known as the Spanish Mines. Dubuque receives a Spanish land grant for the mines on 10 November 1796; after Dubuque's death in 1810, the Fox burn his settlement and ban whites from their lands.

1789 **Treaty of Fort Harmar.** Sauk and Fox Indians are granted the privilege of remaining on lands ceded to

the United States by Great Britain at the end of the Revolutionary War.

1792 **Spanish War Galleys on the Upper Mississippi.** The Mississippi Squadron of galleys is organized under the command of Captain Pedro Rousseau to patrol the Upper Mississippi. The squadron operates on the Upper Mississippi until the Louisiana Purchase.

English Traders in Upper Louisiana. Zenon Trudeau, Lieutenant-Governor of Louisiana, reports from St. Louis that the Upper Mississippi is filled with English traders based at Michili-mackinac. The following year, Spanish troops are sent to disperse foreign traders on the Des Moines River.

1794 **Battle of Fallen Timbers.** United States forces under General "Mad" Anthony Wayne defeat a large Indian force at the Battle of Fallen Timbers near Fort Miami in the Ohio Territory.

British Evacuate Upper Mississippi Posts. Jay's Treaty between the United States and Great Britain specifies that the British must abandon their Upper Mississippi trading posts on American soil by 1 June 1796.

1795 **The "Mississippi Question".** Treaty of San Lorenzo (also known as Pinckney's Treaty) extends United States sovereignty to the east bank of the Mississippi north of the 31st parallel; the treaty also recognizes Americans' right to navigation of the river and right of deposit at New Orleans.

1796 **Land Act.** Congress passes an act providing for rectangular survey and public auction of public domain, raising the minimum price from \$1 to \$2 an acre.

1799 **Tesson Grant.** Louis Honore Tesson, a French fur trader, receives a Spanish land grant on the west bank of the Mississippi River at the Des Moines Rapids.

1800 **Northwest Territory.** Congress divides the Northwest Territory into the territories of Indiana and Ohio.

Louisiana Retrocession. By the terms of the secret Treaty of San Ildefonso, Spain retrocedes Louisiana to France in exchange for Tuscany and recognition of the King of Etruria. France will take actual possession of the Louisiana colony on 15 October 1802.

Girard Grant. Basil Girard, a French fur trader, receives a Spanish land grant for a tract opposite Prairie du Chien.

- 1802 **Ohio Statehood.** Ohio, the first state formed out of the Northwest Territory, is admitted to the Union.
- Buffalo.** By this date the buffalo have become extinct in Illinois.
- 1803 **Louisiana Purchase.** President Thomas Jefferson originally dispatched his ministers James Monroe and Robert Livingston to Paris to buy the port of New Orleans, but Napoleon agrees to sell all of Louisiana for 20 million francs, or about fifteen million dollars. The purchase treaty does not specify boundaries and no one is exactly sure if it includes Texas or the Floridas.
- 1803-1804 **Louisiana Delivered.** The French colonial prefect hands over Lower Louisiana to the American commissioners William C. C. Clairborne and James Wilkinson in a ceremony at New Orleans. On 9 March 1804 the Spanish commandant at St. Louis transfers control of Upper Louisiana to France, represented by Captain Amos Stoddard of the U.S. Army. The next day, Upper Louisiana is formally delivered to the United States.
- Louisiana Territory.** Congress establishes the Territory of Louisiana; Louisiana proper is placed in the Territory of Orleans. For administrative purposes, the Louisiana Territory is attached to the Indiana Territory until 1805.
- 1804-1806 **Lewis and Clark Expedition.** Exploring party leaves St. Louis to explore Upper Louisiana and reaches the Pacific Ocean on 7 November 1805 before returning overland to St. Louis.
- Sauk and Fox Treaty.** Governor William Henry Harrison of the Indiana Territory, signs a treaty with some Sauk and Fox Indians at St. Louis. The treaty is a poorly disguised fraud; nevertheless, it extinguishes Indian sovereignty over lands east of the Mississippi River, while allowing the Sauk and Fox to remain in Illinois until territory is settled.
- 1805-1806 **Pike's Expedition.** Lieutenant Zebulon Montgomery Pike leads an exploring party from St. Louis to the headwaters of the Mississippi River.
- 1808 **Fort Madison.** Fort Madison constructed on west bank of the Mississippi in direct violation of the 1804 Sauk and Fox Treaty.
- 1811 **Earthquake.** New Madrid Earthquake results in incalculable loss of life and property. Aftershocks felt throughout the Mississippi Valley until February 1812.

