

National Park Service  
U.S. Department of the Interior

Niobrara National Scenic River  
Valentine, Nebraska



# NIOBRARA NATIONAL SCENIC RIVER

## RIVER MANAGEMENT PLAN ENVIRONMENTAL ASSESSMENT

### Outstandingly Remarkable Values Workshop Report

NATIONAL PARK SERVICE  
December 2011

Page intentionally left blank

# CONTENTS

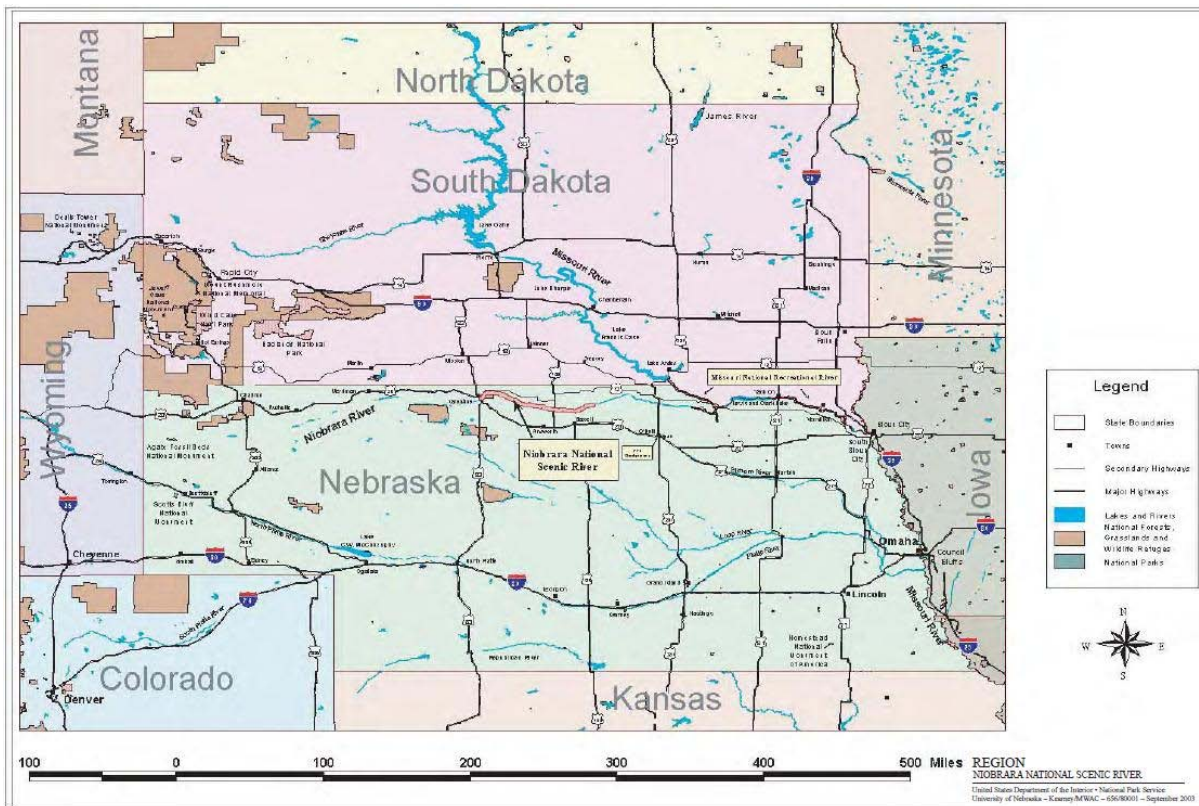
Introduction.....	I
Objectives of the Outstandingly Remarkable Values Workshop.....	3
Methods.....	4
Three Pillars of Protection.....	4
Water Quality .....	4
Free- Flowing Condition.....	5
Outstandingly Remarkable Values.....	6
Geology ORV.....	10
Paleontology ORV.....	13
Fish and Wildlife ORV.....	15
Scenery ORV .....	20
Recreation ORV .....	23
Appendix A – Workshop Participants and Contact Information.....	26
Appendix B – Issues.....	27



## INTRODUCTION

The Niobrara River is the longest river in Nebraska (486 in-state miles), flowing 535 miles from its source in eastern Wyoming to the Missouri River. It drains approximately 12,600 square miles.

In 1975, environmentalists and private landowners founded the Save the Niobrara River Association in response to the proposed O'Neill Unit irrigation project which called for the construction of a dam on the mainstem of the Niobrara River. In that same year, the association filed a lawsuit to block construction of the Norden Dam. In 1980, in response to the threat of the proposed dam, a group of concerned river landowners contacted their congressional representatives and requested federal protection for segments of River under the Wild and Scenic Rivers Act of 1968 (WSRA). Eleven years later portions of the Niobrara River were designated for protection by the Niobrara Scenic River Designation Act of 1991. From this initial designation, and a subsequent addition, Niobrara National Scenic River (NSR) now covers 76 miles, from Borman Bridge to State Highway 137 Bridge. That portion of Niobrara NSR (nine miles) located within Fort Niobrara National Wildlife Refuge (Refuge) is administered by the U.S. Fish and Wildlife Service (USFWS), with the remaining 67 miles being administered by the National Park Service (NPS), with property ownership largely remaining in private hands.



**Figure 1. Regional context of Niobrara National Scenic River.**

Niobrara NSR's purpose is described by the language contained in the WSRA and is as follows: "It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to

be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.”

The WSRA dictates that the agency managing a segment of the Wild and Scenic Rivers System must complete a comprehensive river management plan (RMP) where it shows how it will protect the river’s free-flow, water quality and designated outstandingly remarkable values (ORVs). In 2007, a second<sup>1</sup> General Management Plan (GMP) was completed for Niobrara NSR.

The GMP identified the ORVs that form the basis for management of Niobrara NSR. Such values are to be protected pursuant to the missions set forth in the NPS Organic Act of 1916 and the WSRA. Although the GMP identified ORVs for protection of geologic, paleontologic, fish and wildlife, scenic, and recreation resources, there was no attempt at that time to address them with specificity or adequately quantify them.

Based upon the identified ORVs, the GMP delineated the boundary for Niobrara NSR as also directed under the WSRA. The boundary, encompassing 23,074 acres, was drawn to protect as equitably as possible the river’s ORVs of geology, paleontology, fish and wildlife, scenery, and recreation. As the Fort Niobrara Wilderness is already protected by an Act of Congress, the boundary follows the ordinary high water mark through this portion of the Refuge. The presence of other protected lands were also considered and where they exist a minimum setback of two hundred feet above the ordinary high water mark, measured horizontally, was typically applied. Exceptions abound, the leased land of Smith Falls State Park being the most notable. Due to the complexity of the intertwined biological resources comprising the geologic, fish and wildlife, and scenic values, the boundary is generally wider between the Refuge and Norden Bridge, and expands noticeably again at Highway 183, 7, and 137 crossings to protect distinctive and viewsheds. In some of these areas it extends nearly one mile from the river. It extends about 2.5 miles up Fairfield Creek, a site of key paleontological resources. Although Niobrara NSR’s ORVs encompass more than 150,000 acres in the designated reach, the total land area associated with the boundary is much smaller to remain within congressionally prescribed limits.

The GMP dictated the development of a RMP that would determine prescriptive management zones and the user capacity for each zone that would allow for the greatest level of protection and enhancement of the ORVs. As part of the RMP development process, the NPS, through this plan, has reviewed the ORVs presented in the GMP, and refined them as appropriate, based on input from the planning team, which consists of representatives of key stakeholders. The ORVs will then be open for public comment through the RMP process.

In 1968, Congress passed the WSRA, to preserve some of America’s rivers in a free-flowing condition. The WSRA requires that federal land managers must ensure that they protect and enhance free-flow, water quality and the ORVs of their river(s) through comprehensive river management planning. Managers accomplish this imperative by preparing and implementing management plans for their Wild and Scenic River(s).

---

<sup>1</sup>With the area along the river largely in private ownership and having local opposition to the creation of the National Scenic River, Congress also established the Niobrara Scenic River Advisory Commission (Commission), to advise the Secretary on development of a management plan, and the management and operation of the area. As a result of consultations with the Commission, a General Management Plan and Environmental Impact Statement (Plan) was completed in 1997 which called for the formation of a local council that would manage the river and receive technical and financial assistance from the NPS. The four affected county commissions (Brown, Cherry, Keya Paha, and Rock) formed the Niobrara Council in the spring of 1997 under the Nebraska Inter-local Cooperation Act, and entered into a cooperative agreement with the NPS in August of 1997 as envisioned in the Plan. In 1999 a federal court judge ruled the NPS had unlawfully delegated its management responsibility to the Niobrara Council and ordered the preparation of a new Plan, on the basis that the Secretary of the Interior could not wholly delegate his responsibility to a local entity not bound by the statutory obligations of the Organic Act or the WSRA.

The first step in preparing an RMP is to clearly and succinctly articulate the ORVs. The Interagency Wild and Scenic Rivers Coordinating Council issued guidelines for determining ORVs. To be outstandingly remarkable, values must be:

- River related or dependent. This means that values must:
  - “Be located in the river or on its immediate shorelands (generally within ¼ mile on either side of the river, but not restricted to that distance);
  - Contribute substantially to the functioning of the river ecosystem; and/or
  - Owe their location or existence to the presence of the river.”
- Rare, unique, or exemplary at a comparative regional or national scale. As expressed by Diedrich and Thomas (members of the Interagency Wild and Scenic Rivers Coordinating Council) in 1999, this means that “such a value would be one that is a conspicuous example from among a number of similar values that are themselves uncommon or extraordinary.”

