The Sandhills of South Dakota: A Regional Study

Robert E. Weimer

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THE SANDHILLS OF SOUTH DAKOTA:
A REGIONAL STUDY

BY

ROBERT E. WEIMER

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science, Major in
Geography, South Dakota
State University

1985
THE SANDHILLS OF SOUTH DAKOTA:
A REGIONAL STUDY

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Edward Patrick Hogan, Ph.D.  Date
Thesis Adviser

Edward Patrick Hogan, Ph.D.  Date
Head, Geography Department
ACKNOWLEDGEMENTS

The author wishes to express his appreciation and thanks to Dr. Edward P. Hogan, Head, Department of Geography, Dr. Charles F. Gritzner, and the entire faculty of the Department of Geography for their time, help, and guidance throughout this investigation.

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CHAPTER I

INTRODUCTION

This thesis is a systematic regional study of the Sandhills of South Dakota. The Sandhills of South Dakota occupy an area of slightly more than 400 square miles in south central South Dakota and are a northward extension of the much larger expanse of Nebraska Sandhills. Their distribution in South Dakota includes the southern portions of Shannon, Bennett, Todd, and Tripp counties. The Sandhills extend northward from the South Dakota-Nebraska border approximately five miles. Their east-west extent is some 100 miles.

Sand dunes comprise the prevailing surface formation of the Sandhills. The dunes resulted from erosion of the underlying loosely cemented sandstone.

The surface sand of the region is now largely stabilized by a covering of prairie grass. In small localized areas this grass covering has been removed, resulting in moving sand.

A number of features make the Sandhills region unique for South Dakota. Extensive dune sand is not found elsewhere in South Dakota. The numerous lakes of the Sandhills are a result of a high water table which
Figure 2. Sandhills of South Dakota
lies exposed in many of the low-lying valleys. In the remainder of the region the water table lies only a few feet underground. Cattle ranching comprises the sole economic activity for the entire region.

**Purpose of the Study**

The purpose of the study is to provide a resource data base for further studies of and planning for the Sandhills of South Dakota. It will serve to provide the people of South Dakota and the nation with information and a greater understanding of the geography of the Sandhills. The Department of Geography at South Dakota State University has adopted as a major goal of its graduate program, the completion of a series of Masters theses on the geography of South Dakota.1 Each of these theses will examine the geography of one of the thirteen physiographic divisions that exist within the state (Figure 4).

This study is limited to the Sandhills of South Dakota. Geographic data of the upper Great Plains and surrounding areas are included only as they influence or explain phenomena in the study region. Most transportation routes, service functions, and social entities exist adjacent to, but outside of, the physical region.

The most comprehensive work on the geography of South Dakota was written in 1918 by Stephen Sargent
1. Minnesota River Lowland
2. Lake Dakota Plain
3. Coteau Des Prairie
4. James River Highlands
5. Southern Plateau
6. James River Lowlands
7. Coteau Du Missouri
8. Missouri River Trench
9. Sand Hills
10. Pierre Hills
11. Southern Plateau
12. Northern Plateau
13. Black Hills

Figure 4. Physical Divisions of South Dakota

(Source: Flint, Pleistocene Geology, p. 5)
Visher (Visher: 1918). This study examined only the physiographic components of the area. No known geographic work has been completed which focuses specifically on the physical and cultural environments of the South Dakota Sandhills.

Although various histories of South Dakota have been written, including those by Herbert Schell (History of South Dakota) and John L. Jennewein (Dakota Panorama), no known history has been written specifically for the South Dakota Sandhills. Soil surveys, census counts, hydrological studies, and agricultural studies have been done by state and federal institutions. However, these studies were performed on a county basis and thus generally do not specifically deal with information pertaining only to the Sandhills.

The Regional Concept

A region is an area that may be defined and delimited on the basis of one or more similar or associated features that give it internal unity or homogeneity which in some way distinguish it from surrounding regions. The Sandhills region is characterized by and distinguished from other nearby regions by the surface features (the sand dunes) and the soil (primarily sand). (The South Dakota Sandhills are an extension of the Nebraska Sandhills,
the main difference being political.) The "Great Plains," the "Corn Belt" and the "Midwest" are regions. Each is defined by certain distinguishing characteristics.²

Two United States geographers who have employed the regional concept in much of their work are Preston E. James and Carl O. Sauer. In their work, they have used the region as a basis for the study and understanding of man and the land. Examples of their work include Latin America by Preston E. James and "Homestead and Community on the Middle Border" by Carl O. Sauer.³

**Methodology**

This thesis is a systematic regional study of the Sandhills of South Dakota. Much of the information included is derived from the author's personal experience and observations. This experience includes having been raised in the area, previous employment on cattle ranches of the area, and field work conducted as research for this thesis. Primary information sources include many of the people currently living in the area, whom the author interviewed during the course of research.

Organization of the thesis is topical. Discussion of the physical and cultural environments comprise the major divisions. These are sub-divided into various components as they apply to the study area.
End Notes

1. This thesis is the fifth in this series.

Previous thesis studies include:


2. Other sources of information on the regional concept include:


CHAPTER II

THE PHYSICAL ENVIRONMENT

Introduction

A number of features make the Sandhills a unique physical environment in South Dakota. Geographic elements examined in this chapter include: landscape features, climate, soils, water features, and biogeography. These elements form a unique, yet in many ways, fragile land.

Landscape Features

Sand dunes comprise the dominant surface formation of the Sandhills. The sand is loosely compacted, fine grained, and tan in color. The mineral content is principally quartz (Soil Survey of Bennett County: 1971, 35).

