

Affected Environment

Scope

The following descriptions cover the designated Niobrara National Scenic River, its immediate riparian area, as well as the unit's regional context, in order to provide background information on the regional setting, the park's natural and cultural resources, and the gateway communities.

Location and Access

The Niobrara National Scenic River is located in north central Nebraska in Brown, Cherry, Keya Paha, and Rock counties. The respective county seats are Ainsworth, Valentine, Springview, and Bassett. Access to the area is by east-west paved highways 12 to its north and 20 to its south; north-south paved highways 183, 7, and 137; and by several unpaved county roads. County-maintained gravel roads and bridges cross the river in seven locations and provide access to valley ranches and Smith Falls State Park.

The nearest airports with scheduled passenger service are in Pierre, South Dakota (123 miles north of Valentine) and in North Platte, Nebraska (136 miles south of Valentine).

National Park Service headquarters for the unit is located in O'Neill, Nebraska, 111 miles east of Valentine. The Service also operates a ranger station in Valentine.

Natural Environment

Weather

Weather is continental with wide extremes in temperature caused by movement of air masses from the far north or the Gulf of Mexico. Average annual precipitation varies from seventeen to twenty-two inches. Winters are dry, windy, and cold with subzero lows. Snow covers the ground for an average of thirty-six days each winter. Summers are hot, and humid air from the south brings thunderstorms. Eighty percent of annual moisture falls between April and September. Severe

weather is not uncommon and can include tornadoes, hailstorms, heavy rains, and blizzards.

Air Quality

Air quality is generally good and meets all state and federal standards. The park is a class II air quality area under the Clean Air Act. No obvious point sources of pollution exist in the area. The nearest monitoring station is at Badlands National Park, South Dakota, some ninety-five miles from Valentine.

Topography

The Niobrara River flows across north central Nebraska at the northern edge of the Nebraska Sandhills. The Sandhills cover some nineteen thousand square miles between the Platte and Niobrara rivers. East of Valentine, the Niobrara River has cut a valley more than three hundred feet deep and between one-half and two miles wide. Valley side slopes are generally steeper on the south bank with some cliffs and waterfalls. Terraces and moderate slopes are more common north of the river. These are cut by steep sided canyons of tributary streams that originate on a broad plain defining the north edge of the valley. The valley floor widens noticeably as the river flows east of County Line Bridge and becomes wider still east of Meadville. Elevations range from 1,800 to 2,600 feet above sea level.

Water Resources

The Niobrara River flows east some 535 miles from its headwaters in Wyoming across almost the entire length of Nebraska to its confluence with the Missouri River at the town of Niobrara. In the western portion of the Scenic River, between the Fort Niobrara National Wildlife Refuge launch site to a few miles west of Norden Bridge, the river is confined to a single channel with few islands. East of Norden Bridge, the valley widens and the river spreads and braids into multiple meandering channels with numerous sandbars. The river is laden with sand and silt and flows swiftly at up to six miles per hour.

River flow depends on ground water discharge rather than on rain runoff or snow melt. The Sandhills store water and annual precipitation exceeds transpiration

loss through vegetation. This area is within the northern extent of the Ogallala or High Plains aquifer. The entrenchment of the Niobrara River along the Sandhills drains local groundwater into cold springs, which flow constantly and favor more northern vegetation types. Waterfalls form where spring creeks pour over harder rock layers. Smith Falls, the highest waterfall in the state, and Fort Falls, located on the Fort Niobrara National Wildlife Refuge, are among the most notable of the two-hundred plus waterfalls recorded in the unit.

Water flowing from springs into the river makes for a fairly stable flow throughout the year, averaging about 775 cubic feet per second. However, floods of ten thousand cubic feet per second have been recorded at stream gauging stations located in the designated river reach.

Within the Fort Niobrara National Wildlife Refuge, Cornell Dam has impeded transport of sediment down the Niobrara River. The dam now fosters extensive sandbar development. The dam does not impede water levels. Rather, the river overflows its top, making it a "run of the river" dam. The dam has altered the river's channel morphology and natural ecosystem functioning for several miles upstream. The impacts of these alterations on biota have not been examined. Whooping cranes, a federally listed endangered species, have been rarely seen resting on the sandbars, though not since 1993. The dam itself is an impassible obstacle for fish and other aquatic species trying to migrate upstream.

Long Pine Creek is a Niobrara River tributary entering northwest of Bassett. Long Pine Creek is listed on the Nationwide Rivers Inventory, a register of American rivers maintained since 1980 as potential inclusions to the Wild and Scenic Rivers System. A Presidential directive and subsequent instructions issued by the Council on Environmental Quality, and codified in agency manuals, requires that federal agencies, as part of normal planning and environmental review processes, take care to avoid or mitigate adverse effects on rivers identified in the inventory. The thirty-eight-mile Long Pine Creek is listed because of its fisheries value.

Floodplains and Wetlands

Floods along the Niobrara mainstem occur mainly as a result of winter ice jams, which form erratically and spill water onto the floodplain inundating roads and fields along the river. Spring and summer floods are rare on

the mainstem river. Flash flooding and mud deposits have occurred along tributary creeks on the north bank due to summer thunderstorms. No floodplain survey or mapping has been performed.

Wetlands along the river are generally limited to the immediate bank vegetation on the upper single channel portion and to backwater channels in the lower, more braided portion of the river. Occasional flat floodplain areas just above the river support meadow vegetation dependent on a high water table. Tributaries and seeps support riparian wetland vegetation.

Water Quality

Ground and surface water quality is good. The Nebraska Department of Environmental Quality rated the Niobrara a Class A unimpaired water, in which water quality must be maintained and protected. The Niobrara's surface water quality is monitored monthly during the winter off-season, and weekly during the summer season.

In 2000 the U. S. Geological Survey, under contract to the National Park Service, sampled Niobrara water at five sites between Borman and Norden bridges from mid-June to late-September to determine if this heavily used canoeable reach was being impacted seasonally with fecal bacteria and, if so, whether the contamination was from human or animal sources. Each individual sample consisted of a composite of water collected from ten intervals across a river transect at the sample location. Parallel testing for wastewater tracer compounds commonly associated with human waste also occurred. Although fecal coliform bacteria counts and concentrations of wastewater tracers in the Niobrara were relatively low, their presence, combined with the presence of male-specific coliphage in the river, confirms that water contamination has occurred. While the presence of wastewater tracers indicates the source of some of the contamination is human waste, additional sampling is needed to confirm if human waste is also the source of the bacteria and coliphage detected, and to determine the location of the source areas.