- 1812 **Steamboat Era Begins.** The steamboat "Enterprise" arrives at New Orleans from Pittsburgh, inaugurating the steamboat era on western waters.
- Illinois Military Tract.** Congress establishes the Illinois Military Tract of 5.3 million acres as a reserve for veterans. The Tract is opened to unrestricted settlement in 1830.
- 1812-1814 **War of 1812.** Congress declares war on Great Britain. The war is partly a result of frontier expansionist sentiment and the need to break the power of the Indians of the Northwest. After two years of ineffective campaigning, the British and American governments send commissioners to Ghent in Belgium, where on Christmas Eve a peace treaty is signed, ending the conflict.
- 1816 **Fort Armstrong.** United States military begins construction of Fort Armstrong on Rock Island. The army leaves in 1836 and for two years the fort is occupied by the Indian agency; a federal armory is established in 1840 and removed in 1845; and in 1862 the Rock Island Arsenal is built.
- Treaty of Portage des Sioux.** Sauk Indians living on the Rock River conclude treaty with the United States commissioners William Clark, Ninian Edwards and Auguste Chouteau, agreeing to resume friendly relations with the Americans and reaffirming the provisions of the St. Louis treaty of 1804.
- 1818 **Illinois Statehood.** Congress admits Illinois to the Union.
- Crawford County.** The residue of the old Northwest Territory (Wisconsin, eastern Minnesota) is attached to Crawford County, Michigan Territory.
- 1819 **Panic.** Financial panic causes an economic depression that lasts three years. Western settlers owe the federal treasury more than \$21 million in land payments, which prompts the Land Act of 1820 (see below). The Bank of the United States forecloses on many mortgages, prompting Westerners to regard the central bank as a "monster."
- Fort Snelling.** The U.S. Army establishes a garrison on the Upper Mississippi at the mouth of the St. Peter (Minnesota) River.
- 1820 **Land Act.** Congress passes law abolishing credit system for purchase of public lands, reducing the minimum

price to \$1.25 an acre and fixing the minimum purchase at 80 acres.

- 1820-1821 **Missouri Statehood.** The Missouri Compromise, designed to maintain a balance of slave and free states, paves the way for Missouri's entrance into the Union as a slave state.
- 1823 **First Steamboat on Upper Mississippi.** Steamboat "Virginia" arrives at Fort Snelling from St. Louis.
- 1824 **Half-Breed Tract.** Treaty signed in Washington by William Clark and the chiefs of the Sauk and Fox establishes a reserve for former fur trade employees. The Half-Breed Tract comprises approximately 119,000 acres in present-day Lee County, Iowa, the land to be held in trust by the government. An act of Congress passed on 30 January 1834 opens the Half-Breed Tract to Euro-American settlement.
- 1825 **Treaties of Prairie du Chien.** Series of treaties between the Sauk, Fox, Ojibwa, Menominee, Winnebago, Ottawa and Pottawattamie nations and the United States, establishing boundaries for hunting grounds.
- Erie Canal.** The Erie Canal opens, connecting the Hudson River with Lake Erie, making New York City the leading metropolis of North America and triggering a boom in canal and railroad building.
- 1825-1828 **Galena Lead Mines.** Miners flock to the Galena district to work the lead mines there. The population rises from 200 to more than 10,000; the mines produce 21 million pounds of lead.
- 1826 **Flood.** Mississippi River crests twenty-six feet above high water mark at Prairie du Chien.
- 1830 **Neutral Ground Treaty.** The Sauk, Fox, western Dakota, Omaha, Iowa, Omaha, Oto and Missouri Indians sign treaty with the United States at Prairie du Chien, establishing a 40-mile "Neutral Strip" or buffer between the hunting grounds of the Dakota and the Sauk and Fox; by the terms of the treaty, the Indians cede their lands on the Missouri River slope to the United States.
- 1832 **Black Hawk War.** Following the removal of the Sauk and Fox from their villages on the east bank of the Mississippi, the Sauk chief Black Hawk and about four hundred warriors cross back into Illinois and quickly become embroiled in a guerrilla war with white settlers. The bloody conflict is brought to a conclusion with the massacre of Black Hawk's people at

