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Drainage on the Grand Prairie: the birth of a hydraulic society on the Midwestern frontier

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Abstract

The Grand Prairie of east central Illinois was notorious for a marshy environment that prevented dense agricultural settlement until late in the nineteenth century. While recent historical–geographical scholarship has focused on innovations in drainage technology, drainage-related laws and institutions, and the ecological impacts of wetland reclamation, it has largely failed to account for the persistence of agrarian structure, and its key component, land tenure, on the Grand Prairie. Late-nineteenth-century reclamation efforts were not quite so transformative as previously believed. The same landed elite that dominated in the pre-drainage era quickly emerged atop a system of public drainage that held the key to the region's economic future. In this paper, we extend Karl Wittfogel and Donald Worster's theorizations about 'hydraulic civilizations' from the realm of irrigation to that of drainage. While drainage was indeed important in shaping the history of east central Illinois, we argue that a distinctive social order in east central Illinois emerged from, and was shaped by, an older agrarian structure that had developed in response to marshy, unpredictable conditions before drainage began in the late 1800s. The beneficiaries of the old order did not yield power easily, and instead skillfully capitalized on the new opportunities presented by drainage enterprises, to create a 'hydraulic society' on the prairie. The new order continued to rely on the exploitation of tenant farmers even as the landscape itself was transformed into the intensely managed and highly productive Corn Belt of today.

Keywords: Illinois; Drainage; Wetlands; Agricultural settlement; Frontier settlement

Turner's road not taken

In 1893, Frederick Jackson Turner presented his famous frontier thesis at a meeting of the American Historical Association. Standing before an audience in Chicago, he described the defining role of the western frontier in forging a uniquely American political culture. By stripping the easterner of his traditional ways and stagnant institutions, the western frontier had, by Turner's account, challenged and rejuvenated American society, fashioning both an ethos of individualism and local innovations in democratic governance. But he left his audience unsettled: with the western frontier effectively 'closed,' would democratic and egalitarian forms of government persist?[1]

Had Turner ventured south after the meeting, rather than north to his Wisconsin home, he might witnessed the closing of one of the Midwest's last internal frontiers, the Grand Prairie. The tracks of the Illinois Central Railroad would have carried him downstate, across the Kankakee River, toward the flat terrain of east central Illinois.[2] Outside the train windows, rows of tall July corn would have echoed the rhythms of mechanized farming in a young Corn Belt, whose fields stretched toward a distant horizon, punctuated only by silted streams and neat drainage ditches.[3] Through the Pullman car window, perhaps Turner would have glimpsed a crew of immigrant laborers cutting steep trenches into thick prairie sod. Manning a formidable ditching machine, or perhaps digging by

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[1] F.J. Turner, The significance of the frontier in American History, *Report of the American Historical Association* (1893) 199–227.

[2] Drainage was not widespread in central Wisconsin until a decade later, after the industry in white pine lumbering had died down. See H. Prince, *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes*, Chicago, 1997, 257. Indeed, the region's environmental transformation might serve well as a case study in what constitutes fertile ground for Turner's frontier. Fernand Braudel remarks, 'In the new towns and clearings of the North [of Europe] there grew up a more free civilization on the American pattern,' where 'a pick and an axe might be enough …to make the soil productive.' F. Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, 2nd Edition, Berkeley, 1966, 75. Donald Worster similarly finds that Turner's theory might be 'plausible for the history of Wisconsin or Ohio,' but not the arid American West. D. Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West*, New York, 1985, 11. After 1900, however, drainage would alter central Wisconsin much as it had the east central Illinois.

[3] A.G. Bogue, *From Prairie to Corn Belt: Farming on the Illinois and Iowa Prairies in the Nineteenth Century*, Ames, Iowa, 1963, 239.

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hand, the German and Dutch tenant workers might have carved ditches to carry water away from the estates of their wealthy landlords.[4] Their toil in the mid-summer sun betrayed the increasingly distant rung of farm ownership in the agricultural ladder of east central Illinois; they could only hope that drainage would allow them to retain larger yields after their landlord extracted his ever-growing share of their annual crop.

Easing away from the scene, Turner's train might have progressed across the unmarked boundary of a nearby drainage district, crossing over the community's main drainage channel. The waterway would have been planned by the local drainage commission, whose latest round of special drainage taxes was challenged by local landowners, but to no avail. Yet again, the local court had affirmed the right of these districts to levy heavy taxes on area landowners, who invariably transferred the burden onto the rents of their tenants. Drawing toward a new set of peripheral fields, Turner might have gazed upon the consequently modest properties of such tenant farmers. Their sorry finances precluded the possibility of larger tracts, even as neighboring small owners went out of business or else gave up on prairie farming, leaving their old lands behind. These too would become property of the large landowner.[5] Perhaps once they had repaid their hefty debts, these tenants hoped to pick up and move west as so many others had done, in search of a more promising frontier where they might work for themselves—not for landlords or drainage tax assessors—and under more democratic governance.

Would Turner have been surprised by what he saw?

Turner's defining hypothesis has won its adherents, yet it would seem to stumble clumsily over east central Illinois in 1893. In fact, the area presents a challenge to theories of Midwestern frontier settlement. William Cronon, fusing the insights of Turner, Johann von Thünen, and central place theorists, has argued that regions of distinctive land uses arranged themselves in a spatially well-ordered pattern in symbiosis with the market demands of the Midwestern metropolis, Chicago. Railroads and investment decisions helped reinforce this zonal structure over time and space: livestock raising and forestry became industries of the far hinterlands, while agriculture, especially wheat and corn, dominated somewhat closer to market centers.[6] Meanwhile, government land policies helped to establish a relatively egalitarian land holding pattern and along with it, the class of yeoman farmers that was so central to Turner's notion that the experience of the frontier reinvigorates democratic institutions.

Yet east central Illinois, though just a few hours' train ride from Chicago, was one of the last parts of the state to be densely populated and exploited for agriculture (Fig. 1). Moreover, a landed agricultural elite dominated a tenant underclass there for decades, producing some of the highest rates of farm tenancy anywhere outside of the southern U.S. and defying Turner's generalizations about the dominance of an independent class of farmers working small- to medium-sized parcels.

The obvious reason for the region's slow development was its setting on the swampy Grand Prairie: without modern drainage technologies and institutions to manage drainage effectively, settlers understandably skipped over east central Illinois well into the nineteenth century, instead setting their sights on the more promising terrain still available elsewhere. Indeed, other historical geographers have covered this ground before, arguing that the region's daunting physical geography, along with settlers' perceptions of its danger and unhealthfulness, prevented effective settlement until technological breakthroughs and new institutional arrangements, especially drainage districts, made reclamation economical.[7]

Certainly, the impact of wetland reclamation via drainage in the United States has not received the attention it deserves in historical scholarship, especially when compared with studies devoted to irrigation of arid lands. As Anthony E. Carlson points out, the amount of agricultural land reclaimed by drainage by 1920, mainly in the Midwest, far exceeded that opened by irrigation in the West.[8] However, while drainage undoubtedly reshaped the landscape, late-nineteenth-century reclamation efforts in east central Illinois were not quite so socially transformative as previously believed. While historical–geographical scholarship has focused on innovations in drainage technology, drainage-related laws and institutions, and the ecological impacts of wetland reclamation to explain the region's environmental and agricultural transformation, it has largely failed to account for the distinctive agrarian structures and land tenure patterns that characterized the Grand Prairie during this time.[9] Elements of these structures persisted; the same landed elite that dominated in the pre-drainage era quickly emerged atop a system of public drainage that held the key to the region's economic future.

Indeed, by 1893 east central Illinois featured some of the best farmland in the world, but transforming the wet prairie had been no easy task. Rendering the prairie agriculturally productive meant solving its drainage problem, which required substantial capital investment coupled with effective mechanisms for organizing labor. As the pressures of a layered frontier demanded a transition from cattle-raising to corn-growing, the emergent need for drainage produced a hydraulic society on the prairie, empowering a class of wealthy landlords and cattlemen before the state government implemented an equally strong bureaucracy of localized drainage districts in 1879.

Though the emergent order scarcely resembled the frontier of Turner's theory, the history of east central Illinois demonstrates the validity of his underlying logic. The evolution of any hydraulic society is intertwined with its frontier history because hydraulicism arises out of the choices states make in expanding their power and territory. In this paper, we extend Karl Wittfogel and Donald Worster's theorizations about 'hydraulic civilizations' from the realm of irrigation to that of drainage. We illustrate the transformative potential of drainage and chronicle its importance in shaping the history of east central Illinois. At the same time, we describe how the distinctive social order of east central Illinois emerged from, and was shaped by, an older agrarian structure that had developed in response to marshy, unpredictable conditions before drainage began in the late 1800s. The beneficiaries of the old order did not yield power easily, and instead skillfully capitalized on the new opportunities presented by drainage enterprises. The new order continued to rely on the exploitation of tenant farmers even as the landscape itself was transformed into the intensely managed and highly productive Corn Belt of today.

[4] M.B. Bogue, *Patterns From the Sod: Land Use and Tenure in the Grand Prairie, 1850–1900*, Springfield, 1959, 163.

[5] Bogue, *Patterns From the Sod* (note 4), 137, 150; *Chicago Tribune*, March 30, 1893.

[6] W. Cronon, *Nature's Metropolis: Chicago and the Great West*, New York, 1991, 23–96.

[7] See Prince, *Wetlands of the American Midwest* (note 2); M.R. McCorvie and C.L. Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930, *Agricultural History* 67 (1993) 13–39; R.A. Winsor, Environmental imagery of the wet prairie of east central Illinois, *Journal of Historical Geography* 13 (1987) 375–397; M. Urban, An uninhabited waste: transforming the Grand Prairie in nineteenth century Illinois, USA, *Journal of Historical Geography* 31 (2005) 647–665.

[8] A.E. Carlson, The other kind of reclamation: wetlands drainage and national water policy, 1902–1912, *Agricultural History* 84 (2010) 452–453.