The Sandhills are an eolian formation. The sand was derived from the underlying loosely cemented sandstone, primarily of the Valentine formation. In the Post-Pleistocene this sand was reworked by wind action into a succession of dunes (Collins: 1959, 5).

These dunes are of three general types: (1) broad, massive, elongated dunes; (2) narrow, linear dune
ridges of intermediate length; and (3) relatively small upsiloidal (multi-shaped) dunes (Smith: 1964, 560). These are referred to hereafter as dunes of the first, second, and third series, respectively. Dunes of the three different types occur together over most of the region.

Formation of the Sandhills of South Dakota took place during the Post-Pleistocene or Holocene (the most recent of the geologic periods). They developed at different intervals between 8000 B.P. (Before Present) and 1500 B.P. An arid climate and abundant sand supply in the underlying poorly consolidated sandstone combined to give rapid rise to this dune field (Ahlbrandt: 1983, 403).

Dunes of the first series have the common characteristics of massiveness and great breadth. They vary in height from some 75 feet to nearly 200 feet. They often extend several miles in length. The largest dunes of the first series occur primarily in the western part of the region. Due to a predominantly northwest wind during their formation, orientation is generally northwest to southeast. The surfaces of the dunes are very irregular in detail, roughened by innumerable humps, hollows, and pits (Smith: 1964, 563).

Dunes of the first series are believed to have been formed essentially contemporaneously during a time of particularly strong and persistent wind action under dry
Figure 5. Sandhills Topography

Figure 6. Sandhills Ridges
conditions. At the time of origin, the landform features were believed to be similar to that of modern deserts in Africa or Arabia.

The dunes then stabilized, due to a climate change that lasted long enough to permit soil development and an invasion of vegetation. The fact that the dunes are so uniform indicates that the stabilization was fairly abrupt (Smith: 1964, 565).

Overlying the dunes of the first series are the smaller dunes of the second series. They are similar in shape and orientation to those of the first series but are narrower and shorter. Their height varies from 30 to 60 feet. Length varies from less than a half mile to nearly two miles. It is not easy to determine where one ridge ends and another begins. Individual dunes are generally parallel, but many converge and diverge irregularly (Smith: 1964, 566).

Dunes of the second series were produced by a reworking of the sand of the first series dunes. Moderately intense winds under semi-arid conditions were probably responsible for creation of the dunes of the second series. As the climate modified, these dunes were invaded by vegetation and stabilized (Smith: 1964, 567).

Dunes of the third series are ubiquitous in occurrence. They produce a very intricate and complicated
topography with local relief on the order of ten feet. Some are smooth and rounded, while others have sharp, abrupt shapes. They likely developed during periods when a succession of dry years and reduced vegetation allowed the dunes of the second series to become active. Alternating periods of greater moisture and then drought caused the dunes of the third series to be stable and then active (Smith: 1964, 570).

Essentially flat valleys lie between the ranges of hills. These valleys are generally longer from northwest to southeast, running parallel to the dunes. They vary in size from a few acres to several square miles. These valleys often contain marshes and lakes with no external drainage.

**Climate**

The climate of the Sandhills is a semi-arid continental type, characterized by cold winters and warm to hot summers with large diurnal variations in temperature. The cold winters result from high pressure areas which move into the region from the north and northwest and from the continentality (lack of modifying marine influence) of South Dakota. The warm or hot summers result from a southerly air flow and from continentality. Land tends to take up and give off heat quickly, as compared with the oceans (Strahler: 1983, 134).
These warm and cold air masses dominate the region's weather regime. However, a great deal of frontal activity occurs, particularly in the spring and fall. This activity brings frequent changes in weather conditions and much of the region's annual precipitation results from frontal passages and convectional thunderstorms.

Cold fronts and associated low pressure areas move generally eastward across South Dakota. Precipitation and stormy weather are associated with these cold fronts and low pressure areas (Critchfield: 1983, 197).

Air flow from the south is generally warm. When this flow is from the Gulf of Mexico, it results in humid conditions. Air flow from the southwest is usually hot and dry.

A westerly air flow is usually mild and dry. All mountains to the west of the state act as barriers to the flow of moisture from the Pacific Ocean. After the air passes over the mountains, the downward movement results in a warming effect. These warm winds are called chinook winds (Critchfield: 1983, 197).

The Black Hills have the greatest climatic influence of any topographical feature in South Dakota. Milder temperatures are experienced east of the Black Hills as compared to other parts of the state. This is a result of the warming effect of the downslope winds coming from
Figure 7. South Dakota Normal Precipitation - 1951-1980
(Source: William F. Lytle, State Meteorologist)
Figure 8. South Dakota Growing Season Precipitation - 1951-1980
(Source: William F. Lytle, State Meteorologist)
the west. This is particularly true with the northwest winter winds that are usually colder in other parts of the state (Climate of South Dakota: 1971, 3).

Summers are moderately warm. A reading of plus 90 degrees F. may be expected on an average of 36 days per year at Martin.\(^1\) Average July temperature at Martin is 76 degrees F. The record high temperature is 108 degrees F., recorded in July 1973.

Winters are cold with January being the coldest month. The average January temperature at Martin is 21 degrees F. The record low is \(-28\) degrees F., recorded in January 1963.

Average annual precipitation at Martin is 17 inches. However, annual precipitation differs greatly from year to year, thereby creating uneven cycles of wet and dry years. For example, as of August this year (1985), Martin has received less than half the average amount of precipitation for a "normal" year.