Some ranchers depend on free access to the river or tributaries to water their cattle. There are no major live-stock feedlots along the mainstem of the river but they do exist on tributaries emptying into the mainstem. Local ranching is not dependent on chemical fertilizers



A park ranger samples a spring branch tributary for water quality indicators.

improved the water quality discharged into Niobrara River tributaries.

Downcutting by tributary streams is widespread in the region although no significant problem sites have been identified along or near the river. Downcutting results in soil loss, siltation downstream, and lowering of the water table. Some landowners and managers are implementing erosion controls, such as check dam construction and bankside vegetation restoration. State and federal conservation programs provide technical and financial cost share assistance to landowners, but a condition of federal involvement requires an evaluation of effects on the Scenic River in accordance with Section 7(a) of the Wild and Scenic Rivers Act. Projects such as dam construction that would eliminate free-flowing conditions inside the Scenic River boundary are prohibited.

Soils

The upland dunes south of the Niobrara River are mostly sand with low fertility and little or no organic content. Along the Niobrara River bottoms, soils range from sandy to silty loam. North of the river, soils have more clay content.

About 640 acres along the river are irrigated cropland and meet the Natural Resources Conservation Service definition of prime farmland. All prime farmland soil types along the river must be irrigated in order to meet the prime farmland criteria and comply with the Farmland Protection Act.

Geology

The Great Plains are a remnant of a large alluvial plain that extended eastward from the Rocky Mountains. Repeated cycles of erosion and deposition occurred, including both marine and stream transport and deposition of sediments. Volcanic activity to the west also deposited layers of ash over much of the area. These layers were overlaid by eolian (wind blown) sand. The Sandhills of Nebraska are the most extensive of these plains dune areas, covering approximately nineteen thousand square miles.

The Niobrara River drains more than twelve thousand square miles and cuts through four rock formations. Atop is the Ash Hollow formation, a grayish sandstone cap-rock some five to ten million years old, best seen on



Open stands of ponderosa pine, prairie and Ash-Hollow cap rock, Fort Niobrara Wilderness.

hills north of the river. Underlying this is the Valentine formation. This deposit forms steep cliffs along both sides of the river and is composed of poorly cemented light-colored sandstone some ten to twelve million years old. The Valentine formation showcases an abundance of fossils, including ancient mammalian species such as beaver, horses, rhinoceros, and mastodons.

Next lies the Rosebud formation. This more resistant pinkish tan siltstone some twenty-five million years old accounts for many of the river's rapids between the Brewer and Norden bridges in the popular canoeing reach. The Rosebud also provides the erosion-resistant layer over which tributary or springbranch streams flow, and may tumble many feet to the valley floor. Further downstream near Meadville the Niobrara also cuts through the black shale of the Pierre formation, a rock structure older than sixty-five million years.

An extraordinarily large deposit of underground water, called the Ogallala Aquifer, formed over eons of time from precipitation that saturated underground sand and rock layers. In some areas of the Sandhills water at or near the surface creates lakes, wetlands, or lush meadows. In the Niobrara Valley the river has cut into the plains as much as three hundred feet, allowing water from the aquifer to seep out of valley walls into the river. Observant canoers on the Niobrara in the winter and

spring notice an unusual geologic phenomenon of the river described as a pulsating or surge flow. Here periodic surges, or bores, move along the water surface, eventually forming a cresting or surf-like breaking wave before receding again. At times these unique waves can reach heights of several feet. The waves are best observed during higher water levels when large amounts of sediments are suspended and transported within the stream. This sediment load, a steep gradient, shallow waters, and a fast current are necessary elements for surge flows to occur.

Paleontology

From Agate Fossil Beds near the headwaters of the Niobrara River to Ashfall Fossil Beds near the river's junction with the Missouri, North America's most complete record of the twenty million-year history of grassland animals has been exposed along the Niobrara, often referred to as the "Bone Hunter's River." For almost a century and a half bone hunters have searched the sandstone walls of the Niobrara and its tributaries for remains of ancient mammals.

The central Niobrara Valley in Brown, Cherry, Keya Paha, and Rock counties, in which the Niobrara National Scenic River is located, has been known for more than 145 years as a major source of fossils and stratigraphic data bearing on the history of North American later Cenozoic mammals. Fossil mammal deposits found along the Niobrara River dating from the Miocene and Pliocene epochs figured prominently in scientific studies of mammal evolution in North America. One particular site found within the Scenic River, containing no less than 146 species of vertebrates, is the most diverse single-site of Miocene fauna known in North America. The existence of rich deposits of mammalian fossils in the Niobrara River valley became evident in 1857 when Ferdinand V. Hayden, a member of the Warren Expedition, collected fossils described later by Joseph Leidy. Leidy's 1869 monograph, describing twenty-eight new species of extinct vertebrates, is one of the founding documents of vertebrate paleontology in North America.

More than 160 mapped paleontological sites are present within the designated seventy-six-mile Niobrara watershed. The Scenic River is exceptionally rich in documented fossil sites, averaging some ten times the number of sites per unit area when compared to the State of Nebraska as a whole. Fifteen sites in the Scenic River

study area are deemed of "global" (international) significance, thirty-seven are judged to be of national significance, and 106 of regional significance. Eighty species of extinct vertebrates were first discovered in the Scenic River area: fifty-six mammals, eight amphibians, thirteen reptiles, two birds, and one fish. Collections of fossils from the Scenic River area are housed in some of the nation's premier research institutions, including New York's American Museum of Natural History, Chicago's Field Museum of Natural History, and the Smithsonian's Museum of Natural History in Washington, D.C. By far the largest Niobrara collections are located at the University of Nebraska State Museum in Lincoln and the Frick Laboratory at the American Museum of Natural History.

