

Missouri River Bank Stabilization and Navigation Fish and Wildlife Mitigation Program



Corning Mitigation Site

Draft Project Implementation Report

July 2006



**US Army Corps
of Engineers**
Kansas City District

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U.S. Army Corps of Engineers

Kansas City District
601 East 12th Street
Kansas City, Missouri 64106

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DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
700 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-2896

Finding of No Significant Impact

U.S. Army Corps of Engineers, Kansas City District, Proposed Corning Missouri River Fish and Wildlife Mitigation Project, Atchison and Holt Counties, Missouri

Project Summary

The Corps of Engineers proposes to develop fish and wildlife habitat at the Corning Mitigation Site as part of the Missouri River Fish and Wildlife Mitigation Program. The site is located in Atchison and Holt Counties, Missouri and is adjacent to the left descending bank of the Missouri River, river miles 514 to 517.

The Full Development alternative would include the use of various methods to develop fish and wildlife habitat on the Corning Site. These methods would include incorporation of the NRCS wetland restoration plan for land under easement in the WRP; modifications to Mill Creek; creation of shallow water habitat and wetlands; tree plantings; food plots; and development of terrestrial habitats. Based on the presence of an existing service line and an abandoned well on the north parcel, installation of a pump in the well would be considered. This pump would be used to provide supplemental water during dry periods. In addition, limited amounts of agricultural leasing would likely be required to maintain open areas until habitat improvements can be made. These open areas would help to prevent undesirable woody species succession, and would provide some cropland for food plots and protection from wildlife damage on adjacent lands. Natural succession would be allowed to take place on the site where it is desirable and where favorable conditions exist.

Modifications to Mill Creek would take place near the southern boundary of the northern area of the Corning Site; generally where Mill Creek enters the large scour hole created by the flood of 1993. These modifications would likely focus on opening up the area around the scour hole and along the left descending bank of Mill Creek at its confluence with the Missouri River. River structure modifications, likely a revetment notch and associated pilot channel along the western boundary of the southern area, would be performed to encourage the erosion of the bank along the Missouri River in order to develop shallow water habitat. Any shallow water habitat development activities would be designed to have no impact to the two Federal levees on the Corning Site. As stated above, an existing (abandoned) well may be used to provide supplemental water on the north parcel during dry periods. A water control structure would be used to create wetlands on the northern area. A majority of the proposed tree plantings would likely

occur on the western boundary of the southern area of the Corning Site. Terrestrial habitats, including native prairie grasses and shrubs, would be planted in transition areas that are not planned for wetlands or tree plantings. Disturbed areas would be re-vegetated with native plant species, as necessary. Mixes of grass containing water tolerant species would be utilized. Natural succession, including cottonwood and willow communities in forest areas, would be allowed to take place on the Corning Site where it would be desirable and favorable conditions exist (e.g., along the Corning Site margins closest to the Missouri River).

Monitoring activities would also be conducted and would be used to adaptively manage the site. No recreational features would be constructed by the Corps; however, the site would be open to the public for a variety of uses including bird watching, hiking, fishing, and hunting.

Alternatives

Three alternatives were considered: (1) the Full Development alternative, (**RECOMMENDED**); (2) the Shallow Water Habitat alternative; and (3) the No Development alternative (no action).

Both Alternative 1 and 2 were deemed technically feasible. However, Alternative 2 would not maximize benefits for fish and wildlife habitat development at the Corning Site and only emphasizes shallow water habitat. As such, Alternative 2 was not recommended as the preferred alternative.

The No Development alternative (3) is not recommended because it would not meet the project purpose and need of creating aquatic and terrestrial fish and wildlife habitat. The No Development alternative would have no permanent or temporary construction related impacts.

Recommended Plan

The recommended plan is Alternative 1 as stated above and described in detail in the PIR. Of the three alternatives considered, this plan is recommended because it provides maximum benefits to fish and wildlife habitat at the site and best meets the project purpose and need for creating fish and wildlife habitat. The Full Development alternative would not adversely affect navigation or adjacent landowners.

Summary of Environmental Impacts

On this project, a minor amount of timber and soil will be impacted during the construction phase of the project. The adverse effects associated with the project are short-term/minor and related to project construction. The impacted timber will be left on-site and used to provide habitat for fish and wildlife. Soils disturbed will be returned to the river as sediments or used on-site for berm construction. The benefits of habitat development, including the creation of wetlands and shallow water habitat upon project completion, would offset these minor adverse effects.

The U.S. Army Corps of Engineers, Kansas City District's, proposed fish and wildlife habitat development at the Corning Site would result in environmental benefits and adverse effects are typically minor/long-term and minor/short-term construction related. Minor long-term impacts associated with these projects are typically well outweighed by the overall long-term environmental benefits.

Mitigation Measures

The recommended plan will result in a minor amount of timber clearing and soil disturbance at the Corning Site. As described above in the Summary of Environmental Impacts section, the overall environmental benefits associated with this project greatly outweigh the minor permanent and temporary construction-related impacts of the project. Therefore, no additional mitigation measures are warranted or proposed.

Public Availability

A description of the proposed project was circulated to the public and resource agencies through a Public Notice, No. _____, dated _____, with a thirty-day comment period ending on _____. This notice contained a project description, along with information on the Corps' preliminary determination to prepare a Finding of No Significant Impact for the project and a draft Section 404(b)(1) Evaluation. The notice was mailed to individuals/agencies/businesses listed on the NWK-Regulatory Branch's General, State of Missouri and Atchison and Holt Counties mailing lists. The Public Notice was also available for public/agency review and comment on the NWK-Regulatory Branch's webpage, the Mitigation Program web page (<http://www.nwk.usace.army.mil/projects/mitigation/>).

Conclusion

After evaluating the anticipated environmental, economic, and social effects of the proposed activity, it is my determination that construction of the proposed fish and wildlife habitat at the Corning Mitigation Site does not constitute a major Federal action that would significantly affect the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date: _____

Michael A. Rossi
Colonel, Corps of Engineers
District Engineer

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Acronyms and Abbreviations

ACT	Agency Coordination Team
AMSL	Above Mean Sea Level
APE	Area of Potential Effect
ASM	Archaeological Society of Missouri
BEA	Bureau of Economic Analysis
BSNP	Bank Stabilization and Navigation Project
C	Celsius
CA	Conservation Area
Corps	United State Army Corps of Engineers
CRP	Construction Reference Plane
CWA	Clean Water Act
dbh	Diameter at breast height
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLU	Federal Levee Unit
FONSI	Finding of No Significant Impact
GIS	Geographic Information Systems
IDNR	Iowa Department of Natural Resources
KDWP	Kansas Department of Wildlife and Parks
M&E	Monitoring and Evaluation
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
mg/l	Milligrams per liter
NAAQS	National Ambient Air Quality Standards
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NHPA	National Historic Preservation Act
NLCD	National Land Cover Data Set
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSHS	Nebraska State Historical Society
NWI	National Wetland Inventory
NWP	Nationwide Permit
NWR	National Wildlife Refuge
O&M	Operation & Maintenance
PgMP	Program Management Plan
pH	Potential of Hydrogen
PIR	Project Implementation Report
PL	Public Law
RM	River Mile
ROD	Record of Decision
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SMP	Site Mitigation Plan
SRA	State Recreation Area

SWPPP	Storm Water Pollution Prevention Plan
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wildlife Management Area
WRDA86	Water Resources Development Act of 1986
WRDA99	Water Resources Development Act of 1999
WRP	Wetlands Reserve Program

Chapter 1

Introduction

1.1 INTRODUCTION

The Missouri River Fish and Wildlife Mitigation Program (Mitigation Program) was authorized by the Water Resources Development Acts of 1986 and 1999 (WRDA86 and WRDA99) to develop fish and wildlife habitat along the lower Missouri River from Sioux City, Iowa, to the mouth near St. Louis, Missouri, to mitigate for the loss of habitat that resulted from construction, operation, and maintenance of the Missouri River Bank Stabilization and Navigation Project (BSNP). The Corning Mitigation Site (Corning Site) was purchased from willing sellers from 2000 to 2002 for the purpose of developing fish and wildlife habitat as part of the Mitigation Program. This Project Implementation Report (PIR) includes an Environmental Assessment (EA) consistent with the National Environmental Policy Act (NEPA). It provides an analysis of alternatives and a detailed description of the recommended plan for habitat development at the Corning Site. This PIR also contains an evaluation of environmental impacts related to the development of aquatic and terrestrial habitat consistent with the requirements of pertinent Federal regulations including NEPA, the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and Section 404 of the Clean Water Act (CWA).

1.1.1 PROJECT AUTHORITY

The Corning Site was acquired by the U.S. Army Corps of Engineers (Corps) and is proposed to be developed as part of the Mitigation Program. The Mitigation Program was initially authorized in Section 601(a) of WRDA86 [Public Law (PL) 99-662]. The authorization included the acquisition and development of 29,900 acres of land, and habitat development on an additional 18,200 acres of existing public land in the states of

Iowa, Kansas, Missouri, and Nebraska. The total amount of land authorized for mitigation by WRDA86 was 48,100 acres.

Section 334(a) of WRDA99 (PL 106-53) modified the Mitigation Program by increasing the amount of acreage to be acquired and/or mitigated by 118,650 acres. Therefore, the total amount of land authorized for mitigation is currently 166,750 acres.

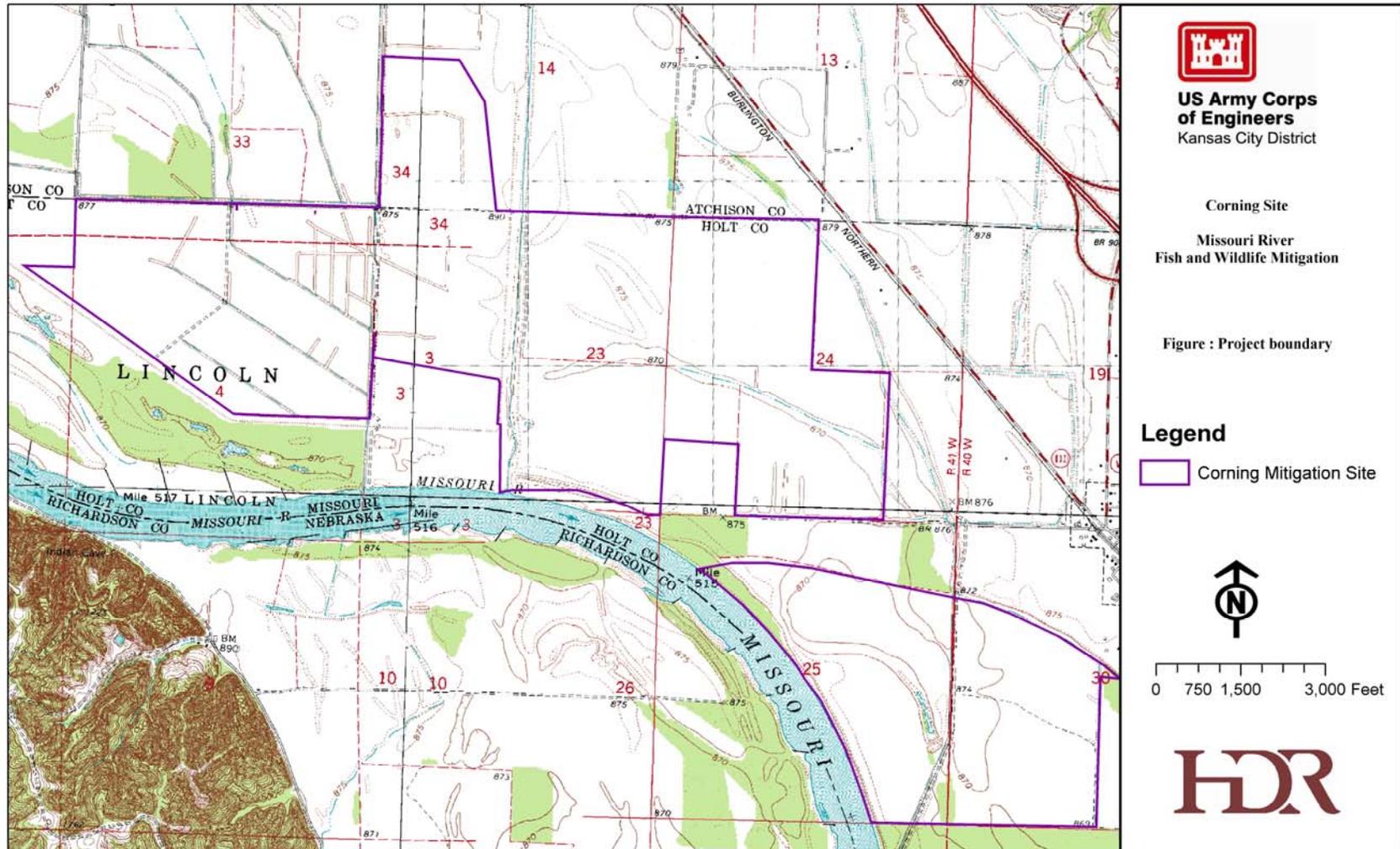
The Corps prepared a *Feasibility Report and Environmental Impact Statement* in 1981 on the original Mitigation Program of 48,100 acres. After Congress modified the Mitigation Program in WRDA99, the Corps initiated a *Supplemental Environmental Impact Statement* (SEIS) in September 2001 for the additional 118,650 acres. The SEIS was completed in early 2003 and the *Record of Decision* (ROD) was signed in June 2003.

1.1.2 PROJECT DESCRIPTION AND LOCATION

The proposed project would develop fish and wildlife habitat at the Corning Site. Habitat development activities would include reestablishing terrestrial, wetland, and prairie habitats, as well as creating shallow water habitat along the bank of the Missouri River. The proposed project is described in more detail in Chapter 2.

The Corning Site is located approximately one mile west of Corning, Missouri (Figure 1-1). The Corning Site is comprised of approximately 1,887 acres and is owned by the Corps. The site is located within rural Atchison and Holt Counties, Missouri and is adjacent to the left descending bank of the Missouri River, river miles (RM) 514 to 517. The site has slightly more than 1.0 mile of river frontage. The site lies in Sections 3, 4, and 5 of T3N, R17E; Section 34 of T4N, R17E; Section 30 of T63N, R40W; and Sections 23, 24, and 25 of T63N, R41W.

Figure 1-1. Corning Mitigation Site, Project Location.



The Corning Site is currently divided into two areas with a small tract of private land in between, composed of three separate landowners. The northern area is bounded by various small farm access roads and private lands on the north and private land on the east. The area is bounded on the west and south by Federal Levee Units (FLU) L-536 and L-519, private land and a small farm access road. The site is protected from flooding by FLUs L-536 and L-519, a small tributary drainage ditch separates the two levee units. The north area contains land (743.30 acres) under easement with the Natural Resource Conservation Service (NRCS) in its Wetland Reserve Program (WRP). It has various combinations of drainage ditches, low swales and levees to allow establishment of wetlands, timbered forest, annual herbaceous vegetation, warm season grasses, food plots and aquatic habitat associated with a scour hole and drainage ditches. The remnants of a farming operation still exist on the northeast area of this tract. A ground water well exists on this area. Access to the site is from the west on a gravel road and the north and east on various farm access dirt roads. Part of this site, through agricultural leasing, has been in a rotation of crop fields and annual herbaceous vegetation since the site was purchased. The north area also lies adjacent to the Deroine Bend Conservation Area, owned by the Missouri Department of Conservation (MDC), which is also in the Mitigation Program.

The south area is bounded on the north, east and south by private land. The area is bounded on the west by the Missouri River. The site is protected from flooding by FLU L-519. It borders the river on one side with scattered riparian vegetation. Landward it has a drainage ditch, low swales and levees to allow establishment of opportunistic wetlands, timbered forest, annual herbaceous vegetation, warm season grasses, food plots and aquatic habitat associated with a small scour hole and a drainage ditch. Access to the site is from the north on a small farm dirt access road. A ground water well exists on this area, with a privately owned center pivot system currently being operated through an agricultural lease. Much of the site has been in a rotation of crop fields and annual herbaceous vegetation since the site was purchased.

Development of the Corning Site is the responsibility of the Corps. The Reaffirmation Report (Corps 1990) established that for the Mitigation Program the Kansas City District would have responsibility for projects in Missouri and Kansas and the Omaha District would have responsibility for projects in Iowa and Nebraska. In 2003, a Cooperative

Agreement between the Corps and MDC was finalized. Under this agreement, MDC will manage the site and the Corps will provide development and management funds and oversight.

1.1.3 PREVIOUS RELATED REPORTS

The following previous reports are related to this PIR:

- MDC, 2001. *U.S. Army Corps of Engineers Mitigation Lands Area Plan (Northwest Missouri Region)*.
- Corps, Missouri River Division, 1981. *Missouri River Fish and Wildlife Mitigation Iowa, Nebraska, Kansas, and Missouri Final Feasibility Report and Final Environmental Impact Statement*.
- Corps, Kansas City District, 1990. *Missouri River Bank Stabilization and Navigation Fish and Wildlife Mitigation Project, Reaffirmation Report*.
- Corps, Missouri River Division, 1990. *Missouri River Bank Stabilization and Navigation, Fish and Wildlife Mitigation Project, Real Estate Design Memorandum #1*.
- Corps, Missouri River Division, 1992. *Missouri River Fish and Wildlife Mitigation Project, Project Management Plan*.
- Corps, Omaha District, 1995. *Langdon Bend Habitat Restoration/Preservation Project, Definite Project Report with Integrated Environmental Assessment and Section 404(b)(1) Evaluation*.
- Corps, Kansas City District, 1997. *Missouri River Bank Stabilization and Navigation, Fish and Wildlife Mitigation Project, Real Estate Letter Design Memorandum, Hemmes Bend/Corning Site, Holt County, Missouri*.
- Corps, Kansas City District, 2000. *Lower Hamburg Bend Mitigation Site, Definite Project Report*.
- Corps, Omaha District, 2003. *Kansas and Nishnabotna Bends, Environmental Assessment*.