[9] On the importance of land tenure in shaping both landscape and society, see S. Salamon, Cultural dimensions of land tenure in the United States, in: Harvey Jacobs (Ed.), *Who Owns America? Social Conflicts Over Property Rights*, Madison, 1998, 177.

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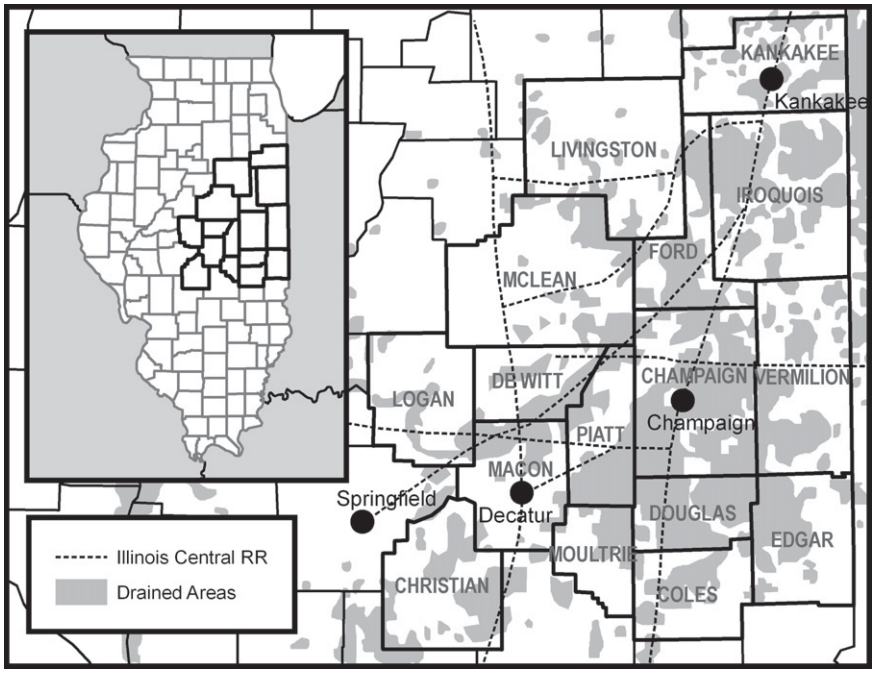

Fig. 1. Map of the study area, by authors.

The wetland problem: a hydraulic solution?

The Grand Prairie provides one instance of an inegalitarian society that grew out of the energetic drainage enterprises of the Midwestern US and the Canadian Great Plains in the late-nineteenth and early twentieth centuries. These regional exceptions to Turner's frontier thesis can be explained by the hydraulic theories of Karl Wittfogel and Donald Worster, which suggest that political institutions, social structures, and land tenure regimes in these places could be conditioned by their hydrological environments. We draw on the historical account of Fernand Braudel to incorporate their hydraulic hypotheses into a theory of state extension. Regions like the Grand Prairie exemplify this new understanding of Worster's 'capitalist state' hydraulicism, which depends as much on the imperatives of the expanding agricultural frontier as on the political economy of wetland transformation; over time, increasingly centralized and powerful state institutions direct capital to wetlands like the Grand Prairie after private interests fail to effect adequate economic development through drainage agriculture.

Our understanding of the Grand Prairie experience begins with Karl Wittfogel's 1957 work, *Oriental Despotism*. Wittfogel proposed that the strong bureaucratic regimes of East Asia were rooted in their reliance on massive irrigation works, which conditioned highly centralized and despotic governments. Water held such politically transformative power, Wittfogel claimed, because it lay between two extremes of agricultural inputs: those resolutely invariable production factors such as regional climatic conditions, and those more malleable characteristics including aspects of vegetation and soil composition.[10] Water, a production factor that was, above all, 'bulky,' thus created a 'technical task which is solved either by mass labor or not at all.'[11] Water control was therefore achievable, but it required specific and profound transformations of a society's political economy—it required hydraulic states.

Indeed, for advanced societies to establish themselves in many of the world's arid regions, they would need strong states that could fund expensive water works and coordinate the mass labor required to construct extensive hydraulic infrastructures. Once established, these powerful governments would in turn extend their control over other sectors, fashioning historically distinctive military, religious, and proprietary traditions.[12] From China and India to the early civilizations of Mesopotamia and the Americas, it was a mastery of water, that lifeblood of human existence, which empowered the world's most formidable ancient states, spawning the first 'hydraulic civilizations.'

Wittfogel's central argument—that the capital investment and labor coordination required for substantial water control condition strong and hierarchical power relations—may be extended beyond the 'despotic' states of the Orient. In his book *Rivers of Empire*, Donald Worster argues that Wittfogel unnecessarily limited the geographical and temporal scope of his theory.[13] In adapting Wittfogel's insights to the irrigated American West, Worster proposes a new taxonomy, a classification of hydraulic societies into three broad groups, which also represent successive stages in global historical development: the local subsistence mode, the agrarian state mode, and the capitalist state mode of production. While Wittfogel extends his theory of hydraulic civilization exclusively over agrarian state societies, Worster argues that during modern times irrigation works have conditioned a new type of hydraulic society. His 'capitalist state mode' of production is characterized by not one, but two powerful groups: wealthy agricultural capitalists and 'water bureaucrats.' These rival yet codependent camps, he suggests, compete for social power before forming an

[10] K. Wittfogel, *Oriental Despotism: A Comparative Study of Total Power*, New Haven, 1957, 14.
[11] Wittfogel, *Oriental Despotism* (note 10), 15.
[12] Wittfogel, *Oriental Despotism* (note 10), 59, 78, 87.
[13] Worster, *Rivers of Empire* (note 2), 30.

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alliance that emerges as a new hydraulic order, encompassing both public and private sectors, less limited than before in scope or ambition.[14]

If Worster's new regime type is the expression of hydraulic forces within a capitalist order, it should appear historically alongside early capitalist markets in the West. Let us return, then, to the regional conditions of 'the Po Plain, of Venice, and of the Netherlands,' where Wittfogel refused to extend his theory. Rather than witnessing the political or geographical dominance that China and India attained, these areas emerged as hydraulic regions of a different class within the 'nonhydraulic nexus' of the continent. Fernand Braudel's *The Mediterranean*, a masterful tour of early modern Europe, provides key insights into these cases. As urban populations of the fifteenth and sixteenth centuries expanded and nobles looked to augment their power, both groups were eager to create productive regions from the stagnant waters of Europe's malarial swamp lands.[15] Across southern Europe governments and capitalists alike shouldered the prohibitive investments in drainage and irrigation, beginning on the smaller plains and working their way toward the larger ones with more extensive hydraulic projects. In Tuscany, the Po Delta, Naples, and Rome, governments began land improvements. Wealthy capitalists were meanwhile responsible for the improvement of the vast plains of Lombardy and Languedoc, where hydraulic social power overflowed into the private sector. In Venice, an urban hydraulic society was shaped by symbiotic relationships maintained between patrician families and government, which were often interlinked through mutually empowering channels of credit.

The emergent social patterns were clear: 'The plains were the property of the nobleman' in Braudel's Mediterranean basin—flat, waterlogged marshlands where feudal structures persisted past their time. For their part, the nobles were such strong property holders that they constituted a state unto themselves. Even in Turkey their drainage efforts were evident in the *çiftliks*, 'villages recognizable from the hovels clustering around the tall master's house, that towers and watches over them.'[16] In Venice, where half of a landowner's property was exacted in payment should he fail to pay for the administration's planned improvements on his land, the burden of government drainage was similarly onerous. Where private investment was at work, absentee landlords ruled over a miserable class of tenant laborers. On this point, Braudel and Worster sing in due harmony. On the low plains of Lombardy Braudel discovers the 'true rural proletariat' in the migrant workers, tenant agriculturalists, and peasant farmers, the modern hydraulic state's 'wage-based answer to the corvée,' later embodied in the immigrant field hands who Worster finds in the arid American West, 'sweating every bit as much as the Egyptian fellahin did.'[17]

Braudel's findings confirm Worster's new classification, and go further, suggesting that drainage—which, like irrigation, confronts the 'bulkiness' of water—is similarly capable of conditioning hydraulic regimes. Though Worster rightly extends hydraulic theory to the modern West, like Wittfogel he denies that flood control is politically transformative, rejecting it as

> …sporadic and unpredictable…flood protection by itself has usually a limited, ambiguous impact on the structure of society and power. Irrigation, on the other hand, is a type of water control that is constant, pervasive, and more socially demanding…The difference is between holding an umbrella over your head when it rains and making the rain go somewhere else. The first is a momentary defense, the second a concerted attempt to control and defeat a threat once and for all.[18]

It would be hard to argue, however, that such an assertion holds in Europe's marshes or on the wet prairies of the Midwest, where water was an ever-present threat and the costs of a lost crop could be disastrous. Here agriculture required drainage works that, in their extension, long-lasting effects on agro-ecology, and demands on social organization, more closely resemble irrigation systems than Worster's 'flood protection' works. Yet drainage does present important differences: where irrigation canals often draw water over great distances from sparse rivers to arid landscapes, drainage operations direct water to nearby outlet streams, conditioning a *localized* hydraulicism that is perhaps closer to Wittfogel's 'hydroagriculture.'[19]

Whether developed through irrigation or drainage, however, new hydraulic orders are a result of state expansion, prompted by the demands of growing populations and their governments' appetites for wealth. States seek to extend their frontiers along the paths of least resistance, and thus circumnavigate geographical features that require special expenditure to develop across. Yet rather than broaden its power, the economical state may instead 'deepen' its power through stronger and more involved government where its extension encounters insurmountable costs: when its frontier runs up against the limits imposed by diseconomies of scale inherent in its own structure, when it confronts the military bounds of other states, or when it encounters natural features it cannot circumnavigate.[20]

Turner may, in fact, be the first to turn to on this latter point. In 'The Significance of the Frontier' he notes that east of where the frontier stalled—'the "fall line;" the Alleghany [sic] Mountains; the Mississippi; the Missouri where its direction approximates north and south; the line of the arid lands…; and the Rocky Mountains'—there cropped up those Eastern, traditionalist forces.[21] No great leap in logic is required to accept that where smaller, circumnavigable boundaries like the Grand Prairie emerged, the frontier would progress around them, returning to colonize such 'high cost' areas when more formidable obstacles presented themselves further west.[22]

We can add to this formulation Turner's 'layered frontier' or von Thünen's 'zones of industry': just like the outer frontier, von

[14] Worster, *Rivers of Empire* (note 2), 31.

