1992

Nebraska's Vanishing Species

Greg Wingfield

Follow this and additional works at: http://digitalcommons.unl.edu/nebgamestaff

Part of the Environmental Sciences Commons

http://digitalcommons.unl.edu/nebgamestaff/51

This Article is brought to you for free and open access by the Nebraska Game and Parks Commission at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Game and Parks Commission -- Staff Research Publications by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
NEBRASKA’S VANISHING SPECIES
Nebraskans are blessed with a rich heritage — friendly, hard-working people, unique landforms and diverse natural resources, including native species of plants and animals. Unfortunately, an irreplaceable part of this heritage, our threatened and endangered species, is vanishing.

Simply stated, a threatened species is one likely to become endangered. An endangered species is one so rare that it is in danger of becoming extinct. Extinction is the loss of a species from this world.

Extinction is both a destination and the process leading to it. The process is natural. The earth’s history contains countless examples of species which were unable to adapt to their changing environments and became extinct. At Morrill Hall on the University of Nebraska campus or Ashfall Fossil Bed’s visitor center near Royal, you can visit extinction first-hand. Their bones are the only evidence that dinosaurs, mammoths and barrel-bodied rhinos once existed.

Scientists estimate that some 30 million to 40 million species of organisms may currently exist on our planet. Humanity’s limited understanding of life on earth comes from relatively few species, the 2 million or 3 million we have identified and categorized. The millions of species that exist today represent only a meager percentage of the millions that have existed during the planet’s history — clear testimony that extinction is a natural process.

In recent times, however, extinction has also become a somewhat unnatural process. Only humans, out of the millions of species, have the ability and propensity to influence the destiny of countless other species. We modify the planet’s environment — the air, water and land around us — in dramatic ways that no other species can. Our influence has caused the extinction rate to accelerate to critical levels. Scientists estimate that one species is lost to extinction each day. In our lifetimes, the rate may reach one species each hour! History proves we have not been kind to the earth’s biological citizenry.

What We Stand to Lose

Why is it important to save species from extinction? Are the money, time and effort really worth the sacrifices we must make to reach the goal of protecting all species? After all, there are millions. How can the loss of the American burying beetle or the Higgins’ eye pearly mussel be significant? What good are they?

The answers to these questions are crucial. The extent to which we modify our behavior, based on the answers, may determine our own survival and that of our planet.

With enough money or effort, it is possible to replace material things — a first shotgun, a ‘55 Chevy. Unlike material belongings, extinct species can never be repurchased, recreated or replaced. Not with any level of sacrifice, not with any amount of resolve. With all our creativity and inventiveness, humans cannot reverse extinction. We must ac-
knowledge that extinction is forever.

We often attempt to judge the worth of a species only in tangible terms — in dollars. Plant species are highly valued if they can feed the world or if they fuel our economy. White-tailed deer and ring-necked pheasants are bread and butter game species in the Midwest, and state fish and game agencies obviously value hunters’ license fees.

But too often we overlook less obvious, but important, values, especially those which a diverse community of species provides. Many of these values are expressed in the preamble to the federal Endangered Species Act in which Congress declared that species of fish, wildlife, and plants are of aesthetic, ecological, educational, historical, recreational and scientific value to the nation and its people.

The aesthetic value of species was expressed long ago by Seattle, chief of the Suquamish: “What is there to life if man cannot hear the lonely cry of the whip-poor-will or the arguments of the frogs around a pond at night? What is man without the beasts? If all the beasts were gone, men would die from a great loneliness of spirit.”

Watching our children marvel at the sight of fireflies and hearing their spontaneous giggles and screams as they pursue their quarry on a midsummer evening, we can begin to understand aesthetic values. We might recall the renewal we experienced while discovering wildflowers in a Sandhills meadow, or while enjoying the quiet of a favorite woodland. For many, value comes simply from knowing that the natural world still contains remnants of pristine environments and diverse wildlife communities.

Moreover, preventing extinction is an ethical duty. In exercising dominion over animals and plants, we soon find ourselves believing that they exist solely for our benefit. We fail to recognize that all life forms possess intrinsic values. With our capacity to cause dramatic change to the natural world, comes a responsibility to be wise stewards.

Just as caged canaries once warned miners of poisonous gas in mineshafts, some species serve as biological indicators, barometers measuring the health of our environment. The successful return of nesting peregrine falcons to eastern Nebraska in 1992 reminds us of their precipitous decline a few decades ago. Low reproductive success in peregrines, bald eagles, ospreys and other predators at the top of the food chain forewarned man that pesticides such as DDT were poisoning our environment. Alarming declines in populations of native fish species in the Missouri River warn that this river system requires immediate care.

Even when measuring a species’ worth by its practical, tangible value, a species can be priceless. Fully half of modern medicines can be traced to wild plants and animals. Our most important food crops were domesticated from wild varieties. Geneticists continue to tap wild stock for desirable characteristics. The cure to some hideous disease may lie in an obscure species presently considered worthless.

Perhaps the most irreplaceable value of a species is the role it plays in the natural community and the contribution it makes to biological diversity. Biological diversity, or biodiversity, is variety of life — the variety of life forms surrounding us and the varying ways they interact with each other and the environment.

The importance of conserving biological diversity may be best expressed as an analogy. The many species making up a natural community might be compared to the rivets in a space shuttle, the spokes in a wheel or the girders in a bridge. The loss of any one rivet, spoke or girder may not be noticed, but that loss will almost certainly lead to the loss of another. The loss of many such components will weaken the system and ultimately may cause its collapse.

