

IOWA'S WATER

Ambient Monitoring Program

Historic Alteration of Surface Hydrology on the Des Moines Lobe

Iowa once was a vast tallgrass prairie ecosystem, interspersed with upland savanna, prairie marshes and sloughs, riparian woodlands along small streams and rivers, as well as isolated stands of trees in small park-like groves. These were components of the Iowa prairie matrix at the time of European settlement in the mid-1800s. To provide a geographic framework for land ownership, the Government Land Office was established, and first-hand accounts of its surveyors were later used in state guides and handbooks that promoted settlement and agriculture.

The surveyors recorded a general description of the terrain, vegetation,

We were unable to receive permission to use Figure 1 on the WEB version of this factsheet.



soils and stream crossings of each township after first laying out a rectangular grid of square-mile sections. They used the term “prairie,” and characterized it as first, second, or third rate, and “level” or “rolling” as an indication of the area’s farming potential. Surface water features

Figure 2. Location of the Des Moines Lobe in Iowa.



Photo from Kock Collection, State Historical Society of Iowa, Iowa City.

Figure 3. Installation of clay tile in excavated trenches accelerated drainage of water from the Des Moines Lobe land surface, Boone County, May 9, 1917.

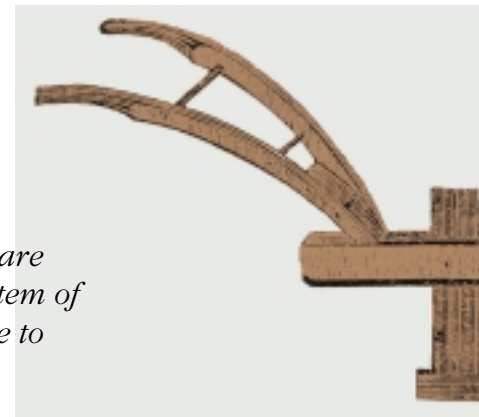
related primarily to township topography. These historic descriptions of Iowa’s pre-settlement landscape provide a valuable reference from which the extent of change in the state’s land and water features can be measured.

The landscape most drastically altered by Euro-American settlement and cultivation was the “wet prairie” of north-central Iowa, a landform region known as the Des Moines Lobe (Figure 2). This area is part of the much larger Prairie Pothole Region that extends north and west into Canada. Iowa’s “wet prairie” coincides with the most recent glacial activity to occur in Iowa, the advance of the Wisconsin ice sheet into the state between 15,000 and 12,000 years ago. This glaciation left much of north-central Iowa’s terrain flat to undulating, with few well-defined drainage networks. Small prairie streams, while gently meandering through the tall grasses, subtly linked the marshes, sloughs, and wetlands to larger streams and rivers, making it difficult to determine exact watershed boundaries.

The natural surface-water features of the pre-settlement landscape provided an infiltrative hydrology, which allowed surface water to move slowly downward and gradually released to larger streams and underground aquifers. The *Hand-Book of Iowa*, written in 1869 by Rufus Blanchard, describes the youthful landscape of the Des Moines Lobe as follows: “*The country consists of broad tables with but slight depressions, drained by frequent undulating sloughs. These are found in parts most distant from large rivers, where the admirable system of drainage which nature has provided for this State has not yet had time to be developed.*”

Mr. Blanchard further notes that “*the immediate sources of these tributaries*

were described with special detail in an effort to label counties as “well watered throughout.” Other descriptions such as “marsh,” “slough,” or “bottom” indicated wetter areas, and “timber” or “barrens” documented areas with trees. Soils also were classified as first or second rate, which



Engraving from *The Prairie* by John H. Klippart. Robert

Figure 5. The mole plow, pulled by oxen, was an early tool used to dig long straight drainage trenches to carry water from fields to nearby streams.

Figure 4. Excavations of large ditches were intended to prevent stream overflow by widening and deepening existing channels, cutting off stream bends, and constructing auxiliary channels and levees.



Photo from *Report of the Iowa State Drainage Waterways and Conservation Commission*, State of Iowa, 1911, Plate 5.

are often found in narrow and deep sloughs, where water issues from the ground beneath the tall grasses.”

These natural wetland conditions described on the Des Moines Lobe in 1869 are nearly beyond recognition today. Instead, a simplified agricultural landscape extends as far as the eye can see. For nearly a century and a half, Midwest farmers drained, dredged and tilled the wetlands and marshes on the Des Moines Lobe and across the greater Prairie Pothole Region. By 1900, landowners earnestly took part in the great endeavor to “improve” and “reclaim” these wet acres. Although estimates vary, it is generally agreed that approximately 99 percent of the original wetlands, marshes and small streams of north-central Iowa were drained and plowed, while the larger streams and rivers were dredged and straightened to facilitate removal of surface water.

