

1990

Bibliography of the Natural and Cultural History of the Loess Hills of Iowa

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Recommended Citation

Roosa, Dean M. and Koenig, Darwin D. (1990) "Bibliography of the Natural and Cultural History of the Loess Hills of Iowa," *Journal of the Iowa Academy of Science: JIAS*, 97(1), 18-32.

Available at: <https://scholarworks.uni.edu/jias/vol97/iss1/6>

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Bibliography of the Natural and Cultural History of the Loess Hills of Iowa

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A bibliography of literature on Iowa's Loess Hills includes references containing information on the cultural or natural history of this western Iowa landform region. The bibliography is divided into six parts: general, archaeological, botanical, geological, historical, and zoological. Annotations are included only where necessary to clarify contents. Because of their rugged topography, the Loess Hills of western Iowa have resisted large-scale conversion to agriculture. This has permitted noteworthy persistence of native prairies and woodlands, along with their associated species. This bibliography complements two special issues of the Proceedings of the Iowa Academy of Science devoted to Iowa's Loess Hills.

INDEX DESCRIPTORS: Iowa Loess Hills, Iowa archaeology, Iowa botany, Iowa geology, Iowa history, Iowa zoology.

This bibliography pertains to archaeological, botanical, geological, historical and zoological literature referable to the Loess Hills landform region in western Iowa. It was compiled as part of a study of the Loess Hills undertaken by the State Preserves Advisory Board and is the final paper in a series designed to document the special nature of this region (See Vol. 92, No. 5 and Vol. 93, No. 3, PIAS). This bibliography is by no means exhaustive, although an attempt was made to include all of the major references dealing with the Iowa Loess Hills. Annotations, included only on a limited basis to clarify content, are set off by brackets.

BRIEF DESCRIPTION OF THE LOESS HILLS

The Loess Hills are a distinctive landform region in western Iowa and northwest Missouri adjacent to the broad Missouri River floodplain. The steep, sharply ridged hills are composed of thick, wind-blown deposits of coarse silt that originated as glacial outwash in the adjacent valley. These deposits were subsequently carved by erosion into the unusual, intricately dissected landscapes seen today. While extensive deposits are also present along the Mississippi and Platte River valleys, on the loess plateau in eastern Europe, and in the Palouse of Washington State, the great thickness and unusual topographic relief of the loess deposits found in western Iowa is equalled only in portions of The People's Republic of China. In Iowa, the area includes the steep bluffs and hills found in a narrow band through portions of Fremont, Mills, Pottawattamie, Harrison, Monona, Woodbury and Plymouth counties (See PIAS 92(5):158, for a map of Iowa Loess Hills).

The climate of the Loess Hills area is mid-continental, characterized by marked seasonal variations including recurrent drought and periods of intense rainfall. The winds are mostly westerly to northwesterly in the winter and southwesterly during the summer. Average annual temperature and precipitation records for the northern (Sioux City), central (Logan), and southern (Sidney) portions of the study area are given below (from U.S. Department of Commerce).

	Average Annual Temperature	Average Annual Precipitation
Sioux City	9.02°C (48.23°F)	61.42 cm. (24.18 inches)
Logan	10.09°C (50.16°F)	79.73 cm. (31.39 inches)
Sidney	11.20°C (52.16°F)	88.85 cm. (34.98 inches)

These climatic conditions are important contributors to the special

botanical niches and the high soil-erosion rates present in this region. The Loess Hills area lies within the tallgrass prairie association of the grassland biome. The well-drained soils, rapid surface runoff, and a high evaporation rate of the loess bluffs provide an arid microenvironment comparable to areas hundreds of miles to the west. Consequently, several western plants are at their easternmost range limit here.

The topography of most of the Loess Hills region consists of a series of high-relief, corrugated hills. The most rugged bluffs are along the western edge of the area where they rise precipitously (40-100 percent slope) from the Missouri River floodplain, attaining heights of from 60 to 200 feet. These bluffs and narrow-ridge hills grade into lower, more rounded hills at the eastern margins of the area. The topography is accentuated by a dense drainage network; soil erosion, gully development, and high-sediment loads in streams are common problems associated with the easily eroded loess. Several larger streams bisect the area from a northeast to southwest direction. These stream valleys are generally wide and nearly level, presenting a great contrast to the adjacent hills. All of these streams have been channelized.

The soils of the bluffs and hills are included in the Hamburg-Ida-Monona soil association, with the Hamburg series found on the steepest slopes (>40 percent), the Ida series on 5-40 percent slopes, and the Monona series on 0-40 percent slopes. These are well drained to excessively drained, somewhat droughty, silty soils formed in loess under prairie vegetation and are very susceptible to erosion. The soils of the stream valleys are characterized by the Kennebec, McPaul, Nodaway, and Napier soil series. These are moderately well-drained soils formed in silty alluvium.

