DRAFT CONCEPTUAL RESTORATION PLAN FOR WHITEWOOD CREEK AND THE BELLE FOURCHE AND CHEYENNE RIVER WATERSHEDS, SOUTH DAKOTA

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and

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EXECUTIVE SUMMARY – WHAT THIS DOCUMENT COVERS

This document describes the process, purpose and need for the Draft Conceptual Restoration Plan for Whitewood Creek and the Belle Fourche and Cheyenne River Watersheds, South Dakota (the Plan). Section 1 of this Plan includes an introduction describing the applicable and guiding laws for resource restoration, definition of trust resources impacted by hazardous substances and the Trustees or officials responsible for the restoration process. The Plan is prepared pursuant to State and Federal regulations, policies and laws in furtherance of the Trustees' responsibilities to restore, replace, rehabilitate and/or acquire the equivalent of injured natural resources. The Plan also serves as an Environmental Assessment (EA) in accordance with the National Environmental Policy Act of 1969 (NEPA).

The State of South Dakota (the State) on behalf of the Department of Game, Fish and Parks (GFP) and the Department of Environment and Natural Resources (DENR), and the United States Department of the Interior (DOI), Fish and Wildlife Service (FWS), also known jointly as the Trustees, together with the DOI Bureau of Land Management (BLM) and DOI Bureau of Reclamation (BOR), have prepared this Draft Plan pursuant to implementation requirements of a Memorandum of Agreement (MOU 1999).

This Plan's purpose (Section 2) is to guide the restoration of trust resources and services (physical and biological functions performed by the resource including ecosystem functions and human uses such as hunting opportunities and bird watching) that were injured, lost or destroyed due to hazardous substance releases from the Homestake Mining Company of California, Inc. (Homestake) into State waters. The intent of restoration funds is not to remediate hazardous substance sites but to restore, replace and/or acquire equivalent trust natural resources and lost services within the Whitewood Creek and the Belle Fourche and Cheyenne River watersheds for perpetual protection and conservation management. The intent is to also replace and/or restore those lost resources and services to the public and therefore, regulated public access is a necessary end product.

Public participation and review is encouraged to help the Trustees identify community concerns associated with restoration of the focus watersheds. Inclusion of public comments, responses to comments and changes made as a result of comments, will be incorporated into the Final Restoration Plan.

The first step in the natural resource restoration process was completed through the 1997 Preassessment Screens and initiation of a Natural Resources Damage Assessment (NRDA) which identified damages and injuries to trust resources that had historically occurred to Whitewood Creek and the downstream watershed (Section 3). The environments affected by hazardous substances are discussed both in terms of identification of trust resources (Section 4) and outlining known or potential injuries to trust resources (Section 5).

The Plan is the second step in the restoration process (Section 6) and determines appropriate restoration activities through action alternatives (Section 7). The alternatives and associated environmental assessments center around three themes: no action or action, limited terms vs.

perpetual protection of restored lands, and treatment of uncontaminated vs. contaminated (with hazardous substances) lands. Alternative 6, Permanent protection and restoration of lands not contaminated with hazardous substances, is the Preferred Alternative. This Alternative best meets all the Plan's goals and objectives of permanent restoration through replacement of lost, damaged or injured trust resources. The preferred alternative proposes to accomplish this via fee title ownership (land acquisition) or in-perpetuity conservation easements/management agreements with regulated public access.

The Final Plan will solicit interested cooperators and includes application instructions (Section 9) for potential restoration projects and activities. Selected projects will be scored according to ranking criteria (Section 8) and those selected for implementation will be guided through cooperative management plans. Section 10 lists the literature cited.

Appendix 1 contains a comprehensive glossary of definitions, acronyms and legal authority.
Appendix 2 lists State and/or Federal Threatened, Endangered and/or Species of Concern.
Appendix 3 lists applicable Federal and State legal authority. Refer to these appendices to clarify terms and species status.
Appendix 4 is the scoping list for this Draft Plan.

ACKNOWLEDGEMENTS

Shelly Deisch, Wildlife Biologist and appointed Plan Coordinator, and John Kirk, Program Administrator for Environmental Review and Management, South Dakota Department of Game, Fish and Parks, Division of Wildlife, were the principal Plan authors. The Plan was developed in coordination with the Restoration Management Team (the Team), which provided local ideas, information, expertise and direction. The Team also assisted with the development of restoration activities and alternatives, and provided review.

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1 INTRODUCTION

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, commonly known as "Superfund", is a two-pronged tool that provides for cleanup of hazardous substances and for restoration of natural resources lost or injured by hazardous substances releases.

1.1 CERCLA: PURPOSE, REQUIREMENTS AND DEFINITIONS

Please refer to "Section 11, Appendix 1. Glossary" for definition of frequently used terms and acronyms used throughout this Plan.

The first prong of CERCLA is cleanup (also referred to as remediation) which eliminates or reduces the potential for future contamination but may not fully restore resources that were destroyed or injured by hazardous substance releases. Cleanup generally focuses on human health and environmental concerns related to human health. The US Environmental Protection Agency (EPA) primarily carries out this work on sites designated for cleanup on the National Priority List (NPL). Cleanup may not restore natural resources to baseline conditions, although cleanup may prevent further injuries to natural resources through mitigation.

CERCLA's second prong, restoration (includes, but is not limited to, on-site restoration, off-site enhancement, replacement of similar local resources via management practices, habitat reconstruction, rehabilitation, mitigation, acquisition, replacement or other techniques), is accomplished through a Natural Resource Damage Assessment (NRDA). The Clean Water Act (CWA) authorizes NRDA when hazardous substances have been released or discharged into navigable waters. DOI employs specific procedures for assessing natural resource injuries that result from releases of CERCLA-defined hazardous substances (Code of Federal Regulations (CFR) – 43: Part 11, as amended in the 59 Federal Register, 14281, March 25, 1994). Under NRDA, injury is an adverse biological, chemical or physical effect on natural resources, such as death, decreased population or lost services. Services are defined as the physical and biological functions performed by the resource including human uses of those functions, such as hunting opportunities, bird watching and ecosystem functions, for example.

State, Federal and/or Tribal agencies responsible for natural resources act on behalf of the public as Trustees. Trustees are authorized under CERCLA to pursue damages (the estimated dollar value of injured resources, determined either through damage assessment studies or negotiation) against the responsible party, NOT the taxpayer, and use natural resource restoration as a means to make the public whole for its losses. Without compensatory restoration, the public will be left uncompensated for losses incurred (Unsworth et al. 1997) and would have to pick up the restoration tab. And consequently, any natural resource compensation received MUST be used for restoration of State, Federal and/or Tribal trust resources that have been injured. Before any settlement monies can be spent on restoration, Trustees must complete a restoration plan and provide for public input through the NEPA process.

1.2 TRUST RESOURCES

For the sole purpose of this Plan, trust resources are defined as those natural resources that belong to, are managed by, are held in trust by, appertain to, or are otherwise controlled by the State of South Dakota and/or the United States (US) and/or the Cheyenne River Sioux Tribe (CRST). Such resources include, but are not limited to, surface and ground waters, drinking water, fisheries resources, soils, sediments, habitat (including uplands, flood plains and riparian areas), vegetation, aquatic and terrestrial biota, aquatic and terrestrial invertebrates, wildlife, State or Federally listed threatened or endangered species and migratory birds.

1.3 RESPONSIBLE OFFICIALS AND RESOURCE TRUSTEES

CERCLA requires that the President and State Governors designate responsible officials as Trustees for natural resources under the jurisdiction of Federal and State governments. The Cheyenne River Sioux Tribe has natural resource jurisdiction for its designated tribal lands.

1.3.1. Federal Resource Trustees

The Secretary of the Interior has been designated to act on behalf of the public as Trustee for natural resources managed or controlled by the DOI. DOI administers lands, has interests in lands and has natural resource Trustee responsibilities for lands and the resources on those lands, along Whitewood Creek and the Belle Fourche, Cheyenne and Missouri Rivers. DOI also has Trustee responsibilities for Federally listed threatened and endangered species and for migratory birds, wherever they occur. DOI's missions are to encourage and provide for the appropriate management, preservation and operation of the Nation's public lands and natural resources for use and enjoyment both now and in the future; to carry out related scientific research and investigations in support of these objectives; to develop and use resources in an environmentally sound manner; to provide an equitable return on these resources to the American taxpayer; and to carry out trust responsibilities of the US Government with respect to American Indians and Alaska Natives.

DOI Federal agency responsibilities pertinent to this Plan include, but are not limited:

- The Fish and Wildlife Service (FWS) has responsibilities for migratory birds and Federally listed threatened and endangered species and their habitats. Over two hundred species of migratory birds are known to occur in the immediate vicinity of Whitewood Creek, the Belle Fourche River, the Cheyenne River and the Missouri River. Federally listed threatened and endangered species (Appendix 2) are also known to occur on these reaches (South Dakota Natural Heritage Program Database, SD GFP).

- The Bureau of Land Management (BLM) administers public lands across western South Dakota but for the purpose of NRDA, BLM's interest was nearly 50 tracts, including approximately 22 miles of riverbank along the Belle Fourche and Cheyenne Rivers which were allegedly contaminated by hazardous substances. Per the NRDA settlement

(Section 3.3), these referenced tracts were deeded to Homestake in exchange for a contiguous block of uncontaminated land near Hilland, South Dakota.

- The Bureau of Reclamation (BOR) administers lands across the State but for the purposes of NRDA, it administers a 150-foot transect for an irrigation canal crossing of Whitewood Creek on the NPL Site and approximately 0.5 miles of Federal land along the Belle Fourche River. The BOR also operates an irrigation project and has lien interests on private lands receiving irrigation water, extending 4 miles along Whitewood Creek and 19.5 miles along the Belle Fourche River.

1.3.2. State Resource Trustees

The Governor of South Dakota has designated the DENR as the Trustee for natural resources for the State. For this NRDA restoration process, DENR is working in conjunction with GFP. State natural resource Trustees have been designated to act on behalf of the public for natural resources, including supporting ecosystems, within the State boundary, belonging to, managed by, controlled by or appertaining to South Dakota.

South Dakota State responsibilities pertinent to this Plan include, but are not limited to:

- The DENR has responsibilities for environmental and natural resource assessment and regulation which provides protection of public health, conservation of natural resources and preservation of the environment.

- The GFP has responsibilities to perpetuate, conserve, manage, protect and enhance South Dakota's wildlife resources, parks and outdoor recreational opportunities for the use, benefit and enjoyment of the people of South Dakota and its visitors, and to give the highest priority to the welfare of this State's wildlife and parks, and their environment, in planning and decisions. Specifically, the Division of Wildlife manages South Dakota's wildlife and fisheries resources and their associated habitats for their sustained and equitable use, and for the benefit, welfare and enjoyment of the citizens of this State and its visitors.

1.3.3. Tribal Resource Trustees

The Cheyenne River Sioux Tribe (CRST), part of the Great Sioux Nation, is a governmental body for the Cheyenne River Sioux Indian Reservation. Tribal lands are located in north central South Dakota with the Cheyenne River as the southern boundary. The Tribe maintains jurisdiction within the boundaries of the Reservation and is the Trustee for those lands and resources, including the Cheyenne River, other surface and ground waters. The Black Hills (of which Whitewood Creek and its downstream waters have been impacted by hazardous substance releases by Homestake) was historically, and still is, sacred to the Great Sioux Nation.

2 PURPOSE AND NEED FOR THE CONCEPTUAL RESTORATION PLAN

The Plan provides background on known and potential resource injuries to Whitewood Creek and downstream receiving waters, identifies proposed restoration actions and presents a process for identifying and selecting specific restoration projects. In addition, opportunities exist for public and government involvement.

The purpose of this Plan is to guide the restoration of natural resources and/or services that were injured, lost or destroyed due to hazardous substance releases from Homestake into State waters. The Plan is needed because the preassessment screens (SD DENR 1997, US DOI and CRST 1997) and a preliminary Statement of damages and injuries to trust resources (SD GFP 1997) determined that injuries to natural resources and/or services had occurred. CERCLA requires preparation of a restoration plan prior to spending restoration money. The Plan will allow the presentation and evaluation of a range of restoration alternatives in order to ensure recovery of lost or injured resources.

This Conceptual Restoration Plan (The Plan) proposes to accomplish natural resource restoration by cooperative partnerships with other State, Federal, county or local governments, or non-profit organizations. CERCLA expressly requires that expenditure of damage settlement monies be used exclusively for the provision of permanent benefits to trust resources. Other values such as recreation improvement and environmental education are secondary to the primary purpose of natural resource restoration.

In order to coordinate and organize restoration efforts, the State DENR and GFP and US DOI entered into a Memorandum of Agreement (MOA) in July, 1999 (which was entered into Federal Court on September 2, 1999), in accordance with CERCLA, CWA and other Federal and State authorities. The MOA created State and Federal Approving Officials to authorize expenditure of Homestake Mining Company Natural Resource Restoration Fund (HMC NRRF) monies. The Approving Official for the State is the Secretary of GFP. The Approving Official for the DOI is the Regional Director, Region 6, of the FWS, or his or her designee. The Approving Officials created a Restoration Management Team (the Team) consisting of technical experts from the State DENR and GFP, and the US DOI: FWS, BLM and BOR (see Acknowledgments, Page iii). The Team is responsible for reviewing proposed projects and for developing and implementing restoration plans that include the development, planning, implementation and monitoring of restoration activities undertaken by the State and DOI. The Team selected a Whitewood Creek Restoration Plan Coordinator who will be responsible for the administration and oversight of activities.

The MOU further outlined decision-making and dispute resolution process. The State and DOI are each entitled to one vote in decision making and must both agree to any decisions regarding restoration planning or expenditures. The two Approving Officials intend to resolve any disputes

at the Team level. If the Team cannot resolve a dispute, each agency can elevate resolution to their designees, to higher level agency authorities, or the Approving Officials may establish other mechanisms for dispute resolution by mutual consent.

The Plan gives an overview of how this Restoration Fund came to be, how funds must be used and offers a broad description of affected trust resources. The Team will implement a phased approach as project proposals are approved and funded. The Plan will be incorporated by reference into selected project proposals to avoid lengthy recital and repetitive information. The Plan serves as an Environmental Assessment (EA) and offers various restoration alternatives, including a preferred alternative, for implementation. If the preferred alternative does not qualify as a major Federal action significantly affecting the quality of the human environment, an Environmental Impact Statement will not be required.

The intent of restoration funds is not to remediate hazardous substance sites but to restore, replace and/or acquire equivalent trust natural resources within the Whitewood Creek and the Belle Fourche and Cheyenne River watersheds for perpetual public uses and services.

2.1 GOALS AND OBJECTIVES

This Draft Plan will guide selection and implementation of restoration projects suggested by the general public, other State, Federal, county or local governments, or non-profit organizations. Initial scoping comments and the Team's responses will be included in the Final Plan and Administrative Record. The following restoration goals are proposed pursuant to damage assessment regulations and applicable State and Federal laws (Appendix 3):

- **Restore, replace or enhance injured and/or lost trust resources and services resulting from hazardous substances released into South Dakota's Whitewood Creek and the Belle Fourche and Cheyenne Rivers; and**

- **Compensate the public (make whole) for injured and/or lost trust resources and services resulting from hazardous substances released into South Dakota's Whitewood Creek and the Belle Fourche and Cheyenne Rivers.**

Goals will be achieved through the following objectives:

- **Natural resource recovery. Recover properly functioning habitats for the benefit of identified trust resources and services. This can be accomplished through restoration, replacement, enhancement, conservation and/or protection activities within injured and/or non-injured drainages of the Whitewood Creek and Belle Fourche and Cheyenne River watersheds. Particular attention will be given to viable populations of State and Federal threatened and/or endangered species and species of special concerns, and**

- **<u>Sustainable benefits</u>. Ensure funds and cooperative partnerships provide maximum benefits for restored, replaced or enhanced trust resources and services, in-perpetuity, when possible; and**

- **<u>Likelihood of success</u>. Ensure restoration projects have a high degree of success by evaluating technical feasibility and degree of restoration effort needed.**

Furthermore, damage assessment regulations require comparison and evaluation of various restoration alternatives (Section 7) before project initiation. Alternatives range from natural recovery (no action) to rehabilitation and acquisition of lands to restore or replace resources and lost services to baseline conditions. Chosen restoration projects will have to meet performance criteria (Section 8) that are clear and measurable, including monitoring, to determine efficacy and success in meeting the Plan's goals and objectives.

2.2 PUBLIC PARTICIPATION AND ADMINISTRATIVE RECORD

The Trustees recognize that public participation in the restoration planning process is desirable and necessary. Restoration effectiveness depends upon public dialog and support of local communities. The goals of public scoping include:

- Involve the public in the Plan's finalization.
- Identify issues of concern related to the Plan.
- Keep the public informed of restoration progress and developments.
- Identify potential cooperators that will best meet the Plan's goals and objectives.
- Solicit public involvement to identify projects that best meet restoration goals and objectives.

As restoration moves forward, public participation will be encouraged and a decision to offer additional public participation opportunities will be based on the nature of the comments received. Individuals and organizations on the Plan's scoping list (Appendix 4) will periodically receive information about the Plan's progress.

The FWS is the lead responsible Federal agency for this Plan and its Federal requirements will be followed. A Notice of Availability of the "Draft Conceptual Restoration Plan for Whitewood Creek and the Belle Fourche and Cheyenne River Watersheds, South Dakota" will be published in several South Dakota newspapers and will be mailed to individuals and organizations known to be interested (Appendix 4). The notice will identify public libraries and GFP and FWS websites where copies of the Draft Plan will be available.

A 30-day public review period and deadline for comments on the Draft Plan will be announced in the Notice of Availability. All comments must be received by November 1, 2004 to be considered in the Final Plan.

After comments have been received, the Team will consider and evaluate comments to produce the Final Plan. The design of conceptual restoration alternatives may be adjusted based on public comments and additional scientific information. After the Final Plan has been adjusted, the Restoration Team will seek applications for potential projects and partnerships.

Written comments on all phases of this Plan will be retained as a supplement to this Plan as part of the Administrative Record (established, maintained and housed by the Whitewood Creek Restoration Plan Coordinator listed below) and will be made available to the public upon request and appointment.

2.2.1. Whitewood Creek Restoration Plan Coordinator and Where to Locate Copies of the Draft Plan:

Copies of the Draft Plan may be available for review at the following locations:

SD Department of Game, Fish and Parks: http://www.sdgfp.info

DOI US Fish and Wildlife Service: http://southdakotafieldoffice.fws.gov

Rapid City Public Library
610 Quincy Street
Rapid City, SD 57701

Rawlins Municipal Library
1000 East Church Street
Pierre, SD 57501

Siouxland Library, Main Branch
201 N. Main Avenue
Sioux Falls, SD 57104

Single hardcopies may be available from:

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3 HISTORIC BACKGROUND

> ***"My mother came to the Black Hills by stagecoach in 1877. [My parents] settled on what was known then as a pre-emption, about 10 miles north of where Whitewood is now. It was a beautiful piece of land covered with soft water springs and wonderful meadows. Soon the Homestake started dumping slag into Whitewood Creek. That ruined the meadows, springs, and farm land …".*** ---Hugh Harney (Bracewell 1969)

3.1 MINING IN THE BLACK HILLS

Gold mining by several corporations and individuals began in the Black Hills of South Dakota in the mid 1870's. Today there is now only one large-scale, open pit gold mining company in operation. The Homestake Mine in Lead is no longer mining and producing gold. However, for 100 years from 1877 to 1977, Homestake discharged at least 100 million tons of gold-mill tailings and hazardous substances (collectively referred to in this Plan as contaminated sediments since tailings themselves are not classified as hazardous substances. See Appendix 1 for Superfund definition of hazardous substances.) into Whitewood Creek (Cherry et al. 1986, Goddard 1987a, Marron 1992, Rahn et al. 1996, US EPA 1989, US EPA 1990, US Geological Survey 1989a, US Geological Survey 1989b). Approximately 2,700 tons of contaminated sediments from Homestake were deposited daily into Whitewood Creek from about 1900 to 1978 (US EPA 1971). From 1920 to 1977, about 270,000 tons of arsenic were discharged into Whitewood Creek (Goddard 1989). Historically, gold was recovered by gravity or by amalgamation with mercury (Hesse et al. 1975). Use of mercury was discontinued in 1970. Since the early 1900's, cyanide was used for gold extraction (SD DENR 1995).

Whitewood Creek's headwaters begin in the northern Black Hills of western South Dakota and flow through Lead, South Dakota (Figure 1), which is the location of Homestake's gold mining and milling facility. Whitewood Creek was an efficient conduit, transporting contaminated sediments into the slow, meandering Belle Fourche River, because much of Whitewood Creek's channel downstream of Lead is steep and incised into bedrock (Marron 1989).

Periods of high stream flow created overbank deposits of contaminated sediments in the flood plains of Whitewood Creek and the Belle Fourche River (Marron 1988). Hazardous substances contained in sediments and tailings moved, and continue to move, along Whitewood Creek and

into downstream receiving waters and flood plains of the Belle Fourche, Cheyenne and Missouri Rivers, reaching Oahe Reservoir approximately 200 miles downstream, half-way across the State (US EPA 1990) (Figure 2).

Gold ores from the Black Hills frequently contain sulfide minerals composed of sulfur and various metals (such as aluminum, cadmium, copper, zinc, iron, selenium, lead and arsenic).

Figure 1: Major tributaries to the Belle Fourche and Cheyenne Rivers include Whitewood, Rapid, Elk and Spearfish Creeks of the Black Hills, South Dakota. Other landmarks include Deadwood, Lead, InterState 90 and the Crook City Bridge.

