

May 1998

Mammals [of the Sand Hills]

Patricia W. Freeman

University of Nebraska-Lincoln, pfreeman1@unl.edu

Follow this and additional works at: <http://digitalcommons.unl.edu/natrespapers>



Part of the [Natural Resources and Conservation Commons](#)

Freeman, Patricia W., "Mammals [of the Sand Hills]" (1998). *Papers in Natural Resources*. 8.
<http://digitalcommons.unl.edu/natrespapers/8>

This Article is brought to you for free and open access by the Natural Resources, School of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Papers in Natural Resources by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Mammals

by Patricia Freeman

*Curator of Zoology
University of Nebraska State Museum*

Introduction

Of approximately 81 species of mammals present in Nebraska today, 55 occur in the Sand Hills, with an additional three species that are associated only with the Niobrara River. Nebraska as a whole is truly a crossroads for mammals because two-thirds of the species reach their distributional limits in the state (Jones, 1964). Most of these mammals are widespread species or are specific to the grasslands as a whole and are not affected by this sandy zone. Jones (1964) wrote that "only a few mammals are restricted to this area. Mostly it serves to filter western species moving east and, in part, eastern species moving west, although some of the latter have

passed through the area along the riparian [river] community bordering the Platte River."

On the other hand, the Sand Hills appear to be a barrier to the distribution of some mammals. The eastern woodrat is a southern species that during a warmer, wetter time moved north. Today an isolated population occurs only along the Niobrara River in central Nebraska. Another mammal, the olive-backed pocket mouse, is found north of the Niobrara River in Cherry County and in the Panhandle, but evidently it does not inhabit the Sand Hills.

The Sand Hills, with their extraordinary variety of habitats from dune top to interdunal wetland and river bank, provide

habitats for many different types of mammals. The drier upland Sand Hills have an abundance of plains pocket gophers, plains pocket mice, Ord's kangaroo rats, prairie voles, and deer mice. Wet areas are characterized by the masked shrew, jumping mouse, meadow vole, and muskrat. The open areas, such as ridge tops and blowouts, tend to be the best microhabitat for kangaroo rats, which are bipedal and fast-moving; the dense grass microhabitat is favored by voles, which are quadrupedal and slow moving. Typically, kangaroo rats are from western, drier habitats, and voles are from eastern, moister habitats. In the Sand Hills, however, these two mammals occur together because of the mosaic of sand and grass (Lemen and Freeman, 1986).

Ord's kangaroo rat



Nebraska Game and Parks Commission



Nebraska Game and Parks Commission

Black-tailed jackrabbit

Distribution of Species

With the settling of the West, the only marsupial found in the United States, the opossum, has been slowly expanding its range northward and westward. However, there are few records of it from the Sand Hills (Jones, 1964). Of the shrews and moles found in the Sand Hills, three species are eastern in affinity; the masked shrew, has boreal (cold, mostly northern) affinities. The short-tailed shrew and the least shrew are not common in the Sand Hills and tend to be in moderately dry habitats, such as grassy roadside ditches away from both the direct upland and the more riparian habitats (Manning, 1983; Genoways, personal communication). In the Nebraska National Forest near Halsey, short-tailed shrews were captured in lush flood-plain and well-drained grassy areas of the river system, while a single least shrew was captured on a burned grassy slope formerly planted in trees (Manning and Geluso, in press). The eastern mole,

usually trapped in riparian habitats, surprisingly, has been found in the dry upland Arapaho Prairie in Arthur County. This native prairie is owned by the Nature Conservancy, managed by the University of Nebraska-Lincoln, and is a place where much research on the upland, drier Sand Hills has taken place. The moles in the Sand Hills are smaller, paler versions of the moles seen outside the sandy region.

Thirteen species of bats have been found in Nebraska, but only seven in the Sand Hills. There may be more, but because extensive netting has not been done on the lakes, ponds, and stock tanks in the area, few records exist. The small-footed bat, the silver-haired bat, the big brown bat, and the hoary bat are all widespread in distribution. Keen's bat and the red bat are eastern; and the free-tailed bat is southern, actually neotropical, in affinity. The free-tailed bat and Keen's bat have been found only in the central Niobrara River valley in the Sand Hills (Czaplewski and others, 1979). Manning and Ge-

luso (in press) recently reported an occurrence of the red bat from the Nebraska National Forest near Halsey in Thomas County.