[15] Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (note 2), 67, 70.

[16] Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (note 2), 69, 75–76; see also 724–725.

[17] Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (note 2), 75, 79; Worster, *Rivers of Empire* (note 2), 51.

[18] Worster, *Rivers of Empire* (note 2), 20.

[19] For more on this often-hazy distinction, see D.H. Price, Wittfogel's neglected hydraulic/hydroagricultural distinction, *Journal of Anthropological Research* 50 (1994) 187–204.

[20] Just so did Braudel's Italian states revisit the lowland marshes when demand for new grain found them squeezed up against the military strength of their neighbors. The same reasoning supports Weber's notion that the cramped territorial conditions of continental Europe were responsible for the divergent political economies of Britain and the continent.

[21] Turner, Significance of the frontier in American History (note 1), 202.

[22] J. Sheppard Smith puts it well: 'In the development of our country it was only natural that the farm lands which were more readily susceptible to cultivation should have been occupied first, and that the overflowed and swamp lands should have been overlooked entirely for years. It was only after the absorption of the more desirable farming land, which resulted from the increase of population, and after the consequent and more intensive development of the country, that attention was directed to the reclaiming of the overflowed lands.' J.S. Smith, Reclamation of swamp lands and the modern drainage bond, *Annals of the American Academy of Political and Social Science* 88 (1920) 102.

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Thünen's zones will avoid marshland barriers as they press outward from core markets, returning to them later. More importantly, wetland barriers pose different problems to the various industries of the layered frontier, especially impeding the development of agriculture after cattle-raising becomes unsustainable. It is during this transition, then, that drainage becomes economically necessary and targeted hydraulic institutions become the most efficient means of maximizing state power. We have theorized a dynamic of circumnavigation and 'filling in'; now Turner's waves and von Thünen's zones suggest exactly which round of this process will condition a strong hydraulicism.

Thus, Turner's own history of the American frontier justifies the exceptions found in east central Illinois and Worster's irrigated West. Indeed, Turner's and Worster's logics converge from the perspective our model reveals. The emergent synthesis brings frontier change to hydraulic theory and, in turn, brings hydraulicism to the wet prairie frontier.

The wet prairie at midcentury

A combination of inaccessibility, poor agricultural prospects, and exaggerated popular imaginings of the Grand Prairie made east central Illinois the last settlement frontier in the state. The impression the wet prairies made on the first frontier settlers has been well documented: Easterners had seen nothing like the vast, flat tallgrass prairies before, and for newcomers it was a miserable and bewildering experience. Successive rounds of glaciation had left the region poorly drained, with few outlets or navigable streams.[23] The rich glacial soils that today render the region ideal for modern farming were during this time still thick muds, often submerged, and would not yet take to the plow. Many eastern settlers mistook the area's lack of trees for a sign of poor soil quality. Meanwhile, the landscape's level slopes, which collected over a meter of stagnant water during the wet spring months, provided an excellent breeding ground for the *anopheles* mosquitoes that buzzed through the high bluestem grass. Wading through the malarial swamps, pioneers were often overcome with the feverish 'ague,' supposedly fainting from loss of blood.[24]

Such exaggerated accounts of disease and the deficiencies of the land prevented heavy settlement. It is telling that in Illinois, Livingston, Ford, Iroquois, and Champaign counties, population density did not surpass Turner's frontier criterion of two people per square mile until after 1840, lagging behind all other counties in the state.[25] Euro-American pioneers in the region favored wooded upland tracts, and ventured cautiously onto small expanses of wet prairie.[26] Not until the Illinois Central passed through the Grand Prairie did the region attract significant settlement.

After midcentury, two pieces of legislation put substantial prairie lands to market, empowering a new capitalist overclass of cattlemen and landlords. In 1850 the federal government allocated one and one-half million acres of poorly drained prairie to Illinois under the Swamp Land Act, a perhaps naïve attempt to accelerate frontier settlement.[27] Though Congress intended that 'the proceeds of said lands shall be applied, exclusively, so far as necessary, to the purpose of reclaiming said lands by means of levees and drains,' drainage was not yet a priority for the state of Illinois.[28] Instead the state, which was heavily in debt, turned over swamp grant land to its counties in 1852, with the intention of reducing this deficit and using any surplus revenue to fund basic infrastructural projects. In Champaign County, swamp grant revenue funded schoolhouses and courthouses, not drainage schemes. Quick sales helped wealthy landowners consolidate their holdings in vast, unimproved tracts.[29]

As per our state extension theory, the degree to which governments were content to sell unimproved lands rather than drain them was a product of their frontier prospects and cheaper extension options. These possibilities varied over time and space; in the 1850s, local governments and their boosters alone voiced strong opposition to the sales policy of the federal, state, and even county administrations because they were the only ones without expansion-based development options. In 1858, an editor for the *Central Illinois Gazette* expressed such concerns, declaring, 'we consider every acre that goes into the hands of non-resident, non-improving speculators as a positive detriment to the people.'[30] Yet above the local level, governments valued quick revenue over the productive disposal of improved swamp land as long as more efficient alternatives for growth remained.

The limitations of drainage technology reinforced these attitudes. Margaret Beattie Bogue notes that 'if [counties] planned to improve their holdings and bring them into production in the 1850s and 1860s they would have to spend large sums of money experimenting with methods of drainage with little assurance of breaking even or realizing a profit.'[31] At this juncture, state development in Illinois was yet rudimentary, and it made little sense to gamble funds on drainage when counties—which were still developing their wooded groves and small prairies—lacked basic infrastructure.

This development logic would change as that infrastructure improved. Eighteen fifty also marked the year the Illinois Central Railroad received its charter from the state.[32] Like those of local governments, the Illinois Central's economic prospects hinged, in part, on the development of its finite set of land, and thus it had a more pressing interest in seeing its two and one-half million rail-side acres in Illinois improved. The railroad's policies therefore encouraged settlement and drainage, in contrast to state swamp

[23] H.R. Mount, *Soil Survey of Champaign County, Illinois*, Washington, 1982; Winsor, Environmental imagery of the wet prairie of east central Illinois (note 7), 375.

[24] Mount, *Soil Survey of Champaign County, Illinois* (note 23); Winsor, Environmental imagery of the wet prairie of east central Illinois (note 7), 375; Urban, An uninhabited waste (note 7), 652.

[25] A. Bogue, *From Prairie to Corn Belt* (note 3), 8; Winsor, Environmental imagery of the wet prairie of east central Illinois (note 7), 380–381; Urban, An uninhabited waste (note 7), 653.

[26] Prince, *Wetlands of the American Midwest* (note 2), 126–127; J.O. Cunningham, *History of Champaign County*, Chicago, 1905, 648; A. Meyer, The Kankakee "Marsh" of northern Indiana and Illinois, *Papers of the Michigan Academy of Science, Arts, and Letters* 21 (1935).

[27] M.B. Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900, *Agricultural History* 25 (1951) 170.

[28] B.H. Hibbard, *Public Land Policies*, Madison, 1965, 270. In fact, for the federal government itself, raising values of adjacent federal lands was a major motivation for the Act.

[29] Cunningham, *History of Champaign County* (note 26), 648; Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 171–173; Paul Wallace Gates, Land policy and tenancy in the prairie states, *Journal of Economic History* 1 (1941): 62-3.

[30] *Central Illinois Gazette*, Urbana, October 13, 1858.

[31] Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 174.

[32] P.W. Gates, The promotion of agriculture by the Illinois Central Railroad, 1855–1870, *Agricultural History* 5 (1931) 58. While Illinois granted the north–south Illinois Central two and one-half million acres of federal land accordingly, the nation's east–west lines would later receive even more generous grants from the federal government, 'the unprecedented liberality in the grants to the Pacific roads due largely to the nature of the country through which the roads were to pass.' Hibbard, *Public Land Policies* (note 28), 249.

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grant policies that endowed eastern speculators and absentee investors.[33] That the Illinois Central still emerged a fixture of the large landowner-dominated economy of the 1850s prairie attests to the power of its soggy geography to impact economic development. Not until after the Civil War would these forces be manifest so plainly.

Of the Illinois Central's hundreds of thousands of acres in checker-boarded lands in Champaign County, many unsold sections coexisted with the large land holdings of farmers and landlords through the 1860s.[34] The Illinois Central's grant stipulated railroad lands go at no less than $2.50 per acre, and their proximity to the railway fetched them between $7 and $15 per acre through the late 1850s, while swamp grant lands sold for $1.25, $3, or $6 per acre in Champaign County, according to their assessed grade.[35]

In addition to high land prices, the prohibitive costs of private drainage meant that the Illinois Central's lands fell into the hands of wealthy landowners, who had already flocked to the region for its cheap lands and easy credit. Indeed, by 1870, most of Illinois' large farms 'were in counties in which the Illinois Central had received large amounts of land.'[36] Writes Gates, 'A considerable part of the early sales of the railroad were made to colony promoters and landlords who were planning the creation of huge estates or bonanza farms.'[37] The simple fact was that no one else could afford to buy on the railroad's terms.

Even so, the Illinois Central went to considerable lengths to promote agricultural development and the prerequisite drainage in order to secure settlement along its lines.[38] The railroad even collaborated with the State Agricultural Society to advertise the region and its prospects. Yet its solutions to the drainage problem were as capital intensive as any. In 1859, the railroad offered a $250 prize for a workable ditching implement, yet 'only large landowners could afford such expensive machines and consequently the problem of draining the wet areas was not solved.'[39] Nonetheless, the Illinois Central worked symbiotically with wealthy landowners to drain lands privately, once constructing a station near a 10,000 acre wetland tract in exchange for its privately funded drainage.[40]

The old regime

Such extensive drainage was not wholly characteristic of the system that arose after 1850, however. While the railroad's hefty land prices and the cost of private drainage advanced the capitalist's influence, drainage schemes were the exception, not the rule, before the mid-1860s. Rather, the wet prairie produced a wealthy ruling class for related but subtler reasons. As land markets exploded after 1850, the many cattle ranchers on the prairie frontier were forced to purchase legally the lands their cattle had heretofore grazed under informal tenure. Yet buying wet prairie land was a high-risk investment, one only those with substantial resources could afford to make, and one money-poor governments with other development options were quite ready to accept.