- Corps, Kansas City and Omaha Districts, 2003. *Missouri River Fish and Wildlife Mitigation Project, Final Supplemental Environmental Impact Statement and Record of Decision.*
- Corps, Kansas City and Omaha Districts, 2005. *Missouri River Fish and Wildlife Mitigation Program, Draft Program Management Plan.*
- Corps, Kansas City District, 2005. *Corning Fish and Wildlife Mitigation Site: Site Mitigation Plan* (Appendix A).
- U.S. Fish and Wildlife Service (USFWS), 1980. *Missouri River Stabilization and Navigation Project, Sioux City, Iowa to Mouth Detailed Fish and Wildlife Coordination Act Report.*

1.1.4 PROJECT GOALS AND OBJECTIVES

The overall objective for the Corning Site as a component of the Mitigation Program is to develop fish and wildlife habitat. Beginning shortly after authorization by WRDA86, the Agency Coordination Team (ACT, discussed in more detail in Section 1.4) has been involved in Mitigation Program guidance and has helped establish overall objectives to:

- Maximize habitat and species diversity;
- Reconnect the river to the floodplain; and
- Develop each site to optimize habitat conditions for that individual site.

In addition to ACT objectives, MDC developed regional goals and objectives specific to the Mitigation Program for its northwest Missouri region in 2001 (MDC 2001). These goals and objectives outline specific habitat restoration activities with emphasis on certain species within habitats. Other goals and objectives of this plan focus on public use and land acquisitions. The goals and objectives of this plan help guide and formulate site specific goals and objectives to maximize habitat benefits. The Corps in cooperation with the ACT recently developed habitat type percentage goals for the Mitigation Program (by state) as part of a Draft Program Management Plan (PgMP).

The specific goals for the Corning Site were developed with consideration for ACT, MDC and PgMP goals to help meet the overall Mitigation Program authorization and to

maximize habitat potential for the site. The Corps, USFWS, and MDC identified these site-specific goals by review of the Site Mitigation Plan (SMP; Appendix A), discussions between the three agencies, and field observations of site conditions. The site-specific goals identified are:

- 1) Create shallow water habitat where opportunities are available to create a more diverse riverine habitat;
- 2) Maximize wetland acres on the site,
- 3) Maximize aquatic and terrestrial habitat development on the site within the limitations of the real estate inholdings,
- 4) Work with the NRCS to finalize, implement, and construct a wetland restoration plan for the portion of the site that is under WRP easement, and
- 5) Add to the diversity, quality and quantity of habitat and public use opportunities present when combined with the Deroin Bend Conservation Area.

Table 1-1 summarizes the acres of general habitat types that currently exist at the Corning Site, the desired future acres of habitat that would result from implementation of the preferred alternative, and project outputs (net habitat changes). Project outputs identified in Table 1-1 differ from preliminary outputs identified in the SMP (Appendix A).

Table 1-1. Corning Mitigation Site Habitat Goals

General Habitat Type	Existing Acres	Proposed Acres	Output ¹
Main Channel, Shallow Water	10 ²	20 ³	10
Backwater Areas	5.4	5.4	0 ⁴
Scour/Blew Holes	Noted Above	Noted Above	NA
Emergent Wetlands	53.3	554.4	501.1
Scrub-Shrub Wetlands	58.3	50.1	-8.2
Forested Wetlands	9.9	296.9	287.0

General Habitat Type	Existing Acres	Proposed Acres	Output ¹
Developed	2.4	2.4	0
Forested	16.6	0 ⁵	-16.6
Shrubland	84	76.1	-7.9
Grassland	921.1	828.6	-92.5
Cultivated, Levees	736.5	73.6	-662.9
TOTAL⁶	1887.5	1887.5	

¹Negative outputs are the result of existing habitat types transitioning into other habitat types or being converted to wetlands through proposed activities.

²Existing maximum acres at five feet above the water surface elevation of the median August discharge.

³This acreage represents a proposed future condition. As this acreage is developed over time it would result in a corresponding loss in other habitat as bank is eroded, which is not represented in this table.

⁴Backwater acres would likely increase if modifications to the scour hole near the mouth of Mill Creek are implemented, however the acreage of this increase would be determined in the design phase.

⁵All proposed forested habitat types were considered forested wetlands.

⁶Totals do not include shallow water habitat in the main channel of the Missouri River.

1.1.5 SCOPE OF STUDY

The scope of this study is confined to the project area shown in Figure 1-1. The acquisition of additional tracts adjacent to the Corning Site is being considered. If additional tracts are acquired in the future, they would be incorporated into the mitigation site and managed to improve terrestrial and aquatic habitat. Alternatives considered in this study were limited to those techniques that would restore or preserve terrestrial and/or aquatic habitat on the 1,887 acres currently owned at the Corning Site. An amendment to this PIR would be needed if additional acres are acquired or if significant changes to the preferred alternative are proposed in the future. All permanent project features would be constructed on government-owned lands.

1.2 PURPOSE OF AND NEED FOR ACTION

The purpose of the Mitigation Program, and site-specific projects, is to mitigate the loss of fish and wildlife habitat due to the BSNP. The Rivers and Harbors Act of 1912, 1925, 1927, and 1945 authorized the BSNP. The existing BSNP extends 735 miles from Sioux City, Iowa to the mouth near St. Louis, Missouri and maintains a nine-foot deep by 300-foot wide channel. The BSNP consists mainly of revetments along the outsides of bends and transverse dikes along the insides of bends to force the river into a single active channel that is self-maintaining.

The need for the Mitigation Program, and site-specific projects, rests in the loss of a unique floodplain ecosystem that included diverse fish and wildlife habitat and species, and the changing public values that have placed significant importance on reestablishing these important fish and wildlife species and ecological resources. The historic variety and quality of aquatic habitats have been eliminated or altered by construction of the navigation channel. Dikes and revetments have greatly reduced the meandering of the river, and flooding of the river has resulted in accretion of lands that have allowed for expansion of agricultural practices into the historic floodplain. The Corps estimated that by 2003, approximately 522,000 acres of fish and wildlife habitat in the natural channel and meander belt of the Missouri River would have been lost as a result of the construction, operation, and maintenance of the BSNP (Corps 1981).

Habitat loss and resultant adverse impacts to fish and wildlife resources need to be mitigated as authorized by the U.S. Congress through WRDA86 and WRDA99. Acquisition and development of lands along the Missouri River need to occur to mitigate the resources lost to channelization and bank stabilization. The Mitigation Program was established to accomplish these needs. Development of this site for fish and wildlife habitat would contribute to achieving the goals and purpose of the Mitigation Program to mitigate for the loss of habitat that resulted from the BSNP.

1.3 SITE SELECTION

The Reaffirmation Report (Corps 1990) established general criteria for the selection of sites for land acquisition as part of the Mitigation Program. These criteria included the following:

- The land in private ownership could be acquired from willing sellers.
- The size of the area was greater than 100 acres.
- The area would not adversely affect navigation, carrying capacity of existing levees, or flood-carrying capacity of the existing floodway.
- The area was a large contiguous tract suitable for terrestrial woodland, grassland, and wetland development, with a remnant chute and backwater that could be restored.
- Emphasis will be given to acquiring the remaining larger contiguous tracts of bottomland timber, areas of wetland or former wetland that can be restored, areas that can be developed to provide terrestrial forest and grassland habitat, and areas where chutes or backwaters can be restored.
- Acquisition of agricultural land should be limited except where the area has high potential for development or where a willing seller is available.
- Consideration will be given to the establishment or preservation of native floodplain prairie habitats.
- The area was part of the meander belt of the Missouri River.
- Public access to areas will not be a determining factor in acquisition.
- Sites chosen for establishment of wetlands will include enough adjacent land so that excessive sedimentation can be prevented and appropriate terrestrial non-forested habitat can be provided.
- Sites chosen for acquisition or development will be based on state and Federal agency input and support.
- Projected operation and maintenance costs will be considered in the selection of acquisition and development sites.

The Corning Site was selected as a potential mitigation site based on review of historic and current aerial photography and on-site evaluations. The Corning Site met the above stated criteria. In addition, the site was determined to have several attributes that made it favorable as a mitigation site. These include its location along the Missouri River with

opportunities to create backwater areas and to develop wetland areas. After preliminary investigations and studies were completed the area was recommended by MDC for mitigation planning. The property was made available by private willing sellers and the Corps acquired fee title to the land between 2000 and 2002. MDC has been managing the area since that time.

1.4 AGENCY COORDINATION

The Mitigation Program ACT meets quarterly. Representatives from the USFWS, U.S. Environmental Protection Agency (EPA), NRCS, Iowa Department of Natural Resources (IDNR), Kansas Department of Wildlife and Parks (KDWP), MDC, and the Nebraska Game and Parks Commission (NGPC) along with the Kansas City and Omaha Districts of the Corps comprise the ACT. The initial responsibility of the ACT was to develop selection criteria for screening and prioritizing general areas to identify willing sellers for potential mitigation sites. The ACT also meets to discuss future activities, priorities, funding, and other issues related to implementing, managing, and monitoring the Mitigation Program. The MDC representatives to the ACT worked with the Kansas City District to identify the Corning Site as an area for potential acquisition and habitat development.

Coordination among the Kansas City District, Omaha District, and MDC has been occurring throughout the planning process for development of the Corning Site. Agency coordination letters were sent to the appropriate Federal and state resource agencies requesting information and their comment regarding the Proposed Action. The agencies provided information on Federally listed and candidate threatened and endangered species, state species of special concern, and natural communities (Appendix A).

Chapter 2

Alternatives

2.1 INTRODUCTION

This chapter presents the alternatives considered for the development of fish and wildlife habitat at the Corning Site. Three alternatives were considered. They are the Full Development, Shallow Water Habitat, and No Development alternatives. The Full Development and Shallow Water Habitat alternatives are the development alternatives. These alternatives were evaluated against their ability to fulfill the site objectives as previously defined in Section 1.1.4. This chapter includes a description of each alternative, an evaluation of the alternatives, and a detailed description of the recommended alternative.

Some habitat development and site management activities have been previously conducted by MDC. Some aspects of the current site management and habitat development activities (e.g., plantings) are considered to be included in all three alternatives. These activities would likely be modified during development of the Corning Site. In the spring of 2002, MDC planted warm season grasses and tree seedlings and established a nursery for future tree spading. In 2005, MDC planted white ladino clover, corn, soybeans, sunflowers, wheat, warm season grasses, and native forbs. In addition, two strips of corn, planted in 2004, remain standing for food plots. Currently, agricultural leasing takes place on the site. This practice maintains open areas in the short-term until habitat improvements can be made and provides food plots for wildlife in the long-term. In addition, it provides protection from wildlife damage to adjacent lands. These lands are proposed to be greatly reduced in the future as the development alternatives would not include croplands; only food plots. It is estimated

that at least 663 acres of leased agricultural lands would be taken out of crop production. The following sections describe the alternatives considered for further development of the Corning Site.

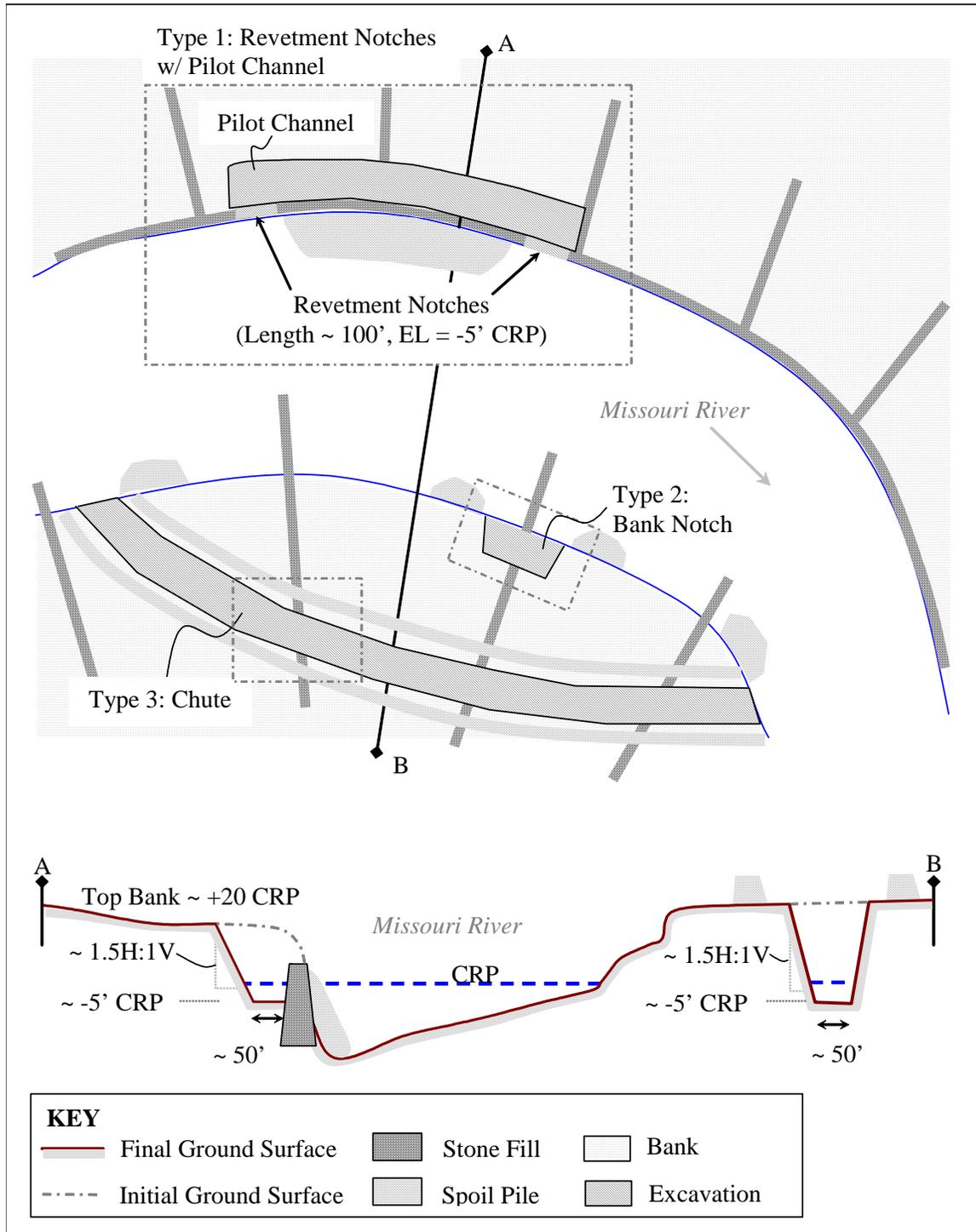
2.2 ALTERNATIVES

2.2.1 FULL DEVELOPMENT ALTERNATIVE

The Full Development alternative would include the use of various methods to develop fish and wildlife habitat on the Corning Site. These methods would include incorporation of the NRCS wetland restoration plan for land under easement in the WRP; modifications to Mill Creek; creation of shallow water habitat and wetlands; tree plantings; food plots; and development of terrestrial habitats. Based on the presence of an existing service line and an abandoned well on the north parcel, installation of a pump in the well would be considered. This pump would be used to provide supplemental water during dry periods and is discussed further in Section 2.4. In addition, limited amounts of agricultural leasing would likely be required to maintain open areas until habitat improvements can be made. These open areas would help to prevent undesirable woody species succession, and would provide some cropland for food plots and protection from wildlife damage on adjacent lands. Natural succession would be allowed to take place on the site where it is desirable and where favorable conditions exist.

Modifications to Mill Creek would take place near the southern boundary of the northern area of the Corning Site; generally where Mill Creek enters the large scour hole created by the flood of 1993. These modifications would likely focus on opening up the area around the scour hole and along the left descending bank of Mill Creek at its confluence with the Missouri River. River structure modifications, likely a revetment notch and associated pilot channel (Figure 2-1, Type 1) along the western boundary of the southern area, would be performed to encourage the erosion of the bank along the Missouri River in order to develop shallow water habitat. Any shallow water habitat development activities would be designed to have no impact to the two Federal levees on the Corning Site. Methods used to develop shallow water habitat are discussed in Section 2.2.4, Shallow Water Habitat Development. In addition to the development of wetlands as part of the NRCS wetland restoration plan, other suitable locations for the

Figure 2-1. Typical Revetment Notches with Pilot Channel.



*CRP = Construction Reference Plane = Elevation representing flow exceeded 75% of the time during the navigation season.

development of wetlands on the north and south areas were evaluated by conducting inundation analyses and by reviewing the available soil survey for Atchison and Holt Counties. The results of these analyses are summarized in the preliminary wetland feasibility assessment which can be found in Appendix B. As stated above, an existing (abandoned) well may be used to provide supplemental water on the north parcel during dry periods. A water control structure would be used to create wetlands on the northern area. A majority of the proposed tree plantings would likely occur on the western boundary of the southern area of the Corning Site. Terrestrial habitats, including native prairie grasses and shrubs, would be planted in transition areas that are not planned for wetlands or tree plantings. Disturbed areas would be re-vegetated with native plant species, as necessary. Mixes of grass containing water tolerant species would be utilized. Natural succession, including cottonwood and willow communities in forest areas, would be allowed to take place on the Corning Site where it would be desirable and favorable conditions exist (e.g., along the Corning Site margins closest to the Missouri River).