These two criteria are fundamental for determining if the resources of Niobrara NSR within each category rise to the level of outstandingly remarkable.

## **OBJECTIVES OF THE OUTSTANDINGLY REMARKABLE VALUES WORKSHOP**

With this in mind, a workshop was held at the Niobrara Lodge in Valentine, Nebraska, February 1 - 3, 2011 to review, refine, and clarify the ORVs for Niobrara NSR that will be included in the river management plan and environmental assessment (RMP). The workshop included NPS staff from Niobrara NSR, Missouri National Recreational River (NRR), Badlands National Park (NP), the NPS Water Resources Division and Midwest Regional Office; USFWS staff; Niobrara Council<sup>2</sup> members; and the planning consultant. Representatives from other federal, state, and tribal agencies were invited, but were not able to attend due to weather and other travel constraints. Appendix A lists workshop participants and contact information. The workshop discussion focused on the ORVs of Niobrara NSR and identifying stakeholders, information needs, and issues related to its use and management. In preparation for the workshop, materials were distributed prior to the meeting to allow participants to become familiar with the wild and scenic river study process. These materials provided the definition of an ORV, guiding principles for ORVs, and example ORV statements from other NPS river management plans.

The objectives of the ORV workshop consisted of the following:

- Review the relationship of the ORVs developed in the 2007 GMP to the RMP.
- Review the definition of ORVs and establish a framework for refining them for the RMP.

---

<sup>2</sup> In 2000, the State of Nebraska passed the Niobrara Scenic River Act, reconstituting the existing Niobrara Council, giving it authority and responsibility to manage the Niobrara scenic river corridor with the National Park Service. This reorganized the Council as a sub-unit of State government, and authorized the Council to assist the NPS in river management. The legislation authorized the Council to enforce zoning regulations within the Niobrara scenic river corridor under the guidance of the federal Wild and Scenic Rivers Act or under the guidance of the general management plan as written by the National Park Service. In addition, the Council was given direct authority to own lands or easements. As a result of this legislation a new Cooperative Agreement was established between the NPS and the Council in 2004. The objective of the agreement was to address selected stewardship issues with respect to the management of the Scenic River and outlined five areas in which the Council was to participate, these being:

- The Council was to seek for additional funds other than those allocated by legislation to carry forth their mandates.
- Coordinate land protection/zoning activities; reviewing proposals from state entities for compliance with the WSRA; working with local governments to ensure consistency with the WSRA; implementing screening guidelines; providing land use information to the public; apprising the NPS of these activities; and requesting NPS support where needed in land protection matters.
- Lead an initiative within the four counties to address infrastructure needs such as road maintenance, ditch improvements, erosion control, and other measures to improve visitor safety.
- Participate in cooperative efforts to control noxious weeds.
- Develop and implement resource management and education programming directed to protecting, enhancing, and restoring natural and cultural resources of the Scenic River area, maintaining the rural, agricultural landscape, and enhancing visitor experiences in the corridor.

- Review and refine ORV statements from the GMP for the river and enhanced site-specific statements.
- Develop desired future conditions for the ORVs to be considered as part of the RMP.
- Identify planning issues and concerns related to the river.

## **METHODS**

NPS Water Resources Division Supervisory Hydrologist/Wild and Scenic River Co-Lead used PowerPoint presentations to familiarize meeting participants with the definition of an ORV as established in the WSRA. Workshop participants were presented with a process for defining ORVs for the river as a whole and at a site-specific level. Because the WSRA clearly states that conditions for designation as Wild and Scenic include a river's free-flowing nature and high water quality, the NPS also developed descriptions for free-flow and water quality that support the identified ORVs. Workshop participants were divided into three working groups that were responsible for reviewing and refining ORV statements developed through the GMP. The workshop participants used these as a starting point for discussing each ORV; the group did not assume that the content or results of the GMP would direct the results of RMP internal scoping.

Once ORV statements were drafted, workshop participants reconvened to review each of the draft statements so that the larger group could provide comment on ways to improve or refine each statement. Working groups then were tasked with identifying stretches along the river where the ORVs were present. Again, these site-specific statements of ORVs were reviewed and modified by the larger working group. The resulting statements represent an in-depth review and refinement of the ORVs developed during the GMP.

Subsequently, to develop planning issues, workshop participants were asked to brainstorm issues and concerns related to the river resources and to be specific about where these issues arise along the river. The issues and concerns were recorded electronically and on flip charts and are presented in this report (Appendix B).

During the workshop the NPS refined and evaluated ORVs for the entire 76 miles of Niobrara NSR. The nine miles of Niobrara NSR running through the Refuge are managed by the USFWS. In January of 2005 the USFWS completed the Fort Niobrara National Wildlife Refuge River Recreation Management Plan for that portion of Niobrara NSR that flows within the refuge boundaries. This plan was called for within the Fort Niobrara Comprehensive Management Plan completed in 1999 and provides for recreational use on the river, protects natural resources of the Refuge, preserves the wilderness character of the Fort Niobrara Wilderness Area, and promotes public understanding of and appreciation for the Refuge's wildlife and recreational values.

## **THREE PILLARS OF PROTECTION**

Free-flowing condition, water quality, and ORVs form the three pillars of protection under the WSRA. Free-flowing condition and water quality support the integrity of the ORVs and are key components of the RMP. These fundamental characteristics of the Niobrara River and its tributaries within Niobrara NSR are described below.

## **WATER QUALITY**

Section 12(c) of the WSRA stipulates that the agency administering a component of the Wild and Scenic Rivers System will cooperate with appropriate federal and state water pollution control agencies in eliminating or diminishing the pollution of waters of the river.



One of the main tools to achieve water quality is adherence to the Clean Water Act (CWA), which focuses on improving water quality by maintaining and restoring the physical, chemical and biological integrity of the nation's waters. It provides a comprehensive framework of standards, technical tools, and financial assistance to address the many stressors that can cause pollution and adversely affect water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction.

The CWA also outlines water quality standards (Section 303 of the CWA) consisting of three interrelated parts:

- 1) Uses — designated by states and authorized Indian tribal governments. Fishable/swimmable are the statutory default “uses.” Uses may be made more specific and more or less stringent. However, if proposed as less stringent, the burden is to show that default uses do not exist or are not reasonably attainable.
- 2) Water Quality Criteria — the criteria measure attainment of uses and can be chemical, biological or other. The EPA and states are identifying and adopting direct indicators of environmental health.
- 3) Antidegradation Policy — EPA regulations require states to adopt, as part of their water quality standards, a statewide antidegradation policy to maintain existing uses and protect high-quality waters. States can designate Outstanding Natural Resource Waters, which afford very stringent protection by prohibiting nearly all new discharges, and for that reason are infrequently adopted.

Water quality conditions of the Niobrara River are generally considered to be high. They are reflective of the largely unaltered geohydrologic setting and are generally within state water quality standards. This is due to the relatively light level of development on the watershed, and to the fact that the river is predominantly groundwater fed, meaning that contaminants from surface water runoff are reduced relative to more tributary-fed rivers and that seasonal fluctuations in flow are relatively more tempered.

Two water quality characteristics that could be considered problematic are *E. coli* and agricultural chemicals. Nebraska Department of Environmental Quality data currently show minor *E. coli* elevations in three Niobrara tributaries: Minnechadusa, Plum, and Long Pine Creeks. The bacterial load reflects both animal and human sources. While livestock in streams and the river mainstem are one possible source, large feedlot operations beyond the scenic river boundary are likely to be the more significant contributor. Human bacterial wastes may arise from municipal treatment facilities, riverside developments, and undesirable visitor behaviors.

Under the Clean Water Act, the Niobrara River is classified as a Tier III Outstanding National Resource Water. No degradation is allowed in these waters, except on a short-term basis.

## FREE- FLOWING CONDITION

Section 16(b) of the Wild and Scenic Rivers Act defines “Free-flowing” as:

“as applied to any river or section of a river, means existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion...”

The Niobrara River originates in the high-plains of eastern Wyoming, flows through the Sandhills of northern Nebraska and joins the Missouri River on the northeast border of the state. As it flows from west to east, the Niobrara River cuts ever deeper into the surface alluvial deposits of our present day Quaternary Period, through to the ancient chinks and shales of the Upper Cretaceous laid down some

70-80 million years ago. Within Niobrara NSR, the river as it flows to the east transitions from an entrenched bedrock channel to a sandy, braided channel streambed.

The Niobrara River is predominantly groundwater fed from the High Plains Aquifer over much of its length, but receives increasing contributions from tributary sources along its eastward course. There are three dams on the mainstem – Box Butte Dam, Cornell Dam, and Spencer Dam. Cornell Dam is within the Niobrara NSR boundary, while Box Butte Dam is approximately 195 river miles upstream, and Spencer Dam is approximately 40 miles downstream. Cornell Dam is now a run-of-the-river structure and is being considered for possible removal. Merritt Dam is located on the Snake River, a tributary of the Niobrara River upstream of Niobrara NSR, and along with Box Butte Dam is a major source of irrigation water for northwest and north-central Nebraska.

Water flow through Niobrara NSR is unprotected. The WSRA establishes a federal reserved water right, subordinate to prior existing water appropriations. In 2008, the Nebraska Department of Natural Resources declared the Middle and Upper Niobrara to be fully appropriated, prohibiting new diversions of water. This declaration was recently overturned by the Nebraska State Supreme Court. The NPS has been working with the Nebraska Game and Parks Commission to obtain a state-based instream flow to protect fish, wildlife, and recreation that has also met with varying degrees of opposition.