the mouth of the Bad Axe River in southwestern Wisconsin.

Winnebago Occupy Neutral Strip. By treaty, the Winnebago are granted the "Neutral Strip" in northern Iowa, preliminary to the Black Hawk Treaty depriving the Sauk and Fox of much of their territory in Iowa (see below).

Black Hawk Purchase. Treaty between the Sauk and Fox and the United States, also known as Scott's Purchase, extinguishes Indian sovereignty over much of Iowa; the Indians surrender a strip extending fifty miles west of the Mississippi between the Half-Breed Tract and the Neutral Strip. 400 sections of land (Keokuk's Reserve) on the lower Iowa River are reserved for the Sauk and Fox.

Cholera. Epidemic of Asiatic Cholera breaks out in New Orleans, where 6,000 die in less than two weeks. The epidemic quickly spreads throughout the Mississippi Valley, decimating frontier settlements and Indian villages.

1833 **Steel Plow.** John Deere, a blacksmith from Grand Detour, Illinois, invents the steel plow and starts production at a factory in Moline.

First Settlement in Iowa. Iowa opened to Euro-American settlement, according to the terms of the Black Hawk Purchase.

1834 **Iowa Attached to Michigan.** Congress attaches the Iowa region to the Michigan Territory. The territorial council establishes the Iowa District for judicial purposes and creates the counties of Dubuque and Des Moines.

1836 **Keokuk Reserve Ceded.** Henry Dodge negotiates a treaty with the Sauk and Fox, whereby the Indians cede their 400-square mile reservation on the Iowa River to the United States.

Wisconsin Territory. Congress creates the Wisconsin Territory out of Crawford County, Michigan. The population of the new territory is less than 12,000, of whom almost half live in the Iowa district west of the Mississippi.

1837 **Panic.** Financial panic caused by large state debts and land speculation touched off when New York City banks suspend all specie payments. The economic depression lasts seven years and spurs an increase in western immigration as well as the rise of the Whig Party.

Land Sales. First public lands in the Half-Breed Tract in Iowa are offered for sale by the Government Land Office.


- 1838 **Iowa Territory.** Congress establishes territorial government in Iowa and Wisconsin.
- 1841 **Pre-Emption Act.** Congress passes the Distribution-Preemption Act, affirming "squatters' rights" on public lands. Settlers occupying unsurveyed lands now have first opportunity to buy the land from the government at \$1.25 an acre. The act makes permanent the pre-emption features of previous federal legislation.
- 1842 **AFC Bankruptcy.** The American Fur Company, originally chartered in New York by John Jacob Astor in 1808, fails and its Upper Mississippi assets are assigned to Pierre Chouteau & Company of St. Louis.
- Second Black Hawk Purchase.** The Sauk and Fox cede all of their remaining lands west of the Mississippi to the United States and move to reservations in Kansas.
- 1844 **Flood.** Worst Mississippi River flood since 1785 wreaks havoc in many newly platted townsites along the river.
- 1846 **Iowa Statehood.** Iowa is admitted to the Union.
- 1847-1848 **Mexican War.** Imperialist adventure launched against Mexico in the name of "Manifest Destiny" secures California and much of northern Mexico for the United States.
- 1848 **California Gold Rush.** Gold is discovered at Johann Sutter's mill on the Sacramento River; news of the discovery triggers a new surge of western migration.
- 1849 **Minnesota Territory.** Congress creates the Minnesota Territory with capital at St. Paul.
- 1850 **Cholera.** Outbreak of Asiatic Cholera in the Mississippi Valley.
- 1851 **"Trader's Treaty".** Treaty of Traverse des Sioux signed by United States commissioners and the Dakota Indians, ceding all Indian lands west of the Mississippi River. The treaty is little more than window dressing for a government bail-out of the Upper Mississippi fur trade.
- 1852 **Flood.** Great Mississippi River flood. Many Upper Valley river towns are inundated.