If we maintain a richness of species and individuals, genetic diversity is preserved. We preserve the planet’s ability to respond to environmental change. If not, we allow earth to become too homogenous, and its genetic library narrows. We limit its adaptive potential and threaten the survival of life on the planet.

While it is dangerously arrogant to ignore the values inherent in wild things — to conclude that we can live without them — it is just as arrogant to believe that we fully understand them and can articulate their values. Instead, we should be serendipitous, anticipating discovery of even more value in wild things.

Earth’s fossil record contains many examples of extinct species, including barrel-bodied rhinos (opposite) unearthed at Ashfall State Park in north-central Nebraska, but human influence has accelerated the extinction rate to critical levels. Blowout penstemon (below) is Nebraska’s only plant on both the federal and state endangered species lists.
Before it was channelized, the Missouri River was more than a mile wide and 20 feet deep in places. It was laced with sandbars and forested islands. Today, only a few reaches, such as the stretch upstream from Niobrara, in Knox County (top photo, below), resemble the Missouri in its natural state.

Classification of Species

To describe the status of species along the continuum from abundance to extinction and to afford appropriate protection, we assign them to categories. In enacting the Nongame and Endangered Species Act in 1975, the Nebraska Unicameral declared that nongame, threatened, and endangered species have need of special protection and that it is in the public interest to preserve, protect, perpetuate, and enhance such species. Endangered species are defined as those whose continued existence as a viable component of the wild fauna and flora of the state is determined to be in jeopardy. Threatened species are those which appear likely to become endangered. Nongame species are those not legally classified as game, furbearers, threatened or endangered, and not belonging to any other statutory grouping. The term extirpated describes species which no longer exist in Nebraska. The grizzly bear, gray wolf and ruffed grouse are examples of species extirpated from Nebraska that still exist in other portions of their range.

A species occurring in Nebraska which is designated endangered or threatened under the federal Endangered Species Act automatically receives the same designation under the Nebraska act. The whooping crane, black-footed ferret, pallid sturgeon and western prairie fringed orchid are examples. Species can be listed as endangered or threatened under the Nebraska act without being included on the federal list. The river otter and blacknose shiner are listed in this fashion.

Stringent criteria must be met before a species can be listed as threatened or endangered. The best scientific and commercial data must be evaluated, and typically, Game and Parks Commission biologists consult a variety of experts including university researchers, museum curators, private birders, naturalists and botanists. The Commission’s natural heritage database provides valuable information for review. When information warrants a proposal to list a species, the
Commission must issue a public notice, notify the governors of adjacent states, hold a public hearing and evaluate comments from all interested parties.

Why Species Become Endangered

The language of the Nongame and Endangered Species Conservation Act provides insight into the reasons species become endangered. It requires that listing be preceded with a demonstration that the species is imperiled as a result of at least one of the following five factors:

1. The present or threatened destruction, modification or curtailment of its habitat or range.
2. Over-utilization for commercial, sporting, scientific, educational or other purposes.
3. Disease or predation.
4. The inadequacy of existing regulatory mechanisms.
5. Other natural or manmade factors affecting its continued existence within the state.

Habitat is central to the story of Nebraska's vanishing wildlife. Habitat, in abundance, can support tremendous populations of many species. Conversely, loss of habitat can bankrupt almost any species.

Habitat is lost in direct, physical ways or in indirect ways when its quality deteriorates. In Nebraska, direct habitat losses since settlement by Europeans are all too familiar. Prairies have been plowed, eastern deciduous woodlands cleared, rivers harnessed and wetlands drained. On a national and international scale, urbanization, rain forest deforestation and habitat fragmentation are among the most serious direct losses.

Habitat loss can be more subtle. A contaminated food source can be just as sinister as a bulldozer. For years, bald eagle populations in the northern United States and Canada suffered dismal reproduction. Nesting areas outwardly appeared unaltered and healthy. However, an important habitat component was not healthy. The eagles' food source, fish, had become contaminated with pesticides, particularly with the insecticide DDT. When eagles consumed contaminated fish, DDT accumulated to produce calcium. Calcium-deficient eggs had thin shells that broke under the weight of incubating adults. Since the use of DDT was banned in the United States in early 1972, its presence in the environment has declined, and eagle populations are recovering.

Habitat for sensitive species can be rendered useless simply by the presence of humans. Whooping cranes once nested throughout the upper Midwest. Now
nesting is restricted to remote wetlands in Canada’s Northwest Territories. While the Midwest may still provide remnant wetlands, it can no longer satisfy the cranes’ need for isolation during the nesting season.

Extreme exploitation of populations can lead to endangerment or extinction, as was the case with the passenger pigeon. Conservation agencies are quick to point out that the market hunting days of old have been replaced with closely regulated hunting that maintains harvest within limits the animal populations can sustain. Regulated sport hunting and trapping have never resulted in a species becoming endangered or threatened, but we must not ignore the magnitude of illegal market hunting that continues today — the commercial, black market trade in wildlife. Gyrfalcons can be bartered for thousands of dollars when today’s sophisticated poacher meets a wealthy buyer. Elephants are slaughtered for their tusks, and bald eagles for their feathers. The list is too long. Conservation agencies face a serious challenge in their efforts to abate black market trade.

