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AN ANNOTATED BIBLIOGRAPHY
OF OBSERVATIONS ON
ILLINOIS WATER RESOURCES
1673 - 1850

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ABSTRACT

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This study is concerned with the development of the water resources to the middle of the nineteenth century. The works involved in it are the French accounts of their travels in the Illinois Country in the seventeenth and early eighteenth centuries; the accounts of the later eighteenth century, during the British period (1763-1783) when the Northwest was closed by royal proclamation to settlement; and the accounts of the nineteenth century when settlement began, primarily in the southern part of the State and, less formally, in the lead region of the northwest corner. By the middle of the century, Illinois reached the stage of sophisticated development; the Federal lands in the State had almost all been entered, and the frontier had moved westward.

An introductory text illustrates the nature of the findings, both as to observations, as well as the influence of the resources themselves, on the growth of the State of Illinois. An extensively annotated bibliography consists of travel narratives and descriptive accounts of Illinois written by observers who were in the State or who wrote of the State between the years 1673 and 1850. These limits were chosen because the first recorded European set foot on Illinois soil in 1673, and after the middle of the nineteenth century the official State and Federal geological reports can be relied upon. The works included in this list were chosen because the authors of them recorded observations bearing on the state of the water resources in Illinois at the time of their visits or publication.

The entries in the bibliography consist of the titles, an introductory and summary paragraph, and the pertinent selections from the works.

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INTRODUCTION

"Land is a drug everywhere; but water, and water power has a mystic charm that draws men together in this country."
(Morleigh, 1843)

During the century and a half before statehood, and the same length of time since, the water resources of Illinois have played a major, though changing, role in the development of the state. This bibliography is an attempt to bring together a list of the early publications and observations of these resources.

Illinois, established in 1818, was the third state to be formed out of the Northwest Territory. The first white men set foot on Illinois land in 1673, inaugurating the history of the state. These Frenchmen, Marquette and Joliet, and those who came after, were interested primarily in exploring this southern portion of New France, and in converting the Indians to Christianity. Settlement, after the explorations of these Jesuit missionaries, came later, and until the middle of the eighteenth century was confined to military posts--on the Illinois River at Starved Rock and at Peoria, and on the Mississippi at Fort Chartres in the present St. Clair County. By 1763, however, when the Illinois Country was ceded to Great Britain, the French had thriving settlements at Kaskaskia, Prairie du Rocher, Cahokia, and Fort Chartres. The first English-American settlement was at Shawneetown, on the Ohio below the mouth of the Wabash. Illinois became part of the newly independent state of Virginia in 1778 when George Rogers Clark

captured Vincennes from the British. Under the plan of the Jefferson Land Ordinance of 1785 and the Northwest Ordinance of 1887, Illinois continued to grow until, finally, the Congress was satisfied that she contained enough inhabitants to become a state.

Travelers to the area--both French and British--in the eighteenth century were merely observers. When the French explorers returned to Montreal they filed reports on their journeys, but these were reports on the country as it was: the length of the rivers, their navigability, the wildlife, and the Indians. These explorers had little interest in what the country could become. The British published their observations to feed the great appetite for descriptions of the unknown western country. After the United States gained independence, in 1783, however, the traveler or writer about the West was seeking habitable areas. His interest in the country was an economic one: Is it possible to settle in this particular place? Will the productions from a homestead in this area be worth the expense and discomfort of emigrating? Can we get the surplus productions to markets in the East or South? What about power to grind our grain and saw our wood? All these questions involved water resources. Good homestead sites had to be neither too wet nor too dry, and they had to have an available water supply. Transportation of freight and commodities in the frontier area depended almost by necessity on the waterway. Hence the constant remarks on stream sizes and navigability. And power meant water power. "Mill seats" were particularly important and valuable in prairie country where stream gradients are unusually low and damsites not plentiful. This was in sharp contrast to the East where damsites and mill seats were so generally available that it was hardly worth mentioning them in descriptive accounts.

As the state moved out of its "colonial" period, through its frontier period, and into a degree of sophisticated settlement, men began to see that successful exploitation of the resources of the state would involve improving on nature. This is the era of the creation of artificial waterways and artificial hydraulic facilities. Steam power eventually replaced water power, but the canal at Chicago has remained important to the present day. But at the same time, as population increased, water assumed an ever more vital importance for domestic and industrial use--for drinking, for manufacturing, and for waste disposal. As the state approaches its sesquicentennial the role water resources play in its growth has taken on a new aspect, that of a much needed commodity that must be conserved.

This study is concerned with the development of the water resources to the middle of the nineteenth century. The works involved in it are the French accounts of their travels in the Illinois Country in the seventeenth and early eighteenth centuries; the accounts of the later eighteenth century, during the British period (1763-1783) when the Northwest was closed by royal proclamation to settlement; and the accounts of the nineteenth century when settlement began, primarily in the southern part of the state and, less formally, in the lead region of the northwest corner. By the middle of the century Illinois reached the stage of sophisticated development; the federal lands in the state had almost all been entered, and the frontier had moved westward. Not until the end of the century would the next wave of immigration swell Chicago and other urban areas.

The first record of Illinois was given by Marquette in his journal of his expedition with Joliet to ascertain whether the Mississippi would give access to the Pacific. The party traveled through the Great Lakes to Green Bay and across Wisconsin to the Mississippi. This route, up the Fox River and across the portage to the Wisconsin, was the preferred route to the Mississippi, as the navigability was more reliable than that of the Chicago-Illinois route. Marquette and Joliet returned, however, by the latter way, and Marquette's brief but enthusiastic description of the Illinois River country is the first record of it: "We have seen nothing like this river that we enter, as regards its fertility of soil, its prairies and woods; its cattle [buffalo]. elk, deer, wildcats, bustards, swans, ducks, parroquets, and even beaver. That on which we sailed is wide, deep, and still, for 65 leagues. In the spring and during part of the Summer there is only one portage of half a league [at Chicago]." This description of the Illinois was expanded by later travelers, but the beauty of the stream and the surrounding country continued to impress travelers such as Charlevoix, who observed in 1721 that below the last rapids, at the mouth of the Vermillion River, "it is everywhere, both in breadth and deepness, equal to most great rivers in Europe." The following year Coxe published a more detailed description which was relied upon for the rest of the century.

The first finely detailed description of the Illinois and its tributaries noting their navigability came from Patrick Kennedy, who traveled up the river looking for copper mines; his journal was published by Hutchins in 1778. By the end of the century the standard description

of the river was, "It is 400 yards wide at its mouth. In its course it receives several considerable streams. It affords a communication with lake Michigan, by Chicago river, between which and the Illinois are two portages, the longest does not exceed 4 miles." This passage is from Scott's gazetteer but Jedediah Morse says almost exactly the same thing. The navigability of the Illinois above Ottawa was always a problem. Charlevoix noted in 1721 that at the junction of the Des Plaines and Kankakee the Illinois was still so shallow "that I have seen a buffalo cross it, without being up to the mid-leg in water" and the river did not "acquire a depth correspondent to its breadth, till fifteen leagues below the Forks; though in that interval many other rivers fall into it."

The portage at Chicago was described by all travelers from Marquette and Joliet until the Illinois-Michigan Canal was started. It consisted of a low, flat prairie which contained the sources of the Des Plaines and the Chicago, and in the spring was completely covered with water. The canoes of the French explorers could pass over the water with little difficulty, although at certain places and certain times of the year it was necessary to walk.

Descriptions of the Mississippi were many varied. Most of the observers noted that at the confluence of the Missouri and the Mississippi the clear waters of the latter were pushed to the east bank by a stronger muddy current of the Missouri, and it was not until far below the junction that the waters finally mingled. Of interest to Illinois history, however, is the effect of the changing channel of the river on the eastern shore. Charlevoix noted that at Cahokia the village

was situated half a league from the bank of the river when he visited in 1721. The villagers told him, however, that the river did wash the foot of the village when it was built, but that "in three years it has lost half a league in breadth." In 1766 Captain Harry Gordon noted the erosion of the banks at Fort Chartres, and Pittman noted them at the same time: "The bank of the Mississippi, next the fort, is continually falling in, being worn away by the current, which has been turned from its course by a sand-bank, now encreased to a considerable island When the fort was begun in the year 1756, it was a good half mile from the water side; in the year 1766 it was but eighty paces; eight years ago the river was fordable to the island, the channel is now forty feet deep." Thirty years later Volney noted that the fort had been undermined by the river, and abandoned by the British. The river has shifted since then, and the ruins of the fort today stand a half a mile from the river.

Notable in the guides to the state of Illinois is the classification of its topography into six physical types. These are: (1) the bottom lands along the rivers, behind the natural levees, known as ripe alluvion; (2) the unripe alluvion at the mouths of rivers; (3) dry prairie behind the bottom lands; (4) wet prairie, abounding in swamps and ponds; (5) timbered land; and (6) broken land and hills. These six classifications were first made in 1817 by Samuel Brown in The Western Gazetteer. Three years later Blowe in A Geographical . . . View of the United States picked them up, and beginning in 1831 Peck's Guide for Emigrants gave them wider circulation in his several editions. Later writers repeated the information from Peck.

Armed with this knowledge of the state, the first wave of settlers hit the state after the War of 1812, barely allowing the surveyors to go ahead. Of prime concern to these pioneers was the reputation the territory enjoyed of unhealthiness. This reputation continued through the greater part of the nineteenth century, and was not unfounded. The bottom lands were especially disease filled, and the sickness of the inhabitants was attributed to the miasma given off by the rotting vegetation in the swamps. Drake variously named the fevers bilious, intermittent, remittent, miasmatic, marsh, ague, fever and ague, or the Fever. The fever was malaria, and sometimes was called that, but it was not known to be insect borne (the name malaria means simply "bad air"). [For a study of the disease see E. H. Ackerknecht, "Malaria in the Upper Mississippi Valley 1760-1900," Bulletin of the History of Medicine, Supp. No. 4 (1945). Pertinent selections from Drake's Systematic Treatise have been collected by Norman D. Levine, ed., Malaria in the Interior Valley of North America (Urbana, 1964).] The French settlers on the bottom lands along the Mississippi were not subject to the ague, a fact which later settlers could not understand. The reason was that malaria was not introduced into the area until the second half of the eighteenth century. The nineteenth-century emigrants' guides all warned settlers away from the bottom lands, but to no avail. The richest land, as well as the necessary timber was there. Mitchell noted, however, in 1837 that when the lands were cleared of the undergrowth, and opened to the sun, they proved to be "salubrious places of habitation."

Another, though slighter, health problem related to water was the effect of hard water on the system. "Those persons who emigrate from a region of sandstone, or primitive rock, where water is soft, will find our limestone water to produce a slight affection of the bowels, which will prove more advantageous to health than otherwise, and which will last but a few weeks." Many of the travelers recorded this affect, but all noted that it was temporary. Other than this, the quality of the water was in general good.

A very serious concern of the settler was the apparent absence of water on the prairies. It was pointed out, however, by many writers that water was available in great abundance beneath the surface, and usually obtained by digging only a few feet. Some of the observations record well depths, and even the kind of material in which the water occurred.

Contributing in a large part to the concern of in-coming settlers in the early years were the stories of the water problems of Morris Birkbeck's English Prairie settlement in Edwards County, approximately thirty-five miles southwest of Vincennes, Indiana. Founded in 1818, this establishment received the most publicity both in the eastern United States and England. Criticism focused on the lack of available water, and apologies attempted show that water was indeed plentiful. The co-founder, George Flower, wrote in his memoirs that water was a problem at first. "The first well was dug in the public-square [at Albion], and more than a hundred feet deep, and no water. The next a considerable depth, and but a limited supply." The first successful well (dug he says in a spot indicated by a "water witch"!) produced

water at forty-five feet. It appears from the accounts that the early water problems resulted from not digging deep enough. Birkbeck notes that settlers in the area complained of poor water quality, but he suggested that they had probably not gone below twenty-five feet. Woods, a resident for two years at English Prairie, notes that a well eleven feet deep produced little water, while another produced so much water at twenty-three feet that they had difficulties walling it. Whether there was actually an acute water problem at the settlement, and it is admitted that there was at first, through lack of preparations for the first settlers, the important thing is that published reports gave the impression, either directly or indirectly, that there was a shortage.

Facilities for grinding corn and wheat and sawing lumber were the next necessity of the settlers. Probably the first water powered mill in the state was that of Monsr. Paget at Kaskaskia, one of the first French land owners. The Kaskaskia continued to furnish mill seats, as Pittman noted in the late 1760's. The early settlers were not as fortunate in other parts of the state. Birkbeck made up for the lack of good mill seats in his neighborhood by erecting a wind-mill to turn mill stones. To emigrants from the eastern states, the lack of good water courses was, as John Bergen, writing in 1830 to a friend in Philadelphia, said, "an evil felt in all the west." Men turned to steam in the 1830's because fuel was abundant and cheap, and between ten and twenty steam mills were noted in 1832. While southern Illinois suffered from lack of mill seats, the northern part of the state abounded in them. It was noted in 1841 that this arrangement was fortunate, as the north lacked the fuel necessary for steam

mills. The Rock and the Fox and the Kankakee all furnished good hydraulic facilities, as did many of the smaller tributaries of the Illinois. Along the route of the Illinois-Michigan Canal, artificial mill seats were created wherever a dam was built to provide a feeder for the canal.

The need for a canal was obvious. The short portage between the Des Plaines and the Chicago rivers was adequate for canoes, which could pass over without a portage in the spring. But as the state grew it was apparent that a better connection was necessary to open up the Mississippi Valley to the Great Lakes. Dablon recorded Joliet's recommendations for a canal as early as 1674; La Salle, in 1680, suggested that a canal all the way to the head of navigation on the Illinois, at Ottawa, would be needed, but it would be a hundred and thirty years before this was seriously proposed again. The problems in construction of the canal were many. At first it was suggested that the Des Plaines be used as the feeder; this was rejected in favor of cutting through the summit and draining Lake Michigan into the canal. When excavation difficulties were encountered the engineers were forced to return to the original plans and seek the water supply from the tributary streams of the Illinois. The first complete report on the canal route was Major Stephen H. Long's proposal in 1817, the report upon which the Congress based its final action on the land grant in 1826. Various travelers to northern Illinois and the writers of the many guides to the state in the 1830's commented on the progress, often slow and discouraging, of the canal. In 1843-44 John Davis toured the route at the request of the English bondholders who were being asked to

put up another 1.6 million dollars to complete the construction. His careful and enlightening report was favorable, and the canal was completed in 1848. Although canals everywhere were receiving competition from the railroads by mid-century, the Illinois-Michigan continued in use until 1933, when it was abandoned in favor of the new canal to Chicago.

Observations on the water resources of Illinois cover many topics, according to the interests of the observer. Many of the travelers related water resources to geological conditions. Maclure was one of these, as was Schoolcraft, with his theory about the total inundation of the state at some time in the distant past. What he recorded as water-lines on the rocks at Grand Tower on the Mississippi were probably lines of the horizontal strata. Christian Schultz calculated the frequency of flood occurrence on the Mississippi, using a primitive calculus which allowed for changes in frequency of inundation as the bank built up. Hall discussed the volume of floods on the Ohio in relation to the flooding on its tributaries. Many writers simply noted the various strata they cut through in digging their wells, furnishing information to geologists.

By 1850 Illinois had reached a fairly advanced state of development. Steam was replacing water and horse mills as the standard mode of power. The railroad was linking the down state areas to the markets and ports in Chicago and on the Mississippi. The Illinois-Michigan Canal, recently opened, would serve the northern areas of the state until the next century, and the last major canal to be built in the country united Illinois River and the Mississippi at Rock Island late in the century.

After the Civil War, however, men became aware of a change in the state of the water resources, reflecting man's effect on them. A government report in 1868 on the Illinois river noted that its navigational facilities were no longer adequate to the needs of the day. It was suggested that perhaps the breaking up of the prairies had increased water retention in them, and that the run-off which had fed the streams before was greatly lessened. Silting up of streams was repeatedly reported. The various county histories that were written in the 1880's and 1890's (notably those of Newton Bateman and Paul Selby) also remarked on the decreasing stream sizes after almost a century of settlement. This effect of settlement and development on the water resources should be a key-note for any study of the modern period.

After the pioneer days, with a greatly increased population, water for domestic use was recognized as a problem magnified by the number of people to be supplied. Developing industries required much larger volumes of water for processing materials. The classic disposal of domestic and industrial wastes in running water began to change the quality of water supplies used by Man and his factories. The "good old days" were coming to an end and the original conditions of land and water were rapidly changing. We hope this list of early references will enable the interested citizen, the investigator, and the planner to find sources to tell what the original conditions in the early days actually were.

AN ANNOTATED BIBLIOGRAPHY
OF OBSERVATIONS ON ILLINOIS WATER RESOURCES
1673 - 1850

PREFATORY NOTE

This bibliography consists of travel narratives and descriptive accounts of Illinois written by observers who were in the state or who wrote of the state between the years 1673 and 1850. These limits were chosen because the first recorded European set foot on Illinois soil in 1673, and after the middle of the nineteenth century the official state and federal geological reports can be relied upon. The works included in this list were chosen because the authors of them recorded observations bearing on the state of the water resources in Illinois at the time of their visits or publication.

The entries in the bibliography consist of the titles, an introductory and summary paragraph, and the pertinent selections from the works. The compiler is indebted to Solon J. Buck, Travel and Description 1765-1865 (Illinois Historical Collections, IX, Springfield, 1914) and Robert R. Hubach, Early Western Travel Narratives; An Annotated Bibliography, 1634-1850 (Detroit, 1961) for biographical material on the authors. Most of the works in this list are included in these two excellent bibliographies.

As will be evident to some, several well known works are missing from this list. This is because the two criteria in assembling this bibliography were that the work contain matter relating to the water resources of Illinois, and that the work was published and therefore received wide circulation. Some deviation from this latter rule will be noted, but this is because the item, usually a diary or letter which was not published contemporaneously, contained an observation of interest or importance. One major body of material which was avoided for this same reason is the reports and notebooks of the government surveyors, who recorded every physical feature of every section of land in the state. If a complete, county-by-county study of the history of the water resources of Illinois is ever undertaken, these surveyors' records will be the prime source of material.

The bibliography is arranged alphabetically. A chronological list of the works, in the order of the years of observation, when they are known, or by order of publication, follows the bibliography.

Allouez, Jean Claude. "Narrative of a 3rd Voyage to the Illinois, Made by Father Claude Allois [sic]," The Jesuit Relations and Allied Documents, Reuben Gold Thwaites, ed. (Cleveland, 1900), vol. LX, pp. 148-67.

Father Allouez (1622-1689) made a great impact on the Great Lakes area as a Jesuit missionary. Most of his work was in the northern areas of Michigan and Wisconsin (he died near present-day Niles, Michigan), but in 1676-1677, Allouez, with two other men, set out to complete the foundation of Marquette's mission at the Illinois Indian village of Kaskaskia, on the upper Illinois river, near Starved Rock. It was in the Spring of 1677 that Allouez made the following observations relative to the water resources of the upper Illinois country.

"[The village of Kaskaskia] is situated in latitude 40 degrees 41 minutes. [This is an error.] On one Side of it is a long stretch of prairie, and on the other a multitude of swamps which are (render the atmosphere) unhealthy and often Covered with fog,--giving Rise to much sickness, and to loud and frequent Peals of thunder; they delight, however, in this location, as they can easily espy from it their enemies." Jesuit Relations, LX:161.

"I have been told that, lower down the river, there are saline springs, and that they [the Indians] make salt from them; I have not yet seen the experiment tried." Ibid., p. 163.

Baird, Elizabeth Therèse. "Reminiscences of Early Days on Mackinac Island," Wisconsin Historical Collections, XIV (Madison, 1898), 17-64.

Reprinted in part: Milo Milton Quaife, The Development of Chicago 1674-1914; Shown in a Series of Contemporary Original Narratives (Chicago, 1916), "Mrs. Baird's Excursion to Chicago, 1817."

Mrs. Baird was born at Prairie du Chien in 1810, and died in 1890. In 1886 and 1887, she contributed a series of articles to the Green Bay State Gazette as memoirs of her youth. They were collected and printed by the Wisconsin State Historical Society. In 1816-1817, Mrs. Baird's family made a stay in Chicago. Her memory of events of seventy years before is quite vivid; but she makes only a slight mention of matters germane to water resources in the Chicago area in 1816.

"There were no ports on the west side of Lake Michigan, at which to stop. But when we reached Chicago, there was considerable delay in getting into the river. It was a very narrow stream, with banks of white sand." Wisconsin Historical Collections, XIV, p. 25.

[Bache, Robert, or Robert Baird]. View of the Valley of the Mississippi; or, The Emigrant's and Traveller's Guide to the West; Containing a General Description of the Entire Country; and also Notices of the Soil, Productions, Rivers, and other Channels of Intercourse and Trade; and Likewise of the Cities and Towns, Progress of Education, &c. of Each State and Territory. Philadelphia: Tanner, 1832. 341 p.

This anonymous work is often attributed to Robert Baird, although Bache is generally accepted. In this book of general descriptions of the states and territories, there is a chapter of twenty pages on Illinois, largely drawn from Peck, A Guide for Emigrants (Boston, 1831). Bache notes the lack of mill seats in the state, and the abundance of salt springs, as well as the boatable rivers. The following notes are from the 2nd edition (Ibid., 1834, 372 p. maps).

"Salt . . . is made in several places in this state. The manufacture of this important article will annually increase. Salt water is abundant in this state, and there is no want of coal, or wood as fuel, by which it may be evaporated." pp. 223-24.

"There are between ten and twenty steam grist and saw mills in the state. Large quantities of flour are now manufactured here and exported. Mills propelled by steam, water, and horse power, or by oxen or horses on an inclined plane, are constantly increasing. Steam mills will become numerous, on account of the comparative want of good sites for water mills, and of the abundance and cheapness of fuel." p. 224.

Concerning the rivers of the state, the following are boatable: Kaskaskia (150 mi.), Rock (150 mi.), Illinois (steamboats to Peoria, and often to the rapids, 230 mi.), Macoupin, Apple Creek, Crooked Creek, Sangamon, Spoon, Mankinac, Vermillion (of the Illinois), Fox, Pickamink, Plane. p. 225.

On the Illinois-Michigan Canal: "This canal has not yet been undertaken. Much greater difficulties than were at first anticipated have been ascertained to exist in the nature of the ground, from the Plane river to Chicago, a distance of about 20 miles; there being a sub-stratum of solid limestone a few feet below the surface.

"On this account the idea of obtaining water for the summit level from the lake will probably be relinquished; and if a feeder cannot be made from the Calumick river,--a stream which flows into the southern extremity of the lake--a rail-road for this intervening distance of 20 miles must be resorted to." p. 226.

Advice to settlers in Illinois: A house site "ought, if possible, to be elevated accessible to the breezes, near to a good spring, and remote from swamps and marshes. The immediate bank of the river is better than the low partially inundated land more remote from the river, and near the bluffs: ravines, coves, and all confined places are to be avoided." p. 231.