## OUTSTANDINGLY REMARKABLE VALUES

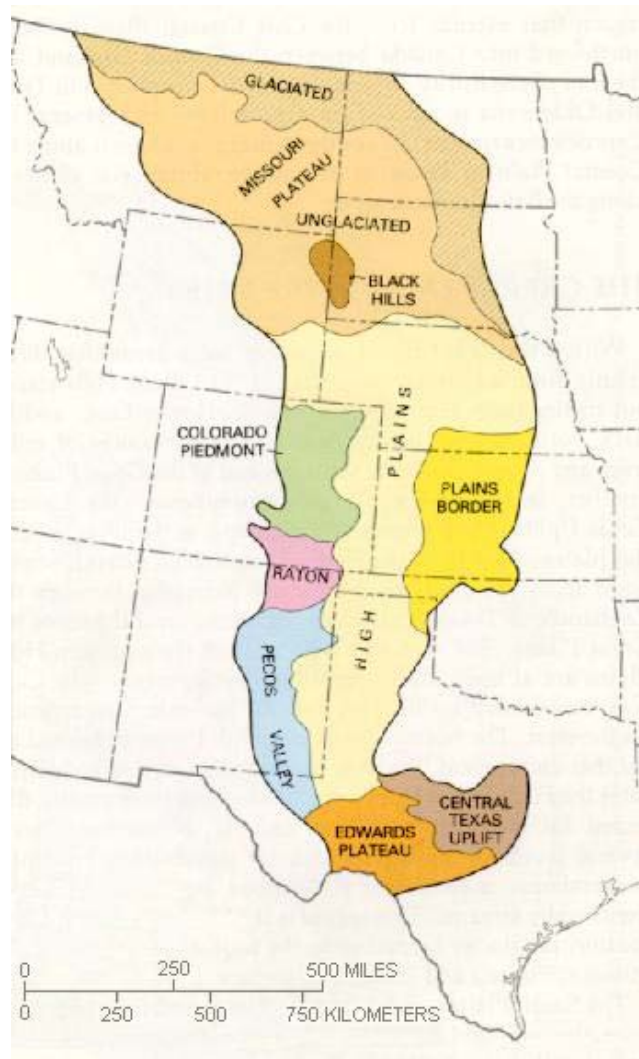
Prior to the workshop, technical specialist reports were prepared for the ORVs identified in the GMP. These reports were solicited from subject matter experts in the fields of geology, hydrology, fish and wildlife, and recreation. These reports were available during the workshop and provided background information on the importance of each ORV, existing conditions, research conducted, and potential research needed.

Following are the ORVs for Niobrara NSR. An important consideration of an ORV is a determination of its importance on a national or regional basis. National importance encompasses the entire nation, while local importance concerns the managing unit and perhaps surrounding areas. With there being no definition as to the regional size, the workshop team defined the geographic region of consideration as the Great Plains of the United States as depicted in Figure 2. It is noted that only a single characteristic was required to raise an ORV to national or regional significance. Although these ORVs are presented as the basis for management of Niobrara NSR, the ultimate responsibility to protect these resources remains with the landowner, whether private or public.

Because a natural “break” in the landform of the river occurs approximately 35 miles east of Borman Bridge at the general location of Norden Chute, the merits of each ORV were evaluated over both Niobrara NSR as a whole, and separately over the west (35-mile) and east (41-mile) reaches, as depicted in Figures 3 and 4.<sup>3</sup>

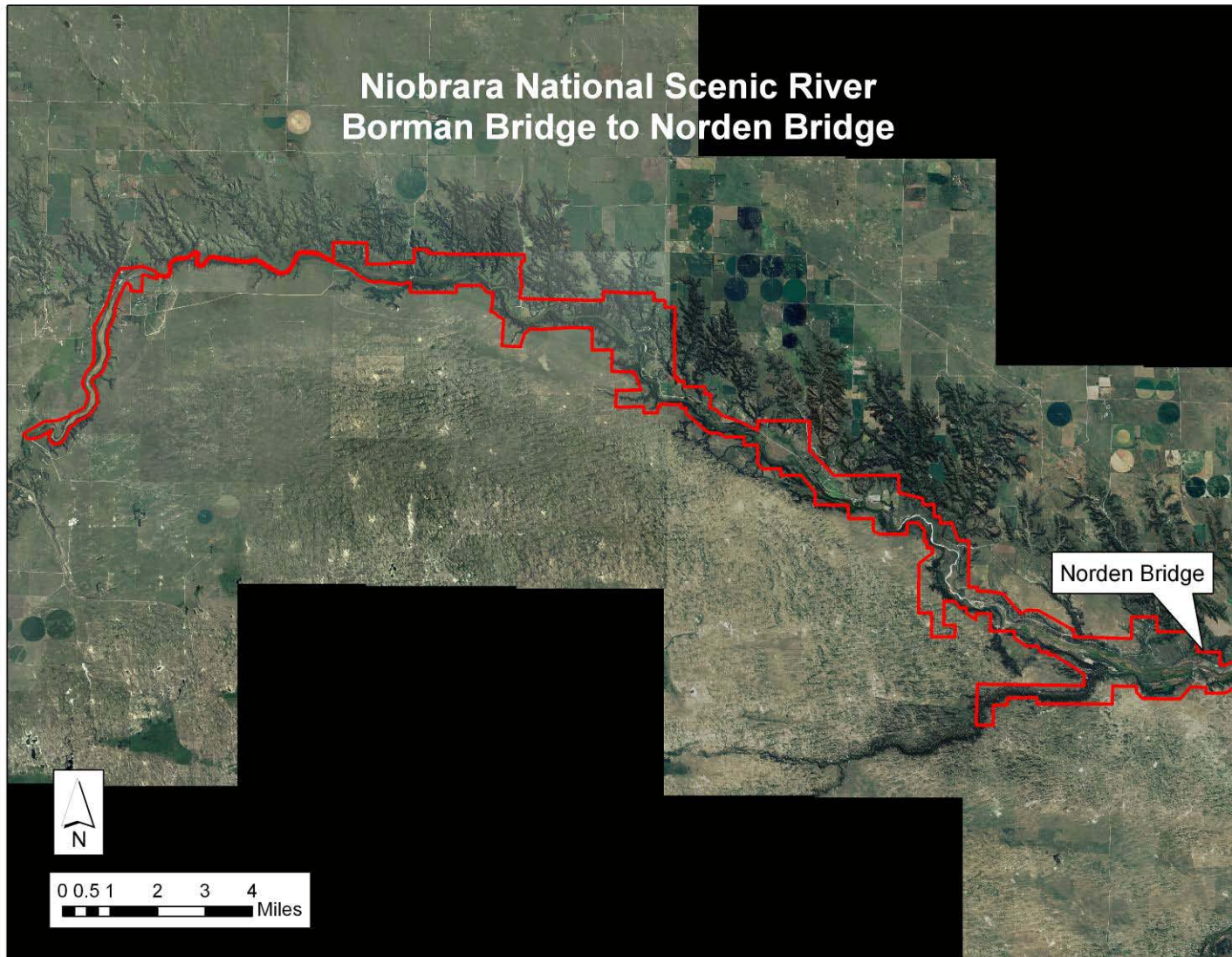
---

<sup>3</sup> Alexander JS, Zelt RB, Schaepe N. 2010. Hydrogeomorphic Segments and Hydraulic Microhabitats of the Niobrara River, Nebraska—With Special Emphasis on the Niobrara National Scenic River. USGS Scientific Investigations Report 2010-5141. Water Science Center, United States Geological Survey, Lincoln, Nebraska.



