

# ENVIRONMENTAL ASSESSMENT

## *Lignite Fuel Enhancement Project*

### COAL CREEK STATION GREAT RIVER ENERGY UNDERWOOD, NORTH DAKOTA

November 2003



Department of Energy  
National Energy Technology Laboratory  
Morgantown, West Virginia



GREAT RIVER ENERGY™   
A Touchstone Energy Company

## ACRONYMS AND ABBREVIATIONS

BTU	British thermal unit
CO <sub>2</sub>	carbon dioxide
DOE	Department of Energy
EA	environmental assessment
F	Fahrenheit
lb	pound
MW	megawatt
NO <sub>x</sub>	nitrogen oxide
%	percent
PM <sub>10</sub>	particulate matter with an aerodynamic diameter of 10 micrometers or less
SO <sub>2</sub>	sulfur dioxide
U.S.	United States

## COVER SHEET

**RESPONSIBLE AGENCY:** U.S. Department of Energy (DOE)

**TITLE:** *Environmental Assessment for Lignite Enhancement Project at Coal Creek Station; Underwood, North Dakota (DOE/EA-1477)*

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**ABSTRACT:** The U.S. Department of Energy (DOE) has prepared this EA to assess the environmental impacts of the commercial application of lignite fuel enhancement. The proposed demonstration project would be implemented at Great River Energy's Coal Creek Station near Underwood, North Dakota. The proposed project would demonstrate a technology to increase the heating value of lignite and other high-moisture coals by reducing the moisture in the fuels. Waste heat that would normally be sent to the cooling towers would be used to drive off a percentage of the moisture contained within the lignite. Application of this technology would be expected to boost power-generating efficiencies, provide economic cost savings for lignite and sub-bituminous power plants, and reduce air emissions. The proposed project would be constructed on a previously disturbed site within the Coal Creek Station and no negative impacts would occur in any environmental resource area.

**AVAILABILITY:** This EA has been made available at the following Reading Rooms:

Underwood Public Library  
88 Lincoln Avenue  
Underwood, North Dakota

Great River Energy  
Coal Creek Station  
2875 Third Street SW  
Underwood, North Dakota 58576

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## **SUMMARY**

The U.S. Department of Energy (DOE) proposes to provide partial funding to Great River Energy to demonstrate the commercial application of lignite fuel enhancement. The proposed demonstration project would be implemented on one of Great River's 546 MW coal-fired generating units at Coal Creek Station. The station, fueled by lignite mined from the nearby Falkirk Mine, is located approximately 6 miles from Underwood, North Dakota.

The proposed project would demonstrate a technology to increase the heating value of lignite and other high-moisture coals by reducing the moisture in the fuels. Waste heat that would normally be sent to the cooling towers would be used to drive off a percentage of the moisture contained within the lignite. Application of this technology would be expected to boost power-generating efficiencies and provide economic cost savings for lignite and sub-bituminous power plants. In addition to increasing the heating value of the fuels, this project would demonstrate that these improvements would not come at a cost to the environment. Widespread use of the technology at all U.S. plants that use Powder River Basin subbituminous coals could achieve annual savings of \$840 million.

The proposed project would be constructed on a previously disturbed site within the Coal Creek Station and no negative impacts would occur in any environmental resource area. Analysis and testing of the technology to date indicate that the air emissions would be reduced. Carbon dioxide and sulfur dioxide emissions would be reduced by 5% coincident with a 10% reduction of fuel moisture content. No impacts to wetlands, floodplains, or threatened and endangered species would occur. Minor economic benefits would be derived indirectly during construction of the project and from decreased electric utility costs in the long-term.

## **1.0 BACKGROUND**

Coal Creek Station is a 2-unit, 1,100-megawatt, mine-mouth power plant that was constructed in the lignite fields of central North Dakota. The two units first went on line in 1979 and 1981. The station is owned and operated by Great River Energy, based in Elk River, Minnesota. Great River Energy is the second largest electric utility in the state based on generating capacity, and the fourth largest generation and transmission cooperative in the U.S. in terms of assets. The organization provides wholesale electric service to 28 electric distribution cooperatives in Minnesota and Wisconsin. Those member cooperatives serve approximately 560,000 consumers. Coal Creek Station is Great River's largest generating station. It comprises about 40 percent of their total 2,539 MW of generating capacity.

The U.S. Department of Energy (DOE) has selected Great River Energy to negotiate an agreement to use Coal Creek Station to demonstrate an approach to increase the value of lignite and other high-moisture coals, such as Powder River Basin sub-bituminous coal, used in the generation of electricity. The process proposed would involve drying high-moisture coals using waste heat streams already present in typical coal-fired power plants. The proposed project would demonstrate that the cost of a coal drying system to reduce the moisture content of lignite feedstock would be outweighed by the cost savings accrued from improved performance, reduced emissions, and increased reliability, availability, and maintainability. These results could promote widespread use and commercialization of the drying technology.

This project offers a creative "twist" for using low-value, often underutilized heat normally available in power plants, to increase the plant's efficiency, reduce pollution, and improve economics. When demonstrated, this technology could be applied to increase the generating capacity, efficiency, and cost-effectiveness of other units that burn high-moisture coal. Currently in the U.S., there are 29 operating plants using lignite coal (15.3 gigawatts) and more than 150 plants burning Powder River Basin coals (more than 150 gigawatts), both with inherently high moisture content. Application of this technology could result in a reduction in the emissions from coal-fired power plants because the plants will require less of the dried coal to produce an equivalent amount of power. For example, in this project, the moisture in the lignite would be lowered from 38% to 29.5% and is estimated to yield a 2.8% efficiency improvement with an attendant benefit of reducing carbon dioxide, sulfur dioxide, and mercury emissions per unit electricity output. This technology could potentially increase the efficiency of plants running on Powder River Basin coal and lignite, which represents slightly more than half of the coal-based electrical generation capacity in the U.S.

## **2.0 PURPOSE AND NEED FOR ACTION**

The Department of Energy's Clean Coal Power Initiative is a government/industry partnership to implement the President's National Energy Policy recommendation to increase investment in clean coal technology. This recommendation, one of several dealing with electricity, addresses our National challenge of ensuring the reliability of our electric supply while simultaneously protecting our environment.

The Initiative is a cost-shared partnership between the government and industry to demonstrate advanced coal-based, power generation technologies. The goal is to accelerate commercial deployment of advanced technologies to ensure the United States has clean, reliable, and affordable electricity. This ten-year initiative is proposed to be funded at a total Federal cost share estimated at up to \$2 billion with a matching cost share of at least 50%.

The United States has abundant lignite and Powder River Basin coal resources. Research and engineering studies performed by Great River Energy, the University of North Dakota, Lehigh University and Falkirk Mining Company, as well as by the Electric Power Research Institute and the U.S. Department of Energy, show that the value of lignite fuel can be enhanced and the quantities of stack pollutants can be lowered by reducing the amount of moisture in the lignite feedstock. However, widespread use or commercialization of lignite drying for electricity production requires a full-scale demonstration of its operational and economic advantages compared to conventional firing of as-received fuel. Because of the cost and risk associated with this first demonstration, and because it benefits a large part of the nation, Great River Energy proposes to perform that full-scale demonstration at its Coal Creek Station in Underwood, North Dakota under a cooperative agreement with the Department of Energy. Current coal reserve/production ratios confirm that there are 200 years of resource available. Almost one half (48%) of the world's coal reserves are lignite and subbituminous coals, which are largely used for power generation.