On the topography of the state, Bache uses Peck's classifications: alluvial bottoms, prairies, barrens, bluffs-knobs-sinkholes. pp. 218-20.

Bergen, John G. An account of Sangamon County, contained in a letter dated at Springfield, Illinois, January 1, 1830, printed in the Milledgeville, Georgia, Federal Union, October 2, 1830, Volume I, Number 13.

This letter from Rev. John G. Bergen was addressed to Mr. David B. Ayers, of Kensington, Pennsylvania. Mr. Ayers had it printed in the Philadelphian, and the Milledgeville, Georgia Federal Union picked it up from there, presumably for the information of emigrants going to Illinois. The letter contains a general description of the "Sangamon country", including the quality of the land, the fiscal state of Illinois, the productions of the state, and in general what emigrants could expect to find there. On the subject of water resources, he makes the following observations.

"[The Sangamon river] lies in the center of this state, than which few states are better watered and perhaps none larger in territory."

"Two thousand dollars expended in clearing the falling timber from [the Sangamon] will make it navigable for steamboats; and this appropriation has been made by the legislature."

"We have many mills around us; mostly turned by ox or horse power. The want of good water courses for mills is an evil felt in all the west. But steam power is remedying it."

"Good water can be had every where by digging from 12 to 30 feet. The common depth is about 15 feet."

Birkbeck, Morris. Letters from Illinois. Philadelphia: Carey, 1818. 154 p.

Morris Birkbeck and George Flower (the latter's History of the English Settlement is included below) established the colony at English Prairie in Edwards County, Illinois, in 1817. Birkbeck and Flower were men of some means, though not more than minor gentry. Their object was to develop a settlement of English farmers like themselves (Birkbeck mentions that one needs about £3000 to become settled in the western country), and in effect transplant part of the English countryside to Illinois. In several books Birkbeck spread the propaganda for English Prairie, with its two towns of Albion and Wanborough, and the colony became so famous (and an object of such controversy) that every traveler to the west was expected to drop by and report on its progress. The two books of Birkbeck of any value to the observer of water resources are Letters from Illinois (1818), which contains only a slight mention of the lack of mill seats, and Notes on a Journey in America (cf. below). A Third, and well known, book was An Address to the Farmers of Great Britain (1822), but it carried no notice of the water conditions.

"There are no very good mill-seats on the streams in our neighborhood, but our prairie affords a most eligible site for a windmill; we are therefore going to erect one immediately. . . ." Letters from Illinois (London: Taylor & Hessey, 1818), p. 34.

Birkbeck, Morris. Notes on a Journey in America from the Coast of Virginia to the Territory of Illinois, with Proposals for the Establishment of a Colony of English. Philadelphia: Caleb Richardson, 1817. 189 p. (Later editions in 1818 and 1819, at London, Dublin, Cork, and in German.)

This is the first of many books on the English Prairie. In it Birkbeck relates his land hunting expedition, and describes the tract in south-eastern Illinois that he finally chose. Of particular interest among the few notes on water resources, is the quality and depth of wells in the area.

"The Little Wabash, which we crossed in search of some prairies which had been described to us in glowing colours, is a sluggish, scanty stream at this season [August]; but for three months at the latter part of winter and spring it covers a great space by the overflow of waters collected in its long course.

"The Skillet-fork is also a river of similar character, and the country lying between them must labour under the inconvenience of seclusion for many months of the year, until bridges and ferries are established. This would be a bar to our settling within the 'fork,' as it is called." pp. 143-44.

"It is dreadful country on each side of the Skillet-fork, flat and swampy, so that the water in many places, even at this season [August], renders travelling disagreeable." p. 145.

"[A certain settler lives] on the edge of seven miles prairie, a spot charming to the eye, but deficient in surface water, and they say the well water is not good. I suppose they have not dug deeper than twenty-five feet, which is no criterion of the purity of springs, in a soil so absorbant from the surface to that depth." p. 146.

"The prairies have been represented as marshes, and many of them are so. This is not, however, the case with all." p. 149.

[Blowe, Daniel]. A Geographical, Historical, Commercial, and Agricultural View of the United States of America; Forming a Complete Emigrant's Directory through Every Part of the Republic . . . Compiled by Several Gentlemen from a Variety of Original Manuscripts, and from the Latest and Best Authorities. London: Edwards & Knibb, etc., 1820. 746 p.

Published anonymously, this work was reissued, probably the same year, at Liverpool, under the author's name. There is evidence in the section on Illinois, which occupies ten pages, that Blowe relied heavily (in some places verbatim) on Samuel R. Brown, The Western Gazetteer (1817) [cf. below]. Notable is their identical statement that, "No state or territory in North America can boast of superior facilities of internal navigation." (Blowe, p. 571, Brown, p. 17). Blowe also uses Brown's six classifications of the topography of Illinois, as did Peck eleven years later. On the matter of the value of a work such as this, in which the author has copied another work,

its worth must be seen in the increased circulation the information itself is given. It is such circulation of information that affected settlement, and whether the author himself made the observation is unimportant. Among other comments in Blowe on the physical features of Illinois, are the following, pertinent to water resource evaluation.

"Nature has been eminently bountiful to Illinois, in bestowing the means of internal navigation without the expense of cutting canals, perhaps nowhere else to be found in the world. The courses of the principal rivers, with their branches, are not less than 3,000 miles; viz. 2,000 internally and 1,000 on the frontiers. A small comparative expense will unite the river Illinois with the Chicago, which, as before observed, falls into lake Michigan. Then the lead of Missouri and the cotton of Tennessee will find their way to Detroit, and to Buffalo on lake Erie." p. 573. This passage is taken substantially from Brown.

Under the heading, "General Aspect of the Country," Blowe relies on Brown for the six divisions of land. These divisions in Blowe are: 1. the bottoms, bordering on the rivers; 2. the land at the mouths of the rivers ("It would be unsafe for the settler to locate himself upon this soil."); 3. dry prairie; 4. wet prairie, found remote from streams, or at their sources, the soil cold and barren, abounding with swamps, ponds, and tall grass; 5. timbered land; 6. hills, sterile soil, stunted timber at best. (pp. 573-74.) See Brown, below, for comparison.

Brown, Samuel R. The Western Gazetteer; or, Emigrant's Directory, Containing a Geographical Description of the Western States and Territories . . . with an Appendix Containing . . . Directions to Emigrants. Auburn, New York: Printed by H. C. Southwick, 1817. 352. p.

This work, because of its date, is basic. The fact that Blowe relied on it for his description of Illinois, and that Peck and others, through Peck, used Brown's land classifications, the first attempt to classify Illinois into physiographic regions, gives it importance. The gazetteers that come after this one also relied on Browns descriptions of the water resources of the territory. The following are his observations.

"No state or territory in North America can boast of superior facilities of internal navigation." p. 17.

The navigable tributaries of the Illinois: Sagamond [sic], 150 miles, for small craft; Demi Quain, 120 miles; Seseme Quain, 60 miles; La Marche, a short distance; Fox, 130 miles; Plein, or Kickapoo; Macopin, 9 miles; Little Michillimackinac, 90 miles; Crow Meadow, 15 miles; Rainy Island River, a few miles. p. 18.

Concerning the Illinois: "The banks of the Illinois are generally high. The bed of the river being a white marble, or clay, or sand, the waters are remarkably clear." p. 19.

Concerning the Kaskaskia: "On the [tributary] streams of this river there are already built, and now building a great number of mills--it is navigable at least 150 miles on a straight line. . . ." p. 20.

The Au Vase river is boatable 60 miles, waters a district 70 by 25 miles. The Saline, emptying into the Ohio, is 150 yards wide at its mouth, and navigable 30 miles for keels and batteaux. There are some, unnamed, streams emptying into the Ohio, which "are sufficiently large to afford mill seats." Also mentioned are several other rivers and "many small lakes" in the south-eastern part of the state. p. 21.

Face of the Country. "There are six distinct kinds of land in Illinois. 1. Bottom, bearing honey locust, pecan, black walnut, beach [sic], sugar maple, buckeye, pawpaw, &c. This land is of the first quality, and may be said to be ripe alluvion, and is found in greater or less quantities, on all the rivers before enumerated. It is called the first bottom. It is almost invariably covered with a pretty heavy growth of the foregoing trees, grape vines, &c. and in autumn the air of these bottoms is agreeably impregnated with an aromatic smell, cause no doubt by the fruit and leaves of the black walnut. This land is inexhaustible in fecundity, as is proved by its present fertility, where it has been annually cultivated without manure, for more than a century. It varies in width from 50 rods to two miles and upwards. 2. The newly formed or unripe alluvion; this kind of land is always found at the mouths and confluences of rivers These bottoms are subject to inundations, the banks being several feet below high water mark. There are many thousands acres of this land at the mouth of the Wabash, and at the confluence of the Mississippi. Woe be to the settler, who locates himself upon this deleterious soil. 3. Dry prairie, bordering all the rivers, lies immediately in the rear of the bottoms; from 30 to 100 feet higher; and from one to ten miles wide, a dry rich soil, and most happily adapted to the purpose of cultivation, as it bears drought and rain with equal success. These prairies are destitute of trees, unless where they are crossed by streams and occasional islands of wood land. The prairies of the Illinois river are the most extensive of any east of the Mississippi, and have alone been estimated at 1,200,000 acres. This soil is some places black, in others of the colour of iron rust interspersed with a light white sand. In point of productiveness, it is not inferior to the first rate river bottoms, and in some respects superior. 4. Wet prairie, which are found remote from streams, or at their sources, the soil is generally cold and barren, abounding with swamps, ponds, and covered with a tall coarse grass. 5. Timbered land, moderately hilly, well watered, and of a rich soil. 6. Hills, of a sterile soil and destitute of timber, or covered with stunted oaks and pines." pp. 22-23.

[Buckingham, J. H.]. Illinois as Lincoln Knew It: A Boston Reporter's Record of a Trip in 1847, Harry E. Pratt, ed. Springfield, Illinois: Abraham Lincoln Association, 1938.

J. H. Buckingham was the son of the founder and publisher of the Boston Courier. He toured Illinois in 1847, and sent back letters to be printed in the Courier. This method of publication of travel accounts was quite popular, as the readers were assured that the reports were up to date, and the impressions spontaneous. Pratt collected and reprinted the letters. The following excerpt is from the letter dated 12 July 1847, at Springfield, and is of interest because mention is made of the moisture in the soil on the prairies.

"I have rode again on the prairies some ten miles and back, to the southeast, and have been where there are no roads, riding over the grass, and seeing the hemp, and the corn, and the wheat, and the oats, all of which grow without any cultivation, except that of sowing. With us [in New England], corn has to be hoed--but here on the prairies, the ground is ploughed up, the seed deposited, and when it comes up the plough is once more run through the field, and the corn ripens as it stands. Dry weather does not affect it injuriously, as there is moisture enough in the earth to sustain it, and with the least attention that can be bestowed upon it, the yield is from thirty to fifty bushels to the acre; on old farms, fifty bushels is a fair average crop." p. 36.

Charlevoix, Pierre François Xavier de. Histoire et description generale de la Nouvelle France avec le journal historique d'un voyage fait par ordre du roi dans L'amerique Septentrionale. 6 vols. Paris: Ganeau, 1744.

. History and General Description of New France. Trans. John Gilmary Shea. 6 vols. New York, 1866-72. Omits the Journal Historique.

. Journal of a Voyage to North-America. Undertaken by Order of the French King. Containing a Geographical Description and Natural History of that Country, Particularly Canada. Together with an Account of the Customs, Characters, Religion, Manners and Traditions of the Original Inhabitants. In a Series of Letters to the Duchess of Lesdiguieres. 2 vols. London: R. and J. Dodsley, 1761. This is the Journal Historique.

Reprinted: Ed. Louise Phelps Kellogg, 2 vols., Chicago: The Caxton Club, 1923.

. Letters to the Duchess of Lesdiguieres; Giving an Account of a Voyage to Canada, and Travels through that Vast Country, and Louisiana, to the Gulf of Mexico. Undertaken by Order of the Present King of France. London: R. Baldwin, 1763. 1 vol., 384 p.

Father Charlevoix is an important source for all later writers of the early history and description of Upper Louisiana. In 1719, the King commissioned him to go to Canada and produce an accurate description of that colony. In the winter of 1721-1722, Charlevoix journeyed through the Great Lakes, across the St. Joseph-

Kankakee river route, down the Illinois to the Mississippi, and to the Gulf, returning home by way of the Floridas and Indies. His Journal Historique is among the first full descriptions of the Mississippi valley. Because he took the usual water route, his observations of the state of water resources in the Illinois Country are concerned with the transportation facilities offered by the streams. The following notes are from the Journal Historique, the 1761 London edition. The six volumes of the Histoire et Description Generale deal only with Canada.

"After ascending up [the Chicago] river, there is a passage to that of the Illinois by means of two carrying places, the longest of which is not above a league and a quarter; but being informed that at this season [September] of the year, there is not water sufficient for a canoe, [I chose to go up the St. Joseph and down the Kankakee to the Illinois]." II, pp. 183-84.

"The [Kankakee] river at the distance of fifty leagues from its source, forms a small lake [English Lake, Indiana?], after which it grows considerably broader. . . . The misfortune is, that the Theakiki [Kankakee] loses in depth, in proportion as it encreases [sic] in breadth, so that we were often obliged to unload the canoe and travel on foot. . . ." II, p. 198.

"I was not a little surprised at seeing so little water in the Theakiki, notwithstanding it receives a good many pretty large rivers, one of which is more than 120 feet in breadth at its mouth, and has been called the River of the Iroquois. . . . The 27th of September we arrived at the Forks, that being the name given by the Canadians to the place where the Theakiki and the river of the Illinois join. This last, notwithstanding it is sixty leagues from its source is still so very shallow, that I have seen a buffalo cross it, without being up to the mid-leg in water. The Theakiki, on the contrary, besides, that it brings its waters from the distance of a hundred leagues, is a most beautiful river. . . . [The Illinois-Theakiki] does not acquire a depth correspondent to its breadth, till fifteen leagues below the Forks; though in that interval many other rivers fall into it." II, p. 199.

At Little Rocks, just above the mouth of the Vermillion river, "we passed that last part of the [Illinois] river, where you are obliged to carry your canoe; from this place forwards, it is everywhere, both in breadth and deepness equal to most great rivers in Europe." II, p. 204.

Charlevoix describes Lake Peoria, then called Pimiteouy, and many of the islands in the Illinois below Peoria.

At Cahokia, on the Mississippi: "This village is situated on a small river which runs from the east, and has no water but in the spring season so that we were obliged to walk above half a league, before we could get to our cabbins [sic]. I was astonished they had pitched upon so inconvenient a situation, especially as they had so

many better in their choice; but I was told that the Mississippi washed the foot of that village when it was built, that in three years it has lost half a league of its breadth. . . ." II, p. 218-19.

Collot, Victor. Voyage dans l'Amerique Septentrionale; ou, Description des pays arroses par le Mississippi, l'Ohio, le Missouri, et autres rivieres affluentes; observations exactes sur le cours et les sondes de ses rivieres. . . . Paris: Bertrand, 1826. 2 vols. & atlas.

A Journey in North America, Containing a Survey of the Countries Watered by the Mississippi, Ohio, Missouri, and other Affluing Rivers. . . . Paris: Bertrand, 1826. 2 vols. in 1, & atlas.

Reprint, English ed., Firenze: O. Lange, 1924. 2 vols. & atlas.

Both editions are said to have been printed before the author's death in 1805, but were not published until 1826, at which time all but one hundred copies of the English edition and three hundred of the French were destroyed. In 1796 Collot visited the West, at the request of Adet, the French minister to the United States. He describes in detail the Wabash, Ohio, Mississippi, and Illinois rivers and treats of the character and appearance of the country. The following notes, taken from the 1924 reprint of the English edition, are his remarks on the Illinois river, as far upstream as Peoria.

Items noticed as Collot ascended the river: at mile 18, the Macopin river, twenty yards broad at its mouth, navigable for nine miles; width of Illinois continues to be 400 yards; Mine river, fifty yards wide, swift current; Sagamond river, 100 yards broad, navigable 180 miles for small canoes; Demi Quian river, fifty yards broad, navigable 120 miles; Demi Quian Lake, "of a circular form, is at least six miles in diameter, and empties itself into the Illinois river by a small channel, which is always four feet deep;" Seseme Quian river, 40 yards broad, navigable by small skiffs nine miles only; Michilimackinac river, fifty yards broad, navigable ninety miles. vol. I, pp. 265-70, passim.

Coxe, Daniel. A Description of the English Province of Carolana, by the Spaniards Call'd Florida, and by the French la Louisiane. As Also of the Great and Famous River Meschacebe or Missisipi, the Five Vast Navigable Lakes of Fresh Water, and the Parts Adjacent. London: Printed for B. Crowse, 1722. 122 p.

Most compilers of geographies and gazetteers in the later eighteenth century relied for a description of the western country on the French accounts and Coxe. Therefore, Coxe received wide circulation, both in his own editions (1726, 1741) and his contributions to other compilations. His knowledge of the Illinois Country is sketchy and vague, often erroneous, as will be seen in the following description of the Illinois river country. This is the only reference he makes

to Illinois

"Forty Miles above the Yellow River [Missouri], on the East side, is the River Checagou or the River of the Alinouecks, corruptly by the French call'd Illinois, which Nation liv'd upon and about this River, having above 60 towns, and formerly 20000 fighting Men, but are now almost totally destroy'd by the Irocois, or driven beyond the Meschacebe Westward. This is a large Pleasant river; And about 250 Miles above its Entrance into the Meschacebe it is divided into two Branches; the lesser comes from North and by East, and its Head is within 4 or 5 miles of the great lake of the Alinouecks [Michigan] on its West-side; the other comes almost directly from the East, and proceeds from a Morass within 2 Miles of the River Miamiha, which empties itself into the same Lake. On the South-East-side, there is an easy Communication between these two rivers, by a Land Carriage of 2 Leagues, about 50 miles to the South-East of the aforementioned Lake. The Course of this River from its Head exceeds 400 Miles, Navigable above half way by Ships, and most of the rest by Sloops and large Boats or Barges. Many small Rivers run into it, and it forms 2 or 3 Lakes; but one mightily extolled, call'd Pimiteoui [Peoria], which is 20 Miles long and 3 Miles broad; it affords great Quantities of good Fish, and the Country round about it, abounds with Game, both Fowls and Beasts." pp. 16-17

Curtiss, Daniel S. Western Portraiture, and Emigrants' Guide; A Description of Wisconsin, Illinois, and Iowa; With Remarks on Minnesota, and Other Territories. New York: J. H. Colton, 1852. 351 p.

Based in part on personal observation, this book is a fitting close to this survey of literature up to 1850. It is one of the best descriptive works of the period. The first part is a series of "trips" from Buffalo to Chicago, and by the Illinois and Mississippi rivers to St. Paul. A later section of about a hundred pages is devoted to a more formal description of Illinois, its towns, counties, people, rivers, canals, and railroads. Another section contains extensive extracts from letters written by a Mr. Thompson on a journey in 1851 down the Illinois and up the Mississippi. Of interest in the following notes is the notice of available water power in various parts of the state, the proposals for draining the American Bottom, and Mr. Thompson's description of a flood on the Mississippi, which mentions the matter of drainage diversion in relation to Lake Michigan.

"There is no marsh or impassibly wet land about Chicago, as strangers often imagine from a casual glance, though the surface is very level, at a height [sic] of from three to five feet above the lake and river. And the winds, off and onto the lake, create fluctuations in the water of the river from twelve to twenty inches, much like tides in seaboard rivers, and have a fine effect in promoting health, by keeping the waters active and fresh." p. 47.

Rock Island: "From its immense, very convenient water-powers,

derived from both the Mississippi and Rock rivers, and for its wider surface of level ground between river and bluff, Rock Island possesses importance and business facilities superior to Davenport. . . . The main and navigable channel of the river is on the west side, while that on the east side is narrower, and has been dammed so as to afford a splendid water-power above, and a fine little harbor of still water below. . . ." p. 85.

The rapids in the Mississippi above Rock Island: "In time of low water, these rapids retard the speed of boats, and the upsticking rocks render navigation somewhat dangerous, except the boats carefully guided by experienced pilots. By throwing out oblique wing dams, at various places, many water powers are obtained." p. 87.

Mill seats and water power facilities noted in: Rock River country (p. 219), Coles county (p. 248), Kane county (p. 258), Livingston county--Vermillion river (p. 262).

A white sulphur spring noted near Rock Island, with the possibilities of a resort being established there. (p. 220).

The American Bottom: "The only objection offered to this tract is its unhealthiness. This arises from the circumstance of the lands directly on the margin of the river being higher than those under the bluffs, where the water, after leaving the former, sets back and forms ponds and lagoons, which during the summer stagnate and throw off noxious effluvia. These, however, might, at a trifling expense be drained by lateral canals communicating with the rivers. . . . Lotteries were numerously got up in the West, declared for the specious purpose of Draining the American Bottoms; but we have never learned that they produced any such beneficial results, although many thousand dollars worth of tickets were sold for years.

"I will notice here an error of the old inhabitants, in regard to a philosophical fact in vegetation. They recommended the settlers not to plant corn near their dwellings on this tract; as its luxuriant growth prevented the sun from dispelling the bad vapors. This is erroneous doctrine; as luxuriant growths of vegetation absorb or take in the carbon and other gases, deleterious to human health, at the same time they give off oxygen, so essential to the existence of life." p. 227.

On viewing a flood on the Mississippi, Mr. Thompson makes the following observation: "I had never before had such an impression of the power of water as an agent in geological changes; nothing can resist such a flood. There is much in the geological features of the region to indicate the agency of far mightier floods in years of ages gone. Perhaps, as has been suggested, the great lakes once emptied through this channel to the sea. Lake Michigan seems now on the map to be turned upside down, and the almost dead level at Chicago favors the idea that it once emptied itself southward. In digging a well at Jacksonville there was found, twenty-five feet below the

surface, a solitary piece of Lake Superior copper. How came it there? Or whence came the marine shells that strew the bank of the Mississippi near New Boston?" p. 328.

[Cutler, Jervis]. A Topographical Description of the State of Ohio, Indiana Territory, and Louisiana; Comprehending the Ohio and Mississippi rivers and Their Principal Tributary Streams, the Face of the Country, Soils, Waters, Natural Productions. . . . Boston: Williams, 1812, 219 p.

Most of this book is based on personal observations; Cutler was one of the first settlers of Marietta, Ohio, and knew the Ohio and lower Mississippi valleys. In this book Illinois is treated under the Indiana Territory. Cutler's notations on the water resources included the government saline, the portage at Chicago, and the Illinois river. The geological references in the book are more extensive than just water resources.