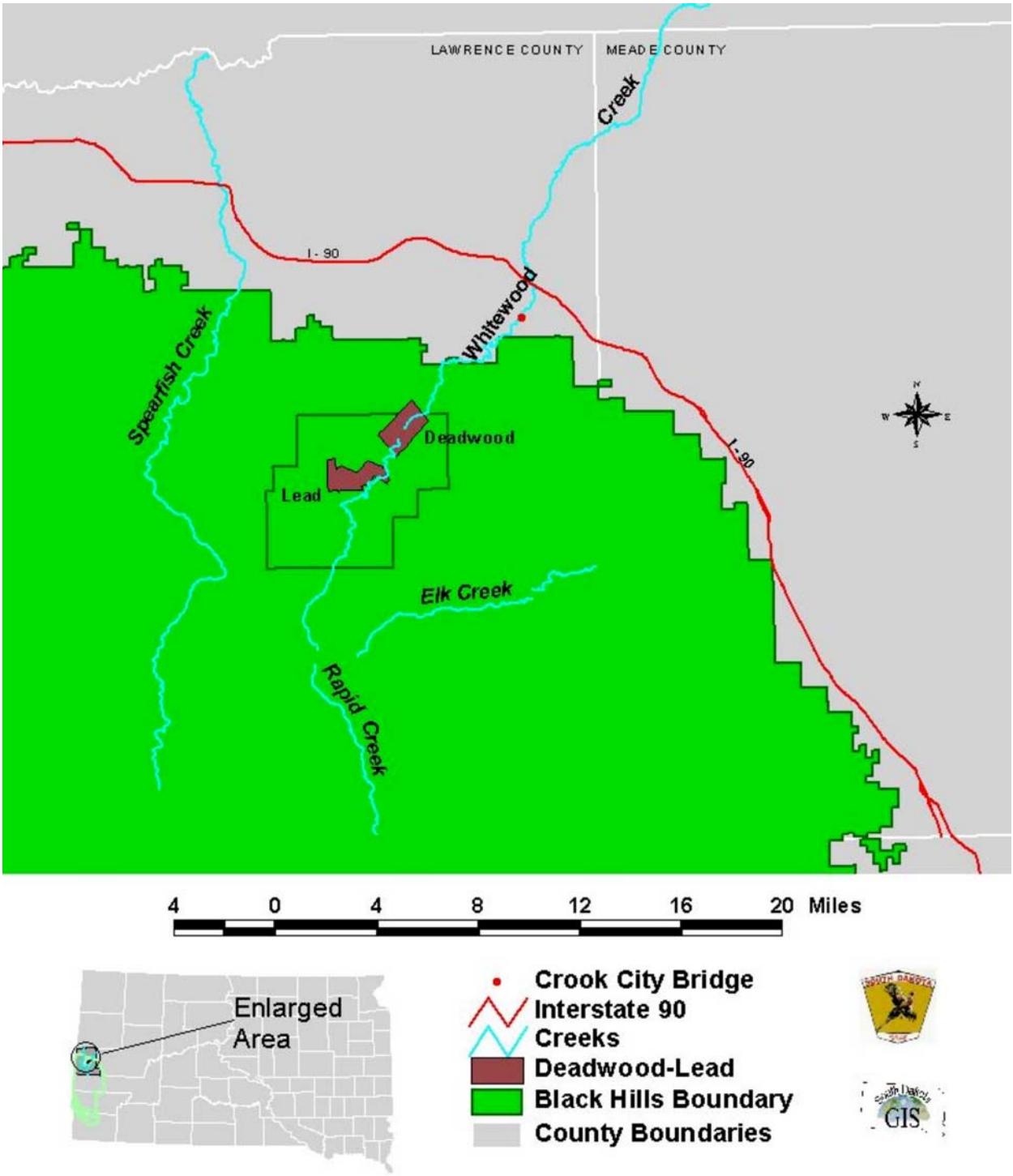
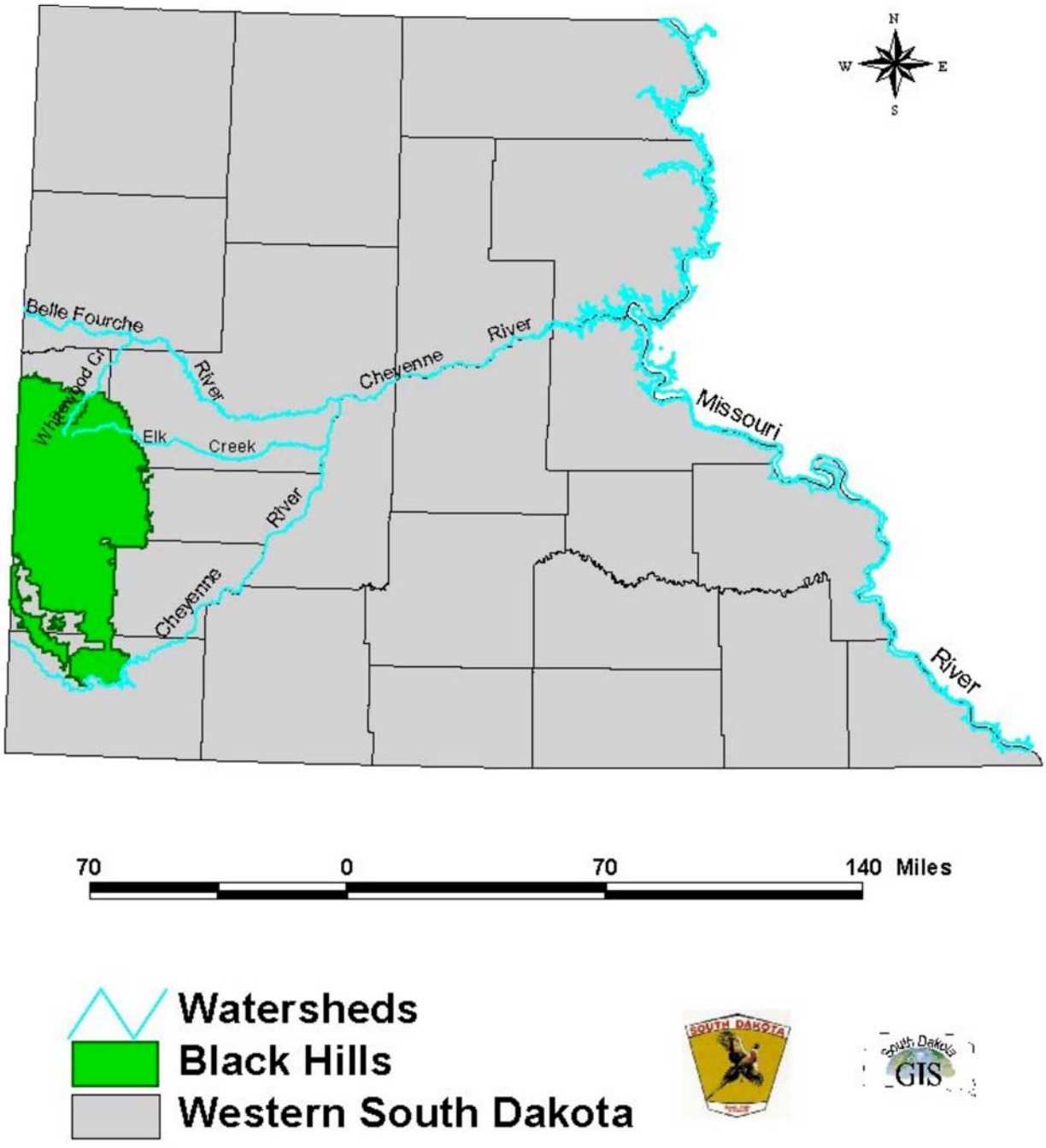


Figure 2: Western South Dakota showing the Black Hills, Whitewood Creek and the Belle Fourche, Cheyenne and Missouri River Watersheds



Tailings deposited into Whitewood Creek generally consisted of finely ground rock, residual metallic and nonmetallic compounds not extracted from ore and certain compounds used in the milling extractive process (US EPA 1990). Hazardous substances that continue to leach from tailings and contaminated alluvium, tainting surface and ground waters, include, but are not limited to: arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, zinc, cyanide and compounds of each substance (Callender and Robbins 1993, Cherry et al. 1986, Goddard 1987a, Horowitz et al. 1990, Marron 1989, Rahn et al. 1996, Ruelle et al. 1993, Sowards 1985, Sowards et al. 1991, Thilenius 1965, US EPA 1971, US EPA 1989, US EPA 1990, US Geological Survey 1988a, US Geological Survey 1988b, US Geological Survey 1989a, US Geological Survey 1989b).

The environmental risk of mining sulfide ore starts with the production of acid mine drainage (AMD) within the tailings and waste rock. AMD forms when the sulfide ore is exposed to air or water and oxidizes. The resultant drop in pH and mobilization of metals is highly toxic to biota. The environmental problem with this reaction is that the insoluble (or unavailable) metals become soluble (available), and this allows biota to systematically uptake or ingest dangerous levels of metals, many of which are classified as hazardous substances. The pH of the ecosystem is partially buffered by natural carbonate. Large outcrops of limestone bedrock are present along the upstream reach of Whitewood Creek. (Goddard 1987b). A ground water study along Whitewood Creek and the Belle Fourche River found that the magnitude of contamination to alluvial aquifers was less than what might be expected (considering the quantity of arsenic-sulfide minerals present in the tailings discharge) due to oxidization, minimal permeability, natural and introduced buffers (ibid.). Marron (1988) estimated that the "…metal-contaminated flood plain deposits will continue to be a source of metals to adjacent streams for centuries."

Gold-mill tailings were not the only substances released into Whitewood Creek. Prior to environmental laws, Homestake, various industries and the Lead/Deadwood sanitary district, discharged contaminated wastewater into Whitewood Creek. There are also several abandoned mines in the drainage basin that contribute to metal loading. (These other pollution sources and potential liable parties were not part of this NRDA lawsuit.)

Use of water was a critical component in gold extraction and in the removal of dust particles from ventilation of underground shafts. To support mining activity and to supply municipal water, a complex water collection system was developed beginning in the late 1870's to divert surface water from upper portions of Rapid, Elk and Spearfish Creeks (Figure 1), which diminished instream flows. The diversion was authorized and permitted by the State and still exists today. In December 2001, the Homestake Mining Company of California, Inc., ceased its gold mining and production of the Homestake Mine in Lead, South Dakota.

3.2 REMEDIATION AND MITIGATION PRIOR TO 2001

Homestake ceased tailings disposal into Whitewood Creek in December, 1977. In settlement of litigation (CIV 78-5094) brought by the US and the State under the CWA, Homestake implemented wastewater treatment in 1984 for wastewater flows from its mining operations.

Commencing in 1981, the EPA, State and Homestake began a remedial investigation under CERCLA along that portion of Whitewood Creek and its flood plain between the Crook City Bridge and the Belle Fourche River (Figure 1). The 18-mile stretch of Whitewood Creek, approximately 2,018 acres, was proposed for inclusion on the NPL of Federal Superfund sites on September 8, 1983. From 1983 to 1990, the NPL Site was investigated for the nature and extent of contamination. Arsenic was identified as the most important hazardous substance of concern; however, increased concentrations of various other substances were documented in flood plain sediments (Goddard 1989, US EPA 1990).

EPA completed its Remedial Investigation and Feasibility Study in 1989. Study results indicated that unacceptable levels of arsenic contamination existed in Whitewood Creek surface water, alluvial ground water, tailing deposits and residential soils located within the NPL Site. On March 30, 1990, the EPA issued a Record of Decision (ROD) which detailed selected remedial alternatives primarily for protection of human health and the environment. Pursuant to a 1991 Consent Decree between the US and Homestake (CIV 90-5101), Homestake implemented the selected remedy. Remedial action consisted of covering and/or removing contaminated soils at existing residential properties, establishing institutional controls to restrict access to tailings deposits and monitoring Whitewood Creek for hazardous substances. The remedial action, other than ongoing monitoring and reviewing activities, was completed in 1994. Thus, the EPA removed the Site from the NPL in 1996.

At the time the NPL Site was listed and remedial action was completed in 1994, some remedial treatments (i.e. installation of Homestake's wastewater treatment plant) contributed to some degree of restoration for impacts to natural resources such as aquatic life and surface waters (EPA 1990). Remediation, as defined by CERLA, was the primary focus, not restoration. Remediation did not bring resources back to baseline condition within the NPL or Restoration Site. Additionally, potential impacts to natural resources downstream from the NPL Site were not addressed.

What is happening within the NPL Site? In the early 1980s, insects, mosses and algae reappeared in Whitewood Creek, trout were reintroduced and riparian vegetation returned to the denuded 18-mile reach (Glover 1982). Aquatic surveys indicate that at least nine fish and one frog species have reestablished within the Whitewood Creek NPL Site (Chadwick Ecological Consultants, Inc., et al. 1997, Newman et al. 1999). Species richness indices for aquatic invertebrates indicate generally good water quality (Chadwick Ecological Consultants, Inc., et al. 1997) but seasonal fluctuations in the invertebrate community indicate stream impairment and stressful conditions during high water events (Newman et al. 1999). This is probably due to flushing of hazardous substances in the tailings and sediments (EPA 1990, USGS 1995). Another theory postulates that impairment could be related to increased metals and associated with degradation of habitat quality (EPA 2001).

Schmulbach et al. (1992) stated, "Whitewood Creek is an example of gross environmental degradation tacitly condoned by public apathy that was halted and then ameliorated by substantial pollution-control efforts. Once pollutants were no longer discharged, the ecosystem

repaired itself, a tribute to its resilience…this story has not reached its conclusion…and the potential for future problems with heavy metal toxicity are real."

3.3 ESTABLISHMENT OF THE NATURAL RESOURCE RESTORATION FUND

In 1997 the State and DOI completed Preassessment Screens (SD DENR 1997, US DOI and CRST 1997) and a preliminary Statement of injuries and damages to trust resources (SD GFP 1997) and initiated the Natural Resources Damage Assessment (NRDA) process for damages and injuries to natural resources that had historically occurred, and continue to occur (Callender and Robbins 1993, Marron 1992, US EPA 1989, and US Geological Survey 1989b) as a result of hazardous substance releases by Homestake into State waters. Under CERCLA, this process is for determination of compensation in order to restore injured resources to a pre-release condition.

Because the State believed that Homestake was the primary responsible party for damages and injuries to trust resources, the State filed suit against Homestake (South Dakota v. Homestake Mining Company of California, CIV 97-5078) on September 25, 1997, alleging claims for natural resource damages, under CERCLA, Section 107, 42 USC § 9607, for:

- Recovery of natural resource damages;
- Lost services provided to humans and the environment by those resources;
- Diminished resource values and past response costs;
- Declaratory judgment for future response costs, with respect to alleged releases and threatened releases of hazardous substances (excluding relief relating to response actions by EPA governed by the 1991 Consent Decree); and
- Alleged releases resulting in a continuing public nuisance, as defined under State law (SDCL 21-10-1).

The US and the CRST also sought natural resource damages on November 26, 1997, (United States and Cheyenne River Sioux Tribe v. Homestake Mining Company of California, CIV 97-5100) under CWA, Section 311(f)(4), 33 USC § 1321(f)(4) and claims for past and future response costs under CERCLA with respect to releases of hazardous substances (with the exception of claims on behalf of EPA within the NPL Site covered by the 1991 Consent Decree). The two lawsuits, CIV 97-5078 and CIV 97-5100, were consolidated on December 30, 1997 and are referred to as consolidated actions.

A Consent Decree (the Decree) of the consolidated actions was filed in July, 1999, in the US District Court for the District of South Dakota, Western Division, and was advertised for public comment. After receiving no public comment, the Court entered the Decree on September 2, 1999. Following is the Decree summary in which Homestake agreed to:

- Pay a $4 million settlement, issued in four equal annual installments, negotiated for the HMC NRRF. One third of each annual installment will be paid to the CRST, which will manage its own funds and is not part of this Plan or the HMC NRRF. The remaining two thirds of each annual payment installment is to be used jointly by the State and Federal Trustees, of whom this Plan and HMC NRRF address**;**

- Amend its South Dakota Water Right No. 43A-1 to not divert water for three months (July, August and September) of each calendar year, at the Little Spearfish Creek intake to the extent that such diversion would reduce the instream flow in Little Spearfish Creek below 20 cubic feet/second of water, as measured at the Little Spearfish Creek point of diversion authorized by Water Right No. 137-1. This will allow water to flow over Spearfish Falls for three months of the year. Homestake further agreed to transfer to GFP the existing rights under Water Right No. 43A-1 upon final and complete mine closure. Since the MOU was signed, Homestake has transferred its water right and GFP has restored natural flow of Little Spearfish Creek and Spearfish Falls for the first time since 1917. Nothing further on this Water Right amendment will be addressed in this Plan;

- Pay the US $500,000 for reimbursement of natural resource damage assessment incurred costs. This is a single one-time payment and will not be further addressed in this Plan;

- Pay the CRST $500,000 for future environmental monitoring or other environmental purposes. Homestake also agreed to transfer by gift deed, 400 acres of land from its holdings within the Black Hills area to the CRST for non-commercial purposes. Again, this Plan does not address Tribal plans for natural resource damage settlements; and

- Develop a land exchange for BLM lands alleged to be contaminated by tailings. The terms of this agreement have been met, but final identification of exchanged lands will not be addressed in this Plan any more extensively than described in Section 1.3.1.

4 AFFECTED ENVIRONMENT - TRUST RESOURCES

Such resources include, but are not limited to, surface and ground waters, drinking water, fisheries resources, soils, sediments, habitat (including uplands, flood plains and riparian areas), vegetation, aquatic and terrestrial biota, aquatic and terrestrial invertebrates, wildlife, State or Federally listed threatened or endangered species and migratory birds.

This section discusses known trust resources affected or potentially affected by hazardous substances within Whitewood Creek, Belle Fourche and Cheyenne River Watersheds. "Affected environment" also refers to known trust resources that could be impacted (both positively and negatively) by restoration efforts. Because this Plan is conceptual and covers a broad expanse of watersheds, site specific assessments on affected environments will be conducted on selected restoration projects.

The following summarization includes accounts, observations, preliminary investigations, biological injury tests and/or supplemental reports from DENR, GFP, FWS, BLM, BOR, EPA, Homestake and various published journals and literature. Surveys, inventories and monitoring of trust resources are normally evaluated and quantified through studies conducted during the NRDA process. Therefore, this section is not intended as an exhaustive literature review nor is it intended as conclusive research results. The Team acknowledges that data are inadequate to document all trust resources. Again, known trust resources will be evaluated for each restoration alternative when specific project proposals have been submitted for consideration.

4.1 RESTORATION SITE DESCRIPTION

The Restoration Site (Figure 2) is much more broadly defined than the narrowly defined NPL Superfund Site (18-mile stretch described in Section 2.2). For the Plan's purposes, Restoration Site activities will be conducted to the extent possible within the Whitewood Creek and the Belle Fourche and Cheyenne River watersheds in South Dakota (MOA 1999).

Variability within western South Dakota is extreme and difficult to describe in a simple manner. Refer to Figure 2 for visual presentation of major landscape features. Stream order is simplified as follows: Whitewood Creek flows into the Belle Fourche River, which flows into the Cheyenne River, which flows into the Missouri River at Oahe Reservoir, a major impoundment. It is not the intent of this Plan to describe detailed Missouri River features. Suffice it to say that the Missouri River bisects South Dakota from north to south and all rivers in western South Dakota flow into the Missouri River. Western South Dakota is unglaciated and the Missouri River was formed along the western-most boundary of a great glacier.

4.1.1. The Black Hills and Whitewood Creek

The Black Hills are the dominant physical feature of western South Dakota. They are isolated, unglaciated mountains surrounded by a sea of grass. The Black Hills elliptical dome covers nearly 6,000 square miles, extending approximately 120 – 125 miles from north to south and approximately 50 – 60 miles from west to east (Feldman and Heimlich 1980, Froiland and Weedon 1990). Altitudes range from 7,242 feet at the highest granite peak (Harney Peak) to average foothill elevations of 3,200 feet on the surrounding Northern Great Plains. A much smaller segment, the Bear Lodge Mountains, extends into northeast Wyoming.

Black Hills soils are extremely varied. Most soils are derived from limestone or sandstone and alluvium derived from igneous and metamorphic parent material. Soils along streams are deep silt loams of variable depth and with weak subsoil development (Froiland and Weedon 1990).

Black Hills climate is distinctly different from the surrounding Northern Great Plains. The Black Hills is known locally as "the banana belt" of South Dakota due in part to the moderated winters and summers. Temperatures average around 60 - 70ºF in the summer to 30 - 40ºF in the winter. Precipitation throughout western South Dakota is related to elevation. As elevation increases, precipitation generally increases and temperature generally decreases (Froiland and Weedon 1990). Average annual precipitation varies spatially from 28 inches in the north to 14 inches in the south. Most precipitation falls from April through September and frequently as high intensity rainstorms. The northern Black Hills can experience significant snowfall with an average annual total of over 100 inches (US DOI and US DOA 1967).

Whitewood Creek is a small, perennial tributary of the Belle Fourche River. From its headwaters in the northern Black Hills, it occupies a deep, narrow canyon with minimum flood plain and flows over gravel, cobbles and a bedrock complex of Precambrian metamorphic rock and Tertiary intrusions (where gold mining occurs). Whitewood Creek then flows northeast to the prairie grasslands near InterState 90. This stretch is classified as coldwater permanent/marginal fish life propagation water (ARSD 74:51:01:01, 74:51:03:02 and 74:51:03:10). Average gradient is about 264 ft/mi (50 m/km). (Goddard 1987b).

From I-90 to the Belle Fourche River confluence, Whitewood Creek's gradient flattens to about 106 ft/mi (20 m/km), through a wider channel with a substantial flood plain underlain by younger limestone and shale (Goddard 1987b). Stream flow ranges from 5 ft^3/s (0.15 m^3/s) to 39 ft^3/s (1.1 m^3/s). This stretch is classified as warmwater permanent fish life propagation water (ARSD 74:51:01:01, 74:51:03:02 and 74:51:03:10).

4.1.2. The Northern Great Plains and the Belle Fourche and Cheyenne Rivers

Broad, shallow valleys and gently sloping hills characterize Northern Great Plains topography. Escarpments up to 200 feet in height exist along the Belle Fourche River. Soils in the Belle Fourche and Cheyenne River basins range from well-drained, level, flood plain soils to sloping soils formed in alluvium on terraces and bottom lands to moderately steep, silty soils over shale

and limestone. In general, basin soils are slowly drained, with good water-holding capacities that shrink and crack when dry (Roddy et al. 1991).

The Northern Great Plains climate is semi-arid continental, with large variations in precipitation and temperature compared to the Black Hills. Low relative humidity, frequent high winds and little precipitation typify the climate. Winters are harsh, but infrequent Chinook winds can warm temperatures and melt snow. Lowland snowmelt normally occurs before April and spring temperatures are cool. Summers are hot and temperatures can exceed 100˚ F. Autumns are cool with first snowfall occurring in November (Roddy et al. 1991). In western South Dakota, not including the Black Hills, precipitation ranges from 14 to 17 inches per year, with most precipitation occurring from April through September. Total winter snowfall averages 20 to 30 inches on the Northern Great Plains (Froiland and Weedon 1990).

The Belle Fourche and Cheyenne Rivers originate in eastern Wyoming and nearly encircle the Black Hills uplift; the Belle Fourche on the north and the Cheyenne on the south. Both rivers flow through sparsely populated regions. The Belle Fourche River flows into the Cheyenne River approximately 15 miles southwest of the Haakon – Meade County line.

The Belle Fourche River is the largest tributary of the Cheyenne River and drains about one-third of the entire Cheyenne River basin (Heakin 1998) and together the two rivers receive all runoff from the Black Hills. The rivers flow within limestone outcrops and Late Cretaceous shale (a source of sulfate and selenium). The rivers continue flowing eastward across flat outcrops of Cretaceous Pierre Shale, locally known as gumbo, a marine shale containing high concentrations of iron, manganese and limestone concretions. Pierre Shale has an abundance of low permeability bentonite clay, resulting in high runoff during intense or extended rainfall (Heakin 1998, Roddy et al. 1991). The average gradient of the Belle Fourche River downstream from the city of Belle Fourche is about 6 ft/mi.

The Cheyenne River forms the southern CRST Reservation boundary and is the largest tributary to the Missouri River within South Dakota (drainage area approximately 25,500mi^2.) (Heakin 1998). The average gradient on the Cheyenne River from the town of Wasta, is about 6 ft/mi. Flow volumes in western tributaries to the Missouri River vary widely among seasons and years. Flows range from overbank-full to dry at many tributary sites during a single year (Ruelle et al. 1993). About half-way between its confluence with the Belle Fourche River and its mouth on the Missouri River, mean monthly stream flow on the Cheyenne River ranges from 100 ft^3/s in January to about 2,000 ft^3/s in May, which coincides with lowest and greatest seasonal precipitation, respectively (Heakin 1998).

4.2 FAUNA AND FLORA

It is no surprise that extreme variability in physical and climatological features lend itself to heterogeneous biological features. The Black Hills Area Resources Study (US DOI and US DOA 1967) stated that "It [Black Hills] is in truth a biological nonconformity in the Great Plains, displaying features of both plains and mountains." Flora and fauna mirror that nonconformity.