Vertebrate paleontologists consider the Niobrara Valley important not merely because of the great abundance of museum-quality specimens collected there but because the fossils occur in a series of tectonically-undeformed, superimposed strata spanning a significant measure of Miocene time. Those within the Scenic River reach provide especially complete coverage for the interval between approximately fourteen million and nine million years before the present. Because of the relatively precise time controls (both biostratigraphic and radiometric) available on Miocene fossils from this relatively small area, the latter serve the scientific community as benchmarks in stratigraphic, evolutionary, and paleontological studies.

Paleontologists first discovered prehistoric bones eroding from the sandstone banks of the Niobrara and its tributaries in 1857 and have continued to explore the river's fossil riches since then. Professor Othniel C. Marsh of Yale University led his first expedition to the Niobrara in 1871. Known to Red Cloud and his Sioux followers as the "Bone Chief," Marsh later gained fame as a dinosaur expert. From that time to the present, several famous paleontologists followed Marsh. In the twentieth century E. H. Barbour of the University of Nebraska and Morris Skinner of the American Museum of Natural History explored the sandstone canyons along the length of the Niobrara, collecting and studying its fossil treasures. More recent research continues under the careful stewardship of Michael R. Voorhies of the University of Nebraska State Museum.

Mineral Resources

Mining activities have been limited to small sand and gravel pits scattered along the Niobrara River. No commercial pit operations are underway in the area. No hardrock mining or coal mining has occurred. Three oil or gas test wells were drilled and capped several miles north of the Niobrara River and one was drilled and capped south of the river, but no production resulted.



Mature paper birch, Jim McAllister Nature Trail, Smith Falls State Park.

Vegetation

The Niobrara River valley has unusually diverse plant groups and ecosystems. The area is noted in scientific literature for the many plants that exist here at or beyond their normal geographic limits. Plants of eastern, western, and northern forest ecosystems and three Great Plains prairie ecosystems converge here. Approximately 160 plant species are at the edge of their natural range in the river valley.

Several factors cause this unusual biological diversity. The river valley provides an unbroken east/west riparian

corridor connecting the dryer western landscape with the more humid midwestern prairie and eastern deciduous forest. Plants typical of each condition intermingle in the transition zone. The river valley also provides a variety of habitats due to differing slope, moisture, and soil conditions. Also, as climate conditions changed over geologic time, plants typical of past colder conditions survived due to the cool, wet, north facing branch canyons.

Ponderosa pine forest is at its eastern limit in the river valley. Eastern deciduous forest has extended up the valley and includes bur oak (*Quercus macrocarpa*), American elm (*Ulmus americana*), black walnut (*Juglans nigra*), green ash (*Fraxinus pennsylvanica*), basswood (*Tilia americana*), and hackberry (*Celtis occidentalis*). Broadleaf shrubs and vines include sumac (*Rhus spp.*), western snowberry (*Symphoricarpos occidentalis*), gooseberry (*Ribes spp.*), wild plum (*Prunus americana*), and wild grape (*Vitis spp.*). Northern (or boreal) forest is found on cool, moist, north facing slopes and includes paper birch (*Betula papyrifera*), hybrid aspen species — quaking aspen x bigtooth aspen (*Populus tremuloides x P. grandidentata*), ferns, and several species of club mosses. These plants apparently have survived as relicts of the Pleistocene ice age, when they were more widely distributed on the Great Plains.

Several types of grassland plant communities are also found in the region. The area provides a botanical transition between the tallgrass prairie of more humid areas to the east and the dryer shortgrass prairie to the west. Sandhills mixed-grass prairie covers the upland country south of the river, with plant species adapted to the sandy conditions. Typical plants on sandy and dry sites along the river and to the south are sand bluestem grass (*Andropogon hallii*), little bluestem (*Schizachyrium scoparium*), needle and thread grass (*Stipa comata*), junegrass (*Koeleria macrantha*), prairie sandreed (*Calamovilfa longifolia*), sand dropseed (*Sporobolus cryptandrus*), blue (*Bouteloua gracilis*) and hairy gramma grass (*B. hirsuta*), switch grass (*Panicum virgatum*), Louisiana sagewort (*Artemisia ludoviciana*), sand milkweed (*Aclepias arenaria*), lead plant (*Amorpha canescens*), scaly blazing star (*Liatris squarrosa*), purple prairie clover (*Petalostemon purpureum*), prairie spiderwort (*Tradescantia occidentalis*), yucca (*Yucca glauca*), poison ivy (*Toxicodendron rydbergii*), sumac, and wild rose (*Rosa woodsii*).



The river widens and islands are more common between Rocky Ford and Norden Bridge.

Small remnant patches of tallgrass prairie can be found on moist river bottoms. Species include big bluestem (*A. gerardii*), switchgrass, Indian grass (*Sorghastrum nutans*), sedges (*Carex spp.*), heath aster (*Aster ericoides*), annual sunflower (*Helianthus annuus*), and prairie cone-flower (*Ratibida columnifera*).

Along the river and to the north, on clayey soils, mixed grass prairie is found without the specialized Sandhills plants. Species include western wheatgrass (*Pascopyrum smithii*), little bluestem, needle and thread grass, blue and hairy gramma, purple lovegrass (*Eragrostis spectabilis*), junegrass, common yarrow (*Achillea millefolium*), evening primrose (*Oeothera spp.*), prickly poppy (*Argemone polyanthemus*), prickly pear (*Opuntia spp.*), and buckbrush. Smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*) have been introduced into these areas.

The sandbar-marsh plant community is found along the broader, eastern portion of the Niobrara River. The marshes have a wide variety of aquatic plants and animals. Barren sandbars not colonized by plants provide nesting sites for the endangered interior least tern and threatened piping plover.

Changes to vegetation that took place after homesteading include introduction of nonnative grasses (primarily north of the river on clay soils) and nonnative weeds. River valley forested area and density has generally increased compared to landscapes in historic photographs, apparently due to fire suppression and the reduction of early timber cutting. Fire suppression has resulted in increased thicket-like stands of eastern red cedar, a native plant that was formerly held in check by prairie fires. The forest cover is denser and grassland is succeeding to woodland. Some landowners are cutting eastern red cedar, ponderosa pine, and some hardwoods

for building materials, commercial sale, or thinning purposes.