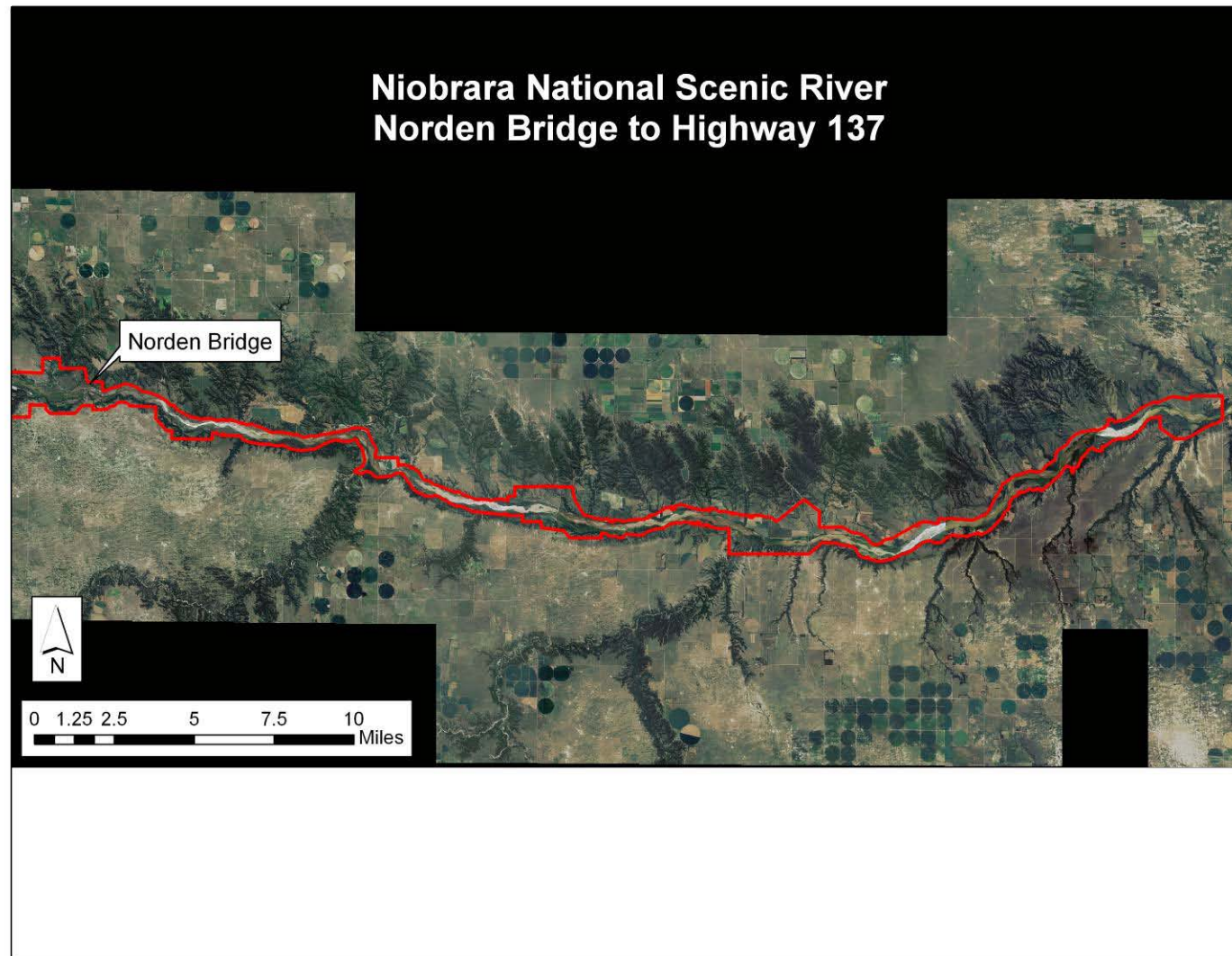
**Figure 2. The Great Plains of the United States.<sup>4</sup>**

<sup>4</sup> From: The Geological Story of the Great Plains, by Donald E. Trimble, USGS Bulletin 1493.



**Figure 3. West reach**





**Figure 4. East reach**

## Geology ORV

The Niobrara River dissects the northern portion of the Sandhills of Nebraska, one of the largest grass-stabilized dune regions in the world, creating a valley 200-400 feet deep through the Ash Hollow, Valentine, Rosebud, and Pierre Shale geologic formations that are up to 70-80 million-years old. The Niobrara River is the only river in Nebraska that flows directly over its bedrock substrate. Niobrara NSR is on the northern extent of the High Plains Aquifer. The groundwater from this aquifer is of exceptional quality and provides a consistently uniform base flow for the Niobrara River, which is unique to the region and a major characteristic for recreational boating. Continued erosion of geologic formations and floodplain areas provide a regionally unique opportunity to witness the ongoing geologic processes of erosion and deposition. Geologic formations are exposed by the downcutting Niobrara River and reveal strata and cliffs rising nearly 200 feet above the river. Scouring from river and ice flows, and subsequent deposition of erosion material into sandbars, are unique in the region as habitat for terns and plovers. Groundwater seeps and springs form side canyons providing a spectacular display of over 200 waterfalls, which are extremely rare in this region. The interaction of water and geology also supports exceptional biodiversity found in this regional biological crossroads by creating cool north facing slopes, floodplain terraces, riparian areas, and aquatic habitats unique to the nation. This interaction also provides a rich and varied tapestry of scenery not experienced elsewhere within the region. These dramatic erosional processes expose nationally significant paleontological resources. The geology ORV exists throughout the 76 miles of Niobrara NSR. The west reach is dominated by streamflow fed by groundwater. In addition, the west reach has a bedrock dominated stream bed that has a steeper river gradient with higher sediment transport capacity compared to the east reach. The east reach has a greater contribution from tributary inflows compared to the west reach. The east reach has a braided channel with sandbars that result from a lower gradient and lower transport capacity. The division between the west and east reaches is the general location of Norden Bridge, where the Niobrara River flow leaves the surface outcropping of the Rosebud Formation and flows onto the Pierre Shale<sup>5</sup>.

### ***West Reach***

Streamflow within the west reach has high water quality that is predominantly fed by groundwater flowing over bedrock. The west reach has a relatively steeper gradient that contributes to the occurrence of an unusual hydrologic process called surge flow, created by sand migration within the river at flow rates above 900 cfs, which is regionally unique. Sudden changes in gradient, or knickpoints, are present within this reach of the river at Rocky Ford, Egelhoffs, and Norden Chute. The river valley is a narrow canyon with cliffs in close proximity to the channel. The rock formations of this area include the younger Ash Hollow Formation, which is a gray to brown silty sandstone containing fossil seed and root-casts indicative of plants found here today. However, fossil animals include camels, rhinoceroses, and long-jawed mastodons, finds which are rare within the nation. The Valentine Formation is generally light colored, fine grained sandstone, enabling the formation of cliffs and it contains unique fossils such as tapirs, horses, camels, and rhinos. The older Rosebud Formation consists of rose-tinted tan to gray siltstone that not only crops out primarily on the valley slopes along the Niobrara River but also provides the bed upon which the Niobrara River flows in this reach. The

---

<sup>5</sup> Rationale for reach choice is based upon Alexander's descriptions of groundwater flows within the Niobrara River drainage found in: Alexander JS, Zelt RB, Schaepe N. 2010. Hydrogeomorphic Segments and Hydraulic Microhabitats of the Niobrara River, Nebraska—With Special Emphasis on the Niobrara National Scenic River. USGS Scientific Investigations Report 2010-5141. Water Science Center, United States Geological Survey, Lincoln, Nebraska.

exposed geologic strata of this area result in a high number of waterfalls, seeps, and springs unique to the Great Plains. Spring-formed side valleys (springbranch canyons) include microclimates that support rare vegetative communities for the Great Plains, such as boreal forest remnants. The geologic setting in this west reach supports unique vegetative communities that display high biological diversity not seen in any other area on the Great Plains.

### ***East Reach***

Bedrock transitions from the Rosebud Formation to the Pierre Shale Formation in this reach, and tributary inputs become increasingly more important. Eagle Rapid is the only sudden change in gradient, or knickpoints, in this reach. The east reach has a lower gradient, less velocity and a lower sediment transport capacity, which results in textbook examples of braided river meandering and subsequent depositional environments, exemplified by the destruction and creation of terraces and formation of sandbars critical to tern and plover nesting. The river valley is wider and canyon walls no longer dominate the river channel. The Pierre Shale is the oldest exposed rock formation in Niobrara NSR. The light gray to black shale tends to develop gravity faults or landslides along the banks of the river. Fossils such as sharks, bony fish, and marine reptiles are less exposed, but regionally significant. Seeps, springs and waterfalls are present, but not as visible from the river due to the expanded river valley. The floodplain and wide terraces possess a variety of vegetative communities that support a uniquely high level of biodiversity for the Great Plains.

### ***Evaluation Criteria<sup>6</sup>***

The criteria used for geologic evaluation include the presence of rock formations that are unique on a regional or national level and river-related or river-dependent features or processes. The unique geologic formations contribute to consistent stream flow and velocity, stream gradient, microclimates, high water quality, and provide the foundation for the other ORVs of paleontology, scenery, fish and wildlife and recreation. The geology ORV associated with Niobrara NSR is unique to the Great Plains and rises to a level of national significance for its entire length.

Geology was found to be a national and regional ORV for Niobrara NSR as a whole and for the separate west and east reaches.

---

<sup>6</sup> A wide variety of information was examined to determine ORV criteria and methods for ranking criteria varied. With this in mind, ORV ranking criteria are listed in a uniform manner and only those criteria that rose to the level of national or regional significance are presented.

**Table 1. Geology ORV Ranking Criteria**

<b>Geological Categories</b>	<b>West Reach</b>	<b>East Reach</b>
Supports and maintains unique biological diversity	N	N
Paleo-exposure	N	N
Consistent groundwater discharge (volume/delivery points)	R	R
Seeps/Springs	R	R
Waterfalls	R	R
Water Quality	R	R
Bedrock dominated streambed	R	
Knickpoints	R	
Surge flows	R	R
Cliffs	R	R
Springbranch canyons	R	R

Note: “N” – Unique or rare to the nation, “R” – Unique or rare to the region.

***Desired Future Conditions***

- Groundwater discharge and surface water runoff remain of a high quality and consistent quantity, including seeps, springs, waterfalls and tributary flows.
- Geomorphic processes such as sediment supply and transport capacity, stream channel migration, braiding, downcutting, bank erosion, floodplain development, remain uninhibited.
- Aquifer-recharge and water remains free-flowing and at levels that sustain natural geologic processes.



## **Paleontology ORV**

The Niobrara River has exposed geologic formations containing diverse paleoenvironments of savannahs which provided homes for prehistoric fish, amphibians, reptiles, birds, and mammals. As a result, Niobrara NSR is extraordinarily rich in documented fossil sites and has been studied by the scientific community for nearly 125 years. Known paleontological sites are internationally, nationally, and regionally significant and 20 locations are recommended for inclusion in the National Register of Historic Places. Numerous species of extinct vertebrates were first exposed and identified along the river, including mammals, reptiles, amphibians, birds, and fish.