The rabbits and hares found in the Sand Hills represent several faunas. Two species, the desert cottontail and the black-tailed jackrabbit, are western, the first reaching its easternmost limit in the western half of the state and the second being statewide. The eastern cottontail is an eastern species and the fourth species, the white-tailed jackrabbit, is a grassland species. Ecologically, the desert cottontail is not common in the Sand Hills, although it is found in the western part. The eastern cottontail is common but is found primarily in the area's riparian or agricultural communities. Neither species of cottontail can be found in the dry upland habitat of the Sand Hills. Jackrabbits have been found all over the state, but the black-tailed is more common in the southern part of the state, and the white-tailed is more common in the northern part. Apparently, the black-

tailed rabbit has been expanding its range northward in historic times, especially in cultivated land. Both jackrabbits are in the Sand Hills, but the black-tailed rabbits may be becoming more abundant in the southern part (Jones, 1964).

Five squirrels, consisting of three ground squirrels, a prairie dog, and a tree squirrel, are distributed in the Sand Hills. Franklin's ground squirrel is typically an inhabitant of the tallgrass prairie to the east but extends into the Sand Hills along natural and constructed waterways. The thirteen-lined ground squirrel is abundant statewide, while the black-tailed prairie dog is typically an inhabitant of the shortgrass prairie. These three squirrels are considered grassland or steppe species by Hoffmann and Jones (1970) and by Armstrong and others (1986). In contrast, the spotted ground squirrel is a western species found in dry habitats and places like the Sand Hills. However, it is not nearly as abundant as the common thirteen-lined ground squirrel. The fifth squirrel is the fox squirrel, a common inhabitant of the eastern forest and non-grassland areas. It extends into the Sand Hills along the major river systems. The fox squirrel has come up the Missouri River and spread westward in historic times (Jones, 1964).

The plains pocket gopher, a grassland species, is also found in the Sand Hills, but the population is generally smaller and paler than its eastern relatives. Like moles, the fur of pocket gophers closely matches the color of the soil in which they live (Jones, 1964).

Among the seed-eating pocket mice and kangaroo rats, the plains pocket mouse and the hispid pocket mouse are abundant. The plains pocket mouse is nearly statewide in distribution. In the Sand Hills, the hispid pocket mouse occupies the same geographic range as the plains pocket mouse; however, the hispid pocket mouse is more restricted to denser grass-forb areas than the smaller plains pocket mouse (Lemen and Freeman, 1986). The trails these mice make in the grass have been followed by dusting them with a non-toxic fluorescent powder. Then, with a black light, researchers have tracked them through these grass forb areas (Lemen and Freeman, 1985). This technique has provided an extremely accurate picture of where mice are foraging in the Sand Hills and where their burrows are hidden. Another pocket mouse, the silky pocket mouse, is rare. It is generally thought of as a southwestern species and has only been caught

in the western part of the Sand Hills. Two recent records of the silky pocket mouse are from Arapaho Prairie in Arthur County (Freeman, unpublished research) and from the Nebraska National Forest in Thomas County (R. M. Timm, personal communication). A single kangaroo rat, Ord's kangaroo rat, gets into the state from the southwest and reaches the eastern edge of the Sand Hills. It is an animal that occupies the open, sandy microhabitat and is abundant in blowouts and ridge tops. As blowouts stabilize with grass, this animal becomes less common. Kangaroo rats and pocket mice are commonly seen foraging for seeds at night on the sandy roads that traverse the Sand Hills. The new fluorescent tracking technique has allowed scientists to see unusual things. Following the trail of a kangaroo rat up the stalk of a sunflower plant that was over a meter tall, researchers found the seed head at the top had been clipped off. Not far from the plant lay a little pile of seed remains and husks. Although it did not seem unusual to follow the smaller, quadrupedal pocket mice into and up stands of sunflower plants, it was surprising to find that the larger, bipedal kangaroo rats can also feed in the tops of these tall prairie plants (Lemen and Freeman, 1985, 1986).

The beaver is a widespread, large, semi-aquatic rodent found on the major waterways in the Sand Hills. In the state as a whole, it is still common in spite of having been heavily trapped for pelts in historic times. The species was protected in 1907

(Jones, 1964).