Based on the results of coal drying system concept design work and the results of the bench-scale technology research and field test demonstrations over the past three years, Great River Energy and the Project Team believe that the coal drying technology is now ready for full-scale demonstration.

The anticipated benefits of the project are:

### **Benefits to the Environment and Nation**

- Increased generation capacity and availability
- A reduction of about 25% in sulfur dioxide (SO<sub>2</sub>) emissions
- Reductions of about 5% in other atmospheric emissions such as carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), ash, and mercury
- Increasing the value of the nation's lignite and Powder River Basin coal reserves, an abundant natural resource.

### **Technology Benefits**

- A 5% improvement in overall performance
- Dry coal is easier to pulverize using less mill power
- Less power needed for induction draft fans
- Less duct erosion and maintenance
- Lower operations and maintenance costs
- Increased reliability: fewer forced and planned outages
- Increased net generation capacity

### **Economic Benefits**

- Estimated total savings of \$0.70 per megawatt-hour (\$3 million per year for a single 546MW Coal Creek Unit)
- Savings in SO<sub>2</sub> reductions
- Possible savings in NO<sub>x</sub> reduction credits
- Possible savings through CO<sub>2</sub> reduction credits
- Possible savings realized through sequestering mercury, sulfur and ash
- Potential annual savings of \$ 84 million per year if applied to all U.S. lignite plants
- Potential annual savings of \$840 million per year if applied to all U.S. plants that use Powder River Basin subbituminous coals

### 3.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

#### 3.1 Proposed Action

DOE proposes to provide partial funding to Great River Energy to demonstrate the lignite enhancement system to achieve higher unit efficiency, lower emissions and larger unit capacity in power plants that utilize lignite fuels. The proposed technical approach to lignite drying is based on using waste heat from the main condenser and energy from primary air to dry lignite and increase coal feed temperature into the pulverizers (Figure 3-1). Technical details of the process are contained in the Technical Application (GRE 2002). A site location map and detailed site plans can be found in the Environmental Information Volume (GRE 2003).

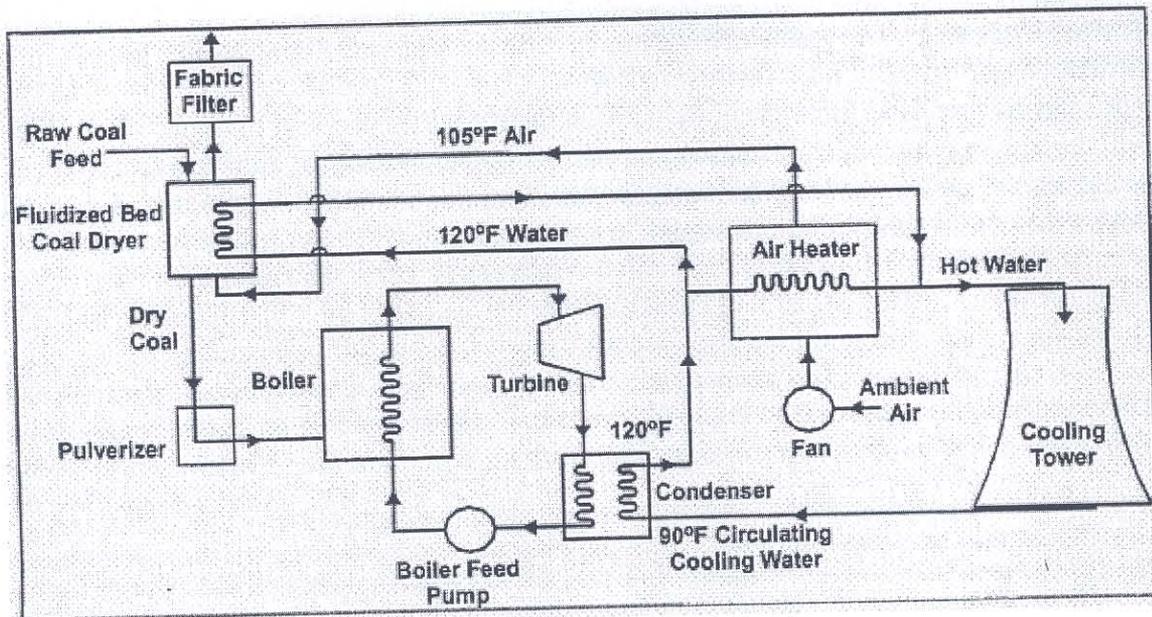


Figure 3-1. Process Diagram of Lignite Enhancement Demonstration Project.

The proposed action is for the United States Department of Energy (DOE) to provide, through a 45-month cooperative agreement with Great River Energy, financial assistance for a proposed Lignite Fuel Enhancement Demonstration Project at the Coal Creek Station near Underwood, North Dakota (about 50 miles north of Bismarck). If approved, DOE would provide \$11 million, or 31% of the total estimated project cost of \$35 million, to demonstrate the commercial viability of technology for using waste heat to reduce the moisture content and improve the fuel value of lignite.

Built to meet the growing needs of rural and suburban electric cooperative members, Coal Creek Station consists of two 546-MW lignite-fired coal units that became operational in 1979 and 1981. The Coal Creek plant is a mine-mouth plant and receives approximately 7.5 million tons of

lignite per year from the Falkirk Mining Company. Eight roll mill pulverizers per unit process coal that is then blown to the furnace by primary air. Seven mills are normally needed for full load, but when the higher heating value of the fuel drops to about 5900 British Thermal Units (BTU)/lb, all eight are required for full load. Volumetric weigh belt feeders drop coal into the top of the mills from individual silos overhead. Three rolls crush the coal, and a classifier returns larger particles to the rolls until they are fine enough to be carried by the primary airflow. Pyrite hoppers collect refuse, which spills from the grinding table. During normal operation, about 130,000 lbs/hr of coal is fed into the operating pulverizers where it is milled into fine powder (80% through a 200-mesh screen, as fine as facial powder). Drier fuel would demand less power from the pulverizer and less primary air to dry and transport the fuel.

The coal drying system will require the installation of additional ductwork, heat exchangers, and a fluidized bed dryer unit. All of the new components will be installed within the existing buildings and structures of Coal Creek Station.

Coal Creek Station is ideally suited to conduct this demonstration because it is a mine-mouth, baseloaded, low-rank coal facility. The large quantity of fuel burned every hour, coal yard proximity, construction space, large difference in ambient conditions (summer vs. winter) and availability of waste heat streams make it an ideal choice for the proposed demonstration. The moisture-to-heating value ratio is also wide enough that even subtle changes will be easy to detect. The plant instrumentation systems are capable of measuring the subtle differences, which will help quantify the technology.

For this demonstration project, Great River Energy would collaborate with Electric Power Research Institute, Lehigh University, Barr Engineering, and Falkirk Mining and Conteau Properties, the lignite coal supplier to the Coal Creek Station. The project's objective is to demonstrate technology for reducing the moisture content of lignite coal, thus increasing the value of lignite as a fuel in electrical generation power plants. The demonstration project would focus on using waste heat from the Coal Creek Station to lower the moisture content of the coal by at least 10 percentage points.