Protection and Recovery

Once people begin to understand extinction, they inevitably want to know what is being done to prevent extinction. Nebraska’s nongame wildlife program is designed to manage species and their habitat to prevent their endangerment, to provide protection when species become endangered and to implement activities that will lead to the recovery of species to a less imperiled status.

For years, state conservation agencies, including the Nebraska Game and Parks Commission, concentrated on management of game species. Later, programs were designed to manage threatened and endangered species. Only recently have programs focused on the hundreds of species that fall outside these special categories in attempts to prevent their endangerment.

The Nebraska Natural Heritage Database, a component of the Commission’s nongame program, is used to investigate the status of roughly 600 species of uncommon plants and animals and 50 types of natural communities. It functions as an early warning system, alerting biologists to the plight of species vulnerable to decline. Species are evaluated to determine those which require more detailed study, those which require immediate management to prevent endangerment, and those which do not require special attention. This information is used to recommend protection strategies such as acquiring tracts of sensitive habitat or proposing listing the species as threatened or endangered.

Both the federal and state endangered species acts provide broad protection to threatened and endangered species. It is illegal to import, export, possess, process, sell, offer for sale, or take any listed species. The Nebraska Act stipulates that take shall mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect. Prohibitions extend to all persons, from private individuals to state, federal and foreign governments, except when authorized for scientific purposes or to enhance the species’ survival. The acts also provide protection by setting up mechanisms to fund conservation work. Projects funded with money authorized by the federal act and administered by the U.S. Fish and Wildlife Service can receive 75 to 90 percent cost sharing.

A 1984 amendment to the Nebraska act created the Nongame and Endangered Species Conservation Fund. This fund is made up entirely of donations, primarily from participants in the Nongame Wildlife Checkoff program associated with the state income tax return. Nebraska’s endangered species program would be crippled without this source of financial support.

One tool to protect a species’ habitat is the regulatory designation of critical habitat. Presently, only one such area has been
been designated in Nebraska, a reach of the central Platte River critical to whooping cranes.

The Nebraska act requires the Governor to review programs administered by his or her office and use them to carry out the purposes of the act. It mandates two additional protections: All other state agencies must carry out programs for the conservation of endangered and threatened species, and they must ensure that their actions do not jeopardize the continued existence of species or result in the destruction or modification of critical habitat. Agencies are required to consult with the Nebraska Game and Parks Commission to determine whether actions they fund, authorize or carry out will affect threatened or endangered species.

Protection and recovery efforts frequently rely on more familiar actions — the activities most Nebraskans associate with game management: research, population and habitat manipulation, habitat acquisition, trap-and-transplant restorations and education campaigns. Recovery activities are directed by formal state and federal plans called Species Recovery Plans. Recovery plans describe, schedule and prioritize a shopping list of actions that must be accomplished before the species can be considered restored to a non-threatened or non-endangered status.

Biologists routinely gather information about the abundance, distribution, habitat needs and population-limiting factors of threatened and endangered species. Wintering bald eagle concentrations are counted; cool, clear prairie streams are seined in search of four threatened fish species (the pearl dace, northern redbelly dace, finescale dace and blacknose shiner); and shortgrass prairies in Kimball County are combed to locate nesting mountain plovers.

Research has helped determine mortality factors that limit swift fox populations, has perfected techniques to propagate and transplant blowout pensemon (an endangered plant) into suitable Sandhills blowouts, and has characterized whooping crane roosting habitat in terms of river channel width, depth and proximity to areas used for feeding and social interaction.

Because habitat degradation is often the cause of a species' endangerment, habitat preservation, restoration and management are often vital to recovery. Depressed reproduction probably limits the recovery of the endangered least tern and threatened piping plover more than any other factor. Reproduction is strongly influenced by the availability of suitable nesting habitat. To provide riverine sandbar nesting sites free of vegetation and safe from flooding, human disturbance and excessive predation, managers manipulate habitat in a variety of ways.

Vegetation on elevated sandbars is mechanically cleared by special mowers and discs, or by hand pulling seedlings. The Platte River Whooping Crane Habitat Maintenance Trust operates a
dredge to deposit material from the adjacent riverbed onto low sandbars. The dredged sand and gravel provides a sterile seedbed that retards vegetation encroachment and elevates the sandbar so that nests are less frequently flooded. Managed sandbars are located in mid-channel to discourage access by terrestrial predators and human intruders.

Habitat acquisition is instrumental in the recovery of some species. In Nebraska, whooping crane migration habitat along the Platte River has been acquired by the Audubon Society, The Nature Conservancy and the Platte River Trust, while Rainwater Basin habitat has been protected by the U.S. Fish and Wildlife Service and the Nebraska Game and Parks Commission. The Commission's staff has developed a list of acquisition needs. Included is a tract harboring blowout penstemon, one of fewer than 10 such sites in the world. Another tract contains a population of prairie white-fringed orchids. Still others would protect rare communities of plants and animals.

To complement acquisition, the Commission is exploring conservation easements and voluntary agreements with landowners. The Nebraska Natural Areas Register, for example, is a program that formally recognizes areas which possess unique and significant natural heritage resources, including threatened and endangered species. Owners of Register areas enter into voluntary agreements to maintain the land in its natural condition. Protection is afforded through the owner's recognition that his or her land harbors a special feature and that the land's best use lies in the support of that feature. Examples of Registry sites are a Sandhills ranch supporting blowout penstemon and a tract near Rulo, in Richardson County, that protects southern flying squirrel habitat.