Most precipitation occurs during the spring and summer months in the form of convectional thundershowers. As the air heats, it rises, causing condensation. May, June, and July are the wettest months, due to the influx of moisture from the Gulf of Mexico and the convectional forces. December and January are the driest months due to the dominance of cool dry air from the northwest. Thus,
TABLE 1

SELECTED PRECIPITATION DATA FOR THE SANDHILLS REGION

<table>
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<tr>
<th></th>
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<th>April</th>
<th>May</th>
<th>June</th>
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<td>.42</td>
<td>.93</td>
<td>1.96</td>
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<td>3.37</td>
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<td>1951-1980</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>July</td>
<td>2.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>August</td>
<td>2.09</td>
<td></td>
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<td>1.26</td>
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<td>October</td>
<td>.89</td>
<td></td>
<td></td>
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<td>November</td>
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<td>December</td>
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<td></td>
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Data are for Martin.

(Source: U. S. Department of Commerce, National Climatic Center, Climate Summary for Selected Sites in the United States (1951-1980) Climatography of the United States No. 20 for Martin, South Dakota, 1984.)
TABLE 2

SELECTED TEMPERATURE DATA FOR THE SANDHILLS REGION

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<th>Month</th>
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<td>27.0</td>
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<td>September</td>
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<td>October</td>
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<tr>
<td>November</td>
<td>35.3</td>
</tr>
<tr>
<td>December</td>
<td>26.3</td>
</tr>
</tbody>
</table>

Data are for Martin.

most precipitation occurs during the growing season.

Severe weather in the form of tornadoes, high winds, and hail occasionally occur, most often in early summer. As is true with most areas of the Great Plains, blizzards occur several times each winter and pose the greatest hardship and threat to animals and humans of any local phenomena.

Soils

Sand comprises the major component of all Sandhills soils. Soil associations include: the Valentine, Valentine Dunday, Elsmere-Loup, and Gannett (Figure 9). Valentine soils make up approximately 80 percent of the Sandhills soils (South Dakota Water Plan, Volume II-B Section 16: 1975, 33).

The Valentine series consists of deep, undulating to steep soils on uplands. These soils have a granular, grayish brown, fine sand surface layer, a sand transitional layer, and a pale brown, sandstone underlying material (Westin: 1967, 18). These soils are excessively drained and have slow runoff and rapid permeability. A small amount of organic material is found in the surface layer.

The Valentine-Dunday association occurs on short, well rounded ridges and hills between the higher ridges
Figure 9. Typical Soil Pattern in the South Dakota Sandhills

(Source: Soil Survey of Todd County: 1974, 9.)
and hills of the Valentine association and the lower, primarily flat areas of the Elsmere-Loup association. The soils of the Valentine-Dunday association have a thin dark grayish-brown surface layer of fine sand over brown and light gray fine sand. These soils are somewhat excessively drained, have slow runoff and rapid permeability (Todd County: 1974, 8).

The Elsmere-Loup association occupies the lowlands and valleys between the ranges of hills (Figure 9). Slight rises or undulations commonly break the nearly level relief. The soil of this association is dark-gray sandy loam. The water table is near or at the surface and thus many marshy areas and lakes occur (Todd County: 1974, 29).

Gannett soils are deep and poorly drained. These soils contain a high water table. This association contains several layers. The first is a spongy, brown layer usually about 4 inches thick. The second is a dark gray layer approximately 15 inches thick. Below this is a layer of brown sandy loam. The underlying material is a gray fine sand which is saturated with water. Gannett soils are found in the meadows and marshes of the lowest valleys of the Sandhills.

Areas of blown-out land occur in various places throughout the Sandhills, but occupy only approximately
Figure 10. Topo-sequence of Sandhills Soils
(Source: McIntosh: 1974, 91.)
Figure 11. Grass Reclaiming a Blowout

Figure 12. Large Blowout
0.2 percent of the area (Soil Survey of Bennett County: 1971, 7). On this land, erosion has removed the surface layer that was slightly darkened by organic matter. The finer sand particles have been blown away leaving behind scooped out depressions and hummocks of medium grained sand. Blown-out areas vary in size from 3 to 40 acres (Soil Survey of Bennett County: 1971, 11).

Throughout the Sandhills, a major concern is the maintenance of adequate plant cover. All the soil associations of the Sandhills are susceptible to wind erosion when the surface plant cover is removed.

**Water Features**

Surface water features of the Sandhills are of two types, lakes and springs. Small lakes occur in many of the lower lying valleys of the Sandhills. Springs are most common along the northern border of the Sandhills, but are also found in some of the valleys. These springs result from water draining from the aquifer.

Due to the porous nature of the surface sand, most of the precipitation percolates downward and becomes groundwater where it is trapped by the underlying sandstone layers (Weaver: 1965, 135-54). This creates a natural aquifer (Figure 13). In many of the valleys this aquifer lies at or near the surface. Whenever the water
Section in the Sand Hills showing: A, Impervious Beds; B, C, Stratified and Wind-blown Sands filled with Water; D, Sand Dune; E, Wet-weather Pond; F, Dry Valley; G, Lake; H, Water Table

Figure 13. Sandhills Profile

(Source: Condra: 1906, 88.)
table reaches the surface, a lake is formed (Russell: 1956, 323-24). The level of the water table is dependent on the amount of precipitation received and thus is higher in wet years and lower in dry years. This greatly affects the number of ponds and lakes and the extent of their surface area in any given year (McCarraher: 1977, 36).

Springs are common in the low lying valleys where the water table is near the surface. Numerous springs also occur along the northern perimeter of the Sandhills and drain primarily into the Little White River. These springs are due to seepage from the underlying aquifer (Condra: 1906, 91).