The rats and mice make up the majority of rodents found in the Sand Hills. Some of the smallest are the harvest mice. Two species occur in the Sand Hills and throughout the state. The plains harvest mouse is found in drier, upland habitat and is less common than the western harvest mouse, which is found in several habitats, including dry, sandy areas and tall grass near lakes. The western harvest mouse has southwestern affinities, while the plains harvest mouse is a grassland species (Hoffmann and Jones, 1970; Armstrong and others, 1986).

The deer mouse and white-footed mouse are close relatives. The deer mouse is a widespread species found in many habitats but not in deep woods and marshy areas. The white-footed mouse, on the other hand, although a widespread species, is more restricted to wooded areas. In the Sand Hills, the deer mouse is a common animal in both upland and more moist grassy areas, but the white-footed mouse is restricted to waterways, especially where there are trees and taller cover (Jones, 1964).

The northern grasshopper mouse is a grassland species whose distribution extends beyond the Sand Hills to the east, but it is probably restricted by tall-grass prairie. It can be found in the upland Sand Hills community. This mouse is more common in the western part of the state than in the eastern part but is not commonly trapped in either area. Grasshopper mice are known to have large

Beaver dam, North Fork of Birdwood Creek, McPherson County



Charles Flowerday



Neil Jensen, Soil Conservation Service

Muskrat

territories where they find food and mates. A single adult male has been trailed in an upland Sand Hills prairie for almost a kilometer (900 meters, more than one half a mile; Lemen and Freeman, 1985). The eastern woodrat, a packrat with a southern affinity, can be found only in the central Niobrara River valley, where it is an isolated population restricted to the dense wooded habitat. Its range is thought to have been extended during a warm, wet period, then isolated in the moist river valley during a warm, dry period (Jones, 1964).

The southern bog lemming, a grass-eating rodent, is a northeastern species that can be found only on the eastern edge of the Sand Hills along the Niobrara and Loup rivers. A southern isolate of this species occurs in the southwestern part of the state south of the Sand Hills. Two other mammals that are related to the lemming are the prairie vole and the meadow vole. Both have the same geographical range in the Sand Hills, but the prairie vole, a widespread grassland species, occupies the drier grassy valleys and areas around lakes, while the meadow vole, a boreal species, is found right next to the water and in sedge areas surrounded by water (C. A. Lemen, personal communication). Thus, ponds and lakes in the Sand Hills will have meadow voles in the wettest areas surrounded by drier ground inhabited by prairie voles. These populations vacillate slightly with the rise and fall of the water table.

Like the beaver, the muskrat is a widespread, large, semi-aquatic rodent that inhabits the waterways; but, unlike beaver, it is commonest in the ponds, lakes, and marshes in the Sand Hills. Another widespread large rodent is the porcupine, which prefers to live in trees where it eats bark. In Nebraska, it is most common in the coniferous western forest of the Pine Ridge and



Charles Flowerday

Muskrat houses, McPherson County

along waterways that extend eastward into the Sand Hills. They are numerous in the planted coniferous forest at Halsey but are less common in eastern Nebraska.

The last rodent is the meadow jumping mouse. A rodent with boreal affinities, it is found mostly in the east in moist, riparian habitats that extend into the Sand Hills. It would not be found in upland Sand Hills habitat.

Carnivores generally are widespread mammals. Of the dog-like carnivores present in the Sand Hills today, the coyote is widespread; the swift fox, an almost extirpated (eliminated) grassland species, should still be in the Sand Hills, but few records exist; the red fox, although widespread, is more common in moist areas to the east; and the gray fox, with a southern affinity, is very rare (a record exists from Loup County; Jones, 1964). Raccoons are a widespread species that, when found away from trees, as in the Sand Hills, den in everything from burrows in the ground to

old buildings to clumps of cattails (Jones, 1964; Gersib, 1986).

Four species of carnivores have been extirpated from the state. These are the gray wolf, black bear, otter, and mountain lion. It is possible that otters are becoming re-established in the state after many years of extirpation. They have been seen and trapped recently in the Republican River south of the Sand Hills (Famey and Jones, 1978). Efforts are now being made by the Nebraska Game and Parks Commission to reintroduce them. A fifth species, the black-footed ferret, is also probably extirpated. It is a grassland species found in close association with prairie dog towns. It is possible that it still resides in

the Sand Hills near the Niobrara River, but extensive trapping in the last few years has not verified this possibility.