A phased implementation approach is planned. In the first phase, a full-scale prototype dryer module would be designed for operation on one boiler unit at the Coal Creek Station. This module would be designed to feed dried coal to a single pulverizer module. Following successful testing of the prototype module, Great River Energy would install and operate dryer modules needed for full power operation of one unit at the Coal Creek Station. Coal feed to the power plant would be dried to several different levels of moisture content, and both the effects of moisture level on operational performance and the optimum operating and drying conditions would be determined.

The technology to be demonstrated for lignite drying would increase the plant's efficiency, reduce pollution, and improve economics by using low-value, often underutilized, heat that is normally available in power plants. The proposed technology could be applied to increase the

generating capacity, efficiency and cost-effectiveness of other units that burn high-moisture content coal and to recover generating capacity in units which were burning bituminous coals but have been switched to low sulfur, lower-rank coals.

### **3.2 No Action Alternative**

Under the No Action alternative, DOE would not provide partial funding for the demonstration of the lignite fuel enhancement technology. This technology was designed with the goals of reducing emissions, increasing operating efficiency, and enhancing the plant's operating characteristics. Not completing this project would result in the loss of the beneficial aspects of the project. The only benefit associated with the No-Action Alternative, would be the cost savings associated with not funding the project.

### **3.3 Other Alternatives**

The intent of the proposed project is to enhance the use of lignite as a fuel without increasing the utilization of other resources. This is accomplished in the project by using heat sources that are normally rejected as waste heat streams. Drying could be accomplished by firing additional fuels or by extracting heat from the steam going to the turbine. However, this would minimize or even eliminate many of the benefits of the project. Therefore, such alternatives are not evaluated in any further detail.

## **4.0 AFFECTED ENVIRONMENT**

### **4.1 Geology and Soils**

Coal Creek Station is located in west central North Dakota in McLean County, south of the city of Underwood. The four square miles of the site include Sections 8, 9, 16, and 17 of Township 145 North, Range 82 West. The site is located in primarily an agricultural area and is adjacent to the Falkirk Mine.

McLean County is in the glaciated plains of central North Dakota. The most recent glaciation period, the Late Wisconsinian glaciation, began approximately 70,000 year ago and ended 10,000 years ago. Sediments deposited by the glaciers in this area are of the Coleharbor Group. These sediments, averaging about 150 feet thick in this part of North Dakota, overlie bedrock, resulting in a nearly level to gently rolling topography.

The soils in and around the site were formed in loamy glacial till. The dominant association is Williams-Bowbells, which consists of deep, well-drained to moderately well-drained, moderately to moderately slowly permeable soils. Textures are generally medium and moderately fine, and include loam, silt loam, clay loam, or fine sandy loam. The Williams series may also contain a large amount of lime in the upper part of the soil.

### **4.2 Cultural Resources**

Within the existing Coal Creek Station disturbed land area, there are no recorded cultural sites (GRE 2003). These facts were verified by a visit to the State Historic Preservation Officer in Bismarck, North Dakota on July 30, 2003. McLean County, however, is rich in cultural and historically significant resources, such as Native American villages and the Lewis and Clark Trail.

### **4.3 Ecological Resources**

Undisturbed areas of the Coal Creek site are covered in vegetation consisting of native mid and tall grasses, emergent wetland species, and some trees. Adjacent properties in agricultural use are planted with crops including spring wheat, durum wheat, sunflowers, barley, canola, and beans.

### **4.4 Threatened and Endangered Species**

The North Dakota Parks and Recreation Department has no recorded threatened or endangered species locations in the vicinity of Coal Creek Station.

The U.S. Fish and Wildlife Service has provided a list of federal threatened, endangered, and candidate species found in McLean County (Appendix B). Threatened species include:

- Bald eagle (*Haliaeetus leucocephalus*) that migrates spring and fall statewide but primarily along the major river courses and concentrates along the Missouri River during winter and is known to nest in the floodplain forest.
- Piping plover (*Charadrius melodus*) that nests on midstream sandbars of the Missouri River and along the shorelines of saline wetlands. More nest in North Dakota than any other state. Incidences of nesting on the Coal Creek Station ash ponds have been reported.

Endangered species include:

- Interior least tern (*Sterna antillarum*) that nests along midstream sandbars of the Missouri River.
- Whooping crane (*Grus Americana*) that migrates through west and central counties of North Dakota during the spring and fall and prefers to roost on wetlands and sock dams with good visibility.
- Pallid sturgeon (*Scaphirhynchus albus*) that is known only from the Missouri and Yellowstone Rivers. No reproduction has been documented in 15 years.

## 4.5 Water Resources

### 4.5.1 Surface Water

There are three primary sources of surface waters in close proximity to Coal Creek Station (GRE 2003). These sources include:

- Missouri River – Coal Creek Station currently uses the Missouri River as a source of cooling water.
- Lake Sakakawea – Located approximately 10 miles north of the site, Lake Sakakawea is capable of storing up to 23.8 million acre feet of water.
- Lake Audubon – Also located approximately 10 miles north of the site, Lake Audubon is under the jurisdiction of the Audubon National Wildlife Refuge and the North Dakota Game and Fish Department.

### 4.5.2 Groundwater

Groundwater is not used as a water source for the operation of Coal Creek Station (GRE 2003). Many of the surrounding population, however, do depend on groundwater as a source of domestic water. Six miles north of the site, the City of Underwood, obtains its water supply from groundwater wells. The wells range in depth from about 82 to 95 feet and have an estimated annual yield of 3.1 million gallons (USGS 1974).

### 4.5.3 Wetlands and Floodplains

A number of natural wetlands exist on the Coal Creek site. The plant also operates a number of retention, detention, and evaporation ponds to support the operation of the power plant. Coal Creek Station is a zero-discharge facility that utilizes cooling towers and ponds to maximize the number of times that the process water can be reused.

Federal Emergency Management Agency mapping shows that the current powerhouse does not fall within the 100-year or 500-year floodplains (GRE 2003).

### 4.6 Air Quality

The latest available summary of air quality in North Dakota is for calendar year 2002. A total of 20 air monitoring sites were operated in the state. According to the State's report (NDDOH 2003):

*The North Dakota Department of Health operated seven ambient and two special purpose air quality monitoring sites, industry operated eight source-specific air quality monitoring sites and the Three Affiliated Tribes on the Fort Berthold Indian Reservation operated two ambient sites. The data from these sites indicated that the quality of the ambient air in North Dakota was generally good during 2002.*

*There were no sulfur dioxide, nitrogen dioxide, ozone or particulate matter exceedances of either the state or federal ambient air quality standards measured during the year.*

The total stack emissions for the year 2002 were reported as follows (GRE 2003):

Total Stack Emissions (Tons) <sup>a, b</sup>	Unit 1	Unit 2
PM <sub>10</sub>	880	850
SO <sub>2</sub>	12,000	13,000
NO <sub>x</sub>	4,700	5,500
CO	900	1,000

a: PM<sub>10</sub> – particulate matter; SO<sub>2</sub> – Sulfur dioxide; NO<sub>x</sub> – Nitrogen oxides; CO – Carbon monoxide

b: Values rounded to two significant digits.