Little surface drainage occurs in the Sandhills themselves. The porous sand allows water to quickly percolate downward. The many valleys and lakes are bound by hills on all sides and thus are not interconnected and lack an organized drainage system.

**Biogeography - Flora**

The Great Plains of North America is primarily an area of grassland. The Sandhills lie near the center of this region. The dominant vegetation of the Sandhills is prairie grass.

Short to mid grasses cover the hills and shallow valleys. These grasses are hardy and require little
Figure 14. Trees Around a Lake

Figure 15. Lake, Tall Grasses, Rushes
moisture to thrive. Common varieties include: prairie sandreed, needle-and-thread, sand dropseed, blue grama, hairy grama, sand bluestem, big bluestem, and little bluestem (Soil Survey of Bennett County: 1971, 41).

Deeper valleys contain sub-irrigated meadows covered with mid to tall prairie grasses. The water table is close to the surface early in the growing season and usually drops to a depth of two to five feet by midsummer. Moisture from the water table is within the reach of plant roots during most of the growing season. Common grass varieties include: timothy, western wheatgrass, slim sedge, switchgrass, and Indian grass (Soil Survey of Bennett County: 1971, 39).

Marshes surround many of the lakes and ponds of the region. These areas are largely unsuitable for grazing but provide an excellent habitat for wildlife. Numerous species of birds, especially waterfowl, nest in these marshes. Muskrats build their houses from materials gleaned from the marsh vegetation. The common rush, northern reed-grass, bluejoint reedgrass, and reed canary grass, grow in these marsh areas.

A number of xerophytes, or plants adapted to a dry environment, occur in the Sandhills. They thrive during periods of drought and on upland areas which have been overgrazed. Plants included in this category are the
Canada thistle, yucca, sandbur, and prickly pear cactus. Sand cherries, a form of wild fruit, grow on the slopes of many hills. Shrubs include the dogwood and wild rose. Trees, though not common in the Sandhills, are present in some of the deeper valleys, around some lakes, and in planted shelterbelts. Cottonwood and white willow are two varieties found here, as well as around many lakes, and along many rivers of the Great Plains.

Fauna

The distribution and abundance of wildlife species are largely determined by the occurrence of suitable habitat. The Sandhills are a home to many animals and birds that are able to secure both food and shelter in this unique environment.

While humans have the knowledge and ability to conserve wildlife and to protect and expand habitat, they have instead destroyed many species. Elk and buffalo lived in the Sandhills until the late 19th century. The white man hunted them to extinction in this area.

The large expanses of rugged hills provide a sheltered and isolated habitat for mule deer and pronghorn antelope. These animals prefer the seclusion from humans provided by the Sandhills. The pronghorn antelope are able to use their superior eyesight and speed to great
Figure 16. Geese Swimming on a Sandhills Lake
advantage in this area.

Predators such as the coyote are found throughout the Sandhills. They hunt rabbits in the hills and uplands and a variety of birds and small animals in the marshes and valleys.

The lakes and marshes provide habitat for many birds. Migratory waterfowl are in abundance in the spring and fall. Many species of ducks as well as geese nest in the area. Numerous shorebirds and songbirds can be seen and heard.

The tall grass of the valleys provide shelter and nesting habitat for the sharp-tailed grouse. This bird is often hunted by humans for its succulent dark meat.

The deeper lakes of the region are inhabited by fish. Shallower lakes and ponds dry up in periods of drought or freeze in winter. Common fish include bullheads, large mouth bass, and bluegill. These are harvested by humans, pelicans, and herons (South Dakota Water Plan, Volume II-B Section 5: 1975, 80).

The Sandhills contain an ecosystem which sustains a variety of fauna. Through overgrazing, hunting, or pollution, humans can destroy the wildlife of the Sandhills. Through planning and conservation practices, the unique environment inhabited by the fauna of the Sandhills can be preserved and even enhanced.
The physical environment of the Sandhills provides humans with a variety of landuse and recreational options. The grasslands are used as rangeland for cattle. The valley meadows provide hay for winter feeding. Native animals of the region provide recreation in the form of hunting, fishing, and observing. The Sandhills present climatic advantages over most regions of South Dakota. Winters are warmer than other parts of the state. The relative humidity is lower than in eastern South Dakota.

The following chapter focuses on human use and occupancy of the Sandhills. The cultural environment of any region is largely a picture of human perception and use of the physical environment.
END NOTES

1. No weather station exists in the Sandhills region of South Dakota. Data from the weather station at Martin are used. Temperatures and precipitation averages would likely be a little higher in the eastern part of the region than those recorded at Martin.

2. The writer observed tornadoes on two occasions in one summer while working in the Sandhills.

3. When walking on this spongy layer one's shoes often become wet giving a feeling similar to walking on muskeg in the north.

4. The terms short, mid, and tall are descriptive terms used in the classification of grasses.
CHAPTER III

CULTURAL ENVIRONMENT

Introduction

The cultural environment of a region embraces the human use and perception of the physical environment of that region. In this chapter various aspects of the cultural environment of the Sandhills are examined and interpreted.

Land use practices in the South Dakota Sandhills differ from those in other regions of South Dakota, the Great Plains, and even the Sandhills of Nebraska in a number of ways. Historically the Indian used this region as a hunting area, not for farming or a place to live. Anglo-American settlement did not occur until the beginning of the 20th century. No towns or even post offices are located in the Sandhills of South Dakota.