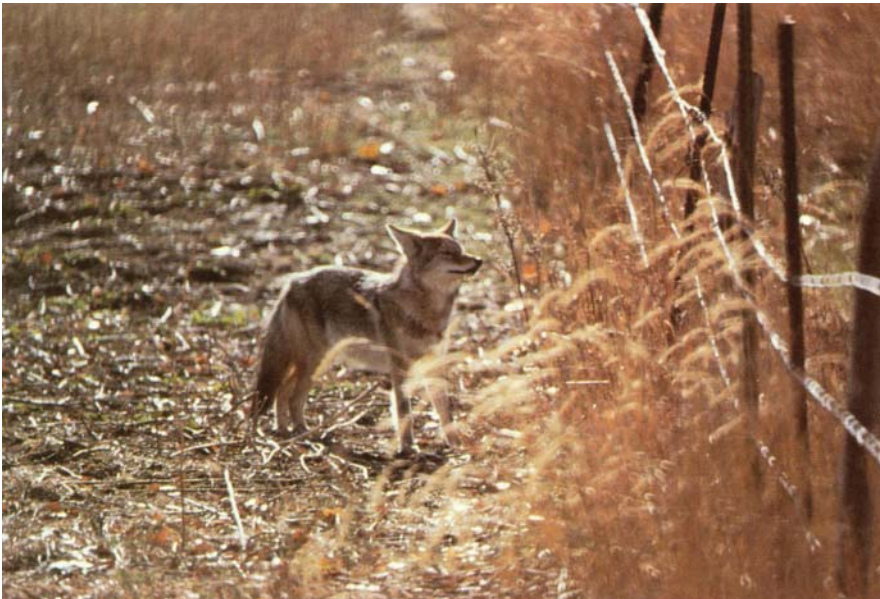
Among the weasels, the mink and badger are common Sand Hills species. Mink, like muskrats, are most abundant around the lakes, ponds, and marshes of the Sand Hills. Burrows of badgers are commonly found in the hillsides. Less common weasels are the long-tailed weasel (a widespread species) and the least weasel (a boreal species), which reaches part of its southern limit in Nebraska and gets into the Sand Hills from the east (Jones, 1964). Two skunks, the spotted skunk and the striped skunk, can be found in the Sand Hills. The striped skunk is a widespread and common mammal, but the spotted skunk, a southern species, is uncommon. The latter has moved northward with the settlement of Nebraska (Jones, 1964).

The only native cat today in the Sand Hills is the bobcat. It is uncommon in the



Nebraska Game and Parks Commission

River otter



Marianne Beel

Coyote

Sand Hills and tends to prefer wooded areas that would occur mostly along the rivers, particularly the Niobrara.

Several hooved mammals, namely elk, bison, and mountain sheep, were once present in the Sand Hills, but now, with the exception of some elk and bison at the Fort Niobrara Wildlife Refuge, are gone. The pronghorn antelope has been extir-

pated from the eastern part of the Sand Hills but can still be seen in western parts. Mule deer and white-tailed deer of course are common in the region and throughout the state. In the more open west, mule deer tend to outnumber white-tailed deer, a species more typically found in wooded or semi-wooded areas.

There are two introduced species of

mammals in the Sand Hills, the house mouse and the Norway rat. Both live in and around human dwellings and do not compete well with native mammals away from human habitation.

Summary

For mammals the Sand Hills provide a large, sandy contact zone between two very different grassland habitats, one wet and one dry. The wetlands and moister areas of the Sand Hills allow the invasion of such species as the opossum, the masked shrew, the short-tailed shrew, the least shrew, the eastern mole, the eastern cottontail rabbit, the fox squirrel, the white-footed mouse, a packrat (the eastern woodrat), the meadow vole, the southern bog lemming, the jumping mouse, the gray fox and the least weasel. Mammals that thrive in the drier conditions of the Sand Hills include the desert cottontail, the black-tailed jack-rabbit, the spotted ground squirrel, Ord's kangaroo rat, the silky pocket mouse, the western harvest mouse, and the northern grasshopper mouse. Since these habitats are interspersed in patches in the Sand Hills, this area provides a unique mosaic of habitats that allow an unusually wide variety of species to live side by side.