"About forty miles from Saint Vincennes, in a southwesterly direction, is the Great Sabine [*sic*], so called, where salt, in large quantities, is made. It is situated in a hilly land, on a stream of water which flows into the Ohio. The land is still owned by the government of the United States, but rented to those who carry on the salt works. . . . The waters in this Saline are said to have double the strength of those at the great salt springs on the Scioto river." p. 56.

Notes the portage, "of only two miles," between the Des Plaines and the Chicago. p. 62.

Illinois river: waters clear, many salt ponds and small lakes near the river, many fish. p. 63.

Dablon, Claudius. "Relation of the Discovery of Many Countries Situated to the South of New France, Made in 1673," The Jesuit Relations and Allied Documents, Reuben Gold Thwaites, ed. (Cleveland, 1899), vol. LVIII, pp. 92-109.

Father Dablon was Marquette's superior in the Jesuit missions. He sent Marquette to accompany Joliet in 1673, and later edited Marquette's journals. Joliet's record of the trip was lost when his canoe capsized in Lake Huron on the return journey. This letter of Dablon, dated August 1, 1674, is his report of what Joliet told him about the expedition. The most notable report is Joliet's recommendations for a canal between the Chicago river and the Illinois, the first such proposal.

". . . we could go with facility to Florida in a bark, and by very easy navigation. It would only be necessary to make a canal, by cutting through half a league of prairie, to pass from the foot of the lake of the Illinois [Michigan] to the river Saint Louis [Illinois]. Here is the route that would be followed: the bark would be built on lake Erie, which is near lake Ontario; it would easily pass from lake Erie to lake Huron, whence it would enter lake Illinois. At the end of that lake the canal or excavation of which I have spoken would be made, to gain a passage into the river Saint Louis, which falls into the Mississippi." Jesuit Relations, LVIII: 105.

Dana, E[dmund]. Geographical Sketches on the Western Country; Designed for Emigrants and Settlers. . . Including a Particular Description of the Unsold Public Lands. . . . Cincinnati: Looker, etc., 1819. 312 p.

This work, ghost written from Dana's notes by Rhuben Kidder, contains, besides a general description of the western country, a section of twenty pages on Illinois. These are the product of personal observation, Dana having spent six years in assisting emigrants in locating and purchasing land. The following notes from his observations on the water resources of Illinois mention the Illinois river and its navigability, the proposed Illinois-Michigan canal, and the various prairie lands, as well as short notices of several streams and mill seats.

"[The Illinois] is discharged into the Mississippi 21 miles above the Missouri, where its width is 420 yards. Its current is gentle and smooth, unimpeded by falls or rapids, and navigable for 400 miles; much of its banks are overflowed in high water." p. 20.

"A fifth canal has been proposed between the Plain, a stream of the Illinois, and the Chicago, flowing into Lake Michigan; the waters of these two streams are so nearly in the same horizontal level, that during freshets boats can conveniently pass from one to the other--A like provision as above mentioned [land reservation] is made by Congress to open a water passage at this place. A very particular report has been lately made by the commissioners to the Secretary of War, stating the practicability of opening a canal here, at a moderate expense." p. 24.

There are two kinds of "prairias": "one low, wet, and flat, occasionally cold and unproductive, contributing to form the sources of streams, and exhibiting the appearance of being the bottom of lakes, long since drained or dried up, and covered with a very coarse, tall grass. Of this kind there are few in this state [Illinois]. The other species is from 25 to 80 feet higher, consisting, commonly, of a deep, strong, dry, warm, dark colored, sandy loam. . . ." p. 133.

". . . even the high prairas [sic] are supposed to be too wet for plough fields: they seem to be designed by nature, as sources from whence to supply many of the tributary streams, which form the sheet of waters, that in a manner surround the state. The greater portion [of northeastern area of the state] is wet prairas, well calculated for the raising of stock. . . ." p. 134.

"The whole extent of the country from the Embarass [to Carlisle on the Kaskaskia], is scantily supplied with streams; and those few which traverse the country, are generally exhausted in the dry summer months. . . . The only water which can be obtained not injurious to health, is rendered disgusting, by the impregnation of sulphur and copperas." p. 135.

Mill seats noted: tributaries of the Kaskaskia (p. 139); tributary streams of the Sangamon (p. 145); Cash river (p. 149); St. Mary's river (p. 149); Cahokia creek, "drives several mills" (p. 150); Wook river, "good mill seats" (p. 150).

Darby, William. The Emigrant's Guide to the Western and Southwestern States and Territories Comprising a Geographical and Statistical Description. New York: Kirk & Mercein, 1818. 311 p.

A few pages are devoted to Illinois, and a section in the appendix discusses Illinois waterways. Notable in Darby's remarks on the possibility of a canal between the Illinois river and Lake Michigan is his ignorance of the geography of the region. He is under the impression that the Kankakee is the sole source of the Illinois, and appears to be not aware of the Des Plaines river and its connection to the Chicago. As is noted, however, he does insert an addendum to this discussion which rectifies the matter. Other notices of the water resources of Illinois are not outstanding, being merely the usual stream length notices, and a notice of the Illinois river (pp. 209-10).

"Canals have been projected to unite the headwaters of the Illinois with Lake Michigan. The country near the sources of Illinois is very imperfectly known; and some reports respecting it are not easily reconciled with the features of other adjacent parts, which have been more accurately surveyed.

"The sources of the Wabash and Maumee rise in a high table land. The Wabash flows in a rapid stream, without falls, to the Ohio; but the Maumee before reaching the western extremity of Lake Erie, is precipitated over extensive cataracts.

"Reports have been made, stating that canoes had passed at high water from Michigan into Illinois; if so, the valley of the latter must be very much lower than that of either the Wabash or Maumee rivers, or the surface of Lake Michigan greatly elevated above that of Lake Erie. All the difference of level that exist between the two

latter lakes, can bear no proportion to the difference between the country near Fort Wayne and the water in Lake Erie. Therefore, if so easy a communication can be effected between Lake Michigan and Illinois river, the latter must flow in a very deep valley, when compared with the region to the east of its source [the Kankakee river in northwestern Indiana]. If a canal without locks can be formed to unite the latter lake and river it will be the only one of its kind that nature admits in the interior of this continent.

"In point of utility, a communication between Lake Erie and Wabash, would be of infinitely more importance than a similar work to unite Michigan and Illinois. Calculating from common experience, it would be rational to conclude, that roads, bridges, and canals, ought to follow, not precede, civilized settlement." p. 300. [Darby wrote, in an addendum to these remarks, that while the book was in the press, an article appeared in a Cincinnati newspaper which "confirms the fact of a communication between Lake Michigan and Illinois river." The route is through the Chicago river.]

Davis, John. "A Diary of the Illinois-Michigan Canal Investigation, 1843-1844," Guy A. Lee, ed. Papers in Illinois History for 1941 (Springfield, 1943), pp. 38-72.

John Davis, of Worcester, Massachusetts, served as governor of and senator from, that state. In 1843 the State of Illinois came before the English bondholders and asked them to contribute \$1,600,000 more toward the building of the canal. The bondholders, before investing more money in what seemed to be a losing proposition, commissioned Davis to ascertain five things: "whether the cost of work upon the canal had exceeded \$5,000,000; whether \$1,600,000 would complete it; whether the proposed pledge of canal property with 230,000 acres of land would be adequate security on \$1,600,000; whether the canal would probably pay if completed; and, finally, whether the American bondholders would subscribe to their share of the new loan." (p. 40.) Davis accordingly set out in November, 1843, to examine the canal route. This diary of that trip reveals Davis to be an observant man, interested in the progress and problems of canal construction, with the obtaining of a good supply of water, and the creation of water power along the route. There is also a mention of water supply on the prairies.

"The Illinois is a broad, tranquil, shallow stream. Although our [steam] boat drew less than 30 inches, she began to experience difficulties before we had ascended 30 miles, and much time was wasted in feeling our way along, very slowly." This was in late November. p. 41.

"The canal is to pass the Fox which enters the Illinois east of [Ottawa] within half a mile of its mouth upon an aqueduct, the piers and abutments of which are nearly completed, and are most

thoroughly made of limestone. The river is about 500 feet wide, and sends down a large volume of water. The town is located between the main river or Illinois and the canal, which from the Fox forward westerly runs a mile, twice the usual breadth between high and strong banks. At this point a lateral canal turns at right angles and runs southerly towards the Illinois river, till it reaches the brow of the bluff, by which you descend to what is called the river bottom or lower bank, then it turns again at right angles, and runs easterly along the brow of the bluff, which is about 32 feet above the ordinary level of the river. The design of this arrangement is to create a great mill power on this bluff. To complete the arrangement and to afford an adequate supply of water a dam is thrown across the Fox, about 4 or 5 miles from its mouth, and the river is thus brought or to be brought into the canal as a feeder, both to supply navigation, and water power. The arrangement is very comprehensive, and the water power must eventually be very valuable, as the country is not well supplied generally with mill privileges." p. 45.

"[Met the engineer who is] to ascertain the quantity of water flowing in the Fox, and the feasibility, as well as the expense of opening a feeder some 20 to 25 miles [from Aurora] to the Summit of the canal. The original plan was to make Lake Michigan the feeder. This required very deep and expensive cutting for more than 30 miles, yet from some singular infatuation the legislature forbid the use of any other. In this deep cut of rock, and hard pan the funds of the state were exhausted, while only about half the distance was excavated. The legislature having removed this restriction, it is now believed, that the DuPage, the Kankakee, and the Fox rivers may be employed as feeders at a level, which will dispense with some 8 or 9 feet of this deep cutting." p. 46-48.

At Aurora, "There is a dam giving five or six feet of head and fall upon which stand a number of mills. Among them is a new and very complete flouring mill with four run of stones. . . ." p. 48.

At St. Charles, "There was a dam which supplied five or six apparently large mills." p. 49

The Des Plaines, "in season of drought dries almost entirely up. A contractor informed me that he had seen the whole stream contracted into such small demensions, that he could place one foot on one side and the other upon the other while the entire current ran between his legs." (p. 54.) "The same persons [who reported on the Des Plaines] concur in the opinion, that the DuPage & the Kankakee are much more steady and uniform in their flow of water, and may be much more safely relied upon." p. 55.

At Joliet, "The canal drops into the river, and passes from the left to the right bank of the river in a pool to be made by a dam not yet erected. To accomplish this object, two dams are necessary, the

lower of which is erected, and can scarcely, in beauty, and solidity of character, be surpassed. Here again is to be a large mill power." p. 57.

The Kankakee: "The design is to rise it upon the Juliette [Joliet] level, or the next level below as a feeder, taking it out at the rapids at Wilmington, where is a woolen factory and a grist mill. We found the stream, which rises in Indiana, several hundred feet broad, and at this time [December] affording a large volume of water." p. 58.

The Calumet river, "about 200 feet wide, is represented as equitable and enduring. . . . [It] is to be brought into the canal at the summit." p. 58.

Water on the prairies: "It is proper to remark that having traveled 200 miles chiefly over prairie, we could not fail to note everywhere a great deficiency of water, and water courses compared with the northern Atlantic state. The amount of drainage from these prairies seems to be very small, and running streams very infrequent. . . . Our general observation upon the character of the Des Plaines, its almost total disappearance in extreme dry weather, the inadequate supply from wells, forces us to the conclusion, that the country is badly supplied with water. . . . The deficiency, we spoke of, however, exists while the Des Plaines is sending down quite a strong current, and thus proving, that the present supplies are abundant compared with seasons of drought. It ought, however, to be remarked, that this feature of the west is not peculiar to this portion of the country." pp. 60-61.

Deliette, Sieur. "Memoir of De Gannes Concerning the Illinois Country [1721]," Illinois Historical Collections, T. C. Pease, ed. (Springfield, 1934), vol. XXIII, pp. 302-395.

The De Gannes Memoir is assumed to be the work of Deliette, the nephew of Tonty, the governor of New France. The memoir relates a journey made in the Illinois Country in 1721, and of interest to the observer of water resources are the following passages, chiefly concerning the Chicago-Illinois route.

"The Chicago is a little stream only two leagues long bordered by prairies of equal dimension in width. This is a route usually taken to go into this country. At this river a portage is made, of a quarter of a league [appx. .6 mi.] in low water and of an arpent [11.5 rods] in high water. One finds a streamlet for half a league which comes from two little lakes that extend a league and a half, at the end of which, on the rising ground at this point, is made a short portage simply of one's baggage. When the water is favorable one re-embarks at once, but when it is low it is necessary to go on a league. This is called the Portage of the Oaks; and it costs

considerable effort to get the boat into this streamlet, which empties into the river which the French call the Illinois. However, this is not the Illinois, as we only come to that stream twenty leagues farther on. The passage is very difficult on account of the low waters which virtually render the river impracticable, because one ordinarily reaches this region only in summer or autumn. There are ten places where for half a league it is necessary to take out half of the baggage, and very often to remove it entirely, until the deep water is reached. It is necessary also sometimes to carry the canoe. There is a place even, called Mount Joliet, where there are four leagues of rapids, and where this must nearly always be done." pp. 302-03.

Delisle, Legardeur. "A Search for Copper on the Illinois River: The Journal of Legardeur Delisle, 1722," Illinois State Historical Society, Journal, XXXVIII (March, 1945), 38-57.

Delisle accompanied F. P. Renault on this trip when the latter, a superintendant of mines, was sent to look for minerals in the Illinois valley. Renault later became the proprietor of three miles of river frontage on the site of later-day Peoria. The journal consists mainly of a listing of the various streams that empty into the lower Illinois, with no record of their size or navigability. Delisle mentions that there was no current in the Illinois, as it was low (p. 53). There is mention of a coal mine about five leagues up the Kikapoo Creek, "but it is not possible to go as far as that mine by dugout canoe, unless it should be in time of high water," (p. 55). He also mentions that they could not ascend Apple River because of the shoals (p. 57). Other than these notices, the journal says little about the water resources in 1722.

Drake, Daniel. A Systematic Treatise . . . on the Principal Diseases of the Interior Valley of North America. . . . Cincinnati, Smith, 1850. 878 p.

Drake was Cincinnati's leading physician in the second quarter of the nineteenth century; he also became famous as an educator in the field of medicine. This work, his most famous, has sections on the American Bottom, the upper Mississippi, the Kaskaskia, Illinois, and Rock river basins. These contain topographical data and historical notes as well as etiological information. The following brief notices contain Drake's remarks on the water resources of the Illinois valley. The greater part of his work is devoted to the various types of illness, and thus forms a good survey of the medical history of the area.

The Illinois basin: "Interminable undulating prairies, dry, wet, and marshy, interspersed with groves, and intersected by streams whose wide and low bottoms are overshadowed with trees, characterize every part of the basin." p. 321.

The road from Jacksonville to Springfield: "In some places the surface is so wet as to require the roads to be thrown up in the middle; but not a pond nor marsh is to be seen on the whole route." p. 322.

Concerning central Illinois, around Bloomington: "The narrow alluvial bottoms are subject to inundation. The surface is gently rolling, and susceptible fo being rendered dry by ditching and cultivation; but in the natural state many of the prairies are wet or marshy." p. 323.

Drake mentions that a dam has been thrown across the Des Plaines at Joliet, to provide mill power and supply the canal. p. 326.

Entick, John. An Historical and Geographical Description of the British Empire. . . . 4 vols. London, 1770.

This rather comprehensive work contains little mention of the Illinois Country, including it in the sections devoted to West Florida and Louisiana. The information on Illinois is confined to an account of the rivers of the region, in volume four, and is taken from Coxe, A Description of the English Province of Carolana (1722). The notation on the Illinois River is identical: ". . . the River Checogou, or the River of the Illinouwecks, corruptly called Illinois. The course of the River Checogou is above four hundred Miles, navigable above half way by Ships, and most of the rest by Sloops and Barges." (IV, p. 471. cf. Coxe, p. 17).

Farnham, Eliza W. Life in Prairie Land. New York: Harper, 1846. 408 p.

This book relates the experiences of a woman traveling and residing in northern and central Illinois in the 1840's. Some of the episodes are no doubt fictitious, but the book does give a picture of frontier life. The two short notices of water resources concern the confluence of the Mississippi and Missouri, mentioned in many travel journals, and a curious experience which throws light on the laundry problems of the day.

Mrs. Farnham writes of the confluence of the two rivers, describing it as others had, the clear eastern current and the muddy western current, and it is not for many miles down stream that the Missouri finally conquers the Mississippi. p. 24.

"The old lady's first call was made in about half an hour after our arrival, and accompanied by the tender of a barrel of rain-water, a kindness which those only can appreciate who have undertaken to clean such a house with lime-water, and that to be brought a distance of some dozen rods." p. 146.

Faux, W[illiam]. Memorable Days in America: Being a Journal of a Tour to the United States Principally Undertaken to Ascertain, by Positive Evidence, the Condition and Probable Prospects of British Emigrants; Including Accounts of Mr. Birkbeck's Settlement in the Illinois. London: W. Simpkin and R. Marshall, 1823. 488 p.

Faux visited the English Settlement in Edwards County in November, 1819, and got involved in the controversy over Birkbeck's foundation [cf. Birkbeck, above]. He was on a trip to find a suitable settlement area for a group of British emigrants, and after spending some time in South Carolina, he sailed down the Ohio to Indiana and Birkbeck's settlement. His impressions of Americans and the West are not always favorable, but he was less harsh than other English writers. The following notes are his observations of the water resources at Birkbeck's colony, and they represent part of his defense of Birkbeck.

An agent in Germantown, Pennsylvania, told Faux that the English settlement in Illinois is "sickly, being exposed, in a high degree, to bilious fever; is supplied with only bad water. . . ." p. 96.

"Water is bad, white, or milky, at Princeton [Indiana]." p. 225.

Birkbeck's mistakes in Illinois: "The neighborhood, however, do not think he intended to misrepresent and deceive, but that he wrote too soon, and without knowing the real state of things, and understanding his subject, or knowing where to find the best land. He ought to have examined, in company with one of Uncle Sam's surveyors; he would not then have entered land in the lump, or mass, a great deal of which is not good, nor ever can be, being wet, swampy, cold prairies, something like undrained marshes in England." pp. 225-26.

"We rode off on our way to Princetown, Indiana, [from English Prairie] through a cold, wet, marshy prairie, over which hang dense fogs, and on which lies water knee-deep in summer. When seen at a distance, it looks like a large lake of water, but on coming into it, the green grass, four feet high, conceals the stinking, stagnant steaming water." p. 301.

On the availability of water on the English Prairie: ". . . [both villages, Albion and Wanborough] are but scantily supplied with water at a distance. Wells, however, it is hoped will soon be dug with an unfailing supply. Wanborough has, I believe, and will have the advantage over Albion, as it regards water; but both Flower and Birkbeck have never-failing water in wells close to their houses, to which people come by permission to draw it. Springs and streams are found in other prairies." p. 279.

[Flagg, Edmund T.]. The Far West; or, A Tour Beyond the Mountains. Embracing Outlines of Western Life and Scenery; Sketches of the Prairies, Rivers, Ancient Mounds, Early Settlements of the French, etc., etc. 2 vols. New York: Harper & Brothers, 1838.

This book is an elaboration of letters published in 1836 in the Louisville Journal, under the title, "Sketches of a Traveler." Flagg, a young man, went from Louisville to St. Louis by the rivers, then up the Illinois to Peoria and back again to St. Louis. Later in the summer he traveled extensively on horse-back in central and southern Illinois and in Missouri. Of interest in the field of water resources are his notes on the Salines in Gallatin County (his reference to drilling as much as six hundred feet for salt water is of particular importance), the confluence of the Ohio and Mississippi, the affect of a Mississippi flood on the quality of water in the Illinois river, the current of the Mississippi, and notes on a well on Monk's Mound, in St. Clair County east of Cahokia.

Salt is made at the Gallatin Salines, "By the evaporation of salt water. This is said to abound over the whole extent of this region, yielding from one eighth to one twelfth of its weight in pure muriate of soda. In many places it bursts forth in perennial springs; but most frequently is obtained by penetrating with the augur a depth of from three to six hundred feet through the solid limestone substratum, when a copper tube is introduced and the strongly-impregnated fluid gushes violently to the surface." I, pp. 38-39.

Mississippi-Ohio confluence: "For some miles before uniting its waters with the Mississippi, the Ohio presents a dull and uninteresting appearance. It is no longer the clear, sparkling stream . . . its waters are turbid. . . . On the right come rolling in the turbid floods of the Mississippi. . . . The Ohio sweeps in majestically from the north, and its clear waters flow on for miles without an intimate union. . . . The characteristics of the two streams are distinctly marked at their junction and long after." I, pp. 48-49.

On the current of the Mississippi: "Our speed was about five miles an hour, and the force of the current nearly the same, which so impedes advancement that it requires as long to ascend from the confluence to St. Louis as to descent [to the confluence] from the Falls [of the Ohio], though the distance is less than half." I, p. 52. Flagg goes on to describe the current method for removing obstructions from the Mississippi (I, pp. 84-85.).

The Illinois river: "The surface of the stream was tranquil; not a ripple disturbed its slumber; it was currentless; the mighty mass of the Mississippi was swollen, and, acting as a dam across the mouth of its tributary, caused a back-water of an hundred miles.

The waters of the Illinois were consequently stagnant, tepid, and by no means agreeable to the taste. There was present, also a peculiarly bitter twang, thought to be imparted by the roots of the trees and plants along its banks, which, when motionless, its waters steep; under these circumstances, water is always provided from the Mississippi before entering the mouth of the Illinois." I, pp. 96-97.

Concerning the construction of a railway from Pittsburg, Illinois to St. Louis: "The expense of this work was considerable. It crosses a lake, into the bed of which piles were forced a depth of ninety feet before a foundation for the tracks sufficiently firm could be obtained." I, p. 157.

Concerning a well on Monk Mound: "Upon the western side of Monk Mound, at a distance of several yards from the summit, is a well some eighty or ninety feet in depth; the water of which would be agreeable enough were not the presence of sulphur, in some of its modifications, so palpable. This well penetrates the heart of the mound, yet from its depth, cannot reach lower than the level of the surrounding plain. I learned, upon inquiry, then when this well was excavated, several fragments of pottery, of decayed ears of corn, and other articles, were thrown up from a depth of sixty-five feet; proof incontestible of the artificial structure of the mound. The associations, when drinking the water of this well, united with its peculiar flavour, are not of the most exquisite character, when we reflect that the precious fluid has probably filtered, part of it, at least, through the contents of a sepulchre." I, p. 167.

Flagg, Gershom. "Pioneer Letters of Gershom Flagg," Solon J. Buck, ed., Illinois State Historical Society, Transactions, 1910 (Springfield, 1912), pp. 139-183.

Gershom Flagg moved from Vermont to Illinois, locating in Madison County in 1818. These letters were written to his brothers Azariah and Artemas; they tell of his experiences in Ohio, and the first stay on his journey, and in Illinois, with the problems of locating a homestead. Of interest to the observer of water resources are his notices on the advantages of water transportation in Illinois, and the general aspect of water in the settled regions. Letters such as these are important as a research source because of the candid way the writers describe settlement possibilities, and generally they are trying to induce their friends to follow them west.