Some cultural aspects of the Sandhills are similar to other areas of the Great Plains. In the Sandhills, as well as in much of the Great Plains, cattle ranching is the primary economic activity. Thus, great economic homogeneity exists. The region is one of sparse settlement.

The previous chapter presented physical aspects of
the Sandhills. Human use of this environment is the theme of this chapter.

**Indian Occupance**

The physical environment of the Sandhills of South Dakota presented the early plains Indians of the region with game to hunt and a supply of fresh water. These early occupants did not leave a written record of their history. However, sites in nearby regions both to the north and south of the Sandhills point to various peoples having lived in the vicinity prior to the coming of Anglo-Americans. It is highly unlikely that early plains dwellers did not at least pass through this region. This leads to the assumption that these Indians also would have exploited the resources which were available to them in the Sandhills. An extensive and diverse animal population existed. Water, in the form of springs and lakes, was another resource which was present and probably very precious to the inhabitants of this semi-arid region. Though the early plains Indians did not practice large animal domestication, the sub-irrigated meadows of the region sustained wildlife to hunt, such as deer, elk, and buffalo, even in periods of drought.

Verifiable evidence in the form of artifacts substantiate use of the Sandhills by the Arikara Tribe. Some
authorities believe the Arikaras arrived in the Sandhills region of South Dakota and Nebraska in the early 1500s (Jennings: 1955, 241-45). The Arikaras were primarily an agricultural people. However, they hunted bison and other animals to supplement their diets, provide skins for clothing, and bones for tools. Arikara artifacts often found in the South Dakota Sandhills include: awls, spear points, scrapers, and arrowheads. All are made of flint.

These artifacts indicate that hunting, not farming, was their primary activity in the Sandhills. The abundance and wide distribution of artifacts would attest to long-term and intensive use of the region for hunting. Animals and birds were abundant in the hills and meadows of this region. The rugged terrain made stalking possible. Hunting by fire, as practiced by the plains Indians, would work well in the dry grasses of the Sandhills in late summer and early fall (Costello: 1980, 53).

Toward the end of the 18th century, the Arikaras were decimated by warfare and European diseases, especially smallpox (Schell: 1961, 18). Their most fierce enemies included the Pawnee, who inhabited the area of central Nebraska, and the Sioux from the northeast. The stronger and more numerous Teton Sioux forced the Arikara to abandon the Sandhills and surrounding area.

The Sandhills thus became the hunting ground of the
Sioux. The nomadic Sioux camped both in the Sandhills and in areas adjacent to the Sandhills. They exploited the same resources previously used by the Arikara.

The Sioux used flint found in the blowouts of the Sandhills for making tools. They also made soap from the root of the soapweed (yucca) and ate the fruit of the sandcherry.

Indian use of the Sandhills of South Dakota changed the natural landscape minimally. This contrasts sharply with the many changes wrought by Anglo-American use and settlement.

European influence in the Sandhills was at first passive. The Fort Laramie Treaty of 1868 had designated all land west of the Missouri River in Dakota Territory as Indian Reservation (Figure 17).

This passivity soon disappeared and Anglo-Americans occupied the region. During the late 19th century, as pressure increased for opening land west of the Missouri River to white settlement, the Federal Government reduced the amount of land allotted as Indian Reservation. The 50th Congress, on March 2, 1889, re-drew the Reservation boundaries so that only a portion of the land west of the Missouri River in Dakota Territory remained the exclusive domain of the Indian. The Sandhills of South Dakota thereby was designated as part of the Pine Ridge
Figure 17. Indian Reservation as Designated by the Fort Laramie Treaty of 1868
(Source: Fort Laramie Treaty)
Indian Reservation. The Dawes Allotment Act allocated parcels of land to individual Indians. The Ogalala Sioux Tribe voted to have unallotted land in Bennett and Mellette counties opened for white settlement (Bennett County Historical Society: 1981, 17). Thus in the early 1900s, a portion of the Sandhills was opened to purchase and occupancy by non-Indians.

Cattle raising had been successful prior to the opening of land for non-Indian settlement. Many of the cattle issued by the Government to Indians as a beef ration were not consumed, but rather used to create a herd owned in part by the Ogalala Tribe and in part by individual Indians.

Several factors eventually led to the almost complete disappearance of the Indian herds and subsequently to the leasing of land to white settlers. High cattle prices during World War I served as an incentive for the Indians to sell their herds. The fencing of small blocks of land by both Indians and white settlers restricted the amount of available land and water. This, with the exception of a very few Indians who continued to ranch, marked the end of Indian use of the Sandhills of South Dakota.

**Anglo-American Settlement**

The settlement and use of the Sandhills of South
Figure 18. The Pine Ridge and Rosebud Indian Reservations

(Source: Base Map - Goode's World Atlas, 1985.)
Dakota by Anglo-Americans occurred later than did that of the adjacent Sandhills region of Nebraska. This area of South Dakota, being reservation land, was closed to white settlement. Due to a location that was peripheral to most transportation routes, the Sandhills of South Dakota was seldom even traversed by Anglo-Americans until late in the 1800s. Government employees and those who provided services for the reservation were present, but their activity focused around the center of bureaucracy at Pine Ridge and Rosebud. The city of Pine Ridge lies some 15 miles northwest of the Sandhills. Rosebud is some six miles north of the Sandhills.

Anglo-American ranchers married to Indian women were allowed to run cattle on the Reservation. However, due to widespread availability of land, they made only limited use of Sandhills pastureland.