Along with the methods used to create fish and wildlife habitat on the Corning Site, monitoring activities would be conducted to determine the quality of the restored habitat and would be used to adaptively manage the Corning Site. Although the Corps would not fund or construct recreation features, it would work with other agencies or organizations interested in developing recreational or public use facilities at their own expense. The Corning Site would be open to the public for a variety of uses including bird watching, hiking, fishing, and hunting. Currently, there are no recreational components on the Corning Site, nor are there any proposed for the development alternatives.

2.2.2 SHALLOW WATER HABITAT ALTERNATIVE

The Shallow Water Habitat alternative would include methods to develop shallow water habitat at the Corning Site. In addition, this alternative would incorporate the NRCS wetland restoration plan for land under easement in WRP, modifications to Mill Creek, and natural succession as previously described in the Full Development Alternative.

River structure modifications, likely a revetment notch and associated pilot channel (Figure 2-1, Type 1) along the western boundary of the southern area, would be

performed to encourage the erosion of the bank along the Missouri River in order to develop shallow water habitat. Care would be taken to avoid impacts to the Federal levees. Methods used to develop shallow water habitat are discussed in Section 2.2.4, Shallow Water Habitat Development. Limited amounts of agricultural leasing would likely be required to maintain open areas until habitat improvements can be made. The agricultural leasing would help prevent undesirable woody species succession and it would provide some cropland for food plots and protection from wildlife damage on adjacent lands. Agricultural leasing of lands on the Corning Site is proposed to be greatly reduced in the future as the proposed development alternatives would not include croplands; only food plots. Monitoring activities would be conducted to determine the quality of the restored habitat. Monitoring of shallow water habitat development would be used to adaptively manage that habitat. Although the Corps would not fund or construct recreation features, it would work with other agencies or organizations interested in developing recreational or public use facilities at their own expense. The Corning Site would be open to the public for a variety of uses including bird watching, hiking, fishing, and hunting. Currently, there are no recreational components on the Corning Site, nor are there any proposed within any of the development alternatives.

2.2.3 NO DEVELOPMENT ALTERNATIVE

The No Development alternative represents the alternative of no action by the Corps.¹ It should be noted that this alternative would incorporate the NRCS wetland restoration plan for land under easement in the WRP. This WRP land was acquired by the Corps; therefore, wetland development is required. No additional activities to develop fish and wildlife habitat would be undertaken as part of the No Development alternative; however, terrestrial habitats would undergo natural succession over many years on lands not under easement in WRP. Considering this and excluding development of lands under easement in WRP, this alternative could also be considered the natural succession alternative because the habitat that would develop at the Corning Site, over the long-

¹ It should be noted that environmental review as required for NEPA and Council on Environmental Quality and Corps regulations for the acquisition of the land was the subject of the Supplemental Environmental Impact Statement and ROD completed in 2004 (Corps 2004).

term, would be solely dependent on the processes of natural succession acting on the area (except for the WRP portion of the Corning Site).

There would be no increase in shallow water habitat with this alternative because no modifications to river structures would occur. This alternative would not reconnect the river to the floodplain. Minimal amounts of agricultural leasing would not be included in this alternative. Agricultural leasing is typically used to maintain open areas until habitat improvements can be made to prevent undesirable woody species succession and to provide some cropland for food plots and to minimize off-site crop foraging and damage from wildlife. Although the Corps would not fund or construct recreation features, it would work with other agencies or organizations interested in developing recreational or public use facilities at their own expense. The Corning Site would be open to the public for a variety of uses including bird watching, hiking, fishing, and hunting.

2.2.4 SHALLOW WATER HABITAT DEVELOPMENT

Development of shallow water habitat is a component of the Full Development and Shallow Water Habitat alternatives. Shallow water habitat can typically be developed through a variety of methods ranging from bank notches, pilot channels landward of revetments, side channel chutes, dike notches, lowered dikes with chevrons, and combinations of these methods. However, because the Corning Site is on the outside bend of the Missouri River and no dikes are present on its bank, and because of the in-holdings of private land and the close proximity to the Federal levee, only revetment notching with an associated pilot channel on the landward side of the revetment would be used to create shallow water habitat. The Kansas City and Omaha Districts are responsible for the development of shallow water habitat on the Missouri River. The Omaha District is responsible for activities on the river upstream of RM 500 at Rulo, Nebraska while the Kansas City District is responsible for activities downstream of RM 500 to the mouth. Although the Kansas City District is responsible for implementing mitigation efforts at the Corning Site, the Omaha District would perform any river structure modifications for shallow water habitat development because the Corning Site is upstream of RM 500.

Because there are no dikes on the outside bend of the Missouri River, the only opportunity to create shallow water habitat is through construction of a pilot channel

landward of the revetment and connecting the pilot channel to the river by a series of revetment notches. This is shown as Type 1 on Figure 2-1. A bank notch (Type 2), which consists of excavating a notch in a stonefill dike landward of the high bank, and a side-channel chute (Type 3) will not be used on the Corning Site. Clearing and grubbing activities typically associated with shallow water habitat construction include clearing an area sufficient to execute the required excavation, generally within 25 feet from the limit of excavation for each notch or pilot channel. Tree disposal from construction of pilot channels landward of revetments would generally be in the river. Trees smaller than 10-inch dbh (diameter at breast height) would be disposed of whole in the river, and trees over 10-inch dbh would be cut off from the rootwad and the tops disposed of in the river (no single piece would exceed 40 feet in length). Root wads with no more than 10 feet of trunk would be disposed of in the pilot channel or in the river at the direction of the contracting officer. In addition, brush may be piled on-site and burned.

It is anticipated that excavated material would consist primarily of fine sand to silty material interspersed with random layers of clay, except from the rock revetment notches. Material excavated for the pilot channel behind the revetment would be disposed of by placing it in the river. Material disposed of in the river would be graded or placed in such a manner so that the maximum height of the material would be below 5-feet above Construction Reference Plane (CRP). Excavated or in-place material would be placed so as not to impede the flow of water into or out of the revetment notch. Excavation may be performed by land based equipment or dredged from the river. Excavated materials may be used on site to enhance topographic features or deposited into the river to increase sediment load and add to development of shallow water habitat. The use of floating plant or dump trucks to dispose of the material would not be required. Revetment structures to be notched consist of rockfill. Revetment structures would be notched to the elevation and width specified, and the rockfill would be salvaged and placed on a riverward portion of the revetment being excavated in an approved manner.

2.3 EVALUATION OF ALTERNATIVES

All three alternatives would fulfill the overall program goal of providing fish and wildlife habitat; however each alternative would provide varying degrees of habitat and diversity. None of the alternatives would substantially fulfill the goal of reconnecting the river to the

floodplain because the private in-holdings prevent a substantial reconnection of the floodplain and the river. These in-holdings either separate the Corning Site (i.e., the northern area) from the river or prevent realignment of the Federal levee that would be required to substantially meet the goal of reconnecting the river and the floodplain. The Full Development alternative would best fulfill the project goals as described in Section 1.1.4. It represents optimal habitat development best suited to the conditions of the Corning Site. It would reconnect the river to the floodplain along the western boundary of the southern parcel, and would create a diversity of wetlands and terrestrial habitat. The benefits of terrestrial habitat development would occur over a longer time period with the Shallow Water Habitat and No Development alternatives than with the Full Development alternative. The Shallow Water Habitat and Full Development alternatives would provide a more diverse riverine habitat than currently exists through the erosion of the river bank to create shallow water habitat along the channel on the western boundary of the southern area of the Corning Site. The Shallow Water Habitat alternative would not establish diverse terrestrial habitat (e.g. bottomland forest, wetlands, or prairies) except for the habitat that would be developed on the WRP easement lands or that would develop over a long period of time in response to natural succession. Likewise, the No Development alternative would not achieve the stated goals of creating a more diverse riverine habitat, reconnecting the river with the floodplain, or developing diverse terrestrial habitat (e.g. bottomland forest, wetlands, or prairies) except for the habitat that would be developed on the WRP easement lands or that would develop over a long period of time in response to natural succession. The No Development alternative would not provide any additional fisheries habitat beyond what currently exists at the site or develops naturally over a long period of time. These benefits would be minimal.

All three alternatives would result in similar environmental consequences, varying primarily in the magnitude of benefits. Beneficial impacts to biological resources including aquatic and terrestrial habitats would be greatest for the Full Development alternative. Benefits to fisheries as a result of shallow water habitat development would be similar for the Full Development and Shallow Water Habitat alternatives. Considering the implementation of the wetland restoration plan for WRP easement lands on the Corning Site, which would be part of each alternative, short-term impacts to air, noise,

water quality, and soils related to construction activities would occur with all of the alternatives. These short-term impacts would be minimal and would be greatest with the Full Development alternative. The Full Development and Shallow Water Habitat alternatives would also result in minimal impact to prime farmland. All three alternatives would result in beneficial impacts to recreational opportunities on the Corning Site. These beneficial impacts would vary by alternative mainly due to the amount and diversity of quality habitats created and the period of time required for the habitats to develop. The greatest amount and diversity of quality habitats would be realized at the fastest rate through implementation of the Full Development alternative. It is anticipated that there would be an increase in outdoor activities over time. It is anticipated that the tree plantings and resulting habitats would likely attract more bird watchers to the site. Other uses such as hiking and hunting would also likely increase. A lesser amount and diversity of quality habitats, excluding the WRP easement lands, would be realized by the Shallow Water Habitat alternative. Recreational uses would be dependent on natural succession and thus would be realized at a slower rate. The amount and diversity of quality habitat resulting from the No Development alternative, excluding implementation of the wetland restoration plan on land under easement in the WRP, would be solely dependent on natural succession and thus would be realized at the slowest rate. For all three alternatives, the diversity of both game and non-game species would be dependent on the types of habitats created and the management practices associated with each alternative. None of the alternatives would affect navigation on the Missouri River.

The Full Development alternative was selected as the recommended alternative for implementation of the Mitigation Program at the Corning Site. This alternative was recommended because it best fulfills all of the program and site-specific goals for the Corning Site and would maximize beneficial environmental impacts while resulting in no significant adverse impacts to the environment. A detailed description of the recommended alternative follows in Section 2.4.

Table 2-1 provides a comparison of environmental consequences for the three alternatives evaluated as part of this PIR. The comparison excludes the planned wetland habitat development of the WRP.

Table 2-1. Comparison of Environmental Consequences of Alternatives Evaluated

Environmental and Socioeconomic Resources	Preferred Alternative (Full Development)	Shallow Water Habitat Alternative	No Development Alternative
Geological Resources			
Topography	Insignificant adverse impacts and minor beneficial impacts through dynamic changes in surface topography and creation of wetlands and shallow water habitat.	Insignificant adverse impacts and minor beneficial impacts through the creation of shallow water habitat.	No impacts
Geology	No impacts	No impacts	No impacts
Soils	Short-term insignificant adverse impacts resulting from the loss of soils by dredging disposal and scour action.	Short-term insignificant adverse impacts resulting from the loss of soils by dredging disposal and scour action.	No impacts
Prime and Unique Farmland	Insignificant adverse impacts resulting from the loss of prime and unique farmland soils by dredging disposal and scour action.	Insignificant adverse impacts resulting from the loss of prime and unique farmland soils by dredging disposal and scour action.	No impacts
Biological Resources			
Aquatic Resources	Short-term insignificant adverse impacts resulting from disturbance during river structure modifications and increases in turbidity impacting water temperatures and dissolved oxygen content. Minor short-term beneficial impacts resulting from increased sediment load simulating historic conditions and increased turbidity lowering light transmission for species adapted to these conditions. Long-term beneficial impacts resulting from the creation of shallow water habitat.	Short-term insignificant adverse impacts resulting from disturbance during river structure modifications and increases in turbidity impacting water temperatures and dissolved oxygen content. Minor short-term beneficial impacts resulting from increased sediment load simulating historic conditions and increased turbidity lowering light transmission for species adapted to these conditions. Long-term beneficial impacts resulting from the creation of shallow water habitat.	Significant adverse impact as no shallow water habitat would be created.
Terrestrial/Wetland Resources	Short-term insignificant impacts resulting from disturbance during construction. Long-term beneficial impacts resulting from the increase in quality terrestrial and wetland habitat.	Short-term insignificant impacts resulting from disturbance during construction. Long-term beneficial impacts resulting from natural succession of terrestrial habitat.	Long-term beneficial impacts resulting from natural succession of terrestrial habitat.
Wildlife	Short-term insignificant impacts resulting from disturbance during construction. Long-term beneficial impacts through the creation of wildlife habitat.	Short-term insignificant impacts resulting from disturbance during construction. Long-term beneficial impacts resulting from the development of wildlife habitat through natural succession.	Long-term beneficial impacts resulting from the development of wildlife habitat through natural succession.

Environmental and Socioeconomic Resources	Preferred Alternative (Full Development)	Shallow Water Habitat Alternative	No Development Alternative
Threatened and Endangered Species	Short-term insignificant adverse impacts resulting from disturbance to species during construction. Long-term beneficial impacts resulting from the creation of valued habitats (aquatic and terrestrial).	Short-term insignificant adverse impacts resulting from disturbance to species during construction. Long-term beneficial impacts resulting from the creation of aquatic habitat and natural succession terrestrial habitat.	Significant adverse impact as no shallow water habitat would be created. Long-term beneficial impacts resulting from the increase of valued terrestrial habitats through natural succession.
Land Cover	No significant adverse impacts	No significant adverse impacts	No significant adverse impacts
Cultural Resources			
Historic Properties and Archaeological Sites	No impact to historic properties. No archaeological site impacts on accreted lands; Phase I survey on non-accreted lands prior to design phase. Measures would be taken to avoid or minimize any impacts.	No impact	No impact
Steamboat Wrecks	Minimal potential for adverse impacts resulting from habitat development.	No cumulative or unavoidable adverse impacts are anticipated from the development of shallow water habitat.	No impact
Water Quality	Short-term insignificant adverse impacts resulting from increased sediment load. Long-term beneficial impacts resulting from wetland development.	Short-term insignificant adverse impacts through increased sediment load	No impact
Air Quality	Short-term insignificant adverse impacts resulting from increased emissions (fugitive dust) during construction. Long-term beneficial impacts resulting from decreased agricultural practices on-site.	Short-term insignificant adverse impacts resulting from increased emissions (fugitive dust) during construction. Long-term beneficial impacts resulting from decreased agricultural practices on-site.	Long-term beneficial impacts resulting from decreased agricultural practices on-site.
Noise	Short-term insignificant adverse impacts resulting from increased noise during construction. Long-term beneficial impacts resulting from decreased agricultural practices on-site.	Short-term insignificant adverse impacts resulting from increased noise during construction. Long-term beneficial impacts resulting from decreased agricultural practices on-site.	Long-term beneficial impacts resulting from decreased agricultural practices on-site.
Socioeconomic Resources			
Population and Income	Insignificant beneficial impacts to local economy during and after construction through increased spending.	Insignificant beneficial impacts to local economy during and after construction through increased spending.	No impact

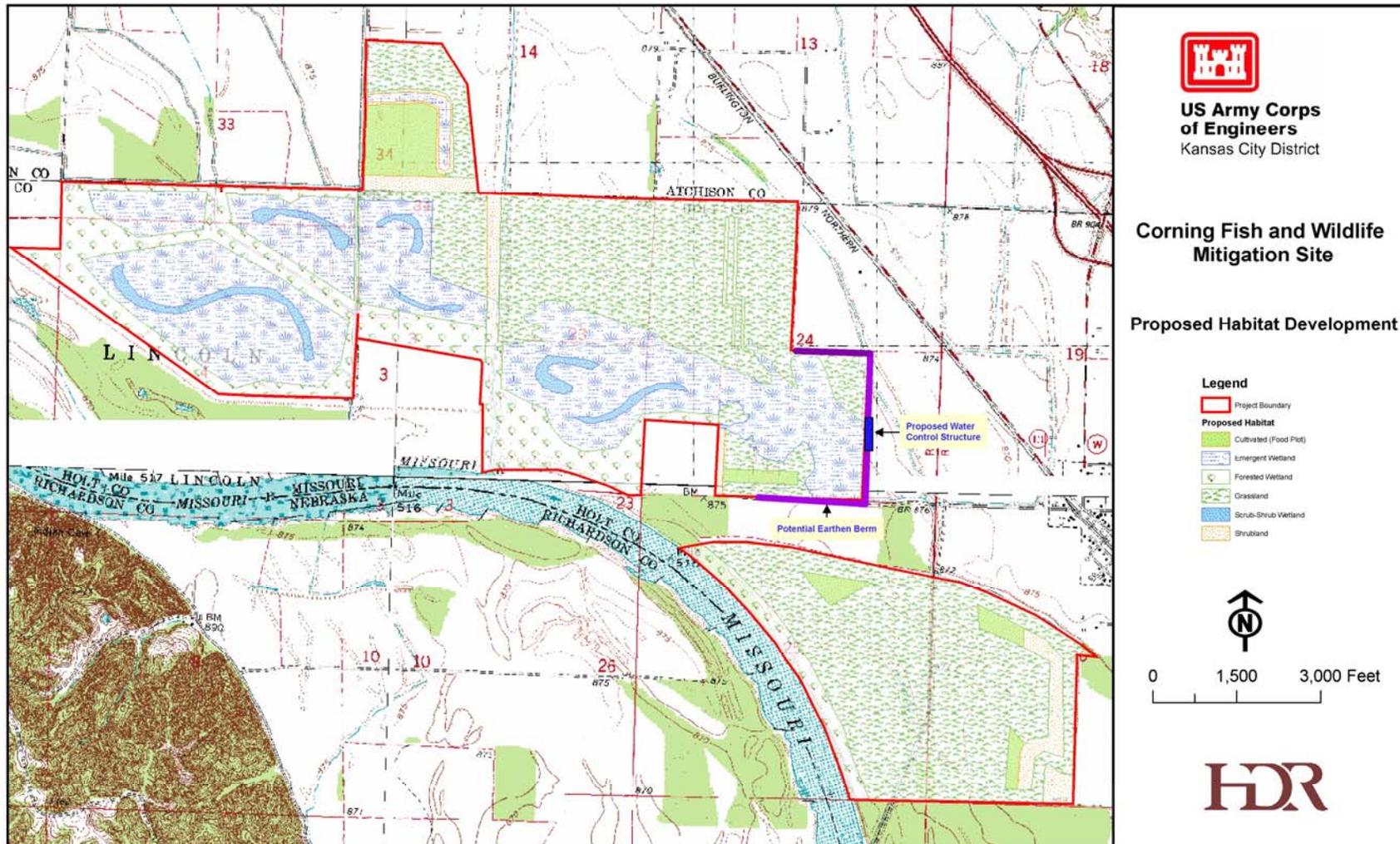
Environmental and Socioeconomic Resources	Preferred Alternative (Full Development)	Shallow Water Habitat Alternative	No Development Alternative
Recreation and Aesthetics	Short-term insignificant adverse impacts resulting from the inaccessibility of the site during construction. Long-term beneficial impacts resulting from increased recreational activities, habitat, and greater diversity of features.	Short-term insignificant adverse impacts resulting from the inaccessibility of the site from the river(s) during construction. Long-term beneficial impacts resulting from increased recreational activities, habitat, and greater diversity of features.	No impact
Navigation	No impact	No impact	No impact

2.4 DESCRIPTION OF RECOMMENDED ALTERNATIVE

The Full Development alternative is the recommended alternative for implementation at the Corning Site. The following list of activities would be part of the recommended alternative and are shown in Figure 2-2.