Joining the cattlemen were eastern speculators, who took up landlordism while seeking quick returns from western land. After the lull in speculation that accompanied the Panic of 1837, investors returned to Illinois, gobbling up public lands through the 1840s and into the mid-1850s. These were the landowners whose lack of improvement schemes provoked scathing criticism from local boosters. When their short-term plans did not pan out, many investors and speculators—who wanted some immediate returns to remain afloat through poor credit cycles—turned to tenancy as a meantime solution and morphed into a landed ruling class that 'forestalled and subsequently took tribute from actual settlers' as it crowded them out of land markets.[41] Tenancy became widespread on the prairies of the Midwest through the 1850s and early 1860s, and nowhere more so than in east central Illinois. In Ford and Champaign counties, rates of tenancy reached 40% and 45%, respectively, while one William Scully's extensive operations boosted neighboring Logan County's rate to a formidable 50%.[42] Whether they were seeking long- or short-term returns initially, by the 1850s this landlord class was firmly established, and it had adopted tenant farming as a solution to the low yields of prairie land investments, an outcome rooted in the natural features of the Grand Prairie itself.

Henry L. Ellsworth was one such landlord who intended to rent out his vast estates when he acquired them in the 1830s. Ellsworth bought 220,000 acres of Illinois and Indiana lands and began to advertise for tenants soon afterward. His tenants came from the ranks of immigrants making their way west, many of whom could not yet afford land on the prairie, since competition between speculators and wealthy landowners ensured that land prices were out of their reach. Others wanted to become acquainted with the land before committing to a parcel. These tenants might pay Ellsworth one-third of their annual crop during their stay, or up to one-half of their harvest in order to gain title after two to three years.[43] Yet few tenants remained on the land; even with title, the prospects of prairie farming in the 1850s were daunting for a small farmer who could not furnish the capital to drain.

Nowhere was this clearer than on William Scully's estates, where tenants were refused assistance in making improvements, leaving it 'the most forlorn-looking estate in Illinois.'[44] Scully's operations showed the extremes of concentrated land and power in east central Illinois. The Irishman, who in 1860 had been wounded in a 'murderous assault' while delivering evictions to a mob of tenants in Ireland, was known to charge extortionate rents and evict tenants without due cause.[45] So severe were his perceived abuses of power that the local press singled him out for criticism, while practically ignoring the misdeeds of other landed elites. As

[33] Gates, The promotion of agriculture by the Illinois Central Railroad, 1855–1870 (note 32), 66.
[34] F.A. Schlipf, J.E. Koch and H.C. Grueneberg Jr. (Eds), *Combined 1893, 1913, and 1929 Atlases of Champaign County, Illinois*, Urbana, Illinois, 1997; Alexander Bowman map of Champaign County, 1863. Champaign County Historical Archives, Urbana Free Library, Urbana, Illinois.
[35] Hibbard, *Public Land Policies* (note 28), 243; Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 171; Bogue, *Patterns From the Sod* (note 4), 32; Champaign County, Deed Record, T: 607, Champaign County Recorder of Deeds Office, 1776 E. Washington St., Urbana, Illinois, 61802.
[36] Gates, The promotion of agriculture by the Illinois Central Railroad, 1855–1870 (note 32), 67; P.W. Gates, Large scale farming in Illinois, 1850–1870, *Agricultural History* 6 (1932) 15.
[37] P.W. Gates, *Landlords and Tenants on the Prairie Frontier: Studies in American Land Policy*, Ithaca, 1973, 244.
[38] Sometimes literally, once providing two and a half miles of empty cars to accommodate agriculturalists and other attendees at the state fair. Gates, The promotion of agriculture by the Illinois Central Railroad, 1855–1870 (note 32), 60.
[39] Gates, The promotion of agriculture by the Illinois Central Railroad, 1855–1870 (note 32), 73.
[40] For a fuller description of the Danforth agreement, see Gates, The promotion of agriculture by the Illinois Central Railroad, 1855–1870 (note 32), 74.
[41] Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 70.
[42] Gates, Land policy and tenancy in the prairie states (note 29), 80–81.
[43] Gates, Land policy and tenancy in the prairie states (note 29), 75; Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 133.
[44] *Bloomington Pantagraph*, Bloomington, Illinois, March 21, 1887. Reprint of an article originally published in the *Chicago Tribune* (note 5).
[45] Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 267.

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the largest non-corporate landowner in Illinois, with 38,000 acres in Logan and Grundy counties alone, Scully came about as close as any to the absolute supremacy of Wittfogel's hydraulic despots.[46] The sheer weight of his power over the 'miserable' Polish and Bohemian tenants who were 'in a state of absolute serfdom under his heartless alien rule,' the unwarranted confiscation of their lands, the full transfer of his tax burden onto them, and the utter absence of help in making the improvements that were sometimes required of them to gain title all demonstrate 'despotic' arrangements that recall the feudal worlds of Wittfogel and Braudel.[47]

While Scully's excesses were atypical for the Grand Prairie, the estates of Matthew T. Scott were largely representative of landlord–tenant relations on unimproved lands at midcentury. Between 1848 and 1859, Scott and a cadre of relatives purchased 45,070 acres in Vermilion, Piatt, Livingston, and McLean counties. Scott was among the class of prairie landlords who 'discarded the theory that the best way to make money from raw prairie was to keep expenditures at a minimum,' the kind of landowner who would survive the profound transitions of the next decade. Accordingly, he tenanted his lands and made impressive efforts to drain them, spending $5700 on labor alone in 18 months during the mid-1850s. Yet his tenants were widely unsuccessful in gaining title to what lands Scott might sell for profit, conveying a general trend in the region; notes Bogue, 'in part the high percentage of failures stemmed from the heavy costs of improving and operating land.' Meanwhile, Scott's large capital outlays allowed him the improvement schemes that catapulted him to local prominence. 'Indeed, if the economic life of Chenoa Township in the frontier period may be said to have revolved around one person, that person was Scott, its chief booster, landowner, and moneylender.'[48] This was the dominance of the 1850s landlord: on estates like those of Matthew T. Scott, the wet prairie had arrived at its first incarnation.

Speculator-landlords defined the future of east central Illinois when they adopted tenancy as a solution to their financial troubles, yet they were both outnumbered threefold and out-landed by the large-scale farmers and cattlemen 'who exercised political power out of all proportion to their numbers,' and formed the other half of east central Illinois' ruling class in the 1850s.[49] The wet prairie favored such men of capital because the untillable terrain of large wet prairies was useful only to cattlemen, who already required substantial holdings to make profits. This constituted a weak selection for large landowners, who became wealthy and powerful not because they alone could afford to drain, but because they alone could afford not to.

While small farmers and settlers of modest means gravitated toward wooded tracts, the cattlemen of the 1840s and 1850s found the large prairies perfectly suitable for ranching. 'The abundance of tall sweet grass,' observes Gates, 'made the prairies a natural area for the cattle industry.'[50] On the bluestem expanses of east central Illinois, prairie cattle kings came to dominate, but initially required less capital than was necessary for private drainage, because the expansive and semi-open range allowed their mobile cattle to take advantage of seasonally changing moisture conditions.[51] In the 1850s, when new land acts and cheap credit induced a wave of immigration into the region, the cattle kings quickly bought up as much public land as they could, seeking to maintain their dominance in the prairie system. During later stages, landowners would likewise take possession of lands left by insolvent neighbors. Though cattle enterprises did not confront the costs of drainage, they were still undertakings out of the newcomer's reach, an inaccessible rung on the agricultural ladder of the wet prairie.[52] Indeed, while cattlemen minimized investments in farm buildings and land improvements, theirs was yet a wealthy man's game, with risks and expenses only justified by the commensurate profits that furnished them with 'costly furniture, art treasures,' and 'palatial country mansions.'[53]

Moreover, the cattle industry in east central Illinois became increasingly capital intensive in response to changes on the national frontier. Initially, the cattle kings inhabited the edge of the frontier, the outer rings of von Thünen's concentric landscape. Yet, as William Cronon suggests, these rings expanded as the nation grew, washing like waves over Turner's stationary vantage point.[54] For a time, the wet prairie of east central Illinois was an exception, a waterlogged frontier that agricultural development passed over, where the speculators, landlords, and cattlemen alone reigned. One is reminded of Braudel's Lombardy—even he cannot omit 'Thünen's law of circles'—where towns gave way to noblemen's castles, which in turn gave way to the capitalists' estates as one descended onto the damp lower plains.[55] Lagging in agricultural intensification as it had in initial settlement, the cattle-raising economy persisted on the Grand Prairie, but eventually development caught up to east central Illinois. As its ranchers could not compete with cattle enterprises further west, they were gradually forced to intensify their operations. The story of east central Illinois' cattle industry in the 1850s and 1860s was the story of that frontier progression, with its strong push and pull of economic forces.

When Michael L. Sullivant, a commercial farmer from Ohio, settled on the prairie of Illinois in 1854, having bought 80,000 acres of federal, railroad, and swamp grant lands in Champaign, Piatt, and Ford counties, he did not fully foresee these impending transitions. He surely possessed the ample land holdings required of prairie cattlemen, and he was likewise ready to purchase equipment and hire laborers in order to work his formidable lands. Upon arrival at his Broadlands farm in early 1855, Sullivant was already supplied with thirty horses and nine wagons. And the 23,000 acre estate in the southeast corner of Champaign county hosted 5000 cattle and 4000 horses by 1863.[56] Yet by the mid-1860s, he and his cattle king comrades increasingly felt the economic pressures of a layered frontier, the strains that would ultimately put Sullivant out of business.