In the 1890s the Spade Ranch, an extremely large cattle operation in the Nebraska Sandhills, also used the South Dakota Sandhills to pasture some of their cattle. The Spade Ranch used pastures at Lacreek and along the Little White River (Richards: 1980, 70). The range used by the Spade Ranch during the 1890s extended from the Burlington Railroad on the south, to the Big White River on the north.4 The Spade Ranch supplied beef to the Reservations from the late 1880s to the early 20th century.
and was allowed to run a portion of its herd on the Pine Ridge and Rosebud Reservations (Figure 19).

Because the Pine Ridge Reservation was opened to non-Indians by Congress in the early 20th century, Anglo-American settlers were able to homestead and purchase land on the Reservation.

Not all land which had been made available to Indians under the Indian Allotment Act was claimed by them. Land not patented by Indians was opened for homesteading. A buyer could also purchase land owned by Indians in Bennett County.

Due to a great demand for homesteading permits, government officials required potential homesteaders to register for a drawing in order to decide who would obtain a permit. 53,388 people registered their names in 1910. Names were drawn and notices were sent out to the winners. A time and place were designated for them to appear and make their homestead selection. Tract size was 160 acres. Residency had to be established and improvements made. Land prices varied from 50 cents to six dollars per acre (Bennett County Historical Society: 1981, 17).

The most desirable parcels were those on which corn, wheat, and hay could be grown. Thus, the Sandhills units were not the first parcels to be chosen because of their unsuitability for grain farming. When the preferred land
Figure 19. The Approximate Maximum Extent of the Spade Ranch

TABLE 3

Population Data for Counties in the Sandhills Region 1980

(Note: Data listed are for the counties, not the Sandhills proper.)

<table>
<thead>
<tr>
<th>County</th>
<th>Total Population</th>
<th>Density per square mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bennett</td>
<td>3,044</td>
<td>2.6</td>
</tr>
<tr>
<td>Shannon</td>
<td>11,323</td>
<td>5.4</td>
</tr>
<tr>
<td>Todd</td>
<td>7,328</td>
<td>5.3</td>
</tr>
<tr>
<td>Tripp</td>
<td>7,268</td>
<td>4.5</td>
</tr>
</tbody>
</table>

(Source: South Dakota Statistics in Brief, Agricultural Experiment Station, South Dakota State University, 1984, 1.)
Figure 20. Fence and Gate in the Sandhills

Figure 21. Cattle Going to Water
was occupied, latecomers looked to the Sandhills as the only available and affordable land.

**Recreation**

An important aspect of the cultural environment of a region is its recreation. Hunting and fishing comprise the chief recreational activities in the Sandhills region.

Big game animals hunted in the Sandhills are deer and the pronghorn antelope. Both species are hunted by both gun and bow and arrow. Most hunting for these species is done in remote and rugged sections of the hills.

The most popular type of hunting is bird hunting. The many lakes provide an excellent habitat for waterfowl. Migratory ducks and geese as well as those that nest locally are abundant in the fall. Sharp-tailed grouse are hunted in the valleys.

The deeper lakes of the Sandhills provide excellent fishing. The most popular species of fish caught is the largemouth bass.

**Agriculture**

Economically, agriculture is the most important industry in South Dakota. From the early days of subsistence farming, to the present day livestock-cash crop economy, South Dakota has been a farm state. The Sandhills are unique in South Dakota in that from the first
Figure 22. Windmill Used to Pump Water

Figure 23. Salt Station for Cattle
Anglo-American settlement to the present day cattle ranching is the only economic activity.

Early settlers who homesteaded or purchased land in the Sandhills intended not to grow grain, but to raise cattle. The Sandhills offered an excellent situation for cattle ranching. Plentiful grass provided the cattle with an abundant food supply. Water was readily available in the many lakes and from shallow wells which were pumped by windmills. The steep hills furnished shelter from winter winds and blizzards. Meadows produced hay for use as winter food.

Making a living on 160 acres of land in the Sandhills was impossible. Even early in the 20th century, several square miles were required to provide enough range for the number of cattle necessary for a rancher to make a profit or even survive. Early ranchers homesteaded or purchased land in hay meadows, and leased grazing land from Indian owners or the Government.

The Sandhills and cattle ranching are nearly synonymous. This union of the physical region and economic exploitation through cattle ranching is a harmonious one with the abundance of grass and water.

A cattle rancher in this region must be a conservationist or he is doomed to economic failure. Overgrazing is the biggest enemy of the landscape. Overgrazing
Figure 24. Haystacks

Figure 25. Hay Rake Used to Gather Hay
removes the stabilizing layer of grass, resulting in wind erosion and a probable blowout. A fine line exists between obtaining maximum grazing for livestock and preserving the landscape in this fragile environment.

Barbed wire is a management tool for the rancher in his maintenance of the rangeland. The wire is used to divide the range into individual units. Pastures often consist of several square miles and are seldom smaller than 320 acres. Cattle are moved to another pasture before overgrazing can occur.

Areas of the Sandhills which receive excess traffic, whether by motor vehicle or from the hooves of animals, must be protected. Even when good range management is practiced, certain areas will eventually lose their grass cover and a blowout is likely to occur. These problem areas include vehicle trails or areas where cattle continually walk or congregate, such as around windmills, saltlicks, winter feeding areas, or along fence lines. These bare areas are sometimes protected by a covering of swamp hay or rushes over the loose sand. Vehicle trails are often protected for miles with such a covering.