- 1855-1856 **Severe Winter.** Coldest winter on record in the Upper Mississippi Valley. Temperature at Muscatine rises above freezing only once between 20 December and 10 February. Ten steamboats wrecked by ice at St. Louis in February.
- 1856 **Rock Island Bridge.** Rock Island railway bridge, first structure across Mississippi, completed. The bridge is described by one engineer as "undoubtedly the worst artificial obstruction to navigation" on the river.
- 1857 **Panic.** Financial panic resulting from excessive real estate speculation, inflation and currency problems. Western development virtually ceases for several years.
- 1858 **Minnesota Statehood.** Congress admits Minnesota as the thirty-second state (perhaps more important, the seventeenth free state), the last formed out of the original Northwest Territory.
- 1861-1865 **Civil War.** The Mississippi Valley becomes a major theatre of military operations in the war between the states. New Orleans is captured by the Union in April 1862 and undisputed federal control of Mississippi is assured with fall of Vicksburg on 4 July 1863.
- 1865 **Chicago Stockyards.** Union Stockyards, owned by railroads and the largest in the world, opens in Chicago. In 1867 Texas cattle are shipped to Chicago for the first time by rail from Abilene, Kansas.
- 1867 **Grange.** Founding of the Order of the Patrons of Husbandry, forerunner of the Grange, the first public interest pressure group representing the interests of western agriculture.
- 1869 **Transcontinental Railroad.** The Union Pacific line meets the Central Pacific railroad at Promontory Point in Utah.
- Knights of Labor.** Noble Order of the Knights of Labor founded as a secret society. The labor organization finally goes public in 1881 and has more than 700,000 enrolled members by 1886.
- 1873 **Panic.** Financial panic triggered by the collapse of Jay Cooke & Company banking house. The severe economic depression lasts five years and is the result of excessive railway speculation and specie manipulation.
- 1874 **Mississippi Bridged at St. Louis.** The first steel arch bridge spanning the Mississippi River, designed by James B. Eads, opens at St. Louis.

- 1879 **Mississippi River Commission.** Congress establishes the Mississippi River Commission to prepare plans for flood control and improvement of navigation.
- 1879 **Flour Milling.** Perfection of milling process for hard-kerneled wheat revolutionizes commercial agriculture on Great Plains.
- 1882 **Flood.** Mississippi River floods leave 85,000 homeless.
- 1891 **Pearl Buttons.** German immigrant John Boepple starts manufacturing buttons from Mississippi River mussel shells in factory at Muscatine. The pearl button industry continues to grow until the early 1920's, when the mussel beds are depleted.
- 1893 **Panic.** Stock market crash results in financial panic, widespread business failures and bank closings. The economic depression lasts four years.
- 1907 **6-foot Channel.** Navigation improvements authorized by Congress, but have little effect on opening Upper Mississippi to heavy traffic.
- 1908 **Model T.** Henry Ford introduces no-frills Model T, first automobile designed for mass production; 15,000,000 are sold by 1928.
- 1913 **Keokuk Dam.** Built as part of a privately-owned hydroelectric project.
- 1914-1918 **World War.** The United States enters the conflict in 1917 on the side of Great Britain and France. Agricultural boom in Upper Mississippi Valley.
- 1924 **Wildlife Refuge.** Navigation improvements lead to conservation crisis on Upper Mississippi, prompting Congress to authorize creation of Upper Mississippi Fish and Wildlife Refuge.
- 1930 **9-foot Channel.** Congress passes Rivers and Harbors Act, directing Corps of Engineers to construct a system of low-water dams creating slack water navigation pools sufficient to maintain a 9-foot channel.
- 1917-1939 **Lock & Dam System.** 26 dams and navigation locks built by U. S. Army Corps of Engineers, creating a staircase of river lakes, falling 335 feet in 662 miles between Minneapolis, Minnesota, and Alton, Illinois.
- 1940-1945 **World War.** With completion of 9-foot navigation channel, Upper Mississippi becomes an industrial waterway and plays a critical role in the war effort.