Letter to Artemas Flagg, 12 September 1818, Edwardsville.

"The situation of this Territory is good for trade having the advantage of Water carriage on all sides the Mississipi [sic] on the West the Ohio & the Wabash S. E. & the Kaskaskia and Illinois in the interior of the Territory. The Illinois which is about 400

miles in length heads near Lake Michigan. A branch of the Illinois heads within 4 miles of the head of Chicago a short River which empties into Lake michgon [sic]. In the freshe[t]s boats pass this portage the waters being connected They are made shallow for the purpose. . . . I think there will be a canall [sic] cut to connect the waters of Illinois & Chicago at no distant period. From information the expense would not be great." p. 157.

Ibid., 6 October 1820.

"we have had a very remarkable dry summer there are streams 40 miles in length which have entirely stopped running--two thirds of the wells and springs have dried and the grass is not more than half its usual length." p. 166.

Ibid., 15 October 1820.

"Several towns in this state have been very sickly this season especially those situated contiguous to Rivers or mill-ponds, The waters are very low and in many places covered with a green poison looking scum. The fogs arising from this stagnated waters makes the air very unwholesome." p. 166.

Ibid., 20 July 1823.

"It is a general time of hea[l]th in this vicinity at present although a sickly season has been expected owing to the great rains in the spring and fore part of summer. The Rivers have been very high much damage done to Bridges Mills &c. &c." p. 172.

Flower, George. History of the English Settlement in Edwards County Illinois, Founded in 1817 and 1818 by Morris Birkbeck and George Flower. Chicago: Fergus Publishing Company, 1882. 402 p.

This is the only record George Flower left of the foundation on the English Prairie. [cf. Birkbeck, above]. Although written in the 1860's and published posthumously, it remains an important source. Bearing out Faux' statement that of the two towns, Albion and Wanborough, the latter was in a better position, water-wise [cf. Faux, above], are Flowers reminiscences on the difficulty of obtaining water at Albion, the depth and situation of wells.

"No water near, a well was of the first necessity. Two laborers, one English and one American, were set at work, and struck solid sandstone rock three feet from the surface. . . . About every other day, I sent to Carmi to have the tools sharpened." p. 119.

"The first efforts of the town-proprietors [of Albion] to obtain water were signally unsuccessful. The first well dug was in the public-square, and more than a hundred feet deep, and no water. The next a considerable depth, and but a limited supply. We knew not where to dig to find water. The elevation of the

town (being on the dividing ridge, between the Great and Little Wabash), giving greater salubrity, was accompanied by the inconvenience of deep-digging for water. When ignorance is complete, we are apt to take up with any superstition. I have often smiled at our resignation on following an old well-digger, who claimed to be a water-witch, with a forked hazel-rod in hand, here and there, up and down, through the bushes, with a solemn tread and mysterious air. The rod is to bend down of its own accord over the spot where water is to be found. After following the witch for a proper time, the rod bent down. We told him to go to work. The result was water at a depth of forty-five feet, not so deep and copius, but affording a moderate supply. This difficulty about water was all obviated afterward, when the property was divided. Tanks and wells then became as common as houses. But the want of water in the first instance was no light difficulty. Population streaming in before adequate preparations, add to all the other inconveniences, the want of water, and it is almost fatal. When there were only two wells, I have known people to stand for two hours in the night to take their turn to dip their bucket full. Hence the efforts of the town-proprietors to get an early supply." pp. 130-131.

Flower, Richard. Letters from the Illinois, 1820, 1821; Containing an Account of the English Settlement at Albion and Its Vicinity, and a Refutation of the Various Misrepresentations, Those more Particularly of Mr. Cobbett; With a Letter from M. Birkbeck; and a Preface and Notes by Benjamin Flower. London: Ridgway, 1822. 76 p.

Richard Flower was the father of George, and brother of Benjamin. Soon after George Flower and Birkbeck founded the English Settlement, Richard came over from England to join his son. His journey out to Illinois is recorded in his Letters from Lexington and the Illinois (London, 1819). Only slight mention is made in Letters from the Illinois of water conditions, the only one of interest is the following about water at Albion, and the problem of having to haul it.

"We have experienced considerable inconvenience from drought, and have been obliged to draw water by carriage to the town, as the wells did not supply the inhabitants with a sufficiency, and the people, like the Israelites, murmured at us, the town proprietors, as much as ever that stiffnecked people did at Moses. I had no rock to strike, or power to raise water by miracle of any kind, and therefore applied industry and perserverence to make up this deficiency, and offered to supply them with fine spring water at a quarter-dollar per barrel, from a most delightful spring, found on my son George's estate, only eight feet deep, and inexhaustible. . . . This want of water would have been a serious objection to our settlement if it had been local, but it has been an unusual drought throughout the whole of the Western country, such as has been rarely experienced. . . . within half a mile of the town an excellent well has been opened, besides two others at a mile and a half so that no lasting want has been known, only a temporary inconvenience suffered." pp. 9-11.

Fordham, Elias P. Personal Narrative of Travels in Virginia, Maryland, Pennsylvania, Ohio, Indiana, Kentucky; and of a Residence in the Illinois Territory; 1817-1818. ed. Frederick Austin Ogg. Cleveland: Clark, 1906. 248 p.

Fordham was one of Birkbeck's followers in the English settlement. His narrative is composed of contemporary letters and journals but was unpublished until 1906. His notices of the water resources of the region were very few, and of interest are only those mentioning the Little Wabash and the government Saline.

The Little Wabash is "a fine mill stream." p. 116.

"There are many salt ponds. Those at the Saline river near Shawnee, yield 150,000 bushels of salt annually. . . ." pp. 119-20.

Gordon, Harry. [Journal of an expedition from Philadelphia to the Illinois and down the Mississippi to New Orleans]. Charles A. Hanna, The Wilderness Trail, 2 vols. (New York, 1911), II, 40-55.

Harry Gordon, a captain in the Royal Engineers, kept this record of a trading expedition made in 1766 by George Croghan and his associates, among whom was Thomas Hutchins, renowned explorer of the western country. An abridged and inaccurate version of part of the Journal was published by Pownall, Topographical Description (1776). Of note to the researcher in the water resources of Illinois at that time are his observations on the Mississippi and its causing the decaying of the shore at Fort Chartres, in Randolph County.

"The Mississippi's principal Stream is from 5[00] to 700 yds. wide, but it is scarcely ever to be seen together, and some small parts are above a mile distant from one another; the Principall [sic] Stream likewise often shifts, & the deep Channells [sic] also, which makes the Pilotage of the River extremely difficult; & Boats often get a Ground in ascending, chiefly when endeavoring to avoid the rapid Current." Hanna, II, p. 46.

Concerning Fort Chartres: "It is now in Danger of being undermined by the Mississippi, whose Eastern Bord is already within 26 Yards of the Point of the S. W. Bastion. The Bank I found thirty Feet high, Sandy, with small Gravel (very uncommon Soil for the Banks of this River, that are mostly Mud or flat Clay), and perpendicular; so that the crumbling occasion'd by Frost would demolish in a little Time this small Space before the Bastion. When we took Possession of this Fort [in 1763] the River was above 100 Yds. Distance, and before that, the French, who foresaw its Approach, had expended much Labour and Money to try to prevent it. They fascined and piled the Banks, but the Torrent soon got Passage behind them. Had they brought the Banks to a large Slope, retired

those of a gravelly Kind so as to have an Eddy on them in Flood Time; drove a Number of Button-Wood short Stakes in the Slope, which immediately take Root, and got together floating Trees and any Thing else of that Kind the Floods bring down, made those fast at the Point where the Stream divides to come by the Fort and round the Island opposite to it; This last might have averted the Strength of the Current towards the western Bank, and by stopping the Rubbish that comes along with the Floods, have formed a Bar at the Point. The gravelly Banks would not have resisted the Flood an Eddy would have laid upon them; nor would there have been any Resistances [sic] to the Current at Bottom, whose Effect would have thereby been "diminished." Hanna, I, p. 47.

Hall, James. Letters from the West; Containing the Sketches on Scenery, Manners, and Customs; and Anecdotes Connected with the First Settlements of the Western Section of the United States. London: Henry Colburn, 1828. 385 p.

_____. Notes on the Western States; Containing Descriptive Sketches of Their Soil, Climate, Resources and Scenery. Philadelphia: Harrison Hall, 1838. 304 p.

James Hall, called by one biographer the "Spokesman of the New West," was a prolific writer and editor of several newspapers and magazines in Illinois and Cincinnati. He was in Shawneetown and Vandalia from 1820 to 1833, during which time he edited the Illinois Gazette. Letters from the West relates his experiences in 1820, when he emigrated from Pittsburg to Illinois. Notes on the Western States is a reissue of his Statistics of the West at the Close of the Year 1836 (Cincinnati, 1836). Of note to the researcher on water resources is Hall's description of floods on the Ohio, especially at Shawneetown, and his speculations whether future settlement will decrease the amount of flooding. In Notes on the Western States, Hall discusses the "destitution of water" on the prairies, and well depths. Of particular interest is his recognition of natural levees, the high land "on the edge of the river, where the town stands." He also comments on flood sequences in tributaries, and its effect on water levels in the main stream, the Ohio. Hall's notes on the lack of springs on the prairies and his details of geological drift and sequence in wells are of great importance.

"The ground [at Shawneetown], as is usually the case in bottom lands, is higher on the edge of the river, where the town stands, than at some distance back, and the town is often insulated, when not actually overflowed. The waters begin to swell in February or March, and continue rising for several weeks. The greatest rise, from the lowest to the highest point, is about fifty feet. The greatest floods of which we have any account, were in 1813 and 1815, when the water covered all the streets, and entered the lower apartments of the dwellings, reaching nearly to the second floors. Since that time the inhabitants have not been expelled by the conquering element, although the water annually covers the plain in the rear of

the town, and advances in front to their very doors. . . . A small deposit of decayed vegetable matter is left, but not enough to corrupt the atmosphere: and even this, before the weather becomes warm, loses its deleterious quality by evaporation, or yields its juices to the vegetable kingdom. When the river first begins to swell, it usually rises as much as three or four feet in twenty-four hours; but as the volume of water increases, its velocity becomes greater, while the widening of the banks affords it room to expand, and the rise becomes daily less perceptible." Letters, pp. 221-22.

"Shawneetown is never overflowed by ordinary floods. To produce this effect a number of circumstances must occur. All the rivers which are tributary to the Ohio must swell at once; and as these are distributed through Kentucky, Virginia, Pennsylvania, New York, Ohio, Indiana, and Illinois, there must be a thaw so general as to melt the snow in all those states, or rains pervading that whole region. It has also been remarked, that this town has never been inundated, except when the Wabash and the Ohio have risen at the same time: an event which, in the ordinary course of things, can seldom happen, as the sources of these streams are so widely separated that a common cause can seldom affect them both at the same time.

"It might be worthy of inquiry, whether the opening and settling the lands upon the head waters of the tributary streams, will not at some future period decrease the spring floods of the Ohio. Will not the climate become ameliorated, and the quantity of snow lessened, when the surface of the earth shall be fully exposed to the warmth of the sun? Will not the accumulation of snow be lessened, by its melting as it falls upon the earth thus exposed?" Letters, pp. 223-25.

Water on the prairies: "In a practical point of view, the absence of water is also a serious objection to the prairie region. No spring bursts out upon these plains. This is a truism; for wherever a stream, however small, trickles over the surface, the soil thus moistened becomes covered with timber. . . .

"It is true, that there is a dearth of water upon the surface. In the summer especially, the traveler may ride a whole day without finding a rivulet, or even a standing pool at which he may water his horse; and those who traverse the unsettled parts of the country, complain of this as one of the greatest inconveniences of the journey. On the other hand, it is a fact equally well ascertained, that water is every where found, in great abundance, at a distance of a few feet below the surface. We have known but a very few spots at which water could not be procured by digging; there are few countries in which the sinking of wells is performed with so much ease, or with such uniform success. There is, in general, no rock to perforate; after removing the rich soil, a stratum of hard clay presents itself, then gravel, and then another layer of clay, all of which are so compact as to require no curbing, during the progress of the operation. The water is found in a stratum of fine clean

sand. The depth of the wells varies from twelve to forty feet, but most usually is from eighteen to twenty-five; it very seldom varies much from twenty feet." Notes, pp. 105-06.

Harris, William Tell. Remarks Made During a Tour through the United States of America, in the Years, 1817, 1818, 1819; In a Series of Letters to Friends in England. Liverpool: H. Fisher, 1819. 74 p.

Also, London: Sherwood, Neely, & Jones, 1821.

Harris toured in the West only at English Prairie and Shawneetown, and spent most of his time further east. He was in Illinois the fall of 1818. Of note on the matter of water resources are his remarks on the water at Birkbeck's settlement and the floods at Shawneetown.

"The soil, (schistose), appears to disadvantage after the rich lands I have lately gone over, but they seem satisfied in being able to till it without the labour of clearing it of timber. The unfavorable reports which have been circulated respecting the [English Prairie] settlement, (perhaps from sinister motives), appeared to me in a very great degree unfounded: they have good water at the depth of from four to ten feet, the situation is not swampy, neither is it exposed to the inundations of the Wabash." London, 1821, p. 138.

"From the situation of Shawnee town, its inhabitants might be supposed to partake of the nature of the wild duck, for every year they expect to be driven by the waters, to their upper stories, as land high enough to avoid them is not to be found within a mile of the place; the consequent unhealthiness of such a place is apparent in the sallow complexions of those who here deprive themselves of many comforts, and risk both health and life, for the sake of gain. . . ." Ibid., p. 139.

Hennepin, Louis. Description de la Louisiane, nouvellement decouverte au sud'ouest de la Nouvelle France, par ordre du roy. Avec la carte du pays; Les moeurs & la maniere de vivre des sauvages. . . . Paris: Sebastien Huré, 1683.

A Description of Louisiana, by Father Louis Hennepin, Recollect Missionary. Translated from the Edition of 1683 and Compared with the Nouvelle Decouverte, the LaSalle Documents and Other Contemporaneous Papers. John Gilmary Shea, trans. & ed. New York: J. G. Shea, 1880.

. Nouvelle Decouverte d'un tres grand pays situe dans l'Amerique, entre le Nouvelu Mexique, et la mer glaciale, avec les cartes & les qu'on en peut tirer par l'establisement des colonies. . . . Utrecht, 1697.

A New Discovery of a Vast Country in America, Extending Above Four Thousand Miles, between New France and New Mexico. . . To Which Are Added, Several New Discoveries in North America, Not Published in the French Edition. London, 1698.

Hennepin accompanied LaSalle and Tonty as a missionary on their 1678-1682 expedition. As far as general interest goes, Hennepin was the most popular of the early writers. There is some question of the authenticity of some of Hennepin's adventures, but the important matter is that the descriptions of the western country were given increased circulation. Concerning water resources in the Illinois Country, Hennepin is not specific enough to be of use. He mentions the Kankakee River and Illinois River, but only says that there was little current, and that the Illinois was as wide as the Seine, (Description of Louisiana, Shea, pp. 140-41, 192-93.). In the Nouvelle Decouverte his description of the Illinois river valley is in vol. I, pp. 95-119.

Hoffman, C[harles] F[enno]. A Winter in the Far West. 2 vols. London: Bently, 1835.

Hoffman was a New York editor and novelist who went to the west in the winter of 1833-34 for his health. He spent the first three months of 1834 in northern Illinois and southern Wisconsin, visiting Chicago, Galena, and Peoria. Then he went to St. Louis through Springfield, Jacksonville, and Alton. On the matter of water resources, his observations on the Illinois-Michigan canal are the only notations of value, with the exception of the fact that he fails to note the sand bars obstructing the mouth of the Chicago river, which the earlier writers mentioned. This would indicate the clearing of that obstruction by 1834. (I, p. 241).

Concerning the Illinois-Michigan canal: "The distance to be overcome is something like ninety miles; and when you remember that the head-waters of the Illinois rise within eleven miles of Chicago River, and that a level plain of not more than eight feet elevation above the latter is the only intervening obstacle, you can conceive how easy it would be to drain Lake Michigan into the Mississippi by this route; boats of eighteen tons having actually passed over the intervening prairie at high water. Lake Michigan, which is several feet above Lake Erie, would afford such a never-failing body of water, that it would keep steam-boats afloat on the route in the driest season." I, pp. 241-42. [It should be noted that this route was later abandoned because of excavation difficulties at the summit level.] In volume II (pp. 58-60) Hoffman gives a little of the history of the canal project to date, and on pages 314-16, he gives an engineer's report on projected cost of the canal.

Hulme, Thomas. Journal made during a tour in the western countries of America, 1818-1819. Forming part III of William Cobbett, A Year's Residence in the United States of America (New York: author, 1818).

Hulme was an English farmer; his journal is of interest principally for its description of the English Settlement in Edwards county. The following note on the water resources of the Settlement, mentions the lack of mill-seats, in contrast to Ohio, Kentucky, and Pennsylvania.

"I was rather disappointed, or sorry, at any rate, not to find near Mr. Birkbeck's any of the means for machinery or of the materials for manufactures, such as the water-falls, and the minerals and mines, which are possessed in such abundance by the States of Ohio and Kentucky, and by some parts of Pennsylvania. Some of these, however, he may yet find. Good water he has, at any rate. He showed me a well 25 feet deep, bored partly through hard substances near the bottom, that was nearly overflowing with water of excellent quality." Cobbett (London, 1828), pp. 272-73.

Hutchins, Thomas. A Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina, Comprehending the Rivers Ohio, Kenhawa, Sioto, Cherokee, Wabash, Illinois, Mississippi, &c. . . . London: Author, 1778. 68 p.

Hutchins was the first and only civil "geographer of the United States," and as such enjoyed a great reputation as engineer and surveyor. He was instrumental in fixing the Pennsylvania-(West) Virginia border, and he ran the first base line for the survey of the First Seven Ranges, in Ohio. Prior to all this, however, Hutchins was a captain in the British army, assigned to the Pennsylvania division. He was in Illinois in 1776 and from 1768 to 1770. This book, intended to explain an accompanying map, is one of the most valuable sources for the Illinois country during the British period, for, in addition to Hutchins comments, the appendix contains the journal of Patrick Kennedy's expedition up the Illinois river in 1773 (cf. below). Gilbert Imlay reprinted the book as the fourth appendix to the 3rd edition of his A Topographical Description of the Western Territory of North America (London, 1797). In the area of water resources, Hutchins' notes are explicit, but of little value, except for the circulation that was given to his description of the Illinois country. He describes the Wabash, the confluence of the Ohio and Mississippi, mentions the navigability of the Kaskaskia and Au Vase rivers (p. 35), and the portages between the Chicago and Illinois rivers (p. 42).

"The Wabash is a beautiful River, with high and upright banks, less subject to overflow, than any other River (the Ohio excepted) in this part of America. . . .Is navigable to Quiatanon [a fort near Lafayette, Indiana] (412 miles) in the Spring, Summer and Autumn, with Battoes or Barges, drawing about three feet water. From thence, on account of a rocky bottom, and shoal except when the River is swelled with

Rains, at which time, it may be ascended with boats, such as I have just described, (197 miles further) to the Miami carrying place, which is nine miles from the Miami village, and this is situated on a River of the same name, that runs into the south-south-west part of Lake Erie." pp. 26-27.

"The land at the confluence, or Fork of the Rivers Mississippi and Ohio, is above 20 feet higher than the common surface of these Rivers; yet so considerable are the Spring floods, that it is generally overflowed for about a week, as are the lands for several miles back in the country." p. 33.

"Illinois and Its Resources," The Merchants' Magazine and Commercial Review, V (November, 1841), 427-37.

This article describes the physical features and agricultural and mineral resources of the state. The description of the topography of the state is taken from Peck, New Guide for Emigrants (cf. below). Of special interest concerning the water resources of the state is the author's discussion of the water powers afforded in the state:

"Steam mills for flouring and for sawing timber, have been erected in the southern and middle portions of the state, and are rapidly increasing in number: while mills driven by water-power are in operation in the north. It is worthy of remark, too, that in those portions of the state not supplied with a constant water-power, coal and wood for fuel abound. The best water-power is found in the northern part, and it has already been improved to a considerable extent. Mills for various purposes have sprung up along the streams, particularly along Rock river and its branches, and the Illinois and Fox rivers. The Illinois and Michigan canal also furnishes an admirable water-power, superior probably to any other in the west. The rapids in the Fox river, four miles above Ottaway, have a descent of sixteen feet, and an abundant supply of water at all seasons of the year, while, from the rapids down, the river has such a descent as will enable its waters to be used for propelling machinery. The improvements on the Great and Little Wabash, and the Kaskaskia, will also make the waters of those streams available for hydraulic purposes, and whenever mills shall be required there is nothing to prevent their rapid multiplication. In 1839, the number of flour, grist, and saw mills, was 1,502, and the value of manufactured products, \$2,306,619." p. 435.

Jefferson, Thomas. Notes on the State of Virginia. London: Stockdale, 1787. 382 p.

This book, written in 1781-82, before Virginia ceded the Illinois Country to the federal government, has passed through numerous editions, the latest being a reprint in 1955. It was originally published in English in Paris in 1785, then translated

into French the following year, and subsequently published in London, Philadelphia, Boston, and New York, with many editions in each city. It was one of the most popular geographical books of the early days. Of interest in his description of Illinois are his notations on the Mississippi, the Illinois, and the Kaskaskia.

"The Missisipi [sic] will be one of the principal channels of future commerce for the country westward of the Alleghaney. From the mouth of this river to where it receives the Ohio, is 1000 miles by water, but only 500 by land, passing through Chickasaw country. From the mouth of the Ohio to that of the Missouri, is 230 miles by water, and 140 by land. From there to the mouth of the Illinois river, is about 25 miles. The Missisipi, below the mouth of the Missouri, is always muddy, and abounding with sand bars, which frequently change their places. However, it carries 15 feet of water to the mouth of the Ohio, to which place it is from one and a half to two miles wide, and thence to Kaskaskia from one mile to a mile and a quarter wide. Its current is so rapid that it can never be stemmed by the force of the wind alone, acting on sails. One vessel, however, navigated with oars, may come up at any time, and receive much aid from the wind. A batteau passes from the mouth of the Ohio to the mouth of the Missisipi in three weeks, and is from two to three months getting up again. During its floods, which are periodical as those of the Nile, the largest vessels may apss down it, if their steerage can be endured. These floods begin in April, and the river returns into its banks early in August. The inundation extends further on the western than eastern side, covering lands in some places for 50 miles from its banks. Above the mouth of the Missouri, it becomes a river as the Ohio, like it clear, and gentle in its current, not quite so wide, the period of floods nearly the same, but not rising to so great a height. The streets of the village at Cohoes [Cahokia] are not more than 10 feet above the ordinary level of the water, and yet were never overflowed. Its bed deepens every year. Cohoes, in the memory of many people now living, was inundated by every flood of the river. What was the Eastern channel has now become a lake, 9 miles in length and one in width, into which the river at this day never flows." (London, 1787) pp. 8-9.