Today, artificial stream systems replace the more absorbent wetlands and marshes, and these streams flow in direct contact with Iowa’s vast agricultural landscape. Further, we have eliminated many natural stream meanders through straightening and channelization. Drainage of wetlands and channelization of streams and rivers have promoted a hydrological imbalance. Today, in the upstream or headwater portion of small streams, water moves off the land much faster, allowing greater stream bank and bed erosion, creating increased transport and deposition of materials (including soil and agricultural chemicals), along with more severe flooding downstream. Draining of wetlands has lowered the water table, causing natural underground springs and small streams to cease flowing and the need for shallow wells to be deepened. Most of these changes in surface and subsurface hydrology have occurred within a human lifetime.

Bear Creek, located in Story and Hamilton counties, is typical of small prairie streams on the Des Moines Lobe that have undergone drastic alteration of their surface and sub-surface hydrology (Figure 6). This watershed contains none of the original wetlands or marshes that existed in the mid-1800s. Instead, intermittent and perennial stream segments have been formed, defining a new watershed hydrology.

Principles and Practice of Land Drainage by
H. C. Clarke & Co., Cincinnati, 1867, p. 232.

*...ed by horses or oxen, was an
...ght ditches to drain excess
...eams.*

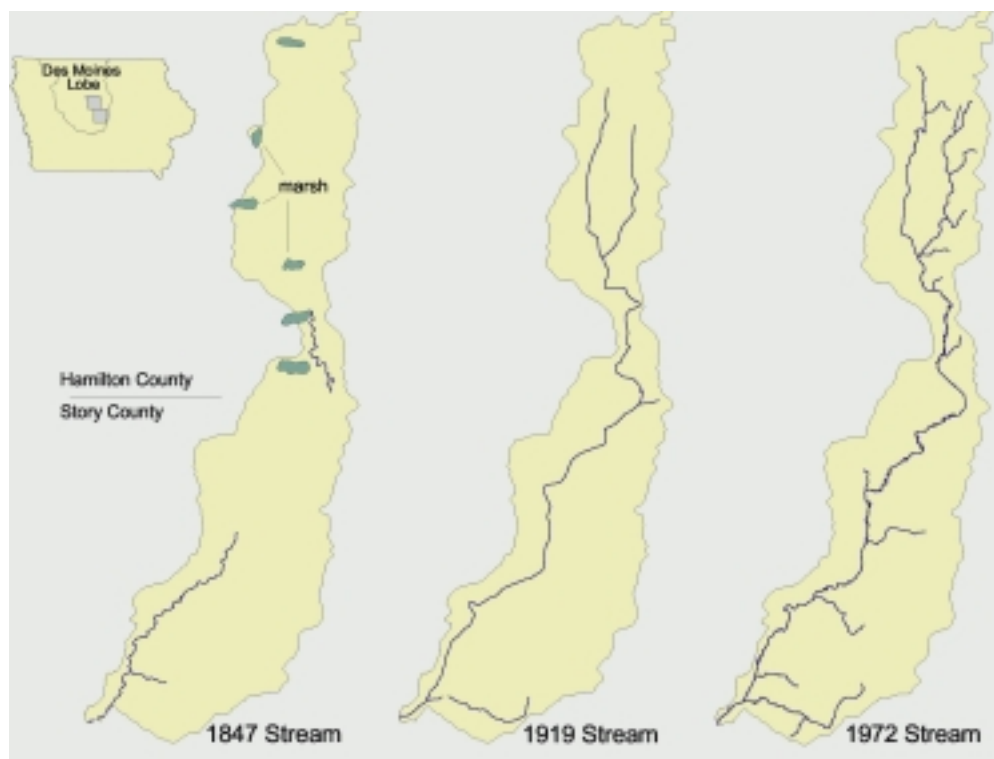


Figure 6. Historic development of Bear Creek.

Today it is difficult to imagine those original conditions of wet prairie described by early public land surveyors. Through researching historical information about Iowa's small prairie streams, we gain a better understanding of the extent of alterations in the hydrology at the landscape scale, as well as valuable information to aid in understanding water quality.

Acknowledgements

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Water Monitoring Program Web Site – www.igsb.uiowa.edu/water



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