APPENDIX D
Historic Survey Sites

M E M O R A N D U M

TO: Dave Benn
FROM: Robert Vogel 
DATE: 6 May 1989
SUBJECT: Pools 13-14 Archival Research

Archival research in published and unpublished sources suggests the following (non-prioritized) locations for potential historic archaeological sites:

1. Mouth of Wapsipinicon River. Documentation for the historic Sauk-Fox village at the mouth of the Wapsipinicon River is minimal; reliable location data is nonexistent. However, the Wapsi was well known to French traders by the early 1700's (it appears on several very early maps), so one can assume that it had some significance in regard to the Indian trade. I have been unable to locate the site of the 1830's American Fur Company post of J. D. Bourne with any precision; it was almost certainly near where US 67 crosses the Wapsi; I doubt that it would have been located very far downstream from the railroad crossing. I am trying to pin down the location of the dam and mill built on the Wapsi in 1842, but doubt that it was in the bottom.
2. The mouth of the Apple River was the scene of significant early Euro-American settlement. The historic Sauk or Fox Indian village on the Apple (1828) was at the falls, now Hannover. The Apple River mills were also probably too far upriver to be on federal land. Arnold settled Arnold's Landing in 1834 and the place was a focus of riverfront activity until the 1930's. I would recommend surveying the point of land between the Apple and Arnold's Landing. The old Portsmouth townsite was marked by the ruins of a warehouse, according to the county history (note: it is not clear if Portsmouth was on the north or south bank of the Apple River; there is no plat at the courthouse).
3. There is a secondary reference to a mid-19th century saw mill at the mouth of Rush Creek.

4. The Golding Woodyard, a late 19th century steamboat fuel depot (?) and lumber mill, located in NE SE NE sec. 3 T85N R5E on Island No. 250 (Bowman Island?), facing the slough.
5. The Smith & Shoecraft Mill, a late 19th century sawmill and farm, located in NW NE sec. 17 T85N R6E.
6. Highland, a late 19th-early 20th century summer resort/cottage community on the North end of Keller's Island, 3 mi. north of Sabula.
7. Sites around the mouth of Elk River: Sauk or Fox camp at mouth of river, ca. 1835; also a contemporary trading post (secondary reference). Mills on Elk River: Crary & Leonard saw mill, 1837-1842, in sec. 11 T83N R6E; Calderwood & Dinwiddie mill, 1841-1870, sec. 18 T83N R7E. Teed's Grove settlement, 1836, sec. 16 T83N R6E.
8. The Savanna Proving Ground was covered with early Euro-American farms and mills. It was, by far, the most heavily developed unplatted section of the river in Pools 13 and 14, but I understand that we cannot survey this tract.
9. The following 19th century farmsteads, mills, etc. appear on historic plats; some are probably within the Pools 13-14 project area (I haven't plotted their locations yet):

Jo Daviess & Carroll County:

house, on river, NW NE NW sec. 4 T25N R2E
 house, on river, N 1/2 NE sec. 5 T25N R2E
 house, center of N sec. line, sec. 35 T23N R3E
 2 houses, on slough, center of sec. 23 T23N R3E
 house & woodyard, SE NW NE sec. 15 T23N R3E
 house, NW NE NE sec. 20 T25N R3E
 house, SW NE NE sec. 18 T25N R3E

Jackson County:

house, on river, NE SE NE sec. 19 T86N R5E
 Cemetery, on river, NW SW sec. 20 T86N R5E
 house, on river, SE NE NW sec. 29 T86N R5E
 house, on river, NE NE sec. 17 T85N R6E
 ice house, on river, N line of SW NE sec. 36 T85N R6E
 house, on island, SW SW SE sec. 31 T85N R7E