References

- Armstrong, D. M., Choate, J. R., and Jones, J. K., Jr., 1986, Distributional patterns of mammals in the plains states: Occasional Papers of the Museum of Texas Tech University, v. 105, p. 1-27.
- Czaplewski, N. J., Famey, J. P., Jones, J. K., Jr., and Dreucker, J. D., 1979, Synopsis of bats of Nebraska: Occasional Papers of the Museum of Texas Tech University, v. 61, p. 1-24.
- Famey, J. P., and Jones, J. K., Jr., 1978, Recent records of the river otter from Nebraska: Transactions of the Kansas Academy of Sciences, v. 81, p. 275-276.
- Gersib, D., 1986, Nebraska furbearers: NEBRASKAland Magazine, v. 64, p. 18-34.
- Hoffmann, R. S., and Jones, J. K., Jr., 1970, Influence of late-glacial and postglacial events on the distribution of Recent mammals on the Northern Great Plains, in Dort, Wakefield, Jr., and Jones, J. K., Jr., eds., Pleistocene and Recent Environments of the Central Great Plains: University of Kansas Press, Lawrence.
- Jones, J. K., Jr., 1964: Distribution and taxonomy of mammals of Nebraska: Uni-



Soil Conservation Service

Badger

- versity of Kansas Publications of the Museum of Natural History, v. 16, p. 1-356.
- Lemen, C. A., and Freeman, P. W., 1985, Tracking mammals with fluor-scent pigments: a new technique: Journal of Mammalogy, v. 66, p. 134-136.
- Lemen, C. A., and Freeman, P. W., 1986,

Habitat selection and movement patterns in Sandhills rodents: Prairie Naturalist, v. 46, p. 129-141.

- Manning, R. W., and Geluso, K. N., *in press*. Habitat utilization of mammals in a man-made forest in the Sandhills region of Nebraska: Occasional Papers of the Museum of Texas Tech University.

Mule deer



Marianne Beel

Table 12-1. Mammals of the Sand Hills

	Affinity ¹	Wetlands	Northern riparian forest	Oak hickory forest	Southern riparian forest	Oak hickory pine forest	Coniferous forest	Sand Hills grassland	Shortgrass prairie	Mixed prairie	Tallgrass prairie	Shrublands
Marsupials												
Opossum (<i>Didelphis virginiana</i>)	S	X	X	X	X	X						
Insectivores												
Masked shrew (<i>Sorex cinereus</i>)	N	X	X									
Short-tailed shrew (<i>Blarina brevicauda</i>)	E	X	X	X							X	
Least shrew (<i>Cryptotis parva</i>)	E	X	X					X		X	X	
Eastern mole (<i>Scalopus aquaticus</i>)	E		X					X				
Bats												
Keen's bat (<i>Myotis keeni</i>)	E		X	X			X					
Small-footed bat (<i>Myotis leibii</i>)	P		X		X							
Silver-haired bat (<i>Lasiurus noctivagans</i>)	P	X	X	X	X							
Big brown bat (<i>Eptesicus fuscus</i>)	P	X	X	X	X	X						
Red bat (<i>Lasiurus borealis</i>)	E	X	X	X	X	X						
Hoary bat (<i>Lasiurus cinereus</i>)	P	X	X	X	X							
*Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	S		X									
Rabbits												
Desert cottontail (<i>Sylvilagus auduboni</i>)	W							X	X		X	
Eastern cottontail (<i>Sylvilagus floridanus</i>)	E	X	X	X	X						X	
Black-tailed jackrabbit (<i>Lepus californicus</i>)	W						X	X			X	
White-tailed jackrabbit (<i>Lepus townsendi</i>)	G						X	X	X		X	
Rodents												
Franklin's ground squirrel (<i>Spermophilus franklini</i>)	G									X		
Spotted ground squirrel (<i>Spermophilus spilosoma</i>)	W						X	X			X	
Thirteen-lined ground squirrel (<i>Spermophilus tridecemlineatus</i>)	G						X	X	X			
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	G						X	X	X			
Fox squirrel (<i>Sciurus niger</i>)	E	X	X	X	X	X						
Plains pocket gopher (<i>Geomys bursarius</i>)	G						X		X	X		
Plains pocket mouse (<i>Perognathus flavescens</i>)	W							X	X			
Silky pocket mouse (<i>Perognathus flavus</i>)	W								X	X		X
Hispid pocket mouse (<i>Perognathus hispidus</i>)	G							X	X	X		X
Ord's kangaroo rat (<i>Dipodomys ordi</i>)	W							X	X	X		X
Beaver (<i>Castor canadensis</i>)	P	X	X		X							
Western harvest mouse (<i>Reithrodontomys megalotis</i>)	W		X							X	X	X
Plains harvest mouse (<i>Reithrodontomys montanus</i>)	G								X	X		X
White-footed mouse (<i>Peromyscus leucopus</i>)	P	X	X	X	X	X						X
Deer mouse (<i>Peromyscus maniculatus</i>)	P	X	X	X	X	X	X	X	X	X	X	X
Northern grasshopper mouse (<i>Onychomys leucogaster</i>)	G							X	X	X		X
*Eastern woodrat (<i>Neotoma floridana</i>)	S		X		X	X						
*Southern bog lemming (<i>Synaptomys cooperi</i>)	E	X										
Prairie vole (<i>Microtus ochrogaster</i>)	G							X			X	
Meadow vole (<i>Microtus pennsylvanicus</i>)	N	X						X			X	