Discussion of Restoration Site species (Appendix 2) is limited to rare, endangered or otherwise protected biota, important sport or commercial species and any species that is essential to, or indicative of healthy habitats. Discussion also encompasses wildlife receptors because those species may be exposed to hazardous substances. For ease of reading, most species are listed in the text by common name. Correlating scientific names are found in Appendix 2.

The Restoration Site supports a variety of flora and fauna commonly found in western coniferous, mixed hardwood forests and short-grass plains with an overlap of some eastern tall-grass prairie species. Most of the Black Hills is ponderosa pine (*Pinus ponderosa*) forests with some patchiness of white spruce (*Picea glauca*), juniper (*Juniperus* spp.), deciduous trees and shrubs, meadows and rock outcrops. On the Great Plains, the mixed-grass prairie and steppes are dominated by western wheatgrass (*Pascopyrum smithii*), needlegrasses (*Stipa* spp.), grama (*Bouteloua* spp.) and buffalo grasses (*Buchloe dactyloides*) and forbs with a mix of juniper, deciduous shrubs and trees within drainages and draws.

A comprehensive list of known vertebrate, invertebrate and plant species within the Restoration Site is unavailable or unknown. Appendix 2 offers more detailed descriptions of known species. Based on various sources, following is an approximate account:

- 139 - 191 avian species, both permanent residents or migratory species that return each year to the Black Hills (Froiland and Weedon 1990, USDA Forest Service Black Hills National Forest Checklist of Birds)

- 150 – 200 avian species, including migratory and wintering waterfowl, use waterways along the Belle Fourche River (Roddy et al. 1991)

- 9 avian species are State and/or Federally threatened, endangered or candidate and 7 are known to occur or could occur within the Site

- 62 mammalian species in the Black Hills (Turner 1974, Higgins et al. 2000)

- 70 mammalian species known to occur throughout the Belle Fourche and Cheyenne River watersheds

- 5 mammalian species are State and/or Federally threatened, endangered or Federal candidates and are known to occur or could occur within the Site

- 52 fish species and 1 hybrid have been documented within Whitewood Creek and the Belle Fourche and Cheyenne Rivers (South Dakota Game, Fish and Parks In House Data, Thilenius 1965, Ruelle et al. 1993, Doorenbos 1998, Hampton 1998). More specifically, the number of species documented by watershed is:
    - 16 species of fish and 1 hybrid in Whitewood Creek
    - 29 species of fish in the Belle Fourche River
    - 45 species of fish in the Cheyenne River

- 4 species of fish are listed as State and/or Federal threatened, endangered or candidate or species of concern and are known to occur or could occur within the Site

- 5 anuran (frogs and toads) and one salamander (Peterson 1974, Fischer et al. 1999) species within the Site

- 3 turtle, 1 lizard (State rare) and 10 snake species (Peterson 1974) within the Site

- Unknown number of invertebrate species but includes species of concern such as Oreohelix snails, Regal Fritillary butterfly and American burying beetle.

- 10 species of plants are listed as State species of concern:

  In 1989, a vegetation survey conducted along a downstream portion of Whitewood Creek in the Northern Great Plains identified 289 different plant species (Harner and Associates, Inc. 1991). Six plant species of State concern historically occurred in this area but were not found during the 1989 survey. However, surveys found alpine rush (*Juncus alpinus*), a South Dakota species of concern.

4.3 WATER RESOURCES

Water is one of the most important natural resources within the Site. The Black Hills Area Resources Study (US DOI and US DOA 1967) reported that water was essential in use and management of other renewable resources of the Black Hills. Water resources for which the State of South Dakota is Trustee include, but are not limited to:

- Surface water, including the major tributaries of Rapid, Elk, Spearfish and Whitewood Creeks and the Belle Fourche and Cheyenne Rivers, and Lake Oahe;

- Ground water in the alluvium of Whitewood Creek and the Belle Fourche River; and

- Riparian wetlands and habitats associated with the surface waters described above.

4.3.1. Surface Water

Major tributaries within the Restoration Site were described in Section 4.1.

4.3.2. Ground Water

Ground water in western South Dakota derives from two sources: alluvium in bedrock valleys cut by surface streams; and bedrock aquifers, which dip radically away from the Black Hills. The alluvial valleys are locally important for agricultural and domestic water supplies and are

recharged by surface stream flow. Bedrock aquifers, sandstones and limestones are regionally important as local water supplies, but the water is highly mineralized (US EPA 1971).

Primary aquifers of the Whitewood Creek drainage area are a shallow alluvial aquifer and two deep bedrock aquifers, the Mesozoic Dakota sandstone and the Paleozoic Minnelusa limestone (US EPA 1990). The water table occurs in natural alluvium underlying and adjacent to tailings but will rise into the tailings during wet periods. Some recharge occurs as precipitation infiltrates through the terrace materials and tailings (US EPA 1990). Bedrock aquifers are separated from the shallow aquifer by deep, low permeable shale, which limits the connection between the alluvial and bedrock aquifers (US EPA 1990).

On the Belle Fourche and Cheyenne Rivers, ground water sampling in the 1970's indicated poor quality with high salt and selenium contents due to natural background sources in the Pierre Shale formation (Stach et al. 1978).

4.4 GEOLOGIC RESOURCES

Geologic resources for which the State of South Dakota is Trustee include, but are not limited to:

- Sediments (including bank, bed and floodplain sediments) associated with the surface waters of Whitewood Creek, Belle Fourche and Cheyenne Rivers and Lake Oahe;
- Rocks, minerals, petroleum and natural gas; and
- Soils, including lowland and floodplain soils, and upland areas affected by wind deposition.

4.5 PUBLIC USES AND SERVICES

The dominant land use within the Black Hills portion of the Restoration Site is ponderosa pine timber output on public lands (EPA 1990, USDA 1997), urban and rural developments and recreation (Mueller 2002). Within the Northern Great Plains, dominant private land use includes agricultural practices such as livestock grazing, water diversion for irrigation, haying and cultivation of small grains (State of South Dakota 2002).

CERCLA defines public uses and services as: "The physical and biological functions performed by the resource including human uses of those functions. These services are the result of the physical, chemical or biological quality of the resource" and include, but are not limited to:

- Water for drinking and other domestic uses;
- Water for livestock and irrigation of crops;

- Primary and secondary contact recreation including swimming and other activities;
- Consumptive and non-consumptive outdoor recreation including hunting, fishing, trapping, wildlife viewing, mushroom and berry picking and photography;
- Habitat for fish and wildlife, including food, shelter, breeding and rearing areas, and other factors essential to long-term survival;
- Use, option and bequest values related to all of the above services; and
- Non-use values, including existence values, related to all of the above services.

There is a wide spectrum of recreational opportunities on and around the Restoration Site such as wildlife and scenic observation, fishing, hunting, trapping, canoeing, boating, snowmobiling, skiing, snowshoeing, hiking, camping, rock climbing, photography, auto touring, plant identification, berry picking, bird watching, recreational gold panning and picnicking. The Black Hills offers flyfishing. Fishing and canoeing are particularly popular activities on the Belle Fourche and Cheyenne Rivers during the spring and summer months (Larson 2001).

Canoeing seems to be increasing in popularity on these two rivers, which have numerous access points at various road crossings. The bicentennial of the Lewis and Clark expedition began in 2003 and extensive visitation is expected along the historic expedition route. The Belle Fourche and Cheyenne Rivers may receive a significant increase in canoeing activities during the four-year celebration. These two rivers remain less altered than that portion of the Missouri River in South Dakota and thus, are more suitable for canoeing (Larson 2001).

Communities along the Cheyenne River also utilize parts of the river for swimming, small-scale recreational activities for children and young adults and intensive fishing for human consumption. Parts of the timbered bottomlands are also suitable for collecting native plants for medicinal use and gathering mushrooms and firewood (Larson 2001).

It is difficult to determine use in terms of hours or days spent on any one particular activity due to the remoteness of the area. Tourism is one of the top four most economically important industries to South Dakota (State of South Dakota 2002) and tourism also benefits from recreational opportunities such as those uses listed above.

4.6 CULTURAL RESOURCES

Cultural resources as defined in the National Historic Preservation Act (NHPA) are archaeological, historical, or architectural sites, buildings, structures, objects, districts, or properties of traditional religious and cultural importance to Native Americans. Cultural resources on public lands or those affected by Federally funded or permitted projects are protected and governed by a number of Federal laws, regulations and guidelines (Appendix 3).

Section 106 of NHPA specifies that Federal agencies must consider the impacts of an activity on historic properties. Historic properties are those buildings, structures, sites, objects, or districts, or properties of traditional religious and cultural importance to Native Americans that are included in or eligible for inclusion in the National Register of Historic Places (NRHP). Not all cultural resources qualify as historic properties. A Federal agency must determine the eligibility of cultural resources and consider the impacts of its activities on those resources that are considered historic properties in consultation with the State of South Dakota through the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), interested Tribes, local governments, and the general public.

4.6.1. Archaeological Context of the Restoration Site

SHPO has an archaeological plan, which divides the State into regions, and describes the archaeological context of each region (Winham and Hannus 1991). The State plan defines the lands included in the Restoration Site to be in the following archaeological regions: Black Hills, Belle Fourche, South Fork Cheyenne, Central Cheyenne and the Bad Cheyenne (Table 1). This is based on archaeological investigations that have been conducted in each region.

Table 1: Archeological Regions in the Restoration Site

Region Name	Geographic Area	Characteristic of Each Region
Black Hills	Region defined by geologic formations that define the Black Hills uplift.	Extensive archaeological surveys have been conducted by Federal land management agencies. Region characterized by the variety of sites associated with prehistoric and historic activities.
Belle Fourche	Region defined by the Belle Fourche River watershed.	Archaeological surveys have been conducted primarily on Federally managed lands and for Federal projects. Region characterized by the variety of sites associated with prehistoric and historic activity.
South Fork Cheyenne	Region defined by the South Fork Cheyenne River watershed.	Many archaeological surveys have been conducted in this region, which have identified a variety of types of sites associated with prehistoric and historic activities. Majority of work has been on Federally managed lands and for Federal projects.
Central Cheyenne	Region defined by the Cheyenne River Valley, terraces, breaks, and adjacent plains.	Few archaeological surveys have been conducted in this region. Little known about the archaeology.
Bad /Cheyenne	Region defined by the Missouri River, breaks and adjacent plains.	Extensive surveys of the Missouri River trench with studies of prehistoric village sites on Army Corps lands prior to inundation of Lake Oahe.

The majority of all cultural resource investigations is done in compliance with Section 106 and Section 110 of NHPA and has been conducted by Federal agencies (i.e. U.S. Forest Service, Bureau of Land Management, U.S. Bureau of Reclamation, and the National Park Service) for Federally sponsored projects. Some regions contain large areas of Federal lands, which have been subject to archaeological investigation. Fewer investigations have been conducted in

regions with a preponderance of privately owned land. As a result, the focus of archaeological investigations is not equal in all regions.

4.6.2. Overview of Archaeological Research

Archaeological research in western South Dakota has largely focused on locating sites, inventorying their contents, making determinations of their temporal affiliation and to a lesser degree making determinations of their eligibility of listing on the National Register of Historic Places (NRHP). Such a determination is often costly and time consuming because it involves archaeological excavation and a laboratory analysis of cultural materials. As a result, only certain sites are evaluated. Archaeological sites contain artifacts, cultural deposits and features that may be considered an expression of people's adaptation to the environment. People's material needs were met by various natural resources that were consumed and made into useable objects.

The archaeological record of western South Dakota indicates humans have inhabited the area for the past 11,500 years. Five major archaeological periods have been constructed, which are in part defined by the material remains from people at archeological sites (Frison 1991). They have been classified as: Paleo-Indian, Archaic, Late Prehistoric, Proto-Historic, and Historic periods. For the purpose of this discussion the term "prehistoric" is used generically to refer to the Paleo-Indian, Archaic, Late Prehistoric periods (Table 2, adapted from Frison 1991).

Table 2: Prehistoric and Historic Temporal Periods in Western South Dakota.

Period	Duration	Description	Site Characteristics
Paleo-Indian	12,000 to 8,000/7,500 years BP (before present)	Nomadic hunter-gatherers who hunted now extinct species of animals.	Sites contain plant and animal remains, distinctive tools and projectile points
Early Archaic Middle Late	7,500 to 5,000 years BP 5,000 / 3,000 years BP 3,000 - 2,000/1,500 years BP	Nomadic, generalized hunter-gatherers who hunted "modern" animals and gathered plants. Used the spear thrower (atlatl).	Includes occupation sites and lithic scatters
Late Prehistoric-Plains Woodland & Plains Village	2,000/1,500 years BP, circa 1750 AD	Increased sedentism, introduction of horticulture, ceramics, and bow and arrow. Villages with defensive perimeters indicating warfare.	Includes artifact scatters, rockshelters, stone circles and earthlodge villages.
Protohistoric	circa AD 1700-1800	Non-Indian trade goods. Introduction the horse and equestrianism	Sites contain manufactured metal artifacts and other objects obtained through trade.
Historic	circa 1750 AD to Present	Non-Indian immigration and technology into the area. Intensive agriculture, ranching and early irrigation systems	Trading posts, railroads, farmsteads, mining sites.

Artifacts at sites from the Paleo-Indian, Archaic, and Late Prehistoric periods differ in material and workmanship. Plant and animals remains differ as well. Differences are considered to relate to punctuated changes in environmental conditions, as well as changes in people's social environment. Social change is evident in Late Prehistoric period sites and becomes very evident in sites from the Proto-Historic and Historic periods. Following is a brief description of each period, simplified to provide an overview of the periods represented in archaeological sites in the restoration project area. Not discussed in detail is the complex archaeological variability that exists based on time and the significant regional variation in material content and spatial distribution of sites.

4.6.3. Paleo-Indian Period (11,500-7500 BP)

The Paleo-Indian period represents the oldest sites in the area. Good preservation of sites from this period is rare in western South Dakota and typically consists of animal kill and processing sites and campsites. However, plant gathering and general foraging was also likely to have been an engaging activity during this time. The few intact sites, such as the Ray Long site in the southern Black Hills, have yielded tools, remains of now extinct species of animals and fire hearths. Typically, Paleo-Indian sites consist of a single isolated projectile point which are found throughout the northern plains. Some researchers accredited the wide distribution of these relatively sparse sites to be indicative of a highly mobile lifestyle (Bamforth 1988, Frison 1991).

4.6.4. Plains Archaic Period (7500-2000/1500 BP)

The Plains Archaic period is distinguished by changes in projectile point styles and changes in the kinds of plants and animals available for food and material needs. These changes are considered to be representative of people's ability to cope and adapt to climatic change. The Archaic Period has been further divided into three distinctive sub-periods classified as the Early, Middle and Late archaic times.

The Early Archaic is considered to have been a time characterized by a drier and hotter environment. The effect of climate change 7500 to 5000 years ago is considered to have caused scarcity of animals and plants that people preferred during the Paleo-Indian period. The atlatl, an instrument that increases the throwing range of spears or darts, may have first appeared in conjunction with certain point types developed during this period. People may have increased reliance on refuge areas away from the arid plains, such as the mountains and high country where conditions were cooler and less arid. Relatively few Early Archaic archaeological sites in the northwestern plains have been found.

Archaeological sites representing the Middle Plains Archaic indicate increase in bison, which is considered to be indicative of greater availability. More sites from this time are found in the plains relative to the Early Archaic. Stone circle sites appear in archaeological site for the first time, which have been interpreted as the remains of tipis or circular lodge shelters (Kornfeld and Cartwright 1991; Wedel 1961).

The Late Archaic climate was less harsh, which accounts for increases in the number of archaeological sites found in the Belle Fourche drainage. This time is distinguished by changes in projectile point forms, which became stylized and appear broadly throughout sites from this time. Pottery, a strong characteristic of Late Prehistoric period sites, appears for the first time in a few archaeological sites.

4.6.5. Late Prehistoric Period (2000/1500-300 BP)

Generally speaking the Late Prehistoric period is divided into the Plains Woodland and Plains Village cultural traditions. These have further been defined into respective early and late and Middle and Late periods with distinctive cultural traditions.

Archeological sites from the Plains Woodland tradition appear to share many characteristics with those of the Late Plains Archaic. A broad spectrum of plant and animal resources were gathered and collected, however there was increased emphasis on bison. Pottery and the bow and arrow were innovations. The remains of semi-permanent dwellings are indicative of adoption of a less mobile lifestyle relative to the preceding periods. Mound burials appear during this tradition.

Archaeological sites associated with the Plains Village tradition consist of earthlodge villages, some of which are fortified with defensive perimeters, burial grounds or cemeteries, smaller satellite villages, hunting camps, campsites and sites where various specialized activities took place. The subsistence strategies practiced during this time included horticulture (garden agriculture), hunting (bison) and gathering. Characteristics of this tradition consist of an increased sedentary lifestyle with a reliance on horticulture and storage of crops in pottery cached in storage pits for later consumption. The role of villages as agricultural and trading centers reflects an increased interest in the value of economic control. This may have strained social relationships among groups of people. The fortification of certain villages was done to enable defense and decrease opportunities for plunder. The Plains Village tradition lasted well into the Protohistoric period.

4.6.6. Protohistoric Period (AD 1700-1800)

The Protohistoric period is a time of initial non-Indian cultural impact on Indian people prior to much actual, first-hand contact. Non-Indian cultural influence may have actually come as early as AD 1700 with the introduction of trade goods into the area from the north and east via long established native trade networks. The horse and non-Indian produced trade goods were in demand about AD 1750. Trade networks extended into the Spanish occupied areas of southwest, and unfortunately were the vectors for the transmission of disease as well. The horse increased cultural interaction among Indian groups and contact with non-Indians. During this period, historically known nomadic groups, the Crow, Sioux and Shoshone (Brown 1980), occupied western South Dakota on a more constant, if not permanent, basis.

4.6.7. Historic Period (AD 1800-present)

During the late 1700s and early 1800s, the westward expansion of the fur trade profoundly influenced and changed traditional life ways among the people of the Great Plains. European epidemic diseases were also first documented in the area resulting in severe population loss and cultural disruption. Metal tools and ornaments were commonplace by this time and became important parts of native technologies. The widespread availability of guns and horses gave rise to Plains nomadic Tribes (the Crow, Cheyenne and Dakota).

In 1874, George A. Custer led the infamous U.S. military expedition to the Black Hills, which violated the Ft. Laramie Treaty of 1868 (O'Brien 1989). News of gold discovery spurred the first major non-Indian migration into the region. Wagon trails to the west coast passed through the area and stimulated establishment of forts and troops for protection. Camp Sturgis was founded in 1878 and later, Fort Meade. The U.S. Military subjugated the equestrian Tribes who fought to prevent non-Indian settlement. Permanent non-Indian settlement was accelerated with construction of railroads. Settlers acquired land from the railroads or from the government through the Homestead, Pre-emption, and Timber Culture Acts in the 1870s and 1880s. The development of agriculture and ranching followed a cyclical pattern of boom and decline as new settlement spread throughout the Great Plains. The Chicago and Northwestern Railway reached Belle Fourche in 1891, which for the remainder of the century was considered to be the largest original shipping point for livestock in the United States.

4.6.8. Properties of Traditional Religious and Cultural Importance to Native Americans

In 1992, the NHPA was amended to address concerns of Native Americans with respect to sites that have religious or cultural importance. The common term for such sites is Traditional Cultural Properties (TCPs). Such sites often differ from other cultural resource sites because they may often lack physical remains, such as artifacts, or they may be of recent origin.

Such sites often can only be identified through interviews of tribal elders and keepers of traditional knowledge. Other sources of information are accounts of explorers and traders, and research of historians, ethnographers and anthropologists. Some tribal members may differentiate between traditional sacred sites and contemporary sacred sites to distinguish between areas of historical use and those of current use. NHPA does not recognize this distinction.

The issue of TCPs is especially critical in the restoration project area since it is within the traditional homelands of the Sioux and other Tribes. The area, along with the Black Hills, was a part of the Great Sioux Reservation, which was established by the Ft. Laramie Treaty of 1868. The Maypenny Agreement in 1877 withdrew the Black Hills from the Great Sioux Reservation.

Despite the withdrawal, the Black Hills and the adjacent areas continue to be of historic and spiritual significance to the Tribes. These areas figure prominently in histories and legends, which are maintained. Sundstrom (1996) has documented the traditional cultural properties in the Black Hills and their significance.

Sundstrom (1996) also documented that specific geographic points or kinds of places also have traditional cultural or religious significance. These include Bear Butte, Bear Butte Lake, Sundance Mountain, Inyan Kara Mountain, Medicine Flats, Devils Tower and the southern Hogback area of the Black Hills, which include the floodplain and bluffs of the Cheyenne River.

5 AFFECTED ENVIRONMENT – INJURIES TO TRUST RESOURCES

> ***"In 1878 the government opened up land for homesteads. [The Pickerings] took a place in Whitewood Valley where the creek was clear, cold, and had many fish. The place caught their fancy because it contained a lake large enough for rowboats and reminded them of Lizzie's home in the East…The Homestake Mining Company built the cyanide plant in Lead, South Dakota, turned the waste water into the creek, and the fish died. The soil on the creek bottoms became infested with the poison, and after each flooding of the creek more red sand was left. The lake filled in…" .***- - - Carrie Lee Somers (Bracewell 1969)

Injuries to trust resources are normally evaluated and quantified through studies conducted during the NRDA process. Whitewood Creek and the Belle Fourche and Cheyenne Rivers, and Oahe Reservoir have been investigated for years regarding the extent of contaminants and hazardous substances. Publications are numerous and many are cited throughout this Plan. State, Federal and Tribal agencies conducted Preassessment Screens (SD DENR 1997, US DOI and CRST 1997) and a Preliminary Statement of Damages and Injuries to Trust Resources (SD GFP 1997) for the Restoration Site based on previously collected data, publications and investigations. A comprehensive damage assessment was not conducted for the Site. This section is a summary of the injuries to trust resources due to releases of hazardous substances and/or continued releases/exposure to hazardous substances. Injuries to trust resources can and will continue to occur in some areas. Injuries could also occur with some restoration activities, depending upon the chosen action alternative. Therefore, this section is not intended as an exhaustive literature review nor is it intended as a conclusive damage and injury evaluation. Data are inadequate to document all damages and injuries and the Team acknowledges the speculative nature of some injuries to some trust resources. The Plan was not designed with biological injury tests in mind. And, site specific environmental assessments may be necessary for some restoration activities once a project has been selected.

5.1 FAUNA

Injuries to biological trust resources occur if releases of hazardous substances cause death, adverse changes in viability, disease, behavioral abnormalities, physiological malfunctions, cancer, physical deformations or genetic mutations (43 CFR § 11.62). Biological impacts of heavy metals depends on food habits (Smith and Rongstad 1982), metal availability and mobility, type of exposure, temperature, seasonal variations (Merry et al. 1986) and the chemical state of the element (Beliles 1975, Goldsmith and Scanlon 1977). During the 100-year time period of discharged hazardous substances, Whitewood Creek and 60 miles of the Belle Fourche River were considered biologically dead and supported no aquatic life (Thilenius 1965). The NPL Site's ability to naturally repair itself from degradation and historic mining impacts is slow and Marron (1988) estimates metals will be a contaminant source for centuries.

Uptake of heavy metals by birds and mammals can cause impairment or destruction of biological functions and processes at the cellular, organ, animal or population level (Wren 1987, SD DENR 1997). Bioaccumulation is the process by which a contaminant is taken up by living organisms directly through physical exposure pathway or consumption of food, water or sediments containing contaminants. It can result in adverse biological impacts, including but not limited to sub-lethal effects, decreased reproduction, specific organ toxicity, mutagenic effects and death (Beliles 1975, Melancon 1995).