"The Illinois is a fine river, clear, gentle, and without rapids; insomuch that it is navigable for batteaux to its source. From thence is a portage of two miles only to the Chickago, which affords a batteaux navigation of 16 miles to its entrance into lake Michigan. The Illinois, about 10 miles above its mouth, is 300 yards wide." p. 12.

"The Kaskaskia is 100 yards wide at its entrance into the Missisipi, and preserves that breadth to the Buffalo plains, 70 miles above. So far it is navigable for loaded batteaux, and perhaps much further. It is not rapid." p. 12.

Johnston, William. "Notes of a Tour from Fort Wayne to Chicago, 1809," The Development of Chicago 1674-1914; Shown in a Series of Contemporary Original Narratives, Milo Milton Quaife, ed. (Chicago: The Caxton Club, 1916), pp. 55-60.

Of William Johnston nothing is known. This manuscript was given to the Chicago Historical Library in 1894, and the excerpt here is its first publication. Of note concerning water resources are Johnston's observations of the Calumet river and the Illinois-Michigan canal route.

"[The Great Calumet and the Little Calumet rivers] are of the greatest consequence to the traders on the lake. They are about twenty yards wide at their mouth, but very deep. One of them is considerably longer than the other; & there is a communication between them, which in case of storm on the lake the trader can go up one several miles, then cross into the other, and down it into the lake. It is twelve miles from the mouth of the little Calumet to the mouth of the Chicago river." p. 59.

"Between the Chicago and the Illinois rivers, there is a direct water communication. The river Plein, which is one of the main forks of the Illinois, has its source near the bank of the lake, and nine miles from fort Dearborn it turns West. At this bend there is a long pond communicates [sic] with it, which runs Eastwardly towards the lake and terminates in a small creek which runs into the Chicago river. This creek is about two miles long; and in the Spring of the year any kind of Craft may sail out of the lake to the Mississippi without being unladen. The U. S. factor at fort Dearborn measured the elevation of land between the lake and the river Plein, and found it to be four feet on the side of the lake and five feet on the side of the Illinois. Thus by digging a canal of nine ["I do not understand this-- why an elevation of 4 feet on one side & 5 on the other should be added together. Does he not include in this, 4 feet for necessary depth of channel."--copyist's note.] feet deep, a passage could be got at any season in the year from the Falls of Niagara to the mouth of the Mississippi without a Single foot of land carriage. The Canal would be about six miles long, through a beautiful prairie; and there is a quarry of limestone near this place which would make excellent casing for the Canal." p. 59.

Jones, A[bner] D. Illinois and the West. With a Township Map, Containing the Latest Surveys and Improvements. Boston: Weeks, 1838. 256 p.

Jones was a New Englander on a prospecting tour through Illinois. He tells of a trip from St. Louis through Alton and Peoria to Tremont in Tazewell County. He took a side trip to the Rock River country. Highlighting his observations in Illinois is his description of the quality of the water, in which he attempts to dispell any qualms emigrants might have concerning it. Jones fancied himself a connoisseur of fine water; thus his judgment is expert. He also discusses at length the water resources of the Rock River valley, which is north and west of the great prairie regions.

"Water.-- One of the greatest bugbears of this place and which is always brought up in conjunction with Illinois, is its water. I know not how many stories I heard of the deleterious qualities and the disgusting properties of the water in Illinois. Indeed I had made up my mind to undergo a severe privation in this respect, being a great water drinker and indulging in scarcely any other beverage, and expected a taste of nothing during my sojourn here, but a muddy, brackish, nauseating mixture of iron, lime, coal, slime, and the quintessence of vegetable decomposition. Whereas, the truth is, I have not passed a drop of disagreeable water through my lips since I entered the state. The most crystal waters of the Green Mountains do not excel the limpid, clear, cool, delicious waters of Illinois. The country, in all its broken portions, abounds with springs, in quality and quantity not to be surpassed in the world, and in the middle of the largest prairies the same delicious beverage, cold almost as ice, may be obtained by sinking a well a few feet beneath the surface. It is true that all the waters of the west are strongly impregnated with lime, which renders them somewhat hard, but one soon becomes accustomed to it as never to notice it. It is also not to be denied, that it acts medicinally on the emigrant. But this is far more salutary than injurious, if it be not too freely indulged, and it soon ceases to exert any undue influence on the system. I have never hesitated to indulge freely in its use after the first fortnight, and I have never experienced the slightest inconvenience therefrom. Indeed I do not believe so large a tract in New England or the Middle States can be found of the same extent with Illinois which produces so much pure water and so easily obtained." pp. 98-100.

Rock River valley: "The country bordering on this stream, is allowed, on all hands, to be one of the finest and most fertile in the whole west, as well as possessing the most salubrious climate. It is principally open, high, undulating prairie, abounding with fine springs of the purest water, although rather sparsely wooded. The water is liberally fed with large rushing tributaries, which flow into it at convenient distances for the hydraulic purposes of the country. Besides these, almost every mile in its course, it is cooled by most abundant springs, which gush from its banks in a plentitude which surprises the observer. The current is very rapid, and the waters clear as crystal." pp. 166-67.

Joutel, Henri. "The Narrative of Joutel, 1687-88," The Development of Chicago 1674-1914; Shown in a Series of Contemporary Original Narratives. Milo Milton Quaife, ed. (Chicago: The Caxton Club, 1916), pp. 21-36.

Joutel accompanied LaSalle on his last expedition down the Mississippi, 1685-88; LaSalle was killed by mutineers in his own party in Texas. When he returned to France, Joutel assembled his journal notes, and some years later they were published as Journal Historique du Dernier Voyage que feu M. de la Salle Fit dans le Golfe de Mexique (Paris, 1713). The following year the journal was translated and published in London, thus giving it increased circulation.

Quaife claimed that the London edition was a faulty and abridged translation, and published this excerpt as a new translation from the Paris edition. Joutel's description of the Chicago-Illinois portage is another indication of the importance of the transportation facilities offered by the water resources of the Illinois Country.

"[At Chicago] there is a small river, formed by the drainage from a great plain or prairie at that place, which flows straight into the lake called, as I have said elsewhere, the Lake of the Illinois or Michigan. At about three or four leagues' distance on the other side of the great plain, the waters run into the River of the Illinois, which is formed by them; and the higher the waters, the less is the distance things have to be carried. It would appear that this place is the highest ground between the Gulf of Mexico and the River St. Laurence, for all the streams from this district run towards the coast at one or other of those places. The more water there is in the streams, the less carrying there is to do; for, in navigating rivers of this sort, it is (sometimes) necessary to carry the canoe or boat and the baggage, and it cannot be avoided." p. 22.

The portage at Chicago: ". . . whether you wish to go up or down, you are obliged to make a portage, sometimes for a quarter of a league, at others half a league or even three-quarters, according to whether the water is high or low; but it would be easy to make a connection between these two rivers, as the ground is very flat and it is soft land." p. 35.

Keating, William H. Narrative of an Expedition to the Source of St. Peter's River. . . Performed in the Year 1823. . . Under the Command of Stephen H. Long, U.S.T.E.; Compiled from the Notes of Major Long, Messrs. Say, Keating, & Calhoun. Philadelphia: Carey & Lea, 1824. 2 v. London: Wittaker, 1825. 2 v.

Keating was a young professor of mineralogy and chemistry at the University of Pennsylvania, who, in 1823 accompanied the expedition headed by Long to explore the upper Mississippi region. This account of the expedition was written, as the title indicates, from the notes of the members, and its heavy reliance on geological data shows the work of Keating. The party passed through Chicago and northern Illinois, and of interest in the area of water resources, as they were seen to affect settlement, is Keating's prediction of limited growth for Chicago because of the lack of harbor facilities. This note was made, it must be remembered in 1823, when Chicago was little more than a village gathered around the ~~ary~~ post. The party passed over the Chicago-Des Plaines portage, and Keating's observations concerning the land west of Chicago are lengthy but acute, concluding in the theory that Lake Michigan once drained through the Mississippi valley.

"It is not impossible that at some distant day. . . Chicago may become one of the points in the direct line of communication between the northern lakes and the Mississippi; but even the intercourse which will be carried on through this communication, will, we think, at all times be a limited one; the dangers attending the navigation of the lake and the scarcity of harbours along the shore, must ever prove a serious obstacle to the increase of the commercial importance of Chicago." I, p. 166.

"We. . . left the fort on the 7th of June, in a boat, which, after having ascended the [Chicago] river about four miles, we exchanged for a narrow pirogue that drew less water; the stream we were ascending was very narrow, rapid, and crooked, presenting a great fall; it continued so for about three miles, when we reached a sort of swamp designated by the Canadian voyagers under the name le petit lac. . . . Observing that our progress through the fen was very slow, and the day being considerably advanced, we landed on the north bank, and continued our course along the edge of the swamp for about three miles, until we reached the place where the old portage road meets the current, which was here very distinct towards the south. We were delighted at beholding. . . the division of waters starting from the same source, and running in two different directions, so as to become feeders of streams that discharge themselves into the ocean at immense distances apart. Although at the time we visited it, there was scarcely water enough to permit our pirogue to pass, we could not doubt, that in the spring of the year the route must be a very eligible one. Lieut. Hopson, who accompanied us to the Des Plaines, told us that he had travelled it with ease, in a boat loaded with lead and flour. The distance from the fort to the intersection with the Portage road and Des Plaines, is supposed to be about twelve or thirteen miles; the elevation of the feeding lake above Chicago river was estimated at five or six feet; and, it is probable, that the descent to the Des Plaines is less considerable. The Portage road is about eleven miles long; the usual distance travelled by land seldom however exceeds from four to nine miles; in very dry seasons it has been said to amount to thirty miles, as the portage then extends to Mount Juliet [sic], near the confluence of the Kankakee. When we consider the facts above stated, we are irresistibly led to the conclusion, that an elevation of the lakes of a few feet (not exceeding ten or twelve), above their present level, would cause them to discharge their waters, partly at least, into the Gulf of Mexico; that such a discharge has at one time existed, every one conversant with the nature of the country must admit; and it is equally apparent that an expenditure, trifling in comparison to the importance of the object, would again render Lake Michigan a tributary of the Mexican gulf. Impressed with the importance of this object, the legislature of Illinois has already caused some observations to be made upon the possibility of establishing this communication. [Keating goes on to mention the canal and possible routes, still in the early planning stages.]" I, pp. 167-69.

Kennedy, Patrick. "Journal of an Expedition Undertaken by Himself and Several Coureurs de Bois in the Year 1773,--from Kaskaskias Village in the Illinois Country, to the Head Waters of the Illinois River," forming Appendix No. I to Hutchins, A Topographical Description. . . (London, 1778), pp. 51-64.

Kennedy was one of the earliest inhabitants of Kaskaskia. For many years the men of Kaskaskia believed there were copper mines on the upper Illinois, as the Indians had frequently brought pieces of the metal to the town. Kennedy was searching for copper on this expedition. For the researcher in water resource conditions, the journal only serves to catalogue the tributaries of the Illinois, noting their width and navigability. This interest in stream navigability, noted generally in works of the eighteenth century, is obvious in a day when waterways provided the only routes through the wilderness.

The tributary streams of the Illinois: Macopin river, 20 yards wide, navigable 9 miles (p. 52); Mine river, 50 yards wide, rapid (p. 53); Sagamond river, 100 yards wide, navigable for small boats and canoes 180 miles (p. 54); Demi-Quian river, 50 yards wide, navigable 120 miles (p. 54); Lake Demi-Quian, "200 yards west from the river of that name, it is of a circular figure, six miles across, and discharges itself by a small passage, four feet deep into the Illinois River" (p. 55); Seseme-Quian river, 40 yards wide, navigable 60 miles (p. 55); river De la March, 30 yards wide, navigable eight or nine miles (p. 56); Michilimackinac river, 50 yards wide, navigable 90 miles (p. 56); Crows Meadows river, 20 yards wide, navigable 15-18 miles (p. 58); Rainy Island river, 15 yards wide, navigable nine miles (p. 59); Vermillion river, 30 yards wide, not navigable (p. 59); Fox river, 25 yards wide, has about five feet of water (p. 60).

La Salle, Rene-Robert Cavelier, Sieur de. "La Salle on the Illinois Country, 1680," Illinois Historical Collections, T. C. Pease, ed. (Springfield, 1934), vol. XXIII, pp. 1-16.

This short memoir of the great explorer was enclosed with a letter from the French governor of Canada, Frontenac, to the king, dated November 9, 1680. It is important for the study of water resources in the Illinois Country because it deals with the area of Chicago, and, in a reversal of what Joliet recommended seven years before (cf. Dablon, above), implies that a canal between the Chicago River and the Des Plaines would be useless, unless it were long enough to reach to Starved Rock.

"The haven which one enters in order to go from the lake of the Illinois [Michigan] to the Divine River [Applied to the Illinois River and its various sources.] is not at all suitable for navigation as there are no winds in the roadstead, nor any passageway for a

vessel, nor even for a canoe, at least in a great calm. The prairies over which communication is maintained are flooded by the great volume of water flowing down from the neighboring hills whenever it rains. It is very difficult to make and maintain a canal that does not immediately fill up with sand and gravel; one need only dig into the ground to find water; and there are some sand dunes between the lake and the prairies. And, although a canal would be possible with a great deal of expense, it would be useless because the Divine River is innavigable for forty leagues, the distance to the great village of the Illinois [at Starved Rock]. Canoes cannot traverse it during the summer, and even then there are long rapids this side of that village." p. 3.

Long, Stephen H., R. Graham, and Joseph Philips. Letter. . .Transmitting Topographical Reports, Made with a View to Ascertain the Practicability of Uniting the Waters of Illinois River, with Those of Lake Michigan (December 28, 1819). U. S. House of Representatives Document No. 17, 16th Congress, 1st. Session. Serial 32. 10 p. Also in American State Papers, Misc., II, pp. 555-57.

Long, a major in the U. S. Topographical Engineers, undertook three major expeditions in the Midwest. These were to the Falls of St. Anthony, in 1817, "from Pittsburgh to the Rocky Mountains," in 1819-20, and to the sources of the St. Peter's River, in 1823. The narrative of the latter was compiled by William Keating (cf. above). The report by Long in this Congressional document is dated March 4, 1817, and contains some of the material relating to the construction of a canal upon which Congress was to act in 1826. He reports on the depth and navigability of the Illinois and Des Plaines rivers, the navigation problems at the mouth of the Chicago river, and proposes simply a short canal between the head of the Chicago and the Des Plaines, with attending improvements on the Illinois and Des Plaines. In their short report, dated April 4, 1819, Graham and Philips make more specific proposals for the canal project, indicating the engineering problems involved. Of interest in both reports is the notice that along the traditional portage route between the Chicago and Des Plaines, a gutter has formed, which is often filled with water and navigable.

"In the flat prairie [between the Chicago and Des Plaines] is a small lake, about 5 miles in length, and from 6 to 30 or 40 yards in width, communicating both with the river Desplanes [sic] and Chicago river by means of a kind of canal, which has been made partly by the current of the water, and partly by the French and Indians, for the purpose of getting their boats across in that direction, in time of high water. [The question arises whether the French and Indians actually cut the canal, or whether the portage path was simply worn into a kind of trough which is filled with water.] Long, p. 6.

"Chicago river is merely an arm of the lake, dividing itself into two branches, at the distance of one mile inland from [its mouth]. The north branch extends along the western side of the lake about thirty miles, and receives some few tributaries. The south branch has an extent of only 5 or 6 miles, and receives no supplies, except from the small lake of the prairie above described. The river and each of its branches are of variable widths, from 15 to 50 yards, and, for 2 or 3 miles inland, have a sufficient depth to admit vessels of almost any burden. The entrance into lake Michigan, however, which is 30 yards wide, is obstructed by a sand bar, about 70 yards broad, upon the highest part of which, the water is usually no more than two feet deep. The difficulty of removing this obstruction would not be great. Piers might be sunk on both sides of the entrance, and the sand removed from between them." Long, p. 6.

"A Canal uniting the waters of the Illinois, with those of Lake Michigan, may be considered the first in importance in this quarter of the country, and, at the same time, the construction of it would be attended with very little expense, compared with the magnitude of the project. The water course, which is already opened between the river Desplanes and Chicago river, needs but little more excavation to render it sufficiently capacious for all the purposes of a canal. It may be supplied with water at all times of the year, by constructing a dam of moderate height across the Des Planes, which would give the water of that river a sufficient elevation to supply a canal extending from one river to the other. It would be necessary also, to construct locks at the extremities of the canal, that communicating with Chicago river being calculated to elevate about six feet, and that communicating with the Des Planes, about four feet. [Here follows mention of improving the Des Plaines and Illinois by the introduction of sluices to assure sufficient depth in the shallow places.]" Long, p. 7.

Graham and Philips in their report (which is too lengthy to note verbatim), point out the problems in constructing the canal along the route Long suggests. Two problems are that the Des Plaines is above the level of a canal, and would be diverted into the lake, and, even with locks to remedy the first, the Des Plaines would be dry part of the year. Two remedies are presented: 1. Sink the bed of the Des Plaines below that of the canal, which would feed it by the lake; 2. Bring the canal into it lower down its course. Having proposed this, the writers mention other routes for a canal, viz., a canal directly from the lake to the Des Plaines near Lake Du Page; or, a canal from the lake to the Kankakee River just above its mouth (p. 9).

Maclure, William. Observations on the Geology of the United States of America. . . . Philadelphia: Printed for the Author by Abraham Small, 1817. Reprint, 1962.

Maclure, pioneer geologist and educator, first published his Observations as a map accompaniment in 1809 in volume VI of the American Philosophical Society Transactions. Early in 1817 he published a revised edition as a book, and reprinted the new edition in 1818 in the first volume of the new series of the Society Transactions. His accurate observations on the relation of water quality and sedimentary rock strata of the Mississippi Valley, including Illinois, show his close attention to geology and water resources.

"Abundance of fine springs of clear good water, more free from all the impurities of foreign substance than in any other of the classes, are found in this class of rocks; which at the same time are generally healthy and favorable to human existence." p. 72.

"Springs of water are of very different qualities in this class of rocks ["Horizontal Secondary", i.e., sedimentary], depending on the nature of the strata through which they filter. Those which pass through sandstone, have the best chance of being purest; slaty clay, and all those argillaceous rocks that accompany coals, are often saturated with the neutral salts of copperas or alum, the result of the decomposition of pyrites which they often contain, or of common salt. The limestone of this class is so easily dissolved in water, that the greatest part of the water that traverses the limestone of it, is fully impregnated with lime, and deranges materially the bowels of strangers for the first day or two that they drink it." p. 81.

Marest, Father Gabriel. "Letter to Father Germon (Kaskaskia, Illinois Country, November 9, 1712," The Jesuit Relations and Allied Documents, Reuben Gold Thwaites, ed. (Cleveland, 1900), vol. LXVI, pp. 218-95.

In this letter Marest, a missionary at Kaskaskia, conveys to Germon the general state of the missionary activity in the Illinois Country. His topographical descriptions touching on water resources are very general, although he does mention the supposed moderating influence of bodies of water on the climate. There is also a note on the Illinois river, mentioning that it is "seldom easily navigable until toward spring" (p. 225), because of the ice.

"During the summer the heat is less scorching [than in Provence]: the air is cooled by the forests and by the number of rivers, lakes, and ponds with which the Country is intersected." p. 225.

Marquette, Jacques. "Of the First Voyage Made by Father Marquette toward New Mexico," The Jesuit Relations and Allied Documents, Reuben Gold Thwaites, ed. (Cleveland, 1900), vol. LIX, pp. 86-163.

_____. "Unfinished Journal of Father Jacques Marquette, Addressed to the Reverend Father Claude Dablon, Superior of the Missions," ibid., vol. LIX, pp. 164-83.

Marquette's first voyage was that with Joliet, 1673-74, when they discovered the Mississippi, and became the first men in Illinois. They crossed Wisconsin via the Rox and Wisconsin rivers, went down the Mississippi as far as the Arkansas river. On the return trip the expedition ascended the Illinois river, crossed the Chicago portage, and came out on Lake Michigan. Of special geological interest is Marquette's recording of an "iron mine" (deposit) apparently on the Kentucky shore of the Mississippi. It is included here for its geological importance. His observations of the water resources of the Illinois Country is limited to his impressions of the Illinois river, seen through the eyes of the first white man to sail upon it. In the journal of the second voyage, this time as a missionary to the Illinois Indians at Starved Rock (the journal is unfinished because Marquette died at the Indian village), he observed the tides on the shore of Lake Michigan in February, 1675, and their effect on water quality. Attached is a notice of "tides" at Green Bay.

"A short distance above [actually below] the river of which I have just spoken [the Ohio], are cliffs, on which our frenchmen noticed an iron mine [deposit], which they consider very rich. There are several veins of ore, and a bed a foot thick, and one sees large masses of it united with pebbles. A sticky earth is found there, of three different colors--purple, violet, and red. The water in which the latter is washed assumes a bloody tinge. There is also very heavy red sand. I placed some on a paddle, which was dyed with its color--so deeply that the water could not wash it away during the 15 days while I used it for paddling." Jesuit Relations, LIX, pp. 145, 147.

The Illinois River: "We have seen nothing like this river that we enter, as regards its fertility of soil, its prairies and woods; its cattle [buffalo], elk, deer, wildcats, bustards, swans, ducks, parrots, and even beaver. That on which we sailed is wide, deep, and still, for 65 leagues. In the spring and during part of the summer there is only one portage of half a league [at Chicago River]." Ibid., p. 161.

The tides: "We have had an opportunity to observe the tides coming in from the lake, which rise and fall several times a day; and, although there seems to be no shelter in the lake, we have seen the ice going against the wind. These tides made the water good or bad, because that which flows from above comes from prairies and small streams." Ibid., p. 179.

Concerning the subject of "tides" on the Great Lakes, the following notes, written by Dablon [q. v.] in April, 1676: "The same Father Andre [a missionary at Green Bay] has made some rather Curious Observations on the tides of the bay des puants [Green Bay], where they are perceptibly felt. That bay is over 30 leagues long, by 7 or 8 in width in some places. It Receives all the waters of the great lake of the Illinois [Michigan], or, rather, it Sends to the lake the waters that it Receives from several rivers which discharge into it. He has drawn up a very accurate journal of the winter tides under the ice, and another of the Summer tides. He found that they were very irregular; that in the Space of 24 hours there were sometimes 2 full tides, sometimes 3, sometimes 4; that, when there are only 2, they delay at some periods, and at others they advance. He noticed their connection with the course of the moon. Notwithstanding all the care that he took, he has not been able to say exactly in what Quarter of the sky the moon is When the tide is full, owing to its vagaries. He has taken a great deal of trouble to Ascertain the causes of those tides. He considers that they come from the lake of the Illinois, rather than from the effect of the winds--which may, in truth, contribute to the variableness of the tides, for they Themselves are exceedingly variable in that bay. He has further Remarked that there is no wind strong enough to Prevent the tide from rising and falling throughout the time while it prevails; that it is true that the wind affects it, and is the cause of its being low when it should be high; and that it ebbs and flows to an Extraordinary degree. But the wind does not make it always fall without rising again, nor does it always rise without ever falling, even when the wind prevails with the same force for several consecutive days." The Jesuit Relations, vol. LX, pp. 205, 207.