Niobrara NSR has exemplary fossil resources. Multiple locations exist where scientists have discovered previously unknown species illustrating an astounding diversity of ancient life forms. Almost 150 vertebrate species were found in one location, surpassing any other site in North America. These findings also include exceptional examples of late Pleistocene fauna such as mammoths, bison, and saber-toothed cats. In many locations, geologists have found large numbers of fossils, providing for outstanding scientific study and significant contributions to our understanding of the diverse paleohistory of North America.<sup>7</sup>

The Paleontology ORV exists throughout the 76 miles of Niobrara NSR and is critical in supporting scenic and recreation opportunities as fossils form a part of the landscape that visitors enjoy. The fossil assemblages located along the river are not considered to be river-dependent because the river existed when the fossil species lived in the area, but because the river has exposed the deposits where the fossils are located.

### ***West Reach***

The Niobrara River has exposed prominent geologic formations that are composed of two Tertiary fossil-bearing layers, the Ash Hollow and Valentine Formations. The Ash Hollow Formation, visible as a gray cap rock, is highly-resistant sandstone. It formed during a time when savannahs dominated the landscape, and the climate was warm and dry. Fossils of tortoises and large grazing mammals are abundant, including horses, rhinos, camels, and ruminants such as deer-like animals. Aquatic species and browsing mammals are also abundant but are found only in ancient stream channels.

The Valentine Formation lies below the Ash Hollow and is a pale, poorly-cemented sandstone easily identified in the cliffs along the river. This formation developed when the environment was warm and wet, and exhibited large streams, forests, and savannah woodlands. Aquatic fossils include fish, alligators, and turtles. Amphibian, reptile, and rodent fossils are also found. Larger mammal species include abundant tapirs, rhinos, horses, peccaries, camels, carnivores, mastodons, and other animals unlike those present today.

### ***East Reach***

Pierre Shale is the predominant geologic formation exposed by the Niobrara River. Dating to the Cretaceous, this formation is thinly-laminated, black shale formed from the shallow marine environment of the Western Interior Seaway. Marine fossils include foraminifera, bivalves, ammonites, sharks, bony fishes, and enormous marine reptiles.

---

<sup>7</sup> Voorhies, M. R., and R. G. Corner. An inventory and evaluation of vertebrate paleontological sites along the Niobrara/Missouri Scenic River corridors. TMs. Lincoln: University of Nebraska. 1993.

### ***Evaluation Criteria***

The criteria used for paleontological evaluation include the presence of fossils or fossil assemblages that are unique on a regional or national level and exposed by river-related processes. The abundance and diversity of species and fossils present, diversity of the paleoenvironment, the rare occurrence of a species, the first occurrence of a species on record, and completeness of fossils present were evaluated. The paleontological ORV associated with Niobrara NSR is unique on a national level, but has also been recognized internationally.

Paleontology was found to be a national and regional ORV for Niobrara NSR as a whole and for the separate west and east reaches.

**Table 2. Paleontology ORV Ranking Criteria**

<b>Paleontological Categories</b>	<b>West Reach</b>	<b>East Reach</b>
Geological formations of paleontological significance	N	R
First occurrence of a species	N	N
Only or rare occurrence of a species	N	N
Diversity of species	N	N
Diversity of paleoenvironment	N	
Number of fossils present (Volume)	N	N
Completeness of fossil skeleton	N	

Note: "N" – Unique or rare to the nation, "R" – Unique or rare to the region.

### ***Desired Future Conditions***

- Landowners understand the regional, national, and international significance of paleontological resources on their property.
- Appropriate scientific study is encouraged and incorporated into interpretation and education services.

## Fish and Wildlife ORV

Niobrara NSR and its tributaries have created springbranch canyons, broad valleys with floodplains, and braided channels that support an exceptional biologic diversity of plant and animal species unique to the Great Plains. Six plant communities converge along the river forming a biological crossroads that is dependent upon the geology and hydrology of Niobrara NSR. There are eastern deciduous, western coniferous, and northern boreal forests, as well as tall grass, short grass and mixed grass prairie species. In addition, the river is the lifeblood for a wide variety of fish and wildlife species.

This rare mix of habitats supports over 160 plants and many animals that survive at or beyond their normal range. These diverse plant communities provide unique habitats for mammals, reptiles, birds, fish, and many other species not common or declining in the Great Plains. The range of river depths, velocities, gradients, sediment loads, channel entrenchment and braiding provide a variety of habitats for aquatic and riparian species. Several threatened or endangered species make their home within Niobrara NSR utilizing braided river channels, geologically dependent sandbars, stream banks, and open water for nesting, rearing, feeding and migratory habitat. Species include the federally-listed piping plover, interior least tern, and whooping crane as well as the state-listed river otter. The diverse habitats of the Niobrara NSR corridor may have led to the formation of hybrid species of several birds, butterflies, and plants. Fish and wildlife are an important part of scenery as forest and grassland species provide land cover and wildlife are an integral component of scenic beauty. Fish and wildlife also play an important function in recreation through such activities as hunting, fishing, wildlife viewing, and photographing the natural world.

### *Forest Communities*

The northern boreal, eastern deciduous, and western coniferous forest communities found within the Niobrara NSR corridor, owe their existence to the river and its tributaries. Downcutting of the Niobrara River created the unique hydrology and landform features necessary for establishment of these forest communities. Within the corridor, these forest communities converge and provide habitat for diverse mammal, bird, and insect populations including several species that may hybridize.

**Northern Boreal Forest:** The northern boreal forest community in Niobrara NSR is found in the west reach on shady north facing slopes. This forest community is here because the geology and hydrology create unique microclimates. The unique microclimates provide refuge for boreal forest remnants following the last ice age. The northern boreal forest community includes rare paper birch, ferns, club mosses and several isolated groves of aspen in Nebraska. This forest type provides habitat for species rarely seen in the region such as northern shrike, white-throated sparrow, black-billed cuckoo, and blackpoll warbler.

**Eastern Deciduous Forest:** The eastern deciduous forest is found throughout the scenic river designation, and dominates the eastern reaches of the river. The geology and hydrology of Niobrara NSR create a topography and climate that provide habitat for eastern deciduous species such as bur oak, eastern redcedar, green ash, box elder, American elm, and American basswood. The eastern deciduous forest community supports many North American mammal species and allows several eastern species to exist at or beyond their normal range – such as the Baltimore oriole, eastern red bat, eastern viceroy butterfly, golden-winged skimmer dragonfly, and the eastern hognose snake. Some studies suggest that the Baltimore oriole and eastern viceroy may hybridize with their western counterparts in this region.

**Western Coniferous Forest:** Niobrara NSR provides topography and a favorable climate for western coniferous forests. The western coniferous forest community extends from the western portion of Niobrara NSR downstream to the east where it ends near the Carns Bridge, about 10 miles from the end of the scenic river designation. The most recognizable member of the western coniferous forest is

ponderosa pine, but this forest type also includes Rocky Mountain juniper, serviceberry, and several other species. The western coniferous forest provides habitat for a diverse array of mammals and birds found primarily in the western United States.

### ***Grassland Communities***

Although grasslands are not uncommon in the Great Plains, the mix of grassland communities within the Niobrara NSR corridor is significant.

**Sandhills Prairie:** The uplands within the south boundary of Niobrara NSR contain Sandhills Prairie, which is distinctive from other regional grasslands in that it contains unique landforms, elevation, soils, surface water character, and vegetation. The Sandhills consist of dunes and valleys dominated by a mixture of tall, medium, and short grasses, including little bluestem, blue grama, needle-and-thread, and switchgrass. A wide variety of forbs and shrubs, including white sage, prairie coneflower, leadplant, and prairie rose can also be found in this community.

**Mixedgrass Prairie:** Niobrara NSR provides topographic features and a climate supporting mixedgrass prairie communities. These are found primarily north of Niobrara NSR, and are characterized by blue grama, prairie sandreed, threadleaf sedge, needle-and-thread grass, little bluestem, and western wheatgrass. Shrubs include skunkbush sumac, and yucca. A wide variety of forbs, including dotted gayfeather, skeletonplant, and lemon scurfpea, are also found within this community.

**Tallgrass Prairie:** The eastern Niobrara NSR also provides topographic features and a climate supporting remnant tallgrass prairie communities which are dominated by little and big bluestem, Indiangrass, and switchgrass. Forbs include western ragweed, prairie clovers, vetches, leadplant, prairie coneflower, and stiff sunflower.

Species found in the three grassland communities include Chestnut-collared longspurs, burrowing owl, plains pocket gopher, grasshopper mouse, lesser earless lizard, and ornate box turtle.

### ***Aquatic Communities***

Niobrara NSR and its tributaries are distinct from other prairie streams within the Great Plains region in that they support one of the highest diversities of fish species occurring within that region, including a number of rare species. The cold-water tributaries and the Niobrara River provide seasonal habitat for rare species of fish including glacial relic species such as the state species of concern plains topminnow and pearl dace, the state threatened northern redbelly dace and finescale dace, and state endangered blacknose shiner. The high level of diversity results from the unique geology of the river and stable hydrologic conditions that provide a variety of habitats. The changing landform of the river over short distances from restricted narrow canyon streams to a wide highly braided channel in the mainstem provides for a diversity of habitats to support unique fish communities. The high quality natural habitats in the river basin are critical to support naturally reproducing and genetically pure populations of native fishes. Niobrara NSR is distinct from other Great Plains rivers due to the prevalence of groundwater feeding the river (>70% base flow) and its tributaries. These stable flow conditions and excellent water quality increase fish and macroinvertebrate diversity.