Leafy spurge (*Euphorbia esula*), purple loosestrife (*Lythrum salicaria*), Canada thistle (*Cirsium arvense*), and spotted knapweed (*Centaurea maculosa*) colonies are scattered along the river and are designated as noxious weeds by the State of Nebraska. County weed boards, landowners, and the National Park Service's Northern Great Plains Exotic Plant Management Team provide varying levels of control and GIS mapping assistance.

Fish

The Niobrara River drainage contains the largest number of fish species occurring in Nebraska. Fish species specifically recorded in the Scenic River reach include the plains topminnow (*Fundulus sciadicus*), red shiner (*Notropis lutrensis*), sand shiner (*Notropis stramineus*), creek chub (*Semotilus atromaculatus*), white sucker (*Catostomus commersoni*), and Iowa darter (*Etheostoma exile*). The Scenic River also contains several species representing glacial relict populations, including the pearl dace (*Margariscus margarita*) and blacknose shiner (*Notropis heterolepis*). The latter species are almost entirely limited in Nebraska to the cool, clear side streams of the Niobrara River.

Blacknose shiners and pearl dace are currently state listed threatened species and status changes have been proposed for both species by the Nebraska Game and Parks Commission. Blacknose shiners are extremely rare in Nebraska and the last known occurrence of this species was in the Niobrara drainage. Recent studies on pearl dace populations within the designated reach and its tributaries found them to be more widely distributed and abundant in the Sandhills region than originally thought. In addition, the Niobrara River and its tributaries also provide important potential habitat for other sensitive species including finescale dace (*Phoxinus neogaeus*) and northern redbelly dace (*Phoxinus eos*).

Cold-water fish species such as rainbow trout (*Onchorhynchus mykiss*) and brown trout (*Salmo trutta*) are present in several Scenic River tributaries. Brown trout are stocked in Plum Creek, and rainbow trout are stocked in Long Pine Creek on an annual basis. Though not native to Nebraska, both populations are stocked and maintained by the Nebraska Game and Parks Commission. The seventy-six mile Scenic River is not

generally regarded as a fishing river, yet fly-fishing is a popular activity in many spring-fed streams in the area. The National Park Service does not foresee limiting or changing stocking densities for cold-water species and will allow it to continue under each management alternative.

Warm-water species such as channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), and green sunfish (*Lepomis cyanellus*) also inhabit the Niobrara River and provide other angling opportunities. Largemouth bass (*Micropterus salmoides*) are stocked in the Mill Pond in Valentine, but are only occasionally caught in the Scenic River below the mouth of Minnechaduza Creek.

Mammals

An amazingly diverse and largely traditional array of Great Plains mammals are recorded in the Niobrara Valley. Most thrive unmanaged, though larger animals like bison (*Bison bison*) and elk (*Cervus canadensis*) occur in fenced enclosures, with free-roaming elk sighted as well. Federally endangered species like the black-footed ferret (*Mustela nigripes*) once inhabited the area, but have since been extirpated from the region.

River otter (*Lutra canadensis*), a state threatened species, is native to the Niobrara. A reintroduction program was conducted by Nebraska Game and Parks Commission biologists from 1986 to 1992, with a release site near the Sheridan-Cherry County line in northwestern Nebraska. Since then river otter sightings have occurred throughout the Niobrara Valley, including several observations in the seventy-six-mile Scenic River reach.

The Scenic River is distinctive in that it supports three mammal species that are uniquely associated with the Niobrara River. Bailey's eastern woodrat (*Neotoma floridana*), a southern species that may have moved north during a warm, wet period, is now found as an isolated population in the central Niobrara Valley. The olive-backed pocket mouse (*Perognathus fasciatus*), a western species, is also found along the valley and is noted at the eastern limits of its range. The southern bog lemming (*Synaptomys cooperi*), a rare mammal of northeastern origin, occurs within the Niobrara Valley at its interface with the Sandhills.

Bats are documented in the Niobrara Valley and represent an important component of the mammal communi



Cow bison resting on the Fort Niobrara National Wildlife Refuge auto tour route.

ty. Keen's bat (*Myotis keenii*) and the Brazilian free-tailed bat (*Tadarida brasiliensis*) have only been found in the central Niobrara Valley. Keen's bat is associated with moist, eastern-type habitats, while the Brazilian free-tailed bat ordinarily has an affinity for southern, neo-tropical habitats.

Other mammals commonly observed in or near the river corridor include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), fox squirrel (*Sciurus niger*), eastern cottontail (*Sylvilagus floridanus*), mink (*Mustela vison*), and beaver (*Castor canadensis*).

Birds

A diverse array of avian life inhabits the Niobrara Valley. Five western species reach their eastern limits in the valley, while six northern oriented species reach their southern limits in the valley. The central reach of the Niobrara Valley is ecologically significant because it serves as an east-west avian corridor and important

meeting ground, especially for forest-dependent species. Hybridization of eastern and western associated species, such as indigo (*Passerina cyanea*) and lazuli buntings (*Passerina amoena*), yellow-shafted (*Colaptes auratus auratus*) and red-shafted flickers (*Colaptes auratus cafer*), and Baltimore (*Icterus galbula galbula*) and Bullock's orioles (*Icterus galbula bullockii*) are vivid testament of the biological uniqueness of the Scenic River. Formerly endangered Peregrine falcons (*Falco peregrinus*) migrate through Nebraska in late April and early May and in September and October. Falcons prey on waterfowl and are found around marshes, cropland, and grassland. Few sightings have been documented in the Niobrara Valley although Kansas State University studied this matter for the U. S. Fish and Wildlife Service.

The Niobrara Valley is home to several state and federal threatened or endangered bird species. Whooping cranes (*Grus americana*) migrate the valley seasonally and the interior least tern (*Sterna antillarum*) and piping plover (*Charadrius melodus*) nest on sandbars east of the

canoeable reach. Bald eagles (*Haliaeetus leucocephalus*) are especially common in winter months, but are also seen in lesser numbers throughout the year.

Game birds such as wild turkey (*Meleagris gallopavo*), pheasant (*Phasianus colchicus*), and sharp-tailed grouse (*Tympanuchus phasianellus*), in addition to several waterfowl species including wood ducks (*Aix sponsa*) and Canada geese (*Branta canadensis*) provide excellent hunting opportunities within the Niobrara corridor.