Food chain exposure and bioaccumulative effects can result from lower trophic levels, such as invertebrates, ingesting hazardous constituents in the water, sediment and plants; and then serving as dietary items for higher food chain species. For example, fish can accumulate contaminants through gill membranes in concentrations that can be hundreds of times greater than ambient water concentrations (Roddy et al. 1991). Therefore, fish-eating species could be most impacted by releases of heavy metals because they are higher on the food chain.

Mercury, a heavy metal, was found in elevated concentrations in fish tissue collected from the Belle Fourche River (Roddy et al. 1991) and from fish at Oahe in the late 1960's. Mercury concentrations found in fish-eating birds collected from the Cheyenne River watershed were at levels which have been documented to cause mortality or chronic adverse effects to birds (Eisler 1987, Hesse et al. 1975, Thompson 1996). Examples of some fish-eating species found within the Restoration Site include: herons, cormorants, kingfishers, mergansers, grebes, pelicans, bald eagles, osprey, terns, mink, raccoon, turtles and frogs.

In addition to mercury, another principal environmental contaminant within the Restoration Site is arsenic. There is abundant literature documenting arsenic toxicity to humans (Hem 1985, Polissar et al. 1990). However, numerous studies are still quantifying arsenic toxicity to other living beings. Arsenic is a teratogen (causes non-hereditary birth defects) and carcinogen (causes or aggravates cancer) that causes fetal death and malformations in many mammal species (Eisler 1988).

Arsenic has the potential to bioaccumulate in tissues of mammals, birds, fish, invertebrates, phytoplankton, mosses, lichens and algae (Cain et al. 1987, Eisler 1988, Fox Consultants, Inc. 1984b, Jenkins 1981, Kuwabara et al. 1987, Lindsay and Sanders 1990, Roddy et al. 1991). Arsenic concentrations have been found in aquatic invertebrates collected from Whitewood Creek (Goddard 1990). Other studies have substantiated that arsenic concentrations in invertebrates collected from Whitewood Creek were at concentrations lethal to bird species that consumed these invertebrates (Cain et al. 1988, US Geological Survey 1989b).

Aquatic invertebrates provide an essential food resource to various species. Representative receptor species that feed on aquatic or terrestrial invertebrates include: other invertebrates, shorebirds, waterfowl, American dipper, grebes, rails, gulls, cranes, swallows, flycatchers, nighthawks, many songbird guilds, blackbirds, fish, amphibians, reptiles, skunk, coyote, fox, shrews and bats.

Elevated levels of copper, cadmium, sulfates and mercury have been documented in vegetation growing in tailings deposits (Fox Consultants, Inc. 1984b, US EPA 1989). Sulfate, a major contributor to high conductance in soil water and elevated soil salinity, can be detrimental to plant growth (ibid.). Receptor species that feed on flood plain and riparian vegetation include: deer, elk, beaver, muskrat, some duck and geese species, seed-eating and berry-eating birds, wild turkey, lagomorphs (rabbits and hares) and small mammals.

Species injured by the constant influx of sediments containing hazardous substances may be exposed to additional, naturally occurring stressors within the system. Selenium, a naturally occurring element in South Dakota, occurs within the Belle Fourche and Cheyenne River watersheds and has been documented in high concentrations in fish tissue, aquatic invertebrates, plants and bird eggs and livers (Roddy et al. 1991, Ruelle et al. 1993). Although selenium is an essential micronutrient for normal nutrition, concentrations not greatly exceeding requirement levels may produce toxic effects that range from physical malformations during embryonic development to sterility and death (Lemly and Smith 1987). Therefore, species that are closely tied to aquatic habitats where contamination, both artificial and natural, is deposited in sediments, are most likely to be affected.

Some species that were present in riparian areas throughout western South Dakota are now rare or absent within the Site. For example, pallid sturgeon and paddlefish, mostly restricted to the Missouri River, were noted to enter the lower reaches of the Cheyenne River (Bailey and Allum 1962) but have not been recently detected. Interior least terns now only nest on the Cheyenne River below the confluence of the Belle Fourche River. River otters were occasionally documented but were not common. Bald eagles, which historically nested close to the Belle Fourche and Cheyenne River, have rarely been detected nesting. They are a winter resident in portions of the Restoration Site. Absence of these species is probably attributed to a combination of environmental factors. In addition to hazardous substance releases, impacts include degradation of historical riparian habitat and absence of periodic flooding that creates and maintains cottonwood- and willow-associated ecosystems.

5.2 HABITAT

Injuries to habitat occur if they can be identified through other trust resources, such as soils, discussed later in this section. Following is a brief discussion of the more significant injuries that have occurred to habitat components found along Whitewood Creek and the Belle Fourche and Cheyenne Rivers.

Habitat, the natural home or dwelling place of an organism, consists of physical and biological characteristics that provide for growth, reproduction and basic survival needs for a particular species. Habitat is often described in terms of plant communities. Within the Restoration Site, habitat includes shorelines, riparian corridors, flood plains, escarpments, cliffs and canyons and wetlands that serve as transitional zones to upland areas.

State and Federal Trustees jointly protect migratory birds, threatened and endangered species and associated habitats. Many of those associated habitats are found along or are adjacent to streams, rivers and wetlands within the Site. Riparian habitats in western South Dakota occupy a small percentage of land surface but support the highest diversity and density of flora and fauna and represent critical travel corridors, resting sites and feeding areas. Riparian areas are an essential component to the overall landscape and can be the most important part of a watershed for a wide range of values and resources (Elmore and Beschta 1987). Many species use riparian areas during some portion of the year and some species, such as the endangered Interior least tern, are totally dependent upon riparian habitats during the nesting season. The American dipper is a riparian obligate species found in the Black Hills and its habitat is currently restricted to only a few drainages.

Fish habitat can be degraded by low summer flows, extreme temperature variations, accelerated stream bank erosion, sedimentation and reduced instream cover. In other cases, poor management practices such as livestock overgrazing, water appropriations for irrigation as well as irrigation drainage, pesticide residues, landowner farming or clearing, road building, sewage effluent discharges and timber harvest have degraded water quality and aquatic habitat (Sowards et al. 1991, Heakin 1998).

Most of the discussion in Section 5.1 emphasized direct impacts and injuries to species, yet just as important are indirect injuries, which include loss of food base and habitat. Habitat loss causes immensely negative impacts and has occurred along Whitewood Creek as a result of release of hazardous substances related to historic mining. Hazardous substances and contaminated sediments have degraded miles of shoreline. Portions of Whitewood Creek have been channelized or deepened.

5.3 FLORA

Direct contact with or uptake of hazardous substances can cause phytotoxic responses in vegetation such as stunted growth, deformation, reduced reproduction, chlorosis, necrosis, leaf epinasty, metal phylotoxicity and discoloration (Lepp 1981, Woolhouse 1983 as cited in State of Montana 1991, Van Assche and Clijsters 1990). Injuries occur to vegetation if the water-holding capacity is decreased, if soil microbial respiration is impeded or if phytotoxic responses retard growth (43 CFR § 11.62). Plant uptake of nonessential trace elements and elevated levels of micronutrients may lead to reduced survival and reproductive success, or morphological deformation (ibid.). The preassessment screen for the Clark Fork River basin NPL sites (State of Montana, 1991) and the Fox Consultants report (1984b) reference numerous studies documenting plant responses to heavy metals. Many of these metals are present at the Whitewood Creek NPL Site. Abundant prairie cordgrass (*Spartina pectinata*) at three sites in the NPL Site suggests elevated soil salinity, apparently because of elevated sulfate levels (Fox Consultants, Inc. 1984b).

Arsenic, cadmium and copper were determined to be substances of possible environmental concern for irrigated crops. For native vegetation, arsenic was identified as a substance of

environmental concern because concentrations may be high enough to limit the productivity of some plants. Copper was also identified as a substance of possible environmental concern (EPA 1990). EPA's ROD (1990) concluded other factors such as the presence of other minerals, clay content, soil pH and permeability act independently in restricting plant growth.

These injuries are not simply *in situ* losses. Particulate movement continues to occur in the Belle Fourche and Cheyenne Rivers (Marron 1989, Marron 1992, Callender and Robbins 1993). This broadens the impacted area by disturbing sediments with hazardous substances during high runoff periods, and subsequently redepositing sediments downstream. Adverse responses to hazardous substances could contribute, in part, to loss of shoreline vegetation and habitat.

5.4 SURFACE WATER

Hazardous substances may reach natural resources through many pathways, including direct contact, surface water pathways, ground water pathways, exposure via the food chain and exposure from particulate movement. Surface water pathways exist through continued leaching of hazardous substances into surface waters at concentrations elevated above toxic effect thresholds. Confirmation of injury to surface waters occurs when concentrations of hazardous substances exceed either drinking water standards or water quality criteria established for the protection for aquatic life (43 CFR Section 11.62).

The presence of heavy metals at toxic levels in Whitewood Creek has been documented many times. The U.S. EPA and the State of South Dakota (ARSD 74:51:01) have set water quality criteria for the protection of freshwater aquatic life from heavy metals (Table 3). Concentrations of hazardous substances, especially mercury, cyanide, silver, copper, lead, and zinc, sometimes exceed the U.S. EPA and South Dakota standards for aquatic life in Whitewood Creek (Fox Consultants, Inc. 1984b). Cyanide and mercury standards for aquatic life are occasionally exceeded in the Belle Fourche River (Fox Consultants, Inc. 1984b).

Surface water standards for arsenic periodically are exceeded in Whitewood Creek (SD DENR 1997). Irrigation or livestock watering criteria for arsenic, iron, chromium, copper and sulfate are sometimes exceeded in Whitewood Creek. Arsenic, cadmium and chromium occasionally exceeded irrigation and livestock watering criteria in the Belle Fourche River (Fox Consultants, Inc. 1984b). Use of surface or shallow well water for domestic supply along the Belle Fourche River is limited by large concentrations of dissolved constituents, particularly sulfate (ibid).

In addition, chromium, arsenic, cooper, cadmium, mercury and cyanide have been detected at concentrations above irrigation, livestock watering or aquatic life criteria in the Belle Fourche River (Fox Consultants, Inc. 1984b). Those same constituents have exceeded chronic aquatic life criteria in the Cheyenne River (USGS 1988b, 1989a, 1989b).

EPA's ROD (1990) directed that 5-year reviews of the NPL Site be conducted to determine whether remedial action remains protective of human health and the environment. Surface water monitoring is part of the continuing operations and maintenance activities required by the ROD.

Table 3: SD Water Quality Parameters of Heavy metals for Aquatic Life Protection

Metal	Hardness[1] (mg/l as $CaCO_3$)	Acute Criteria[2][3] (*u*g/l)	Chronic Criteria[2][4] (*u*g/l)
Arsenic	Not hardness based	360	190
Cadmium	100	3.7	1.0
Copper	100	17	11
Chromium(III)	100	550	180
Chromium (IV)	Not hardness based	15	10
Lead	100	65	2.5
Mercury	Not hardness based	2.1	0.012[5]
Nickel	100	1,400	160
Selenium	Not hardness based	20	5
Zinc	100	110	100
Silver	100	3.4	no standard

(1) Heavy metal ions have a lower activity in harder waters because of electrostatic inhibition due to greater quantity of charged ions. Waters with high hardness values often have a higher pH which reduces the solubility of many heavy metals.
(2) Values refer to dissolved amount of each substance.
(3) Acute criteria must be met at all times based on the results of any one grab sample.
(4) Chronic criteria may not be exceeded more than once every three years on the average based on the results of a 24-hour representative composited sample.
(5) These criteria are based on the total-recoverable fraction of the metal.

5.5 GROUND WATER

Confirmation of injury to ground water resources, including natural springs or seeps, (43 CFR Section 11.62) occurs when concentrations of hazardous substances exceed Federal or State drinking water, ground water or surface water standards. Injury also occurs if concentrations of hazardous substances are sufficient to injure surface water, geologic or biological resources when exposed to groundwater (ibid).

Water in the vadose zone was sampled using lysimeters during the Whitewood Creek Superfund remedial investigations (Fox Consultants, Inc.1984a). Arsenic and sulfate were frequently detected at concentrations potentially harmful to vegetation and/or ground water quality (Fox Consultants, Inc. 1984b). Arsenic was detected above recommended limits for the protection of plants. Sulfate, a major contributor to high conductance in soil water and corresponding elevated soil salinity, is detrimental to plant growth. Cadmium, chromium, lead and nickel were detected at concentrations that have potential to adversely affect ground water and/or vegetation. However, these analytes were only rarely detected.

Ground water in the tailings deposits and the underlying alluvium contains arsenic, cadmium and sulfate at concentrations greater than the drinking water and ground water standards (Stach et al. 1978, Fox Consultants, Inc. 1984b). There is also the potential for uptake by plants. Iron, manganese, selenium, lead, cadmium, and chromium were sometimes detected at concentrations

exceeding drinking water criteria and/or livestock watering criteria (ibid). Ground water also affects surface water. Ground water seeping through the tailings and alluvium into Whitewood Creek adds an average of 365 kg/year (805 lb/yr) of arsenic to the creek (US EPA 1990). The State has instituted a ban on water wells in the Whitewood Creek 100-year flood plain (ARSD 74:02:04:26).

5.6 GEOLOGIC RESOURCES

Injuries to geologic resources occurs if concentrations of hazardous substances is sufficient to exhibit characteristics identified in the Solid Waste Disposal Act, to raise or lower the pH value above 8.5 or below 4.0, to impede soil microbial respiration, to inhibit carbon mineralization, to cause injury to ground water and/or surface water, to cause toxic response to invertebrates or to cause phytotoxic responses to plants (43 CFR § 11.62). Adsorption of hazardous substances onto bottom sediments and floodplain soils exacerbates the difficulty of understanding the processes responsible for the movement and fate of these constituents in steam and water systems (Goddard 1990).

Particulate movement, including resuspension and transport of contaminated sediments from stream banks and floodplain sediments is a critical dispersion pathway in Whitewood Creek. It is estimated that normal erosion of tailings contributes an average of 300 kg/year (661.50 lb/yr) of arsenic to Whitewood Creek (US EPA 1990). Heavy rains may contribute another 6,000 kg/year (13,230 lb/yr). Periodic flood events may add up to 35,000 kg (77,175 lbs) of arsenic in a single event. In addition, surface soils outside the floodplain have been contaminated by windblown tailings (ibid.).

To place the following concentration data in the proper perspective, Goddard (1989) reported the results of analyses of soil samples collected from areas outside the contaminated area. The arithmetic means of arsenic, cadmium, copper, and silver in the reference areas are: 9.2 mg/kg, 0.12 mg/kg, 10.7 mg/kg and 1.6 mg/kg, respectively (ibid.). The arsenic cleanup standard selected by the EPA for the NPL Site is 100 mg/kg (US EPA 1990, Chadwick Ecological Consultants, Inc., et al. 1997).

Stream sediments collected concurrently with the aquatic macroinvertebrate samples in the NPL Site contained arsenic, copper, lead and zinc at mean concentrations of 612 mg/kg, 52 mg/kg, 14 mg/kg, and 62 mg/kg, respectively (Fox Consultants, Inc. 1984a).

Contaminated sediments on the Whitewood Creek flood plain contain arsenic, cadmium, copper and silver from 350 to 8,200 mg/kg, <0.05 to 97 mg/kg, <5.0 to 156 mg/kg, and <0.5 to 247 mg/kg, respectively (Goddard, 1989). In addition, irrigated soils contain arsenic, cadmium, copper and manganese of 600 mg/kg, 7.4 mg/kg, 660 mg/kg and 1,450 mg/kg, respectively (ibid.).

5.7 AIR

Injury to air resources is difficult to substantiate and no determination has been made. See Section 5.6 for discussion of potential exposure via windblown tailings and particulate movement.

5.8 LOST PUBLIC USES AND SERVICES

Services likely lost or injured include consumptive outdoor recreation such as hunting, fishing, trapping, mushroom and berry picking and drinking water. Non-consumptive outdoor recreation includes swimming, camping, boating, shoreline hiking, canoeing, wildlife viewing and photography. Possible losses of or injury to water from hazardous substances for drinking, domestic use, irrigation and livestock were described in Sections 5.4 and 5.5.

5.9 CULTURAL RESOURCES

Injury to cultural resources is possible considering the importance of waterways and riparian areas to prehistoric, historic and current human cultures in South Dakota, but no determination has been made.

6 RESTORATION PLANNING PROCESS

6.1 STEP ONE: DEVELOP ALTERNATIVES

The first step in restoration planning is to develop a broad set of alternatives (pursuant to CERCLA and NEPA) that include conceptual projects for the restoration, replacement, the equivalent of and/or enhancement of lost resources or services. Alternatives are discussed in Section 7.

6.2 STEP TWO: DEVELOP EVALUATION CRITERIA

The Team developed fourteen evaluation criteria to meet the goals and objectives of the Restoration Plan. Ranked criteria will aid both project proposal applicants and the Team to focus on applicability to the Plan's goals and objectives. Project evaluation and ranking criteria are listed in Section 8.

6.3 STEP THREE: PROJECT PROPOSALS

This step involves initiating the project proposal process as outlined in Section 9.

6.4 STEP FOUR: IMPLEMENTATION AND MONITORING

Selected projects are the last phase of restoration process: implementation and monitoring. These efforts are expected to be cooperative among the DOI, the State and cooperators (local and non-profit) who will work together to implement restoration and management. Implementation will include pre-project resource inventory of proposed restoration sites, development of implementation and management plans and completion of required permits and environmental documents (NEPA compliance documents and permit applications, sub-contracting for specific work, application for matching funds and development of cooperative agreements.) Additional planning or coordination beyond those required in the proposal may need to be discussed with selected applicants.

A site-specific EA may need to be prepared for selected projects IF it is uncertain whether an action will have a significant effect on the quality of the human environment. The approving Federal official will determine whether or not proposed actions constitute a major Federal action, which significantly affects the quality of the human environment. Restoration plans that result in a negligible change in the use of the affected area will be included as categorical exclusions for NEPA compliance for actions implemented by the FWS (516 DM 6 Appendix 1). Restoration implementation will likely include these types of categorical exclusions.

All proposals will include a monitoring plan to evaluate the results of any actual or planned response to activities and to address determination of goals, objectives, activities, time and methods required to measure a significant benefit. Often in restoration processes, scientific data and technical ability change, requiring the Team to reassess decisions and to determine project efficacy. This strategy employs adaptive management, which means that if the original approach

proves inadequate, the Team has the prerogative to reassess the project and implement mid-course corrections based on new information. This process should be viewed as being beneficial and proactive to successfully obtain the Plan's goals and objectives in the best manner available.

7 RESTORATION ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

Both CERCLA and NEPA require Federal agencies to evaluate a reasonable range of restoration alternatives and potential environmental consequences of those alternatives

Six conceptual alternatives were considered:

- Alternative 1: Natural Recovery (no-action) with minimal management actions,
- Alternative 2: Restoration and protection of lands with significantly contaminated sediments,
- Alternative 3: Restoration and term protection of lands with minimally contaminated sediments,
- Alternative 4: Restoration and/or term protection of lands with no contaminated sediments,
- Alternative 5: Restoration and permanent protection of lands with minimally contaminated sediments, and
- **Alternative 6: Preferred Alternative. Restoration and/or permanent protection of lands with no contaminated sediments.**

Pursuant to the MOA, the Trustees are not authorized to conduct restoration activities of any nature on property owned or leased by Homestake (or any of its subsidiaries or affiliates) without the express advance written consent of Homestake.

7.1 ALTERNATIVE CONSIDERED, BUT NOT ANALYZED IN DETAIL

7.1.1. Alternative 2: Restoration and Protection of Lands With Significantly Contaminated Sediments

Under this alternative, restoration within the Whitewood Creek and the Belle Fourche and Cheyenne River drainages would involve significant reclamation to remove, redistribute or on-site treatment of hazardous substances and/or highly contaminated sediments to restore stream channels and original floodplain. Disturbed sites would be recontoured and replanted with native grasses, forbs, trees and shrubs.

Environmental consequences: EPA's 1990 ROD for the NPL Site stated: "Removing tailings and alluvium along Whitewood Creek would create a massive environmental disturbance of a relatively stable ecosystem and destroy the alluvial aquifer". Although the NPL Site was only an

18-mile stretch of Whitewood Creek and a large majority of the tailings are downstream of the NPL site, the Restoration Team concluded that significant reclamation of contaminated sediments would cause disturbance within the stream channel and cause water quality impacts.

High potential exists to violate provisions of the Migratory Bird Treaty Act, CWA and the Consent Decree due to additional hazardous substance releases. On the other hand, natural erosion of contaminated sediments presently occurs on a regular basis along shorelines and stream banks, particularly during heavy rainfall. Reclamation within a particular area would ensure mitigation for lost resources and services.

Discussion: Total restoration through reclamation is too costly for available funding and infeasible given the current risk of additional hazardous substance releases. Another possible option is for an entity to be permitted to excavate tailings. Whether excavation is reasonable or not, it is a possible future activity and merits consideration. However, tailings excavation could cause additional hazardous material releases, further injuring existing habitat and damaging restoration efforts. All options in this alternative are cost prohibitive, difficult, environmentally risky and do not meet the Plan's goals and objectives nor MOA direction. Therefore, this alternative will not be analyzed in detail as a viable alternative.

7.2 ALTERNATIVES CONSIDERED

There are five considered alternatives. The first alternative is natural recovery, or no-action. The remaining four action alternatives are conceptual in nature. Two main themes exist among the four action alternatives: restoration of uncontaminated vs. contaminated lands (Plan definition of contaminated sediments), and duration (limited term vs. in-perpetuity) of protection efforts. Alternative 6 is the Preferred Alternative.

Regarding cultural resources, specific project assessments will be conducted in accordance with Section 106 of the National Historic Preservation Act (36 CFR 800) and with pertinent agency policies and standards and directives prior to the implementation of activities associated with the selected alternative. The alternatives propose activities that range in their potential to impact cultural resources. Some activities, such as the acquisition of lands and procurement of easements and leases are strictly administrative in nature and may have a low likelihood to impact cultural resources. Activities, which involve ground disturbance, have potential to impact cultural resources.

Environmental consequences (both beneficial and detrimental) are organized and discussed by affected trust resource, ie: fauna, habitat, flora, etc. Tables 4 and 5 depict comparisons of considered alternatives on affected resources and likelihood that the considered alternatives will meet the Plan's goals and objectives.

7.2.1. Alternative 1: Natural Recovery (No-action) with Minimal Management Actions

CERCLA and NEPA require a natural recovery (no-action) alternative (43 CFR 11.82) to determine if restoration is really needed and to provide a baseline for comparison with other alternatives. The no-action alternative does not spend any or all settlement monies allocated for natural resource damage restoration and would not involve projects for restoration and thus, would allow the Whitewood Creek and the Belle Fourche and Cheyenne River watersheds to remain in their current condition and recover naturally.

Environmental consequences: It would require an undetermined number of years for natural recovery under best conditions. Private management of riparian areas within the Restoration Site would not approximate, much less fulfill, the Plan's goals and objectives. Land development, mining of tailings and unrestricted livestock grazing in riparian habitats are potential impacts to the Site under the no-action alternative. Natural processes resulting in impacts to cultural resources are considered outside the scope of this restoration plan and would continue.