- The Corning Site has good access from multiple locations. Signage for the Corning Site and parking for public use opportunities would increase public awareness of the Corning Site's location and access points.
- The Corps would seek to obtain permanent easement or fee title on the lands that separate the north and south areas of the Corning Site. These adjacent lands are owned by several landowners. If any of the landowners were to become a willing seller in the future, the Corps would pursue acquisition of these properties.
- The construction of shallow water habitat would be completed through modifications to Mill Creek and revetment notches with associated pilot channels as described in Section 2.2.4 and is anticipated to result in the creation of approximately 20 acres of shallow water habitat. However, the construction of shallow water habitat would result in the corresponding loss of existing habitat to erosion resulting from shallow water habitat creation.
- Habitat development as described in Section 2.2.1 would be completed at several areas on the Corning Site. Developed habitats other than wetlands would include grasslands, shrublands, and forested areas. Figure 2-2 shows the desired habitat development plan for the Corning Site. Project outputs resulting from habitat development were summarized in Table 1-1. These outputs represent the net change in habitat types from that currently existing to that which would exist following habitat development activities. These outputs would be realized over the long-term.

Figure 2-2. Proposed Habitat Development for Corning Mitigation Site.



- MDC would re-vegetate disturbed areas with native plant species, as necessary. Terrestrial habitats, including native prairie grasses and shrubs, would be planted in transition areas that are not planned for wetlands or tree plantings. Mixes of grass containing water tolerant species would be utilized (Appendix B). Natural succession, including cottonwood and willow communities in forested areas, would be allowed to take place on Corning where desirable and favorable conditions exist.
- Bottomland forest would be restored on select areas throughout the Corning Site. Some portions of the Corning Site would possibly be leased for crop production, however, over time cropland would likely be phased out completely on the Corning Site; the use of food plots would continue. Planting crops would maintain open areas until habitat improvements can be made in order to prevent undesirable woody species succession, to provide some food plots for wildlife, provide benefits such as curtailing the invasion of reed canarygrass (*Phalaris arundinacea*), and to provide protection from wildlife damage on adjacent lands.
- A water control structure would be constructed on the eastern edge of a drainage that runs east-west through the northern area of the Corning Site. The control structure would be managed to maximize wetland creation in this area of the Corning Site. The anticipated wetland area is shown on Figure 2-1. A more detailed discussion of the plans to develop wetlands in this area is included in the Preliminary Wetland Feasibility Report included in Appendix B. An existing well is associated with this drainage and proposed wetland area. The well is currently connected to an existing electrical line. If this line is found to be in serviceable condition, it would be reused with the capacity to power a 480 volt, 3-phase, 15 horse power converter after a phase converter is installed. Reuse of this well in association with the proposed water control structure would maximize the ability to create and manager wetland acres in this are of the Corning Site. A technical email regarding the electrification of the existing well is included in Appendix B.
- Long-term maintenance of existing and newly created habitats would be performed.
- Monitoring of the habitat improvements would be conducted by MDC and the Corps. Monitoring and evaluation of the Corning Site is discussed further in Section 5.2, Monitoring and Evaluation (M&E) Plan.
- Adaptive management of the Corning Site would be performed as necessary. For purposes of this PIR and the management of the Corning Site, adaptive

management would be defined as the adaptation of techniques to better meet the desired results for the site. Adaptive management would be used to help achieve the desired conditions identified for the Corning Site, not to change the goals identified for the site.

- The Corps would not fund or construct recreation features, but, they would work with any agency or organization interested in developing recreational or public use facilities at their own expense as the site would be open to the public for a variety of uses including bird watching, hiking, fishing, and hunting. The Corps would repair/replace any existing recreation features or access in-kind if any were damaged or destroyed during construction of project habitat features.

Chapter 3

Affected Environment

3.1 INTRODUCTION

This chapter presents the affected environment for Corning. The affected environment is the baseline against which potential beneficial and adverse impacts caused by the action are evaluated. The existing conditions described in this chapter for Corning are based on the current state of the site and not as the site was at the time of purchase by the Corps (2000-2002). Various sources of information were used to compile the affected environment presented in this chapter including field investigations, geographic information systems data, literature searches, review of maps and aerial photography, and previous reports.

3.2 HISTORY OF THE PROJECT AREA

Prior to construction of the BSNP, the lower Missouri River was uncontrolled and it meandered across the floodplain creating a highly dynamic environment through the physical processes of erosion, deposition, and accretion. The historical lower Missouri River consisted of numerous islands, channels, sandbars, and slack water supporting vegetation in various stages of succession. Historically, the Corning Site would have consisted of an area where the meander of the Missouri River across the floodplain would have resulted in a dynamic area where the proportions of habitat types would have been constantly changing due to the physical processes mentioned previously.

Following construction of the BSNP, accreted lands in the area of Corning were created, claimed and converted to cropland. At the time of purchase by the Corps, Corning was primarily cropland with some trees. The lands were purchased from willing sellers during a period from 2000 to 2002. MDC has managed the site since 2003. Table 3-1

Table 3-1. History of Management Activities at the Corning Mitigation Site.

Year	Management Activities
Spring 2002	<ul style="list-style-type: none"> • Planted hardwood tree seedlings on 41 acres • Planted native warm season grasses on 5 acres
Spring 2004	<ul style="list-style-type: none"> • Planted native warm season grasses on 15 acres
Spring 2005	<ul style="list-style-type: none"> • Planted native forbs and native warm season grasses on 46 acres • Planted white ladino clover on 6 acres
2006 (Planned)	<ul style="list-style-type: none"> • Planting of shrubs, gray dogwood, and wild plum • Planting of native forbs and native warm season grasses • Planting of bare root native forbs

summarizes management activities that have been performed to date at the Corning Site.

3.3 GEOLOGICAL RESOURCES

The geological resources include the physical surface and subsurface features of Corning such as topography, geology, and soils.

3.3.1 TOPOGRAPHY

Generally, the topography of the Corning Site is level, a characteristic of a floodplain, with only minor relief due to erosion and deposition from flooding. Drainage for the Corning Site is controlled by ditches, water control structures, and levees (both federal and agricultural). The land area between RM 514 to RM 517 generally ranges from 870 feet above mean sea level (AMSL) to 880 feet AMSL.

3.3.2 GEOLOGY

The Corning Site lies within the Dissected Till Plains (Missouri River Alluvial Plains subsection) of the Central Lowlands physiographic province [U.S. Geological Survey (USGS) 2003].

The Corning Site is situated within a complex system of alluvial deposition and erosion from the changing course of the Missouri River through geologic time; however, construction of the BSNP caused significant amounts of human induced alluvial deposition and erosion to occur in a relatively short time period (less than 100 years). The site is located within the lower reaches (below the mouth of the Platte River in Nebraska) of the Missouri River Valley where the valley generally ranges from five to

seven miles wide (Dahl 1961). The Missouri River flows across Pennsylvanian strata in the general area of the site. Pennsylvanian strata are comprised of sandstone, shale, limestone, clay and coal deposits (Schaper 2004).

Overlying the bedrock in the general area of the Corning Site are typically alluvial clays; sand and gravels, with a few poorly consolidated sandstones; glacial (ice deposited) tillites and gravels; and eolian (wind blown) clays and loess of the Tertiary/Quaternary Period (Shaper 2004).

The floodplain deposits in the river valley bottom consist of geologically recent unconsolidated alluvium. In general, the alluvium can consist of upper zones of fine-grained clays and silts and deeper zones of coarser grained sands. Past river meanders have left a system of remnant channels, an oxbow lake, and sandbars, many of which have been filled in with river sediments and by man. An accreted lands analysis showed that approximately 38.7 percent of the Corning Site consists of both natural and human-induced land accretion. This analysis is described in Section 3.7.3, Accreted Lands, and included in the Cultural Resources Report in Appendix C.

3.3.3 SOILS

Soils located on the Corning Site in Holt County are in the Leta-Grable-Haynie association. These soils make up approximately 14 percent of the soils in Holt County, Missouri [United States Department of Agriculture (USDA) 1997]. The Gilliam, Grable, Haynie, Leta, and Sarpy soil series are located on the Corning Site. The Gilliam series consists of very deep, somewhat poorly drained, moderately permeable soils on flood plains along the Missouri River. The upper and lower profiles consist of silt loam. The Grable series consists of very deep, somewhat excessively drained and well drained soils on the low flood plains along the Missouri River. The upper profile consists of very fine sandy loam whereas the lower profile consists of loose fine sand. Permeability of the Grable series is moderate in the upper part of the profile and rapid in the lower part. The Haynie series consists of very deep, well drained, moderately permeable soils on flood plains along the Missouri River. Soil profiles consist of silt loam throughout. The Leta series consists of very deep, somewhat poorly drained soils on low flood plains along the Missouri River. The upper profile consists of firm silty clay whereas the lower profile consists of very friable silt loam and very fine sandy loam. Permeability of this series is generally slow in the upper part of the profile and moderate in the lower part.

The Sarpy series consists of very deep, excessively drained, rapidly permeable soils on low flood plains along the Missouri River. The upper profile consists of loamy fine sand whereas the lower profile consists of fine sand (USDA 1997). The soil mapping units as shown in the 1997 Soil Survey of Holt County, Missouri located on the Corning Site are the Gilliam silt loam, rarely flooded; Grable very fine sandy loam, rarely flooded; Haynie silt loam, frequently flooded; Haynie silt loam, rarely flooded; Leta silty clay, frequently flooded; Leta silty clay, rarely flooded; Leta silty clay, sandy substratum, rarely flooded; Sarpy fine sand, frequently flooded; and Sarpy loamy fine sand, rarely flooded.

Soils located on the Corning Site in Atchison County are in the Onawa-Paxico-Haynie association. These soils make up approximately seven (7) percent of the soils in Atchison County, Missouri (USDA 1994). The Haynie, Paxico, Percival, and Sarpy soil series are located on the Corning Site. The Haynie series consists of very deep, moderately well drained soils on high and low flood plains along the Missouri River. Permeability is moderate in the upper part of the profile and rapid in the lower part. The Paxico series consists of very deep, somewhat poorly drained soils on low flood plains along the Missouri River. Permeability is moderate in the upper part of the profile and moderately rapid in the lower part. The Percival series consists of very deep, somewhat poorly drained soils on low flood plains along the Missouri River. Permeability is slow in the upper part of the profile and rapid in the lower part. The Sarpy series consists of very deep, excessively drained soils on high, convex natural levees on low flood plains along the Missouri River. Permeability is rapid in the upper part of the profile and moderate in the lower part (USDA 1994). The soil mapping units as shown in the 1994 Soil Survey of Atchison County, Missouri on the Corning Site are the Haynie silt loam; Paxico silt loam; Percival silty clay; and Sarpy loamy fine sand, loamy substratum, rarely flooded.

In Holt County, the Haynie and Sarpy components of the Haynie silt loam, frequently flooded and the Sarpy fine sand, frequently flooded soil mapping units respectively on the Corning Site are listed as being hydric (USDA 2002). In Atchison County, none of the components within the soil mapping units on the Corning Site are listed as being hydric (USDA 2002). In Holt County, inclusions within the Gilliam silt loam, rarely flooded; Grable very fine sandy loam, rarely flooded; Haynie silt loam, rarely flooded; Leta silty clay, frequently flooded; Leta silty clay, rarely flooded; and Leta silty clay, sandy substratum, rarely flooded are listed as being hydric (USDA 2002). In Atchison

County, inclusions within the Percival silty clay and Paxico silt loam are listed as being hydric (USDA 2002).

3.4 PRIME AND UNIQUE FARMLAND

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, oilseed crops, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion [7 U.S.C. 4201 (c)(1)(A)]. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding (USDA 1993). The Farmland Protection Policy Act (PL 97-98; 7 U.S.C. 4201 et seq.) was passed by Congress with the stated purpose of minimizing the unnecessary and irreversible conversion of farmland to nonagricultural uses by Federal programs.

The following soil mapping units in Holt County located on the Corning Site are listed as prime farmland: Gilliam silt loam, rarely flooded; Grable very fine sandy loam, rarely flooded; Haynie silt loam, rarely flooded; Leta silty clay, rarely flooded; and Leta silty clay, sandy substratum, rarely flooded. In addition to these soil mapping units, the following soil mapping units located on the Corning Site are listed as prime farmlands if they are protected from flooding or not frequently flooded during the growing season: Haynie silt loam, frequently flooded and Leta silty clay, frequently flooded. The following soil mapping units located on the Corning Site are listed as being of statewide importance: Sarpy loamy fine sand, rarely flooded and the Sarpy fine sand, frequently flooded (USDA 2004).

The following soil mapping units in Atchison County located on the Corning Site are listed as prime farmland: Haynie silt loam, Paxico silt loam, and Percival silty clay. In addition, the following soil mapping unit located on the Corning Site is listed as being of statewide importance: Sarpy loamy fine sand, loamy substratum, rarely flooded (USDA 2004).

3.5 BIOLOGICAL RESOURCES

Biological resources include the native or introduced plants and animals and the habitats in which they occur. The resources discussed in this section include aquatic resources including fisheries; terrestrial/wetland resources including vegetation communities,

wildlife populations; and species that are candidates for, or listed as, threatened or endangered.

3.5.1 AQUATIC RESOURCES

Aquatic resources include aquatic habitat, fisheries, and other aquatic biota of the Corning Site. Aquatic habitat on the Corning Site includes the Missouri River, Mill Creek, five unnamed drainage ditches, and a scour hole. The Missouri River borders the site on the south and west. Mill Creek flows across the northern portion of the site and empties into the Missouri River. A scour hole is associated with the mouth of Mill Creek. Three unnamed drainage ditches cross the northwestern portion of the Corning Site. A fourth unnamed drainage ditch enters the site on the east and runs into the middle of the site. A fifth runs north/south and bisects the southern portion of the site.

Fish spawning areas are located along the shoreline, in backwaters, and behind channel control structures. Suitable nursery areas in the Missouri River are limited due to high velocity, turbulent flows, and silt and sand loads (Corps 1994). Construction of dikes and revetments have narrowed and deepened the channel into a fixed location, which has greatly eliminated shallow water habitat and increased water depth and current velocity (National Research Council 2002). Existing shallow water habitat⁵ was estimated for the Corning Site. Shallow water habitat available ranged from 2.8 – 10 acres (five feet above and below the elevation associated with the median August discharge). The shallow water habitat analysis is included in Appendix D. In the channelized reaches of the river, fish are associated with revetments and dikes (Corps 2001).

Principal fish species in the lower Missouri River include emerald shiner (*Notropis atherinoides*), river carpsucker (*Carpionodes carpio*), channel catfish (*Ictalurus punctatus*), gizzard shad (*Dorosoma cepedianum*), red shiner (*Notropis lutrensis*), shorthead redhorse (*Moxostoma macrolepidotum*), carp (*Cyprinus carpio*), and goldeye (*Hiodon*

⁵ Shallow water habitat is considered by the USFWS for pallid sturgeon recovery as shallow open water areas (e.g. submerged sandbars, main channel/side channel convergence areas, island tips, etc.) connected to the Missouri River channel that are less than five feet deep and have a variable velocity of flow.

alosooides). Pallid and shovelnose sturgeon and paddlefish (*Polyodon spathula*) are also found in the lower Missouri River (Corps 2001).