Clinton County:

stock farm, on island, NW corner SE SW NW sec. 9 Elk R. Twp
 sawmill, SE NE SE sec. 15 T81N R6E

APPENDIX E
Pools 13-14 Artifacts

APPENDIX E page 1

POOLS 13-14 COLLECTIONS: ILLINOIS

SITE #	11Ca13	11Ca19	11Ca44	11Ca112	11Ca113	11R1538
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DEBITAGE

pri decor

interior

thinning

tertiary

shatter

1

1

flake frag

1

ret flake

CHIPPED STONE

uniface

pri biface

sec biface

projectile

biface frag

CORES

tested cobble

1

exhausted

single-plat

multi-plat

fragment

COBBLES/FCR

2

1

CONCRETE/BRICK

CERAMICS

Black Sand

Havana

Weaver/Linn

Conded/Plain

1

6

Oneota

HISTORIC MATERIAL

Chockery

Glass

Nails/ferrous metal

Miscellaneous

bowl

3 lamp chimney

7

shingle frag.

BONES

TOTALS

1

4

7

1

12

1

APPENDIX E page 2

POOLS 13-14 COLLECTIONS: Illinois

SITE #	11Ri550	11Ri551	11Wt236	11Jd182	11Jd183	11Jd184
DEBITAGE						
pri decor						
interior		1	1		4	3
thinning						
tertiary						
shatter						
flake frag					2	1
ret flake						
CHIPPED STONE						
uniface						
pri biface						
sec biface						
projectile	1					
biface frag						
CORES						
tested cobble						
exhausted						
single-plate				1		
multi-plate						
fragment	1					
COBBLES/FCR						
CONCRETE/BRICK						
CERAMICS						
Black Sand						
Havana						
Weaver/Linn						
Corded/Plain						
Oneota						
HISTORIC MATERIAL						
Glass						
Nail						1
BONES						
TOTALS	2	1	1	1	6	5

APPENDIX E page 3

POOLS 13-14 COLLECTIONS: Iowa

SITE #	13ST88	13ST89	13ST91	13CN55
DEBITAGE				
pri decor				
interior				
thinning				1
tertiary				
shatter	1			
flake frag				
ret flake				
CHIPPED STONE				
uniface				
pri biface				
sec biface				
projectile		tip		
biface frag				
CORES				
tested cobble				
exhausted				
single-plat				
multi-plat				
fragment				
HAMMERSTONE			1	
COBBLES/FCR			1	
CONCRETE/BRICK				
CERAMICS				
Black Sand				
Havana				
Weaver/Linn				
Corded/Plain				
Oneota				
HISTORIC MATERIAL				
Glass		3:1 canning jar, 1 lid liner		
Chickery		5:yellow, brown, gray-brown		
Whiteware		6:1 copper, 2 raised design		
Porcelain		3:2 raised design		
Ironstone		2:1 raised design		
BONES			1	
TOTALS	2	19	3	1

APPENDIX E page 4

POOLS 13-14 COLLECTIONS: Iowa

SITE #	13CN56	13CN57	13CN58	13CN59	13CN60	13CN61
DEBITAGE						
pri decor						
interior		1				
thinning	3					
tertiary						
shatter						
flake frag						
net flake						
CHIPPED STONE						
uniface						
pri biface						
sec biface						
projectile		stem				blade
biface frag						
CORES						
tested cobble			1			
exhausted						
single-plat						
multi-plat						
fragment						
COBBLES/FCR		2		slag		
LIMESTONE				2		
CERAMICS						
Black Sand						
Havana						
Weaver/Linn						
Conded/Plain						
Oneota						
HISTORIC MATERIAL						
Glass						1: white lid liner
Bottles						14: machine & mold
Ironstone						2: cup, oval bowl
Whiteware						2: plate, saucer
Porcelain						1: floral decal
Crockery						7: gray, brown, oatmeal
Metal						2: 1 horn mouthpiece
BONES				clam		
TOTALS	4	3	1	1	29	1