When suitable habitat has either persisted or been restored, it is possible to establish populations of formerly extirpated species with reintroduction or trap-and-transplant programs. Nebraska has recently been successful in returning river otters to streams they historically occupied. Sources as distant as Alaska and Louisiana provided transplant stock. Peregrine falcons can again be counted as a native nesting bird species thanks to years of releasing captive-raised young from the "cliffs" of downtown Omaha and other midwestern cities. A pair of adults originating from these releases successfully raised three young in 1992, Nebraska's first in nearly 90 years.

Obstacles to Recovery

Limited funding is probably the biggest hurdle facing nongame, threatened and endangered species programs. Funding constraints limit vital research and our ability to protect, acquire and enhance key habitat, and limit our attempts to foster an environmental ethic through education programs. In 1992, the U.S. Fish and Wildlife Service budgeted $40 million for its threatened and endangered species program. More than 700 federally listed species depend on that funding. The Nebraska Game and Parks Commission annually budgets approximately $425,000 for work with about 20 threatened and endangered species and hundreds of nongame species.

Restoring endangered species to recovery-goal levels is expensive. Millions of dollars per species have been spent nationwide on showcase species such as the whooping crane, California condor and black-footed ferret. Less glamorous species that may be even more imperiled compete for the same funding. Traditionally, we have managed on a species-by-species basis. Single-species management may not be the most effective method of restoring critically imperiled species, and a growing number of scientific experts are calling for more emphasis on ecosystem and community management. By directing our energies and checkbooks toward protecting rare habitats, communities and entire ecosystems, we can protect all species dependent on these habitats, those already endangered and those declining but not yet imperiled.

Recovery efforts are impeded by political and economic pressures when endangered species interests conflict with those of industry, agriculture and special interest groups. The controversy surrounding the northern spotted owl comes to mind, as does the resistance to reintroduction of wolves to the Greater Yellowstone ecosystem. Nebraska certainly has its own controversies. The interests of species that depend on Platte River habitats — the whooping crane, interior least tern, piping plover and bald eagle, among others — compete with water development interests. To persevere in support of these beleaguered resources, conservation efforts must be advanced by a unified, cohesive, involved public. Resolve and willingness to act are key ingredients in removing obstacles to recovery.

The road to recovery is long and fraught with difficulty, but the goal of preventing extinction and recovering endangered species must be attained. The labor is a worthy labor. All critical steps converge on the universal foundation of wild, living things — habitat.
Nebraska’s Vanishing Habitats

The arrival of European immigrants in the mid-1800s brought widespread change to the Nebraska landscape at a pace never before experienced. Prairies were plowed and planted or fenced and grazed by cattle. Woodlands were cut and cleared. Cities and roads were built. Wetlands were drained. Streams were channelized and tapped for irrigation. The places plants and animals live, their habitats, were profoundly altered.

Actually, habitats are much more than simply the places a species lives. A plant’s habitat includes elements such as the concentration of nutrients and moisture in the soil, the amount of sunlight it receives and the presence of other plant species, pollinators, and grazers. An animal’s habitat includes the water it drinks, the food it eats, predators and other animals with which it competes or on which it depends. These components may be vital to a species’ existence. If one is altered or eliminated from a habitat, the species may not survive.

A plant is stationary in its habitat, but an animal often requires several habitats over a season or a single day. For example, sandhill cranes winter in west Texas, stop along the central Platte River during spring migration and then continue to nesting sites in the Arctic. While on the Platte, they roost in the river shallows at night and feed in wet meadows and cornfields during the day. Alteration or destruction of one area of the cranes’ habitat may have far-reaching effects for the species over its entire range.

Habitats themselves are continually changing in response to climatic, geological and biological factors. These natural changes are usually gradual, sometimes taking thousands of years. This gives the plants and animals time to adapt to the changes or migrate to different areas. Species unable to adapt or migrate may become extinct. Human alterations of the Nebraska landscape in the last 150 years have far outpaced most species’ capacity to evolve.

The loss and degradation of habitats have affected many of the state’s native species. Some, like the black-footed ferret, grizzly bear and wolf, no longer occur here. Others, like the pallid sturgeon, piping plover and prairie white-fringed orchid, were nearly eliminated. Many disturbance-tolerant species, such as annual sunflower, giant ragweed, white-tailed deer and eastern cottontail rabbit, now thrive in Nebraska.

Nebraska’s habitat types can be grouped under four broad classifications: prairies and grasslands, forests and woodlands, wetlands and lakes, and streams and rivers. Since settlement, all four types have undergone alterations which affect, and in some cases imperil, the species that live there.

Prairies and Grasslands

Early French explorers traversing central North America had no term for the vast grassland they encountered, so they
Arrival of settlers brought widespread change to the landscape (previous page). Map opposite shows distribution of major prairie and woodland types prior to settlement. Conversion of unfarmed areas to cropland was spurred by center-pivot irrigation. Infrared photo (below) taken in 1979, shows development in Chase County prairie.

called it prairie — literally, meadow. Then, prairie covered more than 95 percent of the Nebraska landscape. The prairies were of three basic types which developed in response to variations in climate and soils: tallgrass, mixed-grass and Sandhills prairie.

Tallgrass prairie covered the rolling hills of the eastern third of Nebraska where annual precipitation averages more than 25 inches. It also extended westward into the drier plains in stream valleys such as the Platte, Republican and Loup rivers. Tall grasses — big bluestem, Indiangrass, switchgrass and Canada wildrye — dominated the tallgrass prairie. In the rich-soiled wet valleys these grasses often grew head-high or taller. Hundreds of species of wildflowers and other plants added color and diversity to the tallgrass prairie.