The plant was in compliance with air emission limits for 2002. A comparison of these limits with plant performance is shown below (GRE 2003):

Emission Type	Emission Limit	Unit 1 Actuals	Unit 2 Actuals
PM <sub>10</sub> (lb/10 <sup>6</sup> BTU)	0.10	0.058	0.051
SO <sub>2</sub> (lb/10 <sup>6</sup> BTU)	1.20	0.51	0.49
NO <sub>x</sub> (lb/10 <sup>6</sup> BTU)	0.40	0.21	0.22

#### **4.7 Noise**

The area surrounding Coal Creek Station has a low population density due in part to the fact that the land is used for agricultural purposes. The closest residence to the site is approximately 1,500 feet southeast of the water treatment plant, which is the power plant operation closest to this residence (GRE 2003).

#### **4.8 Land Use**

Surrounding lands are used primarily for agricultural purposes. Directly adjacent to the north of the Coal Creek site is Falkirk Mine. Except for lands that are being actively mined or reclaimed, most of the Falkirk property is leased to local farmers for agricultural purposes as well.

The land on which the current power plant is situated is zoned industrial (GRE 2003).

#### **4.9 Socioeconomic Conditions**

The population of McLean County has declined over the last several years. The U.S. Census reports the population of the county in 2001 to be 9,144, a 1.8% decline from the previous year. The 1990 census reported the population of the county to be 10,457. Over the last eleven years there has been a 12.5 percent reduction in county population.

Median household income has increased in McLean County from \$21,853 in 1990 to \$32,337 in 2001, according to the U.S. Census. The percentage of persons living below the poverty line in the county has decreased from 15.8% in 1990 to 13.5% in 2001.

The North Dakota statewide unemployment rate is currently 2.8%. The unemployment rate for McLean County is reported at 5.9%.

#### **4.10 Aesthetics**

The existing Coal Creek Station is a relatively large industrial complex comprised of 2 units with powerhouses, exhaust stacks, and cooling towers visible for miles in all directions. The plant site is situated on generally flat terrain and can be viewed from surrounding population centers and Highway 83.

## **5.0 ENVIRONMENTAL IMPACTS**

### **5.1 Geology and Soils**

No direct impacts on regional geology and geological resources would be expected as a result of the proposed project due to the fact that no earthwork or piling would be required. In addition, no pre-existing geological conditions have the potential to adversely impact installation or operation of the project.

### **5.2 Cultural Resources**

Since the proposed project would require no additional land disturbance, no additional archeological or cultural resource investigations would be required. Since the project would not have any negative impacts to air or water quality, aesthetics, noise, etc., there would not be any negative impacts to tourism in the area, which is dependent on several places of historical significance.

### **5.3 Ecological Resources**

There are no negative impacts anticipated to ecological resources as a result of the proposed project. The reduced emissions may have a positive impact on the surrounding ecology. The demonstration project will not impact or change water discharge operations or the way Great River Energy manages the ash ponds on the Coal Creek Station property.

### **5.4 Threatened and Endangered Species**

The project site is located within the already constructed Coal Creek Station. Therefore, no impacts to federally-listed threatened or endangered species would be anticipated as a result of the proposed project. The project would result in no changes to emissions or effluent streams that would have a negative effect on the surrounding environment, thus affecting any threatened or endangered species.

### **5.5 Water Resources**

The demonstration project will not negatively affect any water usage or discharge. Coal Creek Station is a zero-discharge facility, and therefore there are no direct impacts to streams or groundwater. All discharged waters from the plant, except storm water, are released by evaporation from the cooling tower (the circulating water system) or by evaporation from the various storage basins.

Since the proposed project would be fully contained within the existing site footprint, there would be no impacts to existing floodplains.

## **5.6 Air Quality**

The proposed project would be expected to result in a net reduction in air quality impacts. Exit streams to the environment would change as a result of the drying process. The dryers themselves would produce about 100,000 cubic feet per minute of exhaust air and water vapor at a temperature of 115 degrees F. This exhaust would pass through a baghouse and be exhausted to the atmosphere. Under the current operations of the plant, this water vapor flows through the boiler and out the stack. Therefore the implementation of the demonstration project would result in no net change. The composition of this exhaust stream would be expected to be similar to that of the current lignite dust collector exhaust (GRE 2003).

The Energy Research Center at Lehigh University examined the effect of heat rate improvement on emissions. Their research indicates that mass emissions of CO<sub>2</sub> and SO<sub>2</sub> are a function of coal moisture. The results show that reducing the total coal moisture content by 10% would reduce mass emissions by approximately 5% (GRE 2003). Direct effects on the emissions of carbon monoxide and nitrous oxides would not be anticipated as a result of reducing the moisture content of the lignite fuel, however, with less coal being used to achieve full load, it is possible that slight reductions could also occur for these pollutants. Great River Energy will continue to monitor all criteria pollutants for changes during operation of the Station.

There are no technical data that indicate that the exit temperature will fluctuate adversely as a result of the proposal. In addition to the monitoring for pollutants, Great River Energy will also continue to monitor stack exit temperature.

## **5.7 Noise**

No changes in the ambient noise levels would result from the proposed project.

## **5.8 Land Use**

Since the proposed action would be fully contained within the existing powerhouse, no additional impacts to land use or zoning would occur.

Waste materials resulting from installation of the proposed project would be minimal and would consist of standard construction debris. The debris would not be hazardous and would therefore be disposed of in permitted landfills or recycled, as appropriate.

## **5.9 Socioeconomic Effects**

No long-term socioeconomic impacts would be expected from this project. The project would not create additional permanent jobs for the region. On-site work for the project would be done by Great River Energy employees or contractors hired for specific tasks of the project. However, some minor, temporary local benefits for local hospitality businesses would occur during project construction from workers patronizing local motels and restaurants.

#### **5.10 Aesthetics**

The majority of the construction associated with the Lignite Fuel Enhancement Demonstration Project would be fully contained within the existing powerhouse structure. There would be the possibility of adding some equipment to the roof of the structure, thus providing for a minor increase to the plant's silhouette. This impact would be insignificant relative to the large size of the existing structure.

#### **5.11 Environmental Justice**

In accordance with Executive Order 12898, this Environmental Assessment has evaluated whether or not the Proposed Action results in disproportionately high and adverse impacts on minority and low-income populations. Because the proposed project would be at the existing site of Coal Creek Station in rural McLean County and no adverse impacts have been identified, there would be no environmental justice impacts.

#### **5.12 Irretrievable Commitment of Resources**

The materials used for the project would include additional components (heat exchangers, dryers, filter baghouse, etc.) and construction materials. The Department of Energy will also have expended the finances associated with the funding for the demonstration project.

## **6.0 CONCLUSIONS**

The proposed project would be constructed on a previously disturbed site within the Coal Creek Station and no negative impacts would occur in any environmental resource area. Construction and operation of the proposed project would not be expected to impact any Federal- or state-listed threatened or endangered species.

Air quality from the project would have positive impacts. Air emissions would be expected to decrease as a function of reduction of coal moisture content.