The Loess Hills vegetation can be divided into grassland, woodland, and cropland communities. Originally, the grassland occupied most of the Loess Hills, but it has been diminished since settlement. Morrill (1953) divided the grassland into the following communities:

1. *Andropogon gerardii* community: Usually occurs on the edges of woods on the lower west slopes, upper east slopes, and in sheltered gullies.
2. *Andropogon scoparius-Bouteloua curtipendula* community: Occurs on the upper slopes and summits.
3. *Andropogon scoparius-Yucca glauca* community: Found on the steep, unsheltered slopes exposed to the arid west and southwest winds.
4. *Sporobolus cryptandrus-Lygodesmia juncea* community: Characteristic of bare, vertical, loess exposures.
5. *Verbena stricta* community: Found where the grass cover had been disturbed by overgrazing on the lower west and upper east slopes and summits.

Woodlands were originally restricted to the stream valleys and the protected ravines. They have increased since settlement and, benefiting from the suppression of natural prairie fires, now cover much of the uncropped hills. Invasion by red cedar (*Juniperus virginiana* L.) has become widespread and is a threat to the continued existence of the prairies. The woodland is of the oak-hickory association, dominated by bur oak (*Quercus macrocarpa* Michx.), ash (*Fraxinus pennsylvanica* Marsh), basswood (*Tilia americana* L.) and cottonwood (*Populus deltoides* Bartram). The amount of woodland decreases from south to north (Novacek, 1985).

The greatest acreage in the area is devoted to various agricultural crops (corn, soybeans, hay) and pasture. The crops on the lower slopes and along streams. A substantial portion of pastured acreage is native prairie.

Common animal species dependant on the vegetation of the above communities include white-tailed deer (*Odocoileus virginianus*), gray and fox squirrels (*Sciurus carolinensis*, *S. niger*), Franklin's and thirteen-lined ground squirrels (*Spermophilus franklinii*, *S. tridecemlineatus*), white-tailed jackrabbit (*Lepus townsendii*), eastern cottontail (*Sylvilagus floridanus*), and numerous small rodents. Predatory animals include coyotes (*Canis latrans*), red and gray foxes (*Vulpes vulpes*, *Urocyon cinereoargenteus*), raccoons (*Procyon lotor*), mink (*Mustela vison*), and weasels (*Mustela* sp.) (Lampe and Bowles, 1985).

Numerous streams are found in the area, but except for the Little Sioux River, their fauna has been little studied. The major species of game fish present are channel catfish (*Ictalurus punctatus*) and black bullheads (*Ictalurus melas*). Most of the streams have been channelized, destroying much of their beauty and productivity and most are heavily silt-laden due to excessive erosion from the surrounding croplands.

The Loess Hills are an important nesting area for raptors, particularly the Great-horned Owl (*Bubo virginianus*), Red-tailed Hawk (*Buteo jamaicensis*), and American Kestrel (*Falco sparverius*). The area is also important as a wintering ground for these species as well as for Rough-legged hawks (*Buteo lagopus*) and occasionally Golden Eagles (*Aquila chrysaetos*) and Prairie Falcons (*Falco mexicanus*) (Roosa and Bartelt, 1979).

The Loess Hills region is a unique geologic occurrence of materials and processes. These wind-deposited silts are unusually thick accumulations, and they have been carved into rarely seen topographic forms. The Loess Hills area contains some unique components of Iowa's flora and fauna. The ranges of such plants in Iowa as *Yucca glauca* L., *Gaura coccinea* Pursh, *Mentzelia decapetala* (Pursh) Urban & Gilg, *Asclepias engelmanniana* Woodson, and *Dalea candida* Willd. var. *oligophylla* (Torr.) Shin. are confined to the Loess Hills area. Animals such as the plains spadefoot (*Scaphiopus bombifrons*), great plains skink

(*Eumeces obsoletus*), and prairie rattlesnake (*Crotalus viridis viridis*) are found in Iowa mainly in the Loess Hills.

The steep, west and southwest facing slopes of the bluffs (basically the areas of Hamburg soil) and their summits are considered fragile areas. Most of the plants listed above are found in this restricted part of the Loess Hills. These slopes and summits are easily eroded and intolerant of much disturbance. However, certain species exist because of the prevalence of natural disturbances on the steepest slopes producing extremely dry and barren west-facing exposures.

Much of the Loess Hills area is degraded in ecological quality as a result of excessive human or domestic-animal disturbance. Land is often intensively cultivated with attendant loss and disruption of the native biota. A devastating practice is the mechanized alteration of the topography, smoothing the land surface to make it more accessible to farm machinery. Because of the steep slopes, uniformity and grain size of the loess particles, and its inherent erodibility, such practices only accentuate already serious erosion problems. The amount of soil lost to erosion on the cultivated land in the Loess Hills area is the highest in the state. Urban sprawl, especially near Council Bluffs and Sioux City, is also having a detrimental effect on the ecological quality of the area. County zoning laws would help protect the ecological integrity of this landform region.

Although considerable modification of this landform region has occurred, it does yet harbor much of the state's remnant prairie and provides habitat for a considerable number of the state's rare species.

ACKNOWLEDGEMENTS

We wish to thank the following people who reviewed the manuscript and who made suggestions which resulted in its improvement: E. Arthur Bettis III, Department of Natural Resources; Jim Dinsmore, Iowa State University; Don Farrar, Iowa State University; Loren Horton, State Historical Society; Jim Peck, University of Arkansas; Jean Prior, Department of Natural Resources; and Deb Ziegłowski, Office of State Archaeologist. Their help is genuinely appreciated.

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