The tallgrass prairie region was the first in Nebraska to be settled. Immigrants, who first arrived in large numbers after passage of the Homestead Act in 1862, found the fertile soils and ample rainfall of the tallgrass region well suited for growing corn and other crops. By 1900, the majority of the tallgrass prairie had been plowed. Today less than 5 percent of Nebraska’s original tallgrass prairie remains.

Remnants or small pieces of tallgrass prairie, usually less than 80 acres in size, have survived, mainly as hay meadows and grazed pastures — islands of prairie in a sea of cropland. A few larger tracts exceeding a square mile in area can still be found on land too steep, rocky or infertile to plow. The hayed prairies are generally in the best condition, some having a good diversity of native wildflowers and grasses remaining. Other tracts have been overgrazed, sprayed with herbicides or encroached upon by trees and shrubs.

West of the tallgrass prairie region, but excluding the Sandhills, mixed-grass prairie (including the short-grass plains of far western Nebraska) cloaked the drier plains and hills. The word mixed represents the combination of short, mid- and tall grasses that dominated this prairie type. The drier plains, upper slopes and hilltops supported mid- and short grasses, primarily little bluestem, needle-and-thread, western wheatgrass, side-oats grama, blue grama and buffalo grass. Wetter depressions, ravines and lower slopes sustained the tall grasses.

Roughly a third of Nebraska’s mixed-grass prairie has survived, primarily in areas too steep, rocky, dry or infertile to farm. The largest tracts remain in the shale plains of northwest Nebraska, the steep loess hills of south-central and central Nebraska and the breaks and bluffs of rivers such as the North Platte, Republican and Niobrara.

Settlement and farming in the mixed-grass prairie region started slightly later and proceeded at a slower pace than in the tallgrass prairie region. At the turn of the century, innovations in dryland farming techniques and passage of the 1904 Kincaid Act stimulated settlement in western Nebraska and plowing of the mixed-grass prairie. The Kincaid Act allowed homesteading of 640 acres instead of the 160 acres allowed by the Homestead Act. Plowing of the mixed-grass prairie continued until 1920 when nearly all farmable land was under cultivation. Some mixed-grass prairie not suited for dryland farming went under the plow when well irrigation was developed in the 1950s. This conversion was further spurred with the advent of center-pivot irrigation in the early 1970s. Since the early 1980s, the conversion of prairie to irrigated cropland has slowed.

Nebraska’s third major prairie type, Sandhills prairie, covers much of north-central Nebraska, North America’s largest dune field. The sandy, well-drained dune soils are dominated by tall, mid- and short grasses, including sand bluestem, prairie sandreed, sand dropseed, little bluestem, needle-and-thread and hairy grama. The valleys often support a more lush growth of tall grasses.
In the 1870s, cattlemen, attracted by free and open range, were the first to settle in the Sandhills. Passage of the Kincaid Act in 1904 attracted farmers to the region. However, a succession of dry years and crop failures soon forced most to sell out to ranchers. Ranching has since remained the predominant land use in the Sandhills. Today only 5 percent of the Sandhills is cultivated.

The Sandhills, like all of Nebraska's prairies, developed under the influence of wildfires and grazing by large ungulates such as bison, antelope, elk and deer. Fires kept trees and shrubs from invading prairies, reduced litter buildup, enhanced nutrient availability and, in general, stimulated the growth of prairie plants. Like fire, grazing reduced litter buildup and recycled nutrients. This random grazing also produced areas of varying vegetation height and density. In turn, this provided habitat for a greater diversity of prairie animals than did uniform vegetative conditions. Grazing and fire also eliminated or reduced populations of some plants while favoring others, so the plant species composition of grazed and burned areas differed from that of ungrazed and unburned areas.

Settlement brought suppression of prairie wildfires and a change in the natural grazing patterns as free-roaming ungulates were replaced by fenced herds of cattle. Suddenly, some of the forces that had shaped the prairie were gone.

In the Sandhills, one result of fire suppression has been a change in the vegetation composition of the Sandhills. The dunes now support a denser grass cover than in presettlement times. Most blowouts — wind-excavated depression in dune tops — have grown over with prairie grasses. Populations of plants requiring this open, sandy habitat, such as blowout penstemon and painted milkvetch, have declined substantially. Biologist have found fewer than 7,000 blowout penstemon plants remaining in the Sandhills.

Today, most of the state's remnant prairies are grazed by cattle for long periods each year, sometimes for the entire summer. Over the years, this grazing pressure has reduced or eliminated grazing-sensitive plants. These over-grazed prairies are now dominated by grazing-tolerant native plants and non-native grasses and forbs such as Kentucky bluegrass, smooth brome, cheat grass and thistles.

Prairie remnants suffer problems related to their size and fragmented distribution within a cropland-dominated landscape. Small prairies provide few nesting opportunities for prairie nesting birds requiring fairly large territories, such as bobolinks and prairie chickens. Small prairies are also highly susceptible to activities such as pesticide spraying on adjacent lands. Pesticide drift from neighboring cropland could easily destroy entire populations of certain prairie insects or plants. Small prairies have a high proportion of edge, making them susceptible to invasion by smooth brome and other undesirable exotic plants. These species often invade prairies from bordering disturbed habitats such as roadsides and cropland.