### ***Biological Crossroads***

Niobrara NSR is ecologically significant in part because the river has developed an environment that serves as a corridor and important meeting ground for a variety of species, providing an opportunity for possible genetic exchange. There are several stands of aspen that exist within the Niobrara NSR corridor that are believed to be a hybrid between bigtooth aspen and quaking aspen. These stands are

found along the south side of the river at Smith Falls State Park and immediately downstream on lands belonging to The Nature Conservancy.

Several species of birds meet at the extreme edges of their range within the Niobrara NSR corridor. The potential for hybridization of eastern and western bird species are a testament of the biological uniqueness of the river. Hybrids of closely related species such as the Bullock's and Baltimore orioles, and indigo and lazuli buntings were reported in early studies within the river corridor.

Entomologists have documented three species of butterflies that hybridize within the river corridor. The Weidemeyer's admiral and the eastern viceroys have interbred with the red-spotted purple resulting in evolutionarily distinct and genetically significant species.

The free-flowing and stable flow conditions of the river also provide connected highways that allow for genetic exchanges between tributaries for native cold and warm water fishes. This high connectivity between Niobrara NSR and its tributaries provides important spawning, rearing, and adult fish habitats.

Species interactions such as this would not be possible without the convergence of plant and aquatic communities within the Niobrara NSR corridor.

### **Species of Concern**

Niobrara NSR is significant as a home to several plant and animal species of concern including both state- and federally-listed threatened and endangered species. Federally listed species include the threatened piping plover and endangered interior least tern that nest along exposed river sandbars during the summer. Critical habitat for piping plovers is designated for the river reach from Norden Bridge east to Highway 137 north of Newport. Federally endangered whooping cranes migrate through the Niobrara NSR corridor each spring and fall. There are occasional sightings of state threatened river otters in the river.

Paper birch is a glacial relict species existing in this area since the last glacial ice sheet retreated north some 8-10,000 years ago. These paper birch stands are isolated from their nearest kin in the Black Hills of South Dakota or Minnesota. This tree is dependent upon the unique cool and moist microclimate created by the landform and hydrology of Niobrara NSR and its tributary side canyons.

Stands of aspen uncommon to Nebraska are found along the south side of the river at Smith Falls State Park and immediately downstream on lands belonging to The Nature Conservancy.

Plains topminnow, a species of concern in the Great Plains region, has been documented throughout the mainstem Niobrara NSR. Large populations of plains topminnow are found in shallow water habitat where water velocities decrease, water temperatures increase, vegetation is present, and where prey such as midges and mosquitoes are abundant. Additionally, large populations of plains topminnow are found in spring, seep and wetland habitats that are ephemeral or seasonally connected to the mainstem of the river. The plains topminnow may be a good indicator of stream water quality.

The Nebraska state endangered blacknose shiner, threatened finescale dace and northern redbelly dace, and the Nebraska blacknose dace are all cold water species that have not been collected in the Niobrara River within Niobrara NSR but probably use the mainstem seasonally. Since nearly all fish sampling on the Niobrara River has occurred during warm water time-frames (May-October), it is likely that these rare cold water species may be migrating between tributaries via the mainstem of the river during the winter months when water temperatures decrease to favorable conditions. The tributaries of the Niobrara River within Niobrara NSR support several rare fish species and are contained within the WSR boundaries. From Borman Bridge to Norden Chute the creeks support a variety of fish species. Minnechaduza Creek supports the blacknose shiner, finescale dace, northern

redbelly dace, pearl dace, plains topminnow, and blacknose dace. Fairfield Creek supports the northern redbelly dace. South Fork Fairfield Creek supports the finescale dace, Northern redbelly dace, and plains topminnow. Located between Norden Chute and Highway 137, Plum Creek supports the blacknose dace. Evergreen Creek supports the finescale dace, northern redbelly dace, and plains topminnow. Cedar Creek supports the plains topminnow. Long Pine Creek supports the blacknose shiner, blacknose dace, and plains topminnow. Short Pine Creek supports the pearl dace. Bone Creek supports the finescale dace, northern redbelly dace, pearl dace, and plains topminnow. Willow Creek supports the blacknose shiner, finescale dace, northern redbelly dace, pearl dace, plain topminnow, and blacknose dace. Coon Creek supports the northern redbelly dace, and plains topminnow.

### ***Evaluation Criteria***

Evaluation criteria included rare and unique combinations of vegetation and aquatic communities that support a high diversity of species; high habitat quality and diversity, including six vegetative communities, cold and warm waters, pools, riffles, springs, seeps, and wetlands; high degree of habitat connectivity; the potential for hybridization and genetic exchange due to the close proximity of species normally geographically separated; and the presence of rare, threatened and endangered species. All of these are created or supported by the Niobrara River and its processes. The terrestrial ecology that exists within Niobrara NSR is unique on a national level.

Fish and wildlife was found to be a national and regional ORV for Niobrara NSR as a whole and for the separate west and east reaches.

**Table 3. Fish and Wildlife ORV Ranking Criteria**

<b>Fish and Wildlife Categories</b>	<b>West Reach</b>	<b>East Reach</b>
Supports unique biological diversity	N	N
Potential for hybridization and genetic exchange due to proximity with species normally geographically separated	N	N
Presence of rare, threatened and endangered species	N	N
Presence of native species and species of concern	N	N
Diversity of species	R	R
Habitat quality and diversity	R	R
Connectivity among habitats	R	R

Note: “N” – Unique or rare to the nation, “R” – Unique or rare to the region.

***Desired Future Condition***

- Springbranch canyon habitat is studied and managed.
- River corridor and lands within Niobrara NSR boundary are protected from inappropriate land use changes and incompatible development.
- Habitats for river-related sensitive species are protected and enhanced by improved resource management and effective land protection of critical habitat locations.
- The Niobrara NSR fishery remains ecologically viable and stable with a continued diversity and abundance of native fishes inhabiting healthy cold and warm water aquatic environments throughout the Niobrara River network.
- The High Plains Aquifer continues to provide the primary source of flow to the Niobrara River and its tributaries. Cold water habitats are sustained by the preservation of side canyon habitats and a vegetated landscape. Critical fish habitats for the plains topminnow (shallow margins and bull rush spring grasses) are maintained by effective land management and consistent flow of water of high quality in Niobrara NSR.

## Scenery ORV

Largely undisturbed, the Niobrara NSR corridor is often taken for granted. The designated seventy-six-mile Niobrara NSR reach is renowned for its aesthetically pleasing landscape as the river stretches through sparsely populated lands and contains a broad diversity of plant groups and ecosystems, a condition of diversity widely held as comprising the scenic wonder of Niobrara NSR.

Niobrara NSR has exposed Ash Hollow, Valentine, Rosebud and Pierre Shale formations that are rarely exposed in the Great Plains. These rocks make up the dramatic cliffs and side canyons unique to the river valley. A surprising number of waterfalls flow from the riverside cliffs and side canyon streams fed consistently by the High Plains Aquifer. Water seeps turn to spectacular icefalls clinging to cliffs during the winter. Downcutting of geologic formations by the river exposes rare fossil resources that add to the scenic beauty of the area and enhance recreation opportunities.

The Niobrara NSR valley and canyon topography have created conditions and microclimates unique to the Great Plains that result in a convergence of six types of plant communities living in close proximity, three forest (western coniferous, eastern deciduous, and glacial relict northern boreal species) and three grassland (tallgrass prairie, Sandhills Prairie and mixedgrass prairie). Rare to the region are paper birch and potential hybrid aspen species found in the first 45 miles of the scenic river. The unique mix of plant communities can provide beautiful seasonal displays of flowers and colors. The resulting scenic landscape provides uncommon native forest vistas amid more typical Great Plains vegetation.

Throughout the 76-mile length of Niobrara NSR, the unique mixture of vegetative communities creates views and scenery uncommon to the Great Plains. Ponderosa pine dominates the northern ridges within Niobrara NSR for much of its length. Eastern deciduous forest species predominate in the east reach of the river becoming more interspersed with western coniferous and northern boreal forests to the west. The northern boreal forest species inhabit cooler, shady side canyons predominately on the south side of the river. Remnants of tallgrass prairie are found in greater abundance along the east reach of Niobrara NSR with a transition towards mixedgrass and Sandhills prairies along the west reach of the river. Mixedgrass and Sandhills prairie communities comprise uplands to the north and south, respectively. The flora from all six vegetative communities can be found uniquely intermingled on a more individual and small community basis in the river valley.

### ***West Reach***

Within and along the Niobrara NSR, geologic formations with outcroppings of Valentine sandstone and Rosebud siltstone are prominent. Because of the constricted narrow canyon of this area, the visual interface of the river and land is sharp, with few long-distance vistas and a scene dominated by pine forest covered canyons and sandstone cliffs. The south valley walls are almost entirely pine and hardwood forest, as well as cliff formations with few human intrusions. The relief is dramatic, with vision moving from the river up forested canyons to meet the sky atop tree covered ridges.

Because the river valley on the north shore of the river is broader, development has primarily occurred on this side of the river. This reach has pronounced recreation development by landowners catering to river use. Beginning at the boundary of Fort Niobrara National Wildlife Refuge and continuing downstream to Rock Barn, east of Rocky Ford, landowners on the north side of the river have developed campgrounds, parking lots, and river access sites to accommodate river recreation. Road access to the river has also limited development to the north side of the river, with the exception of a private campground and launch site at Allen Bridge, west of Smith Falls State Park. These sites are easily seen due to limited vegetation screening and the narrow canyon. Structures have generally been painted in colors that blend well with the environment, with a few exceptions. Catering to recreational



activities also brings the attendant noise of these operations such as buses, cars, campgrounds, and recreation activities of people on the river such as boisterous shouting and loud music.