Sport fish include channel catfish, crappie (*Pomoxis* spp.), sauger (*Stizostedion canadense*), flathead catfish (*Pylodictus olivaris*), white bass (*Morone chrysops*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), walleye (*Stizostedion vitreum*), northern pike (*Esox lucius*), and paddlefish (Corps 1995). Species important to the commercial fishery on the lower Missouri River include buffalo (*Ictiobus* spp.), carp, carpsucker, and freshwater drum (*Aplodinotus grunniens*) (Corps 1995).

The two most common plankton in the lower Missouri River were *Fragilaria* and *Pediastrum*, comprising 23 and 26 percent of the total plankton. Nematodes made up about 16 percent of total plankton. Common zooplankton included rotifers and nauplii (Berner 1951). Within the Missouri River, the areas most productive of a true benthos were near the steep banks which averaged 2.17 pounds per acre. Areas downstream of pile dikes supported about 1.27 pounds per acre (Berner 1951). The most common organisms in the benthos included Diptera larvae and Chironomidae larvae (Berner 1951).

3.5.2 TERRESTRIAL/WETLAND RESOURCES

Approximately 921 acres of grassland, 84 acres of shrubland, and 16 acres of forest occur on the Corning Site (Table 3-2). Approximately 736 acres of the site remains in cropland. Current management practices include cropland rotation in order to maintain portions of the site in an early successional herbaceous state dominated by annual weeds. Approximately 121 acres of wetlands currently exist at the Corning Site. Wetlands are generally associated with the drainage ditches, Mill Creek, and the scour hole located near the confluence of Mill Creek and the Missouri River.

Table 3-2. Land Cover at the Corning Mitigation Site

Baseline Habitat Type	Acres
Scour/Blow Holes	5.4
Emergent Wetlands	53.3
Scrub-shrub Wetlands	58.3
Forested Wetlands	9.9
Developed	2.4
Forested	16.6
Shrubland	84
Grassland	921.1
Cultivated, Levees	736.5
Total	1887.5

3.5.3 WILDLIFE

The Corning Site provides habitat for numerous wildlife species. Common mammalian species likely to occur in remnant bottomland forest and agricultural fields within the site include; gray squirrel (*Sciurus carolinensis*), cottontail rabbit (*Sylvilagus floridanus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*) and white-tailed deer (*Odocoileus virginianus*).

Common furbearers likely to occur along the Missouri River's bank within the site include; mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), otter (*Lontra canadensis*), and raccoon (*Procyon lotor*). Other furbearers expected to occur within the site include; opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), and long-tailed weasel (*Mustela frenata*).

Upland game birds expected to occur within the site include ring-necked pheasant (*Phasianus colchicus*), bobwhite quail (*Colinus virginianus*), and wild turkey (*Meleagris gallopavo*). Songbirds likely to occur within the site include mourning dove (*Zenaida macroura*), American robin (*Turdus migratorius*), eastern kingbird (*Tyrannus tyrannus*), American goldfinch (*Carduelis tristis*), red-winged blackbird (*Agelaius phoeniceus*), eastern bluebird (*Sialia sialis*), northern cardinal (*Cardinalis cardinalis*), northern oriole – Baltimore race – (*Icterus galbula*), and brown thrasher (*Toxostoma rufum*), among others.

The Missouri River Valley is an important nesting and feeding area along the Central Flyway for many migratory waterfowl species including wood duck (*Aix sponsa*), blue-winged teal (*Anas discors*), green-winged teal (*Anas crecca*), mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), northern pintail (*Anas acuta*), Canada goose (*Branta Canadensis*), and snow goose (*Chen caerulescens*), among others.

3.5.4 THREATENED AND ENDANGERED SPECIES

USFWS and MDC were contacted to request information regarding Federally and state listed threatened, endangered, candidate species, or species of special concern that have potential to occur at the Corning Site. Comment letters from MDC and USFWS are included in Appendix A. Table 3-3 includes the listed species identified by USFWS and MDC.

Table 3-3. Federal and state listed species with potential to occur at the Corning Mitigation Site.

Common Name	Scientific Name	Status
Bald eagle	<i>Haliaeetus leucocephalus</i>	Federally Threatened
Blue lettuce	<i>Lactuca tatarica ssp. Pulchella</i>	S1 (Critically imperiled in the state)
Flathead Chub	<i>Platygobio gracilis</i>	State Endangered
Franklin's ground squirrel	<i>Spermophilus franklinii</i>	S2S3 (Imperiled in the state; rare and uncommon)
Pale bulrush	<i>Scirpus pallidus</i>	S2 (Imperiled in the state)
Pallid sturgeon	<i>Scaphirhynchus albus</i>	Federally Endangered
Plains minnow	<i>Hybognathus placitus</i>	S2 (Imperiled in the state)
Silver chub	<i>Macrhybopsis storeriana</i>	S3 (Rare and uncommon)

Bald eagles are common migrants and regular winter residents along the Missouri River. Bald eagles are regular breeders in the vicinity of the Corning Site and utilize riparian woodlands along rivers and streams for nesting, perching, and roosting sites. Bald eagles are currently listed as threatened; however, the species was proposed for delisting in 1999. The decision for delisting has been delayed until the USFWS determines how the species would be managed if delisted. No bald eagle nests are known to exist on or in the proximity of the Corning Site.

The pallid sturgeon generally occurs in the main channel of the large, turbid, free-flowing Missouri River, the Mississippi River downstream of St. Louis, and the lower segments of some major tributaries, and in shallow water in these areas. Modification of the natural Missouri River hydrograph, habitat loss, fish migration blockage, pollution, hybridization, and overharvesting are probably responsible for the decline of the species (USFWS 1993). Naturally occurring side channels and chutes that provided shallow water habitat for pallid sturgeon spawning have been greatly reduced in the channelized Missouri River as a result of the BSNP.

Blue lettuce can be found in prairies, meadows, rangeland, roadsides, pastures, stream banks, and cultivated fields in the central and northern Great Plains (Stubbendieck et al. 2003). It is more abundant in moist soils than in dry soils.

Pale bulrush is uncommon and known only from historical collections from western Missouri. It is found in emergent aquatic habitat in wet, open ground (Yatskievych 1999).

Flathead chub may be found in pools of small creeks with moderately clear water over gravel and bedrock bottom, or in large, turbid rivers with swift current and bottom of fine sand and gravel. It occurs in the Missouri and Mississippi rivers, however, populations have declined drastically since the 1960's (MDC 2005).

The silver chub is one of the common minnows in the Missouri River. It also occurs in large streams elsewhere in Missouri, but is seldom abundant (Pfleiger 1975). It also inhabits the quiet pools and backwaters of large streams.

The plains minnow is the most abundant minnow in the upper Missouri River but undergoes a gradual decline in abundance downstream (Pfleiger 1975). The plains minnow is found in the river channel where there is a sandy bottom and some current.

Franklin's ground squirrel is generally rare but may be locally common in the prairie region of western and northern Missouri (Schwartz and Schwartz 2001). It is primarily found in borderlands between woods and prairies and seldom uses forests or strictly open prairies.

3.6 LAND COVER

Land cover at the Corning Site was primarily cropland at the time of purchase by the Corps. In 2002 approximately 276,612 acres of land cover in Atchison County and

211,691 acres in Holt County was cropland [USDA-National Agricultural Statistics Survey (NASS) 2002]; whereas in 1997 approximately 255,799 acres of land cover in Atchison County and 204,136 acres in Holt County was cropland (Corps 2003). This represents an increase of 20,813 acres of cropland in Atchison County and 7,555 acres in Holt County over a five year period. A majority of the land use adjacent to and around the Corning Site is agricultural land and cropland aside from the adjacent Derooin Bend Conservation Area. Existing land cover at the Corning Site is summarized in Table 3-2 and shown in Figure 3-1.

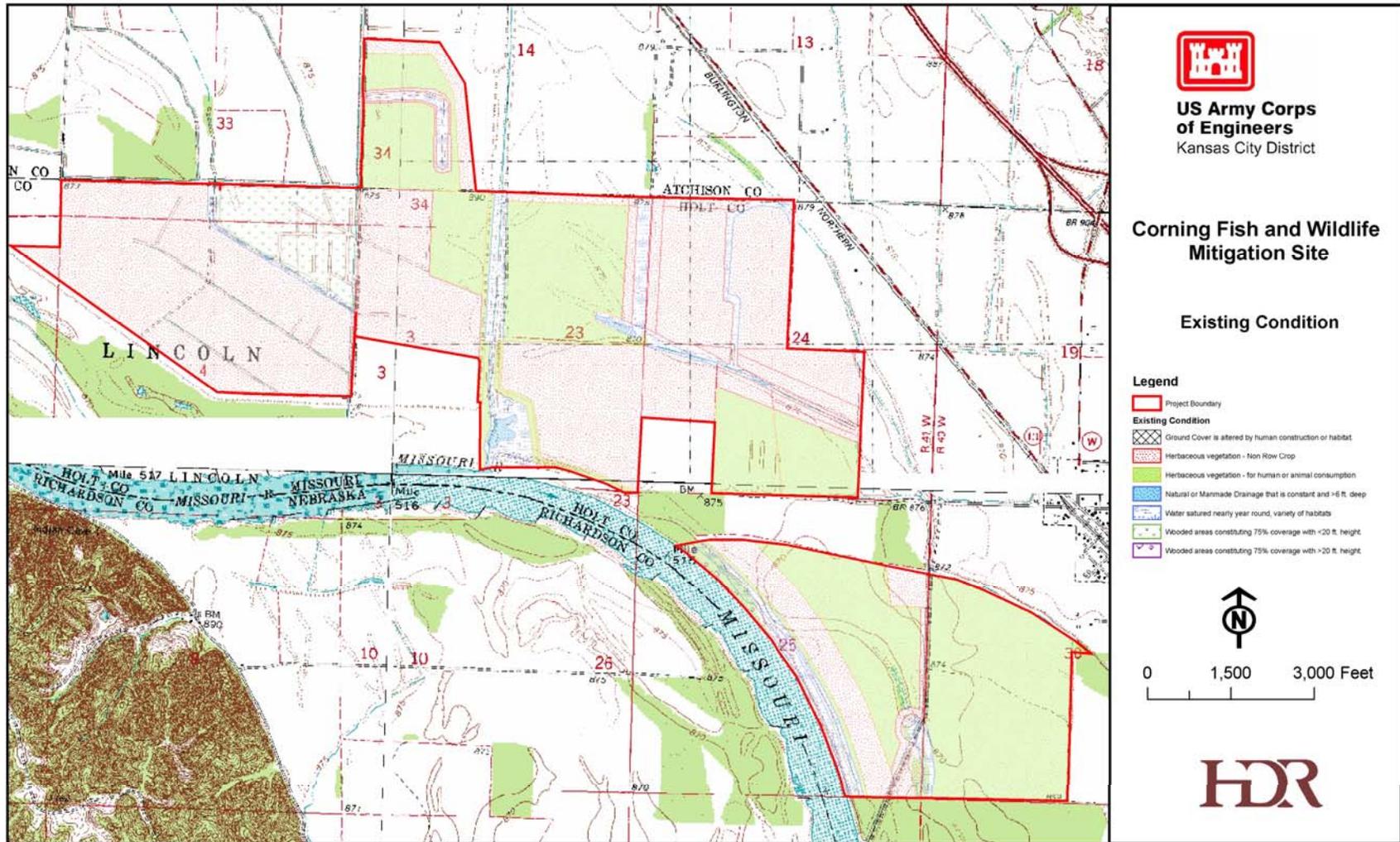
3.7 CULTURAL RESOURCES

Cultural resources include sites, structures, buildings, objects, landscapes, districts, and events, etc. that would have archaeological, historical, cultural, Native American, or scientific value to a culture or community. A records search was conducted for the Corning Site. The results of the records search are included in Appendix C.

3.7.1 HISTORIC PROPERTIES AND ARCHAEOLOGICAL SITES

There are no properties in the immediate vicinity of the Corning Site listed or eligible for listing on the National Register of Historic Places (NRHP). The Archeological Survey of Missouri (ASM), Missouri State Historic Preservation Office (SHPO), and the Nebraska State Historical Society (NSHS) were consulted for recorded sites.

Figure 3-1. Existing Land Cover at the Corning Mitigation Site.



3.7.2 STEAMBOAT WRECKS

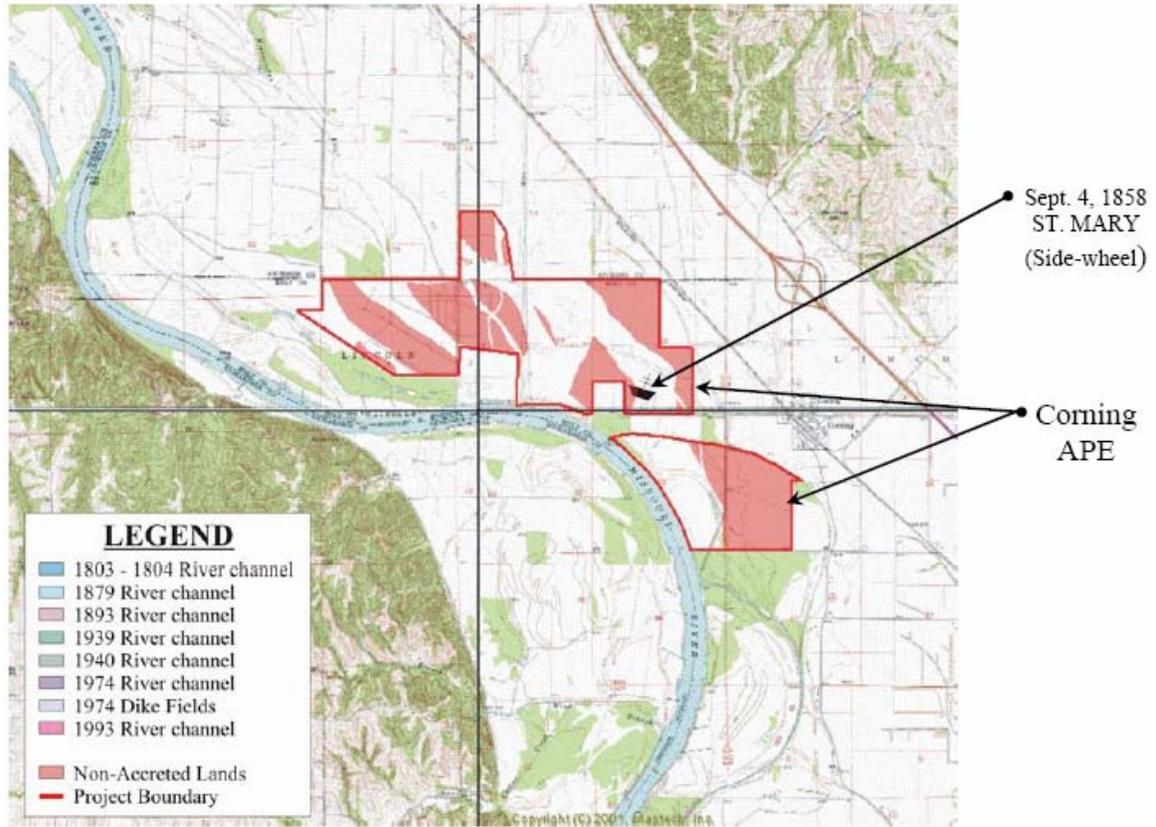
A review of information regarding steamboat wrecks along this area of the Missouri River indicated that one wreck, the *St. Mary*, is potentially located in the Area of Potential Effect (APE). Captain H.M. Chittenden's List of Steamboat Wrecks on the Missouri River (1897) indicates the side-wheeled steamer *St. Mary* struck a snag and sank in September 1858. The *St. Mary's* final resting place is reported in the vicinity of "Hemmes Landing" and lies within the western portion of the APE.

3.7.3 ACCRETED LANDS

A review of the 1803 – 1804 Lewis and Clark Missouri River map, the 1854 GLO plat of T3N R17E, the 1854 GLO plat of T4N R17E, and the 1862 GLO plat of T63N R41W, 1879 and 1893 Missouri River Channel maps [Missouri River Commission 1891 – 1895], 1939 and 1974 Corps river maps, and aerial photographs from 1993 was performed in order to assess the area of accretion occurring in the limits of the APE. Images of the river channel maps and the aerial photographs were digitized and overlaid on to the modern USGS 7.5' quadrangles to show areas in which erosion and accretion has occurred due to natural or man-induced meandering by the Missouri River.

Between 1803 and 1993 a large amount of erosion and accretion of land occurred along the Corning Site. Approximately 38.7 percent (730.0 acres) of the APE has been accreted since 1803 whereas the remaining 61.3 percent (1,157 acres) of the APE is non-accreted land (Figure 3-2) prior to 1803.

Figure 3-2. Non-accreted Lands on the Corning Mitigation Site.



3.8 WATER QUALITY

The most recent water quality data available was collected by the Corps for the low flow studies for the update of the *Missouri River Master Water Control Manual*, July 1994 (Corps 1994). The point of data collection nearest to the Corning Site was at the mouth of the Nemaha River (approximate RM 495), which is located approximately 19 miles downstream from the southern boundary of the southern tract of the Corning Site.

Temperature, pH, dissolved oxygen, and total suspended solids were measured twice over a two-week period in August and September 1990. Temperature ranged from 29 degrees Celsius (°C) to 27 °C; pH was 8.1 to 8.2; dissolved oxygen was 9.8 milligrams per liter (mg/l) to 8.0 mg/l; and total suspended solids were measured at 97 mg/l and 46 mg/l (Corps 1994). These results were fairly consistent with those from other collection points along the Missouri River; however, there was no explanation provided for the large differences in total suspended solids between the two sampling events at this particular location. These parameters have an effect on the fisheries in the Missouri River. High temperatures decrease the amount of dissolved oxygen. The temperature for the Missouri River in Missouri must not be above 32.2 °C and the dissolved oxygen concentration must not be below 5.0 mg/l based on federally approved water quality standards (Corps 1994).