**Forest and Woodlands**

Wildfires, drought and competition with prairie grasses limited the presettlement distribution of trees in Nebraska to the well-watered and somewhat fire-protected river valleys and rocky escarpments. Overall, these wooded habitats covered roughly 2 percent of the landscape. The bluffs and floodplains of

NEBRASKA'S VANISHING SPECIES
the Missouri River and its tributaries in eastern Nebraska supported stands of eastern deciduous forest dominated by oaks, hickories, ash, American elm, basswood and black walnut. Stands of deciduous forest were also found on the floodplains and islands of some streams and rivers in central and western Nebraska. These forests were dominated by cottonwoods and willows, and their distribution along some rivers was very limited. Occasionally, stands of bur oak, boxelder, American elm and green ash could be found in canyons and ravines adjacent to river valleys.

Pine woodlands sparsely covered the Pine Ridge, Wildcat Hills and other smaller, rocky escarpments of western Nebraska. These coniferous woodlands extended eastward along the Niobrara River Valley to central Nebraska. Ponderosa pine was the most common tree in these woodlands, interspersed with eastern and Rocky Mountain red cedar. Limber pine could be found in one small area of Kimball County. Wildfires maintained an open canopy and grassy understory within this woodland type.

Winged habitats, though limited in extent, add an important component of diversity to Nebraska’s grassland-dominated landscape. Eastern deciduous forests are the sole habitat in Nebraska for many plant and animal species normally not found in the Great Plains, including the showy orchis, pawpaw, tufted titmouse (a bird), timber rattle snake and southern flying squirrel. Pine woodlands are the only habitat for many western mountain species such as creeping Oregon-grape, spotted coral-root, least chipmunk and red crossbill (a bird).

Forests and woodlands provide other wildlife values such as habitat for migrating songbirds and roost sites for bald eagles wintering along Nebraska’s rivers.

To early soldiers, settlers and railroaders, and to a lesser degree to modern Nebraskans, forests and woodlands provided two vitally important commodities — firewood and lumber. Virtually all the state’s wooded habitats have been cut at some time. Some were selectively logged, removing only the large black walnut, oak, pine and other valuable lumber trees. In eastern Nebraska, many forests, especially on floodplains, were clear-cut and converted to cropland. As early as 1928, Nebraska botanist J.E. Weaver noted that cutting of the black oak/shellbark hickory forests in southeastern Nebraska had been extensive, and few good examples of the forest type remained.

Selective logging, though less environmentally damaging than clear-cutting, affects wildlife by removing many of the larger, nut-producing and cavity-prone trees. Loss of these trees diminishes the food supply for many forest dwelling animals and eliminates habitat for cavity-nesting birds and mammals such as woodpeckers and the southern flying squirrel.

Clear-cut logging has led to a form of habitat degradation known as forest fragmentation, a process by which large blocks of forest are broken into smaller parcels separated by non-forested habitat. Many forest-nesting birds, such as ovenbirds and barred owls, require large blocks of forest. The interiors of these forests provide an area free of competition for food and nesting sites from species that prefer the forest edge, such as bluejays, brown thrashers and brownheaded cowbirds. Small forests may consist almost entirely of edge and provide little habitat for forest-interior species. Plants that prefer the moist, wind-protected, shaded interior of forests are also affected by forest fragmentation.

Like prairies, overgrazing, pesticide drift and fire suppression have adversely affected Nebraska’s woodlands and forests. Overgrazing by cattle or overbrowsing by white-tailed deer (whose
NEBRASKA'S VANISHING SPECIES

Most Nebraska woodlands have been cut at some time, and virgin stands with large, mature trees like this one (opposite) near DuBois in Pawnee County, are rare. Wetlands, shallow bodies of water or areas of water-saturated soils, are highly productive habitat. Wetland, below, in the Niobrara Valley, was formed in an old oxbow.

populations are now unnaturally high in some areas) can reduce or eliminate tree seedlings and saplings, altering the future composition of wooded areas. Weedy and exotic plant invasion of woodlands and forests is also promoted by over-grazing and overbrowsing. Presettlement fires were especially important in maintaining healthy pine woodlands. The fires naturally pruned old trees and thinned dense stands of young trees, recycled nutrients stored in downed logs, branches and needles and stimulated the growth of ground-layer plants. Suppression of fire in the last 100 years has allowed tree densities to increase and ground litter to accumulate to high levels. Today, fires in pine woodlands are usually more intense than presettlement fires, often killing mature trees. The 1988 Fort Robinson fire was such a fire.

Wetlands and Lakes

Wetlands are shallow bodies of water or areas with water-saturated soils. They usually have aquatic vegetation growing above the water surface. Lakes are deeper water bodies and generally lack the emergent vegetation of wetlands except on their shallow edges. Wetlands and lakes are among Nebraska’s most productive habitats and are home to a diversity of aquatic plants and animals.

Historically, Nebraska had an abundance of wetlands, though relatively few natural lakes. The majority of the state’s wetlands are in the Rainwater Basin of south-central Nebraska, in the Sandhills and along stream and river floodplains. Natural lakes occur in the Sandhills and in abandoned channels (oxbow) of major rivers.

The Rainwater Basin wetlands formed over many thousands of years as wind-excavated depressions in the loess plain south of the Platte River. Rainwater and snowmelt fill the basins. These wetlands are a key spring staging area for millions of ducks, geese and shorebirds that feed and rest here before continuing their northward migration. The handful of whooping cranes surviving in the wild frequently utilize the basins during their migrations.