Interspersed with the recreational development are small, family-owned agricultural developments, reminiscent of early to mid-1900 ranching operations. These typically have a single family dwelling, barn, and a few outbuildings. The buildings are conservative in style and color. Although not unique in the region, these operations are a popular part of the scene and include the sounds typical of family ranching or farming operations such as the occasional farm machinery, and livestock.

From Borman Bridge to Rock Barn, waterfalls and canyon streams, as well as falls and seeps, flow directly into the river creating dramatic scenery. Over 200 documented waterfalls occur in this reach. Uncommon ice falls are found where perennial seeps from Valentine formation flow out from cliffs and freeze in many layers throughout the winter.

The colors of the reach are an important part of the scenic aspect. The sand tinted clarity of the river fades into the green hues of canyon forests during the spring and summer, accents the vibrant colors of the fall, and provides an icy backdrop to the winter snows that blanket the area.

Because of minimal lighting, Niobrara NSR is an ideal location for viewing night skies. With a horizon that is unobstructed to the east and west along the river and limited by the canyon on the north and south, the sky dominates the nighttime experience. Numerous camping locations with easy access make this an ideal reach to enjoy this unique resource. At present, air quality is exceptional.

### ***East Reach***

Only a few cliffs of the Valentine sandstone, Rosebud siltstone, and Pierre Shale occur in the east reach of the river. While waterfalls do occur within the boundary of the NSR below Norden Bridge, they are located within side canyons along the tributary streams and are not seen from the river. This is due to the transition in exposed rock outcroppings from the younger Valentine Formation to the underlying Rosebud and Pierre Shale.

Because of the wider river valley, the visual interface of the river and land is changed, with long-distance vistas dominated by more agricultural settings and forest covered canyons. The setting is unique within the region, due to the local relief and forestation of the river valley. Both shores of the river are bordered by a mix of grass and forest, with few human intrusions. The relief is gradual, with vision moving from the river to grassland and forest to meet the sky atop long-distance vistas of grass and tree covered ridges.

This reach has little recreational development, providing visitors the opportunity to view the natural diversity of the area, with the only exception at the Meadville Campground. The town of Meadville is the only concentrated development within the reach. Road access is again generally limited to the north side of the river.

Some small, family owned agricultural developments, reminiscent of mid-1900's farming/ranching operations are scattered along the river. These typically have a single family dwelling, barn, and a few outbuildings. Most buildings are conservative in style and color. These operations include the sounds typical of family ranching operations such as the occasional farm machine and animals.

The colors of the reach are an important part of the scenic aspect. Because the river widens out and the river bottom is sandier, the color of the river takes on a more brownish tint. The river blends into the pastoral settings of agriculture use with the greens of summer and tan-browns of the off-season.

The only lights to mar the landscape are the occasional yard light or those of Meadville. This reach is an ideal location for viewing night skies. With a horizon that is unobstructed for 360 degrees, the sky dominates the nighttime experience. The River Road, Highway 7, 137, 183, and the Meadville

Campground provide easy access or viewing and make this an ideal reach to enjoy this unique resource. At present, air quality is exceptional.

### ***Evaluation Criteria***

Evaluation criteria for the Scenery ORV include unique geologic formations rare to the Great Plains developed by river processes, a variety of vegetative assemblages supported by the river, waterfalls and surface expressions of the aquifer, and the historic/cultural rural American landscape developed along the river. The characteristics of the Scenery ORV within Niobrara NSR are unique to the Great Plains and provide exceptional examples of viewsheds and scenery.

Scenery was found to be a regional ORV for Niobrara NSR as a whole and for the separate west and east reaches.

**Table 4. Scenery ORV Ranking Criteria**

Scenery Categories	West Reach	East Reach
<i>Geologic formations</i> – Cliffs, canyons, sandstone formations	R	
<i>Vegetation</i> - Naturally occurring forest and grassland communities	R	R
<i>Springs, seeps, and waterfalls and other surface expressions of aquifer</i> – High concentration and abundance	R	R
<i>Maintains a historical/cultural rural American landscape</i>	R	R

Note: “N” – Unique or rare to the nation, “R” – Unique or rare to the region.

### ***Desired Future Conditions***

- The viewshed at the time of designation (1991) is maintained and enhanced, including night skies.
- High air quality is maintained to provide for scenic view protection.
- The vegetative communities and the natural processes associated with them are maintained and enhanced.
- Adequate groundwater flow to waterfalls and seeps and adequate river base flow are maintained.
- Visitor access to scenic views by water, trails, and roads to is maintained or enhanced where possible and appropriate.
- Public access to Smith Falls is preserved.
- Roads and bridges complement, rather than detract from the viewshed.
- The biologic diversity of Niobrara NSR, including its six major vegetative communities, is preserved and enhanced.

## **Recreation ORV**

Niobrara NSR provides some of the most unique and exceptional recreation opportunities in the Great Plains. The Niobrara's bedrock bottom, a rarity for regional rivers, combines with dependable base flow from surrounding sandstone to provide a wide range of experiences. These experiences range from pools, riffles, and runs, providing a quiet, safe, and leisurely floating experience, to Class II and III rapids catering to more adventurous boaters. An important attribute of the river is the opportunity for solitude. Visitors can listen to the sounds of nature, such as waterfalls, water cascading across rocks and riffles, or wind rustling the leaves of trees in a relatively safe natural environment. One can also feel the gentle cradling of the river in its movement. The river provides a consistent opportunity for swimming, wading, paddling, fishing, and other river-related activities. The touch of the cool water during the summer is a refreshing treat, while winter serves as a reminder of nature's extremes. At night, the sounds of water and wildlife provide a serenade for the beauty of the sky, which is unencumbered by urban lights. Hiking trails next to the river provide stunning views of cliff top vistas and side canyons where one can experience diverse and unique plant communities ranging from yucca to paper birch. The biological crossroads hosted by the Niobrara River also provides abundant habitat for uncommon bird and wildlife viewing and photography. The unique cliff and canyon formations, as well as abundant waterfalls, provide for landscape photography and scenic drive opportunities throughout the year. In winter, frozen waterfalls provide a medium for the unusual sport of ice climbing.

### ***West Reach***

Regionally significant on-water recreation includes canoeing, kayaking, tubing, and rafting. The river valley is a narrow canyon restricting the Niobrara River to a relatively uniform width. The stream bed of this area is predominantly bedrock and easy to wade on. These, along with consistent water flow and depth, present a relatively safe environment for water based activities such as non-motorized boating, wading, and swimming. However, during higher flows the steeper river gradient and higher sediment transport capacity of the water restrict visibility in the water making it difficult to see items submerged in the river. Hiking opportunities along developed trails provide movement through a variety of plant communities in a short time and distance at Fort Niobrara NWR, Smith Falls State Park and the Niobrara Valley Preserve. Although the Smith Falls and River Roads are presently unpaved and not designed for high traffic, visitors can enjoy scenic drives along the Niobrara River, and view or photograph the uncommon scenery from Borman, Cornell, Berry, Allen, Brewer, and Norden Bridges.

This reach has a steeper gradient with faster flows resulting in fish species that feed predominantly upon insects. In addition, the Norden Chute also presents a barrier to fish passage. The numbers and types of larger fish found in the west reach are therefore greatly reduced and fishing pressure in this area is minimal.

Wildlife viewing is possible throughout Niobrara NSR valley while recreating by water, trail or road. All of these recreational pursuits offer the opportunity to experience solitude, native flora and fauna, and a natural soundscape of water, nature, and the rural setting of Niobrara NSR.

### ***East Reach***

This reach provides for scenic drives as the River Road follows the river, providing opportunities to photograph the landscape from Norden Bridge to Meadville. The scenic river valley landscape, cliffs, and canyon views can be accessed at the bridge crossings at Meadville and on Highways 7, 183, and 137. Wildlife viewing can also be enjoyed in this reach of the river where opportunities exist to view rare species such as interior least terns, piping plovers, and whooping cranes that can be viewed occasionally in the sandier, more braided portion of the river from Norden Bridge to Highway 137.

The river valley is wider allowing the Niobrara River to meander, resulting in non-uniform width. The lower river gradient and low sediment transport capacity result in braided channels and shallow waters. The streambed of this area presents challenges as water is often shallow and boaters may need to drag boats to find navigable channels. On-water recreation offers opportunities for solitude and the experience of natural sounds. Access to the river is not as developed as in the west reach. Road-based recreation offers more limited opportunities for these experiences dependent upon road conditions.

The gradient of this reach is lower, the flow is slower, and the river channel becomes braided. In this reach, the numbers and types of larger fish such as channel catfish and largemouth bass increase, as well as anglers.

Some tributaries to the Niobrara River Basin are recognized trout fisheries and although trout are not native to the area, are managed as game fish by the Nebraska Game and Parks Commission.

Because of the aforementioned geological and hydrological conditions, recreation activity is light and has little impact on the soundscape or viewshed.

### ***Evaluation Criteria***

Recreation ORV evaluation criteria used were the uniqueness of the opportunities provided within Niobrara NSR and dependent upon the Niobrara River. The variety of recreational pursuits that occur within and along Niobrara NSR and the variety of skill levels that can be accommodated were considered. Each activity was evaluated as to whether it was common, rare or exceptional on a regional or national scale.