3.9 AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. The quality of the air is measured against National Ambient Air Quality Standards (NAAQS) set by the EPA. The Corning Site is located in an attainment area, which is an area wherein the concentrations of all criteria pollutants meet the NAAQS.

3.10 NOISE

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are designated as noise. Noise can be stationary or transient and intermittent or continuous. The Corning Site is located in a rural setting. Typical sources of noise in the area include farm equipment and agricultural activities on adjacent lands and rail and vehicle traffic on the railroad and Interstate 29 located approximately one-and-a-half miles and two-and-a-half miles respectively generally east of the Corning Site. Hunting activities are a source of intermittent noise. Approximately 85 noise receptors are

located within one mile of the site (DeLorme 3-D TopoQuad, Version 2.0) in the state of Missouri. This estimate includes the town of Corning.

3.11 SOCIOECONOMIC RESOURCES

Socioeconomic resources are the part of the human environment that includes the economic, demographic, and social characteristics of individuals and communities.

3.11.1 POPULATION AND INCOME

The Corning Site is located in Atchison and Holt Counties, Missouri. The 2000 estimated population for Atchison and Holt counties was 6,430 and 5,351 respectively. Atchison County experienced a population decline of 13.8 percent from 1990 to 2000 (U.S. Census Bureau 2004). Holt County experienced a population decline of 11.3 percent from 1990 to 2000 (U.S. Census Bureau 2004).

In 2000, per capita personal income in Atchison County was \$24,225. This ranked 17th in the state of Missouri and was 88 percent of the state average (\$27,493) and 81 percent of the national average (\$29,760). In 1990 the per capita personal income for Atchison County was \$14,349 and ranked 32nd in the state. The 1990-2000 average annual growth rate of per capita personal income was 5.4 percent in the county. The average annual growth rate for the state was 4.4 percent and for the nation was 4.4 percent [Bureau of Economic Analysis (BEA) 2004]. Farming ranked second in earnings by industry in Atchison County at less than 25 percent of the total (BEA 2000).

In 2000, per capita personal income in Holt County was \$22,225. This ranked 38th in the state of Missouri and was 82 percent of the state average, \$27,243, and 74 percent of the national average, \$29,847 (BEA 2004). In 1990 the per capita personal income for Holt County was \$14,233 and ranked 35th in the state. The 1990-2000 average annual growth rate of per capita personal income was 4.6 percent in the county.

The closest community to Corning is the town of Corning, Missouri located approximately one mile to the east. The 2000 estimated population of Corning, Missouri was 21 (U.S. Census Bureau 2005). The closest noise receptors to Corning are located within approximately 800 feet of the north area and approximately 300 feet of the south area in Township 63 north, Range 41 west, Section 24 and Township 63 north, Range 40 west, Section 30 respectively (DeLorme 3-D TopoQuad, Version 2.0).

Minorities comprised 3.4 percent of the population of Atchison County in 2000, 1.5 percent of the population of Holt County in 2000, and 15.7 percent of the population of Missouri in 2000 (U.S. Census Bureau 2004). Persons 65 years old and over comprised 21.1 percent of the Atchison County population and 21.5 percent of the Holt County population in 2000, compared to 13.5 percent of the state of Missouri population (U.S. Census Bureau 2004).

3.11.2 RECREATION AND AESTHETICS

The Corning Site is managed by MDC as a conservation area. MDC allows approved recreational activities for the public at the site including bird watching, hiking, nature study, and hunting when in season.

The north area of the Corning Site is adjacent to the Derooin Bend Mitigation Site and Indian Cave State Historic Park in Nebraska is located across the Missouri River (Figure 1-1). The Derooin Bend Mitigation Site is located on 1,082 acres of land owned and operated by MDC (Corps 2005). The site provides similar recreational opportunities as the Corning Site; however, a flow through side channel chute, maintained by the USACE, would likely provide better fishing opportunities at the site. Indian Cave State Historic Park is located on over 3,000 acres of land owned and maintained by the Nebraska Game and Parks Commission. Approximately 2,386 acres of this land is timbered (Nemaha County 2005).

The visual aesthetics of the Corning Site are typical of many rural areas along the Missouri River. Agricultural lands, riparian woodlands, wetlands, and grasslands are typical of the area and surrounding landscape. The Missouri River and associated riverine areas are an important visual resource.

3.11.3 NAVIGATION

Missouri River flows are managed in part, for commercial navigation on the Missouri River. Navigation on the Missouri River is limited to the normal ice-free season, with a full-length flow support season of 8 months (Corps 2001). At Sioux City, the full-length support season extends from March 23 to November 22 and at St. Louis the full-length support season extends from April 1 to December 1 (Corps 2001). In 1994, approximately 50 percent of the commercial tonnage moved on the Missouri River was

in the Omaha to Kansas City reach. This reach was also the origin or destination for about 40 percent of Missouri River commercial tonnage (Corps 2001).

Chapter 4

Environmental Consequences

4.1 INTRODUCTION

This chapter presents the evaluation of beneficial and adverse impacts of the three alternatives including if there is the potential for significant impacts of the Federal action on the environment. The Federal action would be the implementation of the proposed Mitigation Program at the Corning Site as described in the Full Development alternative. The activities included in the Shallow Water Habitat alternative are also part of the Full Development alternative; therefore the potential impacts of development of the Shallow Water Habitat alternative are considered in the context of their evaluation as part of the Full Development alternative. The analysis focused on identifying types of impacts and estimating their potential significance in various environmental and socioeconomic resource areas. The environmental impacts of the implementation and site selection process for the Mitigation Program were previously evaluated and documented in the *Feasibility Report and Environmental Impact Statement* (Corps 1981) and the *Supplemental Environmental Impact Statement* (Corps 2003). Thus, this PIR only evaluated those impacts anticipated from the construction and operation of the three alternatives specific to the Corning Site. The environmental effects presented in this chapter would be the same for all alternatives unless noted otherwise.

The concept of “significance” used in this chapter encompasses several factors, including the magnitude of change from existing conditions and the likelihood of the change to occur. An impact is considered adverse when the outcome of the action results in undesirable effects. A beneficial impact can result if the current condition is improved or if an existing undesirable effect is lessened.

Adverse impacts can be mitigated by different means such as through avoidance or minimization of adverse effects. Beneficial and adverse impacts, including unavoidable adverse effects, are discussed in each resource section of this chapter.

4.2 GEOLOGICAL RESOURCES

Geological resources are limited, non-renewable resources whose characteristics can easily be degraded by physical disturbances. An adverse impact to geological resources would be significant if it depletes a regional or local resource, affects the rate of erosion, changes the characteristics of the soil, or becomes a less natural condition. Geological resources on the Corning Site would be affected from ground disturbances associated with river structure modifications, construction of berms, installation of water control structures, and widening of the scour hole.

4.2.1 TOPOGRAPHY

The topography of the Corning Site would be affected due to potential river structure modifications (revetment notching) of the development alternatives (i.e., Shallow Water Habitat and Full Development alternatives). Due to the relatively level topography of the area, any impacts to topography would be considered insignificant.

The purpose of the Mitigation Program is to restore the Corning Site to a condition similar to that of the Missouri River floodplain prior to its channelization. Allowing erosion of the river bank by scour action would result in dynamic changes in surface topography which would be considered a beneficial impact. The resulting shallow water habitat would resemble a more natural topography at the site, similar to that which occurred prior to the BSNP. Therefore, the Shallow Water Habitat and Full Development alternatives would provide minor beneficial impacts to topography. The No Development alternative would have no affect on topography.

4.2.2 GEOLOGY

The development alternatives would include activities to erode the current river bank in order to create shallow water habitat. All activities would only affect alluvial deposits and not underlying bedrock or exposed bedrock outcroppings at the margins of the floodplain. Therefore, none of the alternatives would affect geology.

4.2.3 SOILS

The intent of the development alternatives is to induce erosion by the scour action of water flows which would affect local soil conditions. This would be an unavoidable impact. Excavating soils for river structure modifications, construction of water control structures, and widening of the scour hole could cause temporary increases in sediment loads and turbidity. Excavated material would be disposed of by placing the material riverward of the former high bank or by disposing it directly into the river. Material disposed of in the river would be graded or placed in such a manner so that the maximum height of the material is below five feet above the CRP. Excavated or in-place material would not impede the flow of water into or out of the river structure modification(s). Likewise, this material would not be placed in such a manner to impede the natural erosion (scour) process of the Missouri River on the riverbank. Although the existing soils would eventually be scoured away along the bank of the river, the river's constant flow would continue to deposit alluvial soils. The sediments deposited from flooding would positively effect vegetative growth by adding nutrients to the soils and increasing productivity.

Control measures would be implemented to ensure that undesirable pollutants from construction activities would not be discharged in stormwater runoff. Disturbed areas that would not be subject to the scour action would be seeded and stabilized after construction with appropriate mixtures of native seed.

Although short-term impacts would occur to the soils at the Corning Site as a result of the development alternatives, the long-term effect of these impacts would be beneficial by restoring and creating additional acres of fish and wildlife habitat through the development of shallow water habitat and wetlands, respectively. Additionally, the increased sediment load within the river would help simulate the rivers historic conditions of continued erosion and deposition. The No Development alternative is not anticipated to cause any adverse effects on soils.

4.3 PRIME AND UNIQUE FARMLAND

Soils designated as prime farmland would be converted from agricultural use to fish and wildlife habitat use as a result of the development alternatives for the Corning Site.

However, none of the activities proposed under the Full Development alternative would render prime farmlands non-farmable. Therefore, there would be no direct or indirect impacts to prime farmland as a result of the development alternatives. Although the prime farmlands on the site would no longer be farmed, no significant adverse impacts are anticipated because of the abundant amount of prime farmlands remaining in the county and on the site. The No Development alternative would not affect Prime Farmlands.

4.4 BIOLOGICAL RESOURCES

Biological resources include the native or introduced plants and animals and the habitats in which they occur. Aquatic resources include water bodies and fisheries. Terrestrial/wetland resources include vegetation communities and wildlife populations. Species that are candidates for, or listed as, threatened or endangered are included in both aquatic and terrestrial/wetland resources. Impacts to these resources could be from the construction and operation of the Corning Site. An adverse impact would be significant if the viability of a biological resource of the area was jeopardized, with little likelihood of reestablishment to its original state or the action would result in the taking⁷ of a listed threatened or endangered species. The significance of the impact would also be dependent upon the importance of the resource and its relative occurrence in the vicinity of the site.

4.4.1 AQUATIC RESOURCES

No significant adverse effects to aquatic resources are expected. The fisheries resource associated with the Corning Site could temporarily be disturbed during construction of some features associated with the Full Development alternative, such as revetment notching along the southern area and enhancement of wetlands around the scour hole. Temporary increases in turbidity could affect water temperatures and dissolved oxygen content; however, any impact would be considered insignificant.

⁷ The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Temporary impacts from incidental discharges into the Missouri River channel are possible, but would also be insignificant because of anticipated staging and timing of river structure modifications. Incidental discharges of sediment from construction activities into the Missouri River could also provide a benefit as an increase in sediment load within the Missouri River would help simulate historic conditions of the river and would provide additional sediment for downstream deposition and improvement of shallow water habitat conditions. Increased turbidity lowers light transmission into the water, which could benefit species adapted to these conditions.

The intent of the development alternatives is to create and restore fish and wildlife habitat associated with the Missouri River. It is expected that the river structure modifications (i.e., revetment notching) would allow the development of approximately 20 acres of shallow water habitat in the area of the Corning Site. Long-term and cumulative beneficial impacts to aquatic habitat outweigh the temporary adverse impacts to the resources that could occur. The river structure modifications and resulting scour of the bank would create shallow water habitat. Populations of fish species, including the endangered pallid sturgeon, that have been declining in numbers, would benefit from shallow water habitat development. Creation of shallow water habitat would provide a beneficial effect to the Missouri River fishery. The No Development alternative would not adversely affect aquatic resources.

4.4.2 TERRESTRIAL/WETLAND RESOURCES

Habitat development activities under the Full Development alternative would result in an increase in acres of wetlands and quality terrestrial habitat at the Corning Site. Minimal amounts of terrestrial habitat may be temporarily disturbed due to construction activities associated with the installation of water control structures or berm construction. The Full Development alternative would result in an increase of 501 acres of emergent wetlands, and 287 acres of forested wetlands. Other habitat types would decline slightly due to the development of wetland acres. Table 1-1 summarizes proposed changes in habitat acres on the Corning Site and the proposed habitat development is illustrated in Figure 2-2. Activities to modify river structures and erode the river bank at the site would result in a conversion of existing terrestrial habitat to shallow water habitat. It is estimated that a maximum of 20 acres of shallow water habitat would be developed by the

development alternatives. This would represent a long-term beneficial impact to terrestrial/wetland resources at the Corning Site. Impacts related to construction activities are considered insignificant.

The Shallow Water Habitat and No Development alternatives would not have the relatively short-term positive effects to wetlands and certain types of terrestrial habitat. The removal of land from cultivation and native grass, forb, and tree plantings that have already occurred would be a beneficial effect. Because no further development activities would occur, terrestrial habitat and wetlands would develop over a much longer period of time, thus providing both short-term and long-term benefits to the terrestrial ecology of the floodplain.

4.4.3 WILDLIFE

Impacts to wildlife inhabiting the Corning Site would occur and are unavoidable. During construction, species would be temporarily displaced, but would likely return to the area after construction is completed. Species with limited mobility could be destroyed. Over the long-term, it is anticipated that wildlife would benefit from the creation of more diverse and productive wetland, terrestrial, and aquatic habitats. These benefits would outweigh any adverse impacts during construction.

An elementary principle of wildlife management states that the abundance of a species is positively correlated with the amount of quality habitat available. An increase in terrestrial habitat would provide food, cover, resting, breeding and nesting areas for wildlife. Bottomland forests would provide hollows for nests and dens, and trees for roosting. Additionally, mast-producing trees associated with bottomland forests, such as pin oak, sycamore and pecan would provide a food source for wildlife. Likewise, an increase in shallow water habitat would have a positive effect on terrestrial wildlife as the anticipated increase in aquatic species through the development of shallow water habitat would provide a food source for many terrestrial species (Funk and Robinson 1974).

Many species of shorebirds and waterfowl would use the developed wetlands. Bird species typically expected to respond to the proposed wetland development include great egret, great blue heron, Canada goose, wood duck, green and blue-winged teal, mallard, pintail, bald eagle, various sandpipers, killdeer, bank swallow, and red-winged

blackbird. The conversion of cropland acres to upland grasslands and wet prairies, as well as fallowing cropland for the development of early successional habitat dominated by herbaceous annual weeds, would benefit many species of grassland and field nesting birds such as the ring-necked pheasant, eastern and western meadowlark, dickcissel, and grasshopper sparrow. Many species of birds are expected to respond positively to forest resources development. For example, the yellow and prothonotary warblers are expected to respond positively as naturally regenerated and planted trees go through succession and mature to forested habitat. Wild turkey numbers are expected to increase as woodlands and forest mature and provide more areas for roosting and cover.

Common mammalian species such as the white-tailed deer depend on river margin bottomland forest for cover and foraging. Common furbearers such as the river otter are piscivorous⁸ and depend on sloughs, chutes and oxbows. Beaver depend on sloughs and backwaters. Muskrat prefer marshes and quiet, shallow, weedy waters to the Missouri's deep, swift channel devoid of vegetation. Like the muskrat, mink are associated with marshes and quiet backwaters. Additionally, mink population density is positively correlated to the mileage of permanent stream in an area (Funk and Robinson 1974). Quiet backwater areas are desirable feeding areas for raccoon and bottomland forests would provide cover and den sites. Like the mink, a positive relationship exists between population density and the mileage of permanent stream in an area.

4.4.4 THREATENED AND ENDANGERED SPECIES

The proposed project is located in a geographic area with potential habitat and potential presence of the threatened bald eagle, endangered pallid sturgeon, and several state listed species. An analysis of the impacts to the Federally-listed species is presented in the Biological Assessment found in Appendix E. The goal of the Mitigation Program, of which the Corning Site is a component, is to restore fish and wildlife habitat along the lower Missouri River. In addition, all project features are designed to enhance, create, or restore wetlands, terrestrial, and aquatic habitat at the Corning Site. These activities

⁸ The term "piscivorous" means to feed or subsist on fishes.

would result in long-term benefits to both Federally listed species identified. In addition, the state listed species could potentially benefit as well.

The bald eagle would benefit indirectly from construction of the proposed project because the increased shallow water habitat would provide another potential forage base for use while wintering along the Missouri River. Human activity (i.e. construction) in the vicinity of wintering eagles is likely to adversely affect eagles by causing disruptions of normal behavior and by displacing eagles to non-preferred, marginal habitat (Stalmaster and Newman 1978). Any disturbance would be temporary in nature and would cease when construction has been completed.

The proposed project would result in long-term beneficial effects to the bald eagle from the restoration of bottomland forest that would provide additional roosting and nesting habitat for the eagle. A field survey would be conducted prior to construction activities to identify existing bald eagle roost/perch/nest sites. If these are discovered the Corps would coordinate with USFWS to establish buffer zones in construction area(s) to prevent adverse impacts to bald eagles.