Invertebrates

Some ninety-two species of butterflies have been recorded in the Niobrara Valley and sixteen species reach the edge of their range there. Hybridization of three species, Red-spotted purple (*Basilarchia arthemis astyanax*), Weidemeyeri's admiral (*Basilarchia weidemeyeri*), and Eastern viceroys (*Basilarchia archippus*) are noted as evolutionary and genetically significant.

Reptiles

Reptiles occupy a special niche within the Niobrara Valley. The ringneck snake (*Diadophis punctatus*) occurs in deciduous forest oriented areas of the valley and reaches its western limits there, while the eastern hognose snake (*Heterodon platyrhinos*) also occurs in the valley and is otherwise only marginally distributed across the Sandhills. Others commonly found in the area include prairie rattlesnakes (*Crotalus viridis*), bull snakes (*Pituophis cantenifer*), and red-sided garter snakes (*Thamnophis sirtalis*). Turtles are frequently seen while canoeing the Scenic River. Several species commonly observed include snapping (*Chelydra serpentina*), painted (*Chrysemys picta*), and spiny softshell (*Trionyx spiniferus*).

Threatened and Endangered Species

The Scenic River is home to several plant and animal species that are listed for federal protection under the Endangered Species Act of 1973, as amended.

Federally protected plants are known elsewhere in the four counties adjacent to the Niobrara National Scenic River but not along this portion of river valley. The endangered blowout penstemon (*Penstemon haydenii*) grows on bare sand dunes in the Nebraska Sandhills, and the threatened western prairie fringed orchid

(*Platanthera praeclara*) grows in wet meadows between sandhills.

Federally protected animals recorded in the area include the endangered whooping crane (*Grus americana*), interior least tern (*Sterna antillarum*), and American burying beetle (*Nicrophorus americanus*); and threatened species including piping plover (*Charadrius melodus*) and bald eagle (*Haliaeetus leucocephalus*). The endangered black-footed ferret (*Mustela nigripes*) once inhabited the area, but has since been extirpated.



The federally threatened Piping Plover can be found nesting on sandbars east of Norden Bridge.

Whooping cranes migrate through the area each spring and fall. Eight sightings have been recorded over the past forty years on the Niobrara River between Valentine and the Carns Bridge, with the most recent observations occurring in April 2004. Shallow, sparsely vegetated segments of streams are used for roosting, and wetlands and cropland are used for feeding. No nesting has been documented.

Interior least terns and piping plovers nest during the summer on barren exposed river sandbars east of the Meadville Bridge. In 2002, the U. S. Fish and Wildlife Service established critical habitat for piping plovers, including the Niobrara National Scenic River reach from the Norden Bridge east to the Highway 137 bridge north of Newport.

The American burying beetle is found to the south on the Valentine National Wildlife Refuge and in northeastern Keya Paha County, but has not been documented along the river.

Bald eagles typically migrate through the valley during spring and fall and some eagles spend the winter months, from late October to early April, along the Niobrara River. Bald eagles are also seen in the summer but no nests have been officially confirmed. Winter population numbers depend on the severity of the season; more birds can be found along the Niobrara River during mild winters. An average of fifty birds have been counted during mid-January aerial surveys of the valley from west of Valentine to the confluence of the Niobrara and Missouri Rivers. Winter populations vary from year to year and no definite population trend is evident. Evidence of human-caused death of bald eagles has been documented in the general area. Lab analyses by the U. S. Fish and Wildlife Service indicates deaths by shooting, power line electrocution, and pesticide poisoning. Fewer carcasses have been found in recent years.

Black footed ferrets are not presently found in the area, which is within their historic range. Prairie dog colonies, necessary to the survival of black footed ferrets, exist on adjacent land.

Candidate species are plant and animal species whose survival is in question and are being studied for possible inclusion under the Endangered Species Act. Some of these species are also protected by Nebraska state law and listed as threatened or endangered. Additional plant and animal species are listed by the state as sensitive or rare in Nebraska (see Appendix B for a list of Nebraska sensitive species). The following candidate species may be found at or near the Scenic River.

Regal fritillary butterfly *Speyeria idalia*
 Belfragi's chlorochroan bug *Chlorochroa belfragi*
 Ferruginous hawk *Buteo regalis*
 Loggerhead shrike *Lanius ludovicianus*
 Western burrowing owl *Athene cunicularia hypugea*
 Black tern *Chlidonias niger*
 Swift fox *Vulpes velox*
 Plains spotted skunk *Spilogale putorius interrupta*
 Blanding's turtle *Emydoidea blandingii*
 Yellow mud turtle *Kinosternon flavescens*
 Black-tailed prairie dog *Cynomys ludovicianus*

Cultural Environment

The region's geography in this transition zone between the moist east and dry west has determined the nature of human use from prehistoric times to the present. Every successful occupant of this region has eventually adapted to the unique demands of the Great Plains environment.

American Indian Use

Prehistoric use of the area consisted of nomadic hunting and gathering camps in the Niobrara River valley and surrounding Sandhills. Archeological remains date back through several cultures to the Paleo-Indian period of 7,500-11,500 years before the present and include scattered projectile points, other stone tools, animal bone fragments, charcoal, pieces of pottery, and chipping debris. No archeological sites in the designated seventy-six mile long Niobrara Valley are listed on the National Register but several concentrations of sites were recommended as eligible for listing. The majority of recorded sites have not yet been evaluated. Available natural resources in the area apparently were not as suitable for villages and farms as those found farther east at the confluence of the Niobrara and Missouri rivers where village sites are more common.

Many Indian people, including the Lakota, Ponca, and Pawnee shared the Niobrara River valley. In addition to hunting and gathering, the valley offered the only sources of stone in the region that was suitable for the manufacture of tools.

Exploration

Early explorations discouraged development of the region. James Mackay explored the Sandhills region in 1795 and 1796. Mackay's map was published in 1802. A notation on it reads, "Grand Desert of moving sand where are neither wood, nor soil, nor stone, nor water, nor animals, except some little tortoises of various colors."