Recreation was found to be a regional ORV for Niobrara NSR as a whole and for the separate west and east reaches.

**Table 5. Recreation ORV Ranking Criteria**

<b>Recreation Categories</b>	<b>West Reach</b>	<b>East Reach</b>
<i>River Access</i>	R	
<i>Safety</i> – Uniformity of river flow, width, depth; water visibility; substrate	R	
<i>Water based recreation</i> – Non-motorized boating, swimming, wading	R	R
<i>River associated recreation</i> – Camping, picnicking, and hunting	R	R
<i>River associated recreation</i> – Hiking, horse riding, and ice climbing	R	
<i>River associated recreation</i> – Bird and wildlife watching, photography, opportunities for solitude, natural sounds/quiet, and star gazing/night sky	R	R

Note: “N” – Unique or rare to the nation, “R” – Unique or rare to the region.

### ***Desired Future Conditions***

- The biologic diversity of the Niobrara NSR valley, including its six major vegetative communities, is preserved and enhanced.
- Groundwater flow that feeds the waterfalls, springs and seeps is maintained.
- Zoning ordinances and enforcement adequately protect the viewshed, including night sky viewing through minimal and proper lighting technology and placement.
- Adequate river flows for water-based recreation are maintained.
- Public access to the river is maintained and enhanced.
- Public access to Smith Falls is maintained.
- A range of compatible visitor experiences is ensured.
- Opportunities exist for on- and off-water visitors to experience relative solitude and natural soundscapes.
- Visitors have an enjoyable experience along the river through sound management and cooperation of recreation concessioners and promotion of safe practices.
- Visitors understand and participate in their role to protect recreation qualities such as natural sounds, quiet, and night skies.
- Consistent levels of high-quality visitor services are provided.
- Visitors have the opportunity to experience natural sounds.

## APPENDIX A – WORKSHOP PARTICIPANTS AND CONTACT INFORMATION

Name	Organization and Function	Email
*Jason Alexander	USGS, Hydrologist, USGS Water Science Center	jalexand@usgs.gov
*Butch Denny	Santee Sioux Tribe of Nebraska, CEO	bdennyceo@yahoo.com
*Russell Eagle Bear	Rosebud Sioux Tribe, Tribal Historic Preservation Officer (THPO)	rstthpo@yahoo.com
*Brandi Flyr	Nebraska Department of Natural Resources, Integrated Water Management Analyst	brandi.flyr@nebraska.gov
Dan Foster	NPS, Superintendent, Niobrara NSR	dan_foster@nps.gov
Twyla Graham	Niobrara Council, Member	No email provided
*Lana Gravatt	Yankton Sioux Tribe, THPO	gravattlana@yahoo.com
*Gloria Hamilton	Ponca Tribe of Nebraska, THPO	ghamilton@poncatribes-ne.org
Bill Hansen	NPS, Supervisory Hydrologist and Wild and Scenic River Co-Lead, WASO-WRD	bill_hansen@nps.gov
*Robert Harms	USFWS, Biologist, Ecological Services	robert_harms@fws.gov
Steve Hicks	USFWS, Project Leader, Fort Niobrara and Valentine National Wildlife Refuges	steve_hicks@fws.gov
Adrienne Johnson	NPS, Ranger (Interpretation), Niobrara NSR	adrienne_johnson@nps.gov
Sandi Kinzer	NPS, Chief of Interpretation, Niobrara NSR	sandi_kinzer@nps.gov
Kalli Kieborz	Niobrara Council, Executive Director	kieborz@niobraracouncil.org
John Macy	NPS, Hydrologist, Niobrara NSR/Missouri NRR	john_macy@nps.gov
Hector Santiago	NPS, Rivers Coordinator, Midwest Regional Office	hector_santiago@nps.gov
Stuart Schneider	NPS, Chief Ranger, Niobrara NSR	stuart_schneider@nps.gov
*Phil Soenksen	USGS, Chief, Hydrologic Data Section, USGS Water Science	pjsoenks@usgs.gov
Pamela Sprenkle	NPS, Chief, Resource Management, Niobrara NSR	pamela_sprenkle@nps.gov
Ellen Starck	NPS, Physical Scientist, Badlands NP	ellen_starck@nps.gov
*Gerry Steinauer	Nebraska Game and Parks Commission, Botanist	gerry.steinauer@nebraska.gov
Mike Tuerk	Niobrara Council, Chairman	No email provided
Greg Wanner	USFWS, Fish and Wildlife Biologist, Great Plains Fish and Wildlife Conservation Office	greg_wanner@fws.gov
Timberley Belish	Parsons, Project Scientist	timberley.belish@parsons.com

\*Unable to attend

## **APPENDIX B – ISSUES**

This section captures information that was recorded on flip charts and verbal statements made by participants during the workshop, providing a record of participants' input about issues that relate to protection and enhancement of Niobrara NSR ORVs.

### **Threats to Water Quality**

- E. coli contamination is entering the river from Long Pine Creek and Plum Creek. Minnechaduza Creek is a potential source of E. coli and organic waste contaminants arising in part from the presence of an upstream municipal waste treatment facility.
- Storm water runoff from Valentine may degrade water quality.

### **Increasing Water Developments**

- Upstream and adjacent to Niobrara NSR, both surface and groundwater water withdrawals affect instream flows.
- Conversion of small farms and ranches to center pivot irrigation results in the potential use of more water from the High Plains Aquifer as grasslands are converted to grain production.

### **Invasive Species and Other “Natural” Threats to Biodiversity**

- Eastern red cedar and other species left unmanaged have changed the fire regime. If these areas burn they increase the potential for short-term erosion and impacts to water quality. Large fires could significantly alter the appearance of forested areas and affect scenic values in other ways.
- Forest management concerns within Niobrara NSR:
  - Cedars are encroaching upon all six of the vegetative types.
  - Increasing stand density of ponderosa pine forest is occurring due to lack of natural processes such as fire.
  - Lack of reproduction of bur oak occurs as a result of deer browsing, lack of fire and perhaps high populations of turkey.
  - Aspen-birch survival is declining due to climate change, cedar encroachment, lack of natural processes such as fire, resultant lack of canopy opening, or a combination thereof.
  - Invasive species can out compete native species.
  - Potential impacts on ground water due to increased densities of pine and cedar encroachment.
- The increase of cedars in the Niobrara NSR corridor may be affecting hydrologic conditions.
- The scenic drive and view of the river is hindered by cedar and excessive forest growth.

### **Development**

- Night sky degradation occurs from unshielded existing lights and potential development within the river corridor.
- Increasing noise within the river corridor affects natural soundscapes and wildlife activity.
- Air quality within the river corridor may be affected by pollution from regional sources such as energy production activities in eastern Wyoming.
- Powerline crossings of the river need to be mitigated to protect water fowl and migratory bird species and scenic resources.

### **Needed Upgrades to Infrastructure**

- Road repair and improvement planning and execution must consider and mitigate impacts to Niobrara NSR resources.
- McLain Bridge stands in the middle of the river with no access from either shore.
- Muleshoe, Meadville, and Carns areas are experiencing river bank cutting, a natural process, and may potentially affect these roads and bridges.
- Cornell Dam has been decommissioned as a hydroelectric producer. It represents an obstruction to the free-flowing river condition and holds a large amount of accumulated sediment. Resolution of this problem should mitigate impacts to Niobrara NSR resources.

### **Need for Land Protection Mechanisms**

- The Niobrara Council, county zoning administrators, and the NPS need to work together to ensure preservation of current land uses or appropriate development of property and visitor services.

### **Landowner Relations**

- Threatened and endangered species nesting activities within the river corridor may be adversely affected by impacts caused by ATV and cattle use on sandbars.
- Often streambank stabilization projects (e.g., planting trees and rip-rap) do not go through the correct process that includes consultation with the NPS, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Nebraska Game and Parks Commission, and other agencies.

### **Human Impacts**

- Increasing noise within the river corridor affects natural soundscapes and possibly wildlife.
- Macroinvertebrates and their habitat are impacted by hiking in the river and tributaries.
- Threatened and endangered species nesting activities within the river corridor are adversely affected by activities on sandbars.
- Visitor use of the river, sandbars and trails can disturb wildlife.

### **Visitor Use, Experience, and Understanding**

- There is visitor overcrowding in some locations along the river.
- Increasing noise from recreation along the river affects visitor experience.
- Access is limited from Rock Barn to the east boundary. There is also a lack of infrastructure in areas such as roads, access points, and parking areas.
- Big Cedar Falls is a popular stopping point and is heavily used.
- There is currently inadequate public access (locations where the public is guaranteed access not subject to a landowner's discretion and fee charges).
- Visitor use of the river may be restricted in certain areas as a result of NPS management efforts to provide resource protection and opportunities for quality visitor experiences.
- Inappropriate behavior such as excessive alcohol consumption, nudity, loud groups, and music, create situations that may lead to visitor conflict or negatively affect the natural environment many visitors come to experience.



- Other recreational activities (e.g., hunting, horse riding, ice climbing) along the river are occurring on private lands and may not be accessible to the general public.

### **Recreation and Visitor Services**

- Restricting visitor access and use of the river may have positive and negative economic impacts.
- Recreation concessioners are required to go through two proposals and permitting processes (NPS and FWS) to serve different segments of Niobrara NSR, both of which are managed by the Department of the Interior.
- There is concern by recreation concessioners about paying multiple fees to the federal government and possibly to the state.
- Recreation concessioners are concerned about the need to continually increase their rates given the current national economic condition.