No changes in noise levels or land use would be expected as a result of the proposed project. Minor economic benefits would be derived indirectly during construction of the project and from decreased electric utility costs in the long-term.

The proposed Lignite Fuel Enhancement project would be expected to demonstrate a technology that would boost power-generating efficiencies and provide economic cost savings for lignite and sub-bituminous power plants. These benefits would be achieved with additional improvements in environmental compliance.

## 7.0 REFERENCES

- GRE 2002            Great River Energy, *Volume II – Technical Application*, July 31, 2002  
(Proprietary).
- GRE 2003            Great River Energy, *Environmental Information Volume*, October, 2003.
- NDDOH 2003        North Dakota Department of Health, Division of Air Quality, *Annual Report, North Dakota Air Quality Monitoring Data Summary 2002*, June 2003,  
(<http://www.health.state.nd.us/AQ/ambient/annual/>).
- USGS 1974           U.S. Geological Survey, *Ground-Water Resources of McLean County, North Dakota, Bulletin 60 Part III*, Robert L. Klausning, 1974.

## **Appendix A**

### **Distribution List**

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3425 Miriam Avenue  
Bismarck, North Dakota 58501

Reading Rooms

Underwood Public Library  
88 Lincoln Avenue  
Underwood, North Dakota

Great River Energy  
Coal Creek Station  
2875 Third Street SW  
Underwood, North Dakota 58576

## **Appendix B**

### **Communication Record**

1. Letter from Joe Rivers, Jason Associates Corporation, to Bill Bicknell, U.S. Fish and Wildlife Service.
2. Letter from Bill Bicknell, U.S. Fish and Wildlife Service, to Joe Rivers, Jason Associates Corporation.

# JASON ASSOCIATES CORPORATION

August 14, 2003

Mr. Bill Bicknell  
U.S. Fish and Wildlife Service  
3425 Miriam Avenue  
Bismarck, North Dakota 58501

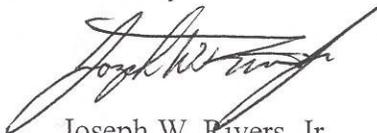
Dear Mr. Bicknell:

Great River Energy, with financial assistance from the Department of Energy's National Energy Technology Laboratory, is proposing to implement a lignite fuel enhancement demonstration project at the Coal Creek Station in McLean County, North Dakota. The project entails using waste heat to drive off moisture from the lignite fuel, thus improving power plant performance and reducing air emissions.

The Department of Energy is preparing an Environmental Assessment (EA) for this project in accordance with the National Environmental Policy Act. The preparation of this EA will include an evaluation of any impacts to Federally listed threatened, endangered, or candidate species in the vicinity of the project. The purpose of this letter is to request a listing of threatened, endangered, and candidate species for McLean County.

Thanks you for your time and assistance in this matter. If you have any questions, I can be reached at (803) 642-2304. My email address is [jrivers@jason.com](mailto:jrivers@jason.com).

Sincerely



Joseph W. Rivers, Jr.  
Vice President

Cc: Roy Spears (DOE)



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ecological Services  
3425 Miriam Avenue  
Bismarck, North Dakota 58501



SEP - 8 2003

Mr. Joseph W. Rivers, Jr., Vice President  
Jason Associates Corporation  
100E Hollow Tree Drive  
Aiken, South Carolina 29803

Dear Mr. Rivers:

I am writing in response to your letter of August 14, 2003, concerning Great River Energy's proposal to implement a lignite fuel enhancement demonstration project at the Coal Creek Station in McLean County, North Dakota. The demonstration project involves using waste heat to remove moisture from lignite fuel, thus improving power plant performance and reducing air emissions.

To assist with the preparation of an Environmental Assessment for this project, I am forwarding a list of the Federal threatened and endangered species that are known to occur in McLean County. This list fulfills the requirements of the Fish and Wildlife Service under Section 7 of the Endangered Species Act. I am also attaching profile sheets for each species that provide information summarizing life history, occurrence, and threats affecting these species.

If a Federal agency authorizes, funds, or carries out a proposed action, the responsible Federal agency, or its delegated agent, is required to evaluate whether the proposed action "may affect" listed species. If it is determined that the action "may affect" a listed species, then the responsible agency shall request formal section 7 consultation with this office. If the evaluation indicates that there will be "no affect" to listed species, further consultation is not necessary.

Thank you for the opportunity to review Great River Energy's proposed project. If additional information is needed, please contact Bill Bicknell of my staff at (701) 250-4481.

Sincerely,

Jeffrey K. Towner  
Field Supervisor  
North Dakota Field Office

Enclosures

FEDERAL THREATENED AND ENDANGERED SPECIES  
AND DESIGNATED CRITICAL HABITAT FOUND IN  
MCLEAN COUNTY, NORTH DAKOTA

**ENDANGERED SPECIES**

Birds

Interior least tern (Sterna antillarum): Nests along midstream sandbars of the Missouri and Yellowstone Rivers.

Whooping crane (Grus Americana): Migrates through west and central counties during spring and fall. Prefers to roost on wetlands and stockdams with good visibility. Young adult summered in North Dakota in 1989, 1990, and 1993. Total population 140-150 birds.

Fish

Pallid sturgeon (Scaphirhynchus albus): Known only from the Missouri and Yellowstone Rivers. No reproduction has been documented in 15 years.

**THREATENED SPECIES**

Birds

Bald eagle (Haliaeetus leucocephalus): Migrates spring and fall statewide but primarily along the major river courses. It concentrates along the Missouri River during winter and is known to nest in the floodplain forest.

Piping plover (Charadrius melodus): Nests on midstream sandbars of the Missouri and Yellowstone Rivers and along shorelines of saline wetlands. More nest in North Dakota than any other state.

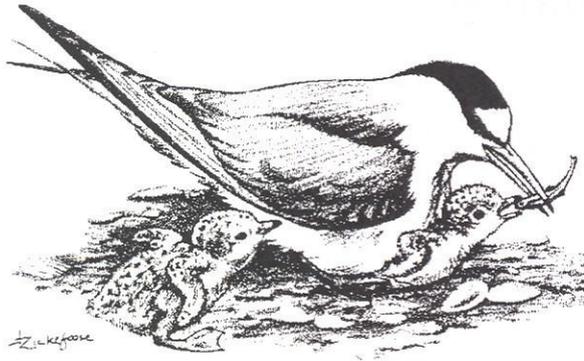
**DESIGNATED CRITICAL HABITAT**

Birds

Piping Plover - Lake Sakakawea and Oahe - Critical habitat includes sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, and their interface with the water bodies.

# INTERIOR LEAST TERN

*Sterna antillarum*



**Official Status:** Endangered (North Dakota)

Endangered species are animals and plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

**Listed:** 50 Federal Register 21792; May 28, 1985  
(interior population of the least tern)

**Historical Status:** Historically, the least tern was found on the Atlantic, Gulf of Mexico, and California coasts and on the Mississippi, Missouri, and Rio Grande River systems. It was found throughout the Missouri River system in North Dakota.

**Present Status:** The interior population of the least tern presently breeds in the Mississippi, Missouri, and Rio Grande river systems. The birds usually stay in close proximity to the rivers. Census data indicates over 8,000 least terns in the interior population. Birds from the interior population winter along the Gulf of Mexico and on Caribbean Islands. In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea. Approximately 100 pairs breed in North Dakota.