Drainage and Darwin: the wet prairie in transition

The American Civil War did not ravage the wet prairie as it did the battlefields of the east, yet the Grand Prairie and its landowner class nevertheless emerged profoundly altered in the post-bellum world.

[46] Prince, *Wetlands of the American Midwest* (note 2), 164.
[47] Gates, Land policy and tenancy in the prairie states (note 29), 76; Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (note 2), 76.
[48] Bogue, *Patterns From the Sod* (note 4), 85–106.
[49] Bogue, *Patterns From the Sod* (note 4), 85.
[50] Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 198.
[51] Bogue, *Patterns From the Sod* (note 4), 49.
[52] Bogue, *Patterns From the Sod* (note 4), 150; Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 133, 204.
[53] Prince, *Wetlands of the American Midwest* (note 2), 172; Bogue, *Patterns From the Sod* (note 4), 73.
[54] Cronon, *Nature's Metropolis* (note 6), 54.
[55] Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (note 2), 61, 74.
[56] N. Bateman and P. Selby, *Historical Encyclopedia of Illinois*, Chicago, 1905, 613; Gates, Large scale farming in Illinois, 1850–1870 (note 36), 17; Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 226, 250.

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As the frontier moved west across Chicago's growing hinterland, Illinois land values and taxes increased steadily. Gradually, the cattlemen of the Grand Prairie found their blooded stock outcompeted by the produce of ranchers on the outer frontier, where land was cheap and taxes low.[57] This was the logic of von Thünen's theory: as rents increased in Illinois, revenues from cattle-raising could no longer compensate the substantial land purchases those enterprises demanded, especially in the face of western competition. These new conditions called for a more intensive agriculture, one that required drainage, and ultimately necessitated a decisive shift in land tenure patterns and the character of prairie tenancy. No longer would the wet prairie support capitalists who neglected its waterlogged soils and stagnant pools. In the mid-1860s, east central Illinois had arrived at a crucial moment, when its hydraulic potential was to be fully realized.

Wittfogel's original theory of hydraulic civilization, contends Donald Worster, represented 'an environmental interpretation of society and social change that had more of Darwin than of Marx in it.'[58] Rather than view the natural world as a passive canvass, hydraulic theory finds 'powerful determining forces' in the physical environment, which actively condition institutional change through the selective pressures they exert on our methods of production. Yet Wittfogel and Braudel too often 'find' hydraulic societies already in place and fully evolved. The case of east central Illinois affords the historian an opportunity to observe the strong selective process that empowered the truly wealthy landed elite.[59]

The Sullivants did not quite make the cut. Though Michael L. Sullivant intensified production on his Broadlands farm, increasing his acreage in corn through the 1850s and early 1860s, ultimately it was his failure to invest early in drainage operations and other improvements that put him at the mercy of lenders' credit and interest rates. When he finally did pay for improvements, he found himself $500,000 in debt, dooming the venture in 1866. By the time the local drainage district purchased the right of way for a sixteen-foot wide ditch in 1883, Sullivant's widow was living on a meager 40 acres.[60] Failure to drain was even more pronounced on his son's neighboring 4600 acre Twin Groves estate in Vermilion County. Even after the sale of his father's Broadlands farm, Joseph M. Sullivant did not spend the large sums that would be required for drainage improvements, instead developing a cattle ranch that rewarded him with losses by the early 1870s. By 1877 he owed $57,500 and forfeited his lands.[61]

Yet many cattlemen did successfully transition into the new economy with the help of tenant labor and drainage schemes. By the late 1860s, the lines between the landlords and the cattlemen had blurred, as both groups evolved programs of tenancy and intensified grain farming. The emergent farmers were former cattlemen like John Sidell, who sold some of his cattle pasture to fund the drainage improvements required to put the vast majority of his remaining holdings into cornfields operated by fifty tenants. Likewise, William Foos of Champaign County sold 1200 acres, sharecropping on his remaining 4000 acres and carrying out $2000 of drainage work before 1880. Still, he remained the largest landowner in Brown township, with holdings of about 6 square miles in 1893 (Fig. 2). After the loss of his Broadlands farm, even Michael L. Sullivant found greater success for a time at his enormous Burr Oaks estate of 40,000 acres, where cattle-raising played a lesser role, and he invested in a ditching plow, 'a huge affair of eighteen feet in length…worked by sixty-eight oxen and eight men.'[62]

The experiences of Foos and Sullivant are a microcosm of broader trends in land holding in east central Illinois, and the prevalence of downsizing after drainage became necessary is borne out in census data. Even as the great cattle kings began to sell many acres of their immense pasturelands to fund drainage and other improvements, the number of farms larger than 1000 acres in the region tripled between 1860 and 1880 (Table 1). Writes Hugh Prince, 'Draining large wet prairies in Illinois and Indiana led to territorial aggrandizement by great estates; it fostered landed monopolies.'[63] But as costs of improvement caught up with farmers, the very largest landowners surrendered some of their competitive advantage in labor and capital: after a spike between 1870 and 1880, the number of very large farms (1000 acres or more) dropped precipitously—by 1900 only 64 such estates remained in sixteen east central Illinois counties. While the requirements of drainage reduced the optimal farm size, land improvement still favored those of means. After 1880—when drainage was to become a universalized expense—most area holdings were large farms (100–999 acres), which increased in number from 1870. Meanwhile, tenancy increased as small farmers could not afford private drainage or the investments in machinery required for mechanized farming; thus, farms of 10–99 acres dropped significantly after 1880. Moreover, the terms of tenancy became more burdensome as sharecropping rents of one-third gave way to two-fifths and then one-half of a tenant's annual crop through the 1870s.[64]

The new, distilled class of wealthy landowners was responsible for pioneering the drainage technologies that revolutionized agriculture in what would become the heart of the Corn Belt. There was 'no financial shortcut' to drainage, and early methods of private drainage were accordingly 'prohibitive' in cost.[65] These included labor-intensive hand-dug ditching efforts and the equally miserable mole plow technique, which entailed dragging a pointed metal ball through thick sod at a depth of 3–4 feet.[66] One imagines the backbreaking labor of Matthew T. Scott's hired workers, carving hand-dug ditches in the high heat of mid-summer, when the prairie mud dried enough to allow digging. It would seem that Braudel's judgment holds on the humid, malarial prairies of 1860s Illinois: 'Economic progress was assured, but at the price of social misery.'[67]

Soon landlords and other farmer-capitalists developed more effective yet similarly expensive drainage methods. In 1871 *Harper's Weekly* reported on Michael L. Sullivant's goliath ditching plow, which by then had dug 150 miles of shallow ditches (two

[57] Bogue, *Patterns From the Sod* (note 4), 68–70.

[58] D. Worster, Natural history: an essay on theory and method, *Pacific Historical Review* 53 (1984) 4.

[59] In Illinois, the transition to hydraulicism is also better documented than in Wittfogel's ancient societies or Braudel's early modern states. In both of their works, one gets the impression that evidence was hard to come by.

[60] Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 251; Champaign County, Deed Record, 68: 412 and 70: 596, Champaign County Recorder of Deeds Office.

[61] Bogue, *Patterns From the Sod* (note 4), 71, 72.

[62] Bogue, *Patterns From the Sod* (note 4), 70, 74, 76; Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 226; *Harper's Weekly* (September 23, 1871) 898.

[63] Gates, Land policy and tenancy in the prairie states (note 29), 79; Prince, *Wetlands of the American Midwest* (note 2), 215.

[64] Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 178; Bogue, *Patterns From the Sod* (note 4), 167.

[65] Bogue, *Patterns From the Sod* (note 4), 96; McCorvie and Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930 (note 7), 29.

[66] McCorvie and Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930 (note 7), 29; Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 178.

[67] W.L. Powers and T.A.H. Teeter, *Land Drainage*, 2nd Edition, New York, 1932, 113; Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (note 2), 74.

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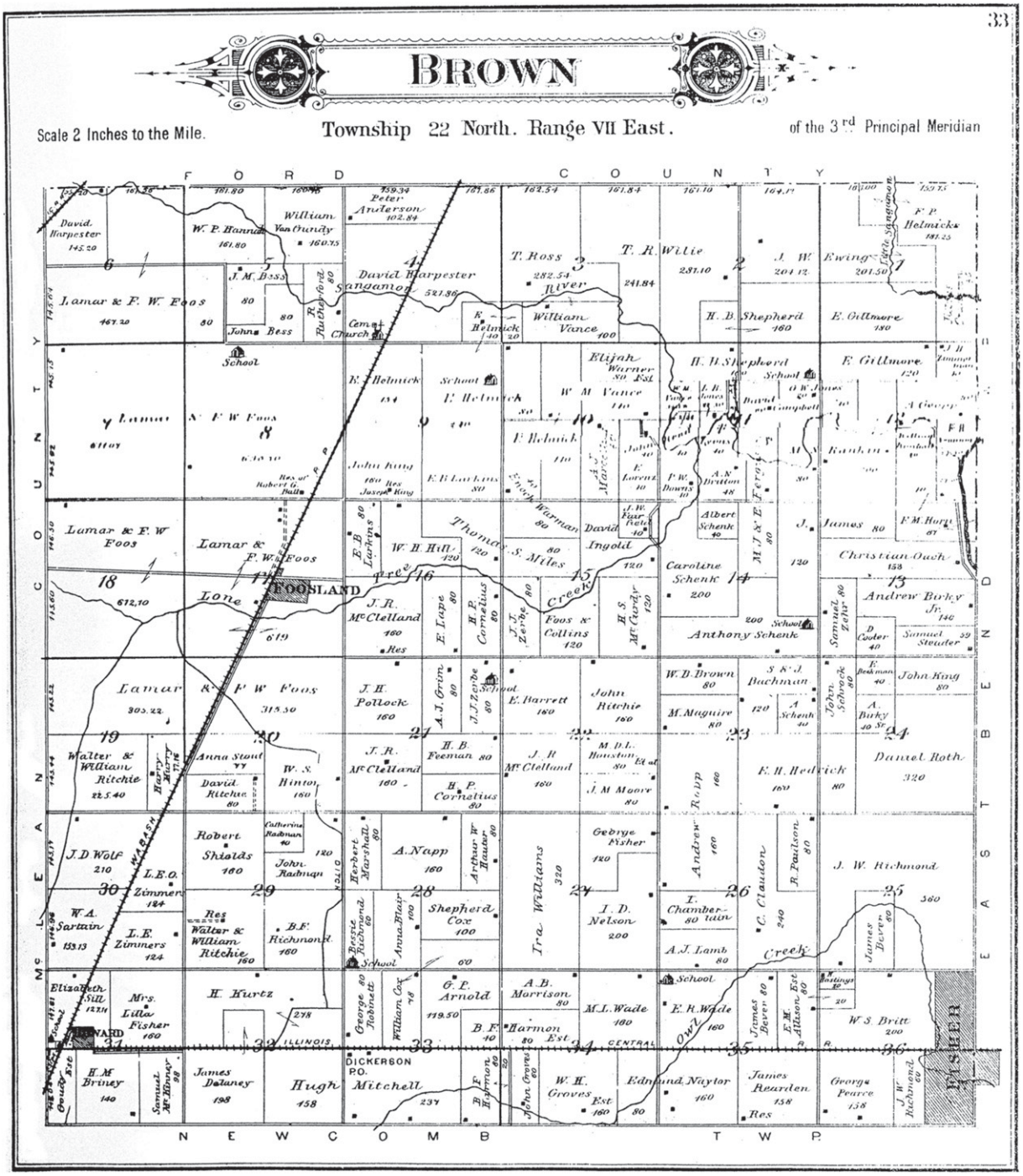