A rancher's life, by necessity, is somewhat cyclical on a yearly basis. It is determined by the various demands of one's profession. Most of the ranchers time is spent in the outdoors caring for livestock. Feeding hay to
Figure 26. Slide Stacker for Making Haystacks

Figure 27. Hay Sweep Used to Gather Hay Before Stacking
Figure 28. Acres in Pastureland and Rangeland by County 1982

(Source: South Dakota Agricultural Census Handbook, Agricultural Experiment Station, South Dakota State University, 1984, 1-14.)
animals occupies much time in winter. Calving and branding are spring tasks. Cutting and stacking hay for winter fodder is a major summer task. Fall is the season for vaccinating and weaning spring calves.

Figures 29 and 30 contain data on the number of cattle and cattle ranches in the counties of the area. These data should not be interpreted as being an accurate assessment for the Sandhills as the data are for the counties as a whole.

In addition to the aforementioned duties, a rancher must keep fences, wells, and machinery in repair. Herds must be monitored for disease. Vehicles and equipment must be maintained. Cattle must be purchased and sold and records must be kept. This list is not intended to be a complete chronicle of a rancher's duties or yearly cycle. Rather it illustrates the variety of skills and knowledge necessary to be a successful cattleman.

Acreage for ranches in the Sandhills varies considerably. By necessity, ranch size averages several square miles for the carrying capacity of the land is small. The average farm in Bennett County contains 2714 acres. This figure, however, is misleading. Many farms in Bennett County are cash grain operations and lie outside the Sand-
Figure 29. Number of Cattle by County 1982

(Source: South Dakota Agricultural Census Handbook, Agricultural Experiment Station, South Dakota State University, 1984, 71-84.)
Figure 30. Number of Cattle Ranches by County 1982

(Source: South Dakota Agricultural Census Handbook, Agricultural Experiment Station, South Dakota State University, 1984, 29-42.)
as an example. Farms outside the Sandhills in the other counties would also be smaller than Sandhills ranches.

Sandhills ranchers take pride in their chosen geographic area. Sandhills cattle ranchers, like their counterparts elsewhere, often complain of low cattle prices and the cost of operating a ranch. Similar dissatisfaction is often voiced over political issues, schools, or a myriad of other perceived social and cultural problems. However, when conversation turns to the Sandhills, cattle or horses, a change in countenance occurs. These people love their "hills." One can challenge a rancher's political views, his brand of tobacco, or his choice of a particular cattle breed and remain a friend; but belittle or criticize the Sandhills and you stand in jeopardy of receiving bodily harm or at least a tongue lashing and an invitation to stay in the city where you belong.

A Sandhills rancher lives close to nature. He shares his land with many animals and birds. Most ranchers hunt and fish as a matter of course, but they respect and maintain wildlife populations.

**Other Factors**

A number of nonagricultural factors also contribute to understanding the cultural environment of a region. Items considered in this section include: cities and
Figure 31. Major Towns in the Sandhills Area.

(Source: South Dakota Road Map)
towns, transportation, and power and utilities.

No cities or towns exist in the Sandhills of South Dakota. People of the Sandhills are served by nearby towns in South Dakota and Nebraska. South Dakota towns include Martin, Winner, and Rapid City. Nebraska towns include Gordon and Valentine.

Transportation has been a problem in the Sandhills since the arrival of the Anglo-American. In the late 1800s roads in the South Dakota Sandhills were nonexistent. Wagons got stuck easily in the loose sand of the trails and travel was slow. Wide wagon wheels were often used to minimize sinking into the loose sand. Due to sparse settlement, distances to doctors, neighbors, and social functions were great.

Access to specific destinations in the Sandhills was generally accomplished on trails running northward from the Chicago and Northwestern Railroad, located from five to ten miles south of the Nebraska-South Dakota border, or from roads to the north of the Sandhills perimeter. Trails within the Sandhills run in the valleys wherever possible to avoid the rugged ridges and hills. However, the valleys run primarily east and west, so one must cross the ranges of hills to travel north and south.

The saddle horse was the most widely used mode of transportation. Many areas of the Sandhills were and are
Figure 32. Old and New Roads in the Sandhills

Figure 33. Road Leading to the Interior of the Sandhills
readily accessible only on horseback. Modern modes of transportation include four-wheel drive vehicles, motorcycles, and the airplane. The airplane is especially useful to survey cattle, range conditions, and water supplies.

The loose sand makes road building expensive and difficult. Most "roads" are simply trails created by the wheels of motor vehicles.

Major east-west highways include U.S. 18 to the north and U.S. 20 to the south. Major north-south highways include South Dakota 391 and 73 and U.S. 83.

Electric power for the Sandhills area is provided by the Lacreek Electric Association Incorporated. Electricity to the Association is supplied through lines running from hydroelectric generating stations on the Missouri River. Telephone service is supplied by Northwestern Bell.

The chief component of cultural environment of the South Dakota Sandhills today is the cattle ranch. Cattle ranching is the sole economic activity. Herds of cattle can be seen grazing throughout the Sandhills. However this has not always been true. The plains Indian used the Sandhills as a source of game. Hunting remains a primary pastime in the Sandhills. However, today hunting is a recreational activity, not a means of subsistence.
Figure 34. Major Highways in the Sandhills Area.
(Source: South Dakota Road Map, 1985.)
END NOTES

1. Many happy hours of the author's childhood were spent searching for Arikara artifacts in the Sandhills.

2. Flint was a precious commodity to the Indian. The occurrence of flint in the Sandhills is probably a result of earlier Indians abandoning or losing it, as it does not occur naturally in this location. A blowout is an area where a dune has become active as a result of the loss of surface cover.