**Habitat:** In North Dakota, the least tern utilizes sparsely vegetated sandbars on the Missouri and Yellowstone Rivers. Birds nest, raise young, and relax on barren river sandbars.

**Life History:** The breeding season for the interior population of the least tern lasts from May through August. The peak of the nesting season occurs from mid-June to mid-July. Nests are bowl-shaped depressions, about 4" across, on barren, sandy areas. Least terns nest in colonies where the nests can be as close as a few feet apart. A typical clutch contains 2 to 3 eggs and takes about 24 days to hatch. Both parents incubate the eggs and feed the young. Young are able to fly in about 21 days. Least terns typically live 1 to 5 years. Terns forage for small fish in the river and nearby wetlands.

**Aid to Identification:** Least terns are the smallest member of the gull and tern family. They are approximately 9" in length. Unlike gulls, terns will dive into the water for small fish. The body of least terns is predominately gray and white, with black streaking on the head. Least terns have a forked tail

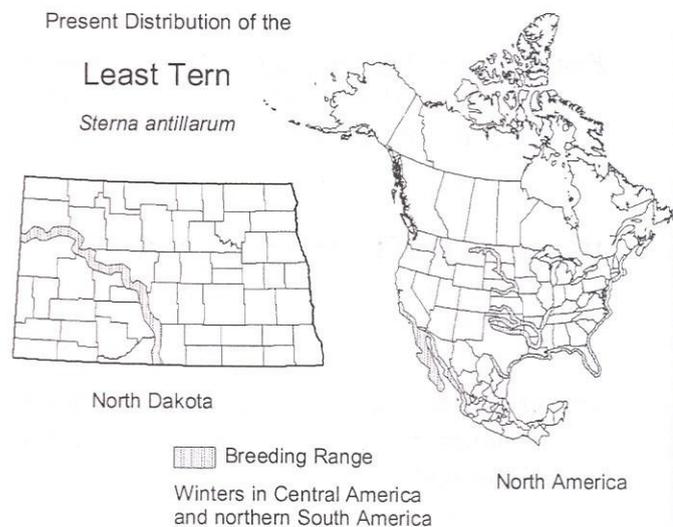
and narrow pointed wings. Least terns less than a year old have less distinctive black streaking on the head and less of a forked tail.

**Reasons for Decline:** The interior population of the least tern has declined due to loss of habitat from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. Because of dams, river flows are often managed in a nonhistoric fashion, not conducive to the creation and maintenance of sandbars with sparse vegetation. Human disturbance is also a problem. Cold water temperatures due to reservoirs may affect the quantity of forage fish available.

**Recommendations:** Avoid sandbars that have least terns present. Adult birds with eggs or young nearby will squeal loudly while circling overhead, and may swoop down at the intruder. Leave the area immediately.

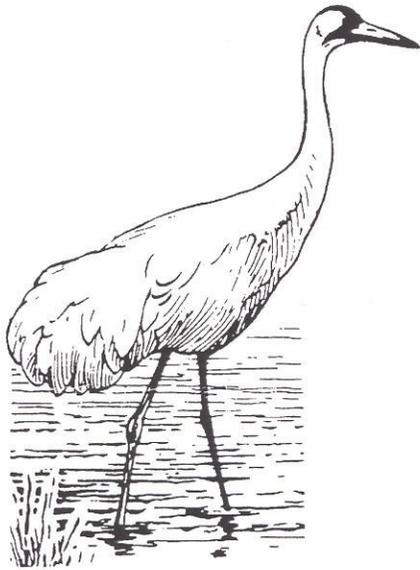
**Comments:** Biologists are uncertain about whether least tern populations from the Atlantic coast, California coast, and interior North America are separate subspecies or simply separate populations. For purposes of the Endangered Species Act, the U.S. Fish and Wildlife Service has assigned the endangered status to the interior population of the least tern. The California population of the least tern has been listed as endangered since 1970. The Atlantic population is not listed. Least terns in North Dakota will often be found sharing sandbars with the piping plover, a threatened species.

**References:** *Interior Population of the Least Tern Recovery Plan* by U.S. Fish and Wildlife Service, 1990.



# WHOOPING CRANE

*Grus americana*



## Official Status: Endangered

Endangered species are animals and plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

**Listed:** 35 Federal Register 8495; June 2, 1970

**Historical Status:** The historical breeding range of the whooping crane extended from Illinois, northwest through North Dakota, and up to the Northwest Territories. The last nesting record for North Dakota was in McHenry County in 1915. The birds historically wintered along the Gulf of Mexico. By the 1940's, there were an estimated 21 whooping cranes left in the world. Most were from a flock that wintered at the Aransas National Wildlife Refuge on the coast of Texas. It was later discovered that the birds were breeding in Wood Buffalo National Park in the Northwest Territories.

**Present Status:** About 188 whooping cranes presently occur in the wild. Almost all of these birds are in the Aransas-Wood Buffalo flock. In 1986, a flock that migrates between Grays Lake National Wildlife Refuge in Idaho and Bosque del Apache National Wildlife Refuge in New Mexico peaked at 35 in 1998; however, only two birds remain in this population. The Aransas-Wood Buffalo population migrates through North Dakota. During the 1999 fall migration, 15 sightings occurred in North Dakota from late August to mid-October. The spring migration occurs from late April to mid-June. Birds can show up in all parts of North Dakota, although most sightings occur in the western two-thirds of the State.

**Habitat:** Whooping cranes inhabit shallow wetlands that are characterized by cattails, bulrushes, and sedges. They can also be found in upland areas, especially during migration.

**Life History:** Whooping cranes do not appear to reach sexual maturity until their 2nd or 3rd year. Courtship occurs at Wood Buffalo National Park in late April and May. Courtship rituals are eccentric with the pair performing loud vocalizations,

wing flapping, head bowing, and leaps into the air. Whooping cranes mate for life. Two eggs are laid in a nest made of bulrush and other vegetation. Incubation is about 29 days. Both parents incubate the eggs and feed the young. Usually only the larger chick survives due to its more aggressive behavior. Young cranes are capable of flight in about 90 days. Whooping cranes may live 20 years. Whooping cranes feed on crabs, crayfish, frogs, and other small aquatic life, as well as plants.

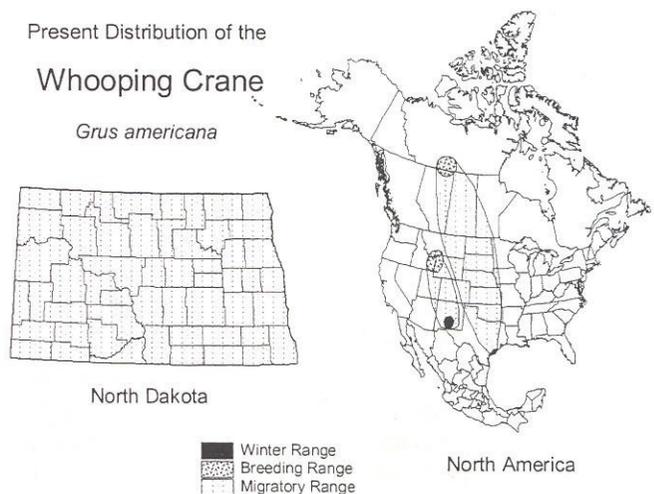
**Aid to Identification:** The whooping crane is the tallest bird in North America. It is a white bird with black wingtips and red markings on the head. Young birds have a brown-mottled appearance until their second summer. Whooping cranes are 5 feet tall and have wingspans of 7 feet. Whooping cranes fly with a slow downward flap and a rapid upstroke. Whooping cranes may migrate with the smaller, gray, sandhill crane. The trumpet-like call carries for miles.