Discussion: The natural recovery (no-action) with minimal management alternative results in an unmitigated recovery of injured resources. Injured resources would not be returned, rehabilitated, and/or replaced through settlement monies. And, associated public uses and services provided by the injured resources would continue to be lost. Since the Trustees are committed to spend monies on restoration, the natural recovery alternative would not meet the Plan's goals and objectives nor CERCLA direction. Therefore, the natural recovery alternative will not be further considered.

7.2.2. Alternative 3: Restoration and Term Protection of Lands with Minimally Contaminated Sediments

Under this alternative, restoration within the injured portions of Whitewood Creek and the Belle Fourche and Cheyenne River drainages could involve minimal reclamation of contaminated sediments; construction of wetlands and restoration of targeted riparian areas and associated uplands. "Minimal" is not defined here because it is site-specific and will rely upon a cost:benefit ratio. "Minimal" will be measured and defined more clearly in Section 8 under project evaluation criteria.

Restoration projects could include activities to restore and/or enhance injured habitats on State, Federal and/or private lands. Activities include but are not limited to: fencing to exclude livestock from riparian areas, temporary fencing to exclude humans and wild herbivores during recovery, implementation of livestock/range management practices, prescribed burning, native plantings and noxious weed control to ensure successful restoration, re-contouring, road improvements and/or obliteration, removal, capping and/or stabilization of contaminated sediments, construction of wildlife structures, etc. Watershed improvement projects would implement Best Management Practices (BMP's). Such projects include but are not limited to: bank regrading, stabilization and revegetation, debris removal, instream habitat improvement (such as road obliteration to prohibit instream and/or shoreline access to motorized vehicle use) and/or restoration of the original stream channels.

Projects would be accomplished in cooperation with landowners/managers, other resource management agencies and/or public interest groups. Restoration actions and interim management practices, including controlled public access, would be bound by term-limited agreements/leases/easements. Conservation easements are a voluntary contract between management parties that limits the type and intensity of future land use while allowing landowners to retain ownership and control of their property. At end of any contractual term, future management of restored areas would rely primarily on landowner incentives.

Environmental consequences: Environmental consequences include land preparation for fencing, re-contouring, watershed improvement, road improvement and/or road obliteration, commercial and non-commercial logging and native plantings through physical and mechanical impacts such as bulldozing and plowing. Potential impacts include soil and sediment movement and disturbance during restoration but once work is completed, erosion problems would be repaired. Road improvement and/or obliteration could include such actions as ripping to eliminate compaction and facilitate revegetation and water barring to reduce surface erosion. Roads that cross live streams would be evaluated for necessity and if needed, improvements such as culverts, stable crossings, etc. would improve water quality. Road obliteration would return barren or disturbed land to productive habitat and significantly reduce surface water impacts.

Cooperative agreements that include revegetation of native plants and/or prescribed burning may positively affect flora and fauna by increasing habitat diversity for numerous species. Impacts of herbicides/biological control agents on invasive or alien vegetation will be considered. Increased shoreline vegetation and reforestation along waterways would provide greater nesting, young-rearing, resting, thermal and security cover. Cooperative agreements which include streambank protection through riparian fencing could result in resurgence of native streamside vegetation, increased shade along waterways, moderation of water temperature fluctuations, improved bank stability, reduction in sediment inputs, higher water table and improved water quality.

Beneficial aspects of stabilizing or capping contaminated sediments include containment or isolation of hazardous substances from the rest of the environment and prevention from further environmental degradation.

Potential impacts of not treating contaminated sediments include exposure of materials that may not be safe for a wide variety of life forms, especially wildlife species whose lifecycles are connected with and dependent upon certain nutrient cycles of soils. Contaminated and non-contaminated dust and particles may be stirred and become airborne. Contaminated wetlands have potential to attract and subsequently injure wildlife species. Potential adverse consequences of stabilization and/or capping include containment leaching due to design or material failure. Nevertheless, with or without the possibility of contaminant leaching, treated habitats would be safer and cleaner but the measured degree of change is unknown without specific project impact analysis.

Construction of wildlife habitats such as nest boxes, created snags or placement of coarse woody ground debris offer habitat elements that may be lacking. These changes will improve habitat for wildlife and could result in increased production.

Some wildlife species may be temporarily disturbed or displaced by mechanical, prescribed burning and/or human activities during restoration but they would be replaced or move back into a healthier biological community. Efforts will be made to identify critical wildlife habitat and/or seasons which require minimal or no disturbance.

Implementation of habitat protection and enhancement projects that involve ground disturbance, flooding, fencing and the clearing and removal of architectural structures may impact cultural resource sites.

Depending upon the public access agreement and location/treatment of contaminated sediments, public services and recreational use may benefit through consumptive and non-consumptive uses such as: fishing, hunting, wildlife viewing, boating, photography and hiking.

Discussion: This alternative may allow the Trustees to carry out their goals of restoration and compensation if non-contaminated sites are unavailable or undesirable and if opportunities to secure permanent management agreements/easements are minimal. Limited-term agreements would help meet the Plan's goals if permanent protection is not possible. However, not all Plan objectives would be met. The Plan's objective to return watersheds back into functioning habitats may or may not be met, depending upon degree and amount of contaminated sediments. There would be no guarantees to proper land management after term expiration.

Pursuit of this alternative would not provide sustainable benefits without assurance of future land management, ownership and mineral rights. Another outcome is that private land may be sold for uses other than for trust resource protection. Privately owned lands within the Restoration Site could undergo development that is not consistent with desired land management practices. Incentives to manage for trust resources are minimal. Less likely, but a possibility, is public land exchanges for private lands and restored lands could be lost to private ownership in a land exchange. Term-limited public use and access agreements/easement would temporarily fulfill the goal of compensating the public. However, it will be difficult to compensate the public once access privileges have been terminated.

This alternative could be costly, difficult and has an unmeasured degree of environmental risk depending upon degree, type and volume of contaminated sediments. Additional costs may be incurred with removal of contaminants, capping and/or stabilization. Another issue regarding capping is that it generally requires continuous removal of trees, shrubs and other deep-rooted vegetation that could compromise cap integrity. Removal of deep-rooted vegetation could conflict with objectives to establish native vegetation and restore natural habitats.

There may also be long-term monitoring and maintenance of contaminated sites to ensure successful mitigation and containment. The extent to which restoration would facilitate natural recovery is unknown. Once a term conservation easement or lease expires, there is no guarantee that restored areas will continue to be managed for trust resources. The likelihood of this alternative's long-term success is not measurable. Broader efforts are essential to promote permanent recovery, restoration and replacement of injured trust resources and provide flexibility to the Plan.

7.2.3. Alternative 4: Restoration and/or Term Protection of Lands With No Contaminated Sediments

Under this alternative, restoration would occur on State, Federal and/or private lands in uncontaminated watersheds within the Restoration Site. Trustees would not be limited to drainages injured by contaminated sediments but could exercise the restoration alternative of replacing injured resources with non-injured lands. Restoration actions and interim management practices would be bound by term-limited agreements/leases/easements. Projects would be accomplished in cooperation with landowners/managers, other resource management agencies and/or public interest groups. At the end of any contractual term, future management of restored areas would rely primarily on landowner incentives.

Projects could include habitat restoration and protection of target habitats (riparian areas and associated uplands) to bring them to or enhance properly functioning condition, depending upon resource condition.. Activities could include but are not limited to: fencing to exclude livestock from target areas, temporary fencing to exclude wild herbivores during recovery, implementation of livestock/range management practices, prescribed burning, native plantings and control of noxious weeds to ensure successful restoration, re-contouring, road improvements or obliteration, construction of habitat structures, etc. Watershed improvement projects would implement BMP's. Such projects could include but are not limited to: bank regrading, stabilization and revegetation, debris removal, instream habitat improvement (such as road obliteration to prohibit instream and/or shoreline access to motorized vehicle use) and/or restoration of the original stream channels.

Environmental consequences: Environmental consequences include land preparation for fencing, re-contouring, watershed improvement, road improvement and/or road obliteration, commercial and non-commercial logging and native plantings through physical and mechanical impacts such as bulldozing and plowing. Potential impacts include soil and sediment movement and disturbance during restoration but once work is completed, erosion problems would be repaired. Road improvement and/or obliteration could include such actions as ripping to eliminate compaction and facilitate revegetation and water barring to reduce surface erosion. Roads that cross live streams would be evaluated for necessity and if needed, improvements such as culverts, stable crossings, etc. would improve water quality. Road obliteration would return barren or disturbed land to productive habitat and eliminate water quality impacts.

Depending upon resource conditions, restoration may be minimal and more efforts and funds would be applied toward enhancement and proper land management to maintain a more natural hydrologic regime. This would allow for an increase in wetland plant community diversity and abundance. The resultant improvements would restore and/or enhance the natural riparian community structure and floodplain function.

Cooperative agreements that include revegetation of native plants may positively affect flora and fauna by increasing habitat diversity for numerous species. Impacts of herbicides/biological control agents on invasive or alien vegetation will be considered. Increased shoreline vegetation and reforestation along waterways would provide greater nesting, young-rearing, resting, thermal

and security cover. Cooperative agreements which include streambank protection through riparian fencing could result in resurgence of native streamside vegetation, increased shade along waterways, moderation of water temperature fluctuations, improved bank stability, reduction in sediment inputs, higher water table and improved water quality.

Construction of wildlife habitats such as nest boxes, created snags or placement of coarse woody ground debris offer habitat elements that may be lacking. These changes will improve habitat for wildlife and could result in increased production.

Some wildlife species may be temporarily disturbed or displaced by mechanical, prescribed burning and/or human activities during restoration but they would be replaced or move back into a healthier biological community. Efforts will be made to identify critical wildlife habitat and/or seasons which require minimal or no disturbance.

Implementation of habitat protection and enhancement projects that involve ground disturbance, flooding, fencing and the clearing and removal of architectural structures may impact cultural resource sites.

Depending upon the public access agreement, public services and recreational use could temporarily benefit through consumptive and non-consumptive uses such as: fishing, hunting, wildlife viewing, boating, photography and hiking.

Discussion: This alternative could allow the Trustees to carry out their goals of restoration and compensation through replacement of contaminated lands with non-contaminated lands. Limited-term agreements would help meet the Plan's goals if permanent protection is undesirable or not possible.

The Plan's objective to return watersheds back into functioning habitats (either through restoration, replacement or enhancement) could be accomplished during the life of the agreement. However, not all Plan objectives would be met because pursuit of this alternative would not provide sustainable benefits without assurance of future land management, ownership and mineral rights. Once a term conservation easement/agreement or lease expires, there is no guarantee that restored areas will continue to be managed for trust resources. Another outcome is that private land may be sold for uses other than for trust resource protection. Privately owned lands within the Restoration Site could undergo development that is not consistent with desired land management practices. Incentives to manage for trust resources are minimal. Less likely, but a possibility, is public land exchanges for private lands and restored lands could be lost to private ownership in a land exchange.

The likelihood of long-term success is not measurable. Broader efforts are essential to promote long-term or permanent recovery, restoration or replacement of injured trust resources and provide flexibility to the Plan.

7.2.4. Alternative 5: Restoration and Permanent Protection of Lands With Minimally Contaminated Sediments

Under this alternative, restoration within the Whitewood Creek and the Belle Fourche and Cheyenne River drainages could involve minimal reclamation of contaminated sediments; construction of wetlands and restoration of targeted riparian areas and associated uplands. "Minimal" is not defined here because it is site-specific and will rely upon a cost:benefit ratio. "Minimal" will be measured and defined more clearly in Section 8 under project evaluation criteria. Projects would be accomplished in cooperation with landowners/managers, other resource management agencies and/or public interest groups.

This alternative differs from Alternative 3 in that it consists of restoration and permanent habitat protection, and controlled public access achieved through land acquisition via the HMC NRRF. Subsequent resource management would be accomplished through an appropriate State, Federal, county, non-profit or other public ownership entity. Or, this alternative also offers restoration and permanent habitat protection, and controlled public access through perpetual agreements/ leases/easements with willing private, State and/or private landowners.

Restoration activities could include but are not limited to: fencing to exclude livestock from target areas, temporary fencing to exclude wild herbivores during recovery, implementation of livestock / range management practices, prescribed burning, native plantings and control of noxious weeds to ensure successful restoration, re-contouring, road improvements or obliteration, removal, capping and/or stabilization of contaminated soils and materials, construction of habitat structures, etc. Watershed improvement projects would implement BMP's. Such projects include but are not limited to: bank regrading, stabilization and revegetation, debris removal, instream habitat improvement (such as road obliteration to prohibit instream and/or shoreline access to motorized vehicle use) and/or restoration of the original stream channels.

Environmental consequences: Environmental consequences include land preparation for fencing, re-contouring, watershed improvement, road improvement and/or road obliteration, commercial and non-commerical logging and native plantings through physical and mechanical impacts such as bulldozing and plowing. Potential impacts include soil and sediment movement and disturbance during restoration but once work is completed, erosion problems would be repaired. Road improvement and/or obliteration could include such actions as ripping to eliminate compaction and facilitate revegetation and water-barring to reduce surface erosion. Roads that cross live streams would be evaluated for necessity and if needed, improvements such as culverts, stable crossings, etc. would improve water quality. Road obliteration would return barren or disturbed land to productive habitat and eliminate water quality impacts.

Whether permanency is sought through acquisition or binding agreements in-perpetuity, restoration and enhancement projects that include revegetation of native plants may positively affect flora and fauna by increasing habitat diversity for numerous species. Impacts of herbicides/biological control agents on invasive or alien vegetation will be considered. Increased shoreline vegetation and reforestation along waterways would provide greater nesting, young-

rearing, resting, thermal and security cover. Restoration and enhancement projects which include streambank protection through riparian fencing could result in resurgence of native streamside vegetation, increased shade along waterways, moderation of water temperature fluctuations, improved bank stability, reduction in sediment inputs, higher water table and improved water quality.

Beneficial aspects of stabilizing or capping contaminated sediments include containment (stabilization) or isolation (capping) of contaminants from the rest of the environment and prevention from further environmental degradation. Another issue regarding capping is that it generally requires continuous removal of trees, shrubs and other deep-rooted vegetation that could compromise cap integrity. Removal of deep-rooted vegetation could conflict with objectives to establish native vegetation and restore natural habitats.

Potential impacts of not treating residually contaminated soils and materials include exposure of materials that may not be safe for a wide variety of life forms, especially wildlife species whose lifecycles are connected with and dependent upon certain nutrient cycles of soils. Contaminated and non-contaminated dust and particles may be stirred and become airborne. Residually contaminated wetlands have potential to attract and subsequently injure wildlife species. Potential adverse consequences of stabilization and/or capping include containment leaching due to design or material failure. Nevertheless, with or without the possibility of contaminant leaching, treated habitats would be safer and cleaner but the measured degree of change is unknown without specific project impact analysis.

Construction of wildlife habitats such as nest boxes, created snags or placement of coarse woody ground debris offer habitat elements that may be lacking. These changes will improve habitat for wildlife and could result in increased production.

Some wildlife species may be temporarily disturbed or displaced by mechanical, prescribed burning and/or human activities during restoration but they would be replaced or move back into a healthier biological community. Efforts will be made to identify critical wildlife habitat and/or seasons which require minimal or no disturbance.

Implementation of habitat protection and enhancement projects that involve ground disturbance, flooding, fencing and the clearing and removal of architectural structures may impact cultural resource sites.

Public services and recreational use could benefit through consumptive and non-consumptive uses such as: fishing, hunting, wildlife viewing, boating, photography and hiking, depending upon location and treatment of hazardous substances.

An environmental consequence of this alternative would result in perpetual control and management authority over the land. Future management of restored areas would be guaranteed through outright ownership or perpetual agreements. Public use and controlled access agreements/easement would guarantee the goal of compensating the public in-perpetuity.

Implementation of restoration projects in wetlands, riparian areas and associated uplands may impact cultural resource sites. Projects involving removal of unwanted structures, ground disturbance, burning, grazing, flooding and fencing may result in injury and destruction to cultural resources. The benefit of acquisition is protection of cultural resources that may not have been otherwise been afforded protection.

Discussion: Fee title interest (acquisition) or some type of permanent agreement/lease/easement with willing landowners, would provide significant, permanent benefits to trust resources compared to other alternatives. Willing landowners that sell or convey lands will be assured that development will not occur and that future generations will enjoy resource benefits, in perpetuity. Habitat enhancement would be most desirable on lands where land management practices and control are compatible with trust resources. Public ownership of land would give managers more flexibility to regulate and allow public access, thus replacing lost services such as wildlife observation, camping, picnicking, photography, hunting and hiking. Stream channel improvement would enhance canoeing, boating, fishing and swimming.

Although this alternative reaches above and beyond short-term land management practices, the issue of hazardous substances (although minor), may cloud fee title interests and delay restoration efforts. On the other hand, even if contaminated sediments are minimal, this alternative would allow Trustees to carry out restoration goals and objectives where other opportunities do not allow.

This alternative reaches above and beyond short-term land management practices and would allow Trustees to carry out most restoration goals and objectives. For example, although restoration actions would help bring habitats to properly functioning condition, depending upon the degree and volume of contaminated sediments, there is no guarantee that restoration and maintenance efforts would keep habitats at that condition.

Public use and access agreements/easements would fulfill the goal of compensating the public.

DOI damage assessment regulations preclude Federal acquisition of land for Federal management unless it is determined that restoration, rehabilitation, and/or other replacement of injured resources is not possible under current or public (i.e., municipal, non-profit or county) ownership.

7.2.5. Alternative 6: Preferred Alternative. Restoration and/or Permanent Protection of Lands With no Contaminated Sediments

This restoration alternative consists of restoration, enhancement and/or permanent habitat protection achieved through: fee-title interest (acquisition via the HMC NRRF and other funding sources) and subsequent management by an appropriate State, Federal, county, non-profit or other public ownership entity. A second possibility is permanent habitat protection and enhancement by State, Federal or private landowners willing to enact perpetual agreements/easements. Despite ownership, the outcome is permanent protection and enhancement of lands not injured by contaminated sediments. Habitat actions would involve

actions within the Restoration Site drainages or adjacent watersheds with similar trust resources. Actions would bring habitats to properly functioning condition and keep them there. Projects would be accomplished in cooperation with landowners/managers, other resource management agencies and/or public interest groups.

Depending upon resource conditions, restoration and/or enhancement activities could include but are not limited to: fencing to exclude livestock from target areas, temporary fencing to exclude humans and wild herbivores during recovery, implementation of livestock / range management practices, prescribed burning, native plantings and control of noxious weeds to ensure successful restoration, re-contouring, road improvements or obliteration, construction of habitat structures, etc. Watershed improvement projects would implement BMP's. Such projects include but are not limited to: bank regrading, stabilization and revegetation, debris removal, instream habitat improvement (such as road obliteration to prohibit instream and/or shoreline access to motorized vehicle use) and/or restoration of the original stream channels.

Environmental consequences: Environmental consequences include land preparation for fencing, re-contouring, watershed improvement, road improvement and/or road obliteration, commercial and non-commercial logging and native plantings through physical and mechanical impacts such as bulldozing and plowing. Potential impacts include soil and sediment movement and disturbance during restoration but once work is completed, erosion problems would be repaired. Road improvement and/or obliteration could include such actions as ripping to eliminate compaction and facilitate revegetation and water-barring to reduce surface erosion. Roads that cross live streams would be evaluated for necessity and if needed, improvements such as culverts, stable crossings, etc. would improve water quality. Road obliteration would return barren or disturbed land to productive habitat and eliminate water quality impacts. Dust and particles may be stirred and become airborne.

Restoration of a more natural hydrologic regime would allow for an increase in wetland plant community diversity and abundance. The resultant improvements would restore the natural riparian community structure and floodplain function.

Whether permanency is sought through acquisition or binding agreements in-perpetuity, restoration and enhancement projects that include revegetation of native plants may positively affect flora and fauna by increasing habitat diversity for numerous species. Impacts of herbicides/biological control agents on invasive or alien vegetation will be considered. Increased shoreline vegetation and reforestation along waterways would provide greater nesting, young-rearing, resting, thermal and security cover for wildlife. Projects which include streambank protection through riparian fencing could result in resurgence of native streamside vegetation, increased shade along waterways, moderation of water temperature fluctuations, improved bank stability, reduction in sediment inputs, higher water table and improved water quality.

Construction of wildlife habitats such as nest boxes, created snags or placement of coarse woody ground debris offer habitat elements that may be lacking. These changes will improve habitat for wildlife and could result in increased production.

Some wildlife species may be temporarily disturbed or displaced by mechanical, prescribed burning and/or human activities during restoration but they would be replaced or move back into a healthier biological community. Efforts will be made to identify critical wildlife habitat and/or seasons which require minimal or no disturbance.

Implementation of habitat protection and enhancement projects that involve ground disturbance, flooding, fencing and the clearing and removal of architectural structures may impact cultural resource sites. Acquisition will protect cultural resources that may not otherwise been afforded protection.

Public services and recreational use would guarantee benefit through consumptive and non-consumptive uses such as: fishing, hunting, wildlife viewing, boating, photography and hiking.

An environmental consequence of this alternative would result in perpetual control and management authority over the land.

Discussion: Fee title interest (acquisition) or some type of permanent agreement/lease/easement with willing landowners, would provide significant benefits to trust resources in-perpetuity, compared to Alternatives 3 and 4. Willing landowners that sell, convey or enter contractual agreements will be assured that development will not occur and that future generations will enjoy resource benefits, in perpetuity. Habitat enhancement would be most desirable on lands where present land management practices and control are compatible with trust resources.

The Plan's objective to return a watersheds back into functioning habitats would be met. Public ownership of land would give managers more flexibility to regulate and allow controlled public access, thus increasing lost services such as wildlife observation, camping, picnicking, photography, hunting and hiking. Stream channel improvement would enhance canoeing, boating, fishing and swimming.

DOI damage assessment regulations preclude Federal acquisition of land for Federal management *unless* it is determined that restoration, rehabilitation, and/or other replacement of injured resources is not possible under current or public (i.e., municipal, non-profit or county) ownership. In other words, this does not preclude State or county governments or other conservation organizations from acquisition and/or management.

This alternative reaches above and beyond short-term land management practices, there are no issues of hazardous substances, and Trustees are unencumbered to carry out all restoration goals and objectives.

This is the preferred alternative because it would allow the Trustees to carry out their restoration goals of restoration and compensation, and meet objectives of natural resource recovery, sustainable benefits and a high likelihood of success. Alternative 6 provides maximum flexibility in restoration projects in order to take full advantage of opportunities to protect, enhance and maintain trust resources. This alternative would provide replacement (through

acquisition and/or perpetual easements) of riparian/wetland trust resources, similar to those that were injured, with the least amount of money expended per resource unit.

7.3 COMPARISON OF ALTERNATIVES

Table 4 compares the primary environmental effects of considered alternatives to trust resources. Table 5 compares the Plan's goals and objectives by considered alternatives.

The benefits of a variety of actions are flexibility and broad scope. Term protection provides interim control and management authority over lands containing important trust resources or influencing trust resources in a cost-effective manner. Term protection allows for resource protection where a permanent alternative is unavailable or undesirable. Permanent protection provides perpetual control and management authority over lands containing important trust resources and influencing trust resources in a cost-effective manner.

Term or permanent easements would restore the natural riparian community structure and floodplain function, reduce sediment inputs, provide organic debris sources, moderate water temperature fluctuations and improve riparian and instream habitats.