Mease, James. A Geological Account of the United States: Comprehending a Short Description of Their Animal, Vegetable, and Mineral Productions, Antiquities, and Curiosities. . . . Philadelphia: Birch & Small, 1807. 496 p.

Mease was a physician of Philadelphia, and he published in that field. But he is remembered principally for literature outside his own field. This book, a commercial geography, was a valuable and pioneer contribution to its field. He makes slight mention of the Illinois area, and in doing so refers to Hutchins (An Historical Narrative of Louisiana, 1784). The notice concerns the Illinois-Chicago portage.

". . . according to the capt. Hutchins, [the Illinois] furnishes a communication with Lake Michigan, by the Chicago river, and by two portages between the latter and the Illinois river, the longest of which does not exceed four miles. The country through which it flows is extremely rich." p. 150.

[Mitchell, Samuel A. ?]. Illinois in 1837; A Sketch Descriptive of the Situation, Boundaries, Face of the Country, Prominent Districts, Prairies, Rivers, Minerals, Animals, Agricultural Productions, Public Lands, Plans of Internal Improvement, Manufactures, &c. of the State of Illinois: Also, Suggestions to Emigrants, Sketches of the Counties, Cities, and Principal Towns in the State. . . . Philadelphia: S. Augustus Mitchell, 1837. 143 p.

This book is a detailed compilation based largely on Peck, Gazetteer of Illinois (1834), without acknowledgment. The bibliographer Sabin says that the book "was gotten up mainly to promote the sale of Illinois lands then owned by John Grigg of Philadelphia," and Grigg's name appears as a joint publisher. Besides sections of the face of the land and the productions of the state, a large part of the book is devoted to accounts of each county. These individual sketches are covered under Peck (below). In the notes following, Schoolcraft's [q. v.] theory concerning "flood-lines" on the rocks at Grand Tower, on the Mississippi, is discussed. Also noted are the water resources of the military bounty lands, that tract of Illinois between the Illinois and Mississippi rivers given to veterans of the War of 1812. Of particular interest is the advice to emigrants concerning the healthfulness of the bottom lands, and the depth of wells.

"In some former period," observes Mr. Schoolcraft, "there has been an obstruction in the channel of the Mississippi, at or about Grand Tower, producing a stagnation of the current at an elevation of about 130 feet above the present ordinary water-mark. This appears evident from the general elevation and direction of the hills, which for several miles above are separated by a valley from 20 to 25 miles wide, that deeply embosoms the current of the Mississippi." Wherever these hills exhibit rocky and abrupt fronts, a series of water-lines are distinctly visible, and preserve a remarkable parallelism uniformly presenting their greatest depression towards the sources of the river; and, at Grand Tower, these water-lines are elevated about one hundred feet above the summit of the stratum in which petrification of the madrepora and various fossil organic remains are deposited. Here the rocks of dark-colored limestone, which pervade the country to a great extent, by their projections toward each other, indicate that they have, at a remote period, been disunited, if not by some convulsion of nature, by the incessant action of the water upon a secondary formation, and that a passage has been effected through them, giving vent to the stantant waters on the prairie lands above, and opening for the Mississippi its present channel.

"The bank of the Mississippi from the vicinity of Grand Tower, extending upwards on the Missouri side of the river, is sufficiently elevated above the surface of the State of Illinois to have formed a western shore of an expanse of water, covering its present area. And the alluvial deposits of which the prairies are formed, are composed of fine, hard, and compact layers of earth, similar to those at the bottom of mill-ponds of water long stagnant." pp. 9-10.

"It is a fact, however, which ought not to be disguised, that a large portion of the lands on the margin of the Mississippi and Illinois rivers, as well as those upon the banks of the smaller streams, including such also as border upon the large, flat, wet prairies, may be reckoned among the situations most unfavorable to health. The stagnant waters which sometimes remain after the overflowings of these rivers, not infrequently produce pestilential vapours, proceeding from putrescent vegetable substances, which very often engender malignant fevers and agues, and prove destructive to the health and vigour of the newly settled emigrant and his family. Habitations should, therefore, at the commencement of a settlement be as far removed as convenient from stagnant waters and low, rich, alluvial grounds, which are thickly shaded by forest trees, and located on more open and elevated ground, where air and water can be enjoyed in their native purity. Lands of this description, which in a state of nature, prove injurious to health, when drained, open to the sun, and cleared of the trees and rank weeds, which generally grow upon them, have often become salubrious places of habitation. But the newcomer should be aware before he is acclimated, that it is a dangerous experiment to attempt the improvement. But of this quality, there is a small part only of the whole tract, most of the residue furnishing situations as healthful as any of the Western Country, old Kentucky not excepted." p. 21.

"In [the military bounty lands] there are but few springs; but water may be plentifully obtained anywhere on the smooth prairies, by digging from fifteen to forty feet below the surface. The well is pure and salutary, and generally preferred to the spring water." p. 21.

Morleigh [pseud.]. Life in the West; Back-wood Leaves and Prairie Flowers; Rough Sketches on the Borders of the Picturesque, the Sublime, and the Ridiculous; Extracts from the Note-book of Morleigh in Search of an Estate. London: Saunders & Otley, 1842. 363 p. 2nd ed., London: Newby, 1843. 376 p.

"Morleigh" was typical of the British travelers in the West who published their journals. Nothing is known of the author. His travels took him north of Illinois, although he did pass through Chicago, and was favorably impressed by the town. The following quote, however, is the main theme of this bibliography.

"Land is a drug everywhere; but water, and water power, has a mystic charm that draws men together in this country." 2nd ed., p. 251.

Morse, Jedidiah. The American Gazetteer, Exhibiting, in Alphabetical Order, a Much More Full and Accurate Account, Than Has Been Given, of the States, Provinces, Counties, Towns. . . on the American Continent. Boston: Hall, 1797. 627 p. 2nd ed., rev., Boston: Thomas and Andrews, 1804. 628 p.

. The American Geography; or, A View of the Present Situation of the United States of America. . . . Elizabethtown [New Jersey]:
 Author, 1789. 534 p. 2nd ed., London: Stockdale, 1792. 536 p.

These two works of Morse, the "Father of American Geography," were among the first compilations of this sort. Their treatment of the Illinois Country is brief, and the notices concerning water resources are confined to descriptions of rivers. The Illinois river is described identically in both books, while the Gazetteer, in its alphabetical arrangement, adds short notices on the Kaskaskia, the Rock, the Chicago, and the Fox rivers.

The Illinois River: "One hundred and seventy-six miles above the Ohio, and 18 miles above the Missouri, the Illinois empties into the Mississippi from the north-east by mouth 400 yards wide. . . . This river furnishes a communication with Lake Michigan by the Chicago river, between which and the Illinois, are two portages, the longest of which does not exceed 4 miles. It receives a number of rivers which are from 20 to 100 yards wide and navigable for boats, from 15 to 180 miles. On the north western side of this river is a coal mine, [bed or deposit] which extends for half a mile along the middle bank of the river. On the eastern side, about half a mile from the river, and about the same distance below the coal mine, are two salt ponds, 100 yards in circumference, and several feet in depth. The water is stagnant, and of a yellow colour; but the French and natives make good salt from it." American Geography, 2nd ed., p. 460.

Nuttall, Thomas. A Journal of Travels into the Arkansa [sic] Territory, During the Year 1819. Philadelphia: Thos. H. Palmer, 1821. 296 p.

Nuttall, a naturalist, gives a scientist's view of the lands in which he traveled. He was not in Illinois, but on this journey passed by on the Ohio River. He notes Cave-in-Rock, Shawneetown, Fort Massac, and the country about the mouth of the Ohio. Concerning the water resources of Illinois he says very little, noting only the Shawneetown is subject to floods, and flooding prevents habitation at the mouth of the Ohio.

Shawneetown: ". . . commanding an agreeable view of the river, but not situated beyond the reach of occasional inundation." p. 40.

"The whole country here [at the confluence], on both sides of the Mississippi and the Ohio, remains uninhabited in consequence of inundation. . . ." p. 41.

Oliver, William. Eight Months in Illinois, With Information to Emigrants
 Newcastle-upon-Tyne: Mitchell, 1843. 141 p.

Oliver traveled in the southern part of the state visiting Kaskaskia, Collinsville, Vandalia, and Greenville. His book is one of the rarest of the later English travel accounts. Concerning water resources, Oliver notes that the conjunction of the Ohio and Mississippi offers a good town-site, but the floods of the rivers, and the unhealthiness of the bottom lands discourages building. He also discusses the quality of water on the bottom lands, and well depth on the prairies. Oliver also recognizes the natural levees along the river, as did many of the travelers.

"This must be a very unhealthy place [the confluence of the Ohio and Mississippi], as it lies so low, that when the Mississippi rises in June, from the melting of the snow on the Rocky Mountains, it overflows almost every foot of land, all around far into the forest, and on the Mississippi, at frequent intervals, for about 30 miles up the river. . . .

"To those who do not know the locality, it may appear singular that there is no town on this point--a fact, however, of itself sufficient to indicate the impracticability of such an undertaking. No doubt a town might be built, but the whole point is composed of an alluvion so very friable, that if the Mississippi, in one of his ordinary freaks, were to change his course, the whole affair might be swept away in a few days. Some may think of embankments, but that is a dream---the baseless fabric of a vision. For a long way up the river there is no shore, but a perpendicular mud bank, which is constantly being undermined and tumbled into the river; besides, the whole point is liable to periodic inundation." pp. 17-18.

"It is a feature of the western rivers, that the bottoms are frequently more elevated near to the river than farther back towards the bluffs, where they are often marshy and abounding in stagnant lagoons and backwaters, which are filled, when the river overflows its banks at the periodical risings or freshets, and on the subsistence of the waters, are left full of vegetable matter to putrify in an almost tropical sun. . . . The want of wholesome water is a serious objection to settling on bottom lands; water no doubt can be had by sinking to no great depth in them, but it is universally impregnated with something imparting to it deleterious qualities and a nauseous taste, and frequently looks as if hay had been steeped in it. Indeed the water in the branches and creeks, muddy though it be, is esteemed more wholesome than that of these wells." pp. 127-28.

"A . . . comfortable dwelling, or other accomodation, can be supplied. . . when the more pressing needs are disposed of; but before this takes place, it ought to be ascertained if water can be had near to the spot fixed upon, this can be done either by boring, or what is perhaps quite as cheap a method, by sinking a well at once;

an affair of no great difficulty, as the prairie is almost one entire bed of alluvial matter. Water is generally got at a depth of about thirty feet, and, what is singular, the higher the situation, the greater is the certainty of finding water at a moderate depth. I do not pretend to account for this, but it is a circumstance, the truth of which, though often asserted, I have never heard doubted, and which my own experience inclines me to credit. [The rolling prairies are here referred to, and not bottoms, marshes, or basins, the receptacles of all the water circulating through the soil of a tract of country--Oliver's note.] I have noticed, however, that the alluvion on the most elevated parts of the prairie, is often not so deep as in the lower situations; as rock of some kind is frequently found in sinking wells, and thus there may be struck springs, or the water discharged from springs and collected from other sources, will naturally circulate between the alluvion and the denser materials below. That there are springs, any one may be satisfied by examining the bluffs on the river courses, where they are frequently in great abundance." pp. 128-29.

Paulding, James K. "Illinois and the Prairies," Graham's American Monthly, XXXIV (January, 1849), 16-25.

Reprinted in part, Illinois State Historical Society, Journal, XLII (September, 1949), 292-312.

Ex-Secretary of the Navy Paulding, and Ex-President Martin Van Buren, took a long and leisurely trip through the West and South in 1842, the object being political. Paulding's narrative of the trip, published some years later, described their excursion up the Illinois River by steamboat and across the prairies to Chicago. Concerning the water resources of the area, he notes that the Illinois River is "one of the prettiest streams to be found in this country of fine rivers," the excellence of the fishing in the Fox and Illinois rivers, and the water power facilities on the Des Plaines.

"That gallant officer and enterprising traveler, Major Long, did the Illinois great injustice when he described it as 'an extended pool of stagnant water,' for it was, when I saw it, one of the prettiest streams to be found in this country of fine rivers. The width is such as to give a full view of objects of both sides in passing; the basin was full without overflowing; and though the current was gentle, its waters were neither muddy nor stagnant. It should, however, be observed that my journey was in the season when the rivers of the great Mississippi valley, though beginning to subside, were still high, and that those who wish to see them to advantage should visit the South and West before the heats of summer. Else will they be assuredly disappointed. . . ." (reprint, 1949) p. 295.

"The fishing is however good both in the Fox River and the Illinois. There is a large species called trout, rather from its habits than appearance, which frequents the rapids, and is a noble subject for the angler; while the vulgar fisherman, who affects the still water, may now and then luxuriate in a catfish weighing ten or fifteen pounds, and ugly enough to frighten a member of a militia court-marshal. There is also the gar-fish, of great size, whose pleasure is to let you toss him up into the air, without ever catching him, and then see him plump down into the water with the bait, perhaps hook and all, in his jaws." p. 304.

"The descent of the River Des Plaines is here [at Lockport] sufficient to afford ample water-power for mills and manufactories, and this, in a country so level that the water half the time does not know which way to run. . . ." p. 311.

Peck, J[ohn] M[ason]. A Gazetteer of Illinois, in Three Parts: Contain-
ing a General View of the State; A General View of Each County; and
a Particular Description of Each Town, Settlement, Stream, Prairie,
Bottom, Bluff, Etc.--Alphabetically Arranged. Jacksonville: R. Goudy,
1834. 376 p.

_____. A Guide for Emigrants; Containing Sketches of Illinois, Missouri,
and the Adjacent Parts. Boston: Lincoln & Edmands, 1831. 336 p.

Reissued, with add. as A New Guide for Emigrants to the West Contain-
ing Sketches of Ohio, Indiana, Illinois, Missouri, and Michigan, with
the Territories of Wisconsin, Arkansas, and the Adjacent Parts.
Boston: Gould, Kendall, & Lincoln, 1836. 374 p.

_____. The Traveler's Directory for Illinois. . . . New York: J. H.
Colton, 1839. 219 p.

Peck's guide, gazetteer, and directory are basic. All those who write later traveler's or emigrant's guides rely on Peck. Peck came to Illinois as a Baptist missionary, and became one of the most famous men in the state. His works listed here are probably the most accurate of any of the comprehensive guides to the state, and concerning water resources he gives the most complete information for the state as a whole at that time. Of particular note are: relationship of water to health in the West; The topography of the state, in which Peck borrows Brown's physiographic classifications (cf. above); a note on certain medicinal waters in the state; notes on the water resources of various counties; a lengthy discussion of the water power sites available in northern Illinois, with a remark that the surplus water from the Illinois-Michigan canal will be able to run seven hundred pairs of mill stones, four and a half feet in diameter; a detailed description of the Illinois and Rock rivers and navigation hazards in them; and details of a project to drain the American Bottom.

Concerning the healthiness of the West: "Of one fact I have long since satisfied my mind, that ordinary fevers are not caused by the use of the water in the West. Exceptions may be made in some cases, where a vein of water is impregnated with some deleterious mineral substance. The use of a well, dug in the vicinity of a coal bed in Illinois, was supposed to have caused sickness in a family for two seasons. Any offensive property in water is readily detected by the taste. Cool, refreshing water is a great preservative of health. It is common for families, (who are too indifferent to their comfort to dig a well,) to use the tepid, muddy water of the small streams in the frontier states, during the summer, or to dig a shallow well and wall it with timber, which soon imparts an offensive taste to the water. Water of excellent quality may be found in springs, or by digging from 20 to 30 feet, throughout the western states. Most of the water thus obtained is hard water, from its limestone qualities, but it is most unquestionably healthy. Those persons who emigrate from a region of sandstone, or primitive rock, where water is soft, will find our limestone water to produce a slight affection of the bowels, which will prove more advantageous to health than otherwise, and which will last but a few weeks." New Guide, p. 73.

Topography of the state, see New Guide, pp. 252-64. Brown's classifications.

Medicinal waters in the state: ". . . found in different parts of the State. These are chiefly sulphur springs, and chalybeate waters. There is said to be one well in the southern part of the State strongly impregnated with the sulphate of magnesia, or Epsom salts, from which considerable quantities have been made for sale, by simply evaporating the water, in a kettle, over a common fire. There are several sulphur springs in Jefferson county, to which persons resort for health." New Guide, p. 271.

Particular notes concerning various counties, from the Gazetteer of Illinois: "Surrounded by rivers and low bottoms, Calhoun county is less healthy than others on the military tract," p. 116. "Probably two thirds of the surface [of Clay County] is prairie of an inferior quality. The streams usually overflow their banks in freshets," p. 118. "[In Coles County] the heads of the Little Wabash afford fine mill streams. . . . The streams are not large; they generally run over a bed of sand and afford many good mill seats," p. 120. Edgar County: "In the census, in 1830, it had three water grist mills, three water saw mills. . . ," p. 123. "There are several grist mills propelled by water power in [Fayette County]. . . ," p. 126. "[Fulton County] is in general well watered; the streams usually flow over a gravelly bottom, and furnish many good mill seats," p. 128. Tracts of swamp land noted in Hamilton and Henry counties, pp. 131, 132. [Jo Daviess County is] well watered, both with springs and mill streams," p. 136. Lawrence County: "In the low prairies, near the Wabash, are swamps and sloughs, known by the name of 'purgatory,' which, in a wet season, are miry, and extremely unpleasant to the traveler. In a dry season, the water evaporates, and the

ground becomes firm," p. 140. In McLean County, there are "good mill seats when the water is not too low," p. 145. Many good mill seats in Morgan County, p. 148; in Pike County, p. 151; in Putnam County, p. 154; in Sangamon County, p. 157; in Warren County, p. 166; and in White County there are three mills, p. 169.

Concerning the water power availability in northern Illinois: "The northern half of the state will be most abundantly supplied with water power, and ordinary mills for sawing lumber and grinding grain are now in operation on the various streams. Probably in no part of the great west does there exist the capability of such an immense water power, as is to be found naturally, and which will be created artificially along the rapids of the Illinois and Fox rivers, and the Illinois and Michigan Canal. . . . Fox River rapids have a descent of sixteen feet at Green's mills, four miles above Ottawa, with abundant supplies of water at its lowest stage; the river itself, from thence to McHenry county, is a rapid stream with rocky banks, admirably suited for hydraulic purposes. On the Kankakee are some fine sites for water privileges. Rock River furnishes abundant facilities for hydraulic purposes, especially at Grand Detour and Rockford. A company engaged in the establishment of a large town at the mouth of Rock River, has been recently chartered by the legislature for the purpose of cutting a canal from a point on the Mississippi at the upper rapids, to Rock River, by which they expect to gain eighteen feet fall and immense hydraulic power.

"It is expected that the improvement of the Kaskaskia and Little Wabash Rivers, as provided for by the recent law of the state, will create valuable water privileges along these streams.

"Certainly in connection with the improvement of the Great Wabash River by the joint operations of Indiana and Illinois, hydraulic power to any desirable extent will be created. Such will be the effect, too, upon Sangamon and other rivers within the state. Des Plaines, and also the Calumet, furnish extensive hydraulic privileges; and the surplus water provided by the construction of the Illinois and Michigan Canal, and which may be conveniently applied to manufacturing purposes, is estimated to be equal to that required for running seven hundred pairs of mill stones four and a half feet in diameter." Traveler's Directory, pp. 88-89.

Concerning the Fox River: "The feeder to the canal from Fox River, connected to the Illinois by a lateral canal at [Ottawa], will open a water communication of immense importance, and create a vast hydraulic power. The chief engineer, Mr. Gooden, in his report to the canal commissioners in 1836, remarks: 'The fall from top water line of canal to low water of Fox River, where the main [canal] line crosses, is thirty-seven feet; and it is supposed that five thousand cubic feet of water per minute, may be drawn from the canal for hydraulic purposes. This will give a power at Ottawa sufficient, at least, to drive forty pairs of millstones of four and a half feet in diameter.'" Traveler's Directory, p. 44.

Concerning the project of draining the American Bottom, Peck discusses the particular features of the land, and notes that the method of draining would be to "cut a canal from Wood River, near Alton, down the bottom, parallel with the bluffs, to the Kaskaskia River, Near the Town of Kaskaskia, and thus secure the double object of navigation, and a complete drainage to the inundated parts." Traveler's Directory, pp. 81-84.

Pittman, Philip. The Present State of the European Settlements on the Mississippi; With a Geographical Description of that River. London: J. Nourse, 1770. 99 p.

Pittman was an engineer with the British troops and arrived in West Florida in 1763 or 1764. He was in the Illinois country making surveys and investigations from November or December 1765 to near the close of 1768. The book contains descriptions of the French villages and general accounts of the Illinois country. His observations on Kaskaskia, Fort Chartres, and Cahokia refer to the Kaskaskia River, the shifting channel of the Mississippi, and the fact that Cahokia is in a bad location, as it is often flooded.

"This river [the Kaskaskia] is a secure port for large batteaux, which can lie so close to its bank as to load and unload without the least trouble; and at all seasons of the year there is water enough for them to come up. It must be observed here, that it is extremely dangerous for batteaux or boats to remain in the Mississippi, on account of the bank falling in, and the vast number of logs and trees which are sent down, with a violent force, by the rapidity of the current, as also on account of the heavy gales of wind to which this climate is subject. Another great advantage that Cascasquias receives from its river is the facility with which mills for corn and planks may be erected on it: Mons. Paget [a French landowner at Kaskaskia] was the first who introduced water-mills in this country, and he constructed a very fine one on the river Cascasquias, which was both for grinding corn and sawing boards; it lies about one mile from the village." p. 42.

"The bank of the Mississippi, next the fort [Chartres], is continually falling in, being worn away by the current, which has been turned from its course by a sand-bank, now encreased to a considerable island covered with willows: many experiments have been tried to stop this growing evil, but to no purpose. When the fort was began in the year 1756, it was a good half mile from the water-side; in the year 1766 it was but eighty paces; eight years ago the river was fordable to the island, the channel is now forty feet deep." [In 1772 a part of the wall of Fort Chartres was undermined by the Mississippi and the fort was abandoned by the British. After that the river shifted to the west, so that the ruins were left a mile from the bank of the river. See Harry Gordon (above) for observations in 1766.] p. 46.

"The situation [of Cahokia] is not well chosen, as in the floods it is generally overflowed two or three feet." p. 48.