Fig. 2. Plat map of Brown township, in northwestern Champaign county, Illinois, 1893. The Foos family holdings are located mainly in the northwestern part of the township, near the railroad station at Foosland. Source: Frederick A. Schlipf, Jean E. Koch, and Howard C. Grueneberg Jr. (Eds.), *Combined 1893, 1913, and 1929 Atlases of Champaign County, Illinois*, Urbana, Illinois, 1997.

feet deep, seven wide) across the sixty-five square mile Burr Oaks property.[68] Meanwhile, many landowners took up tile drainage, which they had been experimenting with as far back as the 1860s, at great expense. Tile drainage required a ditching plow to cut a deep, narrow trench into which cylindrical clay tiles of three or four inches in diameter were placed, one by one, in a process that was both labor and capital intensive.[69] By the 1870s, such tiling was necessary, but it had hardly gotten cheaper; 1000 feet of tile

[68] *Harper's Weekly* (note 62).

[69] Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 178; McCorvie and Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930 (note 7), 29.

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Table 1
Number of farms by acreage in sixteen east central Illinois counties. Source data tables: '1860 Farm Acreage' (NT11 – HIST1860_AG); '1870 Farms by Farm Size' (NT31 – HIST1870_CNTY); '1880 Farms by Size' (NT29); '1890 Number of Farms by Acreage' (NT18 – HIST1890_CNTY); '1900 Farm Acreage' (NT4). From *U.S. Census of Agriculture*, various years, accessed through National Historical GIS database, Minnesota Population Center, www.nhgis.org.

Census year	0–9 Acres	10–99 Acres	100–999 Acres	Over 1000 acres	Total farms
1860	119[a]	10,685	8127	78	19,009
1870	605	24,071	13,892	133	38,701
1880	708	26,165	24,890	248	52,011
1890	639	20,345	25,431	117	46,532
1900	1331	16,889	29,310	64	47,594

[a] Note: In 1860, the census counted farms of 3–9 acres as the smallest size category; farms below 3 acres were not enumerated.

from the Chicago or Joliet manufacturers cost between $20 and $30 depending on tile diameter and freight rates.[70]

Private enterprises thus laid the technological foundation for effective public drainage efforts, yet the unwieldy cost of those endeavors meant that drainage could not be carried out on an individual basis. Indeed, landlords and cattlemen had difficulty downsizing their holdings because their lands often reverted back to them two or three times when new owners could not afford the costs of drainage.[71] Some public, cooperative drainage scheme would be required if east central Illinois were to achieve its full productive potential. This issue had been raised as soon as drainage became an economic necessity, but Illinois enjoyed several prosperous years under a stronger hydraulic overclass nonetheless. By the late 1870s, however, consecutive wet years prompted reconsideration.

Moreover, by this time, the state government had fewer, if any, cheaper options for productive expansion. By 1880 there existed a striking contrast between the unimproved farm acreage in east central Illinois and in the rest of the state. From 1880 to 1890, only in the westernmost part of the state—on the military tract, with its perennially chaotic land claims—were so many unimproved acres put into new farms. The agricultural frontier had largely left Illinois by the late 1870s.

If the national frontier was not limited by the Mississippi River—which settlers crossed as early as 1833—the jurisdiction of the Illinois state government was.[72] The state thus needed to render its existing prairie agriculturally fruitful if it wanted to augment production after the late 1870s. In doing so, its government would take a leading role in drainage, redefining the hydraulic order of east central Illinois.

The new order: public drainage after 1879

Wittfogel's hydraulic theory of society holds that hydraulic production will condition distinct changes in the role of a state, crafting a more powerful, centralized regime more heavily involved in promoting economic development. In 1878 these changes took the form of a profound and acknowledged reconfiguration of the state's role when the Illinois legislature passed a constitutional amendment to permit the formation of drainage districts.[73] By 1879 the state legislature had followed through on the amendment, passing the Farm Act and the Levee Act, which included provisions for the formation of public drainage districts. These 'special purpose local governments' would redefine the political order on the wet prairie, introducing a powerful state presence in a capitalist-dominated landscape.[74]

Drainage districts in Illinois were to be organized by petitions to the county court, signed by either a majority of landowners owning one-third of the land within a proposed district, or by one-third of the landowners owning a majority of land within the district. Drainage districts were thus tied to local needs and drainage features, yet they were not small, often encompassing 'several townships, whole counties or watersheds, or broad stretches of floodplain.'[75] When a petition was submitted to the county court, three district commissioners were to be appointed by the court to submit a plan for drainage in a proposed district and assess the costs and benefits of improvements. Generally an engineer was hired for this purpose.[76] Once these assessments were completed, the drainage district was ready to carry out one of its most important tasks: taxing constituent landowners in proportion to the benefits they were to receive from drainage.

In this aspect, drainage commissions had been granted broad powers over their districts, and their special assessments embodied the primacy of the government institution in the new hydraulic order.[77] Further, drainage boards were permitted to confiscate lands in the event of a delinquent assessment, governing with the full force of state tax law.[78] In a region where drainage was absolutely vital to the new agricultural economy, the importance of drainage districts—and the power of the commissioners who directed them—should not be understated. These institutions were the form that government intervention took in the 'capitalist state' order of the Illinois prairies.

And yet the local drainage districts do not much resemble the sweeping federal institutions that Worster finds in the American West. As we have seen, this is in part due to the nature of irrigation works, which often occur on a larger scale than drainage operations, which usually direct water to local outlets. In part, however, Worster may encounter a greater degree of federal power because his story takes place as Turner's national frontier disappeared,

[70] Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 178, 179; McCorvie and Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930 (note 7), 29.
[71] McCorvie and Lant, 29; Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 177.
[72] Bogue, *From Prairie to Corn Belt* (note 3), 10.
[73] L.G. Stevenson, *Drainage Laws of the State of Illinois*, Springfield, 1915, 6.
[74] McCorvie and Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930 (note 7), 34.
[75] Stevenson, *Drainage Laws of the State of Illinois* (note 73), 7; McCorvie and Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930 (note 7), 34.
[76] Smith, Reclamation of swamp lands and the modern drainage bond (note 22), 105.
[77] Smith, Reclamation of swamp lands and the modern drainage bond (note 22), 105.
[78] Smith, Reclamation of swamp lands and the modern drainage bond (note 22), 105; Stevenson, *Drainage Laws of the State of Illinois* (note 73), 22.

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which, Turner predicted, would prompt an intensification of government as geographical outlets for its power become scarce.[79] Meanwhile, drainage power dynamics remained local in scale until the federal government became similarly involved around the turn of the century through legislation like the Reclamation Act of 1902, in effect 'revers[ing] the Swamp Land Act precedent of only state and local involvement.'[80]

It not surprising, then, that in the 1880s Illinois drainage districts existed in tension with the interests of the old regime of local landlords and cattlemen. Indeed, the friction between landed capitalists and the strong bureaucracies of hydraulic states is central to Worster's capitalist state type, in which the groups initially 'compete for the upper hand without lasting success.'[81] In east central Illinois, the ruling class opposed drainage districts because drainage taxes 'would increase their obligations without bringing in commensurate returns.'[82] For those who had already expended capital to drain privately, drainage assessments were merely further outlays that would benefit small farmers to the detriment of the landowning overclass. The Scott brothers, after their heavy investments in private drainage, took several challenges to drainage districts' taxation power all the way to the Illinois Supreme Court.[83]

Drainage districts became increasingly autonomous and powerful through the 1880s. The broad powers of drainage districts were reasserted in an 1885 drainage law that was 'to be liberally construed' in favor of district drainage; commissioners' projects were not to be 'defeated by reason of any omission, imperfection' or organizational defect, technicalities large landowners often seized upon in their own defense.[84] Drainage districts were further supported by the judiciary: in fourteen cases against Champaign County districts brought before the State Supreme Court before 1901, the district's position was affirmed in thirteen of them, including the Scott brothers' lawsuits.