Acquisition combined with active restoration would cost more per acre and could result in restoration of fewer acres, but would result in an effective recovery of trust resources by replacement. Depending upon the condition of acquired land, improved management to control land-use practices could result in habitat recovery with minimal or no active restoration.

Table 4: Comparison of Environmental Effects of Considered Alternatives

Affected Resource → Considered Alternatives↓	Fauna	Habitat	Flora	Surface Water	Ground Water	Geologic Resources	Air	Public Uses and Services	Cultural Resources
Alternative 1: Natural Recovery (No-Action) with minimal management action.	Habitat improvements would take years to recovery naturally, if at all. Species would continue to be displaced until habitats recover. Optimal habitats not available. Species may not be managed with best conservation and protection measures. Wildlife may be exposed to hazardous substances. No short-term human-caused impacts or disturbances occur since there are no restoration activities.	Revegetation would occur naturally, if at all. No method to measure how long recovery may take. In the interim, some systems may experience further degradation. Hazardous substances continue to be exposed. No short-term human-caused impacts or disturbances occur since there are no restoration activities.	Native plant restoration and soil stability would occur naturally, if at all. Invasive weeds may continue to spread and replace native habitat. Hazardous substances continue to be exposed. No short-term human-caused impacts or disturbances occur since there are no restoration activities.	Native plant restoration and soil stability would occur naturally, if at all. Stream crossings and other impairments remain. Therefore, erosion and/or sedimentation may continue to degrade water quality. Riparian areas and wetlands may not be further protected or improved. Hazardous substances continue to be exposed. No short-term human-caused impacts or disturbances occur since there are no restoration activities.	All surface activities that impact surface water may impact ground water.	Soil erosion will continue. Soil stability would occur naturally, if at all. Hazardous substances continue to be exposed. No short-term human-caused impacts or disturbances occur since there are no restoration activities.	Some dust particles continue to be stirred and become airborne . Some particles may contain hazardous substances. No short-term human-caused impacts or disturbances occur since there are no restoration activities.	No significant increase in public use and services. Public access not acquired. Public may be exposed to hazardous substances. No short-term human-caused impacts or disturbances occur since there are no restoration activities.	Inventories may continue to be conducted in the normal course of business but without benefit of additional protection under this Plan. No short-term human-caused impacts or disturbances occur since there are no restoration activities.

Alternative 3: Restoration and term protection of lands with minimally contaminated sediments	Habitat improvements may increase vertebrates and invertebrates. Reclamation will reduce or eliminate exposure to hazardous substances. Species may be displaced if habitats are not managed properly at end of term agreement. Short-term disturbances during implementation	Revegetation, logging, fencing, roadwork, streambank protection enhances riparian, forested and upland habitats. Reclamation will reduce or eliminate exposure of hazardous substances but few incentives for landowner to properly manage area. at end of term agreement. Short-term impacts during implementation.	Soil stability, fencing and plantings aid in success of native plant restoration during term agreement. Reclamation will reduce or eliminate plant uptake of hazardous substances but few incentives for landowner to properly manage area. at end of term agreement. Short-term impacts during implementation	Soil stability, revegetation, wetland construction reduce sedimentation and turbidity during life of agreement. Reduce or eliminate movement of hazardous substances but few incentives for landowner to properly manage area. at end of term agreement. Short-term impacts during implementation	All surface activities that impact surface water may impact ground water.	Minimal reclamation and erosion control will stabilize hazardous substances. Few incentives for landowner to properly manage area. at end of term agreement, i.e.: if reclamation fails, may expose hazardous substances. Short-term but risk impacts of exposing hazardous substances during implementation.	Dust particles will be stirred and become airborne during restoration. Some particles may contain hazardous substances. Short-term impacts.	Enhanced terrestrial and aquatic habitat and water quality lead to increase public uses and services. Public access may not be acquired. Uses and services may be terminated at end of term agreement. Need to ensure no public exposure to hazardous substances.	With appropriate inventories and clearances, protect resources but there may be some disturbance and injury. Cultural resources may be disturbed and injured at end of term agreement.
Alternative 4: Restoration and/or term protection of lands with no contaminated sediments	Habitat improvements may increase vertebrates and invertebrates. Species may be displaced if habitats are not managed properly at end of term agreement. Short-term disturbances during implementation	Revegetation, logging, fencing, roadwork, streambank protection enhances riparian, forested and upland habitats. Few incentives for land-owner to properly manage area. at end of term agreement. Short-term impacts during implementation	Soil stability, fencing and plantings aid in success of native plant restoration. Few incentives to landowner to properly manage area. at end of term agreement. Short-term impacts during implementation.	Soil stability, revegetation, wetland construction will eliminate sedimentation and turbidity during term agreement. Few incentives for land-owner to properly manage area at end of term agreement. Short-term impacts during implementation	All surface activities that impact surface water may impact ground water.	Erosion control for stabilization. Few incentives for private landowner to properly manage area at end of term agreement. Short-term impacts during implementation.	Dust particles will be stirred and become airborne during restoration. Short-term impacts.	Enhanced terrestrial and aquatic habitat and water quality lead to lead to increase public use and services. Public access may not be acquired. Uses and services may be terminated at end of term agreement	With appropriate inventories and clearances, protect resources but there may be some disturbance and injury. Cultural resources may be disturbed and injured at end of term agreement.

Alternative 5: Restoration and permanent protection of lands with minimally contaminated sediments	Habitat improvements may increase vertebrates and invertebrates. Reclamation will reduce or eliminate exposure to hazardous substances. Species will be ensured permanent protection of restored habitats. Short-term disturbances during	Revegetation, logging, fencing, roadwork, streambank protection enhances riparian, forested and upland habitats. Reclamation will reduce or eliminate exposure of hazardous substances. Restored habitats will be properly managed in-perpetuity. Short-term impacts during implementation.	Soil stability, fencing and plantings aid in success of native plant restoration. Reclamation will reduce or eliminate plant uptake of hazardous substances. Restored vegetation will be properly managed in-perpetuity. Short-term impacts during implementation	Soil stability, revegetation, wetland construction reduce sedimentation and turbidity. Reduce or eliminate movement of hazardous substances. Permanent protection will better meet water quality standards, depending upon degree of contamination. Short-term impacts during implementation	All surface activities that impact surface water may impact ground water. Permanent protection will better meet water quality standards, depending upon degree of contain-nation.	Minimal reclamation and erosion control will stabilize hazardous substances. Permanent monitoring to ensure reclamation is effective and if reclamation fails, may expose hazardous substances until repaired. Short-term but risk impacts of exposing hazardous substances during implementation.	Dust particles will be stirred and become airborne during restoration. Some particles may contain hazardous substances. Short-term impacts.	Enhanced terrestrial and aquatic habitat and water quality lead to increase public uses and services. Controlled public access for uses and services will remain in-perpetuity. Need to ensure no public exposure to hazardous substances.	With appropriate inventories and clearances, protect resources but there may be some disturbance and injury during restoration implementation. Greater opportunity to protect cultural resources in-perpetuity
Alternative 6: Preferred Alternative. Restoration and permanent protection of lands with no contaminated sediments	Habitat improvements may increase vertebrates and invertebrates. Species will be ensured permanent protection of restored habitats. Short-term disturbances during	Revegetation, logging, fencing, roadwork, streambank protection enhances riparian, forested and upland habitats. Restored habitats will be properly managed in-perpetuity. Short-term impacts during implementation.	Soil stability, fencing and plantings aid in success of native plant restoration. Restored vegetation will be properly managed in-perpetuity. Short-term impacts during implementation.	Soil stability, revegetation, wetland construction reduce sedimentation and turbidity in-perpetuity. Permanent protection and enhancement will achieve desirable on-site water quality standards. Short-term impacts during implementation	All surface activities that impact surface water may impact ground water. Permanent protection will meet water quality standards	Erosion control will stabilize soils. Site maintenance will ensure proper management in-perpetuity. Short-term impacts during implementation	Dust particles will be stirred and become airborne during restoration. If barren sites or soil disturbance occurs, future maintenance will ensure reduction of airborne particles. Short-term impacts.	Enhanced terrestrial and aquatic habitat and water quality lead to increase public uses and services. Controlled public access for uses and services will remain in-perpetuity.	With appropriate inventories and clearances, protect resources but there may be some disturbance and injury during implementation. Greater opportunity to protect cultural resources in-perpetuity.

Table 5: Comparison of Plan's Goals and Objectives by Considered Alternatives

Goals and Objectives → **Considered Alternatives↓**	**Goal: Restore injured and/or lost resources and services**	**Goal: Compensate the public**	**Objective: Return watersheds back into functioning habitats**	**Objective: Sustainable benefits, in-perpetuity**	**Objective: Likelihood of success**
Alternative 1: Natural Recovery (No-Action) with minimal management action	Unknown but highly unlikely. Restoration may occur naturally, if at all, depending upon degree of hazardous substances and current condition of resources. No method to measure how long recovery may take. This Alternative will not meet this goal if natural systems never recover. Restoration monies would not be spent and therefore, this alternative does not meet the directive (43 CFR 11.82) to return injured resources to baseline condition.	No. Public would not be compensated for lost uses and services that would have been provided had the discharge and/or release of hazardous substances not occurred (43 CFR 11.82) Public access not guaranteed.	Maybe. Watersheds may or may not be returned back into functioning habitats, depending upon degree of hazardous substances and restoration success. No method to measure how long recovery may take. This Alternative will not meet this goal if natural systems never recover. Restoration monies would not be spent in full, injured watershed resources would not be restored, rehabilitated and/or replaced and the directive to do so (43 CFR 11.82) would not be met.	No. Benefits would not be realized since there are no assurances current landowner will conserve and protect resources in-perpetuity.	Poor to none. Impaired systems may take years to recover naturally, if at all. Unimpaired areas may become developed and habitats further degraded or lost. No guarantee for future maintenance by current landowner.
Alternative 3: Restoration and term protection of lands with minimally contaminated sediments	Maybe. Restoration could occur to the maximum extent possible depending upon degree of hazardous substances and restoration actions. This Alternative would help meet this goal if opportunities for permanent protection and enhancement were not available.	Yes, but term dependant. Public would be compensated during the life of the term agreement. Controlled public access is short-term. Public may be excluded from reclaimed areas. Unknown long-term compensation: there are no guarantees landowner will maintain restored areas and no guarantee for future access.	Maybe. Watersheds may or may not be returned back into functioning habitats, depending upon degree of hazardous substances and restoration success. Future maintenance is not guaranteed. Activities would occur within impaired watersheds of Whitewood Creek, the Belle Fourche or Cheyenne River basins.	No. Benefits would only be realized during life of term agreement. Would have to factor in degree of hazardous substance reclamation. There are no assurances landowner will maintain restoration in-perpetuity. This alternative would meet this objective if opportunities for permanent benefits do not exist.	Unknown. Likelihood of success is unknown and depends upon degree of hazardous substances and restoration activities. There may be more technical risk involved in minimal reclamation and no guarantee for future maintenance of reclaimed sites.

Alternative 4: Restoration and/or term protection of lands with no contaminated sediments	Yes, but limited. Restoration would occur. There would not be need to consider hazardous substances. This Alternative would help meet this goal if opportunities for permanent protection and enhancement were not available.	Yes, but limited. Public would be compensated during the life of the term agreement. There are no guarantees landowner will maintain restored areas and no guarantee for future access..	Yes, but term dependant. Watersheds would benefit from functioning habitats. Future maintenance is not guaranteed. Activities would occur within unimpaired watersheds of Whitewood Creek, the Belle Fourche or Cheyenne River basins or in nearby watersheds that would replace similar lost or injured resources.	No. Benefits would only be realized during life of term agreement. There are no assurances landowner will maintain restoration in-perpetuity. This alternative would meet this objective if opportunities for permanent benefits do not exist.	High during term agreement, Likelihood of success would be high during life of tern agreement. There are no guarantees for future maintenance of restored sites.
Alternative 5: Restoration and permanent protection of lands with minimally contaminated sediments	Maybe. Restoration could occur to the maximum extent possible depending upon degree of hazardous substances and restoration actions. This Alternative would ensure permanent protection and enhancement on impaired lands if opportunities for protection and enhancement are not available on unimpaired lands.	Yes with few limitations. Public would be compensated during the life of the term agreement. Access would be controlled but guaranteed in-perpetuity. Public may be excluded from reclaimed areas. Site will be maintained for future access..	Maybe. Watersheds may or may not be returned back into functioning habitats, depending upon degree of hazardous substances and restoration activities. Future maintenance would be guaranteed. Activities would occur within impaired (contaminated with hazardous substances) watersheds of Whitewood Creek, the Belle Fourche or Cheyenne River basins.	Yes. Benefits would be realized in-perpetuity. Future maintenance of reclaimed and restored areas would be guaranteed	Unknown, but probably moderate. Likelihood of success is unknown and depends upon degree of hazardous substances and restoration activities. There may be more technical risk involved in minimal reclamation. Future maintenance of reclaimed sites is guaranteed.
Alternative 6: Preferred Alternative. Restoration and/or permanent protection pf lands with no contaminated sediments	Yes. Restoration would occur. No need to consider hazardous substances.	Yes. Public would be compensated, controlled access guaranteed and site will be maintained in-perpetuity	Yes. Watersheds would be returned and/or maintained as functioning habitats. Future maintenance is guaranteed in-perpetuity. Activities would occur within unimpaired (not contaminated with hazardous substances) watersheds of Whitewood Creek, the Belle Fourche or Cheyenne River basins or in nearby watersheds that would replace similar lost or injured resources.	Yes. Benefits would be realized in-perpetuity. Future maintenance would be guaranteed.	High. Likelihood of success is high due to permanency of ownership or management agreement. Guaranteed future maintenance of restored sites.

8 PROJECT EVALUATION AND RANKING CRITERIA

Evaluation and ranking criteria used to assess the merits of restoration alternatives are included in the NRDA Rule promulgated by DOI at 43 CFR Part 11 and were derived, in part, from regulations implementing NEPA (40 CFR Parts 1500 – 1508).

The following thirteen weighted criterion (the fourteenth criterion is a statement) will aid both project proposal applicants and the Team to focus applicability of the Plan's goals to restore or replace trust resources and compensate the public (make whole) for lost resources and services. Project evaluation and ranking will ensure identification of the most appropriate and cost-effective projects for restoration targets, i.e., the riparian, wetland and upland habitats. Locations within the Whitewood Creek, the Belle Fourche or Cheyenne River watersheds will be given higher evaluation preference. Projects that propose capital improvements, maintenance or enhancement of recreational facilities or infrastructures that already exist, either public or private, are outside the scope of the Plan's purpose.

Some criteria have a degree of overlap. Each evaluation level is assigned a numerical weight of 0 to 5. High level receives 4 or 5, medium levels receive 2 or 3; low level receives 1 and unacceptable receives 0. Each project will be scored by the criterion and weighted levels and given a final assessment.

8.1 RESTORE, REPLACE OR ENHANCE TRUST RESOUCES

This criterion meets the Plan's first goal to restore injured and/or lost trust resources and services resulting from release of hazardous substances in the Whitewood Creek, Belle Fourche and Cheyenne River drainages. Relevance is integral to restoration as this Plan does not intend to restore, replace or enhance unrelated trust resources and services. For example, a project proposal that addresses credible restoration but does not replace identical or similar trust resources and services identified in this Plan (Sections 4-5), are irrelevant and outside the scope of this Plan. The results of the planned and implemented action should be defined.

Evaluation Levels:

- High: Project will restore to the highest measurable degree, trust resources and services identical or similar to those injured and/or lost. Project clearly defines end results with few uncertain variables.

- Medium: Project will restore to a measurable degree, trust resources and services similar to those injured and/or lost. Project defines end results but with several uncertain variables.

- Low: Project will restore to an unknown degree, trust resources and services similar to those injured and/or lost. Project proposes natural recovery with minimal management.

Project does not define end results and is conceptual in nature or has several uncertain variables.

- Unacceptable: Project will not restore trust resources and services identical or similar to those injured and/or lost. Project is not relevant. Project does not define end results.

8.2 COMPENSATE THE PUBLIC AND PROJECT RELEVANCE

This criteria meets the Plan's second goal to compensate the public (make whole) for injured and/or lost trust resources and services. In order to "make whole", projects will be evaluated on public access, use and resource protection for the benefit of future generations.

Evaluation Levels:

- High: Regulated public access, use and resource protection are ensured in-perpetuity.
- Medium: Regulated public access, use and resource protection is term limited.
- Low: Regulated public access, use and resource protection is unknown.
- Unacceptable: Regulated public access, use and resource protection is not guaranteed.

8.3 NATURAL RESOURCE RECOVERY

This criteria meets the Plan's first objective to return drainages and/or watersheds back into properly functioning habitats through restoration, replacement, enhancement, conservation and/or protection for identified trust resources and lost services. Particular attention will be given to viable populations of State and Federal threatened and endangered species and/or species of special concern (Appendix 2).

Evaluation Levels:

- High: Project enhances or restores substantial, uninjured native wetland, riparian, stream courses and adjacent upland habitats that support a wide array of trust resources and services. State and Federal threatened and endangered species or species of special concern are known to exist.
- Medium: Project enhances or restores uninjured wetland, riparian, stream courses and adjacent upland habitats that support an array of trust resources and services. It is unknown without further investigation if State and Federal threatened and endangered species or species of special concern exist.
- Low: Project enhances or restores injured wetland, riparian, stream courses and adjacent habitats that support seasonal or intermittent benefits to trust resources and services. It is

unknown if State and Federal threatened and endangered species or species of special concern exist.

- Unacceptable: Project protects, enhances or restores injured habitat that supports little species variation. State and Federal threatened and endangers species or species of special concern do not exist.

8.4 SUSTAINABLE BENEFITS

In order to meet the Plan's second objective, HMC-NRRF funds and cooperative partnerships must provide maximum benefits for restored, replaced or enhanced trust resources and services, in perpetuity, when possible. Project restoration may vary in complexity, cooperative efforts and long-term maintenance based on landowners since owners vary in land management practices, long-term goals, economic returns, etc. To better evaluate long-term sustainable benefits, preference will be given to projects that provide guaranteed conservation and protection, in perpetuity. Guarantees may be outright fee title or in perpetuity conservation easements. This criterion also helps identify land ownership since 43 CFR 11.82 (e) States that "A Federal authorized official shall not select an alternative that requires acquisition of land for Federal management unless the Federal authorized official determines that restoration, rehabilitation, and/or other replacement of the injured resources is not possible." This does NOT preclude restoration monies to acquire land to be owned and managed by a State or local government or other natural resource conservation organization which guarantees public access. Access can be restricted and/or regulated depending upon resource management needs.

Evaluation Levels:

- High: Project complies with all of the Plan's goals and objectives, in perpetuity. It provides the greatest scope of ecological benefits and protection to the most injured trust resources through fee title interest or perpetual conservation easements. Project guarantees public access, even if restricted and/or regulated.

- Medium: Project meets some of the Plan's goals and objectives, in perpetuity. Project provides a wide range of ecological benefits and protection to most injured trust resources through fee title interest or perpetual conservation easements. Project guarantees public access, even if restricted and/or regulated.

- Low: Project meets some of the Plan's goals and objectives. Project provides long term, but not permanent, protection of natural resources. Public access is provided on a very limited, term basis only.

- Unacceptable: Project meets some of the Plan's goals and objectives. Project does not provide long-term or perpetual protection of natural resources. Public access privileges are unknown. Conservation easements or fee title interest are not options.

8.5 LIKELIHOOD OF SUCCESS

The Plan's third objective is to evaluate a project's technical feasibility and degree of restoration effort needed. Projects that require the least manipulation and least time to implement actions will have the greatest chances of success. For example, if the project is outside injured portions of Whitewood Creek and/or the Belle Fourche and Cheyenne River drainages, restoration costs and technical feasibility will probably be minimal. Performance criteria of projects will have to be clear and measurable.

Evaluation Levels:

- High: Project is planned where very little or no restoration is required. Where restoration effort is needed, project employs technology that is relatively simple or has been employed at similar sites with a high degree of success.

- Medium: Project is planned where some restoration is required. Where restoration effort is needed, project is more technically difficult and/or employs technology that has been employed at similar sites with some degree of success.

- Low: Project is planned where considerable restoration is required. Project is technically difficult and/or employs experimental or unproven technologies.

- Unacceptable: Project is planned where considerable restoration is required. Project is not technically feasible.

8.6 COST/BENEFITS

Project will be evaluated on ability to achieve maximum amount of restoration (in terms of acres, habitat types, threatened and endangered species) with the least expenditure. Cost effective return is desirable. Some overlap with criteria for Section 8.5: Likelihood of Success.

Evaluation Levels:

- High: Trust resources and/or services currently benefit without additional cost for protracted restoration and/or recovery period. Project has a measurable high ratio of expected costs to expected benefits to restored trust resources or services. Project is cost effective relative to other projects that would benefit the same resource or service.

- Medium: Trust resources and/or services receive added benefit with costs and a restoration and/or recovery period (i.e. benefits derived from weed control, fencing, prescribed burning or passive restoration.). Project has a measurable ratio of expected costs to expected benefits to restored trust resources or services. Project is cost effective relative to other projects that would benefit the same resource or service.

- Low: Project has a measurable low ratio of expected costs to expected benefits to restored trust resources or services. Project is less cost effective relative to other projects that would benefit the same resource or service.

- Unacceptable: Project ratio of expected costs to expected benefits to restored trust resource or services is not definable. Project is not cost effective relative to other projects that would benefit the same resource or service.

8.7 LOCATION OF PROJECT

Project must be in a watershed within the State's jurisdiction. Restoration proposals can be either within or adjacent to the Restoration Site (Whitewood Creek and the Belle Fourche and Cheyenne River basin watersheds). Preference will be given to projects adjacent to property with management practices compatible with the Plan.

Evaluation Levels:

- High: Project located within portions of the Restoration Site. Adjacent property has land management practices compatible with the Plan.

- Medium: Project location is within portions of the Restoration Site or adjacent watershed with similar trust resources. Adjacent property has land management practices compatible with the Plan.

- Low: Project location is not within portions of the Restoration Site or adjacent watersheds with similar trust resources. Adjacent property does not have land management practices compatible with the Plan.

- Unacceptable: Project is located outside the State's jurisdiction.

8.8 COOPERATIVE EFFORTS

Projects must be operated under a cooperative agreement with the Trustees to ensure maintenance and management of trust resources and services. Other land uses may be permitted if they do not compromise the Plan's goals and objectives.

Potential cooperators include municipalities along the Restoration Site, county governments, Federal and State land management agencies, and private non-profit organizations interested in wildlife and stream projects. Project proposals prepared by cooperators are more likely to be supported by the community because they will better reflect local interests, priorities and tolerances. Overall project effectiveness will increase through matching public and private contributions and coordination with other enhancement projects.

Matching contributions include any of the following: direct monetary contributions, fee title/land conveyances, easements, agreements and water, timber and/or mineral rights, etc. In-kind contributions include site maintenance, structures, vegetation restoration, weed control, law enforcement, monitoring/inventorying, services, equipment, materials, etc.

Evaluation Levels:

- High: Cooperator's funds and/or in-kind contributions meet or exceed the project's overall cost. Cooperator willing to enter and remain active in management plan agreement.

- Medium: Cooperator's funds and/or in-kind contributions are more than half the project's overall cost. Cooperator willing to enter and remain active in management plan agreement.

- Low: Cooperator's funds and/or in-kind contributions are less than half the project's overall cost. Cooperator willing to enter and remain active in management plan agreement.