**Reasons for Decline:** Loss of habitat and shooting are the main reasons for the whooping crane's decline.

**Recommendations:** Many of the wild whooping cranes are marked with colored leg bands. Make observations of these birds and report them to a wildlife agency.

**Comments:** The status of whooping cranes in the wild is precarious because the birds concentrate during the winter. Oil spills in the Gulf of Mexico are a potential threat. Eggs from wild birds (1 per nest) have been removed and hatched in captivity. The captive birds are now reproducing.

**References:** *Whooping Crane Recovery Plan* by U.S. Fish and Wildlife Service, 1994.

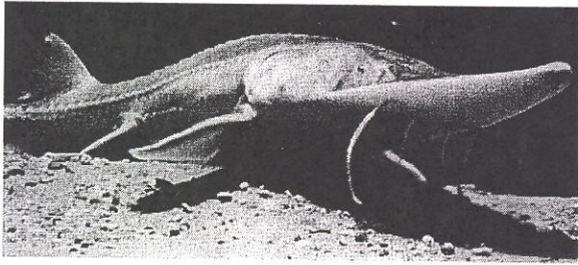


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U.S. Fish & Wildlife Service  
Bismarck, North Dakota

# PALLID STURGEON

*Scaphirhynchus albus*



## Official Status: Endangered

Endangered species are animals and plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

**Listed:** 55 Federal Register 36641; September 6, 1990.

**Historical Status:** Historically, pallid sturgeon were found in the Missouri River from Fort Benton, Montana, to St. Louis, Missouri; in the Mississippi River from above St. Louis to the Gulf; and in the lower reaches of other large tributaries, such as the Yellowstone, Platte, Kansas, Ohio, Arkansas, Red, and Sunflower; and in the first 60 miles of the Atchafalaya River.

**Present Status:** Pallid sturgeon populations are fragmented by dams on the Missouri River. Pallid sturgeon are scarce in the upper Missouri River above Ft. Peck Reservoir; in the Missouri and lower Yellowstone Rivers between Ft. Peck Dam and Lake Sakakawea; in the Missouri River downstream of Gavins Point Dam; and in the Mississippi and Atchafalaya Rivers.

**Habitat:** Large rivers with high turbidity and a natural flow. Preferred habitat has a diversity of depths and velocities formed by braided channels, sandbars, islands, sand flats and gravel bars.

**Life History:** Sexual maturity for males is estimated to be 7-9 years, with up to 3 years between spawns. Females are not expected to reach sexual maturity until 7-15 years, with up to 10-year intervals between spawning. Pallid sturgeons are long lived, with individuals perhaps reaching 60 years of age or more.

**Aid to Identification:** Pallid sturgeon have a unique prehistoric appearance. They have a flattened snout, long slender tail and are armored with five lengthwise rows of bony plates instead of scales. Their mouth is toothless and positioned under the snout for sucking small fishes and invertebrates from the river bottom. Pallid sturgeon can weigh up to 80 pounds and reach lengths of 6 feet, whereas the closely-related shovelnose sturgeon rarely weighs more than 8 pounds. The back and sides of pallid sturgeons are grayish-

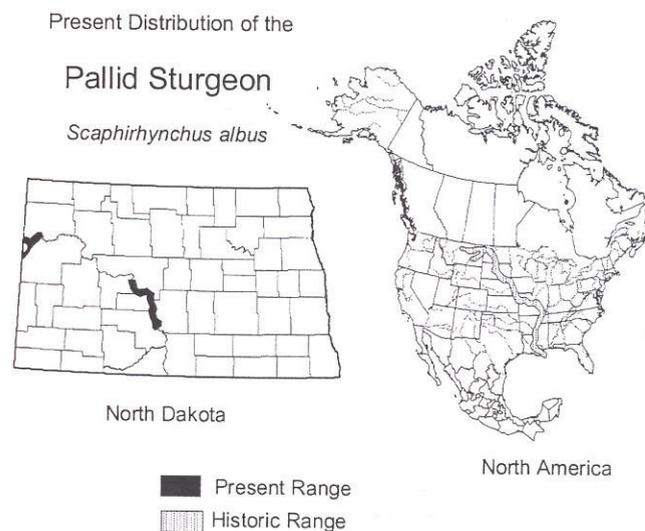
white, versus the brownish tan color of the shovelnose sturgeons.

**Reasons for Decline:** Habitat loss and modification from construction of dams and channelization of rivers. Commercial fishing and environmental contaminants may have also played a role in the pallid sturgeon's decline. Hybridization with the more common shovelnose sturgeon is a threat to the species and may be due to habitat modifications.

**Recommendations:** All species of sturgeon caught in North Dakota must be released immediately. Contact the U.S. Fish and Wildlife Service with information on any pallid sturgeon you catch.

**Comments:** Population augmentation and propagation has occurred to address poor recruitment of juveniles into the population. Current populations are composed of older fish that will die in the near future. Stocking now will ensure a breeding population for future recovery efforts; however, habitat restoration will also be essential to recover this species.

**References:** Pallid Sturgeon Recovery Plan, Fish and Wildlife Service, November 1993.



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Bismarck, North Dakota

# BALD EAGLE

*Haliaeetus leucocephalus*



## Official Status: Threatened (North Dakota)

Threatened species are animals and plants likely to become endangered in the foreseeable future throughout all or a significant portion of their range.

**Listed:** Listed as endangered in 43 Federal Register 6233; February 14, 1978 (North Dakota and 42 other states.) Downlisted from endangered to threatened in 1995, and on July 6, 1999, proposed to delist.

**Historical Status:** Bald eagles are thought to have historically nested in all of the lower 48 states. In North Dakota, bald eagles were apparently common along the Missouri and Red Rivers, and at Devils Lake and the Turtle Mountains. It's estimated that in the lower 48 states there were 50,000 breeding pairs of bald eagles in pre-colonial times. Due to human activities, the population in the lower 48 states reached a low of 400 breeding pairs in the early 1960's.

**Present Status:** Bald eagles are abundant in Alaska and Canada. In 1998, over 5,700 breeding pairs were reported in the lower 48 states. In 1988, the first bald eagle nest in North Dakota since 1975 was documented along the Missouri River. In 1997, eight active nests were documented along the Missouri River between Garrison Dam and Lake Oahe, and one nest was reported at Devils Lake. Major wintering areas for bald eagles are along the lower reaches of the Mississippi River, and Illinois River systems, Florida and the Pacific coast. In recent years, and average of 45 eagles have wintered below the Garrison Dam.