Not surprisingly, such powerful institutions were soon politicized. In 1890 East Lake Fork Special Drainage District—one of Champaign County's most trouble-making districts—was sued by the Wabash Eastern Railroad for trying to levy taxes on its lands.[85] While the railroads—especially the landed Illinois Central—were large landowners and fixtures of the private drainage order naturally opposed to district drainage, it seems that drainage commissions invited certain criticisms. Court records reveal that the East Lake Fork District had initially charged the Wabash Eastern's roughly 40 acres one-eighth of the 31,735 acre district's $35,000 assessment, later reducing the due to one-sixteenth of the total.[86] When the East Lake Fork District was vindicated in a Supreme Court ruling, drainage districts emerged as one of few institutions that could successfully levy new taxes on the railroads, after the state government foolishly limited itself to a 7% tax rate in the Illinois Central's charter.[87]

Such a victory was not trivial during the 'tax fighting' that took place in the latter decades of the century.[88] As tax rates skyrocketed after the Civil War, large landowners squabbled with tax collectors, often refusing to pay their share. Yet through the bickering, a resurgence of the old ruling class began to take shape. Some large landowners used their clout to win low tax rates, while others merely passed the burden of drainage taxes—which 'brought forth a greater volume of protest from large landowners and absentees than any other feature of the taxation system'—onto their tenants, whose rents rose steadily into the 1890s.[89] In this way, 'the inexorable demand for constantly increasing rents' limited the amount of land tenants and small farmers could maintain, quilting the landscape with claims of 160 acres or more even after the formation of drainage districts.[90] By the 1890s, the *Chicago Tribune* could report a widespread exodus of tenants, who sought to escape the 'exorbitant rents' of the wet prairie's landed elite.[91]

Meanwhile, some large landowners began to use the drainage district system to their own advantage. Notes Prince, 'most drainage enterprises were initiated by landowners and farmers for their own private gain and "for no public purpose whatsoever."'[92] Benjamin J. Gifford, who purchased 7500 acres of swampy land in northern Champaign County between 1879 and 1883, engaged in intensive drainage on his tenant-operated estate before pushing for the expansion of the Big Slough Drainage District in 1885. The sizeable district was to drain 30,000 acres over four townships, and Gifford's campaign encountered 'violent opposition' from landowners who feared that it would soon swallow their properties. It was this expansion effort that Matthew T. and John W. Scott objected to, citing a lack of disinterestedness within the petitioning parties.[93] In fact, it seems that Gifford's extensive holding would gain substantially at the expense of smaller landowners and incorporated properties that had already been privately drained.

Some major landowners capitalized on the expansion of drainage works by diversifying into local tile manufacturing and tile-laying businesses. Gifford used his ample resources to construct a tile factory, sinking $300,000 into the factory and the improvements it enabled.[94] During the 1880s and 1890s, local tile

[79] Turner, Significance of the frontier in American History (note 1), 3. In fact, it is difficult for Worster to disprove Turner's argument about frontier freedom and democracy when the bulk of his history in *Rivers of Empire* takes place after 1890, the year, writes Turner, the US Census announced that the American frontier had ground to a final halt. The case of east central Illinois better distinguishes between the government intensification arising out of local conditions and the government presence attributable to the end of the national frontier and the closing of new outlets for federal power.

[80] G.A. Pavelis, *Farm Drainage in the United States: History, Status, and Prospects*, Washington, 18, 1987.

[81] Worster, *Rivers of Empire* (note 2), 51.

[82] Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 234.

[83] Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 179, 244; Supreme Court of Illinois, *John W. Scott v. The People*, 1887; Supreme Court of Illinois, *The People v. The Commissioners of the Wildcat Slough Drainage District*, 1890; Supreme Court of Illinois, *Miller v. Scott*, 1890; F.B. Leonard, The drainage laws of Illinois, in: *A Preliminary Report on the Drainage Situation*, Urbana, Illinois, 1921, 63–64.

[84] Leonard, The drainage laws of Illinois (note 83); quotation from Stevenson, *Drainage Laws of the State of Illinois* (note 73), 22.

[85] Supreme Court of Illinois, *The Wabash Eastern Railway Company of Illinois v. Commissioners of East Lake Fork Special Drainage District*, 1890.

[86] Supreme Court of Illinois, *The Wabash Eastern Railway Company of Illinois v. Commissioners of East Lake Fork Special Drainage District* (note 85); Schlipf, Koch and Grueneberg Jr., *Combined 1893, 1913, and 1929 Atlases of Champaign County, Illinois* (note 34); Cunningham, *History of Champaign County* (note 26), 648.

[87] Bogue, *Patterns From the Sod* (note 4), 232, 234; Hibbard, *Public land policies* (note 28), 249.

[88] Bogue, *Patterns From the Sod* (note 4), 167.

[89] Bogue, *Patterns From the Sod* (note 4), 237, 244.

[90] Gates, Land policy and tenancy in the prairie states (note 29), 80; Bogue, *Patterns From the Sod* (note 4), 251; Schlipf, Koch and Grueneberg Jr., *Combined 1893, 1913, and 1929 Atlases of Champaign County, Illinois* (note 34).

[91] *Chicago Tribune* (note 5).

[92] Prince, Wetlands of the American Midwest (note 2), 208, quoting Ben Palmer, *Swamp land drainage with special reference to Minnesota*, Minneapolis, 1915, 56-57.

[93] Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 180; Supreme Court of Illinois, *John W. Scott v. The People* (note 83).

[94] Prince, *Wetlands of the American Midwest* (note 2), 214–215; Bogue, The swamp land act and wet land utilization in Illinois, 1850–1900 (note 27), 155, 180.

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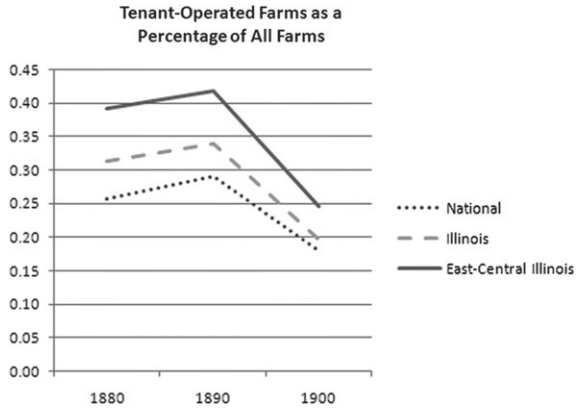

Fig. 3. Tenant-operated farms as a percentage of all farms (chart). Source: US Census of Agriculture, 1880–1900 (for more detail, see note 103).

production rose considerably in east central Illinois, and contemporary maps of the region show railroad tracks dotted with tile factories, which supplied small tiles that drained individual fields, as well as much larger varieties that fed drainage ditches.[95]

Indeed, the complementary nature of district ditching and private tile production forged a symbiotic relationship between drainage districts and wealthy landowners in the last decades of the century. Through the 1880s and 1890s, districts contracted work out to private landowners and labor teams in order to dredge and tile district ditches. In 1887 Gifford won a contract from Big Slough Special Drainage District for constructing 1650 feet of tile drains, while in Beaver Lake Drainage District, commissioner G.W. Winchester exceeded his commissioner's salary in district contracts for tile in 1893.[96] By 1890, when J.T. Harris—scion of a family of Grand Prairie 'cattle kings'—called upon Beaver Lake to provide 460 feet of tile drains 'of sufficient capacity' to better drain his rail-side inheritance, the district had constructed over 25,000 feet of tiled ditches, at substantial expense.[97] Indeed, the inexorable demand for drains in newly (if reluctantly) incorporated properties bolstered a creeping expansion of drainage districts that was often underlain by private tile. Districts made countless additional assessments in order to drain branch and tributary ditches in their peripheral sub-districts; in Camp Creek Special Drainage District, all but one of the district's tributary ditches were tiled, using over 87,800 feet of tile drains.[98]

Just as Worster describes, on the Grand Prairie capitalists and bureaucrats came to realize a powerful codependency, one which transformed the sodden prairie of east central Illinois into treasured ground at the heart of America's Corn Belt. As the new order matured, the capitalist's innovation combined with the state's organizational power, his tiles worked with its ditches, his power merged with its authority. The results were impressive: by the turn of the century, over 1.8 million acres were drained by Illinois districts.[99] Forty years later, more than half the productive cropland in the state was artificially drained. In little over one hundred years, public drainage increased the value of Champaign County land over six-hundredfold.[100]

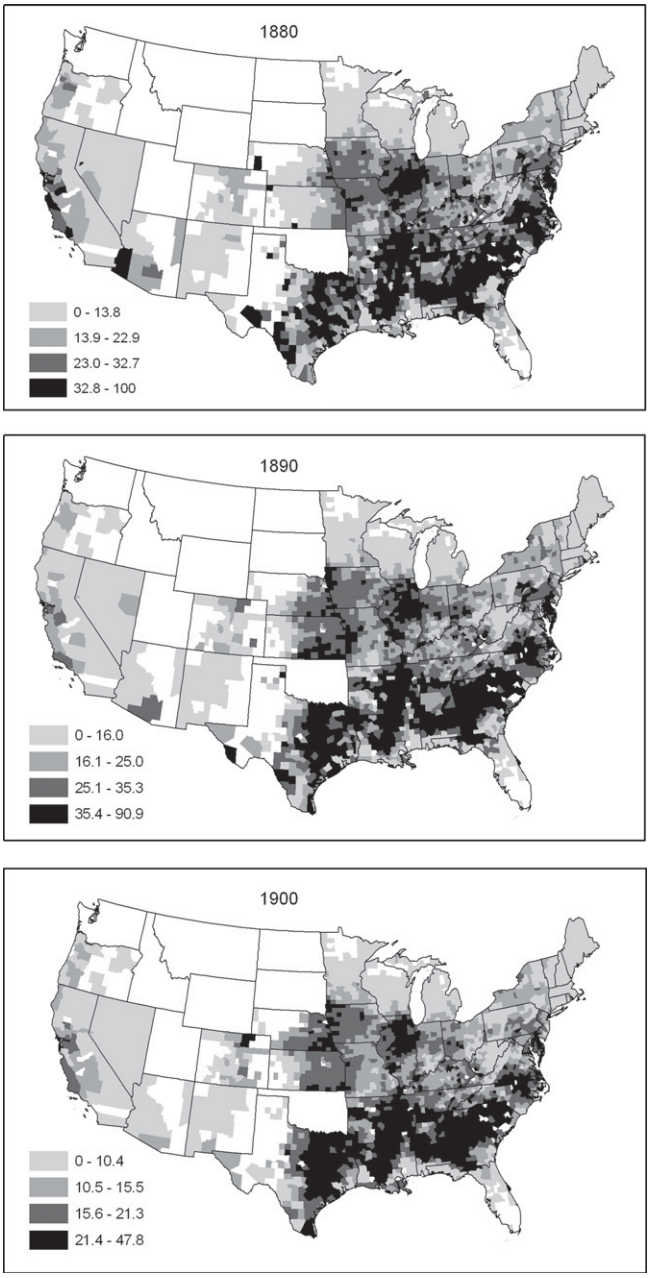

Fig. 4. Rates of tenancy in U.S. farms, 1880–1900. Although the data breaks change from one map to the next, an equal number of counties are represented in each interval. Only counties with farms counted in all three censuses are shown; areas with no data, or no enumerated farms in any year, are shown in white. Source: US Census of Agriculture, 1880–1900 (for more detail, see note 103).