As early as the turn of the century, the majority of the good soils in the loess plains of south-central Nebraska were already farmed. Farmers began draining the basins, deemed wastelands, to increase their acres of cropland. By 1918, 20 to 35 percent of the basins in Fillmore County had been drained and converted to cropland. This was typical of what was happening throughout the Rainwater Basin. Following World War II, a stimulated economy and advances in earth-moving technology resulted in intensified efforts to drain wetlands. By 1981, only 10 percent of the original 94,000 acres of Rainwater Basin wetlands remained undrained. Remaining basins have been degraded by silt and pesticide runoff from adjacent cropland and by reduced water inflow. Development of center-pivot irrigation had a significant negative effect on smaller wetlands, as many marginal areas with wetlands were converted to cropland.

Valuable bird habitat, as well as habitat for other aquatic species, was lost as the basins were drained. Migrating waterfowl have been forced to concentrate in large numbers on the few remaining basins, sometimes exceeding 200,000 birds per basin. The crowding has made the birds susceptible to outbreaks of fowl cholera, a disease that has claimed thousands of birds some years.

The Sandhills contains Nebraska’s largest concentration of wetlands and lakes. The wetland types include wet meadows, marshes and fens (spring-fed wetlands with peat or muck soils). The majority of the wetlands and lakes are groundwater fed and occur in interdunal valleys that intersect the water table. In areas of the western Sandhills, groundwater is rich in calcium, sodium, potassium and magnesium, and alkaline wetlands and lakes are abundant. These alkaline areas support a different aquatic flora and fauna than do freshwater wetlands and lakes in the Sandhills.

Sandhills wetlands and lakes have not experienced the intense conversion to cropland suffered by Nebraska’s other wetland types, although many Sandhills valleys have been ditched and drained to facilitate haying in the valleys. This drainage has converted many lakes and marshes to wet meadows and allowed for intensified land use in the valleys.

Over the years, haying has altered the vegetation of the wet meadows. Typically, these productive, grass- and sedge-dominated sites are cut for hay in midsummer. Annual haying stresses native warm-season plants, at the peak of their growth when hayed. After years of haying, these natives are overtaken by exotic, cool-season grasses, such as timothy, redtop and reed canary grass, seeded to increase hay production. These exotic plants now dominate most wet
meadows. Some wet meadow plants, such as the prairie white-fringed orchid, wild lily and northern green orchis, are now rare in the Sandhills.

Eastern Nebraska saline wetlands occur in the floodplain of Salt Creek and its tributaries in Lancaster and southern Saunders counties. Seepage of groundwater over thousands of years from deeply buried saline aquifers has accumulated salts in the floodplain soils, allowing this unique wetland type to form. The vegetation of these wetlands is composed mainly of salt-loving plants. Their abundant mudflats, rich in invertebrate life, are heavily utilized by migrating shorebirds.

Probably the greatest alteration of the saline wetlands resulted from the channelization of Salt Creek, initiated in 1917 as a flood-protection measure for the city of Lincoln. Completed in 1942, the channelization encouraged tributary streams to head-cut, carving deeper into their beds to adjust their gradients. The lowered stream beds cut into saline wetlands, draining them and diluting their salt concentrations. Many saline wetlands were filled and developed as the city expanded over the years. Others were drained and farmed. One of the largest, Salt Lake, was dammed and flooded with fresh water to form Capitol Beach Lake.

Today, approximately 5 percent of the original eastern saline wetlands remain, high quality saline wetland vegetation is becoming scarce, and shorebird use of the wetlands has dwindled substantially over the years.

**Streams and Rivers**

Nebraska has an estimated 24,000 miles of creeks and rivers. They differ widely in size, rate of flow, water quality and temperature, bottom substrate, channel pattern and other factors that affect the life they support. In their natural condition, prairie streams are dynamic systems. Their flow, sediment load and temperature can fluctuate greatly through the seasons. Aquatic species living in these streams have adapted to these seasonal rhythms over the millennia.

The Missouri River, forming Nebraska's eastern border, is the state's largest river. Its annual flow is about five times that of the Platte River, the state's second largest river. In its natural state, the Missouri River was more than a mile wide and 20 feet deep in places, and was laced with sandbars and forested islands. Its silt-laden waters supported a unique fauna of big-river fish, including sturgeon, chub, sicklefin chub, lake sturgeon, pallid sturgeon and paddlefish.

The river's floodplain was a mosaic of oxbow lakes, backwater marshes, wet prairies and floodplain forests. Annual spring and early summer floods from rainfall and mountain snowmelt were vital to the river's ecology. The floods cut new channels, leaving the old channels to form backwater marshes and oxbow lakes. Sandbars and islands were washed away and new ones deposited. Floods captured sediments, logs, leaves and other organic material from the adjacent floodplain, filling the river with the nutrients necessary to sustain its life.

Taming of the Missouri began in the 1930s with channelization of the river below Sioux City to maintain a 6-foot-deep navigation channel. In 1952, the Fort Peck Dam in Montana was the first of six mainstem dams on the upper Missouri to close its gates. The last was Gavins Point Dam near Yankton in 1955.