In 1857, First Lieutenant Gouverneur Warren of the U. S. Army Corps of Topographic Engineers traveled near the Niobrara in search of a railroad route west. The rugged side canyons of the Niobrara River made wagon travel difficult, and he paralleled the valley at some distance. He subsequently commended the Platte River railroad route to Fort Laramie even though it was forty

miles longer than the Niobrara route. The Niobrara's rugged terrain proved to be an obstacle to transportation and settlement, and it did not become an accessible human transportation corridor as did other Nebraska rivers.

After the Civil War, mining camps in Montana and the Black Hills of South Dakota spawned markets for freighted goods. Several wagon trails crossed the Niobrara River. Other historic routes, including the Gordon Road of 1876-1877 from Sioux City, Iowa, to the Black Hills, paralleled the river. But the Niobrara River and its valley generally remained a barrier to travel rather than a travel corridor.

Military History

By terms of the 1851 Fort Laramie Treaty, the Sandhills and Niobrara River flowing through them were accorded to the Sioux and Pawnee. In 1857 the Pawnees ceded fourteen million acres, including the central Niobrara River area, to the federal government for \$200,000 in annuities.

Following the Great Sioux War of 1876-1877, the government confined Nebraska's and Dakota's Indians to established reservations across the region and in the Indian Territory. By 1878, the Sioux tribes were restricted to segments of the Great Sioux Reservation in Dakota Territory (now western South Dakota). Fort Niobrara was established in 1879 to monitor Brule Sioux activity at the nearby Rosebud Agency, later called the Rosebud Reservation. Cattle were trailed from Texas for distribution to the Sioux, and the fort served as a market for locally furnished goods and services. No major battles or events occurred, although soldiers were dispatched to several threats. For a number of years, African American troops of the Ninth Cavalry were stationed at the fort, which was closed finally in 1906. One army constructed hayshed (now used as a warehouse) remains and the fort site is listed in the National Register of Historic Places. In 1912, the original military reservation was reduced by fifty-four sections to 19,131 acres and converted to the Fort Niobrara National Wildlife Refuge.

Settlement

By 1883, the Fremont, Elkhorn, and Missouri Valley Railroad reached the vicinity of Fort Niobrara and towns developed along the way. In addition to providing law enforcement and protection, the fort was a ready

market for local farm produce and labor, which encouraged homesteading. Several saw and flour mills were operating along the Niobrara River by the mid-1880s.

Homesteading and farming grew during the 1880s, but were challenged by drought and recession in the 1890s. The 1904 Kinkaid Act increased homestead tracts from 160 to 640 acres in the western two-thirds of the state. This further encouraged settlement, although the Sandhills area was nearly the last region of the Great Plains to be homesteaded. Population in the area increased and peaked during World War I with elevated commodity prices, but has steadily declined to the present day. More recently people have renewed their interest in the rural lifestyle, whether in retirement or in pursuit of a self-employed or home-based livelihood.

Properties along the river vary from the 60,550 acre Niobrara Valley Preserve and other large ranches, to family-owned ranches of several thousand acres, to small truck farms. Small residential lots of several acres or less also abound. A scattering of older houses and barns in the valley are considered regionally significant. Many of the older structures are unused and unmaintained and in various stages of deterioration.

Bridges

Several prefabricated iron truss bridges over the Niobrara River still serve county road systems. Borman (1916), Berry (1920 21), Bell or Allen (1903), and Brewer (1899) bridges were listed separately in 1992 in the National Register of Historic Places under criterion C for significance at the state level and as part of a multiple property listing "Highway Bridges of Nebraska, 1879-1942." These bridges are examples of rigid or pin-con



Aerial view of Berry Bridge east of Valentine, Nebraska.

nected Pratt through truss design. The Borman and Berry bridges are still used for through traffic and the Brewer and Allen bridges are used for local ranch traffic. Other bridges of similar age and design, but not listed in the national register, are Norden, County Line (privately owned), and Meadville. The multi-span concrete Carns state aid bridge built in 1912 is also National Register listed. In 1996, a 1910 iron truss bridge moved from Verdigre Creek, Nebraska, was restored and reassembled across the Niobrara River at Smith Falls State Park for pedestrian access to Smith Falls. This bridge was also listed in the National Register of Historic Places though it is a probable candidate for delisting owing to its contextual change.

Cornell Dam

The Cornell Dam was built in 1915-16 on the Niobrara River near Valentine as part of the Niobrara River Power Project. Charles Cornell, one of the organizers of Cherry County and a founder of the town of Valentine, aspired to establish a Nebraska-Dakota Railroad and needed the power project to furnish electricity to the proposed route between Valentine and Spencer, Nebraska. The plant began furnishing power in 1917 but the rail line was never constructed. Instead, the power was used to pump water for the town of Valentine. The plant ceased operating in 1984. The Nebraska Public Power District, the dam's owner at the time, quitclaimed the property to the United States government in 1986 due to its location within the boundaries of the Fort Niobrara National Wildlife Refuge.

Cultural Landscapes

The river valley has supported ranching and farming since the 1880s. Although roads, buildings, and fences are well scattered, current land management practices affect the landscape. The valley's large ranches typify this broad pattern of use. Some rowcropping occurs along the river but current ranching and conservation practices maintain a landscape with the same general appearances as in the earliest days of Euramerican settlement. The valley's woodlands are more extensive than in presettlement times, largely due to prairie fire suppression, but this, too, is a measure of human impact on the land.

Recreational Resources

The Niobrara River valley offers an array of recreational resources distinctive to the Great Plains. The canoeing, tubing, and kayaking reach from Cornell Dam to the vicinity of Norden Bridge offers a nationally renowned, two-day water experience enjoyed by thousands annually. Canoeing occurs east of Norden as well, but is more dependent on seasonal high water. Float trips are heightened by opportunistic wildlife viewing, the valley's distinctive botanical diversity, its array of waterfalls and dramatic cliffs, and the occasional historic truss bridges and dispersed old farm and ranch buildings.