APPENDIX E page 5

POOLS 13-14 COLLECTIONS: Iowa

 SITE # 13JK79 13JK137 13JK138 13JK139 13JK140 13JK141

DEBITAGE

pri decor						
interior	2	13		11	5	1
thinning		2		6	2	
tertiary			1		2	
shatter		6		2	3	1
flake frag	3	15		6		
ret flake				2		

CHIPPED STONE

uniface						
pri biface						
sec biface						
projectile					shank	
biface frag	1	1				

CORES

tested cobble						
exhausted						
single-plat						
multi-plat					1	
fragment						

COBBLES/FCR

3

CONCRETE/BRICK

CERAMICS

Black Sand

Havana

Weaver/Linn

Corded/Plain

1

1

Onepota

HISTORIC MATERIAL

Glass

BONES

1

1

TOTALS

8

38

1

31

14

2

APPENDIX E page 6

POOLS 13-14 COLLECTIONS: Iowa

SITE #	13JK148	13JK150	13JK151
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DEBITAGE

pri decor

interior

thinning

tertiary

shatter

2

flake frag

1

ret flake

CHIPPED STONE

uniface

pri biface

sec biface

projectile

biface frag

CORES

tested cobble

exhausted

single-plat

multi-plat

fragment

COBBLES/FCR

CONCRETE/BRICK

CERAMICS

Black Sand

Havana

Weaver/Linn

Corded/Plain

Oneota

HISTORIC MATERIAL

Glass 2

Whiteware 1

Thick redware 1

BONES 1 domestic

TOTALS	5	2	1
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APPENDIX G
Radiocarbon Dates
Pools 13-14 Survey Project

Beta- #	B.P.	uncorrected B.C./A.D.	Location & Description
31800	800+/-50	1150 A.D.	11R1550, charcoal from hearth in 2BEb horizon, mid-late Holocene terrace.
28895	1030+/-	920 A.D.	very small charcoal sample from 2Ab horizon on Crooked Slough near 11Jd182.
28896 ETH-4887	2095+/-65	145 B.C.	Charcoal from Giddings core GP2, 290cm in mid-Holocene terrace.
31802	3340+/-80	1390 B.C.	bulk soil from core St21, 185-210cm in buried soil horizon of mid-late Holocene terrace.
28891	3430+/-70	1480 B.C.	bulk soil from Giddings core GP3, 160-180cm in buried soil horizon of mid-Holocene terrace.
31801	6860+/-100	4910 B.C.	bulk soil from Giddings core GP9, 240-255cm in Ab horizon of early-mid-Holocene terrace.
28892	7270+/-120	5320 B.C.	bulk soil from Giddings core GP3, 320-395cm in 2nd buried soil horizon of mid-Holocene terrace.
31804	9750+/-110	7800 B.C.	peat from Giddings core ST33, 95-125cm in paleochannel deposits above red clays.
31805	9910+/-190	7960 B.C.	plants and wood from Giddings core ST33, 190-230cm in red clay beneath paleochannel deposits
28893	14,070+/-230	12,120 B.C.	bulk soil from Giddings core GP7, 390-410cm at the bottom of red clay deposits below Holocene sediments.
28894	14,650+/-690	12,700 B.C.	bulk soil from Giddings core GP6, 600-710cm at the bottom of red clay deposits beneath an alluvial fan.
31883	18,790+/-320	16,840 B.C.	plant materials from clay deposits at the water line beneath 15-18ft of stratified sand and clay (Savanna terrace), Beaver Creek bank.

FOR: David Benn
Southwest Missouri State University

DATE RECEIVED: June 19, 1989

DATE REPORTED: July 15, 1989

SUBMITTER'S
PURCHASE ORDER # 89 L 626

OUR LAB NUMBER	YOUR SAMPLE NUMBER	C-14 AGE YEARS B.P. $\pm 1\sigma$	Material	Gm C
Beta-31800	¹⁴ RI 550 Cordova 6	800 +/- 50	Charcoal	
Beta-31801	Pool 13 GP9 240 - 255 cm	6,860 +/- 100	Soil	0.7
Beta-31802	Pool 13 ST21 185 - 210 cm	3,340 +/- 80	Soil	
Beta-31804	Pool 14 ST33 95 - 125	9,750 +/- 110	Peat	1.0
Beta-31805	Pool 14 ST33 190 - 230	9,910 +/- 190	Plant org.	0.5

* Small carbon samples given quadruple-normal counting time to reduce attendant statistical error.