St. Cosme, Jean Francois Buisson de. Expedition to Arkansas, 1698-1699. Exerpt dated January 2, 1699. In The Development of Chicago 1674-1914; Shown in a Series of Contemporary Original Narratives, Milo Milton Quaife, ed. (Chicago: The Caxton Club, 1916), pp. 37-46.

St. Cosme was the principal journalist for this expedition; its purpose was to establish a mission on the lower Mississippi. (St. Cosme achieved the martyr's crown a few years later in a massacre by the Indians of the area.) The party traveled across the Chicago portage, not usually taken because of its difficulty, the Fox-Wisconsin portage being preferable. As is the case with most of the French accounts of this date, the only material of interest in the area of water resources is a description of the water route they traveled. In this case, St. Cosme gives a picture of the portage at Chicago in late October.

"We started from Chikagou on the 29th and slept about two Leagues from it on the little River that afterward loses itself in the prairies. On the following day we began the portage which is about three Leagues in length when the waters are low and is only three fourths of a League in the Spring for then one can embark on a small Lake that discharges into a branch of the river of the Illinois and when the waters are low a portage has to be made to that branch." p. 40.

Schoolcraft, Henry R. Narrative Journal of Travels through the Northwestern Regions of the United States; Extending from Detroit through the Great Chain of American Lakes to the Sources of the Mississippi River; Performed as a Member of the Expedition under Governor Cass, in the Year 1820. . . . Albany: Hosford, 1821. 419 p.

Travels in the Central Portions of the Mississippi Valley: Comprising Observations on Its Mineral Geography, Internal Resources, and Aboriginal Population. (Performed under the Sanction of Government, in the Year 1821.) New York: Collins and Hannay, 1825. 459 p.

One of the best known, and in some ways the most important of Midwestern travelers, Schoolcraft was a man of many interests, and his observations contain matters of geology, mineralogy, ethnology, Indian life, and history. Both of these expeditions were under the leadership of Governor Cass of Michigan Territory, and Schoolcraft acted as the historian of the tours. The tour of 1820 passed through Chicago, and Schoolcraft describes the Chicago River, noting the obstructing bar at its mouth, and the portage over to the Des Plaines River. The tour of 1821 passed down the Wabash and Ohio to Shawneetown, across southern Illinois to St. Louis, up the Illinois River to Peoria, and by horseback to Chicago. His extensive observations on the water resources of the state include: notice of a spring near Cave-in-Rock, and a discussion of "intermitting springs," (pp. 188-89); a discussion of some ancient pottery found at the Illinois Saline, noting that it would indicate a change in the geological structure of the area in the past; speculations on "geological transformations" of the Middle West, indicated by the "flood-lines" on the rocks at Grand Tower (pp. 216-20); and detailed notes on the Illinois River (pp. 300-21), with a plea for a decent harbor at Chicago (p. 334).

"Chicago creek is eighty yards wide, at the garrison [Fort Dearborn], and has a bar at its mouth, which prevents shipping from entering, but is deep within. It is ascended eleven miles in boats, and barges, where there is a portage of seven miles across a prairie to the river Plein, the main northwestern fork of the Illinois. The intervening country consists of different strata of marl and clay, presenting great facilities for canal excavation, and the difference in the level of the two streams is so little, that loaded boats of a small class, may pass over the lowest parts of the prairie, during the spring, and autumnal freshets.--But at mid-summer, it is necessary to transport them over land, to mount Juliet, a distance of thirty miles. From thence the navigation is good, at all seasons, to St. Louis, a distance of four hundred miles." Narrative Journal, p. 251.

"It is common in digging at these salt mines [in Gallatin County], to find fragments of antique pottery, and even entire pots of a coarse earthenware, at great depths below the surface. One of these pots which was, until a very recent period, preserved by a gentleman at Shawneetown, was disinterred at the depth of eighty feet, and was of a capacity to contain eight or ten gallons. . . . If these antique vessels are supposed now to lie in those depths and chasms where they were anciently employed, the surface of the Ohio, and consequently, of the Mississippi, must then have been sixty or eighty feet lower than they are at present, to enable the saline water to drain off. It follows that the ocean itself, must then have stood at a lower level, or extended in an elongated gulf up the present valley of the Mississippi." Travels, pp. 202-03.

Schoolcraft notes the "water-lines", some 130 feet above the Mississippi, on the rocks at Grand Tower, and concludes that at one time there was an obstruction in the Mississippi. At the same time he notes that it is possible that the western shore of the Mississippi once served as the shore of a vast lake, covering the entire Illinois Country, the surface of which was roughly eighty feet above the present elevation of the prairies. This lake would have post dated the first occupation of the land by man, as the pottery fragments found at the Saline would indicate. This theory is supported by the following observations:

"When the Ohio river is in flood at Shawneetown, say about thirty feet above its common level, the stagnant water in Saline river sets up about fifty miles, in a direct line, and extends into the prairies within twelve or fourteen miles of a point on Muddy river, where its waters are stagnant from the same cause in the Mississippi:-- the water at the two points is perhaps very nearly on a level, while the elevation of the intervening prairie does not probably exceed a mean of eighteen or twenty feet. Crooked creek, which is a branch of the Kaskaskia river, nearly mingles its waters with those of the Au Vase, at a point where they are both stagnant when the Mississippi is in flood, the general elevation of the intervening ground being, as before stated, about eighteen or twenty feet, which we think may

be safely assumed as the mean height of the prairie. But should it be estimated at twenty-five, or even thirty feet, then by adding twenty feet as the elevation necessary to render the waters of the Kaskaskia and Au Vase stagnant at the points mentioned, and by deducting this elevation from one hundred and thirty feet, the ancient height of the Mississippi, as proved by the water marks on Grand Tower, we have eight feet as the depth of the water over the highest parts of the prairies,--a depth which is probably adequate to the deposition of those successive strata of small pebblestones, sand, clay, fine rich loams and carbonaceous moulds, of which they are composed." Ibid., pp. 218-19.

There are many minor references to the state of the water resources in Illinois scattered through out the Travels, as well as the description of the Illinois River to Peoria, which are too numerous or lengthy to note.

Schultz, Christian. Travels on an Inland Voyage through the States of New-York, Pennsylvania, Ohio, Virginia, Kentucky, and Tennessee, and through the Territories of Indiana, Louisiana, Mississippi, and New-Orleans; Performed in the Years 1807 and 1808. . . . 2 vols. in 1. New York: Isaac Riley, 1810.

Schultz was a native American who traveled through part of Ohio and the Illinois country in the fall of 1807, part of the territory Thomas Ashe had covered the year before. Schultz's book, published from a series of letters, was the result of having read Ashe's Travels in America. Schultz felt that an answer was needed to Ashe's attack on America. Of particular interest in this book is Schultz's calculations on the changing sedimentation rate. Schultz reads the sediment layers on the bank of the river as one would read tree rings. He notes the decreasing frequency of inundation as the bank is built up. The point of observation was near the confluence of the Ohio and Mississippi, but whether above or below is uncertain.

"I believe I neglected to inform you, when at this place before, that I had discovered a very curious kind of chronometer for this country; and probably would have forgotten it, had not a sight of the same place recalled it to my mind. The circumstance I allude to is this: You will recollect that the river was remarkably low when I ascended, and in consequence of the slow and tedious progress of the boat, I frequently went on shore. It was on one of these occasions, at about ten miles from the mouth of the Ohio, that I observed a large part of the bank newly broken off and fallen into the Mississippi. I thought this an excellent opportunity of ascertaining the number of inundations it had required to form the bank above the level of the water. I had before observed, in some places, the layers composing the banks tolerably distinct for a small height, but never so plainly as at this new fallen bank. In the first place, for want of a means of more accurate measurement, I cut a pole measure of my hands twenty-two feet in length. I then stuck it two feet in the ground,

at such a distance below the bank, as to bring its top, when perpendicular, in a horizontal line with the upper surface of the bank; this gave me twenty feet in height. I next brought its top, when placed as before, in a horizontal line with the spot where it last stood, and in this manner I found the whole height of the bank to be forty-three and a half. I next proceeded to count the different layers, but was unable to ascertain those of the first five feet next the river, on account of the earth which had fallen from above; therefore can only judge of the number of layers it probably might contain, from the next five feet, which I found to consist of one hundred and thirty-three. The next ten feet contained two hundred and twelve; the third division one hundred and ninety-eight; and the fourth one hundred and ninety-one; making forty feet in height, and seven hundred and ninety-eight layers. The remaining three feet and a half, which were nearest the surface, contained no more than five layers that I could distinguish, making the whole number eight hundred and three. These layers were from less than a quarter to three inches in thickness, and although the lowest were generally the smallest, yet there frequently occurred those of an inch among them. It was not without considerable difficulty that I made out the examination recited; nor will I venture to say it is wholly correct, as in many instances the layers were very small, and sometimes so intermixed and confounded together, that I was under the necessity of substituting conjecture for facts. Yet I do not think I am far from the whole number of layers, which have formed the present bank.

"From these data you will perceive, that although my new chronometer does not give the number of years which have passed during the formation of these banks, yet we may reasonably calculate that it has taken at least eight hundred inundations to deposit the like number of layers of earth which compose their present elevation.

"Having ascertained with sufficient accuracy the number of inundations which have been required to raise these banks, it remains to calculate the frequency of their recurrence. To allow one inundation annually would give us in round numbers at most but eight hundred years; a period apparently too short for the formation of banks of forty feet in height. Yet I believe I can show, that eight hundred inundations must have taken place in a much less number of years.

"It is well known that these banks are now seldom overflowed, as well from the accumulation of decayed leaves, trees, and other vegetable matter, as by the river deepening its own channel, and thereby lowering the surface of its waters. In order, therefore, to bring them more generally within the reach of freshes, let us deduct the odd three and a half feet of my measurement; when, by allowing only a spring and fall inundation for each year, it will give us a period of four hundred years. But though the Mississippi is not subject to regular autumnal inundations above the Ohio, yet, as it is always affected by those of that river, I should think an average calculation of two for each year would be hardly sufficient. I shall therefore proceed to give you another calculation which, upon summing up, I find gives nearly the same result. It is obvious, that while the banks are low, they are more subject to inundation; and consequently have overflowed with every trifling rise of the river. We will therefore suppose, that the lowest division was

overflowed as often as five times in each year, which will give us a period of fifty years. Allowing three times only each year for the second will make seventy years more; for the third division, say twice for each year, which gives one hundred and ninety-one years; and for the fourth one annual inundation only, will give an addition of one hundred and twenty-one more; making in the whole a period of four hundred and thirty-five years. Notwithstanding the result of these calculations, I feel myself lost in a wilderness of conjecture. For although I am satisfied that the period is sufficiently long to give time for the number of inundations; yet my senses refuse to acknowledge the probability that banks of such stupendous height should have been formed within the same short period." Vol. II, pp. 89-93.

Scott, James L. A Journal of a Missionary Tour through Pennsylvania, Ohio, Indiana, Illinois, Iowa, Wisconsin, and Michigan; Comprising a Concise Description of Different Sections of the Country; Health of Climate; Inducements for Emigration with the Embarrassments; The Religious Condition of the People; Meetings Connected with the Mission; and of the Great Western Prairies. Providence: Author, 1843. 203 p.

Prompted by the fear that the Midwest would become the stronghold of "Romanism" because the immigrants came from Catholic countries in Europe, Scott, a Seventh-day Baptist missionary, undertook this tour in 1842. He published his journal not only to urge other missionaries to come to the West, but also as a guide for prospective settlers. He visited various parts of Illinois. On the subject of the relation of water to health, he noticed that many of the river lands were subject to "billious diseases". He also noted the limestone flavor of the water, as well as the water resources of Peoria and Fulton counties.

"As to the health of the western country, it is known that it is universally subject to billious diseases, in a greater or less degree. On the rivers these habits are far more prevalent and disastrous than in the immediate vicinities. The Illinois river is, as before noticed, a rather sluggish stream, consequently the inhabitants are the more afflicted with billious diseases, but even on this river it may not be more unhealthy than in many places less frightful in their reputation. Spoon river is also considered not so healthy a stream as many, but that portion we visited was considered as healthy perhaps, as any country, nor did the visage of the inhabitants indicate an unhealthy climate." pp. 94-95.

The water is "pure but limy." p. 96.

"The most of Peoria and Fulton counties are far superior to any country I ever expected to see. Lewiston is situated in a broken portion of Fulton Co., but it is a region well timbered and abounding in living springs, and running brooks. Mill seats may be found in abundance. Indeed, many are already driving machinery to advantage." p. 97.

Scott, Joseph. The United States Gazetteer: Containing an Authentic Description of the Several States. . . . Philadelphia: Bailey, pr., 1795. [292] p.

This is the first gazetteer of the United States, and is important only for that reason. Arranged alphabetically, it contains entries on the Illinois River, Kaskaskia, the Territory Northwest of the Ohio, etc. It is possible that Scott relied on Hutchins for this description of the Illinois River:

"It is 400 yards wide at its mouth. In its course it receives several considerable streams. It affords a communication with Lake Michigan, by Chicago river, between which and the Illinois are two portages, the longest does not exceed 4 miles."

[Sealsfield, Charles]. Die Vereinigten Staaten von Nordamerika, nach ihrem politischen, religiösen und gesellschaftlichen Verhältnisse betrachtet 2 vols. Stuttgart & Tübingen: Cotta, 1827.

English ed. of vol. I as The United States of North America As They Are. London: Murray, 1827. 242 p.

English ed. of vol. II as The Americans As They Are; Described in a Tour through the Valley of the Mississippi. London: Hurst, 1828. 221 p.

The real name of this author is Karl Postl, but he is usually known as Sealsfield. The second volume of the work tells of an 1826 tour which included Albion and Shawneetown. There is a chapter devoted to a general description of Illinois. Of interest is his notice of the change in the character of the Ohio as it approaches the junction with the Mississippi. He also includes a section on the depths of the Mississippi, noting that the depth varies while the width does not, as well as a remark on the suspended sediment in the river water, which is equal, in a glass, to one tenth of volume.

"The nearer we approached the Mississippi, the lower the country became, and the more imposing the scenery. By degrees the river Ohio loses its blue tinge, taking from the mightier stream a milky colour, which changes into a muddy white when very near the junction--this junction itself is one of the most magnificent sights." II (London, 1828), p. 80.

"Whoever comes to the Mississippi with the expectation of beholding a sea-like river flowing quietly along, will find himself disappointed. The magnitude of this river does not consist in its width but in its depth, and the immense quantity of water it pours out into the sea. At the mouth of the Ohio it is a mile and a half wide. This moderate breadth rather diminishes as it proceeds in its course. At New Orleans, after receiving the waters of some great tributary streams, it is not more than a mile in width, and in some places three quarters of a mile. Its depth, however, continues to increase; below

the Ohio it is reckoned to be from thirty-five to fifty feet deep. Below the Arkansas to Natchez, from 100 to 150. From Natchez to New Orleans, from 150 to 200 feet. At its mouth, owing to the sand bar at Paliseter, the depth greatly diminishes, and it is well known that vessels drawing eighteen feet of water can hardly enter the stream. The waters of the Mississippi are not clear at any period of the year. This was the second time I saw it, when it was said to be very low; still its waters were of a muddy turbid appearance. When rising it changes to a muddy yellow. A glass filled with water from the Mississippi, deposits in a quarter of an hour a mass of mud equal to one tenth of the whole contents. But when clear, it is excellent for drinking, and superior to any I have tasted. It is generally used by those who inhabit its banks." Ibid., pp. 82-83.

Sears, Robert. A New and Popular Pictorial Description of the United States; Containing an Account of the Topography, Settlement, History, Revolutionary and Other Interesting Events, Statistics, Progress in Agriculture, Manufactories, and Population, etc., of Each State in the Union. New York: Sears, 1848. 608 p.

Within the twenty pages on Illinois is a lengthy passage dealing with the water resources of the state. Important is Sears' discussion of the deficiency of water in the prairie region, in which he compares the water resources to those of New England.

"In general [Illinois] is well watered with springs and running streams, though some of the prairies in the northern part are somewhat deficient in this respect. Even here, however, it is not common to find a section without a spring." p. 545.

"The great, formidable, permanent, drawback on the eligibility of the prairie region [of Illinois] for settlement, is the deficiency of water. This, perhaps, can never be fully remedied. Though the face of the country is by no means a dead level, but undulating, the inequality is so slight that springs are very, very rare, and running brooks hardly less so. You may ride twenty miles across the country without seeing water enough in all to turn a grist mill; and what you do find a well bred horse will only drink in his last extremity of thirst. A whole country, which in New England would give rise to half a dozen good mill-streams, and can be threaded all over with sparkling trout brooks, will here send off scarcely water enough in summer to run a single pair of burr-stones. This, in a region so wonderfully adapted to the production of grain and cattle, is a sore deficiency. Following down the valley of the Fox, some twenty miles, by the thriving villages of Elgin, St. Charles, Geneva, and Aurora (each well supplied with mill-power by the river), although the scarcity of running streams was here by no means so absolute as in the prairies on either hand, yet we may doubt whether the river gains as much by tributaries as it loses by evaporation within that distance. And, although water is generally obtained with facility by simply digging a few feet through the prairie soil,

we cannot in conscience recommend the drinking of it, whether by man of beast. The abundance of lime, which renders the soil so fertile, exerts a far less desirable influence in the water. Here is the main source of the prevailing diseases. With pure, cold water bubbling up at every door, and the vile liquors so prevalent here consigned to the bottom of the ocean, this would soon be a healthy country.

"In time the want of water on the prairies will in part be remedied by sinking deep wells through the nearest stratum of rock, and raising the fluid by means of a windlass or otherwise. In villages, the Artesian wells may not be too expensive." pp. 548-49.

Shepard, Charles Upham. "Geology of Upper Illinois," The American Journal of Science and Arts, XXXIV (July, 1838), 134-61.

Shepard, primarily a mineralogist, was one of the first graduates from Amherst. He studied for a time under Nuttall, and later became an assistant to Benjamin Silliman, called "the most prominent and influential scientific man in America during the first half of the nineteenth century." (D.A.B.) This article, one of forty or so Shepard wrote for Silliman's American Journal of Science, treats of the country along the lake shore at Chicago, and along the route of the Illinois and Michigan Canal. Of interest in the area of water resources is his note on the wet prairie west of Chicago, and his remarks on the plans for the canal.

"The city plat [of Chicago] scarcely varies from a perfect level, and rises only high enough above the surface of the lake to secure it a bare immunity from inundations during severe gales, and seasons of unusually high water. In the rear of the town lies a broad tract of wet prairie, still lower than Chicago, being only about ten feet above Lake Michigan. . . . The origin of so extreme a lagoon, which is almost completely submerged during the spring freshets, is not easily accounted for . . ." p. 134.

"Before adopting the present route [of the canal], an attempt was made to obtain a supply of water for the summit division from the Des Plaines, the Calumet, and the Fox rivers; but on running a level from the Des Plaines, nearly opposite the mouth of Portage lake, to the Fox river at Elgin, (thirty-five miles south of the state line,) where the surface of the stream is one hundred and fifteen feet above Lake Michigan, it was found, that the intervening ridges had an elevation of fifty or sixty feet, the cutting down of which would be too expensive to justify the expedient. The commissioners were accordingly led to adopt the magnificent plan of making Michigan the feeder to the canal. . . . The depth of six feet of water has been decided on in order to secure to the canal a constant depth of four feet during the fluctuations of the tides in the lake, occasioned by high winds." pp. 138-39. [This plan of making the lake the feeder was later abandoned because of excavation difficulties at the summit; the engineers went back to using the rivers as feeders.]

Shirreff, Patrick. A Tour through North America; Together with a Comprehensive View of the Canadas and United States. As Adapted for Agricultural Emigration. Edinburgh: Oliver & Boyd, 1835. 473 p.

Shirreff was a Scottish farmer who was interested in the prospects for emigrants of his status in the West. He was a careful observer, and he took special care to avoid criticism of America and its people. Four chapters of the "Tour" are devoted to an account of travels in northern and central Illinois. The "View" contains three chapters descriptive of Illinois, with special attention to agricultural conditions. At the time of his visit (1833) Chicago was still plagued with navigation problems at the mouth of its river (p. 226). He predicts growth for Ottawa, "a place of three or four houses," as it is at the head of navigation on the Illinois (p. 234), and he mentions meeting a farmer near Springfield who was planning to move because of the scarcity of water (p. 241). Of particular interest is the description of the confluence of the Ohio and Mississippi, and he notes, as did Sealsfield, that the width of the Mississippi does not increase below the junction. Shirreff's general remarks on the land over which he traveled between Chicago and Springfield give a good survey of the water resources.

"The Ohio at its junction with the Mississippi . . . is broader than the parent stream, and after the junction of three such rivers at the Missouri, Mississippi, and Ohio, their mingled streams do not appear larger to the eye than any of them singly, which arises from the depth and rapidity of the united current. The same difference of colour in the waters which I had remarked at the confluence of the Ottawa and St. Lawrence, and of the Missouri and Mississippi, were here perceptible. The limpid and placid Ohio, dammed up by the larger stream, and resting without motion between smooth and verdant banks, resembled the stillness of sleep. The Mississippi was like maddened intoxication." p. 266

"The rivers, which intersect the country in every direction, have formed deep channels for the conveyance of water, and no great extent of the surface is marshy. The space which I travelled over on foot, between Chicago, on lake Michigan, and the village of Springfield in Sangamon county, a distance of about 200 miles, the surface, with exception of a few miles at the commencement and termination of the journey, was undulating, the swells being long and considerable, without a lake, pond, or marsh being visible, except in one instance. On approaching Springfield, the surface became level without being wet, and from this village until I crossed the Mississippi the wettest parts of the surface might have been rendered dry by the ordinary means of ditching." pp. 420-21.

Storow, Samuel A. Narrative of a Tour in the Summer of 1817 on the Shores of Lake Superior and Other Northern Lakes of the U. S.; Addressed to Major Gen. Brown. [1818]. 39 p.

Reprinted as "The North-West in 1817," Wisconsin Historical Collections, VI (1872), pp. 154-187.

This pamphlet was originally published without title page. Storow was a native of Massachusetts, and Judge Advocate in the army from 1816-1820. Nothing more is known of him. The pamphlet contains a description of Chicago and a discussion of the water resources north of that village. He also remarks on the portage area west of Chicago.

"The country [north of Chicago] suffers at the same time from water and from the want of it. The deficiency of circulation, not of water itself, produces this contradiction. It is not sufficiently uneven to form brooks to lead off its redundant rains and form a deposit for mid-summer. The snows of winter dissolve and remain on the ground until exhaled by the sun at a late period of spring. In prairies that are entirely level this produces a cold which is scarcely dissipated by the heat of summer; in such as are undulated, it rendered one-half (that on which the water rests) useless, or of inferior value." Wisc. Hist. Colls., VI, p. 179.