USFWS indicated that bald eagles are known to prefer trees greater than 11 inches dbh and within 100 to 600 feet of water for perching sites. Eagles also tend to roost on the tallest trees (greater than 63 feet above ground level). Cottonwood and sycamore are often selected over other trees for perching and roosting (see correspondence in Appendix A). Measures would be taken to minimize the loss of trees matching this description.

The proposed project at the Corning Site would create approximately 20 acres of shallow water habitat along the Missouri River bank that is intended to provide additional habitat for the pallid sturgeon, thus, the proposed project is anticipated to result in beneficial effects to the pallid sturgeon.

4.5 LAND COVER

No significant adverse impacts to land cover are expected from construction and operation of the Corning Site. Some of the existing cropland would be converted to fish and wildlife habitat; this is not considered a significant impact in relation to the amount of agricultural land currently in the vicinity of the project area or regionally.

Habitat restoration components of the Full Development Alternative are expected to help recreate or mimic land and aquatic habitat conditions present prior to the BSNP and wide spread agricultural crop production. Beneficial effects to the terrestrial land cover are expected over both the short and long-term from implementation of the Full Development alternative. It is expected under the Full Development Alternative that 297 acres of land would become forested wetland (Table 1-1) over time. Another 501 acres will be converted to emergent wetland habitat. A net conversion of approximately 663 acres of cropland would occur. This would be equal to approximately 0.14 percent of the total cropland in Holt and Atchison County; this would be an insignificant impact. A maximum of 20 acres of shallow water habitat would be provided under this alternative.

The Shallow Water Habitat and No Development alternatives would not have the relatively short-term positive effects to certain types of terrestrial habitat (e.g. warm season grassland, riverine shallow water habitat or wetlands depending on alternative). The removal of land from cultivation and native grass, forb, and tree plantings that have already occurred would be a beneficial effect. Because no further development activities would occur, terrestrial habitat and wetlands would still develop, but over a longer period of time. Both the Shallow Water Habitat and No Development alternatives would provide both short-term and long-term benefits to the terrestrial ecology of the floodplain, but not to the extent that the Full Development alternative would in terms of species and habitat diversity.

4.6 CULTURAL RESOURCES

Cultural resources are limited, non-renewable resources whose integrity could be easily diminished by physical disturbances. The proposed project has the potential to impact unrecorded cultural resources within the project Area of Potential Effect (APE). In the unlikely event that archeological deposits or other cultural resources are encountered during construction, work in the area of discovery would cease, the discovery investigated and coordinated with Missouri SHPO and Federally recognized Native American tribes.

4.6.1 HISTORIC PROPERTIES AND ARCHAEOLOGICAL SITES

No historic properties listed on the NRHP or other recorded archaeological sites are recorded in the project APE. The likelihood of significant adverse impacts to historic or archaeological resources resulting from implementation of the Shallow Water Habitat alternative or the Full Development alternative are minimal because the project is primarily situated on recently accreted lands.

If unanticipated cultural resource sites (including human remains) are encountered during construction or future operation and maintenance, these activities would be halted and the Corps' cultural resource personnel would be notified immediately along with the SHPO [36 C.F.R. § 800.11(b)2]. Additionally, the provisions of 36 C.F.R. § 800.6 would be implemented. No unavoidable adverse impacts are anticipated to cultural resources at this time.

4.6.2 STEAMBOAT WRECKS

Results of record searches for cultural resources in the area and a review of literature regarding steamboat wrecks identified one potential site of concern located in the vicinity of the APE. The potential general location of the side-wheeled steamer the *St. Mary* is shown in Figure 3-2 as being inside the APE, however, it is possible that the remains of this vessel may instead be located outside the APE of the Corning Site, given that the precise locations of shipwrecks can be difficult to ascertain from historic steamboat wreck maps. In addition, shipwrecks are often deeply buried 15 to 25 feet below the ground surface so their exact locations are unknown. Furthermore, much of the land in the area of the *St. Mary's* potential location is accreted lands. No adverse impact to the *St. Mary* is expected because no major land disturbing activities are planned in the general area of its location.

4.6.3 ACCRETED LANDS

Approximately 61.3 percent (1,157 acres) of the APE has not been accreted since the early 19th Century as shown in Figure 3-2. Approximately 38.7 percent (730 acres) of the APE are accreted lands caused either by natural or man-induced (i.e. dike field land accretion) sediment deposition. There is little likelihood of adversely affecting

unanticipated cultural resources on previously accreted or disturbed areas (e.g. bank revetments and levees) located on non-accreted lands. However, those non-disturbed areas on non-accreted land should be the focus of a Phase I Archaeological Survey if land disturbing activities are proposed in the future.

The following is a construction activity specific cultural resources impact assessment of the Full Development alternative on non-accreted lands of the Corning Site. Earth disturbing activities associated with building berms in the WRP tracts of the northern area of the Corning Site would include earth moving activity in non-accreted soils. The proposed location of the water control structure on the eastern border of the northern area and the associated berms would also involve earth work in non-accreted lands. All other earth disturbing activities including proposed revetment notches with associated pilot channels and modifications to the scour hole near the mouth of Mill Creek would occur in accreted lands. In the future, should the Corps pursue and design these elements of the Full Development alternative, a Phase I Archeological Survey is recommended prior to design and construction.

4.7 WATER QUALITY

Physical disturbances during construction could have an adverse impact on water quality. Significant impacts would be those impacts that would affect water quality in a manner that would exceed Federal or state standards, including degrading an existing use.

No significant adverse impacts are anticipated to the water quality of the Missouri River as part of the Mitigation Program. River structure modifications, construction of control structures, and widening of the scour hole would temporarily increase sediment load in the Missouri River. Additionally, construction activities could temporarily increase suspended solids and decrease water clarity and light penetration. Thus any impact would be unavoidable but short-term and insignificant.

Methods to reduce discharges of pollutants in stormwater runoff from the construction areas would be implemented. Construction of the Corning Site would impact more than one acre, thus requiring a general permit for stormwater discharge for land disturbances from the Missouri Department of Natural Resources (MDNR). The general permit and

associated stormwater pollution prevention plan would address control issues for pollutants during and after construction. These construction activities would also comply with any conditions recommended by the Corps and MDNR in jointly issuing the Section 404 authorization and 401 water quality certification. Construction activities at the Corning Site would not cause an exceedance of Federal or state water quality standards, therefore no significant adverse impacts would result.

4.8 AIR QUALITY

Direct air quality impacts that would occur at the Corning Site would result from construction activities including excavation, grading, and construction-related traffic. An air quality impact would be considered significant if it results in a violation of NAAQS. No significant adverse impacts are expected to air quality at the site.

Increases in fugitive dust (suspended particulate matter) and increases in exhaust emissions from construction activities would be unavoidable; however, these impacts would be temporary and emission levels would be relatively low. These pollutants are expected to disperse quickly; therefore, any impact would be minimal. When necessary, construction access roads would be watered down to minimize the escape of fugitive dust during high wind speeds and periods of high construction-vehicle activity. The No Development alternative would not experience any construction related air quality effects.

4.9 NOISE

Noise impacts from the development alternatives at the Corning Site are related to the magnitude of the noise levels generated by construction activities and the proximity of sensitive noise receptors. A sensitive noise receptor is commonly defined as the occupants of a facility or location where a state of quietness is a basis for use. These locations include residences, churches, and wilderness areas. Some species of protected wildlife are also considered to be sensitive noise receptors, for instance, the bald eagle.

The human response to noise is generally subjective (e.g., annoyance). Temporary increases in ambient noise levels at the Corning Site would be caused by construction activities. No adverse impacts to human sensitive receptors are anticipated because no

receptors are within close proximity of the site. The project would result in long-term benefits to noise in the area.

Noise impacts to wildlife vary depending on a species hearing ability, time of year, and physical condition. Species behavior, mating, and feeding activities can be adversely affected due to increases in noise levels. As discussed, construction activities may adversely affect bald eagles that could occur at or near the Corning Site. If bald eagles are found to nest or roost in the area the Corps would coordinate with USFWS as discussed in Section 4.4.4 Threatened and Endangered Species.

4.10 SOCIOECONOMIC RESOURCES

Impacts to socioeconomic resources would be associated with construction activities and the operation of the Corning Site as a conservation area. Impacts would be significant if the proposed project would noticeably affect the local economy, labor market, or land use.

4.10.1 POPULATION AND INCOME

Impacts from construction and implementation of the Corning Site are not expected to have any impact on population and income of the local area. Population trends and composition in the local area are not anticipated to change. An influx of some construction dollars may provide for temporary increases to the local economy. Any possible increases to the local economy, though beneficial, would be insignificant. Long-term revenue in the surrounding communities could increase from additional recreational opportunities. Due to the minimal amount of land removed from crop production, any impacts to the local agricultural economy would be insignificant.

4.10.2 RECREATION AND AESTHETICS

No adverse impacts to recreation facilities or opportunities at the Corning Site are expected. Temporary impacts to recreation opportunities could occur during construction if the Corning Site would be closed to the public for safety reasons. This could be considered inconvenient to some public users, though it would be insignificant. MDC approved recreational activities for the public at the site include hunting, fishing, nature study, wildlife viewing, photography, and hiking. These recreational activities are

expected to increase once the project is complete. Thus, long-term beneficial impacts are expected.

Visual impacts would be temporary and would occur during construction of the recommended alternative; however, no significant adverse impacts to aesthetics and the surrounding landscape are expected. Over the long-term, the visual aesthetic values of the area should improve as a result of the increased habitat and a greater diversity of features on the site and its transformation to a more natural condition. Businesses in surrounding communities could expect a slight increase in revenue over the long-term from increased recreational use of the site.

4.10.3 NAVIGATION

No adverse impacts to navigation are expected from construction and operation of the Corning Site for any of the alternatives. The U.S. Congress requires the Corps to maintain a 9 feet deep by 300 feet wide navigation channel that would not be adversely affected by the alternatives. River structure modifications are not expected to adversely impact navigation.

4.11 CUMULATIVE EFFECTS

Cumulative effects were previously addressed in the SEIS for the Mitigation Program completed in 2003. However, there are other cumulative effects not addressed in the SEIS that would result from the construction and operation of the Corning Site. These include the following:

- Regional beneficial increases in the land acreage base for fish and wildlife habitat would occur due to this and other public lands (mitigation sites, conservation areas (CA), state parks, wildlife management areas (WMA), national wildlife refuges (NWR), and state recreation areas (SRA) located in Holt and Atchison Counties, Missouri; Atchison County, Kansas; and Otoe, Nemaha, and Richardson Counties, Nebraska. These sites include, but are not limited to, Bob Brown, Brickyard Hill, Jamerson C. McCormack, Little Tarkio Prairie, Nodaway Valley, Riverbreaks, Star School Hill Prairie, and Tarkio Prairie CAs in Missouri; Aspinwall Bend CA in Nebraska; Deroin Bend, Hamburg Bend, Lower

Hamburg Bend, Monkey Mountain, Nishnabotna, Thurnau, Rush Bottom Bend, and Wolf Creek mitigation sites in Missouri; Benedictine Bottoms mitigation site in Kansas; and Hamburg Bend, Kansas Bend, and Langdon Bend mitigation sites in Nebraska. Additional public lands include Big Lake State Park, Payne Landing Access, Squaw Creek NWR in Missouri; and Brownville SRA, Indian Cave State Park, and Peru Boat Ramp WMA in Nebraska. Many of these sites are located within the Missouri River floodplain. Total acres of public lands located within the Missouri River floodplain and within Holt and Atchison Counties, Missouri are summarized in Table 4-1.

- Regional increases in fish and wildlife populations resulting from site specific habitat development activities on the land base. Increases in regional habitat quantity should positively correlate to increased fish and wildlife resources in terms of species and abundance.
- Continued regional benefits from increased flood water retention capacity on the Missouri River floodplain would provide incremental flood protection for residences and properties downstream.
- Overall beneficial increases in aquatic shallow water habitat and terrestrial bottomland forest habitat that support the Federally listed pallid sturgeon and bald eagle, respectively. State listed species could potentially benefit as well.
- Regional beneficial improvements in water quality from the creation of wetland habitats on the Corning Site and reduction in agricultural chemical use.
- Regional increases in public land availability for recreational opportunities.
- Long-term and cumulative impacts to wildlife resources are expected to be beneficial because of an increase in valued habitat types and the relative abundance of these habitats.

Table 4-1. Summary of Public Lands.

County	Land in County (ac.)	Public Land in County (ac.)	Public Land in County (%)	Floodplain in County (ac.)	Public Land in Floodplain (ac.)	Public Land in Floodplain (%)
Atchison	350,358	7,435	2	80,356	4,324	5
Holt	300,216	23,122	8	116,549	18,032	15

- Cumulative water quality impacts for all alternatives are expected to be of a long-term benefit because previously farmed lands converted to fish and wildlife habitat would no longer be exposed to the chemical applications for agricultural crop production.
- Cumulative air quality impacts for all alternatives are expected to be of a long-term benefit because suspended particulate matter from annual farming practices would be reduced.
- Cumulative noise impacts for all alternatives are expected to be of a long-term benefit because noise generated from annual farming practices would be reduced.
- No cumulative adverse impacts to cultural resources are anticipated since there is little likelihood of affecting cultural resources through the implementation of the Mitigation Program at the Corning Site.

On a more localized scale, there would be cumulative beneficial effects to fish and wildlife populations that need larger habitat areas due to the close proximity of the Indian Cave State Park which is located in Nebraska and directly across the river from the Corning Site, and the Deroin Bend mitigation site located adjacent to the Corning Site. As an example, the prothonotary warbler needs areas of bottomland forest near rivers and wetlands (Ehrlich et al. 1988) for breeding and migratory resting areas. As bottomland forest continues to develop and mature on the Corning Site, combined with this resource on the Indian Cave and Deroin Bend sites, a larger more contiguous forested area would be established. These larger tracts of contiguous habitat would potentially attract larger

numbers of the prothonotary warbler and many other neotropical migrant birds which are known to favor these larger tracts of contiguous habitat. Grassland and open field birds such as the dickcissel, eastern and western meadowlarks, and grasshopper sparrows should also benefit from native prairie grass restoration, fallowed cropland, or browse plantings (such as clover or alfalfa) on both the Corning and Deroin Bend Sites. Another example of more localized benefits from the two sites would be increased feeding and resting areas for migrating waterfowl such as the mallard or other duck species, which have large home range requirements. Over the long-term, as bottomland forest areas develop and mature to later successional stages, there should be an increase in the use of this resource by native bats for roosting and maternal colonies on both the Corning and Deroin Bend Sites. Local fisheries resources should benefit from the shallow water habitat work that would likely be constructed on the Corning Site coupled with the shallow water habitat work already completed on the Deroin Bend Site. The Thurnau Site, which is within five miles of the Corning Site, would provide the same beneficial effects.

4.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments due to construction and operation of the Corning Site include expenditure of Federal funds, labor, energy, and construction materials used to plan, design, construct, and monitor the project. Some soils would be lost as a result of the development alternatives.

4.13 FUTURE WITHOUT-PROJECT CONDITION

Without construction and operation of the Corning Site, the site would continue to provide terrestrial and limited aquatic and wetland habitat. MDC would continue to manage the mitigation site as a conservation area primarily for terrestrial species, although natural development of terrestrial habitat would be a slow process. The establishment and success of wetlands would be marginal. By taking no action, the mitigation of the aquatic and wetland habitats lost over the years due to the BSNP would occur to a much lesser degree.

4.14 ENVIRONMENTAL COMPLIANCE

This section summarizes the statutory and regulatory environmental compliance requirements and discusses the major Federal and state permits and clearances that would be required for the approval and implementation process for the Corning Site. The applicability and status of these environmental requirements is presented in Table 4-2 and a discussion of the most important requirements follows.

4.14.1 ENVIRONMENTAL POLICY

The Corps is preparing a PIR for each mitigation site. The PIR would document the planning for the mitigation site and would provide the information needed to ensure compliance with respect to environmental considerations.

Federal agencies use NEPA [42 USC 4321 et seq.] to evaluate the environmental impacts of a proposed project. Through the NEPA process, public officials and citizens are given opportunity to be involved in the environmental review and receive information about environmental impacts before any decisions are made on Federal actions regarding the proposed projects. This PIR is intended to serve as the documentation necessary to incorporate the NEPA process into the Mitigation Program planning and implementation. If no significant impacts are determined, a Finding of No Significant Impact (FONSI) would be prepared and NEPA compliance would be fulfilled.

4.14.2 WATER RESOURCES

Federal limits on the amounts of specific pollutants that could be discharged to surface waters in order to restore and maintain the chemical, physical, and biological integrity of the water are governed by CWA [33 USC 1251 et seq., as amended], National Pollutant Discharge Elimination System (NPDES).