These dates are reported as RCYBP (radiocarbon years before 1950 A.D.). By international convention, the half-life of radiocarbon is taken as 5568 years and 95% of the activity of the National Bureau of Standards Oxalic Acid (original batch) used as the modern standard. The quoted errors are from the counting of the modern standard, background, and sample being analyzed. They represent one standard deviation statistics (68% probability), based on the random nature of the radioactive disintegration process. Also by international convention, no corrections are made for DeVries effect, reservoir effect, or isotope fractionation in nature, unless specifically noted above. Stable carbon ratios are measured on request and are calculated relative to the PDB-1 international standard; the adjusted ages are normalized to $\delta^{13}C$ per mil carbon 13.

David W. Benn

December 7, 1989

FOR: _____
Southwest Missouri State University

DATE RECEIVED: _____

DATE REPORTED: May 15, 1989

SUBMITTER'S
PURCHASE ORDER # _____

OUR LAB NUMBER YOUR SAMPLE NUMBER C-14 AGE YEARS B.P. $\pm 1\sigma$

Beta-28896 Pool 13 GP#2 2095 +/- 65 BP
ETH-4887 290cm

Note: this sample was done using the AMS technique. The reported date has been adjusted by carbon 13 for total isotope effect generated in both nature and during the physical and chemical laboratory procedures. The carbon 13 content was measured concurrently with that of carbon 14 and carbon 12 in the accelerator beam, allowing a precise correction.

These dates are reported as RCYBP (radiocarbon years before 1950 A.D.). By international convention, the half-life of radiocarbon is taken as 5568 years and 95% of the activity of the National Bureau of Standards Oxalic Acid (original batch) used as the modern standard. The quoted errors are from the counting of the modern standard, background, and sample being analyzed. They represent one standard deviation statistics (68% probability), based on the random nature of the radioactive disintegration process. Also by international convention, no corrections are made for DeVries effect, reservoir effect, or isotope fractionation in nature, unless specifically noted above. Stable carbon ratios are measured or

FOR: David W. Bern
Southwest Missouri State University
Springfield, MO

DATE RECEIVED: December 7, 1988

DATE REPORTED: January 3, 1989

SUBMITTER'S
PURCHASE ORDER # 89 F 96

OUR LAB NUMBER	YOUR SAMPLE NUMBER	C-14 AGE YEARS B.P. $\pm 1\sigma$	Material	Gms C
<u>PROJECT CAR - 752</u>				
Beta-28891	Pool 13 GP#3 160-130cm	3,430 +/- 70	bulk soil	
Beta-28892	Pool 13 GP#3 380-395cm	7,270 +/- 120	bulk soil	0.5 *
Beta-28893	Pool 13 GP#7 390-410cm	14,070 +/- 230	bulk soil	0.4 *
Beta-28894	Pool 13 GP#6 600-710cm	14,650 +/- 690	bulk soil	0.2 *
Beta-28895	Crooked Slough 2Ab Soil #1	1,030 +/-	charcoal	0.3 *

* Small carbon sample given quadruple-normal counting time to reduce attendant statistical errors.

These dates are reported as RCYBP (radiocarbon years before 1950 A.D.). By international convention, the half-life of radiocarbon is taken as 5568 years and 95% of the activity of the National Bureau of Standards Oxalic Acid (original batch) used as the modern standard. The quoted errors are from the counting of the modern standard, background, and sample being analyzed. They represent one standard deviation statistics (68% probability), based on the random nature of the radioactive disintegration process. Also by international convention, no corrections are made for DeVries effect, reservoir effect, or isotope fractionation in nature, unless specifically noted above. Stable carbon ratios are measured on request and are calculated relative to the PDB-1 international standard; the adjusted ages are normalized to -25 per mil carbon 13.