"The river Chicago (or, in English, Wild Onion river) is deep and about forty yards in width, before it enters the Lake, two branches unite--the one proceeding from the north, the other from the west, where it takes its rise in the fountain of the De Plein, or Illinois, which flows in an opposite direction. The source of these two rivers illustrates the geographical phenomenon of a reservoir on the very summit of a dividing ridge. In the autumn, they are both without any apparent fountain, but are formed within a mile and a half of each other by some imperceptible undulations of the prairie, which drain it and lead to different directions. But in the spring, the space between the two is a single sheet of water, the common reservoir of both, in the centre of which there is no current towards either of the opposite streams." Ibid., p. 180.

Stuart, James. Three Years in North America. 2 vols. Edinburgh: Cadell, 1833.

Stuart, an Englishman, followed the route of Mrs. Frances Trollope (Domestic Manners of the Americans, 1832) along the Mississippi, but contradicted her criticisms of America. Three chapters relate largely to Illinois, Stuart's tour having taken him through southern and central parts of the state, visiting Edwardsville, Alton, Carrollton, Jacksonville, Springfield, Vandalia, and Albion. He mentions the confluence of the Missouri and Mississippi, referring to Charlevoix's description (3rd. ed., II, pp. 334-35). He mentions the Illinois river (Ibid., pp. 335-36), the Kaskaskia, and the Rock river (Ibid., p. 336).

Stuart's references to the water resources of the state are scanty; beyond those noted is a remark on the salt works in Gallatin County.

"The muriate of soda generally appears on sandy flats, the water strongly saturated with salt, of which cattle are especially fond, penetrating through the earth, and during the drought of summer forming on the surface a solid layer of salt, from two to six inches thick, equal in quality to what is obtained by artificial crystallization and evaporation. In Illinois, about 120 gallons of water yield sixty pounds of salt, sold at twenty pence sterling per bushel." Ibid., p. 391.

Thomas, David. Travels Through the Western Country in the Summer of 1816, Including Notices of the Natural History, Antiquities, Topography, Agriculture, Commerce, and Manufactures Auburn, New York: Rumsey, 1819. 320 p.

Thomas, A Quaker practical engineer, traveled as far as the Wabash valley, for the purpose of exploring the "Wabash lands in the New Purchase," and he spent time in and about Vincennes. He did not cross into Illinois, and the only mention of water resources in the state is a letter in the appendix by S. H. Long on the Illinois-Michigan water route (cf. above for the same information). Of interest is Thomas' remark on the increasing hardness of the Ohio River water, and the note that the Wabash makes good soap lather. His geological observations on the land east of Illinois are extensive.

"The water of the Wabash forms a good lather with soap. At Pittsburgh, for washing, the river water was good, but it becomes harder in its descent. At Cincinnati an increase of lime was evident, and near the mouth of the Wabash, the water of the Ohio was hard." p. 203.

Tanner, H[enry] S. A Brief Description of the Canals and Railroads of the United States: Comprehending Notices of All the Important Works of Internal Improvement Throughout the Several States. Philadelphia: Author, 1834. 63 p.

Reissued in expanded form as A Description of the Canals and Railroads of the United States, Comprehending Notices of All the Works of Internal Improvement Throughout the Several States. New York: Tanner & Disturnell, 1840. 272 p.

. Memoir on the Recent Surveys, Observations, and Internal Improvements, in the United States Philadelphia: Author, 1829. 108 p.

Tanner's contribution to descriptive literature, besides these guides to internal improvements, is primarily as a drafter and publisher of maps, and other's journals. The 1829 Memoir contains little on Illinois, mentioning only that a canal is proposed between Chicago and the Illinois River at the mouth of the Vermillion. He gives no details (Memoir, p. 81). By the 1840 edition of A Description of the Canals and Railroads, however, the canal has been started, and Tanner gives a lengthy description of it as it has so far progressed. (He refers to Volney in noting that the route of the canal followed the older transportation route.)

"The Illinois and Michigan Canal, was commenced in 1836, under the authority of the state government. It extends from a point on the south branch of Chicago river, about five and a half miles from Chicago, along the valleys of the Chicago, Des Plaines and Illinois, to the head of steam-boat navigation on the latter river. The main trunk is 96.35 miles in length, to which must be added 5.55 miles of river navigation along the south branch of the Chicago river, and a navigable feeder, 4 miles in length, from Fox river; making a total length of 105.90 miles. It is 6 feet deep; 60 feet wide at top water line, and will cost, according to the last estimate, \$8,654,337.51.

Although the canal is limited in extent, and free from the usual obstruction of hills and other elevations, the nature of the earth through which it is to pass, is such as to render its execution exceedingly laborious and expensive. One section, about 7 miles in length, requires a cut of 18 or 20 feet in mean depth, through an indurated clay, and this is immediately succeeded by another of nearly similar depth through compact limestone, the whole presenting an extent of heavy excavation into solid rock or its equivalent, almost unparalleled in the annals of canal making. At a distance of 30 miles from the lake, the deep cutting terminates, and at the further distance of 6 miles, the canal makes its first descent from the lake level, by 2 locks, of 10 feet lift each. Thence to its entrance into the Illinois, it maintains a nearly uniform descent." (1840, pp. 195-96).

U. S. House of Representatives. Memorial of the Legislature of Illinois on Illinois and Michigan Canal and River Improvements (January 27, 1868). Misc. Doc. No. 48, 40th. Cong., 2nd Sess. Serial 1349, 39 p.

While this document lies outside the range of this study, it is valuable as an assessment of the canal after twenty years' use. Apparently the engineers of the canal, after all the set-backs in its construction, worked out all their problems, because this report terms the canal a success. The problem now is that the Illinois river is not suitable for the traffic it carries, and has thus "proven a failure as a commercial highway" (p. 3). This report is also valuable as a brief history of the canal, noting the problems with the "deep cut", which was abandoned in favor of a water supply by machinery for elevation of water at Chicago, and by feeders" (p. 2). This memorial calls for the improvement of the river as a channel of commerce, in order that the canal can remain useful.

Noting that the Illinois River surveys of forty years before reported that it was sufficient for navigational purposes, while now it is not, the memorialists suggest that, "It is probable that this river like most of our western streams, which formerly derived their supplies of water, readily, from the solid and firm-set prairies, has been largely affected by the immense development of cultivation, absorbing in ploughed lands a large portion of the waters which formerly ran off from the uncultivated and unbroken country." p. 2 This comment on the effect of settlement on the streams properly belongs to another study. The early emigrants and journalists made no comment about this, although a careful survey of the streams in each county, using the proper materials, would reveal this result.

U. S. Senate. Documents Relative to the Drainage of Illinois Lands. (December 19, 1838). Sen. Doc. No. 21, 25th Cong., 3rd Sess. Serial 339. 5 p.

This document consists of letters from the president and manager of the American Bottom Lottery requesting the cession of certain federal lands (lands which had not yet been entered and sold) to facilitate draining operations. The lottery finally fell through, but these documents are valuable for their description of the American Bottom, that strip of alluvial land stretching along the east side of the Mississippi from Wood River to Kaskaskia River. The remarks pertaining to the water resources of the area are lengthy, but of particular interest concerning the relation of water resources to settlement, is the statement that, "It is believed that in the year 1812, the population of the American Bottom was greater than it is now. This is attributed to bad health arising from the stagnant ponds and lakes," (p. 3). The author, William C. Greenup, gives the following description of the Bottom, containing notices of the ponds and lakes, and the diseases of the marshes.

"The whole of the lands in this bottom are alluvial formation, consisting of alternate layers of clay loam and sand. No land can surpass its vegetable luxuriance. About one-half may be esteemed prairie land, and the other timbered land, ponds, and small lakes. The ponds and lakes appear to be in the reservoirs or channels formed by the river before it receded to its present channel; most of them are near the bluff, and the waters in them are a few feet below the river bank. The greater portion of these ponds and lakes are less than five feet in depth in ordinary stage of water; many of them become dry in the summer seasons. There are numerous small streams which flow down from the high-lands and discharge their waters into these ponds, and have no outlet to the river, except through the outlets of the ponds and lakes. Only seven outlets to my recollection find their way to the river through this bottom; and then, all these ponds and lakes discharge their redundant waters when their reservoirs are overfilled by heavy rains or great rises of water.

"The extreme rise in the Mississippi, from low to high water mark, has been estimated by some to be about 25 feet. . . . At the time of extraordinary freshets, the river overflows its banks at several places, but it is known that at no place does it exceed the height of its banks in this bottom but a few feet, and that it is very practicable to embank it throughout so as to be free from all overflow by the river. The examples of embankments on each bank of the same river in Louisiana for several hundred miles can be well applied in this bottom.

"The great fertility of the lands in the American Bottom annually produces luxurious growths of aquatic and noxious vegetation. To this may be added fish and large amphibia in the ponds and lakes. The water of these small ponds and lakes becomes more or less saturated with matter. When they dry up in summer and autumn, the miasma formed and exhaled into the air by a warm sunshine floats with its infecting effluvia and becomes highly noxious. Its effects are at least in two forms--by inhalation and adhering to the skin. Its contaminating qualities are not confined to the bottom lands, but it equally affects those on the contiguous high lands for many miles. Those on the high lands are most commonly affected by it first in the season. This marsh miasma adheres to the skin, and infects its pores--the pores become occluded, and the excretions of the fluids of the body become arrested, resulting in intermittent fevers, (or common ague and fever,) and remittant and other fevers; in fine, the whole viscera of the system becomes deranged. From the several effects of marsh miasma, so prevalent in this region of country, we may attribute the causes of the diseases which annually occur, and which have produced sad havoc to the health of the human race." pp. 2-3.

U. S. Senate. Report of the Survey of the Kaskaskia and Illinois Rivers (March 7, 1838). Sen. Doc. No. 272, 25th. Cong., 2nd. Sess. Serial 317. 14 p., map.

This report contains descriptions of the Illinois and Kaskaskia rivers, with details of the obstructions in their channels, and recommendations for clearing them. Of use in water resource research are the remarks by the authors of the report on the uninhabitability of the bottom lands; the military importance of the Illinois River, noting that uninterrupted navigation of the river is of prime importance (p. 2); the general navigability of the Illinois, noting depth; general description of the obstructions in the stream, and their recommended improvement. On the Kaskaskia, the authors, after noting that the stream is generally low, find that improvement seems impossible, as there is never enough water to make canalization successful.

"The bottom lands [on the Illinois] extend from one to five miles on each side of the river, seldom rising more than a few feet above the level of the stream in its ordinary stages, and from the fact that they are constantly overflowed by every freshet, to a depth varying from one to fifteen feet, are now, and must ever remain, uninhabited." p. 2.

"The Illinois river, from Peru to its mouth, flows over a bottom of sand and alluvial matter, with a current so very gentle and uniform as to cause by a few hours' difference in the time occupied by steamboats in ascending or descending its stream, an estimated distance of two hundred and fifty miles. Its banks consist almost entirely of very low alluvial bottoms, skirted by lagoons or lakes, most of which are connected with the river, the whole overflowed by every freshet for several miles on each side. For the greater part of the year, the navigation by steamboats drawing from three to four feet is uninterrupted, and it is only for about two months in the summer that three feet cannot be obtained as far as Peru For the last three years the water has not been as low as this, but has admitted the passage of boats drawing from two and a half to three feet, without interruption." p. 3.

On the improvement of the stream, two plans are presented. The first would be the construction of wing dams to concentrate the force of the current on the bar to be removed. The other plan would be to excavate channels through the bars. The latter plan is recommended, to a limited extent, as the alluvial matter brought down by the river is deposited slowly enough that the channel would require little upkeep. (pp. 4-5.) The report then goes on to list specific bars and obstructions and their improvement.

Concerning the Kaskaskia, "The principal objection, however, to the plan [of canalization] under consideration is that the river in the dry seasons does not afford sufficient water to supply the necessary lockage. At Vandalia it did not yield more than seven and a half miles. This would occasion interruption in the regular transportation of goods. Again, the inundation of the bottoms is now from eight to ten feet in times of freshets. The depth of water would be increased by the dams, and the periodical submerging of the locks themselves would be the consequence. They would thereby become filled with mud, and the cost of keeping them clear would be by no means inconsiderable." p. 11.

U. S. Senate. Report on a Land Grant to the Mississippi and Rock River Canal Company (January 25, 1839). Sen. Doc. No. 172, 25th. Cong., 3rd. Sess. Serial 340. 7 p.

This report is valuable because it describes the navigational problems on the Rock River, and the topography of the land through which the canal is to pass, noting that it is generally swampy and of little use, but that a canal would raise the value of the land. This is a good example of artificial water resources changing land use patterns.

"The point of commencement [of the canal] on the former river (Mississippi) is sixteen miles above the mouth of Rock river; and the place of termination on the latter river (Rock river) is about eighteen miles above its junction with the Mississippi; and the

length of the canal will not exceed four miles across a narrow neck of low, level bottom-land, communicating between the two rivers, of from three to four miles in width.

"This belt of land, through which it is proposed to cut the canal, though naturally fertile, is nevertheless too wet and swampy for settlement and cultivation, and, consequently, in its present unreclaimed state, offers no inducement to the agriculturist, and will most probably remain unsold for many years to come, if suffered to continue in its present condition; but should the proposed canal be excavated, it would, it is believed, have the immediate effect of redeeming it from its present useless state, and render it productive, and thereby greatly add to the resources of that part of the country, by increasing its settlement and cultivation, and at the same time, to the public revenue, though to an inconsiderable amount, by rendering the land saleable." p. 1.

Van Zandt, Nicholas B. A Full Description of the Soil, Water, Timber, and Prairies of Each Lot, or Quarter Section of the Military Lands between the Mississippi and Illinois Rivers. Washington: Force, pr., 1818. 127 p.

Van Zandt had been a clerk in the general land office. This book was much used by land-seekers, as the first eighty-four pages consist of a lot-by-lot description of the bounty lands, classifying it first-rate, second-rate, etc. In spite of the title, there is little mention of water resources. The book also contains a fifteen-page unfavorable account of Birkbeck's settlement (cf. Birkbeck above). Besides scattered references to the water resources of the area, the author gives a detailed description of the country of the Des Plaines, as well as a description of the Chicago river and the sand bar blocking its mouth, with his recommendation for removing it. He also recommends a short canal with locks at the Chicago portage, and proposes clearing the Illinois for navigation by the construction of sluices to concentrate the stream flow (p. 93).

On the Des Plaines country: "In ascending this river, also, the banks or bluffs gradually decrease in height, being as before mentioned, about 100 feet high at the mouth, and only 20 or 25 at the distance of 30 miles up the river, where, instead of maintaining their parallel direction, they form right angles with the course of the river--that on the right taking an easterly, and that on the left a northwesterly course: but being gradually inflected from these courses, they form an extensive curve, encircling a large tract of flat prairie, in no part elevated more than 12 or 14 feet above the common level of the water in this vicinity. The river, throughout the above mentioned distance, has four or five short rapids or ripples that make their appearance only in time of very low water. In every other part it has the appearance of being a chain of stagnant pools and small lakes, affording sufficient depth of water for small boats of moderate draught.

"In the flat prairies above mentioned is a small lake, about 5 miles in length, and from 6 to 30 or 40 yards in width communicating both with the river Des Planes and Chicago river, by means of a kind of canal, which has been made partly by the current of the water and partly by the French and Indians, for the purpose of getting their boats across in that direction in time of high water. The distance from the river Des Planes to Chicago river, by this water course, is about 9 miles; through the greater part of which there is always more or less water, so that the portage is seldom more than three miles in the dryest season; but in a wet season boats pass and repass with facility between the two rivers." p. 92.

"The [Chicago] river ["merely an arm of the lake"] and each of its branches are of variable widths, from 15 to 50 yards, and for 2 or 3 miles inland, have a sufficient depth of water to admit vessels of almost any burden. The entrance into Lake Michigan, however, which is 80 yards wide, is obstructed by a sand bar almost 70 yards broad; upon the highest parts of which the water is usually no more than two feet deep. The difficulty of removing this obstruction would not be great. Piers might be sunk on both sides of the entrance, and the sand removed from between them" p. 93.

Volney, C. F. Tableau du climat et du sol des États-Unis d'Amerique; suivi d'eclaircissements sur la Florida, sur la colonie Francaise au Scioto, sur quelques colonies canadiennes et sur les sauvages . . . 2 v. Paris: Courcier & Dantu, 1803.

A View of the Soil and Climate of the United States of America . . . Translated with Occasional Remarks by C. B. Brown. Philadelphia: J. Conrad, 1804. 446 p.

View of the Climate and Soil of the United States of America: To Which Are Annexed Some Accounts of Florida, the French Colony on the Scioto, Certain Canadian Colonies, and the Savages or Natives. London: J. Johnson, 1804. 503 p.

This book by Constantin-François Chasseboeuf, comte de Volney is not so much a book of travels as an organized description of the physical features of the country. Prior to this tour of 1795 to 1798, he had published similar studies based on his tours in the Middle East. Besides the material relating to climate, topography, winds, etc., in the general chapters, the appendix contains descriptions of the French colonies on the Wabash and in the Illinois Country. He traveled to Vincennes in 1796, but went no further west, although he outlines the route from Vincennes to Kaskaskia. His description of this route contains little of interest, except that it is a 43½ hour ride, and that "Water is very scarce," (London, 1804, pp. 378, 379). His comments on the shifting channel of the Mississippi, and its effects on the settlements on its banks are interesting, as he records the final destruction of Fort Chartres, foretold by Gordon and Pittman (cf. above).

"Opposite to [Kaskaskia] on the other side of the river was formerly St. Genevieve, a pretty large village, noted for its brinespring: but the inundations of the Mississippi have completely swept it away, and the inhabitants have retired to the high grounds two miles off Twelve or thirteen miles above Kas[kaskia], on the same side of the river, was fort Chartres, built of masonry with extraordinary magnificance. The formidable river has destroyed this also, and has already attacked one bastion of New Madrid, a settlement formed in 1791 opposite the mouth of the Ohio, and two hundred yards from the Mississippi, which undermines the foot of it in such a manner, that a great part of it will tumble down with the first rains.

"This great, magnificent Mississippi . . . is a very bad neighbor. Strong in body of yellowish muddy water, two or three thousand yards in breadth, which it annually rolls over its banks to the height of five and twenty feet, it urges this mass over a loose earth of sand and clay; forms islands and destroys them; floats along trees, which it afterward overturns; varies its course through the obstructions it creates for itself; and at length reaches you at distances, where you would have supposed yourself perfectly secure. . . ." London, 1804, pp. 379-80.

Welby, Adlard. A Visit to North America and the English Settlements in Illinois, With a Winter Residence at Philadelphia; Solely to Ascertain the Actual Prospects of the Emigrating Agriculturist, Mechanic, and Commercial Speculator. London: Drury, 1821. 224 p.

Welby visited the Birkbeck settlement in 1819, made a cursory examination, and, failing to find "all the comforts of home," concluded that it was a failure. Apparently, one of the comforts he missed was water, because he states that there was no water for them when they arrived at Albion; Mr. Birkbeck was very parsimonious with his water, but George Flower was generous.

". . . and what was worse [than no stable for the horses was] no water, not sufficient even to sprinkle over some Indian corn which we got for them." p. 110.

"In the morning a request was sent to Mr. Birkbeck for some water, understanding that he had a plentifully supplied well;-- the answer sent back was, that he made it a rule to refuse every one: a similar application to Mr. Flower however met with a different fate, and the horses were not only well supplied, but a pitch pitcher of good water was sent for our breakfast. If the first was not punished for his general refusal, the latter was rewarded for his grant by finding on his grounds and not far from his house, two days after, a plentiful spring of clear water." p. 111.

Although Welby wrote unfavorably of the English Settlement in general, his relating the want of water there is borne out by the other visitors to the colony, and by Flower's own narrative (cf. above).

Woods, John. Two Years' Residence in the Settlement on the English Prairie, in the Illinois Country London: Longmans, 1822. 310 p.

Woods was a well-to-do English farmer who settled on the English Prairie in 1819. His book gives a favorable view of the conditions there, although the want of water plagues all the settlers, as these notes indicate. On the digging of wells, he notes the various strata through which the well passes. There is also a short note on the retention of moisture on the prairies.

Wanborough, 1820: "As water is scarce, there are some more wells digging. Mr. Birkbeck, in July, found a tolerable good spring, by digging only six feet, about 300 yards from his house; but little water in them." p. 161.

Albion, 1820: ". . . several wells have lately been dug near it, but water is still scarce." p. 162.

"The country round us is not well watered, but very healthy. The creeks in the woods and prairies dry up in a dry season, except a few deep holes that are shaded by trees; nor are there many of the wells that possess good springs. As the weather has been very dry ever since the first of April, water is now (August the sixth) extremely low in most of the wells and creeks; but there are some wells that still afford a good supply; and some of the large holes in the creeks have plenty of water in them." p. 163.

"The soil found in digging wells is, first, a vegetable mould, next a loamy clay, then sandstone, and lastly clay-slate, through which no one has yet penetrated, though some have dug 50 or 60 feet without finding water. Many are of the opinion, that, if the clay-slate was once dug through, water could be found in great abundance underneath; others, that pit-coal lies below the clay-slate. . . . The water that is found in the wells, mostly rises between the sandstone rocks, but often in too small quantities to be of much domestic uses. I have dug two; one at Wanborough, the other at Birk's Prairie; the first is 11 feet deep, it has but little water: the latter is quite without, though 23 feet down to the slate-rock. As most of the wells dug out in Birk's Prairie have produced water, I have begun another, at some distance from the cabin, that promises to afford a good supply: the two I have finished cost me about 15 pounds. I have stopped a creek at Wanborough that has supplied us with water for many uses. Our well, though very short of water, has been very convenient; we let meat down in the bucket, it prevents the flies getting at it, and keeps it much better than any safe in this hot climate." pp. 163-64.

"A well at Birk's Prairie is strongly tinctured with glauber salts [sodium sulphate], and another with sulphur. And there are several salt-licks It is supposed by some that salt-water might be obtained by digging at these places, from which salt might be made, but no one has yet attempted it." p. 165.

September 1, 1820: "I have just finished walling up my well, at Birk's Prairie; the water rose so fast we had some difficulty to do it. As some of the earth gave way, it took a large quantity of stones. At the depth of 23 feet, we found a small vein of coal about three inches thick, just above the slate-rock. In digging this well we found no sand-stone above the clay-slate rock, as is generally the case. The water had, in the first place, a slight taste of sulphur, but it wears off, and is now much better flavoured; it stands sixteen feet deep." p. 286.

Moisture on the prairies: "The soil is a light vegetable mould, of no great depth in general; the under soil is a fat loam or clay, of considerable depth, that retains moisture, and prevents the land from burning. The land is easy of culture, much more so than any I was ever accustomed to, and dry enough to plough in a day after heavy rain; this is the case with most of the land round the prairies." pp. 229-30.

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- 1698 St. Cosme. Expedition to Arkansas, 1698-1699 (1916).
- 1712 Marest, "Letter to Father Germon" (1900).
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