¹ Affinity comes from Armstrong, Choate, and Jones (1986) and relates to geography but is strongly correlated with moisture conditions. Eastern and northern species are generally from moister conditions and western or southwestern species from drier, more desert-like conditions. Ecological categories are limited to those found in Nebraska. P = Widespread, G = Grassland or steppe, N = Northern or boreal, S = Southern or neotropical, E = Eastern or Northeastern, W = Western or southwestern, and I = introduced.

*Species marginally occurring in the Sand Hills

	Affinity ¹	Wetlands	Northern riparian forest	Oak hickory forest	Southern riparian forest	Oak hickory pine forest	Coniferous forest	Sand Hills grassland	Shortgrass prairie	Mixed prairie	Tallgrass prairie	Shrublands
Muskrat (<i>Ondatra zibethicus</i>)	P	X	X		X							
Meadow jumping mouse (<i>Zapus hudsonius</i>)	N	X										
Porcupine (<i>Erethizon dorsatum</i>)	P		X	X			X					
House mouse (<i>Mus musculus</i>)	I											
Norway rat (<i>Rattus norvegicus</i>)	I											
Carnivores												
Coyote (<i>Canis latrans</i>)	P		X	X		X	X	X	X	X	X	X
Swift fox (<i>Vulpes velox</i>)	G							X	X			
Red fox (<i>Vulpes vulpes</i>)	P	X	X	X	X	X	X	X				
Gray fox (<i>Urocyon cinereoargenteus</i>)	S		X	X	X	X					X	
Raccoon (<i>Procyon lotor</i>)	P	X	X	X	X	X						
Long-tailed weasel (<i>Mustela frenata</i>)	P	X	X	X	X	X	X	X	X	X	X	X
Least weasel (<i>Mustela nivalis</i>)	N	X	X								X	
Mink (<i>Mustela vison</i>)	P	X	X		X							
Badger (<i>Taxidea taxus</i>)	P							X	X	X	X	X
Spotted skunk (<i>Spilogale putorius</i>)	S		X	X	X	X				X	X	X
Striped skunk (<i>Mephitis mephitis</i>)	P	X	X	X	X	X	X	X	X	X	X	X
Bobcat (<i>Lynx rufus</i>)	P		X	X	X	X	X	X				X
Artiodactyls												
Elk (<i>Cervus canadensis</i>)	P		X	X			X			X		
Mule deer (<i>Odocoileus hemionus</i>)	P		X				X	X	X	X		X
White-tailed deer (<i>Odocoileus virginianus</i>)	P	X	X	X	X	X				X	X	
Pronghorn (<i>Antilocapra americana</i>)	G								X	X		X
Bison (<i>Bison bison</i>)	P							X	X	X	X	X

From *An Atlas of the Sand Hills*. Ann S. Bleed & Charles A. Flowerday, Editors. Resource Atlas No. 5b. Third edition (expanded)—May 1998. Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska—Lincoln. Pages 193–200.