**Habitat:** Bald eagles prefer forested habitats near bodies of water. Eagles concentrate near open water in the wintertime. The tailrace of the Garrison Dam provides this habitat. Migrating eagles are found throughout North Dakota.

**Life History:** Sexual maturity for eagles is reached at 4 to 6 years of age. Adults mate for life and tend to use the same nest year after year. The majority of nest sites are within one-half mile of water. Nests are usually at the top of tall trees, although cliffs are occasionally used. Nests can become enormous, weighing more than a ton. Usually two eggs are laid in a clutch. The eggs hatch after 35 days of incubation. Both parents assist in feeding the young. Young leave the nest after 75 days. Bald eagles feed on fish, waterfowl and other birds, small mammals, and carrion.

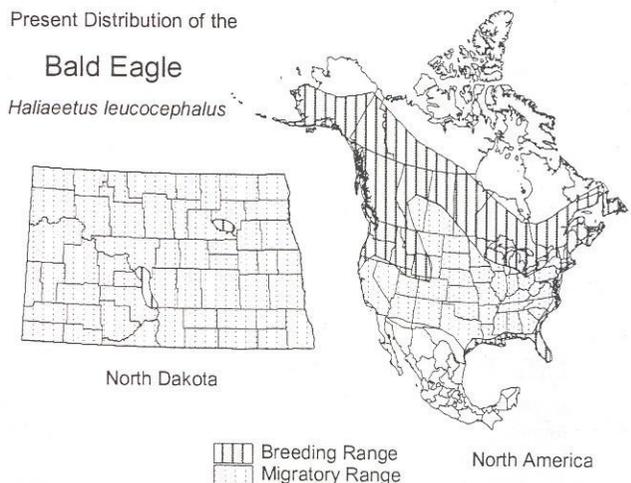
**Aid to Identification:** The white head and tail of mature bald eagles is an identifying characteristic. Immature birds are more difficult to identify. They are predominately brown with an increasing amount of white mottling as the bird matures. The wingspan of 7 feet tends to distinguish the young birds from all other birds, except the golden eagle.

**Reasons for Decline:** Bald eagle populations declined in the early 20th century due to loss of habitat, shooting, and trapping. During the 1950's and 1960's, the use of pesticides, especially DDT, became a major problem. DDT residues accumulated in fish, a major food source of eagles. The residues then accumulated in the eagles that ate the fish and subsequently caused a thinning of the eggshells. DDT is now banned in the United States. Shooting, trapping, poisoning, and human disturbance continue to be a problem. Bald eagles can be electrocuted when perching on powerlines.

**Recommendations:** Although individual bald eagle pairs can show considerable tolerance to human activity, disturbance of nesting pairs should be minimized. Wounded or sick eagles should be reported immediately to a wildlife agency. Many rehabilitation centers exist throughout the country that can care for eagles.

**Comments:** In addition to being protected by the Endangered Species Act of 1973, the bald eagle is also protected by the Bald Eagle Protection Act of 1940. The bald eagle is the national symbol of the United States. The recovery goal for the bald eagle in North Dakota is to have 10 active nests by the year 2000. In 1999, the Fish and Wildlife Service proposed to delist the bald eagle.

**References:** *Northern States Bald Eagle Recovery Plan* by U.S. Fish and Wildlife Service, 1983.

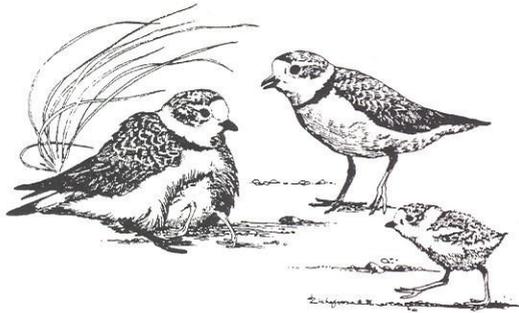


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U.S. Fish & Wildlife Service  
Bismarck, North Dakota

# PIPING PLOVER

*Charadrius melodus*



**Official Status:** Threatened in U.S. Northern Great Plains, including North Dakota and Montana. Endangered in Great Plains of Canada. Species are considered threatened when they are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

**Listed:** 50 Federal Register 50733; December 11, 1985 (entire range, except Great Lakes region, where it is listed as endangered.)

**Historical Status:** In the Great Plains, it appears the piping plover formerly was more widely-distributed than it is today. Historically, breeding piping plovers occurred in at least 28 North Dakota counties. Plovers were observed in 20 counties during the 1990s.

**Present Status:** North Dakota is the most important State in the U.S. Great Plains for nesting piping plovers. The State's population of piping plovers was 496 breeding pairs in 1991 and 399 breeding pairs in 1996. More than three-fourths of piping plovers in North Dakota nest on prairie alkali lakes, while the remainder use the Missouri River. The North Dakota population spends fall to early spring primarily in the Gulf of Mexico, especially the Texas coast.

**Habitat:** In the Great Plains, piping plovers inhabit barren sand and gravel shores of rivers and lakes. Plovers avoid dense vegetation. Nearly all natural lakes used by plovers in North Dakota are alkaline in nature and have salt-encrusted, white beaches. Such alkali lakes probably are selected due to their sparse vegetation. Beaches used by piping plovers generally are 10-40 yards wide. Piping plovers also use barren river sandbars. In North Dakota, this habitat type is found on the Missouri and Yellowstone Rivers.

**Life History:** The breeding season in North Dakota extends from late April until early August. Pairs remain mated for nearly all of the breeding season. Pairs are territorial, which means they defend their nest area from other piping plovers. A 4-egg clutch is laid in a shallow depression in the open, sand/gravel substrate. Both sexes share in incubation, which lasts about 28 days. Plover chicks are able to walk and feed within hours of hatching. Chicks can fly in about 21 days. Piping plovers feed on open beaches on insects and crustaceans.

**Aid to Identification:** The piping plover is a small, stocky shorebird that is distinctly pale, matching the beaches it inhabits. Prominent markings include a black band across the upper forehead and another across the upper breast. The similar killdeer has two black breastbands and is larger and darker. The black bands are faint in juvenile piping plovers, and in all piping plovers during winter. Piping plovers have a distinct melodic, flute-like call.

**Reasons for Decline:** Habitat destruction and poor breeding success are major reasons for the population decline. In North Dakota, plovers that use prairie alkali lakes suffer significant losses of eggs and chicks to predators that have increased in abundance in recent decades. Construction of reservoirs on the Missouri River has resulted in a loss of sandbar habitat. Plovers using the remaining sandbars on the river are susceptible to predation, direct disturbance by people, and water fluctuations as the result of dam operations.

**Recommendations:** Avoid areas of alkali lakes and Missouri River sandbars where piping plovers are present. Leave the area immediately if piping plovers are observed. Advise others to do likewise. Restrain pets when near piping plovers. Wherever possible near alkali lakes, reduce trees, rockpiles, and abandoned vehicles and buildings that often harbor predators such as crows, raccoons, and skunks.

**Comments:** Piping plovers often share sandbars with least terns, an endangered species.

**References:** *Draft revised recovery plan for piping plovers breeding on the Great Lakes & Northern Great Plains of the U.S.* by U.S. Fish and Wildlife Service, 1994.