3. The Dawes Allotment Act authorized the granting of parcels of land on Indian reservations to tribal members. Each head of household received 160 acres with smaller tracts to single men, women, and children. The allotments were to be held in trust by the government for 25 years. Rights of citizenship, including voting privileges, were endowed upon receiving the trust patent (Schell: 1961, 333).

4. The Burlington tracks ran east-west across Nebraska some 70 miles south of the South Dakota–Nebraska border. The Big White River runs from west to east some 60 miles north of the South Dakota–Nebraska border. Thus the north-south extent of the range used by the Spade Ranch was some 130 miles.
CHAPTER IV

CONCLUSION

Additional Research Opportunities

Historically, limited research has been undertaken in the Sandhills of South Dakota. This provides many additional research opportunities for students and scientists from a variety of disciplines.

Unanswered questions on the monolithic economy of the Sandhills remain. What is the impact of Sandhills cattle ranching on the South Dakota economy as a whole? Is agricultural diversification possible? Are other products, such as potatoes, which grow well in sandy soil, an alternative to cattle ranching in the Sandhills?

Of paramount concern in the study area is the lack of roads. Are there economically feasible methods of road construction in the Sandhills?

Other questions which merit future consideration and research include the following. Why are there no rattlesnakes in the Sandhills of South Dakota? Rattlesnakes exist in the area immediately adjacent to the Sandhills to the north. Rattlesnakes exist in the Sandhills of Nebraska to the south of U.S. Highway 20. Why are they not found between the two?
Pre-16th century use of the Sandhills by Indians and their impact on the land merits research. Is the origin of flint in the Sandhills tied to early Indian occupants or was it abandoned in the Sandhills by the Arikara Tribe?

**Future**

Little future change in the geography of the Sandhills is likely. Great population growth in the Sandhills will not occur. Little chance exists for a change in the region's economic activity. Barring new technology, the number of cattle will not likely increase due to the limited carrying capacity of the range. Due to the remoteness of the Sandhills from population centers, hunting and fishing will not likely increase greatly. The lack of cities and towns holds little likelihood for any commercial or industrial growth or development. Taking these factors into consideration, it is possible to suggest that little change will occur in the Sandhills for the foreseeable future.

**Summary**

Wind formed sand dunes comprise the major features of the physical landscape in the Sandhills of South Dakota. The dune sand was derived through the weathering away of the loosely consolidated underlying sandstone layer during
the Holocene period. A rolling, and in many places rugged, topography has resulted.

The semi-arid continental climate of the Sandhills is found over all of western South Dakota, with the exception of the Black Hills. However, the Sandhills region is warmer than other regions of South Dakota. The combination of low humidity and relatively warm temperature make the Sandhills climatically one of the most comfortable regions of the state.

Sand comprises the major component of all the soils of the Sandhills. Soils tend to be excessively drained and contain little organic material. Little runoff occurs as most of the moisture quickly percolates downward. Soil conditions are generally dry in the higher hills and often water saturated in the lower valleys due to a high water table. In areas where surface vegetation has been removed, a blowout is likely to occur. With modern range management techniques, blowouts have been largely controlled.

Numerous lakes are found in the lower lying valleys of the Sandhills. They occur when the water table rises above the ground surface. A water supply lies under the Sandhills in the form of an aquifer. This supplies area ranches with abundant water from shallow wells for cattle and other uses.

Prairie grasses dominate the flora of the region.
The grasses of the hills are relatively short and thin. Grasses of the valleys and meadows are tall and thick. Rushes surround many of the lakes.

Few trees exist in the Sandhills. However, trees do grow near some of the lakes and have been planted in shelterbelts.

Fauna of the Sandhills include many animals and birds. Pronghorn antelope and deer are numerous, but range cattle are the most numerous mammal. Predators include coyotes and badgers.

Many birds are found in the Sandhills. Numerous songbirds, grouse, birds of prey and waterfowl can be seen.

Cultural use of the Sandhills began with the American Indian. Pre-16th century use of the Sandhills by Indians is largely undocumented. However, it can be conjectured that they hunted game in the Sandhills.

Artifacts substantiate use of the Sandhills by the Arikara Tribe. The Arikaras inhabited the area from about 1500 until the end of the 18th century. Their primary activity in the Sandhills was hunting.

The Arikaras were displaced by the stronger and more numerous Teton Sioux. The primary activity of the Sioux was also hunting, and later, to a limited extent, the raising of cattle.

Anglo-American use of the Sandhills did not occur
until the late 1800s. Their activity from the beginning focused on cattle ranching. The first Anglo-Americans to gain use of South Dakota Sandhills' rangeland were those with contracts to supply beef to the Indian reservations.

Anglo-American ownership of the Sandhills began when the government allowed white settlers to buy land from both the Indians and government. The area was also opened for homesteading.

Cattle ranching continues to be the dominant activity in the Sandhills. The Sandhills and cattle ranching are nearly synonymous.

Most roads of the Sandhills are only trails formed by the wheels of vehicles. Exceptions are the few highways which run north and south through the area. Inadequate transportation is one of the main hardships or difficulties of the Sandhills region.

The criticism most often pronounced of the Sandhills is in reality their strength. At first glance, the Sandhills seem to be an almost continuous succession of west to east oriented grass covered dunes, valleys, and sparkling lakes. The dunes seem endless with each one appearing like the last one. These generalities are not true. Each hill is different. Each valley has its own distinguishing characteristics. When driving or riding horseback in the hills, to the trained eye, the great
variety is evident everywhere in the diversity of wildlife and plants, the smells of nature, and even the imprint left by man in his fences, windmills, winding trails, and cattle. The Sandhills exist as a place of subtle beauty.
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