[95] Schlipf, Koch and Grueneberg Jr., *Combined 1893, 1913, and 1929 Atlases of Champaign County, Illinois* (note 34).

[96] Agreement of B.J. Gifford with Big Slough Special Drainage District, 1887; Annual Report of the Commissioners of Beaver Lake Drainage District, 1893, Champaign County Circuit Clerk Office, Urbana, Illinois.

[97] Beaver Lake Drainage District, Records, 1884, Champaign County Circuit Clerk Office, Urbana, Illinois.

[98] Petition to Organize Camp Creek Special Drainage District, 1906; Annual Report of the Commissioners of Embarras Special Drainage District, 1898, Champaign County Circuit Clerk Office, Urbana, Illinois.

[99] W.L. Austin, *Drainage of Agricultural Lands*, Washington, 1932; McCorvie and Lant, Drainage district formation and the loss of the Midwestern wetlands, 1850–1930 (note 7), 33.

[100] Stevenson, *Drainage Laws of the State of Illinois* (note 73), 33; Pavelis, *Farm Drainage in the United States* (note 80), 17.

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Yet the true measure of a hydraulic order—and the transformative power of the wet prairie that conditioned it—lies in its social effects: the society that arose between 1850 and 1900 on the Grand Prairie of Illinois was in large part characterized by a permanent underclass, whose miserable struggle in the malarial trenches endured for over half a century. By the close of the century, tenant rents had reached up to three-fifths and even two-thirds of annual crop, while wages for farm labor reverted to 1850 levels or below, hovering near $22 a month.[101] Indeed, never was there 'aid to the farm laborer searching for a route to ownership or to tenants struggling to retain their step on the ownership ladder.'[102]

Again, evidence from historical censuses substantiates the distinctive agrarian structure of east central Illinois. From 1880 to 1900, east central Illinois counties had higher rates of tenancy, in comparison with Illinois and the U.S. as a whole (Fig. 3). (The steepness of the decline in tenancy, for all areas of the country, from 1890 to 1900 may be a result of changing census methodology.[103]) Moreover, as shown by the time-series map (Fig. 4), east central Illinois was always among the areas with the highest rates of tenancy in the U.S., in this respect sharing more in common with southern states—with their notoriously exploitative institution of sharecropping, especially among African–American farmers—than with other parts of the Midwest. It may be true that, as Sonya Salamon points out, 'In the Midwest, tenancy did not automatically mean low social status and a marginal economic existence, as it often did in the South.'[104] However, wage stagnation and increasingly one-sided sharecropping and rental arrangements, in the context of generally increasing farm values, suggest that marginalization was commonplace.

Conclusion

Today's environmental historians, historical geographers, and restoration ecologists often view the landscape of Illinois's Grand Prairie with concern. Here, the largest wet prairie of the Midwest was transformed, in the span of just a few decades, into a reordered landscape of straightened streams and drained fields. The drainage tile revolution made it feasible to farm some of the world's richest soils, but in the process altered prairie hydrology and destroyed productive habitat. In the end, an ecologically diverse and complex natural system was reduced to the simplified monoculture-oriented landscape we see today. Thus many scholars have trained their sights on detailing this physical transformation. While we agree that the wholesale alteration of these prairie wetlands is cause for lament, such a focus is just one way of reading the landscape. Viewed from a different angle, the landscape of east central Illinois also reveals a mostly hidden history of agrarian structure and its key component, land tenure. To quote Salamon again, 'A history of culture shaping land tenure in a particular place is revealed in the local landscape. […] The land tenure system represents the underlying social structure of any society because it is a mechanism for reproducing present gender, generational, and community relations and maintaining continuity with what was valued in the past.'[105]

A close examination of the land tenure system and agrarian structure in the east central Illinois region provides an insight that is at once straightforward but often forgotten: social structures are slow to change. Indeed, the drainage revolution produced a new agricultural order characterized as much by social continuities as by economic and environmental transformation. Most particularly, tenancy, whether by rental agreements, sharecropping, or other arrangements, continued to be a dominant form of land tenure. This outcome was not preordained, however. A landed elite was able to capitalize on its already strong position by turning drainage policies to its advantage, passing the costs of drainage onto tenants, transitioning from livestock raising to cash crops, and outmaneuvering competing interests, such as railroads. Tenancy and reductions in land holding went hand-in-hand after western ranching competition, rising land taxes, and drainage taxes made drainage necessary and imposed serious costs on large landowners. The successful landlords were those who coped with those costs by selling some of their lands and tenanting (and draining) the remainder.

While the risks and costs of early marshland settlement granted the Grand Prairie's landed capitalists exclusive access to the wet prairie—supporting an especially strong landowner class, whose changing programs of tenancy and agriculture defined the drainage revolution there—the capital and labor coordination required of drainage enterprises across the Midwest produced similar effects elsewhere: in Iowa and southern Minnesota, drainage districts initiated by immigrant communities of small farmers began to converge on the Grand Prairie model as banks and absentee owners gained controlling interests in many district drainage schemes, while land holding sizes increased alongside rates of tenancy.[106] Likewise, as geographer Alfred Meyer pointed out in a classic study, tenancy rates on the Kankakee Marsh of Illinois and Indiana rose to remarkable heights after 1885, when the steam dredge began to work its meandering bottomland streams into tidy, permanent ditches.[107] The disparity between tenancy rates on Kankakee's bottomlands and on its marginally elevated upland prairies recalls the experience in Manitoba, where nearly imperceptible differences in elevation drew unambiguous political lines when drainage taxes became a highly contested political issue there; ultimately those on more expensive 'highland' tracts emerged victorious when the provincial government agreed to directly shoulder their share of drainage expenses.[108]

Indeed, the balance between government and capitalist involvement in collective drainage schemes varied across North America, and perhaps the widespread failure of drainage districts in

[101] In some counties, wages were held to $15 or $18 a month, while cash rents surpassed $4 per acre. See Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 324; Bogue, *Patterns From the Sod* (note 4), 167.

[102] Gates, *Landlords and Tenants on the Prairie Frontier* (note 37), 324.

[103] The census introduced a number of new ownership categories for the 1900 census. We used only the categories 'cash tenants' and 'share tenants' to represent tenant farmers, and so we may have underestimated real rates of tenancy (or, conversely, the census might have overestimated tenancy in earlier censuses, due to lack of discrimination in their categories). 1880 US Census of Agriculture, NHGIS Dataset 1880 – US, State, and County, File HIST 1880_AG, Table 'Farm Tenure by Size of Farm (NT32)'; 1890 US Census of Agriculture, NHGIS Dataset 1890 – US, State, and County, File HIST1890_AG, Table 'Type of Farm Operation by Farm Acreage (NT6)'; 1900 US Census of Agriculture. NHGIS Dataset 1900 – US, State, and County, File HIST1900_AG, Table 'Race of Farmer by Detailed Management (NT7).' All from National Historical GIS database, Minnesota Population Center. Accessed online: http://www.nhgis.org.

[104] Salamon, Cultural dimensions of land tenure in the United States (note 9), 165.

[105] Salamon, Cultural dimensions of land tenure in the United States (note 9), 177.

[106] Writes Prince, 'Owner-occupiers suffered more than tenants, but the conditions of tenancy also deteriorated. Long leases were almost completely replaced by annual arrangements, sharecrop rents rose steeply, and sharecropping itself was superseded by monetary payments, safeguarding the landlord's income against effects of falling prices.' Prince, *Wetlands of the American Midwest* (note 2), 225–226.

[107] Meyer, The Kankakee "Marsh" of northern Indiana and Illinois (note 26), 372, 379.

[108] S.S. Bower, Watersheds: conceptualizing Manitoba's drained landscape, 1895–1950, *Environmental History* 12 (2007) 801–802, 809–811.

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Turner's Wisconsin is a testament to the importance of this balance in Worster's capitalist state model. In the northern forests of Wisconsin and Minnesota, the logging industry precluded the establishment of an agricultural elite, and so drainage districts could not rely on a landlord class to anchor the transition to drainage agriculture, just as they could not simply adopt the drainage technologies that such a class might have pioneered and gradually fine-tuned in the northern peat marshes. As a result, drainage districts in Wisconsin struggled agriculturally, and many failed to repay the loans advanced by state and county governments, who in turn found themselves in possession of an 'empire in the swamps' by default.[109]

From Turner's perspective, it seems the Grand Prairie was just one example in this class of exceptional regions on the North American frontier, a sizeable swath of prairie terrain where his egalitarian democracy did not take hold. A hydraulic interpretation of the Grand Prairie experience offers a new lens through which these seemingly disparate marshland histories can be viewed. Indeed, perhaps the relevant measure of Turner's frontier is found not in a region's population density, but in the costs associated with rendering such an area productive enough to support a state. The theory we have suggested incorporates these costs into Turner and von Thünen's hypotheses of frontier progression, reconciling Turner's democracy with the stark landlord–tenant divides and strong bureaucracies that took hold of east central Illinois after 1850. Conversely, this model introduces crucial elements of frontier change to Worster and Wittfogel's hydraulic concepts, which intended to resolve profound questions posed by the evolution of the modern West. Together, they illuminate the dialectical relationships between nature, state, and social structure on the frontier of expanding states. By connecting their divergent theories, we have hoped to shed some light on this transformative interplay.

Acknowledgments

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[109] Prince, *Wetlands of the American Midwest* (note 2), 273.

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