- Unacceptable: Project is entirely funded by the HMC-NRRF. Cooperator's in-kind contributions are negligible. Cooperator not willing to enter into a management plan agreement.

8.9 MAINTENANCE

Preference will be given to projects that require minimal on-going maintenance. Proposals will give measurable estimates for maintenance.

Evaluation Levels:

- High: Has low on-going operation, maintenance (i.e. fencing, noxious weed control, garbage removal, etc.) and environmental monitoring costs after project has achieved Plan goals and objectives.

- Medium: Predictable or regular maintenance and environmental monitoring costs do not lessen after project has achieved Plan goals and objectives.

- Low: Unpredictable or constant maintenance and environmental monitoring.

- Unacceptable: Considerable and frequent costs for maintenance and environmental monitoring.

8.10 SIZE

Generally, large (acreage) projects can provide greater protection to trust resources and services compared to relatively small projects. Preferences will be given to projects that adjoin contiguous blocks of land already providing high quality functioning trust resources.

Evaluation Levels:

- High: Project adjoins and enlarges an existing tract of high quality, functioning trust resources and services.
- Medium: Project will create a contiguous area for the benefit of high quality, functioning trust resources and services.
- Low: Project will create multiple, compact 'pocket' areas for the benefit of trust resources and services.
- Unacceptable: Project will create a small area for the benefit of trust resources and services.

8.11 PROJECT HAZARDS

Project activities and sites will be protective so that further injury to trust resources and services will be absent or negligible. Preference will be given to projects that impose the least hazardous risks to fauna, flora, water sources, soils, sediments and air. For example, project proposals will consider surrounding land management actions that could impact the project area such as runoff from urban areas, industrial areas, intensively managed agricultural crops or similar impacted areas. Is there a potential for future hazardous releases or contamination from spills or future development?
Evaluation Levels:

- High: The project will cause little or no additional injury to trust resources. Physical hazards (powerlines, highways, etc.) are minimal.
- Medium: The project will cause some injuries to trust resources but adverse impacts will be short-term and limited. Some physical hazards may exist near the site.
- Low: The project will cause significant additional injury to trust resources. Adverse impacts will be long-term. Physical hazards exist on-site.
- Unacceptable: Project will cause serious and extensive long-term impacts to trust resources.

8.12 PROTECT PUBLIC HEALTH, SAFETY AND THE ENVIRONMENT

Evaluation Levels:

- High: Project does not create a public health threat or create adverse impacts on human health and safety.

- Medium: As proposed, Project may create a public health threat or may create adverse impacts on human health and safety. Project warrants re-evaluation to determine if mitigation measures are feasible to eliminate health and safety impacts on humans.

- Low: As proposed, Project creates a public health threat or creates adverse impacts on human health and safety. Project may not warrant re-evaluation to determine if mitigation measures are feasible to eliminate health and safety impacts on humans.

- Unacceptable: Project creates a public health threat or creates adverse impacts on human health and safety. Project does not warrant re-evaluation.

8.13 CONSISTENCY WITH EXISTING LAWS, POLICIES AND REGULATIONS

Evaluation Levels:

- High: Project complies with applicable Federal, State and Tribal laws, policies and regulations (Appendix 3).

- Medium: As proposed, Project may not comply with applicable Federal, State and Tribal laws, policies and regulations. Project warrants re-evaluation to determine if mitigation measures are feasible to bring project into full compliance.

- Low: As proposed, Project does not comply with applicable Federal, State and Tribal laws, policies and regulations. Project may not warrant re-evaluation to determine if mitigation measures are feasible to bring project into full compliance.

- Unacceptable: Project does not comply with applicable Federal, State and Tribal laws, policies and regulations. Project does not warrant re-evaluation.

8.14 NO DUPLICATE OR REPLACEMENT FUNDING

The Trustees will not fund projects that are already funded or accomplished by other means or should be funded by more appropriate sources.

9 INSTRUCTIONS FOR PROJECT PROPOSALS

Prospective proposals for restoration of trust resources will be scored by the weighted-criteria in Section 8. There are unavoidable overlaps on some criteria but applicants should provide a complete response to each section. In this way, each point will be thoroughly covered and the cumulative project benefits will be made clear.

Use any format but please provide the following information as completely as possible, and be specific. Include any pertinent information not previously covered that you feel would be helpful in evaluation of the proposed project. Send proposals to the Whitewood Creek Restoration Plan Coordinator listed in Section 2.3.

1. Project Title
   Include a local place name in title rather than a generic term. For example, "Cheyenne River Watershed Restoration Project" rather than "South Dakota Wetland Restoration Project".

2. Location
   List project location(s), submit map and include legal description. Include drainages and local place names that will help identify the project area.

3. Person or Organization Making the Proposal
   The name (s) and affiliation (s) of principal parties involved. Include addresses with phone numbers, e-mail, etc. Identify a contact person (the person most familiar with the project in case clarification or additional information is needed).

4. Qualifications
   List your qualifications and past experience related to similar cooperatively funded projects. What are your qualifications to design such projects? What have been your implementation achievements and successes related to habitat restoration?

5. Project Summary
   Briefly describe:
   - Known trust resources or include copies of previous inventories.
   - Management goals, objectives.
   - Restoration options (i.e. acquisition, conservation easement, lease agreement, joint management agreement, or any combination).
   - Describe cooperative management agreements with other agencies and/or conservation groups.

6. Implementation Schedule
   - List month and year when project could be initiated.
   - Provide a concise Statement of implementation schedule.
   - List any time critical information.

7. Estimated Project Cost

The financial information requested below should be as complete as possible. Please give an explanation if, for some reason, you cannot supply all of the information requested.

- List total amount of funds requested from the HMC-NRRF, include all partner contributions.
- Provide allocated cost estimates for:
  - start up (i.e. environmental, archeological, land, etc. survey or inventory)
  - project goal implementation (i.e. fencing, signage, revegetation, etc.)
  - annual operations and maintenance (i.e. law enforcement; public health and safety; resource management; infrastructure; public use, etc.)

8. Existing Project Area Land Management Activities

- Names and addresses of property owner(s).
- Identify size of project area, estimate acreage or percentage of each habitat type represented on the property.
- Land status and describe present land use.
- Identify known or suspected hazardous substances, chemicals, pesticides, petroleum products or other substances of concern. Include description of where these substances occur, to what degree and disposal proposal. List any known present or historical usage or dumping of hazardous materials on the property (e.g., pesticide container storage, airstrip for aerial spray applicators, battery storage, old farms and barns sometimes have underground tanks for gasoline, oil dump pits, transmission lines, underground gas pipelines, dry wells, etc.).
- Describe the project's relationship to adjacent land use (i.e. easements, water rights, timber harvest, mining, livestock grazing, recreation development, etc.).
- Describe any encumbrances associated with the property (e.g., timber, mineral, and water rights, access and utility easements). Has a title search been conducted? (yes or no – do not have to conduct one at this point).
- List any existing problems on the area that you are aware of such as weed control, erosion, overgrazing, fencing or easements that need or will need immediate attention.

9. Project Ranking Criteria

Describe how the proposed project will meet each of the ranking criteria in Section 8.

10. Cultural Resources

Identify known or suspected historical and archeological sites on the property (i.e., real property that meets criteria for historical significance and any Native American cultural artifacts or sites). If the property has been surveyed in the past, present the results. If no survey information exists, state whether there is a strong possibility that such resources exist. Cultural resources may affect resource management efforts on the property and will be carefully considered.

11. Threats

Describe the specific type and degree (long- or short-term) of threat to the resource the Trustees are attempting to protect by your proposed action. Provide your best estimate of how soon these threats could be realized (i.e. sub-development, agricultural practices, industry, etc.).

12. Application Deadline

Application deadline for project submittal will be announced in the Final Restoration Plan after public comments have been incorporated into this Draft Plan. However, depending upon proposal response and successful applicants, we reserve the flexibility to offer more than one proposal application process within the next year, if necessary. Each announcement for proposals will give application deadline as well as projected time for Team review and project ranking.

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11 APPENDIX 1. GLOSSARY

Acid mine drainage	AMD. Drainage of water from hardrock mining operations that unearth and expose iron sulfide ores, which forms sulfuric acid when oxidized (exposed to air or water). Effects to aquatic systems include lowering pH and mobilization of heavy metals, impairing the environment and associated aquatic organisms.
Affected environment	A description of existing environment to be affected by the proposed action.
Alternative	A reasonable way to fix the identified problem or satisfy the Stated need
ARSD 74:02:04:26	Administrative Rules of South Dakota. Well Construction Prohibited Along Sections of Whitewood Creek and Sections of Belle Fourche River -- Variance. No well that supplies water to the public or supplies water for household domestic use or for agricultural purposes may be constructed in the 100-year flood plain of Whitewood Creek from the Crook City Bridge, above the town of Whitewood, Lawrence County, in the northeast quarter of the northeast quarter of section 33, township 6 north, range 4 east of the Black Hills meridian, downstream to the confluence of Whitewood Creek and the Belle Fourche River, Butte County, in the northeast quarter of the northeast quarter of section 24, township 8 north, range 5 east, and the 100-year flood plain of the Belle Fourche River to two and one-half miles downstream from the confluence of Whitewood Creek, Butte County, in the southwest quarter of the southwest quarter of section 20, township 8 north, range 6 east. A variance may be granted from this section if it is shown that a well in this location will not be contaminated from tailings deposits and will not cause groundwater pollution. The chief engineer or the board shall grant a variance by written order.
ARSD 74:51:03:02, 74:51:03:10,	Administrative Rules of South Dakota. Beneficial Uses of Stream Segments, and The Belle Fourche River and Certain Tributaries' Uses, respectively.
ARSD 74:51:01	South Dakota surface water quality standards for toxic pollutants.
Arsenic	A naturally occurring metallic element often released in toxic quantities in gold mining processes. A carcinogen and teratogen. Has potential to bioaccumulate in most living beings.

Baseline	The condition(s) that would have existed in a particular area if the hazardous discharge or release had not occurred.
Bioaccumulative Pollutants	Those pollutants which are taken up, retained, or accumulated in the bodies of organisms and are transferred by ingestion in increasing concentrations in the predator organisms to the point that one or more organisms in the food chain suffer significant harm. (ARSD 74:51:01:01(7))
Bioaccumulation	Process by which a contaminant is taken up by living organisms through physical exposure pathway or consumption of contaminated water, food or sediments
Bioconcentration	Process by which a contaminant is directly taken up via non-dietary exposure by living organisms and is accumulated in tissues to levels greater than those found in the surrounding medium
Biomagnification	An increase in tissue concentrations of a bioaccumulated contaminant as it passes up through trophic levels
BLM	United States Department of the Interior, Bureau of Land Management
BMP's	Best Management Practices
BOR	United States Department of the Interior, Bureau of Reclamation
Carcinogen	An agent capable of aggravating or inducing cancer
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 USC 9601-9641. This act has four basic elements. 1: Information gathering and analysis system to characterize contaminated sites. This information is used to develop the NPL. 2: Federal authority to respond to hazardous substance emergencies and to cleanup sites. 3: Creation of a trust fund (Superfund) to pay for removal and remedial actions. 4: Makes person responsible for hazardous substance releases liable for cleanup and restitution costs.
CFR	Code of Federal Regulations
Chlorosis	Discoloration of normally green plant parts caused by disease, lack of nutrients or various pollutants.
CIV	Civil

CIV 78-5094	Unites States and the State of South Dakota vs. Homestake Mining Company of California, Inc., civil lawsuit filed in 1978 under the Clean Water Act to cease tailings disposal into Whitewood Creek.
CIV 90-5101	United States vs. Homestake Mining Company of California, Inc., civil lawsuit filed in 1990 by EPA under CERCLA for remediation on Whitewood Creek.
CIV 97-5078	State of South Dakota vs. Homestake Mining Company of California, Inc., civil lawsuit filed in 1997 under CERCLA for Natural Resource Damage Assessment.
CIV 97-5100	United States and Cheyenne River Sioux Tribe vs. Homestake Mining Company of California, Inc., civil lawsuit filed in 1997 under CERCLA for Natural Resource Damage Assessment.
Cleanup	Under Superfund regulations, the reduction or elimination of the potential for hazardous substance releases. Remediation.
Conservation easement	A legally binding restriction on allowable uses for a parcel of land in exchange for a tax break to the land owner. Examples include: restricted development, restricted use to agriculture, wildlife habitat, hiking, etc.
Consolidated Actions	Civil law suits CIV 97-5078 and CIV 97-5100 combined.
Contaminated Sediments	For the purpose of this Plan, contaminated substances collectively refer to gold-mill tailings and/or Superfund defined hazardous substances.
CRST	Cheyenne River Sioux Tribe of South Dakota
Cultural Resources	Archaeological, historical, or architectural sites, buildings, structures, objects, and districts, or properties of traditional religious and cultural importance to Native Americans. As defined in the National Historic Preservation Act (NHPA)
CWA	Clean Water Act, Section 311 of the Federal Water Pollution Control Act, as amended, 33 USC. § 1251 *et seq*. Addresses restoration and maintenance of chemical, physical and biological integrity of the nation's waters. Establishes methods for mitigation, protection and restoration of wetlands.

Damages	The estimated dollar values of injured resources, determined either through damage assessment studies or negotiation.
Decree	Consent Decree of consolidated cases CIV 97-5078 and CIV 97-5100 disclosing settlement terms and actions to be taken by the parties.
DENR	South Dakota Department of Environment and Natural Resources
DOI	United States Department of the Interior, of which US Fish and Wildlife Service, Bureau of Land Management and Bureau of Reclamation are a part. Primary designated Federal Trustee for natural resources protected by Federal law such as migratory birds and threatened and endangered species.
Environmental Assessment	A concise public document, prepared in compliance with NEPA that briefly discusses the purpose and need for an action, alternatives to such action and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact Statement or finding of no significant impact.
Environmental consequences	Environmental effects of project alternatives, including the proposed action, any adverse environmental effects that cannot be avoided, the relationship between short-term uses of the human environment, and any irreversible or irretrievable commitments of resources, which would be involved if the proposal is implemented.
EPA	United States Environmental Protection Agency. Responsible for setting and enforcing environmental standards and regulations, regulation of pesticides and toxic substances, cleanup of Superfund sites.
Epinasty	Imbalance in plant growth hormones which causes twisting, deformity, or discoloration. Caused by virus or toxic substance.
ESA	Endangered Species Act of 1973, as amended, 16 USC. § 1531 et seq. Purpose is to achieve conservation of endangered and threatened species and the ecosystems upon which such species depend. DOI FWS has been delegated primary authority to oversee Federal compliance with ESA.
Floodplain	Lowland and relatively flat areas adjoining inland waters which may be inundated by a base flood, which is a flood that has one percent or greater chance of occurring in any year or that has a chance of occurring once in 100 years on the average over a long period (ARSD 74:27:07:01(26)). For this Plan, the definition also includes areas that support characteristic vegetation communities referred to as riparian vegetation.

Food chain	Transfer of energy or chemicals from one organism to another, from primary levels such as a plant to secondary level such as a deer to a tertiary level such as a mountain lion.
FWS	United States Department of the Interior, Fish and Wildlife Service
GFP	South Dakota Department of Game, Fish and Parks
Groundwater	Any form of water defined by the following: - Water under the surface, whatever may be the geologic reservoir in which it is standing or moving (46-1-6(12)) - As defined in subdivision ARSD 74:03:16:01(8); (74:27:07:01(29)) - Water below the land surface that is in the zone of saturation (ARSD 74:54:01:01(3)) - Water below the land surface that is in the zone of saturation (74:54:02:01(8)) - Water below the land surface in a zone of saturation (74:55:01:01(21)) - Waters of the State (74:56:01:01(20)) - Water below the land surface that is in the zone of saturation (74:56:04:01(8))
Groundwater Protection	Standards for groundwaters as defined by ARSD 74:03:15:03; 74:27:07:01(30)
Habitat	The natural home or dwelling place of an organism, including the physical features, vegetation and climate of the environment.
Hardness	Water hardness is defined as the sum of the polyvalent cations dissolved in the water. The most common such cations are calcium and magnesium, although iron, strontium, and manganese may contribute (AWWA, 1990; EPA, 1986). Hardness is usually reported as an equivalent quantity of calcium carbonate (CaCO3). Generally, waters are classified according to degree of hardness (EPA, 1986).
Hazardous Substances	Substances either specifically designated as hazardous under Superfund, or those substances identified under other laws, and includes more than 800 substances as hazardous (does not include petroleum or natural gas) and identifies many more as potentially hazardous due to their characteristics and the circumstances of their release. Typical hazardous substances are toxic, corrosive, ignitable, explosive or chemically reactive. Substances, pollutants or contaminants that pose imminent and substantial danger to public health and welfare or the environment "pollutant or contaminant" include, but are not limited to, any element, substance, compound or mixture, including disease-causing agents, which after

	release in the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, will likely cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including reproductive), or physical deformations in such organisms or their offspring. A substance designated under 40 C.F.R. Part 116 (July 1, 1991), pursuant to § 311 of the CWA (ARSD 74:52:01:01(22)).
HMC NRRF	Homestake Mining Company Natural Resources Restoration Fund
Homestake	Homestake Mining Company of California, Inc.
Impact	Pollution, contamination, or degradation of the environment caused by wastewater or associated solids that may result from either abandonment of the permitted activity or from an event not caused by an act of nature (ARSD 74:07:01:01(6)). A man-induced change in the chemical, physical, or biological quality or condition of surface waters of the State (ARSD 74:51:01:01(29)).
Injury	As defined in 43 CFR 11.14(v) means a measurable adverse change, either short- or long-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil or release of a hazardous substance. Encompasses the phrases "injury", "destruction" and "loss".
in situ	In its proper position.
MBTA	Migratory Bird Treaty Act of 1918, as amended, 16 USC 703 et seq. Federal law that enforces international conventions for the protection of migratory birds to which the United States is a party. In a short summary the Treaty States: unless permitted, it is unlawful to pursue, hunt, take, capture, kill, transport, carry, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest or egg of any such bird, or any product.
Migratory birds	All birds protected by the Migratory Bird Treaty Act, including waterfowl, birds of prey, herons, shorebirds, songbirds, woodpeckers, gull and terns. Essentially all birds except rock doves, house sparrows and European starlings.
Mitigation	Planning actions taken to avoid an impact altogether to minimize the degree of magnitude of the impact, reduce the impact over time, rectify the impact or compensate for the impact.

MOA	Memorandum of Agreement for consolidated cases CIV 97-5078 and CIV 97-5100, a brief summary disclosing final agreement by all parties to cooperate on settlement terms.
Natural resources	For the purposes of this Plan: Trust resources. Those natural resources that belong to, are managed by, are held in trust by, appertain to, or are otherwise controlled by the State of South Dakota and/or the United States and/or the Cheyenne River Sioux Tribe. Such resources include, but are not limited to, surface and ground water, drinking water, fisheries resources, soils, sediment, habitat (including uplands, flood plains and riparian areas), vegetation, aquatic and terrestrial biota, aquatic and terrestrial invertebrates, wildlife, State or Federally listed threatened or endangered species and migratory birds.
Necrosis	Death of plant or animal cells or tissues. Necrosis can discolor stems or leaves or kill a plant entirely.
NEPA	National Environmental Policy Act of 1969 (PL 91-190) . A comprehensive Federal environmental law declaring that the Federal government has responsibility for restoring and maintaining environmental quality. NEPA requires all Federal agencies to prepare an environmental impact Statement for any project, Federal action or permitted action, which has the potential to significantly affect the environmental quality. NEPA was enacted to encourage harmony between humans and the environment.
No Action Alternative	The alternative where current conditions and trends are projected into the future without another proposed action.
NPL	National Priority List (for Superfund Sites)
NRDA	Natural Resource Damage Assessment, regulations found in 43 CFR Part 11, as amended in the 59 Federal Register, 14281 (March 25, 1994). Process of collecting, compiling and analyzing information, statistics or data through prescribed methodologies to determine damages for injuries to natural resources.
Phytoplankton	Small, usually microscopic aquatic plants, such as algae.
Phytotoxic	Harmful to plants.
Plan	Homestake Mining Company Natural Resource Restoration Fund Plan.
Proposed	A plan that contains sufficient details about the intended actions to

action	be taken, or that will result, to allow alternatives to be developed and its environmental impacts analyzed.
Receptor	Ecological entity exposed to a stressor, such as a hazardous substance.
Reclamation	Restoration of disturbed land to a beneficial use, form or productivity level that will be ecologically balanced and in conformity with a predetermined land management plan.
Rehabilitation	Actions undertaken to return an injured resource to its baseline condition, or to a close approximation, as measured in terms of the injured resource's physical, chemical or biological properties or the services it previously provided.
Release	Spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment, including the abandonment or discarding of barrels, containers and other closed receptacle containing any hazardous substance, pollutant or contaminant.
Remediation	Cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a Superfund site. Cleanup eliminates future risks to people and the environment.
Replacement	Acquisition or substitution with a resource that provides the same or substantially similar services.
Restoration	Includes, but is not limited to, on-site restoration, off-site enhancement, replacement of similar local resources via management practices, habitat reconstruction, rehabilitation, mitigation, acquisition, replacement or other techniques
Restoration alternatives	Different levels considered for restoring an ecosystem to baseline condition as measured by the services provided by that resource. Actions include rehabilitation, replacement or acquisition of resources or services. CERCLA requires the evaluation of a range of alternatives from no-action to intensive restoration.
Restoration plan	A plan outlining different restoration alternatives that can be used to accomplish natural resource restoration.
Riparian systems	Border or banks of a stream or river with differing habitat, density, diversity and productivity of plant and animal species relative to nearby uplands. Typical vegetation includes cottonwood, willow, box elder, persistent emergents, etc. Relatively less narrow than a flood plain, as

	flooding is less intense and for shorter duration. Trees, shrubs and snags provide nesting, roosting, resting, cover and feeding sites for migratory and residential birds and mammals. Corridors provide protective pathways for all forms of wildlife.
Riparian Zones	Lands and water adjacent to the banks of a stream, pond, lake, or other source of water that support vegetation dependent on the water source (ARSD 74:29:01:01(40)).
ROD	Record of Decision. Decision of the proposed action associated with an environmental impact Statement.
Scoping	An early and open process for determining the extent and variety of issues to be addressed and for identifying the significant issues related to a proposed action.
SDCL 21-10-1	South Dakota Codified Law defines "public nuisance"
Services	The physical and biological functions performed by the resource including human uses of those functions, such as hunting opportunities, bird watching and ecosystem functions.
Site	For this Plan, refers to the geographic area and all natural resources, including surface waters, streambeds, banks, flood plains and adjacent soils of Whitewood Creek and the Belle Fourche and Cheyenne River basins, to Lake Oahe on the Missouri River, South Dakota. It is the area determined to be injured by hazardous releases.
State	State of South Dakota
Superfund	Also known as CERCLA, Comprehensive Environmental Response, Compensation and Liability Act of 1980. Superfund sites are placed on the National Priorities List due to hazardous materials and have the highest cleanup priority.
Surface water	Water defined as - All water that is open to the atmosphere and subject to surface runoff (ARSD 74:04:05:01(54)). - As defined in subdivision 74:03:02:01(54); (74:27:07:01(67)) - Lakes, ponds, streams, rivers, wetlands, and any other body or accumulation of water on the land surface that is considered to be waters of the State, but not waste treatment systems, including treatment ponds, lagoons, leachate collection ponds, or stormwater retention ponds designed to meet the requirements of the CWA other

	than cooling ponds as defined in 40 C.F.R. § 423.11(m) (July 1, 1991); (74:51:01:01(53)) - Waters of the State; (74:56:01:01(50))
Tailings	Waste rock, often consisting of finely ground rock, residual metallic and nonmetallic compounds and certain compounds used in the milling extractive process for gold. For the purposes of this Plan, includes the definition of contaminated sediments. The discharged valueless product of a beneficiation process. (45-6B-3(17))
Teratogen	Non-hereditary, structural developmental birth defects due to exposure to a contaminant during formation.
Threatened or endangered	Species protected under the Endangered Species Act of 1973, as amended. Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range; (SDCL 34A-8-1(3)).
Toxic	Poisonous. Toxic pollutants cause death, disease, birth defects, reduced fertility, for example, in organisms that ingest or absorb them. Toxic substances are chemical or mixture that may present an unreasonable risk or injury to health or the environment.
Toxic Pollutant	As defined in: ARSD 74:51:01:01(55); § 307(a)(1) of the CWA or, in the case of sludge use or disposal practices, any pollutant identified in regulations implementing § 405(d) of the CWA amended to January 1, 1992; ARSD 74:52:01:01(50)); ARSD 74:54:01:02; SDCL 34A-2-115.
Trustee	State, Federal or Tribal agencies responsible for natural resources acting on behalf of the public.
Trust resources	Natural resources that belong to, are managed by, are held in trust by, appertain to, or are otherwise controlled by the State of South Dakota and/or the United States and/or the Cheyenne River Sioux Tribe. Such resources include, but are not limited to, surface and ground water, drinking water, fisheries resources, soils, sediment, habitat (including uplands, flood plains and riparian areas), vegetation, aquatic and terrestrial biota, aquatic and terrestrial invertebrates, wildlife, State or Federally listed threatened or endangered species and migratory birds.