In a little more than 30 years, the Missouri was changed from a naturally functioning, large river ecosystem to one dominated by reservoirs and a narrow, fast-flowing navigation channel. Lost were key areas of habitat: the backwaters, side channels, shallow water areas, sandbars and islands. In Nebraska, the only relatively natural reaches of the river remaining are a 70-mile stretch between South Sioux City and Gavins Point Dam, and a 30-mile stretch above Lewis and Clark Lake.

Even on the unchannelized portions, natural flows are now regulated by upstream dams. Gone are the annual spring and summer flood pulses vital to the spawning and feeding cycles of the Missouri's aquatic organisms. The still water of the reservoirs allows silt and sand to settle out of the water. When the water is released from the dams, it is able to erode more silt and sand from the river bed. This has lead to downcutting of the river bed, and in the process, to the reduction of shallow water areas and the draining of streamside marshes, important fish spawning and feeding areas.

Alteration of the Missouri River ecosystem has been so severe that even populations of common fish species, such as the channel catfish, largemouth bass and bullheads, are declining. Several species, including the lake sturgeon and pallid sturgeon, have been nearly eliminated from the river.

The Platte is a classic example of a Great Plains river. Early immigrants encountered a Platte River with a shallow, wide, braided channel and a multitude of sandbars. At its widest, the Platte's channel measured three miles from bank to bank, and its floodplain 15 miles from bluff to bluff. Wet meadow and marsh covered much of the floodplain. Annual floods scour ed the sandy channel, preventing trees from establishing except on a few larger islands. The sandbars, isolated from mainland predators by water channels, were ideal nesting sites for least tern and piping plover. Along the central Platte River, migrating sandhill and whooping cranes roosted in the broad, shallow channel and fed in the

14

NEBRASKA'S VANISHING SPECIES
invertebrate-rich wet meadows.

Diversion of irrigation water from the Platte River began as early as the mid-1800s. In 1909, Pathfinder dam on the North Platte River in Wyoming was the first of 14 upstream dams built to store water for irrigation, municipal use and power generation. With the closing of Kingsley Dam on the North Platte River near Ogallala in 1941, regulation of Platte River flows was nearly complete.

Today, development has reduced annual flows on the central Platte River near Overton to roughly 30 percent of their 1920s volume. On some reaches of the central Platte, the river channel is one-tenth its former width. Without scouring floods, the channel has been encroached upon by trees, converting former sandbars to wooded islands. West of the city of Columbus, unvegetated sandbars are nearly nonexistent, and few least terns and piping plovers nest there. Sandbar roosting habitat for cranes is now primarily confined to the river between Kearney and Grand Island where the channel is still fairly open.

Smaller creeks such as Shell Creek, Wamaduza Creek, Birdwood Creek and a plethora of Spring and Muddy creeks make up the majority of Nebraska’s stream miles. Prior to settlement, most had relatively clear, cool water and gravelly or sandy bottoms. They provided a habitat unlike the larger, siltier rivers. Many of the state’s small fish species, the darters, daces, minnows and shiners, are found primarily in these streams. In Nebraska, several species, including four now considered threatened — the pearl dace, finescale dace, northern redbelly dace and blacknose shiner — were limited to spring-fed Sandhills streams.

Agricultural and urban runoff have degraded the water quality of many small streams, especially in heavily farmed and populated areas. Sediment from eroding cropland and streambanks clouds the water, reducing the growth of aquatic plants and algae which are the base of the aquatic food chain. The sediment eventually settles to the stream bottom covering rocks and gravel — important fish spawning habitat. Irrigation has de-watered many small streams. In areas, perennial flowing streams have been converted to intermittent streams, greatly reducing the aquatic life they can support.

Many small streams throughout the state have been channelized and cleared of streamside vegetation to facilitate drainage and farming. Ditching has reduced the habitat diversity of these streams. Streams that once flowed shallow and fast in some reaches and deep and slow in others now flow with a homogeneous depth and velocity. Heavy grazing along some streams has reduced streamside vegetation, causing streambank erosion and, as shade decreases, allowing water temperatures to rise, lowering its capacity to hold oxygen and support aquatic life.

**Prospects for The Future**

In the last 150 years, the destruction and degradation of Nebraska’s native habitat have been substantial. Sadly, this pattern continues today, primarily a result of our agricultural and urban land use practices. Individual species, including humans, are closely tied to their habitats; as habitats continue to decline so will the species that depend upon them. Today, relatively few species are listed as threatened and endangered. The list will surely grow in the future.

Reversing this trend will be difficult, but it can be done. We must come to accept the fact that habitat loss is a serious problem — one with long-lasting consequences. Then, we must be willing to take action to solve the problem. This includes a willingness to modify our current land-use practices and to allocate sufficient financial resources for habitat acquisition, research and education. If we take these steps, our grandchildren may still enjoy the sight of a soaring bald eagle, the sound of sandhill cranes along the Platte River and the smell of wildflowers in a tallgrass prairie.
Nebraska's Vanishing Species was published in December 1992, by NEBRASKAland Magazine (Nebraska Game and Parks Commission) and supported in part with funds from the Nebraska Non-game Wildlife Tax Checkoff Fund. "Nebraska's Vanishing Species," by Greg Wingfield, endangered species specialist; "Nebraska's Vanishing Habitats," by Gerry Steinauer, community ecologist, both of the Nebraska Game and Parks Commission. Cover and back cover photos by Jon Farrar.

For more information about Nebraska's threatened and endangered species, or for additional copies of this publication, contact the Wildlife Division, Nebraska Game and Parks Commission, P.O. Box 30370, Lincoln, NE, 68503.