Discharge of stormwater resulting from construction activities that would disturb more than one acre of surface area requires an NPDES permit under Section 402 of the CWA. The MDNR authorizes NPDES permits in the state of Missouri. A stormwater permit

**Table 4-2: Compliance of Preferred Alternative with Environmental Protection
Statutes and Other Environmental Requirements**

Federal Environmental Requirements	Applicability	Status^{a, b, c, d}
Archeological Resources Protection Act, 16 U.S.C. 470, et. seq.	Applicable	Partial Compliance ^b
Clean Air Act, as amended, 42 U.S.C. 7401-7671g, et. seq.	Applicable	Full Compliance ^a
Clean Water Act (Federal Water Pollution Control Act),	Applicable	Partial Compliance
Coastal Zone Management Act, 16 U.S.C. 1451, et. seq.	Not Applicable ^d	Not Applicable
Endangered Species Act, 16 U.S.C. 1531, et. seq.	Applicable	Partial Compliance
Estuary Protection Act, 16 U.S.C. 1221, et. seq.	Not Applicable	Not Applicable
Federal Water Project Recreation Act, 16 U.S.C. 4601-12, et. seq.	Applicable	Full Compliance
Fish and Wildlife Coordination Act, 16 U.S.C. 661, et. seq.	Applicable	Partial Compliance
Land and Water Conservation Fund Act, 16 U.S.C. 4601-4, et. seq.	Not Applicable	Not Applicable
Marine Protection Research and Sanctuary Act, 33 U.S.C. 1401, et. seq.	Not Applicable	Not Applicable
National Environmental Policy Act, 42 U.S.C. 4321, et. seq.	Applicable	Partial Compliance
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470a, et. seq.	Applicable	Partial Compliance
Rivers and Harbors Act, 33 U.S.C. 403, et. seq.	Applicable	Partial Compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et. seq.	Not Applicable	Not Applicable
Wild and Scenic River Act, 16 U.S.C. 1271, et. seq.	Not Applicable	Not Applicable
Farmland Protection Policy Act, 7 U.S.C. 4201, et. seq.	Applicable	Full Compliance
Protection & Enhancement of the Cultural Environment (Executive Order 11593)	Applicable	Partial Compliance
Floodplain Management (Executive Order 11988)	Applicable	Full Compliance
Protection of Wetlands (Executive Order 11990)	Applicable	Full Compliance
Environmental Justice (Executive Order 12898)	Applicable	Full Compliance

NOTES:

- a. Full Compliance. Having met all requirements of the statute for the current stage of planning (either pre-authorization or post-authorization)
- b. Partial compliance. Not having met some of the requirements in the current stage of planning.
- c. Noncompliance. Violation of a requirement of the statute.
- d. Not applicable. No requirements for the statute required; compliance for the current stage of planning.

under Missouri's general permit for land disturbance will be submitted for the Corning Site which would include preparation of a pollution prevention plan. The plan would address practices and measures required to control and reduce the amount of pollutants in stormwater runoff (Appendix F).

Regulatory requirements for a permit system governing the placement of dredged or fill material into waters of the United States are also mandated by CWA under Section 404. The Corps authorizes this permit. The Section 404(b)(1) Evaluation (40 CFR 23) is included in Appendix G. The proposed project would likely fall within the parameters of a nationwide permit number (NWP) 27 for stream and wetland restoration activities. NWP 27 also covers those activities that would obstruct or alter a navigable water (Missouri River) by affecting the course, location, or capacity of the water as defined under Section 10 of the *Rivers and Harbors Act of 1899* [33 USC 403].

Section 401 of the CWA requires state agencies to certify that a project requiring a Federal permit to discharge complies with specific provision of the CWA. The state of Missouri has issued water quality certification for wetland restoration activities under nationwide permit number 27.

4.14.3 BIOLOGICAL RESOURCES

Federal agencies are required to determine the effects of their actions on Federally listed endangered or threatened species and their critical habitats under ESA [16 USC 1531 et seq.]. Steps must be taken by the Federal agency to conserve and protect these species and their habitat, and to avoid or mitigate any potentially adverse impacts resulting from the implementation of the proposed project.

The *Fish and Wildlife Coordination Act* (16 U.S.C. 661, et seq.) provides the basic authority for USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It also requires that Federal agencies that construct, license or permit water resource development projects must first consult with USFWS (and the National Marine Fisheries Service in some instances) and state fish and wildlife agency regarding the impacts on fish and wildlife

resources and measures to mitigate these impacts. Full consideration is to be given to USFWS recommendations.

The preparation of a biological assessment (Appendix E) is required under ESA to evaluate if a major construction activity is likely to adversely affect a listed species or its habitat. The assessment is used to determine if formal consultation between the Federal agency and the USFWS would be required. Formal consultation would not be required for the proposed project as adverse impacts to listed species or their habitats are not anticipated.

4.14.4 CULTURAL RESOURCES

Section 106 of NHPA of 1966 (amended June 17, 1999) requires Federal agencies to take into account the effects of their undertakings on historic properties. By definition, historic properties are properties eligible for or listed on the NRHP. Federal undertakings refer to any Federal involvement including funding, permitting, licensing, or approval. Federal agencies are required to define and document the APE for undertakings. The APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.

The Advisory Council on Historic Preservation (ACHP) issues regulations that implement Section 106 of NHPA at 36 CFR Part 800, Protection of the Historic Properties. Section 106 sets up the review process whereby a Federal agency consults with the SHPO, Native American tribes, and other interested parties including the public to identify, evaluate, assess effects, and mitigate adverse impacts on any historic properties affected by their undertaking. The PIR will be provided to the Missouri State Historic Preservation Officer and appropriate Federally recognized Native American Tribes for comment in accordance with Section 106 of the NHPA during the public comment period.

4.14.5 LAND USE (PRIME FARMLANDS)

The *Farmland Protection Act* [7 CFR 658] minimizes the extent to which Federal actions contribute to the unnecessary conversion of prime farmlands to nonagricultural use. The NRCS takes steps to ensure that prime farmlands lost to development are documented

and provided to congress in a yearly report. After coordination with the NRCS (Appendix A) it was determined that there would be no irreversible impacts to prime farmland as a result of habitat development at the Corning Site.

4.14.6 AIR QUALITY

The Federal policy to protect and enhance the quality of the air to protect human health and the environment is established under the *Clean Air Act* [42 USC 7401 et seq., as amended]. Impacts to air quality are considered to be insignificant. Therefore, no additional actions would be required for full compliance.

Chapter 5

Other Considerations

5.1 INTRODUCTION

The recommended alternative for the Corning Site includes various activities, previously described, to develop fish and wildlife habitat. Management of the site currently includes native warm season grass and forbs plantings, limited tree plantings and reestablishment of the riparian corridor, establishment of cover crops (clover), and noxious weed control. This section describes the monitoring and evaluation plan, operations and maintenance plan, real estate considerations, implementation responsibilities and views, cost estimate, schedule, and conclusions and recommendations for the Corning Site's recommended alternative.

5.2 MONITORING AND EVALUATION (M&E) PLAN

The purpose of the site M&E plan is to establish goals for monitoring and evaluating and to guide the pre- and post-construction collection of physical and biological information. This information would be used to evaluate any changes or improvements to the Corning Site and as a tool to measure the success of the proposed project in helping to achieve the goals of the overall Mitigation Program. Information obtained could also be used to compare the Corning Site to the success of past and future mitigation sites.

The M&E Committee appointed by the ACT was established to develop an M&E plan for the Mitigation Program. This committee included representatives from the Corps, USFWS, IDNR, KDWP, MDC, and NGPC. A draft of the M&E Plan has been completed. The goal of the M&E plan is to understand the physical and biological responses to Mitigation Program actions within an adaptive management context. The objectives of

the M&E plan include the following:

- Track location, type, and physical characteristics of each mitigation site
- Quantify habitat use and population responses of key species
- Recommend program adaptations based on new information
- Gain understanding of the physical and biological responses through time
- Formalize information transfer among all to communicate lessons-learned and increase the effectiveness of project actions.

Because of the Mitigation Program's significant financial investment, it is important to learn how constructed mitigation sites are performing and apply adaptive management, as needed, on existing and future sites to maximize habitat potential. This information will help determine the level of success and provide a basis for future adaptive management. By monitoring the mitigation sites and collecting basic habitat data, the ACT can determine whether the mitigation sites are performing as expected. Utilizing information obtained through the monitoring of sites will enable decision makers to recommend improvements to existing sites and make more informed decisions about planning and design of future sites. The M&E committee has agreed to a three-tiered M&E program. Tier 1 will gather data on the physical aspects of the mitigation sites, Tier 2 will document the project's biologic response, and Tier 3 activities will include focused research to test a specific hypothesis.

Tier 1 data is limited to physical data on mitigation sites. The physical data will include habitat delineations, cross sections, hydrographs, etc. Habitats will be classified using the National Wetland Inventory (NWI) and the National Land Cover Data (NLCD) classification system. Aquatic and wetland habitats will be classified using the NWI and all upland habitats will be classified using the NLCD system. The existing baseline habitat conditions will be documented for each mitigation site to establish the baseline habitats that existed prior to acquisition by the Mitigation Program. This data will be established and maintained by the Corps as a Geographic Information Systems (GIS) land cover data layer. Tier 1 efforts will be performed by the Corps or its contractors. In general, the baseline condition of new sites will be documented during site-specific design activities and NEPA compliance.

Tier 2 activities will utilize standardized protocol, as approved by the M&E committee, to monitor the biologic response at select mitigation sites. The committee has established native riverine fish species as being the highest priority for monitoring followed by birds,

reptiles, and amphibians. This monitoring may also track changes in both quality and quantity of a species' preferred habitat. Tier 2 activities may characterize the habitat in greater detail using the NWI and NLCD systems, as appropriate. This additional data on habitat will be added to the GIS land cover data layer maintained by the Corps. These monitoring activities will be completed by the mitigation site's land managing agency and funded through the site's annual management plan. MDC is the land managing agency for the Corning Site. Each land managing agency will decide how to conduct these activities (i.e. in-house labor, contract, academic institution, etc.). Monitoring results will be reported in annual progress reports and final reports. Tier 2 monitoring data will also be summarized and presented in the Annual Implementation Report. The M&E committee will meet annually to review all on-going monitoring activities and decide on future activities based on available appropriations.

Specific research activities will be Tier 3 activities and will test a specific hypothesis relevant to the Mitigation Program. These activities may include more rigorous research techniques and sampling protocol. As with Tier 2 monitoring, these research projects will be completed by the mitigation site's land managing agency and funded through the site's annual management plan. For Tier 3 research, the land managing agency will also decide how to conduct these activities (i.e. as in-house labor, contract, academic institution, etc.). Research results will be reported in annual progress reports and final reports. The M&E committee will meet annually to review all on-going monitoring activities and decide on future activities based on available appropriations. Tier 3 research will receive lower priority for funding than Tier 1 or Tier 2 monitoring activities.

Monitoring efforts may reveal the need for adaptive management at the Corning Site. As an example, adaptive management efforts might become necessary on the site if drought conditions persist or flooding results in damage to project features or vegetative plantings. Additionally, the biotic response of the habitat development measures, results of the M&E plan, changing site conditions and opportunities to focus on achieving the maximum restoration benefits possible at each site may also require changes to the site through adaptive management. If any re-work is needed to restore the area, it would be paid for with Construction General funds. If the re-work was considered a major change to the recommended alternative identified in this PIR, an amended PIR would be prepared.

The M&E committee established two subcommittees to develop the program's mitigation efforts. These protocols are "living" documents that may be modified to better facilitate future monitoring activities, as needed (i.e. improved sampling methods, additional informational needs, etc.). A team of biologists, representative of the four state fish and game agencies and Federal agencies affiliated with various Missouri River projects, including pallid sturgeon projects, provided the framework for these plans and protocols. These biologists provided knowledge and experience regarding the fish and bird communities of the Missouri River ecosystem, including the pallid sturgeon. The fish monitoring protocol includes standard operating procedures for fishery sampling gears, sampling segments, sampling strategies, sampling experimental design, and collection of micro-habitat characteristic data.

Standardized protocols for monitoring of fish and avian response are included as an appendix to the M&E Plan that has been prepared by the M&E Committee. The M&E Plan also includes guidance on schedule, funding, quality control, acquisition strategy, and communications regarding M&E activities for the Mitigation Program. The M&E Plan and appendices will be made available on the Mitigation Program website (<http://www.nwk.usace.army.mil/projects/mitigation/>).

5.3 OPERATIONS AND MAINTENANCE (O&M) PLAN

The MDC would operate and maintain the Corning Site for fish and wildlife purposes through a Cooperative Agreement with the Corps that was finalized in 2003. The Corps would maintain any shallow water habitat constructed on the site or in the Missouri River, while all other O&M activities would be the responsibility of MDC.

O&M activities at the Corning Site would include the operation of water control structures to enhance wetlands at the site, maintenance of developed habitats, establishment of food plots, and additional management activities at the site. Garlic mustard (*Alliaria petiolata*) and purple loosestrife (*Lythrum salicaria*) were identified as potential exotic/invasive species with potential to occur at the Corning Site by MDC (Appendix A). O&M activities at the Corning Site should include measures to control these species. Appendix B includes the Vegetation Management Guidelines prepared by MDC for these species. These guidelines include control recommendations for the species and should be consulted during O&M.

MDC will submit an Annual Management Plan to the Corps for approval. The Kansas City District would negotiate the costs of implementing the Annual Management Plan with MDC prior to each Federal fiscal year. Individual management and maintenance features required at the Corning Site would be described in the plan. The Corps would be responsible for all costs required to implement the approved Annual Management Plan by MDC. The MDC would be reimbursed for all costs in accordance with the Cooperative Agreement.

The Corps will prepare an O&M Manual for the Corning Site. It is anticipated that MDC will conduct certain aspects of O&M as part of its normal management activities at the Corning Site. These final arrangements would be outlined in the O&M Manual.

5.4 REAL ESTATE CONSIDERATIONS

The Corning Site is currently owned by the Corps. The lands were purchased from willing sellers during a period from 2000 to 2002. The MDC currently manages the site under a Cooperative Agreement with the Corps and would continue to do so upon completion of the project. The relationship, arrangements, and general procedures that the Corps and MDC would follow in operating, maintaining, repairing, and rehabilitating the project features are defined within the Cooperative Agreement.

The north area contains land (743.30 acres) under WRP easement with the NRCS. Project activities must be compliant with the terms of the WRP easement.

Additional lands may be acquired at the Corning Site, especially the inholdings separating the two areas. These additional lands are not required for project development as described in this PIR. If acquired, these lands would be managed as part of the Corning Site. Additional acquisitions would also be to improve access to the site for management and public use.

5.5 IMPLEMENTATION RESPONSIBILITIES

The Corps is responsible for study management and coordination with USFWS, MDC, and other affected/interested agencies. The Corps will prepare and submit the subject PIR and complete all environmental review and coordination requirements. The Corps will then prepare any design plans that may be required, finalize any plans and specifications, prepare and implement a monitoring and evaluation plan, advertise and award a construction contract, perform construction contract supervision and

administration, develop an O&M manual, ensure O&M is carried out in accordance with the O&M manual, and develop and implement the real estate agreement and O&M agreement. The Corps will maintain river structures, altered or otherwise, for all project purposes including fisheries and navigation. In the event of flood damages to the project, the Corps will evaluate and complete the work necessary to reestablish project features.

The MDC is responsible for management of the project features and the Corning Site and for any other activities outlined as MDC responsibility in any O&M agreements.

The ACT meets quarterly to discuss the status of the Mitigation Program. As part of the meetings, an O&M update is given at which time the ACT ensures that site O&M is appropriate and reasonable.

5.6 COST ESTIMATE

The total estimated cost of the Corning Site includes: future acquisitions⁹, planning and design, construction, O&M during construction, and S&A totaling \$1,500,000 (Table 5-1; Corps 2005). This total cost would be adjusted based on whether additional lands are acquired as part of the site.

The Corning Site would be Federally funded in its entirety. If Federal funds are not available to accomplish general operations, management and maintenance at the site, such work could be deferred or not accomplished. Additionally, the dynamics of the Missouri River adjacent to the site could deem a deferment or “no action” decision about operations, management and maintenance at the site. If the Corning Site would remain 1,887 acres in size, annual O&M costs are estimated at \$40,000 (Corps 2005). The cost estimate would be updated throughout the life of the project as project features are further defined.

⁹ While additional acquisitions are not necessary to complete the project, these estimated costs are included for informational purposes.

Table 5-1. Cost Estimate for the Corning Mitigation Site.

Activity	Cost
Future Acquisitions	\$500,000
Planning & Design	300,000
Construction	500,000
O&M During Construction	150,000
S&A	50,000
Total	\$1,500,000

Source: Corps, Corning Site Mitigation Plan, June 2005

5.7 SCHEDULE

Table 5-2. Corning Mitigation Site Project Schedule

Milestone	Scheduled	Actual
Real Estate DM Submitted		4/2000
Real Estate DM Approved		4/2000
Current Real Estate Acquisition Initiated		2000
Current Real Estate Acquisition Completed		2002
Future Acquisitions	Not Scheduled	
Cooperative Agreement Signed		4/2003
Habitat Restoration Plan (Fact Sheet) Approved		6/2005
PIR Started		7/2005
PIR Approved	2006	
Plans & Specifications Started	Not Scheduled	
Plans & Specification Reviewed	Not Scheduled	
Plans & Specification Approved	Not Scheduled	
Construction Contract Advertised	Not Scheduled	
Construction Contract Awarded	Not Scheduled	
Construction Contract Completed	Not Scheduled	

5.8 CONCLUSIONS AND RECOMMENDATIONS

The habitat development at the Corning Site has been identified as a priority project for inclusion into the Missouri River Fish and Wildlife Mitigation Program. The MDC and ACT concur. The value of the area as fish and wildlife habitat prior to acquisition was minimal due to the majority of the area being in agricultural use. Development at the

Corning Site would restore shallow water habitat, wetlands, prairie, and bottomland forest. These activities would greatly enhance the site's value as fish and wildlife habitat.

It is recommended that the Full Development alternative be constructed as described in this PIR and operated by MDC in accordance with their Cooperative Agreement with the Corps. The Full Development alternative would result in the greatest beneficial impacts to fish and wildlife habitat and would not significantly adversely affect the human environment.

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