Several gravel roads paralleling the river provide sight-seeing opportunities, including through the Fort Niobrara National Wildlife Refuge and from Brewer Bridge to Norden Bridge. Paved highways cross the Niobrara River north of Ainsworth, Bassett, and Newport and offer interesting views of a pristine river, open fields and woodlands, valley slopes, and ranches. Extant overlooks south of Sparks and north of Bassett provide exceptional viewing opportunities of the river and valley. The Sparks Overlook also provides dramatic long distance viewing of the Sandhills south of the river.

Photography, camping, fishing, hunting, and hiking are other widely enjoyed activities enhanced by well-developed public and private facilities scattered throughout the seventy-six mile Niobrara reach and at all of its gateway communities. The historic Meadville hamlet north of Ainsworth showcases a restored and operating 1888 general store, a Fourth of July celebration, and a popular, mid-winter icy river romp.

Wintertime recreational opportunities abound including hunting, sightseeing, and bald eagle watching. Though concentrated in summer, canoeing occurs every month of the year.

Socioeconomic Environment

Visitor Use

The diverse recreational use of the Niobrara National Scenic River is widely scattered across the seventy-six-mile-long unit but its nationally touted canoeing is generally concentrated along the thirty-mile river segment



Tubers enjoy the Scenic River between Smith Falls and Brewer Bridge on a busy Saturday.

between the Fort Niobrara National Wildlife Refuge and the Norden Bridge. Easily the most heavily used public launch is the Fort Niobrara access at the refuge's entrance. Other popular public access sites include Smith Falls State Park, managed by the Nebraska Game and Parks Commission, and the Brewer Bridge landing managed by the Middle Niobrara Natural Resources District. Commercial operators also stage from privately owned sites at Berry Bridge and down river between the Brewer and Norden bridges.

In 1993 canoe and tube use of the river was estimated at approximately thirty thousand annually, with an additional approximate five thousand nonwater-oriented visitors in the river valley. The National Park Service derived this figure with assistance from the University of Nebraska Bureau of Business Research. Use in 1995 was estimated to have increased by approximately ten percent and evidence offered below suggests that public use continues to grow. In 2001 the National Park Service contracted with the University of Minnesota's Cooperative Park Studies Program to survey and report public use and formulate a protocol for collecting and reporting monthly and annual use of the unit thereafter.

This study was completed in 2003 and the protocol is now being implemented.

In 1993 approximately twenty-four thousand individual floaters began their river trip on the Fort Niobrara Refuge. In 1994 approximately twenty-five thousand floaters commenced there. With the implementation on the refuge of special conditions set forth in the 1999 comprehensive conservation plan aimed at dispersing river use, protecting refuge resource values, and particularly enhancing a visitor's experience in the Fort Niobrara Wilderness, floating use at Fort Niobrara dropped to approximately fourteen thousand in 2002. At the same time, National Park Service, outfitter, and Nebraska Game and Parks Commission personnel offer anecdotal reports of substantially increased river usage downstream from the refuge, use in part reflected in statistics collected at Smith Falls State Park. The state park reported 26,200 visitors in 1993, 31,800 in 1994, and 76,300 in 2000. In 2002 Smith Falls reported 72,400 visitors. Doubtless, some of these river users are included in the Fort Niobrara count, a detail among many addressed by the University of Minnesota visitor use study for the National Park Service in 2001-2002.



Egelhoff's Rapids.



Rocky Ford Rapids.

River use typically occurs from late May until early September. Use from October through April is light but canoeing occurs throughout the winter season, weather permitting. Winter use in the canoeable reach is abetted by the river's steady flow and quick current, which inhibit freezing. About eighty percent of river use occurs on Saturdays, about ten percent on Sundays, with the remaining ten percent spread across the weekdays.

A common use pattern is to arrive in Valentine on Friday, float all day Saturday, and depart on Sunday. Some users also enjoy a short float before departing on Sunday.

On peak Saturdays, it is not unusual to see one hundred to two hundred canoes and tubes on the river at almost any location from Fort Niobrara to Brewer Bridge. People coming to the Niobrara expressly for a solitary experience have learned to avoid summer weekends and opt, instead, for a mid-week float or a visit in the shoulder seasons where, in both instances, it remains entirely possible to enjoy the river environment with an atmosphere of solitude.

Use on peak Saturdays is now essentially controlled by the availability of rental canoes and tubes. Increases could still result if outfitters added to their canoe and tube inventory, if new outfitters commenced business, or if more users brought their own canoes and tubes. The U. S. Fish and Wildlife Service issues special use permits for outfitters launching on the Fort Niobrara Refuge, and no new permits have been issued since 1999

pending completion of detailed river management plans, one part focusing on the refuge alone and a second part to be written cooperatively with the National Park Service addressing the remainder of the canoeable river.

Currently, thirteen commercial outfitters based in Valentine or at several river locations rent canoes, kayaks, and innertubes. In 2001 slightly more than ninety-three percent of floaters rented equipment or hired the services of outfitters.

The survey of river floaters conducted in 2001 by the University of Minnesota for the National Park Service included questions about group size and composition, place of origin, purpose of trip, degree of satisfaction, and general management needs. The average group size floating the river in 2001 was nine people. Weekend groups tended to be larger than ten. Most people began their float at the Fort Niobrara National Wildlife Refuge and may float the lower or eastern portion of the canoeable reach on a second day. Sixty-six percent of the floaters were from Nebraska (down from seventy-five percent in 1993), and of those nearly sixty percent were from Omaha and Lincoln. Another nearly eleven percent of river floaters were from South Dakota, nine percent from Iowa, and four percent from Colorado. Reasons given for floating the river included opportunities to enjoy the natural scenery, escape the usual demands of life, and enjoy a family activity. River floaters were generally greatly satisfied with their experiences. About forty-two percent of the floaters indicated that this was their first experience on the Niobrara.

The Fort Niobrara National Wildlife Refuge features a visitor center at refuge headquarters seven-tenths of a mile east of the Fort Niobrara launch site. Information on the river and refuge is typically available on weekdays throughout the year, along with displays on fort history, wildlife, and plant ecology. The refuge also provides opportunities for wildlife viewing from an internal road network and hiking on self-guided nature trails, including in the wilderness area. Refuge attendance was 130,000 in 2000. About 5.5 miles of the river below the Fort Niobrara launch passes through the federally designated Fort Niobrara Wilderness.