Uplands	Dry land areas that are not influenced greatly by surface water or shallow groundwater, areas that are not wetlands.
USC	United States Code
Vadose Zone	The zone containing water under pressure less than that of the atmosphere, including soil water, intermediate vadose water, and capillary water, limited above by the land surface and below by the surface of the zone of saturation or the water table (ARSD 74:54:02:01(23)).
Watershed	The total land area contributing surface or ground water to a lake, river or drainage basin.
Wetlands	Broadly used to describe wet habitats. Transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water (Cowardin et al. 1979). Include features that are permanently wet or intermittently water-covered, such as swamps, marshes, bogs, muskegs, potholes, swales, glades, slashes and overflow land of river valleys. Wetlands are legally defines as: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, and similar areas (ARSD 74:27:07:01(78)). Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions including swamps, marshes, bogs, and similar areas (ARSD 74:51:01:01(62)).
Wildlife	Any nondomesticated animal, whether reared in captivity or not, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof (SDCL 34A-8-1(4)).

12 APPENDIX 2. FAUNA AND FLORA

This list of species, although incomplete, does present a reasonable representative list of wildlife receptors, which may be exposed to site contaminants within the Restoration Site. Little or no data has been collected to quantify any adverse risk or impact to these species, although hazards to site contaminants do exist for these species and should be quantified further.

Additionally, this list includes those State or Federally listed threatened or endangered species, or species of special concern known to occur or could potentially occur within the Site. Many of the species accounts were taken from Ashton and Dowd 1991, Thompson and Backlund, Fischer et al. 1999 and Higgins et al. 2000 or are tracked by the South Dakota Natural Heritage Database.

12.1 BIRDS

American Dipper (*Cinclus mexicanus*) - An aquatic bird listed as a State threatened species. It has been reported to occur and nest in reaches of Whitewood Creek. This species relies extensively on aquatic invertebrates for its diet.

American Robin *(Turdus migratorius*)- This common songbird occurs extensively throughout the US and has been reported along Whitewood Creek. Robins feed extensively on the ground on insects and earthworms.

American White Pelican *(Pelecanus erythrorhynchos)* – A fish-eating bird tracked by the South Dakota Natural Heritage Database. Non-breeding birds have been observed along the Cheyenne River.

Baird's Sparrow (*Ammodramus bairdii*) - State rare. Small, spring and summer migrant songbird found during the spring and summer in mixed grass prairie, wet meadow or tall grass prairie, with abundant nesting cover. Baird's sparrows eat grasshoppers, spiders, moths, leafhoppers and seeds. The major threat to the Baird's sparrow is probably loss of habitat to cultivation and wetland drainage. Both upland and wet lowland grasslands are important habitats because the species may shift breeding habitats in wet and dry years.

Bald eagle *(Haliaeetus leucocephalus*) - A large bird of prey listed as State endangered and Federal threatened. This species feeds on waterfowl and dead or dying fish. Nests along the Belle Fourche River below Whitewood Creek and is a seasonal resident along Whitewood Creek, Belle Fourche River and the Cheyenne River. Black Hills winter resident.

Belted Kingfisher (*Ceryle alcyon*) - A fish-eating bird found nesting along reaches of Whitewood Creek, and the Belle Fourche and Cheyenne Rivers.

Burrowing Owl *(Athene cunicularia)* – Inhabits open country and in western South Dakota, is highly associated with prairie dog colonies. Tracked by the South Dakota Natural Heritage

Database and could occur within uplands of the site. Feeds mostly on insects and small mammals.

Common Merganser *(Mergus merganser)* – A duck associated with forest-lined streams, rivers and lakes. Tracked by the South Dakota Natural Heritage Database. Very local breeding area along Rapid Creek. Non-breeding birds could occur in the site. Diet consists mostly of fish, crustaceans and aquatic insects.

Cooper's Hawk *(Accipiter cooperii)* – Inhabits wooded uplands or riparian deciduous areas, streamside zones. Tracked by the South Dakota Natural Heritage Database and could occur within the site. Preys largely on songbirds.

Ferruginous Hawk *(Buteo regalis)* – Plains-adapted hawk found within mixed grassland/scattered tree habitats. Tracked by South Dakota Natural Heritage Database and occurs within the uplands of the site.

Golden Eagle *(Aquila chrysaetos)* – Breeds in western South Dakota and nests in large cottonwoods or on cliffs. Tracked by South Dakota Natural Heritage Database and occurs within the site. Feeds on small mammals, snakes, birds and carrion.

Great Blue Heron (*Ardea herodias*) - This large wading bird feeds on fish and other aquatic organisms and has been observed nesting along Whitewood Creek and the Belle Fourche and Cheyenne Rivers.

Interior Least Tern *(Sterna antillarum*) - A small fish-eating bird listed as an endangered species by both Federal and State statute. Nests along the Cheyenne River. The least tern nests along riverine habitats, and is generally found on sparsely vegetated sandbars within a wide unobstructed river channel. It feeds in shallow water of rivers and streams. Fish prey include red shiners, creek chubs, white suckers, plains killifishes and other cyprinid species.

Loggerhead Shrike (*Lanius ludovicianus*) - The only true predatory songbird in North America. Feeds on insects, small mammals and small birds. Reported to be in serious decline.

Long-eared Owl *(Asio otus)* – Inhabits upland prairies for hunting and nests and roosts in dense wooded thickets or woody draws. Tracked by the South Dakota Natural Heritage Database and could occur within the site. Preys on small mammals, small birds and insects.

Northern Saw-whet Owl *(Aegolius acadicus*) – A small, inconspicuous owl that favors dense forests. Mostly reported within the Black Hills but could occur in dense woodlands within the site. Tracked by the South Dakota Natural Heritage Database. Preys on small mammals, small birds, insects and frogs.

Peregrine Falcon (*Falco peregrinus*) – This State endangered falcon is a rare summer resident of the Black Hills, an uncommon migrant and an occasional visitor during the winter. It feeds primarily on small to medium-sized birds.

Piping plover *(Charadrius melodus)* – A robin-sized shorebird listed as State and Federally threatened. The FWS is proposing that critical habitat be designated for this species where the Cheyenne River enters Lake Oahe. Documented nesting on Lake Oahe. It nests on sandbars and sand and gravel beaches with short, sparse vegetation along inland lakes, on natural and dredge islands in rivers, in gravel pits along rivers and on salt-encrusted bare areas of sand, gravel or pebbly mud on interior alkali ponds and lakes. Piping plovers feed along the water's edge on small insects, crustaceans and mollusks. It is a common breeding associate of the endangered interior least tern.

Swainson's hawk (*Buteo swainsoni*) - A large hawk considered "sensitive" by various State and Federal agencies as it appears to be in decline in the western plains It feeds largely on rodents and other small vertebrates.

Tree swallow (*Tachycineta bicolor*)- A small streamlined bird that nests in dead trees found in open country near lakes and streams. Feeds on flying insects.

Whooping crane (*Grus americana*) – State and Federally endangered. Regularly migrate over the downstream areas and may use sandbars of the Belle Fourche and Cheyenne Rivers and fallow fields throughout the Site.

Wild turkey (*Meleagris gallopavo*) - This game bird is commonly found along all creeks and river bottoms within the Site. Forage on both plant material and insects.

Wood duck (*Aix sponsa*) – A cavity nesting duck and inhabitant of creeks, rivers and flood plain lakes. They have been observed nesting along Whitewood Creek and occur along all wooded creek and river bottoms within the Site. Food habits during early life stages include feeding on aquatic plants, insects, pupa and newly emerged midges.

12.2 MAMMALS

American Marten (*Martes americana*) – This member of the weasel family was successfully reintroduced into the Black Hills and inhabits dense spruce forests.

Black Bear (*Ursus americanus*) – This omnivorous species has been a casual visitor in the Black Hills and is listed as State threatened. There have been unconfirmed reporting of a sow and cubs in the year 2000.

Black-footed ferret (*Mustela nigripes*) – This member of the weasel family is a State and Federal endangered species. Its historic range occurred throughout black-tailed prairie dog colonies of the Northern Great Plains. Recently, the State and FWS supported six reintroduction efforts, including on the Cheyenne River Sioux Tribe reservation lands

Black-tailed prairie dog (*Cynomys ludovicianus*) –Large burrowing rodent found in short-grass prairies including habitat adjacent to the Belle Fourche and Cheyenne Rivers. Prairie dog

colonies and burrows often provide habitat for black-footed ferret, swift fox, burrowing owl, among others. The State is working on a prairie dog management plan.

Dwarf shrew *(Sorex nanus)* – Small insect-eating mammal found mainly in grasslands, woody draws and sedge marsh habitats. Tracked by the South Dakota Natural Heritage Database and occurs within the site.

Fringe-tailed Myotis (*Myotis thysanodes pahasapensis*) – This particular bat subspecies is only found in the Black Hills. It is a State rare species

Gray wolf (*Canis lupus*) – This Federal endangered species historically occurred throughout Western South Dakota.

Least shrew *(Cryptotis parva)* – A very small mammal which inhabits open areas with some dense vegetation such as woody draws, forest edges and upland prairies. Tracked by the South Dakota Natural Heritage Database and occurs within the site. Preys mostly on insects but will eat seeds, fruit and plant materials.

Long-eared Myotis *(Myotis evotis)* – This bat favors coniferous forests but may occupy other habitat types. Roosts in structures, caves, mines and loose tree barks. Tracked by the South Dakota Natural Heritage Database and occurs within the site.

Meadow vole (*Microtus pennsylvanicus*) - This species warrants evaluation as a receptor of concern since it nests either above or below ground and has been known to burrow in soil. Feeds on grasses, sedges, seeds and some insects. This mammal is ranked low on the food chain.

Mink (*Mustela vison*) – This member of the weasel family warrants evaluation as a receptor species due to its semi-aquatic habit habits and forages for the most part in the water for fish, frogs, snakes, crayfish and invertebrates. Will consume terrestrial vertebrates. It occurs throughout the site.

Mountain lion (*Felis concolor*) – This State big game species occurs throughout the Black Hills and has been reported in additional western South Dakota counties.

Northern flying squirrel *(Glaucomys sabrinus)* – Generally inhabits tree cavities but may build a stick nest. Found in dense coniferous or mixed coniferous/deciduous forests. Consumes mostly fungi, nuts, seeds, insects and bird eggs. Tracked by the South Dakota Natural Heritage Database and occurs within the site.

Northern Myotis *(Myotis septentrionalis)* – This insect-eating bat favors dense deciduous and coniferous forests along rivers and streams. Roosts in a variety of habitats but hibernates mostly in caves and mines. Tracked by the South Dakota Natural Heritage Database and occurs within the site.

Red fox (*Vulpes fulva*) - This carnivorous mammal is near the top of the food chain and has been reported throughout the Site.

River otter (*Lutra canadensis*) – This State threatened species historically occurred in the lower reaches of the Cheyenne River but has not been recently detected.

Silver-haired bat *(Lasionycteris noctivagans)* – This insect-eating bat inhabits coniferous and deciduous forest and edges along riparian areas and roosts in trees. Generally does not winter in South Dakota. Falls prey to owls and some terrestrial carnivores. Tracked by the South Dakota Natural Heritage Database and occurs within the site.

Townsend's big-eared bat *(Corynorhinus townsendii)* – Inhabits caves and mines year-round. Rare and local. Tracked by the South Dakota Natural Heritage Database and occurs within the site.

Swift fox (*Vulpes velox*) – This State threatened species occurs within Western South Dakota. Private entities, the State and FWS are studying the feasibility of reintroductions.

White-tailed deer (*Odocoileus virginianus*) - This game animal inhabits most areas within the Site. As a herbivore, this makes the white-tailed deer a receptor (low on the food chain) to possible contaminants in vegetation and soil.

12.3 FISH

Brook trout (*Salvelinus fontinalis*) - This species is found in selective reaches of Whitewood Creek. Food habits include aquatic invertebrates.

Brown trout (*Salmo trutta*) - This game fish species is found in Whitewood Creek. Food habits include aquatic invertebrates and other fish.

Channel catfish (*Ictalurus punctatus*) - A common resident of the Whitewood Creek and the Belle Fourche and Cheyenne Rivers. Food habitats include any organic matter including aquatic invertebrates and other fish. In the Cheyenne River, it has been found to have elevated mercury levels.

Finescale dace (*Phoxinus neogaeus*) **–** Small fish found in cool, spring-fed streams. It feeds on insects, crustaceans and plankton. State endangered.

Longnose sucker (*Catostomus catostomus*) – Found in cool, spring-fed creeks and spawns in lakes or in shallow-flowing streams. Populations are found in the Belle Fourche River drainage north of the Black Hills. State threatened species.
Mountain sucker (*Catostomus platyrhynchus*) – Found only in coldwater streams of the Black Hills but populations are dwindling. Historically, it probably occurred in the upper reaches of Whitewood Creek.

Northern pike (*Esox lucius*)- This game fish species is found in the Cheyenne River. It is a top predator and forages on other fish species. In the Cheyenne River, it has been found to have elevated mercury levels (SD Public Health Department, 1970).

Paddlefish (*Polyodon spathula*) - This ancient fish occurs in quiet, slow-flowing waters, swimming continuously near the surface or in shallow waters. It feeds on zooplankton and insect larvae that it filters from the water through its elaborate gill rakers. Paddlefish are long-lived, some reaching over 30 years of age.

Pallid sturgeon (*Scaphirhynchus albus*) – State and Federal endangered. One of the largest fishes found in the Missouri-Mississippi River drainage. A bottom dweller, found in areas of strong current and firm sand bottom in the main channel of large turbid rivers such as the Missouri River. Pallids are slow-growing, late-maturing fish that feed on small fishes and immature aquatic insects. Alteration of water quality, temperature and flow patterns, as well as reduced spawning habitat, have reduced the overall habitat diversity of the pallid sturgeon, threatening the species' survival. As a result of these habitat changes, no successful pallid sturgeon reproduction has been documented in recent history.

Plains topminnow (*Hybognathus placitus*) – Small fish found in found in clear, slow-moving streams with aquatic vegetation, quiet pools of small creeks and backwaters and overflow pools of larger streams. Food habits are unknown. It may be an indicator of stream water quality.

Sauger (*Stizostedion canadense*) – This game species is found in the Belle Fourche and Cheyenne Rivers. It is a top predator and forages on other fish species.

Sturgeon chub (*Macrhybopsis gelida*) – State threatened fish. This small fish prefers swift current areas of channels of large silty rivers, usually over gravel bottoms. Has been found in the Cheyenne River downstream from Wasta. Never yet reported for the Belle Fourche River. Little is known about the biology of this fish. Its diet is suspected to be mainly bottom-dwelling invertebrates.

Walleye (*Stizostedion vitreum*) - This game fish species is found in the Belle Fourche and Cheyenne Rivers. It is a top predator and forages on other fish species. In the Cheyenne River, it has been found to have elevated mercury levels.

12.4 AMPHIBIANS AND REPTILES

Leopard frog (*Rana pipiens*) - This common species provides an amphibian component to the receptors of concern list.

Short-horned Lizard (*Phrynosoma douglassii*) – This State rare species is indigenous to semi-arid, short-grass habitats of the Northern Great Plains.

Spiny softshell (*Apalone spinifera*) - Turtle found on mud flats, sandbars and soft sandy or muddy bottoms with some aquatic vegetation in lakes, reservoirs, fast-flowing rivers, ponds along rivers and intermittent streams. The spiny softshell feeds on crayfish, aquatic insects, mollusks, fishes, amphibians and some vegetation. The spiny softshell is threatened by loss of natural river habitat.

12.5 INVERTEBRATES

American burying beetle (*Nicrophorus americanus*) – Federally endangered carrion beetle. Habitat is thought to be sandy or sandy loamed grasslands with interspersed stands of low meadow cottonwoods.

Regal fritillary butterfly (*Speyeria idalia*) – Found in prairie habitats throughout the Site.

Oreohelix Snail Species – Found in certain drainages in the Black Hills

12.6 PLANTS

Alaska oniongrass (*Melica subulata*) – Perennial grass found in moist, shady forest or thickets along Whitewood Creek. State species of concern either due to rarity or only local in a restricted range.

Alder buckthorn (*Rhamnus alnifolia*) - Shrub found in moist thickets along Whitewood Creek. State species of concern due to uncertain status.

Alpine Rush (*Juncus alpinus*) - Locally common rush along Whitewood Creek (Harner 1991). State species of concern due to restricted range.

Fendler's Spurge (*Euphorbia fenderi*) – Has been found near Belle Fourche

Great Plains bladderpod or Secund bladderpond (*Lesquerella arenosa var. argillosa*) Annual or short-lived perennial herb of the mustard family found along Whitewood Creek. State species of concern because it is a poorly documented regional endemic.

Hairy stoneseed or Hairy puccoon (*Lithospermum caroliniense*) – Perennial herb of the borage family. State species of concern due to rarity at periphery of its range.

Narrowleaf cottonwood (*Populus angustifolius*) – Found along Whitewood Creek (Harner 1991) but restricted range. Associated with redosier dogwood (*Cornus sericea*) as a rare natural community type.

Nodding false dandelion (*Microseris nutans*) – Perennial herb of the aster family. State species of concern due to historic occurrence but not recently found.

Pink microseris (*Microseris gracilis*) – Perennial herb of the aster family. State species of concern due to uncertain status.

Ute ladies' tresses (*Spiranthes diluvialis*) – Federally threatened orchid recently discovered in eastern Wyoming along the Cheyenne and Belle Fourche River basins. Could occur in same watersheds within South Dakota, but thus far has not been documented within the State.

Yellow ladyslipper (*Cypripedium calceolus*) – Perennial orchid, scattered and uncommon along drainages. State species of concern due to population declines from former abundance.

13 APPENDIX 3. COMPLIANCE WITH ENVIRONMENTAL LAWS, REGULATIONS, DIRECTIVES AND POLICIES

The Preferred Alternative and Proposed Action will comply with the following Federal and State environmental laws, regulations, directives and policies (as amended):

- ARSD: Administrative Rules of South Dakota:74:02 (Water Rights), 74:27 (Solid Waste), 74:28 (Hazardous Waste), 74:34 (Regulated Substance Discharges), 74:36 (Air Pollution Control), 74:51 (Surface Water Quality), 74:54 (Ground Water Quality)
- American Indian Religious Freedom Act of 1978 (PL. 95-341)
- Antiquities Act of 1906
- Archeological and Historic Preservation Act of 1974
- Archaeological Resources Protection Act of 1979
- Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines
- BEPA: Bald Eagle Protection Act of 1940, as amended (16 USC 668 et seq.)
- Clean Air Act (33 USC 1251 et seq.), Sections 401, 402, and 404
- Consent Decree of consolidated cases: United States and Cheyenne River Sioux Tribe v. Homestake Mining Company of California, CIV 97-5100 and South Dakota v. Homestake Mining Company of California, CIV 97-5078
- CWA: Clean Water Act/Federal Water Pollution Control Act (33 USC 1251-1387 § 311)
- CERCLA: Comprehensive Environmental Response, Compensation and Liability Act of 1980 (Superfund) (42 USC 9601-9641)
- ESA: Endangered Species Act of 1973 (PL 93-205)
- Executive Order 11988 (Floodplain Management, 1977)
- Executive Order 11990 (Protection of Wetlands, 1977)
- Executive Order 12898 (Environmental Justice, 1994)
- Executive Order 12962 (Recreational Fisheries 1995)
- Executive Order 13007 (Access to Sacred Sites, 1996)
- Executive Order 13112 (Invasive Species 1999)
- FLPMA: Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.)
- Federal Noxious Weed Act of 1974 (PL 93-629)
- Fish and Wildlife Coordination Act (16 USC 661 et seq.)
- Fish and Wildlife Conservation Act (16 USC 2901 et seq.)
- MBTA: Migratory Bird Treaty Act of 1918, as amended (16 USC 703 et seq.)
- National Historic Preservation Act of 1966 (PL 89-665), as amended (PL 95-515) and as amended though 1992 (PL 102-575)
- Native American Graves Protection and Repatriation Act
- Natural Resource Damage Assessment (43 CFR Part 11, as amended)
- NEPA: National Environmental Policy Act of 1969 (PL 91-190)
- Rivers and Harbors Act (33 USC 401 et seq.)
- SDCL: South Dakota Codified Law 21-10-1 (public nuisance)
- South Dakota Endangered and Threatened Species (SDCL 34-08)
- South Dakota State Burial Law (SDCL 34-27)
- 36 CFR Part 800- Protection of Historic and Cultural Properties
- 36 CFR Part 60.4 National Register Criteria
- 43 CFR Part 7 - Protection of Archeological Resources: Uniform Regulations
- 43 CFR Part 10 - Native American Graves Protection and Repatriation Act Regulations

14 APPENDIX 4. SCOPING LIST

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The Argus Leader
200 S. Minnesota Ave. PO Box 5034
Sioux Falls, SD 57117-5034

Belle Fourche Bee
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Belle Fourche, SD 57717

Black Hills Pioneer
315 Seaton Cricle
Spearfish, SD 57783

The Capital Journal
333 West Dakota Avenue
Pierre, SD 57501

Hot Springs Star
107 North Chicago
Hot Springs, SD 57747

Lawrence County Centennial
68 Sherman Street
Deadwood, SD 57732

Meade County Times-Tribune
1022 Main
Sturgis, SD 57785

The Pioneer Review
221 East Oak
Phillip, SD 57567

Rapid City Journal
507 Main
Rapid City, SD 57701

Custer County Chronicle
522 Mt. Rushmore Road
Custer, SD 57730

Rapid City Public Library
610 Quincy Street
Rapid City, SD 57701

Siouxland Library, Main Branch
201 N. Main Avenue
Sioux Falls, SD 57104

Rawlins Municipal Library
1000 E Church Street
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Chairman
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Butte County Commissioners
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