Smith Falls State Park provides river access, camping, picnicking, trails to Smith Falls and the south valley rim, and informal environmental interpretation.

Private camping is currently available at ten commercial sites between Fort Niobrara and the Norden Bridge and at a small private park at the Meadville Bridge north of Ainsworth.

The Nature Conservancy's Niobrara Valley Preserve accommodates school groups and the organization's membership for nature study and ecological research.

The chambers of commerce in Valentine and Ainsworth and the National Park Service's Niobrara/Missouri Headquarters Office in O'Neill provide general visitor information. Formal interpretation remains meager, with small displays at the Fort Niobrara Refuge, Smith Falls State Park, and the Fred Thomas Wildlife Management Area overlooking the river north of Bassett. The National Park Service has placed identification signs at certain river landmarks and hazards. The National Park Service provides and distributes an interim informational brochure for the Scenic River, one destined soon to be replaced by a formal park brochure produced by the Service's Harpers Ferry Interpretive Design Center in 2005. River outfitters have also developed and distributed a variety of maps and brochures.

Hunting for deer, turkey, grouse, and quail is popular, as is fishing for catfish in the Niobrara River and trout in larger tributary creeks. Some landowners charge fees, lease property, or provide guiding services for hunting on private land. Some trapping occurs for recreation, commercial fur harvest, and nuisance animal control.

Demographics

The 2000 census recorded 12,400 people in the four counties along the Scenic River. This was down some nine percent from 1990 and reflects Nebraska's diminishing rural and growing urban population. Valentine (2,800), Ainsworth (1,850), Springview (250), and Bassett (750) are county seats. Nebraska's population is eighty-seven percent white, 5.5 percent Hispanic, four percent black, and less than one percent American Indian. Median ages range from thirty-six years in Cherry County to thirty-nine years in Keya Paha County. High school graduation rates average seventy-six percent. Seventy-seven percent of the people in the area were born in Nebraska.

Employment

Farming and ranching provide the greatest employment, accounting for thirty-three percent of jobs in the four-county area. The percentage of nonagricultural jobs increased by ten percent between 1975 and 1990. Between 1975 and 1990 total employment decreased three percent in the region versus a twenty-five percent increase statewide. Keya Paha County recorded the greatest decrease at eleven percent. Government employment declined three percent between 1975 and 1990, but government transfer payments (retirement, medical, welfare) increased fifty-seven percent on a per capita basis adjusted for inflation. Tourism is growing but represents only about six percent of the local economy. Valentine is the hub of services for river recreation.

Landownership

Federal Land

Nine miles of the Niobrara National Scenic River are within the 19,122-acre Fort Niobrara National Wildlife Refuge. The U. S. Fish and Wildlife Service also manages a 221-acre conservation easement in Keya Paha County near the river that features a wetland and grassland buffer. The Bureau of Reclamation owns some 186 acres in the project area in a number of small and widely scattered parcels. The Bureau of Land Management owns a 57.5-acre tract near the Borman Bridge. The Bureau of Reclamation tracts are eligible for immediate transfer to the National Park Service for management as Scenic River lands. The Bureau of Land Management

tract, though located immediately upstream of the Scenic River boundary, is a site alternative for a prospective visitor education center serving the greater Niobrara and Sandhills region.

State and Local Government Land

Two tracts of state-owned school trust land adjacent to the river are leased for grazing and hunting. The Nebraska Game and Parks Commission has a well established presence on the Niobrara, owning 160 acres and some two miles of south bank river frontage at the Borman Bridge Wildlife Management Area, the 218-acre Fred Thomas Wildlife Management Area north of Bassett with one-half mile of south bank river frontage, and leasing the 264-acre Smith Falls State Park with a collective 2.5 miles of river frontage. A two-acre tract at Brewer Bridge is managed for recreation by the Middle Niobrara Natural Resources District.

Private Land

Most of the land between Borman Bridge and Nebraska Highway 137 within one-quarter mile of the river (about eighty-five percent) is privately owned by individuals, family ranches, and The Nature Conservancy. The remainder is managed by the U. S. Fish and Wildlife Service and Nebraska Game and Parks Commission.

The 60,550-acre Niobrara Valley Preserve, owned and managed by The Nature Conservancy, includes approximately 25 miles of riverfront on the south bank of the Niobrara and 4.4 miles of frontage on the north bank in Cherry, Brown, and Keya Paha counties. The Preserve is managed for resource preservation, education, and ecological research.

Land Use

Ranching and farming have accounted for the primary land use of the Niobrara and comprise cornerstones of the local economy since settlement in the 1880s. Irrigated cropland exists in a few bench areas near the river and on flat uplands away from the river. Upland prairie is used for pasture, and hay is cut near the river.

Until recently, most residential use along the river was associated with ranching although the introduction of scattered recreational cabins and mobile homes were occasionally noted through most of the 1990s. Late in the decade, however, recreational homestead develop-

ment surged, particularly south of Sparks where a substantial tract of timbered land was subdivided and now features sizeable seasonal homesteads. Development is also occurring in the Meadville hamlet and at the mouth of Long Pine Creek, a traditional cabin area on a heralded trout stream.

Developments associated with the recreational industry have also surged in the late 1990s with the construction of two substantial private landings and concession facilities targeting floaters, added to four private concession-type facilities of longer standing.

Land Protection Status

The Existing Conditions map (**Map 2**) shows the locations of land owned by public and private nonprofit entities.

Public Land

Public lands along the seventy-six-mile Niobrara National Scenic River detailed above are managed under the long-term goals and mandates of the respective managing agencies and are subject to all federal and state environmental protection laws. Undeveloped public land would probably remain undeveloped in accordance with agency goals and mandates. Public land, whether federal or state owned or leased, comprises some 10.25 miles of north bank riverfront and some 12.3 miles of south bank riverfront.

Private Nonprofit Land

The Niobrara Valley Preserve, owned and managed by The Nature Conservancy and detailed above, has as its long-term management goal the protection of native natural resources, including rare plants and habitat. Under Conservancy ownership the land is protected from subdivision and resource degradation. The Conservancy protects 29.4 miles of river frontage.



Early morning fog rises off the Niobrara river near Valentine, Nebraska.